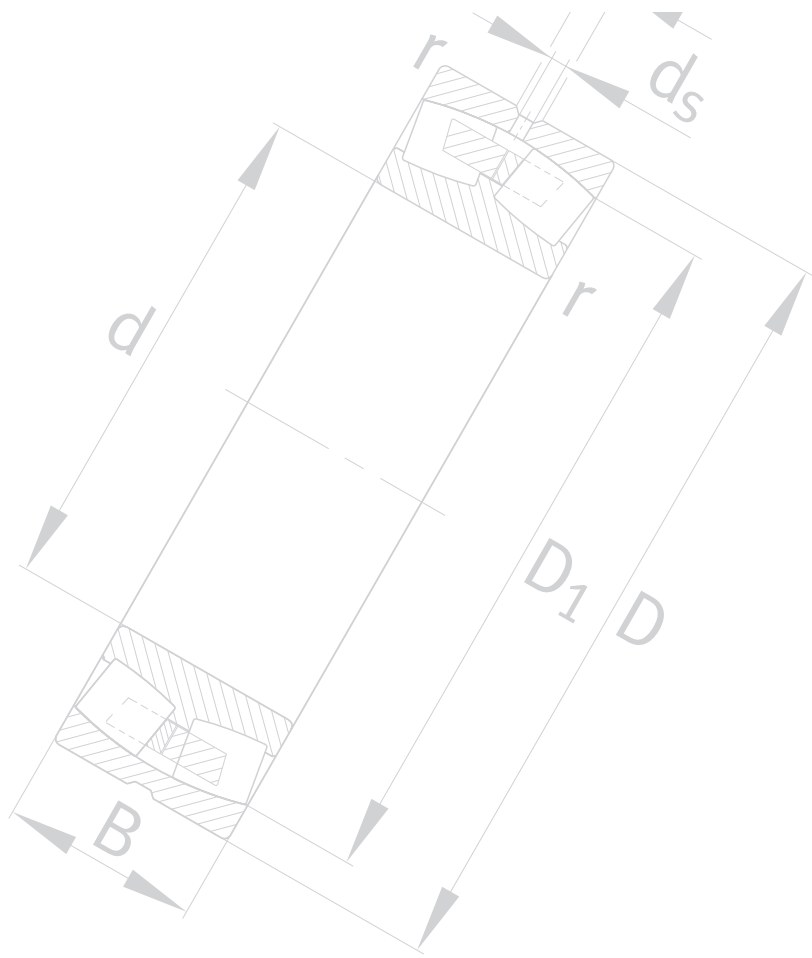




Rolling bearings

- Ball bearings
- Roller bearings
- Needle roller bearings
- Track rollers
- Bearings for screw drives
- Insert bearings/housing units
- Bearing housings
- Accessories



Rolling bearings

Ball bearings

Roller bearings

Needle roller bearings

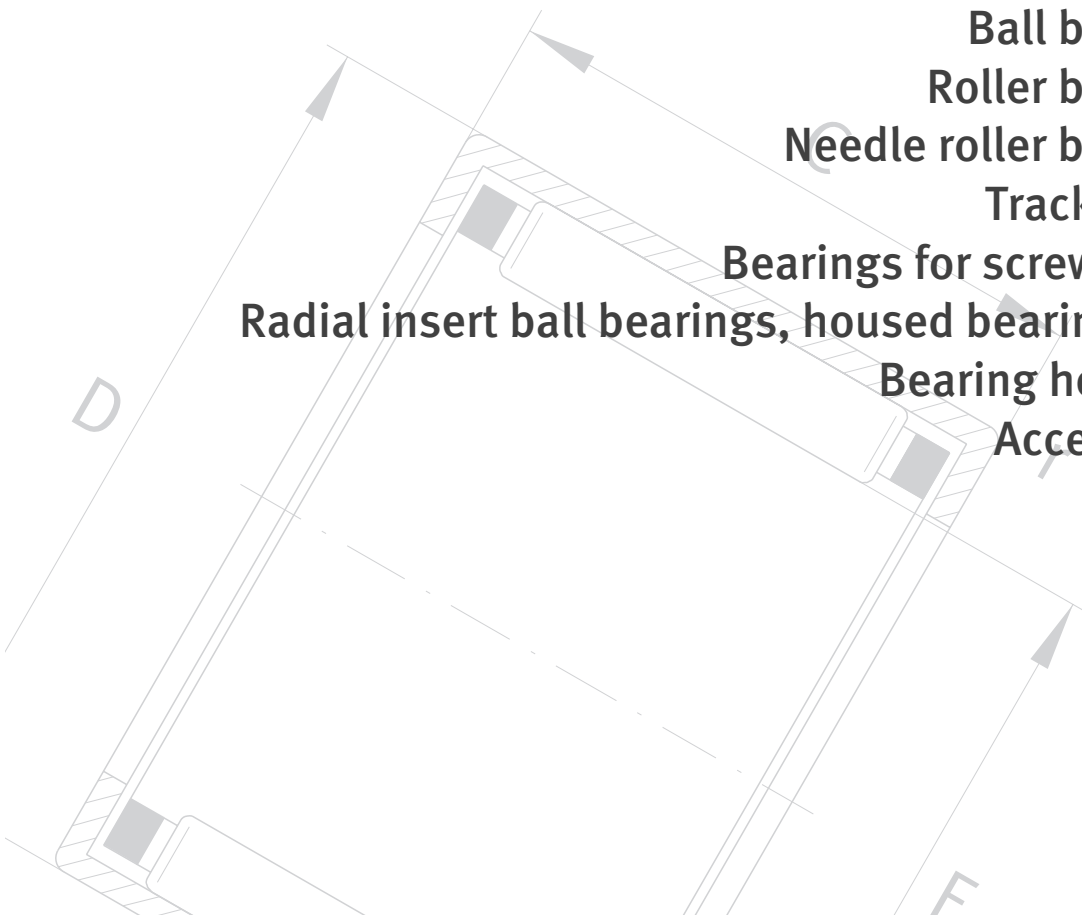
Track rollers

Bearings for screw drives

Radial insert ball bearings, housed bearing units

Bearing housings

Accessories



Every care has been taken to ensure the correctness of the information contained in this publication but no liability can be assumed for any incorrect or incomplete data. We reserve the right to make modifications in the interests of technical progress.

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Foreword

Schaeffler Group Industrial is a leading worldwide supplier of rolling bearings, spherical plain bearings, plain bearings, linear products, accessories specific to bearings and comprehensive maintenance products and services. It has approximately 40 000 catalogue products manufactured as standard, providing an extremely wide portfolio that gives secure coverage of applications from all 60 designated industrial market sectors.

The central factors responsible for this success are our outstanding strength in innovation, our global focus on local customer proximity, highly developed manufacturing methods, extremely high quality standards in all processes and our ability to transform specific customer requirements quickly and accurately into cost-effective solutions. Against this background of expertise, knowledge and experience together with our wide range of catalogue items, we see ourselves as a high performance, customer focussed partner in the development, manufacture and delivery of products.

Research and Development

As a company looking to the future, we are especially active in the field of research and development. The key areas in this respect include not only research into fundamental principles, materials technology, tribology and calculation but also extensive inspection and test methods as well as activities to optimise manufacturing technology. This is oriented towards ensuring the continuous development, improvement and application of our products in the long term.

We carry out research and development on a global basis. Our development centres are linked with each other worldwide and are thus in a position to exchange current information on a very short timescale as well as access and communicate the most recent data. This ensures that a uniform level of knowledge and information is available worldwide.

In addition to continued development of standard products, we work closely in research and development activities with our customers where specific customer solutions are required. They can thus benefit from the best product for their application, with the maximum possible performance capacity at a cost-effective price.

Manufacturing technologies, quality inspections, environmental protection

“Zero defects” is our quality objective. We have matched all our processes to this target. In addition, our many years of experience in forming of sheet metal and heavier section material, in vertical and horizontal forging, heat treatment, surface technologies, grinding, honing and assembly ensures that our products fulfil the required quality level.

Ongoing quality inspections are a defined component of the manufacturing process. These are integrated directly as a feedback function in the manufacturing process. This ensures that all products continuously fulfil the same high standard of quality.

We have a highly effective quality management system, and the quality of our products and processes is confirmed by certification; for example, all manufacturing facilities comply with DIN-EN ISO 9001:2000 and ISO/TS 16 949:2002.

With the validation and certification of our manufacturing sites, we are taking a pioneering role in environmental protection. All larger manufacturing sites are certified not only to ISO 14001, but are also validated in accordance with the more stringent EC ECO Management and Audit Scheme (EMAS).

Foreword

Worldwide presence

Through a closely knit network of development and manufacturing sites, sales companies and an international distribution structure, we are represented throughout the world. This global presence ensures effective linkage between the major markets in Europe, India, South East Asia/Pacific Region, East Asia, North and South America.

As a result, we have an on-site presence with service and technical advice in close proximity to the customer. We take orders from throughout the world and make deliveries worldwide too. Our distribution network generally has stock of the catalogue products relevant to the appropriate markets and company locations and can therefore make deliveries within a very short timescale.

Furthermore, we support our customers worldwide in resolving their bearing arrangement requirements, respond to technical queries and develop specific bearing arrangement solutions in local partnership with our customers.

The new rolling bearing catalogue – a technical compendium

As an interface between product, complex rolling bearing technology and our customers, we can offer not only personal consultations by our external sales and application engineering functions, but also our technical catalogues in electronic form and as paper copy.

Everything in one place

By combining numerous individual catalogues in one overall catalogue, we have now concentrated the majority of our rotary bearing range in a single printed volume. Even more strongly than before, this bundles together our technical knowledge and our advisory expertise, for your benefit. In one publication, you can now find the required INA and FAG products, both quickly and securely.

The catalogue describes the rolling bearings in accordance with DIN/ISO that are required for original equipment manufacture, distribution and the aftermarket, specific rolling bearing accessories and further rolling bearing types and design variants.

It is a completely new creation and is significantly different, in format as well, from all previous publications from Schaeffler Group Industrial.

Find it, select it, fit it

This catalogue constitutes a fundamental tool for information and advice that will assist you on all issues relating to rolling bearing technology. It will show you which products you may be able to use, what you need to consider when designing the bearing arrangement, which tolerances are suitable for the adjacent construction and how you can achieve the most effective sealing of your bearing arrangement. It will also tell you how to calculate the rating life of the bearings, what temperatures and loads can be supported, which lubricants are most suitable for the bearing arrangement and how you should carry out maintenance at the correct times. Of course it also describes the correct way to install the products. Last but not least, this catalogue also promotes dialogue between you and us.

Valid for... The catalogue supersedes the following publications:

- INA Catalogue 307, Needle Roller Bearings, Cylindrical Roller Bearings
- INA Catalogue 520, Radial Insert Ball Bearings, Housed Bearing Units
- INA Catalogue 901, High Precision Deep Groove Ball Bearings, Angular Contact Ball Bearings
- FAG Catalogue WL 41 520/3 E, Rolling Bearings
- INA publication LFR, Track Rollers
- INA publication GKL, Precision Bearings For Combined Loads
- INA publication ZAE, Bearings For Screw Drives.

The data in the catalogue represent the current level of knowledge as of January 2006. They reflect not only progress in recent years but also practical experience. Data in earlier catalogues and publications that do not correspond to the data in this catalogue are therefore invalid.

Significant innovations In addition to the layout with its didactic structure and its user and application focus, there is also a range of technical innovations in the catalogue that are described below.

Technical principles

- Unified life calculation methods; notably calculation of minimum load and axial load capacity of FAG cylindrical roller bearings
- Unified calculation of fatigue limit load C_u
- Uniform life calculation for ball bearings in accordance with ISO
- Calculation of friction values for FAG bearings
- Standard for reference speed n_B from DIN 732 to ISO 15 312
- Formula symbols matched to relevant standards.

Lubrication

- Detailed operating temperature data for greases
- New overview of greases in use
- New method for calculating the grease operating life/relubrication interval
- New diagram for estimating the required oil quantities
- New diagram relating to the oil change interval
- Arcanol rolling bearing greases.

Products

- New prefixes, designations and suffixes for all products, with harmonisation of the brands; see New product designations
- Needle roller bearings, cylindrical roller bearings, single row angular contact ball bearings and spherical roller bearings in X-life quality; see X-life
- Spindle bearings: standard bearings with ceramic balls (HCB)
- High precision cylindrical roller bearings: expanded data on shaft and housing tolerances
- Spherical roller bearings: design E1 in place of E and axial load carrying capacity
- Housings: new seals DHV and TCV, additional inch sizes in series SNV
- Expanded range of housing series S30 and SD31.

Foreword

New product designations

In this catalogue, the designation system of the two brands has been harmonised. With this adaptation, we have also created a single, common standard for our customers.

The designations are now simpler and the codes are thus more transparent. For example, in some designs the seals for track rollers have been matched to those for our ball bearings and the P type seals have been replaced by radially preloaded seals. The suffix has therefore changed from PP to 2RSR and describes the radial preload of the contact seals on both sides.

The new prefixes, designations and suffixes are published for the first time in this catalogue. Orders submitted using the old system will of course continue to be processed very rapidly and to your full satisfaction.

X-life – maximum customer benefit through excellent product quality

X-life is the premium brand of Schaeffler Group Industrial. It brings together the strengths of the two brands and opens up completely new design opportunities for design engineers. X-life is an all-encompassing concept: advice, product development, service and sales are fully integrated with each other in all phases of the product cycle. As a service surround system, it includes a comprehensive lubrication concept. X-life stands for continuous quality improvement and local customer focus applied worldwide.

Advantages of the X-life grade

The use of state of the art manufacturing technologies has resulted in a better, more uniform surface over the whole contact face between the rolling elements and raceway. As a result, under identical load there is a significant reduction in the stress conditions present on the rolling elements and raceway. The improved surface quality gives reduced friction and lower bearing temperatures, running resistance is lower and less strain is placed on the lubricant.

Thanks to such improvements, the basic dynamic load ratings are significantly higher than those of the previous design. As a result, the basic rating life is higher; i.e. the operating life of the bearings is considerably longer under the same operating conditions. Alternatively, higher loads can be applied while maintaining the same life values.

With their optimised characteristics, X-life bearings open up completely new application prospects, such as downsizing of the bearing arrangement. Furthermore, the improved price/performance ratio ultimately increases the overall cost-effectiveness of the bearing arrangement.

X-life bearings are described in the sections on product features and are indicated in the dimension tables by the symbol XL.

Product ranges for specific market sectors

Special product ranges are available for specific market sectors. In addition to standard products, these include a large number of special solutions. The range extends from simple, application-specific bearings via complete, ready-to-fit systems to special solutions that can be used to fulfil the most complex bearing technology requirements with high functional security and cost-effectiveness.

Contact our External Sales at the earliest possible stage and benefit from the broad knowledge and considerable experience of these specialists for your project.

**medias[®] professional –
the electronic
information system**

medias[®] professional, the proven selection and information system, contains the INA/FAG catalogue products in electronic format. As with the printed catalogue, this gives our customers product information on both brands in a single data source. This saves time and gives easier handling.

medias[®] is available online and on CD in several languages, is easy to navigate and is particularly clear thanks to the use of numerous pictures, diagrams and models. There are also highly representative application examples, classified by market sector.

Datasheets on the bearing series can be generated as PDF files. It includes a lubricant database and also the web2CAD link for direct download and inclusion of 3D models.

medias[®] focusses on the individual bearing. The complete shaft can be simulated and any influences arising from its deformation on the bearings can be determined using the calculation program BEARINX[®]. This program can also be made available to direct customers as BEARINX[®]-Online via the Internet (for conditions, see the INA/FAG homepage).

In conclusion, **medias[®] professional** is a comprehensive, reliable system to help you help yourself answer many questions on rolling bearing technology by electronic means, quickly and at any location.

Other technical publications

This main catalogue HR1 has approximately 1500 pages and contains a large proportion of the core rotary range of the brands INA and FAG. Nevertheless, we develop and manufacture many other products and systems of interest in terms of technical progress and cost-effectiveness for rotary and linear bearing arrangements as well as for the automotive sector. These are covered in separate, product-specific technical publications that can be obtained upon request.

**INA and FAG –
the brands for you when it
comes to motion and advice**

The new catalogue stands for pioneering bearing technology, application-focussed advice, the highest product and performance density and continuous development.

The benefits to you:

- Selection of products from a vast product range
- Maximum benefit, since the most suitable product is used in the right place
- Worldwide product availability
- Short delivery times
- Long term supply capability
- Security of planning for the long view
- Simplified stockholding
- Market-competitive prices
- Global service
- Comprehensive, application-focussed advice.

Together we move the world

For us, technical progress means never standing still. In partnership with you, we are continually working on new solutions so that your vision and our technical ideas can continue to become a reality, to your benefit. With our products and our knowledge, we can together continue to fulfil the challenges of your market in relation to rolling bearing arrangements. To this end, this catalogue is an important instrument.

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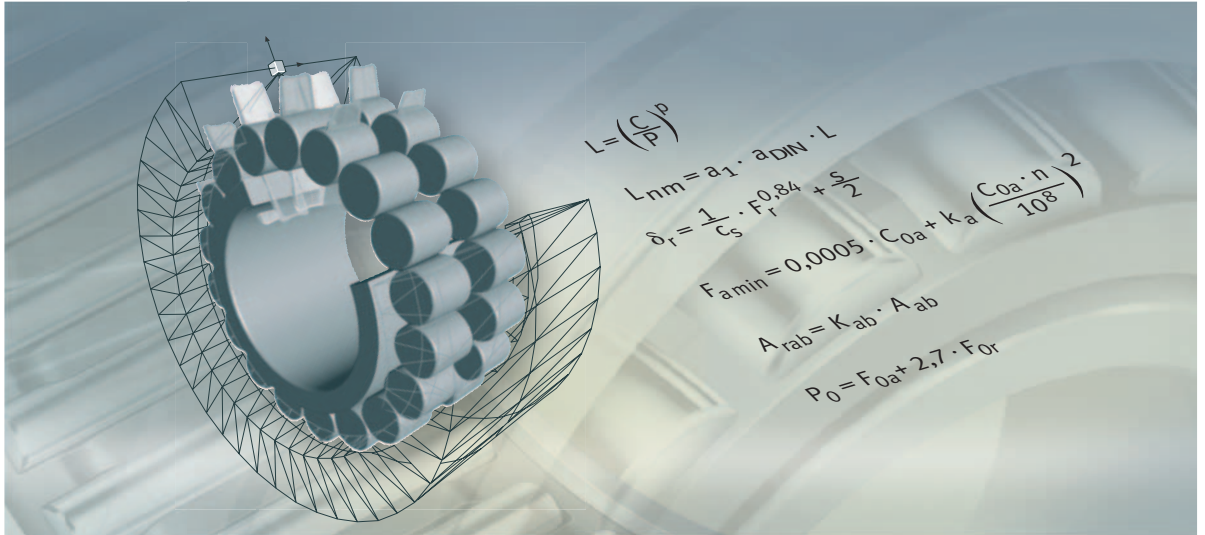
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Technical principles

- Load carrying capacity and life
- Rigidity
- Friction and increases in temperature
- Speeds
- Lubrication
- Bearing data
- Design of bearing arrangements
- Fitting and dismantling

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Load carrying capacity and life

Schaeffler KG introduced the “Expanded calculation of the adjusted rating life” in 1997. This method is standardised in accordance with DIN ISO 281, Appendix 1. The method will be incorporated in the next version of the international standard ISO 281.

Fatigue theory as a principle

The basis of the rating life calculation in accordance with ISO 281 is Lundberg and Palmgren’s fatigue theory which always gives a final rating life.

However, modern, high quality bearings can exceed by a considerable margin the values calculated in accordance with ISO 281 under favourable operating conditions. Ioannides and Harris have developed a further model of fatigue in rolling contact that expands on the Lundberg/Palmgren theory and gives a better description of the performance capability of modern bearings.

The method “Expanded calculation of the adjusted rating life” takes account of the following influences:

- the bearing load
- the fatigue limit of the material
- the extent to which the surfaces are separated by the lubricant
- the cleanliness in the lubrication gap
- additives in the lubricant
- the internal load distribution and frictional conditions in the bearing.

Caution! The influencing factors, especially those relating to contamination, are extremely complex. A great deal of experience is essential for an accurate assessment. For further advice, we recommend that you consult the engineering service of Schaeffler Group Industrial. The tables and diagrams can give only guide values.

Dynamic load carrying capacity and life

The required size of a rolling bearing is dependent on the demands made on its:

- load carrying capacity
- rating life
- operational reliability.

The dynamic load carrying capacity is described in terms of the basic dynamic load ratings. The basic dynamic load ratings are based on DIN ISO 281.

The basic dynamic load ratings for rolling bearings are matched to contemporary performance standards and those published in previous FAG and INA catalogues.

The fatigue behaviour of the material determines the dynamic load carrying capacity of the rolling bearing.

The dynamic load carrying capacity is described in terms of the basic dynamic load rating and the basic rating life.

The rating life as a fatigue period depends on:

- the load
- the operating speed
- the statistical probability of the first appearance of failure.

The basic dynamic load rating C applies to rotating rolling bearings. It is:

- a constant radial load C_r for radial bearings
- a constant, concentrically acting axial load C_a for axial bearings.

The basic dynamic load rating C is that load of constant magnitude and direction which a sufficiently large number of apparently identical bearings can endure for a basic rating life of one million revolutions.

Load carrying capacity and life

Calculation of the rating life

The methods for calculating the rating life are:

- the basic rating life to DIN ISO 281, page 34
- the adjusted rating life to DIN ISO 281, page 35
- the expanded adjusted rating life to DIN ISO 281, Appendix 1, page 38.

Basic rating life

The basic rating life L and L_h is determined using the following formulae:

$$L = \left(\frac{C}{P} \right)^p$$

$$L_h = \frac{16666}{n} \cdot \left(\frac{C}{P} \right)^p$$

L 10^6 revolutions

The basic rating life in millions of revolutions is the life reached or exceeded by 90% of a sufficiently large group of apparently identical bearings before the first evidence of material fatigue develops

L_h h
The basic rating life as defined for L but expressed in operating hours

C N
Basic dynamic load rating

P N
Equivalent dynamic bearing load for radial and axial bearings
(see also Equivalent operating values, page 42 and page 43)

p $-$
Life exponent;
for roller bearings: $p = 10/3$
for ball bearings: $p = 3$

n min^{-1}
Operating speed
(see also Equivalent operating values, page 42 and page 43).

Equivalent dynamic load

The equivalent dynamic load P is a calculated value. This value is constant in size and direction; it is a radial load for radial bearings and an axial load for axial bearings.

P gives the same rating life as the combined load occurring in practice.

$$P = X \cdot F_r + Y \cdot F_a$$

P N
Equivalent dynamic bearing load

F_r N
radial dynamic bearing load

F_a N
axial dynamic bearing load

X $-$
Radial factor given in the dimension tables or product description

Y $-$
Axial factor given in the dimension tables or product description.

Caution! This calculation cannot be applied to radial needle roller bearings, axial needle roller bearings and axial cylindrical roller bearings. Combined loads are not permissible with these bearings.

Equivalent values for non-constant loads or speeds:
see Equivalent operating values, page 42 and page 43.

Adjusted rating life

The adjusted rating life can be calculated if, in addition to the load and speed, other influences are known such as:

- special material characteristics
- lubrication

or

- if a requisite reliability other than 90% is specified.

$$L_{na} = a_1 \cdot a_2 \cdot a_3 \cdot L$$

L_{na} 10⁶ revolutions

Adjusted rating life for special material characteristics and operating conditions with a requisite reliability of (100 - n) %

L 10⁶ revolutions

Basic rating life

a_1 -

Life adjustment factor for a requisite reliability other than 90%, table Life adjustment factor a_1

a_2 -

Life adjustment factor for special material characteristics – for standard rolling bearing steels: $a_2 = 1$

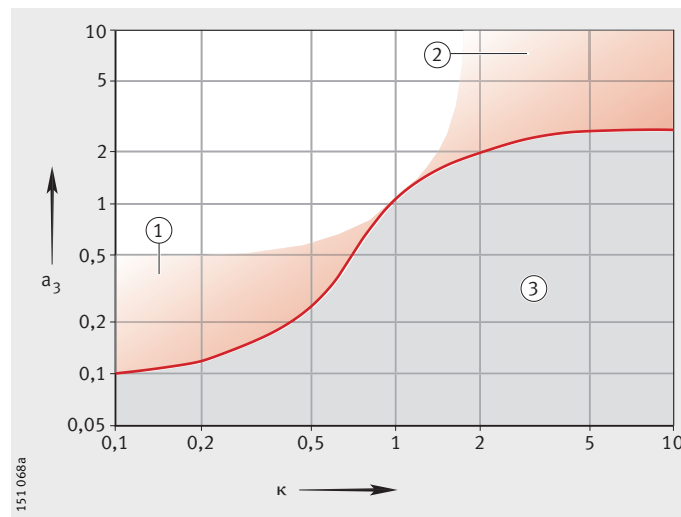
a_3 -

Life adjustment factor for special operating conditions – in particular lubrication, *Figure 1*.

The viscosity ratio κ is determined according to the formula on page 36.

Life adjustment factor a_1

Requisite reliability	90%	95%	96%	97%	98%	99%
Life adjustment factor a_1	1	0,62	0,53	0,44	0,33	0,21



a_3 = life adjustment factor
 κ = viscosity ratio

- ① Good cleanliness and suitable additives
- ② Very high cleanliness and low load
- ③ Contamination in the lubricant

Figure 1

Life adjustment factor a_3

Load carrying capacity and life

Viscosity ratio The viscosity ratio κ is an indication of the quality of lubricant film formation:

$$\kappa = \frac{\nu}{\nu_1}$$

ν mm^2s^{-1}
Kinematic viscosity of the lubricant at operating temperature
 ν_1 mm^2s^{-1}
Reference viscosity of the lubricant at operating temperature.

The reference viscosity ν_1 is determined from the mean bearing diameter $d_M = (D + d)/2$ and the operating speed n , *Figure 2*, Reference viscosity ν_1 , page 37.

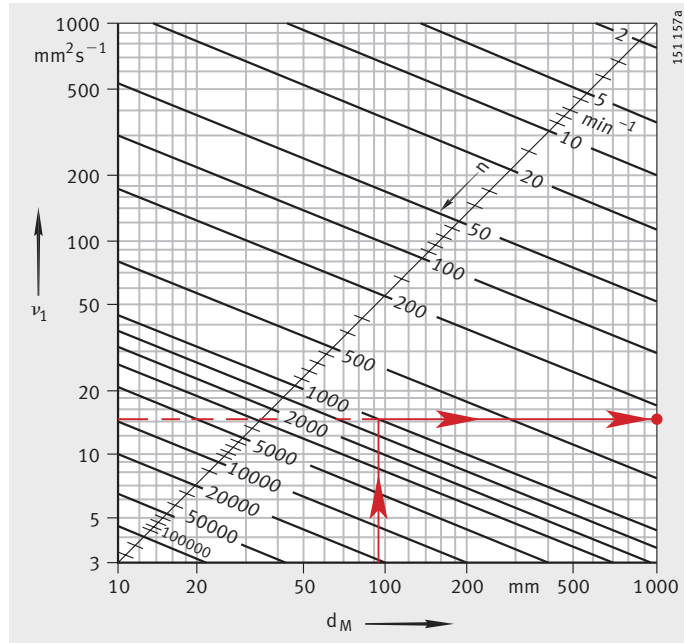
The nominal viscosity of the oil at +40 °C is determined from the required operating viscosity ν and the operating temperature ϑ , *Figure 3*, V/T diagram for mineral oils, page 37. In the case of greases, ν is the operating viscosity of the base oil.

In the case of heavily loaded bearings with a high proportion of sliding contact, the temperature in the contact area of the rolling elements may be up to 20 K higher than the temperature measured on the stationary ring (without the influence of any external heat).

Caution! Taking account of EP additives in calculation of the expanded adjusted rating life L_{nm} : see page 38.

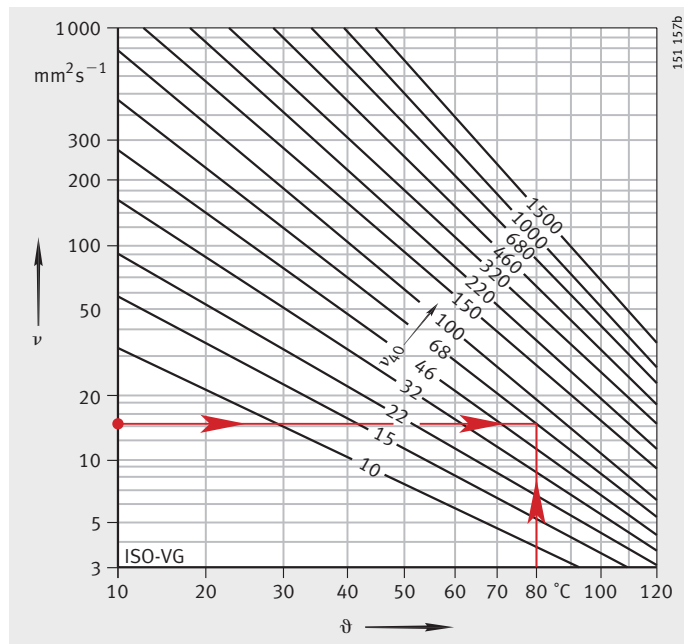
ν_1 = reference viscosity
 d_M = mean bearing diameter
 n = speed

Figure 2
 Reference viscosity ν_1



ν = operating viscosity
 ϑ = operating temperature
 ν_{40} = viscosity at +40 °C

Figure 3
 V/T diagram for mineral oils



Load carrying capacity and life

Expanded adjusted rating life

The expanded adjusted rating life is calculated according to the following formula:

$$L_{nm} = a_1 \cdot a_{DIN} \cdot L$$

L_{nm} 10^6 revolutions

Expanded adjusted rating life to DIN ISO 281, Appendix 1.

This appendix defines manual calculation at the catalogue level; computer-aided calculation is standardised in DIN ISO 281, Appendix 4

a_1 –

Life adjustment factor for a requisite reliability other than 90%, table Life adjustment factor a_1 , page 35

a_{DIN} –

Life adjustment factor for operating conditions, see formula below

L 10^6 revolutions

Basic rating life, page 34.

Life adjustment factor a_{DIN}

The standardised method for calculating the life adjustment factor a_{DIN} essentially takes account of the following influences:

- the load on the bearing
- the lubrication conditions – viscosity and type of lubricant, speed, bearing size, additives
- the fatigue limit of the material
- the type of bearing
- the residual stress in the material
- the environmental conditions
- contamination in the lubricant.

$$a_{DIN} = f \left[\frac{e_C \cdot C_u}{P}, \kappa \right]$$

a_{DIN} –

Life adjustment factor for operating conditions, see Figure 4 to Figure 7

e_C –

Life adjustment factor for contamination, see table, page 41

C_u N

Fatigue limit load, according to dimension tables

P N

Equivalent dynamic bearing load

κ –

Viscosity ratio, see page 36

For $\kappa > 4$ calculation should be carried out using $\kappa = 4$.

This calculation method cannot be used for $\kappa < 0,1$.

Taking account of EP additives

DIN ISO 281, Appendix 1, describes how EP additives are taken into consideration. For a viscosity ratio $\kappa < 1$ and a contamination factor $e_C \geq 0,2$, calculation can be carried out using the value $\kappa = 1$ for lubricants with EP additives that have been proven effective. With severe contamination (contamination factor $e_C < 0,2$), the effectiveness of the additives under these contamination conditions must be proven. The effectiveness of the EP additives can be demonstrated in the actual application or on a rolling bearing test rig FE 8 to DIN 51 819-1.

If the EP additives are proven effective and calculation is carried out using the value $\kappa = 1$, the life adjustment factor must be restricted to $a_{DIN} \leq 3$. If the calculated value a_{DIN} for the actual κ is greater than 3, this value can be used in calculation.

Figure 4
Life adjustment factor a_{DIN}
for radial roller bearings

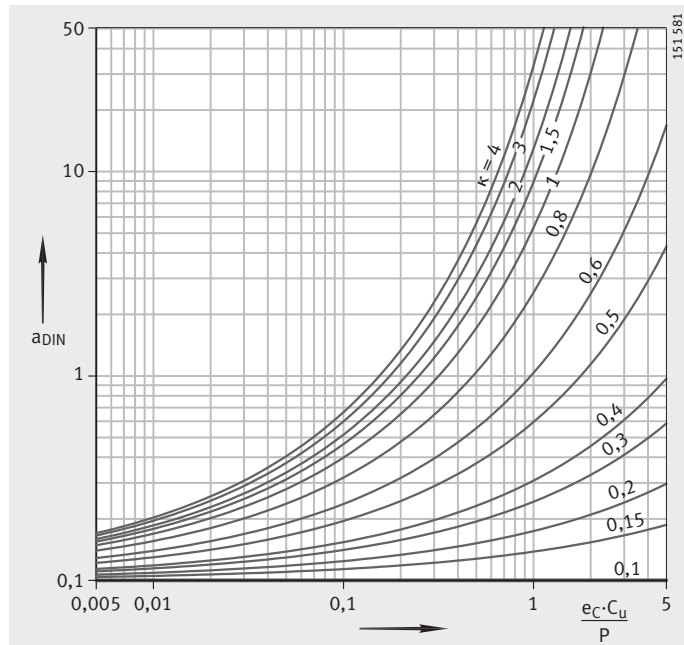
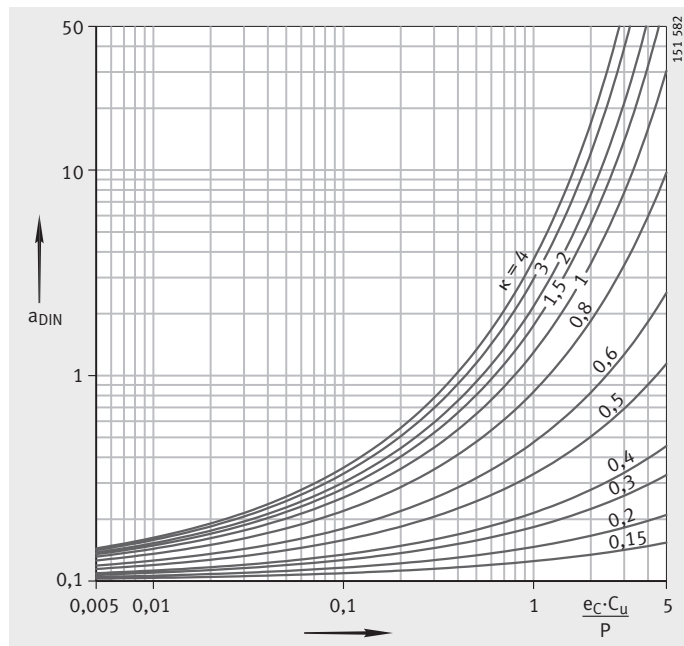


Figure 5
Life adjustment factor a_{DIN}
for axial roller bearings



Load carrying capacity and life

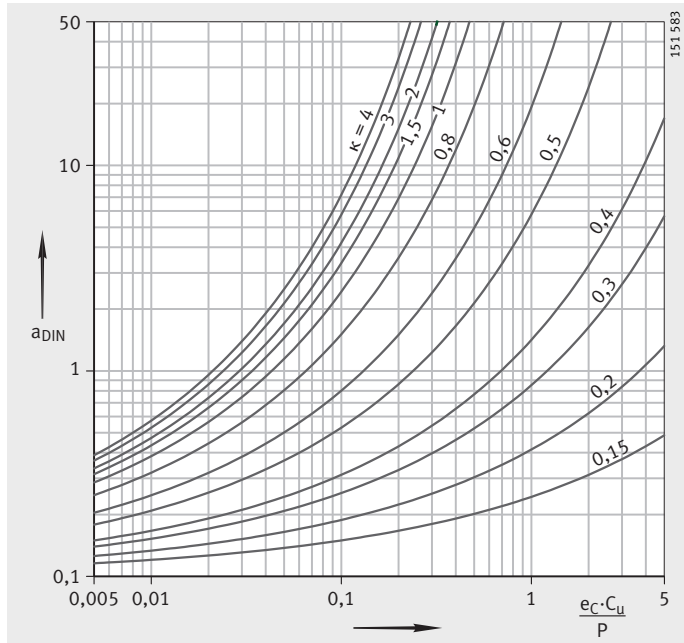


Figure 6
Life adjustment factor a_{DIN}
for radial ball bearings

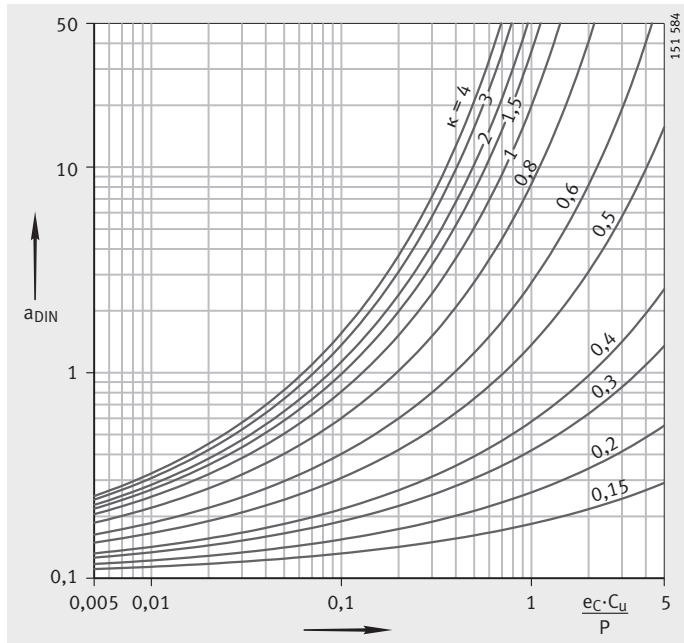


Figure 7
Life adjustment factor a_{DIN}
for axial ball bearings

Fatigue limit load The fatigue limit load C_U is defined as the load below which – under laboratory conditions – no fatigue occurs in the material.

Life adjustment factor for contamination The life adjustment factor for contamination e_C takes into consideration the influence of contamination in the lubrication gap on the rating life, table Factor e_C .

The rating life is reduced by solid particles in the lubrication gap and is dependent on:

- the type, size, hardness and number of particles
- the relative lubrication film thickness
- the bearing size.

Due to the complex nature of the interaction between these influencing factors, only an approximate guide value can be attained. The values in the tables are valid for contamination by solid particles, table Factor e_C . They do not take account of other contamination such as that caused by water or other fluids.

Caution! Under severe contamination – $e_C \rightarrow 0$ – the bearings may fail due to wear.

In this case, the operating life is substantially less than the calculated life.

Factor e_C

Contamination	Factor e_C	
	$d_M < 100 \text{ mm}^1$	$d_M \geq 100 \text{ mm}^1$
Extreme cleanliness ■ Particle size within lubricant film thickness ■ Laboratory conditions	1	1
High cleanliness ■ Oil filtered through extremely fine filter ■ Sealed, greased bearings	0,8 to 0,6	0,9 to 0,8
Standard cleanliness ■ Oil filtered through fine filter	0,6 to 0,5	0,8 to 0,6
Slight contamination ■ Slight contamination of oil	0,5 to 0,3	0,6 to 0,4
Typical contamination ■ Bearing contaminated with abraded material from other machine elements	0,3 to 0,1	0,4 to 0,2
Heavy contamination ■ Bearing environment is heavily contaminated ■ Bearing arrangement is insufficiently sealed	0,1 to 0	0,1 to 0
Very heavy contamination	0	0

¹⁾ d_M = mean bearing diameter $(d + D)/2$.

Load carrying capacity and life

Equivalent operating values

The rating life formulae are based on the assumption that the bearing load P and bearing speed n are constant.

If the load and speed are not constant, equivalent operating values can be determined that induce the same fatigue as the actual conditions.

Caution! The equivalent operating values calculated here already take account of the life adjustment factors a_3 or a_{DIN} . They must not be applied again when calculating the adjusted rating life.

Variable load and speed

If the load and speed vary over a time period T , the speed n and equivalent bearing load P are calculated as follows:

$$n = \frac{1}{T} \int_0^T n(t) \cdot dt$$

$$P = p \sqrt{\frac{\int_0^T \frac{1}{a(t)} \cdot n(t) \cdot F^p(t) \cdot dt}{\int_0^T n(t) \cdot dt}}$$

Variation in steps

If the load and speed vary in steps over a time period T , the speed n and equivalent bearing load P are calculated as follows:

$$n = \frac{q_1 \cdot n_1 + q_2 \cdot n_2 + \dots + q_z \cdot n_z}{100}$$

$$P = p \sqrt{\frac{\frac{1}{a_1} \cdot q_1 \cdot n_1 \cdot F_1^p + \dots + \frac{1}{a_z} \cdot q_z \cdot n_z \cdot F_z^p}{q_1 \cdot n_1 + \dots + q_z \cdot n_z}}$$

Variable load at constant speed

If the function F describes the variation in the load over the time period T and the speed is constant, the equivalent bearing load P is calculated as follows:

$$P = p \sqrt{\frac{1}{T} \int_0^T \frac{1}{a(t)} \cdot F^p(t) \cdot dt}$$

Load varying in steps and constant speed

If the load varies in steps over a time period T and the speed is constant, the equivalent bearing load P is calculated as follows:

$$P = p \sqrt{\frac{\frac{1}{a_1} \cdot q_1 \cdot F_1^p + \dots + \frac{1}{a_z} \cdot q_z \cdot F_z^p}{100}}$$

Constant load at variable speed

If the speed varies but the load remains constant, the following applies:

$$n = \frac{1}{T} \int_0^T \frac{1}{a(t)} \cdot n(t) \cdot dt$$

Constant load with speed varying in steps

If the speed varies in steps but the load remains constant, the following applies:

$$n = \frac{\frac{1}{a_1} \cdot q_1 \cdot n_1 + \dots + \frac{1}{a_z} \cdot q_z \cdot n_z}{100}$$

Oscillating bearing motion

The equivalent speed under oscillating bearing motion is calculated as follows:

$$n = n_{osc} \cdot \frac{\varphi}{180^\circ}$$

Caution! The formula is valid only if the angle of oscillation is greater than twice the angular pitch of the rolling elements. If the angle of oscillation is smaller, there is a risk of false brinelling.

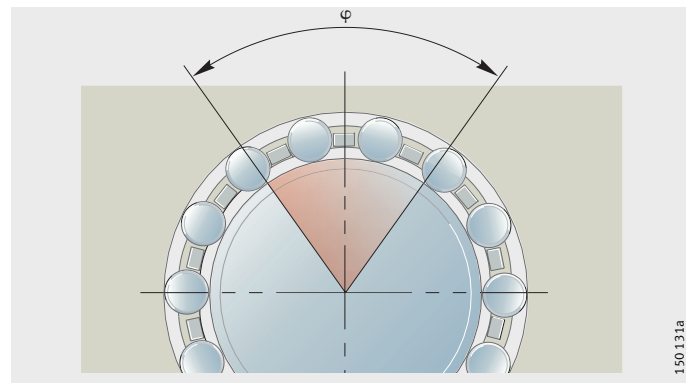


Figure 8
Angle of oscillation φ

Symbols, units and definitions

n	min ⁻¹
Mean speed	
T	min
Time period under consideration	
P	N
Equivalent bearing load	
p	-
Life exponent:	
for roller bearings: p = 10/3	
for ball bearings: p = 3	
a _i , a(t)	-
Life adjustment factor a _{DIN} for current operating condition, see Life adjustment factor a _{DIN} , page 38	
n _i , n(t)	min ⁻¹
Bearing speed for current operating condition	
q _i	%
Duration of operating condition as a proportion of the total operating period; q _i = (Δt _i /T) · 100	
F _i , F(t)	N
Bearing load during the current operating condition	
n _{osc}	min ⁻¹
Frequency of oscillating motion	
φ	°
Angle of oscillation, Figure 8.	

Load carrying capacity and life

Required rating life

If no information is available on the required rating life, the guide values from the following tables may be used.

Caution! Do not overspecify the bearing. If the calculated life is greater than 60 000 h, this normally means that the bearing arrangement is overspecified.

Pay attention to the minimum load for the bearings; see the design and safety guidelines in the product sections.

Motor vehicles

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Motorcycles	400	2 000	400	2 400
Passenger car powertrains	500	1 100	500	1 200
Passenger car bearings protected against contamination (gearbox)	200	500	200	500
Passenger car wheel bearings	1 400	5 300	1 500	7 000
Light commercial vehicles	2 000	4 000	2 400	5 000
Medium commercial vehicles	2 900	5 300	3 600	7 000
Heavy commercial vehicles	4 000	8 800	5 000	12 000
Buses	2 900	11 000	3 600	16 000
Internal combustion engines	900	4 000	900	5 000

Rail vehicles

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Wheelset bearings for freight wagons	7 800	21 000	–	–
Tram carriages	–	–	35 000	50 000
Passenger carriages	–	–	20 000	35 000
Goods wagons	–	–	20 000	35 000
Tipper wagons	–	–	20 000	35 000
Powered units	–	–	35 000	50 000
Locomotives/external bearings	–	–	35 000	50 000
Locomotives/internal bearings	–	–	75 000	110 000
Gearboxes for rail vehicles	14 000	46 000	20 000	75 000

Shipbuilding

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Marine thrust blocks	–	–	20 000	50 000
Marine shaft bearings	–	–	50 000	200 000
Large marine gearboxes	14 000	46 000	20 000	75 000
Small marine gearboxes	4 000	14 000	5 000	20 000
Boat propulsion systems	1 700	7 800	2 000	10 000

Agricultural machinery

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Tractors	1 700	4 000	2 000	5 000
Self-propelled machinery	1 700	4 000	2 000	5 000
Seasonal machinery	500	1 700	500	2 000

Construction machinery

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Dozers, loaders	4 000	7 800	5 000	10 000
Excavators/travelling gear	500	1 700	500	2 000
Excavators/slewing gear	1 700	4 000	2 000	5 000
Vibratory road rollers, imbalance generators	1 700	4 000	2 000	5 000
Vibrator bodies	500	1 700	500	2 000

Electric motors

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Electric motors for household appliances	1 700	4 000	–	–
Series motors	21 000	32 000	35 000	50 000
Large motors	32 000	63 000	50 000	110 000
Electric traction motors	14 000	21 000	20 000	35 000

Rolling mills, steelworks equipment

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Rolling mill frames	500	14 000	500	20 000
Rolling mill gearboxes	14 000	32 000	20 000	50 000
Roller tables	7 800	21 000	10 000	35 000
Centrifugal casting machines	21 000	46 000	35 000	75 000

Machine tools

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Headstock spindles, milling spindles	14 000	46 000	20 000	75 000
Drilling spindles	14 000	32 000	20 000	50 000
Grinding spindles	7 800	21 000	10 000	35 000
Workpiece spindles in grinding machines	21 000	63 000	35 000	110 000
Machine tool gearboxes	14 000	32 000	20 000	50 000
Presses/flywheels	21 000	32 000	35 000	50 000
Presses/eccentric shafts	14 000	21 000	20 000	35 000
Electric tools and compressed air tools	4 000	14 000	5 000	20 000

Woodworking machinery

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Milling spindles and cutter blocks	14 000	32 000	20 000	50 000
Saw frames/main bearings	–	–	35 000	50 000
Saw frames/connecting rod bearings	–	–	10 000	20 000
Circular saws	4 000	14 000	5 000	20 000

Load carrying capacity and life

Gearboxes in general machine building

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Universal gearboxes	4 000	14 000	5 000	20 000
Geared motors	4 000	14 000	5 000	20 000
Large gearboxes, stationary	14 000	46 000	20 000	75 000

Conveying equipment

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Belt drives/mining	–	–	75 000	150 000
Conveyor belt rollers/mining	46 000	63 000	75 000	110 000
Conveyor belt rollers/general	7 800	21 000	10 000	35 000
Belt drums	–	–	50 000	75 000
Bucket wheel excavators/trav. dr.	7 800	21 000	10 000	35 000
Bucket wheel excavators/buck. wh.	–	–	75 000	200 000
Bucket wheel excavators/ bucket wheel drive	46 000	83 000	75 000	150 000
Winding cable sheaves	32 000	46 000	50 000	75 000
Sheaves	7 800	21 000	10 000	35 000

Pumps, fans, compressors

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Ventilators, fans	21 000	46 000	35 000	75 000
Large fans	32 000	63 000	50 000	110 000
Piston pumps	21 000	46 000	35 000	75 000
Centrifugal pumps	14 000	46 000	20 000	75 000
Hydraulic axial and radial piston engines	500	7 800	500	10 000
Gear pumps	500	7 800	500	10 000
Compressors	4 000	21 000	5 000	35 000

Centrifuges, stirrers

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Centrifuges	7 800	14 000	10 000	20 000
Large stirrers	21 000	32 000	35 000	50 000

Textile machinery

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Spinning machines/spindles	21 000	46 000	35 000	75 000
Weaving and knitting machines	14 000	32 000	20 000	50 000

Plastics processing

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Plastics worm extruders	14 000	21 000	20 000	35 000
Rubber and plastics calenders	21 000	46 000	35 000	75 000

Crushers, mills, screens

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Jaw crushers	–	–	20 000	35 000
Gyratory crushers, roll crushers	–	–	20 000	35 000
Rigid hammer mills, hammer mills, impact crushers	–	–	50 000	110 000
Tube mills	–	–	50 000	100 000
Vibration grinding mills	–	–	5 000	20 000
Grinding track mills	–	–	50 000	110 000
Vibrating screens	–	–	10 000	20 000
Briquette presses	–	–	35 000	50 000
Rotary furnace track rollers	–	–	50 000	110 000

Paper and printing machinery

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Paper machinery/wet section	–	–	110 000	150 000
Paper machinery/dry section	–	–	150 000	250 000
Paper machinery/refiners	–	–	110 000	150 000
Paper machinery/calenders	–	–	75 000	110 000
Printing machinery	32 000	46 000	50 000	75 000

Operating life

The operating life is the life actually achieved by a rolling bearing. It may differ significantly from the calculated life.

This may be due to wear or fatigue as a result of:

- deviating operating conditions
- misalignment between the shaft and housing
- insufficient or excessive operating clearance
- contamination
- insufficient lubrication
- excessive operating temperature
- oscillating bearing motion with very small angles of oscillation – false brinelling
- high vibration and false brinelling
- very high shock loads – leading to static overloading
- prior damage during installation.

Due to the wide variety of possible installation and operating conditions, it is not possible to precisely predetermine the operating life. The most reliable way of arriving at a close estimate is by comparison with similar applications.

Load carrying capacity and life

Axial load carrying capacity of cylindrical roller bearings

Radial cylindrical roller bearings used as semi-locating and locating bearings can support axial forces in one or both directions in addition to radial forces.

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements
- the sliding velocity at the ribs
- the lubrication on the contact surfaces.

Caution! Ribs subjected to load must be supported across their entire height, *Figure 9*.

If severe shaft flexing is present, reversed bending loads may occur as a result of this support at the rib. Special analysis is required in this case.

The limiting load $F_{a \max}$ must not be exceeded, in order to avoid unacceptable pressure at the contact surfaces. Calculation of axial load: see page 49.

The ratio F_a/F_r must not exceed a value of 0,4.

Continuous axial loading without simultaneous radial loading is not permissible.

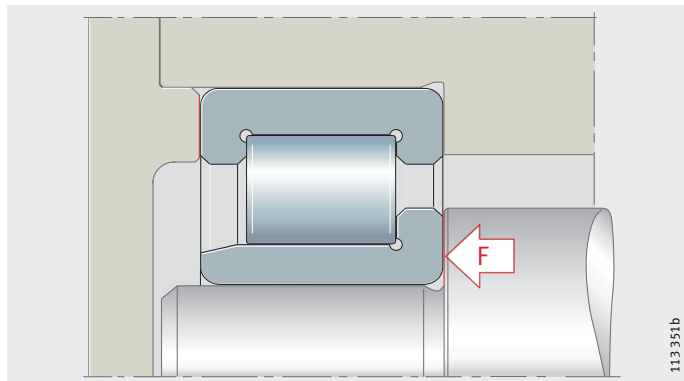


Figure 9
Support of ribs under axial load

Calculation of axial load

The permissible axial load $F_{a\ per}$ and the axial limiting load $F_{a\ max}$ are calculated according to the following formulae:

$$F_{a\ per} = k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{-0,6} \leq F_{a\ max}$$

$$F_{a\ max} = 0,075 \cdot k_B \cdot d_M^{2,1}$$

$F_{a\ per}$ N
Permissible axial load
 $F_{a\ max}$ N
Axial limiting load
 k_S –
Factor dependent on the lubrication method,
see table Factor k_S for the lubrication method
 k_B –
Factor dependent on the bearing series,
see table Bearing factor k_B
 d_M mm
Mean bearing diameter $(d + D)/2$
 n min^{-1}
Operating speed.

Factor k_S for the lubrication method

Lubrication methods ¹⁾	k_S
Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ($\nu < 0,5 \cdot \nu_1$)	7,5 to 10
Little heat dissipation, oil sump lubrication, oil spray lubrication, low oil flow	10 to 15
Good heat dissipation, recirculating oil lubrication (pressure oil lubrication)	12 to 18
Very good heat dissipation, recirculating oil lubrication with oil cooling, high operating viscosity ($\nu > 2 \cdot \nu_1$)	16 to 24

¹⁾ The precondition for these k_S values is the reference viscosity ν_1 according to the section Oil lubrication. Doped lubricating oils should be used, for example CLP (DIN 51 517) and HLP (DIN 51 524) of ISO VG classes 32 to 460 and ATF oils (DIN 51 502) and gearbox oils (DIN 51 512) of SAE viscosity classes 75 W to 140 W.

Bearing factor k_B

Series	k_B
SL1818, SL0148	4,5
SL1829, SL0149	11
SL1830, SL1850	17
SL1822	20
LSL1923, ZSL1923	28
SL1923	30
NJ2..-E, NJ22..-E, NUP2...-E, NUP22...-E	18
NJ3..-E, NJ23..-E, NUP3...-E, NUP23...-E	23

Load carrying capacity and life

Static load carrying capacity

Very high static loads or shock loads can cause plastic deformation on the raceways and rolling elements. This deformation limits the static load carrying capacity of the rolling bearing with respect to the permissible noise level during running.

If a rolling bearing operates without rotary motion or with only infrequent rotary motion, its size is determined in accordance with the basic static load rating C_0 .

According to DIN ISO 76, this is:

- a constant radial load C_{0r} for radial bearings
- a constant, concentrically acting axial load C_{0a} for axial bearings.

The basic static load rating C_0 is that load under which the Hertzian pressure at the most heavily loaded point between the rolling elements and raceways reaches the following values:

- for roller bearings, 4 000 N/mm²
- for ball bearings, 4 200 N/mm²
- for self-aligning ball bearings, 4 600 N/mm².

Under normal contact conditions, this load causes a permanent deformation at the contact points of approx. 1/10 000 of the rolling element diameter.

Static load safety factor

The static load safety factor S_0 is the ratio between the basic static load rating C_0 and the equivalent static load P_0 :

$$S_0 = \frac{C_0}{P_0}$$

S_0 – Static load safety factor
 C_0 (C_{0r} , C_{0a}) N Basic static load rating according to dimension tables
 P_0 (P_{0r} , P_{0a}) N Equivalent static load on the radial or axial bearing.

Caution! Guide values and shock loads occurring during operation according to table Guide values for static load safety factor must be taken into consideration.

Guide values for axial spherical roller bearings and high precision bearings: see corresponding product description.

For drawn cup needle roller bearings, $S_0 \geq 3$ is necessary.

Guide values for static load safety factor

Operating conditions	S_0	
	Roller bearings	Ball bearings
Smooth, low-vibration, normal operation with minimal demands for smooth running; bearings with slight rotary motion	≥ 1	$\geq 0,5$
Normal operation with greater demands for smooth running	≥ 2	≥ 1
Operation with pronounced shock loads	≥ 3	≥ 2
Bearing arrangement with high requirements for running accuracy and smooth running	≥ 4	≥ 3

Equivalent static load

The equivalent static load P_0 is a calculated value. It corresponds to a radial load in radial bearings and a concentric axial load in axial bearings.

P_0 induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined load occurring in practice.

$$P_0 = X_0 \cdot F_{0r} + Y_0 \cdot F_{0a}$$

P_0 N Equivalent static bearing load
 F_{0r} N Radial static bearing load
 F_{0a} N Axial static bearing load
 X_0 – Radial factor given in the dimension tables or product description
 Y_0 – Axial factor given in the dimension tables or product description.

Caution! This calculation cannot be applied to radial needle roller bearings, axial needle roller bearings and axial cylindrical roller bearings. Combined loads are not permissible with these bearings.

Rigidity

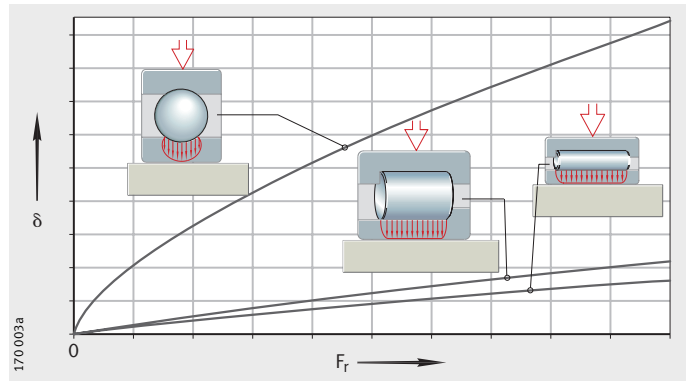
The rigidity of a rolling bearing is dependent on the bearing type, size and operating clearance.

The rigidity increases with the number of rolling elements supporting the load.

Rolling bearings with line contact have a higher rigidity than rolling bearings with point contact, *Figure 1*.

δ = displacement
 F_r = radial bearing load

Figure 1
 Rigidity,
 dependent on the bearing type



Deflection

Rolling bearings have a progressive deflection rate.

The displacement values can be determined using approximation formulae.

Caution! The formulae are valid for bearings without misalignment and with a rigid surrounding structure.

In axial bearings, a concentrically acting load is assumed.

$$\delta_r = \frac{1}{c_s} \cdot F_r^{0,84} + \frac{s}{2}$$

$$\delta_a = \frac{1}{c_s} \cdot \left[(F_{av} + F_a)^{0,84} - F_{av}^{0,84} \right]$$

$$c_s = K_c \cdot d^{0,65}$$

c_s $N^{0,84}/\mu m$
 Rigidity parameter
 d mm
 Bearing bore diameter
 δ_r μm
 Radial displacement between shaft axis and centre of bore,
Figure 2

δ_a μm
 Axial displacement between shaft locating washer and housing locating washer, *Figure 3*

s μm
 Radial operating clearance of fitted, unloaded bearing

F_r N
 Radial bearing load

F_a N
 Axial bearing load

F_{av} N
 Axial preload force

K_c –
 Factor for determining the rigidity parameter,
 table Factor K_c , page 53.

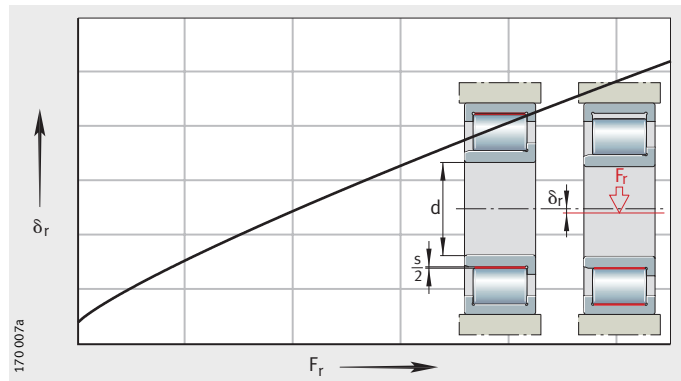
Factor K_c

Series	K_c	Series	K_c
SL1818	12,8	NJ2...-E	11,1
SL1829, SL1830, SL1923	16	NJ3...-E	11,3
SL1850, SL0148, SL0248, SL0249	29,2	NJ22...-E	15,4
NA48	24,9	NJ23...-E	16,9
NA49	23,5	NU10	9,5
NA69	37,3	NU19	11,3
NKIS	21,3	NN30...-AS-K	18,6
NKI	$4,4 \cdot B^{0,8}/d^{0,2}$	ZNR31-22	21,1
HK, BK	$4,2 \cdot C^{0,8}/d^{0,2}$	ZNR31-23	23,2
K811, 811, K812, 812	36,7	ZNR31-30	30
K893, 893, K894, 894	59,7	ZNR31-31	29,3
		ZNR31-32	28,9

δ_r = radial displacement
 F_r = radial bearing load

Figure 2

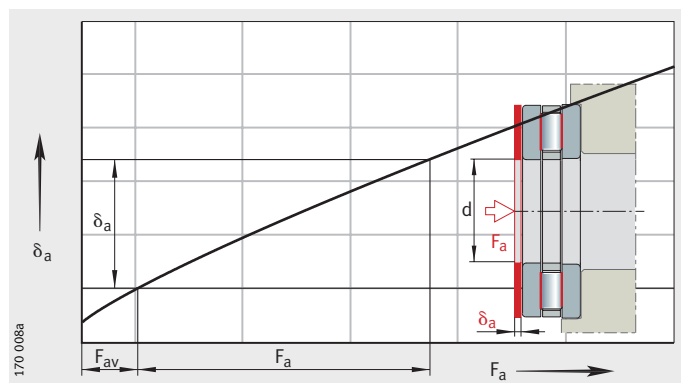
Radial displacement δ_r
 Example:
 radial cylindrical roller bearing



δ_a = axial displacement
 F_a = axial bearing load

Figure 3

Axial displacement δ_a
 Example:
 axial cylindrical roller bearing



Friction and increases in temperature

Friction The friction in a rolling bearing is made up of several components, see table Frictional component and influencing factor. Due to the large number of influencing factors, the frictional torque and thus the frictional energy can only be calculated in approximate terms and on the precondition of constant operating conditions.

Frictional component and influencing factor

Frictional component	Influencing factor
Rolling friction	Magnitude of load
Sliding friction of rolling elements Sliding friction of cage	Magnitude and direction of load Speed and lubrication conditions, running-in condition
Fluid friction – flow resistance	Type and speed Type, quantity and operating viscosity of lubricant
Seal friction	Type and preload of seal

The idling friction is dependent on:

- the quantity of lubricant
- the speed
- the operating viscosity of the lubricant
- the seals
- the running-in condition of the bearing.

Heat dissipation

Friction is converted into heat; this heat is dissipated from the bearing. The equilibrium between the frictional energy and heat dissipation allows calculation of the thermally permissible speed n_{per} , see Speeds, page 62.

Heat dissipation by the lubricant

If oil lubrication is used, a portion of the heat is dissipated by the oil: recirculating oil lubrication with additional cooling is particularly effective.

Caution! Grease does not give dissipation of heat.

Heat dissipation via the shaft and housing

Heat dissipation via the shaft and housing is dependent on the temperature difference between the bearing and the surrounding structure, *Figure 1*.

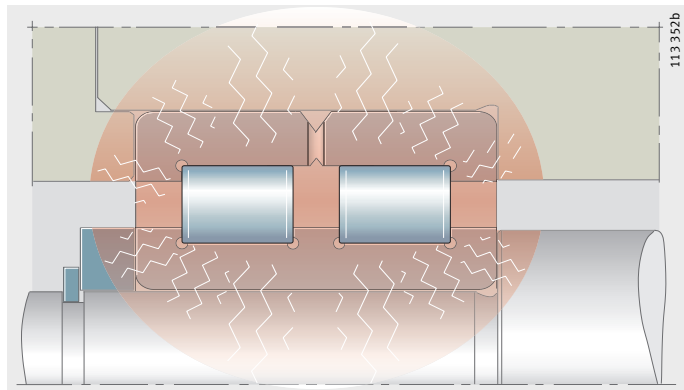


Figure 1
Temperature distribution between bearing, shaft and housing

Caution! Any additional adjacent sources of heat or thermal radiation must be taken into consideration.

Calculation of friction values

In order to determine the friction values, the speed and load must be known. The type of lubrication, lubrication method and viscosity of lubricant at operating temperature are further important factors in calculation.

Total frictional torque M_R
(calculation of axially loaded cylindrical roller bearings, see page 60):

$$M_R = M_0 + M_1$$

Frictional energy N_R :

$$N_R = M_R \cdot \frac{n}{9550}$$

Frictional torque as a function of speed for $v \cdot n \geq 2000$:

$$M_0 = f_0 \cdot (v \cdot n)^{\frac{2}{3}} \cdot d_M^3 \cdot 10^{-7}$$

Frictional torque as a function of speed for $v \cdot n < 2000$:

$$M_0 = f_0 \cdot 160 \cdot d_M^3 \cdot 10^{-7}$$

Frictional torque as a function of load for needle roller and cylindrical roller bearings:

$$M_1 = f_1 \cdot F \cdot d_M$$

Frictional torque as a function of load for ball bearings, tapered roller bearings and spherical roller bearings:

$$M_1 = f_1 \cdot P_1 \cdot d_M$$

M_R Nmm
Total frictional torque

M_0 Nmm
Frictional torque as a function of speed

M_1 Nmm
Frictional torque as a function of load

N_R W
Frictional energy

n min^{-1}
Operating speed

f_0 –
Bearing factor for frictional energy as a function of speed, see *Figure 2* and tables from page 57 to page 59

f_1 –
Bearing factor for frictional torque as a function of load, tables from page 57 to page 59

ν mm^2s^{-1}
Kinematic viscosity of lubricant at operating temperature. In the case of grease, the decisive factor is the viscosity of the base oil at operating temperature

F (F_r , F_a) N
Radial load for radial bearings, axial load for axial bearings

P_1 N
Decisive load for frictional torque, table Ball bearings, tapered roller bearings and spherical roller bearings, page 60

d_M mm
Mean bearing diameter.

Friction and increases in temperature

Bearing factors

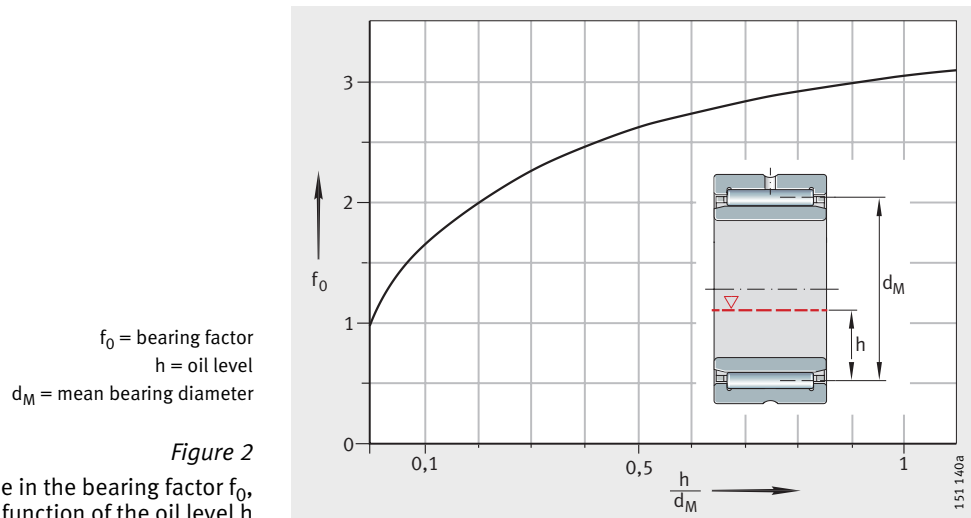
The bearing factors f_0 and f_1 are mean values determined from series of tests and corresponding data according to ISO 15 312.

They are valid for grease lubrication applied to fitted bearings.

In the freshly greased state, the bearing factor f_0 may be higher by a factor of between two and five.

If oil mist lubrication is used, a marginal lubricant supply is assumed.

If oil bath lubrication is used, the oil level must reach the centre of the lowest rolling element. If the oil level is higher, f_0 may be up to 3 times the value given in the table, *Figure 2*.



**Bearing factors
for needle roller bearings,
drawn cup needle roller bearings,
needle roller and cage assemblies**

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
NA48	3	5	0,0005
NA49	4	5,5	
RNA48	3	5	
RNA49	4	5,5	
NA69	7	10	
RNA69			
NKI, NK, NKIS, NKS, NAO, RNO, K	$(12 \cdot B)/(33 + d)$	$(18 \cdot B)/(33 + d)$	
HK, BK	$(24 \cdot B)/(33 + d)$	$(36 \cdot B)/(33 + d)$	
HN	$(30 \cdot B)/(33 + d)$	$(45 \cdot B)/(33 + d)$	

**Bearing factors
for cylindrical roller bearings,
full complement**

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
SL1818	3	5	0,00055
SL1829	4	6	
SL1830	5	7	
SL1822	5	8	
SL0148, SL0248	6	9	
SL0149, SL0249	7	11	
SL1923	8	12	
SL1850	9	13	

**Bearing factors
for cylindrical roller bearings
with cage**

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
LSL1923	1	3,7	0,00020
ZSL1923	1	3,8	0,00025
2..-E	1,3	2	0,00030
3..-E			0,00035
4			0,00040
10, 19			0,00020
22..-E	2	3	0,00040
23..-E	2,7	4	0,00040
30	1,7	2,5	0,00040

**Bearing factors
for axial roller bearings**

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
AXK, AXW	3	4	0,0015
811, K811	2	3	
812, K812			
893, K893			
894, K894			

Friction and increases in temperature

Bearing factors for combined bearings

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
ZARN, ZARF	3	4	0,0015
NKXR	2	3	
NX, NKX	2	3	$0,001 \cdot (F_a/C_0)^{0,33}$
ZKLN, ZKLF	4	6	
NKIA, NKIB	3	5	0,0005

Bearing factors for tapered roller bearings

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
302, 303, 313	2	3	0,0004
329, 320, 322, 323	3	4,5	
330, 331, 332	4	6	

Bearing factors for axial and radial spherical roller bearings

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
213	2,3	3,5	$0,0005 \cdot (P_0/C_0)^{0,33}$
222	2,7	4	
223	3	4,5	$0,0008 \cdot (P_0/C_0)^{0,33}$
230, 239			$0,00075 \cdot (P_0/C_0)^{0,5}$
231	3,7	5,5	$0,0012 \cdot (P_0/C_0)^{0,5}$
232	4	6	$0,0016 \cdot (P_0/C_0)^{0,5}$
240	4,3	6,5	$0,0012 \cdot (P_0/C_0)^{0,5}$
241	4,7	7	$0,0022 \cdot (P_0/C_0)^{0,5}$
292..-E	1,7	2,5	0,00023
293..-E	2	3	0,00030
294..-E	2,2	3,3	0,00033

Bearing factors for deep groove ball bearings

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
618, 618..-2Z, (2RSR)	1,1	1,7	$0,0005 \cdot (P_0/C_0)^{0,5}$
160	1,1	1,7	
60, 60..-2RSR, 60..-2Z, 619, 619..-2Z, (2RSR)	1,1	1,7	$0,0007 \cdot (P_0/C_0)^{0,5}$
622..-2RSR	1,1	–	
623..-2RSR	1,1	–	
62, 62..-2RSR, 62..-2Z	1,3	2	
63, 63..-2RSR, 63..-2Z	1,5	2,3	
64	1,5	2,3	
42..-B	2,3	3,5		$0,0010 \cdot (P_0/C_0)^{0,5}$
43..-B	4	6	

**Bearing factors
for angular contact ball bearings**

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
70..-B, 70..-B-2RS	1,3	2	$0,001 \cdot (P_0/C_0)^{0,33}$
718..-B, 72..-B, 72..-B-2RS			
73..-B, 73..-B-2RS	2	3	
30..-B, 30..-B-2RSR, 30..-B-2Z	2,3	3,5	
32..-B, 32..-B-2RSR, 32..-B-2Z, 32			
38..-B, 38..-B-2RSR, 38..-B-2Z			
33..-B, 33..-B-2RSR, 33, 33..-DA	4	6	

**Bearing factors
for self-aligning ball bearings**

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
12	1	1,5	$0,0003 \cdot (P_0/C_0)^{0,4}$
13	1,3	2	
22	1,7	2,5	
23	2	3	

**Bearing factors
for four point contact bearings**

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
QJ2, QJ3	2,7	4	$0,001 \cdot (P_0/C_0)^{0,33}$

**Bearing factors
for axial deep groove
ball bearings**

Series	Bearing factor f_0		Bearing factor f_1
	Grease, oil mist	Oil bath, recirculating oil	
511, 512, 513, 514, 532, 533	1	1,5	$0,0012 \cdot (F_a/C_0)^{0,33}$
522, 523, 524, 542, 543	1,3	2	

**Symbols,
units and definitions**

B	mm
Bearing width	
C_0 (C_{0r} , C_{0a})	N
Basic static load rating according to dimension tables	
d	mm
Shaft diameter	
P_0	N
Equivalent static bearing load	
F_a	N
Axial dynamic bearing load	
F_r	N
Radial dynamic bearing load.	

Friction and increases in temperature

Decisive load for ball bearings, tapered roller bearings and spherical roller bearings

Bearing type	Single bearing P_1	Bearing pair P_1
Deep groove ball bearings	$3,3 \cdot F_a - 0,1 \cdot F_r$	–
Angular contact ball bearings, single row	$F_a - 0,1 \cdot F_r$	$1,4 \cdot F_a - 0,1 \cdot F_r$
Angular contact ball bearings, double row	$1,4 \cdot F_a - 0,1 \cdot F_r$	–
Four point contact bearings	$1,5 \cdot F_a + 3,6 \cdot F_r$	–
Tapered roller bearings	$2 \cdot Y \cdot F_a$ or F_r Use the larger value	$1,21 \cdot Y \cdot F_a$ or F_r Use the larger value
Spherical roller bearings	$1,6 \cdot F_a/e$ if $F_a/F_r > e$ $F_r \{1 + 0,6 \cdot [F_a/(e \cdot F_r)]^3\}$ if $F_a/F_r \leq e$. In cylindrical roller bearings with additional axial load, M_2 must be added to the frictional torque M_1 : $M = M_0 + M_1 + M_2$	

Caution! If $P_1 \leq F_r$, then $P_1 = F_r$.

Cylindrical roller bearings under axial load

In cylindrical roller bearings under axial load, sliding friction between the end faces of the rolling elements and the ribs on the rings leads to an additional frictional torque M_2 .

The total frictional torque is therefore:

$$M_R = M_0 + M_1 + M_2$$

$$M_2 = f_2 \cdot F_a \cdot d_M$$

$$A = k_B \cdot 10^{-3} \cdot d_M^{2,1}$$

M_R	Nmm
Total frictional torque	
M_0	Nmm
Frictional torque as a function of speed	
M_1	Nmm
Frictional torque as a function of radial load	
M_2	Nmm
Frictional torque as a function of axial load	
f_2	–
Factor as a function of the bearing series, <i>Figure 3</i> , page 61	
A	–
Bearing parameter according to above formula	
F_a	N
Axial dynamic bearing load	
k_B	–
Factor as a function of the bearing series, table Bearing factor k_B , page 61	
d_M	mm
Mean bearing diameter $(d + D)/2$.	

f_2 = bearing factor
 F_a = axial dynamic bearing load
 A = bearing parameter
 ν = operating viscosity
 n = operating speed
 d_M = mean bearing diameter

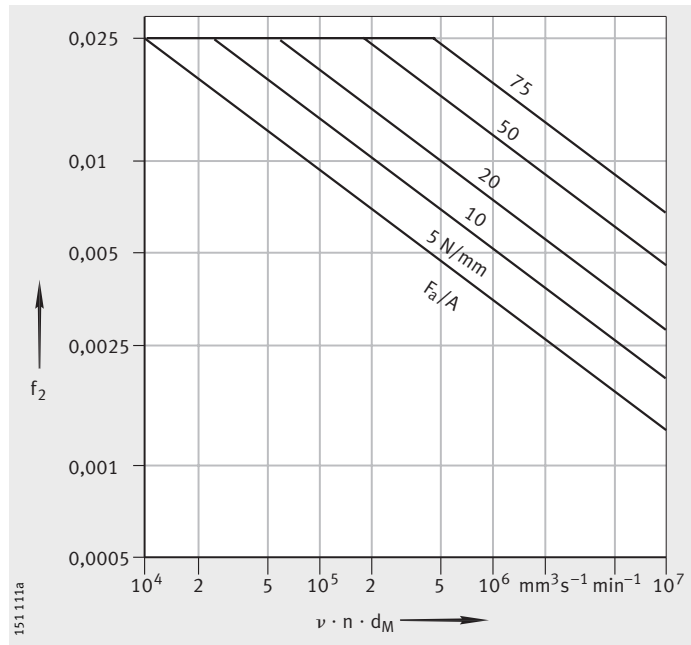


Figure 3
 Bearing factor f_2 as a function of operating parameter $\nu \cdot n \cdot d_M$

Caution! The bearing factors f_2 are subject to wide scatter. The values shown are valid for recirculating oil lubrication with an adequate oil quantity, *Figure 3*.

The curves must not be extrapolated, *Figure 3*.

Bearing factor k_B

Series	k_B
SL1818, SL0148	4,5
SL1829, SL0149	11
SL1830, SL1850	17
SL1822	20
LSL1923, ZSL1923	28
SL1923	30
NJ2..-E, NJ22..-E, NUP2..-E, NUP22..-E	18
NJ3..-E, NJ23..-E, NUP3..-E, NUP23..-E	23

Speeds

On the basis of DIN 732-1, calculation of the thermal reference speed n_B has been standardised in ISO 15312. The calculation of reference speeds was matched to this standard, giving modified values compared to the previous catalogue data.

The symbols used in the formulae have been matched to the international standard.

Thermal reference speed

The thermal reference speed n_B is used as an auxiliary quantity for calculating the thermally safe operating speed n_{per} . This is the speed at which, under defined reference conditions, a bearing operating temperature of +70 °C is achieved.

Reference conditions

The reference conditions are based on the usual operating conditions of the most significant bearing types and sizes.

They are defined as follows in ISO 15312:

- mean ambient temperature $\vartheta_{Ar} = +20$ °C
- mean bearing temperature at the outer ring $\vartheta_r = +70$ °C
- load on radial bearings: $P_{1r} = 0,05 \cdot C_{0r}$
- load on axial bearings: $P_{1a} = 0,02 \cdot C_{0a}$
- operating viscosities:
These are selected for radial bearings such that similar reference speeds are achieved for both oil and grease lubrication
 - radial bearings: $12 \text{ mm}^2\text{s}^{-1}$ (ISO VG 32)
 - axial bearings: $24 \text{ mm}^2\text{s}^{-1}$ (ISO VG 68)
- heat dissipation through the bearing seating surfaces in accordance with the following formulae:

for radial bearings, bearing seat $A_r \leq 50\,000 \text{ mm}^2$

$$q_r = 0,016 \text{ W/mm}^2$$

for radial bearings, bearing seat $A_r > 50\,000 \text{ mm}^2$

$$q_r = 0,016 \cdot \left(\frac{A_r}{50000} \right)^{-0,34} \text{ W/mm}^2$$

for axial bearings, bearing seat $A_r \leq 50\,000 \text{ mm}^2$

$$q_r = 0,020 \text{ W/mm}^2$$

for axial bearings, bearing seat $A_r > 50\,000 \text{ mm}^2$

$$q_r = 0,020 \cdot \left(\frac{A_r}{50000} \right)^{-0,16} \text{ W/mm}^2$$

Limiting speed

The limiting speed n_G is based on practical experience. It takes account of additional criteria such as smooth running, sealing function and centrifugal forces.

Caution! The limiting speed must not be exceeded even under favourable operating and cooling conditions.

Thermally safe operating speed

The thermally safe operating speed n_{per} is calculated according to DIN 732-2 (draft). Calculation is based on the heat balance in the bearing, the equilibrium between frictional energy as a function of speed and heat dissipation as a function of temperature. When equilibrium is present, the bearing temperature is constant.

The permissible operating temperature determines the thermally safe operating speed n_{per} of the bearing. The preconditions for calculation are correct fitting, normal operating clearance and constant operating conditions.

The calculation method is not valid for:

- sealed bearings with contact seals, since the maximum speed is restricted by the permissible sliding speed at the seal lip
- yoke and stud type track rollers
- aligning needle roller bearings
- axial deep groove and axial angular contact ball bearings.

Calculation of the thermally safe operating speed

The thermally safe operating speed n_{per} is the product of the reference speed n_B and the speed ratio f_n :

$$n_{per} = n_B \cdot f_n$$

Caution!

The limiting speed must be observed.

The speed ratio is derived from *Figure 1*, page 64:

$$k_L \cdot f_n^{5/3} + k_P \cdot f_n = 1$$

In the normal range $0,01 < k_L < 10$ and $0,01 < k_P < 10$, f_n can be calculated using an approximation formula:

$$f_n = \frac{490,77}{1 + 498,78 \cdot k_L^{0,599} + 852,88 \cdot k_P^{0,963} - 504,5 \cdot k_L^{0,055} \cdot k_P^{0,832}}$$

Heat dissipation via the bearing seating surfaces \dot{Q}_S , *Figure 2*, page 64:

$$\dot{Q}_S = k_q \cdot A_r \cdot \Delta\vartheta_A$$

Heat dissipation by the lubricant \dot{Q}_L :

$$\dot{Q}_L = 0,0286 \frac{\text{kW}}{\text{l/min} \cdot \text{K}} \cdot \dot{V}_L \cdot \Delta\vartheta_L$$

Total dissipated heat flow \dot{Q} :

$$\dot{Q} = \dot{Q}_S + \dot{Q}_L + \dot{Q}_E$$

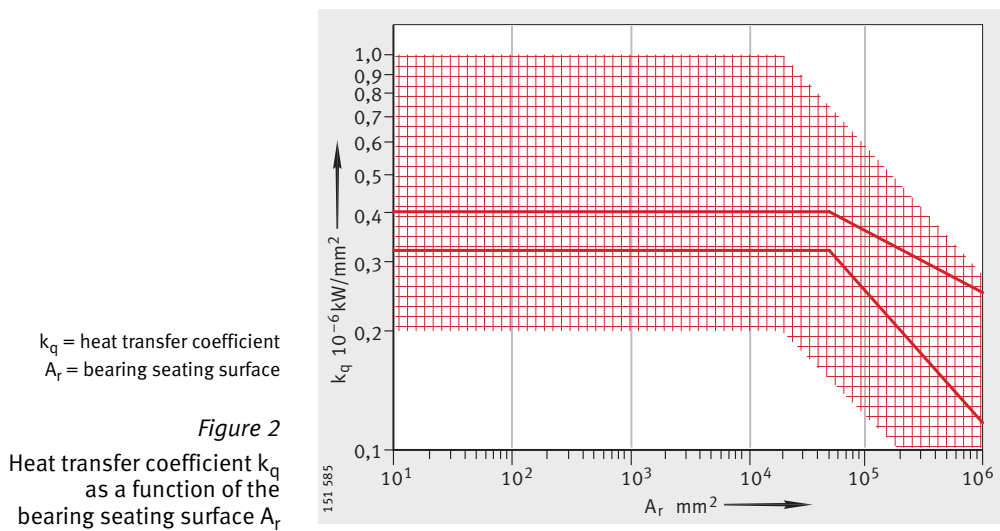
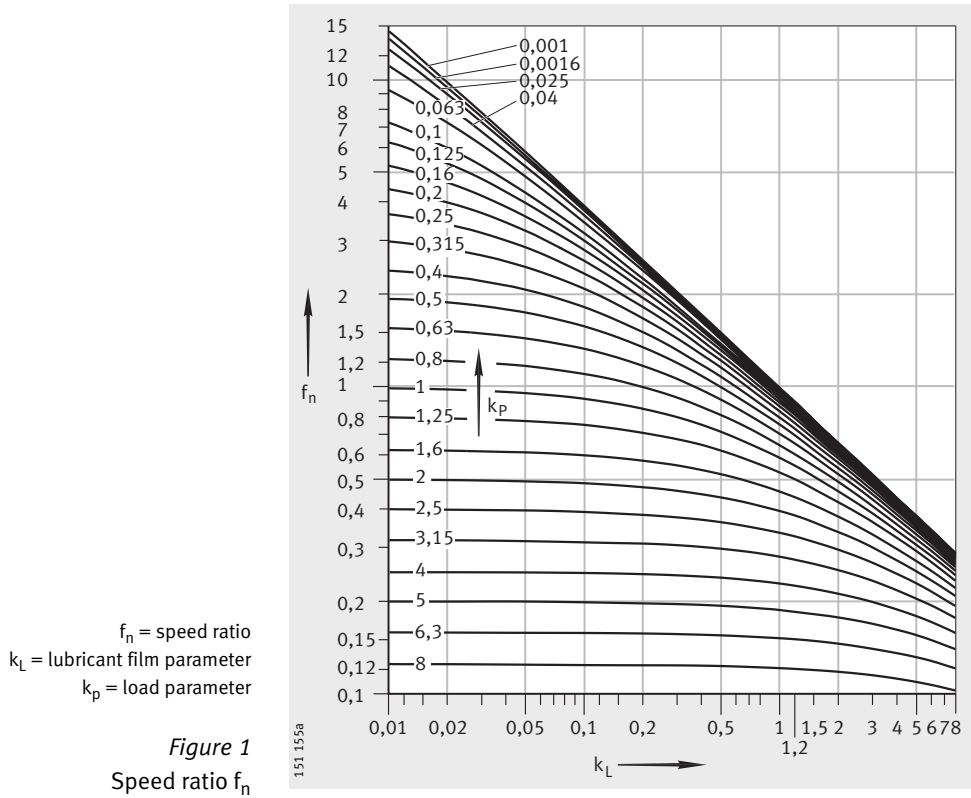
Lubricant film parameter k_L :

$$k_L = 10^{-6} \cdot \frac{\pi}{30} \cdot n_B \cdot \frac{10^{-7} \cdot f_0 \cdot (v \cdot n_B)^{\frac{2}{3}} \cdot d_M^3}{\dot{Q}}$$

Load parameter k_P :

$$k_P = 10^{-6} \cdot \frac{\pi}{30} \cdot n_B \cdot \frac{f_1 \cdot P_1 \cdot d_M}{\dot{Q}}$$

Speeds



Symbols, units and definitions

A_r mm^2
 Bearing seating surface for radial bearings: $A_r = \pi \times B \times (D + d)$
 axial bearings: $A_r = \pi/2 \times (D^2 - d^2)$
 tapered roller bearings: $A_r = \pi \times T \times (D + d)$
 axial spherical roller bearings: $A_r = \pi/4 \times (D^2 + d_1^2 - D_1^2 - d^2)$

**Symbols,
units and definitions
continued**

B	mm
Bearing width	
d	mm
Bearing bore	
D	mm
Bearing outside diameter	
d_1	mm
Outside diameter of shaft locating washer	
D_1	mm
Inside diameter of housing locating washer	
d_M	mm
Mean bearing diameter $(D + d)/2$	
f_0	–
Bearing factor for frictional torque as a function of speed (see section Friction and increases in temperature)	
f_1	–
Bearing factor for frictional torque as a function of load (see section Friction and increases in temperature)	
f_n	–
Speed ratio, <i>Figure 1</i> , page 64	
k_L	–
Lubricant film parameter	
k_p	–
Load parameter	
k_q	10^{-6} kW/mm ²
Heat transfer coefficient of bearing seating surface, <i>Figure 2</i> , page 64. This is dependent on the housing design, size and material and installation position. Under normal conditions, the heat transfer coefficient for bearing seating surfaces up to 25 000 mm ² is between 0,2 and $1,0 \cdot 10^{-6}$ kW/mm ²	
P_1	N
Radial load for radial bearings, axial load for axial bearings	
n_{per}	min ⁻¹
Thermally safe operating speed	
n_B	min ⁻¹
Reference speed according to dimension tables	
q_r	W/mm ²
Heat flow density	
\dot{Q}	kW
Total dissipated heat flow	
\dot{Q}_E	kW
Heat flow due to heating by external source	
\dot{Q}_L	kW
Heat flow dissipated by the lubricant	
\dot{Q}_S	kW
Heat flow dissipated via the bearing seating surfaces	
T	mm
Total width of tapered roller bearing	
\dot{V}_L	l/min
Oil flow	
$\Delta\vartheta_A$	K
Difference between mean bearing temperature and ambient temperature	
$\Delta\vartheta_l$	K
Difference between oil output temperature and oil input temperature	
ν	mm ² s ⁻¹
Kinematic viscosity of lubricant at operating temperature.	

Lubrication

Principles

Lubrication and maintenance are important for the reliable operation and long operating life of rolling bearings.

Functions of the lubricant

The lubricant should, *Figure 1*:

- form a lubricant film on the contact surfaces that is sufficiently capable of supporting loads and thus preventing wear and premature fatigue ①
- dissipate heat in the case of oil lubrication ②
- give additional sealing of the bearing, in the case of grease lubrication, against the entry of both solid and fluid contaminants ③
- reduce the running noise ④
- protect the bearing against corrosion ⑤.

- ① Formation of a lubricant film capable of supporting loads
- ② Heat dissipation in the case of oil lubrication
- ③ Sealing of the bearing against external contaminants in the case of grease lubrication
- ④ Damping of running noise
- ⑤ Protection against corrosion

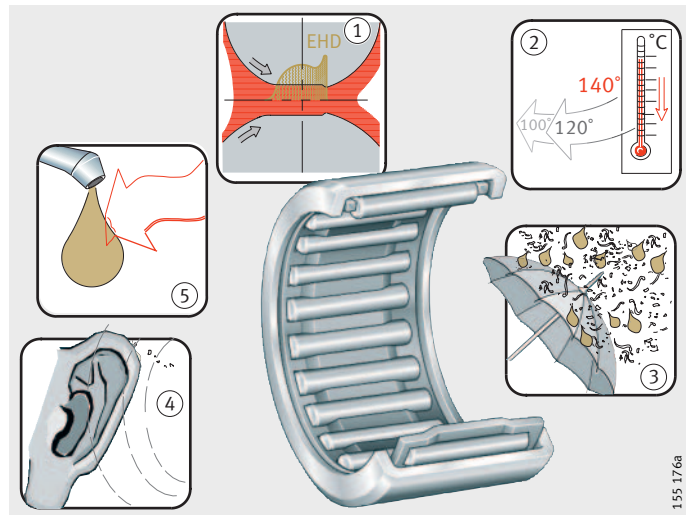


Figure 1

Functions of the lubricant

Selection of the type of lubrication

It should be determined as early as possible in the design process whether bearings should be lubricated using grease or oil.

The following factors are decisive in determining the type of lubrication and quantity of lubricant:

- the operating conditions
- the type and size of the bearing
- the adjacent construction
- the lubricant feed.

Criteria for grease lubrication

In the case of grease lubrication, the following criteria must be considered:

- very little design work required
- sealing action
- reservoir effect
- long operating life with little maintenance work ("for life" lubrication possible in certain circumstances)
- if relubrication is required, it may be necessary to provide collection areas for old grease and feed ducts
- no heat dissipation by the lubricant
- no rinsing out of wear debris and other particles.

Criteria for oil lubrication

In the case of oil lubrication, the following criteria must be considered:

- good lubricant distribution and supply to contact areas
- dissipation of heat possible from the bearing (significant principally at high speeds and/or loads)
- rinsing out of wear debris
- very low friction losses with minimal quantity lubrication
- more work required on feed and sealing.

Under extreme operating conditions (such as very high temperatures, vacuum, aggressive media), it may be possible to use special lubrication methods such as solid lubricants in consultation with the engineering service.

Design of lubricant feed

When designing feed lines and lubrication holes in the housings and shafts, *Figure 2* and *Figure 3*:

- these should lead directly to the lubrication hole in the rolling bearing
- they should be as short as possible
- an individual feed should be provided for each bearing.

Caution! Ensure that the feeds are filled, *Figure 2*; the feed line should be bled if necessary.

Follow the instructions provided by the lubrication device manufacturer.

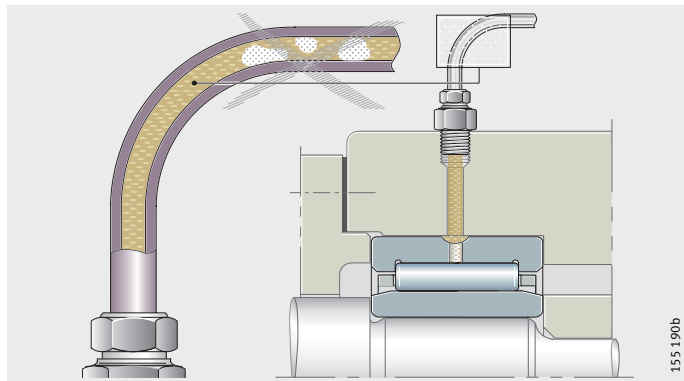


Figure 2
Lubricant feed

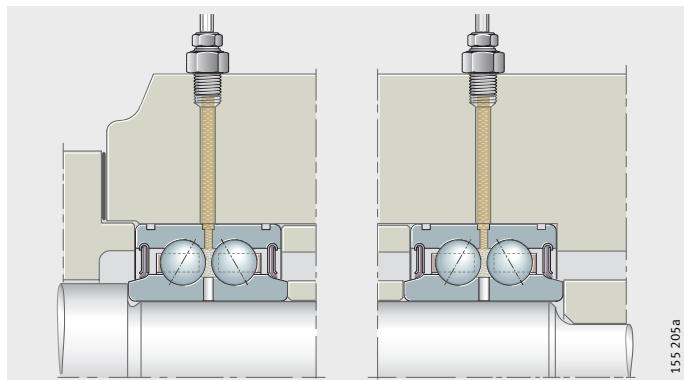


Figure 3
Arrangement of feed to more than
one bearing on a shaft

Lubrication

Grease lubrication

Greases can be differentiated in terms of their thickeners and base oils. The base oils of greases are covered by the information in the section “Oil lubrication”, page 83.

Composition of a grease

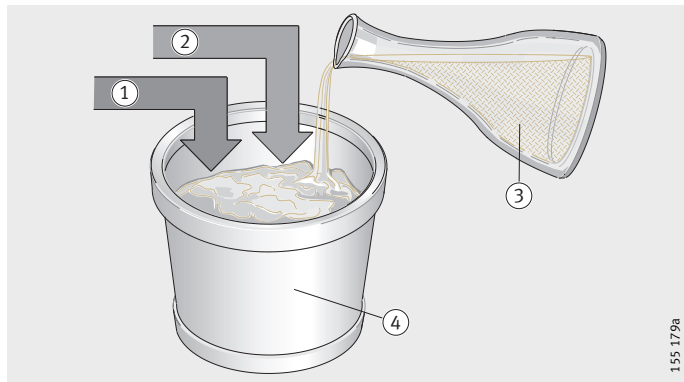
Conventional greases have metal soaps as thickeners and a mineral base oil.

They also contain additives. These have a specific influence on, for example, the characteristics in relation to wear prevention, corrosion prevention or resistance to ageing. These combinations of additives are not, however, fully effective across every temperature and load range.

Greases exhibit widely varying behaviour in response to environmental influences such as temperature and moisture.

- ① Thickener
- ② Additives
- ③ Base oil
- ④ Grease

Figure 4
Type of grease



Caution!

Lubricants should be checked for their compatibility with:

- other lubricants
- anti-corrosion agents
- thermoplastics, thermosets and elastomers
- light and non-ferrous metals
- coatings
- colouring agents and paints
- the environment.

When considering compatibility with the environment, attention must be paid to toxicity, biodegradability and water pollution class.

- Type of grease** The characteristics of a grease are dependent on:
- the base oil
 - the viscosity of the base oil (this is important for the speed range)
 - the thickener (the shear strength is significant for the speed range)
 - the additives.

Consistency of greases Greases are subdivided into consistency classes – NLGI classes – (DIN 51 818). For rolling bearings, classes 1, 2 or 3 should be used in preference, *Figure 5*.

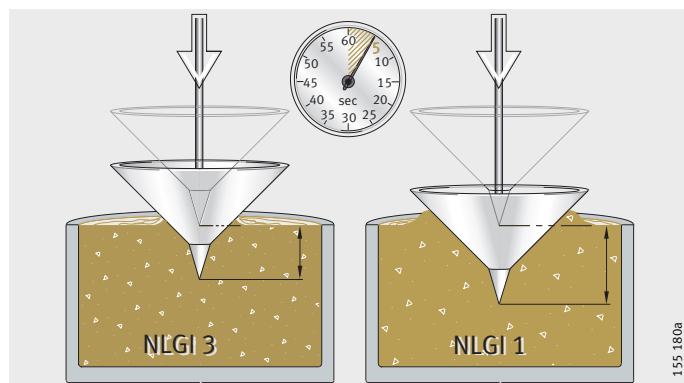


Figure 5
Consistency of greases

- Selection of suitable grease** Rolling bearing greases K to DIN 51 825 are suitable. Suitable greases should be selected in accordance with the operating conditions of the bearing:
- temperature
 - compressive load
 - speed
 - the presence of water/moisture.

Operating temperature range The operating temperature range of the grease must correspond to the range of possible operating temperatures in the rolling bearing. Grease manufacturers indicate an operating temperature range for their rolling bearing greases K in accordance with DIN 51 825. The upper value is determined in accordance with DIN 51 821 by means of testing using the FAG rolling bearing grease test rig FE 9. At the upper operating temperature, a 50% failure probability (F_{50}) of at least 100 hours must be achieved in this test. The lower value is defined in accordance with DIN 51 825 by means of flow pressure. The flow pressure of a grease is the pressure required to press a stream of grease through a defined nozzle. For greases of type K, the flow pressure at the lower operating temperature must be less than 1400 mbar.

Lubrication

The use of flow pressure in determining the lower operating temperature only indicates, however, whether the grease can be moved at this temperature. This cannot be used to give an indication of its suitability for use in rolling bearings at low temperatures.

In addition to the lower operating temperature of a grease, therefore, the low temperature frictional torque is also determined in accordance with ASTM D 1478 or IP 186/93. At the lower operating temperature, the starting torque must not exceed 1 000 Nmm and the running torque must not exceed 100 Nmm.

Schaeffler Group Industrial recommends that greases should be used in accordance with the bearing temperature normally occurring in the standard operating range in order to achieve a reliable lubricating action and an acceptable grease operating life, *Figure 6*.

At low temperatures, greases release very little base oil. This can result in lubricant starvation. Schaeffler Group Industrial therefore recommends that greases are not used below the lower continuous limit temperature $T_{\text{lowerlimit}}$, *Figure 6*. This is approx. 20 K above the lower operating temperature of the grease as indicated by the grease manufacturer.

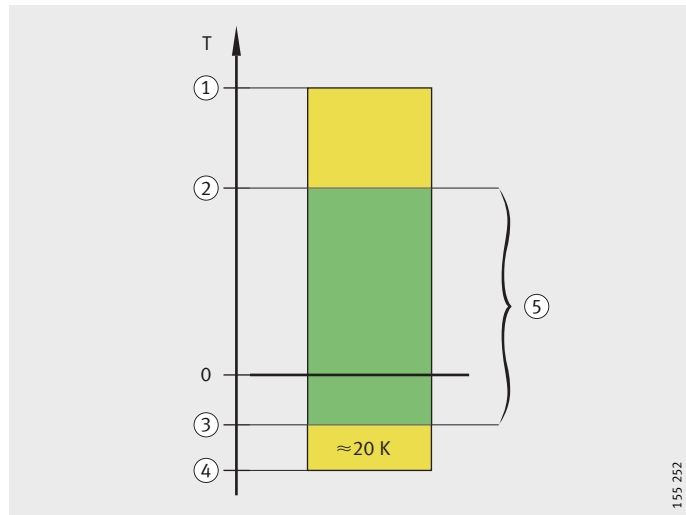
The upper continuous limit temperature $T_{\text{upperlimit}}$ must not be exceeded if a reduction in the grease operating life due to temperature is to be avoided. See the section Grease operating life, page 74.

Caution! At consistently low temperatures (for example in cold store applications), it must be ensured that the grease releases sufficient oil in relation to the bearing type.

- ① Upper operating temperature according to grease manufacturer
- ② $T_{\text{upperlimit}}$
- ③ $T_{\text{lowerlimit}}$
- ④ Lower operating temperature according to grease manufacturer
- ⑤ Standard operating range

Figure 6

Operating temperature range



155 252

Pressure properties The viscosity at operating temperature must be sufficiently high for the formation of a lubricant film capable of supporting loads. At high loads, greases with EP characteristics – “extreme pressure” – and high base oil viscosity should be used (KP grease to DIN 51 825). Such greases should also be used for bearings with substantial sliding or line contact.

Silicone greases should only be used at low loads ($P \leq 3\% C$).

Caution! Greases with solid lubricants should preferably be used for applications with mixed or boundary friction conditions. The solid lubricant particle size must not exceed $5 \mu\text{m}$.

Speed Grease should be selected in accordance with the speed parameter $n \cdot d_M$ for grease (see table, page 72 and page 73):

- For rolling bearings running at high speeds or with a low starting torque, greases with a high speed parameter should be used.
- For bearings running at low speeds, greases with a low speed parameter should be used.

Under centrifugal acceleration greater than 500 g, separation (of the thickener and base oil) may occur. In this case, please consult the lubricant manufacturer.

Caution! The consistency of polycarbamide greases can be altered by shear stresses to a greater extent than that of metal soap greases.

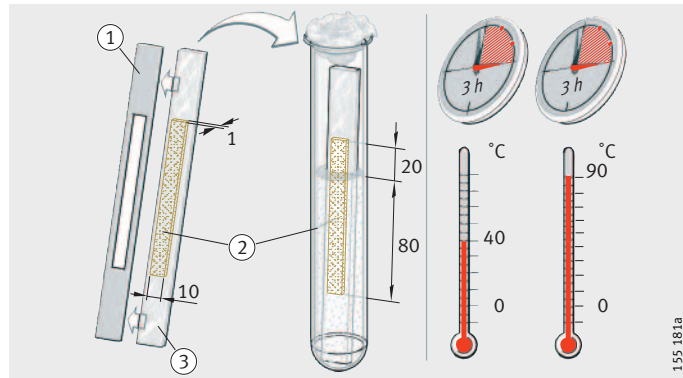
Water/moisture Water in the grease has a highly detrimental effect on the operating life of the bearing:

- the static behaviour of greases in the presence of water is assessed in accordance with DIN 51 807, see Figure 7
- the anti-corrosion characteristics can be tested according to DIN 51 802 (Emcor test) – information is given in the grease manufacturer’s data sheets.

- ① Blank
- ② Grease specimen
- ③ Glass slide

Figure 7

Behaviour in the presence of water in accordance with DIN 51 807



Lubrication

Greases with special suitability

Schaeffler Group Industrial uses greases in accordance with the table Greases. These have proved particularly suitable for the applications in mechanical-dynamic tests.

Greases

Designation	Classification	Type of grease
GA01	Ball bearing grease for $T < +180\text{ °C}$	Polycarbamide Ester oil
GA02	Ball bearing grease for $T < +160\text{ °C}$	Polycarbamide SHC
GA13	Standard ball bearing/ insert bearing grease for $D > 62\text{ mm}$	Lithium soap Mineral oil
GA14	Low-noise ball bearing grease for $D \leq 62\text{ mm}$	Lithium soap Mineral oil
GA15	Low-noise ball bearing grease for high speeds	Lithium soap Ester oil
GA22	Free-running grease with low frictional torque	Lithium soap Ester oil
L014	Initial greasing for insert bearings for low temperatures	Gel Ester oil
L086	Initial greasing for insert bearings for wide temperature range and low loads	Sodium complex soap Silicone oil
GA08	Grease for line contact	Lithium complex soap Mineral oil
GA26	Standard grease for drawn cup roller clutches	Calcium/ lithium soap Mineral oil
GA28	Screw drive bearing grease	Lithium soap Ester oil
GA11	Rolling bearing grease resistant to media for temperatures up to $+250\text{ °C}$	PTFE Alkoxyfluoroether
GA47	Rolling bearing grease resistant to media for temperatures up to $+140\text{ °C}$	Barium complex soap Mineral oil

- 1) The upper continuous limit temperature $T_{\text{upperlimit}}$ must not be exceeded if a reduction in the grease operating life due to temperature is to be avoided.
- 2) Dependent on bearing type.
- 3) Operating temperature range determined not according to DIN 51 825 but to MIL specification.

Operating temperature range °C	Upper continuous limit temperature $T_{\text{upperlimit}}^{1)}$ °C	NLGI class	Speed parameter $n \cdot d_M$ $\text{min}^{-1} \cdot \text{mm}$	ISO VG class (base oil) ²⁾	Designation
-40 to +180	+115	2 to 3	600 000	68 to 220	GA01
-40 to +160	+85	2 to 3	500 000	68 to 220	GA02
-30 to +140	+75	3	500 000	68 to 150	GA13
-30 to +140	+75	2	500 000	68 to 150	GA14
-50 to +150	+70	2 to 3	1 000 000	22 to 32	GA15
-50 to +120	+70	2	1 000 000	10 to 22	GA22
-54 to +204 ³⁾	+80	1 to 2	900 000	22 to 46	L014
-40 to +180	+115	3	150 000	68 to 150	L086
-30 to +140	+95	2 to 3	500 000	150 to 320	GA08
-20 to +80	+60	2	500 000	10 to 22	GA26
-30 to +160	+110	2	600 000	15 to 100	GA28
-40 to +250	+180	2	300 000	460 to 680	GA11
-20 to +140	+70	1 to 2	350 000	150 to 320	GA47

Lubrication

Grease operating life

The grease operating life t_{fG} is the decisive value if it is less than the calculated bearing life. It applies if rolling bearings cannot be relubricated.

A guide value for the grease operating life t_{fG} can be determined in approximate terms.

$$t_{fG} = t_f \cdot K_T \cdot K_P \cdot K_R \cdot K_U \cdot K_S$$

t_{fG} h
Guide value for grease operating life

t_f h
Basic grease operating life

K_T, K_P, K_R, K_U, K_S –
Correction factors for temperature, load, oscillation, environment, vertical shaft, page 77 to page 80.

Caution! If a grease operating life > 3 years is required, this should be discussed with the lubricant manufacturer.

Basic grease operating life

The basic grease operating life t_f is valid under the following preconditions, see table:

Preconditions for basic grease operating life t_f

	Precondition
Bearing temperature	< Upper continuous limit temperature $T_{upperlimit}$
Load ratio	$C_0/P = 20$
Speed and load	Constant
Load in main direction	Radial bearings – radial, axial bearings – axial
Axis of rotation	Horizontal for radial bearings
Inner ring	Rotating
Environmental influences	No disruptive influences

Bearing-specific speed parameter $k_f \cdot n \cdot d_M$

The basic grease operating life t_f is dependent on the bearing-specific speed parameter $k_f \cdot n \cdot d_M$.

k_f –
Factor for bearing type, table Factor k_f , page 75

n min^{-1}
Operating speed or equivalent speed

d_M mm
Mean bearing diameter $(d + D)/2$.

**Factor k_f –
as a function of bearing type**

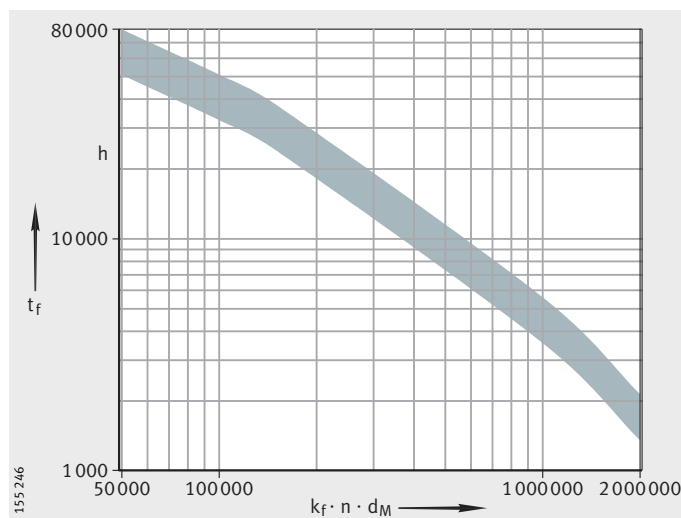
Bearing type	Factor k_f
Deep groove ball bearings, single row	1
Deep groove ball bearings, double row	1,5
Angular contact ball bearings, single row	1,6
Angular contact ball bearings, double row	2
Four point contact bearings	1,6
Self-aligning ball bearings	1,45
Axial deep groove ball bearings	5,5
Axial angular contact ball bearings, double row	1,4
Cylindrical roller bearings, single row, with constant axial load	3,25
Cylindrical roller bearings, single row, with alternating axial load	2
Cylindrical roller bearings, double row	3,5
Cylindrical roller bearings, full complement	5,3
Tapered roller bearings	4
Barrel roller bearings	10
Spherical roller bearings without central rib	8
Spherical roller bearings with central rib	10,5
Needle roller and cage assemblies, needle roller bearings	3,6
Drawn cup needle roller bearings	4,2
Yoke and stud type track rollers, with cage or full complement cylindrical roller set	15,5
Yoke and stud type track rollers with full complement needle roller set	30
Yoke type track rollers, single row	1
Yoke type track rollers, double row	2
Yoke type track rollers PWTR, stud type track rollers PWKR	3,2
Cylindrical roller bearings LSL, ZSL	3,1
Crossed roller bearings	4,4
Axial needle roller bearings, axial cylindrical roller bearings	58
Radial insert ball bearings, housed bearing units	1

**Calculation
of basic grease operating life t_f**

Calculation of the bearing-specific speed parameter $k_f \cdot n \cdot d_M$ and basic grease operating life t_f from *Figure 8*.

t_f = basic grease operating life
 $k_f \cdot n \cdot d_M$ = speed parameter

Figure 8
Calculation of
basic grease operating life t_f



Lubrication

Guidelines on calculating the grease operating life Combined rolling bearings

Caution!

The radial and axial bearing components must be calculated separately – the decisive value is the shorter grease operating life.

Rotating outer ring

If the outer ring rotates, there may be a reduction in the grease operating life.

In the case of yoke and stud type track rollers:

- angular misalignment must be zero
- the effect of the rotating outer ring on the grease operating life is taken into consideration in the bearing type factor k_f .

Restrictions

Caution!

The grease operating life cannot be determined using the above method:

- if the grease can flow out of the rolling bearing
 - there is excessive evaporation of the base oil
 - in bearings without seals
 - in axial bearings with a horizontal axis of rotation
- if air is sucked into the rolling bearing during operation
 - this can cause the grease to oxidise
- in combined rotary and linear motion
 - the grease is distributed over the whole stroke length
- if contamination, water or other fluids enter the bearings
- for spindle bearings
- for drawn cup roller clutches
- for screw drive bearings
- for high precision bearings for combined loads.

The additional guidelines on lubrication in the product sections must be observed.

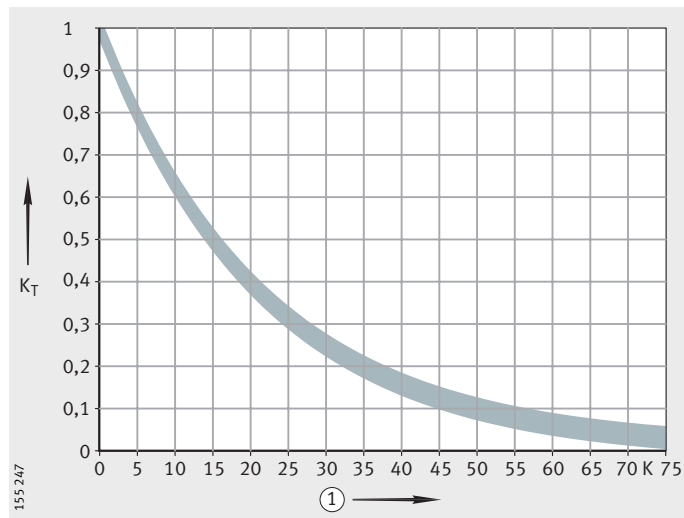
**Correction factors for determining
the grease operating life**
Temperature factor K_T

If the bearing temperature is higher than the continuous limit temperature $T_{upperlimit}$, K_T must be calculated from the diagram, *Figure 9*.

Caution! The diagram should not be used if the bearing temperature is higher than the upper operating temperature of the grease used, see table Greases, page 72.
If necessary, select a different grease and/or consult the engineering service.

K_T = temperature factor
① K above $T_{upperlimit}$

Figure 9
Temperature factor K_T

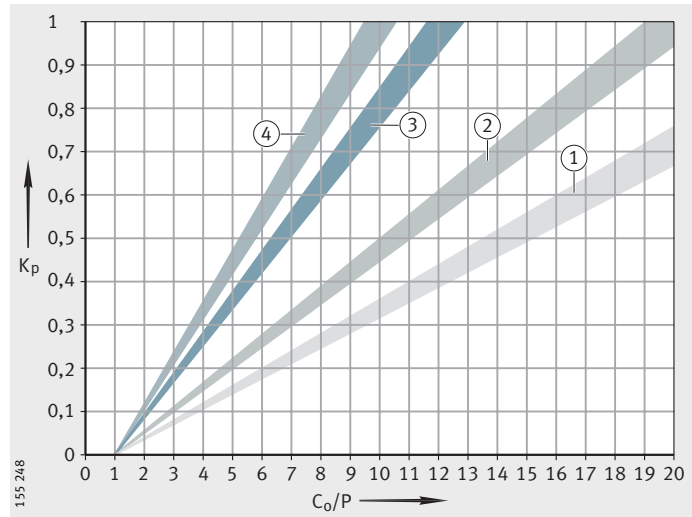


Lubrication

Load factor K_p The load factor reflects the reduction due to higher load, as a function of the bearing type. This places greater strain on the grease, *Figure 10*.
This is based on high-quality lithium soap greases.

①, ②, ③, ④ See table K_p factor
 C_0/P = ratio between basic static load rating and equivalent dynamic bearing load

Figure 10
 K_p factor for bearings



K_p factor

Curve ¹⁾	Application
①	Axial angular contact ball bearings, double row
	Axial deep groove ball bearings
	Axial needle roller bearings, axial cylindrical roller bearings
	Crossed roller bearings
②	Spherical roller bearings with central rib
	Needle roller and cage assemblies, needle roller bearings
	Drawn cup needle roller bearings
	Cylindrical roller bearings, double row
③	Yoke type track rollers PWTR, stud type track rollers PWKR
	Cylindrical roller bearings LSL, ZSL
	Yoke and stud type track rollers, with cage or full complement cylindrical roller set
	Yoke and stud type track rollers with full complement needle roller set
	Tapered roller bearings
	Spherical roller bearings without central rib (E1)
	Barrel roller bearings
	Cylindrical roller bearings, full complement
	Cylindrical roller bearings, single row (constant/alternating load)
Four point contact bearings	
④	Deep groove ball bearings (single/double row)
	Angular contact ball bearings (single/double row)
	Self-aligning ball bearings
	Yoke type track rollers (single/double row)
	Radial insert ball bearings, housed bearing units

¹⁾ Curves: see *Figure 10*.

Oscillation factor K_R

Oscillating motion places a greater strain on the grease than does rotating motion.

Caution! In order to reduce fretting corrosion, the lubrication interval should be reduced.
If the rolling elements do not undergo a complete revolution, please consult the engineering service.

The factor K_R applies for an angle of oscillation φ of $< 180^\circ$, Figure 11 and Figure 12.

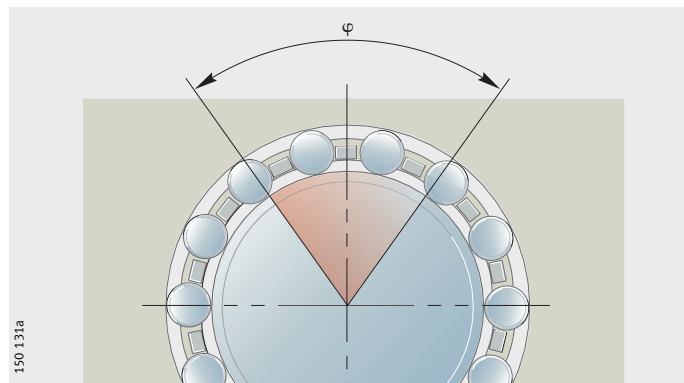
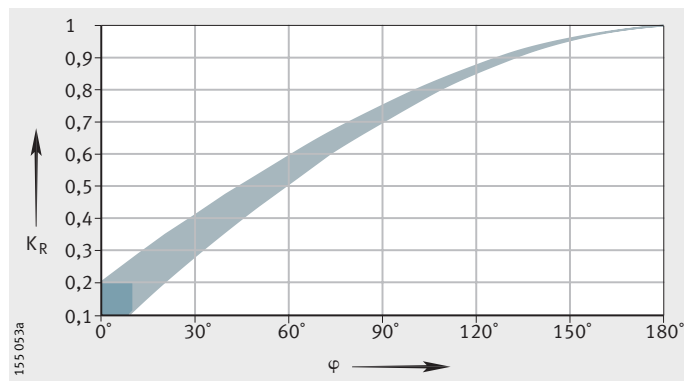


Figure 11
Angle of oscillation φ



K_R = oscillation factor
 φ = angle of oscillation

Figure 12
Oscillation factor K_R

Environmental factor K_U

The environmental factor K_U takes account of the influences of moisture, shaking forces, slight vibration (leading to fretting corrosion) and shocks, see table Environmental factor K_U .

Caution! The environmental factor K_U does not take account of extreme environmental influences such as water, aggressive media, contamination, radiation and extreme vibrations such as those occurring in vibratory machines.

In relation to contamination, attention should also be paid to the section Influence of contamination on life calculation.

Environmental factor K_U

Environmental influence	Environmental factor K_U
Slight	1
Moderate	0,8
Severe	0,5

Lubrication

Factor K_S for vertical shafts If increased escape of grease is expected, for example in radial bearings with a vertical axis of rotation, the factor according to the table Factor K_S for vertical shafts must be applied.

Factor K_S for vertical shafts

Vertical shaft	Factor K_S
Vertical shaft (depending on sealing)	0,5 to 0,7
Otherwise	1

Relubrication intervals

For rolling bearings that are relubricated, attention must be paid to the lubrication interval in order to ensure reliable function of the bearings.

Caution! The precise lubrication interval should be determined by tests conducted under application conditions:

- sufficiently long observation periods must be used
- the condition of the grease must be checked at regular intervals.

In most applications, experience has shown that the guide value is:

$$t_{FR} = 0,5 \cdot t_{FG}$$

t_{FR} h
Guide value for relubrication interval

t_{FG} h
Guide value for grease operating life.

Conditions

The grease should be the same as that used for initial greasing. If different greases are used, their miscibility and compatibility should be checked.

Relubrication should be carried out:

- with the bearing still warm from operation and rotating if safe to do so
- before the bearing comes to rest if safe to do so
- before extended breaks in operation.

Relubrication quantity

Due to the compact construction of INA/FAG bearings, we recommend that relubrication should be carried out using 50% to 80% of the initial greasing quantity.

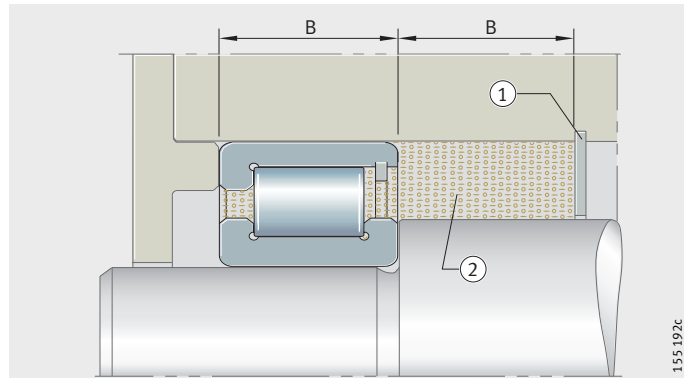
If feed lines filled with air are present, the filling volume of the feed lines should be included in calculation of the relubrication quantity.

Relubrication

Regreasing should continue until a fresh collar of grease appears at the seal gaps. Old grease must be able to leave the bearing unhindered.

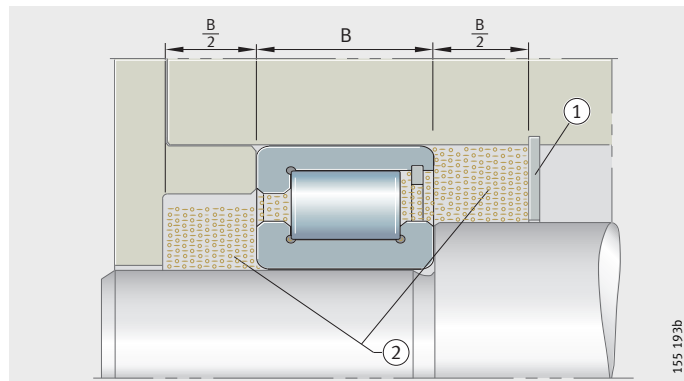
- ① Sealing shield
- ② Grease reservoir

Figure 13
Grease reservoir on one side



- ① Sealing shield
- ② Grease reservoir

Figure 14
Grease reservoir on both sides



The initial greasing quantity is between 30% and 100% of the available volume in the bearing, dependent on the bearing type and operating conditions.

A grease reservoir can extend the grease operating life. The grease in the reservoir must be in constant contact with the grease on the raceway. The grease operating life does not increase proportionally with the size of the grease reservoir.

The volume of the grease reservoir should correspond to the area in the bearing between the inner and outer ring (not taking account of the cage and rolling elements), *Figure 13* and *Figure 14*.

Evaporation of the base oil should be prevented by design measures, for example by sealing shields, *Figure 13* and *Figure 14*.

Lubrication

- Miscibility** Mixing of greases should be avoided if at all possible. If mixing of greases is unavoidable, the following preconditions must be fulfilled:
- same base oil
 - compatible thickener types
 - similar base oil viscosities – differing by no more than one ISO VG class
 - same consistency – NLGI class.
- Caution!** Consult the grease manufacturer.
- Even if these preconditions are fulfilled, impairment of the performance capability of the mixed grease cannot be ruled out. If a conscious decision is taken to change to a different grease grade, the grease should be rinsed out if this is permitted by the design of the mounting location. Further relubrication should be carried out after a shortened period.
- Caution!** If incompatible greases are mixed this may lead to substantial structural changes and even to a substantial softening of the mixed grease.
- Definite statements on miscibility can only be obtained by means of suitable tests.
- Storage** Experience shows that the greases used can be stored for up to 3 years.
- The preconditions are:
- a closed room or store
 - temperatures between 0 °C and + 40 °C
 - relative humidity no more than 65%
 - no influence of chemical agents – vapours, gases, fluids
 - the bearings are sealed.
- Caution!** Lubricants age due to environmental influences. The information provided by the lubricant manufacturer should be adhered to.
- After long periods of storage, the start-up frictional torque of greased bearings can be temporarily higher than normal. The lubricity of the grease may also have deteriorated.
- Since the lubrication characteristics of greases vary and different raw materials may be used for greases of the same name as a result of globalisation, we cannot offer any guarantees either for the lubricants used by customers for relubrication or for their characteristics in operation.

Oil lubrication

For the lubrication of rolling bearings, mineral oils and synthetic oils are essentially suitable. Oils with a mineral oil base are used most frequently. They must fulfil at least the requirements according to DIN 51 517 or DIN 51 524. Special oils, often synthetic oils, are used under extreme operating conditions or where there are special requirements relating to oil resistance.

Caution! In these cases, please consult the lubricant manufacturer or our engineering service.

Operating temperatures

Caution! The information provided by the lubricant manufacturer should be taken as authoritative.

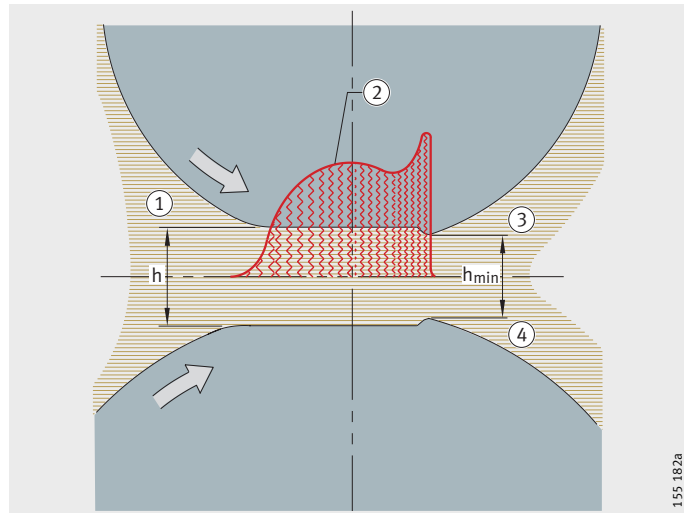
Selection of suitable oil

The achievable life and security against wear are higher with better separation of the contact surfaces by a lubricant film, *Figure 15* and section Load carrying capacity and life.

- ① Entry zone
- ② Pressure curve according to EHD theory
- ③ Exit zone
- ④ Lubricant

Figure 15

Lubricant film in the contact zones – schematic



Lubrication

Reference viscosity for mineral oils

The guide value for ν_1 is dependent on:

- the mean bearing diameter d_M and the speed n .

The guide value ν_1 takes account of:

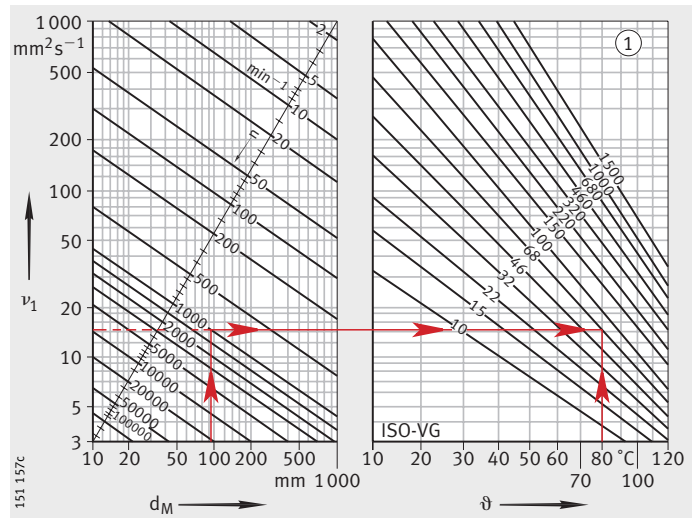
- the EHD theory on the formation of a lubricant film
- practical experience.

Depending on the operating speed, the oil at operating temperature must have at least the reference viscosity ν_1 , *Figure 16*.

- n = operating speed
- ν_1 = reference viscosity
- d_M = mean bearing diameter $(d + D)/2$
- ϑ = operating temperature
- ① Viscosity mm^2s^{-1} at $+40\text{ }^\circ\text{C}$

Figure 16

Reference viscosity and V/T diagram for mineral oils



Calculation of reference viscosity

Calculate the reference viscosity ν_1 in accordance with the example, *Figure 16*:

- Assign ν_1 to a nominal viscosity with ISO VG between 10 and 1500
 - centre point viscosity to DIN 51 519
- Round intermediate values should be rounded to the nearest ISO VG
 - due to the steps between the groups.

Caution! This method cannot be used for synthetic oils, since these have different viscosity/pressure and viscosity/temperature characteristics.

Please consult our engineering service.

Influence of temperature on viscosity

As the temperature increases, the viscosity of the oil decreases. This temperature-dependent change in the viscosity is described using the viscosity index VI. For mineral oils, this VI should be at least 95.

Caution! When selecting the viscosity, the lower operating temperature must be taken into consideration:

■ increasing viscosity restricts the flow behaviour of the lubricant and leads to increased power losses.

Very long life can be achieved with a viscosity ratio $\kappa = \nu/\nu_1 = 3$ to 4 (ν = operating viscosity). Highly viscous oils do not, however, bring only advantages. In addition to the aforementioned power losses due to lubrication friction, there may be problems with the feed and removal of oil at low or even at normal temperatures.

The oil must therefore be selected to be sufficiently viscous that the longest possible fatigue life is achieved while ensuring satisfactory supply of oil to the bearings at all times.

Pressure properties of oil

If the bearings are subjected to high loads or the operating viscosity ν is less than the reference viscosity ν_1 , oils with anti-wear additives (type P to DIN 51 502) should be used.

Such oils are also necessary for types of rolling bearings with a substantial proportion of sliding contact (for example bearings with line contact).

These additives form boundary layers to reduce the harmful effects of metallic contact occurring at various areas (wear).

The suitability of these additives varies and is normally heavily dependent on temperature. Their effectiveness can only be assessed by means of testing in the rolling bearing (for example on our test rig FE8 in accordance with DIN 51 819).

Caution! Silicone oils should only be used for low loads ($P \leq 3\%$ C).

Compatibility

Caution! Before oils are used, their behaviour must be checked in relation to plastics, seal materials (elastomers) and light and non-ferrous metals.

This must be checked under dynamic conditions and at operating temperature.

Synthetic oils must always be checked for their compatibility and the lubricant manufacturer must be consulted.

Miscibility

Mixing of different oils should be avoided wherever possible. In particular, the presence of different additive packages may lead to undesirable interactions.

In general, oils with a mineral oil base and the same classification are miscible, for example two oils both of type HLP can be mixed.

The viscosities should vary by no more than one ISO VG class.

Caution! Synthetic oils must always be checked for their compatibility and the lubricant manufacturer must be consulted.

Miscibility must be checked in advance for each individual case.

Lubrication

Cleanliness The cleanliness of the oil influences the rating life of bearings, see section Expanded adjusted rating life.

Recommendation:

- An oil filter should be provided and attention should be paid to the filtration rate (recommended filter mesh $< 25 \mu\text{m}$).

Lubrication methods A distinction can essentially be drawn between the following methods:

- drip feed oil lubrication
- pneumatic oil lubrication
 - in order to protect the environment, this should be used as a substitute for oil mist lubrication
- oil bath lubrication
 - splash or sump lubrication
- recirculating oil lubrication.

Drip feed oil lubrication This method is suitable for bearings running at high speeds, *Figure 17*.

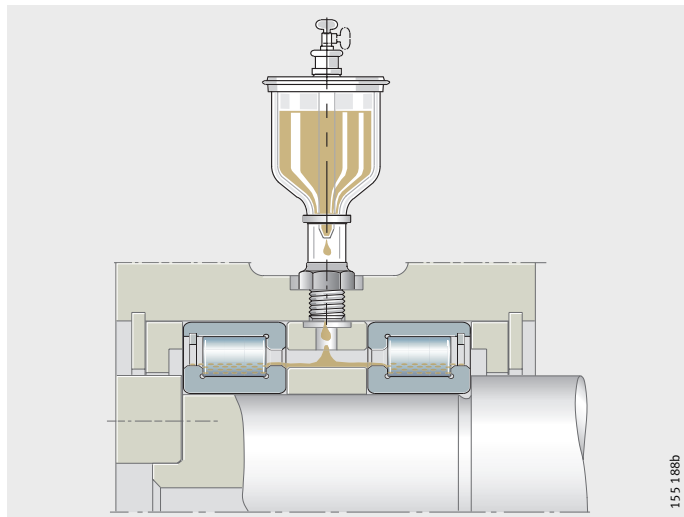


Figure 17
Drip feed lubrication – schematic

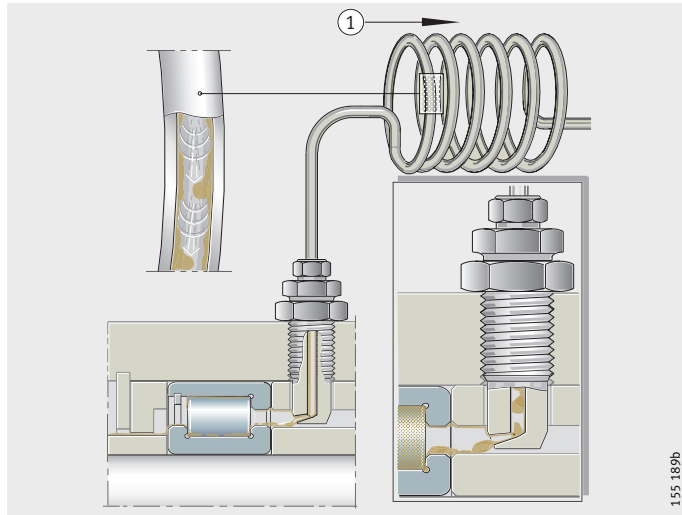
The oil quantity required is dependent on the type and size of bearing, the operating speed and the load.

The guide value is between 3 drops/min and 50 drops/min for each rolling element raceway (one drop weighs approx. 0,025 g).

Caution! Excess oil must be allowed to flow out of the bearing arrangement.

Pneumatic oil lubrication

This method is particularly suitable for radial bearings running at high speeds and under low loads ($n \cdot d_M = 800\,000$ to $3\,000\,000 \text{ min}^{-1} \cdot \text{mm}$). Parameters for designing the equipment should be requested from the lubrication device manufacturer, *Figure 18*.



① To the pneumatic oil unit

Figure 18

Pneumatic oil lubrication – schematic

With a pneumatic oil lubrication system designed for minimal quantity lubrication, low frictional torque and a low operating temperature can be achieved.

Clean compressed air free from moisture feeds oil to the bearing. This generates an excess pressure. This prevents contaminants from entering the bearing.

Pneumatic oil lubrication has little cooling effect.

Caution! Pneumatic oil lubrication of axial bearings should be avoided if possible.

The oil quantity required for adequate supply is dependent on the bearing type.

Follow the instructions provided by the lubrication device manufacturer.

Lubrication

Oil bath lubrication The oil level should reach the centre line of the lowest rolling element, *Figure 19*. If the oil level is higher than this, the bearing temperature may increase at high circumferential speeds and losses due to splashing may occur. Furthermore, foaming of the oil may occur.

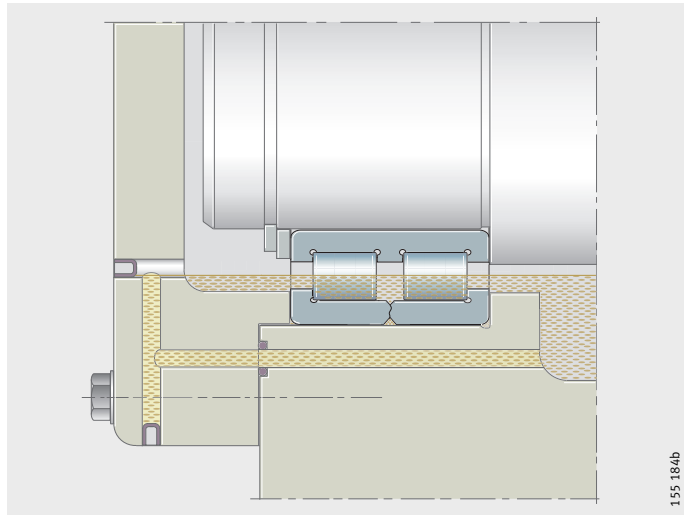


Figure 19
Oil bath lubrication –
schematic

In general, the method is suitable up to
 $n \cdot d_M = 300\,000 \text{ min}^{-1} \cdot \text{mm}$.

At $n \cdot d_M < 150\,000 \text{ min}^{-1} \cdot \text{mm}$, the bearing may be fully immersed.

In bearings with an asymmetrical cross-section, oil return ducts must be provided due to the pumping effect so that recirculation can be achieved.

In axial bearings, the oil level must cover the inside diameter of the axial cage.

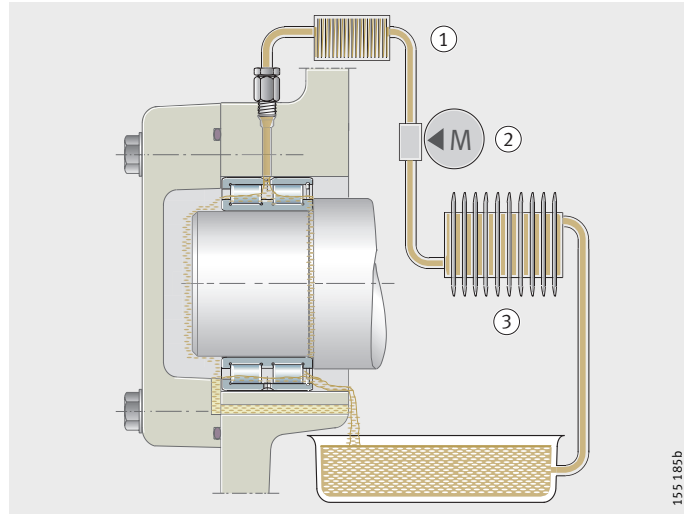
The oil quantity in the housing must be adequately proportioned, otherwise very short oil change intervals will be necessary.

Recirculating oil lubrication

In recirculating oil lubrication, the oil is subjected to additional cooling, *Figure 20*. The oil can therefore dissipate heat from the bearing. The quantity of oil required for heat dissipation is dependent on the cooling conditions, see section Speeds.

- ① Filter
- ② Pump
- ③ Cooling system

Figure 20
Recirculating oil lubrication – schematic

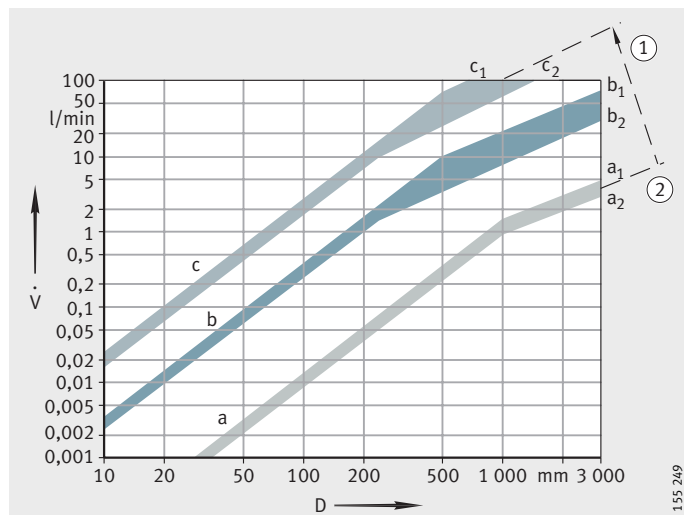


The oil quantities \dot{V} are matched to the operating conditions, *Figure 21*. The diagram indicates oil quantities that can be fed through the bearing without pressure with a side feed arrangement and banking up to the lower edge of the shaft.

For bearings with an asymmetrical cross-section (such as angular contact ball bearings, tapered roller bearings, axial spherical roller bearings), larger throughput quantities are permissible due to the pumping effect than for bearings with a symmetrical cross-section. Large quantities can be used to dissipate wear debris or heat.

- D = outside bearing diameter
- \dot{V} = oil quantity
- ① Increasing oil quantity required for heat dissipation
- ② No heat dissipation necessary
- a = oil quantity sufficient for lubrication
- b = upper limit for bearings of symmetrical design
- c = upper limit for bearings of asymmetrical design
- $a_1; b_1; c_1: D/d > 1,5$
- $a_2; b_2; c_2: D/d \leq 1,5$

Figure 21
Oil quantities



Lubrication

Design of adjacent construction for oil lubrication

The lubrication holes in the housing and shaft must align with those in the rolling bearings.

Adequate cross-sections must be provided for annular slots, pockets, etc.

The oil must be able to flow out without pressure (this prevents oil build-up and additional heating of the oil).

In axial bearings, the oil must always be fed from the inside to the outside.

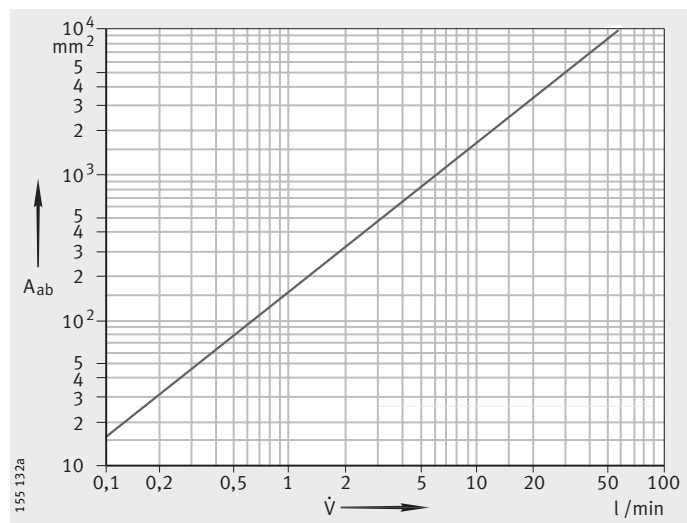
Outlet cross-section – guide values for oil lubrication

The cross-section of the oil outlet hole should be significantly larger than that of the inlet, *Figure 22*.

A_{ab} = cross-section for pressure-free oil runout
 \dot{V} = oil quantity

Figure 22

Outlet cross-sections – guide values



The cross-section A_{rab} is dependent on the oil quantity and the viscosity.

$$A_{rab} = K_{ab} \cdot A_{ab}$$

A_{rab} mm^2
 Outlet cross-section taking account of viscosity

K_{ab} –
 Correction factor for viscosity, see table Correction factor K_{ab}

A_{ab} mm^2
 Outlet cross-section, *Figure 22*.

Correction factor K_{ab}

Viscosity $\text{mm}^2 \cdot \text{s}^{-1}$	Correction factor K_{ab}
up to 30	1
30 to 60	1,2 to 1,6
60 to 90	1,8 to 2,2
90 to 120	2,4 to 2,8
120 to 150	3 to 3,4

Oil injection lubrication

In bearings running at high speeds, the oil is injected into the gap between the cage and bearing ring. Injection lubrication using large recirculation quantities is associated with high power loss, *Figure 23*.

Heating of the bearings can only be held within limits with a considerable amount of effort. The appropriate upper limit for the speed parameter $n \cdot d_M = 1\,000\,000 \text{ min}^{-1} \cdot \text{mm}$ for recirculating lubrication with suitable bearings (for example spindle bearings) can be exceeded to a considerable degree when using injection lubrication.

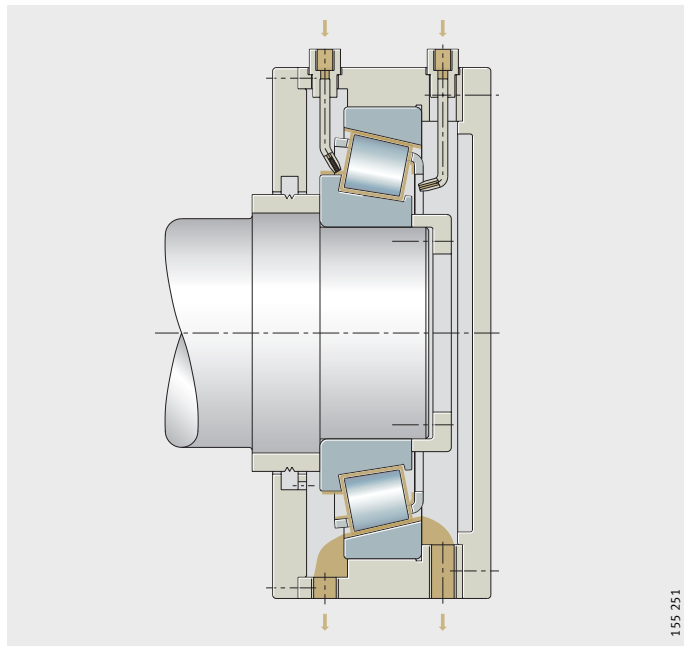


Figure 23
Oil injection lubrication –
oil feed from both sides for
tapered roller bearing running at
high speeds

Lubrication

Heat dissipation by the lubricant

Oil can dissipate frictional heat from the bearing.

The following can be calculated:

- the heat flow \dot{Q}_L dissipated by the lubricant, see section Speeds
- the required lubricant volume flow \dot{V}_L .

Heat flow

$$\dot{Q} = 10^{-6} \cdot \frac{\pi}{30} \cdot n \cdot (M_0 + M_1) + \dot{Q}_E$$

$$\dot{Q}_L = \dot{Q} - \dot{Q}_S$$

Approximate calculation

$$\dot{V}_L = \frac{\dot{Q}_L}{0,0286 \cdot \Delta\vartheta_L}$$

\dot{Q}_L	kW
Heat flow dissipated by the lubricant	
\dot{Q}	kW
Total dissipated heat flow	
\dot{Q}_S	kW
Heat flow dissipated via the bearing seating surfaces	
\dot{Q}_E	kW
Heat flow due to heating by external source	
n	min^{-1}
Operating speed or equivalent speed	
M_0	Nmm
Frictional torque as a function of speed	
M_1	Nmm
Frictional torque as a function of load	
\dot{V}_L	l/min
Lubricant volume flow	
$\Delta\vartheta_L$	K
Difference between oil outlet and oil inlet temperature.	

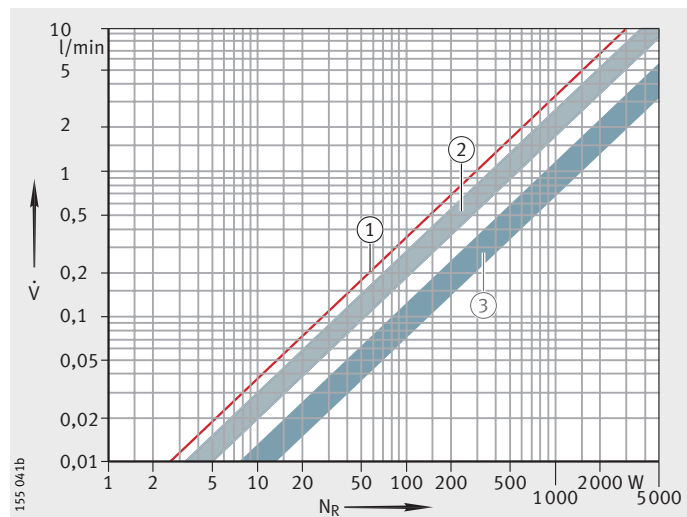
Guide values for the oil quantity in cooling and lubrication

If these values cannot be calculated, the guide values in accordance with Figure 24 are valid for a temperature difference of $\Delta\vartheta_L = 10$ K.

- \dot{V} = oil quantity
 N_R = frictional energy
- ① No account is taken of thermal conduction, radiation or convection
 - ② Empirical values for normal cooling conditions
 - ③ Empirical values for very good cooling conditions

Figure 24

Guide values for the oil quantity in lubrication/cooling



Oil changes

In general, an annual oil change is sufficient for temperatures in the bearing of less than +50 °C and low levels of contamination.

Severe operating conditions

Under severe conditions, the oil should be changed more frequently. This applies, for example, in the case of higher temperatures and low oil quantities with high recirculation frequencies.

The recirculation frequency indicates how often the entire oil volume available is recirculated and pumped per hour:

$$\text{Circulation index} = \frac{\text{Pump displacement} \left[\frac{\text{m}^3}{\text{h}} \right]}{\text{Container volume} \left[\text{m}^3 \right]}$$

Caution! The precise oil change intervals should be determined with the assistance of the oil manufacturer.

Guide values for oil change intervals are given in *Figure 25*.

t = oil change interval
 ϑ = oil sump temperature
 ① Synthetic gearbox oils
 ② Mineral gearbox oils
 Source: FVA Project No. 171

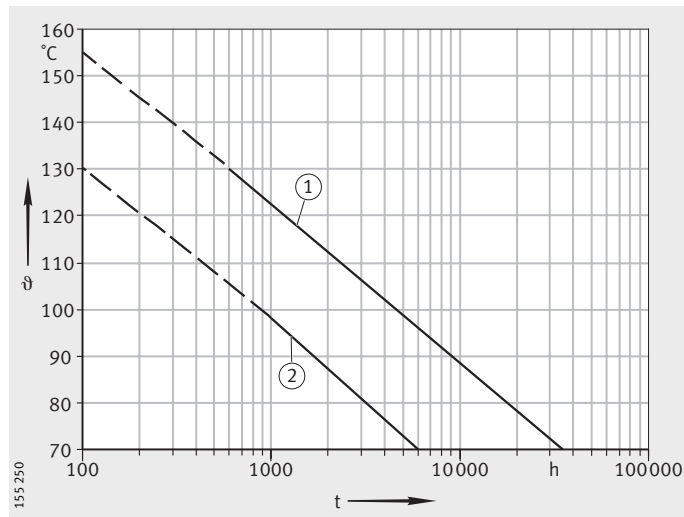


Figure 25
 Oil change intervals

Lubrication

Arcanol – rolling bearing greases

In co-operation with renowned lubricant manufacturers, Schaeffler Group Industrial has developed lubricating greases that are particularly suitable for rolling bearings. The greases in the Arcanol range are tested on the lubricant test rigs FE8 (DIN 51 819) and FE9 (DIN 51 821) in rolling bearings in relation to life, friction, wear and temperature suitability.

Every grease batch in the Arcanol range is subjected to goods inward inspection in order to ensure consistent quality.

The greases in the range are arranged in grades in terms of their performance capability such that almost all areas of application are covered, see table Arcanol rolling bearing greases.

Arcanol rolling bearing greases

Arcanol grease	Designation to DIN 51 825	Classification	Type of grease
MULTI2	K2N-30	Low-noise ball bearing grease for $D \leq 62$ mm	Lithium soap Mineral oil
MULTI3	K3N-30	Standard ball bearing/insert bearing grease for $D > 62$ mm	Lithium soap Mineral oil
SPEED2,6	KE3K-50	Spindle bearing grease Standard	Polycarbamide PAO + ester oil
MULTITOP	KP2N-40	Universal high performance grease	Lithium soap Mineral oil + ester oil ¹⁾
TEMP90	KP2P-40	Low-noise rolling bearing grease, up to +160 °C	Calcium soap + polycarbamide, PAO ¹⁾
TEMP110	KE2P-40	Universal grease for higher temperatures	Lithium complex soap, ester oil
TEMP120	KPHC2R-30	Grease for high temperatures and high loads	Polycarbamide PAO + ester oil ¹⁾
TEMP200	KFK2U-40	Rolling bearing grease for $T > +150$ °C to +250 °C	PTFE Alkoxyfluoroether
LOAD220	KP2N-20	Heavy duty grease, wide speed range	Lithium-calcium soap ¹⁾ Mineral oil
LOAD400	KP2N-20	Grease for high loads, shocks	Lithium-calcium soap ¹⁾ Mineral oil
LOAD1000	KP2N-20	Grease for high loads, shocks, large bearings	Lithium-calcium soap ¹⁾ Mineral oil
FOOD2	KPF2K-30	Grease with foodstuffs approval	Aluminium complex soap White oil
VIB3	KP3N-30	Grease for oscillating motion	Lithium complex soap Mineral oil
BIO2	KPE2K-30	Grease with rapid biodegradability	Lithium-calcium soap ¹⁾ Ester oil

¹⁾ With EP additives.

Operating temperature range °C	Upper continuous limit temperature T _{upperlimit} °C	NLGI class	Speed parameter n · d _M min ⁻¹ · mm	Kinematic viscosity	
				at +40 °C mm ² /s	at +100 °C
-30 to +140	+75	2	500 000	100	10
-30 to +140	+75	3	500 000	80	8
-50 to +120	+80	2/3	2 000 000	22	5
-40 to +150	+80	2	800 000	85	12,5
-40 to +160	+90	2	500 000	130	15,5
-40 to +160	+110	2	600 000	150	19,8
-35 to +180	+120	2	300 000	460	40
-40 to +260	+200	2	300 000	400	35
-20 to +140	+80	2	500 000	220	16
-25 to +140	+80	2	400 000	400	28
-20 to +140	+80	2	300 000	1 000	42
-30 to +120	+70	2	500 000	192	17,5
-30 to +150	+90	3	350 000	170	13,5
-30 to +120	+80	2	300 000	58	10

Bearing data

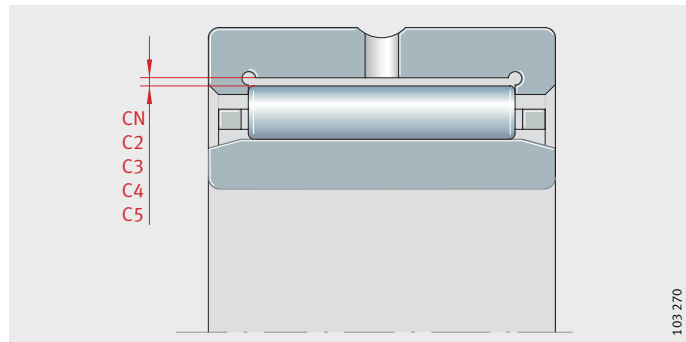
Radial internal clearance

The radial internal clearance applies to bearings with an inner ring before the bearing is fitted. It is defined as the amount by which the inner ring can be moved in a radial direction from one extreme position to the other in relation to the outer ring, *Figure 1*.

The radial internal clearance is subdivided into groups according to DIN 620 and ISO 5 753, see table Radial internal clearance groups. The values for the radial internal clearance are given in DIN 620-4, ISO 5 753 and in the Features section of the product description.

CN, C2, C3, C4, C5
Internal clearance groups

Figure 1
Radial internal clearance



Radial internal clearance groups

Internal clearance group ¹⁾	Description	Standard	Application
CN	Normal CN is not included in bearing designations	DIN 620-4 ISO 5 753	Normal operating conditions, shaft and housing tolerances as shown in Operating clearance and Design of bearing arrange- ments
C2	Smaller than CN		High alternating loads combined with oscillating motion
C3	Larger than CN		Bearing rings with press fits and large temperature differential between inner and outer ring
C4	Larger than C3		
C5	Larger than C4	ISO 5 753	

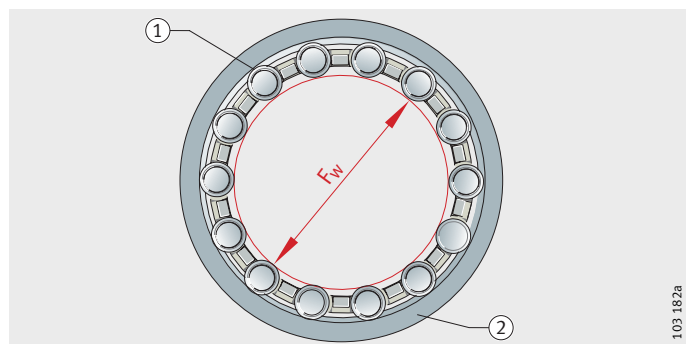
¹⁾ Internal clearance group values: see also product sections.

Enveloping circle

In bearings without inner ring, the enveloping circle value F_w is used. This is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway, *Figure 2*. For unfitted bearings, it is in tolerance zone F6 (except for drawn cup needle roller bearings).

① Needle roller
② Outer raceway

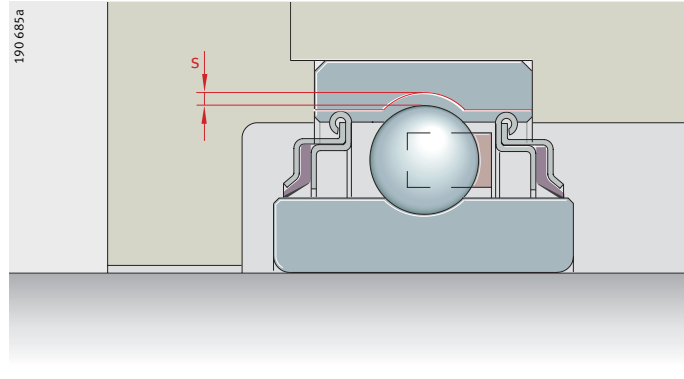
Figure 2
Enveloping circle F_w



Operating clearance

The operating clearance is determined on a fitted bearing still warm from operation. It is defined as the amount by which the shaft can be moved in a radial direction from one extreme position to the other, *Figure 3*.

The operating clearance is derived from the radial internal clearance and the change in the radial internal clearance as a result of interference fit and thermal influences in the fitted condition.



s = operating clearance

Figure 3
Operating clearance

Operating clearance value

The operating clearance value is dependent on the operating and installation conditions of the bearing.

A larger operating clearance is necessary, for example, if heat is transferred via the shaft, the shaft undergoes deflection or if misalignment occurs.

An operating clearance smaller than CN should only be used in special cases, for example in high precision bearing arrangements.

The normal operating clearance is achieved with internal clearance CN or, in larger bearings, predominantly with C3 if the recommended shaft and housing tolerances are fulfilled, see section Design of bearing arrangements, page 125.

Caution! Please observe the design guidelines in the section Design of bearing arrangements.

Calculation of operating clearance

The operating clearance is derived from:

$$s = s_r - \Delta s_p - \Delta s_T$$

s	μm
Radial operating clearance of fitted bearing warm from operation	
s _r	μm
Radial internal clearance	
Δs _p	μm
Reduction in radial internal clearance due to fit	
Δs _T	μm
Reduction in radial internal clearance due to temperature.	

Bearing data

Reduction in radial internal clearance due to fit

The radial internal clearance is reduced due to the fit as a result of expansion of the inner ring and contraction of the outer ring:

$$\Delta s_p = \Delta d + \Delta D$$

Δd μm
Expansion of the inner ring
 ΔD μm
Contraction of the outer ring.

Expansion of the inner ring

The expansion of the inner ring is calculated as follows:

$$\Delta d \approx 0,9 \cdot U \cdot d / F \approx 0,8 \cdot U$$

d mm
Bore diameter of the inner ring
 U μm
Theoretical interference of the fitted parts with firm seating
The theoretical interference is determined from:
the mean deviations and the upper and lower deviations of the tolerance zones of the fitted parts reduced by $\frac{1}{3}$ of their acceptable value. This must be reduced by the amount by which parts are smoothed during fitting
 F mm
Raceway diameter of the inner ring.

Caution! For very thin-walled housings and light metal housings, the reduction in the radial internal clearance must be determined by mounting trials.

Contraction of the outer ring

The expansion of the inner ring is calculated as follows:

$$\Delta D \approx 0,8 \cdot U \cdot E / D \approx 0,7 \cdot U$$

E mm
Raceway diameter of the outer ring
 D mm
Outside diameter of the outer ring.

Reduction in the radial internal clearance due to temperature

The radial internal clearance can alter considerably if there is a substantial temperature differential between the inner and outer ring.

$$\Delta s_T = \alpha \cdot d_M \cdot 1000 \cdot (\vartheta_{IR} - \vartheta_{AR})$$

Δs_T μm
Reduction in the radial internal clearance due to temperature
 α K^{-1}
Coefficient of thermal expansion of steel: $\alpha = 0,000011 \text{ K}^{-1}$
 d_M mm
Mean bearing diameter $(d + D)/2$
 ϑ_{IR} $^{\circ}\text{C}, \text{K}$
Temperature of the inner ring
 ϑ_{AR} $^{\circ}\text{C}, \text{K}$
Temperature of the outer ring.

Caution! A larger radial internal clearance should be used for shafts running at high speeds, since adequate thermal compensation between the bearing, shaft and housing does not occur in this situation. Δs_T can, in this case, be significantly higher in this case than for continuous operation.

Bearing materials

INA and FAG rolling bearings fulfil the requirements for fatigue strength, wear resistance, hardness, toughness and structural stability.

The material used for the rings and rolling elements is generally a low alloy, through hardening chromium steel of high purity. For bearings subjected to considerable shock loads and reversed bending stresses, case hardening steel is also used (supplied by agreement).

In recent years, the improved quality of rolling bearing steels has been the principal factor in achieving considerable increases in basic load ratings.

The results of research as well as practical experience confirm that bearings made from the steel currently used as standard can achieve their endurance limit if loads are not excessively high and the lubrication and cleanliness conditions are favourable.

High Nitrogen Steel

Through the use of special bearings made from HNS (High Nitrogen Steel, supplied by agreement), it is possible to achieve adequate service life even under the most challenging conditions (high temperatures, moisture, contamination).

Ceramic materials

Ceramic hybrid spindle bearings contain balls made from silicon nitride. These ceramic balls are substantially lighter than steel balls. The centrifugal forces and friction are significantly lower.

Hybrid bearings allow very high speeds – even with grease lubrication – as well as long operating life and low operating temperatures.

Materials and bearing components

Material	Bearing component – example
Through hardening chromium steel – rolling bearing steel to ISO 683-17	Outer and inner ring, axial washer
HNS – High Nitrogen Steel	Outer and inner ring
Corrosion-resistant steel – rolling bearing steel to ISO 683-17	Outer and inner ring
Case hardening steel	e.g. outer ring of yoke type track rollers
Flame or induction hardening steel	Stud of stud type track rollers
Steel strip to EN 10139, SAE J403	Outer ring of drawn cup needle roller bearings
Silicon nitride	Ceramic balls
Brass alloy	Cage
Aluminium alloy	Cage
Polyamide – thermoplastic	Cage
NBR, FPM, PUR	Sealing ring

Bearing data

Cages

The most important functions of the cage are:

- to separate the rolling elements from each other in order to minimise friction and heat generation
- to maintain the rolling elements at the same distance from each other in order to ensure uniform load distribution
- to prevent the rolling elements from falling out in bearings that can be dismantled or swivelled out
- to guide the rolling elements in the load zone of the bearing.

Rolling bearing cages are subdivided into sheet metal and solid section cages.

Sheet metal cages

These cages are predominantly made from steel and for some bearings from brass, *Figure 4*. In comparison with solid section cages made from metal, they are of lower mass.

Since a sheet metal cage only fills a small proportion of the gap between the inner and outer ring, lubricant can easily reach the interior of the bearing and is held on the cage.

In general, a sheet steel cage is only included in the bearing designation if it is not defined as a standard version of the bearing.

Solid section cages

These cages are made from metal, laminated fabric or plastic, *Figure 5*. They can be identified from the bearing designation.

Solid section cages made from metal or laminated fabric

Solid section cages made from metal are used where there are requirements for high cage strength and at high temperatures.

Solid section cages are also used if the cage must be guided on ribs. Rib-guided cages for bearings running at high speeds are made in many cases from light materials such as light metal or laminated fabric in order to achieve low inertia forces.

Solid section cages made from polyamide PA66

Solid section cages made from polyamide 66 are produced using injection moulding, *Figure 6*. Cage types can thus generally be realised that allow designs with particularly high load carrying capacity. The elasticity and low mass of polyamide are favourable under shock type bearing loads, high accelerations and decelerations and tilting of the bearing rings in relation to each other. Polyamide cages have very good sliding and emergency running characteristics.

Cages made from glass fibre reinforced polyamide 66 are suitable for long term temperatures up to +120 °C.

Caution! When using oil lubrication, additives in the oil can impair the cage operating life. The interrelationship between the cage operating life, the long term temperature of the stationary bearing ring and the lubricant is shown in *Figure 7*, page 102. Aged oil can also impair the cage operating life at high temperatures, so attention must be paid to compliance with the oil change intervals.

Cage designs – examples

- ① Lug cage and
- ② Riveted cage for deep groove ball bearings
- ③ Window cage for spherical roller bearings



Figure 4
Sheet steel cages

- ① Riveted solid section cage for deep groove ball bearings
- ② Window cage for angular contact ball bearings
- ③ Riveted cage with crosspiece rivets for cylindrical roller bearings

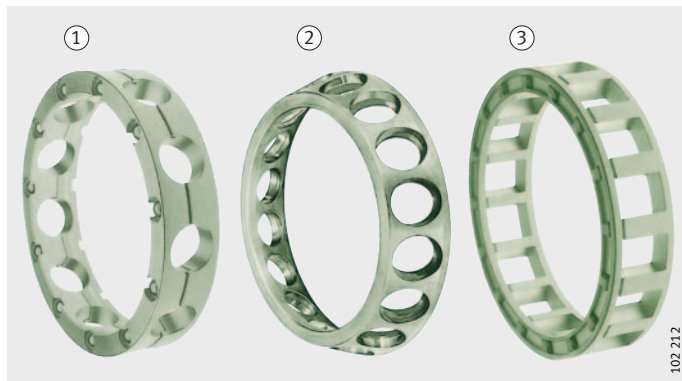


Figure 5
Solid section brass cages

- ① Window cage for single row angular contact ball bearings
- ② Window cage for cylindrical roller bearings

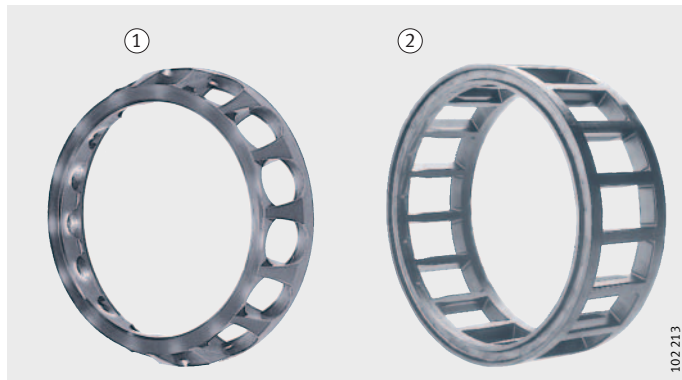
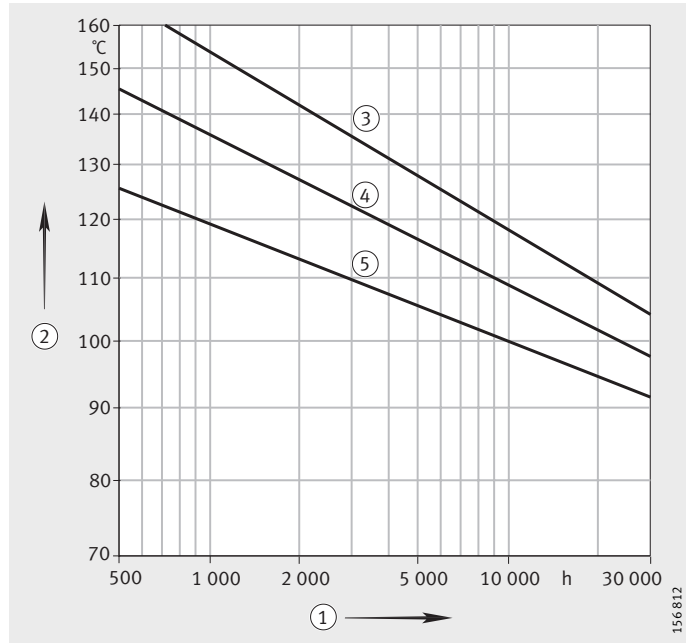


Figure 6
Solid section cages made from glass fibre reinforced polyamide

Bearing data

- ① Operating life of window cages
- ② The curves are valid for the long term temperature of the stationary bearing ring. If the high temperature does not act continuously, the cage operating life is longer.
- ③ Rolling bearing grease K to DIN 51 825, engine oil or machine oil
- ④ Gearbox oil
- ⑤ Hypoid oil

Figure 7
Operating life of window cages made from polyamide PA66-GF25



Guidance method

A further means of distinguishing between cages is their guidance method, *Figure 8*. Most cages are guided by the rolling elements and do not have a suffix for the guidance method.

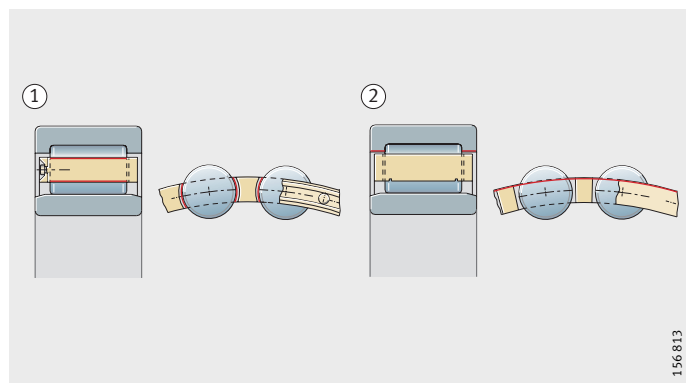
If guidance is by the bearing outer ring, the suffix A is used. Cages that are guided on the inner ring have the suffix B.

Under normal operating conditions, the cage design defined as the standard cage is generally suitable. Standard cages that may differ within a bearing series according to the bearing size are described in the product sections.

Under special operating conditions, a cage that is suitable for the specific conditions must be selected.

- Rolling bearing cages
- ① Guided by rolling elements
 - ② Guided by ribs

Figure 8
Guidance of cages



Operating temperature

Rolling bearings are thermally stabilised such that, depending on the bearing type, they are generally dimensionally stable up to +120 °C or +150 °C.

Operating temperatures above +150 °C require special heat treatment. Bearings treated in this way are available by agreement and are identified by the suffix S1 ... S4 (DIN 623-1).

Temperature range and corresponding suffixes:
see table Bearings for high temperatures.

Caution! The temperature data in the product sections must be observed.

Bearings for high temperatures – suffixes

Suffix	S1	S2	S3	S4
Max. operating temperature	+200 °C	+250 °C	+300 °C	+350 °C

Track rollers

An operating temperature of +70 °C is regarded as a normal operating temperature. Further temperature data in the product descriptions must be observed.

Sealed bearings

The permissible temperature for sealed bearings is dependent on the requirements for the operating life of the grease filling and on the action of the contact seals.

Sealed bearings are greased with specially tested, high performance, high quality greases. These greases can withstand +120 °C for short periods. At long term temperatures of +70 °C and above, a reduction in the operating life of standard greases with a lithium soap base must be expected.

In many cases, adequate operating life values are only achieved at high temperatures through the use of special greases. In these cases, it must also be checked whether seals made from especially heat-resistant materials must be used. The operating limit of normal contact seals is +100 °C.

Caution! If high temperature synthetic materials are used for seals and greases, it must be noted that the particularly high performance materials containing fluoride may give off harmful gases and vapours when heated to approx. +300 °C and above. This may occur, for example, if a welding torch is used in the dismantling of a bearing.

High temperatures are critical especially in the case of seals made from fluoroelastomer (FKM, FPM, e.g. Viton) or greases containing fluoride such as the rolling bearing grease Arcanol TEMP200 and greases to GA11.

If high temperatures are unavoidable, attention must be paid to the valid safety data sheet for the specific fluoride-containing material, which can be obtained upon request.

Bearing data

Anti-corrosion protection

Bearings are not resistant to corrosion by water or agents containing alkalis or acids but are often exposed to these corrosion-inducing agents. In these applications, anti-corrosion protection is therefore a decisive factor in achieving a long operating life of the bearings.

In principle, corrosion-resistant steels to ISO 693-17 can be used for components at risk of corrosion. These bearings have the prefix S; for deep groove ball bearings with anti-corrosion protection, see page 186. In many applications, however, the INA special plating Corrotect[®] is more cost-effective.

Corrotect[®] plating

Corrotect[®] is an extremely thin, electroplated surface coating – coating thickness 0,5 µm to 3 µm.

The coating is effective against moisture, contaminated water, salt spray and weakly alkaline and weakly acidic cleaning agents.



Figure 9
Bearing rings after the salt spray test.
Left: a part with Corrotect[®] plating;
Right: an unplated bearing ring

Advantages of the plating

The advantages of the INA special plating Corrotect[®] are all-round rust protection, including the turned surfaces of chamfers and radii, *Figure 9*. It also gives long term prevention of rust penetration beneath seals and smaller bright spots are protected against rust by the cathodic protection effect. In comparison with unplated parts, operating life is significantly increased by the anti-corrosion protection. Unplated bearings can be easily replaced by plated bearings of the same dimensions; there is no decrease in load carrying capacity, in contrast to corrosion-resistant steels. During storage, there is no need to use organic-based preservatives.

Fitting of plated bearings

Caution!

Before bearings plated with Corrotect[®] are fitted, compatibility with the media should always be checked.

In order to reduce the press-in force required, the surface of the parts should be lightly greased – the tolerances are increased by the thickness of the plating.

Dimensional and geometrical tolerances

Unless stated otherwise, the tolerances for radial rolling bearings correspond to DIN 620-2 and ISO 492; the tolerances for axial rolling bearings correspond to DIN 620-3 and ISO 199, *Figure 10*.

The accuracy corresponds to tolerance class PN. For bearings with increased accuracy, the tolerances are restricted to values in the classes P6, P5, P4 and P2. Tolerance tables for the individual tolerance classes: see page 107 to page 120.

The standardised tolerance classes are not applied to high precision bearings, which are produced to the tolerance classes P4S, SP and UP. These tolerances are listed in the product descriptions for the high precision bearings.

Measurement methods according to DIN 620-1 and ISO 1132-2 are valid for the acceptance inspection of rolling bearings.

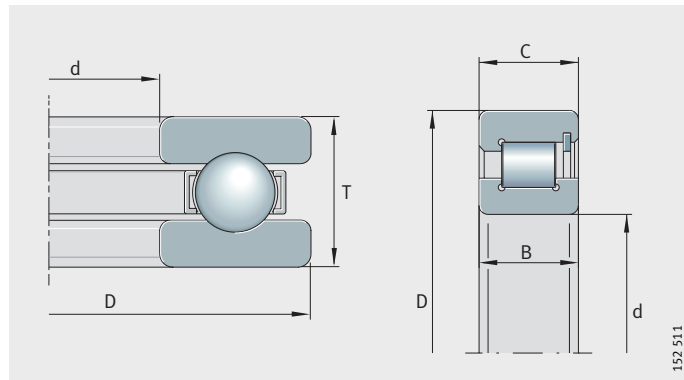


Figure 10
Main dimensions to DIN 620

Bearing data

Tolerance symbols and definitions

Tolerance symbol	Toleranced characteristic to DIN 1 132 and DIN 620
d	Nominal bore diameter
Δ_{dmp}	Deviation of mean bore diameter in a single plane
Δ_{d1mp}	Deviation of mean large end diameter in tapered bores
V_{dsp}	Variation of single bore diameter in a single plane
V_{dmp}	Variation of mean bore diameter
D	Nominal outside diameter
Δ_{Dmp}	Deviation of mean outside diameter in a single plane
V_{Dsp}	Variation of single outside diameter in a single plane
V_{Dmp}	Variation of mean outside diameter
B	Nominal inner ring width
Δ_{Bs}	Deviation of a single inner ring width
V_{Bs}	Variation of inner ring width
C	Nominal outer ring width
Δ_{Cs}	Deviation of a single outer ring width
V_{Cs}	Variation of outer ring width
K_{ia}	Radial runout of inner ring of assembled bearing
K_{ea}	Radial runout of outer ring of assembled bearing
S_d	Runout of inner ring face to the bore
S_D	Runout of outer ring outside surface generatrix to the face
S_{ia}	Axial runout of inner ring of assembled bearing
S_{ea}	Axial runout of outer ring of assembled bearing
S_i	Variation of washer thickness of shaft locating washer
S_e	Variation of washer thickness of housing locating washer
T	Nominal bearing height of a single direction axial bearing

Radial bearings, excluding tapered roller bearings

**Tolerance class PN
Inner ring
Tolerances in μm**

d mm		Δ_{dmp} Deviation		V_{dsp} Diameter series			V_{dmp} max.	K_{ia} max.
over	incl.	upper	lower	9 max.	0, 1 max.	2, 3, 4 max.		
0,6 ¹⁾	2,5	0	-8	10	8	6	6	10
2,5	10	0	-8	10	8	6	6	10
10	18	0	-8	10	8	6	6	10
18	30	0	-10	13	10	8	8	13
30	50	0	-12	15	12	9	9	15
50	80	0	-15	19	19	11	11	20
80	120	0	-20	25	25	15	15	25
120	180	0	-25	31	31	19	19	30
180	250	0	-30	38	38	23	23	40
250	315	0	-35	44	44	26	26	50
315	400	0	-40	50	50	30	30	60
400	500	0	-45	56	56	34	34	65
500	630	0	-50	63	63	38	38	70
630	800	0	-75	-	-	-	-	80
800	1 000	0	-100	-	-	-	-	90
1 000	1 250	0	-125	-	-	-	-	100
1 250	1 600	0	-160	-	-	-	-	120
1 600	2 000	0	-200	-	-	-	-	140

**Tolerance class PN
Inner ring – continued
Tolerances in μm**

d mm		Δ_{Bs}				V_{Bs} max.
over	incl.	Normal deviation		Modified deviation ²⁾		
		upper	lower	upper	lower	
0,6 ¹⁾	2,5	0	-40	0	-	12
2,5	10	0	-120	0	-250	15
10	18	0	-120	0	-250	20
18	30	0	-120	0	-250	20
30	50	0	-120	0	-250	20
50	80	0	-150	0	-380	25
80	120	0	-200	0	-380	25
120	180	0	-250	0	-500	30
180	250	0	-300	0	-500	30
250	315	0	-350	0	-500	35
315	400	0	-400	0	-630	40
400	500	0	-450	0	-	50
500	630	0	-500	0	-	60
630	800	0	-750	0	-	70
800	1 000	0	-1 000	0	-	80
1 000	1 250	0	-1 250	0	-	100
1 250	1 600	0	-1 600	0	-	120
1 600	2 000	0	-2 000	0	-	140

¹⁾ This diameter is included in the group.

²⁾ Only for bearings manufactured specifically for use as matched pairs.

Bearing data

Tolerance class PN
Outer ring ¹⁾
Tolerances in μm

D mm		Δ_{Dmp} Deviation		V_{Dsp}				V_{Dmp} ³⁾	K_{ea}
				Open bearings Diameter series			Bearings with sealing shields or sealing washers		
				9	0, 1	2, 3, 4			
over	incl.	up- per	lower	max.	max.	max.	max.	max.	
2,5 ²⁾	6	0	-8	10	8	6	10	6	15
6	18	0	-8	10	8	6	10	6	15
18	30	0	-9	12	9	7	12	7	15
30	50	0	-11	14	11	8	16	8	20
50	80	0	-13	16	13	10	20	10	25
80	120	0	-15	19	19	11	26	11	35
120	150	0	-18	23	23	14	30	14	40
150	180	0	-25	31	31	19	38	19	45
180	250	0	-30	38	38	23	-	23	50
250	315	0	-35	44	44	26	-	26	60
315	400	0	-40	50	50	30	-	30	70
400	500	0	-45	56	56	34	-	34	80
500	630	0	-50	63	63	38	-	38	100
630	800	0	-75	94	94	55	-	55	120
800	1 000	0	-100	125	125	75	-	75	140
1 000	1 250	0	-125	-	-	-	-	-	160
1 250	1 600	0	-160	-	-	-	-	-	190
1 600	2 000	0	-200	-	-	-	-	-	220
2 000	2 500	0	-250	-	-	-	-	-	250

¹⁾ Δ_{CS} , Δ_{C1S} , V_{CS} and V_{C2S} are identical to Δ_{BS} and V_{BS} for the inner ring of the corresponding bearing (see table Tolerance class PN, Inner ring, Tolerances in μm , page 107).

²⁾ This diameter is included in the group.

³⁾ Applies before assembly of the bearing and after removal of internal and/or external snap rings.

Radial bearings, excluding tapered roller bearings

**Tolerance class P6
Inner ring
Tolerances in μm**

d		Δ_{dmp}		V_{dsp} Diameter series			V_{dmp} max.	K_{ia} max.
mm		Deviation		9	0, 1	2, 3, 4		
over	incl.	upper	lower	max.	max.	max.		
0,6 ¹⁾	2,5	0	-7	9	7	5	5	5
2,5	10	0	-7	9	7	5	5	6
10	18	0	-7	9	7	5	5	7
18	30	0	-8	10	8	6	6	8
30	50	0	-10	13	10	8	8	10
50	80	0	-12	15	15	9	9	10
80	120	0	-15	19	19	11	11	13
120	180	0	-18	23	23	14	14	18
180	250	0	-22	28	28	17	17	20
250	315	0	-25	31	31	19	19	25
315	400	0	-30	38	38	23	23	30
400	500	0	-35	44	44	26	26	35
500	630	0	-40	50	50	30	30	40

**Tolerance class P6
Inner ring – continued
Tolerances in μm**

d		Δ_{Bs}				V_{Bs} max.
mm		Normal deviation		Modified deviation ²⁾		
over	incl.	upper	lower	upper	lower	
0,6 ¹⁾	2,5	0	-40	-	-	12
2,5	10	0	-120	0	-250	15
10	18	0	-120	0	-250	20
18	30	0	-120	0	-250	20
30	50	0	-120	0	-250	20
50	80	0	-150	0	-380	25
80	120	0	-200	0	-380	25
120	180	0	-250	0	-550	30
180	250	0	-300	0	-500	30
250	315	0	-350	0	-500	35
315	400	0	-400	0	-630	40
400	500	0	-450	-	-	45
500	630	0	-500	-	-	50

¹⁾ This diameter is included in the group.

²⁾ Only for bearings manufactured specifically for use as matched pairs.

Bearing data

Tolerance class P6
Outer ring ¹⁾
Tolerances in μm

D		Δ_{Dmp}		V_{Dsp}				V_{Dmp} ³⁾	K_{ea}
				Open bearings Diameter series			Bearings with sealing shields or sealing washers		
over	incl.	up- per	lower	9	0, 1	2, 3, 4		max.	max.
mm		Deviation		max.	max.	max.	max.	max.	max.
2,5 ²⁾	6	0	-7	9	7	5	9	5	8
6	18	0	-7	9	7	5	9	5	8
18	30	0	-8	10	8	6	10	6	9
30	50	0	-9	11	9	7	13	7	10
50	80	0	-11	14	11	8	16	8	13
80	120	0	-13	16	16	10	20	10	18
120	150	0	-15	19	19	11	25	11	20
150	180	0	-18	23	23	14	30	14	23
180	250	0	-20	25	25	15	-	15	25
250	315	0	-25	31	31	19	-	19	30
315	400	0	-28	35	35	21	-	21	35
400	500	0	-33	41	41	25	-	25	40
500	630	0	-38	48	48	29	-	29	50
630	800	0	-45	56	56	34	-	34	60
800	1 000	0	-60	75	75	45	-	45	75

¹⁾ Δ_{Cs} , Δ_{C1s} , V_{Cs} and V_{C2s} are identical to Δ_{Bs} and V_{Bs} for the inner ring of the corresponding bearing (see table Tolerance class P6, Inner ring, Tolerances in μm , page 109).

²⁾ This diameter is included in the group.

³⁾ Applies before assembly of the bearing and after removal of internal and/or external snap rings.

Radial bearings, excluding tapered roller bearings

**Tolerance class P5
Inner ring
Tolerances in μm**

d		Δ_{dmp}		V_{dsp} Diameter series		V_{dmp}	K_{ia}	S_{d}
mm		Deviation		9	0, 1, 2, 3, 4			
over	incl.	upper	lower	max.	max.	max.	max.	max.
0,6 ¹⁾	2,5	0	-5	5	4	3	4	7
2,5	10	0	-5	5	4	3	4	7
10	18	0	-5	5	4	3	4	7
18	30	0	-6	6	5	3	4	8
30	50	0	-8	8	6	4	5	8
50	80	0	-9	9	7	5	5	8
80	120	0	-10	10	8	5	6	9
120	180	0	-13	13	10	7	8	10
180	250	0	-15	15	12	8	10	11
250	315	0	-18	18	14	9	13	13
315	400	0	-23	23	18	12	15	15

**Tolerance class P5
Inner ring – continued
Tolerances in μm**

d		$S_{\text{ia}}^{2)}$	Δ_{Bs}				V_{Bs}
mm			Normal deviation		Modified deviation ³⁾		
over	incl.	max.	upper	lower	upper	lower	max.
0,6 ¹⁾	2,5	7	0	-40	0	-250	5
2,5	10	7	0	-40	0	-250	5
10	18	7	0	-80	0	-250	5
18	30	8	0	-120	0	-250	5
30	50	8	0	-120	0	-250	5
50	80	8	0	-150	0	-250	6
80	120	9	0	-200	0	-380	7
120	180	10	0	-250	0	-380	8
180	250	13	0	-300	0	-500	10
250	315	15	0	-350	0	-500	13
315	400	20	0	-400	0	-630	15

1) This diameter is included in the group.

2) Only for deep groove and angular contact ball bearings.

3) Only for bearings manufactured specifically for use as matched pairs.

Bearing data

Tolerance class P5
Outer ring ¹⁾
Tolerances in μm

D		Δ_{Dmp}		V_{Dsp} ³⁾ Diameter series		V_{Dmp} ⁴⁾	K_{ea}	S_{D}	S_{ea} ⁵⁾	V_{Cs}
over	incl.	up- per	lower	9 max.	0, 1, 2, 3, 4 max.	max.	max.	max.	max.	
2,5 ²⁾	6	0	-5	5	4	3	5	8	8	5
6	18	0	-5	5	4	3	5	8	8	5
18	30	0	-6	6	5	3	6	8	8	5
30	50	0	-7	7	5	4	7	8	8	5
50	80	0	-9	9	7	5	8	8	10	6
80	120	0	-10	10	8	5	10	9	11	8
120	150	0	-11	11	8	6	11	10	13	8
150	180	0	-13	13	10	7	13	10	14	8
180	250	0	-15	15	11	8	15	11	15	10
250	315	0	-18	18	14	9	18	13	18	11
315	400	0	-20	20	15	10	20	13	-	13
400	500	0	-23	23	17	12	23	15	-	15
500	630	0	-28	28	21	14	25	18	-	18
630	800	0	-35	35	26	18	30	20	-	20

1) Δ_{Cs} is identical to Δ_{Bs} for the inner ring of the corresponding bearing (see table Tolerance class P5, Inner ring – continued, Tolerances in μm , page 111).

2) This diameter is included in the group.

3) No values are given for radial ball bearings with sealing shields or sealing washers.

4) Applies before assembly of the bearing and after removal of internal and/or external snap rings.

5) Only for deep groove and angular contact ball bearings.

Radial bearings, excluding tapered roller bearings

**Tolerance class P4
Inner ring
Tolerances in μm**

d mm		Δ_{dmp} Deviation		Δ_{ds}		V_{dsp}		V_{dmp}	K_{ia}
				Diameter series		9	0, 1, 2, 3, 4		
over	incl.	upper	lower	upper	lower			max.	max.
0,6 ¹⁾	2,5	0	-4	0	-4	4	3	2	2,5
2,5	10	0	-4	0	-4	4	3	2	2,5
10	18	0	-4	0	-4	4	3	2	2,5
18	30	0	-5	0	-5	5	4	2,5	3
30	50	0	-6	0	-6	6	5	3	4
50	80	0	-7	0	-7	7	5	3,5	4
80	120	0	-8	0	-8	8	6	4	5
120	180	0	-10	0	-10	10	8	5	6
180	250	0	-12	0	-12	12	9	6	8

**Tolerance class P4
Inner ring – continued
Tolerances in μm**

d mm		S_{d}	$S_{\text{ia}}^{2)}$	Δ_{Bs}				V_{Bs}
				Normal deviation		Modified deviation ³⁾		
over	incl.	max.	max.	upper	lower	upper	lower	max.
0,6 ¹⁾	2,5	3	3	0	-40	0	-250	2,5
2,5	10	3	3	0	-40	0	-250	2,5
10	18	3	3	0	-80	0	-250	2,5
18	30	4	4	0	-120	0	-250	2,5
30	50	4	4	0	-120	0	-250	3
50	80	5	5	0	-150	0	-250	4
80	120	5	5	0	-200	0	-380	4
120	180	6	6	0	-250	0	-380	5
180	250	7	7	0	-300	0	-500	6

¹⁾ This diameter is included in the group.

²⁾ Only for deep groove and angular contact ball bearings.

³⁾ Only for bearings manufactured specifically for use as matched pairs.

Bearing data

**Tolerance class P4
Outer ring
Tolerances in μm**

D mm		Δ_{Dmp} Deviation		Δ_{Ds}		$V_{Dsp}^{2)}$		V_{Dmp}	K_{ea}		
				Diameter series							
				0, 1, 2, 3, 4		9	0, 1, 2, 3, 4				
over	incl.	upper	lower	upper	lower	max.	max.	max.	max.		
2,5 ¹⁾	6	0	-4	0	-4	4	3	2	3		
6	18	0	-4	0	-4	4	3	2	3		
18	30	0	-5	0	-5	5	4	2,5	4		
30	50	0	-6	0	-6	6	5	3	5		
50	80	0	-7	0	-7	7	5	3,5	5		
80	120	0	-8	0	-8	8	6	4	6		
120	150	0	-9	0	-9	9	7	5	7		
150	180	0	-10	0	-10	10	8	5	8		
180	250	0	-11	0	-11	11	8	6	10		
250	315	0	-13	0	-13	13	10	7	11		
315	400	0	-15	0	-15	15	11	8	13		

**Tolerance class P4
Outer ring – continued
Tolerances in μm**

D mm		S_D S_{D1}	$S_{ea}^{3)}$	Δ_{Cs}	V_{Cs}
2,5 ¹⁾	6	4	5	Δ_{Cs} and V_{Cs} are identical to Δ_{Bs} and V_{Bs} for the inner ring of the corresponding bearing (see table Tolerance class P4, Inner ring – continued, Tolerances in μm , page 113)	2,5
6	18	4	5		2,5
18	30	4	5		2,5
30	50	4	5		2,5
50	80	4	5		3
80	120	5	6		4
120	150	5	7		5
150	180	5	8		5
180	250	7	10		7
250	315	8	10		7
315	400	10	13	8	

1) This diameter is included in the group.

2) No values are given for bearings with sealing shields or sealing washers.

3) Only for deep groove and angular contact ball bearings.

Radial bearings, excluding tapered roller bearings

**Tolerance class P2
Inner ring
Tolerances in μm**

d mm		Δ_{dmp} Deviation		Δ_{ds} Deviation		V_{dsp}	V_{dmp}	K_{ia}
over	incl.	upper	lower	upper	lower	max.	max.	max.
0,6 ¹⁾	2,5	0	-2,5	0	-2,5	2,5	1,5	1,5
2,5	10	0	-2,5	0	-2,5	2,5	1,5	1,5
10	18	0	-2,5	0	-2,5	2,5	1,5	1,5
18	30	0	-2,5	0	-2,5	2,5	1,5	2,5
30	50	0	-2,5	0	-2,5	2,5	1,5	2,5
50	80	0	-4	0	-4	4	2	2,5
80	120	0	-5	0	-5	5	2,5	2,5
120	150	0	-7	0	-7	7	3,5	2,5
150	180	0	-7	0	-7	7	3,5	5
180	250	0	-8	0	-8	8	4	5

**Tolerance class P2
Inner ring – continued
Tolerances in μm**

d mm		S_{d}	S_{ia} ²⁾	Δ_{Bs} Normal deviation		V_{Bs}
over	incl.	max.	max.	upper	lower	max.
0,6 ¹⁾	2,5	1,5	1,5	0	-40	1,5
2,5	10	1,5	1,5	0	-40	1,5
10	18	1,5	1,5	0	-80	1,5
18	30	1,5	2,5	0	-120	1,5
30	50	1,5	2,5	0	-120	1,5
50	80	1,5	2,5	0	-150	1,5
80	120	2,5	2,5	0	-200	2,5
120	150	2,5	2,5	0	-250	2,5
150	180	4	5	0	-300	4
180	250	5	5	0	-350	5

¹⁾ This diameter is included in the group.

²⁾ Only for deep groove and angular contact ball bearings.

Bearing data

**Tolerance class P2
Outer ring
Tolerances in μm**

D mm		Δ_{Dmp} Deviation		Δ_{Ds} Deviation		$V_{Dsp}^{2)}$	V_{Dmp}	K_{ea}
over	incl.	upper	lower	upper	lower	max.	max.	max.
2,5 ¹⁾	6	0	-2,5	0	-2,5	2,5	1,5	1,5
6	18	0	-2,5	0	-2,5	2,5	1,5	1,5
18	30	0	-4	0	-4	4	2	2,5
30	50	0	-4	0	-4	4	2	2,5
50	80	0	-4	0	-4	4	2	4
80	120	0	-5	0	-5	5	2,5	5
120	150	0	-5	0	-5	5	2,5	5
150	180	0	-7	0	-7	7	2,5	5
180	250	0	-8	0	-8	8	4	7
250	315	0	-8	0	-8	8	4	7
315	400	0	-10	0	-10	10	5	8

**Tolerance class P2
Outer ring – continued
Tolerances in μm**

D mm		S_D S_{D1}	$S_{ea}^{3)}$	Δ_{Cs}	V_{Cs}
over	incl.	max.	max.		max.
2,5 ¹⁾	6	1,5	1,5	Δ_{Cs} and V_{Cs} are identical to Δ_{Bs} and V_{Bs} for the inner ring of the corresponding bearing (see table Tolerance class P2, Inner ring – continued, Tolerances in μm , page 115)	1,5
6	18	1,5	1,5		1,5
18	30	1,5	2,5		1,5
30	50	1,5	2,5		1,5
50	80	1,5	4		1,5
80	120	2,5	5		2,5
120	150	2,5	5		2,5
150	180	2,5	5		2,5
180	250	4	7		4
250	315	5	7		5
315	400	7	8	7	

1) This diameter is included in the group.

2) No values are given for bearings with sealing shields or sealing washers.

3) Only for deep groove and angular contact ball bearings.

**Tolerances for tapered bores –
taper 1:12
Tolerances in μm**

Bore diameter d mm		Tolerance class PN				
over	incl.	Δ_{dmp} Deviation μm		$V_{dp}^{1)}$ max.	$\Delta_{d1mp} - \Delta_{dmp}$ Deviation μm	
		upper	lower		upper	lower
18	30	+21	0	13	+21	0
30	50	+25	0	15	+25	0
50	80	+30	0	19	+30	0
80	120	+35	0	25	+35	0
120	180	+40	0	31	+40	0
180	250	+46	0	38	+46	0
250	315	+52	0	44	+52	0
315	400	+57	0	50	+57	0
400	500	+63	0	56	+63	0
500	630	+70	0	–	+70	0
630	800	+80	0	–	+80	0
800	1 000	+90	0	–	+90	0

1) Valid in any radial cross-section of the bore.

**Tolerances for tapered bores –
taper 1:30
Tolerances in μm**

Bore diameter d mm		Tolerance class PN				
over	incl.	Δ_{dmp} Deviation μm		$V_{dp}^{1)}$ max.	$\Delta_{d1mp} - \Delta_{dmp}$ Deviation μm	
		upper	lower		upper	lower
–	80	+15	0	19	+35	0
80	120	+20	0	25	+40	0
120	180	+25	0	31	+50	0
180	250	+30	0	38	+55	0
250	315	+35	0	44	+60	0
315	400	+40	0	50	+65	0
400	500	+45	0	56	+75	0
500	630	+50	0	63	+85	0
630	800	+75	0	–	+100	0
800	1 000	+100	0	–	+100	0

1) Valid in any radial cross-section of the bore.

Taper 1:12
Half of taper angle $\alpha = 2^\circ 23' 9,4''$
Theoretical large end diameter
 $d_1 = d + \frac{1}{12} \times B$

Taper 1:30
Half of taper angle $\alpha = 0^\circ 57' 17,4''$
Theoretical large end diameter
 $d_1 = d + \frac{1}{30} \times B$

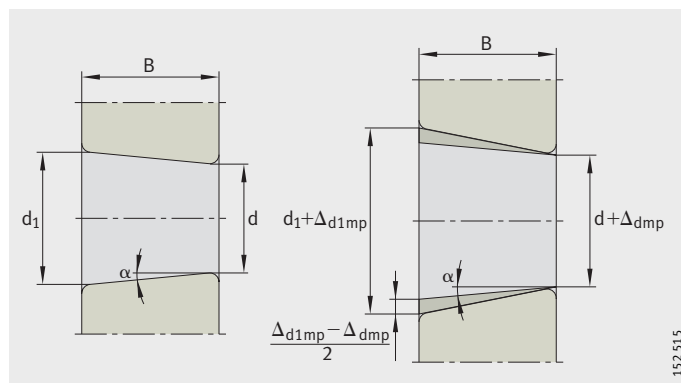


Figure 11

Tolerances for tapered bores

Bearing data

Axial bearings Bore diameter tolerances for shaft locating washers to ISO 199 and DIN 620-3 Tolerances in μm

d mm		PN (normal tolerance), P6 and P5			P4		
		Δ_{dmp} Deviation		V_{dp} max.	Δ_{dmp} Deviation		V_{dp} max.
over	incl.	upper	lower		upper	lower	
-	18	0	-8	6	0	-7	5
18	30	0	-10	8	0	-8	6
30	50	0	-12	9	0	-10	8
50	80	0	-15	11	0	-12	9
80	120	0	-20	15	0	-15	11
120	180	0	-25	19	0	-18	14
180	250	0	-30	23	0	-22	17
250	315	0	-35	26	0	-25	19
315	400	0	-40	30	0	-30	23
400	500	0	-45	34	0	-35	26
500	630	0	-50	38	0	-40	30
630	800	0	-75	56	0	-50	-
800	1 000	0	-100	75	0	-	-
1 000	1 250	0	-125	95	0	-	-

Outside diameter tolerances for housing locating washers to ISO 199 and DIN 620-3 Tolerances in μm

D mm		PN (normal tolerance), P6 and P5			P4		
		Δ_{Dmp} Deviation		V_{Dp} max.	Δ_{Dmp} Deviation		V_{Dp} max.
over	incl.	upper	lower		upper	lower	
10	18	0	-11	8	0	-7	5
18	30	0	-13	10	0	-8	6
30	50	0	-16	12	0	-9	7
50	80	0	-19	14	0	-11	8
80	120	0	-22	17	0	-13	10
120	180	0	-25	19	0	-15	11
180	250	0	-30	23	0	-20	15
250	315	0	-35	26	0	-25	19
315	400	0	-40	30	0	-28	21
400	500	0	-45	34	0	-33	25
500	630	0	-50	38	0	-38	29
630	800	0	-75	55	0	-45	34
800	1 000	0	-100	75	-	-	-
1 000	1 250	0	-125	75	-	-	-
1 250	1 600	0	-160	120	-	-	-

**Variation of washer thickness
for shaft and
housing locating washers**
Tolerances in μm

d mm		S_i				S_e PN (normal tolerance), P6, P5, P4
		PN (normal tolerance) max.	P6 max.	P5 max.	P4 max.	
over	incl.					Identical to S_i for the shaft locating washer of the corresponding bearing
-	18	10	5	3	2	
18	30	10	5	3	2	
30	50	10	6	3	2	
50	80	10	7	4	3	
80	120	15	8	4	3	
120	180	15	9	5	4	
180	250	20	10	5	4	
250	315	25	13	7	5	
315	400	30	15	7	5	
400	500	30	18	9	6	
500	630	35	21	11	7	
630	800	40	25	13	8	
800	1 000	45	30	15	8	
1 000	1 250	50	35	18	9	

**Tolerances
for nominal bearing height**

These tolerances are given in the table on page 120.
The corresponding dimensional symbols are shown in *Figure 12*.

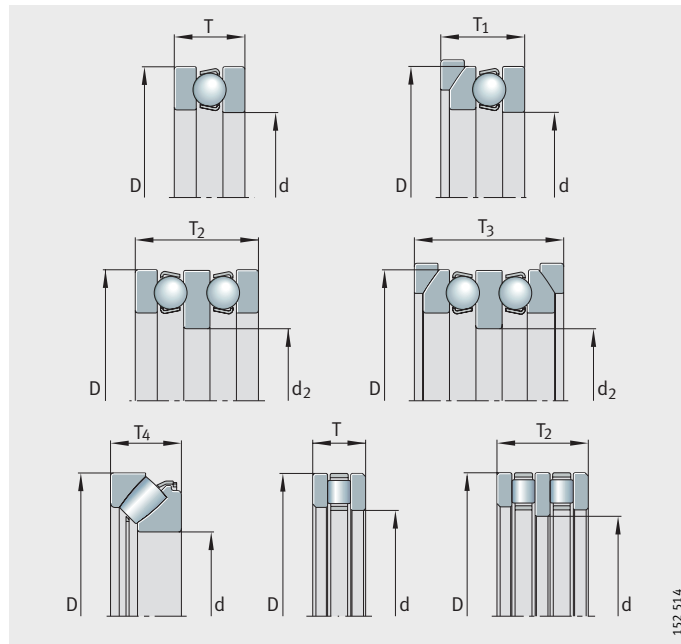


Figure 12
Tolerances
for nominal bearing height

Bearing data

**Tolerances
for nominal bearing height
Tolerances in μm**

d mm		T Deviation		T ₁ Deviation		T ₂ Deviation	
over	incl.	upper	lower	upper	lower	upper	lower
-	30	20	-250	100	-250	150	-400
30	50	20	-250	100	-250	150	-400
50	80	20	-300	100	-300	150	-500
80	120	25	-300	150	-300	200	-500
120	180	25	-400	150	-400	200	-600
180	250	30	-400	150	-400	250	-600
250	315	40	-400	200	-400	350	-700
315	400	40	-500	200	-500	350	-700
400	500	50	-500	300	-500	400	-900
500	630	60	-600	350	-600	500	-1 100
630	800	70	-750	400	-750	600	-1 300
800	1 000	80	-1 000	450	-1 000	700	-1 500
1 000	1 250	100	-1 400	500	-1 400	900	-1 800

**Tolerances
for nominal bearing height –
continued
Tolerances in μm**

d mm		T ₃ Deviation		T ₄ Deviation	
over	incl.	upper	lower	upper	lower
-	30	300	-400	20	-300
30	50	300	-400	20	-300
50	80	300	-500	20	-400
80	120	400	-500	25	-400
120	180	400	-600	25	-500
180	250	500	-600	30	-500
250	315	600	-700	40	-700
315	400	600	-700	40	-700
400	500	750	-900	50	-900
500	630	900	-1 100	60	-1 200
630	800	1 100	-1 300	70	-1 400
800	1 000	1 300	-1 500	80	-1 800
1 000	1 250	1 600	-1 800	100	-2 400

Chamfer dimensions

Radial bearings, excluding tapered roller bearings

The chamfer dimensions correspond to DIN 620-6.

The minimum and maximum values for the bearings are given in the table Limit values for chamfer dimensions to DIN 620-6, page 122.

For drawn cup needle roller bearings with open ends HK, drawn cup needle roller bearings with closed end BK and aligning needle roller bearings PNA and RPNA, the chamfer dimensions deviate from DIN 620-6. The lower limit values for r are given in the dimension tables.

Chamfer dimensions for tapered roller bearings: see page 123; for axial bearings, see page 124.

- ① Symmetrical ring cross-section with identical chamfers on both rings
- ② Symmetrical ring cross-section with different chamfers on both rings
- ③ Asymmetrical ring cross-section
- ④ Annular slot on outer ring, bearing with rib washer
- ⑤ L-section ring

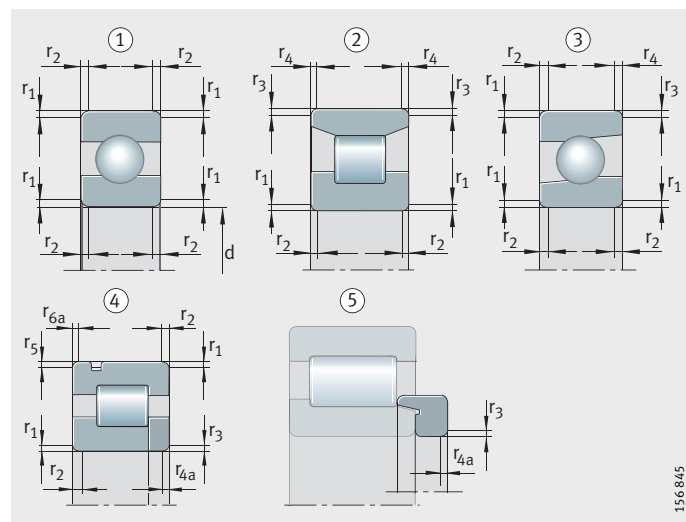


Figure 13
Chamfer dimensions
for radial bearings excluding
tapered roller bearings

156 845

Bearing data

Limit values
for chamfer dimensions
to DIN 620-6

r ¹⁾ mm	d		r ₁ to r _{6a} min. mm	r ₁ , r ₃ , r ₅ max. mm	r ₂ , r ₄ , r ₆ ²⁾ max. mm	r _{4a} , r _{6a} max. mm
	over mm	incl. mm				
0,05	–	–	0,05	0,1	0,1	0,1
0,08	–	–	0,08	0,16	0,16	0,16
0,1	–	–	0,1	0,2	0,2	0,2
0,15	–	–	0,15	0,3	0,6	0,3
0,2	–	–	0,2	0,5	0,8	0,5
0,3	–	40	0,3	0,6	1	0,8
	40	–	0,3	0,8	1	0,8
0,5	–	40	0,5	1	2	1,5
	40	–	0,5	1,3	2	1,5
0,6	–	40	0,6	1	2	1,5
	40	–	0,6	1,3	2	1,5
1	–	50	1	1,5	3	2,2
	50	–	1	1,9	3	2,2
1,1	–	120	1,1	2	3,5	2,7
	120	–	1,1	2,5	4	2,7
1,5	–	120	1,5	2,3	4	3,5
	120	–	1,5	3	5	3,5
2	–	80	2	3	4,5	4
	80	220	2	3,5	5	4
	220	–	2	3,8	6	4
2,1	–	280	2,1	4	6,5	4,5
	280	–	2,1	4,5	7	4,5
2,5	–	100	2,5	3,8	6	5
	100	280	2,5	4,5	6	5
	280	–	2,5	5	7	5
3	–	280	3	5	8	5,5
	280	–	3	5,5	8	5,5
4	–	–	4	6,5	9	6,5
5	–	–	5	8	10	8
6	–	–	6	10	13	10
7,5	–	–	7,5	12,5	17	12,5
9,5	–	–	9,5	15	19	15
12	–	–	12	18	24	18
15	–	–	15	21	30	21
19	–	–	19	25	38	25

¹⁾ The nominal chamfer dimension r is identical to the smallest permissible chamfer dimension r_{min}.

²⁾ For bearings with a width of 2 mm or less, the values for r₁ apply.

Tapered roller bearings

The minimum and maximum values for metric tapered roller bearings are given in the table Limit values for chamfer dimensions.

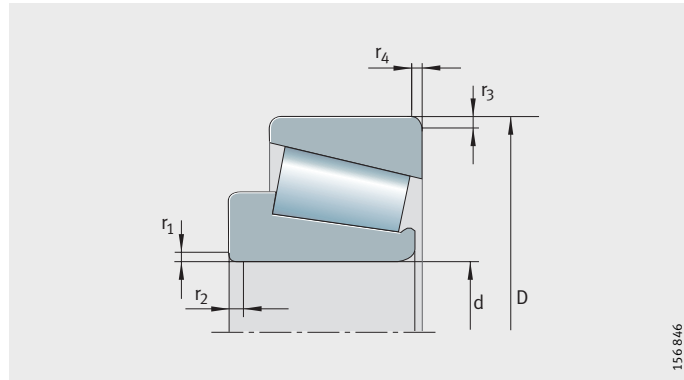


Figure 14
Chamfer dimensions
for metric tapered roller bearings

Limit values for chamfer dimensions

r ¹⁾ mm	d		r ₁ to r ₄ min. mm	r ₁ , r ₃ max. mm	r ₂ , r ₄ max. mm
	over mm	incl. mm			
0,3	–	40	0,3	0,7	1,4
	40	–	0,3	0,9	1,6
0,6	–	40	0,6	1,1	1,7
	40	–	0,6	1,3	2
1	–	50	1	1,6	2,5
	50	–	1	1,9	3
1,5	–	120	1,5	2,3	3
	120	250	1,5	2,8	3,5
	250	–	1,5	3,5	4
2	–	120	2	2,8	4
	120	250	2	3,5	4,5
	250	–	2	4	5
2,5	–	120	2,5	3,5	5
	120	250	2,5	4	5,5
	250	–	2,5	4,5	6
3	–	120	3	4	5,5
	120	250	3	4,5	6,5
	250	400	3	5	7
	400	–	3	5,5	7,5
4	–	120	4	5	7
	120	250	4	5,5	7,5
	250	400	4	6	8
	400	–	4	6,5	8,5
5	–	180	5	6,5	8
	180	–	5	7,5	9
6	–	180	6	7,5	10
	180	–	6	9	11

¹⁾ The nominal chamfer dimension r is identical to the smallest permissible chamfer dimension r_{min}.

Bearing data

Axial bearings

The minimum and maximum values for the bearings are given in the table Limit values for chamfer dimensions. The table corresponds to DIN 620-6.

For axial deep groove ball bearings, the tolerances for the chamfer dimensions are identical in both axial and radial directions.

- ① Single direction axial deep groove ball bearing with flat housing locating washer
- ② Double direction axial deep groove ball bearing with spherical housing locating washers and seating washers
- ③ Single direction axial cylindrical roller bearing
- ④ Single direction axial spherical roller bearing

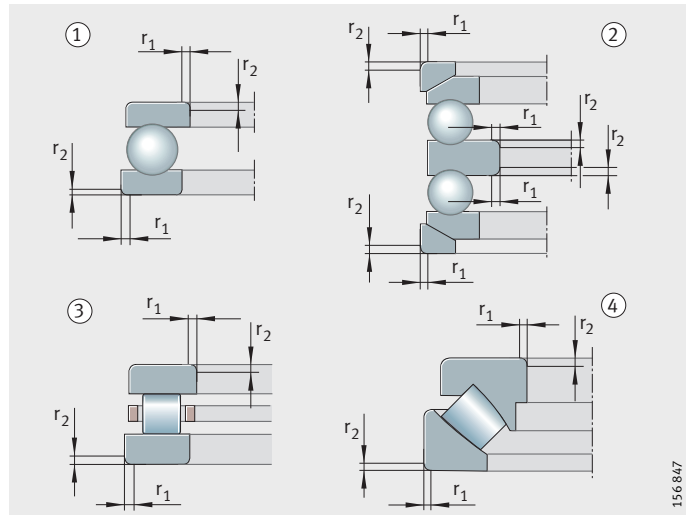


Figure 15
Chamfer dimensions
for axial bearings

Limit values for chamfer dimensions

r ¹⁾ mm	r ₁ , r ₂	
	min. mm	max. mm
0,05	0,05	0,1
0,08	0,08	0,16
0,1	0,1	0,2
0,15	0,15	0,3
0,2	0,2	0,5
0,3	0,3	0,8
0,6	0,6	1,5
1	1	2,2
1,1	1,1	2,7
1,5	1,5	3,5
2	2	4
2,1	2,1	4,5
3	3	5,5
4	4	6,5
5	5	8
6	6	10
7,5	7,5	12,5
9,5	9,5	15
12	12	18
15	15	21
19	19	25

1) The nominal chamfer dimension r is identical to the smallest permissible chamfer dimension r_{min}.

Design of bearing arrangements

Selection of bearing arrangement	The guidance and support of a rotating shaft requires at least two bearings arranged at a certain distance from each other. Depending on the application, a decision is made between a locating/non-locating bearing arrangement, an adjusted bearing arrangement and a floating bearing arrangement.
Locating/non-locating bearing arrangement	On a shaft supported by two radial bearings, the distances between the bearing seats on the shaft and in the housing frequently do not coincide as a result of manufacturing tolerances. The distances may also change as a result of temperature increases during operation. These differences in distance are compensated in the non-locating bearing. Examples of locating/non-locating bearing arrangements: see <i>Figure 1</i> to <i>Figure 4</i> .
Non-locating bearings	<p>Ideal non-locating bearings are cylindrical roller bearings with cage of series N and NU or needle roller bearings, <i>Figure 1</i> ②, ④. In these bearings, the roller and cage assembly can be displaced on the raceway of the bearing ring without ribs.</p> <p>All other bearing types, for example deep groove ball bearings and spherical roller bearings, can only act as non-locating bearings if one bearing ring has a fit that allows displacement, <i>Figure 2</i>. The bearing ring subjected to point load therefore has a loose fit; this is normally the outer ring, see Conditions of rotation, page 132.</p>
Locating bearings	<p>The locating bearing guides the shaft in an axial direction and supports external axial forces. In order to prevent axial preload, shafts with more than two bearings have only one locating bearing.</p> <p>The type of bearing selected as a locating bearing depends on the magnitude of the axial forces and the accuracy with which the shafts must be axially guided.</p> <p>A double row angular contact ball bearing, <i>Figure 3</i> ①, for example, will give closer axial guidance than a deep groove ball bearing or a spherical roller bearing. A pair of symmetrically arranged angular contact ball bearings or tapered roller bearings <i>Figure 4</i>, used as locating bearings will provide extremely close axial guidance.</p> <p>Angular contact ball bearings of the universal design, <i>Figure 5</i>, give particular advantages. The bearings can be fitted in pairs in any O or X arrangement without shims. Angular contact ball bearings of the universal design are matched so that, in an X or O arrangement, they have a low axial internal clearance (design UA), zero clearance (UO) or slight preload (UL).</p> <p>Spindle bearings of the universal design UL, <i>Figure 6</i>, have slight preload when fitted in an X or O arrangement (designs with higher preload are available by agreement).</p> <p>In gearboxes, a four point contact bearing is sometimes fitted directly adjacent to a cylindrical roller bearing to give a locating bearing arrangement, <i>Figure 3</i> ③. The four point contact bearing, without radial support of the outer ring, can only support axial forces. The radial force is supported by the cylindrical roller bearing.</p> <p>If a lower axial force is present, a cylindrical roller bearing with cage of series NUP can also be used as a locating bearing, <i>Figure 4</i> ③.</p>
No adjustment or setting work with matched pairs of tapered roller bearings	Fitting is also made easier with a matched pair of tapered roller bearings as a locating bearing (313..N11CA), <i>Figure 7</i> ②. They are matched with appropriate axial internal clearance so that no adjustment or setting work is required.

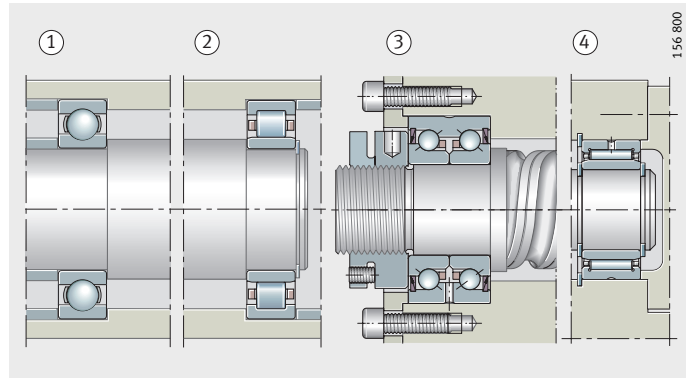
Design of bearing arrangements

Examples of locating/non-locating bearing arrangements

- Deep groove ball bearing
 - ① Locating bearing
- Cylindrical roller bearing NU
 - ② Non-locating bearing
- Axial angular contact ball bearing ZKLN
 - ③ Locating bearing
- Needle roller bearing NKIS
 - ④ Non-locating bearing

Figure 1

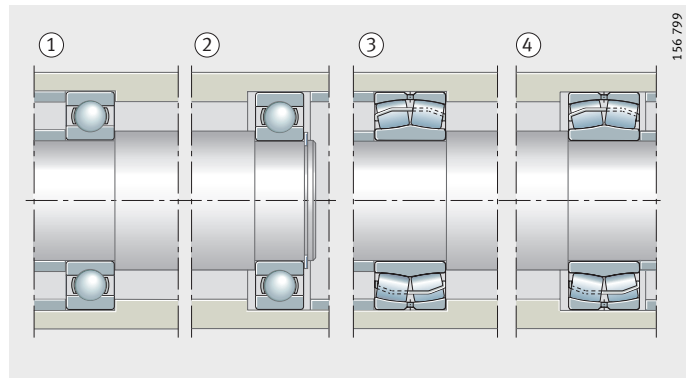
Deep groove, axial angular contact ball bearing as locating bearing
Cylindrical, needle roller bearing as non-locating bearing



- Deep groove ball bearing
 - ① Locating bearing
- ② Non-locating bearing
- Spherical roller bearing
 - ③ Locating bearing
- ④ Non-locating bearing

Figure 2

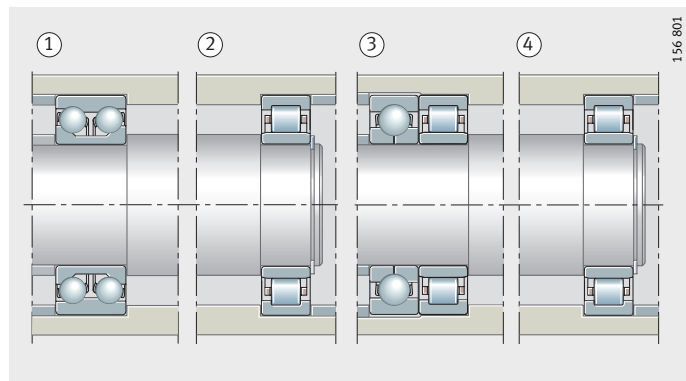
Deep groove ball and spherical roller bearing as locating and non-locating bearing



- Double row angular contact ball bearing
 - ① Locating bearing
- Cylindrical roller bearing NU
 - ② Non-locating bearing
- Four point contact, cylindrical roller bearing
 - ③ Locating bearing
- Cylindrical roller bearing NU
 - ④ Non-locating bearing

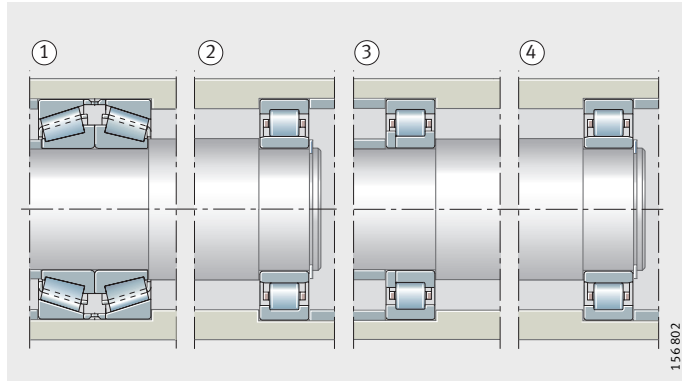
Figure 3

Double row angular contact ball and four point contact bearing as locating bearing, cylindrical roller bearing as non-locating bearing



- Two tapered roller bearings
- ① Locating bearing
- Cylindrical roller bearing NU
- ② Non-locating bearing
- Cylindrical roller bearing NUP
- ③ Locating bearing
- Cylindrical roller bearing NU
- ④ Non-locating bearing

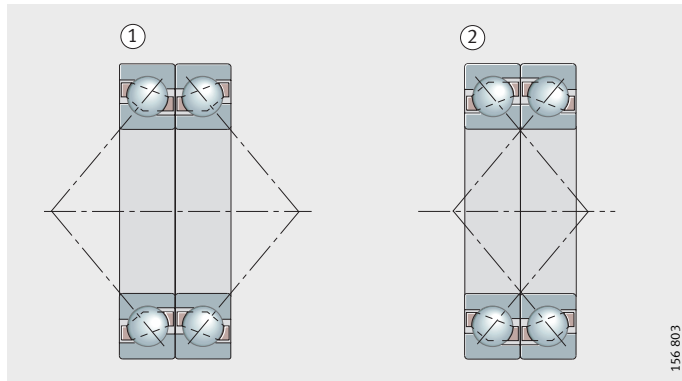
Figure 4
Tapered, cylindrical roller bearing
as locating bearing,
cylindrical roller bearing
as non-locating bearing



156 802

- ① O arrangement
- ② X arrangement

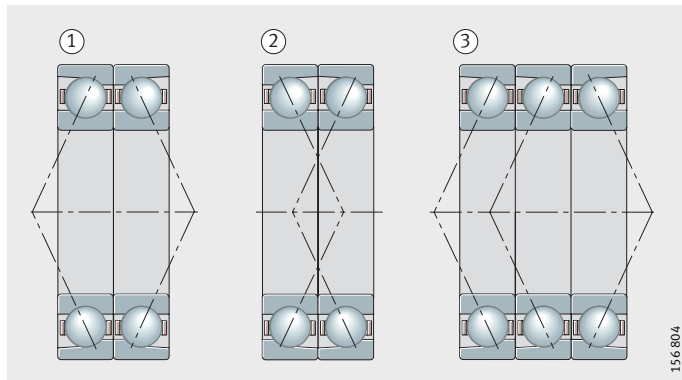
Figure 5
Pair of
angular contact ball bearings of
universal design as locating bearing



156 803

- ① O arrangement
- ② X arrangement
- ③ Tandem O arrangement

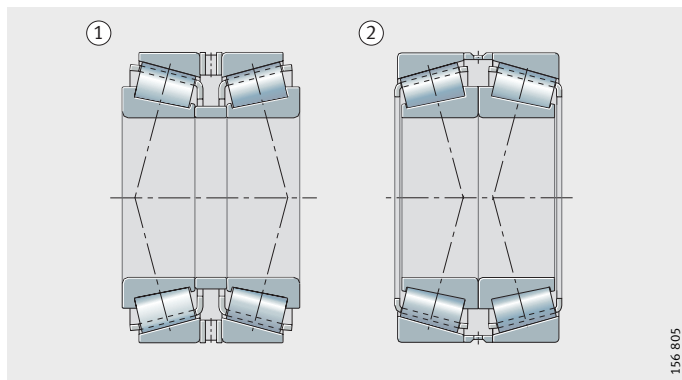
Figure 6
Pair of
spindle bearings of
universal design as locating bearing



156 804

- ① O arrangement
- ② X arrangement

Figure 7
Pair of
tapered roller bearings
as locating bearing



156 805

Design of bearing arrangements

Adjusted bearing arrangement

An adjusted bearing arrangement generally consists of two symmetrically arranged angular contact ball bearings or tapered roller bearings, *Figure 8*.

During fitting, one bearing ring is displaced on its seat until the bearing arrangement achieves the required clearance or the necessary preload.

Application

Due to this adjustment facility, the adjusted bearing arrangement is particularly suitable where close guidance is required, for example in pinion bearing arrangements with spiral toothed bevel gears and spindle bearing arrangements in machine tools.

X and O arrangements

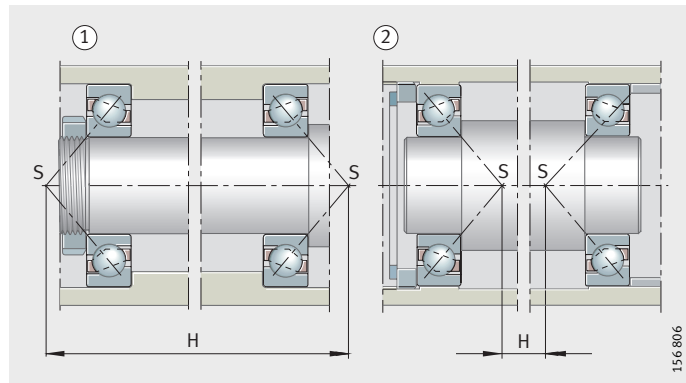
A fundamental distinction is drawn between the O arrangement, *Figure 8* ①, and the X arrangement, *Figure 8* ②, of the bearings. In the O arrangement, the cones and their apexes S formed by the pressure lines point outwards; in the X arrangement, the cones point inwards.

The support base H, in other words the distance between the apexes of the pressure cones, is larger in the O arrangement than in the X arrangement. The O arrangement therefore gives the lower tilting clearance.

- ① O arrangement
- ② X arrangement
- S = apexes of the pressure cones
- H = support distance

Figure 8

Adjusted bearing arrangement with angular contact ball bearings in O arrangement and X arrangement



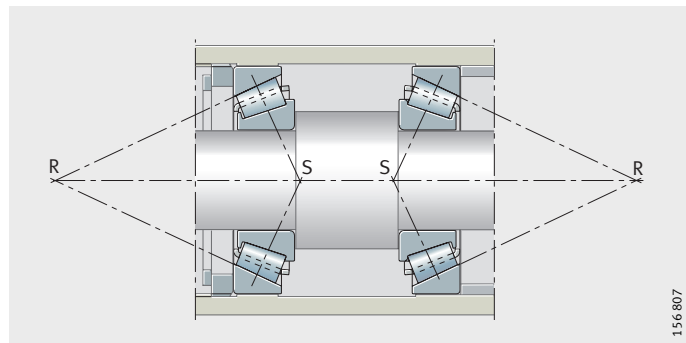
Influence of thermal expansion in X and O arrangements

When setting the axial internal clearance, thermal expansion must be taken into consideration. In the X arrangement, *Figure 9*, a temperature differential between the shaft and housing always leads to a reduction in the internal clearance (assuming the following preconditions: shaft and housing of identical material, inner ring and complete shaft at identical temperature, outer ring and complete housing at identical temperature).

- S = apexes of the pressure cones
- R = roller cone apexes

Figure 9

Adjusted bearing arrangement with tapered roller bearings in X arrangement and apexes of the roller cones



In the O arrangement, a distinction is drawn between three cases:

- The apexes R of the roller cones, i.e. the intersection points of the extended outer ring raceway with the bearing axis, coincide: the required internal clearance is achieved, *Figure 10* ①.
- The roller cones overlap if there is a short distance between the bearings: the axial internal clearance is reduced, *Figure 10* ②.
- The roller cones do not meet if there is a large distance between the bearings: the axial internal clearance is increased, *Figure 11*.

- ① Intersection points coincide
- ② Intersection points overlap
- S = apexes of the pressure cones
- R = roller cone apexes

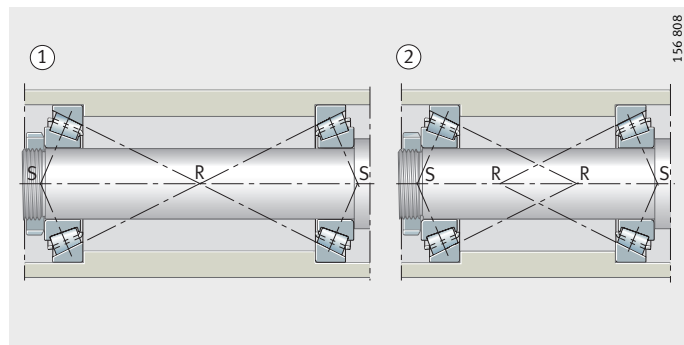


Figure 10
Adjusted bearing arrangement with tapered roller bearings in O arrangement

- S = apexes of the pressure cones
- R = roller cone apexes

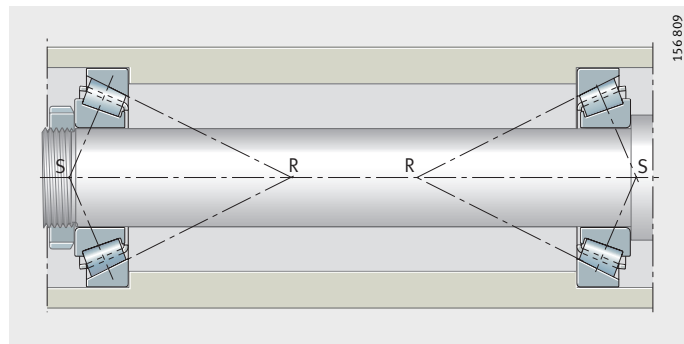


Figure 11
Adjusted bearing arrangement with tapered roller bearings in O arrangement, no overlap of roller cone apexes

Elastic adjustment

Adjusted bearing arrangements can also be achieved by preloading using springs, *Figure 12* ①. The elastic adjustment method compensates for thermal expansion. It can also be used where bearing arrangements are at risk of vibration while stationary.

- ① Curved spring washer

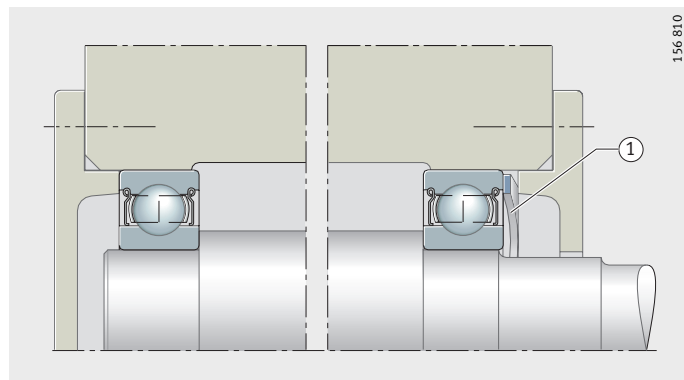


Figure 12
Adjusted deep groove ball bearings preloaded by curved spring washer

Design of bearing arrangements

Floating bearing arrangement

The floating bearing arrangement is an economical solution where close axial guidance of the shaft is not required, *Figure 13*. The construction is similar to that of the adjusted bearing arrangement.

In the floating bearing arrangement, however, the shaft can be displaced in relation to the housing to the extent of the axial clearance s . The value s is defined as a function of the required guidance accuracy such that the bearings are not axially preloaded even under unfavourable thermal conditions.

Suitable bearings

Suitable bearing types for the floating bearing arrangement include deep groove ball bearings, self-aligning ball bearings and spherical roller bearings.

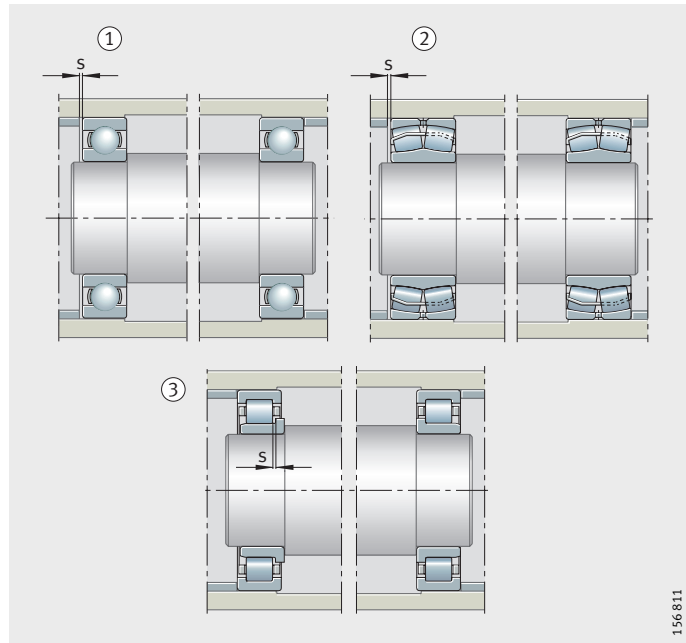
In both bearings, one ring – usually an outer ring – has a fit that allows displacement.

In floating bearing arrangements comprising cylindrical roller bearings with cage of series NJ, the length compensation takes place within the bearings. The inner and outer rings can have tight fits, *Figure 13* ③.

Tapered roller bearings and angular contact ball bearings are not suitable for a floating bearing arrangement, since they must be adjusted in order to run correctly.

- ① Two deep groove ball bearings
 - ② Two spherical roller bearings
 - ③ Two cylindrical roller bearings NJ
- s = axial clearance

Figure 13
Examples of
floating bearing arrangements



Fits Rolling bearings are located on the shaft and in the housing in a radial, axial and tangential direction according to their function. Radial and tangential location is normally achieved by force locking, i. e. tight fits on the bearing rings. Axial location is normally achieved by geometrical locking, see Axial location of bearings, page 156.

Criteria for selection of fits

The following must be observed when selecting fits:

- The bearing rings must be well supported on their circumference in order to allow full utilisation of the load carrying capacity.
- The bearings must not creep on their mating parts, otherwise the seats will be damaged.
- One ring of the non-locating bearing must adapt to changes in shaft and housing length and must therefore be capable of axial displacement; it is only in cylindrical roller bearings N and NU that displacement occurs within the bearing.
- The bearings must be easy to fit and dismantle.

Good support of the bearing rings on their circumference requires rigid seating, i. e. a tight fit. The requirement that bearings must not creep on their mating parts also requires rigid seating.

If non-separable bearings must be fitted and dismantled, a tight fit cannot be achieved, at least for one ring.

In cylindrical roller bearings N and NU and needle roller bearings, both rings can have tight fits, since the length compensation takes place within the bearing and since the rings can be fitted separately.

With tight fits and a temperature differential between the inner and outer ring, the radial internal clearance of the bearing is reduced. This must be taken into consideration when selecting the internal clearance, Operating clearance, page 97.

Caution! If materials other than cast iron or steel are used for the adjacent construction, the following must also be taken into consideration to achieve rigid seating: the modulus of elasticity and the differing coefficients of thermal expansion of the materials.

For aluminium housings, thin-walled housings and hollow shafts, a closer fit should be selected if necessary in order to achieve the same force locking as with cast iron, steel or solid shafts.

Higher loads, especially shocks, require a fit with larger interference and adherence to narrow geometrical tolerances.

Seats for axial bearings

Axial bearings, which can support axial loads only, must not be guided radially (with the exception of: axial cylindrical roller bearings, in which the degree of freedom in the radial direction is present due to the flat raceways).

In axial bearings with groove-shaped raceways, such as axial deep groove ball bearings, this is not present and must be achieved by a loose seat for the stationary washer. A rigid seat is normally selected for the rotating washer.

Where axial bearings support radial forces in addition to axial forces, such as in axial spherical roller bearings, fits should be selected in the same way as for radial bearings.

The contact surfaces of the mating parts must be perpendicular to the axis of rotation (runout tolerance to IT5 or better), in order to ensure uniform load distribution over all the rolling elements.

Design of bearing arrangements

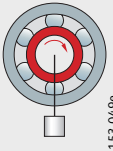

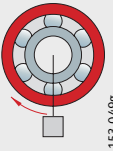

Conditions of rotation The conditions of rotation indicate the motion of one bearing ring with respect to the load direction and are expressed as either circumferential load or point load, see table Conditions of rotation.

Point load If the ring remains stationary relative to the load direction, there are no forces that displace the ring relative to its seating surface. This type of load is described as point load. There is no risk that the seating surface will be damaged and a loose fit is possible.

Circumferential load If forces are present that displace the ring relative to its seating surface, every point on the raceway is subjected to load over the course of one revolution of the bearing. A load with this characteristic is described as a circumferential load.

Caution! There is a risk that the seating surface will be damaged and a tight fit should be used.

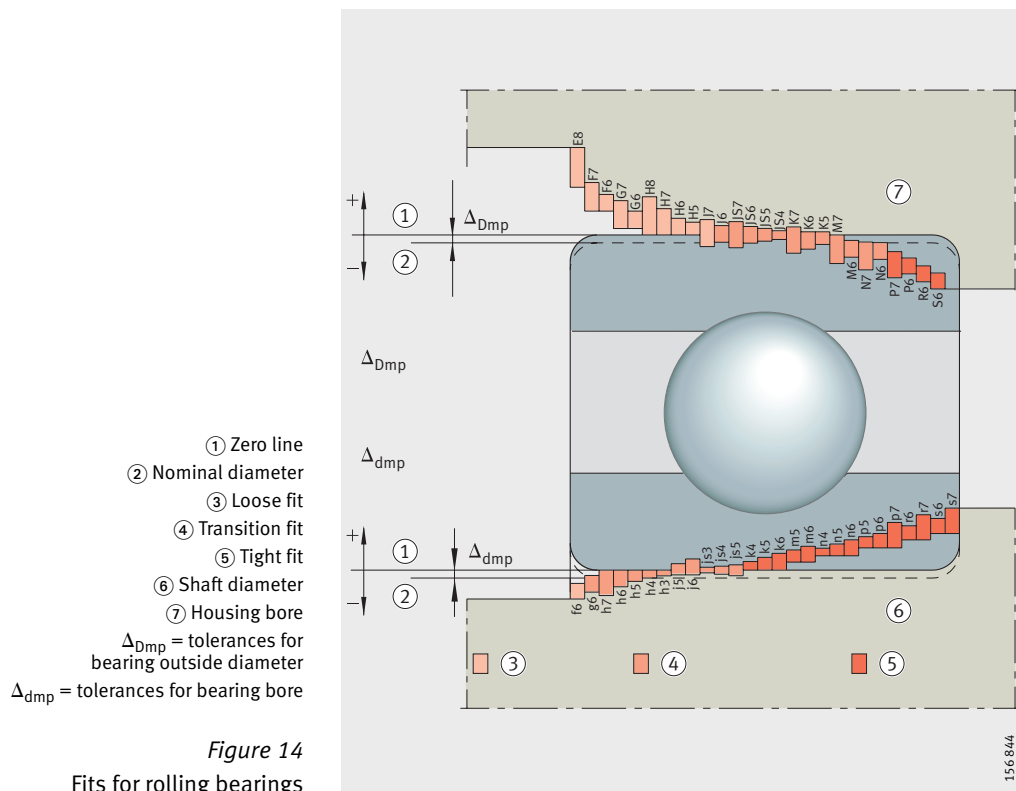
Conditions of rotation

Conditions of motion	Example	Schematic	Load case	Fit
Rotating inner ring Stationary outer ring Constant load direction	Shaft with weight load	 153 049e	Circumferential load on inner ring	Inner ring: tight fit necessary Outer ring: loose fit permissible
Stationary inner ring Rotating outer ring Load direction rotates with outer ring	Hub bearing arrangement with significant imbalance	 153 049f	and Point load on outer ring	
Stationary inner ring Rotating outer ring Constant load direction	Passenger car front wheel bearing (hub bearing arrangement)	 153 049g	Point load on inner ring	Inner ring: loose fit permissible Outer ring: tight fit necessary
Rotating inner ring Stationary outer ring Load direction rotates with inner ring	Centrifuge, vibrating screen	 153 049h	and Circumferential load on outer ring	

Shaft and housing tolerances

The fit is determined by the ISO tolerances for shafts and housings (ISO 286), in conjunction with the tolerances Δ_{dmp} for the bore and Δ_{Dmp} for the outside diameter of the bearings (DIN 620). The ISO tolerances are defined in the form of tolerance zones. They are determined by their position relative to the zero line (= tolerance position) and their size (= tolerance grade, see ISO 286). The tolerance position is indicated by letters (upper case for housings, lower case for shafts). A schematic illustration of the most common rolling bearing fits is shown in *Figure 14*.

The tables on pages 134 to 136 contain recommendations for the selection of shaft and housing tolerances.



Design of bearing arrangements

Shaft tolerances – radial bearings with cylindrical bore

Condition of rotation	Bearing type	Shaft diameter mm	Displacement facility Load	Tolerance
Point load on inner ring	Ball bearings, roller bearings	all sizes	Inner ring easily displaced	g6 (g5)
			Inner ring not easily displaced. Angular contact ball bearings and tapered roller bearings with adjusted inner ring	h6 (j6)
	Needle roller bearings	all sizes	Non-locating bearings	h6 (g6) ¹⁾
Circumferential load on inner ring or indeterminate load direction	Ball bearings	up to 50	Normal loads ²⁾	j6 (j5)
			50 to 100	Low loads ³⁾
		100 to 200	Normal and high loads ⁴⁾	k6 (k5)
			Low loads ²⁾	k6 (m6)
		over 200	Normal and high loads ⁵⁾	m6 (m5)
			Low loads	m6 (m5)
	Roller bearings	up to 60	Low loads	j6 (j5)
			Normal and high loads	k6 (k5)
		60 to 200	Low loads	k6 (k5)
			Normal loads	m6 (m5)
		200 to 500	High loads	n6 (n5)
			Normal loads	m6 (n6)
	over 500	High loads, shocks	p6	
		Normal loads	n6 (p6)	
	Needle roller bearings	up to 50	Low loads	k6
			Normal and high loads	m6
		50 to 120	Low loads	m6
			Normal and high loads	n6
		120 to 250	Low loads	n6
			Normal and high loads	p6
250 to 400		Low loads	p6	
		Normal and high loads	r6	
400 to 500		Low loads	r6	
		Normal and high loads	s6	
over 500		Low loads	r6	
		Normal and high loads	s6	

1) For easier fitting.

2) $C/P > 10$

3) $C/P > 12$

4) $C/P < 12$

5) $C/P < 10$

Shaft tolerances – axial bearings

Load	Bearing type	Shaft diameter	Operating conditions	Tolerance
Axial load	Axial deep groove ball bearings	all sizes	–	j6
	Axial deep groove ball bearings, double direction		–	k6
	Axial cylindrical roller bearings with shaft locating washer		–	h6 (j6)
	Axial cylindrical roller and cage assemblies		–	h8
Combined load	Axial spherical roller bearings	all sizes	Point load on shaft locating washer	j6
		up to 200 mm	Circumferential load on shaft locating washer	j6 (k6)
		over 200 mm		k6 (m6)

Design of bearing arrangements

Housing tolerances – radial bearings

Condition of rotation	Displacement facility Load	Operating conditions	Tolerance
Point load on outer ring	Outer ring easily displaced Housing unsplit	The tolerance grade is determined by the running accuracy required	H7 (H6) ¹⁾
	Outer ring easily displaced Housing split		H8 (H7)
	Outer ring not easily displaced Housing unsplit	High running accuracy required	H6 (J6)
	Outer ring not easily displaced Angular contact ball bearings and tapered roller bearings with adjusted outer ring	Normal running accuracy	H7 (J7)
	Outer ring easily displaced	Heat input via shaft	G7 ²⁾
Circumferential load on outer ring or indeterminate load direction	Low loads Outer ring cannot be displaced	High running accuracy requirements K6, M6, N6 and P6	K7 (K6)
	Normal loads, shocks Outer ring cannot be displaced		M7 (M6)
	High loads, shocks (C/P < 6) Outer ring cannot be displaced		N7 (N6)
	High loads, severe shocks Thin-walled housing, outer ring cannot be displaced		P7 (P6)

1) G7 for flake graphite cast iron housings if bearing outside diameter D > 250 mm and temperature differential between outer ring and housing > 10 K.

2) F7 for flake graphite cast iron housings if bearing outside diameter D > 250 mm and temperature differential between outer ring and housing > 10 K.

Housing tolerances – axial bearings

Load	Bearing type	Operating conditions	Tolerance
Axial load	Axial deep groove ball bearings	Normal running accuracy High running accuracy	E8 H6
	Axial cyl. roller bearings with housing locating washer	–	H7 (K7)
	Axial cyl. roller and cage assemblies	–	H10
	Axial spherical roller bearings	Normal loads High loads	E8 G7
Combined loads Point load on housing locating washer	Axial spherical roller bearings	–	H7
Combined loads Circumferential load on housing locating washer	Axial spherical roller bearings	–	K7

Tables for shaft and housing fits

The numerical values for the fits (page 138 to page 151) are valid for solid steel shafts and cast iron housings. In the table header, below the nominal diameters, are the normal tolerances for the bore or outside diameters of radial bearings (excluding tapered roller bearings). Below these are the deviations for the most important tolerance zones for fitting of rolling bearings.

Shaft fits

In each cell are five numbers in accordance with the following scheme, for example for shaft $\varnothing 40 j5$:

Example: table entry for shaft fit

Shaft deviation in μm		Fit interference or fit clearance in μm	
Maximum material value	+6	18 ²⁾	Interference or fit clearance if the maximum material values are combined
		10 ¹⁾²⁾	
Minimum material value	-5	5 ³⁾	Interference or fit clearance if the minimum material values are combined

- 1) The probable interference or fit clearance is the value obtained if the actual dimensions are one third away from the maximum material values.
- 2) Values printed in bold type indicate fit interference.
- 3) Values printed in regular type indicate fit clearance.

Shaft fits: see tables from page 138.

Housing fits

In each cell are five numbers in accordance with the following scheme, for example for housing $\varnothing 100 K6$:

Example: table entry for housing fit

Housing deviation in μm		Fit interference or fit clearance in μm	
Minimum material value	+4	18 ²⁾	Interference or fit clearance if the maximum material values are combined
		6 ¹⁾²⁾	
Maximum material value	-18	19 ³⁾	Interference or fit clearance if the minimum material values are combined

- 1) The probable interference or fit clearance is the value obtained if the actual dimensions are one third away from the maximum material values.
- 2) Values printed in bold type indicate fit interference.
- 3) Values printed in regular type indicate fit clearance.

Housing fits: see tables from page 147.

Design of bearing arrangements

Shaft fits

Nominal shaft diameter in mm										
over	3		6		10		18		30	
incl.	6		10		18		30		50	
Deviation of bearing bore diameter in μm (normal tolerance)										
Δ_{dmp}	0		0		0		0		0	
	-8		-8		-8		-10		-12	
Shaft deviation, fit interference or fit clearance in μm										
g5	-4	4 0 9	-5	3 2 11	-6	2 3 14	-7	3 3 16	-9	3 5 20
g6	-4	4 1 12	-5	3 3 14	-6	2 4 17	-7	3 5 20	-9	3 6 25
h5	0	8 4 5	0	8 3 6	0	8 3 8	0	10 4 9	0	12 4 11
h6	0	8 3 8	0	8 2 9	0	8 2 11	0	10 2 13	0	12 3 16
j5	+3	11 7 2	+4	12 7 2	+5	13 8 3	+5	15 9 4	+6	18 10 5
j6	+6	14 8 2	+7	15 9 2	+8	16 10 3	+9	19 11 4	+11	23 14 5
js5	+2,5	11 6 3	+3	11 6 3	+4	12 6 4	+4,5	15 9 5	+5,5	18 10 6
js6	+4	12 7 4	+4,5	13 7 5	+5,5	14 8 6	+6,5	17 9 7	+8	20 11 8
k5	+6	14 9 1	+7	15 10 1	+9	17 12 1	+11	21 15 2	+13	25 17 2
k6	+9	17 11 1	+10	18 12 1	+12	20 14 1	+15	25 17 2	+18	30 21 2
m5	+9	17 13 4	+12	20 15 6	+15	23 18 7	+17	27 21 8	+20	32 24 9
m6	+12	20 15 4	+15	23 17 6	+18	26 20 7	+21	31 23 8	+25	37 27 9

50		65		80		100		120		140		160		180		200		225	
65		80		100		120		140		160		180		200		225		250	
0		0		0		0		0		0		0		0		0		0	
-15		-15		-20		-20		-25		-25		-25		-30		-30		-30	
-10	5	-10	5	-12	8	-12	8	-14	11	-14	11	-14	11	-15	15	-15	15	-15	15
-23	4	-23	4	-27	4	-27	4	-32	3	-32	3	-32	3	-35	2	-35	2	-35	2
	23		23		27		27		32		32		32		35		35		35
-10	5	-10	5	-12	8	-12	8	-14	11	-14	11	-14	11	-15	15	-15	15	-15	15
-29	6	-29	6	-34	6	-34	6	-39	6	-39	6	-39	6	-44	5	-44	5	-44	5
	29		29		34		34		39		39		39		44		44		44
0	15	0	15	0	20	0	20	0	25	0	25	0	25	0	30	0	30	0	30
-13	6	-13	6	-15	8	-15	8	-18	11	-18	11	-18	11	-20	13	-20	13	-20	13
	13		13		15		15		18		18		18		20		20		20
0	15	0	15	0	20	0	20	0	25	0	25	0	25	0	30	0	30	0	30
-19	4	-19	4	-22	6	-22	6	-25	8	-25	8	-25	8	-29	10	-29	10	-29	10
	19		19		22		22		25		25		25		29		29		29
+6	21	+6	21	+6	26	+6	26	+7	32	+7	32	+7	32	+7	37	+7	37	+7	37
-7	12	-7	12	-9	14	-9	14	-11	18	-11	18	-11	18	-13	20	-13	20	-13	20
	7		7		9		9		11		11		11		13		13		13
+12	27	+12	27	+13	33	+13	33	+14	39	+14	39	+14	39	+16	46	+16	46	+16	46
-7	16	-7	16	-9	19	-9	19	-11	22	-11	22	-11	22	-13	26	-13	26	-13	26
	7		7		9		9		11		11		11		13		13		13
+6,5	22	+6,5	22	+7,5	28	+7,5	28	+9	34	+9	34	+9	34	+10	40	+10	40	+10	40
-6,5	13	-6,5	13	-7,5	16	-7,5	16	-9	20	-9	20	-9	20	-10	23	-10	23	-10	23
	7		7		8		8		9		9		9		10		10		10
+9,5	25	+9,5	25	+11	31	+11	31	+12,5	38	+12,5	38	+12,5	38	+14,5	45	+14,5	45	+14,5	45
-9,5	13	-9,5	13	-11	17	-11	17	-12,5	21	-12,5	21	-12,5	21	-14,5	25	-14,5	25	-14,5	25
	10		10		11		11		13		13		13		15		15		15
+15	30	+15	30	+18	38	+18	38	+21	46	+21	46	+21	46	+24	54	+24	54	+24	54
+2	21	+2	21	+3	26	+3	26	+3	32	+3	32	+3	32	+4	37	+4	37	+4	37
	2		2		3		3		3		3		3		4		4		4
+21	36	+21	36	+25	45	+25	45	+28	53	+28	53	+28	53	+33	63	+33	63	+33	63
+2	25	+2	25	+3	31	+3	31	+3	36	+3	36	+3	36	+4	43	+4	43	+4	43
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+24	39	+24	39	+28	48	+28	48	+33	58	+33	58	+33	58	+37	67	+37	67	+37	67
+11	30	+11	30	+13	36	+13	36	+15	44	+15	44	+15	44	+17	50	+17	50	+17	50
	11		11		13		13		15		15		15		17		17		17
+30	45	+30	45	+35	55	+35	55	+40	65	+40	65	+40	65	+46	76	+46	76	+46	76
+11	34	+11	34	+13	42	+13	42	+15	48	+15	48	+15	48	+17	56	+17	56	+17	56
	11		11		13		13		15		15		15		17		17		17

Design of bearing arrangements

Shaft fits

Nominal shaft diameter in mm								
over	250		280		315		355	
incl.	280		315		355		400	
Deviation of bearing bore diameter in μm (normal tolerance)								
Δ_{dmp}	0		0		0		0	
	-35		-35		-40		-40	
Shaft deviation, fit interference or fit clearance in μm								
g5	-17 -40	18 1 40	-17 -40	18 1 40	-18 -43	22 0 43	-18 -43	22 0 43
g6	-17 -49	18 4 49	-17 -49	18 4 49	-18 -54	22 3 54	-18 -54	22 3 54
h5	0 -23	35 16 23	0 -23	35 16 23	0 -25	40 18 25	0 -25	40 18 25
h6	0 -32	35 13 32	0 -32	35 13 32	0 -36	40 15 36	0 -36	40 15 36
j5	+7 -16	42 23 16	+7 -16	42 23 16	+7 -18	47 25 18	+7 -18	47 25 18
j6	+16 -16	51 29 16	+16 -16	51 29 16	+18 -18	58 33 18	+18 -18	58 33 18
js5	+11,5 -11,5	47 27 12	+11,5 -11,5	47 27 12	+12,5 -12,5	53 32 13	+12,5 -12,5	53 32 13
js6	+16 -16	51 29 16	+16 -16	51 29 16	+18 -18	58 33 18	+18 -18	58 33 18
k5	+27 +4	62 43 4	+27 +4	62 43 4	+29 +4	69 47 4	+29 +4	69 47 4
k6	+36 +4	71 49 4	+36 +4	71 49 4	+40 +4	80 55 4	+40 +4	80 55 4
m5	+43 +20	78 59 20	+43 +20	78 59 20	+46 +21	86 64 21	+46 +21	86 64 21
m6	+52 +20	87 65 20	+52 +20	87 65 20	+57 +21	97 72 21	+57 +21	97 72 21

400		450		500		560		630		710		800	
450		500		560		630		710		800		900	
0		0		0		0		0		0		0	
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-47	1	-47	1	-51	1	-51	1	-56	15	-56	15	-62	29
	47		47		51		51		56		56		62
-20	25	-20	25	-22	28	-22	28	-24	51	-24	51	-26	74
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	60		60		66		66		74		74		82
0	45	0	45	0	50	0	50	0	75	0	75	0	100
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	27		27		29		29		32		32		36
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-40	17	-40	17	-44	18	-44	18	-50	33	-50	33	-56	48
	40		40		44		44		50		50		56
+7	52	+7	52	-	-	-	-	-	-	-	-	-	-
-20	28	-20	28										
	20		20										
+20	65	+20	65	+22	72	+22	72	+25	100	+25	100	+28	128
-20	37	-20	37	-22	40	-22	40	-25	58	-25	58	-28	76
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	14		14		15		15		16		16		18
+20	65	+20	65	+22	72	+22	72	+25	100	+25	100	+28	128
-20	37	-20	37	-22	40	-22	40	-25	58	-25	58	-28	76
	20		20		22		22		25		25		28
+32	77	+32	77	+29	79	+29	79	+32	107	+32	107	+36	136
+5	53	+5	53	0	53	0	53	0	71	0	71	0	91
	5		5		0		0		0		0		0
+45	90	+45	90	+44	94	+44	94	+50	125	+50	125	+56	156
+5	62	+5	62	0	62	0	62	0	83	0	83	0	104
	5		5		0		0		0		0		0
+50	95	+50	95	+55	105	+55	105	+62	137	+62	137	+70	170
+23	71	+23	71	+26	78	+26	78	+30	101	+30	101	+34	125
	23		23		26		26		30		30		34
+63	108	+63	108	+70	120	+70	120	+80	155	+80	155	+90	190
+23	80	+23	80	+26	88	+26	88	+30	113	+30	113	+34	138
	23		23		26		26		30		30		34

Design of bearing arrangements

Shaft fits

Nominal shaft diameter in mm												
over	3		6		10		18		30		50	
incl.	6		10		18		30		50		65	
Deviation of bearing bore diameter in μm (normal tolerance)												
Δ_{dmp}	0		0		0		0		0		0	
	-8		-8		-8		-10		-12		-15	
Shaft deviation, fit interference or fit clearance in μm												
n5	+13	21	+16	24	+20	28	+24	34	+28	40	+33	48
	+8	17 8	+10	19 10	+12	23 12	+15	28 15	+17	32 17	+20	39 20
n6	+16	24	+19	27	+23	31	+28	38	+33	45	+39	54
	+8	19 8	+10	21 10	+12	25 12	+15	30 15	+17	36 17	+20	43 20
p6	+20	28	+24	32	+29	37	+35	45	+42	54	+51	66
	+12	23 12	+15	26 15	+18	31 18	+22	37 22	+26	45 26	+32	55 32
p7	+24	32	+30	38	+36	44	+43	53	+51	63	+62	77
	+12	25 12	+15	30 15	+18	35 18	+22	43 22	+26	51 26	+32	62 32
r6	+23	31	+28	36	+34	42	+41	51	+50	62	+60	75
	+15	25 15	+19	30 19	+23	35 23	+28	44 28	+34	53 34	+41	64 41
r7	+27	35	+34	42	+41	49	+49	59	+59	71	+71	86
	+15	28 15	+19	34 19	+23	40 23	+28	49 28	+34	59 34	+41	71 41
Shaft tolerances for adapter sleeves and extraction sleeves												
h7/ $\frac{\text{IT5}}{2}$	0	<i>2,5</i>	0	<i>3</i>	0	<i>4</i>	0	<i>4,5</i>	0	<i>5,5</i>	0	<i>6,5</i>
	-12		-15		-18		-21		-25		-30	
h8/ $\frac{\text{IT5}}{2}$	0	<i>2,5</i>	0	<i>3</i>	0	<i>4</i>	0	<i>4,5</i>	0	<i>5,5</i>	0	<i>6,5</i>
	-18		-22		-27		-33		-39		-46	
h9/ $\frac{\text{IT6}}{2}$	0	<i>4</i>	0	<i>4,5</i>	0	<i>5,5</i>	0	<i>6,5</i>	0	<i>8</i>	0	<i>9,5</i>
	-30		-36		-43		-52		-62		-74	

The values printed in *italic* type indicate guide values for the cylindricity tolerance t_1 (ISO 1101).

65		80		100		120		140		160		180		200		225	
80		100		120		140		160		180		200		225		250	
0		0		0		0		0		0		0		0		0	
-15		-20		-20		-25		-25		-25		-30		-30		-30	
+33	48	+38	58	+38	58	+45	70	+45	70	+45	70	+51	81	+51	81	+51	81
+20	39	+23	46	+23	46	+27	56	+27	56	+27	56	+31	64	+31	64	+31	64
	20		23		23		27		27		27		31		31		31
+39	54	+45	65	+45	65	+52	77	+52	77	+52	77	+60	90	+60	90	+60	90
+20	43	+23	51	+23	51	+27	60	+27	60	+27	60	+31	70	+31	70	+31	70
	20		23		23		27		27		27		31		31		31
+51	66	+59	79	+59	79	+68	93	+68	93	+68	93	+79	109	+79	109	+79	109
+32	55	+37	65	+37	65	+43	76	+43	76	+43	76	+50	89	+50	89	+50	89
	32		37		37		43		43		43		50		50		50
+62	77	+72	92	+72	92	+83	108	+83	108	+83	108	+96	126	+96	126	+96	126
+32	62	+37	73	+37	73	+43	87	+43	87	+43	87	+50	101	+50	101	+50	101
	32		37		37		43		43		43		50		50		50
+62	77	+73	93	+76	96	+88	113	+90	115	+93	118	+106	136	+109	139	+113	143
+43	66	+51	79	+54	82	+63	97	+65	99	+68	102	+77	116	+80	119	+84	123
	43		51		54		63		65		68		77		80		84
+73	88	+86	106	+89	109	+103	128	+105	130	+108	133	+123	153	+126	156	+130	160
+43	73	+51	87	+54	90	+63	107	+65	109	+68	112	+77	128	+80	131	+84	135
	43		51		54		63		65		68		77		80		84
0	6,5	0	7,5	0	7,5	0	9	0	9	0	9	0	10	0	10	0	10
-30		-35		-35		-40		-40		-40		-46		-46		-46	
0	6,5	0	7,5	0	7,5	0	9	0	9	0	9	0	10	0	10	0	10
-46		-54		-54		-63		-63		-63		-72		-72		-72	
0	9,5	0	11	0	11	0	12,5	0	12,5	0	12,5	0	14,5	0	14,5	0	14,5
-74		-87		-87		-100		-100		-100		-115		-115		-115	

Design of bearing arrangements

Shaft fits

Nominal shaft diameter in mm										
over	250		280		315		355		400	
incl.	280		315		355		400		450	
Deviation of bearing bore diameter in μm (normal tolerance)										
Δ_{dmp}	0		0		0		0		0	
	-35		-35		-40		-40		-45	
Shaft deviation, fit interference or fit clearance in μm										
n5	+57	92	+57	92	+62	102	+62	102	+67	112
	+34	73 34	+34	73 34	+37	80 37	+37	80 37	+40	88 40
n6	+66	101	+66	101	+73	113	+73	113	+80	125
	+34	79 34	+34	79 34	+37	88 37	+37	88 37	+40	97 40
p6	+88	123	+88	123	+98	138	+98	138	+108	153
	+56	101 56	+56	101 56	+62	113 62	+62	113 62	+68	125 68
p7	+108	143	+108	143	+119	159	+119	159	+131	176
	+56	114 56	+56	114 56	+62	127 62	+62	127 62	+68	139 68
r6	+126	161	+130	165	+144	184	+150	190	+166	211
	+94	138 94	+98	142 98	+108	159 108	+114	165 114	+126	183 126
r7	+146	181	+150	185	+165	205	+171	211	+189	234
	+94	152 94	+98	156 98	+108	173 108	+114	179 114	+126	198 126
Shaft tolerances for adapter sleeves and extraction sleeves										
h7/	$\frac{\text{IT5}}{2}$	0	<i>11,5</i>	0	<i>11,5</i>	0	<i>12,5</i>	0	<i>12,5</i>	0
		-52		-52		-57		-57		-63
										<i>13,5</i>
h8/	$\frac{\text{IT5}}{2}$	0	<i>11,5</i>	0	<i>11,5</i>	0	<i>12,5</i>	0	<i>12,5</i>	0
		-81		-81		-89		-89		-97
										<i>13,5</i>
h9/	$\frac{\text{IT6}}{2}$	0	<i>16</i>	0	<i>16</i>	0	<i>18</i>	0	<i>18</i>	0
		-130		-130		-140		-140		-155
										<i>20</i>

The values printed in *italic* type indicate guide values for the cylindricity tolerance t_1 (ISO 1101).

450		500		560		630		710		800	
500		560		630		710		800		900	
0		0		0		0		0		0	
-45		-50		-50		-75		-75		-100	
+67	112	+73	123	+73	123	+82	157	+82	157	+92	192
+40	88	+44	96	+44	96	+50	121	+50	121	+56	147
	40		44		44		50		50		56
+80	125	+88	138	+88	138	+100	175	+100	175	+112	212
+40	97	+44	106	+44	106	+50	133	+50	133	+56	160
	40		44		44		50		50		56
+108	153	+122	172	+122	172	+138	213	+138	213	+156	256
+68	125	+78	140	+78	140	+88	171	+88	171	+100	204
	68		78		78		88		88		100
+131	176	+148	198	+148	198	+168	243	+168	243	+190	290
+68	139	+78	158	+78	158	+88	199	+88	199	+100	227
	68		78		78		88		88		100
+172	217	+194	244	+199	249	+225	300	+235	310	+266	366
+132	189	+150	212	+155	217	+175	258	+185	268	+210	314
	132		150		155		175		185		210
+195	240	+220	270	+225	275	+255	330	+265	340	+300	400
+132	204	+150	230	+155	235	+175	278	+185	288	+210	337
	132		150		155		175		185		210
0	13,5	0	14,5	0	14,5	0	16	0	16	0	18
-63		-70		-70		-80		-80		-90	
0	13,5	0	14,5	0	14,5	0	16	0	16	0	18
-97		-110		-110		-125		-125		-140	
0	20	0	22	0	22	0	25	0	25	0	28
-155		-175		-175		-200		-200		-230	

Design of bearing arrangements

Housing fits

Nominal housing bore diameter in mm										
over incl.	6		10		18		30		50	
	10		18		30		50		80	
Deviation of bearing outside diameter in μm (normal tolerance)										
Δ_{Dmp}	0		0		0		0		0	
	-8		-8		-9		-11		-13	
Housing deviation, fit interference or fit clearance in μm										
E8	+47	25 35 55	+59	32 44 67	+73	40 54 82	+89	50 67 100	+106	60 79 119
F7	+28	13 21 36	+34	16 25 42	+41	20 30 50	+50	25 37 61	+60	30 44 73
G6	+14	5 11 22	+17	6 12 25	+20	7 14 29	+25	9 18 36	+29	10 21 42
G7	+20	5 13 28	+24	6 15 32	+28	7 17 37	+34	9 21 45	+40	10 24 53
H6	+9	0 6 17	+11	0 6 19	+13	0 7 22	+16	0 9 27	+19	0 11 32
H7	+15	0 8 23	+18	0 9 26	+21	0 10 30	+25	0 12 36	+30	0 14 43
H8	+22	0 10 30	+27	0 12 35	+33	0 14 42	+39	0 17 50	+46	0 20 59
J6	+5	4 2 13	+6	5 1 14	+8	5 2 17	+10	6 3 21	+13	6 5 26
J7	+8	7 1 16	+10	8 1 18	+12	9 1 21	+14	11 1 25	+18	12 2 31
JS6	+4,5	4,5 2 12,5	+5,5	5,5 1 13,5	+6,5	6,5 0 15,5	+8	8 1 19	+9,5	9,5 0 22,5
JS7	-7,5	7,5 1 15,5	+9	9 0 17	+10,5	10,5 1 19,5	+12,5	12,5 1 23,5	+15	15 1 28
K6	+2	7 1 10	+2	9 3 10	+2	11 4 11	+3	13 4 14	+4	15 4 17
K7	+5	10 2 13	+6	12 3 14	+6	15 5 15	+7	18 6 18	+9	21 7 22

Design of bearing arrangements

Housing fits

Nominal housing bore diameter in mm								
over incl.	80 120		120 150		150 180		180 250	
Deviation of bearing outside diameter in μm (normal tolerance)								
Δ_{Dmp}	0 -15		0 -18		0 -25		0 -30	
Housing deviation, fit interference or fit clearance in μm								
E8	+126 +72	72 85 141	+148 +85	85 112 166	+148 +85	85 114 173	+172 +100	100 134 202
F7	+71 +36	36 53 86	+83 +43	43 62 101	+83 +43	43 64 108	+96 +50	50 75 126
G6	+34 +12	12 24 49	+39 +14	14 28 57	+39 +14	14 31 64	+44 +15	15 35 74
G7	+47 +12	12 29 62	+54 +14	14 33 72	+54 +14	14 36 79	+61 +15	15 40 91
H6	+22 0	0 12 37	+25 0	0 14 43	+25 0	0 17 50	+29 0	0 20 59
H7	+35 0	0 17 50	+40 0	0 19 58	+40 0	0 22 65	+46 0	0 25 76
H8	+54 0	0 23 69	+63 0	0 27 81	+63 0	0 29 88	+72 0	0 34 102
J6	+16 -6	6 6 31	+18 -7	7 7 36	+18 -7	7 10 43	+22 -7	7 13 52
J7	+22 -13	13 4 37	+26 -14	14 5 44	+26 -14	14 8 51	+30 -16	16 9 60
JS6	+11 -11	11 1 26	+12,5 -12,5	12,5 1 30,5	+12,5 -12,5	12,5 3 37,5	+14,5 -14,5	14,5 5 44,5
JS7	+17,5 -17,5	17,5 1 32,5	+20 -20	20 1 38	+20 -20	20 1 45	+23 -23	23 2 53
K6	+4 -18	18 6 19	+4 -21	21 7 22	+4 -21	21 4 29	+5 -24	24 4 35
K7	+10 -25	25 8 25	+12 -28	28 9 30	+12 -28	28 6 37	+13 -33	33 8 43

250		315		400		500		630		800		1000	
315		400		500		630		800		1000		1250	
0		0		0		0		0		0		0	
-35		-40		-45		-50		-75		-100		-125	
+191	110	+214	125	+232	135	+255	145	+285	160	+310	170	+360	195
+110	149	+125	168	+135	182	+145	199	+160	227	+170	250	+195	292
	226		254		277		305		360		410		485
+108	56	+119	62	+131	68	+146	76	+160	80	+176	86	+203	98
+56	85	+62	94	+68	104	+76	116	+80	132	+86	149	+98	175
	143		159		176		196		235		276		328
+49	17	+54	18	+60	20	+66	22	+74	24	+82	26	+94	28
+17	39	+18	43	+20	48	+22	54	+24	66	+26	78	+28	93
	84		94		105		116		149		182		219
+69	17	+75	18	+83	20	+92	22	+104	24	+116	26	+133	28
+17	46	+18	50	+20	56	+22	62	+24	76	+26	89	+28	105
	104		115		128		142		179		216		258
+32	0	+36	0	+40	0	+44	0	+50	0	+56	0	+66	0
0	22	0	25	0	28	0	32	0	42	0	52	0	64
	67		76		85		94		125		156		191
+52	0	+57	0	+63	0	+70	0	+80	0	+90	0	+105	0
0	29	0	32	0	36	0	40	0	52	0	63	0	77
	87		97		108		120		155		190		230
+81	0	+89	0	+97	0	+110	0	+125	0	+140	0	+165	0
0	39	0	43	0	47	0	54	0	67	0	80	0	97
	116		129		142		160		200		240		290
+25	7	+29	7	+33	7	-	-	-	-	-	-	-	-
-7	15	-7	18	-7	21								
	60		69		78								
+36	16	+39	18	+43	20	-	-	-	-	-	-	-	-
-16	13	-18	14	-20	16								
	71		79		88								
+16	16	+18	18	+20	20	+22	22	+25	25	+28	28	+33	33
-16	7	-18	6	-20	8	-22	10	-25	17	-28	24	-33	31
	51		58		65		72		100		128		158
+26	26	+28,5	28,5	+31,5	31,5	+35	35	+40	40	+45	45	+52	52
-26	3	-28,5	3	-31,5	4	-35	5	-40	12	-45	18	-52	24
	61		68,5		76,5		85		115		145		177
+5	27	+7	29	+8	32	0	44	0	50	0	56	0	66
-27	5	-29	4	-32	4	-44	12	-50	8	-56	4	-66	2
	40		47		53		50		75		100		125
+16	36	+17	40	+18	45	0	70	0	80	0	90	0	105
-36	7	-40	8	-45	9	-70	30	-80	28	-90	27	-105	28
	51		57		63		50		75		100		125

Design of bearing arrangements

Housing fits

Nominal housing bore diameter in mm												
over		6	10	18	30	50	80					
incl.		10	18	30	50	80	120					
Deviation of bearing outside diameter in μm (normal tolerance)												
Δ_{Dmp}		0	0	0	0	0	0	0				
		-8	-8	-9	-11	-13	-15					
Housing deviation, fit interference or fit clearance in μm												
M6	-3	12	-4	15	-4	17	-4	20	-5	24	-6	28
	-12	6	-15	9	-17	10	-20	11	-24	13	-28	16
		5	4	4	5	5	7	8	8	8	9	9
M7	0	15	0	18	0	21	0	25	0	30	0	35
	-15	7	-18	9	-21	11	-25	13	-30	16	-35	18
		8	8	8	9	9	11	11	13	13	15	15
N6	-7	16	-9	20	-11	24	-12	28	-14	33	-16	38
	-16	10	-20	14	-24	17	-28	19	-33	22	-38	26
		1	1	1	2	2	1	1	1	1	1	1
N7	-4	19	-5	23	-7	28	-8	33	-9	39	-10	45
	-19	11	-23	14	-28	18	-33	21	-39	25	-45	28
		4	3	3	2	2	3	3	4	4	5	5
P6	-12	21	-15	26	-18	31	-21	37	-26	45	-30	52
	-21	15	-26	20	-31	24	-37	28	-45	34	-52	40
		4	7	7	9	9	10	10	13	13	15	15
P7	-9	24	-11	29	-14	35	-17	42	-21	51	-24	59
	-24	16	-29	20	-35	25	-42	30	-51	37	-59	42
		1	3	3	5	5	6	6	8	8	9	9

120		150		180		250		315		400		500		630		800	
150		180		250		315		400		500		630		800		1000	
0		0		0		0		0		0		0		0		0	
-18		-25		-30		-35		-40		-45		-50		-75		-100	
-8	33	-8	33	-8	37	-9	41	-10	46	-10	50	-26	70	-30	80	-34	90
-33	19	-33	16	-37	17	-41	19	-46	21	-50	22	-70	38	-80	38	-90	38
	10		17		22		26		30		35		24		45		66
0	40	0	40	0	46	0	52	0	57	0	63	-26	96	-30	110	-34	124
-40	21	-40	18	-46	21	-52	23	-57	25	-63	27	-96	56	-110	58	-124	61
	18		25		30		35		40		45		24		45		66
-20	45	-20	45	-22	51	-25	57	-26	62	-27	67	-44	88	-50	100	-56	112
-45	31	-45	28	-51	31	-57	35	-62	37	-67	39	-88	56	-100	58	-112	60
	2		5		8		10		14		18		6		25		44
-12	52	-12	52	-14	60	-14	66	-16	73	-17	80	-44	114	-50	130	-56	146
-52	33	-52	30	-60	35	-66	37	-73	41	-80	44	-114	74	-130	78	-146	83
	6		13		16		21		24		28		6		25		44
-36	61	-36	61	-41	70	-47	79	-51	87	-55	95	-78	122	-88	138	-100	156
-61	47	-61	44	-70	50	-79	57	-87	62	-95	67	-122	90	-138	96	-156	104
	18		11		11		12		11		10		28		13		0
-28	68	-28	68	-33	79	-36	88	-41	98	-45	108	-78	148	-88	168	-100	190
-68	49	-68	46	-79	54	-88	59	-98	66	-108	72	-148	108	-168	126	-190	127
	10		3		3		1		1		0		28		13		0

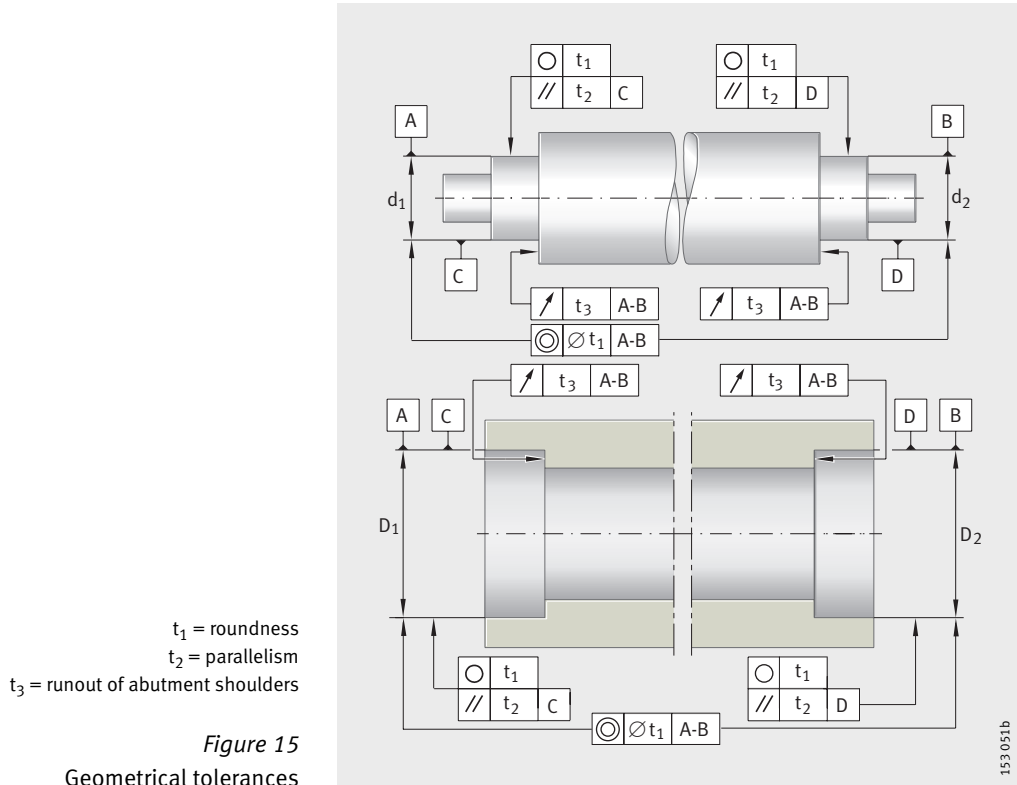
Housing fits

Nominal housing bore diameter in mm	
over	1000
incl.	1250
Deviation of bearing outside diameter in μm (normal tolerance)	
Δ_{Dmp}	0
	-125
Housing deviation, fit interference or fit clearance in μm	
M6	-40 -106
	106 45 85
M7	-40 -145
	145 68 85
N6	-66 -132
	132 67 59
N7	-66 -171
	171 94 59
P6	-120 -186
	186 121 5
P7	-120 -225
	225 148 5

Design of bearing arrangements

Geometrical tolerances of bearing seating surfaces

In order to achieve the required fit, the bearing seats/fit surfaces of the shaft and housing must conform to certain tolerances matched to the bearings, *Figure 15* and table Geometrical tolerances of bearing seating surfaces, page 153.



Accuracy of bearing seating surfaces

The degree of accuracy for the bearing seat tolerances on the shaft and in the housing is given in the tables Geometrical tolerances of bearing seating surfaces, page 153, and the ISO fundamental tolerances (ISO 286).

Second bearing seat

The tolerances for a second bearing seat on the shaft (d_2) or in the housing (D_2) – expressed in terms of coaxiality to DIN ISO 1101 – must be based on the angular adjustment facility of the specific bearing. Misalignments due to elastic deformation of the shaft and housing must be taken into consideration.

Housings

In split housings, the joints must be free from burrs.

The accuracy of the bearing seats is determined as a function of the accuracy of the bearing selected.

Geometrical tolerances of bearing seating surfaces

Bearing tolerance class	Bearing seating surface	Diameter tolerance	Roundness tolerance	Parallelism tolerance	Abutment shoulder runout tolerance
			t_1	t_2	t_3
PN P6X	Shaft	IT6 (IT5)	Circumferential load IT4/2	IT4	IT4
			Point load IT5/2	IT5	
	Housing	IT7 (IT6)	Circumferential load IT5/2	IT5	IT5
			Point load IT6/2	IT6	
P5	Shaft	IT5	Circumferential load IT2/2	IT2	IT2
			Point load IT3/2	IT3	
	Housing	IT6	Circumferential load IT3/2	IT3	IT3
			Point load IT4/2	IT4	
P4 P4S SP	Shaft	IT4	Circumferential load IT1/2	IT1	IT1
			Point load IT2/2	IT2	
	Housing	IT5	Circumferential load IT2/2	IT2	IT2
			Point load IT3/2	IT3	
UP	Shaft	IT3	Circumferential load IT0/2	IT0	IT0
			Point load IT1/2	IT1	
	Housing	IT4	Circumferential load IT1/2	IT1	IT1
			Point load IT2/2	IT2	

Roughness of bearing seats

The roughness of the bearing seats must be matched to the tolerance class of the bearings. The mean roughness value R_a must not be too high, in order to maintain the interference loss within limits. Shafts should be ground and bores should be precision turned.

The bore and shaft tolerances and permissible roughness values are also given in the design and safety guidelines in the product sections. The guide values for roughness correspond to DIN 5 425-1.

Design of bearing arrangements

Raceways for bearings without inner and/or outer ring

In rolling bearings without an inner and/or outer ring as a raceway, the rolling elements run directly on the shaft or in the housing bore.

Caution!

The shaft and housing bore must be suitable for use as rolling bearing raceways.

A precision ground raceway surface without undulations is essential. The raceways must always be precision machined (grinding and honing). At a mean roughness $R_a > 0,2 \mu\text{m}$, it is not possible to utilise the full load carrying capacity of the bearings.

The additional guidelines on shaft design in the product sections must be observed.

The diameter tolerances of the shaft and housing determine the internal clearance.

Materials for raceways

Through hardening steels

Through hardening steels to ISO 683-17 (e.g. 100Cr6) are suitable as materials for rolling bearing raceways in direct bearing arrangements. These steels can also be surface layer hardened.

Case hardening steels

Case hardening steels must conform to ISO 683-17 (e.g. 17MnCr5, 16CrNiMo6) or EN 10 084 (e.g. 16MnCr5).

Flame or induction hardening

For flame and induction hardening, the steels used must conform to ISO 683-17 (e.g. Cf54, 43CrMo4) or to DIN 17 212 (e.g. Cf53).

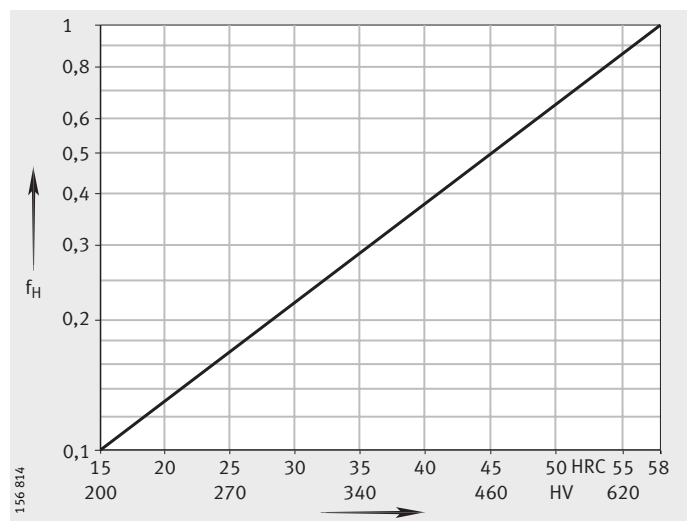
Surface hardness and hardening depth

Case, flame or induction hardened steels must have a surface hardness of 670 HV + 170 HV and an adequate hardening depth CHD or Rht.

The hardening depth is, according to DIN 50 190, the depth of the hardened surface zone at which there is still a hardness of 550 HV. It is measured on the finish ground shaft and must correspond to the stated values, but must in any case be $\geq 0,3 \text{ mm}$.

Caution!

If the raceways are softer than 650 HV (58 HRC), the bearing arrangement will not achieve the full load carrying capacity. The basic dynamic load rating C_r and the basic static load rating C_{0r} must then be reduced by the factor f_H , Figure 16.



f_H = factor to take account of raceway hardness
HRC, HV = surface hardness

Figure 16

Factor f_H to take account of raceway surface hardness

Hardness curves

The hardness curves are shown schematically, see *Figure 17* and *Figure 18*. The required hardness curve is derived from the strain on the material.

The formulae are based on the hardness curves normally achieved with professional heat treatment.

Case hardening:

$$CHD \geq 0,078 \cdot D_w$$

Flame or induction hardening:

$$R_{ht} \geq 140 \cdot D_w / R_{p0,2}$$

- CHD mm
- Case hardening depth
- R_{ht} mm
- Effective hardening depth
- D_w mm
- Rolling element diameter
- R_{p 0,2} N/mm²
- Proof stress.

- ① Case hardening
 - ② Required hardness
 - ③ Hardness
 - ④ Distance from surface
- CHD = case hardening depth with hardness 550 HV

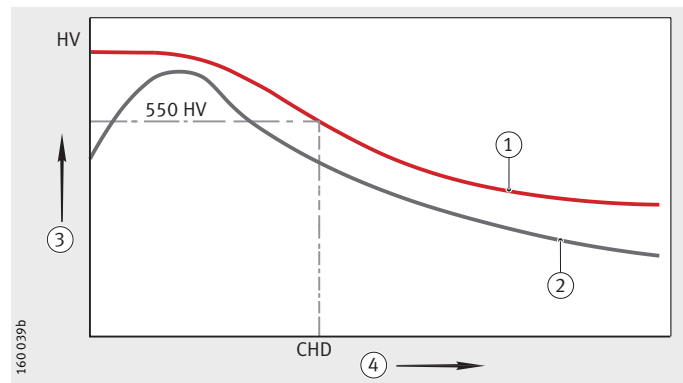


Figure 17
Case hardening depth CHD – hardness curve

- ① Flame or induction hardening
 - ② Required hardness
 - ③ Hardness
 - ④ Distance from surface
- R_{ht} = effective hardening depth

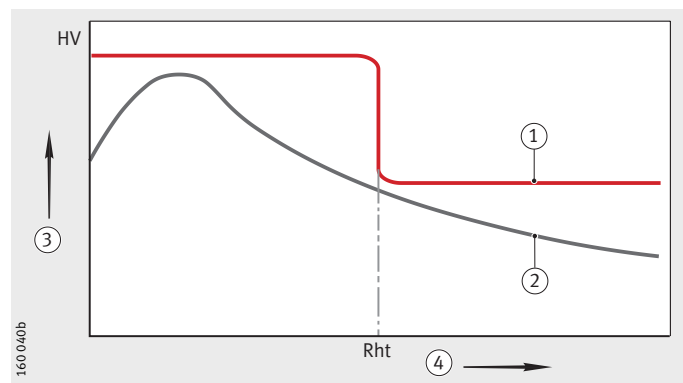


Figure 18
Effective hardening depth R_{ht}

Design of bearing arrangements

Axial location of bearings	<p>Axial location of the bearing rings is matched to the specific bearing arrangement (locating bearing, non-locating bearing, adjusted and floating arrangements of bearings).</p> <p>Examples: see <i>Figure 19</i>, page 157 to <i>Figure 29</i>, page 160.</p>
Design guidelines	<p>Bearing rings must be located by force or geometrical locking in order to prevent lateral movement.</p> <p>The bearing rings must only be in contact with the shaft or housing shoulder, but not with the fillet.</p> <p>Every radius of the mating part must be smaller than the smallest chamfer dimension r or r_1 of the bearing.</p> <p>The radius should have rounding to DIN 5 418 or an undercut to DIN 509.</p> <p>The shoulders on the mating parts must be large enough to provide a sufficiently wide contact surface even with the largest chamfer dimension of the bearing (DIN 5 418).</p> <p>The bearing tables give the maximum values for the radius r_a and r_{a1} and the diameter of the abutment shoulders (D_a and d_a).</p> <p>Any special characteristics of the individual bearing types, e.g. for needle roller bearings, cylindrical roller bearings, tapered roller bearings and axial bearings are indicated in the product sections.</p>
Locating bearings	<p>Locating bearings can support axial forces. The retaining element must be matched to these axial forces. The following are suitable: shoulders on shaft and housing, snap rings, housing cover, shaft covers, nuts, spacer rings etc.</p>
Non-locating bearings	<p>Non-locating bearings only need to support slight axial forces occurring in thermal expansion. The means of axial location only needs to prevent creep of the rings. A tight fit is often sufficient.</p>
Self-retaining bearings	<p>In non-separable bearings, only one bearing ring requires a tight fit; the other ring is retained by the rolling elements.</p>

**Deep groove ball bearings,
double row angular contact
ball bearings**

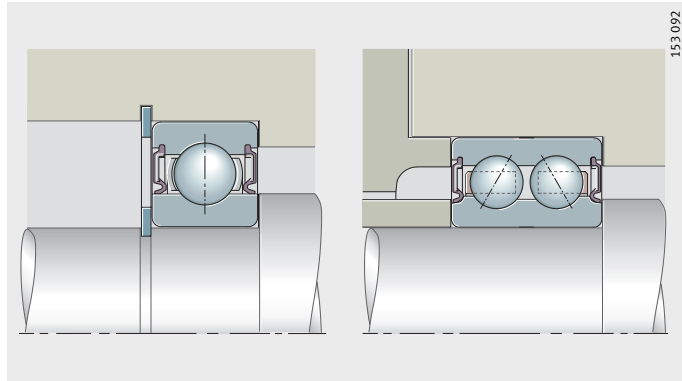


Figure 19
Locating bearing
Supported on both sides
on inner and outer rings

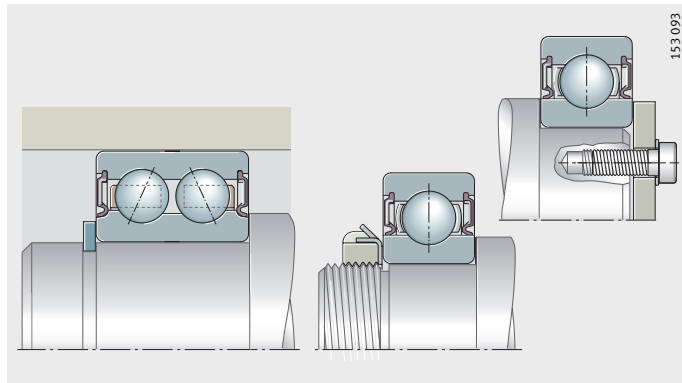


Figure 20
Non-locating bearing
Supported on both sides
on inner ring
Ribs of axially loaded bearing to be
supported up to shoulder diameter

Cylindrical roller bearings

The bearings must be supported on both sides on the inner and outer rings, *Figure 21* to *Figure 23*.

The ribs of axially loaded cylindrical roller bearings must be supported up to dimension d_1 and D_1 .

Dimensions d_1 , D_1 : see dimension tables.

For semi-locating bearings, support of the bearing rings is required on only one side, i.e. the side with the rib supporting the axial load.

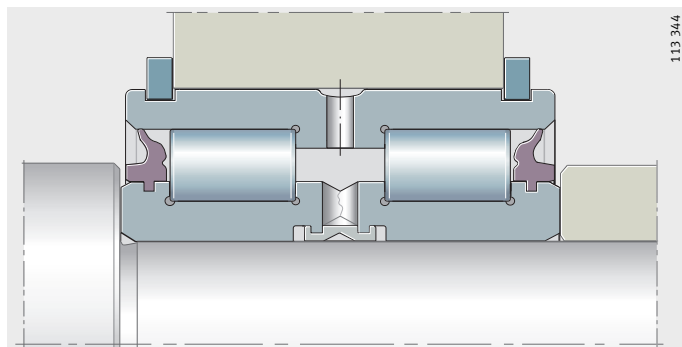


Figure 21
Locating bearing
Outer ring axially located by
retaining rings

Design of bearing arrangements

- ① Locating bearing
- ② Non-locating bearing

Figure 22
Axial location by geometrical locking

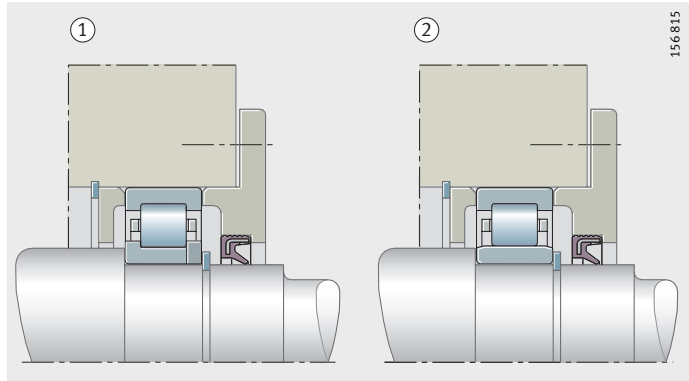
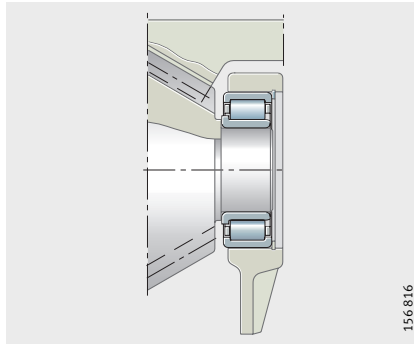


Figure 23
Non-locating bearing
Inner ring rib prevents axial creep to one side



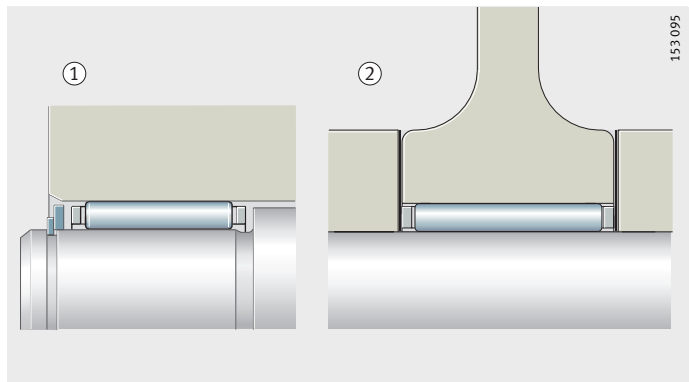
Needle roller and cage assemblies

Caution!

Axial running surfaces should be precision machined (R_a2) and wear resistant.
A washer should be fitted against retaining and snap rings.
Sufficient interference must be ensured between the snap ring and washer.

- ① Location by snap ring and washer
- ② Location by adjacent construction

Figure 24
Axial location of
needle roller and cage assemblies



**Drawn cup needle roller bearings,
needle roller bearings without ribs,
needle roller bearings, inner rings**

Location by snap ring and shaft shoulder. Sufficient interference must be ensured between the snap ring and end face of the inner ring.

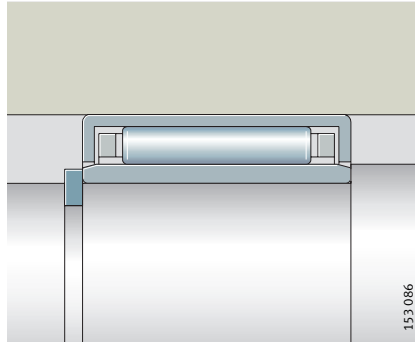
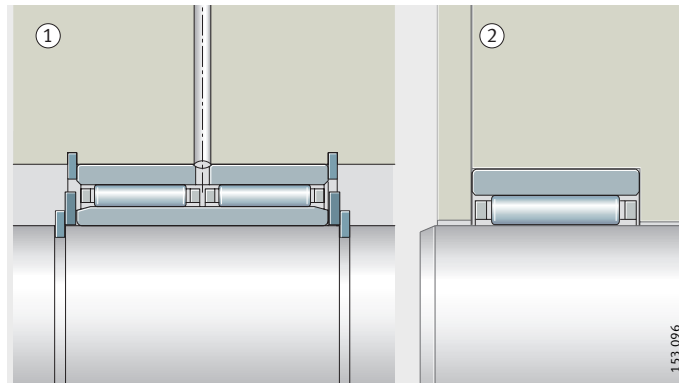


Figure 25
Axial location by
snap ring and shaft shoulder



- ① Axial location by snap rings
- ② Axial location by abutment shoulder

Figure 26
Axial location of bearing rings

Combined needle roller bearings

Caution!

Axial support of bearing rings on both sides is particularly important for locating bearings and bearings with a split inner ring or split outer ring.

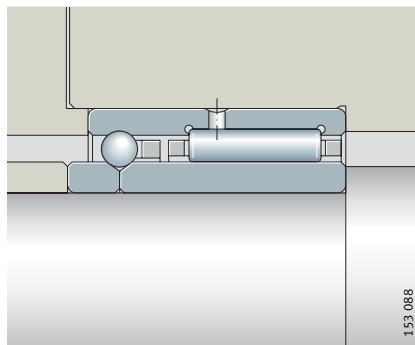


Figure 27
Locating bearing
Axial support of
bearing rings on both sides

Design of bearing arrangements

Adjusted and floating bearing arrangements

Since bearings in adjusted and floating arrangements support axial forces in one direction only, the bearing rings only need to be supported on one side. Counterguidance is performed by a second, symmetrically arranged bearing, *Figure 28* and *Figure 29*. Shaft nuts, ring nuts, covers or spacer washers can be used as adjustment elements.

In floating bearing arrangements, lateral movement of the rings is prevented by shaft or housing shoulders, covers, snap rings etc., *Figure 29*.

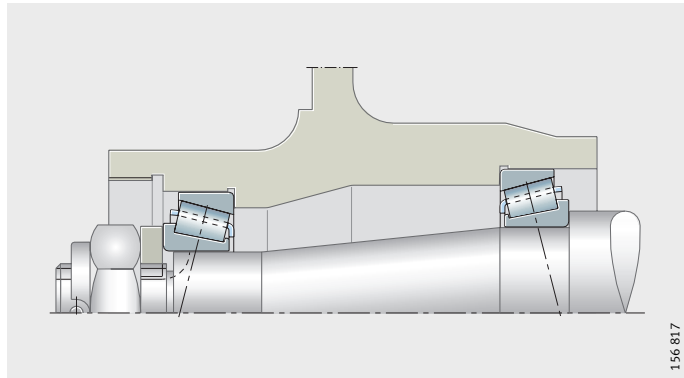
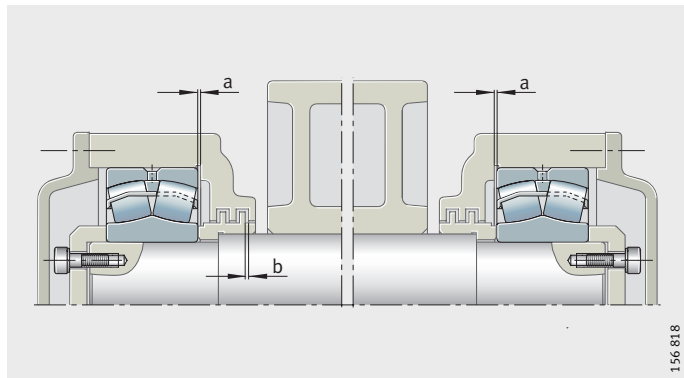


Figure 28
Axial location in adjusted bearing arrangement



a = guidance clearance;
a < b (b = axial labyrinth gap)

Figure 29
Axial location in floating bearing arrangement

Seals

Sealing has a considerable influence on the operating life of a bearing arrangement. It is intended to retain the lubricant in the bearing and prevent the ingress of contaminants into the bearing. Contaminants may have various effects:

- A large quantity of very small, abrasive particles causes wear in the bearing. The increase in the operating clearance and noise level then bring the operating life of the bearing to an end.
- Large, overrolled hard particles reduce the fatigue life since pittings occur at the indentation points under high bearing loads.

A basic distinction is made between contact and non-contact seals in the adjacent construction and the bearing.

Non-contact seals in the adjacent construction

With non-contact seals, there is no friction in the lubricant gap other than that due to lubricant friction itself. The seals do not undergo wear and remain capable of operation for a long period. Since they generate no heat, non-contact seals are also suitable for very high speeds.

Gap seals

A simple design, although adequate in many cases, is a narrow seal gap between the shaft and housing, *Figure 30*.

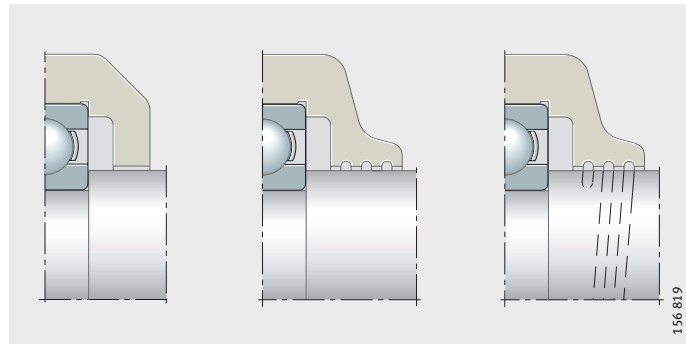


Figure 30
Simple gap seal

Labyrinth seals

A considerably greater sealing effect than with gap seals is achieved by labyrinths incorporating gaps filled with grease, *Figure 31*. In contaminated environments, grease should be pressed from the interior into the seal gap at short intervals.

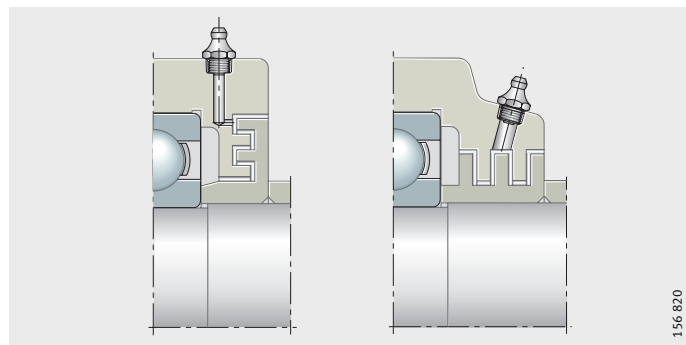


Figure 31
Labyrinth seals

Design of bearing arrangements

Splash ring Where oil lubrication is used with a horizontal shaft, splash rings are suitable for preventing the escape of oil, *Figure 32*. The oil outlet hole on the underside of the seal location must be sufficiently large that it cannot be clogged by contamination.

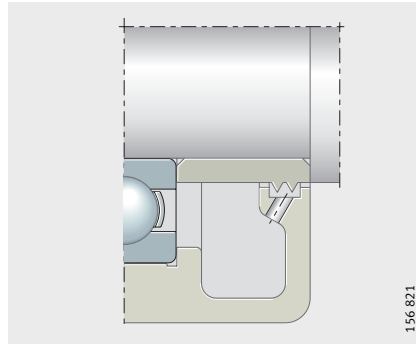


Figure 32
Splash ring

Flinger shields Co-rotating flinger shields have the effect of shielding the seal gap from heavy contamination, *Figure 33*.

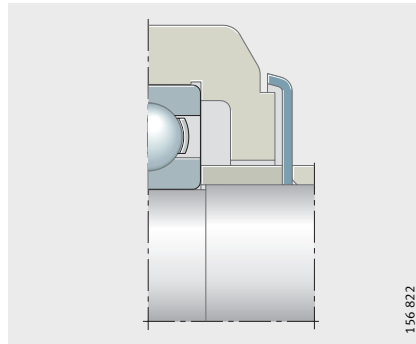


Figure 33
Flinger shields

Baffle plates Stationary baffle plates ensure that grease remains in the area around the bearing, *Figure 34*. The grease collar that forms at the seal gap protects the bearing against contamination.

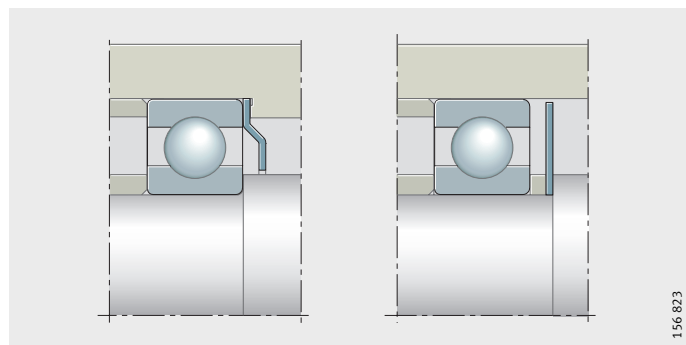


Figure 34
Rigid baffle plates

Lamellar rings Lamellar rings made from steel and radially sprung either outwards or inwards require little mounting space, *Figure 35*. They give protection against loss of grease and ingress of contamination and are also used as an outer seal against spray water.

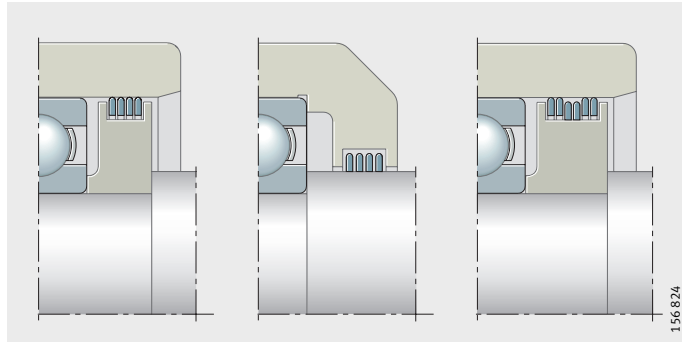


Figure 35
Lamellar rings

Non-contact seals in the bearing

Sealing shields in the bearing

Sealing shields, *Figure 36*, are compact sealing elements fitted on one or both sides of the bearing. Bearings with sealing shields on both sides (suffix 2Z) are supplied with a grease filling.

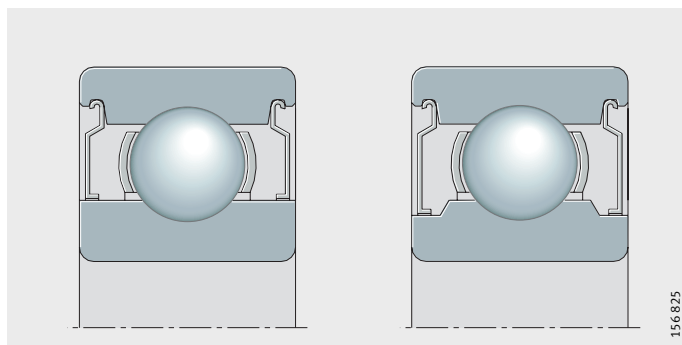


Figure 36
Sealing shields, suffix 2Z

BRS seals

Bearings with BRS seals are supplied by agreement only, *Figure 37*.

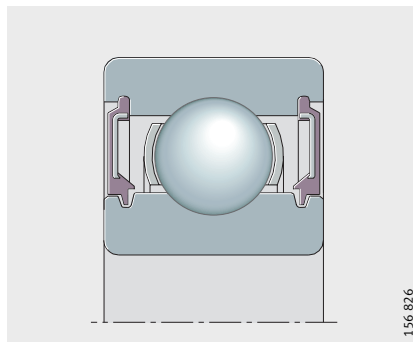


Figure 37
BRS seals, suffix 2BRS

Design of bearing arrangements

The friction in this case is as low as that in bearings with sealing shields. They have the advantage over these, however, that the outer elastic rim gives good sealing when fitted in the slot in the outer ring. This is important with a rotating outer ring since the base oil is separated from the soap suspension by centrifugal force and would escape through the unsealed metallic seat in the outer ring if sealing shields were fitted.

Contact seals in the adjacent construction

Contact seals are in contact with the running surface under contact force (normally radial). The contact force should be kept small to avoid an excessive increase in frictional torque and temperature. The frictional torque and temperature as well as the wear of the seal are also affected by the lubrication condition at the running surface, its roughness and the sliding speed.

With grease lubrication

Felt rings are simple sealing elements that have proved effective primarily with grease lubrication, *Figure 38*. They are impregnated with oil before fitting and give particularly good sealing against dust. In unfavourable environmental conditions, two felt rings are arranged adjacent to each other. Felt rings and annular slots are standardised according to DIN 5 419.

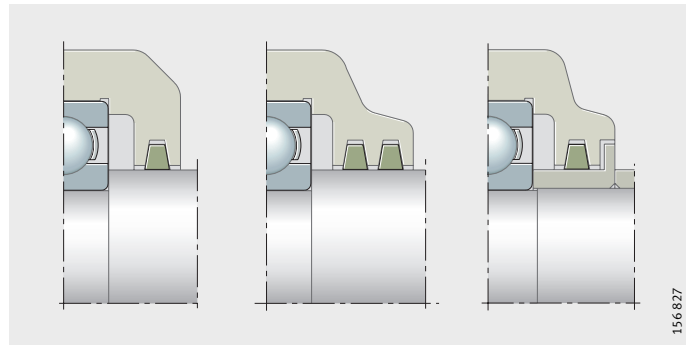


Figure 38
Felt rings or felt strips

With oil lubrication

If oil lubrication is used, sealing is primarily carried out with rotary shaft seals to DIN 3 760 and DIN 3 761, *Figure 39*. The seal collar with one lip is pressed against the shaft running surface by a spring.

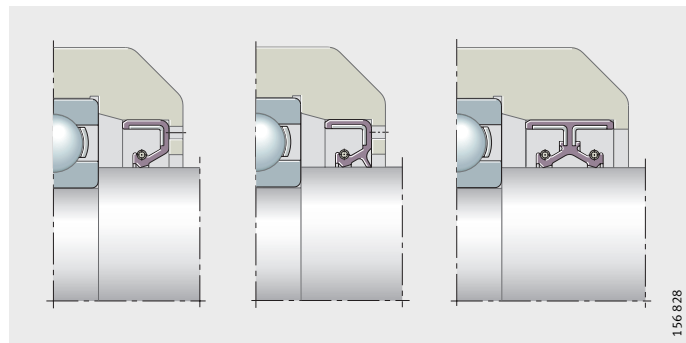


Figure 39
Rotary shaft seals

If the principal objective is to prevent escape of lubricant, the lip is arranged on the inner side of the bearing arrangement. A sealing ring with an additional protective lip also prevents the ingress of contamination. Seal lips made from the conventional material nitrile butadiene rubber (NBR) are suitable with oil lubrication for circumferential speeds up to 12 m/s.

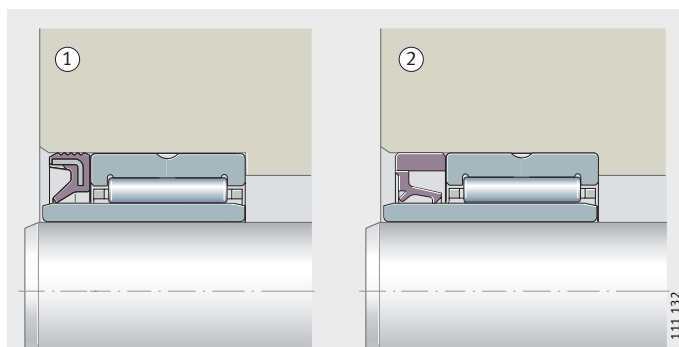
INA sealing rings for needle roller bearings

These compact sealing rings are matched to INA needle roller bearings and are suitable for circumferential speeds at the running surface of up to 10 m/s, *Figure 40*. INA inner rings are recommended as sealing ring raceways.

- ① INA sealing ring G
- ② INA sealing ring SD

Figure 40

INA sealing rings for needle roller bearings



Lip seal with axial sealing action

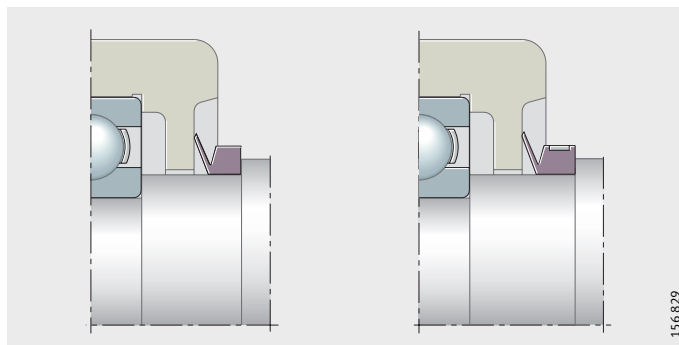
The V ring is a lip seal with axial sealing action, *Figure 41*. During fitting, this single piece rubber ring is pushed under tension along the shaft until its lip is in axial contact with the housing wall. The seal lip acts simultaneously as a flinger shield.

Axial lip seals are unaffected by radial misalignment and slight skewing of the shaft.

Rotating V rings are suitable with grease lubrication for circumferential speeds up to 12 m/s, stationary V rings up to 20 m/s. For circumferential speeds over 8 m/s, the V ring must be axially abutted and, from 12 m/s, it must be radially clamped in addition.

V rings are frequently used as outer seals in order to keep contamination away from a rotary shaft seal.

Figure 41
V ring



Design of bearing arrangements

Axial spring seals

When using grease lubrication, effective sealing can also be achieved by means of axial spring seals, *Figure 42*. The thin sheet metal washers are clamped to the end face of the inner ring or outer ring and are axially sprung against the other bearing ring.

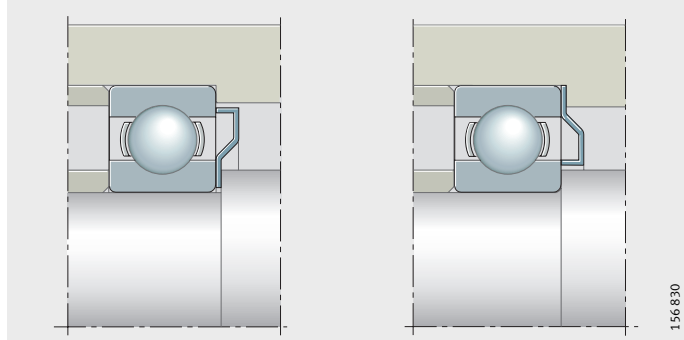


Figure 42
Spring seals

Contact seals in the bearing Sealing washers

Bearings fitted with one or two sealing washers allow simple designs, *Figure 43*. The washers are suitable for giving protection against dust, contamination, damp atmospheres and slight pressure differentials.

Sealing washers are used, for example, in maintenance-free bearings with grease filling.

The sealing washer design RSR made from acrylonitrile butadiene rubber (NBR), normally used in deep groove ball bearings, is located under slight contact pressure against a cylindrically ground inner ring bore.

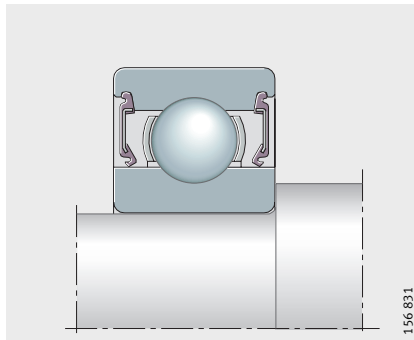


Figure 43
Sealing washers 2RSR

Fitting and dismantling

Handling Rolling bearings are precision products. These products must be handled with care before and during fitting in order to maintain their full performance capacity.

Rolling bearings are preserved using an anti-corrosion agent with a mineral oil base, dry preserved using VCI paper or provided with a long term preservative for overseas transport.

The preservative and packaging used with rolling bearings must be matched to each other to maintain the characteristics of the bearings for as long as possible.

Storage of rolling bearings During storage, measures must be taken to prevent action by aggressive media such as gases, mist or aerosols of acids, alkalis or salts. Direct sunlight should also be avoided since, apart from the harmful effects of UV radiation, it can lead to wide temperature fluctuations in the packaging.

Parts must be stored in dry, clean rooms with the temperature as constant as possible.

In order to prevent condensation, the following permissible conditions should be adhered to:

- temperature between +6 °C and +25 °C, for short periods +30 °C
- temperature differences between day and night \leq 8 K
- relative humidity of max. 65%.

The storage period for greased and sealed bearings is limited by the shelf life of the grease and the sealing ring material.

Permissible storage periods for rolling bearings With normal preservation, bearings can be stored for up to 5 years if the above conditions are fulfilled. If the permissible storage period is exceeded, it is recommended that the bearing should be checked for preservative condition and for corrosion. By agreement, we will give information on the risk assessment relating to the continued storage or use of older bearings.

In special cases, special preservatives are used that permit shorter or longer storage periods than the normal preservation.

Bearings sealed on both sides with sealing shields (suffix 2Z) or sealing washers (suffix 2RSR) should not, where possible, be stored up to the limit of their normal storage capability. The greases used for filling may undergo changes in their chemical-physical behaviour during storage as a result of ageing. Even if the minimum performance capacity remains, the safety reserves of the grease may have diminished. Further relevant information is given in the section Lubrication.

Fitting and dismantling

Unpacking of rolling bearings

Perspiration from handling leads to corrosion. Hands should be kept clean and dry and gloves worn if necessary.

Bearings should only be removed from their original packaging immediately before assembly. If bearings are removed from multi-item packaging with dry preservation, the package must be closed again immediately afterwards, since the protective vapour phase is only effective in closed packaging.

Caution! Bearings should be oiled or greased immediately after unpacking.

Compatibility, miscibility

The anti-corrosion agent in rolling bearings with an oil-based preservative is compatible and miscible with oils and greases with a mineral oil base. Compatibility should be checked if synthetic lubricants or thickeners other than lithium or lithium complex soaps are used.

If there is an incompatibility, the anti-corrosion oil should be washed out before greasing, especially in the case of lubricants with a PTFE/alkoxyfluoroether base and thickeners based on polycarbamide. Bearings should be washed out if the lubricant is changed or the rolling bearings are contaminated.

If in doubt, please consult the relevant lubricant manufacturer.

Cleaning of rolling bearings

Caution! If cleaning is to be carried out, the legal regulations relating to environmental protection, health and safety at work etc. must be observed. The specifications of the cleaning agent manufacturer, for example on handling, must be observed. The design and safety guidelines in the product sections must be observed.

Cleaning should be carried out using brushes, paint brushes or lint-free cloths. If the bearings contain resinous oil or grease residues, precleaning by mechanical means followed by treatment with an aqueous, strongly alkaline cleaning agent is recommended.

The following are suitable for degreasing and washing of rolling bearings:

- aqueous neutral, acidic or alkaline cleaning agents. Check the compatibility of alkaline agents with aluminium components before cleaning
- organic cleaning agents such as paraffin oil free from water and acid, petroleum ether (not petrol), spirit, dewatering fluids, freon 12 substitutes, cleaning agents containing chlorinated hydrocarbons.

Caution! Paraffin oil, petroleum ether, spirit and dewatering fluids are flammable and alkaline agents are corrosive. The use of chlorinated hydrocarbons is associated with the risk of fire, explosion and decomposition as well as with health hazards.

These hazards and appropriate protective measures are described comprehensively in datasheet ZH1/425 of the Hauptverband der gewerblichen Berufsgenossenschaften (German Federation of Institutions for Statutory Accident Insurance and Prevention).

Caution! Rolling bearings must be dried and preservative applied immediately after cleaning – risk of corrosion.

Fitting Comprehensive information on fitting and dismantling is given in the publications WL 80 100, Mounting of Rolling Bearings and WL 80 250, Equipment and Services for the Mounting and Maintenance of Rolling Bearings.

For more extensive work, a fitting manual should be available that precisely describes all relevant work. The manual should also contain details on means of transport, fitting equipment, measurement tools, type and quantity of lubricant and a precise description of the fitting procedure.

Guidelines for fitting

- Before fitting, familiarise yourself with the design by means of the final assembly drawing.
- Before fitting, check whether the bearing presented for fitting corresponds to the data in the drawing.
- The assembly area must be kept clean and free from dust.
- Protect bearings from dust, contaminants and moisture. Contaminants have a detrimental influence on the running and operating life of rolling bearings.
- Check the housing bore and shaft seat of the axis for dimensional and geometrical accuracy and cleanliness.
- Wipe away any anti-corrosion agent from the seating and contact surfaces, wash anti-corrosion agent out of tapered bores.
- Lightly oil the bearing ring seating surfaces.
- Check that the shaft and housing bore have a lead chamfer of 10° to 15°.
- Do not cool the bearings excessively, since moisture due to condensation can lead to corrosion in the bearings and bearing seats.
- After fitting, provide the rolling bearings with lubricant.
- Check the correct functioning of the bearing arrangement.

Fitting and dismantling

Fitting of rolling bearings with cylindrical seats

Caution! Avoid applying direct blows to the bearing rings with a hammer.

In non-separable bearings, apply the fitting forces to the ring with a tight fit, which should also be fitted first, *Figure 1*.

If the inner ring of a non-separable bearing will have a tight fit, press the bearing onto the shaft first. Then push the bearing together with the shaft into the housing (fit clearance).

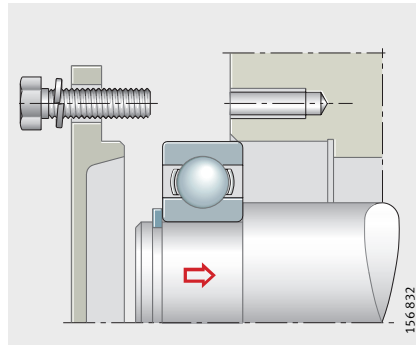


Figure 1

In non-separable bearings, fit the ring with the tight fit first (tight fit for the inner ring in this case)

In separable bearings, *Figure 2*, fitting is easier; both rings can be fitted individually. Rotating the ring while fitting to give a screwdriver effect will help to avoid scraping marks.

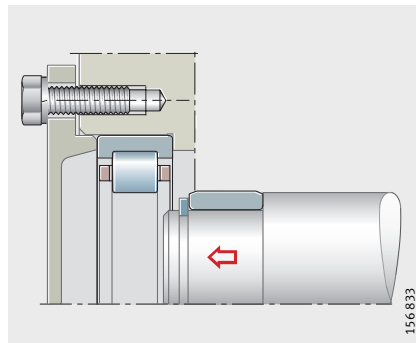


Figure 2

In cylindrical roller bearings, the rings are fitted individually (tight fit)

Cold fitting of bearings by pressing

Bearings up to a bore diameter of approx. 80 mm can be pressed onto the shaft while cold for normal tight fits (mechanical or hydraulic presses), *Figure 3*.

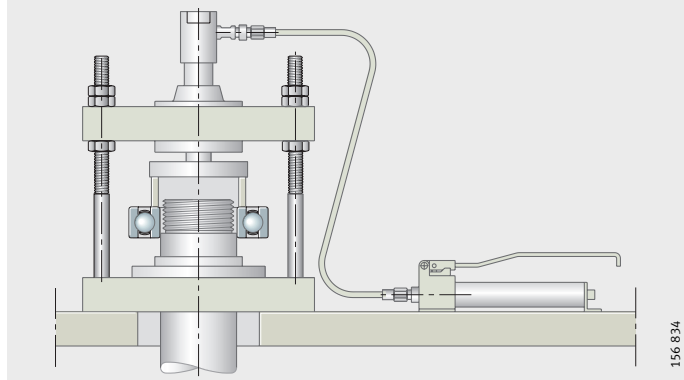


Figure 3
Fitting of deep groove ball bearing using hydraulic press

If a press is not available, the bearings can be fitted by means of a hammer and mounting sleeve.

In bearings with an angular adjustment facility, tilting of the outer ring is prevented by a mounting disc that is in contact with both bearing rings, *Figure 4*. In bearings with axially protruding cages or balls (e.g. some self-aligning ball bearings), the disc must have a turned recess, *Figure 4* ②.

- ① Without turned recess, for barrel roller bearings
- ② With turned recess, for some self-aligning ball bearings

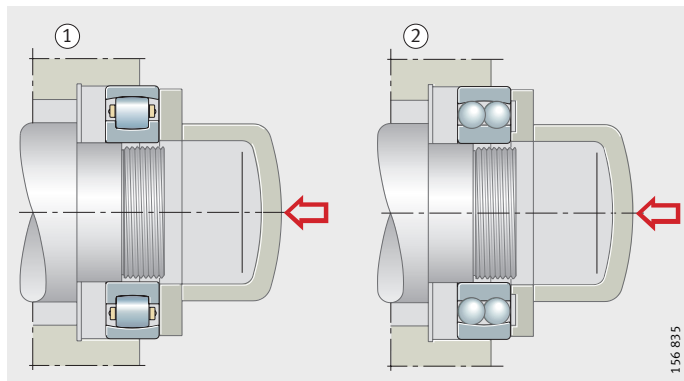


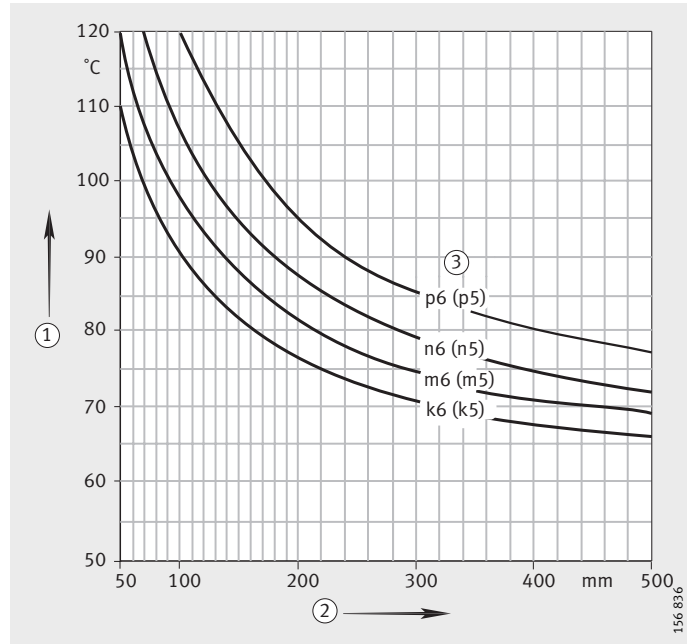
Figure 4
Fitting of bearings by simultaneously pressing onto shaft and pushing into housing with the aid of a mounting disc

Fitting and dismantling

Heating of bearings

Bearings with a cylindrical bore should be heated before fitting if a tight fit on the shaft is intended and excessive effort is required for pressing by mechanical means. The heating temperature required for problem-free fitting is shown as a function of bearing bore diameter in *Figure 5*.

The data are valid for maximum fit interference, a room temperature of +20 °C and an excess temperature safety margin of 30 K.



- ① Heating temperature
- ② Bearing diameter d
- ③ Shaft tolerance

Figure 5

Heating temperature

Induction heating devices

Induction heating devices are particularly suitable for achieving rapid, safe and clean heating. These devices are used mainly in volume fitting work.

Heating plate

As an interim measure, individual bearings can be heated on an electric heating plate. The bearing is covered with a metal sheet and turned several times. A thermostatic controller is absolutely necessary.

Heating cabinet

Safe, clean heating of bearings can be carried out in a thermostatically controlled hot air or heating cabinet. This method is mainly used for small and medium sized bearings. The heating times are relatively long.

Oil bath

With the exception of sealed, greased bearings and high precision bearings, rolling bearings of all sizes and type can be heated in an oil bath. A thermostatic controller is advisable (temperature +80 °C to +100 °C). In order to achieve uniform heating, the bearings should be laid on a grid or suspended in the oil bath.

Caution!

Risk of accidents, environmental pollution by oil vapour, flammability of hot oil, risk of bearing contamination.

Fitting of rolling bearings with tapered bore

Bearings with a tapered bore are mounted either directly on the tapered shaft seat or by means of an adapter sleeve or extraction sleeve on a cylindrical shaft, *Figure 6* ①, ②, ③.

Small bearings (with a bore of up to approx. 80 mm) are driven up the tapered shaft seat or adapter sleeve using a locknut.

The tight fit is achieved by the axial pressing of the inner ring.

The nut is tightened using, for example, a hook wrench.

Small extraction sleeves can also be pressed into the gap between the shaft and inner ring bore using a locknut.

Fitting
 ① using a locknut,
 ② on an adapter sleeve using
 the adapter sleeve nut,
 ③ on an extraction sleeve using a locknut

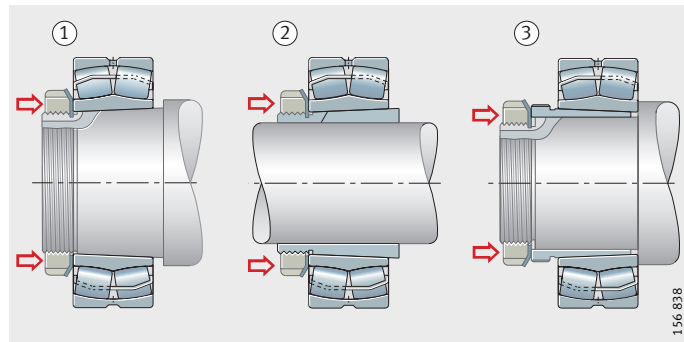


Figure 6
Fitting of rolling bearings with tapered bore

Reduction in radial internal clearance

The reduction in radial internal clearance as a result of inner ring expansion is used as a means of checking the tight fit.

In spherical roller bearings, the radial internal clearance (s_r) must be measured simultaneously over both rows of rollers, *Figure 7*. Alternatively, the axial displacement is measured.

Values for reduction in radial internal clearance and displacement in spherical roller bearings: see section Spherical roller bearings.

For the measurement of radial internal clearance, aids such as feeler gauges FEELER.GAUGE100 and FEELER.GAUGE300 are suitable.

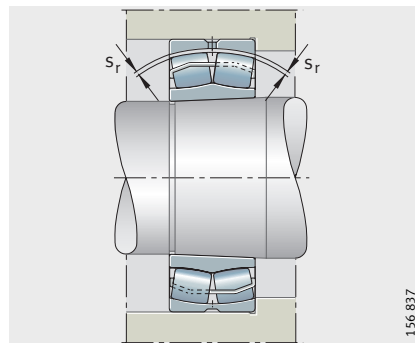


Figure 7
Radial internal clearance (s_r)
in spherical roller bearings

Fitting and dismantling

Fitting using pressure screws or hydraulic tool

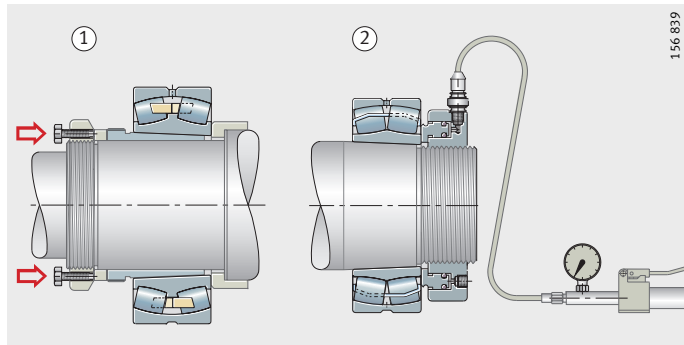
Even in the case of medium sized bearings, the forces required to tighten nuts are considerable. In such cases, fitting can be made easier by using locknuts with pressure screws (not suitable for spherical roller bearings of E1 design, *Figure 8 ①*).

For the fitting of large bearings, a hydraulic device should be used to drive up the bearing or press in the sleeve, *Figure 8 ②*.

Hydraulic nuts are available for all common threaded sleeves and shafts.

- Fitting on an extraction sleeve
① using a locknut and pressure screws and on a tapered shaft
② using a hydraulic nut

Figure 8
Fitting of rolling bearings with tapered bore



Hydraulic method

The hydraulic method gives considerable assistance in the fitting and particularly in the dismantling of bearings with a bore of approx. 160 mm and above.

For fitting, an oil with a viscosity of 75 mm²/s at +20 °C (nominal viscosity 32 mm²/s at +40 °C) is recommended.

Guidelines for dismantling

Comprehensive information on fitting and dismantling is given in the publications WL 80 100, Mounting of Rolling Bearings and WL 80 250, Equipment and Services for the Mounting and Maintenance of Rolling Bearings.

Dismantling should be taken into consideration in the original design of the bearing location. If bearing rings are to be mounted with a tight fit, slots should be provided in the shaft or housing bore to facilitate removal of the bearing rings.

If the bearing is to be reused, the following guidelines should be taken into consideration:

- do not use a concentrated or “hard” flame
- do not apply direct blows to the bearing rings
- do not apply fitting forces through the rolling elements
- carefully clean the bearings after dismantling.

Dismantling of rolling bearings on cylindrical seats

If the bearings and adjacent parts are to be reused, the extraction tool should be applied to the ring fitted with a tight fit.

In non-separable bearings, the ring fitted with a drive fit is dismantled and the ring with a tight fit is then removed.

Extraction of small bearings

For the extraction of small bearings, mechanical extraction devices, *Figure 9* or hydraulic presses are suitable. Dismantling is made easier if there are extraction slots on the shaft or housing so that the extraction tool can be applied to the bearing ring fitted with a tight fit.

Special devices are available for those cases where extraction slots are not present.

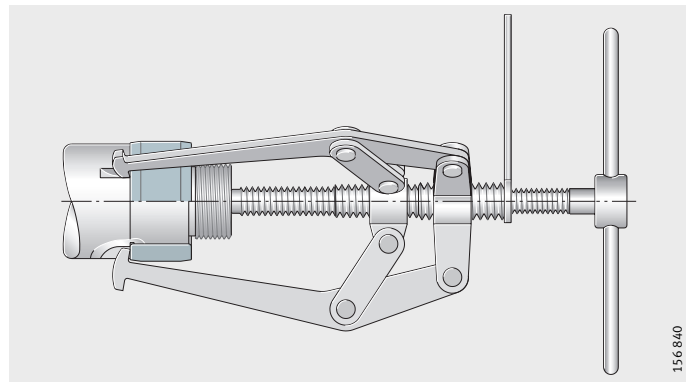


Figure 9

Extraction device with three adjustable arms for the extraction of separable bearings

Extraction of inner rings using an induction device

Induction heating devices are used mainly to extract the shrink-fitted inner rings of cylindrical roller bearings, *Figure 10*.

Heating is achieved quickly and the rings are loosened easily without the transfer of substantial heat to the shaft.



Figure 10

Induction heating device for extraction of cylindrical roller bearing inner rings

Fitting and dismantling

Heating rings Heating rings made from light metal with radial slots can be used to dismantle the inner rings of cylindrical roller bearings that have no ribs or only one rigid rib, *Figure 11*.

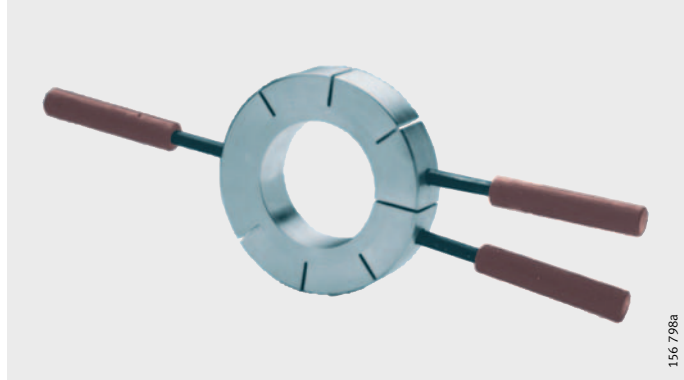


Figure 11
Heating rings are suitable for the extraction of cylindrical roller bearing inner rings

Heating rings are heated on an electric heating plate to between +200 °C and +300 °C, pushed over the bearing ring to be extracted and clamped in place using the grips. Once the press fit on the shaft has been eliminated, both rings are removed together.

Caution! The bearing ring must be removed from the heating ring immediately after extraction in order to prevent overheating.

Flames If an induction device is not available and there are no oil ducts for the hydraulic method, the inner rings of separable bearings can if necessary be heated for extraction by means of a flame, preferably using a ring burner.

Caution! This should be done with extreme care since the rings are sensitive to uneven heating and localised overheating.

Dismantling of rolling bearings with tapered bore

Mechanical dismantling

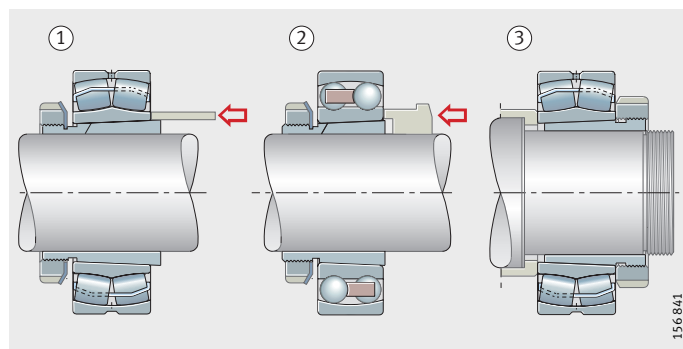
Where bearings are mounted directly on a tapered shaft seat or on an adapter sleeve, the locking effect of the shaft or adapter sleeve nut must be loosened first. The nut is then unscrewed by the amount of the drive-up distance. The inner ring is then driven off the sleeve or shaft, for example using a hammer and metal drift or impact block, *Figure 12* ①, ②.

If an impact block is used, this avoids the risk of slipping.

Bearings located using extraction sleeves are dismantled with the aid of the extraction nut, *Figure 12* ③.

- ① Metal drift
- ② Impact block
- ③ Extraction nut

Figure 12
Dismantling of bearings



Fitting and dismantling

Large bearings located using an extraction sleeve require considerable force. In this case, locknuts with additional pressure screws can be used, *Figure 13* ①. A disc is inserted between the inner ring and pressure screws.

Hydraulic dismantling

An easier and more economical method is the dismantling of extraction sleeves using hydraulic nuts, *Figure 13* ②. The protruding extraction sleeve is supported by a heavy-section ring.

The dismantling of large bearings can be made easier by using the hydraulic method, *Figure 13* ③, and *Figure 14*. Oil is pressed between the fit surfaces. The adjacent parts can then be moved in relation to each other by applying only slight force and without the risk of surface damage.

Tapered shafts must be provided with appropriate oil slots and feed holes. Oil injectors are sufficient to generate the pressure required.

Caution! The extraction sleeve becomes loose abruptly. Leave the nut on the shaft.

Large adapter and extraction sleeves already have the appropriate slots and holes. In this case, a pump must be used to generate the oil pressure required.

Dismantling of an extraction sleeve
 ① using a nut and pressure screws,
 ② using a hydraulic nut,
 dismantling of a spherical roller bearing
 from the extraction sleeve
 ③ using the hydraulic method

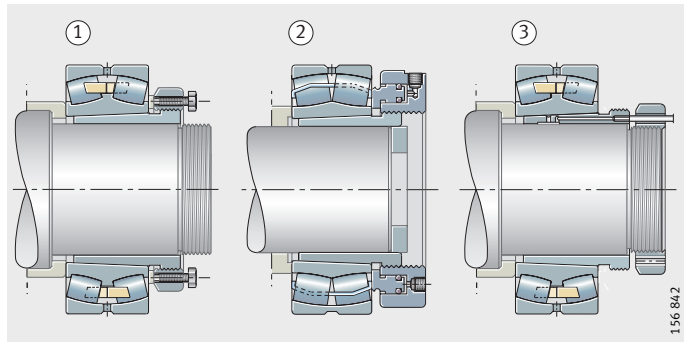


Figure 13

Dismantling of an extraction sleeve

Suitable oils

For dismantling, the oil used should have a viscosity of approx. $150 \text{ mm}^2/\text{s}$ at $+20 \text{ }^\circ\text{C}$ (nominal viscosity $46 \text{ mm}^2/\text{s}$ at $+40 \text{ }^\circ\text{C}$).

Fretting corrosion can be dissolved by rust-dissolving additives in the oil.

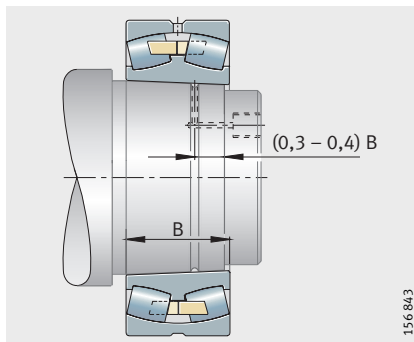


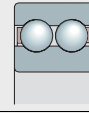
Figure 14

Arrangement of oil ducts in the hydraulic method for dismantling of a spherical roller bearing from a tapered shaft seat

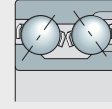
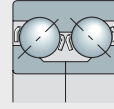
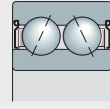
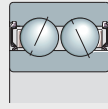
Disposal of bearings after dismantling

If the bearings are not to be reused after dismantling, they should be separated into their constituent parts. Grease, seals and plastic parts should be disposed of in accordance with the relevant waste product guidelines.

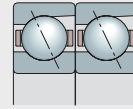
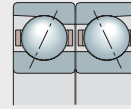
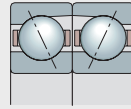
Bearing rings and rolling elements can be sent for recycling.



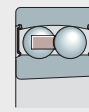
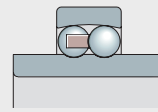
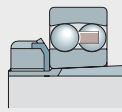
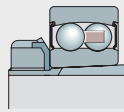
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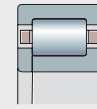
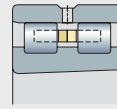
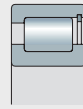
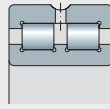
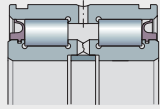
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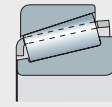
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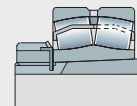
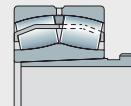
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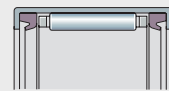
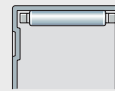
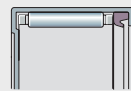
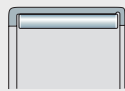
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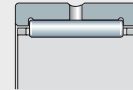
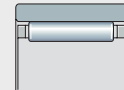
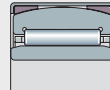
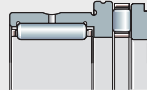
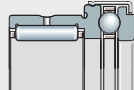
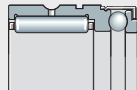
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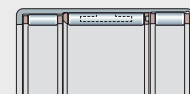
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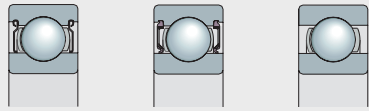
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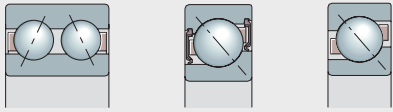


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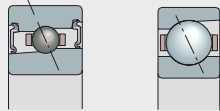
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Deep groove ball bearings



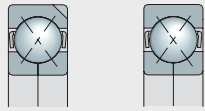
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Angular contact ball bearings



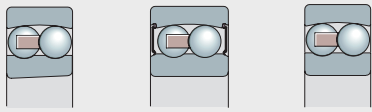
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Spindle bearings



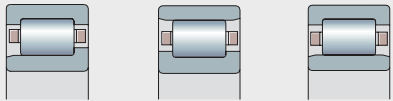
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Four point contact bearings



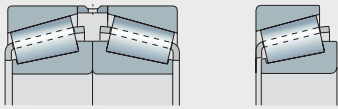
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Self-aligning ball bearings



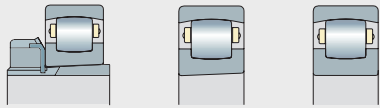
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Cylindrical roller bearings



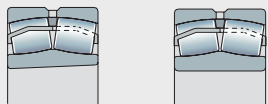
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Tapered roller bearings



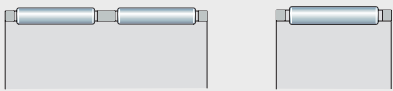
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Barrel roller bearings



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Spherical roller bearings



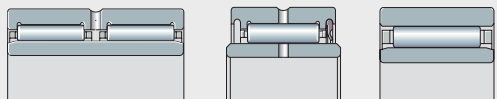
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Needle roller and cage assemblies



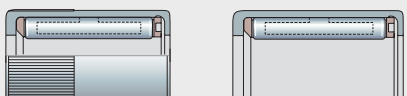
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Drawn cup needle roller bearings



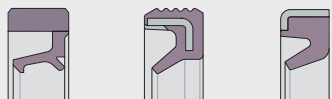
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Machined needle roller bearings
Inner rings



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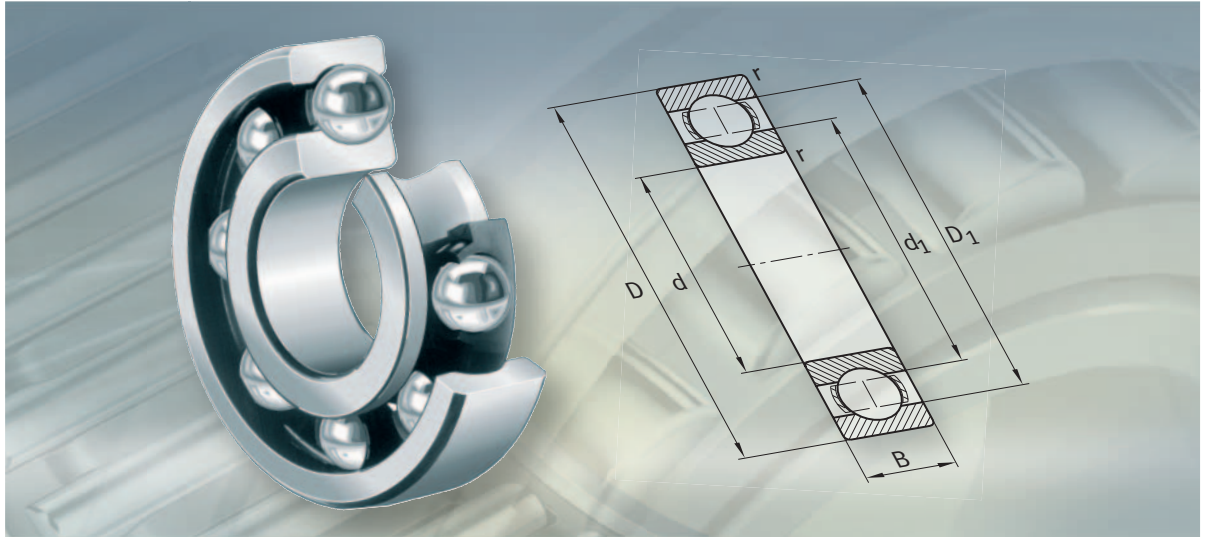
Drawn cup roller clutches



191 594

Sealing rings

FAG



Deep groove ball bearings

Single row

Double row



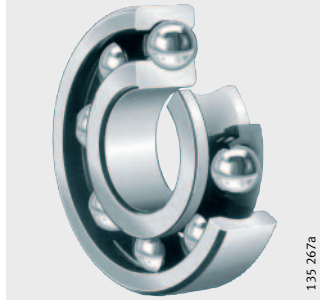
Deep groove ball bearings

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Product overview Deep groove ball bearings

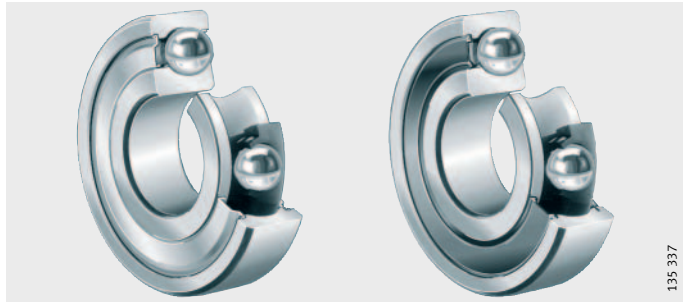
Single row

160, 60, 62, 63, 64,
618, 619



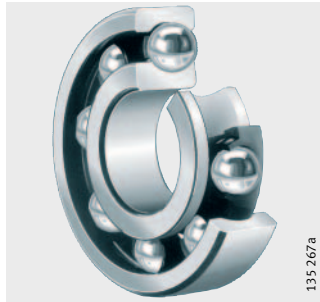
Gap seals Lip seals

60..-2Z, 62..-2Z, 63..-2Z, 618..-2Z, 619..-2Z,
60..-2RSR, 62(622)..-2RSR, 63(623)..-2RSR, 618(619)..-2RSR

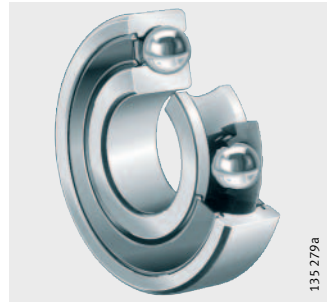


Corrosion-resistant design Lip seals

S60, S62, S63

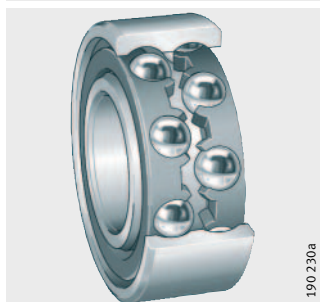


S60..-2RSR, S62..-2RSR,
S63..-2RSR



Double row

42..-B, 43..-B





Deep groove ball bearings

Features Deep groove ball bearings are versatile, self-retaining bearings with solid outer rings, inner rings and ball and cage assemblies. These products, which are of simple design, robust in operation and easy to maintain, are available in single and double row designs and in open and sealed variants. Due to the manufacturing processes used, open bearings can have turned recesses in the outer ring for seals or shields.

Due to their low frictional torque, deep groove ball bearings are suitable for high speeds.

Radial and axial load capacity Due to the raceway geometry and the balls used as rolling elements, deep groove ball bearings can support axial loads in both directions as well as radial loads. Axial load carrying capacity, page 192.

Compensation of angular misalignments The angular adjustment facility of single row deep groove ball bearings is limited, so the bearing positions must be well aligned. Misalignments can lead to unfavourable ball running and induce additional loads in the bearing that shorten the operating life.

In order to keep these loads at a low level, only small adjustment angles are permissible – dependent on the load – for single row deep groove ball bearings, see table Load and adjustment angle.

Caution! Due to their internal construction, double row deep groove ball bearings do not have an angular adjustment facility. When using these bearings, therefore, misalignments are not permissible.

Load and adjustment angle for single row deep groove ball bearings

Series	Adjustment angle	
	Low loads	High loads
62, 622, 63, 623, 64	5' to 10'	8' to 16'
618, 619, 160, 60	2' to 6'	5' to 10'

Deep groove ball bearings

Single row deep groove ball bearings

Single row deep groove ball bearings are the most frequently used type of rolling bearing. They are produced in numerous sizes and designs and are particularly economical.

Sealing/lubrication

Bearings without seals are suitable for high to very high speeds.

Deep groove ball bearings with the suffix 2Z have gap seals on both sides. These bearings are greased using a high quality grease, lubricated for life and suitable for high speeds.

Bearings with the suffix 2RSR have lip seals on both sides made from nitrile butadiene rubber NBR.

These designs are greased using a high quality grease, lubricated for life and suitable for moderate speeds.

By agreement, we can supply bearings with non-contact BRS seals on both sides (suffix 2BRS). The frictional behaviour of these bearings is just as favourable as that of bearings with Z seals. If the inner ring is stationary and the outer ring rotates, the lubricant loss is smaller than that in bearings with Z seals.

Corrosion-resistant deep groove ball bearings

In deep groove ball bearings of series S60, S62 and S63, the cages and the inner and outer rings are made from corrosion-resistant steel X70Cr13, while the balls are made from high alloy chromium steel X102CrMo17.

These bearings are resistant to water, water vapour, alkalis, photographic developers and in certain cases to acids.

Corrosion-resistant deep groove ball bearings are available in open and sealed designs.

In the case of bearings sealed on both sides (suffix 2RSR) in particular, the resistance to acids is limited by the sealing ring material nitrile butadiene rubber NBR.



Matched single row deep groove ball bearings

By agreement, deep groove ball bearings of series 160, 60, 62, 63, 64 and 618 are available in various arrangements as matched pairs of bearings, *Figure 1*.

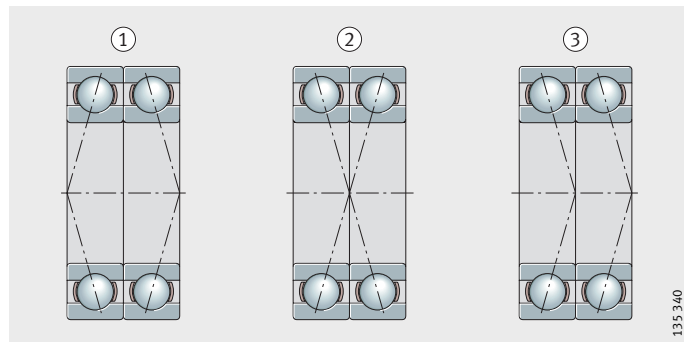
Sets in an O arrangement (suffix DB) can support axial loads in both directions as well as tilting moments.

Sets in an X arrangement (suffix DF) can support axial loads in both directions but are not suitable for tilting moments.

For high axial loads from one direction, pairs of bearings in a tandem arrangement are suitable (suffix DT).

- ① O arrangement, DB
- ② X arrangement, DF
- ③ Tandem arrangement, DT

Figure 1
Matched sets



Double row deep groove ball bearings

Double row deep groove ball bearings correspond in their structure and function to a pair of single row deep groove ball bearings. They are designed for high to very high speeds and are used where the load carrying capacity of single row deep groove ball bearings is not sufficient.

Double row deep groove ball bearings are wider than single row deep groove ball bearings of the same bore and outside diameter but have a significantly higher load carrying capacity.

Sealing/lubrication

The bearings are not sealed and are greased using a high quality grease.

Operating temperature

Deep groove ball bearings without seals can be used up to an operating temperature of +120 °C. For applications at temperatures above +120 °C, please contact us. Bearings with a diameter D of more than 240 mm are dimensionally stable up to +200 °C.

Deep groove ball bearings with lip seals can be used at operating temperatures from -30 °C to +110 °C, limited by the grease and sealing ring material.

Bearings with gap seals can be used from -30 °C to +120 °C.

Caution! Bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to +120 °C.

Deep groove ball bearings

Cages Single row deep groove ball bearings without a cage suffix have a sheet steel cage.
 Deep groove ball bearings with ball-guided solid brass cages are indicated by the suffix M.
 Suffix Y indicates bearings with a sheet brass cage.
 Double row deep groove ball bearings have cages made from glass fibre reinforced polyamide (suffix TVH).

Caution! Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.
 Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures. The oil change intervals must be observed.

Cage/bore code

Series	Sheet steel cage	Sheet brass cage	Solid brass cage	Cage made from glass fibre reinforced polyamide
	Bore code			
42	–	–	–	all
43	–	–	–	all
60	up to 30, 34	–	32, from 36	–
62	up to 30	–	from 32	–
63	up to 24	–	from 26	–
64	up to 14	–	from 15	–
160	up to 52	–	from 56	–
618	–	up to 24	from 64	–
619	up to 16	–	–	–
622	up to 10	–	–	–
623	up to 10	–	–	–



Suffixes Suffixes for the available designs: see table.

Available designs

Suffix	Description	Design
B	Modified internal construction	Standard
M	Solid brass cage, ball-guided	Standard
DB	Two deep groove ball bearings in O arrangement, matched clearance-free	Special design ¹⁾
DF	Two deep groove ball bearings in X arrangement, matched clearance-free	Special design ¹⁾
DT	Two deep groove ball bearings in tandem arrangement, matched clearance-free	Special design ¹⁾
2RSR	Lip seals on both sides	Standard
RSR	Lip seal on one side	Special design ¹⁾
BRS	Labyrinth seal	Special design ¹⁾
TVH	Cage made from glass fibre reinforced polyamide	Standard
Y	Sheet brass cage	Standard
2Z	Gap seals on both sides	Standard
Z	Gap seal on one side	Special design ¹⁾

¹⁾ Available by agreement.

Deep groove ball bearings

Design and safety guidelines Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq e$	$P = F_r$
$\frac{F_a}{F_r} > e$	$P = X \cdot F_r + Y \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load
F_r N
Radial dynamic bearing load
e, X, Y –
Factors: see table Factors e, X, Y.

The values according to the table e, X, Y are valid for normal fits:

- Shaft machined to j5 or k5, housing machined to J6.

Factors e, X and Y

$\frac{f_0 \cdot F_a}{C_{0r}}$	Factor for radial internal clearance								
	CN			C3			C4		
	e	X	Y	e	X	Y	e	X	Y
0,3	0,22	0,56	2	0,32	0,46	1,7	0,4	0,44	1,4
0,5	0,24	0,56	1,8	0,35	0,46	1,56	0,43	0,44	1,31
0,9	0,28	0,56	1,58	0,39	0,46	1,41	0,45	0,44	1,23
1,6	0,32	0,56	1,4	0,43	0,46	1,27	0,48	0,44	1,16
3	0,36	0,56	1,2	0,48	0,46	1,14	0,52	0,44	1,08
6	0,43	0,56	1	0,54	0,46	1	0,56	0,44	1

C_{0r} N
Basic static load rating according to dimension tables
f₀ –
Factor: see table Factor f₀ for deep groove ball bearings, page 191
F_a N
Axial dynamic bearing load.



Factor f_0 for deep groove ball bearings

Bore code	Factor f_0										
	618	619	160	60	62	622	63	623	64	42	43
3	-	-	-	-	12,9	-	-	-	-	-	-
4	-	-	-	-	12,2	-	12,4	-	-	-	-
5	-	-	-	-	13,2	-	12,2	-	-	-	-
6	-	-	-	-	13	-	-	-	-	-	-
7	-	-	-	13	12,4	-	-	-	-	-	-
8	-	-	-	12,4	13	-	-	-	-	-	-
9	-	-	-	13	12,4	-	-	-	-	-	-
00	-	-	-	12,4	12,1	12,1	11,3	-	-	12,1	-
01	-	-	-	13	12,3	12,2	11,1	-	-	12,7	-
02	-	-	13,9	13,9	13,1	13,1	12,1	12,1	-	13,4	12,8
03	-	-	14,3	14,3	13,1	13,1	12,3	12,2	12,4	13,1	13,1
04	-	-	14,9	13,9	13,1	13,1	12,4	12,1	13	13,8	13,1
05	-	-	15,4	14,5	13,8	13,8	12,4	12,4	13,1	14,3	13,2
06	-	-	15,2	14,8	13,8	13,8	13	13	12,2	14,3	13,8
07	-	-	15,6	14,8	13,8	13,8	13,1	13,1	12,1	14,5	13,1
08	-	15,4	16	15,3	14	14	13	13	12,2	14,9	13,2
09	16,2	15,7	15,9	15,4	14,3	14,1	13	13	12,1	15,3	13,9
10	16,1	16	16,1	15,6	14,3	14,3	13	13	13,1	15,5	13,8
11	16,2	16	16,1	15,4	14,3	-	12,9	-	13,2	15,5	13,8
12	16,3	16,1	16,3	15,5	14,3	-	13,1	-	13,2	15,4	13,8
13	16,2	16,3	16,4	15,7	14,3	-	13,2	-	13,2	15,3	-
14	16,1	16,1	16,2	15,5	14,4	-	13,2	-	13,3	15,5	-
15	16	16,2	16,4	15,7	14,7	-	13,2	-	13,3	15,7	-
16	15,9	16,4	16,4	15,6	14,6	-	13,2	-	12,3	15,7	-
17	16,2	-	16,4	15,7	14,7	-	13,1	-	12,3	15,7	-
18	16,1	-	16,3	15,6	14,5	-	13,9	-	12,2	15,5	-
19	16	-	16,5	15,7	14,4	-	13,9	-	-	-	-
20	16	-	16,5	15,9	14,4	-	13,8	-	-	-	-
21	15,9	-	16,3	15,8	14,3	-	13,8	-	-	-	-
22	16,1	-	16,3	15,6	14,3	-	13,8	-	-	-	-
24	16	-	16,5	15,9	14,8	-	13,5	-	-	-	-
26	-	-	16,4	15,8	14,5	-	13,6	-	-	-	-
28	-	-	16,5	16	14,8	-	13,6	-	-	-	-
30	-	-	16,4	16	15,2	-	13,7	-	-	-	-
32	-	-	16,5	16	15,2	-	13,9	-	-	-	-
34	-	-	16,4	15,7	15,3	-	13,9	-	-	-	-
36	-	-	16,3	15,6	15,3	-	13,9	-	-	-	-
38	-	-	16,4	15,8	15	-	14	-	-	-	-
40	-	-	16,3	15,6	15,3	-	14,1	-	-	-	-
44	-	-	16,3	15,6	15,2	-	14,1	-	-	-	-
48	-	-	16,5	15,8	15,2	-	14,2	-	-	-	-
52	-	-	16,4	15,7	15,2	-	-	-	-	-	-

Deep groove ball bearings

Continued
Factor f_0 for
deep groove ball bearings

Bore code	Factor f_0										
	618	619	160	60	62	622	63	623	64	42	43
56	–	–	16,5	15,9	15,3	–	–	–	–	–	–
60	–	–	16,4	15,7	–	–	–	–	–	–	–
64	15,9	–	16,5	15,9	–	–	–	–	–	–	–
68	15,9	–	16,3	15,8	–	–	–	–	–	–	–
72	15,8	–	16,4	15,9	–	–	–	–	–	–	–
76	16	–	16,5	–	–	–	–	–	–	–	–
80	15,9	–	–	–	–	–	–	–	–	–	–
84	15,9	–	–	–	–	–	–	–	–	–	–
88	15,8	–	–	–	–	–	–	–	–	–	–
92	16	–	–	–	–	–	–	–	–	–	–
96	16	–	–	–	–	–	–	–	–	–	–
/500	15,9	–	–	–	–	–	–	–	–	–	–
/530	15,9	–	–	–	–	–	–	–	–	–	–
/560	15,8	–	–	–	–	–	–	–	–	–	–
...											
/850											

Equivalent static bearing load

For bearings under static loading, the following applies:

Load ratio	Equivalent static load
$\frac{F_{0a}}{F_{0r}} \leq 0,8$	$P_0 = F_{0r}$
$\frac{F_{0a}}{F_{0r}} > 0,8$	$P_0 = 0,6 \cdot F_{0r} + 0,5 \cdot F_{0a}$

P_0
Equivalent static bearing load for combined load
 F_{0a}
Axial static bearing load
 F_{0r}
Radial static bearing load.

Axial load carrying capacity

Deep groove ball bearings are also suitable for axial loads.

Caution!

If the bearing is subjected to high loads and high speeds, a reduced life as well as increased friction and bearing temperature must be taken into consideration.

Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, a minimum radial load of the order of $P/C_r > 0,01$ is necessary for ball bearings with cage.

Mounting dimensions

The dimension tables give the maximum radius dimension r_a and the diameters of the abutment shoulders D_a, d_a .



Accuracy The main dimensions of single row deep groove ball bearings correspond to DIN 625-1, the main dimensions of double row deep groove ball bearings to DIN 625-3.
The dimensional and running tolerances correspond to tolerance class PN to DIN 620.
The width tolerance of matched bearings is different from this standard: see table Width tolerance.

Width tolerance of bearing rings in matched bearings

Bore diameter d mm		Width deviation Δ_{Bs} μm	
over	incl.	min.	max.
-	18	0	-250
18	50	0	-300
50	80	0	-450
80	120	0	-550
120	180	0	-750
180	250	0	-950
250	315	0	-1050
315	400	0	-1350
400	500	0	-1650

Deep groove ball bearings

Radial internal clearance of bearings with cylindrical bore

The radial internal clearance corresponds to internal clearance group CN.

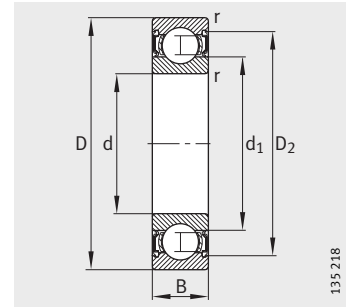
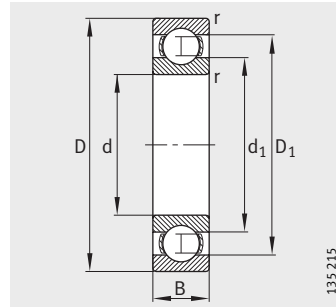
Radial internal clearance to DIN 620-4

Bore		Radial internal clearance							
d mm		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
2,5	6	0	7	2	13	8	23	–	–
6	10	0	7	2	13	8	23	14	29
10	18	0	9	3	18	11	25	18	33
18	24	0	10	5	20	13	28	20	36
24	30	1	11	5	20	13	28	23	41
30	40	1	11	6	20	15	33	28	46
40	50	1	11	6	23	18	36	30	51
50	65	1	15	8	28	23	43	38	61
65	80	1	15	10	30	25	51	46	71
80	100	1	18	12	36	30	58	53	84
100	120	2	20	15	41	36	66	61	97
120	140	2	23	18	48	41	81	71	114
140	160	2	23	18	53	46	91	81	130
160	180	2	25	20	61	53	102	91	147
180	200	2	30	25	71	63	117	107	163
200	225	4	32	28	82	73	132	120	187
225	250	4	36	31	92	87	152	140	217
250	280	4	39	36	97	97	162	152	237
280	315	8	45	42	110	110	180	175	260
315	355	8	50	50	120	120	200	200	290
355	400	8	60	60	140	140	230	230	330
400	450	10	70	70	160	160	260	260	370
450	500	10	80	80	180	180	290	290	410
500	560	20	90	90	200	200	320	320	460
560	630	20	100	100	220	220	350	350	510
630	710	30	120	120	250	250	390	390	560
710	800	30	130	130	280	280	440	440	620
800	900	30	150	150	310	310	490	490	690



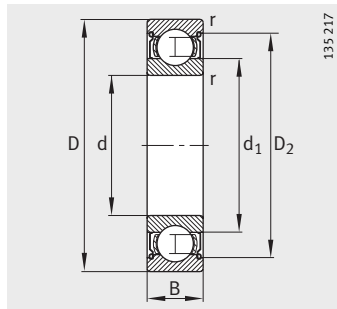
Deep groove ball bearings

Single row
Open or sealed

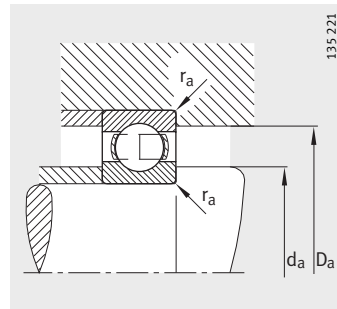


2RSR seal

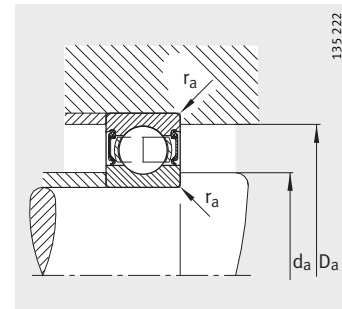
Dimension table · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈
623	0,001	3	10	4	0,15	7,7	–	5
623-2RSR	0,001	3	10	4	0,15	–	8,2	5
623-2Z	0,001	3	10	4	0,15	–	8,2	5
624	0,003	4	13	5	0,2	10,5	–	7
624-2RSR	0,003	4	13	5	0,2	–	11,2	7
624-2Z	0,004	4	13	5	0,2	–	11,2	7
634	0,006	4	16	5	0,3	12,5	–	8,5
634-2RSR	0,006	4	16	5	0,3	–	13,2	8,5
634-2Z	0,006	4	16	5	0,3	–	13,2	8,5
625	0,005	5	16	5	0,3	12,5	–	8,5
625-2RSR	0,005	5	16	5	0,3	–	13,2	8,5
625-2Z	0,005	5	16	5	0,3	–	13,2	8,5
635	0,008	5	19	6	0,3	15,5	–	10,8
635-2RSR	0,008	5	19	6	0,3	–	16,7	10,8
635-2Z	0,029	5	19	6	0,3	–	16,7	10,8
626	0,008	6	19	6	0,3	15,5	–	10,6
626-2RSR	0,008	6	19	6	0,3	–	16,7	10,6
626-2Z	0,029	6	19	6	0,3	–	16,7	10,6
607	0,007	7	19	6	0,3	15,5	–	10,6
607-2RSR	0,007	7	19	6	0,3	–	16,7	10,6
607-2Z	0,008	7	19	6	0,3	–	16,7	10,6
627	0,011	7	22	7	0,3	18	–	12,4
627-2RSR	0,011	7	22	7	0,3	–	19,1	12,4
627-2Z	0,012	7	22	7	0,3	–	19,1	12,4
608	0,01	8	22	7	0,3	18	–	12,4
608-2RSR	0,01	8	22	7	0,3	–	19,1	12,4
608-2Z	0,011	8	22	7	0,3	–	19,1	12,4
609	0,015	9	24	7	0,3	19,6	–	14
609-2RSR	0,016	9	24	7	0,3	–	20,5	14
609-2Z	0,016	9	24	7	0,3	–	20,5	14
629	0,02	9	26	8	0,3	21,4	–	14,7
629-2RSR	0,021	9	26	8	0,3	–	22,5	14,7
629-2Z	0,021	9	26	8	0,3	–	22,5	14,7
6000	0,019	10	26	8	0,3	21,4	–	14,7
6000-2RSR	0,02	10	26	8	0,3	–	22,5	14,7
6000-2Z	0,02	10	26	8	0,3	–	22,5	14,7



2Z seal



Mounting dimensions
Open design

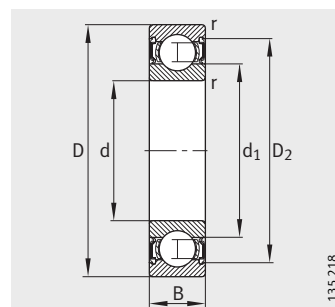
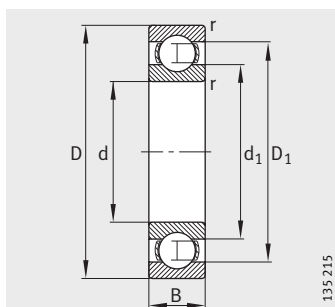


Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
4,4	8,6	0,15	640	220	10,6	53 000	57 000
4,4	8,6	0,15	640	220	10,6	32 000	–
4,4	8,6	0,15	640	220	10,6	45 000	57 000
5,8	11,2	0,2	1 290	490	24,6	45 000	46 500
5,8	11,2	0,2	1 290	490	24,6	26 000	–
5,8	11,2	0,2	1 290	490	24,6	38 000	46 500
6,4	13,6	0,3	1 730	670	35,5	43 000	35 000
6,4	13,6	0,3	1 730	670	35,5	24 000	–
6,4	13,6	0,3	1 730	670	35,5	36 000	35 000
7,4	13,6	0,3	1 320	440	22,4	43 000	36 500
7,4	13,6	0,3	1 320	440	22,4	24 000	–
7,4	13,6	0,3	1 320	440	22,4	36 000	36 500
7,4	16,6	0,3	2 600	1 100	53	40 000	31 500
7,4	16,6	0,3	2 600	1 100	53	22 000	–
7,4	16,6	0,3	2 600	1 100	53	32 000	31 500
8,4	16,6	0,3	2 600	1 100	53	38 000	32 500
8,4	16,6	0,3	2 600	1 100	53	22 000	–
8,4	16,6	0,3	2 600	1 100	53	32 000	32 500
9	17	0,3	2 600	1 100	53	38 000	34 500
9	17	0,3	2 600	1 100	53	22 000	–
9	17	0,3	2 600	1 100	53	32 000	35 500
9,4	19,6	0,3	3 250	1 370	72	36 000	30 000
9,4	19,6	0,3	3 250	1 370	72	20 000	–
9,4	19,6	0,3	3 250	1 370	72	30 000	30 000
10	20	0,3	3 250	1 370	72	36 000	31 500
10	20	0,3	3 250	1 370	72	20 000	–
10	20	0,3	3 250	1 370	72	30 000	32 500
11	22	0,3	3 650	1 630	89	36 000	28 500
11	22	0,3	3 650	1 630	89	20 000	–
11	22	0,3	3 650	1 630	89	30 000	29 000
11,4	23,6	0,3	4 550	1 960	93	34 000	25 500
11,4	23,6	0,3	4 550	1 960	93	19 000	–
11,4	23,6	0,3	4 550	1 960	93	28 000	25 500
12	24	0,3	4 550	1 960	93	34 000	28 500
12	24	0,3	4 550	1 960	93	19 000	–
12	24	0,3	4 550	1 960	93	28 000	28 500

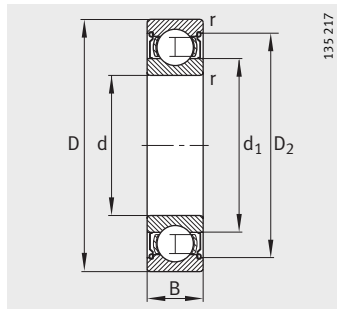
Deep groove ball bearings

Single row
Open or sealed

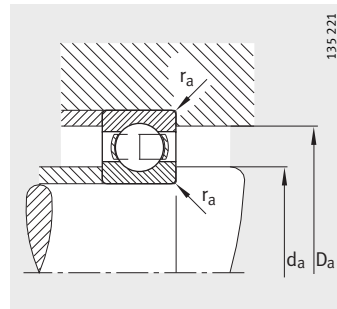


2RSR seal

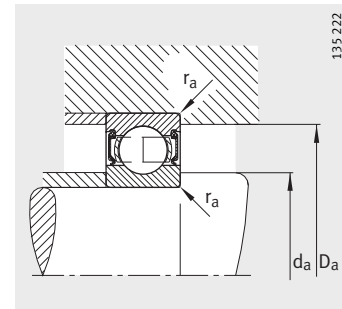
Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈
S6000	0,019	10	26	8	0,3	21,4	–	14,7
S6000-2RSR	0,02	10	26	8	0,3	–	22,5	14,7
6200	0,031	10	30	9	0,6	24	–	16,7
6200-2RSR	0,032	10	30	9	0,6	–	25	16,7
6200-2Z	0,032	10	30	9	0,6	–	25	16,7
S6200	0,031	10	30	9	0,6	24	–	16,7
S6200-2RSR	0,034	10	30	9	0,6	–	25	16,7
62200-2RSR	0,048	10	30	14	0,6	–	25	16,7
6300	0,055	10	35	11	0,6	27	–	18,1
6300-2RSR	0,057	10	35	11	0,6	–	28,6	18,1
6300-2Z	0,057	10	35	11	0,6	–	28,6	18,1
S6300	0,056	10	35	11	0,6	27	–	18,1
S6300-2RSR	0,058	10	35	11	0,6	–	28,6	18,1
6001	0,02	12	28	8	0,3	23,5	–	16,7
6001-2RSR	0,022	12	28	8	0,3	–	24,5	16,7
6001-2Z	0,02	12	28	8	0,3	–	24,5	16,7
S6001	0,021	12	28	8	0,3	23,5	–	16,7
S6001-2RSR	0,023	12	28	8	0,3	–	24,5	16,7
6201	0,037	12	32	10	0,6	25,8	–	18,3
6201-2RSR	0,039	12	32	10	0,6	–	27,4	18,3
6201-2Z	0,039	12	32	10	0,6	–	27,4	18,3
S6201	0,038	12	32	10	0,6	25,8	–	18,3
S6201-2RSR	0,04	12	32	10	0,6	–	27,4	18,3
62201-2RSR	0,051	12	32	14	0,6	–	27,4	18,3
6301	0,062	12	37	12	1	29,6	–	19,5
6301-2RSR	0,064	12	37	12	1	–	31,4	19,5
6301-2Z	0,064	12	37	12	1	–	31,4	19,5
S6301	0,063	12	37	12	1	29,6	–	19,5
S6301-2RSR	0,065	12	37	12	1	–	31,4	19,5
16002	0,027	15	32	8	0,3	26,9	–	20,5
6002	0,031	15	32	9	0,3	26,9	–	20,5
6002-2RSR	0,033	15	32	9	0,3	–	28,4	20,5
6002-2Z	0,033	15	32	9	0,3	–	28,4	20,5
S6002	0,029	15	32	9	0,3	26,9	–	20,5
S6002-2RSR	0,031	15	32	9	0,3	–	28,4	20,5
6202	0,043	15	35	11	0,6	29,3	–	21,1
6202-2RSR	0,045	15	35	11	0,6	–	30,9	21,1



2Z seal



Mounting dimensions
Open design

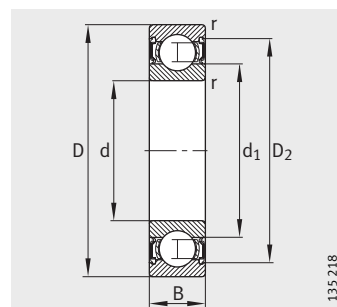
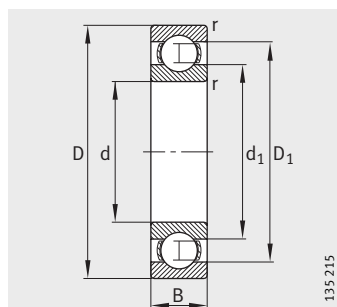


Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
12	24	0,3	4 550	1 960	93	34 000	27 500
12	24	0,3	4 550	1 960	93	19 000	–
14,2	25,8	0,6	6 000	2 600	171	32 000	23 400
14,2	25,8	0,6	6 000	2 600	171	17 000	–
14,2	25,8	0,6	6 000	2 600	171	26 000	23 400
14,2	25,8	0,6	6 000	2 600	171	32 000	23 400
14,2	25,8	0,6	6 000	2 600	171	17 000	–
14,2	25,8	0,6	6 000	2 600	158	17 000	–
14,2	30,8	0,6	8 150	3 450	230	56 000	21 100
14,2	30,8	0,6	8 150	3 450	230	15 000	–
14,2	30,8	0,6	8 150	3 450	230	22 000	21 100
14,2	30,8	0,6	8 150	3 450	230	56 000	21 100
14,2	30,8	0,6	8 150	3 450	230	15 000	–
14	26	0,3	5 100	2 360	130	32 000	25 000
14	26	0,3	5 100	2 360	130	18 000	–
14	26	0,3	5 100	2 360	130	26 000	25 000
14	26	0,3	5 100	2 360	130	32 000	24 200
14	26	0,3	5 100	2 360	130	18 000	–
16,2	27,8	0,6	6 950	3 100	198	30 000	22 200
16,2	27,8	0,6	6 950	3 100	198	16 000	–
16,2	27,8	0,6	6 950	3 100	198	24 000	22 200
16,2	27,8	0,6	6 950	3 100	198	30 000	22 200
16,2	27,8	0,6	6 950	3 100	198	16 000	–
16,2	27,8	0,6	6 950	3 100	198	16 000	–
17,6	31,4	1	9 650	4 150	280	53 000	20 000
17,6	31,4	1	9 650	4 150	280	13 000	–
17,6	31,4	1	9 650	4 150	280	20 000	20 000
17,6	31,4	1	9 650	4 150	280	53 000	20 000
17,6	31,4	1	9 650	4 150	280	13 000	–
17	30	0,3	5 600	2 850	144	30 000	20 000
17	30	0,3	5 600	2 850	134	30 000	22 000
17	30	0,3	5 600	2 850	134	16 000	–
17	30	0,3	5 600	2 850	134	24 000	22 000
17	30	0,3	5 600	2 850	134	30 000	21 500
17	30	0,3	5 600	2 850	134	16 000	–
19,2	30,8	0,6	7 800	3 750	220	26 000	20 200
19,2	30,8	0,6	7 800	3 750	220	14 000	–

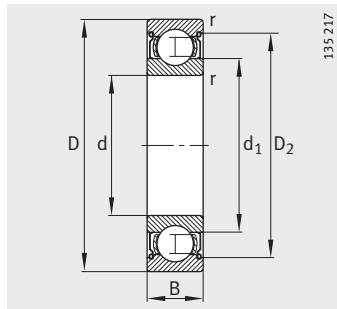
Deep groove ball bearings

Single row
Open or sealed

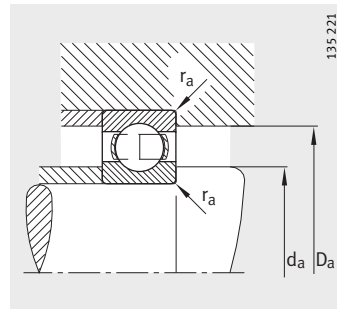


2RSR seal

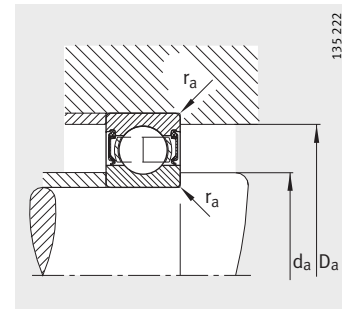
Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈
6202-2Z	0,045	15	35	11	0,6	–	30,9	21,1
S6202	0,043	15	35	11	0,6	29,3	–	21,1
S6202-2RSR	0,045	15	35	11	0,6	–	30,9	21,1
62202-2RSR	0,057	15	35	14	0,6	–	30,9	21,1
6302	0,088	15	42	13	1	33,5	–	23,6
6302-2RSR	0,09	15	42	13	1	–	35	23,6
6302-2Z	0,09	15	42	13	1	–	35	23,6
S6302	0,088	15	42	13	1	33,5	–	23,6
S6302-2RSR	0,09	15	42	13	1	–	35	23,6
62302-2RSR	0,114	15	42	17	1	–	35	23,6
16003	0,03	17	35	8	0,3	29,5	–	22,7
6003	0,038	17	35	10	0,3	29,5	–	22,7
6003-2RSR	0,04	17	35	10	0,3	–	30,8	22,7
6003-2Z	0,04	17	35	10	0,3	–	30,8	22,7
S6003	0,038	17	35	10	0,3	29,5	–	22,7
S6003-2RSR	0,04	17	35	10	0,3	–	30,8	22,7
6203	0,065	17	40	12	0,6	33,1	–	24
6203-2RSR	0,067	17	40	12	0,6	–	34,4	24
6203-2Z	0,067	17	40	12	0,6	–	34,4	24
S6203	0,065	17	40	12	0,6	33,1	–	24
S6203-2RSR	0,067	17	40	12	0,6	–	34,4	24
62203-2RSR	0,087	17	40	16	0,6	–	34,4	24
6303	0,114	17	47	14	1	37,9	–	26,2
6303-2RSR	0,118	17	47	14	1	–	39,3	26,2
6303-2Z	0,117	17	47	14	1	–	39,3	26,2
S6303	0,111	17	47	14	1	37,9	–	26,2
S6303-2RSR	0,115	17	47	14	1	–	39,3	26,2
62303-2RSR	0,154	17	47	19	1	–	39,3	26,2
6403	0,269	17	62	17	1,1	50,2	–	36,4
16004	0,05	20	42	8	0,3	34,7	–	27,2
6004	0,069	20	42	12	0,6	35,5	–	26,6
6004-2RSR	0,071	20	42	12	0,6	–	37,4	26,6
6004-2Z	0,071	20	42	12	0,6	–	37,4	26,6
S6004	0,065	20	42	12	0,6	35,5	–	26,6
S6004-2RSR	0,067	20	42	12	0,6	–	37,4	26,6
6204	0,106	20	47	14	1	38,4	–	28,8
6204-2RSR	0,11	20	47	14	1	–	41	28,8



2Z seal



Mounting dimensions
Open design

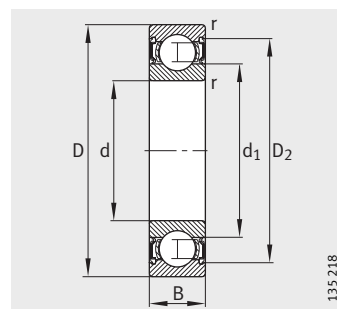
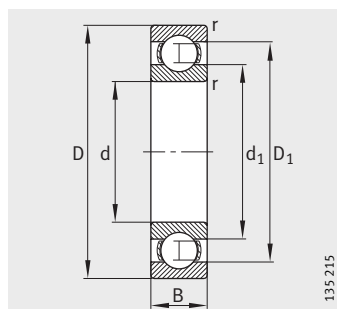


Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
19,2	30,8	0,6	7 800	3 750	220	20 000	20 200
19,2	30,8	0,6	7 800	3 750	220	26 000	20 200
19,2	30,8	0,6	7 800	3 750	220	14 000	–
19,2	30,8	0,6	7 800	3 750	220	14 000	–
20,6	36,4	1	11 400	5 400	350	43 000	17 500
20,6	36,4	1	11 400	5 400	350	12 000	–
20,6	36,4	1	11 400	5 400	350	18 000	17 500
20,6	36,4	1	11 400	5 400	350	43 000	17 500
20,6	36,4	1	11 400	5 400	350	12 000	–
20,6	36,4	1	11 400	5 400	350	12 000	–
19	33	0,3	6 000	3 250	157	28 000	17 700
19	33	0,3	6 000	3 250	157	28 000	21 000
19	33	0,3	6 000	3 250	157	14 000	–
19	33	0,3	6 000	3 250	157	22 000	21 000
19	33	0,3	6 000	3 250	157	28 000	20 300
19	33	0,3	6 000	3 250	157	14 000	–
21,2	35,8	0,6	9 500	4 750	275	22 000	18 100
21,2	35,8	0,6	9 500	4 750	275	12 000	–
21,2	35,8	0,6	9 500	4 750	275	18 000	18 100
21,2	35,8	0,6	9 500	4 750	275	22 000	18 100
21,2	35,8	0,6	9 500	4 750	275	12 000	–
21,2	35,8	0,6	9 500	4 750	280	12 000	–
22,6	41,4	1	13 400	6 550	425	30 000	15 900
22,6	41,4	1	13 400	6 550	425	11 000	–
22,6	41,4	1	13 400	6 550	425	16 000	15 900
22,6	41,4	1	13 400	6 550	425	30 000	15 900
22,6	41,4	1	13 400	6 550	425	11 000	–
22,6	41,4	1	13 400	6 550	425	11 000	–
26	53	1	22 400	11 400	750	28 000	13 700
22	40	0,3	6 950	4 050	202	22 000	14 300
23,2	38,8	0,6	9 300	5 000	285	20 000	18 900
23,2	38,8	0,6	9 300	5 000	285	12 000	–
23,2	38,8	0,6	9 300	5 000	285	17 000	18 900
23,2	38,8	0,6	9 300	5 000	285	20 000	18 200
23,2	38,8	0,6	9 300	5 000	285	12 000	–
25,6	41,4	1	12 700	6 550	440	18 000	16 300
25,6	41,4	1	12 700	6 550	440	10 000	–

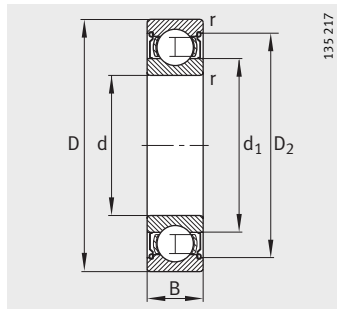
Deep groove ball bearings

Single row
Open or sealed

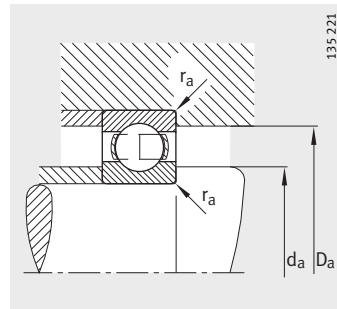


2RSR seal

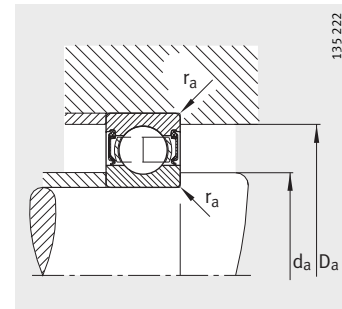
Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈
6204-2Z	0,11	20	47	14	1	–	41	28,8
S6204	0,105	20	47	14	1	38,4	–	28,8
S6204-2RSR	0,109	20	47	14	1	–	41	28,8
62204-2RSR	0,139	20	47	18	1	–	41	28,8
6304	0,151	20	52	15	1,1	41,9	–	30,3
6304-2RSR	0,155	20	52	15	1,1	–	44,4	30,3
6304-2Z	0,155	20	52	15	1,1	–	44,4	30,3
S6304	0,153	20	52	15	1,1	41,9	–	30,3
62304-2RSR	0,209	20	52	21	1,1	–	44,4	30,3
6404	0,414	20	72	19	1,1	59,6	–	44,6
16005	0,055	25	47	8	0,3	39,7	–	32,2
6005	0,081	25	47	12	0,6	40,2	–	32
6005-2RSR	0,085	25	47	12	0,6	–	42,5	32
6005-2Z	0,083	25	47	12	0,6	–	42,5	32
S6005	0,082	25	47	12	0,6	40,2	–	32
S6005-2RSR	0,084	25	47	12	0,6	–	42,5	32
6205	0,129	25	52	15	1	43,6	–	33,5
6205-2RSR	0,133	25	52	15	1	–	45,4	33,5
6205-2Z	0,133	25	52	15	1	–	45,4	33,5
S6205	0,129	25	52	15	1	43,6	–	33,5
S6205-2RSR	0,133	25	52	15	1	–	45,4	33,5
62205-2RSR	0,157	25	52	18	1	–	45,4	33,5
6305	0,234	25	62	17	1,1	50,2	–	36,4
6305-2RSR	0,242	25	62	17	1,1	–	52,5	36,4
6305-2Z	0,24	25	62	17	1,1	–	52,5	36,4
S6305	0,237	25	62	17	1,1	50,2	–	36,4
S6305-2RSR	0,245	25	62	17	1,1	–	52,5	36,4
62305-2RSR	0,272	25	62	24	1,1	–	52,5	36,4
6405	0,549	25	80	21	1,5	65,5	–	49,3
16006	0,082	30	55	9	0,3	47,5	–	37,7
6006	0,122	30	55	13	1	47,2	–	38,3
6006-2RSR	0,126	30	55	13	1	–	49,2	38,3
6006-2Z	0,126	30	55	13	1	–	49,2	38,3
S6006	0,109	30	55	13	1	47,2	–	38,3
6206	0,195	30	62	16	1	52,1	–	40
6206-2RSR	0,201	30	62	16	1	–	54,9	40
6206-2Z	0,201	30	62	16	1	–	54,9	40



2Z seal



Mounting dimensions
Open design

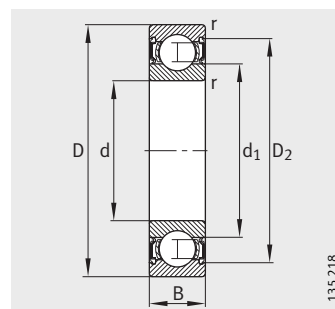
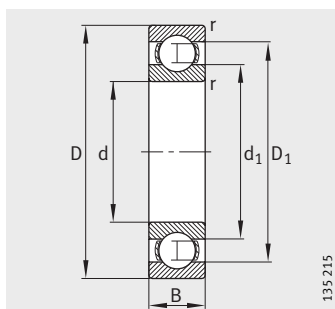


Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
25,6	41,4	1	12 700	6 550	440	15 000	16 300
25,6	41,4	1	12 700	6 550	440	18 000	16 300
25,6	41,4	1	12 700	6 550	440	10 000	–
25,6	41,4	1	12 700	6 550	385	10 000	–
27	45	1	16 000	7 800	530	34 000	14 400
27	45	1	16 000	7 800	530	9 500	–
27	45	1	16 000	7 800	530	14 000	14 400
27	45	1	16 000	7 800	530	34 000	14 400
27	45	1	16 000	7 800	495	9 500	–
27	65	1	29 000	16 300	1 020	24 000	12 100
27	45	0,3	7 200	4 650	215	19 000	12 000
28,2	43,8	0,6	10 000	5 850	305	36 000	15 800
28,2	43,8	0,6	10 000	5 850	305	10 000	–
28,2	43,8	0,6	10 000	5 850	305	15 000	15 800
28,2	43,8	0,6	10 000	5 850	305	36 000	15 200
28,2	43,8	0,6	10 000	5 850	305	10 000	–
30,6	46,4	1	14 000	7 800	510	17 000	14 400
30,6	46,4	1	14 000	7 800	510	9 000	–
30,6	46,4	1	14 000	7 800	510	14 000	14 400
30,6	46,4	1	14 000	7 800	510	17 000	14 400
30,6	46,4	1	14 000	7 800	510	9 000	–
30,6	46,4	1	14 000	7 800	415	9 000	–
32	55	1	22 400	11 400	750	28 000	12 300
32	55	1	22 400	11 400	750	7 500	–
32	55	1	22 400	11 400	750	11 000	12 300
32	55	1	22 400	11 400	750	28 000	12 300
32	55	1	22 400	11 400	750	7 500	–
32	55	1	22 400	11 400	750	7 500	–
36	71	1,5	33 500	19 000	1 250	20 000	11 000
32	53	0,3	11 200	7 350	365	16 000	10 400
34,6	50,4	1	12 700	8 000	390	32 000	13 600
34,6	50,4	1	12 700	8 000	390	8 500	–
34,6	50,4	1	12 700	8 000	390	13 000	13 600
34,6	50,4	1	12 700	8 000	390	32 000	13 100
35,6	56,4	1	19 300	11 200	680	14 000	12 000
35,6	56,4	1	19 300	11 200	680	7 500	–
35,6	56,4	1	19 300	11 200	680	11 000	12 000

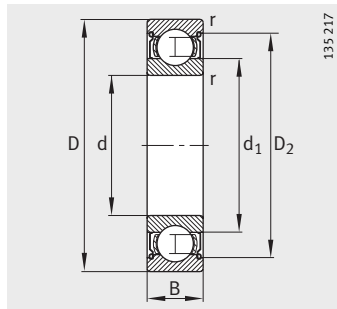
Deep groove ball bearings

Single row
Open or sealed

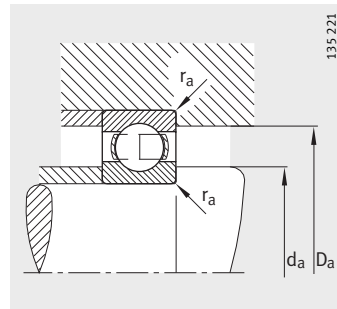


2RSR seal

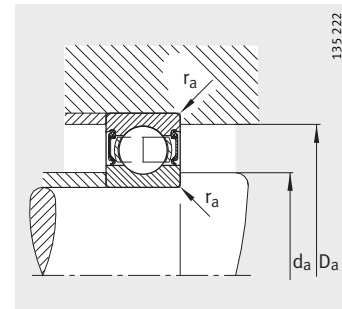
Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈
S6206	0,205	30	62	16	1	52,1	–	40
S6206-2RSR	0,211	30	62	16	1	–	54,9	40
62206-2RSR	0,245	30	62	20	1	–	54,9	40
6306	0,355	30	72	19	1,1	59,6	–	44,6
6306-2RSR	0,365	30	72	19	1,1	–	61,6	44,6
6306-2Z	0,363	30	72	19	1,1	–	61,6	44,6
S6306	0,355	30	72	19	1,1	59,6	–	44,6
S6306-2RSR	0,365	30	72	19	1,1	–	61,6	44,6
62306-2RSR	0,499	30	72	27	1,1	–	61,6	44,6
16007	0,105	35	62	9	0,3	53,5	–	43,7
6007	0,157	35	62	14	1	53,3	–	43,2
6007-2RSR	0,163	35	62	14	1	–	55,4	43,2
6007-2Z	0,163	35	62	14	1	–	55,4	43,2
S6007	0,157	35	62	14	1	53,3	–	43,2
S6007-2RSR	0,163	35	62	14	1	–	55,4	43,2
6207	0,291	35	72	17	1,1	60,7	–	47,2
6207-2RSR	0,301	35	72	17	1,1	–	63,3	47,2
6207-2Z	0,299	35	72	17	1,1	–	63,3	47,2
S6207	0,285	35	72	17	1,1	60,7	–	47,2
S6207-2RSR	0,303	35	72	17	1,1	–	63,3	47,2
62207-2RSR	0,393	35	72	23	1,1	–	63,3	47,2
6307	0,471	35	80	21	1,5	65,5	–	49,3
6307-2RSR	0,483	35	80	21	1,5	–	67,6	49,3
6307-2Z	0,481	35	80	21	1,5	–	67,6	49,3
S6307	0,471	35	80	21	1,5	65,5	–	49,3
S6307-2RSR	0,483	35	80	21	1,5	–	67,6	49,3
62307-2RSR	0,687	35	80	31	1,5	–	67,6	49,3
6407	0,971	35	100	25	1,5	83,3	–	62
61908	0,11	40	62	12	0,6	55,3	–	46,6
61908-2RSR	0,11	40	62	12	0,6	–	56,6	46,6
61908-2Z	0,11	40	62	12	0,6	–	56,6	46,6
16008	0,12	40	68	9	0,3	59,3	–	49,4
6008	0,194	40	68	15	1	59,1	–	49,3
6008-2RSR	0,202	40	68	15	1	–	61,6	49,3
6008-2Z	0,2	40	68	15	1	–	61,6	49,3
S6008	0,196	40	68	15	1	59,1	–	49,3
6208	0,372	40	80	18	1,1	67,5	–	53



2Z seal



Mounting dimensions
Open design

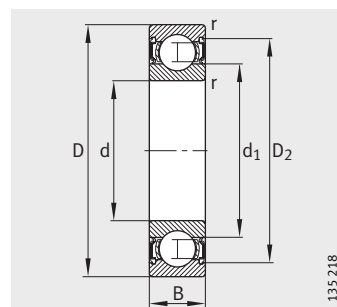
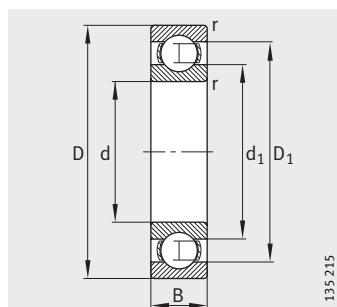


Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
35,6	56,4	1	19 300	11 200	680	14 000	12 000
35,6	56,4	1	19 300	11 200	680	7 500	–
35,6	56,4	1	19 300	11 200	680	7 500	–
37	65	1	29 000	16 300	1 020	24 000	10 800
37	65	1	29 000	16 300	1 020	6 300	–
37	65	1	29 000	16 300	1 020	9 500	10 800
37	65	1	29 000	16 300	1 020	24 000	10 800
37	65	1	29 000	16 300	1 020	6 300	–
37	65	1	29 000	16 300	1 020	6 300	–
37	60	0,3	12 200	8 800	415	14 000	8 900
39,6	57,4	1	16 000	10 200	550	28 000	12 100
39,6	57,4	1	16 000	10 200	550	7 500	–
39,6	57,4	1	16 000	10 200	550	11 000	12 100
39,6	57,4	1	16 000	10 200	550	28 000	11 600
39,6	57,4	1	16 000	10 200	550	7 500	–
42	65	1	25 500	15 300	920	24 000	10 300
42	65	1	25 500	15 300	920	6 300	–
42	65	1	25 500	15 300	920	9 500	10 300
42	65	1	25 500	15 300	920	24 000	10 300
42	65	1	25 500	15 300	920	6 300	–
42	65	1	25 500	15 300	920	6 300	–
44	71	1,5	33 500	19 000	1 250	20 000	9 900
44	71	1,5	33 500	19 000	1 250	5 600	–
44	71	1,5	33 500	19 000	1 250	8 500	9 900
44	71	1,5	33 500	19 000	1 250	20 000	9 900
44	71	1,5	33 500	19 000	1 250	5 600	–
44	71	1,5	33 500	19 000	1 250	5 600	–
46	89	1,5	53 000	31 500	2 180	16 000	8 900
43,2	58,8	0,6	13 700	10 000	540	28 000	10 000
43,2	58,8	0,6	13 700	10 000	540	7 000	–
43,2	58,8	0,6	13 700	10 000	540	11 000	10 000
42	66	0,3	13 200	10 200	465	13 000	7 800
44,6	63,4	1	16 600	11 600	580	26 000	11 100
44,6	63,4	1	16 600	11 600	580	6 700	–
44,6	63,4	1	16 600	11 600	580	10 000	11 100
44,6	63,4	1	16 600	11 600	580	26 000	10 700
47	73	1	29 000	18 000	1 050	20 000	9 300

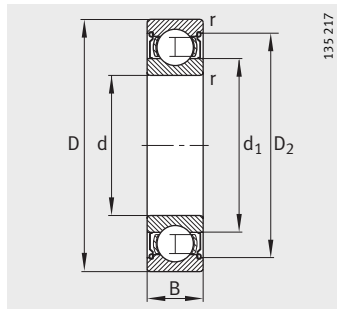
Deep groove ball bearings

Single row
Open or sealed

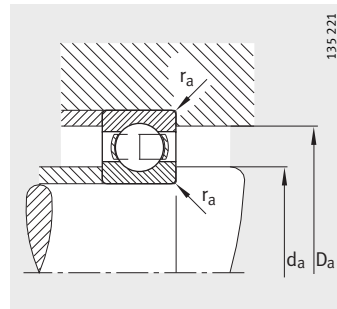


2RSR seal

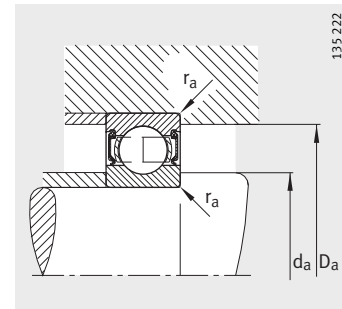
Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈
6208-2RSR	0,384	40	80	18	1,1	–	70,4	53
6208-2Z	0,382	40	80	18	1,1	–	70,4	53
S6208	0,372	40	80	18	1,1	67,5	–	53
S6208-2RSR	0,384	40	80	18	1,1	–	70,4	53
62208-2RSR	0,478	40	80	23	1,1	–	70,4	53
6308	0,64	40	90	23	1,5	74,6	–	55,6
6308-2RSR	0,654	40	90	23	1,5	–	76,5	55,6
6308-2Z	0,654	40	90	23	1,5	–	76,5	55,6
S6308	0,641	40	90	23	1,5	74,6	–	55,6
62308-2RSR	0,903	40	90	33	1,5	–	76,5	55,6
61809-Y	0,039	45	58	7	0,3	54,1	–	49,1
61809-2RSR-Y	0,039	45	58	7	0,3	–	55,4	49,1
61809-2Z-Y	0,039	45	58	7	0,3	–	55,4	49,1
61909	0,13	45	68	12	0,6	60,8	–	52,1
61909-2RSR	0,13	45	68	12	0,6	–	62,1	52,1
61909-2Z	0,13	45	68	12	0,6	–	62,1	52,1
16009	0,167	45	75	10	0,6	65,6	–	55
6009	0,247	45	75	16	1	65,5	–	54,2
6009-2RSR	0,257	45	75	16	1	–	68	54,2
6009-2Z	0,253	45	75	16	1	–	68	54,2
S6009	0,234	45	75	16	1	65,5	–	54,2
S6009-2RSR	0,244	45	75	16	1	–	67,9	54,2
6209	0,429	45	85	19	1,1	71,8	–	57,2
6209-2RSR	0,441	45	85	19	1,1	–	74,6	57,2
6209-2Z	0,441	45	85	19	1,1	–	74,6	57,2
S6209	0,429	45	85	19	1,1	71,8	–	57,2
S6209-2RSR	0,441	45	85	19	1,1	–	74,6	57,2
62209-2RSR	0,522	45	85	23	1,1	–	74,6	57,2
6309	0,849	45	100	25	1,5	83,3	–	62,3
6309-2RSR	0,867	45	100	25	1,5	–	85,6	62
6309-2Z	0,869	45	100	25	1,5	–	85,6	62
S6309	0,859	45	100	25	1,5	83,3	–	62
S6309-2RSR	0,879	45	100	25	1,5	–	85,6	62
62309-2RSR	1,2	45	100	36	1,5	–	85,6	62
6409	1,98	45	120	29	2	100,9	–	75,5
61810-Y	0,052	50	65	7	0,3	60,5	–	55,1
61810-2RSR-Y	0,052	50	65	7	0,3	–	61,8	55,1



2Z seal



Mounting dimensions
Open design

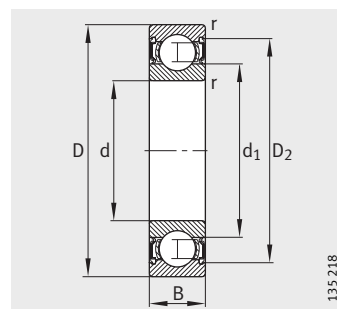
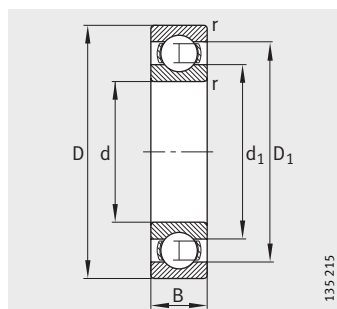


Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
47	73	1	29 000	18 000	1 050	5 600	–
47	73	1	29 000	18 000	1 050	8 500	9 300
47	73	1	29 000	18 000	1 050	20 000	9 300
47	73	1	29 000	18 000	1 050	5 600	–
47	73	1	29 000	18 000	1 050	5 600	–
49	81	1,5	42 500	25 000	1 640	18 000	9 000
49	81	1,5	42 500	25 000	1 640	5 000	–
49	81	1,5	42 500	25 000	1 640	7 500	9 000
49	81	1,5	42 500	25 000	1 640	18 000	9 000
49	81	1,5	42 500	25 000	1 640	5 000	–
47	56	0,3	6 400	5 600	285	14 000	9 000
47	56	0,3	6 400	5 600	285	7 500	–
47	56	0,3	6 400	5 600	285	11 000	9 000
48,2	64,8	0,6	14 000	10 800	570	26 000	8 900
48,2	64,8	0,6	14 000	10 800	570	6 700	–
48,2	64,8	0,6	14 000	10 800	570	10 000	8 900
48,2	71,8	0,6	15 600	12 200	580	22 000	7 300
49,6	70,4	1	20 000	14 300	730	22 000	10 200
49,6	70,4	1	20 000	14 300	730	6 000	–
49,6	70,4	1	20 000	14 300	730	9 000	10 200
49,6	70,4	1	20 000	14 300	730	22 000	9 700
49,6	70,4	1	20 000	14 300	730	6 000	–
52	78	1	31 000	20 400	1 150	19 000	8 700
52	78	1	31 000	20 400	1 150	5 300	–
52	78	1	31 000	20 400	1 150	8 000	8 700
52	78	1	31 000	20 400	1 150	19 000	8 700
52	78	1	31 000	20 400	1 150	5 300	–
52	78	1	31 000	20 400	1 150	5 300	–
54	91	1,5	53 000	31 500	2 180	16 000	8 300
54	91	1,5	53 000	31 500	2 180	4 500	–
54	91	1,5	53 000	31 500	2 180	6 700	8 300
54	91	1,5	53 000	31 500	2 180	16 000	8 300
54	91	1,5	53 000	31 500	2 180	4 500	–
54	91	1,5	53 000	31 500	2 180	4 500	–
58	107	2	76 500	47 500	3 050	13 000	7 600
52	63	0,3	6 800	6 300	265	13 000	8 000
52	63	0,3	6 800	6 300	265	6 700	–

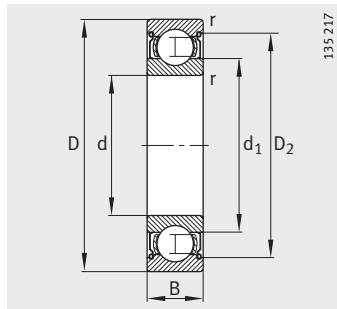
Deep groove ball bearings

Single row
Open or sealed

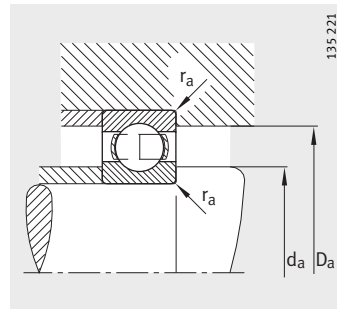


2RSR seal

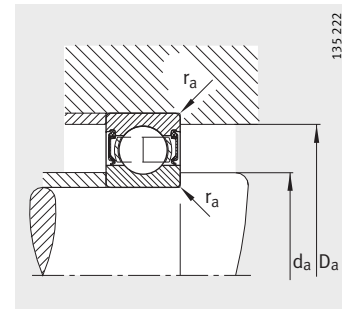
Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈
61810-2Z-Y	0,052	50	65	7	0,3	–	61,8	55,1
61910	0,13	50	72	12	0,6	65,5	–	56,6
61910-2RSR	0,13	50	72	12	0,6	–	68,6	56,6
16010	0,181	50	80	10	0,6	70,6	–	60,1
6010	0,272	50	80	16	1	70,1	–	59,8
6010-2RSR	0,283	50	80	16	1	–	72,9	59,8
6010-2Z	0,282	50	80	16	1	–	72,9	59,8
S6010	0,26	50	80	16	1	70,1	–	59,8
S6010-2RSR	0,271	50	80	16	1	–	72,9	59,8
6210	0,466	50	90	20	1,1	77,9	–	62
6210-2RSR	0,48	50	90	20	1,1	–	80	62
6210-2Z	0,478	50	90	20	1,1	–	80	62
S6210	0,469	50	90	20	1,1	77,9	–	62
62210-2RSR	0,543	50	90	23	1,1	–	80	62
6310	1,1	50	110	27	2	91,6	–	68,3
6310-2RSR	1,12	50	110	27	2	–	95,1	68
6310-2Z	1,12	50	110	27	2	–	95,1	68
S6310-2RSR	1,11	50	110	27	2	–	95,1	68
62310-2RSR	1,55	50	110	40	2	–	95,1	68,3
6410	1,96	50	130	31	2,1	108,4	–	81,6
61811-Y	0,084	55	72	9	0,3	66,5	–	60,6
61811-2RSR-Y	0,084	55	72	9	0,3	–	68,6	60,6
61811-2Z-Y	0,084	55	72	9	0,3	–	68,6	60,6
61911	0,18	55	80	13	1	72,3	–	62,6
61911-2RSR	0,18	55	80	13	1	–	74,2	62,6
16011	0,266	55	90	11	0,6	78	–	67,1
6011	0,397	55	90	18	1,1	78,9	–	66,2
6011-2RSR	0,41	55	90	18	1,1	–	81,5	66,2
6011-2Z	0,409	55	90	18	1,1	–	81,5	66,2
S6011	0,403	55	90	18	1,1	78,9	–	66,2
6211	0,618	55	100	21	1,5	86,1	–	68,9
6211-2RSR	0,632	55	100	21	1,5	–	88,2	68,7
6211-2Z	0,632	55	100	21	1,5	–	88,2	68,7
S6211	0,617	55	100	21	1,5	86,1	–	68,7
6311	1,39	55	120	29	2	100,9	–	75,5
6311-2RSR	1,43	55	120	29	2	–	104,3	75,2
6311-2Z	1,43	55	120	29	2	–	104,3	75,2



2Z seal



Mounting dimensions
Open design

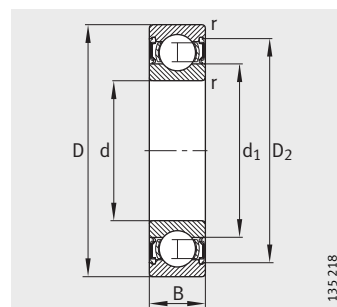
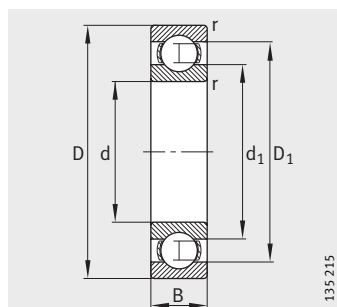


Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
52	63	0,3	6 800	6 300	265	9 300	8 000
53,2	68,8	0,6	14 600	11 800	600	22 000	8 100
53,2	68,8	0,6	14 600	11 800	600	6 000	–
53,2	76,8	0,6	16 000	13 200	610	20 000	6 700
54,6	75,4	1	20 800	15 600	770	20 000	9 300
54,6	75,4	1	20 800	15 600	770	5 600	–
54,6	75,4	1	20 800	15 600	770	8 500	9 300
54,6	75,4	1	20 800	15 600	770	20 000	8 900
54,6	75,4	1	20 800	15 600	770	5 600	–
57	83	1	36 500	24 000	1 420	18 000	8 200
57	83	1	36 500	24 000	1 420	4 800	–
57	83	1	36 500	24 000	1 420	7 500	8 200
57	83	1	36 500	24 000	1 420	18 000	8 200
57	83	1	36 500	24 000	1 420	4 800	–
61	99	2	62 000	38 000	2 600	14 000	7 700
61	99	2	62 000	38 000	2 600	4 000	–
61	99	2	62 000	38 000	2 600	6 000	7 700
61	99	2	62 000	38 000	2 600	4 000	–
61	99	2	62 000	38 000	2 600	4 000	–
64	116	2,1	81 500	52 000	3 400	12 000	7 200
57	70	0,3	9 000	8 500	375	11 000	8 000
57	70	0,3	9 000	8 500	375	6 000	–
57	70	0,3	9 000	8 500	375	9 000	8 000
59,6	75,4	1	16 600	14 000	700	19 000	7 500
59,6	75,4	1	16 600	14 000	700	5 600	–
58,2	86,8	0,6	19 300	16 300	780	18 000	6 200
61	84	1	28 500	21 200	1 120	18 000	8 700
61	84	1	28 500	21 200	1 120	5 000	–
61	84	1	28 500	21 200	1 120	7 500	8 300
61	84	1	28 500	21 200	1 120	18 000	8 300
64	91	1,5	43 000	29 000	1 720	16 000	7 500
64	91	1,5	43 000	29 000	1 720	4 300	–
64	91	1,5	43 000	29 000	1 720	6 700	7 500
64	91	1,5	43 000	29 000	1 720	16 000	7 500
66	109	2	76 500	47 500	3 050	13 000	7 100
66	109	2	76 500	47 500	3 050	3 600	–
66	109	2	76 500	47 500	3 050	5 300	7 100

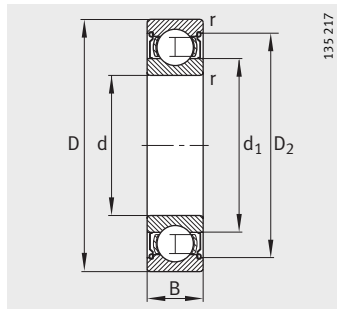
Deep groove ball bearings

Single row
Open or sealed

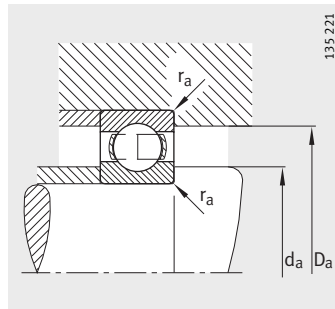


2RSR seal

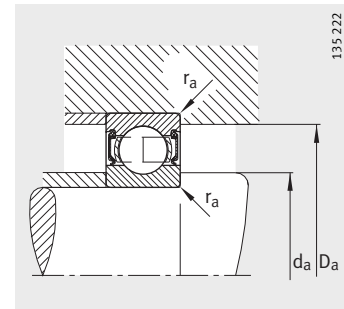
Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈
6411	1,38	55	140	33	2,1	117,5	–	88,6
61812-Y	0,105	60	78	10	0,3	72,6	–	65,6
61812-2RSR-Y	0,105	60	78	10	0,3	–	74,5	65,6
61812-2Z-Y	0,105	60	78	10	0,3	–	74,5	65,6
61912	0,19	60	85	13	1	77,3	–	67,6
61912-2RSR	0,19	60	85	13	1	–	79,2	67,6
16012	0,283	60	95	11	0,6	82,9	–	72,1
6012	0,419	60	95	18	1,1	83,9	–	71,3
6012-2RSR	0,432	60	95	18	1,1	–	86	71,3
6012-2Z	0,431	60	95	18	1,1	–	86	71,3
S6012	0,416	60	95	18	1,1	83,8	–	71,4
6212	0,791	60	110	22	1,5	95,6	–	76,1
6212-2RSR	0,809	60	110	22	1,5	–	97,7	75,8
6212-2Z	0,807	60	110	22	1,5	–	97,7	75,8
S6212	0,795	60	110	22	1,5	95,6	–	75,8
6312	1,75	60	130	31	2,1	108,4	–	81,6
6312-2RSR	1,79	60	130	31	2,1	–	113,1	81,3
6312-2Z	1,79	60	130	31	2,1	–	113,1	81,3
6412	2,83	60	150	35	2,1	126,3	–	95,1
61813-Y	0,13	65	85	10	0,6	78,6	–	71,6
61813-2RSR-Y	0,13	65	85	10	0,6	–	80,5	71,6
61813-2Z-Y	0,13	65	85	10	0,6	–	80,5	71,6
61913	0,2	65	90	13	1	82,3	–	72,6
61913-2RSR	0,2	65	90	13	1	–	84,2	72,6
16013	0,302	65	100	11	0,6	87,9	–	77,1
6013	0,448	65	100	18	1,1	88,8	–	76,2
6013-2RSR	0,463	65	100	18	1,1	–	91,5	76,2
6013-2Z	0,464	65	100	18	1,1	–	91,5	76,2
6213	1	65	120	23	1,5	103,1	–	82,3
6213-2RSR	1,03	65	120	23	1,5	–	106,3	82
6213-2Z	1,03	65	120	23	1,5	–	106,3	82
6313	2,14	65	140	33	2,1	117,5	–	88,6
6313-2RSR	2,18	65	140	33	2,1	–	122,2	88,3
6313-2Z	2,18	65	140	33	2,1	–	122,2	88,3
6413	3,49	65	160	37	2,1	133,2	–	101,7
61814-Y	0,14	70	90	10	0,6	83,6	–	76,6
61814-2RSR-Y	0,14	70	90	10	0,6	–	85,5	76,6



2Z seal



Mounting dimensions
Open design

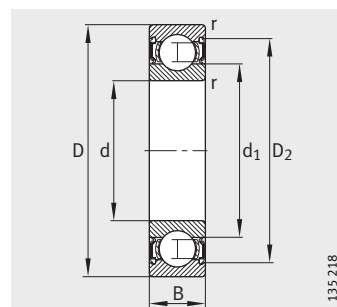
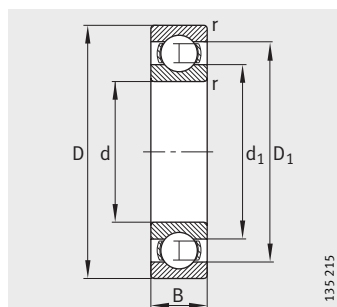


Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
69	126	2,1	93 000	60 000	3 950	11 000	6 700
62	76	0,3	11 800	11 000	485	9 500	8 000
62	76	0,3	11 800	11 000	485	5 600	–
62	76	0,3	11 800	11 000	485	8 000	8 000
64,6	80,4	1	16 300	14 300	700	18 000	6 900
64,6	80,4	1	16 300	14 300	700	5 000	–
63,2	91,8	0,6	20 000	17 600	820	17 000	5 700
66	89	1	29 000	23 200	1 190	17 000	8 000
66	89	1	29 000	23 200	1 190	4 500	–
66	89	1	29 000	23 200	1 190	7 000	8 000
66	89	1	29 000	23 200	1 190	16 000	7 600
69	101	1,5	52 000	36 000	2 240	14 000	6 800
69	101	1,5	52 000	36 000	2 240	4 000	–
69	101	1,5	52 000	36 000	2 240	6 000	6 800
69	101	1,5	52 000	36 000	2 220	14 000	6 800
72	118	2,1	81 500	52 000	3 400	12 000	6 700
72	118	2,1	81 500	52 000	3 400	3 400	–
72	118	2,1	81 500	52 000	3 400	5 000	6 700
74	136	2,1	104 000	68 000	4 450	10 000	6 400
68,2	81,8	0,6	12 200	12 000	520	9 000	7 000
68,2	81,8	0,6	12 200	12 000	520	5 000	–
68,2	81,8	0,6	12 200	12 000	520	7 500	7 000
69,6	85,4	1	20 000	17 600	860	17 000	6 400
69,6	85,4	1	20 000	17 600	860	4 800	–
68,2	96,8	0,6	21 200	19 600	910	16 000	5 300
71	94	1	30 500	25 000	1 270	15 000	7 500
71	94	1	30 500	25 000	1 270	4 300	–
71	94	1	30 500	25 000	1 270	6 300	7 500
74	111	1,5	60 000	41 500	2 550	13 000	6 300
74	111	1,5	60 000	41 500	2 550	3 600	–
74	111	1,5	60 000	41 500	2 550	5 300	6 300
77	128	2,1	93 000	60 000	3 950	11 000	6 400
77	128	2,1	93 000	60 000	3 950	3 000	–
77	128	2,1	93 000	60 000	3 950	4 500	6 400
79	146	2,1	114 000	76 500	4 650	9 500	6 100
73,2	86,8	0,6	12 500	12 500	540	8 500	6 700
73,2	86,8	0,6	12 500	12 500	540	4 800	–

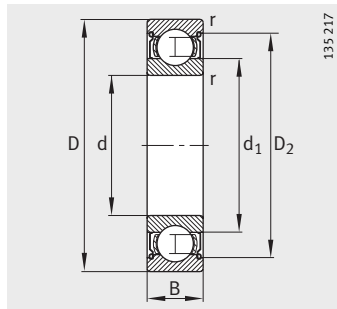
Deep groove ball bearings

Single row
Open or sealed

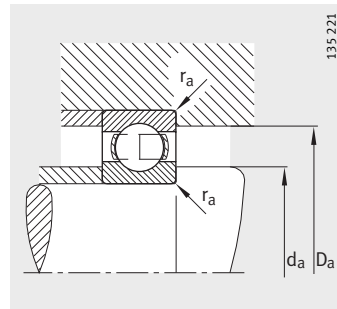


2RSR seal

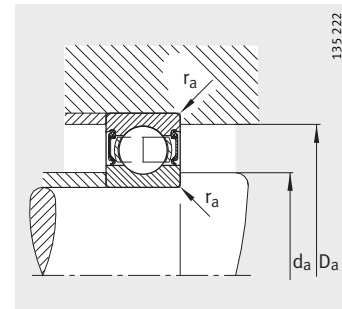
Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈
61814-2Z-Y	0,14	70	90	10	0,6	–	85,5	76,6
61914	0,34	70	100	16	1	90,9	–	79,1
61914-2RSR	0,34	70	100	16	1	–	92,8	79,1
16014	0,438	70	110	13	0,6	96,2	–	83,7
6014	0,622	70	110	20	1,1	97,3	–	82,8
6014-2Z	0,642	70	110	20	1,1	–	100	82,8
6214	1,09	70	125	24	1,5	108	–	87,1
6214-2RSR	1,11	70	125	24	1,5	–	110,7	86,8
6214-2Z	1,11	70	125	24	1,5	–	110,7	86,8
6314	2,55	70	150	35	2,1	126,3	–	95,1
6314-2RSR	2,6	70	150	35	2,1	–	130,2	94,8
6314-2Z	2,6	70	150	35	2,1	–	130,2	94,8
6414	5,06	70	180	42	3	151,6	–	114,4
61815-Y	0,15	75	95	10	0,6	88,7	–	81,6
61815-2RSR-Y	0,15	75	95	10	0,6	–	90,5	81,6
61815-2Z-Y	0,15	75	95	10	0,6	–	90,5	81,6
61915	0,356	75	105	16	1	96,2	–	84,1
61915-2RSR	0,356	75	105	16	1	–	98,2	84,1
16015	0,463	75	115	13	0,6	101,2	–	88,7
6015	0,654	75	115	20	1,1	102,6	–	88,1
6015-2RSR	0,678	75	115	20	1,1	–	105,3	88,1
6015-2Z	0,676	75	115	20	1,1	–	105,3	88,1
6215	1,19	75	130	25	1,5	112,8	–	92,5
6215-2RSR	1,22	75	130	25	1,5	–	115,5	92,1
6215-2Z	1,21	75	130	25	1,5	–	115,5	92,1
6315	3,18	75	160	37	2,1	133,2	–	101,8
6315-2RSR	3,18	75	160	37	2,1	–	137,2	101,8
6315-2Z	3,23	75	160	37	2,1	–	137,2	101,4
6415-M	7	75	190	45	3	151,6	–	114,4
61816-Y	0,155	80	100	10	0,6	93,7	–	86,6
61816-2RSR-Y	0,155	80	100	10	0,6	–	95,5	86,6
61816-2Z-Y	0,155	80	100	10	0,6	–	95,5	86,6
61916	0,379	80	110	16	1	100,8	–	89,1
16016	0,609	80	125	14	0,6	110,7	–	96,9
6016	0,845	80	125	22	1,1	111	–	94
6016-2Z	0,893	80	125	22	1,1	–	113,7	93,7
6216	1,46	80	140	26	2	121,3	–	98,8



2Z seal



Mounting dimensions
Open design

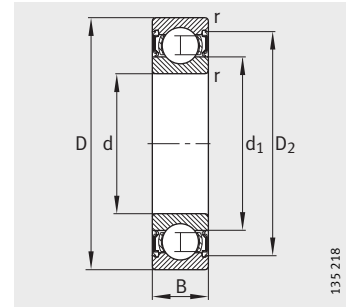
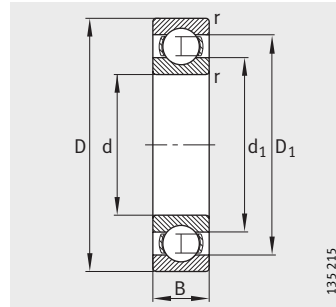


Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
73,2	86,8	0,6	12 500	12 500	540	7 000	6 700
74,6	95,4	1	27 000	23 200	1 160	15 000	6 400
74,6	95,4	1	27 000	23 200	1 160	4 300	–
73,2	106,8	0,6	28 000	25 000	1 230	14 000	5 300
76	104	1	38 000	31 000	1 850	14 000	7 200
76	104	1	38 000	31 000	1 850	6 000	7 200
79	116	1,5	62 000	44 000	2 900	12 000	6 100
79	116	1,5	62 000	44 000	2 900	3 400	–
79	116	1,5	62 000	44 000	2 900	5 000	6 100
82	138	2,1	104 000	68 000	4 450	10 000	6 100
82	138	2,1	104 000	68 000	4 450	2 800	–
82	138	2,1	104 000	68 000	4 450	4 300	6 100
86	164	2,5	132 000	96 500	5 800	8 500	5 700
78,2	91,8	0,6	12 900	13 400	690	8 000	6 000
78,2	91,8	0,6	12 900	13 400	690	4 500	–
78,2	91,8	0,6	12 900	13 400	690	6 700	6 000
79,6	100,4	1	28 000	25 000	1 230	14 000	6 700
79,6	100,4	1	28 000	25 000	1 230	4 000	–
78,2	111,8	0,6	28 500	27 000	1 290	13 000	4 900
81	109	1	39 000	33 500	1 960	13 000	6 700
81	109	1	39 000	33 500	1 960	3 800	–
81	109	1	39 000	33 500	1 960	5 600	6 700
84	121	1,5	65 500	49 000	3 350	11 000	5 900
84	121	1,5	65 500	49 000	3 350	3 200	–
84	121	1,5	65 500	49 000	3 350	4 800	5 900
87	148	2,1	114 000	76 500	4 650	9 500	5 800
87	148	2,1	114 000	76 500	4 650	7 000	–
87	148	2,1	114 000	76 500	4 650	4 000	5 800
91	174	2,5	132 000	96 500	5 800	8 500	5 600
83,2	96,8	0,6	12 900	13 700	600	7 500	5 600
83,2	96,8	0,6	12 900	13 700	600	4 300	–
83,2	96,8	0,6	12 900	13 700	600	6 300	5 600
84,6	105,4	1	28 500	27 000	1 290	13 000	6 300
83,2	121,8	0,6	32 000	31 000	1 510	13 000	4 700
86	119	1	47 500	40 000	2 340	12 000	6 500
86	119	1	47 500	40 000	2 340	5 000	6 500
91	129	2	72 000	54 000	3 450	11 000	5 500

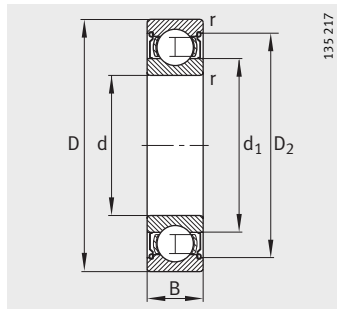
Deep groove ball bearings

Single row
Open or sealed

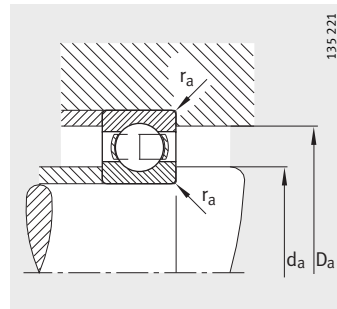


2RSR seal

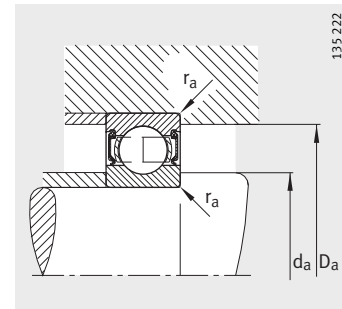
Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈
6216-2Z	1,49	80	140	26	2	–	124,5	98,5
6316	3,75	80	170	39	2,1	141,8	–	108,6
6316-2RSR	3,75	80	170	39	2,1	–	145,5	108,6
6316-2Z	3,82	80	170	39	2,1	–	145,5	108,2
6416-M	8,29	80	200	48	3	162,1	–	117,9
61817-Y	0,27	85	110	13	1	101,7	–	93,2
61817-2RSR-Y	0,27	85	110	13	1	–	104,2	93,2
61817-2Z-Y	0,27	85	110	13	1	–	104,2	93,2
16017	0,666	85	130	14	0,6	113,8	–	101,6
6017	0,917	85	130	22	1,1	116	–	99,6
6017-2RSR	0,917	85	130	22	1,1	–	119,2	99,6
6017-2Z	0,94	85	130	22	1,1	–	119,2	99,2
6217	1,87	85	150	28	2	129,7	–	106,2
6217-2RSR	1,87	85	150	28	2	–	133,8	106,2
6217-2Z	1,91	85	150	28	2	–	133,8	106,2
6317	4,25	85	180	41	3	151,6	–	114,4
6317-2RSR	4,25	85	180	41	3	–	154,9	114,4
6317-2Z	4,33	85	180	41	3	–	154,9	114
6417-M	9,6	85	210	52	4	173	–	123,4
61818-Y	0,28	90	115	13	1	106,7	–	98,2
61818-2RSR-Y	0,28	90	115	13	1	–	109,2	98,2
61818-2Z-Y	0,28	90	115	13	1	–	109,2	98,2
16018	0,866	90	140	16	1	122,7	–	107,6
6018	1,21	90	140	24	1,5	123,7	–	106,6
6018-2RSR	1,21	90	140	24	1,5	–	126,8	106,6
6018-2Z	1,23	90	140	24	1,5	–	126,8	106,2
6218	2,21	90	160	30	2	139,4	–	112,3
6218-2RSR	2,21	90	160	30	2	–	143,4	112,3
6218-2Z	2,26	90	160	30	2	–	143,4	112,3
6318	5,43	90	190	43	3	157,1	–	123,8
6318-2RSR	5,43	90	190	43	3	–	160,7	123,8
6318-2Z	5,53	90	190	43	3	–	160,7	123,3
6418-M	11,7	90	225	54	4	184	–	132,2
61819-Y	0,295	95	120	13	1	112	–	103,2
61819-2RSR-Y	0,295	95	120	13	1	–	114,2	103,2
61819-2Z-Y	0,295	95	120	13	1	–	114,2	103,2
16019	0,922	95	145	16	1	128,3	–	113,8



2Z seal



Mounting dimensions
Open design

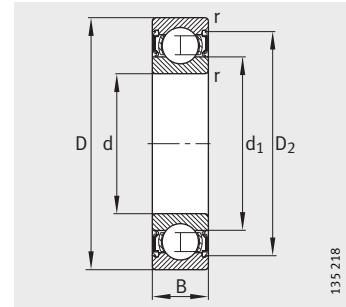
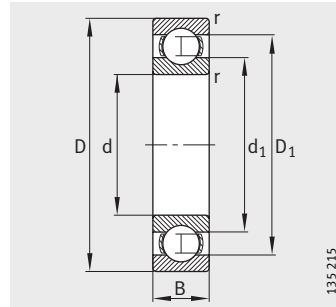


Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
91	129	2	72 000	54 000	3 450	4 500	5 500
92	158	2,1	122 000	86 500	5 200	9 000	5 500
92	158	2,1	122 000	86 500	5 200	6 700	–
92	158	2,1	122 000	86 500	5 200	3 800	5 500
96	184	2,5	163 000	125 000	6 900	7 500	5 400
89,6	105,4	1	19 300	20 000	960	6 700	6 000
89,6	105,4	1	19 300	20 000	960	3 800	–
89,6	105,4	1	19 300	20 000	960	5 600	6 000
88,2	126,8	0,6	34 000	33 500	1 570	12 000	4 400
91	124	1	49 000	43 000	2 430	11 000	6 100
91	124	1	49 000	43 000	2 430	3 200	–
91	124	1	49 000	43 000	2 430	4 800	6 100
96	139	2	83 000	64 000	4 050	10 000	5 300
96	139	2	64 000	83 000	4 050	2 800	–
96	139	2	83 000	64 000	4 050	4 300	5 300
99	166	2,5	132 000	96 500	5 800	8 000	5 300
99	166	2,5	132 000	96 500	5 800	6 300	–
99	166	2,5	132 000	96 500	5 800	3 400	5 300
105	190	3	173 000	137 000	7 500	7 000	5 300
94,6	110,4	1	19 600	20 400	990	6 300	5 600
94,6	110,4	1	19 600	20 400	990	3 600	–
94,6	110,4	1	19 600	20 400	990	5 300	5 600
94,6	135,4	1	41 500	39 000	1 870	11 000	4 400
97	133	1,5	58 500	50 000	2 650	11 000	6 000
97	133	1,5	58 500	50 000	2 650	3 000	–
97	133	1,5	58 500	50 000	2 650	4 500	6 000
101	149	2	96 500	72 000	4 200	9 000	5 100
101	149	2	96 500	72 000	4 200	2 600	–
101	149	2	96 500	72 000	4 200	3 800	5 100
104	176	2,5	134 000	102 000	5 800	8 000	5 100
104	176	2,5	134 000	102 000	5 800	6 000	–
104	176	2,5	134 000	102 000	5 800	3 400	5 100
110	205	3	196 000	163 000	8 900	6 700	4 900
99,6	115,4	1	20 000	21 200	1 100	6 300	5 300
99,6	115,4	1	20 000	21 200	1 100	3 400	–
99,6	115,4	1	20 000	21 200	1 100	5 300	5 300
99,6	140,4	1	40 000	40 500	1 990	11 000	4 200

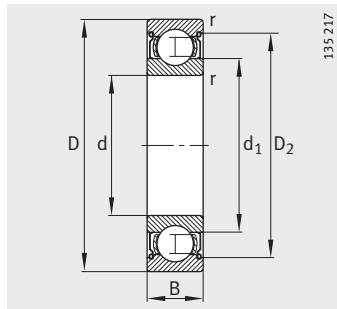
Deep groove ball bearings

Single row
Open or sealed

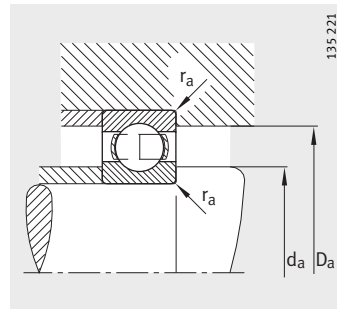


2RSR seal

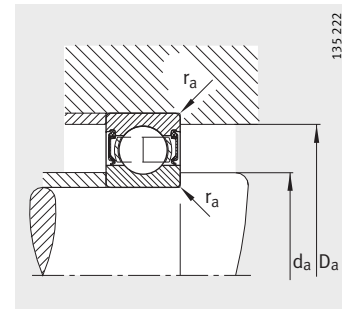
Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈
6019	1,27	95	145	24	1,5	129	–	111
6019-2RSR	1,27	95	145	24	1,5	–	131,8	111
6219	2,73	95	170	32	2,1	146,6	–	118,3
6219-2RSR	2,73	95	170	32	2,1	–	150,9	118,3
6219-2Z	2,79	95	170	32	2,1	–	150,9	118,3
6319	6,23	95	200	45	3	166,9	–	129,1
6319-2Z	7,14	95	200	45	3	–	170,4	128,7
61820-Y	0,31	100	125	13	1	116,7	–	108,2
61820-2RSR-Y	0,31	100	125	13	1	–	119,2	108,2
61820-2Z-Y	0,31	100	125	13	1	–	119,2	108,2
16020	0,956	100	150	16	1	132,7	–	117,6
6020	1,32	100	150	24	1,5	134	–	116,6
6020-2RSR	1,32	100	150	24	1,5	–	137,3	116,6
6020-2Z	1,35	100	150	24	1,5	–	137,3	116,2
6220	3,3	100	180	34	2,1	154,8	–	124,7
6220-2RSR	3,3	100	180	34	2,1	–	158,9	124,7
6220-2Z	3,36	100	180	34	2,1	–	158,9	124,7
6320	7,67	100	215	47	3	179	–	138,6
6320-2Z	7,78	100	215	47	3	–	184,6	138,1
61821-Y	0,33	105	130	13	1	121,7	–	113,2
61821-2RSR-Y	0,33	105	130	13	1	–	124,2	113,2
61821-2Z-Y	0,33	105	130	13	1	–	124,2	113,2
16021	1,24	105	160	18	1	141,2	–	124,2
6021	1,67	105	160	26	2	142,4	–	122,1
6021-2Z	1,7	105	160	26	2	–	145,3	121,7
6221	3,88	105	190	36	2,1	163,2	–	131,9
6221-2Z	3,99	105	190	36	2,1	–	168,1	131,5
6321	8,7	105	225	49	3	187	–	144,5
61822-Y	0,5	110	140	16	1	130,3	–	119,7
61822-2RSR-Y	0,5	110	140	16	1	–	133,3	119,7
61822-2Z-Y	0,5	110	140	16	1	–	133,3	119,7
16022	1,52	110	170	19	1	149,5	–	130,7
6022	2,06	110	170	28	2	150,9	–	129,2
6022-2RSR	2,06	110	170	28	2	–	155	129,2
6022-2Z	2,11	110	170	28	2	–	155	128,7
6222	4,64	110	200	38	2,1	171,6	–	138,5
6222-2Z	4,8	110	200	38	2,1	–	177,2	138



2Z seal



Mounting dimensions
Open design

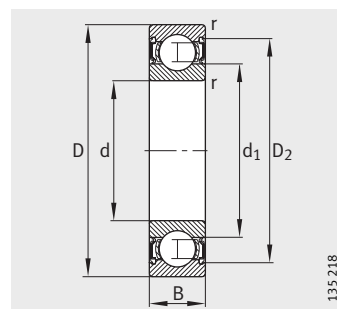
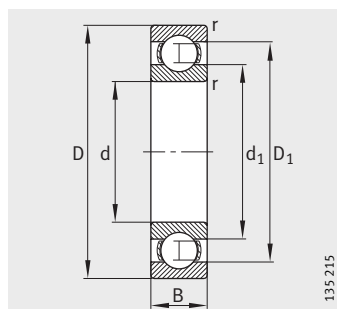


Mounting dimensions
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
102	138	1,5	60 000	54 000	2 800	10 000	5 800
102	138	1,5	60 000	54 000	2 800	2 800	–
107	158	2,1	108 000	81 500	4 700	8 500	4 950
107	158	2,1	108 000	81 500	4 700	2 400	–
107	158	2,1	108 000	81 500	4 700	3 600	4 950
109	186	2,5	146 000	114 000	6 400	7 500	4 950
109	186	2,5	146 000	114 000	6 400	3 200	4 950
104,6	120,4	1	20 000	22 000	1 010	6 000	5 000
104,6	120,4	1	20 000	22 000	1 010	3 400	–
104,6	120,4	1	20 000	22 000	1 010	5 000	5 000
104,6	145,4	1	44 000	44 000	1 990	10 000	4 000
107	143	1,5	60 000	54 000	2 700	9 500	5 400
107	143	1,5	60 000	54 000	2 700	2 800	–
107	143	1,5	60 000	54 000	2 700	4 000	5 400
112	168	2,1	122 000	93 000	5 400	8 000	4 800
112	168	2,1	122 000	93 000	5 400	2 400	–
112	168	2,1	122 000	93 000	5 400	3 400	4 800
114	201	2,5	163 000	134 000	7 400	7 000	4 650
114	201	2,5	163 000	134 000	7 400	3 000	4 650
109,6	125,4	1	20 800	23 600	1 060	5 600	4 800
109,6	125,4	1	20 800	23 600	1 060	3 200	–
109,6	125,4	1	20 800	23 600	1 060	4 800	4 800
109,6	155,4	1	54 000	54 000	2 390	9 500	3 950
113,8	151,2	2	71 000	64 000	3 100	9 000	5 300
113,8	151,2	2	71 000	64 000	3 100	3 800	5 300
117	178	2,1	132 000	104 000	5 700	7 500	4 650
117	178	2,1	132 000	104 000	5 700	3 200	4 650
119	211	2,5	173 000	146 000	7 500	6 700	4 500
114,6	135,4	1	28 000	30 500	1 320	5 000	5 000
114,6	135,4	1	28 000	30 500	1 320	3 000	–
114,6	135,4	1	28 000	30 500	1 320	4 300	5 000
114,6	165,4	1	57 000	57 000	2 800	9 000	3 850
118,8	161,2	2	80 000	71 000	3 450	8 500	5 200
118,8	161,2	2	80 000	71 000	3 450	2 400	–
118,8	161,2	2	80 000	71 000	3 450	3 600	5 200
122	188	2,1	143 000	116 000	6 300	7 000	4 550
122	188	2,1	143 000	116 000	6 300	3 000	4 550

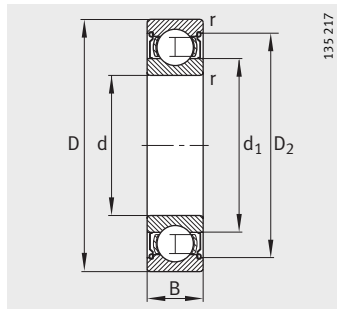
Deep groove ball bearings

Single row
Open or sealed

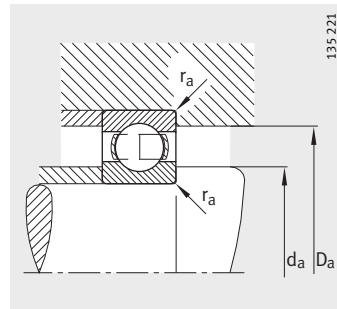


2RSR seal

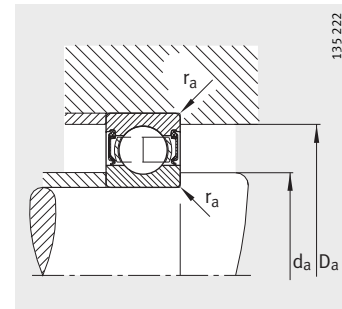
Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈
6322	10,3	110	240	50	3	197,4	–	153,4
6322-2RSR	10,3	110	240	50	3	–	203,1	153,4
6322-2Z	10,5	110	240	50	3	–	203,1	152,9
61824-Y	0,55	120	150	16	1	140,6	–	129,7
61824-2Z-Y	0,55	120	150	16	1	–	143,3	129,7
16024	1,62	120	180	19	1	159,5	–	140,7
6024	2,18	120	180	28	2	161,2	–	139,9
6024-2RSR	2,18	120	180	28	2	–	165,4	139,9
6024-2Z	2,23	120	180	28	2	–	165,4	139,4
6224	5,62	120	215	40	2,1	184,9	–	151,6
6224-2Z	5,62	120	215	40	2,1	–	190,5	151,6
6324	12,8	120	260	55	3	214,9	–	165,1
16026	2,41	130	200	22	1,1	176,7	–	154,7
6026	3,42	130	200	33	2	177,9	–	153,3
6026-2RSR	3,42	130	200	33	2	–	182,1	153,3
6026-2Z	3,4	130	200	33	2	–	182,1	152,9
6226	6,24	130	230	40	3	198,6	–	161,4
6226-2Z	6,24	130	230	40	3	–	203,5	161,4
6326-M	18,3	130	280	58	4	231,2	–	178,9
61828-Y	0,86	140	175	18	1,1	163,7	–	151,3
16028	2,55	140	210	22	1,1	186,6	–	164,8
6028	3,57	140	210	33	2	187,5	–	162,3
6028-2Z	3,65	140	210	33	2	–	191,3	161,9
6228	8,07	140	250	42	3	213,7	–	175,9
6328-M	22,3	140	300	62	4	248,7	–	191,3
16030	3,17	150	225	24	1,1	199,6	–	176
6030	4,32	150	225	35	2,1	201,4	–	174,4
6230	10,3	150	270	45	3	229,1	–	191,6
6330-M	26,5	150	320	65	4	266,1	–	205,6
16032	3,8	160	240	25	1,5	212,4	–	187,3
6032-M	6,16	160	240	38	2,1	214,6	–	186,2
6032-2RSR	6,16	160	240	38	2,1	–	219,7	186,2
6232-M	14,7	160	290	48	3	244,8	–	205
6332-M	31,8	160	340	68	4	280,9	–	219,7
16034	5,15	170	260	28	1,5	228,6	–	202,3
6034	7,13	170	260	42	2,1	231,2	–	199,4
6234-M	18,3	170	310	52	4	260,7	–	219,1



2Z seal



Mounting dimensions
Open design

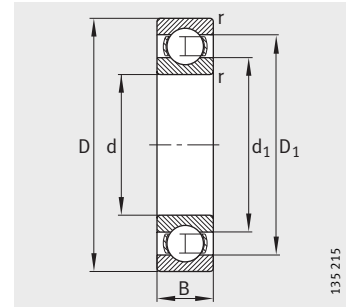


Mounting dimensions
Sealed design

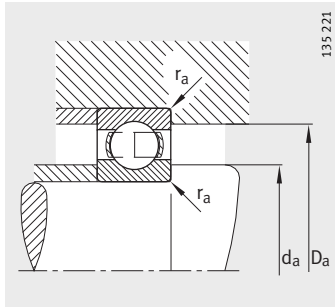
Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
124	226	2,5	190 000	166 000	8 600	6 300	4 150
124	226	2,5	190 000	166 000	8 600	4 500	–
124	226	2,5	190 000	166 000	8 600	2 600	4 150
124,6	145,4	1	29 000	32 500	1 370	4 800	4 500
124,6	145,4	1	29 000	32 500	1 370	4 000	4 500
124,6	175,4	1	61 000	64 000	3 000	8 000	3 550
128,8	171,2	2	83 000	78 000	3 550	8 000	4 750
128,8	171,2	2	83 000	78 000	3 550	2 200	–
128,8	171,2	2	83 000	78 000	3 550	3 400	4 750
132	203	2,1	146 000	122 000	6 200	6 700	4 300
132	203	2,1	146 000	122 000	6 200	2 800	4 300
134	246	2,5	212 000	190 000	9 000	6 000	3 850
136	194	1	78 000	81 500	3 650	7 500	3 450
138,8	191,2	2	106 000	100 000	4 850	7 000	4 650
138,8	191,2	2	106 000	100 000	4 850	2 000	–
138,8	191,2	2	106 000	100 000	4 850	3 000	4 650
144	216	2,5	166 000	146 000	7 500	6 300	3 900
144	216	2,5	166 000	146 000	7 500	2 600	3 900
147	263	3	228 000	216 000	9 800	5 600	3 500
146	169	1	39 000	46 500	1 750	4 000	4 000
146	204	1	80 000	86 500	3 700	7 000	3 200
148,8	201,2	2	108 000	108 000	4 950	6 700	4 350
148,8	201,2	2	108 000	108 000	4 950	2 800	4 350
154	236	2,5	176 000	166 000	8 100	6 000	3 600
157	283	3	255 000	245 000	11 100	5 300	3 250
156	219	1	91 500	98 000	3 650	6 700	3 100
160,2	214,8	2,1	122 000	125 000	5 400	6 300	3 850
164	256	2,5	176 000	170 000	7 800	5 600	3 350
167	303	3	280 000	290 000	13 100	4 800	3 000
167	233	1,5	102 000	114 000	4 600	6 300	2 950
170,2	229,8	2,1	134 000	137 000	5 800	6 300	3 750
170,2	229,8	2,1	134 000	137 000	5 800	1 700	–
174	276	2,5	200 000	204 000	8 900	5 600	3 100
177	323	3	300 000	325 000	14 000	4 300	2 800
177	253	1,5	122 000	137 000	5 400	6 000	2 850
180,2	249,8	2,1	170 000	173 000	7 400	5 600	3 550
187	293	3	212 000	224 000	9 400	5 300	2 950

Deep groove ball bearings

Single row
Open



Dimension table (continued) · Dimensions in mm							
Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁ ≈	d ₁ ≈
6334-M	37,3	170	360	72	4	298	232,6
16036	6,92	180	280	31	2	238,8	211,9
6036-M	10,6	180	280	46	2,1	249,3	211,8
6236-M	19	180	320	52	4	272	228,7
6336-M	43	180	380	75	4	317	245,2
16038	7,04	190	290	31	2	255,1	225,8
6038-M	11,3	190	290	46	2,1	257,9	222,6
6238-M	22,6	190	340	55	4	291,5	239,9
6338-M	50,4	190	400	78	5	330,5	260,2
16040	9	200	310	34	2	276,4	244,5
6040-M	14,4	200	310	51	2,1	276,3	234,8
6240-M	27	200	360	58	4	306,5	254,9
6340-M	56,6	200	420	80	5	345,9	274,7
16044	11,8	220	340	37	2,1	298,1	262,8
6044-M	18,8	220	340	56	3	303,1	258,1
6244-M	37,9	220	400	65	4	337,6	282,2
6344-M	73,7	220	460	88	5	383	299,4
16048	12,7	240	360	37	2,1	317,4	283,1
6048-M	20,5	240	360	56	3	321,9	278,8
6248-M	51,3	240	440	72	4	369,6	309,9
6348-M	96,4	240	500	95	5	411,3	328,7
16052	19,1	260	400	44	3	351,2	310
6052-M	29,8	260	400	65	4	357	304,6
6252-M	68,4	260	480	80	5	402,4	337,3
16056-M	23,2	280	420	44	3	370,6	329,9
6056-M	31,7	280	420	65	4	377,5	324,1
6256-M	72,9	280	500	80	5	423	356,7
16060-M	32,6	300	460	50	4	404	357,3
6060-M	44,5	300	460	74	4	410,8	350,8
61864-M	11,3	320	400	38	2,1	373,8	347
16064-M	34,9	320	480	50	4	423,1	377,7
6064-M	47,4	320	480	74	4	430,8	370,9
61868-M	12	340	420	38	2,1	394,2	366,7
16068-M	47,5	340	520	57	4	457,1	403,6
6068-M	63,2	340	520	82	5	469,6	402,3
61872-M	12,8	360	440	38	2,1	413	387,7
16072-M	49,4	360	540	57	4	478,1	423,5

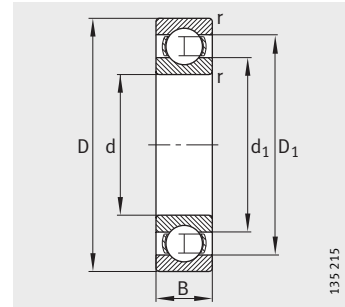


Mounting dimensions

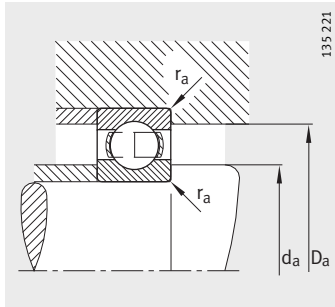
Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
187	343	3	325 000	365 000	14 700	4 000	2 600
188,8	271,2	2	132 000	146 000	5 200	5 600	2 800
190,2	269,8	2,1	190 000	200 000	8 200	5 600	3 300
197	303	3	224 000	245 000	10 300	4 800	2 750
197	363	3	355 000	405 000	16 300	3 800	2 440
198,8	281,2	2	150 000	166 000	6 300	5 300	2 650
200,2	279,8	2,1	196 000	212 000	8 500	5 300	3 150
207	323	3	255 000	280 000	11 600	4 300	2 600
210	380	4	375 000	440 000	17 500	3 600	2 300
208,8	301,2	2	176 000	204 000	7 300	4 800	2 550
210,2	299,8	2,1	216 000	245 000	9 600	4 800	3 000
217	343	3	270 000	310 000	12 400	4 000	2 430
220	400	4	380 000	465 000	18 000	3 400	2 170
230,2	329,8	2,1	200 000	240 000	8 400	4 300	2 310
232,4	327,6	2,5	245 000	290 000	11 100	4 000	2 700
237	383	3	300 000	355 000	13 500	3 600	2 200
240	440	4	440 000	560 000	20 000	3 200	1 960
250,2	349,8	2,1	204 000	255 000	8 500	3 800	2 100
252,4	347,6	2,5	255 000	315 000	11 400	3 800	2 450
257	423	3	360 000	475 000	16 700	3 400	1 980
260	480	4	465 000	620 000	21 800	3 000	1 800
272,4	387,6	2,5	236 000	310 000	9 900	3 600	1 960
274,6	385,4	3	300 000	390 000	13 300	3 400	2 260
280	460	4	405 000	560 000	19 200	3 000	1 820
292,4	407,6	2,5	240 000	325 000	10 100	3 400	1 800
294,6	405,4	3	320 000	440 000	14 400	3 400	2 060
291	489	4	425 000	600 000	20 300	3 000	1 690
314,6	445,4	3	300 000	430 000	12 700	3 200	1 670
314,6	445,4	3	365 000	510 000	16 700	3 000	1 930
330,2	389,8	2,1	156 000	220 000	6 500	3 400	1 710
334,6	465,4	3	305 000	455 000	13 000	3 000	1 550
334,6	465,4	3	380 000	560 000	17 400	3 000	1 790
350,2	409,8	2,1	156 000	220 000	6 600	3 200	1 590
354,6	505,4	3	355 000	550 000	17 800	2 800	1 460
358	502	4	440 000	695 000	20 800	2 800	1 660
370,2	429,8	2,1	160 000	236 000	6 900	3 200	1 480
374,6	525,4	3	365 000	585 000	15 700	2 800	1 370

Deep groove ball bearings

Single row
Open



Dimension table (continued) · Dimensions in mm							
Designation	Mass m ≈ kg	Dimensions					
		d	D	B	r min.	D ₁ ≈	d ₁ ≈
6072-M	66,2	360	540	82	5	489	423,7
61876-M	20,6	380	480	46	2,1	445,9	414,1
16076-M	51,7	380	560	57	4	498	443,5
61880-M	21,5	400	500	46	2,1	467,3	433,7
61884-M	22,8	420	520	46	2,1	485,8	454,3
61888-M	23,8	440	540	46	2,1	505,9	474,2
61892-M	35,8	460	580	56	3	540,9	500,2
61896-M	37,3	480	600	56	3	560,9	520,3
618/500-M	38,7	500	620	56	3	580,9	540,4
618/530-M	41,3	530	650	56	3	610,8	570,4
618/560-M	35,1	560	680	56	3	640,7	600,4
618/600-M	54,2	600	730	60	3	687,8	643,6
618/630-M	75,9	630	780	69	4	730,5	681,1
618/670-M	80,4	670	820	69	4	770,3	721,1
618/710-M	96	710	870	74	4	818,9	762,7
618/750-M	114	750	920	78	5	864,9	806,7
618/800-M	136	800	980	82	5	921,8	860
618/850-M	144	850	1 030	82	5	971,9	910

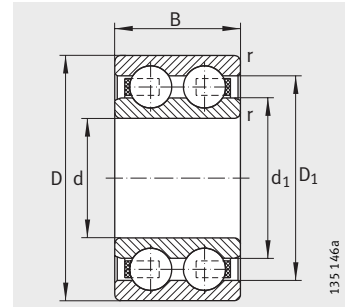


Mounting dimensions

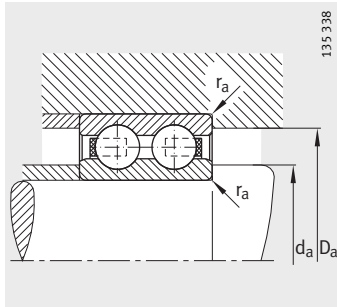
Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
378	522	4	455 000	735 000	21 500	2 600	1 560
390,2	469,8	2,1	220 000	320 000	8 900	3 000	1 430
394,6	545,4	3	375 000	620 000	16 100	2 600	1 290
410,2	489,8	2,1	220 000	335 000	8 900	2 800	1 300
430,2	509,8	2,1	224 000	345 000	9 200	2 800	1 260
450,2	529,8	2,1	228 000	355 000	9 400	2 600	1 190
472,4	567,6	2,5	290 000	480 000	12 000	2 400	1 170
492,4	587,6	2,5	290 000	500 000	12 100	2 200	1 110
512,4	607,6	2,5	300 000	510 000	12 300	2 000	1 060
542,4	637,6	2,5	305 000	550 000	12 800	2 000	980
572,4	667,6	2,5	310 000	560 000	13 500	1 900	930
612,4	717,6	2,5	355 000	670 000	15 000	1 800	850
644,6	765,4	3	400 000	780 000	17 500	1 600	830
684,6	805,4	3	405 000	815 000	17 700	1 500	760
724,6	855,4	3	465 000	980 000	20 000	1 400	720
768	902	4	510 000	1 120 000	22 600	1 300	680
818	962	4	550 000	1 270 000	23 800	1 300	630
868	1 012	4	560 000	1 290 000	23 900	1 200	580

Deep groove ball bearings

Double row

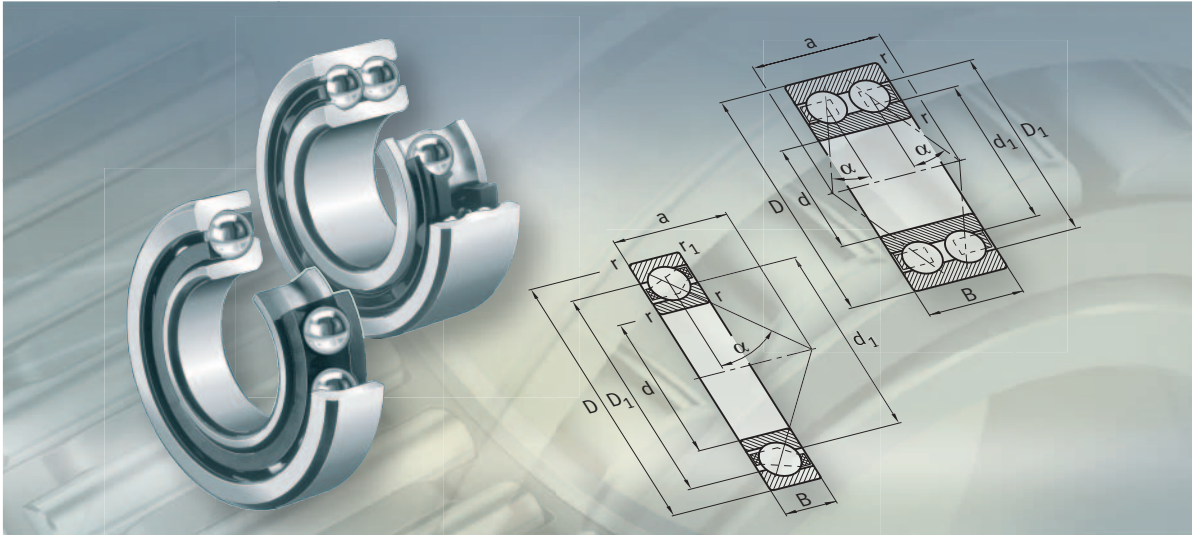


Dimension table · Dimensions in mm							
Designation	Mass m ≈ kg	Dimensions					
		d	D	B	r min.	D ₁ ≈	d ₁ ≈
4200-B-TVH	0,054	10	30	14	0,6	23,9	16,6
4201-B-TVH	0,057	12	32	14	0,6	25,9	18,6
4202-B-TVH	0,065	15	35	14	0,6	28,9	21,6
4302-B-TVH	0,116	15	42	17	1	33,5	24,2
4203-B-TVH	0,098	17	40	16	0,6	33,2	24
4303-B-TVH	0,16	17	47	19	1	39,1	28,7
4204-B-TVH	0,143	20	47	18	1	39,5	30,2
4304-B-TVH	0,211	20	52	21	1,1	43,1	31,5
4205-B-TVH	0,166	25	52	18	1	44	34,7
4305-B-TVH	0,336	25	62	24	1,1	51,7	38,4
4206-B-TVH	0,467	30	62	20	1	52,5	41,3
4306-B-TVH	0,51	30	72	27	1,1	61,1	46,6
4207-B-TVH	0,407	35	72	23	1,1	60,1	47,7
4307-B-TVH	0,758	35	80	31	1,5	66,9	49,2
4208-B-TVH	0,545	40	80	23	1,1	66,6	54,2
4308-B-TVH	1,03	40	90	33	1,5	75,5	55,7
4209-B-TVH	0,592	45	85	23	1,1	71,6	59,2
4309-B-TVH	1,23	45	100	36	1,5	86,8	66,7
4210-B-TVH	0,587	50	90	23	1,1	77,6	65,2
4310-B-TVH	1,62	50	110	40	2	96,2	73,6
4211-B-TVH	0,86	55	100	25	1,5	84,7	71,4
4311-B-TVH	2,06	55	120	43	2	105,3	80,4
4212-B-TVH	1,09	60	110	28	1,5	95,3	79,8
4312-B-TVH	2,51	60	130	46	2,1	113,8	87,7
4213-B-TVH	1,6	65	120	31	1,5	101,9	84,2
4214-B-TVH	1,7	70	125	31	1,5	109,4	91,7
4215-B-TVH	1,72	75	130	31	1,5	115,4	97,7
4216-B-TVH	2,14	80	140	33	2	124	105,2
4217-B-TVH	2,7	85	150	36	2	132,8	112,7
4218-B-TVH	3,7	90	160	40	2	140,2	117,6



Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N		
14,2	25,8	0,6	9 150	5 200	315	24 000
16,2	27,8	0,6	9 300	5 500	330	20 000
19,2	30,8	0,6	10 400	6 700	370	18 000
20,6	36,4	1	14 600	9 150	550	17 000
21,2	35,8	0,6	14 600	9 500	550	17 000
22,6	41,4	1	19 600	13 200	770	15 000
25,6	41,4	1	18 000	12 700	690	14 000
27	45	1	23 200	16 000	940	13 000
30,6	46,4	1	19 300	14 600	740	12 000
32	55	1	31 500	22 400	1 330	10 000
35,6	56,4	1	26 000	20 800	1 170	9 500
37	65	1	40 000	30 500	1 840	8 500
42	65	1	32 000	26 000	1 460	8 500
44	71	1,5	51 000	38 000	2 260	8 000
47	73	1	34 000	30 000	1 570	7 500
49	81	1,5	63 000	48 000	2 900	7 000
52	78	1	36 000	33 500	1 690	7 000
54	91	1,5	72 000	60 000	3 600	6 000
57	83	1	37 500	36 500	1 810	6 300
61	99	2	90 000	75 000	4 450	5 300
64	91	1,5	36 500	43 000	2 260	5 600
66	109	2	104 000	90 000	5 400	5 000
69	101	1,5	57 000	58 500	2 850	5 000
72	118	2,1	120 000	106 000	6 200	4 500
74	111	1,5	67 000	67 000	3 350	4 800
79	116	1,5	69 500	73 500	3 600	4 500
84	121	1,5	73 500	80 000	3 750	4 300
91	129	2	80 000	90 000	4 350	4 000
96	139	2	93 000	106 000	5 100	3 800
101	149	2	112 000	122 000	5 900	3 600

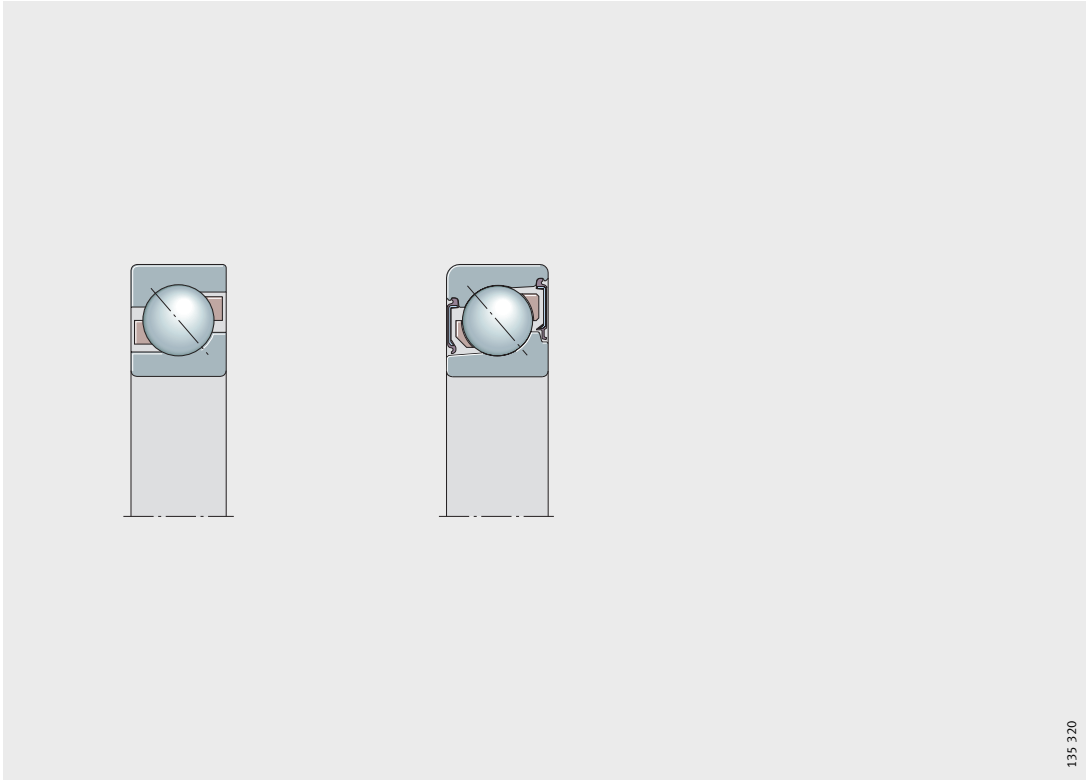


Angular contact ball bearings

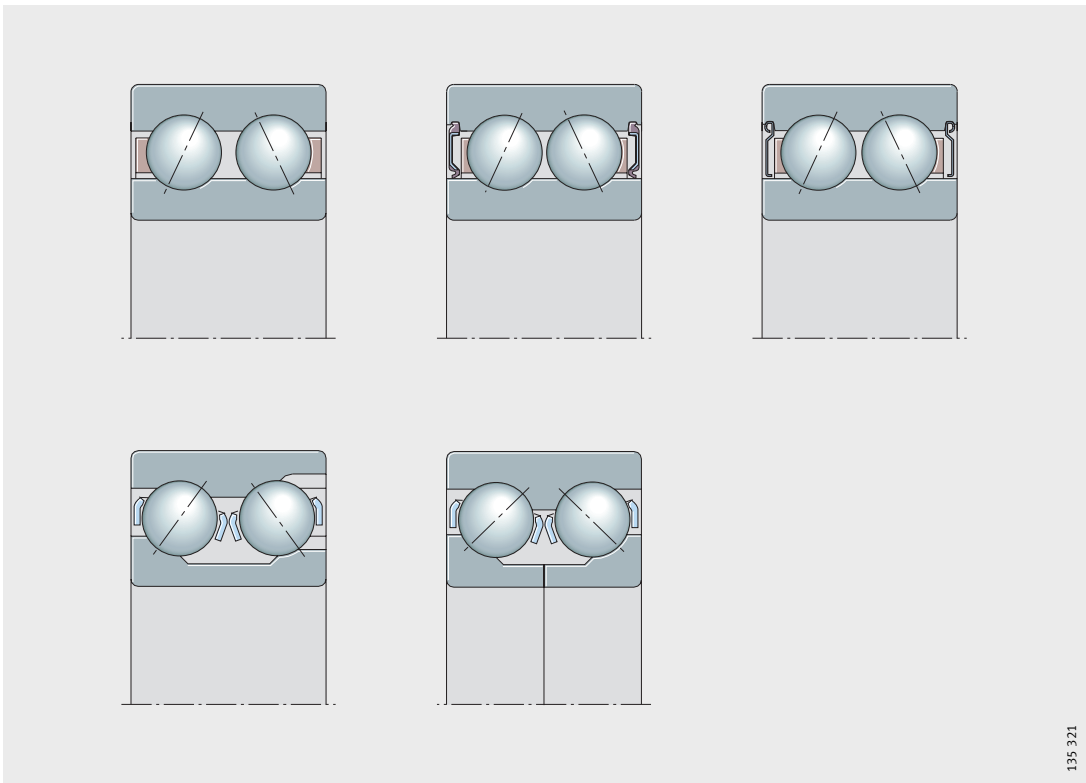
Single row
Double row

Angular contact ball bearings

X-life Single row angular contact ball bearings	..... 230
	In single row angular contact ball bearings, the raceways are arranged such that the forces are transmitted at a particular contact angle – oblique to the radial plane – from one raceway to the other. The axial load carrying capacity increases with the contact angle. Due to the large contact angle, single row angular contact ball bearings are more suitable than deep groove ball bearings for supporting large axial forces acting in one direction. Single row angular contact ball bearings can support radial loads and unilateral axial loads. They are adjusted against a second bearing that provides counter guidance.
Double row angular contact ball bearings	..... 248
	Double row angular contact ball bearings are similar in design to a pair of single row angular contact ball bearings in an O arrangement. In this case, the apexes of the cones formed by the ball pressure lines point outwards. Double row bearings can support high radial forces as well as axial forces in both directions and are particularly suitable for rigid axial guidance arrangements. Depending on the series, the bearings are designed with or without filling slots.

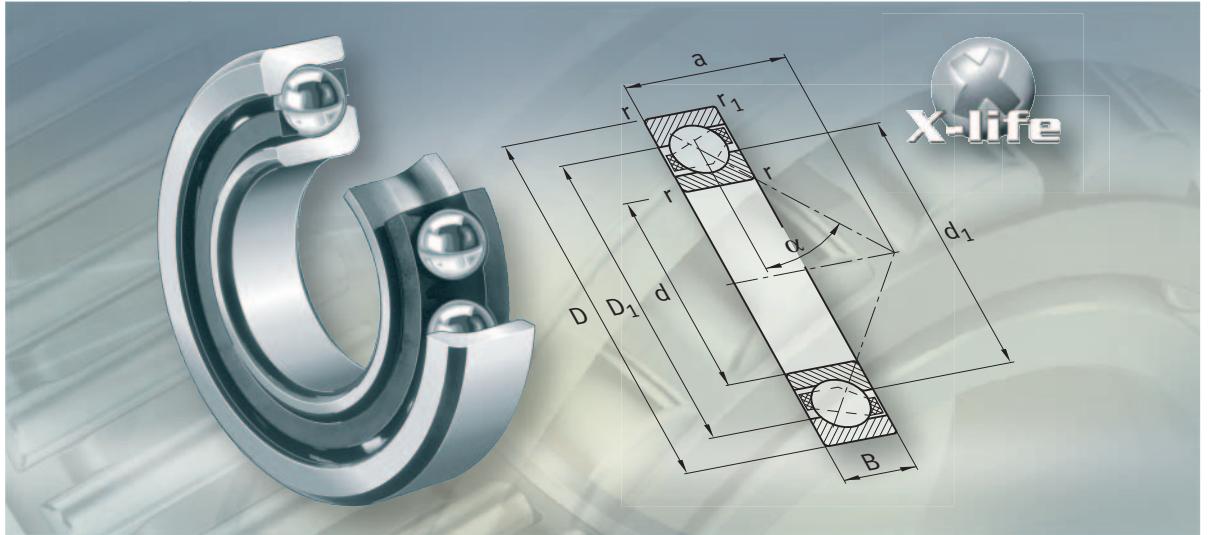


135 320



135 321

FAG



Single row angular contact ball bearings



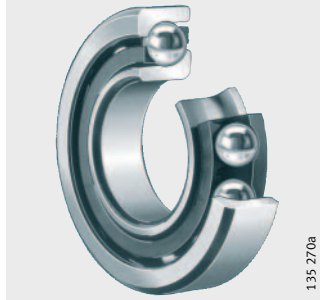
Single row angular contact ball bearings

	Page
Product overview	Single row angular contact ball bearings 232
Features	Radial and axial load capacity 233
	X-life 233
	Operating temperature 233
	Cages 234
	Suffixes 234
Design and safety guidelines	Calculation of axial force 235
	Equivalent dynamic bearing load 236
	Equivalent static bearing load 237
	Basic dynamic and static load ratings for bearing pairs 237
	Minimum radial load 237
	Speeds 237
Accuracy	Tolerances for universal designs and for matched bearings 238
	Axial internal clearance or preload of universal design 238
Dimension tables	Single row angular contact ball bearings
	Open or sealed 240

Product overview Single row angular contact ball bearings

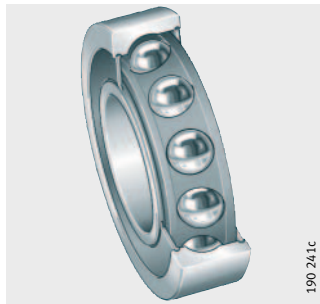
Single row

718..-B, 70..-B, 72..-B,
73..-B



Lip seals

70..-B-2RS, 72..-B-2RS,
73..-B-2RS



Single row angular contact ball bearings



Features Single row angular contact ball bearings are self-retaining units with solid inner and outer rings and ball and cage assemblies with polyamide, sheet metal or brass cages. The raceways of the inner and outer rings are offset from each other along the bearing axis. The bearings are available in open and sealed designs. Their angular adjustment facility is very limited.

X-life Many sizes of angular contact ball bearings are classified as X-life products. These bearings are indicated in the dimension tables. Bearings of X-life quality have an improved raceway geometry and optimised surfaces. This gives a significant increase in the fatigue limit load of the bearings. When calculating the expanded adjusted rating life, values up to 50% higher can thus be achieved. In certain applications, this means that a smaller bearing arrangement can be designed.

Radial and axial load capacity Single row angular contact ball bearings can support axial forces in one direction and high radial forces. They must be axially adjusted against a second bearing fitted in a mirror image arrangement. The axial load carrying capacity is dependent on the contact angle; i. e. the larger the angle, the higher the load to which the bearing can be subjected. Due to the contact angle of 40°, these bearings can support high axial loads.

Universal design Single row angular contact ball bearings of universal design have the suffix UA, UL or UO and are intended for fitting in pairs in an X, O or tandem arrangement or fitting in groups. These bearings can be fitted in any arrangement required.

The suffix UA indicates small axial internal clearance, suffix UL indicates slight preload and suffix UO indicates freedom from clearance in an X or O arrangement.

When ordering bearings, the total quantity of bearings must be stated, not the number of bearing pairs or bearing groups.

Matched bearings Sets without an intermediate ring are available in an O arrangement (DB), X arrangement (DF) or tandem arrangement (DT).

When ordering bearings, the number of sets must be stated, not the number of single bearings.

Sealing/lubrication Bearings with the suffix 2RS have lip seals on both sides. RS contact seals are suitable for giving protection against dust, contamination and damp atmospheres. The bearings are greased with a high quality grease and are lubricated for life.

Bearings without seals or with seals on one side are not greased. They can be lubricated with grease or oil.

Operating temperature Open angular contact ball bearings can be used at operating temperatures from -30 °C to +150 °C. Bearings with a diameter $D > 240$ mm are dimensionally stable up to +200 °C.

Caution! Angular contact ball bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to +120 °C, restricted by the cage material.

Sealed bearings are suitable for operating temperatures from -30 °C to +110 °C, restricted by the lubricant and the seal material.

Single row angular contact ball bearings

Cages Angular contact ball bearings with solid cages made from glass fibre reinforced polyamide have the suffix TVP or TVH.
Solid brass cages have the suffix MP.
The bearings are also available with universally applicable sheet steel window cages (suffix JP).

Caution! Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

The oil change intervals must be observed.

Cage/bore code

Series	Solid window cage made from polyamide ¹⁾	Solid window cage made from brass ¹⁾	Sheet steel cage ¹⁾
	Bore code		
718..-B	06 to 16	–	–
70..-B	all	–	–
72..-B	up to 20, 22 to 26	21, from 28	up to 22
73..-B	up to 20, 22 to 26	21, from 28	up to 22

¹⁾ Other cage designs available by agreement.

In such cages, suitability for high speeds and high temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.

Suffixes

Suffixes for the available designs: see table.

Available designs

Suffix	Description	Design
B	Modified internal construction	Standard
JP	Sheet steel cage	Standard
MP	Solid brass cage	Standard
DB	Two angular contact ball bearings in O arrangement, matched clearance-free	Special design ¹⁾
DF	Two angular contact ball bearings in X arrangement, matched clearance-free	Special design ¹⁾
DT	Two angular contact ball bearings in tandem arrangement, matched	Special design ¹⁾
TVH TVP	Solid cage made from glass fibre reinforced polyamide	Standard
UA	Universal design for fitting in pairs, bearing pair has small axial internal clearance in O and X arrangement	Standard
UL	Universal design for fitting in pairs, bearing pair has slight preload in O and X arrangement	Standard
UO	Universal design for fitting in pairs, bearing pair is clearance-free in O and X arrangement	Standard
P5	Bearing in tolerance class P5	Special design ¹⁾
2RS	Contact seals on both sides	Standard

¹⁾ Available by agreement.



Design and safety guidelines

Calculation of axial force

Under radial load, an internal axial force is induced in the bearing that must be supported by a second bearing and taken into consideration when calculating the equivalent bearing load.

Depending on the bearing arrangement (O or X arrangement), the axial force must first be determined for bearings adjusted clearance-free without preload, see table Load ratio and axial bearing load, page 236 and *Figure 1, Figure 2*.

The following preconditions apply:

- The radial forces act at the central pressure points and are positive
- Bearing A is subjected to a radial load F_{rA} , bearing B to F_{rB}
- F is an external axial force acting on bearing A.

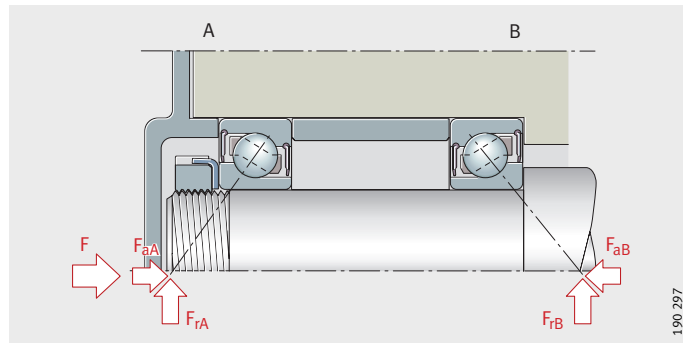


Figure 1
Bearings in O arrangement

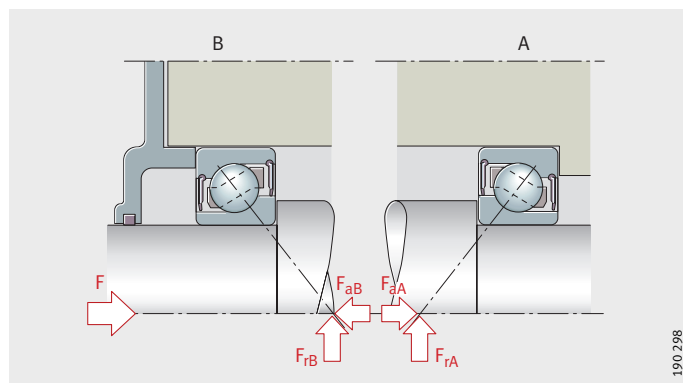


Figure 2
Bearings in X arrangement

Single row angular contact ball bearings

Load ratio and axial bearing load

Load ratio ³⁾		Axial force F_a ¹⁾³⁾	
Radial bearing load	External axial force	Bearing A	Bearing B
$\frac{F_{rA}}{Y_A} \leq \frac{F_{rB}}{Y_B}$	$F \geq 0$	$F_a = F + 0,5 \cdot \frac{F_{rB}}{Y_B}$	2)
$\frac{F_{rA}}{Y_A} > \frac{F_{rB}}{Y_B}$	$F > 0,5 \cdot \left(\frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B} \right)$	$F_a = F + 0,5 \cdot \frac{F_{rB}}{Y_B}$	2)
	$F \leq 0,5 \cdot \left(\frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B} \right)$	2)	$F_a = 0,5 \cdot \frac{F_{rA}}{Y_A} - F$

1) Axial force F_a , to be used in calculation of the equivalent dynamic bearing load.

2) If no formula is given, the axial force is not taken into consideration.

3) For bearings of series 718..-B, 70..-B, 72..-B and 73..-B, the axial load component factor for $Y = 0,57$ is used in the formulae.

Equivalent dynamic bearing load

Contact angle 40°

For bearings under dynamic loading, the following applies:

Bearing arrangement	Load ratio	Equivalent dynamic load
Single bearing ¹⁾	$\frac{F_a}{F_r} \leq 1,14$	$P = F_r$
	$\frac{F_a}{F_r} > 1,14$	$P = 0,35 \cdot F_r + 0,57 \cdot F_a$
Bearing pair in O or X arrangement	$\frac{F_a}{F_r} \leq 1,14$	$P = F_r + 0,55 \cdot F_a$
	$\frac{F_a}{F_r} > 1,14$	$P = 0,57 \cdot F_r + 0,93 \cdot F_a$

1) Calculation of axial force for single bearing: see table Load ratio and axial bearing load.

P N
Equivalent dynamic bearing load for combined load

F_a N
Axial dynamic bearing load

F_r N
Radial dynamic bearing load.



Equivalent static bearing load

Contact angle 40°

For bearings under static loading, the following applies:

Bearing arrangement	Load ratio	Equivalent static load
Single bearing	$\frac{F_{0a}}{F_{0r}} \leq 1,9$	$P_0 = F_{0r}$
	$\frac{F_{0a}}{F_{0r}} > 1,9$	$P_0 = 0,5 \cdot F_{0r} + 0,26 \cdot F_{0a}$
Bearing pair in O or X arrangement	–	$P_0 = F_{0r} + 0,52 \cdot F_{0a}$

P_0 N
Equivalent static bearing load for combined load
 F_{0a} N
Axial static bearing load
 F_{0r} N
Radial static bearing load.

Basic dynamic and static load ratings for bearing pairs

If two bearings of the same size and design are fitted immediately adjacent to each other in an O or X arrangement, the basic dynamic load rating C_r and basic static load rating C_{0r} of the bearing pair are as follows:

- $C_r = 1,625 \cdot C_{r \text{ single bearing}}$
- $C_{0r} = 2 \cdot C_{0r \text{ single bearing}}$

Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, a minimum radial load of the order of $P/C_r > 0,01$ is necessary for ball bearings with cage.

Speeds

For greased and sealed bearings, the speeds are lower than in the case of unsealed bearings.

Caution! The limiting speeds n_G given in the dimension tables must not be exceeded.

Bearings in universal design

Bearings with the suffix UA, UL and UO can be used in an X, O or tandem arrangement. The operating speed of the bearing pair is then approximately 20% below the calculated permissible operating speed of the single bearing.

The limiting speed n_G is possible if the less favourable thermal balance of the bearing pair is taken into consideration.

Single row angular contact ball bearings

Accuracy The main dimensions of the bearings conform to DIN 628-1. The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620-2.

Tolerances for universal designs and for matched bearings In addition to the normal tolerance (no tolerance suffix), angular contact ball bearings of universal designs UO, UL or UA are also available by agreement in tolerance class P5 (suffix P5-UL or P5-UA). The following exceptions apply: bore tolerances for bearings of all tolerance classes uniformly to P5 (no special suffix), width tolerances for universal bearings and matched bearings according to the following table:

Ring width tolerance

Bore d mm		Width deviation Δ_{B_5} μm			
		PN		P5	
over	incl.	min.	max.	min.	max.
–	50	0	–250	0	–250
50	80	0	–380	0	–250
80	120	0	–380	0	–380
120	180	0	–500	0	–380
180	315	0	–500	0	–500

Axial internal clearance or preload of universal design The axial internal clearance and preload of series 70..-B, 72..-B and 73..-B of universal design, in pairs in an X or O arrangement, are shown in the table Axial internal clearance/preload, page 239. The axial internal clearance or freedom from clearance do not apply to fitted bearing pairs. If rigid fits are used, this leads to reduced axial internal clearance or increased preload of the bearing pair.



**Axial internal clearance/
preload**

Bore code	Axial internal clearance or preload of bearing pair Nominal dimension μm					Preload $F_{V \max}$ N		
	UA	UO	UL			UL		
	70B, 72B, 73B	70B	72B	73B	70B	72B	73B	
	Tolerance classes					Tolerance class		
	PN, P6, P5	P5	P5	P5	P5	P5	P5	
00	22	0	-	-3	-	-	38	-
01	24	0	-	-4	-5	-	53	82
02	24	0	-	-4	-5	-	62	99
03	24	0	-	-4	-6	-	77	123
04	28	0	-4	-5	-6	103	103	146
05	34	0	-4	-4	-6	115	112	200
06	34	0	-5	-5	-7	141	157	250
07	40	0	-5	-6	-7	172	208	300
08	40	0	-5	-6	-8	200	246	385
09	44	0	-	-6	-9	-	277	462
10	44	0	-	-6	-10	-	288	535
11	46	0	-	-7	-10	-	358	600
12	46	0	-	-7	-10	-	431	692
13	46	0	-	-8	-11	-	492	785
14	50	0	-	-8	-11	-	535	877
15	50	0	-	-8	-12	-	523	977
16	50	0	-	-8	-12	-	615	1077
17	54	0	-	-8	-13	-	692	1154
18	54	0	-	-9	-13	-	815	1231
19	54	0	-	-10	-14	-	892	1331
20	54	0	-	-11	-14	-	992	1485
21	58	0	-	-11	-14	-	1100	1538
22	58	0	-	-12	-15	-	1177	1723
24	58	0	-	-12	-16	-	1277	1923
26	60	0	-	-12	-17	-	1431	2115
28	60	0	-	-12	-17	-	1508	2308
30	60	0	-	-13	-18	-	1723	2500
32	60	0	-	-13	-18	-	1815	2769
34	70	0	-	-14	-19	-	2038	3115

**Tolerances for
axial internal clearance or preload**

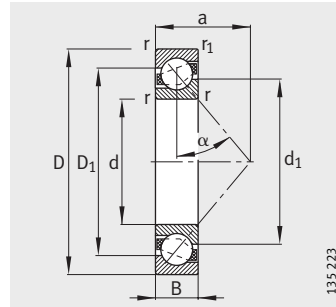
Tolerances for axial internal clearance or preload for angular contact ball bearings of universal design fitted in pairs in X and O arrangement.

**Tolerance
in μm**

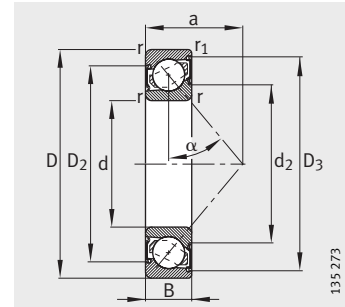
Bore code	Series 70B, 72B		Series 73B	
	Tolerance classes			
	PN, P6	P5	PN, P6	P5
00 to 09	+8	+6	+8	+6
10 to 11	+8	+6	+12	+10
12 to 34	+12	+10	+12	+10

Angular contact ball bearings

Single row
Open or sealed

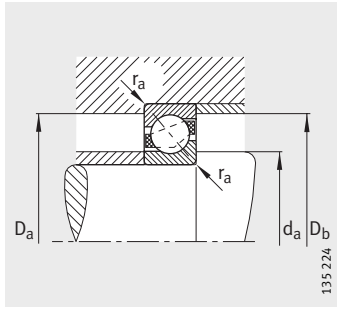


70..-B, 72..-B, 73..-B
 $\alpha = 40^\circ$

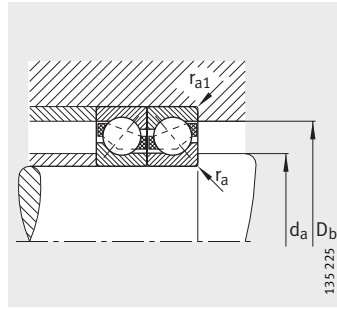


70..-B-2RS, 72..-B-2RS,
73..-B-2RS
2RS seal

Dimension table · Dimensions in mm											
Designation	X-life	Mass m ≈kg	Dimensions								
			d	D	B	r	r ₁	D ₁	D ₂	D ₃	d ₁
						min.	min.	≈	≈	≈	≈
7200-B-JP	XL	0,033	10	30	9	0,6	0,3	22,1	–	–	18
7200-B-TVP	XL	0,032	10	30	9	0,6	0,3	22,1	–	–	18
7200-B-2RS-TVP	XL	0,032	10	30	9	0,6	0,3	–	23,3	25,6	–
7201-B-JP	XL	0,038	12	32	10	0,6	0,3	24,6	–	–	19,5
7201-B-TVP	XL	0,035	12	32	10	0,6	0,3	24,6	–	–	19,5
7201-B-2RS-TVP	XL	0,037	12	32	10	0,6	0,3	–	25,9	28,8	–
7301-B-JP	XL	0,066	12	37	12	1	0,6	27,2	–	–	22,1
7301-B-TVP	XL	0,06	12	37	12	1	0,6	27,2	–	–	22,1
7202-B-JP	XL	0,047	15	35	11	0,6	0,3	27,6	–	–	22,5
7202-B-TVP	XL	0,044	15	35	11	0,6	0,3	27,6	–	–	22,5
7202-B-2RS-TVP	XL	0,044	15	35	11	0,6	0,3	–	29,2	32,1	–
7302-B-JP	XL	0,088	15	42	13	1	0,6	31,8	–	–	25,5
7302-B-TVP	XL	0,082	15	42	13	1	0,6	31,8	–	–	25,5
7302-B-2RS-TVP	XL	0,082	15	42	13	1	0,6	–	33,3	38,1	–
7203-B-JP	XL	0,069	17	40	12	0,6	0,6	31,2	–	–	26,2
7203-B-TVP	XL	0,065	17	40	12	0,6	0,6	31,2	–	–	26,2
7203-B-2RS-TVP	XL	0,065	17	40	12	0,6	0,6	–	33,1	36,3	–
7303-B-JP	XL	0,117	17	47	14	1	0,6	35,8	–	–	28,5
7303-B-TVP	XL	0,109	17	47	14	1	0,6	35,8	–	–	28,5
7303-B-2RS-TVP	XL	0,109	17	47	14	1	0,6	–	37,2	42,6	–
7004-B-TVP	XL	0,06	20	42	12	0,6	0,3	34,7	–	–	29,1
7004-B-2RS-TVP	XL	0,061	20	42	12	0,6	0,3	–	37,1	40,9	–
7204-B-JP	XL	0,111	20	47	14	1	0,6	36,6	–	–	30,4
7204-B-TVP	XL	0,104	20	47	14	1	0,6	36,6	–	–	30,4
7204-B-2RS-TVP	XL	0,104	20	47	14	1	0,6	–	39,1	43	–
7304-B-JP	XL	0,152	20	52	15	1,1	0,6	39,9	–	–	32,4
7304-B-TVP	XL	0,143	20	52	15	1,1	0,6	39,9	–	–	32,4
7304-B-2RS-TVP	XL	0,143	20	52	15	1,1	0,6	–	41,4	47,1	–
7005-B-TVP	XL	0,071	25	47	12	0,6	0,3	39,7	–	–	34,1
7005-B-2RS-TVP	XL	0,071	25	47	12	0,6	0,3	–	41,5	45,9	–
7205-B-JP	XL	0,135	25	52	15	1	0,6	41,6	–	–	35,4
7205-B-TVP	XL	0,127	25	52	15	1	0,6	41,6	–	–	35,4
7205-B-2RS-TVP	XL	0,127	25	52	15	1	0,6	–	44,1	48	–
7305-B-JP	XL	0,242	25	62	17	1,1	0,6	48,1	–	–	39,3
7305-B-TVP	XL	0,223	25	62	17	1,1	0,6	48,1	–	–	39,3
7305-B-2RS-TVP	XL	0,231	25	62	17	1,1	0,6	–	50,4	57,1	–



Mounting dimensions



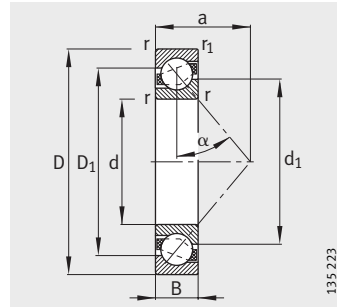
Mounting dimensions



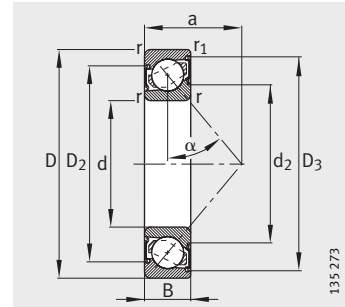
		Mounting dimensions					Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_2	a	d_a	D_a	D_b	r_a	r_{a1}	dyn. C_r N	stat. C_{Or} N			
\approx	\approx	min.	max.	max.	max.	max.					
-	13	14,2	25,8	27,6	0,6	0,3	5 000	2 600	174	32 000	22 600
-	13	14,2	25,8	27,6	0,6	0,3	5 000	2 600	174	32 000	22 600
15,5	13	14,2	25,8	27,6	0,6	0,3	5 000	2 600	174	15 000	-
-	14	16,2	27,8	29,6	0,6	0,3	6 950	3 550	241	28 000	21 200
-	14	16,2	27,8	29,6	0,6	0,3	6 950	3 550	241	28 000	21 200
17	14	16,2	27,8	29,6	0,6	0,3	6 950	3 550	241	14 000	-
-	16	17,6	31,4	32,8	1	0,6	10 600	5 300	355	24 000	16 400
-	16	17,6	31,4	32,8	1	0,6	10 600	5 300	355	24 000	16 400
-	16	19,2	30,8	32,6	0,6	0,3	8 000	4 450	300	24 000	19 200
-	16	19,2	30,8	32,6	0,6	0,3	8 000	4 450	300	24 000	19 200
19,7	16	19,2	30,8	32,6	0,6	0,3	8 000	4 450	300	12 000	-
-	18	20,6	36,4	37,8	1	0,6	13 200	7 200	485	20 000	14 300
-	18	20,6	36,4	37,8	1	0,6	13 200	7 200	485	20 000	14 300
22,9	18	20,6	36,4	37,8	1	0,6	13 200	7 200	485	11 000	-
-	18	21,2	35,8	35,8	0,6	0,6	10 000	5 700	380	20 000	17 200
-	18	21,2	35,8	35,8	0,6	0,6	10 000	5 700	380	20 000	17 200
22,9	18	21,2	35,8	35,8	0,6	0,6	10 000	5 700	380	11 000	-
-	20	22,6	41,4	42,8	1	0,6	16 300	9 000	610	18 000	12 900
-	20	22,6	41,4	42,8	1	0,6	16 300	9 000	610	18 000	12 900
26,1	20	22,6	41,4	42,8	1	0,6	16 300	9 000	610	9 500	-
-	12	23,2	38,8	40	0,6	0,3	13 400	7 500	470	18 000	-
25,9	12	23,2	38,8	40	0,6	0,3	13 400	7 500	470	9 500	-
-	21	25,6	41,4	42,8	1	0,6	13 400	7 800	520	18 000	15 400
-	21	25,6	41,4	42,8	1	0,6	13 400	7 800	520	18 000	15 400
26,8	21	25,6	41,4	42,8	1	0,6	13 400	7 800	520	9 000	-
-	23	27	45	47,8	1	0,6	19 000	11 000	750	17 000	11 600
-	23	27	45	47,8	1	0,6	19 000	11 000	750	17 000	11 600
30	23	27	45	47,8	1	0,6	19 000	11 000	750	8 500	-
-	21	28,2	43,8	45	0,6	0,3	15 000	9 300	580	16 000	-
30,9	21	28,2	43,8	45	0,6	0,3	15 000	9 300	580	8 000	-
-	24	30,6	46,4	47,8	1	0,6	14 600	9 300	600	16 000	13 600
-	24	30,6	46,4	47,8	1	0,6	14 600	9 300	600	16 000	13 600
31,8	24	30,6	46,4	47,8	1	0,6	14 600	9 300	600	8 000	-
-	27	32	55	57,8	1	0,6	26 000	15 800	1 070	14 000	9 900
-	27	32	55	57,8	1	0,6	26 000	15 800	1 070	14 000	9 900
35,8	27	32	55	57,8	1	0,6	26 000	15 800	1 070	7 000	-

Angular contact ball bearings

Single row
Open or sealed

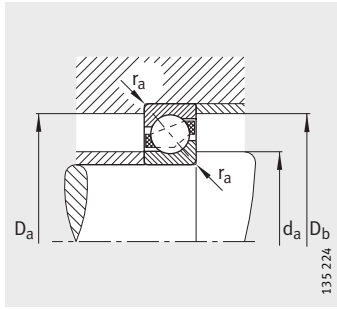


718...-B, 70...-B, 72...-B, 73...-B
 $\alpha = 40^\circ$

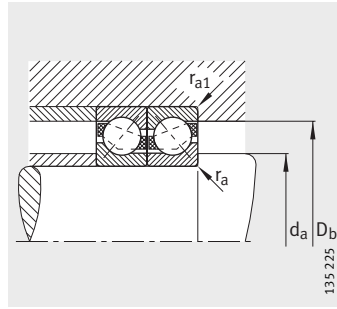


70...-B-2RS, 72...-B-2RS,
73...-B-2RS
2RS seal

Dimension table (continued) · Dimensions in mm											
Designation	X-life	Mass m ≈kg	Dimensions								
			d	D	B	r	r ₁	D ₁	D ₂	D ₃	d ₁
						min.	min.	≈	≈	≈	≈
71806-B-TVH	–	0,025	30	42	7	0,3	0,2	37,3	–	–	34,7
7006-B-TVP	XL	0,109	30	55	13	1	0,6	46,9	–	–	40,7
7006-B-2RS-TVP	XL	0,109	30	55	13	1	0,6	–	48,8	53,6	–
7206-B-JP	XL	0,202	30	62	16	1	0,6	49,8	–	–	42,8
7206-B-TVP	XL	0,196	30	62	16	1	0,6	49,8	–	–	42,8
7206-B-2RS-TVP	XL	0,203	30	62	16	1	0,6	–	51,9	57	–
7306-B-JP	XL	0,362	30	72	19	1,1	0,6	56	–	–	46,5
7306-B-TVP	XL	0,341	30	72	19	1,1	0,6	56	–	–	46,5
7306-B-2RS-TVP	XL	0,341	30	72	19	1,1	0,6	–	58,6	65,9	–
71807-B-TVH	–	0,027	35	47	7	0,3	0,2	42,3	–	–	39,7
7007-B-TVP	XL	0,14	35	62	14	1	0,6	53,2	–	–	46,5
7007-B-2RS-TVP	XL	0,14	35	62	14	1	0,6	–	55	60,4	–
7207-B-JP	XL	0,3	35	72	17	1,1	0,6	57,9	–	–	49,5
7207-B-TVP	XL	0,282	35	72	17	1,1	0,6	57,9	–	–	49,5
7207-B-2RS-TVP	XL	0,282	35	72	17	1,1	0,6	–	60,2	66,5	–
7307-B-JP	XL	0,475	35	80	21	1,5	1	63,1	–	–	52,7
7307-B-TVP	XL	0,447	35	80	21	1,5	1	63,1	–	–	52,7
7307-B-2RS-TVP	XL	0,447	35	80	21	1,5	1	–	64,7	73,5	–
71808-B-TVH	–	0,029	40	52	7	0,3	0,2	47,3	–	–	44,7
7008-B-TVP	XL	0,17	40	68	15	1	0,6	58,6	–	–	51,3
7008-B-2RS-TVP	XL	0,17	40	68	15	1	0,6	–	60,5	66,3	–
7208-B-JP	XL	0,387	40	80	18	1,1	0,6	64,7	–	–	55,7
7208-B-TVP	XL	0,367	40	80	18	1,1	0,6	64,7	–	–	55,7
7208-B-2RS-TVP	XL	0,367	40	80	18	1,1	0,6	–	67	73,8	–
7308-B-JP	XL	0,646	40	90	23	1,5	1	71,7	–	–	59,2
7308-B-TVP	XL	0,61	40	90	23	1,5	1	71,7	–	–	59,2
7308-B-2RS-TVP	XL	0,61	40	90	23	1,5	1	–	73,9	83,3	–
71809-B-TVH	–	0,033	45	58	7	0,3	0,2	52,8	–	–	50,2
7209-B-JP	XL	0,428	45	85	19	1,1	0,6	70	–	–	60,5
7209-B-TVP	XL	0,405	45	85	19	1,1	0,6	70	–	–	60,5
7309-B-JP	XL	0,878	45	100	25	1,5	1	79,8	–	–	66,7
7309-B-TVP	XL	0,813	45	100	25	1,5	1	79,8	–	–	66,7



Mounting dimensions



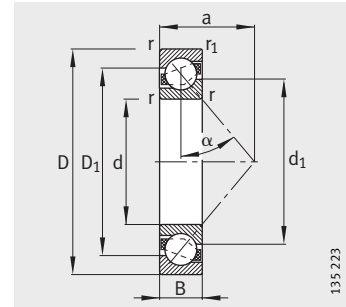
Mounting dimensions



		Mounting dimensions					Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_2	a	d_a min.	D_a max.	D_b max.	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{Or} N			
–	18,6	32	40	40,6	0,3	0,2	5 600	4 550	295	17 000	–
–	24	34,6	50,4	51,8	1	0,6	18 300	12 500	770	14 000	–
38,2	24	34,6	50,4	51,8	1	0,6	18 300	12 500	770	6 700	–
–	27	35,6	56,4	57,8	1	0,6	20 400	14 100	950	13 000	11 300
–	27	35,6	56,4	57,8	1	0,6	20 400	14 100	950	13 000	11 300
39,8	27	35,6	56,4	57,8	1	0,6	20 400	14 100	950	6 300	–
–	31	37	65	67,8	1	0,6	33 000	22 100	1 490	11 000	8 700
–	31	37	65	67,8	1	0,6	33 000	22 100	1 490	11 000	8 700
42,8	31	37	65	67,8	1	0,6	33 000	22 100	1 490	6 000	–
–	20,7	37	45	45,6	0,3	0,2	6 000	5 300	350	15 000	–
–	27	39,6	57,4	58,8	1	0,6	22 400	16 000	1 000	12 000	–
44	27	39,6	57,4	58,8	1	0,6	22 400	16 000	1 000	6 000	–
–	31	42	65	67,8	1	0,6	27 000	19 000	1 280	11 000	9 600
–	31	42	65	67,8	1	0,6	27 000	19 000	1 280	11 000	9 600
45,8	31	42	65	67,8	1	0,6	27 000	19 000	1 280	5 600	–
–	35	44	71	74,4	1,5	1	40 000	27 500	1 860	9 500	7 900
–	35	44	71	74,4	1,5	1	40 000	27 500	1 860	9 500	7 900
49,2	35	44	71	74,4	1,5	1	40 000	27 500	1 860	5 000	–
–	22,8	42	50	50,6	0,3	0,2	6 300	5 850	395	13 000	–
–	30	44,6	63,4	64,8	1	0,6	26 000	18 600	1 180	10 000	–
48,8	30	44,6	63,4	64,8	1	0,6	26 000	18 600	1 180	5 300	–
–	34	47	73	75,8	1	0,6	32 000	23 500	1 580	9 500	8 600
–	34	47	73	75,8	1	0,6	32 000	23 500	1 580	9 500	8 600
52	34	47	73	75,8	1	0,6	32 000	23 500	1 580	5 000	–
–	39	49	81	84,4	1,5	1	50 000	34 500	2 320	8 500	7 200
–	39	49	81	84,4	1,5	1	50 000	34 500	2 320	8 500	7 200
55,6	39	49	81	84,4	1,5	1	50 000	34 500	2 320	4 500	–
–	25,1	47	56	56,6	0,3	0,2	6 550	6 550	450	13 000	–
–	37	52	78	80,8	1	0,6	36 000	27 000	1 810	8 500	8 000
–	37	52	78	80,8	1	0,6	36 000	27 000	1 810	8 500	8 000
–	43	54	91	95	1,5	1	61 000	43 000	2 900	7 500	6 600
–	43	54	91	94,4	1,5	1	61 000	43 000	2 900	7 500	6 600

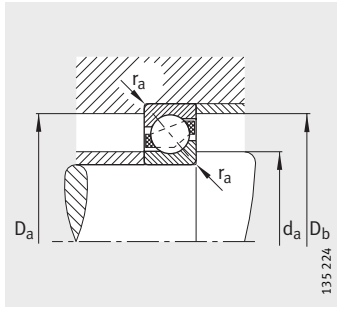
Angular contact ball bearings

Single row
Open

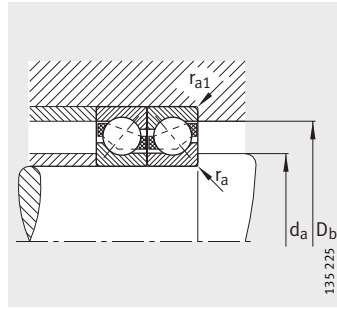


718..-B, 72..-B, 73..-B
 $\alpha = 40^\circ$

Dimension table (continued) - Dimensions in mm										
Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r min.	r ₁ min.	D ₁ ≈	d ₁ ≈	a ≈
71810-B-TVH	-	0,043	50	65	7	0,3	0,2	59,3	56,7	27,8
7210-B-JP	XL	0,493	50	90	20	1,1	0,6	74,8	66,2	39
7210-B-TVP	XL	0,458	50	90	20	1,1	0,6	74,8	66,2	39
7310-B-JP	XL	1,13	50	110	27	2	1	87,6	73,1	47
7310-B-TVP	XL	1,05	50	110	27	2	1	87,6	73,1	47
71811-B-TVH	-	0,058	55	72	9	0,3	0,2	65,3	61,7	31,1
7211-B-JP	XL	0,645	55	100	21	1,5	1	83	72,6	43
7211-B-TVP	XL	0,604	55	100	21	1,5	1	83	72,6	43
7311-B-JP	XL	1,46	55	120	29	2	1	95,3	80,3	51
7311-B-TVP	XL	1,38	55	120	29	2	1	95,3	80,3	51
71812-B-TVH	-	0,07	60	78	10	0,3	0,2	70,8	67,2	33,9
7212-B-JP	XL	0,847	60	110	22	1,5	1	91,1	79,5	47
7212-B-TVP	XL	0,78	60	110	22	1,5	1	91,1	79,5	47
7312-B-JP	XL	1,74	60	130	31	2,1	1,1	103,4	87,3	55
7312-B-TVP	XL	1,72	60	130	31	2,1	1,1	103,4	87,3	55
71813-B-TVH	-	0,085	65	85	10	0,6	0,3	77	73	36,5
7213-B-JP	XL	1,08	65	120	23	1,5	1	98,9	86	51
7213-B-TVP	XL	1	65	120	23	1,5	1	98,9	86	51
7313-B-JP	XL	2,22	65	140	33	2,1	1,1	112	95	60
7313-B-TVP	XL	2,12	65	140	33	2,1	1,1	112	95	60
71814-B-TVH	-	0,091	70	90	10	0,6	0,3	82	78	38,5
7214-B-JP	XL	1,17	70	125	24	1,5	1	104,7	91	53
7214-B-TVP	XL	1,08	70	125	24	1,5	1	104,7	91	53
7314-B-JP	XL	2,76	70	150	35	2,1	1,1	120,1	101,9	64
7314-B-TVP	XL	2,58	70	150	35	2,1	1,1	120,1	101,9	64
71815-B-TVH	-	0,096	75	95	10	0,6	0,3	87	83	40,6
7215-B-JP	XL	1,25	75	130	25	1,5	1	109,2	96,5	56
7215-B-TVP	XL	1,16	75	130	25	1,5	1	109,2	96,5	56
7315-B-JP	XL	3,29	75	160	37	2,1	1,1	128,5	108,8	68
7315-B-TVP	XL	3,1	75	160	37	2,1	1,1	128,5	108,8	68
71816-B-TVH	-	0,101	80	100	10	0,6	0,3	92	88	42,7
7216-B-JP	XL	1,53	80	140	26	2	1	117,8	102,9	59
7216-B-TVP	XL	1,42	80	140	26	2	1	117,8	102,9	59
7316-B-JP	XL	3,86	80	170	39	2,1	1,1	136,7	115,7	72
7316-B-TVP	XL	3,66	80	170	39	2,1	1,1	136,7	115,7	72



Mounting dimensions



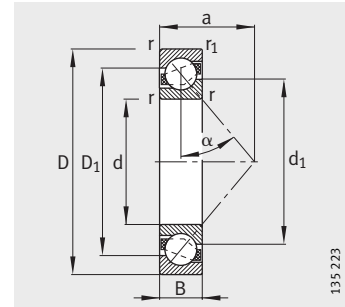
Mounting dimensions



Mounting dimensions					Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	D_b max.	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{0r} N			
52	63	63,6	0,3	0,2	6 950	7 350	520	9 500	–
57	83	85,8	1	0,6	37 500	28 500	1 920	8 000	7 600
57	83	85,8	1	0,6	37 500	28 500	1 920	8 000	7 600
61	99	104,4	2	1	70 000	50 000	3 400	7 000	6 100
61	99	104,4	2	1	70 000	50 000	3 400	7 000	6 100
57	70	70,6	0,3	0,2	11 800	11 800	760	9 000	–
64	91	94,4	1,5	1	46 500	38 500	2 600	7 000	6 900
64	91	94,4	1,5	1	46 500	38 500	2 600	7 000	6 900
66	109	114,4	2	1	80 000	61 000	4 100	6 300	5 700
66	109	114,4	2	1	80 000	61 000	4 100	6 300	5 700
62	76	76,6	0,3	0,2	12 200	12 900	840	8 000	–
69	101	104,4	1,5	1	56 000	45 000	3 050	6 300	6 200
69	101	104,4	1,5	1	56 000	45 000	3 050	6 300	6 200
72	118	123	2,1	1	90 000	66 900	4 650	5 600	5 400
72	118	123	2,1	1	90 000	66 900	4 650	5 600	5 400
68,2	81,8	83	0,6	0,3	15 300	16 000	970	7 500	–
74	111	114,4	1,5	1	64 000	55 000	3 700	6 000	5 700
74	111	114,4	1,5	1	64 000	55 000	3 700	6 000	5 700
77	128	133	2,1	1	103 000	82 000	5 400	5 300	5 100
77	128	133	2,1	1	103 000	82 000	5 400	5 300	5 100
73,2	86,8	88	0,6	0,3	16 000	17 300	1 070	7 000	–
79	116	119,4	1,5	1	69 500	62 000	4 200	5 600	5 500
79	116	119,4	1,5	1	69 500	62 000	4 200	5 600	5 500
82	138	143	2,1	1	117 000	93 000	6 000	5 000	4 800
82	138	143	2,1	1	117 000	93 000	6 000	5 000	4 800
78,2	91,8	93	0,6	0,3	16 300	18 000	1 140	6 300	–
84	121	124,4	1,5	1	68 000	62 000	4 100	5 300	5 400
84	121	124,4	1,5	1	68 000	62 000	4 100	5 300	5 400
87	148	153	2,1	1	130 000	107 000	6 700	4 500	4 550
87	148	153	2,1	1	130 000	107 000	6 700	4 500	4 550
83,2	96,8	98	0,6	0,3	16 600	19 000	1 200	6 000	–
91	129	134,4	2	1	80 000	72 000	4 650	5 000	5 000
91	129	134,4	2	1	80 000	72 000	4 650	5 000	5 000
92	158	163	2,1	1	144 000	124 000	7 500	4 300	4 350
92	158	163	2,1	1	144 000	124 000	7 500	4 300	4 350

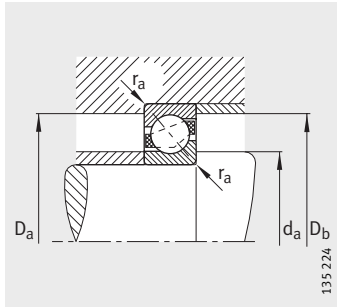
Angular contact ball bearings

Single row
Open

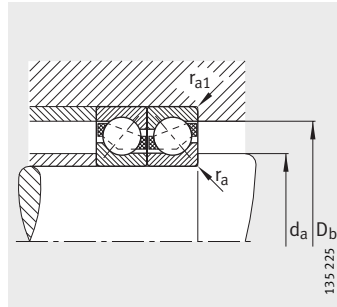


72..-B, 73..-B
 $\alpha = 40^\circ$

Dimension table (continued) · Dimensions in mm										
Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r	r ₁	D ₁	d ₁	a
						min.	min.	≈	≈	≈
7217-B-JP	XL	1,94	85	150	28	2	1	125	110,6	63
7217-B-TVP	XL	1,82	85	150	28	2	1	125	110,6	63
7317-B-JP	XL	4,4	85	180	41	3	1,1	144	122	76
7317-B-TVP	XL	4,26	85	180	41	3	1,1	144	122	76
7218-B-JP	XL	2,38	90	160	30	2	1	133,4	117,5	67
7218-B-TVP	XL	2,21	90	160	30	2	1	133,4	117,5	67
7318-B-JP	XL	5,14	90	190	43	3	1,1	153	129,7	80
7318-B-TVP	XL	5	90	190	43	3	1,1	153	129,7	80
7219-B-JP	XL	2,64	95	170	32	2,1	1,1	142	124,9	72
7219-B-TVP	XL	2,64	95	170	32	2,1	1,1	142	124,9	72
7319-B-JP	XL	5,93	95	200	45	3	1,1	160,1	136,7	84
7319-B-TVP	XL	5,78	95	200	45	3	1,1	160,1	136,7	84
7220-B-JP	XL	3,45	100	180	34	2,1	1,1	149,6	131,9	76
7220-B-TVP	XL	3,17	100	180	34	2,1	1,1	149,6	131,9	76
7320-B-JP	XL	7,38	100	215	47	3	1,1	172,3	145,8	90
7320-B-TVP	XL	7,16	100	215	47	3	1,1	172,3	145,8	90
7221-B-MP	XL	4,18	105	190	36	2,1	1,1	157,7	138,2	80
7321-B-MP	XL	9	105	225	49	3	1,1	179,6	153,5	94
7222-B-JP	XL	4,7	110	200	38	2,1	1,1	165,7	144,9	84
7222-B-TVP	XL	4,44	110	200	38	2,1	1,1	165,7	144,9	84
7322-B-JP	XL	9,97	110	240	50	3	1,1	191,5	161,9	98
7322-B-TVP	XL	9,74	110	240	50	3	1,1	191,5	161,9	98
7224-B-TVP	XL	5,31	120	215	40	2,1	1,1	179,5	157,2	90
7324-B-TVP	XL	12,5	120	260	55	3	1,1	207,7	175,9	107
7226-B-TVP	XL	6,12	130	230	40	3	1,1	191,8	169,2	96
7326-B-TVP	XL	15,1	130	280	58	4	1,5	222,5	188,5	115
7228-B-MP	XL	8,55	140	250	42	3	1,1	207,5	183,5	103
7328-B-MP	–	20,5	140	300	62	4	1,5	240,2	203,9	123
7230-B-MP	XL	10,9	150	270	45	3	1,1	223,5	197,5	111
7330-B-MP	–	24,8	150	320	65	4	1,5	256,5	217,8	131
7232-B-MP	–	13,5	160	290	48	3	1,1	238	212	118
7332-B-MP	–	29	160	340	68	4	1,5	272,2	232,4	139
7234-B-MP	–	16,7	170	310	52	4	1,5	256,5	226,9	127
7334-B-MP	–	34,4	170	360	72	4	1,5	291,6	248,4	147



Mounting dimensions

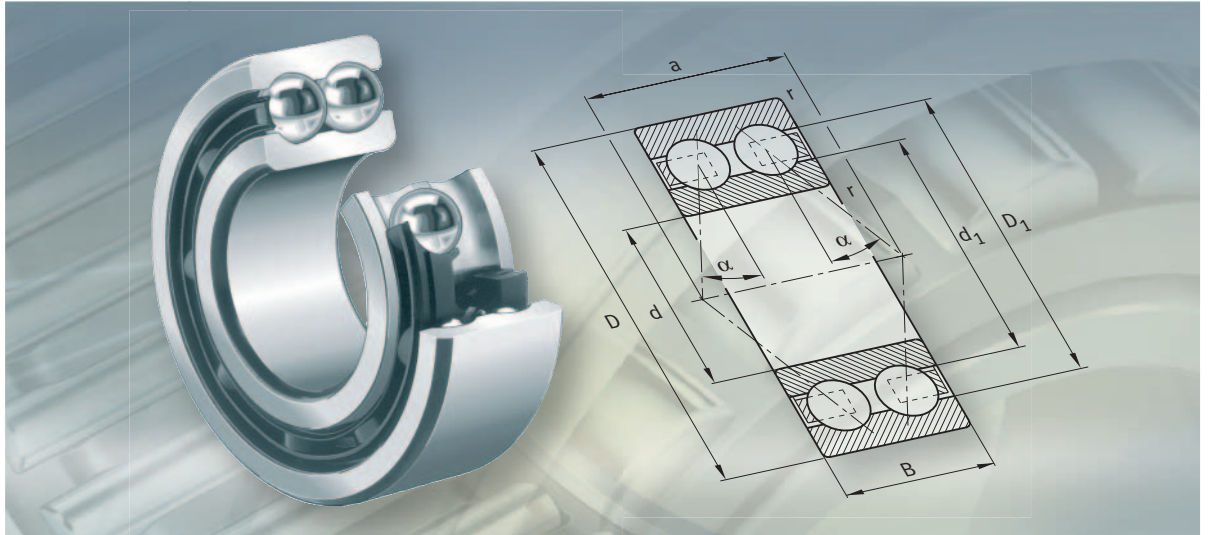


Mounting dimensions



Mounting dimensions					Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	D_b max.	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{0r} N			
96	139	144,4	2	1	90 000	86 000	5 300	4 500	4 800
96	139	144,4	2	1	90 000	86 000	5 300	4 500	4 800
99	166	173	2,5	1	155 000	138 000	8 100	4 000	4 150
99	166	173	2,5	1	155 000	138 000	8 100	4 000	4 150
101	149	154,4	2	1	106 000	98 000	5 900	4 300	4 600
101	149	154,4	2	1	106 000	98 000	5 900	4 300	4 600
104	176	183	2,5	1	167 000	155 000	8 800	3 800	4 000
104	176	183	2,5	1	167 000	155 000	8 800	3 800	4 000
107	158	163	2,1	1	116 000	106 000	6 200	4 000	4 500
107	158	163	2,1	1	116 000	106 000	6 200	4 000	4 500
109	186	193	2,5	1	176 000	167 000	9 300	3 800	3 850
109	186	193	2,5	1	176 000	167 000	9 300	3 800	3 850
112	168	173	2,1	1	137 000	132 000	7 500	3 800	4 250
112	168	173	2,1	1	132 000	124 000	7 100	3 800	4 250
114	201	208	2,5	1	199 000	197 000	10 600	3 600	3 600
114	201	208	2,5	1	199 000	197 000	10 600	3 600	3 600
117	178	183	2,1	1	144 000	142 000	7 900	6 000	4 150
119	211	218	2,5	1	209 000	214 000	11 200	5 300	3 500
122	188	193	2,1	1	155 000	154 000	8 300	3 600	4 050
122	188	193	2,1	1	155 000	154 000	8 300	3 600	4 050
124	226	233	2,5	1	232 000	245 000	12 500	3 400	3 200
124	226	233	2,5	1	232 000	245 000	12 500	3 400	3 200
132	203	208	2,1	1	169 000	178 000	9 300	3 400	3 800
134	246	253	2,5	1	255 000	285 000	13 900	3 200	2 950
144	216	223	2,5	1	186 000	204 000	10 300	3 200	3 400
147	263	271	3	1,5	285 000	325 000	15 400	3 000	2 650
154	236	243	2,5	1	198 000	231 000	11 100	4 800	3 200
157	283	291	3	1,5	300 000	345 000	12 700	4 300	2 450
164	256	263	2,5	1	227 000	275 000	12 800	4 500	2 900
167	303	311	3	1,5	325 000	390 000	14 200	3 800	2 250
174	276	283	2,5	1	236 000	280 000	10 400	4 300	2 700
177	323	331	3	1,5	360 000	450 000	15 100	3 600	2 070
187	293	301	3	1,5	265 000	325 000	11 700	3 800	2 500
187	343	351	3	1,5	405 000	530 000	18 100	3 200	1 910

FAG



Double row angular contact ball bearings



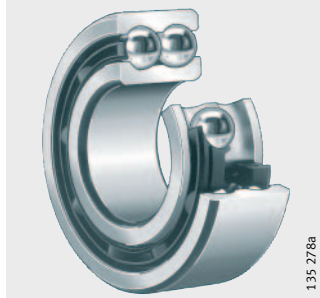
Double row angular contact ball bearings

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Product overview Double row angular contact ball bearings

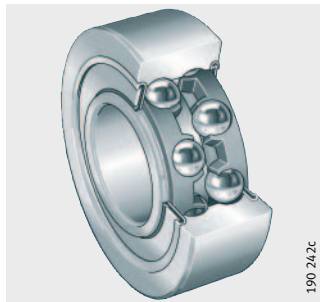
Double row

38..-B, 30..-B, 32..-B, 33..-B

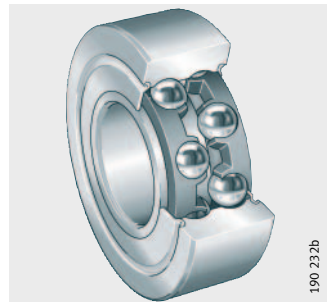


Lip seals or gap seals

38..-B-2RSR, 30..-B-2RSR,
32..-B-2RSR, 33..-B-2RSR

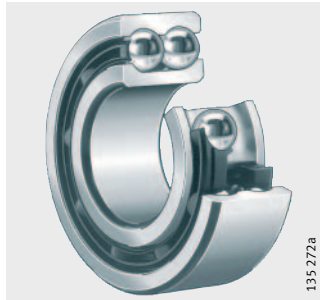


38..-B-2Z, 30..-B-2Z,
32..-B-2Z, 33..-B-2Z



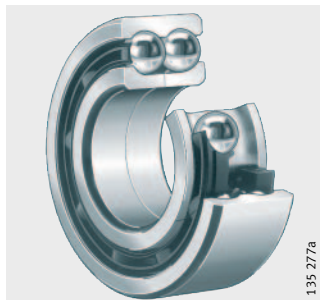
With filling slot

32, 33



Split inner ring

33..-DA



Double row angular contact ball bearings



Features	<p>Double row angular contact ball bearings are units with solid inner and outer rings and ball and cage assemblies with polyamide, sheet steel or brass cages. Their construction is similar to a pair of single row angular contact ball bearings in an O arrangement but they are narrower to a certain extent. They differ in the size of the contact angle and the design of the bearing rings.</p> <p>The bearings are available in open and sealed designs. Due to the manufacturing processes used, open bearings can have turned recesses in the outer ring for seals or shields. Sealed bearings are maintenance-free and therefore allow particularly economical bearing arrangements.</p> <p>The angular adjustment facility of the angular contact ball bearings is very limited.</p>
Radial and axial load capacity	<p>Double row angular contact ball bearings can support axial forces in both directions and high radial forces. They are particularly suitable for bearing arrangements where rigid axial guidance is required.</p> <p>The axial load carrying capacity is dependent on the contact angle; i. e. the larger the angle ($\alpha = 25^\circ, 35^\circ$ and 45°), the higher the axial load to which the bearing can be subjected.</p>
Without filling slot	<p>Bearings of series 38..-B, 30..-B, 32..-B and 33..-B are self-retaining and do not have filling slots in the end faces of the bearing rings. The contact angle $\alpha = 25^\circ$. Their axial load carrying capacity is the same in both directions. These bearings are highly versatile.</p>
With filling slot	<p>Angular contact ball bearings of series 32 und 33 are self-retaining and have filling slots on one side. The contact angle $\alpha = 35^\circ$.</p>
Caution!	<p>These series must be fitted such that the main load direction is supported by the raceways without filling slots.</p>
With split inner ring	<p>Bearings of series 33..-DA have a split inner ring. Due to the contact angle of $\alpha = 45^\circ$, they can support high axial forces in both directions.</p> <p>The inner ring halves are matched to the particular bearing and must not be interchanged with those of other bearings of the same size.</p>
Sealing/lubrication	<p>Series 38..-B, 30..-B, 32..-B and 33..-B with suffix 2RSR are sealed by lip seals on both sides. Contact seals are suitable for giving protection against dust, contamination and damp atmospheres.</p> <p>Series with the suffix 2Z have gap seals on both sides.</p> <p>Sealed bearings are greased with a high quality grease and are lubricated for life. Bearings without seals can be lubricated with grease or oil.</p>

Double row angular contact ball bearings

Operating temperature Open bearings are suitable for operating temperatures from –30 °C to +150 °C.

Caution! Bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to +120 °C, restricted by the cage material.

Bearings with suffix 2RSR are suitable for operating temperatures up to +110 °C, restricted by the lubricant and seal material.

Cages Bearings without a cage suffix have standard cages made from sheet steel.

Angular contact ball bearings with cages made from glass fibre reinforced polyamide have the suffix TVH.

Bearings with ball-guided solid brass cages are indicated by the suffix M. Solid brass cages guided on the outer ring have the suffix MA.

Caution! Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

The oil change intervals must be observed.

Cage/bore code

Series	Polyamide cage ¹⁾	Solid brass cage ¹⁾	Sheet steel cage ¹⁾
	Bore code		
32	–	19, 21, 22	17, 18, 20
33	–	17, 19, 20, 22	14 to 16, 18
30..-B	up to 08	–	–
32..-B	up to 16	–	–
33..-B	up to 13	–	–
38..-B	up to 16	–	–
33..-DA	05	08, 10, 11	06, 07, 09, from 12

¹⁾ Other cage designs available by agreement.

In such cages, suitability for high speeds and high temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.

Suffixes

Suffixes for the available designs: see table.

Available designs

Suffix	Description	Design
B	Modified internal construction, contact angle $\alpha = 25^\circ$, without filling slot	Standard
C2	Axial internal clearance C2	Special design ¹⁾
C3	Axial internal clearance C3	Special design ¹⁾
DA	Inner ring split	Standard
M	Solid brass cage, ball-guided	Standard
MA	Solid brass cage, guidance on outer ring	Standard
TVH	Solid polyamide snap cage, ball-guided	Standard
2RSR	Lip seals on both sides	Standard
2Z	Gap seals on both sides	Standard

¹⁾ Available by agreement.



**Design and
safety guidelines
Equivalent
dynamic bearing load**

For bearings under dynamic loading, the following applies:

Contact angle 25°

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq 0,68$	$P = F_r + 0,92 \cdot F_a$
$\frac{F_a}{F_r} > 0,68$	$P = 0,67 \cdot F_r + 1,41 \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load
F_r N
Radial dynamic bearing load.

Contact angle 35°

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq 0,95$	$P = F_r + 0,66 \cdot F_a$
$\frac{F_a}{F_r} > 0,95$	$P = 0,6 \cdot F_r + 1,07 \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load
F_r N
Radial dynamic bearing load.

Contact angle 45°

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq 1,33$	$P = F_r + 0,47 \cdot F_a$
$\frac{F_a}{F_r} > 1,33$	$P = 0,54 \cdot F_r + 0,81 \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load
F_r N
Radial dynamic bearing load.

Double row angular contact ball bearings

Equivalent static bearing load

For bearings under static loading, the following applies:

Contact angle 25°

$$P_0 = F_{0r} + 0,76 \cdot F_{0a}$$

P_0 N
Equivalent static bearing load for combined load
 F_{0a} N
Axial static bearing load
 F_{0r} N
Radial static bearing load.

Contact angle 35°

$$P_0 = F_{0r} + 0,58 \cdot F_{0a}$$

P_0 N
Equivalent static bearing load for combined load
 F_{0a} N
Axial static bearing load
 F_{0r} N
Radial static bearing load.

Contact angle 45°

$$P_0 = F_{0r} + 0,44 \cdot F_{0a}$$

P_0 N
Equivalent static bearing load for combined load
 F_{0a} N
Axial static bearing load
 F_{0r} N
Radial static bearing load.

Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, a minimum radial load of the order of $P/C_r > 0,01$ is necessary for ball bearings with cage.

Speeds

The reference speed n_B can be exceeded up to the limiting speed n_G if permitted by the operating conditions. If the reference speed in the tables is higher than the limiting speed, the higher value cannot be used.

In bearings with lip seals 2RSR, the speed is limited by the permissible sliding speed of the sealing lips, so only the limiting speed is given in the dimension tables.

Caution! The limiting speed n_G given in the dimension tables must not be exceeded.



Accuracy The main dimensions of the bearings conform to DIN 628-3. The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620-2.

Axial internal clearance Double row angular contact ball bearings of the basic design have the normal axial internal clearance (CN). Bearings are available by agreement with an axial internal clearance larger (C3) or smaller (C2) than normal.

Bearings with a split inner ring are intended for higher axial loads. In general, they have a tighter fit than unsplit bearings. Their normal internal clearance corresponds to internal clearance group C3 for unsplit bearings.

Axial internal clearance to DIN 628-3 for bearings with unsplit inner ring

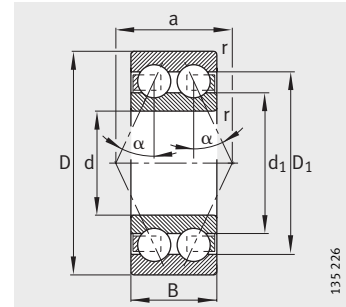
Bore d mm		Axial internal clearance					
		C2 μm		CN μm		C3 μm	
over	incl.	min.	max.	min.	max.	min.	max.
–	10	1	11	5	21	12	28
10	18	1	12	6	23	13	31
18	24	2	14	7	25	16	34
24	30	2	15	8	27	18	37
30	40	2	16	9	29	21	40
40	50	2	18	11	33	23	44
50	65	3	22	13	36	26	48
65	80	3	24	15	40	30	54
80	100	3	26	18	46	35	63
100	120	4	30	22	53	42	73

Axial internal clearance for bearings with split inner ring

Bore d mm		Axial internal clearance					
		C2 μm		CN μm		C3 μm	
over	incl.	min.	max.	min.	max.	min.	max.
24	30	8	27	16	35	27	46
30	40	9	29	18	38	30	50
40	50	11	33	22	44	36	58
50	65	13	36	25	48	40	63
65	80	15	40	29	54	46	71

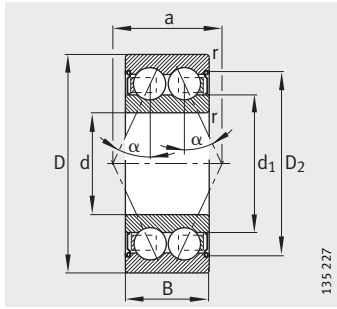
Angular contact ball bearings

Double row
Open or sealed

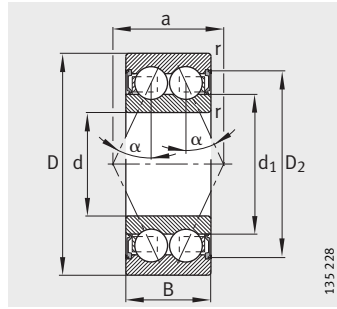


30..-B, 38..-B, 32..-B
 $\alpha = 25^\circ$

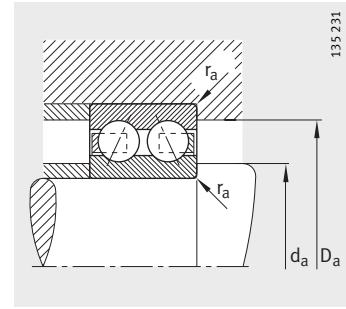
Dimension table · Dimensions in mm									
Designation	Mass m ≈kg	Dimensions							
		d	D	B	r	D ₁	D ₂	d ₁	a
					min.	≈	≈	≈	≈
30/5-B-TVH	0,008	5	14	7	0,2	–	–	7,5	6,3
30/5-B-2Z-TVH	0,008	5	14	7	0,2	–	–	7,5	6,3
30/5-B-2RSR-TVH	0,008	5	14	7	0,2	–	–	7,5	6,3
30/6-B-TVH	0,01	6	17	9	0,3	–	–	8,3	8,8
30/6-B-2Z-TVH	0,01	6	17	9	0,3	–	–	8,3	8,8
30/6-B-2RSR-TVH	0,01	6	17	9	0,3	–	–	8,3	8,8
30/7-B-TVH	0,012	7	19	10	0,3	–	–	9	10
30/7-B-2Z-TVH	0,012	7	19	10	0,3	–	–	9	10
30/7-B-2RSR-TVH	0,012	7	19	10	0,3	–	–	9	10
30/8-B-TVH	0,02	8	22	11	0,3	–	–	10,5	10,7
30/8-B-2Z-TVH	0,02	8	22	11	0,3	–	–	10,5	10,7
30/8-B-2RSR-TVH	0,02	8	22	11	0,3	–	–	10,5	10,7
3800-B-TVH	0,008	10	19	7	0,3	–	–	13	8,1
3800-B-2Z-TVH	0,008	10	19	7	0,3	–	–	13	8,1
3800-B-2RSR-TVH	0,008	10	19	7	0,3	–	–	13	8,1
3000-B-TVH	0,022	10	26	12	0,3	–	–	13,5	12,3
3000-B-2Z-TVH	0,022	10	26	12	0,3	–	–	13,5	12,3
3000-B-2RSR-TVH	0,022	10	26	12	0,3	–	–	13,5	12,3
3200-B-TVH	0,05	10	30	14	0,6	23,9	–	17,9	15
3200-B-2Z-TVH	0,051	10	30	14	0,6	–	25,3	17,9	15
3801-B-TVH	0,008	12	21	7	0,3	–	–	15	8,9
3801-B-2Z-TVH	0,008	12	21	7	0,3	–	–	15	8,9
3801-B-2RSR-TVH	0,008	12	21	7	0,3	–	–	15	8,9
3001-B-TVH	0,025	12	28	12	0,3	–	–	15,5	13
3001-B-2Z-TVH	0,025	12	28	12	0,3	–	–	15,5	13
3001-B-2RSR-TVH	0,025	12	28	12	0,3	–	–	15,5	13
3201-B-TVH	0,051	12	32	15,9	0,6	25,7	–	18,3	17
3201-B-2Z-TVH	0,053	12	32	15,9	0,6	–	28,1	18,3	17



30..-B-2Z, 38..-B-2Z, 32-B-2Z
 $\alpha = 25^\circ$



30..-B-2RSR, 32-B-2RSR,
 38..-B-2RSR
 $\alpha = 25^\circ$



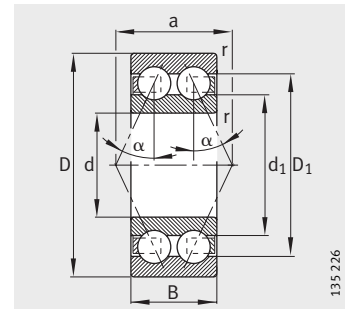
Mounting dimensions



Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
6,4	12,6	0,2	1 810	950	48,5	30 000	23 500
6,4	12,6	0,2	1 810	950	48,5	24 000	23 500
6,4	12,6	0,2	1 810	950	48,5	15 000	–
8	15	0,3	3 100	1 420	72	28 000	22 500
8	15	0,3	3 100	1 420	72	22 000	22 500
8	15	0,3	3 100	1 420	72	15 000	–
9	17	0,3	3 650	1 700	86	26 000	21 000
9	17	0,3	3 650	1 700	86	20 000	21 000
9	17	0,3	3 650	1 700	86	15 000	–
10	20	0,3	5 200	2 650	133	26 000	20 000
10	20	0,3	5 200	2 650	133	19 000	20 000
10	20	0,3	5 200	2 650	133	14 000	–
12	17	0,3	2 120	1 400	71	26 000	21 100
12	17	0,3	2 120	1 400	71	18 000	21 100
12	17	0,3	2 120	1 400	71	16 000	–
12	24	0,3	5 700	3 250	164	24 000	17 500
12	24	0,3	5 700	3 250	164	17 000	17 500
12	24	0,3	5 700	3 250	164	14 000	–
14,2	25,8	0,6	7 800	4 550	223	22 000	20 900
14,2	25,8	0,6	7 800	4 550	223	16 000	20 900
14	19	0,3	2 190	1 550	79	24 000	18 100
14	19	0,3	2 190	1 550	79	17 000	18 100
14	19	0,3	2 190	1 550	79	15 000	–
14	26	0,3	6 200	3 750	191	22 000	15 500
14	26	0,3	6 200	3 750	191	16 000	15 500
14	26	0,3	6 200	3 750	191	13 000	–
16,2	27,8	0,6	10 600	5 850	295	20 000	20 000
16,2	27,8	0,6	10 600	5 850	295	15 000	20 000

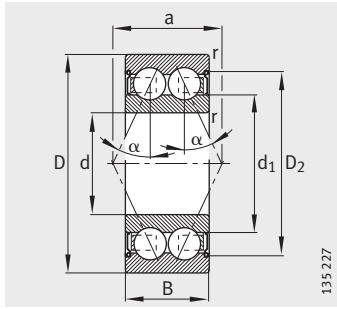
Angular contact ball bearings

Double row
Open or sealed

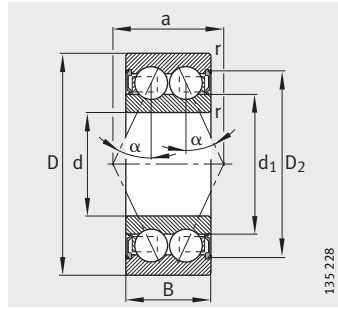


38..-B, 30..-B, 32..-B, 33..-B
 $\alpha = 25^\circ$

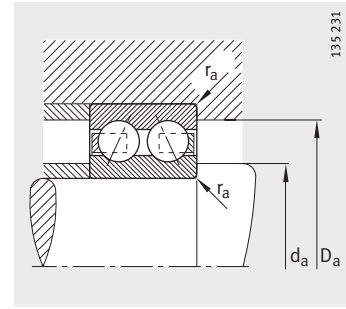
Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈ kg	Dimensions							
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈	a ≈
3802-B-TVH	0,009	15	24	7	0,3	–	–	18	10,1
3802-B-2Z-TVH	0,009	15	24	7	0,3	–	–	18	10,1
3802-B-2RSR-TVH	0,009	15	24	7	0,3	–	–	18	10,1
3002-B-TVH	0,036	15	32	13	0,3	–	–	20,4	14,8
3002-B-2Z-TVH	0,036	15	32	13	0,3	–	–	20,4	14,8
3002-B-2RSR-TVH	0,036	15	32	13	0,3	–	–	20,4	14,8
3202-B-TVH	0,065	15	35	15,9	0,6	28,8	–	21,1	18
3202-B-2Z-TVH	0,067	15	35	15,9	0,6	–	31,6	21,1	18
3202-B-2RSR-TVH	0,067	15	35	15,9	0,6	–	31,6	21,1	18
3302-B-TVH	0,124	15	42	19	1	34,5	–	25,6	21
3803-B-TVH	0,015	17	26	7	0,3	–	–	20	10,9
3803-B-2Z-TVH	0,015	17	26	7	0,3	–	–	20	10,9
3803-B-2RSR-TVH	0,015	17	26	7	0,3	–	–	20	10,9
3003-B-TVH	0,042	17	35	14	0,3	–	–	21,6	15,5
3003-B-2Z-TVH	0,042	17	35	14	0,3	–	–	21,6	15,5
3003-B-2RSR-TVH	0,042	17	35	14	0,3	–	–	21,6	15,5
3203-B-TVH	0,093	17	40	17,5	0,6	33,1	–	24	20
3203-B-2Z-TVH	0,095	17	40	17,5	0,6	–	35,1	24	20
3203-B-2RSR-TVH	0,095	17	40	17,5	0,6	–	35,1	24	20
3303-B-TVH	0,177	17	47	22,2	1	37,7	–	26,2	24
3804-B-TVH	0,02	20	32	10	0,3	–	–	24,3	14,3
3804-B-2Z-TVH	0,02	20	32	10	0,3	–	–	24,3	14,3
3804-B-2RSR-TVH	0,02	20	32	10	0,3	–	–	24,3	14,3
3004-B-TVH	0,08	20	42	16	0,6	–	–	25,2	19,1
3004-B-2Z-TVH	0,08	20	42	16	0,6	–	–	25,2	19,1
3004-B-2RSR-TVH	0,08	20	42	16	0,6	–	–	25,2	19,1
3204-B-TVH	0,154	20	47	20,6	1	38,7	–	28,9	24
3204-B-2Z-TVH	0,16	20	47	20,6	1	–	41,1	28,9	24
3204-B-2RSR-TVH	0,158	20	47	20,6	1	–	41,1	28,9	24
3304-B-TVH	0,217	20	52	22,2	1,1	42,7	–	31,2	26
3304-B-2Z-TVH	0,222	20	52	22,2	1,1	–	45,1	31,2	26
3304-B-2RSR-TVH	0,221	20	52	22,2	1,1	–	45,1	31,2	26



38..-B-2Z, 30..-B-2Z,
32..-B-2Z, 33..-B-2Z
 $\alpha = 25^\circ$



38..-B-2RSR, 30..-B-2RSR,
32..-B-2RSR, 33..-B-2RSR
 $\alpha = 25^\circ$

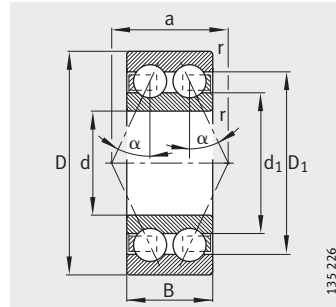


Mounting dimensions

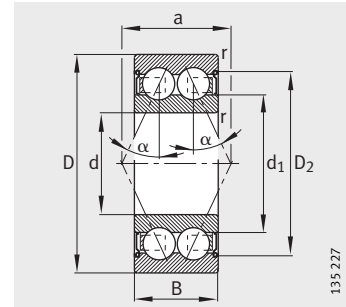
Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
17	22	0,3	2 430	1 960	99	22 000	14 800
17	22	0,3	2 430	1 960	99	16 000	14 800
17	22	0,3	2 430	1 960	99	14 000	–
17	30	0,3	8 600	5 400	275	20 000	13 200
17	30	0,3	8 600	5 400	275	15 000	13 200
17	30	0,3	8 600	5 400	275	12 000	–
19,2	30,8	0,6	11 800	7 100	360	19 000	17 100
19,2	30,8	0,6	11 800	7 100	360	14 000	17 100
19,2	30,8	0,6	11 800	7 100	360	12 000	–
20,6	36,4	1	16 300	10 000	460	16 000	12 000
19	24	0,3	2 480	2 080	107	19 000	13 200
19	24	0,3	2 480	2 080	107	14 000	13 200
19	24	0,3	2 480	2 080	107	12 000	–
19	33	0,3	9 200	6 200	315	18 000	12 200
19	33	0,3	9 200	6 200	315	13 000	12 200
19	33	0,3	9 200	6 200	315	11 000	–
21,2	35,8	0,6	14 600	9 000	420	17 000	15 400
21,2	35,8	0,6	14 600	9 000	420	12 000	15 400
21,2	35,8	0,6	14 600	9 000	420	10 000	–
22,6	41,4	1	20 800	12 500	570	15 000	11 400
22	30	0,3	5 800	4 850	245	17 000	12 700
22	30	0,3	5 800	4 850	245	12 000	12 700
22	30	0,3	5 800	4 850	245	10 000	–
23,2	38,8	0,6	14 500	9 600	485	16 000	10 600
23,2	38,8	0,6	14 500	9 600	485	11 000	10 600
23,2	38,8	0,6	14 500	9 600	485	9 000	–
25,6	41,4	1	19 600	12 500	610	15 000	13 900
25,6	41,4	1	19 600	12 500	610	10 000	13 900
25,6	41,4	1	19 600	12 500	610	8 500	–
27	45	1	23 200	15 000	690	13 000	9 900
27	45	1	23 200	15 000	690	9 000	9 900
27	45	1	23 200	15 000	690	8 000	–

Angular contact ball bearings

Double row
Open or sealed
Split inner ring



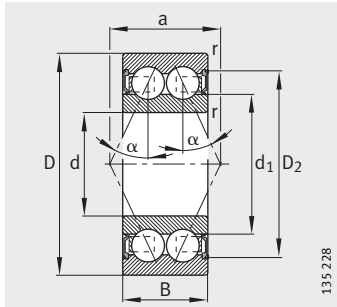
38..-B, 30..-B, 32..-B, 33..-B
 $\alpha = 25^\circ$



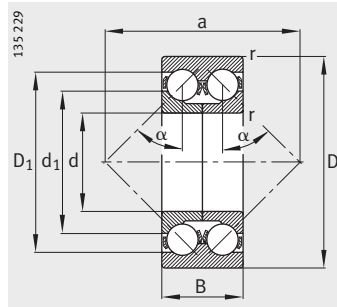
38..-B-2Z, 30..-B-2Z,
32..-B-2Z, 33..-B-2Z
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm

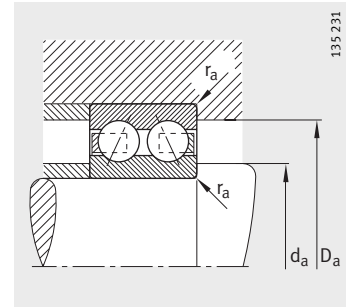
Designation	Mass m ≈ kg	Dimensions							
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈	a ≈
3805-B-TVH	0,025	25	37	10	0,3	–	–	28,3	15,9
3805-B-2Z-TVH	0,025	25	37	10	0,3	–	–	28,3	15,9
3805-B-2RSR-TVH	0,025	25	37	10	0,3	–	–	28,3	15,9
3005-B-TVH	0,1	25	47	16	0,6	–	–	29,8	21,2
3005-B-2Z-TVH	0,1	25	47	16	0,6	–	–	29,8	21,2
3005-B-2RSR-TVH	0,1	25	47	16	0,6	–	–	29,8	21,2
3205-B-TVH	0,178	25	52	20,6	1	43,7	–	33,9	26
3205-B-2Z-TVH	0,182	25	52	20,6	1	–	46,1	33,9	26
3205-B-2RSR-TVH	0,182	25	52	20,6	1	–	46,1	33,9	26
3305-B-TVH	0,353	25	62	25,4	1,1	50	–	37,2	31
3305-B-2Z-TVH	0,359	25	62	25,4	1,1	–	53,1	37,2	31
3305-B-2RSR-TVH	0,359	25	62	25,4	1,1	–	53,1	37,2	31
3305-DA-TVP	0,341	25	62	25,4	1,1	51,8	–	47,5	56
3806-B-TVH	0,03	30	42	10	0,3	–	–	32,8	18,1
3806-B-2Z-TVH	0,03	30	42	10	0,3	–	–	32,8	18,1
3806-B-2RSR-TVH	0,03	30	42	10	0,3	–	–	32,8	18,1
3006-B-TVH	0,16	30	55	19	1	–	–	35,6	24,8
3006-B-2Z-TVH	0,16	30	55	19	1	–	–	35,6	24,8
3006-B-2RSR-TVH	0,16	30	55	19	1	–	–	35,6	24,8
3206-B-TVH	0,289	30	62	23,8	1	52,1	–	40	31
3206-B-2Z-TVH	0,295	30	62	23,8	1	–	55,7	40	31
3206-B-2RSR-TVH	0,296	30	62	23,8	1	–	55,7	40	31
3306-B-TVH	0,548	30	72	30,2	1,1	58,9	–	44	36
3306-B-2Z-TVH	0,558	30	72	30,2	1,1	–	62,5	44	36
3306-B-2RSR-TVH	0,558	30	72	30,2	1,1	–	62,5	44	36
3306-DA	0,657	30	72	30,2	1,1	61,5	–	55,2	67



38..-B-2RSR, 30..-B-2RSR,
32..-B-2RSR, 33..-B-2RSR
 $\alpha = 25^\circ$



33..-DA
Split inner ring
 $\alpha = 45^\circ$



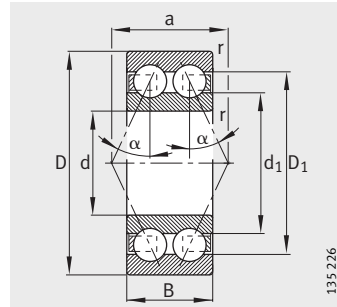
Mounting dimensions



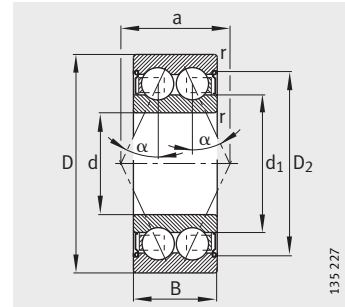
Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
27	35	0,3	6 000	5 600	280	14 000	10 300
27	35	0,3	6 000	5 600	280	9 500	10 300
27	35	0,3	6 000	5 600	280	8 500	–
28,2	43,8	0,6	15 500	11 100	560	13 000	8 900
28,2	43,8	0,6	15 500	11 100	560	9 000	8 900
28,2	43,8	0,6	15 500	11 100	560	8 000	–
30,6	46,4	1	21 200	14 600	710	12 000	11 800
30,6	46,4	1	21 200	14 600	710	8 500	11 800
30,6	46,4	1	21 200	14 600	710	7 500	–
32	55	1	30 000	20 000	900	10 000	8 500
32	55	1	30 000	20 000	900	7 500	8 500
32	55	1	30 000	20 000	900	6 700	–
32	55	1	30 000	23 200	1270	10 000	8 400
32	40	0,3	6 300	6 100	320	11 000	8 700
32	40	0,3	6 300	6 100	320	8 000	8 700
32	40	0,3	6 300	6 100	320	7 000	–
34,6	50,4	1	20 300	15 600	790	10 000	18 000
34,6	50,4	1	20 300	15 600	790	7 500	18 000
34,6	50,4	1	20 300	15 600	790	6 700	–
35,6	56,4	1	30 000	21 200	980	9 500	10 300
35,6	56,4	1	30 000	21 200	980	7 000	10 300
35,6	56,4	1	30 000	21 200	980	6 300	–
37	65	1	41 500	28 500	1310	8 500	7 800
37	65	1	41 500	28 500	1310	6 300	7 800
37	65	1	41 500	28 500	1310	5 600	–
37	65	1	41 500	34 500	2070	8 500	7 600

Angular contact ball bearings

Double row
Open or sealed
Split inner ring



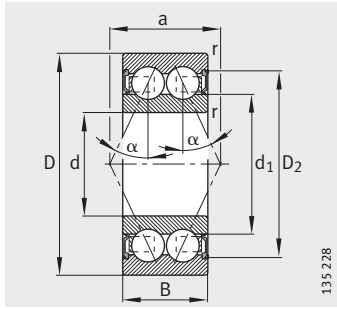
38..-B, 30..-B, 32..-B, 33..-B
 $\alpha = 25^\circ$



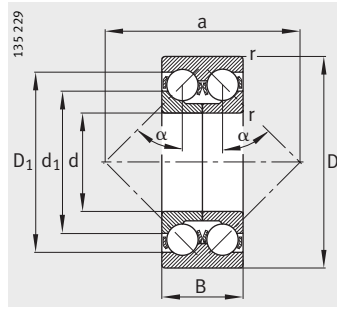
38..-B-2Z, 30..-B-2Z,
32..-B-2Z, 33..-B-2Z
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm

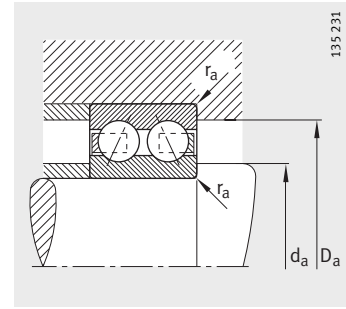
Designation	Mass m ≈ kg	Dimensions							
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈	a ≈
3807-B-TVH	0,035	35	47	10	0,3	–	–	38,5	20
3807-B-2Z-TVH	0,035	35	47	10	0,3	–	–	38,5	20
3807-B-2RSR-TVH	0,035	35	47	10	0,3	–	–	38,5	20
3007-B-TVH	0,2	35	62	20	1	–	–	41,7	27,8
3007-B-2Z-TVH	0,2	35	62	20	1	–	–	41,7	27,8
3007-B-2RSR-TVH	0,2	35	62	20	1	–	–	41,7	27,8
3207-B-TVH	0,446	35	72	27	1,1	60,6	–	47,2	36
3207-B-2Z-TVH	0,454	35	72	27	1,1	–	64,2	47,2	36
3207-B-2RSR-TVH	0,454	35	72	27	1,1	–	64,2	47,2	36
3307-B-TVH	0,657	35	80	34,9	1,5	65,5	–	49,3	41
3307-B-2Z-TVH	0,667	35	80	34,9	1,5	–	68,5	49,3	41
3307-B-2RSR-TVH	0,739	35	80	34,9	1,5	–	68,5	49,3	41
3307-DA	0,889	35	80	34,9	1,5	69,6	–	62	75
3808-B-TVH	0,04	40	52	10	0,3	–	–	43,4	22,4
3808-B-2Z-TVH	0,04	40	52	10	0,3	–	–	43,4	22,4
3808-B-2RSR-TVH	0,04	40	52	10	0,3	–	–	43,4	22,4
3008-B-TVH	0,25	40	68	21	1	–	–	46,7	30,8
3008-B-2Z-TVH	0,25	40	68	21	1	–	–	46,7	30,8
3008-B-2RSR-TVH	0,25	40	68	21	1	–	–	46,7	30,8
3208-B-TVH	0,594	40	80	30,2	1,1	67,9	–	53	41
3208-B-2Z-TVH	0,604	40	80	30,2	1,1	–	71,3	53	41
3208-B-2RSR-TVH	0,605	40	80	30,2	1,1	–	71,3	53	41
3308-B-TVH	0,984	40	90	36,5	1,5	74,6	–	55,6	46
3308-B-2Z-TVH	0,998	40	90	36,5	1,5	–	77,4	55,6	46
3308-B-2RSR-TVH	0,998	40	90	36,5	1,5	–	77,4	55,6	46
3308-DA-MA	1,19	40	90	36,5	1,5	79,4	–	72,5	85



38..-B-2RSR, 30..-B-2RSR,
32..-B-2RSR, 33..-B-2RSR
 $\alpha = 25^\circ$



33..-DA
Split inner ring
 $\alpha = 45^\circ$



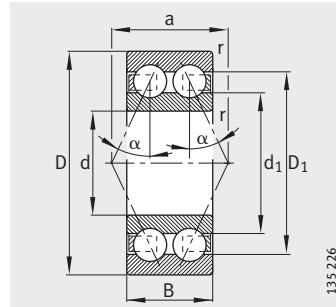
Mounting dimensions



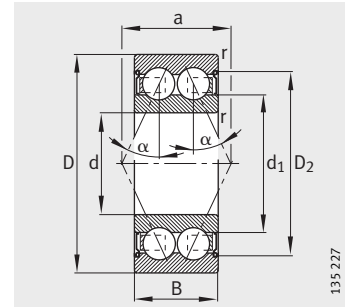
Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
37	45	0,3	6 700	7 000	370	9 500	7 400
37	45	0,3	6 700	7 000	370	7 000	7 400
37	45	0,3	6 700	7 000	370	6 000	–
39,6	57,4	1	24 500	19 400	980	9 000	6 600
39,6	57,4	1	24 500	19 400	980	6 700	6 600
39,6	57,4	1	24 500	19 400	980	5 600	–
42	65	1	39 000	28 500	1 370	8 500	9 200
42	65	1	39 000	28 500	1 370	6 300	9 200
42	65	1	39 000	28 500	1 370	5 300	–
44	71	1,5	51 000	34 500	1 650	7 500	7 300
44	71	1,5	51 000	34 500	1 650	5 600	7 300
44	71	1,5	51 000	34 500	1 650	5 000	–
44	71	1,5	50 000	41 500	2 480	7 500	7 200
42	50	0,3	7 000	7 800	425	8 500	6 500
42	50	0,3	7 000	7 800	425	6 300	6 500
42	50	0,3	7 000	7 800	425	5 300	–
44,6	63,4	1	25 500	21 700	1 100	8 000	6 300
44,6	63,4	1	25 500	21 700	1 100	6 000	6 300
44,6	63,4	1	25 500	21 700	1 100	5 000	–
47	73	1	48 000	36 500	1 840	7 500	8 500
47	73	1	48 000	36 500	1 840	5 600	8 500
47	73	1	48 000	36 500	1 840	4 800	–
49	81	1,5	62 000	45 000	2 500	6 700	6 400
49	81	1,5	62 000	45 000	2 500	5 000	6 400
49	81	1,5	62 000	45 000	2 500	4 500	–
49	81	1,5	62 000	53 000	3 150	6 300	6 300

Angular contact ball bearings

Double row
Open or sealed
Split inner ring



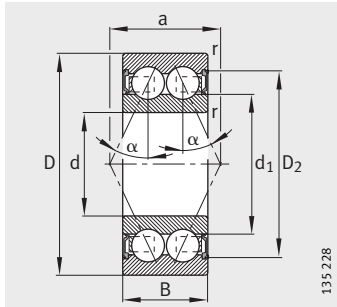
38..-B, 32..-B, 33..-B
 $\alpha = 25^\circ$



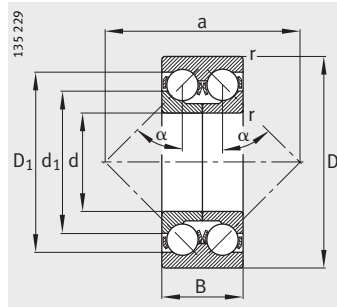
38..-B-2Z, 32..-B-2Z, 33..-B-2Z
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm

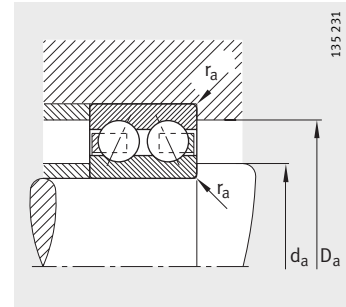
Designation	Mass m ≈ kg	Dimensions							
		d	D	B	r	D ₁	D ₂	d ₁	a
					min.	≈	≈	≈	≈
3809-B-TVH	0,053	45	58	10	0,3	–	–	48,6	24,2
3809-B-2Z-TVH	0,053	45	58	10	0,3	–	–	48,6	24,2
3809-B-2RSR-TVH	0,053	45	58	10	0,3	–	–	48,6	24,2
3209-B-TVH	0,628	45	85	30,2	1,1	72,9	–	57,2	43
3209-B-2Z-TVH	0,64	45	85	30,2	1,1	–	75,5	57,2	43
3209-B-2RSR-TVH	0,64	45	85	30,2	1,1	–	75,5	57,2	43
3309-B-TVH	1,34	45	100	39,7	1,5	81,5	–	62,3	50
3309-B-2RSR-TVH	1,36	45	100	39,7	1,5	–	86,5	62	50
3309-DA	1,55	45	100	39,7	1,5	86,7	–	78,6	93
3810-B-TVH	0,07	50	65	12	0,3	–	–	55,1	27,1
3810-B-2Z-TVH	0,07	50	65	12	0,3	–	–	55,1	27,1
3810-B-2RSR-TVH	0,07	50	65	12	0,3	–	–	55,1	27,1
3210-B-TVH	0,68	50	90	30,2	1,1	77,9	–	62	45
3210-B-2Z-TVH	0,692	50	90	30,2	1,1	–	80,9	62	45
3210-B-2RSR-TVH	0,693	50	90	30,2	1,1	–	80,9	62	45
3310-B-TVH	1,8	50	110	44,4	2	89,5	–	68,3	55
3310-DA-MA	2,24	50	110	44,4	2	96,9	–	87,6	104
3811-B-TVH	0,09	55	72	13	0,3	–	–	61,9	30,7
3811-B-2Z-TVH	0,09	55	72	13	0,3	–	–	61,9	30,7
3811-B-2RSR-TVH	0,09	55	72	13	0,3	–	–	61,9	30,7
3211-B-TVH	0,954	55	100	33,3	1,5	85,3	–	69	50
3211-B-2RSR-TVH	0,969	55	100	33,3	1,5	–	89,1	68,7	50
3311-B-TVH	2,32	55	120	49,2	2	98,4	–	75,2	61
3311-B-2Z-TVH	2,36	55	120	49,2	2	–	105,2	75,2	61
3311-B-2RSR-TVH	2,35	55	120	49,2	2	–	105,2	75,2	61
3311-DA-MA	2,85	55	120	49,2	2	105,3	–	94,6	111



38..-B-2RSR, 32..-B-2RSR,
33..-B-2RSR
 $\alpha = 45^\circ$



33..-DA
Split inner ring
 $\alpha = 45^\circ$



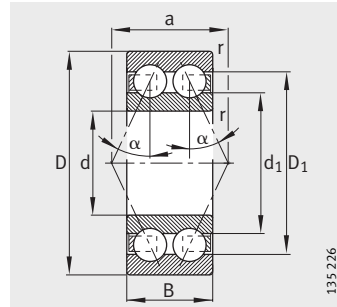
Mounting dimensions



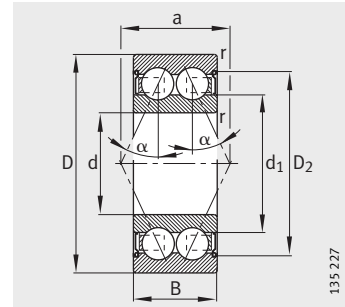
Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
47	56	0,3	7 200	8 300	465	7 500	5 700
47	56	0,3	7 200	8 300	465	5 600	5 700
47	56	0,3	7 200	8 300	465	5 000	–
52	78	1	48 000	37 500	1 800	6 700	7 800
52	78	1	48 000	37 500	1 800	5 000	7 800
52	78	1	48 000	37 500	1 800	4 500	–
54	91	1,5	68 000	51 000	2 750	6 000	6 000
54	91	1,5	68 000	51 000	2 950	4 000	–
54	91	1,5	75 000	64 000	3 400	6 000	5 800
52	63	0,3	8 700	10 400	580	7 000	5 600
52	63	0,3	8 700	10 400	580	5 300	5 600
52	63	0,3	8 700	10 400	580	4 500	–
57	83	1	51 000	42 500	2 120	6 300	7 100
57	83	1	51 000	42 500	2 120	4 800	7 100
57	83	1	51 000	42 500	2 120	4 000	–
61	99	2	81 500	62 000	3 450	5 300	5 700
61	99	2	90 000	85 000	5 200	5 300	5 500
57	70	0,3	12 100	15 700	880	6 300	5 100
57	70	0,3	12 100	15 700	880	4 500	5 100
57	70	0,3	12 100	15 700	880	4 300	–
64	91	1,5	58 500	49 000	2 390	5 600	6 600
64	91	1,5	58 500	49 000	2 390	3 800	–
66	109	2	102 000	78 000	4 250	5 000	5 400
66	109	2	102 000	78 000	4 250	3 800	5 400
66	109	2	102 000	78 000	4 250	3 400	–
66	109	2	110 000	100 000	5 400	5 000	5 200

Angular contact ball bearings

Double row
Open or sealed
Split inner ring



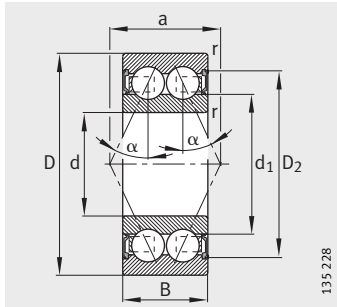
38..-B, 32..-B, 33..-B
 $\alpha = 25^\circ$



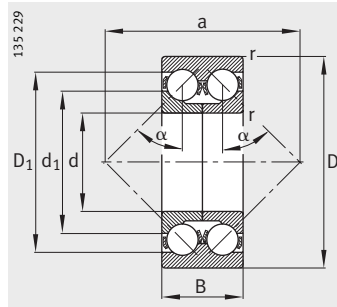
38..-B-2Z, 32..-B-2Z
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm

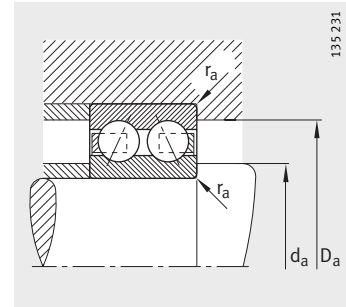
Designation	Mass m ≈ kg	Dimensions							
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈	a ≈
3812-B-TVH	0,14	60	78	14	0,3	–	–	65,9	33,2
3812-B-2Z-TVH	0,14	60	78	14	0,3	–	–	65,9	33,2
3812-B-2RSR-TVH	0,14	60	78	14	0,3	–	–	65,9	33,2
3212-B-TVH	1,27	60	110	36,5	1,5	94,5	–	75,8	55
3212-B-2Z-TVH	1,29	60	110	36,5	1,5	–	98,6	75,8	55
3212-B-2RSR-TVH	1,29	60	110	36,5	1,5	–	98,6	75,8	55
3312-B-TVH	2,92	60	130	54	2,1	108,7	–	81,6	67
3312-B-2RSR-TVH	2,92	60	130	54	2,1	–	113,1	81,6	67
3312-DA	3,39	60	130	54	2,1	115,8	–	101,7	122
3813-B-TVH	0,16	65	85	15	0,6	–	–	71,2	36,2
3813-B-2Z-TVH	0,16	65	85	15	0,6	–	–	71,2	36,2
3813-B-2RSR-TVH	0,16	65	85	15	0,6	–	–	71,2	36,2
3213-B-TVH	1,64	65	120	38,1	1,5	103,9	–	84,8	60
3213-B-2RSR-TVH	1,66	65	120	38,1	1,5	–	107,2	84,5	60
3313-B-TVH	3,63	65	140	58,7	2,1	117,6	–	88,6	71
3313-DA	4,38	65	140	58,7	2,1	124,3	–	110,2	131
3814-B-TVH	0,19	70	90	15	0,6	–	–	76,5	38,5
3814-B-2Z-TVH	0,19	70	90	15	0,6	–	–	76,5	38,5
3814-B-2RSR-TVH	0,19	70	90	15	0,6	–	–	76,5	38,5
3214-B-TVH	1,8	70	125	39,7	1,5	106,3	–	87	62
3314	5,03	70	150	63,5	2,1	131,9	–	98,5	109
3314-DA	5,36	70	150	63,5	2,1	132,4	–	118,2	141
3815-B-TVH	0,21	75	95	15	0,6	–	–	81,2	40,4
3815-B-2Z-TVH	0,21	75	95	15	0,6	–	–	81,2	40,4
3815-B-2RSR-TVH	0,21	75	95	15	0,6	–	–	81,2	40,4
3215-B-TVH	1,91	75	130	41,3	1,5	112,6	–	92,4	65
3315	6,07	75	160	68,3	2,1	141,2	–	105,5	117



38..-B-2RSR, 32..-B-2RSR,
33..-B-2RSR
 $\alpha = 25^\circ$



33..-DA
Split inner ring
 $\alpha = 45^\circ$



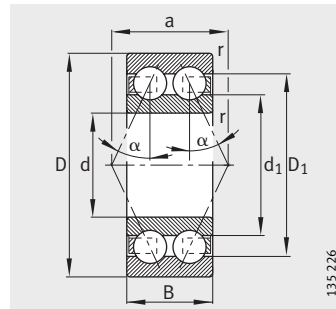
Mounting dimensions



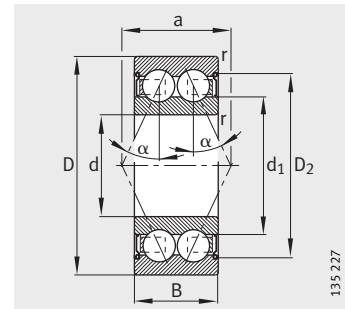
Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
62	76	0,3	14 500	17 500	960	5 600	4 800
62	76	0,3	14 500	17 500	960	4 300	4 800
62	76	0,3	14 500	17 500	960	3 800	–
69	101	1,5	72 000	61 000	3 450	5 000	6 200
69	101	1,5	72 000	61 000	3 450	3 800	6 200
69	101	1,5	72 000	61 000	3 450	3 400	–
72	118	2,1	125 000	98 000	5 200	4 500	5 100
72	118	2,1	125 000	98 000	5 200	3 000	–
72	118	2,1	127 000	118 000	6 500	4 500	4 950
68,2	81,8	0,6	17 700	21 400	1 120	5 000	4 500
68,2	81,8	0,6	17 700	21 400	1 120	4 000	4 500
68,2	81,8	0,6	17 700	21 400	1 120	3 600	–
74	111	1,5	80 000	73 500	3 700	4 500	5 700
74	111	1,5	80 000	73 500	3 700	3 000	–
77	128	2,1	143 000	112 000	6 100	4 300	4 850
77	128	2,1	143 000	137 000	7 200	4 300	4 750
73,2	86,8	0,6	19 200	23 800	1 300	5 000	4 200
73,2	86,8	0,6	19 200	23 800	1 300	3 800	4 200
73,2	86,8	0,6	19 200	23 800	1 300	3 400	–
79	116	1,5	83 000	76 500	4 000	4 500	5 500
82	138	2,1	163 000	167 000	8 800	4 000	4 500
82	138	2,1	163 000	156 000	8 200	4 000	4 550
78,2	91,8	0,6	19 400	24 400	1 370	4 800	3 950
78,2	91,8	0,6	19 400	24 400	1 370	3 600	3 950
78,2	91,8	0,6	19 400	24 400	1 370	3 200	–
89,3	116,6	1,5	91 500	85 000	4 250	4 300	5 300
87	148	2,1	185 000	192 000	9 700	3 800	4 350

Angular contact ball bearings

Double row
Open or sealed



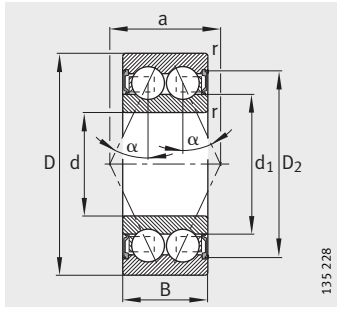
38..-B, 32..-B
 $\alpha = 25^\circ$



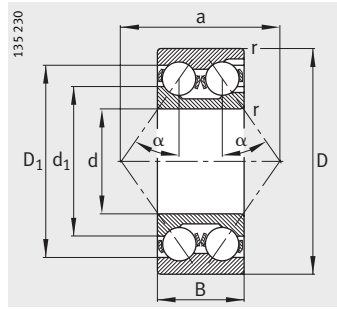
38..-B-2Z, 32..-B-2Z
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm

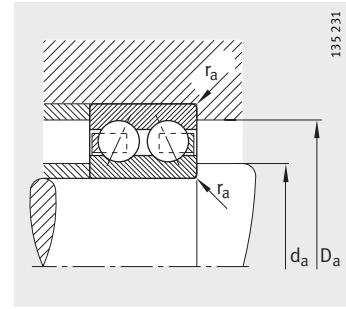
Designation	Mass m ≈ kg	Dimensions							
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈	a ≈
3816-B-TVH	0,23	80	100	15	0,6	–	–	85,5	42,2
3816-B-2Z-TVH	0,23	80	100	15	0,6	–	–	85,5	42,2
3816-B-2RSR-TVH	0,23	80	100	15	0,6	–	–	85,5	42,2
3216-B-TVH	2,45	80	140	44,4	2	120,3	–	98,5	69
3216-B-2Z-TVH	2,48	80	140	44,4	2	–	125,4	98,5	69
3316	7,26	80	170	68,3	2,1	149,7	–	111,8	123
3217	3,44	85	150	49,2	2	135,1	–	108,5	106
3317-M	8,78	85	180	73	3	160	–	119,6	131
3218	4,22	90	160	52,4	2	143,7	–	115,6	113
3318	9,23	90	190	73	3	168,2	–	126,1	136
3219-M	5,31	95	170	55,6	2,1	152,8	–	122,2	120
3319-M	11,4	95	200	77,8	3	177,3	–	133	143
3220	6,19	100	180	60,3	2,1	163,7	–	131	127
3320-M	14,6	100	215	82,6	3	188,7	–	142,5	153
3221-M	7,78	105	190	65,1	2,1	172,9	–	138	135
3222-M	9,23	110	200	69,8	2,1	180,1	–	143,3	144
3322-M	20	110	240	92,1	3	209,6	–	161,5	171



38..-B-2RSR
 $\alpha = 25^\circ$



32, 33
 $\alpha = 35^\circ$

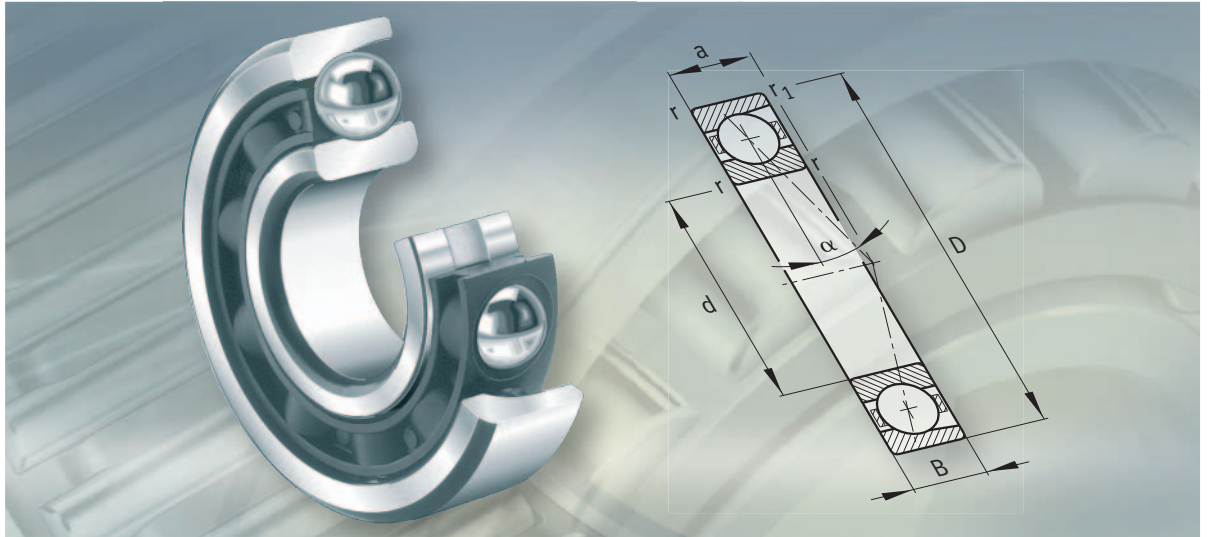


Mounting dimensions



Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N			
83,2	96,8	0,6	19 600	25 500	1 420	4 500	3 650
83,2	96,8	0,6	19 600	25 500	1 420	3 400	3 650
83,2	96,8	0,6	19 600	25 500	1 420	3 000	–
91	129	2	98 000	93 000	4 950	4 000	5 100
91	129	2	98 000	93 000	4 950	3 000	5 100
92	158	2,1	209 000	213 000	11 500	3 600	3 950
96	139	2	126 000	151 000	7 300	3 800	4 750
99	166	2,5	223 000	229 000	10 900	3 400	3 750
104	146	2	140 000	169 000	7 900	3 600	4 550
104	176	2,5	245 000	275 000	12 800	3 200	3 400
107	158	2,1	156 000	186 000	8 600	3 400	4 400
109	186	2,5	260 000	285 000	12 900	3 200	3 250
112	168	2,1	181 000	224 000	10 000	3 200	4 200
114	201	2,5	270 000	320 000	13 900	3 000	3 000
117	178	2,1	213 000	247 000	11 100	3 200	4 000
122	188	2,1	229 000	280 000	12 100	3 000	3 800
124	226	2,5	320 000	385 000	16 000	2 600	2 700

FAG



Spindle bearings



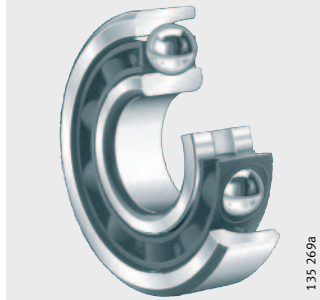
Spindle bearings

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	Universal designs 274
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Product overview Spindle bearings

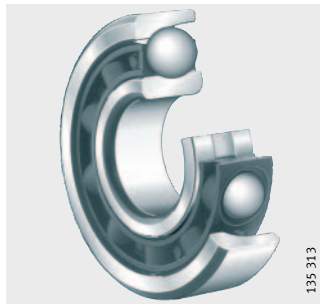
Standard spindle bearings

B719, B70, B72



With ceramic balls

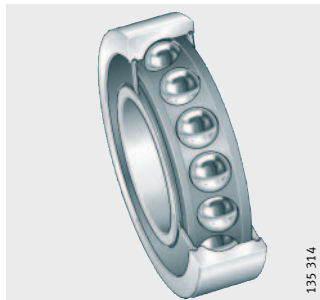
HCB719, HCB70, HCB72



High speed spindle bearings

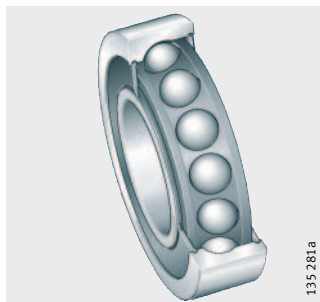
Sealed

HSS719, HSS70



With ceramic balls, sealed

HCS719, HCS70



Spindle bearings

Features	<p>Spindle bearings are single row angular contact ball bearings, comprising solid inner and outer rings and ball and cage assemblies with solid window cages. They cannot be dismantled. The bearings are available in open and sealed designs.</p> <p>Spindle bearings have restricted tolerances. They are particularly suitable for bearing arrangements with very high requirements for guidance accuracy and suitability for high speeds. They have proved extremely suitable for spindle bearing arrangements in machine tools.</p>
Radial and axial load capacity	<p>The bearings can support axial forces in one direction as well as radial forces. Spindle bearings used in an O or X arrangement can support axial forces in both directions and moments. Bearings in a tandem arrangement can only support axial loads in one direction.</p> <p>Spindle bearings are available with a contact angle $\alpha = 15^\circ$ (suffix C) or $\alpha = 25^\circ$ (suffix E).</p>
Standard spindle bearings	<p>Standard spindle bearings B70, B719 and B72 have steel balls.</p>
With ceramic balls	<p>Spindle bearings HCB70, HCB719 and HCB72 have balls in standard sizes made from ceramic (hybrid bearings).</p>
Sealing/lubrication	<p>Spindle bearings B70..-2RSD, B719..-2RSD, B72..-2RSD, HCB70..-2RSD, HCB719..-2RSD and HCB72..-2RSD are sealed on both sides by gap seals. They are greased with a FAG polycarbamide grease and are maintenance-free.</p>
High speed spindle bearings	<p>High speed spindle bearings HSS70 and HSS719 have smaller steel balls.</p>
With ceramic balls	<p>High speed spindle bearings HCS70 and HCS719 with ceramic balls (hybrid bearings) are also available.</p> <p>These four series thus achieve higher speeds, have lower friction and heat generation, place less strain on the lubricant and have a longer operating life.</p>
Sealing/lubrication	<p>The bearings are sealed on both sides by gap seals. They are greased with a FAG polycarbamide grease and are maintenance-free.</p> <p>Unsealed bearings of series HS70 and HS719 as well as HC70 and HC719 are also available.</p>
X-life ultra bearings	<p>X-life ultra bearings have bearing rings made from a corrosion-resistant steel that contains nitrogen and has a particularly fine structure (prefix X) and ceramic balls. They fulfil very high requirements for speed and load carrying capacity. The bearings have longer life compared to conventional bearings. Most series of spindle bearings are available as X-life ultra bearings.</p> <p>For a more detailed description, see Catalogue AC 41 130 Super Precision Bearings.</p>



Spindle bearings

Universal designs Spindle bearings of universal design are intended for mounting in pairs or groups in X, O or tandem arrangements. Bearings with the suffix UL are designed for slight preload in an X or O arrangement.

Caution! The preload is altered by mounting and the operating conditions.

Ordering data When ordering, the number of individual bearings must be stated.

Operating temperature

Caution! The bearings are suitable for operating temperatures from -30 °C to $+100\text{ °C}$, restricted by the seal and cage material. The operating temperature must be taken into consideration when selecting the lubricant.

Cages Spindle bearings have solid window cages made from laminated fabric or high performance plastic (suffix T). The cage is guided on the outer ring.

Caution! Check the chemical resistance of the seal or cage material to synthetic greases and lubricants with EP additives. Aged oil and additives in the oil can impair the operating life of the cages and seals at high temperatures. The oil change intervals must be observed.

Suffixes Suffixes for the available designs: see table.

Available designs

Suffixes	Description
C	Contact angle 15°
E	Contact angle 25°
H	High preload ¹⁾
L	Slight preload ¹⁾
M	Moderate preload ¹⁾
P4S	Tolerance class P4S
T	Solid window cage made from hard fabric or high performance plastic
UL	Universal design, for example for fitting in pairs, bearing pair has slight preload in O and X arrangement ¹⁾
2RSD	Spindle bearing with sealing shields on both sides (in series B and HCB)

¹⁾ For preload values, see Catalogue AC 41 130, Super Precision Bearings.

**Design and
safety guidelines
Equivalent
dynamic bearing load**

Bearings with contact angle 15°

For bearings under dynamic loading, the following applies:



Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq e$	$P = F_r$
$\frac{F_a}{F_r} > e$	$P = 0,44 \cdot F_r + Y \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load
F_r N
Radial dynamic bearing load
e, Y -
Factors: see table.

Factors e and Y

$\frac{f_0 \cdot F_a}{i \cdot C_{0r}}$	Factors	
	e	Y
0,3	0,4	1,4
0,5	0,43	1,31
0,9	0,45	1,23
1,6	0,48	1,16
3	0,52	1,08
6	0,56	1

f₀ -
Factor: see table, page 276
i -
Number of bearings supporting axial load
C_{0r} N
Basic static load rating according to dimension tables.

Bearings with contact angle 25°

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq 0,68$	$P = F_r$
$\frac{F_a}{F_r} > 0,68$	$P = 0,41 \cdot F_r + 0,87 \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load
F_r N
Radial dynamic bearing load.

Spindle bearings

Factor f_0 for
bearings with contact angle 15°

Bore code	Factor f_0				
	B70...-C HCB70...-C	B719...-C HCB719...-C	B72...-C HCB72...-C	HSS70...-C HCS70...-C	HSS719...-C HCS719...-C
00	12,6	14,2	12,3	15,5	15,3
01	13,2	14,7	12,9	15,5	15,7
02	14,1	14,5	13,6	15,8	15,8
03	14,3	14,8	13,9	15,9	16
04	14,3	14,2	13,8	16,1	16,2
05	14,9	14,9	14,4	16,2	16,5
06	15,1	15,4	14,3	16,3	16,4
07	15,4	15,9	14,6	16,5	16,4
08	15,7	15,5	14,2	16,5	16,2
09	15,5	15,8	14,2	16,5	16,3
10	15,7	16	14,4	16,5	16,2
11	15,5	16	14,5	16,5	16,1
12	15,6	16,2	14,4	16,4	16,2
13	15,9	16,4	14,5	16,4	16,1
14	15,6	16,2	14,6	16,4	16,1
15	15,8	16,3	14,8	16,3	16,1
16	15,7	16,4	14,8	16,3	16,1
17	15,9	16,3	14,9	16,3	16
18	15,7	16,4	14,8	16,3	16
19	15,9	16,4	14,9	16,3	15,9
20	16	16,5	14,5	16,2	16
21	15,9	16,4	14,5	16,3	15,9
22	15,8	16,4	14,5	16,2	16
24	16	16,4	14,9	16,3	15,9
26	15,9	16,4	14,7	16,2	15,9
28	16	16,4	15	-	-
30	16	16,3	15,3	-	-
32	16,2	16,4	15,3	-	-
34	15,9	16,5	15,4	-	-
36	15,7	16,4	15,4	-	-
38	15,9	16,4	15,2	-	-
40	15,8	16,2	15,4	-	-
44	15,7	16,4	15,3	-	-
48	15,9	16,5	-	-	-

Equivalent static bearing load

Bearings with contact angle 15°

For bearings under static loading, the following applies:

Load ratio	Equivalent static load
$\frac{F_{0a}}{F_{0r}} \leq 1,09$	$P_0 = F_{0r}$
$\frac{F_{0a}}{F_{0r}} > 1,09$	$P_0 = 0,5 \cdot F_{0r} + 0,46 \cdot F_{0a}$

Bearings with contact angle 25°

Load ratio	Equivalent static load
$\frac{F_{0a}}{F_{0r}} \leq 1,3$	$P_0 = F_{0r}$
$\frac{F_{0a}}{F_{0r}} > 1,3$	$P_0 = 0,5 \cdot F_{0r} + 0,38 \cdot F_{0a}$

Static load safety factor

In order to achieve sufficiently smooth running, a static load safety factor $S_0 > 3$ is necessary.

$$S_0 = \frac{C_{0r}}{P_0}$$

C_{0r} N
Basic static load rating according to dimension tables.
If using several bearings, $C_{0r} = i \cdot C_{0r \text{ single bearing}}$, i = number of single bearings
 P_0 N
Equivalent static load.

Speeds

The speeds of the bearing arrangements are dependent on:

- the preload of the bearings
- the elastic or rigid arrangement of the bearings in the spindle
- mounting as single bearings or in pairs
- the lubricants
- the cooling of the bearings.

Caution!

The speeds stated in the dimension tables are guide values for single bearings under elastic preload and low loads.

The limiting speeds n_G in the dimension tables apply for lubrication with grease or for minimal quantity lubrication with oil and must not be exceeded.

For a more detailed description, see Catalogue AC 41 130, Super Precision Bearings.

Bearing sets

Universal bearings of the same sort (same bore and outside diameter) are available as sets. They can be used in any arrangement (O, X, tandem) as shown on page 278, *Figure 1 to Figure 3*.

Sets with slight preload have the following designations:

- duplex; suffix DUL (2 bearings)
- triplex; suffix TUL (3 bearings)
- quadruplex; suffix QUL (4 bearings).

Ordering data

When ordering bearings, the number of sets must be stated, not the number of single bearings.



Spindle bearings

Ready-to-fit bearing sets

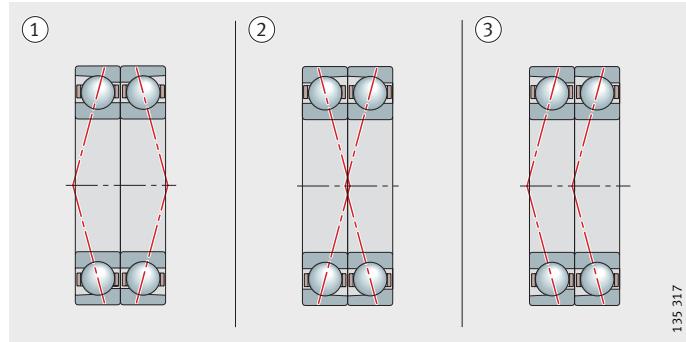
In ready-to-fit bearing sets, the bearings are supplied for use in a specifically defined arrangement.

Caution! The bearings must be fitted in the arrangement ordered.

- ① DBL, O arrangement
- ② DFL, X arrangement
- ③ DTL, tandem arrangement

Figure 1

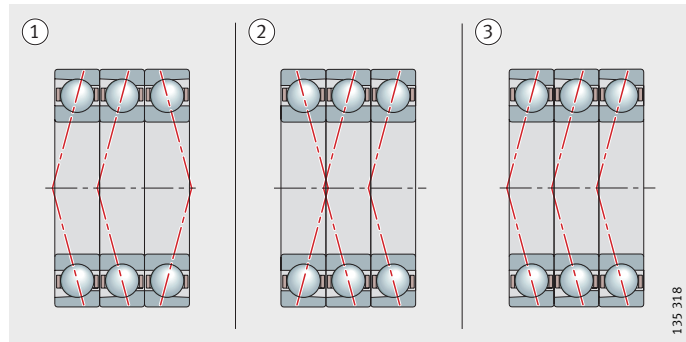
Sets of 2 bearings



- ① TBTL, combination of O arrangement and tandem arrangement
- ② TFTL, combination of X arrangement and tandem arrangement
- ③ TTL, tandem arrangement

Figure 2

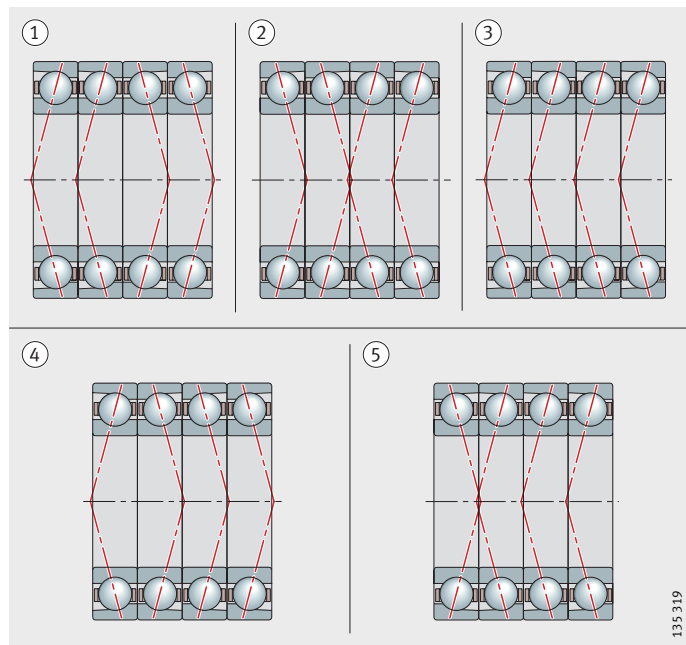
Sets of 3 bearings



- ① QBCL, O arrangement
- ② QFCL, X arrangement
- ③ QTL, tandem arrangement
- ④ QBTL, combination of O arrangement and tandem arrangement
- ⑤ QFTL, combination of X arrangement and tandem arrangement

Figure 3

Sets of 4 bearings



Ordering example

1-HSS7012-C-T-P4S-DBL

Description: two spindle bearings in O arrangement, slight preload.

Accuracy

The main dimensions of the bearings conform to DIN 628-1. The dimensional tolerances of the bearings correspond to tolerance class P4, the running tolerances correspond to tolerance class P2 to DIN 620-2.

Deviations from the nominal dimensions for the bore, outside diameter and bearing width are indicated on the end faces of the inner and outer rings and on the packaging, where they are stated in the sequence “bore/outside diameter/bearing width”.



Inner ring tolerances

Bore		Bore deviation		Width deviation		Width variation	Radial runout	Axial runout	
d mm		Δ_{dmp} μm		Δ_{Bs} μm		V_{Bs} μm	K_{ia} μm	S_d μm	S_{ia} μm
over	incl.								
–	10	0	–4	0	–100	1,5	1,5	1,5	1,5
10	18	0	–4	0	–100	1,5	1,5	1,5	1,5
18	30	0	–5	0	–120	1,5	2,5	1,5	2,5
30	50	0	–6	0	–120	1,5	2,5	1,5	2,5
50	80	0	–7	0	–150	1,5	2,5	1,5	2,5
80	120	0	–8	0	–200	2,5	2,5	2,5	2,5
120	150	0	–10	0	–250	2,5	2,5	2,5	2,5
150	180	0	–10	0	–250	4	5	4	5
180	250	0	–12	0	–300	5	5	5	5

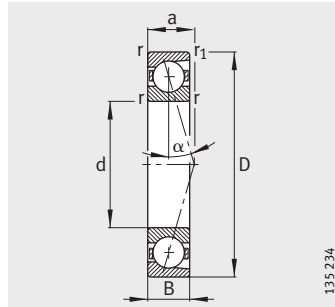
Outer ring tolerances

Outside diameter		Outside diameter deviation		Width variation	Radial runout	Axial runout	
D mm		Δ_{Dmp} μm		V_{Cs} μm	K_{ea} μm	S_D μm	S_{ea} μm
over	incl.						
18	30	0	–5	1,5	2,5	1,5	2,5
30	50	0	–6	1,5	2,5	1,5	2,5
50	80	0	–7	1,5	4	1,5	4
80	120	0	–8	2,5	5	2,5	5
120	150	0	–9	2,5	5	2,5	5
150	180	0	–10	2,5	5	2,5	5
180	250	0	–11	4	7	4	7
250	315	0	–13	5	7	5	7
315	400	0	–15	7	8	7	8

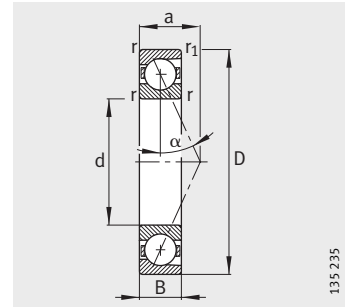
The width deviation Δ_{Cs} is identical to Δ_{Bs} of the corresponding inner ring.

Spindle bearings

With steel balls

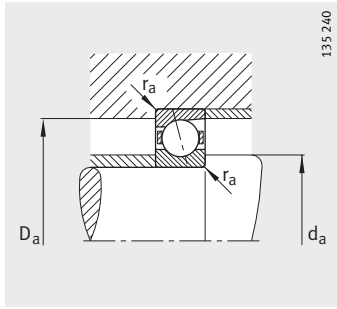


B719...-C, B70...-C, B72...-C
 $\alpha = 15^\circ$

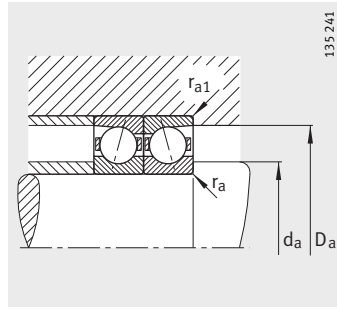


B719...-E, B70...-E, B72...-E
 $\alpha = 25^\circ$

Dimension table · Dimensions in mm							
Designation	Mass m ≈ kg	Dimensions					
		d	D	B	r min.	r ₁ min.	a ≈
B71900-C-T-P4S	0,009	10	22	6	0,3	0,3	5
B71900-E-T-P4S	0,009	10	22	6	0,3	0,3	7
B7000-C-T-P4S	0,019	10	26	8	0,3	0,3	6
B7000-E-T-P4S	0,019	10	26	8	0,3	0,3	8
B7200-C-T-P4S	0,031	10	30	9	0,6	0,6	7
B7200-E-T-P4S	0,031	10	30	9	0,6	0,6	9
B71901-C-T-P4S	0,01	12	24	6	0,3	0,3	5
B71901-E-T-P4S	0,01	12	24	6	0,3	0,3	7
B7001-C-T-P4S	0,021	12	28	8	0,3	0,3	5
B7001-E-T-P4S	0,021	12	28	8	0,3	0,3	6
B7201-C-T-P4S	0,038	12	32	10	0,6	0,6	8
B7201-E-T-P4S	0,037	12	32	10	0,6	0,6	10
B71902-C-T-P4S	0,015	15	28	7	0,3	0,3	6
B71902-E-T-P4S	0,015	15	28	7	0,3	0,3	9
B7002-C-T-P4S	0,03	15	32	9	0,3	0,3	8
B7002-E-T-P4S	0,03	15	32	9	0,3	0,3	10
B7202-C-T-P4S	0,044	15	35	11	0,6	0,6	9
B7202-E-T-P4S	0,044	15	35	11	0,6	0,6	11
B71903-C-T-P4S	0,017	17	30	7	0,3	0,3	7
B71903-E-T-P4S	0,017	17	30	7	0,3	0,3	9
B7003-C-T-P4S	0,039	17	35	10	0,3	0,3	9
B7003-E-T-P4S	0,039	17	35	10	0,3	0,3	11
B7203-C-T-P4S	0,066	17	40	12	0,6	0,6	10
B7203-E-T-P4S	0,066	17	40	12	0,6	0,6	13
B71904-C-T-P4S	0,036	20	37	9	0,3	0,3	8
B71904-E-T-P4S	0,036	20	37	9	0,3	0,3	11
B7004-C-T-P4S	0,068	20	42	12	0,6	0,6	10
B7004-E-T-P4S	0,068	20	42	12	0,6	0,6	13
B7204-C-T-P4S	0,105	20	47	14	1	1	12
B7204-E-T-P4S	0,105	20	47	14	1	1	15
B71905-C-T-P4S	0,042	25	42	9	0,3	0,3	9
B71905-E-T-P4S	0,042	25	42	9	0,3	0,3	12
B7005-C-T-P4S	0,081	25	47	12	0,6	0,6	11
B7005-E-T-P4S	0,081	25	47	12	0,6	0,6	14
B7205-C-T-P4S	0,13	25	52	15	1	1	13
B7205-E-T-P4S	0,13	25	52	15	1	1	17



Mounting dimensions



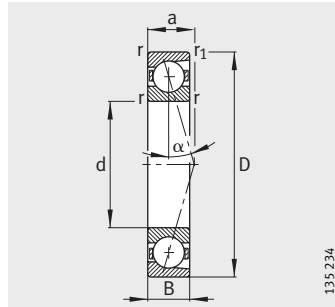
Mounting dimensions



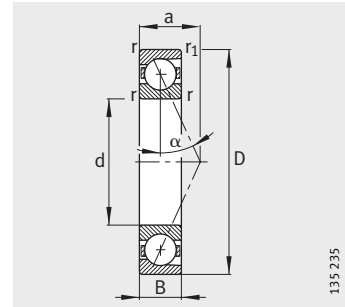
Mounting dimensions				Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{Or} N		n_G grease min^{-1}	n_G oil min^{-1}
13	19,5	0,3	0,3	3 000	1 530	110	70 000	110 000
13	19,5	0,3	0,3	2 900	1 460	105	63 000	95 000
14	22	0,3	0,1	4 250	2 080	151	60 000	90 000
14	22	0,3	0,1	4 050	2 000	145	56 000	85 000
14,5	25,5	0,6	0,6	5 850	2 900	305	53 000	80 000
14,5	25,5	0,6	0,6	5 600	2 800	295	48 000	70 000
15	21,5	0,3	0,3	3 350	1 860	135	60 000	90 000
15	21,5	0,3	0,3	3 200	1 760	128	56 000	85 000
16,5	24,5	0,3	0,1	4 750	2 600	188	56 000	85 000
16,5	24,5	0,3	0,1	4 550	2 500	180	50 000	75 000
16,5	27,5	0,6	0,6	7 650	3 900	400	50 000	75 000
16,5	27,5	0,6	0,6	7 350	3 750	385	45 000	67 000
18	25,5	0,3	0,3	5 000	2 900	209	50 000	75 000
18	25,5	0,3	0,3	4 800	2 750	200	45 000	67 000
19	29	0,3	0,1	6 200	3 400	248	48 000	70 000
19	29	0,3	0,1	6 000	3 250	237	43 000	63 000
19,5	30,5	0,6	0,6	9 650	5 000	520	45 000	67 000
19,5	30,5	0,6	0,6	9 300	4 800	510	40 000	60 000
20	27,5	0,3	0,3	5 300	3 150	229	48 000	70 000
20	27,5	0,3	0,3	5 000	3 000	219	43 000	63 000
21	32	0,3	0,1	8 650	4 900	360	43 000	63 000
21	32	0,3	0,1	8 300	4 750	345	38 000	56 000
22,5	34,5	0,6	0,6	10 800	5 850	600	38 000	56 000
22,5	34,5	0,6	0,6	10 400	5 600	580	36 000	53 000
24	33,5	0,3	0,3	7 350	4 550	330	38 000	56 000
24	33,5	0,3	0,3	6 950	4 400	315	36 000	53 000
25	37	0,6	0,3	10 400	6 000	435	36 000	53 000
25	37	0,6	0,3	10 000	5 700	415	32 000	48 000
26,5	40,5	1	1	14 600	8 150	820	32 000	48 000
26,5	40,5	1	1	14 000	7 800	790	30 000	45 000
29	38,5	0,3	0,3	8 150	5 700	415	32 000	48 000
29	38,5	0,3	0,3	7 800	5 500	395	30 000	45 000
30	42	0,6	0,3	14 600	9 150	660	30 000	45 000
30	42	0,6	0,3	13 700	8 650	640	28 000	43 000
31,5	45,5	1	1	15 600	9 300	950	28 000	43 000
31,5	45,5	1	1	15 000	9 000	910	26 000	40 000

Spindle bearings

With steel balls

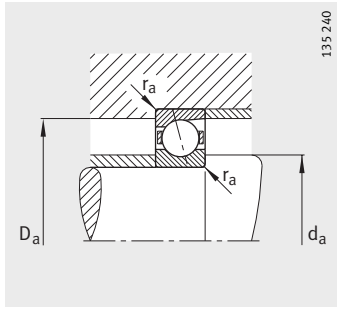


B719...-C, B70...-C, B72...-C
 $\alpha = 15^\circ$

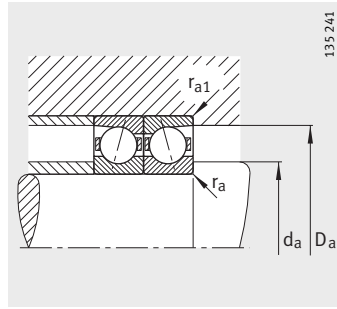


B719...-E, B70...-E, B72...-E
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm							
Designation	Mass m ≈ kg	Dimensions					
		d	D	B	r	r ₁	a
					min.	min.	≈
B71906-C-T-P4S	0,049	30	47	9	0,3	0,3	10
B71906-E-T-P4S	0,049	30	47	9	0,3	0,3	14
B7006-C-T-P4S	0,12	30	55	13	1	1	12
B7006-E-T-P4S	0,12	30	55	13	1	1	17
B7206-C-T-P4S	0,197	30	62	16	1	1	14
B7206-E-T-P4S	0,196	30	62	16	1	1	19
B71907-C-T-P4S	0,083	35	55	10	0,6	0,6	11
B71907-E-T-P4S	0,082	35	55	10	0,6	0,6	16
B7007-C-T-P4S	0,159	35	62	14	1	1	14
B7007-E-T-P4S	0,159	35	62	14	1	1	18
B7207-C-T-P4S	0,28	35	72	17	1,1	1,1	16
B7207-E-T-P4S	0,279	35	72	17	1,1	1,1	21
B71908-C-T-P4S	0,113	40	62	12	0,6	0,6	13
B71908-E-T-P4S	0,113	40	62	12	0,6	0,6	18
B7008-C-T-P4S	0,196	40	68	15	1	1	15
B7008-E-T-P4S	0,195	40	68	15	1	1	20
B7208-C-T-P4S	0,376	40	80	18	1,1	1,1	17
B7208-E-T-P4S	0,375	40	80	18	1,1	1,1	23
B71909-C-T-P4S	0,127	45	68	12	0,6	0,6	14
B71909-E-T-P4S	0,127	45	68	12	0,6	0,6	19
B7009-C-T-P4S	0,24	45	75	16	1	1	16
B7009-E-T-P4S	0,24	45	75	16	1	1	22
B7209-C-T-P4S	0,401	45	85	19	1,1	1,1	18
B7209-E-T-P4S	0,4	45	85	19	1,1	1,1	25
B71910-C-T-P4S	0,132	50	72	12	0,6	0,6	14
B71910-E-T-P4S	0,132	50	72	12	0,6	0,6	20
B7010-C-T-P4S	0,259	50	80	16	1	1	17
B7010-E-T-P4S	0,258	50	80	16	1	1	23
B7210-C-T-P4S	0,455	50	90	20	1,1	1,1	19
B7210-E-T-P4S	0,453	50	90	20	1,1	1,1	26



Mounting dimensions



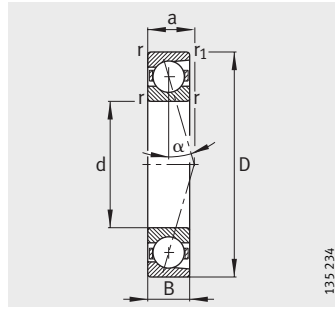
Mounting dimensions



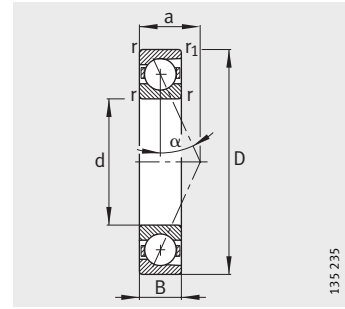
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}	n_G oil min^{-1}
34	43,5	0,3	0,3	8 650	6 550	480	28 000	43 000
34	43,5	0,3	0,3	8 150	6 300	455	26 000	40 000
36	49	1	0,3	15 000	10 200	750	26 000	40 000
36	49	1	0,3	14 300	9 800	720	24 000	38 000
37,5	54,5	1	1	23 200	14 600	1 540	24 000	38 000
37,5	54,5	1	1	22 000	14 000	1 470	22 000	36 000
40	51,5	0,6	0,6	11 800	9 500	700	24 000	38 000
40	51,5	0,6	0,6	11 000	9 000	660	22 000	36 000
41	56	1	0,3	19 000	13 700	990	22 000	36 000
41	56	1	0,3	18 300	12 900	940	20 000	34 000
44	63	1	1	25 500	18 000	1 880	20 000	34 000
44	63	1	1	24 500	17 000	1 790	19 000	32 000
45	58,5	0,6	0,6	17 600	13 700	1 020	22 000	36 000
45	58,5	0,6	0,6	16 600	13 200	970	20 000	34 000
46	62	1	0,3	20 400	16 000	1 150	20 000	34 000
46	62	1	0,3	19 600	15 000	1 100	19 000	32 000
48	72	1	1	32 000	22 400	1 660	18 000	30 000
48	72	1	1	30 500	21 600	1 580	17 000	28 000
50	63,5	0,6	0,6	18 600	15 600	1 150	19 000	32 000
50	63,5	0,6	0,6	17 600	15 000	1 090	18 000	30 000
51	69	1	0,3	27 500	21 200	1 530	18 000	30 000
51	69	1	0,3	26 500	20 000	1 460	17 000	28 000
52,5	78	1	1	33 500	24 500	1 820	17 000	28 000
52,5	78	1	1	32 000	23 600	1 740	15 000	24 000
55	67,5	0,6	0,6	19 000	16 600	1 210	18 000	30 000
55	67,5	0,6	0,6	18 000	15 600	1 230	16 000	26 000
56	74	1	0,3	28 500	22 800	1 660	17 000	28 000
56	74	1	0,3	27 000	21 600	1 580	15 000	24 000
57	83	1	1	43 000	31 500	2 300	16 000	26 000
57	83	1	1	40 500	30 500	2 200	14 000	22 000

Spindle bearings

With steel balls

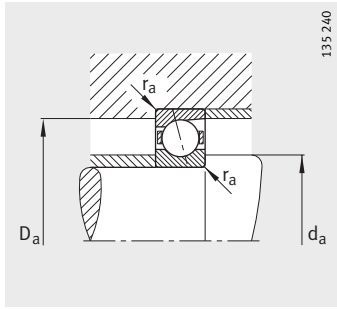


B719...-C, B70...-C, B72...-C
 $\alpha = 15^\circ$

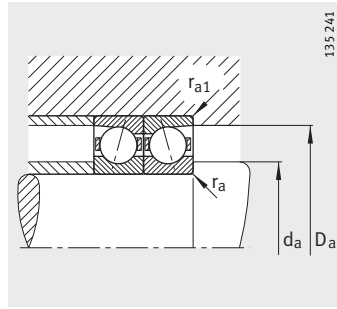


B719...-E, B70...-E, B72...-E
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm							
Designation	Mass m ≈ kg	Dimensions					
		d	D	B	r min.	r ₁ min.	a ≈
B71911-C-T-P4S	0,182	55	80	13	1	1	16
B71911-E-T-P4S	0,181	55	80	13	1	1	22
B7011-C-T-P4S	0,374	55	90	18	1,1	1,1	19
B7011-E-T-P4S	0,373	55	90	18	1,1	1,1	26
B7211-C-T-P4S	0,609	55	100	21	1,5	1,5	21
B7211-E-T-P4S	0,599	55	100	21	1,5	1,5	29
B71912-C-T-P4S	0,196	60	85	13	1	1	16
B71912-E-T-P4S	0,195	60	85	13	1	1	23
B7012-C-T-P4S	0,397	60	95	18	1,1	1,1	19
B7012-E-T-P4S	0,396	60	95	18	1,1	1,1	27
B7212-C-T-P4S	0,795	60	110	22	1,5	1,5	23
B7212-E-T-P4S	0,793	60	110	22	1,5	1,5	31
B71913-C-T-P4S	0,202	65	90	13	1	1	17
B71913-E-T-P4S	0,202	65	90	13	1	1	25
B7013-C-T-P4S	0,421	65	100	18	1,1	1,1	20
B7013-E-T-P4S	0,42	65	100	18	1,1	1,1	28
B7213-C-T-P4S	1,01	65	120	23	1,5	1,5	24
B7213-E-T-P4S	1,01	65	120	23	1,5	1,5	33
B71914-C-T-P4S	0,332	70	100	16	1	1	19
B71914-E-T-P4S	0,331	70	100	16	1	1	28
B7014-C-T-P4S	0,595	70	110	20	1,1	1,1	22
B7014-E-T-P4S	0,593	70	110	20	1,1	1,1	31
B7214-C-T-P4S	1,1	70	125	24	1,5	1,5	25
B7214-E-T-P4S	1,1	70	125	24	1,5	1,5	35
B71915-C-T-P4S	0,352	75	105	16	1	1	20
B71915-E-T-P4S	0,351	75	105	16	1	1	29
B7015-C-T-P4S	0,618	75	115	20	1,1	1,1	23
B7015-E-T-P4S	0,616	75	115	20	1,1	1,1	32
B7215-C-T-P4S	1,21	75	130	25	1,5	1,5	26
B7215-E-T-P4S	1,2	75	130	25	1,5	1,5	36



Mounting dimensions



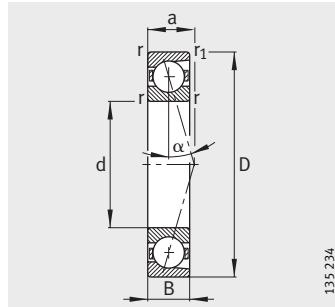
Mounting dimensions



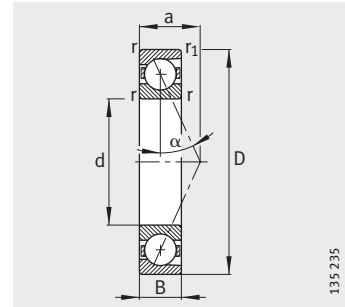
Mounting dimensions				Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{Or} N		n_G grease min^{-1}	n_G oil min^{-1}
60	75,5	0,6	0,6	22 800	20 400	1 490	16 000	26 000
60	75,5	0,6	0,6	21 600	19 300	1 410	15 000	24 000
62	83	1	0,6	38 000	31 000	2 270	15 000	24 000
62	83	1	0,6	36 000	29 000	2 160	14 000	22 000
63	92	1,5	1,5	46 500	37 500	2 700	14 000	22 000
63	92	1,5	1,5	44 000	35 500	2 600	13 000	20 000
65	80,5	0,6	0,6	24 000	22 800	1 650	15 000	24 000
65	80,5	0,6	0,6	22 800	21 600	1 560	14 000	22 000
67	88	1	0,6	39 000	33 500	2 440	14 000	22 000
67	88	1	0,6	36 500	31 500	2 320	13 000	20 000
69,5	101,5	1,5	1,5	55 000	44 000	3 200	13 000	20 000
69,5	101,5	1,5	1,5	52 000	42 500	3 050	12 000	19 000
70	85,5	0,6	0,6	24 500	24 000	1 740	14 000	22 000
70	85,5	0,6	0,6	22 800	22 400	1 640	13 000	20 000
72	93	1	0,6	40 000	35 500	2 600	13 000	20 000
72	93	1	0,6	38 000	33 500	2 480	12 000	19 000
75,5	109,5	1,5	1,5	67 000	54 000	3 950	12 000	19 000
75,5	109,5	1,5	1,5	64 000	52 000	3 750	11 000	18 000
76	94,5	0,6	0,6	33 500	32 500	2 360	13 000	20 000
76	94,5	0,6	0,6	31 500	31 000	2 240	12 000	19 000
77	102	1	0,6	50 000	43 000	3 150	12 000	19 000
77	102	1	0,6	46 500	41 500	3 000	11 000	18 000
80	115	1,5	1,5	69 500	58 500	4 250	11 000	18 000
80	115	1,5	1,5	65 500	56 000	4 050	10 000	17 000
81	99,5	0,6	0,6	34 000	34 500	2 490	12 000	19 000
81	99,5	0,6	0,6	32 000	32 500	2 360	11 000	18 000
82	107	1	0,6	51 000	46 500	3 350	12 000	19 000
82	107	1	0,6	48 000	44 000	3 200	11 000	18 000
85	120	1,5	1,5	72 000	63 000	4 550	11 000	18 000
85	120	1,5	1,5	68 000	60 000	4 300	9 500	16 000

Spindle bearings

With steel balls

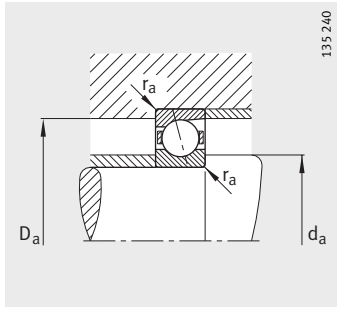


B719...-C, B70...-C, B72...-C
 $\alpha = 15^\circ$

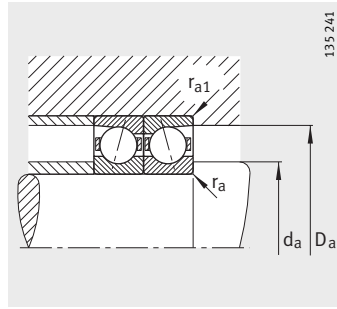


B719...-E, B70...-E, B72...-E
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm							
Designation	Mass m ≈ kg	Dimensions					
		d	D	B	r min.	r ₁ min.	a ≈
B71916-C-T-P4S	0,367	80	110	16	1	1	21
B71916-E-T-P4S	0,366	80	110	16	1	1	30
B7016-C-T-P4S	0,837	80	125	22	1,1	1,1	25
B7016-E-T-P4S	0,834	80	125	22	1,1	1,1	35
B7216-C-T-P4S	1,43	80	140	26	2	2	28
B7216-E-T-P4S	1,42	80	140	26	2	2	39
B71917-C-T-P4S	0,526	85	120	18	1,1	1,1	23
B71917-E-T-P4S	0,524	85	120	18	1,1	1,1	33
B7017-C-T-P4S	0,878	85	130	22	1,1	1,1	25
B7017-E-T-P4S	0,875	85	130	22	1,1	1,1	36
B7217-C-T-P4S	1,81	85	150	28	2	2	30
B7217-E-T-P4S	1,8	85	150	28	2	2	42
B71918-C-T-P4S	0,558	90	125	18	1,1	1,1	23
B71918-E-T-P4S	0,556	90	125	18	1,1	1,1	34
B7018-C-T-P4S	1,14	90	140	24	1,5	1,5	27
B7018-E-T-P4S	1,13	90	140	24	1,5	1,5	39
B7218-C-T-P4S	2,2	90	160	30	2	2	32
B7218-E-T-P4S	2,19	90	160	30	2	2	44
B71919-C-T-P4S	0,576	95	130	18	1,1	1,1	24
B71919-E-T-P4S	0,575	95	130	18	1,1	1,1	35
B7019-C-T-P4S	1,18	95	145	24	1,5	1,5	28
B7019-E-T-P4S	1,18	95	145	24	1,5	1,5	40
B7219-C-T-P4S	2,73	95	170	32	2,1	2,1	34
B7219-E-T-P4S	2,72	95	170	32	2,1	2,1	47
B71920-C-T-P4S	0,784	100	140	20	1,1	1,1	26
B71920-E-T-P4S	0,781	100	140	20	1,1	1,1	38
B7020-C-T-P4S	1,24	100	150	24	1,5	1,5	29
B7020-E-T-P4S	1,23	100	150	24	1,5	1,5	41
B7220-C-T-P4S	3,21	100	180	34	2,1	2,1	36
B7220-E-T-P4S	3,2	100	180	34	2,1	2,1	50



Mounting dimensions



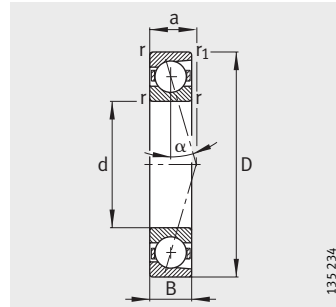
Mounting dimensions



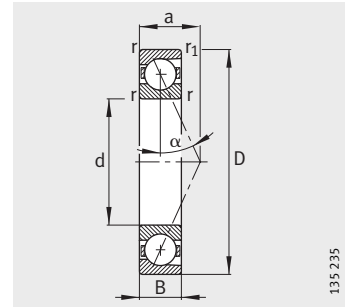
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d _a h12	D _a H12	r _a max.	r _{a1} max.	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G grease min ⁻¹	n _G oil min ⁻¹
86	104	0,6	0,6	34 500	36 000	2 600	12 000	19 000
86	104	0,6	0,6	32 500	34 000	2 470	11 000	18 000
88	117	1	0,6	63 000	58 500	4 150	11 000	18 000
88	117	1	0,6	60 000	55 000	3 950	9 500	16 000
91	129	2	2	93 000	78 000	5 400	10 000	17 000
91	129	2	2	88 000	73 500	5 100	9 000	15 000
92	114	0,6	0,6	45 000	46 500	3 400	11 000	18 000
92	114	0,6	0,6	42 500	44 000	3 200	9 500	16 000
93	122	1	0,6	65 500	62 000	4 300	10 000	17 000
93	122	1	0,6	62 000	58 500	4 100	9 000	15 000
98	138	2	2	96 500	85 000	5 600	9 000	15 000
98	138	2	2	91 500	80 000	5 400	8 000	13 000
97	119	0,6	0,6	45 500	49 000	3 450	10 000	17 000
97	119	0,6	0,6	43 000	46 500	3 300	9 000	15 000
100	131	1,5	0,6	76 500	72 000	4 900	9 500	16 000
100	131	1,5	0,6	72 000	68 000	4 650	8 500	14 000
104	147	2	2	122 000	104 000	6 900	8 500	14 000
104	147	2	2	116 000	100 000	6 600	7 500	12 000
102	124	0,6	0,6	46 500	51 000	3 550	9 500	16 000
102	124	0,6	0,6	44 000	48 000	3 350	8 500	14 000
105	136	1,5	0,6	78 000	76 500	5 100	9 000	15 000
105	136	1,5	0,6	75 000	72 000	4 850	8 000	13 000
110,5	154	2	2	127 000	114 000	7 300	8 000	13 000
110,5	154	2	2	122 000	108 000	6 900	7 000	11 000
107	133	0,6	0,6	58 500	64 000	4 200	9 000	15 000
107	133	0,6	0,6	55 000	60 000	3 950	8 000	13 000
110	141	1,5	0,6	81 500	81 500	5 300	8 500	14 000
110	141	1,5	0,6	76 500	76 500	5 000	7 500	12 000
114,5	165,5	2,1	2,1	132 000	122 000	7 600	7 500	12 000
114,5	165,5	2,1	2,1	125 000	116 000	7 300	6 700	10 000

Spindle bearings

With steel balls

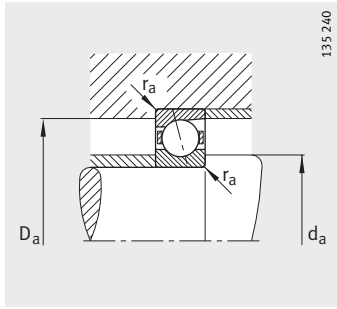


B719...-C, B70...-C, B72...-C
 $\alpha = 15^\circ$

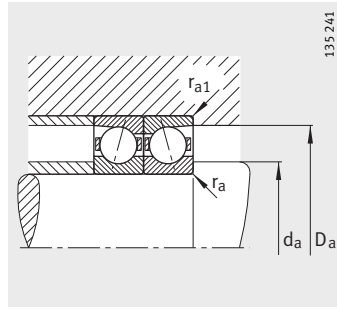


B719...-E, B70...-E, B72...-E
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm							
Designation	Mass m ≈ kg	Dimensions					
		d	D	B	r min.	r ₁ min.	a ≈
B71921-C-T-P4S	0,814	105	145	20	1,1	1,1	27
B71921-E-T-P4S	0,813	105	145	20	1,1	1,1	39
B7021-C-T-P4S	1,52	105	160	26	2	2	31
B7021-E-T-P4S	1,51	105	160	26	2	2	44
B7221-C-T-P4S	3,89	105	190	36	2,1	2,1	38
B7221-E-T-P4S	3,88	105	190	36	2,1	2,1	52
B71922-C-T-P4S	0,848	110	150	20	1,1	1,1	27
B71922-E-T-P4S	0,845	110	150	20	1,1	1,1	40
B7022-C-T-P4S	1,94	110	170	28	2	2	33
B7022-E-T-P4S	1,94	110	170	28	2	2	47
B7222-C-T-P4S	4,59	110	200	38	2,1	2,1	40
B7222-E-T-P4S	4,58	110	200	38	2,1	2,1	55
B71924-C-T-P4S	1,16	120	165	22	1,1	1,1	30
B71924-E-T-P4S	1,16	120	165	22	1,1	1,1	44
B7024-C-T-P4S	2,07	120	180	28	2	2	34
B7024-E-T-P4S	2,06	120	180	28	2	2	49
B7224-C-T-P4S	5,29	120	215	40	2,1	2,1	43
B7224-E-T-P4S	5,27	120	215	40	2,1	2,1	59
B71926-C-T-P4S	1,52	130	180	24	1,5	1,5	33
B71926-E-T-P4S	1,52	130	180	24	1,5	1,5	48
B7026-C-T-P4S	3,15	130	200	33	2	2	39
B7026-E-T-P4S	3,14	130	200	33	2	2	55
B7226-C-T-P4S	6,1	130	230	40	3	3	44
B7226-E-T-P4S	6,08	130	230	40	3	3	62
B71928-C-T-P4S	1,63	140	190	24	1,5	1,5	34
B71928-E-T-P4S	1,62	140	190	24	1,5	1,5	50
B7028-C-T-P4S	3,34	140	210	33	2	2	40
B7028-E-T-P4S	3,33	140	210	33	2	2	57
B7228-C-T-P4S	7,87	140	250	42	3	3	47
B7228-E-T-P4S	7,85	140	250	42	3	3	66
B71930-C-T-P4S	2,49	150	210	28	2	1	38
B71930-E-T-P4S	2,49	150	210	28	2	1	56
B7030-C-T-P4S	3,99	150	225	35	2,1	2,1	43
B7030-E-T-P4S	3,98	150	225	35	2,1	2,1	61
B7230-C-T-P4S	10,1	150	270	45	3	3	51
B7230-E-T-P4S	10,1	150	270	45	3	3	71



Mounting dimensions



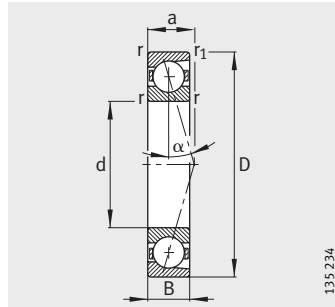
Mounting dimensions



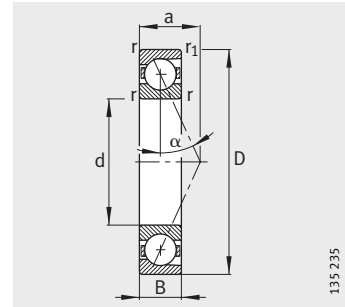
Mounting dimensions				Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{Or} N		n_G grease min^{-1}	n_G oil min^{-1}
112	138	0,6	0,6	58 500	64 000	4 150	8 500	14 000
112	138	0,6	0,6	55 000	60 000	3 900	7 500	12 000
116	150	2	1	83 000	85 000	5 400	8 000	13 000
116	150	2	1	78 000	81 500	5 200	7 000	11 000
120,5	174,5	2,1	2,1	163 000	146 000	8 800	7 000	11 000
120,5	174,5	2,1	2,1	156 000	140 000	8 400	6 300	9 500
117	143	0,6	0,6	58 500	67 000	4 250	8 000	13 000
117	143	0,6	0,6	56 000	63 000	4 000	7 500	12 000
121	159	2	1	110 000	110 000	6 700	7 500	12 000
121	159	2	1	104 000	104 000	6 400	6 700	10 000
126,5	183,5	2,1	2,1	163 000	150 000	8 700	6 700	10 000
126,5	183,5	2,1	2,1	153 000	143 000	8 300	6 000	9 000
128	157	0,6	0,6	73 500	85 000	5 100	7 000	11 000
128	157	0,6	0,6	69 500	80 000	4 850	6 700	10 000
131	169	2	1	112 000	116 000	6 900	6 700	10 000
131	169	2	1	106 000	110 000	6 500	6 300	9 500
140	195	2,1	2,1	204 000	196 000	11 000	6 000	9 000
140	195	2,1	2,1	196 000	186 000	10 500	5 300	8 000
139	171	0,6	0,6	71 000	81 500	4 750	6 700	10 000
139	171	0,6	0,6	67 000	75 000	4 500	6 000	9 000
142	189	2	1	143 000	150 000	8 600	6 000	9 000
142	189	2	1	137 000	143 000	8 100	5 600	8 500
148	211,5	2,5	2,5	212 000	216 000	11 600	5 600	8 500
148	211,5	2,5	2,5	204 000	204 000	11 000	5 000	7 500
149	181	0,6	0,6	73 500	86 500	5 000	6 000	9 000
149	181	0,6	0,6	69 500	81 500	4 750	5 600	8 500
152	199	2	1	146 000	160 000	8 800	5 600	8 500
152	199	2	1	140 000	150 000	8 400	5 000	7 500
163	226,5	2,5	2,5	220 000	232 000	12 100	5 000	7 500
163	226,5	2,5	2,5	212 000	224 000	11 500	4 500	6 700
160	199	1	1	122 000	143 000	7 700	5 600	8 500
160	199	1	1	114 000	134 000	7 300	5 000	7 500
163	213	2,1	1	183 000	193 000	10 300	5 300	8 000
163	213	2,1	1	173 000	186 000	9 800	4 800	7 000
178	241,5	2,5	2,5	228 000	255 000	12 600	4 500	6 700
178	241,5	2,5	2,5	216 000	240 000	12 000	4 000	6 000

Spindle bearings

With steel balls



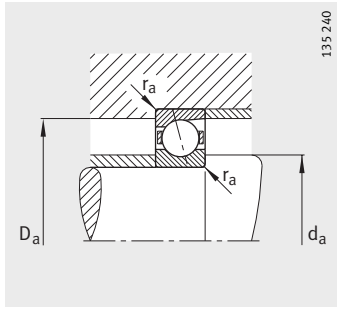
B719...-C, B70...-C, B72...-C
 $\alpha = 15^\circ$



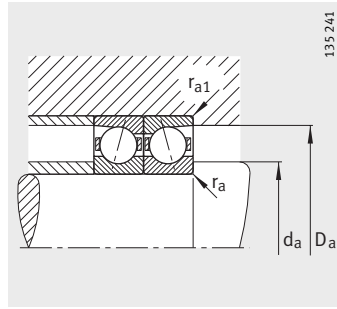
B719...-E, B70...-E, B72...-E
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈ kg	Dimensions					
		d	D	B	r min.	r ₁ min.	a ≈
B71932-C-T-P4S	2,62	160	220	28	2	1	40
B71932-E-T-P4S	2,61	160	220	28	2	1	58
B7032-C-T-P4S	5,01	160	240	38	2,1	2,1	46
B7032-E-T-P4S	4,99	160	240	38	2,1	2,1	66
B7232-C-T-P4S	12,9	160	290	48	3	3	54
B7232-E-T-P4S	12,9	160	290	48	3	3	76
B71934-C-T-P4S	2,78	170	230	28	2	1,5	41
B71934-E-T-P4S	2,77	170	230	28	2	1,5	61
B7034-C-T-P4S	6,51	170	260	42	2,1	2,1	50
B7034-E-T-P4S	6,48	170	260	42	2,1	2,1	71
B7234-C-T-P4S	15,6	170	310	52	4	4	58
B7234-E-T-P4S	15,6	170	310	52	4	4	82
B71936-C-T-P4S	4,13	180	250	33	2	1	45
B71936-E-T-P4S	4,11	180	250	33	2	1	67
B7036-C-T-P4S	8,77	180	280	46	2,1	2,1	54
B7036-E-T-P4S	8,74	180	280	46	2,1	2,1	77
B7236-C-T-P4S	16,3	180	320	52	4	4	60
B7236-E-T-P4S	16,3	180	320	52	4	4	84
B71938-C-T-P4S	4,31	190	260	33	2	1	47
B71938-E-T-P4S	4,29	190	260	33	2	1	69
B7038-C-T-P4S	9,18	190	290	46	2,1	2,1	55
B7038-E-T-P4S	9,15	190	290	46	2,1	2,1	79
B7238-C-T-P4S	20	190	340	55	4	4	63
B7238-E-T-P4S	19,9	190	340	55	4	4	89
B71940-C-T-P4S	6,03	200	280	38	2,1	1,1	51
B71940-E-T-P4S	6,01	200	280	38	2,1	1,1	75
B7040-C-T-P4S	11,6	200	310	51	2,1	2,1	60
B7040-E-T-P4S	11,5	200	310	51	2,1	2,1	85
B7240-C-T-P4S	24,1	200	360	58	4	4	67
B7240-E-T-P4S	24,1	200	360	58	4	4	94



Mounting dimensions



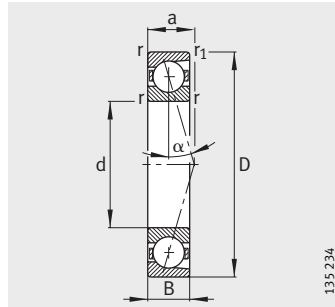
Mounting dimensions



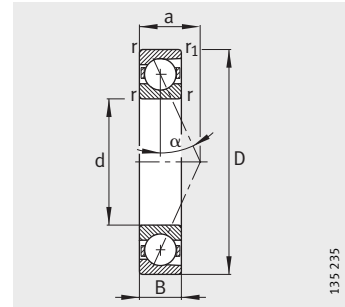
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d _a h12	D _a H12	r _a max.	r _{a1} max.	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G grease min ⁻¹	n _G oil min ⁻¹
170	209	1	1	125 000	150 000	7 900	5 000	7 500
170	209	1	1	116 000	140 000	7 500	4 800	7 000
174	228	2	1	190 000	208 000	10 600	4 800	7 000
174	228	2	1	176 000	196 000	10 100	4 300	6 300
191	259	2,5	2,5	245 000	285 000	13 800	4 300	6 300
191	259	2,5	2,5	232 000	270 000	13 200	3 800	5 600
180	219	1	1	129 000	163 000	8 300	4 800	7 000
180	219	1	1	122 000	150 000	7 900	4 300	6 300
185	246	2	1	236 000	270 000	13 300	4 500	6 700
185	246	2	1	224 000	255 000	12 600	4 000	6 000
205	275	3	3	300 000	360 000	16 800	3 800	5 600
205	275	3	3	280 000	345 000	16 000	3 600	5 300
192	238	1	1	163 000	204 000	10 200	4 500	6 700
192	238	1	1	156 000	193 000	9 700	4 000	6 000
196	264	2	1	245 000	285 000	13 800	4 000	6 000
196	264	2	1	232 000	275 000	13 100	3 800	5 600
213,5	286,5	3	3	305 000	390 000	17 600	3 800	5 600
213,5	286,5	3	3	290 000	365 000	16 800	3 400	5 000
202	247	1	1	166 000	212 000	10 400	4 300	6 300
202	247	1	1	156 000	200 000	9 900	3 800	5 600
206	274	2	1	250 000	305 000	14 300	3 800	5 600
206	274	2	1	236 000	290 000	13 600	3 600	5 300
223,5	306,5	3	3	315 000	415 000	18 300	3 400	5 000
223,5	306,5	3	3	300 000	390 000	17 400	3 200	4 800
214	266	1	1	204 000	255 000	11 900	3 800	5 600
214	266	1	1	193 000	240 000	11 300	3 600	5 300
217	293	2	1	305 000	390 000	17 500	3 600	5 300
217	293	2	1	290 000	365 000	16 700	3 200	4 800
238,5	321,5	3	3	325 000	440 000	19 000	3 200	4 800
238,5	321,5	3	3	310 000	415 000	18 000	3 000	4 500

Spindle bearings

With steel balls



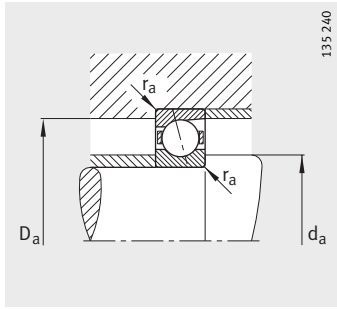
B719...-C, B70...-C, B72...-C
 $\alpha = 15^\circ$



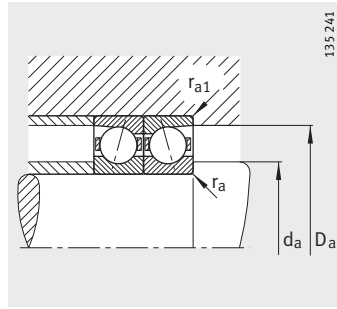
B719...-E, B70...-E, B72...-E
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈ kg	Dimensions					
		d	D	B	r	r ₁	a
					min.	min.	≈
B71944-C-T-P4S	6,57	220	300	38	2,1	1,1	54
B71944-E-T-P4S	6,55	220	300	38	2,1	1,1	80
B7044-C-T-P4S	15,7	220	340	56	3	3	66
B7044-E-T-P4S	15,6	220	340	56	3	3	93
B7244-C-T-P4S	33	220	400	65	4	4	74
B7244-E-T-P4S	32,9	220	400	65	4	4	105
B71948-C-T-P4S	7,08	240	320	38	2,1	1,1	57
B71948-E-T-P4S	7,06	240	320	38	2,1	1,1	84
B7048-C-T-P4S	16,7	240	360	56	3	3	68
B7048-E-T-P4S	16,7	240	360	56	3	3	98



Mounting dimensions



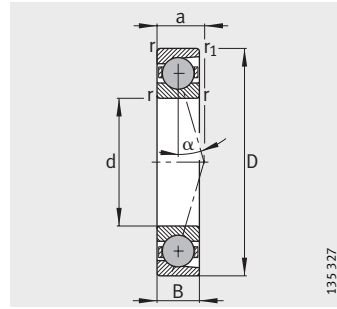
Mounting dimensions



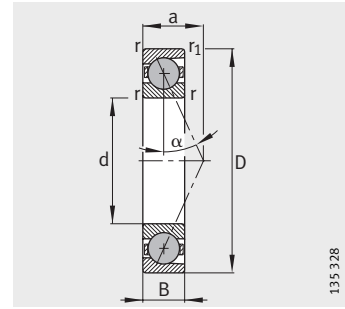
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G grease min^{-1}	n_G oil min^{-1}
234	286	1	1	216 000	285 000	12 900	3 600	5 300
234	286	1	1	204 000	270 000	12 200	3 200	4 800
239	321	2,5	1	325 000	440 000	19 000	3 200	4 800
239	321	2,5	1	310 000	415 000	18 000	3 000	4 500
264	356	3	3	400 000	560 000	23 200	2 800	4 300
264	356	3	3	380 000	540 000	22 100	2 600	4 000
254	307	1	1	224 000	310 000	13 500	3 200	4 800
254	307	1	1	212 000	285 000	12 800	3 000	4 500
260	341	2,5	1	335 000	465 000	19 500	3 000	4 500
260	341	2,5	1	315 000	440 000	18 500	2 800	4 300

Spindle bearings

With ceramic balls

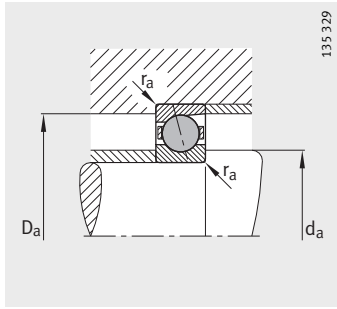


HCB719...-C, HCB70...-C,
HCB72...-C
 $\alpha = 15^\circ$

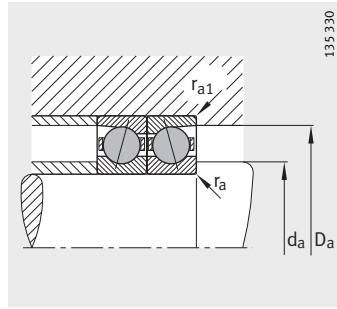


HCB719...-E, HCB70...-E,
HCB72...-E
 $\alpha = 25^\circ$

Dimension table · Dimensions in mm							
Designation	Mass m ≈ kg	Dimensions					
		d	D	B	r min.	r ₁ min.	a ≈
HCB71900-C-T-P4S	0,01	10	22	6	0,3	0,3	5
HCB71900-E-T-P4S	0,01	10	22	6	0,3	0,3	7
HCB7000-C-T-P4S	0,02	10	26	8	0,3	0,3	6
HCB7000-E-T-P4S	0,02	10	26	8	0,3	0,3	8
HCB7200-C-T-P4S	0,03	10	30	9	0,6	0,6	7
HCB7200-E-T-P4S	0,03	10	30	9	0,6	0,6	9
HCB71901-C-T-P4S	0,02	12	24	6	0,3	0,3	5
HCB71901-E-T-P4S	0,02	12	24	6	0,3	0,3	7
HCB7001-C-T-P4S	0,02	12	28	8	0,3	0,3	7
HCB7001-E-T-P4S	0,02	12	28	8	0,3	0,3	9
HCB7201-C-T-P4S	0,03	12	32	10	0,6	0,6	8
HCB7201-E-T-P4S	0,03	12	32	10	0,6	0,6	10
HCB71902-C-T-P4S	0,02	15	28	7	0,3	0,3	6
HCB71902-E-T-P4S	0,02	15	28	7	0,3	0,3	9
HCB7002-C-T-P4S	0,03	15	32	9	0,3	0,3	8
HCB7002-E-T-P4S	0,03	15	32	9	0,3	0,3	10
HCB7202-C-T-P4S	0,04	15	35	11	0,6	0,6	9
HCB7202-E-T-P4S	0,04	15	35	11	0,6	0,6	11
HCB71903-C-T-P4S	0,02	17	30	7	0,3	0,3	7
HCB71903-E-T-P4S	0,02	17	30	7	0,3	0,3	9
HCB7003-C-T-P4S	0,04	17	35	10	0,3	0,3	9
HCB7003-E-T-P4S	0,04	17	35	10	0,3	0,3	11
HCB7203-C-T-P4S	0,06	17	40	12	0,6	0,6	10
HCB7203-E-T-P4S	0,06	17	40	12	0,6	0,6	13
HCB71904-C-T-P4S	0,03	20	37	9	0,3	0,3	8
HCB71904-E-T-P4S	0,03	20	37	9	0,3	0,3	11
HCB7004-C-T-P4S	0,07	20	42	12	0,6	0,6	10
HCB7004-E-T-P4S	0,07	20	42	12	0,6	0,6	13
HCB7204-C-T-P4S	0,1	20	47	14	1	1	12
HCB7204-E-T-P4S	0,1	20	47	14	1	1	15
HCB71905-C-T-P4S	0,04	25	42	9	0,3	0,3	9
HCB71905-E-T-P4S	0,04	25	42	9	0,3	0,3	12
HCB7005-C-T-P4S	0,07	25	47	12	0,6	0,6	11
HCB7005-E-T-P4S	0,07	25	47	12	0,6	0,6	14
HCB7205-C-T-P4S	0,12	25	52	15	1	1	13
HCB7205-E-T-P4S	0,12	25	52	15	1	1	17



Mounting dimensions



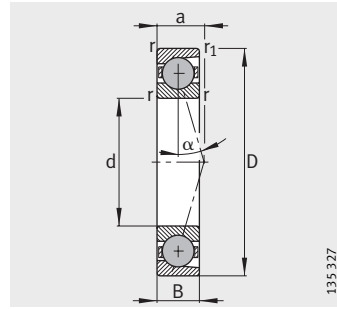
Mounting dimensions



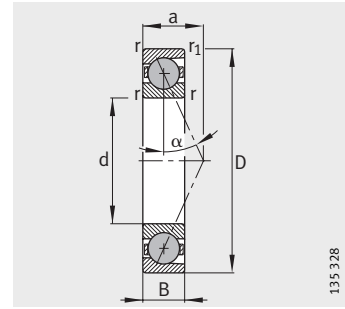
Mounting dimensions				Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{Or} N		n_G grease min^{-1}	n_G oil min^{-1}
13	19,5	0,3	0,3	2 080	1 060	78	90 000	150 000
13	19,5	0,3	0,3	2 000	1 000	75	75 000	120 000
14	22	0,3	0,1	2 900	1 430	107	80 000	130 000
14	22	0,3	0,1	2 800	1 400	102	67 000	100 000
14,5	25,5	0,6	0,6	4 000	2 040	217	70 000	110 000
14,5	25,5	0,6	0,6	3 900	1 960	208	60 000	90 000
15	21,5	0,3	0,3	2 320	1 290	95	80 000	130 000
15	21,5	0,3	0,3	2 200	1 220	91	67 000	100 000
16,5	24,5	0,3	0,1	3 250	1 800	133	70 000	110 000
16,5	24,5	0,3	0,1	3 150	1 730	128	60 000	90 000
16,5	27,5	0,6	0,6	5 300	2 700	285	63 000	95 000
16,5	27,5	0,6	0,6	5 100	2 600	275	56 000	85 000
18	25,5	0,3	0,3	3 450	2 000	148	67 000	100 000
18	25,5	0,3	0,3	3 350	1 930	141	56 000	85 000
19	29	0,3	0,1	4 300	2 360	176	60 000	90 000
19	29	0,3	0,1	4 150	2 240	168	50 000	75 000
19,5	30,5	0,6	0,6	6 700	3 450	370	56 000	85 000
19,5	30,5	0,6	0,6	6 400	3 350	360	48 000	70 000
20	27,5	0,3	0,3	3 650	2 200	162	60 000	90 000
20	27,5	0,3	0,3	3 450	2 080	155	50 000	75 000
21	32	0,3	0,1	6 000	3 450	255	53 000	80 000
21	32	0,3	0,1	5 700	3 250	246	45 000	67 000
22,5	34,5	0,6	0,6	7 500	4 050	425	50 000	75 000
22,5	34,5	0,6	0,6	7 200	3 900	410	43 000	63 000
24	33,5	0,3	0,3	5 000	3 200	234	50 000	75 000
24	33,5	0,3	0,3	4 800	3 050	223	43 000	63 000
25	37	0,6	0,3	7 200	4 150	310	45 000	67 000
25	37	0,6	0,3	6 950	4 000	295	38 000	56 000
26,5	40,5	1	1	10 000	5 600	580	43 000	63 000
26,5	40,5	1	1	9 650	5 400	560	36 000	53 000
29	38,5	0,3	0,3	5 600	4 000	280	43 000	63 000
29	38,5	0,3	0,3	5 300	3 800	260	36 000	53 000
30	42	0,6	0,3	10 000	6 300	470	38 000	56 000
30	42	0,6	0,3	9 500	6 000	450	34 000	50 000
31,5	45,5	1	1	10 800	6 550	670	36 000	53 000
31,5	45,5	1	1	10 400	6 200	640	32 000	48 000

Spindle bearings

With ceramic balls

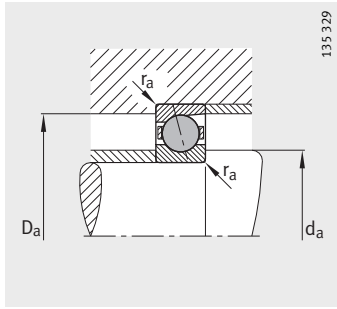


HCB719...-C, HCB70...-C,
HCB72...-C
 $\alpha = 15^\circ$

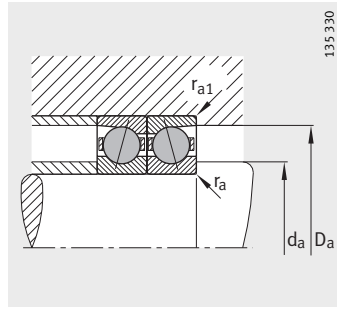


HCB719...-E, HCB70...-E,
HCB72...-E
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm							
Designation	Mass m ≈ kg	Dimensions					
		d	D	B	r min.	r ₁ min.	a ≈
HCB71906-C-T-P4S	0,05	30	47	9	0,3	0,3	10
HCB71906-E-T-P4S	0,05	30	47	9	0,3	0,3	14
HCB7006-C-T-P4S	0,11	30	55	13	1	1	12
HCB7006-E-T-P4S	0,11	30	55	13	1	1	16
HCB7206-C-T-P4S	0,19	30	62	16	1	1	14
HCB7206-E-T-P4S	0,19	30	62	16	1	1	19
HCB71907-C-T-P4S	0,08	35	55	10	0,6	0,6	11
HCB71907-E-T-P4S	0,08	35	55	10	0,6	0,6	16
HCB7007-C-T-P4S	0,15	35	62	14	1	1	14
HCB7007-E-T-P4S	0,15	35	62	14	1	1	18
HCB7207-C-T-P4S	0,28	35	72	17	1,1	1,1	16
HCB7207-E-T-P4S	0,28	35	72	17	1,1	1,1	21
HCB71908-C-T-P4S	0,11	40	62	12	0,6	0,6	13
HCB71908-E-T-P4S	0,11	40	62	12	0,6	0,6	18
HCB7008-C-T-P4S	0,19	40	68	15	1	1	–
HCB7008-E-T-P4S	0,19	40	68	15	1	1	–
HCB7208-C-T-P4S	0,37	40	80	18	1,1	1,1	17
HCB7208-E-T-P4S	0,37	40	80	18	1,1	1,1	23
HCB71909-C-T-P4S	0,13	45	68	12	0,6	0,6	14
HCB71909-E-T-P4S	0,13	45	68	12	0,6	0,6	19
HCB7009-C-T-P4S	0,23	45	75	16	1	1	16
HCB7009-E-T-P4S	0,23	45	75	16	1	1	22
HCB7209-C-T-P4S	0,41	45	85	19	1,1	1,1	18
HCB7209-E-T-P4S	0,41	45	85	19	1,1	1,1	25
HCB71910-C-T-P4S	0,13	50	72	12	0,6	0,6	14
HCB71910-E-T-P4S	0,13	50	72	12	0,6	0,6	20
HCB7010-C-T-P4S	0,25	50	80	16	1	1	17
HCB7010-E-T-P4S	0,25	50	80	16	1	1	23
HCB7210-C-T-P4S	0,46	50	90	20	1,1	1,1	19
HCB7210-E-T-P4S	0,46	50	90	20	1,1	1,1	26
HCB71911-C-T-P4S	0,18	55	80	13	1	1	16
HCB71911-E-T-P4S	0,18	55	80	13	1	1	22
HCB7011-C-T-P4S	0,37	55	90	18	1,1	1,1	19
HCB7011-E-T-P4S	0,37	55	90	18	1,1	1,1	26
HCB7211-C-T-P4S	0,61	55	100	21	1,5	1,5	21
HCB7211-E-T-P4S	0,61	55	100	21	1,5	1,5	29



Mounting dimensions



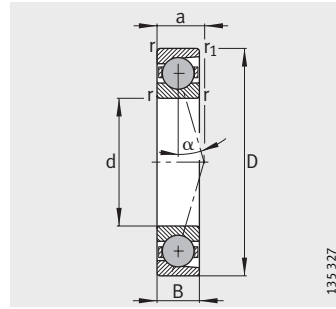
Mounting dimensions



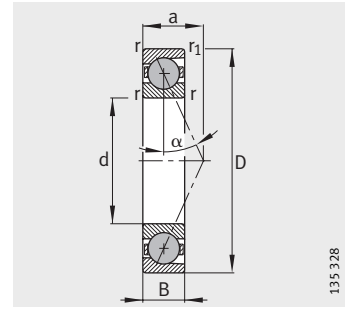
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d _a h12	D _a H12	r _a max.	r _{a1} max.	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G grease min ⁻¹	n _G oil min ⁻¹
34	43,5	0,3	0,3	6 000	4 650	340	36 000	53 000
34	43,5	0,3	0,3	5 600	4 400	320	32 000	48 000
36	49	1	0,3	10 400	7 200	530	32 000	48 000
36	49	1	0,3	10 000	6 800	510	28 000	43 000
37,5	54,5	1	1	16 000	10 200	1 090	30 000	45 000
37,5	54,5	1	1	15 300	9 800	1 040	26 000	40 000
40	51,5	0,6	0,6	8 150	6 550	495	32 000	48 000
40	51,5	0,6	0,6	7 650	6 300	470	26 000	40 000
41	56	1	0,3	13 200	9 500	700	28 000	43 000
41	56	1	0,3	12 500	9 000	670	24 000	38 000
44	63	1	1	17 600	8 800	1 330	26 000	40 000
44	63	1	1	16 600	8 500	1 270	22 000	36 000
45	58,5	0,6	0,6	12 200	9 650	720	28 000	43 000
45	58,5	0,6	0,6	11 400	9 150	680	24 000	38 000
46	62	1	0,3	14 300	11 000	820	26 000	40 000
46	62	1	0,3	13 400	10 600	780	22 000	36 000
48	72	1	1	22 000	15 600	1 170	24 000	38 000
48	72	1	1	21 200	15 000	1 120	20 000	34 000
50	63,5	0,6	0,6	12 900	10 800	820	24 000	38 000
50	63,5	0,6	0,6	12 200	10 400	770	22 000	36 000
51	69	1	0,3	19 000	14 600	1 090	24 000	38 000
51	69	1	0,3	18 000	14 000	1 030	20 000	34 000
52,5	78	1	1	23 200	12 200	1 290	22 000	36 000
52,5	78	1	1	22 000	11 600	1 230	18 000	30 000
55	67,5	0,6	0,6	13 200	11 600	870	22 000	36 000
55	67,5	0,6	0,6	12 200	11 000	820	20 000	34 000
56	74	1	0,3	19 600	16 000	1 170	22 000	36 000
56	74	1	0,3	18 600	15 300	1 120	18 000	30 000
57	83	1	1	30 000	22 000	1 630	20 000	34 000
57	83	1	1	28 000	21 200	1 560	17 000	28 000
60	75,5	0,6	0,6	16 000	14 300	1 050	20 000	34 000
60	75,5	0,6	0,6	15 000	13 400	1 000	18 000	30 000
62	83	1	0,6	26 000	21 600	1 610	19 000	32 000
62	83	1	0,6	25 000	20 400	1 530	17 000	28 000
63	92	1,5	1,5	32 000	18 300	1 910	18 000	30 000
63	92	1,5	1,5	30 500	17 600	1 820	15 000	24 000

Spindle bearings

With ceramic balls

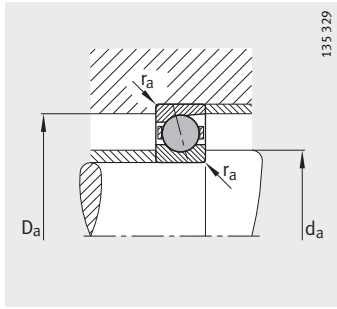


HCB719...-C, HCB70...-C,
HCB72...-C
 $\alpha = 15^\circ$

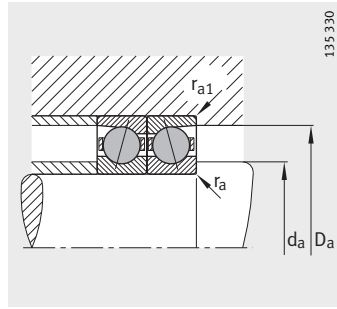


HCB719...-E, HCB70...-E,
HCB72...-E
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm							
Designation	Mass m ≈ kg	Dimensions					
		d	D	B	r min.	r ₁ min.	a ≈
HCB71912-C-T-P4S	0,19	60	85	13	1	1	16
HCB71912-E-T-P4S	0,19	60	85	13	1	1	23
HCB7012-C-T-P4S	0,4	60	95	18	1,1	1,1	19
HCB7012-E-T-P4S	0,4	60	95	18	1,1	1,1	27
HCB7212-C-T-P4S	0,8	60	110	22	1,5	1,5	23
HCB7212-E-T-P4S	0,8	60	110	22	1,5	1,5	31
HCB71913-C-T-P4S	0,2	65	90	13	1	1	17
HCB71913-E-T-P4S	0,2	65	90	13	1	1	25
HCB7013-C-T-P4S	0,42	65	100	18	1,1	1,1	20
HCB7013-E-T-P4S	0,42	65	100	18	1,1	1,1	28
HCB7213-C-T-P4S	1,02	65	120	23	1,5	1,5	24
HCB7213-E-T-P4S	1,02	65	120	23	1,5	1,5	33
HCB71914-C-T-P4S	0,33	70	100	16	1	1	19
HCB71914-E-T-P4S	0,33	70	100	16	1	1	28
HCB7014-C-T-P4S	0,59	70	110	20	1,1	1,1	22
HCB7014-E-T-P4S	0,59	70	110	20	1,1	1,1	31
HCB7214-C-T-P4S	1,12	70	125	24	1,5	1,5	25
HCB7214-E-T-P4S	1,12	70	125	24	1,5	1,5	35
HCB71915-C-T-P4S	0,35	75	105	16	1	1	20
HCB71915-E-T-P4S	0,35	75	105	16	1	1	29
HCB7015-C-T-P4S	0,62	75	115	20	1,1	1,1	23
HCB7015-E-T-P4S	0,62	75	115	20	1,1	1,1	32
HCB7215-C-T-P4S	1,21	75	130	25	1,5	1,5	26
HCB7215-E-T-P4S	1,21	75	130	25	1,5	1,5	36
HCB71916-C-T-P4S	0,37	80	110	16	1	1	21
HCB71916-E-T-P4S	0,37	80	110	16	1	1	30
HCB7016-C-T-P4S	0,84	80	125	22	1,1	1,1	25
HCB7016-E-T-P4S	0,84	80	125	22	1,1	1,1	35
HCB71917-C-T-P4S	0,53	85	120	18	1,1	1,1	23
HCB71917-E-T-P4S	0,53	85	120	18	1,1	1,1	33
HCB7017-C-T-P4S	0,88	85	130	22	1,1	1,1	25
HCB7017-E-T-P4S	0,88	85	130	22	1,1	1,1	36
HCB71918-C-T-P4S	0,55	90	125	18	1,1	1,1	23
HCB71918-E-T-P4S	0,55	90	125	18	1,1	1,1	34
HCB7018-C-T-P4S	1,15	90	140	24	1,5	1,5	27
HCB7018-E-T-P4S	1,15	90	140	24	1,5	1,5	39



Mounting dimensions



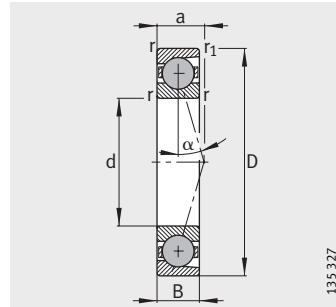
Mounting dimensions



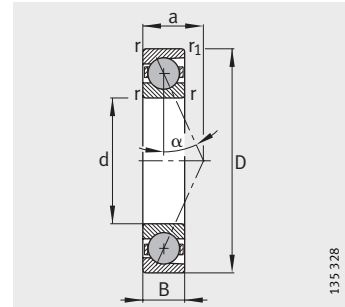
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_r N	stat. C_{Or} N	C_{ur} N	n_G grease min^{-1}	n_G oil min^{-1}
65	80,5	0,6	0,6	16 600	16 000	1 170	19 000	32 000
65	80,5	0,6	0,6	15 600	15 000	1 100	17 000	28 000
67	88	1	0,6	27 000	23 200	1 730	18 000	30 000
67	88	1	0,6	25 500	22 000	1 650	15 000	24 000
69,5	101,5	1,5	1,5	38 000	30 500	2 260	16 000	26 000
69,5	101,5	1,5	1,5	36 000	29 000	2 150	14 000	22 000
70	85,5	0,6	0,6	17 000	16 600	1 230	18 000	30 000
70	85,5	0,6	0,6	16 000	16 000	1 160	15 000	24 000
72	93	1	0,6	27 500	24 500	1 850	17 000	28 000
72	93	1	0,6	26 000	23 600	1 760	15 000	24 000
75,5	109,5	1,5	1,5	46 500	37 500	2 800	15 000	24 000
75,5	109,5	1,5	1,5	44 000	36 000	2 650	13 000	20 000
76	94,5	0,6	0,6	23 200	22 800	1 670	16 000	26 000
76	94,5	0,6	0,6	22 000	21 600	1 580	14 000	22 000
77	102	1	0,6	34 000	30 000	2 230	16 000	26 000
77	102	1	0,6	32 500	29 000	2 120	13 000	20 000
80	115	1,5	1,5	48 000	40 500	3 000	14 000	22 000
80	115	1,5	1,5	45 500	39 000	2 900	12 000	19 000
81	99,5	0,6	0,6	23 600	24 000	1 760	16 000	26 000
81	99,5	0,6	0,6	22 000	22 800	1 670	13 000	20 000
82	107	1	0,6	35 500	32 500	2 380	15 000	24 000
82	107	1	0,6	33 500	30 500	2 260	13 000	20 000
85	120	1,5	1,5	50 000	44 000	3 200	14 000	22 000
85	120	1,5	1,5	47 500	41 500	3 050	12 000	19 000
86	104	0,6	0,6	24 000	25 000	1 850	15 000	24 000
86	104	0,6	0,6	22 400	23 600	1 750	13 000	20 000
88	117	1	0,6	44 000	40 500	2 950	14 000	22 000
88	117	1	0,6	41 500	39 000	2 800	12 000	19 000
92	114	0,6	0,6	31 000	32 500	2 400	13 000	20 000
92	114	0,6	0,6	29 000	30 500	2 270	12 000	19 000
93	122	1	0,6	45 000	43 000	3 050	13 000	20 000
93	122	1	0,6	42 500	40 500	2 900	11 000	18 000
97	119	0,6	0,6	31 500	34 000	2 460	13 000	20 000
97	119	0,6	0,6	30 000	32 000	2 330	11 000	18 000
100	131	1,5	0,6	53 000	50 000	3 450	12 000	19 000
100	131	1,5	0,6	50 000	47 500	3 300	10 000	17 000

Spindle bearings

With ceramic balls



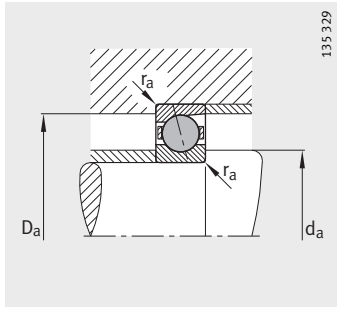
HCB719...-C, HCB70...-C,
 $\alpha = 15^\circ$



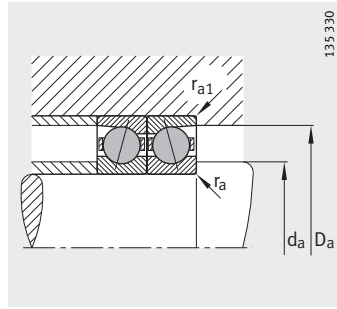
HCB719...-E, HCB70...-E,
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈ kg	Dimensions					
		d	D	B	r min.	r ₁ min.	a ≈
HCB71919-C-T-P4S	0,58	95	130	18	1,1	1,1	24
HCB71919-E-T-P4S	0,58	95	130	18	1,1	1,1	35
HCB7019-C-T-P4S	1,2	95	145	24	1,5	1,5	28
HCB7019-E-T-P4S	1,2	95	145	24	1,5	1,5	40
HCB71920-C-T-P4S	0,79	100	140	20	1,1	1,1	26
HCB71920-E-T-P4S	0,79	100	140	20	1,1	1,1	38
HCB7020-C-T-P4S	1,25	100	150	24	1,5	1,5	29
HCB7020-E-T-P4S	1,25	100	150	24	1,5	1,5	41
HCB71921-C-T-P4S	0,82	105	145	20	1,1	1,1	27
HCB71921-E-T-P4S	0,82	105	145	20	1,1	1,1	39
HCB7021-C-T-P4S	1,49	105	160	26	2	2	31
HCB7021-E-T-P4S	1,49	105	160	26	2	2	44
HCB71922-C-T-P4S	0,85	110	150	20	1,1	1,1	27
HCB71922-E-T-P4S	0,85	110	150	20	1,1	1,1	40
HCB7022-C-T-P4S	1,95	110	170	28	2	2	33
HCB7022-E-T-P4S	1,95	110	170	28	2	2	47
HCB71924-C-T-P4S	1,12	120	165	22	1,1	1,1	30
HCB71924-E-T-P4S	1,12	120	165	22	1,1	1,1	44
HCB7024-C-T-P4S	2,12	120	180	28	2	2	34
HCB7024-E-T-P4S	2,12	120	180	28	2	2	49
HCB71926-C-T-P4S	1,49	130	180	24	1,5	1,5	33
HCB71926-E-T-P4S	1,49	130	180	24	1,5	1,5	48
HCB7026-C-T-P4S	3,21	130	200	33	2	2	39
HCB7026-E-T-P4S	3,21	130	200	33	2	2	55
HCB71928-C-T-P4S	1,65	140	190	24	1,5	1,5	34
HCB71928-E-T-P4S	1,65	140	190	24	1,5	1,5	50
HCB7028-C-T-P4S	3,34	140	210	33	2	2	40
HCB7028-E-T-P4S	3,34	140	210	33	2	2	57



Mounting dimensions



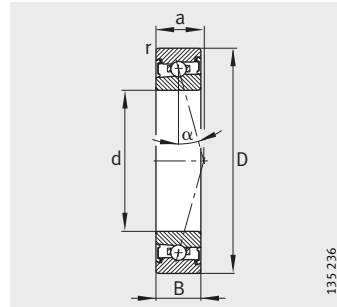
Mounting dimensions



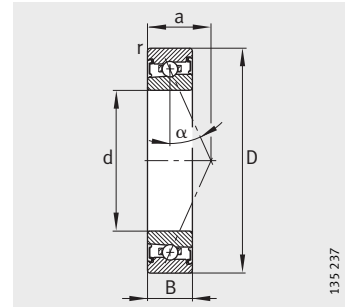
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d _a h12	D _a H12	r _a max.	r _{a1} max.	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G grease min ⁻¹	n _G oil min ⁻¹
102	124	0,6	0,6	32 000	35 500	2 500	12 000	19 000
102	124	0,6	0,6	30 500	33 500	2 380	10 000	17 000
105	136	1,5	0,6	54 000	53 000	3 600	11 000	18 000
105	136	1,5	0,6	51 000	51 000	3 450	9 500	16 000
107	133	0,6	0,6	40 500	44 000	2 950	11 000	18 000
107	133	0,6	0,6	38 000	42 500	2 800	9 500	16 000
110	141	1,5	0,6	56 000	56 000	3 750	11 000	18 000
110	141	1,5	0,6	53 000	53 000	3 550	9 000	15 000
112	138	0,6	0,6	40 000	45 000	2 950	11 000	18 000
112	138	0,6	0,6	38 000	42 500	2 800	9 000	15 000
116	150	2	1	57 000	60 000	3 850	10 000	17 000
116	150	2	1	54 000	57 000	3 650	8 500	14 000
117	143	0,6	0,6	40 500	46 500	3 000	10 000	17 000
117	143	0,6	0,6	39 000	44 000	2 850	9 000	15 000
121	159	2	1	75 000	76 500	4 750	9 500	16 000
121	159	2	1	72 000	72 000	4 500	8 000	13 000
128	157	0,6	0,6	51 000	58 500	3 600	9 000	15 000
128	157	0,6	0,6	48 000	55 000	3 450	8 000	13 000
131	169	2	1	78 000	81 500	4 900	8 500	14 000
131	169	2	1	73 500	76 500	4 650	7 500	12 000
139	171	0,6	0,6	60 000	69 500	4 100	8 500	14 000
139	171	0,6	0,6	45 500	53 000	3 200	7 000	11 000
142	189	2	1	100 000	104 000	6 100	7 500	12 000
142	189	2	1	95 000	98 000	5 800	6 700	10 000
149	181	0,6	0,6	62 000	76 500	4 350	7 500	12 000
149	181	0,6	0,6	47 500	57 000	3 350	6 700	10 000
152	199	2	1	102 000	110 000	6 300	7 000	11 000
152	199	2	1	96 500	104 000	5 900	6 300	9 500

High speed spindle bearings

With steel balls
Sealed

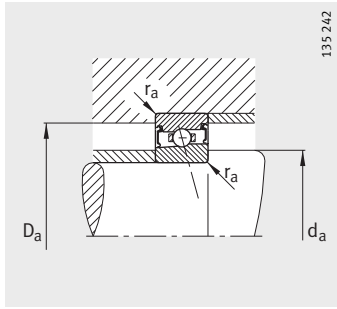


HSS719...-C, HSS70...-C
 $\alpha = 15^\circ$

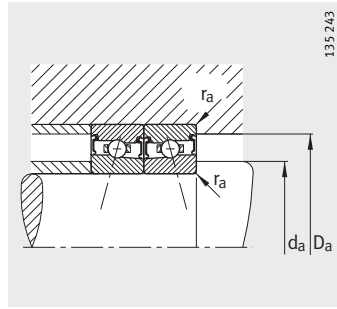


HSS719...-E, HSS70...-E
 $\alpha = 25^\circ$

Dimension table · Dimensions in mm						
Designation	Mass m ≈kg	Dimensions				
		d	D	B	r min.	a ≈
HSS71900-C-T-P4S	0,01	10	22	6	0,3	5
HSS71900-E-T-P4S	0,01	10	22	6	0,3	7
HSS7000-C-T-P4S	0,02	10	26	8	0,3	6
HSS7000-E-T-P4S	0,02	10	26	8	0,3	8
HSS71901-C-T-P4S	0,01	12	24	6	0,3	5
HSS71901-E-T-P4S	0,01	12	24	6	0,3	7
HSS7001-C-T-P4S	0,022	12	28	8	0,3	7
HSS7001-E-T-P4S	0,022	12	28	8	0,3	9
HSS71902-C-T-P4S	0,015	15	28	7	0,3	6
HSS71902-E-T-P4S	0,015	15	28	7	0,3	9
HSS7002-C-T-P4S	0,033	15	32	9	0,3	8
HSS7002-E-T-P4S	0,033	15	32	9	0,3	10
HSS71903-C-T-P4S	0,017	17	30	7	0,3	7
HSS71903-E-T-P4S	0,017	17	30	7	0,3	9
HSS7003-C-T-P4S	0,044	17	35	10	0,3	9
HSS7003-E-T-P4S	0,044	17	35	10	0,3	11
HSS71904-C-T-P4S	0,041	20	37	9	0,3	8
HSS71904-E-T-P4S	0,041	20	37	9	0,3	11
HSS7004-C-T-P4S	0,074	20	42	12	0,6	10
HSS7004-E-T-P4S	0,074	20	42	12	0,6	13
HSS71905-C-T-P4S	0,047	25	42	9	0,3	9
HSS71905-E-T-P4S	0,047	25	42	9	0,3	12
HSS7005-C-T-P4S	0,085	25	47	12	0,6	11
HSS7005-E-T-P4S	0,085	25	47	12	0,6	14
HSS71906-C-T-P4S	0,047	30	47	9	0,3	10
HSS71906-E-T-P4S	0,047	30	47	9	0,3	14
HSS7006-C-T-P4S	0,121	30	55	13	1	12
HSS7006-E-T-P4S	0,121	30	55	13	1	16
HSS71907-C-T-P4S	0,076	35	55	10	0,6	11
HSS71907-E-T-P4S	0,076	35	55	10	0,6	16
HSS7007-C-T-P4S	0,166	35	62	14	1	14
HSS7007-E-T-P4S	0,166	35	62	14	1	18
HSS71908-C-T-P4S	0,122	40	62	12	0,6	13
HSS71908-E-T-P4S	0,122	40	62	12	0,6	18
HSS7008-C-T-P4S	0,208	40	68	15	1	15
HSS7008-E-T-P4S	0,208	40	68	15	1	20



Mounting dimensions



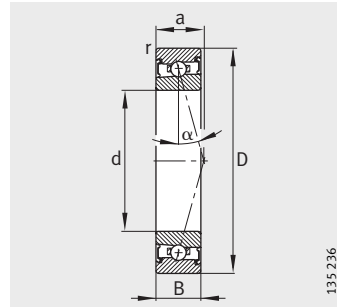
Mounting dimensions



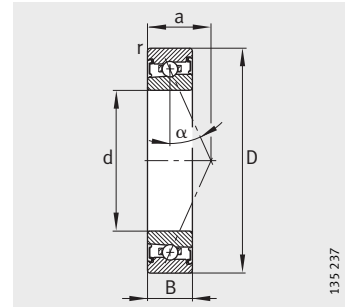
Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G grease min^{-1}
d_a h12	D_a H12	r_a max.	dyn. C_r N	stat. C_{0r} N		
13	19,5	0,3	1 960	1 100	67	90 000
13	19,5	0,3	1 860	1 040	64	75 000
14	22	0,3	2 750	1 600	97	80 000
14	22	0,3	2 600	1 500	92	67 000
15	21,5	0,3	2 040	1 200	74	80 000
15	21,5	0,3	1 930	1 140	71	67 000
16,5	24,5	0,3	2 700	1 630	99	70 000
16,5	24,5	0,3	2 550	1 530	94	60 000
18	25,5	0,3	2 800	1 760	107	67 000
18	25,5	0,3	2 650	1 660	102	56 000
19	29	0,3	3 750	2 450	152	60 000
19	29	0,3	3 550	2 320	145	50 000
20	27,5	0,3	2 900	1 900	116	60 000
20	27,5	0,3	2 700	1 800	110	50 000
21	32	0,3	3 800	2 650	165	53 000
21	32	0,3	3 650	2 500	157	45 000
24	33,5	0,3	3 900	2 850	178	50 000
24	33,5	0,3	3 750	2 700	168	43 000
25	37	0,6	6 200	4 550	280	45 000
25	37	0,6	5 850	4 300	265	38 000
29	38,5	0,3	4 250	3 350	212	43 000
29	38,5	0,3	4 000	3 150	201	36 000
30	42	0,6	6 300	4 900	305	38 000
30	42	0,6	6 000	4 650	285	34 000
34	43,5	0,3	6 400	5 200	320	36 000
34	43,5	0,3	6 000	4 900	305	32 000
36	49	1	8 800	7 100	435	32 000
36	49	1	8 300	6 700	415	28 000
40	51,5	0,6	6 950	6 200	390	32 000
40	51,5	0,6	6 550	5 850	370	26 000
41	56	1	9 300	8 300	510	28 000
41	56	1	8 800	7 800	485	24 000
45	58,5	0,6	7 200	6 950	445	28 000
45	58,5	0,6	6 800	6 400	420	24 000
46	62	1	10 000	9 300	590	26 000
46	62	1	9 300	8 650	560	22 000

High speed spindle bearings

With steel balls
Sealed

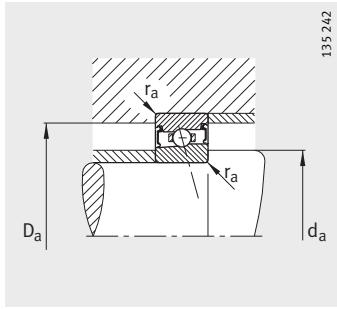


HSS719...-C, HSS70...-C
 $\alpha = 15^\circ$

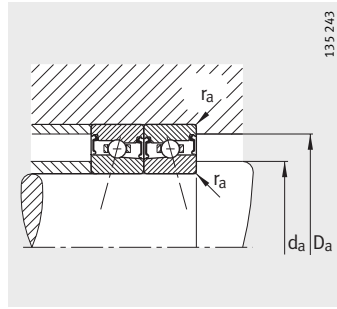


HSS719...-E, HSS70...-E
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm						
Designation	Mass m ≈kg	Dimensions				
		d	D	B	r min.	a ≈
HSS71909-C-T-P4S	0,132	45	68	12	0,6	14
HSS71909-E-T-P4S	0,132	45	68	12	0,6	19
HSS7009-C-T-P4S	0,273	45	75	16	1	16
HSS7009-E-T-P4S	0,272	45	75	16	1	22
HSS71910-C-T-P4S	0,133	50	72	12	0,6	14
HSS71910-E-T-P4S	0,133	50	72	12	0,6	20
HSS7010-C-T-P4S	0,296	50	80	16	1	17
HSS7010-E-T-P4S	0,295	50	80	16	1	23
HSS71911-C-T-P4S	0,198	55	80	13	1	16
HSS71911-E-T-P4S	0,198	55	80	13	1	22
HSS7011-C-T-P4S	0,411	55	90	18	1,1	19
HSS7011-E-T-P4S	0,41	55	90	18	1,1	26
HSS71912-C-T-P4S	0,22	60	85	13	1	16
HSS71912-E-T-P4S	0,22	60	85	13	1	23
HSS7012-C-T-P4S	0,453	60	95	18	1,1	19
HSS7012-E-T-P4S	0,453	60	95	18	1,1	27
HSS71913-C-T-P4S	0,226	65	90	13	1	17
HSS71913-E-T-P4S	0,226	65	90	13	1	25
HSS7013-C-T-P4S	0,468	65	100	18	1,1	20
HSS7013-E-T-P4S	0,468	65	100	18	1,1	28
HSS71914-C-T-P4S	0,354	70	100	16	1	19
HSS71914-E-T-P4S	0,353	70	100	16	1	28
HSS7014-C-T-P4S	0,644	70	110	20	1,1	22
HSS7014-E-T-P4S	0,643	70	110	20	1,1	31
HSS71915-C-T-P4S	0,38	75	105	16	1	20
HSS71915-E-T-P4S	0,379	75	105	16	1	29
HSS7015-C-T-P4S	0,68	75	115	20	1,1	23
HSS7015-E-T-P4S	0,679	75	115	20	1,1	32
HSS71916-C-T-P4S	0,385	80	110	16	1	21
HSS71916-E-T-P4S	0,385	80	110	16	1	30
HSS7016-C-T-P4S	0,931	80	125	22	1,1	25
HSS7016-E-T-P4S	0,929	80	125	22	1,1	35
HSS71917-C-T-P4S	0,58	85	120	18	1,1	23
HSS71917-E-T-P4S	0,579	85	120	18	1,1	33
HSS7017-C-T-P4S	0,975	85	130	22	1,1	25
HSS7017-E-T-P4S	0,974	85	130	22	1,1	36



Mounting dimensions



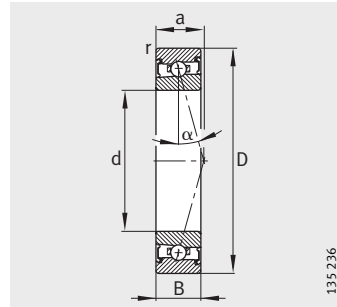
Mounting dimensions



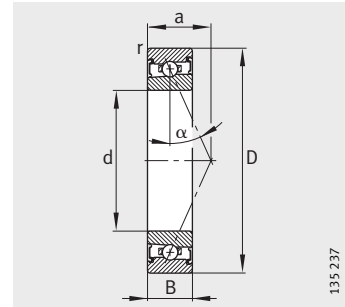
Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G grease min^{-1}
d_a h12	D_a H12	r_a max.	dyn. C_r N	stat. C_{0r} N		
50	63,5	0,6	10 000	9 650	610	24 000
50	63,5	0,6	9 500	9 000	580	22 000
51	69	1	12 900	12 200	770	24 000
51	69	1	12 200	11 400	730	20 000
55	67,5	0,6	10 400	10 200	670	22 000
55	67,5	0,6	9 800	9 650	630	20 000
56	74	1	13 400	13 200	840	22 000
56	74	1	12 500	12 200	790	18 000
60	75,5	0,6	13 400	13 700	870	20 000
60	75,5	0,6	12 700	12 700	830	18 000
62	83	1	18 600	19 000	1 180	19 000
62	83	1	17 600	17 600	1 120	17 000
65	80,5	0,6	14 000	14 600	940	19 000
65	80,5	0,6	13 200	13 400	890	17 000
67	88	1	19 300	20 000	1 280	18 000
67	88	1	18 300	19 000	1 210	15 000
70	85,5	0,6	14 300	15 300	1 010	18 000
70	85,5	0,6	13 400	14 300	960	15 000
72	93	1	20 000	21 600	1 380	17 000
72	93	1	19 000	20 000	1 310	15 000
76	94,5	0,6	18 300	20 000	1 330	16 000
76	94,5	0,6	17 300	18 600	1 250	14 000
77	102	1	26 000	28 000	1 770	16 000
77	102	1	24 500	26 000	1 670	13 000
81	99,5	0,6	19 000	21 200	1 420	16 000
81	99,5	0,6	17 600	20 000	1 340	13 000
82	107	1	26 500	29 000	1 850	15 000
82	107	1	25 000	27 000	1 740	13 000
86	104	0,6	21 200	24 000	1 590	15 000
86	104	0,6	19 600	22 400	1 500	13 000
88	117	1	31 500	34 500	2 220	14 000
88	117	1	30 000	32 500	2 100	12 000
92	114	0,6	22 000	26 000	1 720	14 000
92	114	0,6	20 400	24 500	1 630	12 000
93	122	1	32 000	36 000	2 250	13 000
93	122	1	30 000	33 500	2 130	11 000

High speed spindle bearings

With steel balls
Sealed



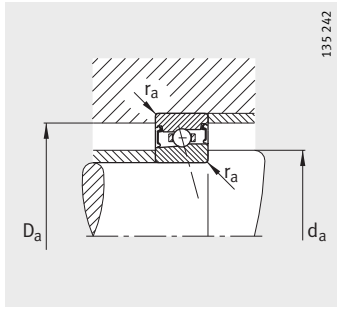
HSS719...-C, HSS70...-C
 $\alpha = 15^\circ$



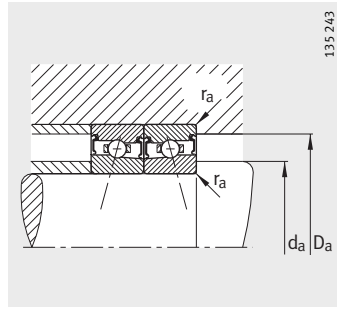
HSS719...-E, HSS70...-E
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions				
		d	D	B	r min.	a ≈
HSS71918-C-T-P4S	0,589	90	125	18	1,1	23
HSS71918-E-T-P4S	0,588	90	125	18	1,1	34
HSS7018-C-T-P4S	1,28	90	140	24	1,5	27
HSS7018-E-T-P4S	1,27	90	140	24	1,5	39
HSS71919-C-T-P4S	0,615	95	130	18	1,1	24
HSS71919-E-T-P4S	0,614	95	130	18	1,1	35
HSS7019-C-T-P4S	1,33	95	145	24	1,5	28
HSS7019-E-T-P4S	1,33	95	145	24	1,5	40
HSS71920-C-T-P4S	0,861	100	140	20	1,1	26
HSS71920-E-T-P4S	0,859	100	140	20	1,1	38
HSS7020-C-T-P4S	1,39	100	150	24	1,5	29
HSS7020-E-T-P4S	1,38	100	150	24	1,5	41
HSS71921-C-T-P4S	0,897	105	145	20	1,1	27
HSS71921-E-T-P4S	0,87	105	145	20	1,1	39
HSS7021-C-T-P4S	1,71	105	160	26	2	31
HSS7021-E-T-P4S	1,71	105	160	26	2	44
HSS71922-C-T-P4S	0,933	110	150	20	1,1	27
HSS71922-E-T-P4S	0,932	110	150	20	1,1	40
HSS7022-C-T-P4S	2,17	110	170	28	2	33
HSS7022-E-T-P4S	2,17	110	170	28	2	47
HSS71924-C-T-P4S	1,3	120	165	22	1,1	30
HSS71924-E-T-P4S	1,3	120	165	22	1,1	44
HSS7024-C-T-P4S	2,33	120	180	28	2	34
HSS7024-E-T-P4S	2,33	120	180	28	2	49
HSS71926-C-T-P4S	1,71	130	180	24	1,5	33
HSS71926-E-T-P4S	1,71	130	180	24	1,5	48
HSS7026-C-T-P4S	3,52	130	200	33	2	39
HSS7026-E-T-P4S	3,51	130	200	33	2	55



Mounting dimensions



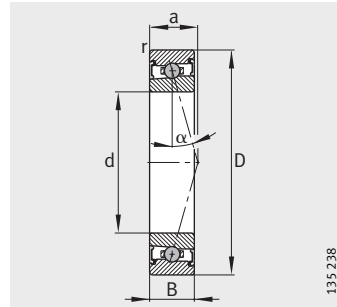
Mounting dimensions



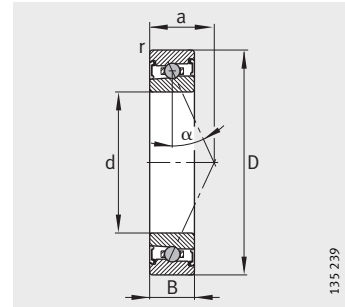
Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G grease min^{-1}
d_a h12	D_a H12	r_a max.	dyn. C_r N	stat. C_{0r} N		
97	119	0,6	23 600	28 500	1 860	13 000
97	119	0,6	22 400	26 500	1 750	11 000
100	131	1,5	37 500	43 000	2 550	12 000
100	131	1,5	35 500	40 000	2 410	10 000
102	124	0,6	24 500	30 000	1 930	12 000
102	124	0,6	22 800	28 000	1 820	10 000
105	136	1,5	38 000	44 000	2 600	11 000
105	136	1,5	35 500	41 500	2 450	9 500
107	133	0,6	29 000	36 000	2 200	11 000
107	133	0,6	27 500	33 500	2 080	9 500
110	141	1,5	38 000	45 500	2 650	11 000
110	141	1,5	36 000	42 500	2 490	9 000
112	138	0,6	30 000	38 000	2 280	11 000
112	138	0,6	28 000	35 500	2 150	9 000
116	150	2	49 000	58 500	3 250	10 000
116	150	2	46 500	54 000	3 050	8 500
117	143	0,6	34 500	44 000	2 550	10 000
117	143	0,6	32 500	40 500	2 430	9 000
121	159	2	50 000	60 000	3 300	9 500
121	159	2	46 500	56 000	3 100	8 000
128	157	0,6	36 500	48 000	2 750	9 000
128	157	0,6	34 000	45 000	2 600	8 000
131	169	2	51 000	63 000	3 400	8 500
131	169	2	48 000	58 500	3 200	7 500
139	171	0,6	41 500	56 000	3 000	8 500
139	171	0,6	39 000	52 000	2 850	7 000
142	189	2	65 500	83 000	4 250	7 500
142	189	2	62 000	78 000	4 000	6 700

High speed spindle bearings

With ceramic balls
Sealed

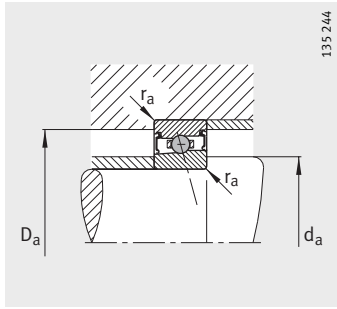


HCS719...-C, HCS70...-C
 $\alpha = 15^\circ$

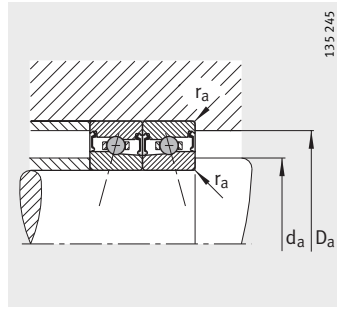


HCS719...-E, HCS70...-E
 $\alpha = 25^\circ$

Dimension table · Dimensions in mm						
Designation	Mass m ≈kg	Dimensions				
		d	D	B	r min.	a ≈
HCS71900-C-T-P4S	0,01	10	22	6	0,3	5
HCS71900-E-T-P4S	0,009	10	22	6	0,3	7
HCS7000-C-T-P4S	0,02	10	26	8	0,3	6
HCS7000-E-T-P4S	0,02	10	26	8	0,3	8
HCS71901-C-T-P4S	0,01	12	24	6	0,3	5
HCS71901-E-T-P4S	0,01	12	24	6	0,3	7
HCS7001-C-T-P4S	0,022	12	28	8	0,3	7
HCS7001-E-T-P4S	0,022	12	28	8	0,3	9
HCS71902-C-T-P4S	0,015	15	28	7	0,3	6
HCS71902-E-T-P4S	0,015	15	28	7	0,3	9
HCS7002-C-T-P4S	0,033	15	32	9	0,3	8
HCS7002-E-T-P4S	0,033	15	32	9	0,3	10
HCS71903-C-T-P4S	0,017	17	30	7	0,3	7
HCS71903-E-T-P4S	0,017	17	30	7	0,3	9
HCS7003-C-T-P4S	0,044	17	35	10	0,3	9
HCS7003-E-T-P4S	0,044	17	35	10	0,3	11
HCS71904-C-T-P4S	0,041	20	37	9	0,3	8
HCS71904-E-T-P4S	0,041	20	37	9	0,3	11
HCS7004-C-T-P4S	0,074	20	42	12	0,6	10
HCS7004-E-T-P4S	0,074	20	42	12	0,6	13
HCS71905-C-T-P4S	0,047	25	42	9	0,3	9
HCS71905-E-T-P4S	0,047	25	42	9	0,3	12
HCS7005-C-T-P4S	0,085	25	47	12	0,6	11
HCS7005-E-T-P4S	0,085	25	47	12	0,6	14
HCS71906-C-T-P4S	0,047	30	47	9	0,3	10
HCS71906-E-T-P4S	0,047	30	47	9	0,3	14
HCS7006-C-T-P4S	0,123	30	55	13	1	12
HCS7006-E-T-P4S	0,123	30	55	13	1	16
HCS71907-C-T-P4S	0,076	35	55	10	0,6	11
HCS71907-E-T-P4S	0,076	35	55	10	0,6	16
HCS7007-C-T-P4S	0,168	35	62	14	1	14
HCS7007-E-T-P4S	0,168	35	62	14	1	18
HCS71908-C-T-P4S	0,122	40	62	12	0,6	13
HCS71908-E-T-P4S	0,122	40	62	12	0,6	18
HCS7008-C-T-P4S	0,211	40	68	15	1	15
HCS7008-E-T-P4S	0,211	40	68	15	1	20



Mounting dimensions



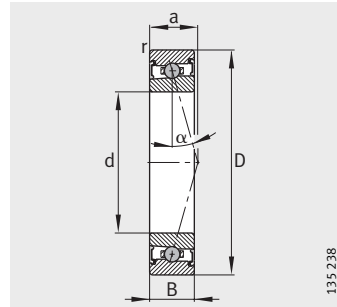
Mounting dimensions



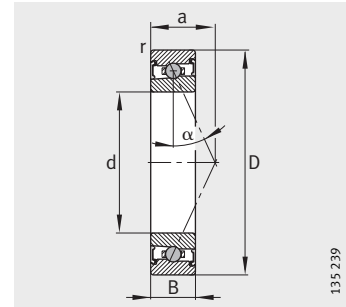
Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G grease min^{-1}
d_a h12	D_a H12	r_a max.	dyn. C_r N	stat. C_{0r} N		
13	19,5	0,3	1 370	765	47,5	100 000
13	19,5	0,3	1 290	720	45,5	85 000
14	22	0,3	1 900	1 100	68	90 000
14	22	0,3	1 800	1 060	65	75 000
15	21,5	0,3	1 400	830	53	90 000
15	21,5	0,3	1 340	800	50	75 000
16,5	24,5	0,3	1 860	1 120	70	80 000
16,5	24,5	0,3	1 760	1 080	67	70 000
18	25,5	0,3	1 930	1 220	76	75 000
18	25,5	0,3	1 830	1 160	72	63 000
19	29	0,3	2 600	1 700	108	70 000
19	29	0,3	2 450	1 600	103	60 000
20	27,5	0,3	2 000	1 340	82	70 000
20	27,5	0,3	1 900	1 270	78	60 000
21	32	0,3	2 650	1 830	117	63 000
21	32	0,3	2 500	1 730	111	53 000
24	33,5	0,3	2 700	1 960	126	56 000
24	33,5	0,3	2 550	1 860	119	48 000
25	37	0,6	4 300	3 200	198	53 000
25	37	0,6	4 050	3 000	188	45 000
29	38,5	0,3	2 900	2 360	150	48 000
29	38,5	0,3	2 750	2 200	142	40 000
30	42	0,6	4 300	3 450	214	45 000
30	42	0,6	4 050	3 250	203	38 000
34	43,5	0,3	4 400	3 650	227	43 000
34	43,5	0,3	4 150	3 450	215	36 000
36	49	1	6 000	4 900	310	38 000
36	49	1	5 700	4 650	295	32 000
40	51,5	0,6	4 800	4 400	275	36 000
40	51,5	0,6	4 500	4 050	260	30 000
41	56	1	6 400	5 850	365	34 000
41	56	1	6 100	5 400	345	28 000
45	58,5	0,6	5 000	4 800	315	32 000
45	58,5	0,6	4 750	4 500	295	28 000
46	62	1	6 800	6 550	415	30 000
46	62	1	6 400	6 100	395	26 000

High speed spindle bearings

With ceramic balls
Sealed

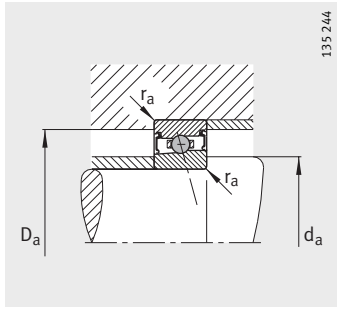


HCS719...-C, HCS70...-C
 $\alpha = 15^\circ$

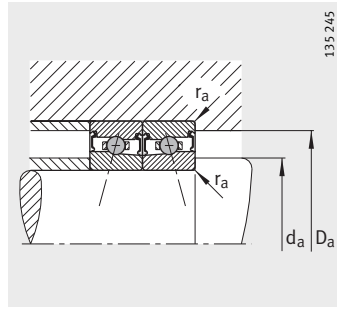


HCS719...-E, HCS70...-E
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm						
Designation	Mass m ≈kg	Dimensions				
		d	D	B	r min.	a ≈
HCS71909-C-T-P4S	0,135	45	68	12	0,6	14
HCS71909-E-T-P4S	0,135	45	68	12	0,6	19
HCS7009-C-T-P4S	0,248	45	75	16	1	16
HCS7009-E-T-P4S	0,247	45	75	16	1	22
HCS71910-C-T-P4S	0,136	50	72	12	0,6	14
HCS71910-E-T-P4S	0,136	50	72	12	0,6	20
HCS7010-C-T-P4S	0,269	50	80	16	1	17
HCS7010-E-T-P4S	0,268	50	80	16	1	23
HCS71911-C-T-P4S	0,17	55	80	13	1	16
HCS71911-E-T-P4S	0,17	55	80	13	1	22
HCS7011-C-T-P4S	0,348	55	90	18	1,1	19
HCS7011-E-T-P4S	0,347	55	90	18	1,1	26
HCS71912-C-T-P4S	0,19	60	85	13	1	16
HCS71912-E-T-P4S	0,19	60	85	13	1	23
HCS7012-C-T-P4S	0,388	60	95	18	1,1	19
HCS7012-E-T-P4S	0,388	60	95	18	1,1	27
HCS71913-C-T-P4S	0,194	65	90	13	1	17
HCS71913-E-T-P4S	0,194	65	90	13	1	25
HCS7013-C-T-P4S	0,402	65	100	18	1,1	20
HCS7013-E-T-P4S	0,402	65	100	18	1,1	28
HCS71914-C-T-P4S	0,322	70	100	16	1	19
HCS71914-E-T-P4S	0,321	70	100	16	1	28
HCS7014-C-T-P4S	0,611	70	110	20	1,1	22
HCS7014-E-T-P4S	0,61	70	110	20	1,1	31
HCS71915-C-T-P4S	0,347	75	105	16	1	20
HCS71915-E-T-P4S	0,346	75	105	16	1	29
HCS7015-C-T-P4S	0,645	75	115	20	1,1	23
HCS7015-E-T-P4S	0,644	75	115	20	1,1	32
HCS71916-C-T-P4S	0,317	80	110	16	1	21
HCS71916-E-T-P4S	0,317	80	110	16	1	30
HCS7016-C-T-P4S	0,873	80	125	22	1,1	25
HCS7016-E-T-P4S	0,871	80	125	22	1,1	35
HCS71917-C-T-P4S	0,512	85	120	18	1,1	23
HCS71917-E-T-P4S	0,511	85	120	18	1,1	33
HCS7017-C-T-P4S	0,916	85	130	22	1,1	25
HCS7017-E-T-P4S	0,915	85	130	22	1,1	36



Mounting dimensions



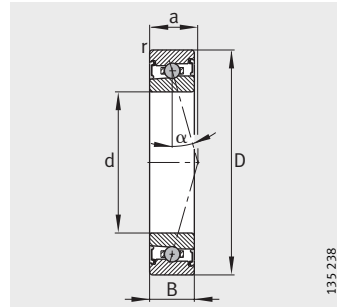
Mounting dimensions



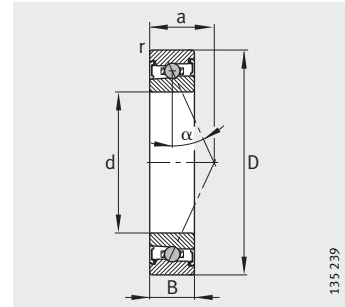
Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G grease min^{-1}
d_a h12	D_a H12	r_a max.	dyn. C_r N	stat. C_{0r} N		
50	63,5	0,6	6 950	6 700	435	28 000
50	63,5	0,6	6 550	6 300	410	24 000
51	69	1	8 800	8 500	550	26 000
51	69	1	8 300	8 000	520	24 000
55	67,5	0,6	7 100	7 200	470	26 000
55	67,5	0,6	6 700	6 700	445	22 000
56	74	1	9 150	9 150	590	24 000
56	74	1	8 650	8 500	560	22 000
60	75,5	0,6	9 300	9 500	620	24 000
60	75,5	0,6	8 800	8 800	590	20 000
62	83	1	12 900	13 200	840	22 000
62	83	1	12 200	12 200	790	19 000
65	80,5	0,6	9 650	10 000	670	22 000
65	80,5	0,6	9 000	9 500	630	19 000
67	88	1	13 400	14 000	910	20 000
67	88	1	12 700	13 200	860	18 000
70	85,5	0,6	9 800	10 800	720	20 000
70	85,5	0,6	9 300	10 000	680	18 000
72	93	1	13 700	15 000	980	20 000
72	93	1	12 900	14 000	930	17 000
76	94,5	0,6	12 700	14 000	940	19 000
76	94,5	0,6	12 000	13 200	890	16 000
77	102	1	18 000	19 600	1 250	18 000
77	102	1	17 000	18 300	1 190	15 000
81	99,5	0,6	12 900	15 000	1 010	18 000
81	99,5	0,6	12 200	13 700	950	15 000
82	107	1	18 300	20 000	1 310	17 000
82	107	1	17 300	18 600	1 240	15 000
86	104	0,6	14 600	16 600	1 130	17 000
86	104	0,6	13 700	15 600	1 060	15 000
88	117	1	21 600	24 500	1 570	16 000
88	117	1	20 400	22 800	1 480	13 000
92	114	0,6	15 000	18 000	1 220	16 000
92	114	0,6	14 300	17 000	1 150	13 000
93	122	1	22 000	25 000	1 590	15 000
93	122	1	20 800	23 200	1 510	13 000

High speed spindle bearings

With ceramic balls
Sealed

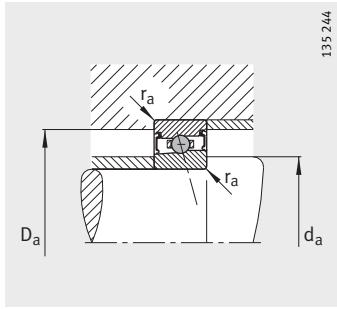


HCS719...-C, HCS70...-C
 $\alpha = 15^\circ$

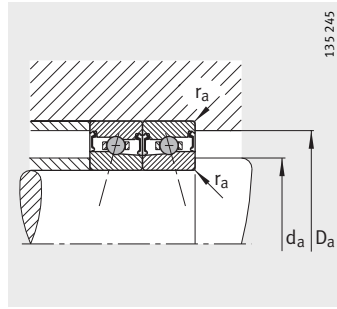


HCS719...-E, HCS70...-E
 $\alpha = 25^\circ$

Dimension table (continued) · Dimensions in mm						
Designation	Mass m ≈kg	Dimensions				
		d	D	B	r min.	a ≈
HCS71918-C-T-P4S	0,588	90	125	18	1,1	23
HCS71918-E-T-P4S	0,587	90	125	18	1,1	34
HCS7018-C-T-P4S	1,19	90	140	24	1,5	27
HCS7018-E-T-P4S	1,18	90	140	24	1,5	39
HCS71919-C-T-P4S	0,615	95	130	18	1,1	24
HCS71919-E-T-P4S	0,614	95	130	18	1,1	35
HCS7019-C-T-P4S	1,24	95	145	24	1,5	28
HCS7019-E-T-P4S	1,24	95	145	24	1,5	40
HCS71920-C-T-P4S	0,818	100	140	20	1,1	26
HCS71920-E-T-P4S	0,816	100	140	20	1,1	38
HCS7020-C-T-P4S	1,29	100	150	24	1,5	29
HCS7020-E-T-P4S	1,29	100	150	24	1,5	41
HCS71921-C-T-P4S	0,851	105	145	20	1,1	27
HCS71921-E-T-P4S	0,85	105	145	20	1,1	39
HCS7021-C-T-P4S	1,59	105	160	26	2	31
HCS7021-E-T-P4S	1,59	105	160	26	2	44
HCS71922-C-T-P4S	0,859	110	150	20	1,1	27
HCS71922-E-T-P4S	0,858	110	150	20	1,1	40
HCS7022-C-T-P4S	2,05	110	170	28	2	33
HCS7022-E-T-P4S	2,05	110	170	28	2	47
HCS71924-C-T-P4S	1,22	120	165	22	1,1	30
HCS71924-E-T-P4S	1,22	120	165	22	1,1	44
HCS7024-C-T-P4S	2,2	120	180	28	2	34
HCS7024-E-T-P4S	2,2	120	180	28	2	49
HCS71926-C-T-P4S	1,59	130	180	24	1,5	33
HCS71926-E-T-P4S	1,59	130	180	24	1,5	48
HCS7026-C-T-P4S	3,52	130	200	33	2	39
HCS7026-E-T-P4S	3,51	130	200	33	2	55



Mounting dimensions

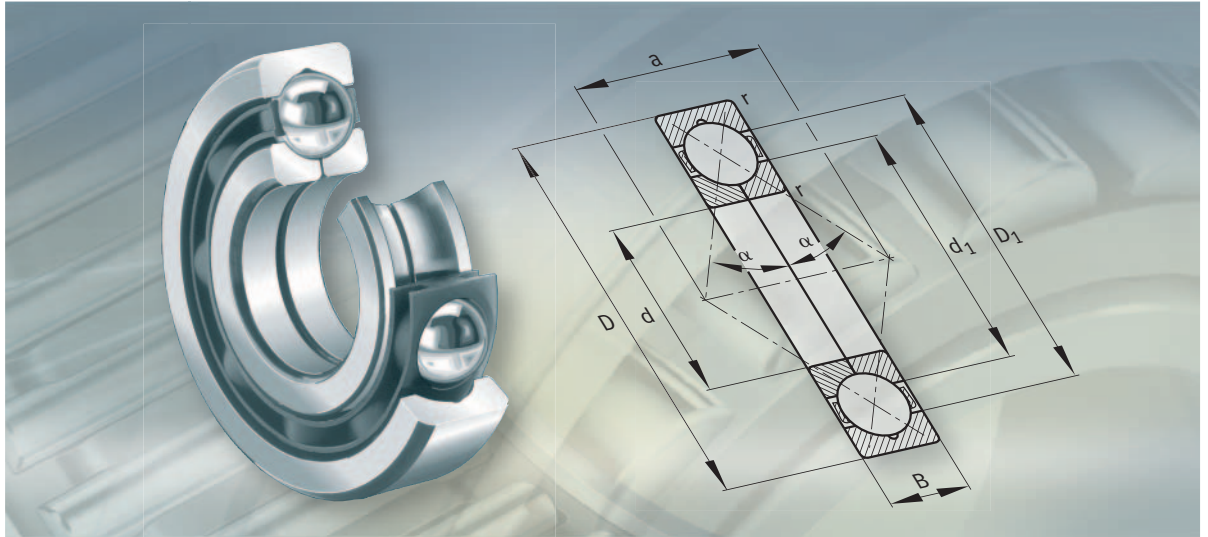


Mounting dimensions



Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G grease min^{-1}
d_a h12	D_a H12	r_a max.	dyn. C_r N	stat. C_{0r} N		
97	119	0,6	16 300	19 600	1 320	15 000
97	119	0,6	15 600	18 600	1 240	13 000
100	131	1,5	26 000	30 000	1 810	14 000
100	131	1,5	24 500	28 000	1 710	12 000
102	124	0,6	17 000	20 800	1 360	14 000
102	124	0,6	16 000	19 300	1 290	12 000
105	136	1,5	26 000	31 000	1 840	13 000
105	136	1,5	24 500	28 500	1 730	11 000
107	133	0,6	20 400	25 000	1 560	13 000
107	133	0,6	19 000	23 600	1 470	11 000
110	141	1,5	26 500	31 500	1 860	12 000
110	141	1,5	25 000	30 000	1 760	11 000
112	138	0,6	20 800	26 500	1 620	12 000
112	138	0,6	19 600	24 500	1 530	11 000
116	150	2	34 000	40 500	2 300	12 000
116	150	2	32 000	38 000	2 180	10 000
117	143	0,6	24 000	30 500	1 820	12 000
117	143	0,6	22 800	28 500	1 720	10 000
121	159	2	34 500	41 500	2 330	11 000
121	159	2	32 500	39 000	2 200	9 000
128	157	0,6	25 000	33 500	1 950	11 000
128	157	0,6	23 600	31 000	1 830	9 000
131	169	2	35 500	44 000	2 410	10 000
131	169	2	33 500	41 500	2 280	8 500
139	171	0,6	29 000	39 000	2 140	9 500
139	171	0,6	27 000	36 500	2 010	8 000
142	189	2	45 500	58 500	3 000	9 000
142	189	2	42 500	54 000	2 850	7 500

FAG



Four point contact bearings

Four point contact bearings

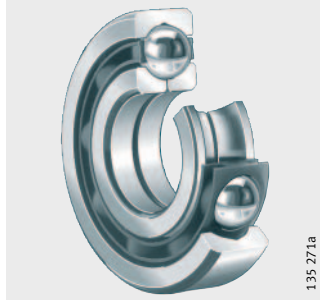
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Product overview Four point contact bearings

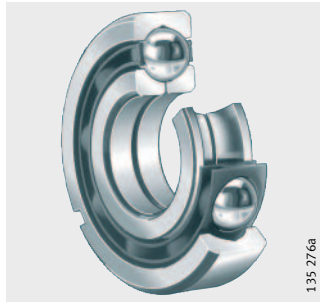
Without retaining slots

QJ2, QJ3



With retaining slots

QJ2..-N2, QJ3..-N2



Four point contact bearings

Features	<p>Four point contact bearings are single row angular contact ball bearings and therefore require significantly less space in an axial direction than double row designs.</p> <p>The bearings comprise solid outer rings, split inner rings and ball and cage assemblies with brass or polyamide cages. The two-piece inner rings allow a large complement of balls to be accommodated. The inner ring halves are matched to the particular bearing and must not be interchanged with those of other bearings of the same size. The outer ring with the ball and cage assembly can be mounted separately from the two inner ring halves.</p>
Axial load capacity in both directions	<p>Due to the design of the rolling element raceways with their high raceway shoulders, the contact angle of 35° and the large number of rolling elements, four point contact bearings have a high load carrying capacity. They can support high axial forces in both directions as well as small radial loads.</p>
With or without retaining slots in the outer ring	<p>Single row four point contact bearings capable of supporting axial loads in both directions are often combined with a radial bearing and used as an axial bearing with radial clearance in a housing. For quick and secure location, larger four point contact bearings therefore have two retaining slots in the outer ring offset by 180°. These bearings have the suffix N2.</p>
Compensation of angular misalignments	<p>The possible skewing of the inner rings in relation to the outer ring depends on the bearing load, the operating clearance and the bearing size and is very small. Four point contact bearings are not therefore suitable for the compensation of angular misalignments in housing bores or due to shaft deflections.</p> <p>Skewing of the bearing rings increases the running noise, places increased strain on the cages and has a harmful influence on the operating life of the bearings.</p>
Sealing/lubrication	<p>Four point contact bearings are not sealed and not greased. They can be lubricated using oil or grease.</p>
Operating temperature	<p>Bearings with solid brass cages can be used at operating temperatures from -30 °C to +150 °C.</p> <p>Bearings with an outside diameter of more than 240 mm are dimensionally stable up to +200 °C.</p>
Caution!	<p>Bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to +120 °C.</p>
Cages	<p>The standard cages for four point contact bearings are shown in the table Cage/bore code, page 318.</p> <p>Four point contact bearings with brass cages have the suffix MPA. These window cages are guided on the outer ring.</p> <p>Cages made from glass fibre reinforced polyamide are indicated by the suffix TVP.</p>
Caution!	<p>Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.</p> <p>Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.</p> <p>The oil change intervals must be observed.</p>



Four point contact bearings

Cage/bore code

Series	Solid brass cage ¹⁾	Window cage made from polyamide ¹⁾
	Bore code	
QJ2	up to 07, 10, 13, from 16	08, 09, 11, 12, 14, 15
QJ3	04, from 10	05 to 09

¹⁾ Other cage designs available by agreement. In such cages, suitability for high speeds and temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.

Suffixes

Suffixes for the available designs: see table.

Available designs

Suffixes	Description	Design
C3	Axial internal clearance larger than normal	Special design ¹⁾
MPA	Solid cage made from brass	Standard
TVP	Window cage made from glass fibre reinforced polyamide 66	Standard
N2	Two retaining slots in outer ring	Standard for larger bearings

¹⁾ Available by agreement.

Design and safety guidelines

Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq 0,95$	$P = F_r + 0,66 \cdot F_a$
$\frac{F_a}{F_r} > 0,95$	$P = 0,6 \cdot F_r + 1,07 \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load
F_r N
Radial dynamic bearing load.

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + 0,58 \cdot F_{0a}$$

P₀ N
Equivalent static bearing load for combined load
F_{0a} N
Axial static bearing load
F_{0r} N
Radial static bearing load.

Minimum axial load

In order to ensure low friction in the bearing, especially at high speeds, a minimum axial load is required. In order to prevent an excessive increase in friction, the axial force should be sufficiently high that the rolling bearings are in contact with the inner and outer ring raceway at only one point. This is ensured if $F_a \geq 1,2 \cdot F_r$.

Application as axial bearings only

If four point contact bearings are to be used as axial bearings only, the outer ring must have a large radial clearance in the housing. As a result, the bearings are not subjected to radial load.

Speeds

High speeds can be achieved if four point contact ball bearings are subjected to purely axial load.

ISO 15 312 does not give thermal reference speeds for these bearings.

Caution!

The dimension tables therefore only state limiting speeds n_G . These values are for oil lubrication and must not be exceeded. If higher speeds are required, please contact us.

Mounting dimensions

The shoulders on the adjacent construction (shaft/housing) must be sufficiently high that adequate abutment surfaces are ensured even with very large chamfer dimensions.

The maximum values for the radii r_a and the diameters of the abutment surfaces d_a , D_a are indicated in the dimension tables.

Accuracy

The main dimensions of the bearings conform to DIN 628-4.

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620-2.

Axial internal clearance

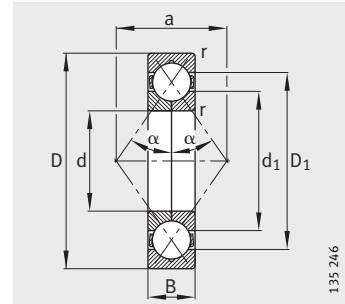
The axial internal clearance corresponds to internal clearance group CN.

Axial internal clearance to DIN 628-4

Bore d mm		Axial internal clearance					
		C2 μm		CN μm		C3 μm	
over	incl.	min.	max.	min.	max.	min.	max.
18	40	30	70	60	110	100	150
40	60	40	90	80	130	120	170
60	80	50	100	90	140	130	180
80	100	60	120	100	160	140	200
100	140	70	140	120	180	160	220
140	180	80	160	140	200	180	240
180	220	100	180	160	220	200	260
220	260	120	200	180	240	220	300

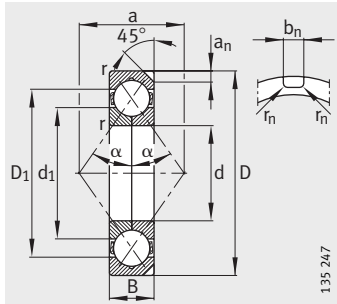


Four point contact bearings

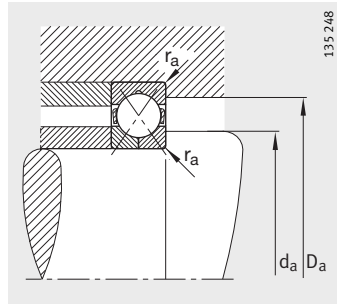


Without retaining slots
 $\alpha = 35^\circ$

Dimension table · Dimensions in mm									
Designation	Mass m ≈kg	Dimensions							
		d	D	B	r min.	D ₁ ≈	d ₁ ≈	a ≈	a _n
QJ304-MPA	0,184	20	52	15	1,1	41,4	30,6	26	–
QJ205-MPA	0,171	25	52	15	1	43,1	34,2	27	–
QJ305-TVP	0,256	25	62	17	1,1	49,5	37,5	31	–
QJ206-MPA	0,254	30	62	16	1	50,7	40,3	32	–
QJ306-TVP	0,379	30	72	19	1,1	58	43,9	36	–
QJ207-MPA	0,359	35	72	17	1,1	59,1	47,9	38	–
QJ307-TVP	0,516	35	80	21	1,5	64,8	50,7	41	–
QJ208-TVP	0,399	40	80	18	1,1	66,8	53,6	42	–
QJ308-TVP	0,695	40	90	23	1,5	73,4	56,6	46	–
QJ209-TVP	0,467	45	85	19	1,1	72	58,4	45	–
QJ309-TVP	0,934	45	100	25	1,5	81,7	63,6	51	–
QJ210-MPA	0,609	50	90	20	1,1	76,4	63,6	49	–
QJ310-MPA	1,39	50	110	27	2	89,6	70,8	56	–
QJ211-TVP	0,697	55	100	21	1,5	84,7	70,6	54	–
QJ311-MPA	1,76	55	120	29	2	97,8	77,5	61	–
QJ212-TVP	0,889	60	110	22	1,5	93	77,3	60	–
QJ312-MPA	2,2	60	130	31	2,1	106,9	84,2	67	–
QJ213-MPA	1,27	65	120	23	1,5	101,5	84,1	65	–
QJ313-MPA	2,71	65	140	33	2,1	114,4	90,9	72	–
QJ214-TVP	1,22	70	125	24	1,5	106,3	89	68	–
QJ314-MPA	3,29	70	150	35	2,1	123,6	97,6	77	–
QJ215-TVP	1,34	75	130	25	1,5	111,5	94	72	–
QJ315-N2-MPA	3,95	75	160	37	2,1	131	104,3	82	10,1
QJ216-MPA	1,84	80	140	26	2	119,6	100,9	77	–
QJ316-N2-MPA	4,65	80	170	39	2,1	140,8	110,6	88	10,1
QJ217-MPA	2,3	85	150	28	2	128,6	107,5	82	–
QJ317-N2-MPA	5,54	85	180	41	3	148,6	117,8	93	11,7
QJ218-N2-MPA	2,8	90	160	30	2	136,1	114,2	88	8,1
QJ318-N2-MPA	6,44	90	190	43	3	157,1	124,5	98	11,7
QJ219-N2-MPA	3,41	95	170	32	2,1	144,4	121	93	8,1
QJ319-N2-MPA	7,45	95	200	45	3	165,4	131,2	103	11,7
QJ220-N2-MPA	4,1	100	180	34	2,1	153,6	127,7	98	10,1
QJ320-N2-MPA	9,04	100	215	47	3	176,6	138,9	110	11,7
QJ221-N2-MPA	4,81	105	190	36	2,1	161,6	134,7	103	10,1



N2, two retaining slots
 $\alpha = 35^\circ$

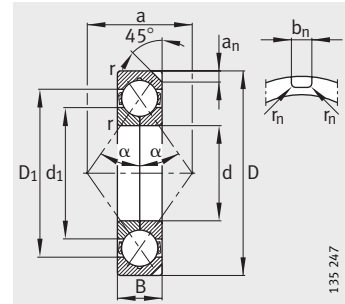


Mounting dimensions



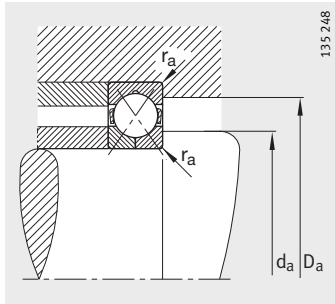
		Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
b_n	r_n	d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G
		min.	max.	max.	N	N	N	min^{-1}
-	-	27	45	1	30 000	19 600	990	28 000
-	-	31	46	1	25 500	18 600	950	26 000
-	-	32	55	1	44 000	31 500	1 590	14 000
-	-	36	56	1	36 500	27 500	1 410	20 000
-	-	37	65	1	58 500	43 000	2 170	11 000
-	-	42	65	1	44 000	35 500	1 800	18 000
-	-	44	71	1,5	62 000	51 000	2 550	9 500
-	-	47	73	1	56 000	46 500	2 380	9 500
-	-	49	81	1,5	86 500	68 000	3 500	8 500
-	-	52	78	1	64 000	57 000	2 900	8 500
-	-	54	91	1,5	102 000	83 000	4 550	7 500
-	-	57	83	1	61 000	56 000	2 900	13 000
-	-	61	99	2	110 000	91 500	4 950	11 000
-	-	64	91	1,5	80 000	76 500	3 900	7 000
-	-	66	109	2	127 000	108 000	5 900	10 000
-	-	69	101	1,5	96 500	93 000	4 800	6 300
-	-	72	118	2,1	146 000	127 000	6 700	9 000
-	-	74	111	1,5	104 000	104 000	3 950	9 500
-	-	77	128	2,1	163 000	146 000	7 900	8 500
-	-	79	116	1,5	118 000	122 000	6 800	5 600
-	-	82	138	2,1	183 000	166 000	8 600	8 000
-	-	84	121	1,5	125 000	129 000	6 800	5 300
8,5	2	87	148	2,1	212 000	204 000	10 500	7 000
-	-	91	129	2	132 000	137 000	7 100	8 000
8,5	2	92	158	2,1	224 000	220 000	10 800	7 000
-	-	96	139	2	153 000	160 000	8 100	7 000
10,5	2	99	166	2,5	245 000	255 000	11 700	6 300
6,5	1	101	149	2	176 000	186 000	8 800	7 000
10,5	2	104	176	2,5	265 000	285 000	12 900	6 000
6,5	1	107	158	2,1	200 000	212 000	10 100	6 300
10,5	2	109	186	2,5	285 000	310 000	14 100	6 000
8,5	2	112	168	2,1	224 000	240 000	11 200	6 000
10,5	2	114	201	2,5	325 000	365 000	16 300	5 600
8,5	2	117	178	2,1	232 000	260 000	11 600	6 000

Four point contact bearings



N2, two retaining slots
 $\alpha = 35^\circ$

Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈kg	Dimensions							
		d	D	B	r min.	D ₁ ≈	d ₁ ≈	a ≈	a _n
QJ222-N2-MPA	5,66	110	200	38	2,1	169,8	141,6	109	10,1
QJ322-N2-MPA	12,2	110	240	50	3	195,5	156,4	123	11,7
QJ224-N2-MPA	6,74	120	215	40	2,1	183,6	152,8	117	11,7
QJ324-N2-MPA	15,6	120	260	55	3	210,6	169,8	133	11,7
QJ226-N2-MPA	7,66	130	230	40	3	195	165,4	127	11,7
QJ326-N2-MPA	19,2	130	280	58	4	228	184	144	12,7
QJ228-N2-MPA	9,69	140	250	42	3	210,5	180	137	11,7
QJ328-N2-MPA	23,2	140	300	62	4	243	197	154	12,7
QJ230-N2-MPA	12,2	150	270	45	3	226,7	193,7	147	11,7
QJ330-N2-MPA	28	150	320	65	4	261	211,3	165	12,7
QJ232-N2-MPA	15,3	160	290	48	3	240	210	158	12,7
QJ332-N2-MPA	32,8	160	340	68	4	279,9	222,7	175	12,7
QJ234-N2-MPA	18,9	170	310	52	4	260,5	221,4	168	12,7
QJ334-N2-MPA	38,4	170	360	72	4	292	238	186	12,7
QJ236-N2-MPA	19,6	180	320	52	4	269	231	175	12,7
QJ336-N2-MPA	44,9	180	380	75	4	311	249,1	196	12,7
QJ238-N2-MPA	23,8	190	340	55	4	286,3	245,8	186	12,7
QJ338-N2-MPA	52,1	190	400	78	5	327	262,5	207	12,7
QJ240-N2-MPA	28	200	360	58	4	302	258,6	196	12,7
QJ244-N2-MPA	38,6	220	400	65	4	336	284,6	217	12,7
QJ344-N2-MPA	77,1	220	460	88	5	378	302	238	15
QJ248-N2-MPA	53,1	240	440	72	4	367	312,5	238	15
QJ348-N2-MPA	98,2	240	500	95	5	410	330,7	259	15

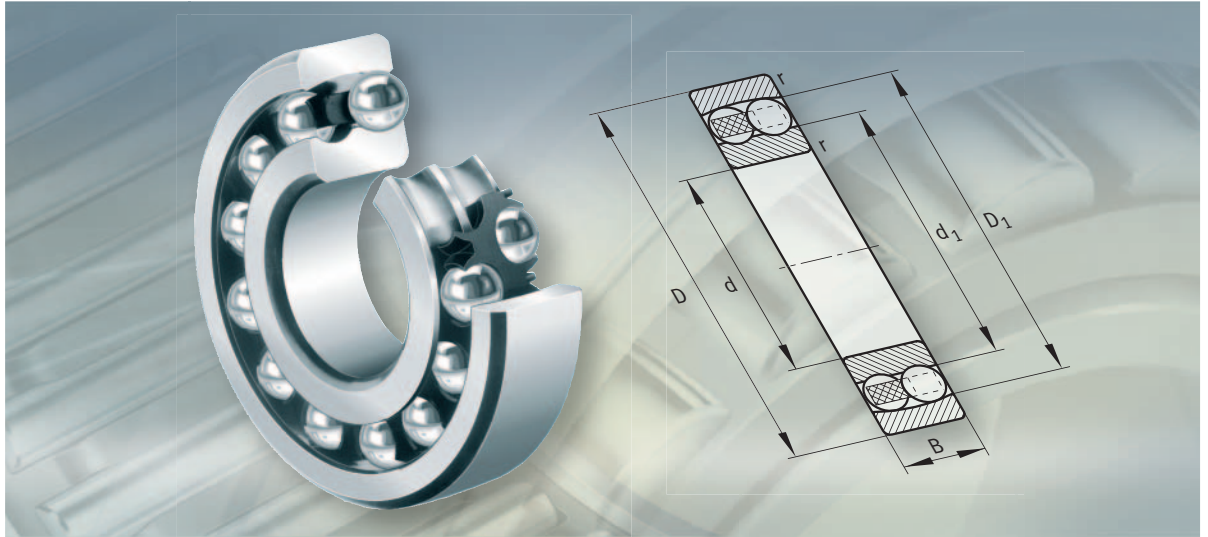


Mounting dimensions



		Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
b_n	r_n	d_a	D_a	r_a	dyn. C_r	stat. C_{0r}	C_{ur}	n_G
		min.	max.	max.	N	N	N	min^{-1}
8,5	2	122	188	2,1	250 000	285 000	12 300	5 600
10,5	2	124	226	2,5	345 000	415 000	17 400	5 300
10,5	2	132	203	2,1	280 000	340 000	13 800	5 300
10,5	2	134	246	2,5	380 000	480 000	19 300	5 000
10,5	2	144	216	2,5	290 000	365 000	14 500	5 000
10,5	2	147	263	3	425 000	570 000	21 600	4 800
10,5	2	154	236	2,5	315 000	415 000	16 500	4 800
10,5	2	157	283	3	475 000	655 000	19 700	4 300
10,5	2	164	256	2,5	345 000	480 000	18 400	4 500
10,5	2	167	303	3	510 000	735 000	25 500	3 800
10,5	2	174	276	2,5	375 000	530 000	16 800	4 300
10,5	2	177	323	3	585 000	865 000	29 500	3 600
10,5	2	187	293	3	425 000	630 000	22 800	3 800
10,5	2	187	343	3	585 000	915 000	24 900	3 200
10,5	2	197	303	3	430 000	670 000	18 900	3 600
10,5	2	197	363	3	680 000	1 080 000	33 000	3 000
10,5	2	207	323	3	455 000	735 000	24 400	3 200
10,5	2	210	380	4	735 000	1 250 000	37 000	2 800
10,5	2	217	343	3	510 000	850 000	22 600	3 000
10,5	2	237	383	3	630 000	1 120 000	31 000	2 800
12,5	2,5	240	440	4	900 000	1 660 000	44 500	2 800
12,5	2,5	257	423	3	680 000	1 270 000	30 500	2 800
12,5	2,5	260	480	4	1 020 000	1 960 000	52 000	2 600

FAG



Self-aligning ball bearings

Self-aligning ball bearings

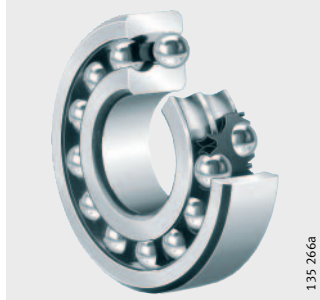
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Product overview Self-aligning ball bearings

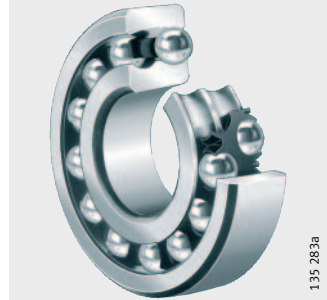
With cylindrical or tapered bore

10, 12, 13,
22, 23



135 266a

12..-K, 13..-K,
22..-K, 23..-K



135 283a

Lip seals

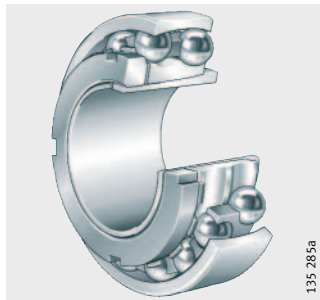
22..-2RS, 22..-K-2RS,
23..-2RS



135 300a

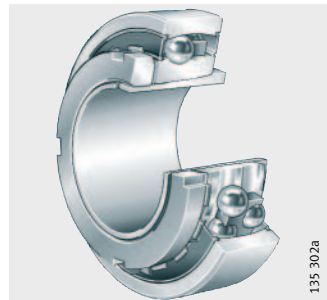
With adapter sleeve
Without or with lip seals

12..-K + H, 13..-K + H
22..-K + H, 23..-K + H



135 285a

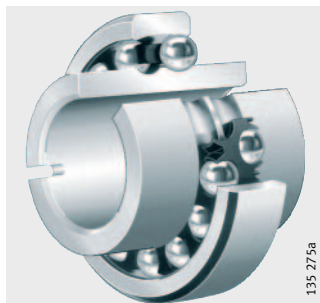
22..-K-2RS + H



135 302a

With extended inner ring

112



135 275a

Self-aligning ball bearings

Features	Self-aligning ball bearings are double row, self-retaining units comprising outer rings with a concave raceway, inner rings with a cylindrical or tapered bore and ball and cage assemblies. The bearings are available in open and sealed designs.
Radial and axial load capacity	Self-aligning ball bearings can support axial forces in both directions as well as radial forces.
With cylindrical/tapered bore	Bearings of series 12, 13, 22 and 23 are available with a cylindrical or tapered bore. Bearings with a tapered bore have a bore taper of 1:12 and the suffix K.
With adapter sleeve	Self-aligning ball bearings with a tapered bore are also available with an adapter sleeve, locknut and tab washer. Adapter sleeves must be ordered in addition to the bearing.
With extended inner ring	Bearings of series 112 have an extended inner ring, a location slot on one side of the inner ring and are located by means of dowel pins. These bearings are intended for simple bearing arrangements with conventional shafts. Due to the bearing bore tolerance (J7), they are very easy to fit.
Sealing/lubrication	Self-aligning ball bearings of series 12, 13, 22 and 23 are also available in sealed designs. Sealed bearings have contact seals on both sides and the suffix 2RS. They are greased with a high quality grease and are maintenance-free.
Compensation of angular misalignments	Under normal operating conditions and with a rotating inner ring, self-aligning ball bearings can swivel approx. 4° about their central position; sealed bearings can swivel by max. 1,5°. As a result, they permit skewing between the inner and outer ring and can thus compensate misalignments, shaft deflections and housing deformations. If the outer ring rotates or the inner ring undergoes tumbling motion, the angular adjustment facility is smaller. In this case, please contact us.
Operating temperature	Open bearings with brass cages can be used at operating temperatures from -30 °C to +150 °C. Caution! Bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to +120 °C. Sealed self-aligning ball bearings are suitable for operating temperatures from -30 °C to +100 °C, restricted by the grease and seal material.



Self-aligning ball bearings

Cages The standard cages for self-aligning ball bearings are shown in the table Cage/bore code.

Self-aligning ball bearings with cages made from glass fibre reinforced polyamide 66 have the suffix TVH.

Ball-guided solid brass cages are indicated by the suffix M.

Caution! Check the chemical resistance of polyamide to synthetic greases and oils and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

The oil change intervals must be observed.

Cage/bore code

Series	Solid polyamide cage ¹⁾ Bore code	Solid brass cage ¹⁾
10	8	–
12	up to 18	from 19
13	up to 13	from 14
22	up to 13, 15, 16, 18	14, 17, from 19
23	up to 13	from 14
112	04 to 12	–

¹⁾ Other cage designs available by agreement. In such cages, suitability for high speeds and temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.

Suffixes Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
C3	Radial internal clearance larger than normal	Standard for tapered bore
K	Tapered bore	Standard
M	Solid brass cage	Standard
TVH	Solid cage made from glass fibre reinforced polyamide 66	Standard
2RS	Contact seals on both sides	Standard

Design and safety guidelines
Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq e$	$P = F_r + Y_1 \cdot F_a$
$\frac{F_a}{F_r} > e$	$P = 0,65 \cdot F_r + Y_2 \cdot F_a$

P N
 Equivalent dynamic bearing load for combined load
 F_a N
 Axial dynamic bearing load
 F_r N
 Radial dynamic bearing load
 e, Y_1, Y_2 –
 Factors from dimension tables.



Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + Y_0 \cdot F_{0a}$$

P_0 N
 Equivalent static bearing load for combined load
 F_{0a} N
 Axial static bearing load
 F_{0r} N
 Radial static bearing load
 Y_0 –
 Factors from dimension tables.

Minimum load

In order to ensure slippage-free operation, the bearings must be subjected to sufficient load. If insufficient load is applied – for example at high speeds during a test run – slippage can occur that may lead under conditions of inadequate lubrication to bearing damage.

The minimum load should be $P/C_r = 0,01$.

Speeds

Caution!

If the reference speed n_B in the dimension tables is higher than the limiting speed n_G , the higher value cannot be used.

In bearings with contact seals (suffix 2RS), the speed is limited by the permissible sliding speed of the sealing lips, so only the limiting speed n_G is given in the tables.

Mounting dimensions

The dimension tables give the maximum radius dimension r_a and the diameters of the abutment shoulders.

When fitting self-aligning ball bearings with adapter sleeves, attention must be paid to the dimensions of the support ring.

Self-aligning ball bearings

Projecting balls in bearings with brass cage

In some bearings with a brass cage, the balls project to a certain extent at the sides. The projection C_1 must be taken into consideration when designing the adjacent construction.

The projection is larger in the following bearings according to the table, *Figure 1*:

Ball projection

Bearing	Projection C_1 mm
1224-M	1,8
1226-M	0,6
1228-M	2,7
1230-M	3,8
1319-M	1,6
1320-M	2,4
1321-M	2,5
1322-M	2,7

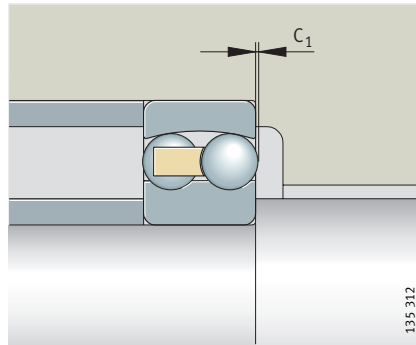


Figure 1
Ball projection C_1

Location Series 112

These bearings are axially located by means of dowel pins that engage in the slot in the inner ring, *Figure 2*. These also prevent the inner rings creeping on the shaft.

If a shaft is to be supported by two bearings, the locating slots must be arranged on the sides of the bearing facing towards or away from each other, *Figure 2*.

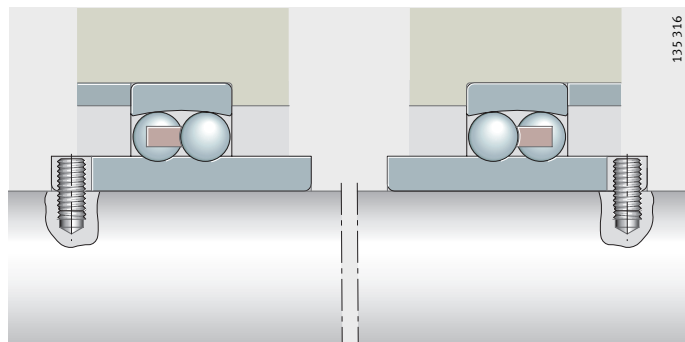


Figure 2
Location and
arrangement of bearings

Bearings with tapered bore

Bearings with a tapered inner ring bore are:

- located either directly on tapered shaft seats or
- located on a cylindrical shaft seat using an adapter sleeve, locknut and tab washer.

If high axial forces are present, a support ring can be used.

For fitting, attention must be paid to the dimensions on the support ring according to the dimension tables.

Accuracy

The main dimensions of the bearings conform to DIN 630.

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620-2.

In series 112, the bearing bore tolerance is J7.

Radial internal clearance of bearings with cylindrical bore

The radial internal clearance is CN.



Radial internal clearance to DIN 620-4

Bore		Radial internal clearance			
d mm		CN μm		C3 μm	
over	incl.	min.	max.	min.	max.
-	6	5	15	10	20
6	10	6	17	12	25
10	14	6	19	13	26
14	18	8	21	15	28
18	24	10	23	17	30
24	30	11	24	19	35
30	40	13	29	23	40
40	50	14	31	25	44
50	65	16	36	30	50
65	80	18	40	35	60
80	100	22	48	42	70
100	120	25	56	50	83
120	140	30	68	60	100
140	160	35	80	70	120

Radial internal clearance of bearings with tapered bore

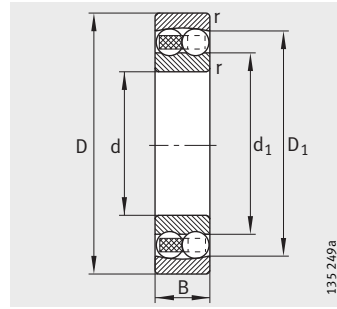
Bearings with a tapered bore have the internal clearance group C3.

Radial internal clearance to DIN 620-4

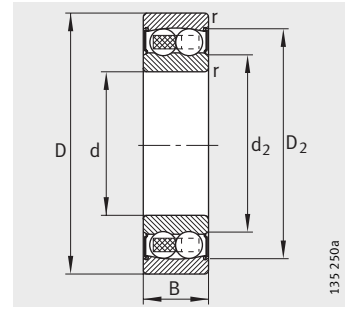
Bore		Radial internal clearance			
d mm		CN μm		C3 μm	
over	incl.	min.	max.	min.	max.
18	24	13	26	20	33
24	30	15	28	33	39
30	40	19	35	29	46
40	50	22	39	33	52
50	65	27	47	41	61
65	80	35	57	50	75
80	100	42	68	62	90
100	120	50	81	75	108
120	140	60	98	90	130
140	160	65	110	100	150

Self-aligning ball bearings

With cylindrical bore
Open or sealed

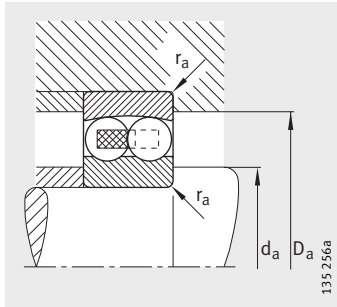


Cylindrical bore



Cylindrical bore
2RS seals

Dimension table · Dimensions in mm									
Designation	Mass m ≈ kg	Dimensions							
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈	d ₂ ≈
135-TVH	0,01	5	19	6	0,3	14,5	–	10,1	–
126-TVH	0,009	6	19	6	0,3	14,5	–	10,1	–
127-TVH	0,014	7	22	7	0,3	16,8	–	12,4	–
108-TVH	0,014	8	22	7	0,3	16,8	–	12,4	–
129-TVH	0,022	9	26	8	0,6	20	–	14,5	–
1200-TVH	0,034	10	30	9	0,6	23,5	–	16,3	–
2200-2RS-TVH	0,053	10	30	14	0,6	–	25,9	–	14,1
2200-TVH	0,045	10	30	14	0,6	24,2	–	15,1	–
1201-TVH	0,041	12	32	10	0,6	25,4	–	18,2	–
2201-2RS-TVH	0,058	12	32	14	0,6	–	27,9	–	16,2
2201-TVH	0,05	12	32	14	0,6	26,2	–	17,1	–
1202-TVH	0,048	15	35	11	0,6	29,2	–	20,2	–
2202-2RS-TVH	0,061	15	35	14	0,6	–	31	–	19
2202-TVH	0,057	15	35	14	0,6	29,5	–	20,3	–
2302-TVH	0,111	15	42	17	1	34,8	–	22,5	–
1203-TVH	0,073	17	40	12	0,6	32,3	–	23,7	–
2203-2RS-TVH	0,098	17	40	16	0,6	–	34,3	–	21,7
2203-TVH	0,054	17	40	16	0,6	34,1	–	23,9	–
1303-TVH	0,065	17	47	14	1	37,3	–	26,7	–
2303-2RS-TVH	0,175	17	47	19	1	–	40,3	–	23,9
2303-TVH	0,155	17	47	19	1	37,3	–	26,2	–



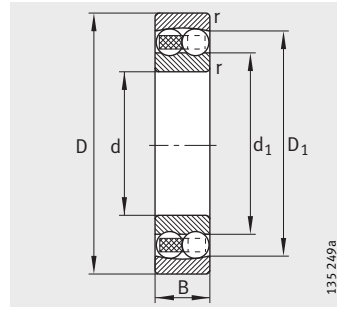
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N	e	Y_1	Y_2	Y_0			
7,4	16,6	0,3	2 600	475	0,35	1,82	2,82	1,91	29,5	36 000	35 000
8,4	16,6	0,3	2 600	475	0,35	1,82	2,82	1,91	29,5	36 000	39 500
9,4	19,6	0,3	2 750	560	0,33	1,92	2,97	2,01	34,5	36 000	36 500
10,6	19,4	0,3	2 750	560	0,33	1,92	2,97	2,01	34,5	36 000	–
13,2	21,8	0,6	3 950	800	0,32	1,95	3,01	2,04	50	32 000	31 500
14,2	25,8	0,6	5 700	1 180	0,32	1,95	3,02	2,05	73	30 000	28 500
14,2	25,8	0,6	5 700	1 180	0,32	1,95	3,02	2,05	73	18 000	–
14,2	25,8	0,6	8 800	1 730	0,58	1,09	1,69	1,14	107	28 000	27 500
16,2	27,8	0,6	5 700	1 260	0,37	1,69	2,62	1,77	78	30 000	27 500
16,2	27,8	0,6	5 700	1 260	0,37	1,69	2,62	1,77	78	17 000	–
16,2	27,8	0,6	9 400	1 920	0,53	1,2	1,85	1,25	120	26 000	24 600
19,2	30,8	0,6	7 700	1 730	0,34	1,86	2,88	1,95	108	26 000	24 800
19,2	30,8	0,6	7 700	1 730	0,34	1,86	2,88	1,95	108	15 000	–
19,2	30,8	0,6	9 600	2 080	0,46	1,37	2,13	1,44	130	24 000	21 100
20,6	36,4	1	17 000	3 700	0,51	1,23	1,91	1,29	232	18 000	18 200
21,2	35,8	0,6	8 100	2 000	0,33	1,93	2,99	2,03	124	22 000	22 300
21,2	35,8	0,6	8 100	2 000	0,33	1,93	2,99	2,03	124	14 000	–
21,2	35,8	0,6	11 800	2 750	0,46	1,37	2,12	1,43	171	19 000	19 600
22,6	41,4	1	12 900	3 150	0,32	1,94	3	2,03	197	18 000	17 900
22,6	41,4	1	12 900	3 150	0,32	1,94	3	2,03	197	11 000	–
22,6	41,4	1	13 900	3 150	0,53	1,19	1,85	1,25	197	17 000	16 900

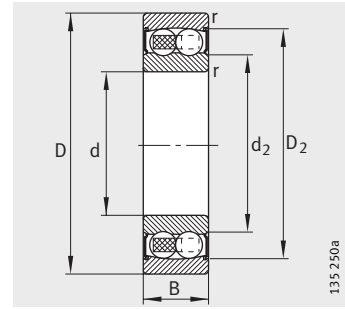


Self-aligning ball bearings

With cylindrical or tapered bore
Open or sealed

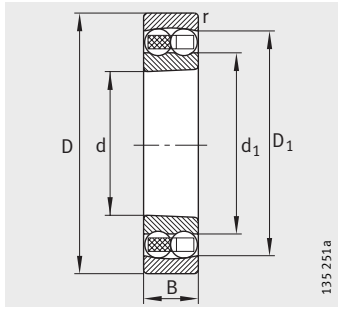


Cylindrical bore

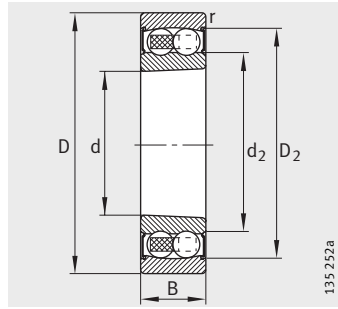


Cylindrical bore
2RS seals

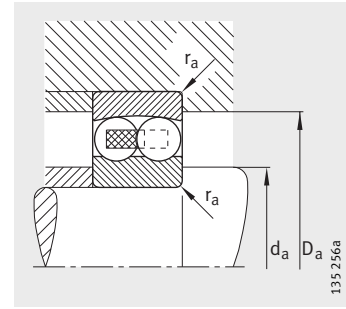
Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈ kg	Dimensions							
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈	d ₂ ≈
1204-K-TVH-C3	0,116	20	47	14	1	38,1	–	29,2	–
1204-TVH	0,118	20	47	14	1	38,1	–	29,2	–
2204-2RS-TVH	0,151	20	47	18	1	–	41,7	–	25,9
2204-TVH	0,134	20	47	18	1	39,5	–	28	–
1304-TVH	0,163	20	52	15	1,1	41,9	–	31,6	–
2304-2RS-TVH	0,23	20	52	21	1,1	–	45,2	–	27,2
2304-TVH	0,206	20	52	21	1,1	41,5	–	29,1	–
1205-K-TVH-C3	0,135	25	52	15	1	43,9	–	33,3	–
1205-TVH	0,138	25	52	15	1	43,9	–	33,3	–
2205-2RS-TVH	0,161	25	52	18	1	–	46,3	–	30,7
2205-K-2RS-TVH-C3	0,157	25	52	18	1	–	46,3	–	30,7
2205-K-TVH-C3	0,152	25	52	18	1	44,7	–	32,3	–
2205-TVH	0,156	25	52	18	1	44,7	–	32,3	–
1305-K-TVH-C3	0,254	25	62	17	1,1	50,8	–	38,1	–
1305-TVH	0,258	25	62	17	1,1	50,8	–	38,1	–
2305-2RS-TVH	0,367	25	62	24	1,1	–	53,2	–	33,5
2305-K-TVH-C3	0,328	25	62	24	1,1	50,1	–	35,5	–
2305-TVH	0,335	25	62	24	1,1	50,1	–	35,5	–
1206-K-TVH-C3	0,217	30	62	16	1	51,9	–	40,1	–
1206-TVH	0,221	30	62	16	1	51,9	–	40,1	–
2206-2RS-TVH	0,274	30	62	20	1	–	54,3	–	37,3
2206-K-2RS-TVH-C3	0,268	30	62	20	1	–	54,3	–	37,3
2206-K-TVH-C3	0,246	30	62	20	1	54	–	38,5	–
2206-TVH	0,252	30	62	20	1	54	–	38,5	–
1306-K-TVH-C3	0,379	30	72	19	1,1	59,4	–	45	–
1306-TVH	0,384	30	72	19	1,1	59,4	–	45	–
2306-2RS-TVH	0,554	30	72	27	1,1	–	63	–	40,6
2306-K-TVH-C3	0,476	30	72	27	1,1	59,3	–	41,5	–
2306-TVH	0,488	30	72	27	1,1	59,3	–	41,5	–



Tapered bore
K = taper 1:12



Tapered bore
K = taper 1:12
2RS seals



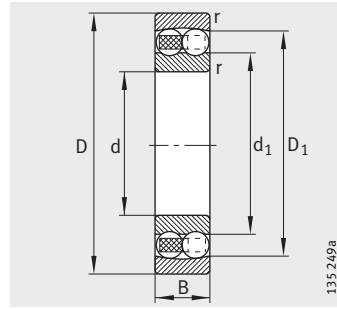
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N	e	Y_1	Y_2	Y_0			
25,6	41,4	1	10 100	2 600	0,28	2,24	3,46	2,34	161	18 000	20 200
25,6	41,4	1	10 100	2 600	0,28	2,24	3,46	2,34	161	18 000	20 200
25,6	41,4	1	10 100	2 600	0,28	2,24	3,46	2,34	161	11 000	–
25,6	41,4	1	14 700	3 500	0,44	1,45	2,24	1,51	219	17 000	17 300
27	45	1	12 700	3 300	0,29	2,17	3,35	2,27	206	16 000	16 200
27	45	1	12 700	3 300	0,29	2,17	3,35	2,27	206	10 000	–
27	45	1	17 600	4 250	0,51	1,23	1,9	1,29	265	16 000	15 600
30,6	46,4	1	12 300	3 250	0,27	2,37	3,66	2,48	203	16 000	17 800
30,6	46,4	1	12 300	3 250	0,27	2,37	3,66	2,48	203	16 000	17 800
30,6	46,4	1	12 300	3 250	0,27	2,37	3,66	2,48	203	9 500	–
30,6	46,4	1	12 300	3 250	0,27	2,37	3,66	2,48	203	9 500	–
30,6	46,4	1	17 300	4 400	0,35	1,78	2,75	1,86	275	15 000	14 600
30,6	46,4	1	17 300	4 400	0,35	1,78	2,75	1,86	275	15 000	14 600
32	55	1	18 300	4 950	0,28	2,29	3,54	2,4	310	14 000	13 900
32	55	1	18 300	4 950	0,28	2,29	3,54	2,4	310	14 000	13 900
32	55	1	18 300	4 950	0,28	2,29	3,54	2,4	310	8 000	–
32	55	1	25 000	6 500	0,48	1,32	2,04	1,38	405	13 000	13 500
32	55	1	25 000	6 500	0,48	1,32	2,04	1,38	405	13 000	13 500
35,6	56,4	1	15 900	4 600	0,25	2,53	3,91	2,65	285	14 000	14 900
35,6	56,4	1	15 900	4 600	0,25	2,53	3,91	2,65	285	14 000	14 900
35,6	56,4	1	15 900	4 600	0,25	2,53	3,91	2,65	285	8 000	–
35,6	56,4	1	15 900	4 600	0,25	2,53	3,91	2,65	285	8 000	–
35,6	56,4	1	26 000	6 900	0,3	2,13	3,29	2,23	430	12 000	12 600
35,6	56,4	1	26 000	6 900	0,3	2,13	3,29	2,23	430	12 000	12 600
37	65	1	21 700	6 300	0,26	2,39	3,71	2,51	390	11 000	12 300
37	65	1	21 700	6 300	0,26	2,39	3,71	2,51	390	11 000	12 300
37	65	1	21 700	6 300	0,26	2,39	3,71	2,51	390	6 700	–
37	65	1	32 500	8 700	0,45	1,4	2,17	1,47	540	10 000	11 900
37	65	1	32 500	8 700	0,45	1,4	2,17	1,47	540	10 000	11 900

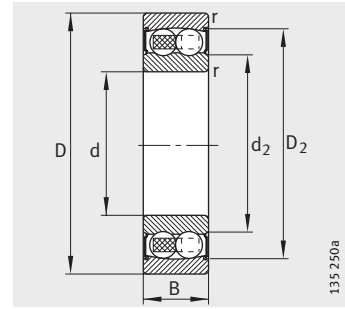


Self-aligning ball bearings

With cylindrical or tapered bore
Open or sealed

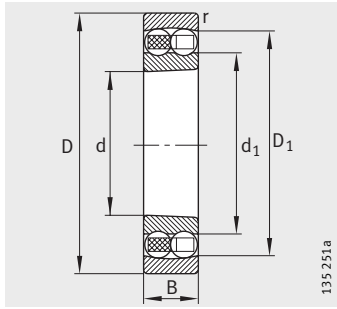


Cylindrical bore

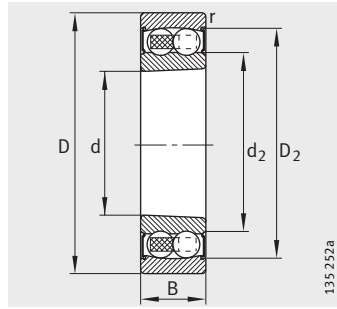


Cylindrical bore
2RS seals

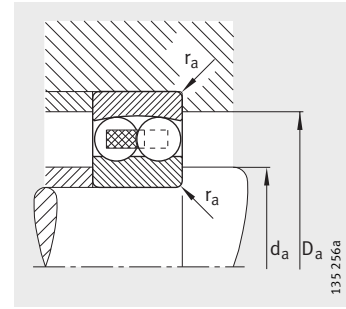
Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈kg	Dimensions							
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈	d ₂ ≈
1207-K-TVH-C3	0,319	35	72	17	1,1	59,6	–	47,7	–
1207-TVH	0,324	35	72	17	1,1	59,6	–	47,7	–
2207-2RS-TVH	0,442	35	72	23	1,1	–	64,3	–	43,5
2207-K-2RS-TVH-C3	0,432	35	72	23	1,1	–	64,3	–	43,5
2207-K-TVH-C3	0,38	35	72	23	1,1	62,9	–	45,7	–
2207-TVH	0,389	35	72	23	1,1	62,9	–	45,7	–
1307-K-TVH-C3	0,5	35	80	21	1,5	67,5	–	51,3	–
1307-TVH	0,507	35	80	21	1,5	67,5	–	51,3	–
2307-2RS-TVH	0,744	35	80	31	1,5	–	69,1	–	44,9
2307-K-TVH-C3	0,96	35	80	31	1,5	66,8	–	46,9	–
2307-TVH	0,975	35	80	31	1,5	66,8	–	46,9	–
1208-K-TVH-C3	0,408	40	80	18	1,1	67,8	–	54	–
1208-TVH	0,414	40	80	18	1,1	67,8	–	54	–
2208-2RS-TVH	0,528	40	80	23	1,1	–	71,1	–	49,2
2208-K-2RS-TVH-C3	0,517	40	80	23	1,1	–	71,1	–	49,2
2208-K-TVH-C3	0,465	40	80	23	1,1	70,7	–	52,5	–
2208-TVH	0,476	40	80	23	1,1	70,7	–	52,5	–
1308-K-TVH-C3	0,698	40	90	23	1,5	75,3	–	57,8	–
1308-TVH	0,708	40	90	23	1,5	75,3	–	57,8	–
2308-2RS-TVH	1,01	40	90	33	1,5	–	78	–	51
2308-K-TVH-C3	0,899	40	90	33	1,5	75	–	53,7	–
2308-TVH	0,922	40	90	33	1,5	75	–	53,7	–
1209-K-TVH-C3	0,454	45	85	19	1,1	72,7	–	57,7	–
1209-TVH	0,462	45	85	19	1,1	72,7	–	57,7	–
2209-2RS-TVH	0,548	45	85	23	1,1	–	75,4	–	53,8
2209-K-2RS-TVH-C3	0,535	45	85	23	1,1	–	75,4	–	53,8
2209-K-TVH-C3	0,505	45	85	23	1,1	75,9	–	59	–
2209-TVH	0,517	45	85	23	1,1	75,9	–	59	–
1309-K-TVH-C3	0,939	45	100	25	1,5	84,1	–	64,1	–
1309-TVH	0,953	45	100	25	1,5	84,1	–	64,1	–
2309-2RS-TVH	1,34	45	100	36	1,5	–	86,6	–	57,5
2309-K-TVH-C3	1,19	45	100	36	1,5	84,2	–	60,1	–
2309-TVH	1,22	45	100	36	1,5	84,2	–	60,1	–



Tapered bore
K = taper 1:12



Tapered bore
K = taper 1:12
2RS seals



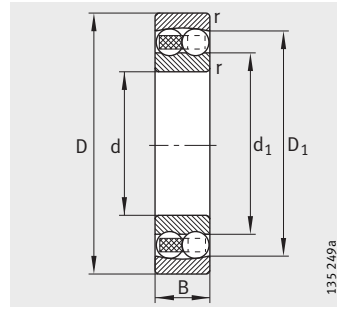
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	C _{ur}	n _G	n _B
min.	max.	max.	N	N					N	min ⁻¹	min ⁻¹
42	65	1	16 000	5 100	0,22	2,8	4,34	2,94	315	12 000	12 900
42	65	1	16 000	5 100	0,22	2,8	4,34	2,94	315	12 000	12 900
42	65	1	16 000	5 100	0,22	2,8	4,34	2,94	315	7 000	–
42	65	1	16 000	5 100	0,22	2,8	4,34	2,94	315	7 000	–
42	65	1	33 000	8 900	0,3	2,13	3,29	2,23	560	9 500	11 400
42	65	1	33 000	8 900	0,3	2,13	3,29	2,23	560	9 500	11 400
44	71	1,5	25 500	7 800	0,26	2,47	3,82	2,59	485	9 500	11 300
44	71	1,5	25 500	7 800	0,26	2,47	3,82	2,59	485	9 500	11 300
44	71	1,5	25 500	7 800	0,26	2,47	3,82	2,59	485	6 000	–
44	71	1,5	40 500	11 100	0,47	1,35	2,1	1,42	690	9 000	11 200
44	71	1,5	40 500	11 100	0,47	1,35	2,1	1,42	690	9 000	11 200
47	73	1	19 400	6 500	0,22	2,9	4,49	3,04	400	10 000	11 600
47	73	1	19 400	6 500	0,22	2,9	4,49	3,04	400	10 000	11 600
47	73	1	19 400	6 500	0,22	2,9	4,49	3,04	400	6 300	–
47	73	1	19 400	6 500	0,22	2,9	4,49	3,04	400	6 300	–
47	73	1	32 500	9 400	0,26	2,43	3,76	2,54	580	9 000	9 900
47	73	1	32 500	9 400	0,26	2,43	3,76	2,54	580	9 000	9 900
49	81	1,5	30 000	9 600	0,25	2,52	3,9	2,64	600	8 500	10 300
49	81	1,5	30 000	9 600	0,25	2,52	3,9	2,64	600	8 500	10 300
49	81	1,5	30 000	9 600	0,25	2,52	3,9	2,64	600	5 300	–
49	81	1,5	46 000	13 400	0,43	1,45	2,25	1,52	830	8 000	10 000
49	81	1,5	46 000	13 400	0,43	1,45	2,25	1,52	830	8 000	10 000
52	78	1	22 000	7 300	0,21	3,04	4,7	3,18	455	9 000	10 900
52	78	1	22 000	7 300	0,21	3,04	4,7	3,18	455	9 000	10 900
52	78	1	22 000	7 300	0,21	3,04	4,7	3,18	455	5 600	–
52	78	1	22 000	7 300	0,21	3,04	4,7	3,18	455	5 600	–
52	78	1	28 500	8 900	0,26	2,43	3,76	2,54	550	8 500	9 000
52	78	1	28 500	8 900	0,26	2,43	3,76	2,54	550	8 500	9 000
54	91	1,5	38 500	12 600	0,25	2,5	3,87	2,62	780	7 500	9 500
54	91	1,5	38 500	12 600	0,25	2,5	3,87	2,62	780	7 500	9 500
54	91	1,5	38 500	12 600	0,25	2,5	3,87	2,62	780	4 800	–
54	91	1,5	55 000	16 500	0,43	1,48	2,29	1,55	1030	7 000	9 300
54	91	1,5	55 000	16 500	0,43	1,48	2,29	1,55	1030	7 000	9 300

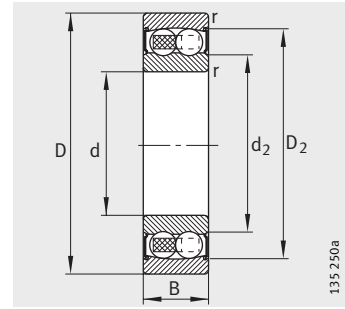


Self-aligning ball bearings

With cylindrical or tapered bore
Open or sealed



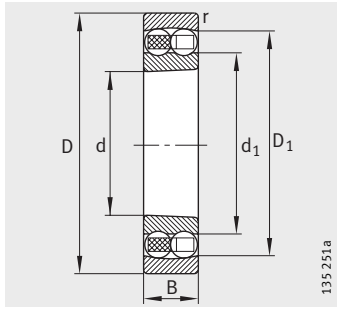
Cylindrical bore



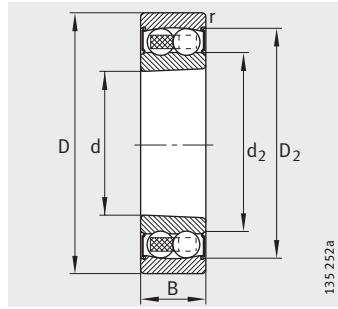
Cylindrical bore
2RS seals

Dimension table (continued) · Dimensions in mm

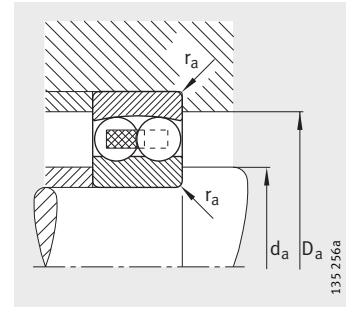
Designation	Mass m ≈kg	Dimensions							
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈	d ₂ ≈
1210-K-TVH-C3	0,516	50	90	20	1,1	77,6	–	62,7	–
1210-TVH	0,526	50	90	20	1,1	77,6	–	62,7	–
2210-2RS-TVH	0,606	50	90	23	1,1	–	80	–	60,6
2210-K-2RS-TVH-C3	0,593	50	90	23	1,1	–	80	–	60,6
2210-K-TVH-C3	0,543	50	90	23	1,1	81	–	64	–
2210-TVH	0,556	50	90	23	1,1	81	–	64	–
1310-K-TVH-C3	1,52	50	110	27	2	91,9	–	71,2	–
1310-TVH	1,54	50	110	27	2	91,9	–	71,2	–
2310-2RS-TVH	1,82	50	110	40	2	–	96	–	65,9
2310-TVH	1,64	50	110	40	2	92	–	66,9	–
1211-K-TVH-C3	0,682	55	100	21	1,5	86,9	–	69,5	–
1211-TVH	0,693	55	100	21	1,5	86,9	–	69,5	–
2211-2RS-TVH	0,825	55	100	25	1,5	–	88,9	–	68
2211-K-2RS-TVH-C3	0,808	55	100	25	1,5	–	88,9	–	68
2211-K-TVH-C3	0,73	55	100	25	1,5	90	–	69,6	–
2211-TVH	0,746	55	100	25	1,5	90	–	69,6	–
1311-K-TVH-C3	1,55	55	120	29	2	101,6	–	78	–
1311-TVH	1,57	55	120	29	2	101,6	–	78	–
2311-2RS-TVH	2,28	55	120	43	2	–	107	–	70,5
2311-K-TVH-C3	2,02	55	120	43	2	100,7	–	71,7	–
2311-TVH	2,07	55	120	43	2	100,7	–	71,7	–



Tapered bore
K = taper 1:12



Tapered bore
K = taper 1:12
2RS seals



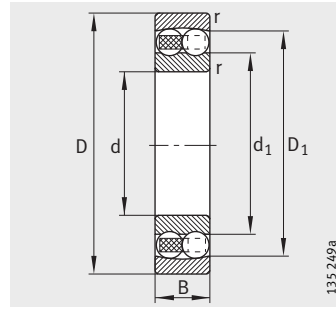
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N	e	Y_1	Y_2	Y_0			
57	83	1	22 900	8 000	0,2	3,17	4,9	3,32	500	8 500	10 300
57	83	1	22 900	8 000	0,2	3,17	4,9	3,32	500	8 500	10 300
57	83	1	22 900	8 000	0,2	3,17	4,9	3,32	500	5 300	–
57	83	1	22 900	8 000	0,2	3,17	4,9	3,32	500	5 300	–
57	83	1	28 500	9 400	0,24	2,61	4,05	2,74	580	8 000	8 300
57	83	1	28 500	9 400	0,24	2,61	4,05	2,74	580	8 000	8 300
61	99	2	42 000	14 100	0,24	2,6	4,03	2,73	880	6 700	8 800
61	99	2	42 000	14 100	0,24	2,6	4,03	2,73	880	6 700	8 800
61	99	2	42 000	14 100	0,24	2,6	4,03	2,73	880	4 300	–
61	99	2	66 000	19 900	0,43	1,47	2,27	1,54	1 240	6 300	8 800
64	91	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	7 500	9 400
64	91	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	7 500	9 400
64	91	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	4 800	–
64	91	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	4 800	–
64	91	1,5	39 000	12 400	0,22	2,92	4,52	3,06	770	6 700	7 700
64	91	1,5	39 000	12 400	0,22	2,92	4,52	3,06	770	6 700	7 700
66	109	2	52 000	17 700	0,24	2,66	4,12	2,79	1 100	6 000	8 300
66	109	2	52 000	17 700	0,24	2,66	4,12	2,79	1 100	6 000	8 300
66	109	2	52 000	17 700	0,24	2,66	4,12	2,79	1 100	3 800	–
66	109	2	77 000	23 800	0,42	1,51	2,33	1,58	1 480	5 600	8 200
66	109	2	77 000	23 800	0,42	1,51	2,33	1,58	1 480	5 600	8 200

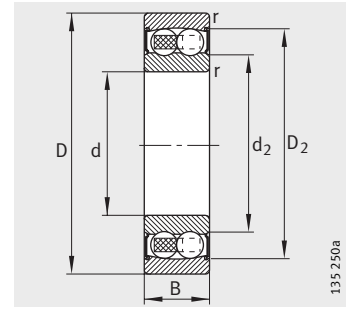


Self-aligning ball bearings

With cylindrical or tapered bore
Open or sealed

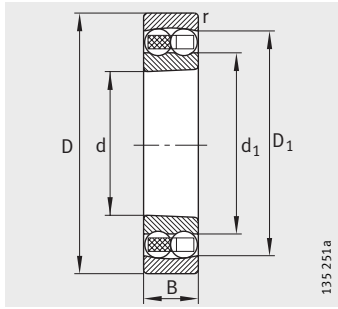


Cylindrical bore

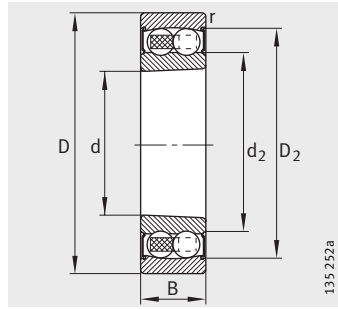


Cylindrical bore
2RS seals

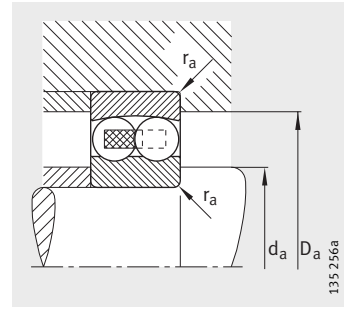
Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈kg	Dimensions							
		d	D	B	r min.	D ₁ ≈	D ₂ ≈	d ₁ ≈	d ₂ ≈
1212-K-TVH-C3	0,88	60	110	22	1,5	95,8	–	78	–
1212-TVH	0,894	60	110	22	1,5	95,8	–	78	–
2212-2RS-TVH	1,13	60	110	28	1,5	–	98,5	–	70,4
2212-K-2RS-TVH-C3	1,13	60	110	28	1,5	–	98,5	–	70,4
2212-K-TVH-C3	1,03	60	110	28	1,5	98,8	–	76,6	–
2212-TVH	1,06	60	110	28	1,5	98,8	–	76,6	–
1312-K-TVH-C3	1,94	60	130	31	2,1	112,2	–	87	–
1312-TVH	1,97	60	130	31	2,1	112,2	–	87	–
2312-K-TVH-C3	2,52	60	130	46	2,1	109,1	–	77	–
2312-TVH	2,58	60	130	46	2,1	109,1	–	77	–
1213-K-TVH-C3	1,13	65	120	23	1,5	103,2	–	85,2	–
1213-TVH	1,14	65	120	23	1,5	103,2	–	85,2	–
2213-2RS-TVH	1,53	65	120	31	1,5	–	106,6	–	78
2213-K-2RS-TVH-C3	1,5	65	120	31	1,5	–	106,6	–	78
2213-K-TVH-C3	1,33	65	120	31	1,5	107,5	–	82,4	–
2213-TVH	1,36	65	120	31	1,5	107,5	–	82,4	–
1313-K-TVH-C3	2,41	65	140	33	2,1	118,8	–	92,7	–
1313-TVH	2,44	65	140	33	2,1	118,8	–	92,7	–
2313-K-TVH-C3	3,16	65	140	48	2,1	118,9	–	85,6	–
2313-TVH	3,23	65	140	48	2,1	118,9	–	85,6	–
1214-K-TVH-C3	1,23	70	125	24	1,5	106,6	–	87,7	–
1214-TVH	1,25	70	125	24	1,5	106,6	–	87,7	–
2214-2RS-TVH	1,59	70	125	31	1,5	–	111,4	–	84,7
2214-M	1,69	70	125	31	1,5	108,9	–	87,6	–
1314-M	3,22	70	150	35	2,1	126,4	–	97,7	–
2314-M	4,38	70	150	51	2,1	127,2	–	91,5	–
1215-K-TVH-C3	1,32	75	130	25	1,5	114,1	–	93,7	–
1215-TVH	1,34	75	130	25	1,5	114,1	–	93,7	–
2215-K-TVH-C3	1,6	75	130	31	1,5	114,3	–	93,3	–
2215-TVH	1,6	75	130	31	1,5	114,3	–	93,3	–
1315-K-M-C3	3,81	75	160	37	2,1	134,8	–	104,4	–
1315-M	3,86	75	160	37	2,1	134,8	–	104,4	–
2315-K-M-C3	5,21	75	160	55	2,1	146,7	–	100,5	–
2315-M	5,33	75	160	55	2,1	146,7	–	100,5	–



Tapered bore
K = taper 1:12



Tapered bore
K = taper 1:12
2RS seals



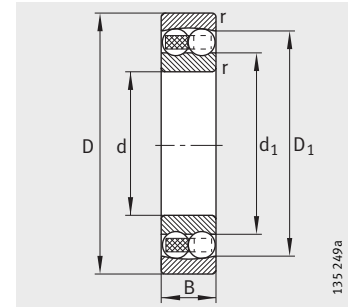
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N	e	Y_1	Y_2	Y_0			
69	101	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	6 700	8 600
69	101	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	6 700	8 600
69	101	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	4 300	–
69	101	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	4 300	–
69	101	1,5	48 000	16 300	0,23	2,69	4,16	2,82	1 020	6 300	7 400
69	101	1,5	48 000	16 300	0,23	2,69	4,16	2,82	1 020	6 300	7 400
72	118	2,1	58 000	20 600	0,23	2,77	4,28	2,9	1 280	5 300	7 800
72	118	2,1	58 000	20 600	0,23	2,77	4,28	2,9	1 280	5 300	7 800
72	118	2,1	89 000	28 000	0,41	1,55	2,4	1,62	1 740	5 000	7 800
72	118	2,1	89 000	28 000	0,41	1,55	2,4	1,62	1 740	5 000	7 800
74	111	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	6 300	8 000
74	111	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	6 300	8 000
74	111	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	4 000	–
74	111	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	4 000	–
74	111	1,5	58 000	19 000	0,23	2,78	4,31	2,92	1 190	5 300	7 100
74	111	1,5	58 000	19 000	0,23	2,78	4,31	2,92	1 190	5 300	7 100
77	128	2,1	63 000	22 700	0,23	2,75	4,26	2,88	1 380	5 000	7 400
77	128	2,1	63 000	22 700	0,23	2,75	4,26	2,88	1 380	5 000	7 400
77	128	2,1	98 000	32 000	0,39	1,62	2,51	1,7	1 980	4 800	7 300
77	128	2,1	98 000	32 000	0,39	1,62	2,51	1,7	1 980	4 800	7 300
79	116	1,5	35 000	13 700	0,19	3,36	5,21	3,52	850	6 000	7 700
79	116	1,5	35 000	13 700	0,19	3,36	5,21	3,52	850	6 000	7 700
79	116	1,5	35 000	13 700	0,19	3,36	5,21	3,52	850	3 800	–
79	116	1,5	44 000	16 900	0,27	2,34	3,62	2,45	1 050	8 500	6 600
82	138	2,1	75 000	27 500	0,23	2,79	4,32	2,93	1 620	7 000	7 000
82	138	2,1	112 000	37 000	0,38	1,65	2,55	1,73	2 210	6 300	6 900
84	121	1,5	39 000	15 500	0,19	3,32	5,15	3,48	950	5 600	7 500
84	121	1,5	39 000	15 500	0,19	3,32	5,15	3,48	950	5 600	7 500
84	121	1,5	44 500	17 600	0,26	2,47	3,82	2,59	1 080	5 300	6 300
84	121	1,5	44 500	17 600	0,26	2,47	3,82	2,59	1 080	5 300	6 300
87	148	2,1	80 000	29 500	0,23	2,77	4,29	2,9	1 690	6 300	6 700
87	148	2,1	80 000	29 500	0,23	2,77	4,29	2,9	1 690	6 300	6 700
87	148	2,1	124 000	42 000	0,38	1,64	2,54	1,72	2 420	6 000	6 700
87	148	2,1	124 000	42 000	0,38	1,64	2,54	1,72	2 420	6 000	6 700



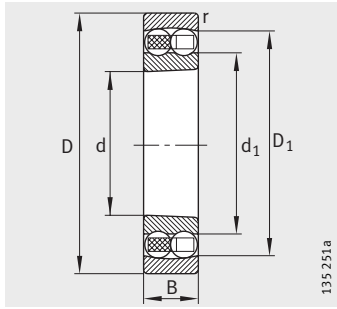
Self-aligning ball bearings

With cylindrical or tapered bore

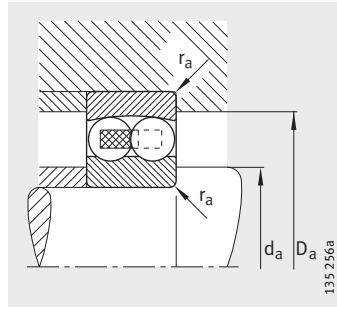


Cylindrical bore

Dimension table (continued) · Dimensions in mm							
Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁ ≈	d ₁ ≈
1216-K-TVH-C3	1,62	80	140	26	2	122,1	102
1216-TVH	1,65	80	140	26	2	122,1	102
2216-K-TVH-C3	1,97	80	140	33	2	120,8	99,5
2216-TVH	2,01	80	140	33	2	120,8	99,5
1316-K-M-C3	4,5	80	170	39	2,1	144,3	110,2
1316-M	4,56	80	170	39	2,1	144,3	110,2
2316-K-M-C3	6,18	80	170	58	2,1	144,5	107,6
2316-M	6,31	80	170	58	2,1	144,5	107,6
1217-K-TVH-C3	2,03	85	150	28	2	130,4	107,5
1217-TVH	2,07	85	150	28	2	130,4	107,5
2217-K-M-C3	2,73	85	150	36	2	130	105,2
2217-M	2,79	85	150	36	2	130	105,2
1317-K-M-C3	5,32	85	180	41	3	152	117,2
1317-M	5,39	85	180	41	3	152	117,2
2317-K-M-C3	7,36	85	180	60	3	153,3	114
2317-M	7,35	85	180	60	3	153,3	114
1218-K-TVH-C3	2,48	90	160	30	2	138,7	112,7
1218-TVH	2,52	90	160	30	2	138,7	112,7
2218-K-TVH-C3	3,18	90	160	40	2	139,4	111,5
2218-TVH	3,18	90	160	40	2	139,4	111,5
1318-K-M-C3	6,27	90	190	43	3	159,9	124,4
1318-M	6,35	90	190	43	3	159,9	124,4
2318-K-M-C3	8,6	90	190	64	3	161	115,7
2318-M	8,78	90	190	64	3	161	115,7
1219-K-M-C3	3,28	95	170	32	2,1	148,2	120,5
1219-M	3,32	95	170	32	2,1	148,2	120,5
2219-K-M-C3	4,24	95	170	43	2,1	148,6	118,9
2219-M	4,33	95	170	43	2,1	148,6	118,9
1319-K-M-C3	7,2	95	200	45	3	170,5	127,7
1319-M	7,29	95	200	45	3	170,5	127,6
2319-K-M-C3	9,97	95	200	67	3	168,5	121,6
2319-M	10,2	95	200	67	3	168,5	121,6



Tapered bore
K = taper 1:12



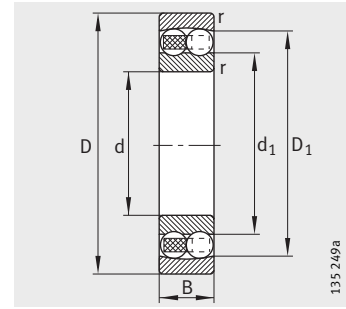
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	C _{ur}	n _G	n _B
min.	max.	max.	N	N					N	min ⁻¹	min ⁻¹
91	129	2	40 000	16 800	0,16	3,9	6,03	4,08	990	5 000	7 000
91	129	2	40 000	16 800	0,16	3,9	6,03	4,08	990	5 000	7 000
91	129	2	49 500	19 800	0,25	2,48	3,84	2,6	1 180	5 000	6 000
91	129	2	49 500	19 800	0,25	2,48	3,84	2,6	1 180	5 000	6 000
92	158	2,1	89 000	33 000	0,22	2,87	4,44	3	1 810	6 000	6 400
92	158	2,1	89 000	33 000	0,22	2,87	4,44	3	1 810	6 000	6 400
92	158	2,1	139 000	48 500	0,37	1,7	2,62	1,78	2 700	5 600	6 400
92	158	2,1	139 000	48 500	0,37	1,7	2,62	1,78	2 700	5 600	6 400
96	139	2	49 500	20 600	0,17	3,73	5,78	3,91	1 180	4 800	6 800
96	139	2	49 500	20 600	0,17	3,73	5,78	3,91	1 180	4 800	6 800
96	139	2	59 000	23 400	0,26	2,46	3,81	2,58	1 340	7 000	5 800
96	139	2	59 000	23 400	0,26	2,46	3,81	2,58	1 340	7 000	5 800
99	166	2,5	99 000	37 500	0,22	2,88	4,46	3,02	2 010	5 600	6 200
99	166	2,5	99 000	37 500	0,22	2,88	4,46	3,02	2 010	5 600	6 200
99	166	2,5	143 000	51 000	0,37	1,68	2,61	1,76	2 750	5 300	6 100
99	166	2,5	143 000	51 000	0,37	1,68	2,61	1,76	2 750	5 300	6 100
101	149	2	57 000	23 300	0,17	3,74	5,79	3,92	1 300	4 500	6 500
101	149	2	57 000	23 300	0,17	3,74	5,79	3,92	1 300	4 500	6 500
101	149	2	71 000	28 500	0,27	2,33	3,61	2,44	1 580	4 300	5 700
101	149	2	71 000	28 500	0,27	2,33	3,61	2,44	1 580	4 300	5 700
104	176	2,5	109 000	42 500	0,22	2,83	4,38	2,97	2 230	5 300	5 900
104	176	2,5	109 000	42 500	0,22	2,83	4,38	2,97	2 230	5 300	5 900
104	176	2,5	156 000	57 000	0,39	1,63	2,53	1,71	3 000	5 000	5 800
104	176	2,5	156 000	57 000	0,39	1,63	2,53	1,71	3 000	5 000	5 800
107	158	2,1	64 000	27 000	0,17	3,73	5,78	3,91	1 450	6 000	6 300
107	158	2,1	64 000	27 000	0,17	3,73	5,78	3,91	1 450	6 000	6 300
107	158	2,1	84 000	34 000	0,27	2,32	3,59	2,43	1 840	6 000	5 600
107	158	2,1	84 000	34 000	0,27	2,32	3,59	2,43	1 840	6 000	5 600
109	186	2,5	134 000	50 000	0,23	2,73	4,23	2,86	2 550	5 000	5 700
109	186	2,5	134 000	50 000	0,23	2,73	4,23	2,86	2 550	5 000	5 700
109	186	2,5	167 000	63 000	0,38	1,66	2,57	1,74	3 250	4 800	5 500
109	186	2,5	167 000	63 000	0,38	1,66	2,57	1,74	3 250	4 800	5 500



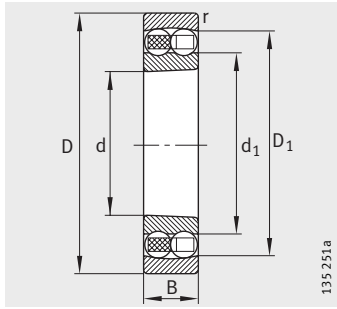
Self-aligning ball bearings

With cylindrical or tapered bore

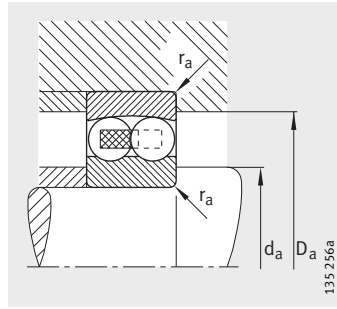


Cylindrical bore

Dimension table (continued) · Dimensions in mm							
Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁ ≈	d ₁ ≈
1220-K-M-C3	3,94	100	180	34	2,1	155,2	127,7
1220-M	3,99	100	180	34	2,1	155,2	127,7
2220-K-M-C3	5,1	100	180	46	2,1	156,9	124,4
2220-M	5,21	100	180	46	2,1	156,9	124,4
1320-K-M-C3	8,95	100	215	47	3	182,6	135,5
1320-M	9,06	100	215	47	3	182,6	135,5
2320-K-M-C3	12,7	100	215	73	3	183	130,8
2320-M	12,9	100	215	73	3	183	130,8
1221-M	4,75	105	190	36	2,1	164,4	133,9
1321-M	10,3	105	225	49	3	191,3	143,2
1222-K-M-C3	5,49	110	200	38	2,1	173,9	140,7
1222-M	5,57	110	200	38	2,1	173,9	140,7
2222-K-M-C3	7,27	110	200	53	2,1	174,1	136,9
2222-M	7,45	110	200	53	2,1	174,1	136,9
1322-K-M-C3	12,2	110	240	50	3	203,2	154,7
1322-M	12,3	110	240	50	3	203,2	154,5
2322-K-M-C3	17,5	110	240	80	3	203	145,5
2322-M	18,1	110	240	80	3	203	145,5
1224-M	7,13	120	215	42	2,1	187,3	149
1226-M	8,67	130	230	46	3	200,1	161,5
1228-M	11,2	140	250	50	3	221,2	175
1230-M	14,6	150	270	54	3	237,9	186,7



Tapered bore
K = taper 1:12



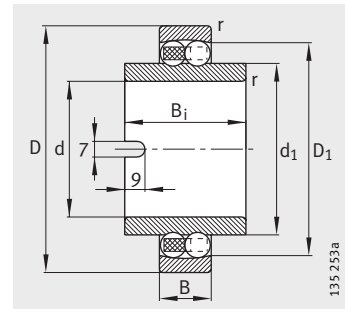
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min ⁻¹	Reference speed n_B min ⁻¹
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N	e	Y_1	Y_2	Y_0			
112	168	2,1	70 000	29 500	0,18	3,58	5,53	3,75	1 550	5 600	6 200
112	168	2,1	70 000	29 500	0,18	3,58	5,53	3,75	1 550	5 600	6 200
112	168	2,1	98 000	40 000	0,27	2,33	3,61	2,44	2 120	5 600	5 600
112	168	2,1	98 000	40 000	0,27	2,33	3,61	2,44	2 120	5 600	5 600
114	201	2,5	145 000	57 000	0,24	2,68	4,15	2,81	2 800	4 800	5 400
114	201	2,5	145 000	57 000	0,24	2,68	4,15	2,81	2 800	4 800	5 400
114	201	2,5	196 000	78 000	0,38	1,67	2,58	1,75	3 900	4 500	5 200
114	201	2,5	196 000	78 000	0,38	1,67	2,58	1,75	3 900	4 500	5 200
117	178	2,1	75 000	32 000	0,18	3,54	5,48	3,71	1 640	5 300	6 600
119	211	2,5	158 000	64 000	0,23	2,75	4,25	2,88	3 100	4 500	5 200
122	188	2,1	89 000	38 000	0,17	3,61	5,59	3,78	1 900	5 000	5 800
122	188	2,1	89 000	38 000	0,17	3,61	5,59	3,78	1 900	5 000	5 800
122	188	2,1	126 000	51 000	0,28	2,23	3,45	2,33	2 550	5 000	5 300
122	188	2,1	126 000	51 000	0,28	2,23	3,45	2,33	2 550	5 000	5 300
124	226	2,5	165 000	71 000	0,23	2,79	4,32	2,92	3 300	4 500	4 850
124	226	2,5	165 000	71 000	0,23	2,79	4,32	2,92	3 300	4 500	4 850
124	226	2,5	221 000	94 000	0,37	1,69	2,62	1,77	4 400	4 300	4 600
124	226	2,5	221 000	94 000	0,37	1,69	2,62	1,77	4 400	4 300	4 500
132	203	2,1	121 000	52 000	0,2	3,11	4,81	3,25	2 500	4 800	5 600
144	216	2,5	125 000	55 000	0,19	3,24	5,02	3,4	2 550	4 500	5 400
154	236	2,5	163 000	74 000	0,21	3,05	4,71	3,19	3 600	4 300	4 950
164	256	2,5	180 000	86 000	0,22	2,9	4,49	3,04	3 700	3 800	4 600



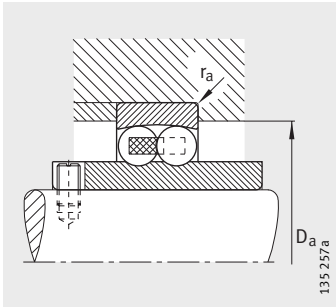
Self-aligning ball bearings

With extended inner ring



Extended inner ring

Dimension table · Dimensions in mm										
Designation	Mass m ≈ kg	Dimensions							Mounting dimensions	
		d	D	B	r min.	B _i	D ₁ ≈	d ₁ ≈	D _a max.	r _a max.
11204-TVH	0,085	20	47	14	1	40	38,1	29,2	41,4	1
11205-TVH	0,226	25	52	15	1	44	43,9	33,3	46,4	1
11206-TVH	0,364	30	62	16	1	48	51,9	40,1	56,4	1
11207-TVH	0,554	35	72	17	1,1	52	59,6	47,7	65	1
11208-TVH	0,722	40	80	18	1,1	56	67,8	54	73	1
11209-TVH	0,78	45	85	19	1,1	58	72,7	57,7	78	1
11210-TVH	0,866	50	90	20	1,1	58	77,6	62,7	83	1
11211-TVH	1,13	55	100	21	1,5	60	86,9	69,5	91	1,5
11212-TVH	1,51	60	110	22	1,5	62	95,8	78	101	1,5



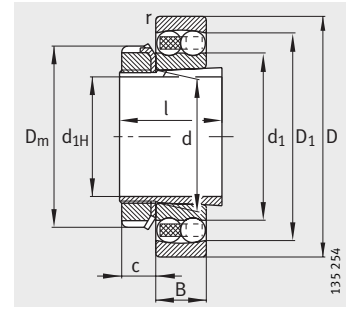
Mounting dimensions

Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed
dyn. C_r N	stat. C_{0r} N	e	Y_1	Y_2	Y_0	C_{ur} N	n_G min^{-1}
10 100	2 600	0,28	2,24	3,46	2,34	161	13 000
12 300	3 250	0,27	2,37	3,66	2,48	203	10 000
15 900	4 600	0,25	2,53	3,91	2,65	285	8 500
16 000	5 100	0,22	2,8	4,34	2,94	315	7 500
19 400	6 500	0,22	2,9	4,49	3,04	400	6 700
22 000	7 300	0,21	3,04	4,7	3,18	455	6 000
22 900	8 000	0,2	3,17	4,9	3,32	500	5 600
27 000	9 900	0,19	3,31	5,12	3,47	620	5 000
30 500	11 400	0,18	3,47	5,37	3,64	710	4 500



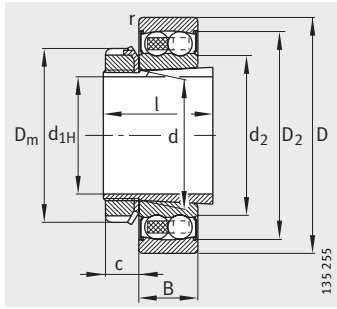
Self-aligning ball bearings

With adapter sleeve
Open or sealed

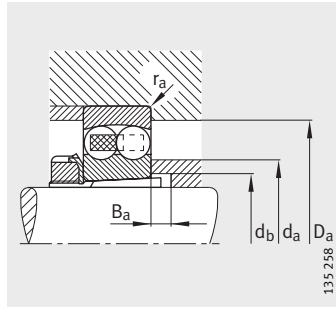


Open

Dimension table · Dimensions in mm													
Designation		Mass m		Dimensions									
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d _{1H}	d	D	B	r	D ₁	D ₂	d ₁	d ₂	D _m
								min.	≈	≈	≈	≈	
1204-K-TVH-C3	H204	0,116	0,041	17	20	47	14	1	38,1	-	29,2	-	32
1205-K-TVH-C3	H205	0,135	0,069	20	25	52	15	1	43,9	-	33,3	-	38
2205-K-2RS-TVH-C3	H305	0,157	0,075	20	25	52	18	1	-	46,3	-	30,7	38
2205-K-TVH-C3	H305	0,152	0,075	20	25	52	18	1	44,7	-	32,3	-	38
1305-K-TVH-C3	H305	0,254	0,075	20	25	62	17	1,1	50,8	-	38,1	-	38
2305-K-TVH-C3	H2305	0,328	0,085	20	25	62	24	1,1	50,1	-	35,5	-	38
1206-K-TVH-C3	H206	0,217	0,091	25	30	62	16	1	51,9	-	40,1	-	45
2206-K-2RS-TVH-C3	H306	0,268	0,099	25	30	62	20	1	-	54,3	-	37,3	45
2206-K-TVH-C3	H306	0,246	0,099	25	30	62	20	1	54	-	38,5	-	45
1306-K-TVH-C3	H306	0,379	0,099	25	30	72	19	1,1	59,4	-	45	-	45
2306-K-TVH-C3	H2306	0,476	0,116	25	30	72	27	1,1	59,3	-	41,5	-	45
1207-K-TVH-C3	H207	0,319	0,129	30	35	72	17	1,1	59,6	-	47,7	-	57
2207-K-2RS-TVH-C3	H307	0,432	0,147	30	35	72	23	1,1	-	64,3	-	43,5	57
2207-K-TVH-C3	H307	0,38	0,147	30	35	72	23	1,1	62,9	-	45,7	-	57
1307-K-TVH-C3	H307	0,5	0,147	30	35	80	21	1,5	67,5	-	51,3	-	57
2307-K-TVH-C3	H2307	0,96	0,171	30	35	80	31	1,5	66,8	-	46,9	-	52
1208-K-TVH-C3	H208	0,408	0,17	35	40	80	18	1,1	67,8	-	54	-	58
2208-K-2RS-TVH-C3	H308	0,517	0,185	35	40	80	23	1,1	-	71,1	-	49,2	58
2208-K-TVH-C3	H308	0,465	0,185	35	40	80	23	1,1	70,7	-	52,5	-	58
1308-K-TVH-C3	H308	0,698	0,185	35	40	90	23	1,5	75,3	-	57,8	-	58
2308-K-TVH-C3	H2308	0,899	0,222	35	40	90	33	1,5	75	-	53,7	-	58
1209-K-TVH-C3	H209	0,454	0,216	40	45	85	19	1,1	72,7	-	57,7	-	65
2209-K-2RS-TVH-C3	H309	0,535	0,246	40	45	85	23	1,1	-	75,4	-	53,8	65
2209-K-TVH-C3	H309	0,505	0,246	40	45	85	23	1,1	75,9	-	59	-	65
1309-K-TVH-C3	H309	0,939	0,246	40	45	100	25	1,5	84,1	-	64,1	-	65
2309-K-TVH-C3	H2309	1,19	0,283	40	45	100	36	1,5	84,2	-	60,1	-	65



2RS seals



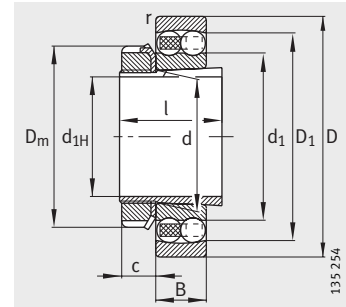
Mounting dimensions

		Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
l	c	da	Da	db	Ba	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	C _{ur}	n _G	n _B
	≈	max.	max.	min.	min.	max.	N	N					N	min ⁻¹	min ⁻¹
24	7	27	41,4	23	5	1	10 100	2 600	0,28	2,24	3,46	2,34	161	18 000	20 200
26	9	32	46,4	28	5	1	12 300	3 250	0,27	2,37	3,66	2,48	203	16 000	17 800
29	9	32	46,4	28	5	1	12 300	3 250	0,27	2,37	3,66	2,48	203	9 500	–
29	9	32	46,4	28	5	1	17 300	4 400	0,35	1,78	2,75	1,86	275	15 000	14 600
29	9	35	55	28	6	1	18 300	4 950	0,28	2,29	3,54	2,4	310	14 000	13 900
35	9	34	55	30	5	1	25 000	6 500	0,48	1,32	2,04	1,38	405	13 000	13 500
27	9	38	56,4	33	5	1	15 900	4 600	0,25	2,53	3,91	2,65	285	14 000	14 900
31	9	38	56,4	33	5	1	15 900	4 600	0,25	2,53	3,91	2,65	285	8 000	–
31	9	38	56,4	33	5	1	26 000	6 900	0,3	2,13	3,29	2,23	430	12 000	12 600
31	9	42	65	33	6	1	21 700	6 300	0,26	2,39	3,71	2,51	390	11 000	12 300
38	9	40	65	35	5	1	32 500	8 700	0,45	1,4	2,17	1,47	540	10 000	11 900
29	10	45	65	38	5	1	16 000	5 100	0,22	2,8	4,34	2,94	315	12 000	12 900
35	10	45	65	38	5	1	16 000	5 100	0,22	2,8	4,34	2,94	315	7 000	–
35	10	44	65	39	5	1	33 000	8 900	0,3	2,13	3,29	2,23	560	9 500	11 400
35	10	49	71	39	8	1,5	25 500	7 800	0,26	2,47	3,82	2,59	485	9 500	11 300
43	10	45	71	40	5	1,5	40 500	11 100	0,47	1,35	2,1	1,42	690	9 000	11 200
31	11	52	73	43	5	1	19 400	6 500	0,22	2,9	4,49	3,04	400	10 000	11 600
36	11	52	73	43	5	1	19 400	6 500	0,22	2,9	4,49	3,04	400	6 300	–
36	11	50	73	44	5	1	32 500	9 400	0,26	2,43	3,76	2,54	580	9 000	9 900
36	11	55	81	44	5	1,5	30 000	9 600	0,25	2,52	3,9	2,64	600	8 500	10 300
46	11	51	81	45	5	1,5	46 000	13 400	0,43	1,45	2,25	1,52	830	8 000	10 000
33	12	57	78	48	5	1	22 000	7 300	0,21	3,04	4,7	3,18	455	9 000	10 900
39	12	57	78	48	5	1	22 000	7 300	0,21	3,04	4,7	3,18	455	5 600	–
39	12	56	78	50	8	1	28 500	8 900	0,26	2,43	3,76	2,54	550	8 500	9 000
39	12	61	91	50	5	1,5	38 500	12 600	0,25	2,5	3,87	2,62	780	7 500	9 500
50	12	57	91	50	5	1,5	55 000	16 500	0,43	1,48	2,29	1,55	1 030	7 000	9 300



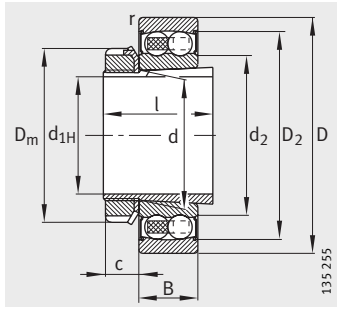
Self-aligning ball bearings

With adapter sleeve
Open or sealed

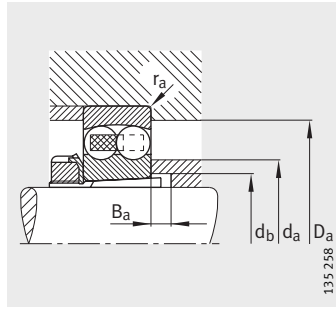


Open

Dimension table (continued) · Dimensions in mm													
Designation		Mass m		Dimensions									
Bearing	Adapter sleeve	Bearing	Adapter sleeve	d _{1H}	d	D	B	r	D ₁	D ₂	d ₁	d ₂	D _m
		≈kg	≈kg					min.	≈	≈	≈	≈	
1210-K-TVH-C3	H210	0,516	0,264	45	50	90	20	1,1	77,6	–	62,7	–	70
2210-K-2RS-TVH-C3	H310	0,593	0,301	45	50	90	23	1,1	–	80	–	60,6	70
2210-K-TVH-C3	H310	0,543	0,301	45	50	90	23	1,1	81	–	64	–	70
1310-K-TVH-C3	H310	1,52	0,301	45	50	110	27	2	91,9	–	71,2	–	70
1211-K-TVH-C3	H211	0,682	0,292	50	55	100	21	1,5	86,9	–	69,5	–	75
2211-K-2RS-TVH-C3	H311	0,808	0,35	50	55	100	25	1,5	–	88,9	–	68	75
2211-K-TVH-C3	H311	0,73	0,35	50	55	100	25	1,5	90	–	69,6	–	75
1311-K-TVH-C3	H311	1,55	0,35	50	55	120	29	2	101,6	–	78	–	75
2311-K-TVH-C3	H2311	2,02	0,426	50	55	120	43	2	100,7	–	71,7	–	75
1212-K-TVH-C3	H212	0,88	0,325	55	60	110	22	1,5	95,8	–	78	–	80
2212-K-2RS-TVH-C3	H312	1,13	0,373	55	60	110	28	1,5	–	98,5	–	70,4	80
2212-K-TVH-C3	H312	1,03	0,373	55	60	110	28	1,5	98,8	–	76,6	–	80
1312-K-TVH-C3	H312	1,94	0,373	55	60	130	31	2,1	112,2	–	87	–	80
2312-K-TVH-C3	H2312	2,52	0,464	55	60	130	46	2,1	109,1	–	77	–	80
1213-K-TVH-C3	H213	1,13	0,393	60	65	120	23	1,5	103,2	–	85,2	–	92
2213-K-2RS-TVH-C3	H313	1,5	0,452	60	65	120	31	1,5	–	106,6	–	78	92
2213-K-TVH-C3	H313	1,33	0,452	60	65	120	31	1,5	107,5	–	82,4	–	92
1313-K-TVH-C3	H313	2,41	0,452	60	65	140	33	2,1	118,8	–	92,7	–	92
2313-K-TVH-C3	H2313	3,16	0,553	60	65	140	48	2,1	118,9	–	85,6	–	92
1214-K-TVH-C3	H214	1,23	0,603	60	70	125	24	1,5	106,6	–	87,7	–	98
1215-K-TVH-C3	H215	1,32	0,693	65	75	130	25	1,5	114,1	–	93,7	–	98
2215-K-TVH-C3	H315	1,6	0,826	65	75	130	31	1,5	114,3	–	93,3	–	104
1315-K-M-C3	H315	3,81	0,826	65	75	160	37	2,1	134,8	–	104,4	–	104
2315-K-M-C3	H2315	5,21	1,05	65	75	160	55	2,1	146,7	–	100,5	–	98
1216-K-TVH-C3	H216	1,62	0,876	70	80	140	26	2	122,1	–	102	–	105
2216-K-TVH-C3	H316	1,97	1,01	70	80	140	33	2	120,8	–	99,5	–	105
1316-K-M-C3	H316	4,5	1,01	70	80	170	39	2,1	144,3	–	110,2	–	105
2316-K-M-C3	H2316	6,18	1,27	70	80	170	58	2,1	144,5	–	107,6	–	105
1217-K-TVH-C3	H217	2,03	0,995	75	85	150	28	2	130,4	–	107,5	–	110
2217-K-M-C3	H317	2,73	1,16	75	85	150	36	2	130	–	105,2	–	110
1317-K-M-C3	H317	5,32	1,16	75	85	180	41	3	152	–	117,2	–	110
2317-K-M-C3	H2317	7,36	1,44	75	85	180	60	3	153,3	–	114	–	110



2RS seals



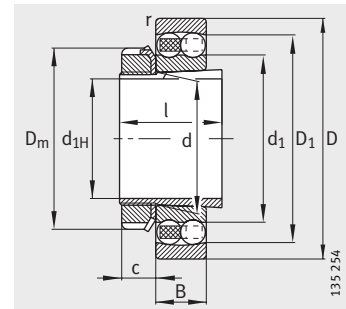
Mounting dimensions

		Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
l	c	da	Da	db	Ba	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	Cur	nG	nB
	≈	max.	max.	min.	min.	max.	N	N					N	min ⁻¹	min ⁻¹
35	13	62	83	53	5	1	22 900	8 000	0,2	3,17	4,9	3,32	500	8 500	10 300
42	13	62	83	53	5	1	22 900	8 000	0,2	3,17	4,9	3,32	500	5 300	–
42	13	61	83	55	10	1	28 500	9 400	0,24	2,61	4,05	2,74	580	8 000	8 300
42	13	68	99	55	5	2	42 000	14 100	0,24	2,6	4,03	2,73	880	6 700	8 800
37	13	69	91	60	6	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	7 500	9 400
45	13	69	91	60	6	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	4 800	–
45	13	68	91	60	10	1,5	39 000	12 400	0,22	2,92	4,52	3,06	770	6 700	7 700
45	13	74	109	60	6	2	52 000	17 700	0,24	2,66	4,12	2,79	1 100	6 000	8 300
59	13	69	109	61	6	2	77 000	23 800	0,42	1,51	2,33	1,58	1 480	5 600	8 200
38	13	75	101	64	5	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	6 700	8 600
47	13	75	101	64	5	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	4 300	–
47	13	73	101	65	8	1,5	48 000	16 300	0,23	2,69	4,16	2,82	1 020	6 300	7 400
47	13	83	118	65	5	2,1	58 000	20 600	0,23	2,77	4,28	2,9	1 280	5 300	7 800
62	13	74	118	66	5	2,1	89 000	28 000	0,41	1,55	2,4	1,62	1 740	5 000	7 800
40	14	83	111	70	5	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	6 300	8 000
50	14	83	111	70	5	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	4 000	–
50	14	79	111	70	8	1,5	58 000	19 000	0,23	2,78	4,31	2,92	1 190	5 300	7 100
50	14	89	128	70	5	2,1	63 000	22 700	0,23	2,75	4,26	2,88	1 380	5 000	7 400
65	14	82	128	72	5	2,1	98 000	32 000	0,39	1,62	2,51	1,7	1 980	4 800	7 300
41	14	86	116	75	5	1,5	35 000	13 700	0,19	3,36	5,21	3,52	850	6 000	7 700
43	15	92	121	80	5	1,5	39 000	15 500	0,19	3,32	5,15	3,48	950	5 600	7 500
55	15	90	121	80	12	1,5	44 500	17 600	0,26	2,47	3,82	2,59	1 080	5 300	6 300
55	15	100	148	80	5	2,1	80 000	29 500	0,23	2,77	4,29	2,9	1 690	6 300	6 700
73	15	94	148	82	5	2,1	124 000	42 000	0,38	1,64	2,54	1,72	2 420	6 000	6 700
46	17	99	129	85	5	2	40 000	16 800	0,16	3,9	6,03	4,08	990	5 000	7 000
59	17	96	129	85	12	2	49 500	19 800	0,25	2,48	3,84	2,6	1 180	5 000	6 000
59	17	107	158	85	5	2,1	89 000	33 000	0,22	2,87	4,44	3	1 810	6 000	6 400
78	17	100	158	88	5	2,1	139 000	48 500	0,37	1,7	2,62	1,78	2 700	5 600	6 400
50	18	105	139	90	6	2	49 500	20 600	0,17	3,73	5,78	3,91	1 180	4 800	6 800
63	18	102	139	91	12	2	59 000	23 400	0,26	2,46	3,81	2,58	1 340	7 000	5 800
63	18	114	166	91	6	2,5	99 000	37 500	0,22	2,88	4,46	3,02	2 010	5 600	6 200
82	18	106	166	94	6	2,5	143 000	51 000	0,37	1,68	2,61	1,76	2 750	5 300	6 100



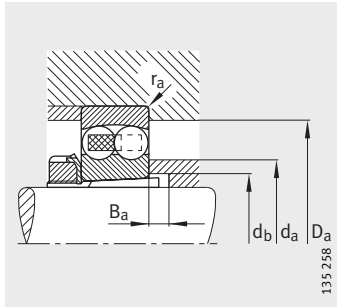
Self-aligning ball bearings

With adapter sleeve



Open

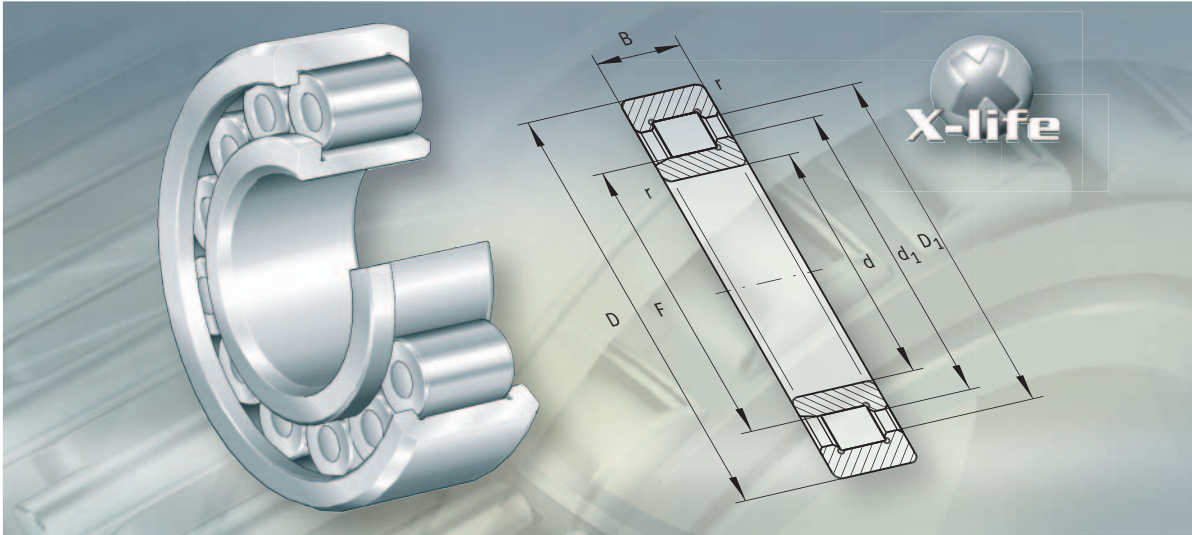
Dimension table (continued) · Dimensions in mm											
Designation		Mass m		Dimensions							
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d _{1H}	d	D	B	r min.	D ₁ ≈	d ₁ ≈	D _m
1218-K-TVH-C3	H218	2,48	1,17	80	90	160	30	2	138,7	112,7	126
2218-K-TVH-C3	H318	3,18	1,36	80	90	160	40	2	139,4	111,5	126
1318-K-M-C3	H318	6,27	1,36	80	90	190	43	3	159,9	124,4	126
2318-K-M-C3	H2318	8,6	1,68	80	90	190	64	3	161	115,7	126
1219-K-M-C3	H219	3,28	1,32	85	95	170	32	2,1	148,2	120,5	125
2219-K-M-C3	H319	4,24	1,51	85	95	170	43	2,1	148,6	118,9	125
1319-K-M-C3	H319	7,2	1,51	85	95	200	45	3	170,5	127,7	125
2319-K-M-C3	H2319	9,97	1,89	85	95	200	67	3	168,5	121,6	133
1220-K-M-C3	H220	3,94	1,48	90	100	180	34	2,1	155,2	127,7	130
2220-K-M-C3	H320	5,1	1,69	90	100	180	46	2,1	156,9	124,4	130
1320-K-M-C3	H320	8,95	1,69	90	100	215	47	3	182,6	135,5	130
2320-K-M-C3	H2320	12,7	2,17	90	100	215	73	3	183	130,8	142
1222-K-M-C3	H222	5,49	1,9	100	110	200	38	2,1	173,9	140,7	145
2222-K-M-C3	H322	7,27	2,15	100	110	200	53	2,1	174,1	136,9	154
1322-K-M-C3	H322	12,2	2,15	100	110	240	50	3	203,2	154,7	154
2322-K-M-C3	H2322	17,5	2,74	100	110	240	80	3	203	145,5	154



Mounting dimensions

		Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
l	c	d _a	D _a	d _b	B _a	r _a	dyn. C _r	stat. C _{0r}	e	Y ₁	Y ₂	Y ₀	C _{ur}	n _G	n _B
	≈	max.	max.	min.	min.	max.	N	N					N	min ⁻¹	min ⁻¹
52	18	110	149	95	6	2	57 000	23 300	0,17	3,74	5,79	3,92	1 300	4 500	6 500
65	18	108	149	96	10	2	71 000	28 500	0,27	2,33	3,61	2,44	1 580	4 300	5 700
65	18	120	176	96	6	2,5	109 000	42 500	0,22	2,83	4,38	2,97	2 230	5 300	5 900
86	18	112	176	100	6	2,5	156 000	57 000	0,39	1,63	2,53	1,71	3 000	5 000	5 800
55	19	117	158	100	7	2,1	64 000	27 000	0,17	3,73	5,78	3,91	1 450	6 000	6 300
68	19	114	158	102	9	2,1	84 000	34 000	0,27	2,32	3,59	2,43	1 840	6 000	5 600
68	19	126	186	102	7	2,5	134 000	50 000	0,23	2,73	4,23	2,86	2 550	5 000	5 700
90	19	117	186	105	7	2,5	167 000	63 000	0,38	1,66	2,57	1,74	3 250	4 800	5 500
58	20	124	168	106	7	2,1	70 000	29 500	0,18	3,58	5,53	3,75	1 550	5 600	6 200
71	20	120	168	108	8	2,1	98 000	40 000	0,27	2,33	3,61	2,44	2 120	5 600	5 600
71	20	132	201	108	7	2,5	145 000	57 000	0,24	2,68	4,15	2,81	2 800	4 800	5 400
97	20	125	201	110	7	2,5	196 000	78 000	0,38	1,67	2,58	1,75	3 900	4 500	5 200
63	21	138	188	116	7	2,1	89 000	38 000	0,17	3,61	5,59	3,78	1 900	5 000	5 800
77	21	132	188	118	6	2,1	126 000	51 000	0,28	2,23	3,45	2,33	2 550	5 000	5 300
77	21	150	226	118	9	2,5	165 000	71 000	0,23	2,79	4,32	2,92	3 300	4 500	4 850
105	21	139	226	121	7	2,5	221 000	94 000	0,37	1,69	2,62	1,77	4 400	4 300	4 500





Cylindrical roller bearings

- Cylindrical roller bearings with cage
- Low friction cylindrical roller bearings
- High precision cylindrical roller bearings
- Full complement cylindrical roller bearings
- Full complement cylindrical roller bearings with snap ring grooves

Cylindrical roller bearings

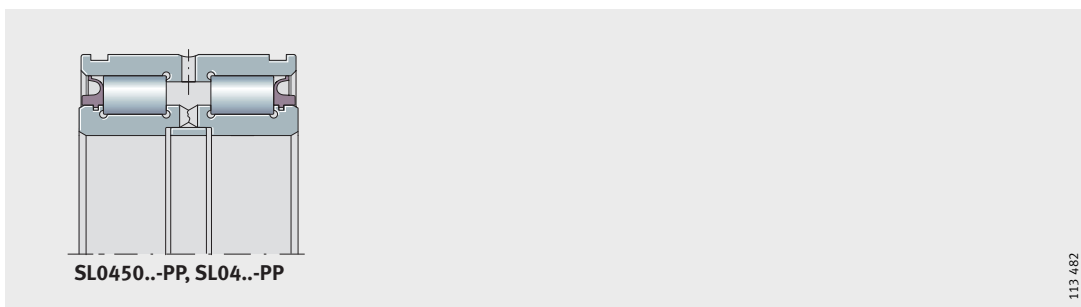
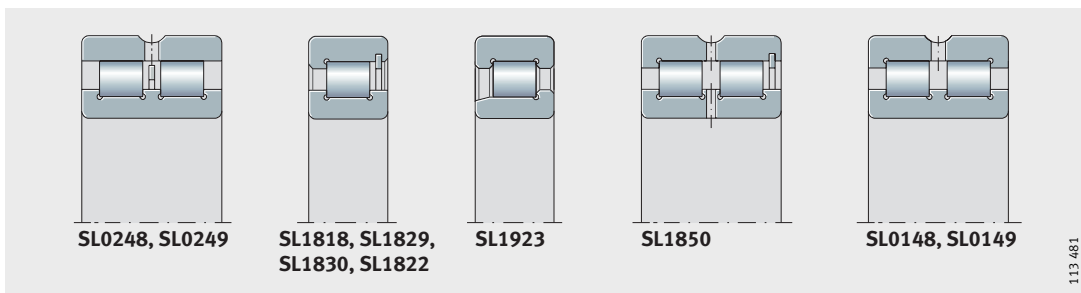
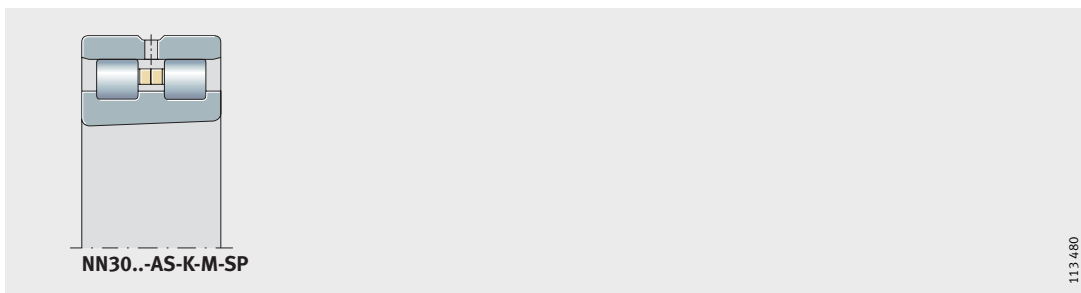
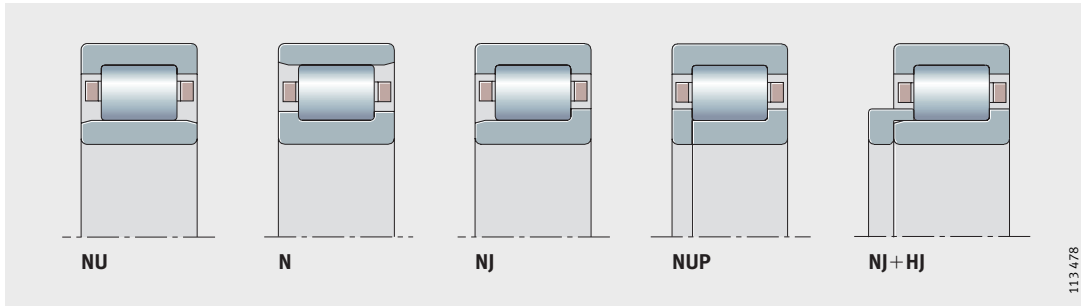
X-life **358**
Cylindrical roller bearings with cage
Single row cylindrical roller bearings with cage have a very high radial load carrying capacity and are suitable for higher speeds compared to full complement designs. The rollers are guided between rigid ribs in one of the two bearing rings and form a unit with this ring due to the cage. Since a bearing ring of this type can be removed, the rings can be mounted separately. The bearings are available as non-locating, semi-locating and locating bearings.

X-life **402**
Low friction cylindrical roller bearings
In the low friction cylindrical roller bearings, a brass disc cage or plastic spacers prevent the rolling elements from coming into contact with each other. They combined the advantages of full complement cylindrical roller bearings (high load carrying capacity) with those of cage type bearings (high limiting speeds). The frictional torque is very low across the entire speed range. As a result, the bearings have the highest limiting speeds of any cylindrical roller bearings.

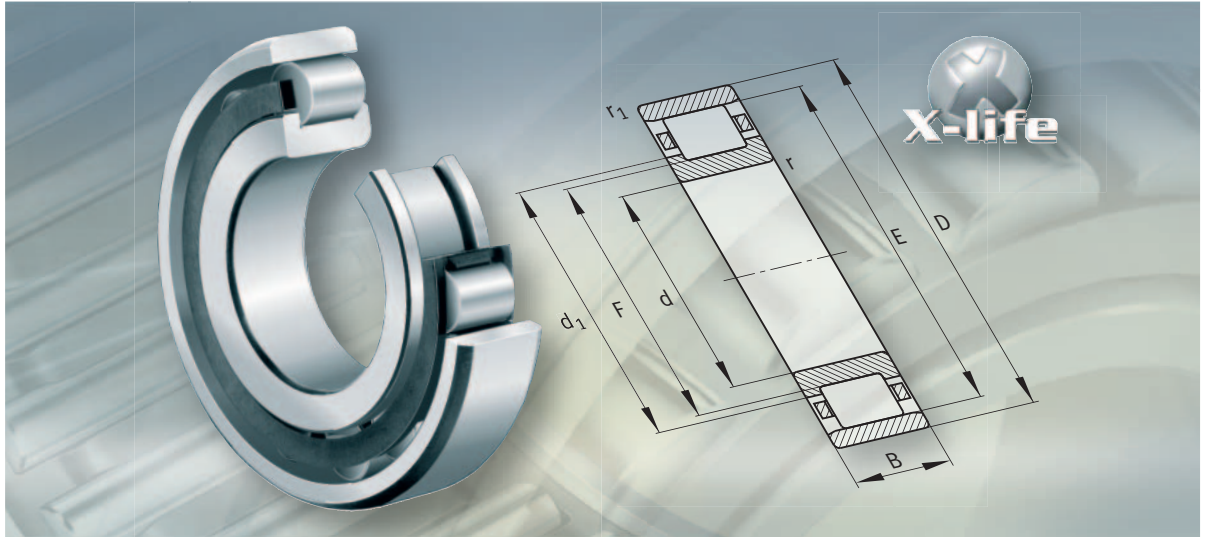
..... **414**
High precision cylindrical roller bearings
Cylindrical roller bearings of this design are double row precision bearings (non-locating bearings) for machine tools and correspond to tolerance class SP. They are used to give radial support for main spindles. The bearings are separable and are therefore easier to fit and dismantle. The inner ring has a tapered bore for optimum setting of the radial internal clearance.

X-life **428**
Full complement cylindrical roller bearings
These single and double row bearings have full complement rolling element sets. The rolling elements are guided by ribs on the bearing rings. Since they have the maximum possible number of rollers, full complement bearings have extremely high load carrying capacity and high rigidity. Due to the kinematic conditions, however, they do not achieve the high speeds that are possible when using cylindrical roller bearings with cage. The bearings are available as non-locating, semi-locating and locating bearings.

..... **452**
Full complement cylindrical roller bearings with snap ring grooves
Due to the grooves in the outer rings, the bearing rings can be axially located using retaining rings. The bearings are therefore highly suitable for cable sheave bearing arrangements. Sealing rings on both sides of the bearings protect the running system reliably against contamination and moisture. Since it has the maximum possible number of rollers, the full complement design has extremely high load carrying capacity and high rigidity and is suitable for particularly compact designs.



FAG



Cylindrical roller bearings with cage

Cylindrical roller bearings with cage

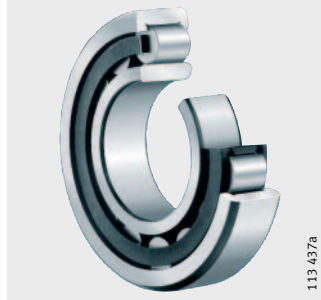
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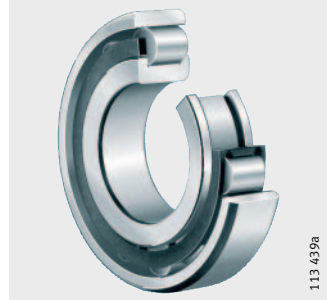
Product overview Cylindrical roller bearings with cage

Non-locating bearings

NU10, NU19, NU2...-E, NU3...-E,
NU22...-E, NU23...-E

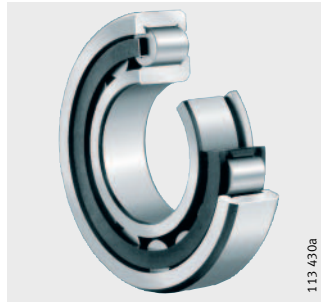


N2...-E, N3...-E



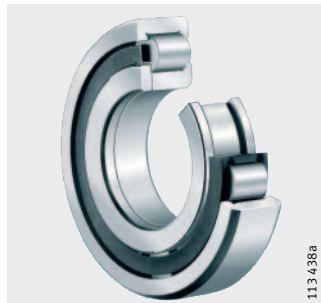
Semi-locating bearings

NJ2...-E, NJ3...-E,
NJ22...-E, NJ23...-E



Locating bearings With rib washer

NUP2...-E, NUP3...-E,
NUP22...-E, NUP23...-E



With L-section ring

NJ2...-E + HJ, NJ3...-E + HJ,
NJ22...-E + HJ, NJ23...-E + HJ



Cylindrical roller bearings with cage

Features	<p>Single row cylindrical roller bearings with cage are units comprising solid inner and outer rings and cylindrical roller and cage assemblies. The outer rings have rigid ribs on both sides or no ribs, the inner rings have one or two rigid ribs or are designed without ribs. The cage prevents the cylindrical rollers from coming into contact with each other during rolling.</p> <p>The cylindrical roller bearings have high rigidity, high radial load carrying capacity and, due to the cage, are suitable for higher speeds compared to full complement designs. Bearings with the suffix E have a higher capacity roller set and are thus designed for very high load carrying capacity.</p> <p>The bearings are separable and are therefore easier to fit and dismantle. Both bearing rings can be given a tight fit by this process.</p> <p>Single row cylindrical roller bearings with cage are available as non-locating, semi-locating and locating bearings.</p>
Sealing/lubricant	<p>The bearings are supplied without seals. They can be lubricated from the end faces.</p>
X-life	<p>Numerous sizes are supplied in the X-life grade. These bearings are indicated in the dimension tables.</p> <p>Bearings of X-life quality have lower roughness R_a and higher geometrical accuracy of the raceways than comparable designs that are not X-life. As a result, these bearings have higher load carrying capacity and longer life for the same dimensioning. In certain applications, this means that a smaller bearing arrangement can be designed.</p>
Non-locating bearings	<p>Cylindrical roller bearings NU and N are non-locating bearings and can support radial forces only.</p> <p>In series NU, the outer ring has two ribs, while the inner ring has no ribs. Bearings of series N have two ribs on the inner ring and an outer ring without ribs.</p>
Axial displacement	<p>The outer and inner ring can be axially displaced relative to each other from the central position by the values “s” stated in the dimension tables.</p>
Semi-locating bearings	<p>Cylindrical roller bearings NJ are semi-locating bearings. Semi-locating bearings can support not only high radial forces but also axial forces in one direction and can therefore guide shafts axially in one direction. They act as non-locating bearings in the opposite direction.</p> <p>The bearings have two ribs on the outer ring and one rib on the inner ring.</p>
Non-locating bearings with L-section ring	<p>Non-locating bearings NU can be combined with an L-section ring HJ to form a semi-locating bearing unit.</p>
	<p>Caution! Bearings NU must not be installed with two L-section rings – there is a risk of jamming.</p>
Axial displacement	<p>The outer and inner ring can be axially displaced relative to each other in one direction only by the dimension “s” stated in the dimension table.</p>



Cylindrical roller bearings with cage

Locating bearings	Cylindrical roller bearings NUP and NJ with HJ are locating bearings. Locating bearings can support not only high radial forces but also axial forces in both directions and can therefore guide shafts axially in both directions.
Bearings with rib washer	Type NUP has two ribs on the outer ring and one rigid rib on the inner ring. A loose rib washer is fitted on the opposite side.
Bearings with L-section ring	Type NJ with HJ has two ribs on the outer ring, one rib on the inner ring and an L-section ring for the ribless side of the inner ring. The L-section rings suitable for the bearings are indicated in the dimension tables. The bearing and L-section ring must be ordered separately.
L-section rings	L-section rings are advantageous where, under high loads, the seating surface of the inner ring in NUP bearings with a loose rib washer is too small to provide a sufficiently high bearing seat. In some applications, they make it easier to fit and dismantle the bearings.
Operating temperature	Single row cylindrical roller bearings with cage can be used at operating temperatures from -30 °C to $+150\text{ °C}$. For continuous operating temperatures above $+120\text{ °C}$, please contact us.
Caution!	Bearings with a plastic cage (suffix TVP2) are suitable up to $+120\text{ °C}$; the operating life is heavily dependent on the lubricant used.
Cages	Suffix M1 indicates bearings with brass cages guided by rollers. Higher strength cylindrical roller bearings with the suffix TVP2 have a cage made from glass fibre reinforced polyamide PA66.
Caution!	Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives. Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures. The oil change intervals must be observed.
	The cages used in the bearings are shown in the table Bearing series and cage material, page 363.
Other cage designs	Other cage designs available by agreement. In such cages, suitability for high speeds and temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.

Bearing series and cage material

Series	Solid polyamide PA66 cage TVP2 Bore code	Solid brass cage M1
NU10	–	from 05
NU19	–	from 92
NU2..-E	up to 26	from 28
NU3..-E	up to 28	from 30
NU22..-E	up to 26	from 28
NU23..-E	up to 22	from 24
N2..-E	up to 20, 22 to 26	21, from 28
N3..-E	up to 16	from 17
NJ2..-E	up to 26	from 28
NJ3..-E	up to 28	from 30
NJ22..-E	up to 26	from 28
NJ23..-E	up to 22	from 24
NUP2..-E	up to 26	from 28
NUP3..-E	up to 28	from 30
NUP22..-E	up to 26	from 28
NUP23..-E	up to 22	from 24



Suffixes

Suffixes for available designs: see table.

Available designs

Suffixes	Description	Design
C3	Radial internal clearance larger than normal	Special design ¹⁾
C4	Radial internal clearance larger than C3	Special design ¹⁾
E	Increased capacity design	Standard
JP3	Sheet steel window cage, single-piece, roller-guided	Special design ¹⁾
MP1A	Solid brass cage, single-piece, rib-guided on outer ring	Special design ¹⁾
MP1B	Solid brass cage, single-piece, rib-guided on inner ring	Special design ¹⁾
M1	Solid brass cage, roller-guided	Standard
TVP2	Solid window cage made from glass fibre reinforced polyamide PA66	Standard
EX	Increased capacity design, design modified in accordance with standard (parts from these bearings must not be interchanged with parts from bearings of the same size of the previous design E)	Standard

¹⁾ Available by agreement.

Design and safety guidelines

Permissible skewing

The permissible skewing of the inner ring relative to the outer ring is dependent on the load ratio C_r/P and is restricted to a few angular minutes.

Caution! At a ratio $C_r/P \geq 5$ ($P/C_r \leq 0,2$), the adjustment angle must be no than 4 angular minutes (approx. 1,2 mrad).

Cylindrical roller bearings with cage

Axial load carrying capacity

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements,
- the sliding velocity at the ribs,
- the lubrication on the contact surfaces.

Caution! Ribs subjected to load must be supported across their entire height. If severe shaft flexing is present, reversed bending loads may occur as a result of this support. Special analysis is required in this case. The axial limiting load $F_{a\ max}$ must not be exceeded, in order to avoid impermissible pressure at the contact surfaces. The ratio F_a/F_r should not exceed 0,4. Continuous axial loading without simultaneous radial loading is not permissible.

Permissible and maximum axial load

$$F_{a\ per} = k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{-0,6} \leq F_{a\ max}$$

$$F_{a\ max} = 0,075 \cdot k_B \cdot d_M^{2,1}$$

$F_{a\ per}$ N
Permissible axial load

$F_{a\ max}$ N
Axial limiting load

k_S –
Factor dependent on the lubrication method, see table

k_B –
Factor dependent on the bearing series, see table

d_M mm
Mean bearing diameter $(d + D)/2$ according to dimension table

n min^{-1}
Operating speed.

Factor k_S for lubrication method

Lubrication method ¹⁾	Factor k_S
Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ($\nu < 0,5 \cdot \nu_1$)	7,5 to 10
Poor heat dissipation, oil sump lubrication, oil spray lubrication, low oil flow	10 to 15
Good heat dissipation, recirculating oil lubrication (pressurised oil lubrication)	12 to 18
Very good heat dissipation, recirculating oil lubrication with oil cooling, high operating viscosity ($\nu > 2 \cdot \nu_1$)	16 to 24

¹⁾ Doped lubricating oils should be used, e.g. CLP (DIN 51 517) and HLP (DIN 51 524) of ISO VG classes 32 to 460 and ATF oils (DIN 51 502) and gearbox oils (DIN 51 512) of SAE viscosity classes 75 W to 140 W.

Bearing factor k_B

Series	Bearing factor k_B
NJ2..-E, NJ22..-E, NUP2..-E, NUP22..-E	18
NJ3..-E, NJ23..-E, NUP3..-E, NUP23..-E	23

Minimum radial load

In continuous operation, a minimum radial load of the order of $C_{0r}/P < 60$ is necessary.

Caution! If $C_{0r}/P > 60$, please contact us.

Equivalent dynamic bearing load
Non-locating bearings

For bearings under dynamic loading, the following applies:

$$P = F_r$$

Semi-locating and locating bearings

If an axial force F_a is present in addition to the radial force F_r , the effect on the life must be calculated using our calculation program BEARINX®.

Equivalent static bearing load
Non-locating bearings

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

Semi-locating and locating bearings

If an axial force F_{0a} is present in addition to the radial force F_{0r} , the effect on the static load safety factor must be calculated using our calculation program BEARINX®.

Accuracy

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620.



Radial internal clearance

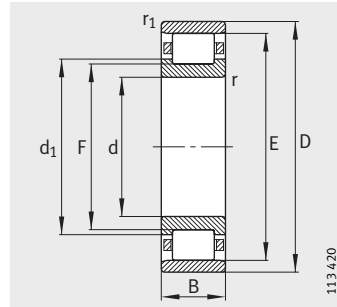
The radial internal clearance corresponds to internal clearance group CN.

Radial internal clearance to DIN 620-4

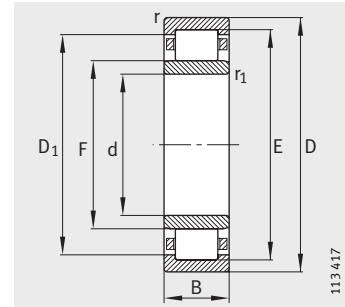
Bore d mm		Radial internal clearance					
		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.
–	24	20	45	35	60	50	75
24	30	20	45	35	60	50	75
30	40	25	50	45	70	60	85
40	50	30	60	50	80	70	100
50	65	40	70	60	90	80	110
65	80	40	75	65	100	90	125
80	100	50	85	75	110	105	140
100	120	50	90	85	125	125	165
120	140	60	105	100	145	145	190
140	160	70	120	115	165	165	215
160	180	75	125	120	170	170	220
180	200	90	145	140	195	195	250
200	225	105	165	160	220	220	280
225	250	110	175	170	235	235	300
250	280	125	195	190	260	260	330
280	315	130	205	200	275	275	350
315	355	145	225	225	305	305	385
355	400	190	280	280	370	370	460
400	450	210	310	310	410	410	510
450	500	220	330	330	440	440	550
500	560	240	360	360	480	480	600
560	630	260	380	380	500	500	620
630	710	285	425	425	565	565	705

Cylindrical roller bearings with cage

Non-locating bearings

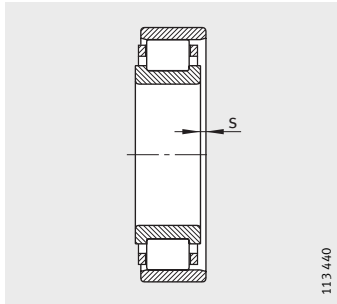


N

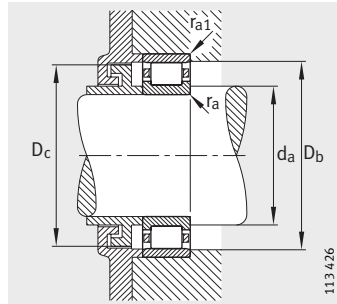


NU

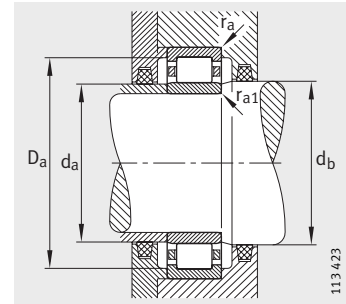
Dimension table · Dimensions in mm												
Designation	X-life	Mass m ≈kg	Dimensions									
			d	D	B	r	r ₁	s ¹⁾	E	F	D ₁	d ₁
						min.	min.				≈	≈
N202-E-TVP2	XL	0,047	15	35	11	0,6	0,3	0,5	30,3	19,3	–	21,6
NU202-E-TVP2	XL	0,048	15	35	11	0,6	0,3	1,6	30,3	19,3	28	–
N203-E-TVP2	XL	0,068	17	40	12	0,6	0,3	1,2	35,1	22,1	–	24,9
NU203-E-TVP2	XL	0,069	17	40	12	0,6	0,3	1,2	35,1	22,1	32,5	–
NU2203-E-TVP2	XL	0,051	17	40	16	0,6	0,3	1,7	35,1	22,1	32,5	–
NU303-E-TVP2	XL	0,121	17	47	14	1	0,6	1,2	40,2	24,2	37,1	–
N204-E-TVP2	XL	0,112	20	47	14	1	0,6	0,8	41,5	26,5	–	29,7
NU204-E-TVP2	XL	0,114	20	47	14	1	0,6	0,8	41,5	26,5	38,8	–
NU2204-E-TVP2	XL	0,146	20	47	18	1	0,6	1,8	41,5	26,5	38,8	–
NU304-E-TVP2	XL	0,153	20	52	15	1,1	0,6	1	45,5	27,5	42,4	–
NU2304-E-TVP2	XL	0,215	20	52	21	1,1	0,6	1,9	45,5	27,5	42,4	–
NU1005-M1	XL	0,092	25	47	12	0,6	0,3	2,4	41,5	30,5	39,3	–
N205-E-TVP2	XL	0,135	25	52	15	1	0,6	1,3	46,5	31,5	–	34,7
NU205-E-TVP2	XL	0,137	25	52	15	1	0,6	1,2	46,5	31,5	43,8	–
NU2205-E-TVP2	XL	0,165	25	52	18	1	0,6	1,7	46,5	31,5	43,8	–
N305-E-TVP2	XL	0,242	25	62	17	1,1	1,1	1,4	54	34	–	38,1
NU305-E-TVP2	XL	0,245	25	62	17	1,1	1,1	1,5	54	34	50,7	–
NU2305-E-TVP2	XL	0,349	25	62	24	1,1	1,1	1,9	54	34	50,7	–
NU1006-M1	XL	0,134	30	55	13	1	0,6	2,4	48,5	36,5	46,1	–
N206-E-TVP2	XL	0,205	30	62	16	1	0,6	1,4	55,5	37,5	–	41,1
NU206-E-TVP2	XL	0,207	30	62	16	1	0,6	1,5	55,5	37,5	52,5	–
NU2206-E-TVP2	XL	0,255	30	62	20	1	0,6	1,6	55,5	37,5	52,5	–
N306-E-TVP2	XL	0,366	30	72	19	1,1	1,1	0,6	62,5	40,5	–	45
NU306-E-TVP2	XL	0,368	30	72	19	1,1	1,1	1,2	62,5	40,5	59,2	–
NU2306-E-TVP2	XL	0,529	30	72	27	1,1	1,1	2,2	62,5	40,5	59,2	–
NU1007-M1	XL	0,177	35	62	14	1	0,6	2,6	55	42	52,4	–
N207-E-TVP2	XL	0,301	35	72	17	1,1	0,6	0,7	64	44	–	48
NU207-E-TVP2	XL	0,303	35	72	17	1,1	0,6	0,7	64	44	61	–
NU2207-E-TVP2	XL	0,406	35	72	23	1,1	0,6	2,2	64	44	61	–
N307-E-TVP2	XL	0,486	35	80	21	1,5	1,1	0,6	70,2	46,2	–	51
NU307-E-TVP2	XL	0,486	35	80	21	1,5	1,1	0,6	70,2	46,2	66,6	–
NU2307-E-TVP2	XL	0,723	35	80	31	1,5	1,1	3	70,2	46,2	66,6	–
NU1008-M1	XL	0,216	40	68	15	1	0,6	2	61	47	58,2	–



1) Axial displacement "s" for N and NU



Mounting dimensions for N



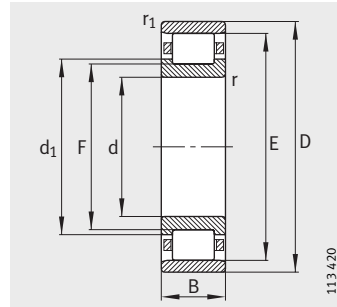
Mounting dimensions for NU

Mounting dimensions								Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a		d_b	D_a	D_b	D_c	r_a	r_{a1}	dyn. C_r N	stat. C_{0r} N			
min.	max.	min.	max.	min.	max.	max.	max.					
17,4	–	–	32,6	31	29	0,6	0,3	15 100	10 400	1 470	22 000	17 600
17,4	18,5	20	32,6	–	–	0,6	0,3	15 100	10 400	1 290	22 000	17 600
21	–	–	36	36	34	0,6	0,3	20 800	14 600	2 110	18 000	15 400
21	21,5	23	36	–	–	0,6	0,3	20 800	14 600	1 820	18 000	15 400
21	21,5	23	36	–	–	0,6	0,3	28 500	21 900	3 500	18 000	13 300
21,2	23,5	25	42,8	–	–	1	0,6	30 000	21 200	2 650	16 000	13 700
24	–	–	41	43	40	1	0,6	32 500	24 700	3 850	16 000	13 100
24	26	29	41	–	–	1	0,6	32 500	24 700	3 100	16 000	13 100
24	26	29	41	–	–	1	0,6	38 500	31 000	5 000	16 000	11 400
24	27	30	45	–	–	1	0,6	36 500	26 000	3 250	14 000	12 100
24	27	30	45	–	–	1	0,6	48 500	38 000	6 300	14 000	9 900
27	30	32	44	–	–	0,6	0,3	16 700	12 900	1 520	28 000	13 100
29	–	–	46	48	45	1	0,6	34 500	27 500	4 350	15 000	11 800
29	31	34	46	–	–	1	0,6	34 500	27 500	3 500	15 000	11 800
29	31	34	46	–	–	1	0,5	41 500	34 500	5 700	15 000	9 800
32	–	–	55	55	53	1	1	48 000	36 500	5 800	12 000	10 200
32	33	37	55	–	–	1	1	48 000	36 500	4 700	12 000	10 200
32	33	37	55	–	–	1	1	66 000	55 000	9 400	12 000	8 400
33	35	38	50	–	–	1	0,6	22 900	19 300	2 400	24 000	11 000
34	–	–	56	57	54	1	0,6	45 000	36 000	5 700	12 000	9 800
34	37	40	56	–	–	1	0,6	45 000	36 000	4 650	12 000	9 800
34	37	40	56	–	–	1	0,6	57 000	48 500	8 100	12 000	8 200
37	–	–	65	64	61	1	1	61 000	48 000	8 000	10 000	9 000
37	40	44	65	–	–	1	1	61 000	48 000	6 400	10 000	9 000
37	40	44	65	–	–	1	1	86 000	75 000	13 200	10 000	7 300
38	41	44	57	–	–	1	0,6	29 000	26 000	3 150	20 000	9 700
39	–	–	65	65	63	1	0,6	58 000	48 500	7 900	10 000	8 300
39	43	46	65	–	–	1	0,6	58 000	48 500	6 400	10 000	8 300
39	43	46	65	–	–	1	0,6	72 000	64 000	10 800	10 000	7 300
42	–	–	71	71	69	1,5	1	76 000	63 000	10 700	9 000	8 100
42	45	48	71	–	–	1,5	1	76 000	63 000	8 600	9 000	8 100
42	45	48	71	–	–	1,5	1	108 000	98 000	17 400	9 000	6 700
43	46	49	63	–	–	1	0,6	33 500	30 500	3 350	19 000	8 900

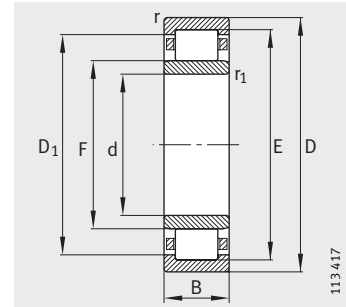


Cylindrical roller bearings with cage

Non-locating bearings



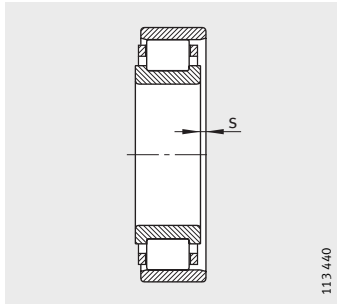
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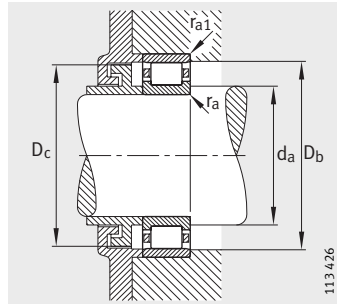
NU

Dimension table (continued) - Dimensions in mm

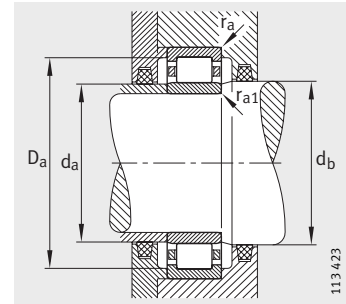
Designation	X-life	Mass m ≈ kg	Dimensions									
			d	D	B	r min.	r ₁ min.	s ¹⁾	E	F	D ₁ ≈	d ₁ ≈
N208-E-TVP2	XL	0,358	40	80	18	1,1	1,1	1	71,5	49,5	-	54
NU208-E-TVP2	XL	0,379	40	80	18	1,1	1,1	1	71,5	49,5	68,3	-
NU2208-E-TVP2	XL	0,492	40	80	23	1,1	1,1	1,5	71,5	49,5	68,3	-
N308-E-TVP2	XL	0,656	40	90	23	1,5	1,5	1,2	80	52	-	57,6
NU308-E-TVP2	XL	0,659	40	90	23	1,5	1,5	1,3	80	52	75,9	-
NU2308-E-TVP2	XL	0,958	40	90	33	1,5	1,5	2,7	80	52	75,9	-
NU1009-M1	XL	0,277	45	75	16	1	0,6	2,5	67,5	52,5	64,5	-
N209-E-TVP2	XL	0,434	45	85	19	1,1	1,1	1	76,5	54,5	-	59
NU209-E-TVP2	XL	0,434	45	85	19	1,1	1,1	1	76,5	54,5	73,3	-
NU2209-E-TVP2	XL	0,532	45	85	23	1,1	1,1	1,5	76,5	54,5	73,3	-
N309-E-TVP2	XL	0,891	45	100	25	1,5	1,5	1	88,5	58,5	-	64,4
NU309-E-TVP2	XL	0,893	45	100	25	1,5	1,5	1	88,5	58,5	84,1	-
NU2309-E-TVP2	XL	1,3	45	100	36	1,5	1,5	2,5	88,5	58,5	84,1	-
NU1010-M1	XL	0,305	50	80	16	1	0,6	2,1	72,5	57,5	69,5	-
N210-E-TVP2	XL	0,488	50	90	20	1,1	1,1	1,3	81,5	59,5	-	64
NU210-E-TVP2	XL	0,49	50	90	20	1,1	1,1	1,3	81,5	59,5	78,3	-
NU2210-E-TVP2	XL	0,573	50	90	23	1,1	1,1	1,3	81,5	59,5	78,3	-
N310-E-TVP2	XL	1,16	50	110	27	2	2	1,7	97	65	-	71,3
NU310-E-TVP2	XL	1,16	50	110	27	2	2	1,7	97	65	92,5	-
NU2310-E-TVP2	XL	1,75	50	110	40	2	2	3,2	97	65	92,5	-
NU1011-E-M1	XL	0,451	55	90	18	1,1	1	2,1	82	64	79,2	-
N211-E-TVP2	XL	0,668	55	100	21	1,5	1,1	0,8	90	66	-	70,8
NU211-E-TVP2	XL	0,665	55	100	21	1,5	1,1	0,8	90	66	86,6	-
NU2211-E-TVP2	XL	0,796	55	100	25	1,5	1,1	1,3	90	66	86,6	-
N311-E-TVP2	XL	1,48	55	120	29	2	2	1,8	106,5	70,5	-	77,5
NU311-E-TVP2	XL	1,48	55	120	29	2	2	1,8	106,5	70,5	101,4	-
NU2311-E-TVP2	XL	2,23	55	120	43	2	2	3,3	106,5	70,5	101,4	-
NU1012-M1	XL	0,48	60	95	18	1,1	1	3,3	85,5	69,5	82,3	-
N212-E-TVP2	XL	0,827	60	110	22	1,5	1,5	1,6	100	72	-	77,6
NU212-E-TVP2	XL	0,824	60	110	22	1,5	1,5	1,6	100	72	96,1	-
NU2212-E-TVP2	XL	1,08	60	110	28	1,5	1,5	1,6	100	72	96,1	-
N312-E-TVP2	XL	1,84	60	130	31	2,1	2,1	1,9	115	77	-	84,4
NU312-E-TVP2	XL	1,85	60	130	31	2,1	2,1	1,8	115	77	109,6	-



1) Axial displacement "s" for N and NU



Mounting dimensions for N



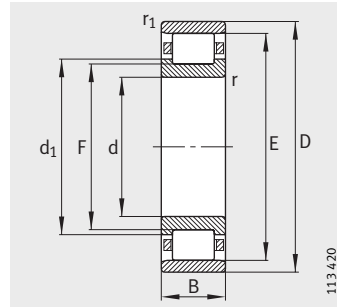
Mounting dimensions for NU

Mounting dimensions								Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a		d_b	D_a	D_b	D_c	r_a	r_{a1}	dyn. C_r N	stat. C_{0r} N			
min.	max.											
47	–	–	73	73	70	1	1	63 000	53 000	8 700	9 000	7 600
47	49	52	73	–	–	1	1	63 000	53 000	7 000	9 000	7 600
47	49	52	73	–	–	1	1	83 000	75 000	12 900	9 000	6 400
49	–	–	81	81	79	1,5	1,5	95 000	78 000	12 900	7 500	7 300
49	51	55	81	–	–	1,5	1,5	95 000	78 000	10 400	7 500	7 300
49	51	55	81	–	–	1,5	1,5	132 000	119 000	20 700	7 500	6 000
48	52	54	70	–	–	1	0,6	40 000	37 500	4 800	16 000	8 100
52	–	–	78	78	75	1	1	72 000	63 000	10 600	8 500	7 100
52	54	57	78	–	–	1	1	72 000	63 000	8 600	8 500	7 100
52	54	57	78	–	–	1	1	87 000	82 000	14 100	8 500	5 800
54	–	–	91	90	87	1,5	1,5	115 000	98 000	16 400	6 700	6 500
54	57	60	91	–	–	1,5	1,5	115 000	98 000	13 300	6 700	6 500
54	57	60	91	–	–	1,5	1,5	162 000	153 000	27 000	6 700	5 400
53	57	59	75	–	–	1	0,6	42 500	41 500	5 300	15 000	7 400
57	–	–	83	83	80	1	1	75 000	69 000	11 500	8 000	6 700
57	58	62	83	–	–	1	1	75 000	69 000	9 300	8 000	6 700
57	58	62	83	–	–	1	1	92 000	88 000	15 300	8 000	5 400
61	–	–	99	98	96	2	2	130 000	113 000	19 100	6 300	6 100
61	63	67	99	–	–	2	2	130 000	113 000	15 500	6 300	6 100
61	63	67	99	–	–	2	2	192 000	187 000	33 000	6 300	5 000
60	63	65	84	–	–	1,1	1	53 000	62 000	6 600	13 000	6 900
62	–	–	91	91	89	1,5	1	99 000	95 000	16 300	7 000	5 800
62	65	68	91	–	–	1,5	1	99 000	95 000	13 200	7 000	5 800
62	65	68	91	–	–	1,5	1	117 000	118 000	20 700	7 000	4 750
66	–	–	109	108	105	2	2	159 000	139 000	23 600	5 600	5 600
66	69	72	109	–	–	2	2	159 000	139 000	19 100	5 600	5 600
66	69	72	109	–	–	2	2	235 000	230 000	41 000	5 600	4 600
65	68	71	89	–	–	1,1	1	52 000	55 000	7 100	13 000	6 400
69	–	–	101	101	99	1,5	1,5	111 000	102 000	16 800	6 300	5 400
69	71	75	101	–	–	1,5	1,5	111 000	102 000	13 900	6 300	5 400
69	71	75	101	–	–	1,5	1,5	151 000	152 000	26 500	6 300	4 400
72	–	–	118	116	114	2,1	2,1	177 000	157 000	26 500	5 000	5 300
72	75	79	118	–	–	2,1	2,1	177 000	157 000	21 700	5 000	5 300

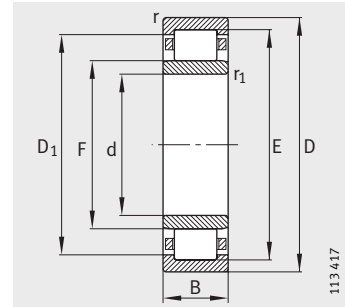


Cylindrical roller bearings with cage

Non-locating bearings



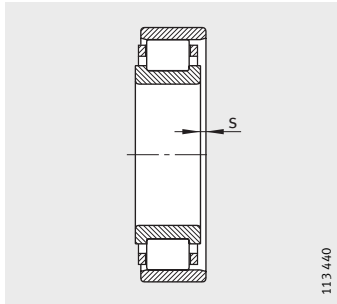
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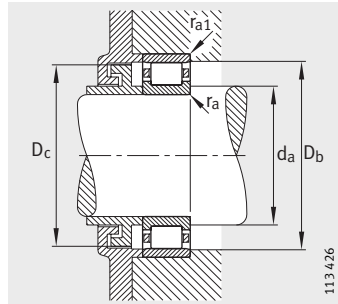
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Dimension table (continued) · Dimensions in mm

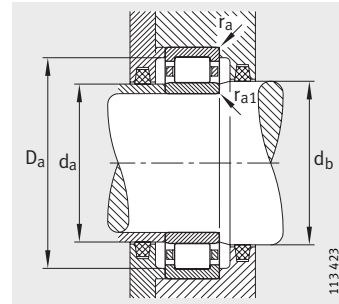
Designation	X-life	Mass m ≈ kg	Dimensions									
			d	D	B	r	r ₁	s ¹⁾	E	F	D ₁	d ₁
						min.	min.				≈	≈
NU2312-E-TVP2	XL	2,78	60	130	46	2,1	2,1	3,5	115	77	109,6	–
NU1013-M1	XL	0,507	65	100	18	1,1	1	3,3	90,5	74,5	87,3	–
N213-E-TVP2	XL	1,05	65	120	23	1,5	1,5	1,4	108,5	78,5	–	84,4
NU213-E-TVP2	XL	1,04	65	120	23	1,5	1,5	1,4	108,5	78,5	104,3	–
NU2213-E-TVP2	XL	1,43	65	120	31	1,5	1,5	1,9	108,5	78,5	104,3	–
N313-E-TVP2	XL	2,28	65	140	33	2,1	2,1	1,4	124,5	82,5	–	90,5
NU313-E-TVP2	XL	2,28	65	140	33	2,1	2,1	1,5	124,5	82,5	118,6	–
NU2313-E-TVP2	XL	3,32	65	140	48	2,1	2,1	4	124,5	82,5	118,6	–
NU1014-M1	XL	0,706	70	110	20	1,1	1	2,5	100	80	96	–
N214-E-TVP2	XL	1,16	70	125	24	1,5	1,5	1,6	113,5	83,5	–	89,4
NU214-E-TVP2	XL	1,15	70	125	24	1,5	1,5	1,6	113,5	83,5	109,4	–
NU2214-E-TVP2	XL	1,52	70	125	31	1,5	1,5	1,6	113,5	83,5	109,4	–
N314-E-TVP2	XL	2,79	70	150	35	2,1	2,1	1,6	133	89	–	97,4
NU314-E-TVP2	XL	2,79	70	150	35	2,1	2,1	1,7	133	89	126,8	–
NU2314-E-TVP2	XL	4,02	70	150	51	2,1	2,1	4,7	133	89	126,8	–
NU1015-M1	XL	0,737	75	115	20	1,1	1	2,5	105	85	101,7	–
N215-E-TVP2	XL	1,29	75	130	25	1,5	1,5	1,1	118,5	88,5	–	94,4
NU215-E-TVP2	XL	1,27	75	130	25	1,5	1,5	1,2	118,5	88,5	114,4	–
NU2215-E-TVP2	XL	1,6	75	130	31	1,5	1,5	1,6	118,5	88,5	114,4	–
N315-E-TVP2	XL	3,34	75	160	37	2,1	2,1	1,1	143	95	–	104,1
NU315-E-TVP2	XL	3,33	75	160	37	2,1	2,1	1,2	143	95	136,2	–
NU2315-E-TVP2	XL	4,95	75	160	55	2,1	2,1	4,2	143	95	136,2	–
NU1016-M1	XL	0,99	80	125	22	1,1	1	2,7	113,5	91,5	109,8	–
N216-E-TVP2	XL	1,55	80	140	26	2	2	1,2	127,3	95,3	–	101,5
NU216-E-TVP2	XL	1,55	80	140	26	2	2	1,3	127,3	95,3	122,9	–
NU2216-E-TVP2	XL	2,01	80	140	33	2	2	1,3	127,3	95,3	122,9	–
N316-E-TVP2	XL	4,12	80	170	39	2,1	2,1	0,6	151	101	–	110,4
NU316-E-TVP2	XL	3,96	80	170	39	2,1	2,1	0,7	151	101	143,9	–
NU2316-E-TVP2	XL	5,89	80	170	58	2,1	2,1	3,7	151	101	143,9	–
NU1017-M1	XL	1,04	85	130	22	1,1	1	4	118,5	96,5	114,8	–
N217-E-TVP2	XL	1,92	85	150	28	2	2	0,7	136,5	100,5	–	107,5
NU217-E-TVP2	XL	1,91	85	150	28	2	2	0,8	136,5	100,5	131,5	–
NU2217-E-TVP2	XL	2,5	85	150	36	2	2	1,3	136,5	100,5	131,5	–



1) Axial displacement "s" for N and NU



Mounting dimensions for N



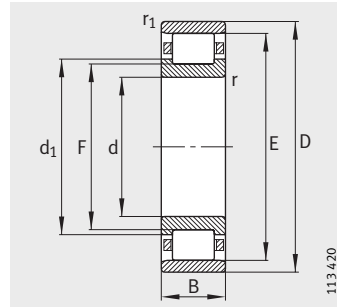
Mounting dimensions for NU

Mounting dimensions								Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a		d_b	D_a	D_b	D_c	r_a	r_{a1}	dyn. C_r N	stat. C_{0r} N			
min.	max.	min.	max.	min.	max.	max.	max.					
72	75	79	118	–	–	2,1	2,1	265 000	260 000	47 000	5 000	4 300
70	73	76	94	–	–	1,1	1	53 000	58 000	7 500	12 000	5 900
74	–	–	111	110	107	1,5	1,5	127 000	119 000	19 800	6 000	5 000
74	77	81	111	–	–	1,5	1,5	127 000	119 000	16 300	6 000	5 000
74	77	81	111	–	–	1,5	1,5	176 000	181 000	32 000	5 600	4 150
77	–	–	128	126	123	2,1	2,1	214 000	191 000	32 000	4 800	4 900
77	81	85	128	–	–	2,1	2,1	214 000	191 000	26 000	4 800	4 900
77	81	85	128	–	–	2,1	2,1	295 000	285 000	50 000	4 800	4 050
75	78	82	104	–	–	1	1	75 000	78 000	10 600	11 000	5 500
79	–	–	116	115	112	1,5	1,5	140 000	137 000	23 100	5 300	4 750
79	82	86	116	–	–	1,5	1,5	140 000	137 000	19 000	5 300	4 750
79	82	86	116	–	–	1,5	1,5	184 000	194 000	34 000	5 300	3 900
82	–	–	138	135	131	2,1	2,1	242 000	222 000	37 000	4 500	4 550
82	87	92	138	–	–	2,1	2,1	242 000	222 000	30 000	4 500	4 550
82	87	92	138	–	–	2,1	2,1	325 000	325 000	56 000	4 500	3 850
80	83	87	109	–	–	1,1	1	76 000	82 000	11 100	10 000	5 200
84	–	–	121	120	117	1,5	1,5	154 000	156 000	26 500	5 300	4 500
84	87	90	121	–	–	1,5	1,5	154 000	156 000	21 700	5 300	4 500
84	87	90	121	–	–	1,5	1,5	191 000	207 000	36 000	5 300	3 700
87	–	–	148	145	141	2,1	2,1	285 000	265 000	43 000	4 000	4 200
87	93	97	148	–	–	2,1	2,1	285 000	265 000	34 500	4 000	4 200
87	93	97	148	–	–	2,1	2,1	390 000	395 000	67 000	4 000	3 600
85	90	94	119	–	–	1	1	91 000	99 000	13 600	9 500	5 000
91	–	–	129	129	126	2	2	165 000	167 000	27 500	4 800	4 250
91	94	97	129	–	–	2	2	165 000	167 000	22 600	4 800	4 250
91	94	97	129	–	–	2	2	220 000	243 000	42 000	4 800	3 450
92	–	–	158	153	149	2,1	2,1	300 000	275 000	46 000	3 800	4 150
92	99	105	158	–	–	2,1	2,1	300 000	275 000	37 000	3 800	4 150
92	99	105	158	–	–	2,1	2,1	420 000	425 000	73 000	3 800	3 500
90	95	99	124	–	–	1	1	93 000	103 000	14 000	9 000	4 750
96	–	–	139	138	135	2	2	194 000	194 000	31 500	4 500	4 100
96	99	104	139	–	–	2	2	194 000	194 000	26 000	4 500	4 100
96	99	104	139	–	–	2	2	255 000	275 000	46 500	4 500	3 350

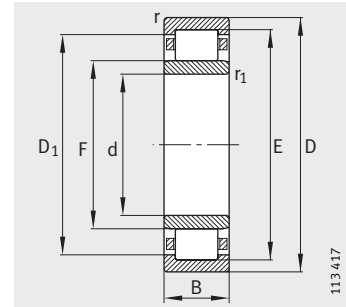


Cylindrical roller bearings with cage

Non-locating bearings

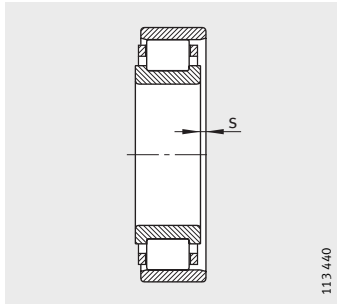


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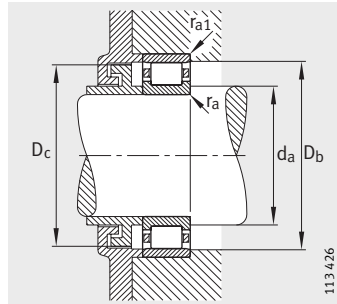


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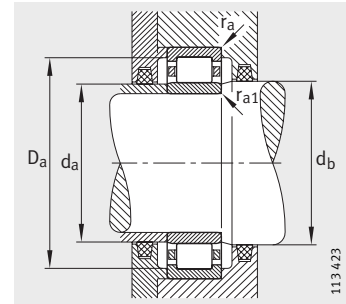
Dimension table (continued) · Dimensions in mm												
Designation	X-life	Mass m ≈kg	Dimensions									
			d	D	B	r	r ₁	s ¹⁾	E	F	D ₁	d ₁
						min.	min.				≈	≈
N317-E-M1	XL	5,3	85	180	41	3	3	1,1	160	108	–	117,8
NU317-E-TVP2	XL	4,62	85	180	41	3	3	1,3	160	108	152,7	–
NU2317-E-TVP2	XL	6,72	85	180	60	3	3	4,7	160	108	152,7	–
NU1018-M1	XL	1,31	90	140	24	1,5	1,1	3	127	103	122,9	–
N218-E-TVP2	XL	2,37	90	160	30	2	2	1,4	145	107	–	114,3
NU218-E-TVP2	XL	2,36	90	160	30	2	2	1,5	145	107	139,7	–
NU2218-E-TVP2	XL	3,17	90	160	40	2	2	2,5	145	107	139,7	–
N318-E-M1	XL	6,19	90	190	43	3	3	1,3	169,5	113,5	–	124
NU318-E-TVP2	XL	5,39	90	190	43	3	3	1,5	169,5	113,5	161,6	–
NU2318-E-TVP2	XL	8,04	90	190	64	3	3	5	169,5	113,5	161,6	–
NU1019-M1	XL	1,41	95	145	24	1,5	1,1	4,1	132	108	127,9	–
N219-E-TVP2	XL	2,89	95	170	32	2,1	2,1	0,6	154,5	112,5	–	120,5
NU219-E-TVP2	XL	2,88	95	170	32	2,1	2,1	0,7	154,5	112,5	148,6	–
NU2219-E-TVP2	XL	3,9	95	170	43	2,1	2,1	2,2	154,5	112,5	148,6	–
N319-E-M1	XL	7,05	95	200	45	3	3	1,4	177,5	121,5	–	132
NU319-E-TVP2	XL	6,32	95	200	45	3	3	1,4	177,5	121,5	169,6	–
NU2319-E-TVP2	XL	9,4	95	200	67	3	3	5,6	177,5	121,5	169,6	–
NU1020-M1	XL	1,46	100	150	24	1,5	1,1	4,3	137	113	132,9	–
N220-E-TVP2	XL	3,5	100	180	34	2,1	2,1	1,4	163	119	–	127,3
NU220-E-TVP2	XL	3,49	100	180	34	2,1	2,1	1,5	163	119	156,9	–
NU2220-E-TVP2	XL	4,77	100	180	46	2,1	2,1	2,5	163	119	156,9	–
N320-E-M1	XL	8,75	100	215	47	3	3	1,2	191,5	127,5	–	139,4
NU320-E-TVP2	XL	7,67	100	215	47	3	3	1,2	191,5	127,5	182	–
NU2320-E-TVP2	XL	12,1	100	215	73	3	3	4,2	191,5	127,5	182	–
NU1021-M1	XL	1,84	105	160	26	2	1,1	4,5	145,5	119,5	141	–
N221-E-M1	XL	4,63	105	190	36	2,1	2,1	1,2	171,5	125,5	–	134,5
NU221-E-TVP2	XL	4,08	105	190	36	2,1	2,1	1,3	171,5	125,5	165,1	–
NU1022-M1	XL	2,31	110	170	28	2	1,1	3,2	155	125	149,7	–
N222-E-TVP2	XL	4,85	110	200	38	2,1	2,1	1,4	180,5	132,5	–	141,6
NU222-E-TVP2	XL	4,84	110	200	38	2,1	2,1	1,5	180,5	132,5	173,8	–
NU2222-E-TVP2	XL	6,76	110	200	53	2,1	2,1	4	180,5	132,5	173,8	–
N322-E-M1	XL	11,7	110	240	50	3	3	1,3	211	143	–	155,6
NU322-E-TVP2	XL	10,3	110	240	50	3	3	1,3	211	143	200,9	–



1) Axial displacement "s" for N and NU



Mounting dimensions for N



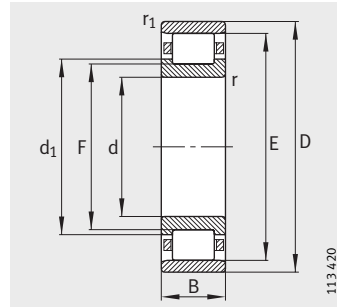
Mounting dimensions for NU

Mounting dimensions							Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}	
d_a		d_b	D_a	D_b	D_c	r_a	r_{a1}	dyn. C_r N				stat. C_{0r} N
min.	max.	min.	max.	min.	max.	max.	max.					
99	–	–	166	162	158	2,5	2,5	340 000	325 000	53 000	5 600	3 850
99	106	110	166	–	–	2,5	2,5	320 000	300 000	40 000	3 600	4 000
99	106	110	166	–	–	2,5	2,5	435 000	445 000	75 000	3 600	3 350
96	101	106	133	–	–	1,5	1	111 000	124 000	16 800	8 500	4 550
101	–	–	149	147	143	2	2	215 000	217 000	35 000	4 300	3 950
101	105	109	149	–	–	2	2	215 000	217 000	28 500	4 300	3 950
101	105	109	149	–	–	2	2	285 000	315 000	52 000	4 300	3 300
104	–	–	176	171	168	2,5	2,5	370 000	350 000	55 000	5 300	3 750
104	111	117	176	–	–	2,5	2,5	370 000	350 000	44 000	3 400	3 750
104	111	117	176	–	–	2,5	2,5	510 000	530 000	86 000	3 400	3 050
101	106	111	138	–	–	1,5	1	113 000	130 000	17 300	8 000	4 350
107	–	–	158	156	153	2,1	2,1	260 000	265 000	41 500	3 800	3 700
107	111	116	158	–	–	2,1	2,1	260 000	265 000	34 000	3 800	3 700
107	111	116	158	–	–	2,1	2,1	340 000	370 000	60 000	3 800	3 100
109	–	–	186	179	176	2,5	2,5	390 000	380 000	59 000	5 300	3 600
109	119	124	186	–	–	2,5	2,5	390 000	380 000	48 000	3 400	3 600
109	119	124	186	–	–	2,5	2,5	540 000	580 000	93 000	3 400	2 850
106	111	116	143	–	–	1,5	1	116 000	135 000	17 900	7 500	4 150
112	–	–	168	165	161	2,1	2,1	295 000	305 000	47 500	3 800	3 500
112	117	122	168	–	–	2,1	2,1	295 000	305 000	38 500	3 800	3 500
112	117	122	168	–	–	2,1	2,1	395 000	445 000	72 000	3 800	2 900
114	–	–	201	193	190	2,5	2,5	450 000	425 000	65 000	5 000	3 400
114	125	132	201	–	–	2,5	2,5	450 000	425 000	53 000	3 200	3 400
114	125	132	201	–	–	2,5	2,5	680 000	720 000	114 000	3 200	2 550
111	118	122	151	–	–	2	1	131 000	153 000	19 400	7 000	4 050
117	–	–	178	173	170	2,1	2,1	310 000	320 000	49 000	5 600	3 450
117	123	128	178	–	–	2,1	2,1	310 000	320 000	40 000	3 600	3 450
116	124	128	161	–	–	2	1	166 000	190 000	24 200	7 000	3 850
122	–	–	188	182	179	2	2	345 000	365 000	56 000	3 400	3 300
122	130	135	188	–	–	2,1	2,1	345 000	365 000	56 000	3 400	3 300
122	130	135	188	–	–	2,1	2,1	455 000	520 000	81 000	3 400	2 800
124	–	–	226	213	209	2,5	2,5	520 000	510 000	78 000	4 800	3 000
124	140	145	226	–	–	2,5	2,5	495 000	475 000	59 000	3 000	3 100

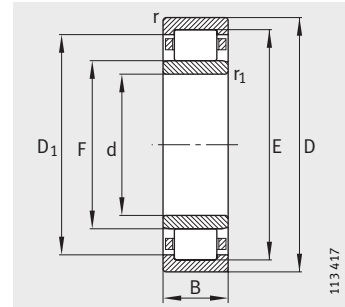


Cylindrical roller bearings with cage

Non-locating bearings



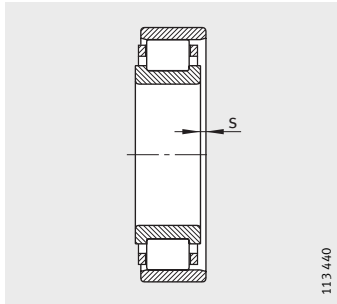
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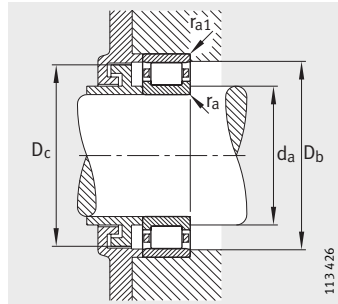
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Dimension table (continued) · Dimensions in mm

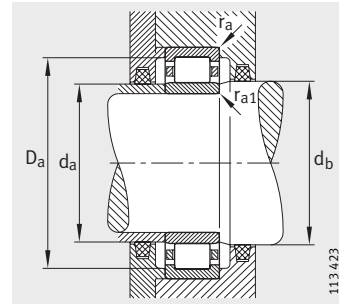
Designation	X-life	Mass m ≈ kg	Dimensions									
			d	D	B	r	r ₁	s ¹⁾	E	F	D ₁	d ₁
						min.	min.				≈	≈
NU2322-E-TVP2	XL	16,6	110	240	80	3	3	5,8	211	143	200,9	–
NU1024-M1	XL	2,47	120	180	28	2	1,1	3,2	165	135	159,7	–
N224-E-TVP2	XL	5,67	120	215	40	2,1	2,1	1,4	195,5	143,5	–	153,2
NU224-E-TVP2	XL	5,8	120	215	40	2,1	2,1	1,4	195,5	143,5	187,8	–
NU2224-E-TVP2	XL	8,38	120	215	58	2,1	2,1	4,5	195,5	143,5	187,8	–
N324-E-M1	XL	15,1	120	260	55	3	3	3,5	230	154	–	168,7
NU324-E-TVP2	XL	13,3	120	260	55	3	3	3,5	230	154	218,7	–
NU2324-E-M1	XL	23,2	120	260	86	3	3	7,2	230	154	218,7	–
NU1026-M1	XL	3,81	130	200	33	2	1,1	3,9	182	148	175,9	–
N226-E-TVP2	XL	6,51	130	230	40	3	3	1,2	209,5	153,5	–	164
NU226-E-TVP2	XL	6,5	130	230	40	3	3	1,2	209,5	153,5	201,2	–
NU2226-E-TVP2	XL	10,4	130	230	64	3	3	5,2	209,5	153,5	201,2	–
N326-E-M1	XL	18,4	130	280	58	4	4	3,5	247	167	–	181,7
NU326-E-TVP2	XL	16,2	130	280	58	4	4	3,5	247	167	235,2	–
NU2326-E-M1	XL	28,8	130	280	93	4	4	8,1	247	167	235,2	–
NU1028-M1	XL	3,94	140	210	33	2	1,1	3,8	192	158	185,9	–
N228-E-M1	XL	9,3	140	250	42	3	3	2	225	169	–	179,4
NU228-E-M1	XL	9,31	140	250	42	3	3	2	225	169	216,7	–
NU2228-E-M1	XL	14,5	140	250	68	3	3	7	225	169	216,7	–
N328-E-M1	XL	22,5	140	300	62	4	4	5,2	264	180	–	195,4
NU328-E-TVP2	XL	20,1	140	300	62	4	4	5,2	264	180	251,7	–
NU2328-E-M1	XL	36	140	300	102	4	4	9,2	264	180	251,7	–
NU1030-M1	XL	4,93	150	225	35	2,1	1,5	4,2	205,5	169,5	199	–
N230-E-M1	XL	11,7	150	270	45	3	3	4	242	182	–	193,1
NU230-E-M1	XL	11,8	150	270	45	3	3	4	242	182	233,2	–
NU2230-E-M1	XL	18,4	150	270	73	3	3	7,5	242	182	233,2	–
N330-E-M1	XL	26,8	150	320	65	4	4	5,5	283	193	–	209,5
NU330-E-M1	XL	26,8	150	320	65	4	4	5,5	283	193	269,8	–
NU2330-E-M1	XL	43,2	150	320	108	4	4	9,7	283	193	269,8	–
NU1032-M1	XL	5,92	160	240	38	2,1	1,5	4,3	220	180	212,9	–
N232-E-M1	XL	14,6	160	290	48	3	3	4,1	259	195	–	206,8
NU232-E-M1	XL	14,6	160	290	48	3	3	4,1	259	195	249,6	–
NU2232-E-M1	XL	23,5	160	290	80	3	3	7,2	261	193	251,1	–



1) Axial displacement "s" for N and NU



Mounting dimensions for N



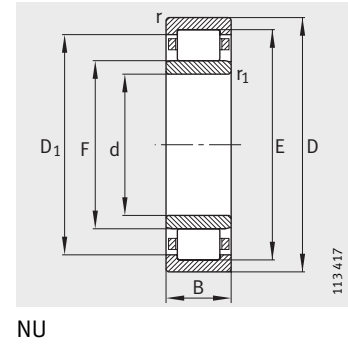
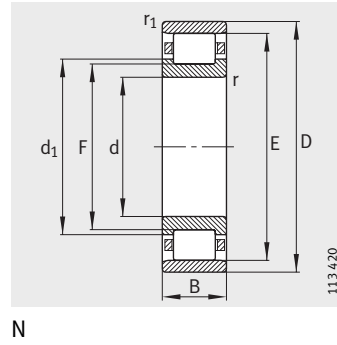
Mounting dimensions for NU

Mounting dimensions								Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a		d_b	D_a	D_b	D_c	r_a	r_{a1}	dyn. C_r N	stat. C_{0r} N			
min.	max.	min.	max.	min.	max.	max.	max.					
124	140	145	226	–	–	2,5	2,5	750 000	800 000	126 000	2 800	2 320
126	134	138	171	–	–	2	1	174 000	207 000	26 000	6 300	3 550
132	–	–	203	197	194	2,1	2,1	390 000	415 000	64 000	3 200	3 100
132	141	146	203	–	–	2,1	2,1	390 000	415 000	52 000	3 200	3 100
132	141	146	203	–	–	2,1	2,1	530 000	610 000	97 000	3 200	2 550
134	–	–	246	232	228	2,5	2,5	610 000	600 000	87 000	4 500	2 700
134	151	156	246	–	–	2,5	2,5	610 000	600 000	70 000	2 800	2 700
134	151	156	246	–	–	2,5	2,5	930 000	1 010 000	153 000	4 300	2 000
136	146	151	191	–	–	2	1	212 000	250 000	31 000	5 600	3 500
144	–	–	216	212	207	2,5	2,5	425 000	445 000	65 000	3 000	2 850
144	151	158	216	–	–	2,5	2,5	425 000	445 000	54 000	3 000	2 850
144	151	158	216	–	–	2,5	2,5	620 000	730 000	111 000	3 000	2 300
147	–	–	263	249	245	3	3	720 000	720 000	103 000	4 300	2 460
147	164	169	263	–	–	3	3	680 000	670 000	79 000	2 600	2 460
147	164	169	263	–	–	3	3	1 080 000	1 220 000	180 000	3 800	1 780
146	156	161	201	–	–	2	1	216 000	265 000	32 000	5 300	3 250
154	–	–	236	227	223	2,5	2,5	460 000	510 000	72 000	4 800	2 600
154	166	171	236	–	–	2,5	2,5	460 000	510 000	59 000	4 800	2 600
154	166	171	236	–	–	2,5	2,5	670 000	830 000	123 000	4 500	2 080
157	–	–	283	266	262	3	3	790 000	800 000	113 000	3 800	2 200
157	176	182	283	–	–	3	3	790 000	800 000	92 000	2 400	2 200
157	176	182	283	–	–	3	3	1 210 000	1 390 000	202 000	3 600	1 640
158	167	173	215	–	–	2,1	1,5	248 000	310 000	37 000	5 000	3 100
164	–	–	256	244	240	2,5	2,5	520 000	590 000	82 000	4 500	2 390
164	179	184	256	–	–	2,5	2,5	520 000	590 000	68 000	4 500	2 390
164	179	184	256	–	–	2,5	2,5	780 000	970 000	142 000	4 300	1 860
167	–	–	303	285	281	3	3	900 000	930 000	126 000	3 600	1 970
167	190	195	303	–	–	3	3	900 000	930 000	103 000	3 600	1 970
167	190	195	303	–	–	3	3	1 380 000	1 600 000	226 000	3 200	1 480
168	178	184	230	–	–	2,1	1,5	290 000	355 000	42 500	4 800	3 000
174	–	–	276	261	257	2,5	2,5	590 000	670 000	93 000	4 300	2 190
174	192	197	276	–	–	2,5	2,5	590 000	670 000	76 000	4 300	2 190
174	192	197	276	–	–	2,5	2,5	940 000	1 170 000	172 000	3 800	1 670

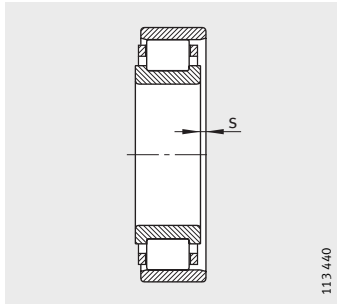


Cylindrical roller bearings with cage

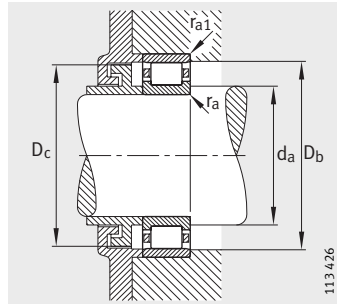
Non-locating bearings



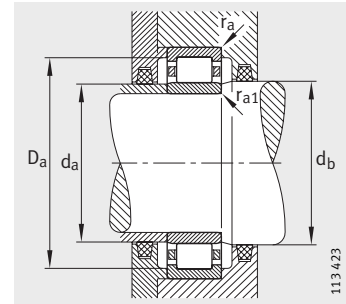
Dimension table (continued) · Dimensions in mm												
Designation	X-life	Mass m ≈ kg	Dimensions									
			d	D	B	r	r ₁	s ¹⁾	E	F	D ₁	d ₁
						min.	min.				≈	≈
N332-E-M1	-	32,6	160	340	68	4	4	5,5	300	204	-	221,6
NU332-E-M1	-	31,8	160	340	68	4	4	5,6	300	204	286	-
NU2332-E-M1	-	51,5	160	340	114	4	4	9,9	300	204	286	-
NU1034-M1	XL	8,03	170	260	42	2,1	2,1	4,8	237	193	229,1	-
N234-E-M1	XL	18	170	310	52	4	4	4,3	279	207	-	218,4
NU234-E-M1	XL	18,1	170	310	52	4	4	4,3	279	207	268,5	-
NU2234-E-M1	XL	29,4	170	310	86	4	4	7,2	281	205	269,9	-
N334-E-M1	-	37,9	170	360	72	4	4	5,9	318	218	-	237
NU334-E-M1	-	38	170	360	72	4	4	6	318	218	301,6	-
NU2334-EX-M1	-	61,4	170	360	120	4	4	10,2	320	216	303	-
NU1036-M1	XL	10,5	180	280	46	2,1	2,1	5	255	205	245,9	-
NU236-E-M1	XL	18,9	180	320	52	4	4	4,7	289	217	278,6	-
NU2236-E-M1	XL	30,5	180	320	86	4	4	7,2	291	215	280	-
NU336-E-M1	-	43,9	180	380	75	4	4	6,1	335	231	319,8	-
NU2336-EX-M1	-	71,8	180	380	126	4	4	10,5	339	227	320,8	-
NU1038-M1	XL	10,9	190	290	46	2,1	2,1	5	265	215	255,9	-
N238-E-M1	-	22,8	190	340	55	4	4	4,7	306	230	-	244
NU238-E-M1	-	22,8	190	340	55	4	4	4,7	306	230	295	-
NU2238-E-M1	-	37,1	190	340	92	4	4	8	308	228	296,4	-
NU338-E-M1	-	50,6	190	400	78	5	5	6,3	353	245	336	-
NU2338-EX-M1	-	83,1	190	400	132	5	5	11	360	240	340,5	-
NU1040-M1	XL	14,1	200	310	51	2,1	2,1	8,3	281	229	271,5	-
N240-E-M1	-	27,2	200	360	58	4	4	4,8	323	243	-	257,6
NU240-E-M1	-	27,2	200	360	58	4	4	4,8	323	243	311,5	-
NU2240-E-M1	-	44,7	200	360	98	4	4	8,2	325	241	312,9	-
NU340-E-M1	-	57,3	200	420	80	5	5	6,3	370	258	351,8	-
NU2340-EX-M1	-	95,6	200	420	138	5	5	11,3	377	253	356,9	-
NU1044-M1	-	20,5	220	340	56	3	3	6,2	310	250	298,9	-
NU244-E-M1	-	38,5	220	400	65	4	4	5,5	358	268	344,9	-
NU2244-EX-M1	-	61,6	220	400	108	4	4	8,4	367	259	349,4	-
NU344-E-M1	-	75,5	220	460	88	5	5	7	406	282	386	-
NU2344-EX-M1	-	121	220	460	145	5	5	11,9	413	277	391,2	-
NU1048-M1	-	19,8	240	360	56	3	3	6,4	330	270	318,9	-



1) Axial displacement "s" for N and NU



Mounting dimensions for N



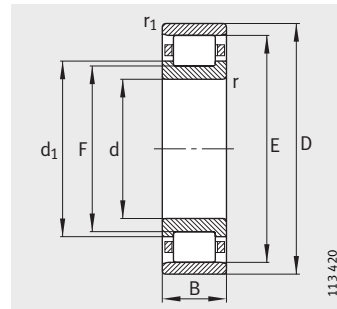
Mounting dimensions for NU

Mounting dimensions								Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a		d_b	D_a	D_b	D_c	r_a	r_{a1}	dyn. C_r N	stat. C_{0r} N			
min.	max.	min.	max.	min.	max.	max.	max.					
177	–	–	323	302	298	3	3	865 000	1 060 000	114 000	3 000	1 790
177	200	211	323	–	–	3	3	865 000	1 060 000	96 000	3 000	1 790
177	200	211	323	–	–	3	3	1 320 000	1 830 000	204 000	3 000	1 350
180	190	197	250	–	–	2,1	2,1	350 000	435 000	49 500	4 500	2 800
187	–	–	293	281	277	3	3	700 000	780 000	107 000	3 600	2 010
187	204	211	293	–	–	3	3	700 000	780 000	88 000	3 600	2 010
187	204	211	293	–	–	3	3	1 130 000	1 400 000	198 000	3 200	1 500
187	–	–	343	320	316	3	3	965 000	1 220 000	132 000	3 000	1 630
187	215	221	343	–	–	3	3	965 000	1 220 000	105 000	3 000	1 630
187	214	218	343	–	–	3	3	1 500 000	2 080 000	231 000	2 800	1 230
190	203	209	270	–	–	2,1	2,1	425 000	520 000	61 000	4 500	2 550
197	214	221	303	–	–	3	3	730 000	830 000	93 000	3 600	1 880
197	214	221	303	–	–	3	3	1 180 000	1 490 000	209 000	3 200	1 390
197	228	234	363	–	–	3	3	1 040 000	1 320 000	112 000	2 800	1 520
197	225	229	363	–	–	3	3	1 660 000	2 320 000	260 000	2 800	1 130
200	213	219	280	–	–	2,1	2,1	435 000	550 000	63 000	4 300	2 410
207	–	–	323	309	303	3	3	680 000	930 000	100 000	3 200	1 750
207	227	234	323	–	–	3	3	680 000	930 000	85 000	3 200	1 750
207	227	234	323	–	–	3	3	1 100 000	1 660 000	184 000	3 000	1 300
210	242	248	380	–	–	4	4	1 120 000	1 430 000	120 000	2 800	1 430
210	237,8	242,2	380	–	–	4	4	1 900 000	2 650 000	285 000	2 600	1 030
210	226	233	300	–	–	2,1	2,1	470 000	600 000	68 000	3 800	2 310
217	–	–	343	326	320	3	3	750 000	1 040 000	110 000	3 000	1 620
217	240	247	343	–	–	3	3	750 000	1 040 000	94 000	3 000	1 620
217	240	247	343	–	–	3	3	1 220 000	1 860 000	206 000	2 800	1 210
220	255	261	400	–	–	4	4	1 180 000	1 530 000	128 000	2 600	1 340
220	250,7	255,3	400	–	–	4	4	2 040 000	2 900 000	310 000	2 400	960
232	248	254	328	–	–	2,5	2,5	510 000	765 000	69 000	3 200	2 040
237	265	271	383	–	–	3	3	950 000	1 320 000	109 000	2 800	1 400
237	256,7	261,3	383	–	–	3	3	1 630 000	2 360 000	250 000	2 600	1 020
240	279	285	440	–	–	4	4	1 430 000	1 900 000	152 000	2 400	1 160
240	274,7	279,3	440	–	–	4	4	2 360 000	3 350 000	340 000	2 200	840
252	268	275	348	–	–	2,5	2,5	540 000	850 000	74 000	3 000	1 840

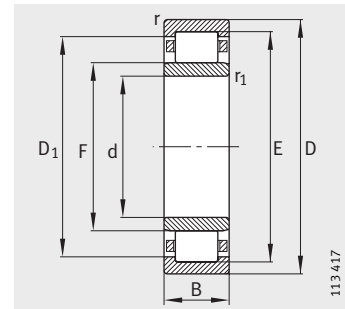


Cylindrical roller bearings with cage

Non-locating bearings

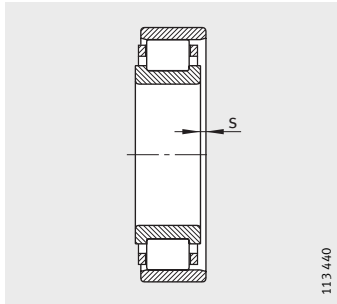


N

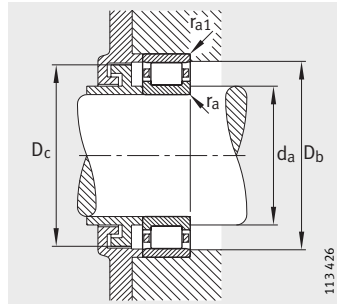


NU

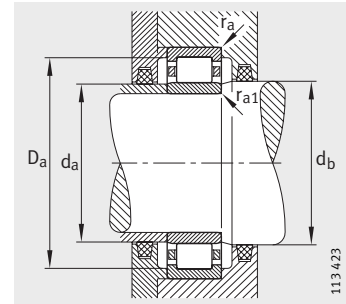
Dimension table (continued) · Dimensions in mm											
Designation	Mass m ≈ kg	Dimensions									
		d	D	B	r min.	r ₁ min.	s ¹⁾	E	F	D ₁ ≈	d ₁ ≈
N248-E-M1	51,5	240	440	72	4	4	6	393	293	–	312
NU248-E-M1	51,8	240	440	72	4	4	6	393	293	376,6	–
NU2248-EX-M1	82,8	240	440	120	4	4	10,2	399	287	380,7	–
NU348-E-M1	95,7	240	500	95	5	5	7,4	442	306	421,2	–
NU2348-EX-M1	151	240	500	155	5	5	13,3	447	303	424	–
NU1052-M1	29,7	260	400	65	4	4	7,2	364	296	351,3	–
NU252-E-M1	68,4	260	480	80	5	5	6,2	429	317	410,8	–
NU2252-E-M1	109	260	480	130	5	5	10,5	433	313	413,6	–
NU352-E-M1	121	260	540	102	6	6	10	477	337	454,6	–
NU2352-EX-M1	189	260	540	165	6	6	13,7	484	324	458,4	–
NU1056-M1	31,3	280	420	65	4	4	7,2	384	316	371,3	–
NU256-E-M1	72,1	280	500	80	5	5	6,3	449	337	430,8	–
NU2256-E-M1	114	280	500	130	5	5	10,5	453	333	436	–
NU356-E-M1	147	280	580	108	6	6	8,7	512	362	488	–
NU2356-EX-M1	234	280	580	175	6	6	13,8	521	351	493,8	–
NU1060-M1	44,6	300	460	74	4	4	7,9	420	340	405,2	–
NU260-E-M1	90,4	300	540	85	5	5	6,9	484	364	464,6	–
NU2260-EX-M1	143	300	540	140	5	5	12,2	495	355	472,6	–
NU1064-M1	46,9	320	480	74	4	4	11,5	440	360	425,1	–
NU264-EX-M1	113	320	580	92	5	5	7,5	520	392	499,4	–
NU2264-EX-M1	180	320	580	150	5	5	11,9	530	380	506	–
NU1068-M1	63,2	340	520	82	5	5	12,5	475	385	458,2	–
NU1072-M1	66	360	540	82	5	5	12,5	495	405	478,1	–
NU2272-E-M1	254	360	650	170	6	6	15	588	428	562	–
NU1076-M1	69,1	380	560	82	5	5	9	515	425	498,1	–
NU2276-E-M1	288	380	680	175	6	6	13,8	615	451	588,8	–
NU1080-M1	89,8	400	600	90	5	5	13,5	550	450	531,5	–
NU1084-M1	92,9	420	620	90	5	5	9,6	570	470	551,5	–
NU1088-M1	107	440	650	94	6	6	9,8	597	493	577,6	–
NU1992-M1	63,1	460	620	74	4	4	8,4	578	502	562,8	–
NU1092-M1	125	460	680	100	6	6	11,2	624	516	603,9	–
NU1996-M1	74,2	480	650	78	5	5	6,8	605	525	589	–
NU1096-M1	129	480	700	100	6	6	10,7	644	536	623,9	–



1) Axial displacement "s" for N and NU



Mounting dimensions for N248-E-M1: $D_{b \min} = 396 \text{ mm}$, $D_{c \max} = 390 \text{ mm}$



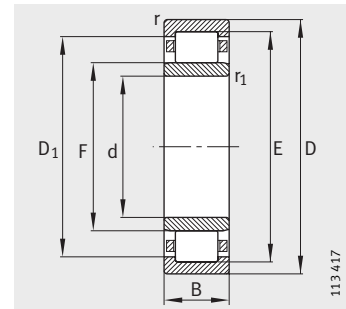
Mounting dimensions for NU

Mounting dimensions						Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a		d_b	D_a	r_a	r_{a1}	dyn. C_r N	stat. C_{0r} N			
min.	max.	min.	max.	max.	max.					
257	–	–	423	3	3	1 140 000	1 600 000	163 000	2 600	1 240
257	290	296	423	3	3	1 140 000	1 600 000	132 000	2 600	1 240
257	284,5	289,5	423	3	3	1 830 000	2 800 000	295 000	2 400	910
260	303	309	480	4	4	1 730 000	2 280 000	176 000	2 200	1 010
260	300,5	305,5	480	4	4	2 600 000	3 750 000	375 000	2 000	770
275	292	300	385	3	3	655 000	1 020 000	90 000	2 800	1 690
280	314	320	460	4	4	1 340 000	1 900 000	154 000	2 400	1 120
280	310	316	460	4	4	2 160 000	3 350 000	345 000	2 200	790
286	334,3	339,7	514	5	5	1 900 000	2 600 000	198 000	2 000	920
286	321,3	326,7	514	5	5	3 100 000	4 500 000	435 000	1 800	670
295	312	321	405	3	3	680 000	1 100 000	96 000	2 800	1 550
300	334	340	480	4	4	1 400 000	2 000 000	163 000	2 200	1 040
300	330	336	480	4	4	2 280 000	3 600 000	360 000	2 000	730
306	359	366	554	5	5	2 160 000	3 050 000	224 000	1 900	810
306	348	354	554	5	5	3 550 000	5 200 000	495 000	1 600	600
315	336	345	445	3	3	900 000	1 430 000	120 000	2 400	1 390
320	359	367	520	4	4	1 600 000	2 320 000	182 000	2 000	930
320	352	358	520	4	4	2 700 000	4 150 000	395 000	1 900	660
335	356	365	465	3	3	915 000	1 500 000	124 000	2 400	1 300
340	388,5	395,5	560	4	4	1 800 000	2 700 000	204 000	1 900	850
340	376,5	383,5	560	4	4	3 150 000	4 900 000	460 000	1 600	580
357	381	390	503	4	4	1 120 000	1 830 000	147 000	2 200	1 190
377	400	410	523	4	4	1 140 000	1 900 000	151 000	2 200	1 120
386	424	432	624	5	5	3 600 000	5 700 000	520 000	1 400	520
397	420	430	543	4	4	1 180 000	2 000 000	156 000	2 000	1 050
406	446	456	654	5	5	4 050 000	6 700 000	610 000	1 400	455
417	445	455	583	4	4	1 370 000	2 320 000	177 000	1 900	980
437	465	475	603	4	4	1 400 000	2 450 000	183 000	1 800	920
463	488	498	627	5	5	1 560 000	2 750 000	203 000	1 600	860
475	498	506	605	3	3	1 020 000	1 960 000	152 000	1 800	–
483	510	522	657	5	5	1 660 000	3 000 000	218 000	1 600	820
497	521	529	633	4	4	1 140 000	2 240 000	172 000	1 800	–
503	530	542	677	5	5	1 700 000	3 100 000	225 000	1 500	780



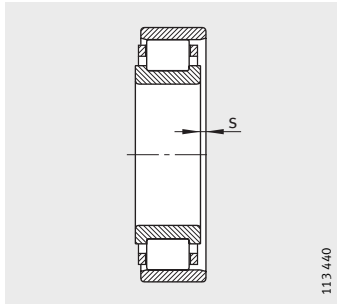
Cylindrical roller bearings with cage

Non-locating bearings

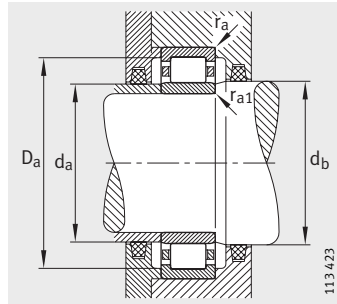


NU

Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈ kg	Dimensions								
		d	D	B	r min.	r ₁ min.	s ¹⁾	E	F	D ₁ ≈
NU10/500-M1	133	500	720	100	6	6	10,7	664	556	643,9
NU19/560-M1	105	560	750	85	5	5	9,6	700	610	682
NU10/560-M1	213	560	820	115	6	6	9,8	754	626	731
NU19/600-M1	125	600	800	90	5	5	9,9	748	652	730,7
NU19/670-M1	186	670	900	103	6	6	11,3	839	731	817
NU19/710-M1	213	710	950	106	6	6	9,3	886	774	867,7



1) Axial displacement "s" for N and NU



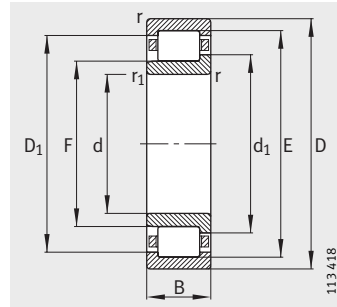
Mounting dimensions for NU

Mounting dimensions					Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}	
d_a		d_b	D_a	r_a	r_{a1}	dyn. C_r N				stat. C_{0r} N
min.	max.	min.	max.	max.	max.					
523	550	562	697	5	5	1 760 000	3 200 000	232 000	1500	750
577	606	614	733	4	4	1 460 000	3 000 000	215 000	1400	–
583	620	632	797	5	5	2 700 000	5 100 000	355 000	1200	590
617	647	657	783	4	4	1 700 000	3 450 000	249 000	1400	–
693	726	736	877	5	5	2 040 000	4 250 000	300 000	1200	–
733	769	779	927	5	5	2 240 000	4 750 000	335 000	1100	–

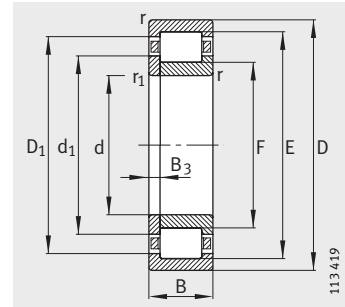


Cylindrical roller bearings with cage

Semi-locating and locating bearings

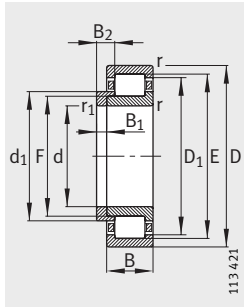


NJ
Semi-locating bearings

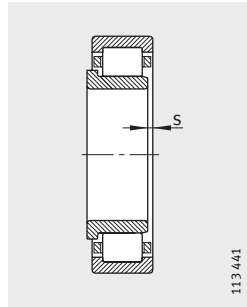


NUP
Locating bearings

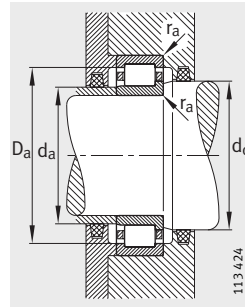
Dimension table · Dimensions in mm														
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r	r ₁	s ¹⁾	E	F	D ₁	d ₁
					min.	min.	min.	min.	min.	min.	min.	min.	min.	min.
NJ202-E-TVP2	XL	–	0,049	–	15	35	11	0,6	0,3	1,6	30,3	19,3	28	21,6
NJ202-E-TVP2	XL	HJ202-E	0,049	0,005	15	35	11	0,6	0,3	–	30,3	19,3	28	21,6
NJ203-E-TVP2	XL	–	0,07	–	17	40	12	0,6	0,3	1,2	35,1	22,1	32,5	24,7
NJ203-E-TVP2	XL	HJ203-E	0,07	0,008	17	40	12	0,6	0,3	–	35,1	22,1	32,5	24,7
NUP203-E-TVP2	XL	–	0,073	–	17	40	12	0,6	0,3	–	35,1	22,1	32,5	24,7
NJ2203-E-TVP2	XL	–	0,053	–	17	40	16	0,6	0,3	1,7	35,1	22,1	32,5	24,7
NJ2203-E-TVP2	XL	HJ2203-E	0,053	0,008	17	40	16	0,6	0,3	–	35,1	22,1	32,5	24,7
NUP2203-E-TVP2	XL	–	0,055	–	17	40	16	0,6	0,6	–	35,1	22,1	32,5	24,7
NJ303-E-TVP2	XL	–	0,124	–	17	47	14	1	0,6	1,2	40,2	24,2	37,1	27,6
NJ303-E-TVP2	XL	HJ303-E	0,124	0,014	17	47	14	1	0,6	–	40,2	24,2	37,1	27,6
NUP303-E-TVP2	XL	–	0,142	–	17	47	14	1	0,6	–	40,2	24,2	37,1	27,6
NJ204-E-TVP2	XL	–	0,117	–	20	47	14	1	0,6	1	41,5	26,5	38,8	29,7
NJ204-E-TVP2	XL	HJ204-E	0,117	0,011	20	47	14	1	0,6	–	41,5	26,5	38,8	29,7
NUP204-E-TVP2	XL	–	0,119	–	20	47	14	1	0,6	–	41,5	26,5	38,8	29,7
NJ2204-E-TVP2	XL	–	0,15	–	20	47	18	1	0,6	1,8	41,5	26,5	38,8	29,7
NJ2204-E-TVP2	XL	HJ2204-E	0,15	0,012	20	47	18	1	0,6	–	41,5	26,5	38,8	29,7
NUP2204-E-TVP2	XL	–	0,154	–	20	47	18	1	0,6	–	41,5	26,5	38,8	29,7
NJ304-E-TVP2	XL	–	0,156	–	20	52	15	1,1	0,6	1	45,5	27,5	42,4	31,3
NJ304-E-TVP2	XL	HJ304-E	0,156	0,017	20	52	15	1,1	0,6	–	45,5	27,5	42,4	31,3
NUP304-E-TVP2	XL	–	0,16	–	20	52	15	1,1	0,6	–	45,5	27,5	42,4	31,3
NJ2304-E-TVP2	XL	–	0,219	–	20	52	21	1,1	0,6	1,9	45,5	27,5	42,4	31,3
NJ2304-E-TVP2	XL	HJ2304-E	0,219	0,019	20	52	21	1,1	0,6	–	45,5	27,5	42,4	31,3
NUP2304-E-TVP2	XL	–	0,224	–	20	52	21	1,1	0,6	–	45,5	27,5	42,4	31,3
NJ205-E-TVP2	XL	–	0,14	–	25	52	15	1	0,6	1,2	46,5	31,5	43,8	34,7
NJ205-E-TVP2	XL	HJ205-E	0,14	0,014	25	52	15	1	0,6	–	46,5	31,5	43,8	34,7
NUP205-E-TVP2	XL	–	0,145	–	25	52	15	1	0,6	–	46,5	31,5	43,8	34,7
NJ2205-E-TVP2	XL	–	0,17	–	25	52	18	1	0,6	1,7	46,5	31,5	43,8	34,7
NJ2205-E-TVP2	XL	HJ2205-E	0,17	0,015	25	52	18	1	0,6	–	46,5	31,5	43,8	34,7
NUP2205-E-TVP2	XL	–	0,174	–	25	52	18	1	0,6	–	46,5	31,5	43,8	34,7
NJ305-E-TVP2	XL	–	0,25	–	25	62	17	1,1	1,1	1,5	54	34	50,7	38,1
NJ305-E-TVP2	XL	HJ305-E	0,25	0,025	25	62	17	1,1	1,1	–	54	34	50,7	38,1
NUP305-E-TVP2	XL	–	0,256	–	25	62	17	1,1	1,1	–	54	34	50,7	38,1
NJ2305-E-TVP2	XL	–	0,356	–	25	62	24	1,1	1,1	1,9	54	34	50,7	38,1
NJ2305-E-TVP2	XL	HJ2305-E	0,356	0,027	25	62	24	1,1	1,1	–	54	34	50,7	38,1
NUP2305-E-TVP2	XL	–	0,364	–	25	62	24	1,1	1,1	–	54	34	50,7	38,1



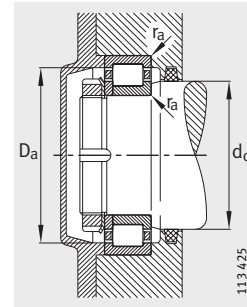
NJ and HJ
Locating bearings



1) Axial
displacement "s"
for NJ



Mounting dimensions
for NJ



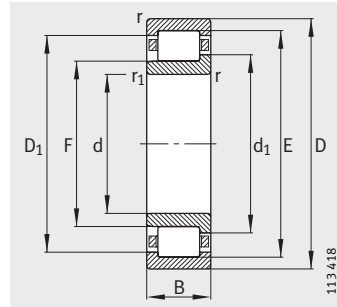
Mounting dimensions
for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B ₁	B ₂	B ₃	d _a		d _c	D _a	r _a	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	n _B min ⁻¹
			min.	max.								
-	-	-	17,4	18,5	22	32,6	0,6	15 100	10 400	1 460	22 000	17 600
2,5	5	-	17,4	-	22	32,6	0,6	15 100	10 400	1 460	22 000	17 600
-	-	-	21	21,5	28	36	0,6	20 800	14 600	2 100	18 000	15 400
3	5,5	-	21	-	28	36	0,6	20 800	14 600	2 100	18 000	15 400
-	-	2,5	21	-	28	36	0,6	20 800	14 600	2 100	18 000	15 400
-	-	-	21	21,5	26	36	0,6	28 500	21 900	3 500	18 000	13 300
3	6	-	21	-	26	36	0,6	28 500	21 900	3 500	18 000	13 300
-	-	3	21	-	26	36	0,6	28 500	21 900	3 500	18 000	13 300
-	-	-	21,2	23,5	28	42,8	1	30 000	21 200	3 300	16 000	13 700
4	6,5	-	21,2	-	28	42,8	1	30 000	21 200	3 300	16 000	13 700
-	-	2,5	21,2	-	28	42,8	1	30 000	21 200	3 300	16 000	13 700
-	-	-	24	26	32	41	1	32 500	24 700	3 850	16 000	13 100
3	5,5	-	24	-	32	41	1	32 500	24 700	3 850	16 000	13 100
-	-	2,5	24	-	32	41	1	32 500	24 700	3 850	16 000	13 100
-	-	-	24	26	32	41	1	38 500	31 000	5 000	16 000	11 400
3	6,5	-	24	-	32	41	1	38 500	31 000	5 000	16 000	11 400
-	-	3,5	24	-	32	41	1	38 500	31 000	5 000	16 000	11 400
-	-	-	24	27	33	45	1	36 500	26 000	4 050	14 000	12 100
4	6,5	-	24	-	33	45	1	36 500	26 000	4 050	14 000	12 100
-	-	2,5	24	-	33	45	1	36 500	26 000	4 050	14 000	12 100
-	-	-	24	27	33	45	1	48 500	38 000	6 300	14 000	9 900
4	7,5	-	24	-	33	45	1	48 500	38 000	6 300	14 000	9 900
-	-	3,5	24	-	33	45	1	48 500	38 000	6 300	14 000	9 900
-	-	-	29	31	37	46	1	34 500	27 500	4 350	15 000	11 800
3	6	-	29	-	37	46	1	34 500	27 500	4 350	15 000	11 800
-	-	3	29	-	37	46	1	34 500	27 500	4 350	15 000	11 800
-	-	-	29	31	37	46	1	41 500	34 500	5 700	15 000	9 800
3	6,5	-	29	-	37	46	1	41 500	34 500	5 700	15 000	9 800
-	-	3,5	29	-	37	46	1	41 500	34 500	5 700	15 000	9 800
-	-	-	32	33	40	55	1	48 000	36 500	5 800	12 000	10 200
4	7	-	32	-	40	55	1	48 000	36 500	5 800	12 000	10 200
-	-	3	32	-	40	55	1	48 000	36 500	5 800	12 000	10 200
-	-	-	32	33	40	55	1	66 000	55 000	9 400	12 000	8 400
4	8	-	32	-	40	55	1	66 000	55 000	9 400	12 000	8 400
-	-	4	32	-	40	55	1	66 000	55 000	9 400	12 000	8 400

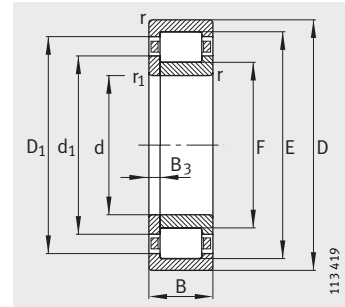


Cylindrical roller bearings with cage

Semi-locating and locating bearings

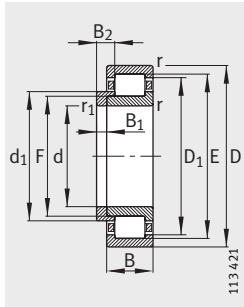


NJ
Semi-locating bearings

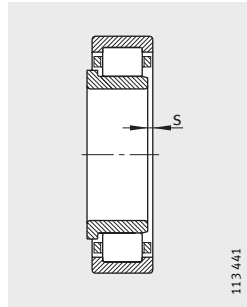


NUP
Locating bearings

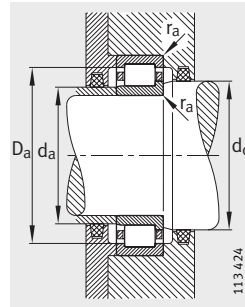
Dimension table (continued) · Dimensions in mm														
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ring ≈kg	L-section ring ≈kg	d	D	B	r	r ₁	s ¹⁾	E	F	D ₁	d ₁
					min.	min.	min.	min.	min.	min.	min.	min.	min.	min.
NJ206-E-TVP2	XL	—	0,213	—	30	62	16	1	0,6	1,5	55,5	37,5	52,5	41,1
NJ206-E-TVP2	XL	HJ206-E	0,213	0,024	30	62	16	1	0,6	—	55,5	37,5	52,5	41,1
NUP206-E-TVP2	XL	—	0,219	—	30	62	16	1	0,6	—	55,5	37,5	52,5	41,1
NJ2206-E-TVP2	XL	—	0,261	—	30	62	20	1	0,6	1,6	55,5	37,5	52,5	41,3
NJ2206-E-TVP2	XL	HJ2206-E	0,261	0,025	30	62	20	1	0,6	—	55,5	37,5	52,5	41,3
NUP2206-E-TVP2	XL	—	0,268	—	30	62	20	1	0,6	—	55,5	37,5	52,5	41,3
NJ306-E-TVP2	XL	—	0,376	—	30	72	19	1,1	1,1	1,2	62,5	40,5	59,2	45
NJ306-E-TVP2	XL	HJ306-E	0,376	0,042	30	72	19	1,1	1,1	—	62,5	40,5	59,2	45
NUP306-E-TVP2	XL	—	0,385	—	30	72	19	1,1	1,1	—	62,5	40,5	59,2	45
NJ2306-E-TVP2	XL	—	0,54	—	30	72	27	1,1	1,1	2,2	62,5	40,5	59,2	45
NJ2306-E-TVP2	XL	HJ2306-E	0,54	0,044	30	72	27	1,1	1,1	—	62,5	40,5	59,2	45
NUP2306-E-TVP2	XL	—	0,551	—	30	72	27	1,1	1,1	—	62,5	40,5	59,2	45
NJ207-E-TVP2	XL	—	0,309	—	35	72	17	1,1	0,6	0,7	64	44	61	48
NJ207-E-TVP2	XL	HJ207-E	0,309	0,032	35	72	17	1,1	0,6	—	64	44	61	48
NUP207-E-TVP2	XL	—	0,317	—	35	72	17	1,1	0,6	—	64	44	61	48
NJ2207-E-TVP2	XL	—	0,416	—	35	72	23	1,1	0,6	2,2	64	44	61	48
NJ2207-E-TVP2	XL	HJ2207-E	0,416	0,035	35	72	23	1,1	0,6	—	64	44	61	48
NUP2207-E-TVP2	XL	—	0,427	—	35	72	23	1,1	0,6	—	64	44	61	48
NJ307-E-TVP2	XL	—	0,496	—	35	80	21	1,5	1,1	0,6	70,2	46,2	66,6	51
NJ307-E-TVP2	XL	HJ307-E	0,496	0,06	35	80	21	1,5	1,1	—	70,2	46,2	66,6	51
NUP307-E-TVP2	XL	—	0,506	—	35	80	21	1,5	1,1	—	70,2	46,2	66,6	51
NJ2307-E-TVP2	XL	—	0,736	—	35	80	31	1,5	1,1	2,1	70,2	46,2	66,6	51
NJ2307-E-TVP2	XL	HJ2307-E	0,736	0,063	35	80	31	1,5	1,1	—	70,2	46,2	66,6	51
NUP2307-E-TVP2	XL	—	0,751	—	35	80	31	1,5	1,5	—	70,2	46,2	66,6	51
NJ208-E-TVP2	XL	—	0,389	—	40	80	18	1,1	1,1	1	71,5	49,5	68,3	54
NJ208-E-TVP2	XL	HJ208-E	0,389	0,049	40	80	18	1,1	1,1	—	71,5	49,5	68,3	54
NUP208-E-TVP2	XL	—	0,399	—	40	80	18	1,1	1,1	—	71,5	49,5	68,3	54
NJ2208-E-TVP2	XL	—	0,504	—	40	80	23	1,1	1,1	1,5	71,5	49,5	68,3	54
NJ2208-E-TVP2	XL	HJ2208-E	0,504	0,05	40	80	23	1,1	1,1	—	71,5	49,5	68,3	54
NUP2208-E-TVP2	XL	—	0,518	—	40	80	23	1,1	1,1	—	71,5	49,5	68,3	54
NJ308-E-TVP2	XL	—	0,674	—	40	90	23	1,5	1,5	1,3	80	52	75,9	57,6
NJ308-E-TVP2	XL	HJ308-E	0,674	0,087	40	90	23	1,5	1,5	—	80	52	75,9	57,6
NUP308-E-TVP2	XL	—	0,688	—	40	90	23	1,5	1,5	—	80	52	75,9	57,6
NJ2308-E-TVP2	XL	—	0,978	—	40	90	33	1,5	1,5	2,7	80	52	75,9	57,6
NJ2308-E-TVP2	XL	HJ2308-E	0,978	0,091	40	90	33	1,5	1,5	—	80	52	75,9	57,6
NUP2308-E-TVP2	XL	—	0,999	—	40	90	33	1,5	1,5	—	80	52	75,9	57,6



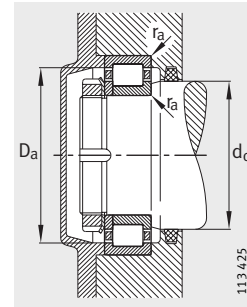
NJ and HJ
Locating bearings



1) Axial
displacement "s"
for NJ



Mounting dimensions
for NJ



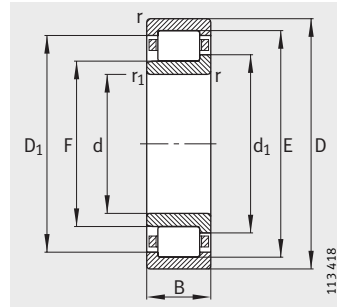
Mounting dimensions
for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B ₁	B ₂	B ₃	d _a		d _c	D _a	r _a	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	n _B min ⁻¹
			min.	max.								
-	-	-	34	37	44	56	1	45 000	36 000	5 700	12 000	9 800
4	7	-	34	-	44	56	1	45 000	36 000	5 700	12 000	9 800
-	-	3	34	-	44	56	1	45 000	36 000	5 700	12 000	9 800
-	-	-	34	37	44	56	1	57 000	48 500	8 100	12 000	8 200
4	7,5	-	34	-	44	56	1	57 000	48 500	8 100	12 000	8 200
-	-	3,5	34	-	44	56	1	57 000	48 500	8 100	12 000	8 200
-	-	-	37	40	48	65	1	61 000	48 000	8 000	10 000	9 000
5	8,5	-	37	-	48	65	1	61 000	48 000	8 000	10 000	9 000
-	-	3,5	37	-	48	65	1	61 000	48 000	8 000	10 000	9 000
-	-	-	37	40	48	65	1	86 000	75 000	13 200	10 000	7 300
5	9,5	-	37	-	48	65	1	86 000	75 000	13 200	10 000	7 300
-	-	4,5	37	-	48	65	1	86 000	75 000	13 200	10 000	7 300
-	-	-	39	43	50	65	1	58 000	48 500	7 900	10 000	8 300
4	7	-	39	-	50	65	1	58 000	48 500	7 900	10 000	8 300
-	-	3	39	-	50	65	1	58 000	48 500	7 900	10 000	8 300
-	-	-	39	43	50	65	1	72 000	64 000	10 800	10 000	7 300
4	8,5	-	39	-	50	65	1	72 000	64 000	10 800	10 000	7 300
-	-	4,5	39	-	50	65	1	72 000	64 000	10 800	10 000	7 300
-	-	-	42	45	53	71	1,5	76 000	63 000	10 700	9 000	8 100
6	9,5	-	42	-	53	71	1,5	76 000	63 000	10 700	9 000	8 100
-	-	3,5	42	-	53	71	1,5	76 000	63 000	10 700	9 000	8 100
-	-	-	42	45	53	71	1,5	108 000	98 000	17 400	9 000	6 700
6	11	-	42	-	53	71	1,5	108 000	98 000	17 400	9 000	6 700
-	-	5	42	-	53	71	1,5	108 000	98 000	17 400	9 000	6 700
-	-	-	47	49	56	73	1	63 000	53 000	8 700	9 000	7 600
5	8,5	-	47	-	56	73	1	63 000	53 000	8 700	9 000	7 600
-	-	3,5	47	-	56	73	1	63 000	53 000	8 700	9 000	7 600
-	-	-	47	49	56	73	1	83 000	75 000	12 900	9 000	6 400
5	9	-	47	-	56	73	1	83 000	75 000	12 900	9 000	6 400
-	-	4	47	-	56	73	1	83 000	75 000	12 900	9 000	6 400
-	-	-	49	51	60	81	1,5	95 000	78 000	12 900	7 500	7 300
7	11	-	49	-	60	81	1,5	95 000	78 000	12 900	7 500	7 300
-	-	4	49	-	60	81	1,5	95 000	78 000	12 900	7 500	7 300
-	-	-	49	51	60	81	1,5	132 000	119 000	20 700	7 500	6 000
7	12,5	-	49	-	60	81	1,5	132 000	119 000	20 700	7 500	6 000
-	-	5,5	49	-	60	81	1,5	132 000	119 000	20 700	7 500	6 000

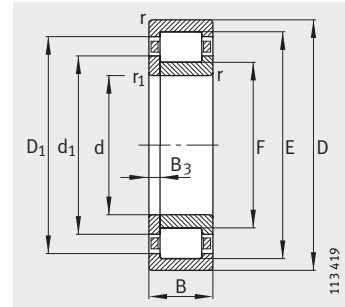


Cylindrical roller bearings with cage

Semi-locating and locating bearings

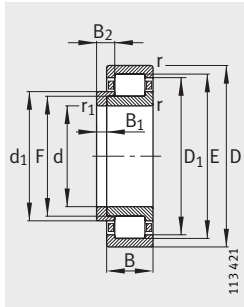


NJ
Semi-locating bearings

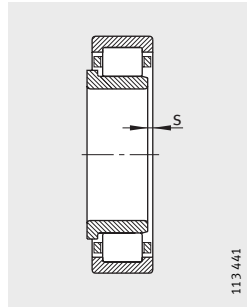


NUP
Locating bearings

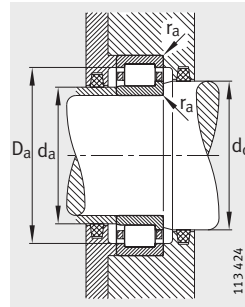
Dimension table (continued) · Dimensions in mm														
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ring ≈ kg	L-section ring ≈ kg	d	D	B	r	r ₁	s ¹⁾	E	F	D ₁	d ₁
					min.	min.	min.	min.	min.	min.	min.	min.	min.	min.
NJ209-E-TVP2	XL	–	0,445	–	45	85	19	1,1	1,1	1,9	76,5	54,5	73,3	59
NJ209-E-TVP2	XL	HJ209-E	0,445	0,054	45	85	19	1,1	1,1	–	76,5	54,5	73,3	59
NUP209-E-TVP2	XL	–	0,457	–	45	85	19	1,1	1,1	–	76,5	54,5	73,3	59
NJ2209-E-TVP2	XL	–	0,544	–	45	85	23	1,1	1,1	1,5	76,5	54,5	73,3	59
NJ2209-E-TVP2	XL	HJ2209-E	0,544	0,055	45	85	23	1,1	1,1	–	76,5	54,5	73,3	59
NUP2209-E-TVP2	XL	–	0,559	–	45	85	23	1,1	1,1	–	76,5	54,5	73,3	59
NJ309-E-TVP2	XL	–	0,913	–	45	100	25	1,5	1,5	1	88,5	58,5	84,1	64,4
NJ309-E-TVP2	XL	HJ309-E	0,913	0,109	45	100	25	1,5	1,5	–	88,5	58,5	84,1	64,4
NUP309-E-TVP2	XL	–	0,937	–	45	100	25	1,5	1,5	–	88,5	58,5	84,1	64,4
NJ2309-E-TVP2	XL	–	1,33	–	45	100	36	1,5	1,5	2,5	88,5	58,5	84,1	64,4
NJ2309-E-TVP2	XL	HJ2309-E	1,33	0,115	45	100	36	1,5	1,5	–	88,5	58,5	84,1	64,4
NUP2309-E-TVP2	XL	–	1,36	–	45	100	36	1,5	1,5	–	88,5	58,5	84,1	64,4
NJ210-E-TVP2	XL	–	0,503	–	50	90	20	1,1	1,1	1,3	81,5	59,5	78,3	64
NJ210-E-TVP2	XL	HJ210-E	0,503	0,06	50	90	20	1,1	1,1	–	81,5	59,5	78,3	64
NUP210-E-TVP2	XL	–	0,517	–	50	90	20	1,1	1,1	–	81,5	59,5	78,3	64
NJ2210-E-TVP2	XL	–	0,586	–	50	90	23	1,1	1,1	1,3	81,5	59,5	78,3	64
NJ2210-E-TVP2	XL	HJ210-E	0,586	0,06	50	90	23	1,1	1,1	–	81,5	59,5	78,3	64
NUP2210-E-TVP2	XL	–	0,597	–	50	90	23	1,1	1,1	–	81,5	59,5	78,3	64
NJ310-E-TVP2	XL	–	1,19	–	50	110	27	2	2	1,7	97	65	92,5	71,3
NJ310-E-TVP2	XL	HJ310-E	1,19	0,149	50	110	27	2	2	–	97	65	92,5	71,3
NUP310-E-TVP2	XL	–	1,21	–	50	110	27	2	2	–	97	65	92,5	71,3
NJ2310-E-TVP2	XL	–	1,77	–	50	110	40	2	2	4,2	97	65	92,5	71,3
NJ2310-E-TVP2	XL	HJ2310-E	1,77	0,156	50	110	40	2	2	–	97	65	92,5	71,3
NUP2310-E-TVP2	XL	–	1,82	–	50	110	40	2	2	–	97	65	92,5	71,3
NJ211-E-TVP2	XL	–	0,679	–	55	100	21	1,5	1,1	0,8	90	66	86,6	70,8
NJ211-E-TVP2	XL	HJ211-E	0,679	0,087	55	100	21	1,5	1,1	–	90	66	86,6	70,8
NUP211-E-TVP2	XL	–	0,693	–	55	100	21	1,5	1,1	–	90	66	86,6	70,8
NJ2211-E-TVP2	XL	–	0,812	–	55	100	25	1,5	1,1	1,3	90	66	86,6	70,8
NJ2211-E-TVP2	XL	HJ2211-E	0,812	0,087	55	100	25	1,5	1,1	–	90	66	86,6	70,8
NUP2211-E-TVP2	XL	–	0,828	–	55	100	25	1,5	1,1	–	90	66	86,6	70,8
NJ311-E-TVP2	XL	–	1,51	–	55	120	29	2	2	1,8	106,5	70,5	101,4	77,5
NJ311-E-TVP2	XL	HJ311-E	1,51	0,192	55	120	29	2	2	–	106,5	70,5	101,4	77,5
NUP311-E-TVP2	XL	–	1,54	–	55	120	29	2	2	–	106,5	70,5	101,4	77,5
NJ2311-E-TVP2	XL	–	2,27	–	55	120	43	2	2	3,3	106,5	70,5	101,4	77,5
NJ2311-E-TVP2	XL	HJ2311-E	2,27	0,2	55	120	43	2	2	–	106,5	70,5	101,4	77,5
NUP2311-E-TVP2	XL	–	2,31	–	55	120	43	2	2	–	106,5	70,5	101,4	77,5



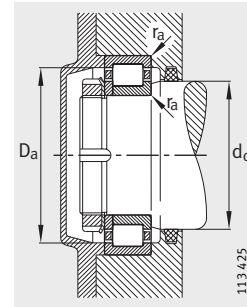
NJ and HJ
Locating bearings



1) Axial
displacement "s"
for NJ



Mounting dimensions
for NJ



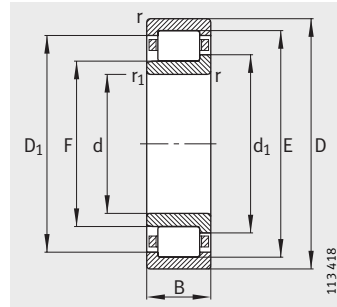
Mounting dimensions
for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B ₁	B ₂	B ₃	d _a		d _c	D _a	r _a	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	n _B min ⁻¹
			min.	max.								
-	-	-	52	54	61	78	1	72 000	63 000	10 600	8 500	7 100
5	8,5	-	52	-	61	78	1	72 000	63 000	10 600	8 500	7 100
-	-	3,5	52	-	61	78	1	72 000	63 000	10 600	8 500	7 100
-	-	-	52	54	61	78	1	87 000	82 000	14 100	8 500	5 800
5	9	-	52	-	61	78	1	87 000	82 000	14 100	8 500	5 800
-	-	4	52	-	61	78	1	87 000	82 000	14 100	8 500	5 800
-	-	-	54	57	66	91	1,5	108 000	91 000	15 200	6 700	6 500
7	11,5	-	54	-	66	91	1,5	108 000	91 000	15 200	6 700	6 500
-	-	4,5	54	-	66	91	1,5	115 000	98 000	16 400	6 700	6 500
-	-	-	54	57	66	91	1,5	162 000	153 000	27 000	6 700	5 400
7	13	-	54	-	66	91	1,5	162 000	153 000	27 000	6 700	5 400
-	-	6	54	-	66	91	1,5	162 000	153 000	27 000	6 700	5 400
-	-	-	57	58	67	83	1	75 000	69 000	11 500	8 000	6 700
5	9	-	57	-	67	83	1	75 000	69 000	11 500	8 000	6 700
-	-	4	57	-	67	83	1	75 000	69 000	11 500	8 000	6 700
-	-	-	57	58	67	83	1	92 000	88 000	15 300	8 000	5 400
5	9	-	57	-	67	83	1	92 000	88 000	15 300	8 000	5 400
-	-	4	57	-	67	83	1	92 000	88 000	15 300	8 000	5 400
-	-	-	61	63	73	99	2	130 000	113 000	19 100	6 300	6 100
8	13	-	61	-	73	99	2	130 000	113 000	19 100	6 300	6 100
-	-	5	61	-	73	99	2	130 000	113 000	19 100	6 300	6 100
-	-	-	61	63	73	99	2	192 000	187 000	33 000	6 300	5 000
8	14,5	-	61	-	73	99	2	192 000	187 000	33 000	6 300	5 000
-	-	6,5	61	-	73	99	2	192 000	187 000	33 000	6 300	5 000
-	-	-	62	65	73	91	1,5	99 000	95 000	16 300	7 000	5 800
6	9,5	-	62	-	73	91	1,5	99 000	95 000	16 300	7 000	5 800
-	-	3,5	62	-	73	91	1,5	99 000	95 000	16 300	7 000	5 800
-	-	-	62	65	73	91	1,5	117 000	118 000	20 700	7 000	4 750
6	10	-	62	-	73	91	1,5	117 000	118 000	20 700	7 000	4 750
-	-	4	62	-	73	91	1,5	117 000	118 000	20 700	7 000	4 750
-	-	-	66	69	80	109	2	159 000	139 000	23 600	5 600	6 000
9	14	-	66	-	80	109	2	159 000	139 000	23 600	5 600	6 000
-	-	5	66	-	80	109	2	159 000	139 000	23 600	5 600	6 000
-	-	-	66	69	80	109	2	235 000	230 000	41 000	5 600	4 600
9	15,5	-	66	-	80	109	2	235 000	230 000	41 000	5 600	4 600
-	-	6,5	66	-	80	109	2	235 000	230 000	41 000	5 600	4 600

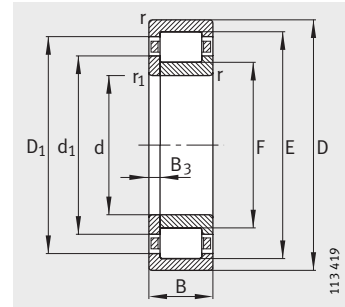


Cylindrical roller bearings with cage

Semi-locating and locating bearings

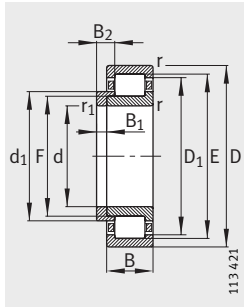


NJ
Semi-locating bearings

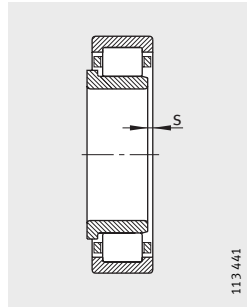


NUP
Locating bearings

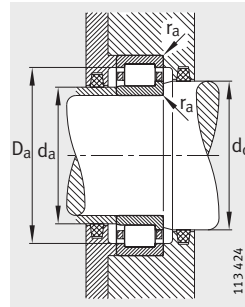
Dimension table (continued) · Dimensions in mm														
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈ kg	L-section ring ≈ kg	d	D	B	r	r ₁	s ¹⁾	E	F	D ₁	d ₁
								min.	min.					
NJ212-E-TVP2	XL	–	0,845	–	60	110	22	1,5	1,5	1,6	100	72	96,1	77,6
NJ212-E-TVP2	XL	HJ212-E	0,845	0,106	60	110	22	1,5	1,5	–	100	72	96,1	77,6
NUP212-E-TVP2	XL	–	0,865	–	60	110	22	1,5	1,5	–	100	72	96,1	77,6
NJ2212-E-TVP2	XL	–	1,1	–	60	110	28	1,5	1,5	1,6	100	72	96,1	77,6
NJ2212-E-TVP2	XL	HJ212-E	1,1	0,106	60	110	28	1,5	1,5	–	100	72	96,1	77,6
NUP2212-E-TVP2	XL	–	1,12	–	60	110	28	1,5	1,5	–	100	72	96,1	77,6
NJ312-E-TVP2	XL	–	1,89	–	60	130	31	2,1	2,1	1,8	115	77	109,6	84,4
NJ312-E-TVP2	XL	HJ312-E	1,89	0,229	60	130	31	2,1	2,1	–	115	77	109,6	84,4
NUP312-E-TVP2	XL	–	1,93	–	60	130	31	2,1	2,1	–	115	77	109,6	84,4
NJ2312-E-TVP2	XL	–	2,83	–	60	130	46	2,1	2,1	3,5	115	77	109,6	84,4
NJ2312-E-TVP2	XL	HJ2312-E	2,83	0,238	60	130	46	2,1	2,1	–	115	77	109,6	84,4
NUP2312-E-TVP2	XL	–	2,88	–	60	130	46	2,1	2,1	–	115	77	109,6	84,4
NJ213-E-TVP2	XL	–	1,06	–	65	120	23	1,5	1,5	1,4	108,5	78,5	104,3	84,4
NJ213-E-TVP2	XL	HJ213-E	1,06	0,127	65	120	23	1,5	1,5	–	108,5	78,5	104,3	84,4
NUP213-E-TVP2	XL	–	1,09	–	65	120	23	1,5	1,5	–	108,5	78,5	104,3	84,4
NJ2213-E-TVP2	XL	–	1,46	–	65	120	31	1,5	1,5	1,9	108,5	78,5	104,3	84,4
NJ2213-E-TVP2	XL	HJ2213-E	1,46	0,13	65	120	31	1,5	1,5	–	108,5	78,5	104,3	84,4
NUP2213-E-TVP2	XL	–	1,54	–	65	120	31	1,5	1,5	–	108,5	78,5	104,3	84,4
NJ313-E-TVP2	XL	–	2,32	–	65	140	33	2,1	2,1	1,5	124,5	82,5	118,6	90,5
NJ313-E-TVP2	XL	HJ313-E	2,32	0,285	65	140	33	2,1	2,1	–	124,5	82,5	118,6	90,5
NUP313-E-TVP2	XL	–	2,37	–	65	140	33	2,1	2,1	–	124,5	82,5	118,6	90,5
NJ2313-E-TVP2	XL	–	3,38	–	65	140	48	2,1	2,1	4	124,5	82,5	118,6	90,5
NJ2313-E-TVP2	XL	HJ2313-E	3,38	0,303	65	140	48	2,1	2,1	–	124,5	82,5	118,6	90,5
NUP2313-E-TVP2	XL	–	3,45	–	65	140	48	2,1	2,1	–	124,5	82,5	118,6	90,5
NJ214-E-TVP2	XL	–	1,18	–	70	125	24	1,5	1,5	1,6	113,5	83,5	109,4	89,4
NJ214-E-TVP2	XL	HJ214-E	1,18	0,155	70	125	24	1,5	1,5	–	113,5	83,5	109,4	89,4
NUP214-E-TVP2	XL	–	1,2	–	70	125	24	1,5	1,5	–	113,5	83,5	109,4	89,4
NJ2214-E-TVP2	XL	–	1,54	–	70	125	31	1,5	1,5	1,6	113,5	83,5	109,4	89,4
NJ2214-E-TVP2	XL	HJ2214-E	1,54	0,157	70	125	31	1,5	1,5	–	113,5	83,5	109,4	89,4
NUP2214-E-TVP2	XL	–	1,58	–	70	125	31	1,5	1,5	–	113,5	83,5	109,4	89,4
NJ314-E-TVP2	XL	–	2,84	–	70	150	35	2,1	2,1	1,7	133	89	126,8	97,4
NJ314-E-TVP2	XL	HJ314-E	2,84	0,328	70	150	35	2,1	2,1	–	133	89	126,8	97,4
NUP314-E-TVP2	XL	–	2,89	–	70	150	35	2,1	2,1	–	133	89	126,8	97,4
NJ2314-E-TVP2	XL	–	4,1	–	70	150	51	2,1	2,1	4,7	133	89	126,8	97,4
NJ2314-E-TVP2	XL	HJ2314-E	4,1	0,352	70	150	51	2,1	2,1	–	133	89	126,8	97,4
NUP2314-E-TVP2	XL	–	4,18	–	70	150	51	2,1	2,1	–	133	89	126,8	97,4



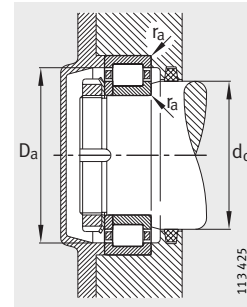
NJ and HJ
Locating bearings



1) Axial
displacement "s"
for NJ



Mounting dimensions
for NJ



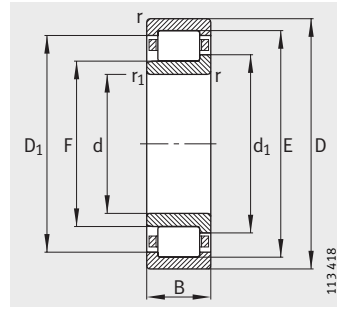
Mounting dimensions
for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B ₁	B ₂	B ₃	d _a		d _c	D _a	r _a	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	n _B min ⁻¹
			min.	max.								
-	-	-	69	71	80	101	1,5	111 000	102 000	16 800	6 300	5 400
6	10	-	69	-	80	101	1,5	111 000	102 000	16 800	6 300	5 400
-	-	4	69	-	80	101	1,5	111 000	102 000	16 800	6 300	5 400
-	-	-	69	71	80	101	1,5	151 000	152 000	26 500	6 300	4 400
6	10	-	69	-	80	101	1,5	151 000	152 000	26 500	6 300	4 400
-	-	4	69	-	80	101	1,5	151 000	152 000	26 500	6 300	4 400
-	-	-	72	75	86	118	2,1	177 000	157 000	26 500	5 000	5 300
9	14,5	-	72	-	86	118	2,1	177 000	157 000	26 500	5 000	5 300
-	-	5,5	72	-	86	118	2,1	177 000	157 000	26 500	5 000	5 300
-	-	-	72	75	86	118	2,1	265 000	260 000	47 000	5 000	4 300
9	16	-	72	-	86	118	2,1	265 000	260 000	47 000	5 000	4 300
-	-	7	72	-	86	118	2,1	265 000	260 000	47 000	5 000	4 300
-	-	-	74	77	87	111	1,5	127 000	119 000	19 800	6 000	5 000
6	10	-	74	-	87	111	1,5	127 000	119 000	19 800	6 000	5 000
-	-	4	74	-	87	111	1,5	127 000	119 000	19 800	6 000	5 000
-	-	-	74	77	87	111	1,5	176 000	181 000	32 000	5 600	4 150
6	10,5	-	74	-	87	111	1,5	176 000	181 000	32 000	5 600	4 150
-	-	4,5	74	-	87	111	1,5	176 000	181 000	32 000	5 600	4 150
-	-	-	77	81	93	128	2,1	214 000	191 000	32 000	4 800	4 900
10	15,5	-	77	-	93	128	2,1	214 000	191 000	32 000	4 800	4 900
-	-	5,5	77	-	93	128	2,1	214 000	191 000	32 000	4 800	4 900
-	-	-	77	81	93	128	2,1	295 000	285 000	50 000	4 800	4 050
10	18	-	77	-	93	128	2,1	295 000	285 000	50 000	4 800	4 050
-	-	8	77	-	93	128	2,1	295 000	285 000	50 000	4 800	4 050
-	-	-	79	82	92	116	1,5	140 000	137 000	23 100	5 300	4 750
7	11	-	79	-	92	116	1,5	140 000	137 000	23 100	5 300	4 750
-	-	4	79	-	92	116	1,5	140 000	137 000	23 100	5 300	4 750
-	-	-	79	82	92	116	1,5	184 000	194 000	34 000	5 300	3 900
7	11,5	-	79	-	92	116	1,5	184 000	194 000	34 000	5 300	3 900
-	-	4,5	79	-	92	116	1,5	184 000	194 000	34 000	5 300	3 900
-	-	-	82	87	100	138	2,1	242 000	222 000	37 000	4 500	4 550
10	15,5	-	82	-	100	138	2,1	242 000	222 000	37 000	4 500	4 550
-	-	5,5	82	-	100	138	2,1	242 000	222 000	37 000	4 500	4 550
-	-	-	82	87	100	138	2,1	325 000	325 000	56 000	4 500	3 850
10	18,5	-	82	-	100	138	2,1	325 000	325 000	56 000	4 500	3 850
-	-	8,5	82	-	100	138	2,1	325 000	325 000	56 000	4 500	3 850

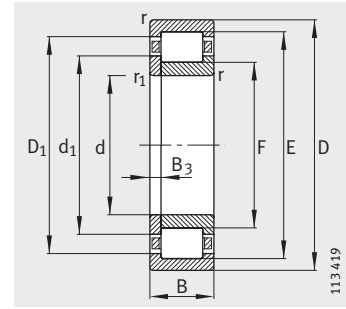


Cylindrical roller bearings with cage

Semi-locating and locating bearings

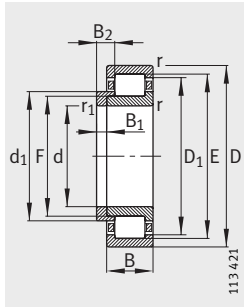


NJ
Semi-locating bearings

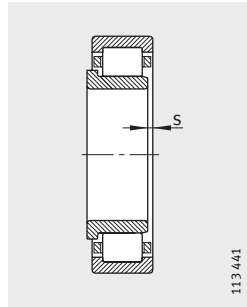


NUP
Locating bearings

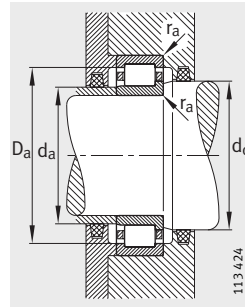
Dimension table (continued) · Dimensions in mm														
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r	r ₁	s ¹⁾	E	F	D ₁	d ₁
					min.	min.	min.	min.	min.	min.	min.	min.	min.	min.
NJ215-E-TVP2	XL	–	1,3	–	75	130	25	1,5	1,5	1,2	118,5	88,5	114,4	94,4
NJ215-E-TVP2	XL	HJ215-E	1,3	0,164	75	130	25	1,5	1,5	–	118,5	88,5	114,4	94,4
NUP215-E-TVP2	XL	–	1,33	–	75	130	25	1,5	1,5	–	118,5	88,5	114,4	94,4
NJ2215-E-TVP2	XL	–	1,64	–	75	130	31	1,5	1,5	1,6	118,5	88,5	114,4	94,4
NJ2215-E-TVP2	XL	HJ2215-E	1,64	0,165	75	130	31	1,5	1,5	–	118,5	88,5	114,4	94,4
NUP2215-E-TVP2	XL	–	1,67	–	75	130	31	1,5	1,5	–	118,5	88,5	114,4	94,4
NJ315-E-TVP2	XL	–	3,39	–	75	160	37	2,1	2,1	1,2	143	95	136,2	104,1
NJ315-E-TVP2	XL	HJ315-E	3,39	0,407	75	160	37	2,1	2,1	–	143	95	136,2	104,1
NUP315-E-TVP2	XL	–	3,45	–	75	160	37	2,1	2,1	–	143	95	136,2	104,1
NJ2315-E-TVP2	XL	–	5,04	–	75	160	55	2,1	2,1	4,2	143	95	136,2	104,1
NJ2315-E-TVP2	XL	HJ2315-E	5,04	0,436	75	160	55	2,1	2,1	–	143	95	136,2	104,1
NUP2315-E-TVP2	XL	–	5,14	–	75	160	55	2,1	2,1	–	143	95	136,2	104,1
NJ216-E-TVP2	XL	–	1,58	–	80	140	26	2	2	1,3	127,3	95,3	122,9	101,5
NJ216-E-TVP2	XL	HJ216-E	1,58	0,22	80	140	26	2	2	–	127,3	95,3	122,9	101,5
NUP216-E-TVP2	XL	–	1,62	–	80	140	26	2	2	–	127,3	95,3	122,9	101,5
NJ2216-E-TVP2	XL	–	2,04	–	80	140	33	2	2	1,3	127,3	95,3	122,9	101,5
NJ2216-E-TVP2	XL	HJ216-E	2,04	0,22	80	140	33	2	2	–	127,3	95,3	122,9	101,5
NUP2216-E-TVP2	XL	–	2,08	–	80	140	33	2	2	–	127,3	95,3	122,9	101,5
NJ316-E-TVP2	XL	–	4,03	–	80	170	39	2,1	2,1	0,7	151	101	143,9	110,4
NJ316-E-TVP2	XL	HJ316-E	4,03	0,456	80	170	39	2,1	2,1	–	151	101	143,9	110,4
NUP316-E-TVP2	XL	–	4,11	–	80	170	39	2,1	2,1	–	151	101	143,9	110,4
NJ2316-E-TVP2	XL	–	6	–	80	170	58	2,1	2,1	3,7	151	101	143,9	110,4
NJ2316-E-TVP2	XL	HJ2316-E	6	0,488	80	170	58	2,1	2,1	–	151	101	143,9	110,4
NUP2316-E-TVP2	XL	–	6,11	–	80	170	58	2,1	2,1	–	151	101	143,9	110,4
NJ217-E-TVP2	XL	–	1,95	–	85	150	28	2	2	0,8	136,5	100,5	131,5	107,5
NJ217-E-TVP2	XL	HJ217-E	1,95	0,247	85	150	28	2	2	–	136,5	100,5	131,5	107,5
NUP217-E-TVP2	XL	–	2,08	–	85	150	28	2	2	–	136,5	100,5	131,5	107,5
NJ2217-E-TVP2	XL	–	2,55	–	85	150	36	2	2	1,3	136,5	100,5	131,5	107,5
NJ2217-E-TVP2	XL	HJ2217-E	2,55	0,249	85	150	36	2	2	–	136,5	100,5	131,5	107,5
NUP2217-E-TVP2	XL	–	2,6	–	85	150	36	2	2	–	136,5	100,5	131,5	107,5
NJ317-E-TVP2	XL	–	4,71	–	85	180	41	3	3	1,3	160	108	152,7	117,8
NJ317-E-TVP2	XL	HJ317-E	4,71	0,566	85	180	41	3	3	–	160	108	152,7	117,8
NUP317-E-TVP2	XL	–	4,8	–	85	180	41	3	3	–	160	108	152,7	117,8
NJ2317-E-TVP2	XL	–	6,85	–	85	180	60	3	3	4,7	160	108	152,7	117,8
NJ2317-E-TVP2	XL	HJ2317-E	6,85	0,606	85	180	60	3	3	–	160	108	152,7	117,8
NUP2317-E-TVP2	XL	–	6,99	–	85	180	60	3	3	–	160	108	152,7	117,8



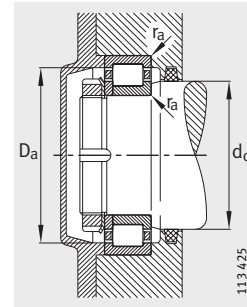
NJ and HJ
Locating bearings



1) Axial
displacement "s"
for NJ



Mounting dimensions
for NJ



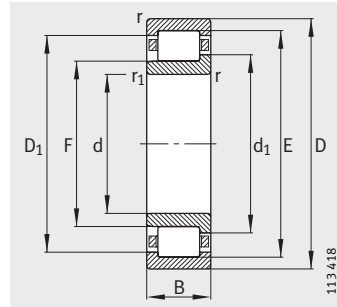
Mounting dimensions
for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B ₁	B ₂	B ₃	d _a		d _c	D _a	r _a	dyn. C _r	stat. C _{0r}	C _{ur}	n _G	n _B
			min.	max.	min.	max.	max.	N	N				N	min^{-1}	min^{-1}
-	-	-	84	87	96	121	1,5	154 000	156 000	26 500	5 300	4 500
7	11	-	84	-	96	121	1,5	154 000	156 000	26 500	5 300	4 500
-	-	4	84	-	96	121	1,5	154 000	156 000	26 500	5 300	4 500
-	-	-	84	87	96	121	1,5	191 000	207 000	36 000	5 300	3 700
7	11,5	-	84	-	96	121	1,5	191 000	207 000	36 000	5 300	3 700
-	-	4,5	84	-	96	121	1,5	191 000	207 000	36 000	5 300	3 700
-	-	-	87	93	106	148	2,1	285 000	265 000	43 000	4 000	4 200
11	16,5	-	87	-	106	148	2,1	285 000	265 000	43 000	4 000	4 200
-	-	5,5	87	-	106	148	2,1	285 000	265 000	43 000	4 000	4 200
-	-	-	87	93	106	148	2,1	390 000	395 000	67 000	4 000	3 600
11	19,5	-	87	-	106	148	2,1	390 000	395 000	67 000	4 000	3 600
-	-	8,5	87	-	106	148	2,1	390 000	395 000	67 000	4 000	3 600
-	-	-	91	94	104	129	2	165 000	167 000	27 500	4 800	4 250
8	12,5	-	91	-	104	129	2	165 000	167 000	27 500	4 800	4 250
-	-	4,5	91	-	104	129	2	165 000	167 000	27 500	4 800	4 250
-	-	-	91	94	104	129	2	220 000	243 000	42 000	4 800	3 450
8	12,5	-	91	-	104	129	2	220 000	243 000	42 000	4 800	3 450
-	-	4,5	91	-	104	129	2	220 000	243 000	42 000	4 800	3 450
-	-	-	92	99	114	158	2,1	300 000	275 000	46 000	3 800	4 150
11	17	-	92	-	114	158	2,1	300 000	275 000	46 000	3 800	4 150
-	-	6	92	-	114	158	2,1	300 000	275 000	46 000	3 800	4 150
-	-	-	92	99	114	158	2,1	420 000	425 000	73 000	3 800	3 500
11	20	-	92	-	114	158	2,1	420 000	425 000	73 000	3 800	3 500
-	-	9	92	-	114	158	2,1	420 000	425 000	73 000	3 800	3 500
-	-	-	96	99	110	139	2	194 000	194 000	31 500	4 500	4 100
8	12,5	-	96	-	110	139	2	194 000	194 000	31 500	4 500	4 100
-	-	4,5	96	-	110	139	2	194 000	194 000	31 500	4 500	4 100
-	-	-	96	99	110	139	2	255 000	275 000	46 000	4 500	3 350
8	13	-	96	-	110	139	2	255 000	275 000	46 000	4 500	3 350
-	-	5	96	-	110	139	2	255 000	275 000	46 000	4 500	3 350
-	-	-	99	106	119	166	2,5	320 000	300 000	49 500	3 600	4 000
12	18,5	-	99	-	119	166	2,5	320 000	300 000	49 500	3 600	4 000
-	-	6,5	99	-	119	166	2,5	320 000	300 000	49 500	3 600	4 000
-	-	-	99	106	119	166	2,5	435 000	445 000	75 000	3 600	3 350
12	22	-	99	-	119	166	2,5	435 000	445 000	75 000	3 600	3 350
-	-	10	99	-	119	166	2,5	435 000	445 000	75 000	3 600	3 350

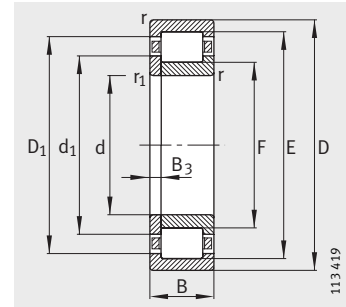


Cylindrical roller bearings with cage

Semi-locating and locating bearings

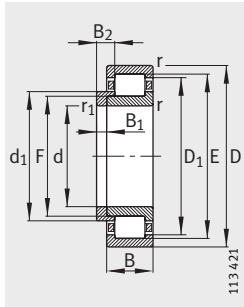


NJ
Semi-locating bearings

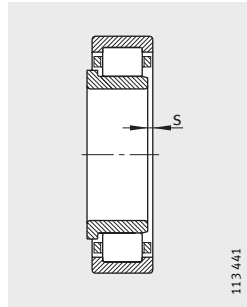


NUP
Locating bearings

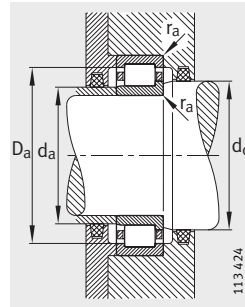
Dimension table (continued) · Dimensions in mm														
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ring ≈kg	L-section ring ≈kg	d	D	B	r	r ₁	s ¹⁾	E	F	D ₁	d ₁
					min.	min.	min.	min.	min.	min.	min.	min.	min.	min.
NJ218-E-TVP2	XL	–	2,41	–	90	160	30	2	2	1,5	145	107	139,7	114,3
NJ218-E-TVP2	XL	HJ218-E	2,41	0,317	90	160	30	2	2	–	145	107	139,7	114,3
NUP218-E-TVP2	XL	–	2,46	–	90	160	30	2	2	–	145	107	139,7	114,3
NJ2218-E-TVP2	XL	–	3,23	–	90	160	40	2	2	2,5	145	107	139,7	114,3
NJ2218-E-TVP2	XL	HJ2218-E	3,23	0,323	90	160	40	2	2	–	145	107	139,7	114,3
NUP2218-E-TVP2	XL	–	3,29	–	90	160	40	2	2	–	145	107	139,7	114,3
NJ318-E-TVP2	XL	–	5,49	–	90	190	43	3	3	1,5	169,5	113,5	161,6	124
NJ318-E-TVP2	XL	HJ318-E	5,49	0,623	90	190	43	3	3	–	169,5	113,5	161,6	124
NUP318-E-TVP2	XL	–	5,59	–	90	190	43	3	3	–	169,5	113,5	161,6	124
NJ2318-E-TVP2	XL	–	8,19	–	90	190	64	3	3	5	169,5	113,5	161,6	124
NJ2318-E-TVP2	XL	HJ2318-E	8,19	0,669	90	190	64	3	3	–	169,5	113,5	161,6	124
NUP2318-E-TVP2	XL	–	8,35	–	90	190	64	3	3	–	169,5	113,5	161,6	124
NJ219-E-TVP2	XL	–	2,94	–	95	170	32	2,1	2,1	0,7	154,5	112,5	148,6	120,5
NJ219-E-TVP2	XL	HJ219-E	2,94	0,352	95	170	32	2,1	2,1	–	154,5	112,5	148,6	120,5
NUP219-E-TVP2	XL	–	2,99	–	95	170	32	2,1	2,1	–	154,5	112,5	148,6	120,5
NJ2219-E-TVP2	XL	–	3,98	–	95	170	43	2,1	2,1	2,2	154,5	112,5	148,6	120,5
NJ2219-E-TVP2	XL	HJ2219-E	3,98	0,366	95	170	43	2,1	2,1	–	154,5	112,5	148,6	120,5
NUP2219-E-TVP2	XL	–	4,05	–	95	170	43	2,1	2,1	–	154,5	112,5	148,6	120,5
NJ319-E-TVP2	XL	–	6,44	–	95	200	45	3	3	1,4	177,5	121,5	169,6	132
NJ319-E-TVP2	XL	HJ319-E	6,44	0,777	95	200	45	3	3	–	177,5	121,5	169,6	132
NUP319-E-TVP2	XL	–	6,56	–	95	200	45	3	3	–	177,5	121,5	169,6	132
NJ2319-E-TVP2	XL	–	9,58	–	95	200	67	3	3	5,6	177,5	121,5	169,6	132
NJ2319-E-TVP2	XL	HJ2319-E	9,58	0,83	95	200	67	3	3	–	177,5	121,5	169,6	132
NUP2319-E-TVP2	XL	–	9,77	–	95	200	67	3	3	–	177,5	121,5	169,6	132
NJ220-E-TVP2	XL	–	3,55	–	100	180	34	2,1	2,1	1,5	163	119	156,9	127,3
NJ220-E-TVP2	XL	HJ220-E	3,55	0,436	100	180	34	2,1	2,1	–	163	119	156,9	127,3
NUP220-E-TVP2	XL	–	3,61	–	100	180	34	2,1	2,1	–	163	119	156,9	127,3
NJ2220-E-TVP2	XL	–	4,85	–	100	180	46	2,1	2,1	3	163	119	156,9	127,3
NJ2220-E-TVP2	XL	HJ2220-E	4,85	0,446	100	180	46	2,1	2,1	–	163	119	156,9	127,3
NUP2220-E-TVP2	XL	–	4,92	–	100	180	46	2,1	2,1	–	163	119	156,9	127,3
NJ320-E-TVP2	XL	–	7,82	–	100	215	47	3	3	1,2	191,5	127,5	182	139,4
NJ320-E-TVP2	XL	HJ320-E	7,82	0,883	100	215	47	3	3	–	191,5	127,5	182	139,4
NUP320-E-TVP2	XL	–	7,96	–	100	215	47	3	3	–	191,5	127,5	182	139,4
NJ2320-E-TVP2	XL	–	12,3	–	100	215	73	3	3	6,1	191,5	127,5	182	139,4
NJ2320-E-TVP2	XL	HJ2320-E	12,3	0,934	100	215	73	3	3	–	191,5	127,5	182	139,4
NUP2320-E-TVP2	XL	–	12,5	–	100	215	73	3	3	–	191,5	127,5	182	139,4



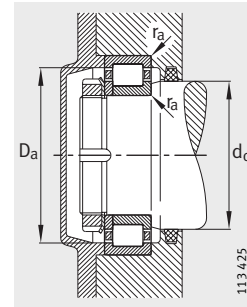
NJ and HJ
Locating bearings



1) Axial
displacement "s"
for NJ



Mounting dimensions
for NJ



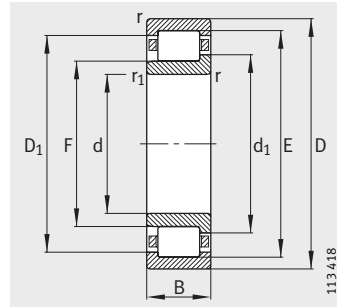
Mounting dimensions
for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B ₁	B ₂	B ₃	d _a		d _c	D _a	r _a	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	n _B min ⁻¹
			min.	max.								
-	-	-	101	105	116	149	2	215 000	217 000	35 000	4 300	3 950
9	14	-	101	-	116	149	2	215 000	217 000	35 000	4 300	3 950
-	-	5	101	-	116	149	2	215 000	217 000	35 000	4 300	3 950
-	-	-	101	105	116	149	2	285 000	315 000	52 000	4 300	3 300
9	15	-	101	-	116	149	2	285 000	315 000	52 000	4 300	3 300
-	-	6	101	-	116	149	2	285 000	315 000	52 000	4 300	3 300
-	-	-	104	111	127	176	2,5	370 000	350 000	55 000	3 400	3 750
12	18,5	-	104	-	127	176	2,5	370 000	350 000	55 000	3 400	3 750
-	-	6,5	104	-	127	176	2,5	370 000	350 000	55 000	3 400	3 750
-	-	-	104	111	127	176	2,5	510 000	530 000	86 000	3 400	3 050
12	22	-	104	-	127	176	2,5	510 000	530 000	86 000	3 400	3 050
-	-	10	104	-	127	176	2,5	510 000	530 000	86 000	3 400	3 050
-	-	-	107	111	123	158	2,1	260 000	265 000	41 500	3 800	3 700
9	14	-	107	-	123	158	2,1	260 000	265 000	41 500	3 800	3 700
-	-	5	107	-	123	158	2,1	260 000	265 000	41 500	3 800	3 700
-	-	-	107	111	123	158	2,1	340 000	370 000	60 000	3 800	3 100
9	15,5	-	107	-	123	158	2,1	340 000	370 000	60 000	3 800	3 100
-	-	6,5	107	-	123	158	2,1	340 000	370 000	60 000	3 800	3 100
-	-	-	109	119	134	186	2,5	390 000	380 000	59 000	3 400	3 600
13	20,5	-	109	-	134	186	2,5	390 000	380 000	59 000	3 400	3 600
-	-	7,5	109	-	134	186	2,5	390 000	380 000	59 000	3 400	3 600
-	-	-	109	119	134	186	2,5	540 000	580 000	92 000	3 400	2 850
13	24,5	-	109	-	134	186	2,5	540 000	580 000	92 000	3 400	2 850
-	-	11,5	109	-	134	186	2,5	540 000	580 000	92 000	3 400	2 850
-	-	-	112	117	130	168	2,1	295 000	305 000	47 500	3 800	3 500
10	15	-	112	-	130	168	2,1	295 000	305 000	47 500	3 800	3 500
-	-	5	112	-	130	168	2,1	295 000	305 000	47 500	3 800	3 500
-	-	-	112	117	130	168	2,1	395 000	445 000	72 000	3 800	2 900
10	16	-	112	-	130	168	2,1	395 000	445 000	72 000	3 800	2 900
-	-	6	112	-	130	168	2,1	395 000	445 000	72 000	3 800	2 900
-	-	-	114	125	143	201	2,5	450 000	425 000	65 000	3 200	3 400
13	20,5	-	114	-	143	201	2,5	450 000	425 000	65 000	3 200	3 400
-	-	7,5	114	-	143	201	2,5	450 000	425 000	65 000	3 200	3 400
-	-	-	114	125	143	201	2,5	680 000	720 000	114 000	3 200	2 550
13	23,5	-	114	-	143	201	2,5	680 000	720 000	114 000	3 200	2 550
-	-	10,5	114	-	143	201	2,5	680 000	720 000	114 000	3 200	2 550

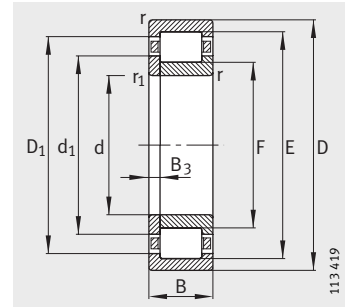


Cylindrical roller bearings with cage

Semi-locating and locating bearings

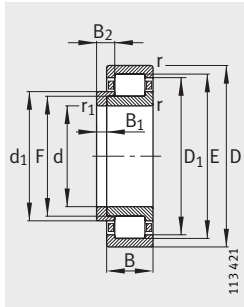


NJ
Semi-locating bearings

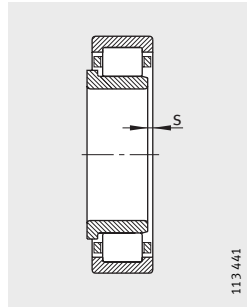


NUP
Locating bearings

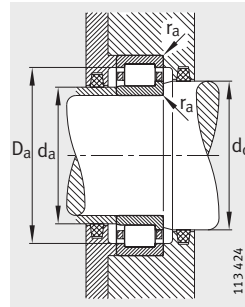
Dimension table (continued) · Dimensions in mm														
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ring ≈kg	L-section ring ≈kg	d	D	B	r	r ₁	s ¹⁾	E	F	D ₁	d ₁
					min.	min.	min.	min.	min.	min.	min.	min.	min.	min.
NJ221-E-TVP2	XL	–	4,17	–	105	190	36	2,1	2,1	1,3	171,5	125,5	165,1	134,5
NJ221-E-TVP2	XL	HJ221-E	4,17	0,51	105	190	36	2,1	2,1	–	171,5	125,5	165,1	134,5
NUP221-E-TVP2	XL	–	4,26	–	105	190	36	2,1	2,1	–	171,5	125,5	165,1	134,5
NJ222-E-TVP2	XL	–	4,93	–	110	200	38	2,1	2,1	1,5	180,5	132,5	173,8	141,6
NJ222-E-TVP2	XL	HJ222-E	4,93	0,616	110	200	38	2,1	2,1	–	180,5	132,5	173,8	141,6
NUP222-E-TVP2	XL	–	5,02	–	110	200	38	2,1	2,1	–	180,5	132,5	173,8	141,6
NJ2222-E-TVP2	XL	–	6,89	–	110	200	53	2,1	2,1	4	180,5	132,5	173,8	141,6
NJ2222-E-TVP2	XL	HJ2222-E	6,89	0,647	110	200	53	2,1	2,1	–	180,5	132,5	173,8	141,6
NUP2222-E-TVP2	XL	–	7,02	–	110	200	53	2,1	2,1	–	180,5	132,5	173,8	141,6
NJ322-E-TVP2	XL	–	10,3	–	110	240	50	3	3	1,3	211	143	200,9	155,6
NJ322-E-TVP2	XL	HJ322-E	10,3	1,21	110	240	50	3	3	–	211	143	200,9	155,6
NUP322-E-TVP2	XL	–	10,7	–	110	240	50	3	3	–	211	143	200,9	155,6
NJ2322-E-TVP2	XL	–	16,9	–	110	240	80	3	3	5,8	211	143	200,9	155,6
NJ2322-E-TVP2	XL	HJ2322-E	16,9	1,3	110	240	80	3	3	–	211	143	200,9	155,6
NUP2322-E-TVP2	XL	–	17,2	–	110	240	80	3	3	–	211	143	200,9	155,6
NJ224-E-TVP2	XL	–	5,91	–	120	215	40	2,1	2,1	1,4	195,5	143,5	187,8	153,2
NJ224-E-TVP2	XL	HJ224-E	5,91	0,707	120	215	40	2,1	2,1	–	195,5	143,5	187,8	153,2
NUP224-E-TVP2	XL	–	6,02	–	120	215	40	2,1	2,1	–	195,5	143,5	187,8	153,2
NJ2224-E-TVP2	XL	–	8,54	–	120	215	58	2,1	2,1	4,5	195,5	143,5	187,8	153,2
NJ2224-E-TVP2	XL	HJ2224-E	8,54	0,75	120	215	58	2,1	2,1	–	195,5	143,5	187,8	153,2
NUP2224-E-TVP2	XL	–	8,7	–	120	215	58	2,1	2,1	–	195,5	143,5	187,8	153,2
NJ324-E-TVP2	XL	–	13,5	–	120	260	55	3	3	3,5	230	154	218,7	168,1
NJ324-E-TVP2	XL	HJ324-E	13,5	1,41	120	260	55	3	3	–	230	154	218,7	168,1
NUP324-E-TVP2	XL	–	13,8	–	120	260	55	3	3	–	230	154	218,7	168,1
NJ2324-E-M1	XL	–	23,5	–	120	260	86	3	3	7,2	230	154	218,7	168,1
NJ2324-E-M1	XL	HJ2324-E	23,5	1,49	120	260	86	3	3	–	230	154	218,7	168,1
NUP2324-E-M1	XL	–	23,8	–	120	260	86	3	3	–	230	154	218,7	168,1



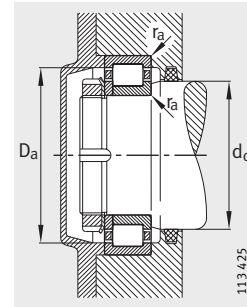
NJ and HJ
Locating bearings



1) Axial
displacement "s"
for NJ



Mounting dimensions
for NJ



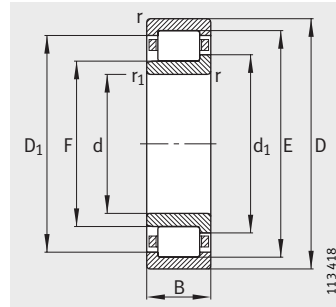
Mounting dimensions
for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B ₁	B ₂	B ₃	d _a		d _c	D _a	r _a	dyn. C _r	stat. C _{0r}	C _{ur}	n _G	n _B
			min.	max.	min.	max.	max.	N	N				N	min^{-1}	min^{-1}
-	-	-	117	123	137	178	2,1	310 000	320 000	49 000	3 600	3 450
10	16	-	117	-	137	178	2,1	310 000	320 000	49 000	3 600	3 450
-	-	6	117	123	137	178	2,1	310 000	320 000	49 000	3 600	3 450
-	-	-	122	130	144	188	2,1	345 000	365 000	55 000	3 400	3 300
11	17	-	122	-	144	188	2,1	345 000	365 000	55 000	3 400	3 300
-	-	6	122	-	144	188	2,1	345 000	365 000	55 000	3 400	3 300
-	-	-	122	130	144	188	2,1	455 000	520 000	81 000	3 400	2 800
11	19,5	-	122	-	144	188	2,1	455 000	520 000	81 000	3 400	2 800
-	-	8,5	122	-	144	188	2,1	455 000	520 000	81 000	3 400	2 800
-	-	-	124	140	158	226	2,5	495 000	475 000	73 000	3 000	3 100
14	22	-	124	-	158	226	2,5	495 000	475 000	73 000	3 000	3 100
-	-	8	124	-	158	226	2,5	495 000	475 000	73 000	3 000	3 100
-	-	-	124	140	158	226	2,5	750 000	800 000	126 000	2 800	2 320
14	26,5	-	124	-	158	226	2,5	750 000	800 000	126 000	2 800	2 320
-	-	12,5	124	-	158	226	2,5	750 000	800 000	126 000	2 800	2 320
-	-	-	132	141	156	203	2,1	390 000	415 000	64 000	3 200	3 100
11	17	-	132	-	156	203	2,1	390 000	415 000	64 000	3 200	3 100
-	-	6	132	-	156	203	2,1	390 000	415 000	64 000	3 200	3 100
-	-	-	132	141	156	203	2,1	530 000	610 000	96 000	3 200	2 550
11	20	-	132	-	156	203	2,1	530 000	610 000	96 000	3 200	2 550
-	-	9	132	-	156	203	2,1	530 000	610 000	96 000	3 200	2 550
-	-	-	134	151	171	246	2,5	610 000	600 000	87 000	2 800	2 700
14	22,5	-	134	-	171	246	2,5	610 000	600 000	87 000	2 800	2 700
-	-	8,5	134	-	171	246	2,5	610 000	600 000	87 000	2 800	2 700
-	-	-	134	151	171	246	2,5	930 000	1 010 000	153 000	4 300	2 000
14	26	-	134	-	171	246	2,5	930 000	1 010 000	153 000	4 300	2 000
-	-	12	134	-	171	246	2,5	930 000	1 010 000	153 000	4 300	2 000

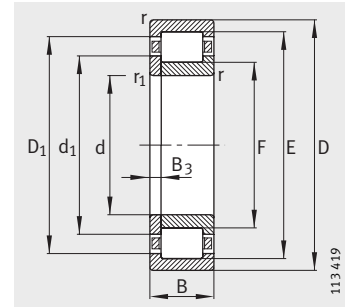


Cylindrical roller bearings with cage

Semi-locating and locating bearings



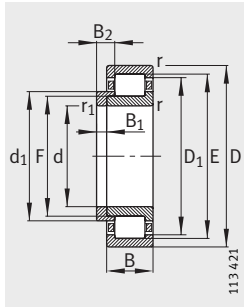
NJ
Semi-locating bearings



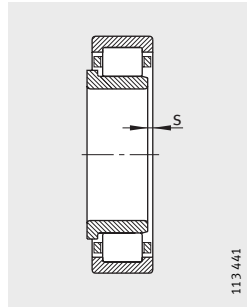
NUP
Locating bearings

Dimension table (continued) · Dimensions in mm

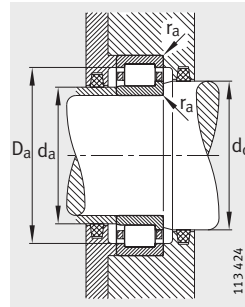
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ring ≈kg	L-section ring ≈kg	d	D	B	r	r ₁	s ¹⁾	E	F	D ₁	d ₁
								min.	min.				≈	≈
NJ226-E-TVP2	XL	–	6,63	–	130	230	40	3	3	1,2	209,5	153,5	201,2	164
NJ226-E-TVP2	XL	HJ226-E	6,63	0,78	130	230	40	3	3	–	209,5	153,5	201,2	164
NUP226-E-TVP2	XL	–	6,74	–	130	230	40	3	3	–	209,5	153,5	201,2	164
NJ2226-E-TVP2	XL	–	10,6	–	130	230	64	3	3	5,2	209,5	153,5	201,2	164
NJ2226-E-TVP2	XL	HJ2226-E	10,6	0,849	130	230	64	3	3	–	209,5	153,5	201,2	164
NUP2226-E-TVP2	XL	–	10,8	–	130	230	64	3	3	–	209,5	153,5	201,2	164
NJ326-E-TVP2	XL	–	16,5	–	130	280	58	4	4	3,5	247	167	235,2	181,7
NJ326-E-TVP2	XL	HJ326-E	16,5	1,64	130	280	58	4	4	–	247	167	235,2	181,7
NUP326-E-TVP2	XL	–	16,7	–	130	280	58	4	4	–	247	167	235,2	181,7
NJ2326-E-M1	XL	–	29,2	–	130	280	93	4	4	8,1	247	167	235,2	181,7
NJ2326-E-M1	XL	HJ2326-E	29,2	1,77	130	280	93	4	4	–	247	167	235,2	181,7
NUP2326-E-M1	XL	–	29,7	–	130	280	93	4	4	–	247	167	235,2	181,7
NJ228-E-M1	XL	–	9,46	–	140	250	42	3	3	2	225	169	216,7	179,4
NJ228-E-M1	XL	HJ228-E	9,46	0,986	140	250	42	3	3	–	225	169	216,7	179,4
NUP228-E-M1	XL	–	9,61	–	140	250	42	3	3	–	225	169	216,7	179,4
NJ2228-E-M1	XL	–	14,7	–	140	250	68	3	3	7	225	169	216,7	179,4
NJ2228-E-M1	XL	HJ2228-E	14,7	1,08	140	250	68	3	3	–	225	169	216,7	179,4
NUP2228-E-M1	XL	–	16,8	–	140	250	68	3	3	–	225	169	216,7	180
NJ328-E-TVP2	XL	–	20,5	–	140	300	62	4	4	5,2	264	180	251,7	195,4
NJ328-E-TVP2	XL	HJ328-E	20,5	2,03	140	300	62	4	4	–	264	180	251,7	195,4
NUP328-E-TVP2	XL	–	20,8	–	140	300	62	4	4	–	264	180	251,7	195,4
NJ2328-E-M1	XL	–	36,6	–	140	300	102	4	4	9,2	264	180	251,7	195,4
NJ2328-E-M1	XL	HJ2328-E	36,6	2,2	140	300	102	4	4	–	264	180	251,7	195,4
NUP2328-E-M1	XL	–	37,1	–	140	300	102	4	4	–	264	180	251,7	195,4
NJ230-E-M1	XL	–	11,9	–	150	270	45	3	3	4	242	182	233,2	193,1
NJ230-E-M1	XL	HJ230-E	11,9	1,26	150	270	45	3	3	–	242	182	233,2	193,1
NUP230-E-M1	XL	–	12,1	–	150	270	45	3	3	–	242	182	233,2	193,1
NJ2230-E-M1	XL	–	18,7	–	150	270	73	3	3	7,5	242	182	233,2	193,1
NJ2230-E-M1	XL	HJ2230-E	18,7	1,36	150	270	73	3	3	–	242	182	233,2	193,1
NUP2230-E-M1	XL	–	19,1	–	150	270	73	3	3	–	242	182	233,2	193,1
NJ330-E-M1	XL	–	27,2	–	150	320	65	4	4	5,5	283	193	269,8	209,5
NJ330-E-M1	XL	HJ330-E	27,2	2,33	150	320	65	4	4	–	283	193	269,8	209,5
NUP330-E-M1	XL	–	27,7	–	150	320	65	4	4	–	283	193	269,8	209,5
NJ2330-E-M1	XL	–	43,8	–	150	320	108	4	4	9,7	283	193	269,8	209,5
NJ2330-E-M1	XL	HJ2330-E	43,8	2,55	150	320	108	4	4	–	283	193	269,8	209,5
NUP2330-E-M1	XL	–	44,6	–	150	320	108	4	4	–	283	193	269,8	209,5



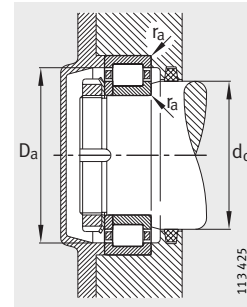
NJ and HJ
Locating bearings



1) Axial displacement "s" for NJ



Mounting dimensions for NJ



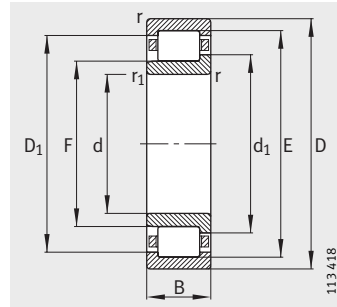
Mounting dimensions for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B ₁	B ₂	B ₃	d _a		d _c	D _a	r _a	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	n _B min ⁻¹
			min.	max.								
-	-	-	144	151	168	216	2,5	425 000	445 000	65 000	3 000	2 850
11	17	-	144	-	168	216	2,5	425 000	445 000	65 000	3 000	2 850
-	-	6	144	-	168	216	2,5	425 000	445 000	65 000	3 000	2 850
-	-	-	144	151	168	216	2,5	620 000	730 000	111 000	3 000	2 300
11	21	-	144	-	168	216	2,5	620 000	730 000	111 000	3 000	2 300
-	-	10	144	-	168	216	2,5	620 000	730 000	111 000	3 000	2 300
-	-	-	147	164	184	263	3	680 000	670 000	96 000	2 600	2 460
14	23	-	147	-	184	263	3	680 000	670 000	96 000	2 600	2 460
-	-	9	147	-	184	263	3	680 000	670 000	96 000	2 600	2 460
-	-	-	147	164	184	263	3	1 080 000	1 220 000	180 000	3 800	1 780
14	28	-	147	-	184	263	3	1 080 000	1 220 000	180 000	3 800	1 780
-	-	14	147	-	184	263	3	1 080 000	1 220 000	180 000	3 800	1 780
-	-	-	154	166	182	236	2,5	460 000	510 000	72 000	4 800	2 600
11	18	-	154	-	182	236	2,5	460 000	510 000	72 000	4 800	2 600
-	-	7	154	-	182	236	2,5	460 000	510 000	72 000	4 800	2 600
-	-	-	154	166	182	236	2,5	670 000	830 000	123 000	4 500	2 080
11	23	-	154	-	182	236	2,5	670 000	830 000	123 000	4 500	2 080
-	-	12	154	-	182	236	2,5	670 000	830 000	123 000	4 500	2 080
-	-	-	157	176	198	283	3	790 000	800 000	113 000	2 400	2 200
15	25	-	157	-	198	283	3	790 000	800 000	113 000	2 400	2 200
-	-	10	157	-	198	283	3	790 000	800 000	113 000	2 400	2 200
-	-	-	157	176	198	283	3	1 210 000	1 390 000	202 000	3 600	1 640
15	31	-	157	-	198	283	3	1 210 000	1 390 000	202 000	3 600	1 640
-	-	16	157	-	198	283	3	1 210 000	1 390 000	202 000	3 600	1 640
-	-	-	164	179	196	256	2,5	520 000	590 000	82 000	4 500	2 390
12	19,5	-	164	-	196	256	2,5	520 000	590 000	82 000	4 500	2 390
-	-	7,5	164	-	196	256	2,5	520 000	590 000	82 000	4 500	2 390
-	-	-	164	179	196	256	2,5	780 000	970 000	142 000	4 300	1 860
12	24,5	-	164	-	196	256	2,5	780 000	970 000	142 000	4 300	1 860
-	-	12,5	164	-	196	256	2,5	780 000	970 000	142 000	4 300	1 860
-	-	-	167	190	213	303	3	900 000	930 000	126 000	3 600	1 970
15	25	-	167	-	213	303	3	900 000	930 000	126 000	3 600	1 970
-	-	10	167	-	213	303	3	900 000	930 000	126 000	3 600	1 970
-	-	-	167	190	213	303	3	1 380 000	1 600 000	226 000	3 200	1 480
15	31,5	-	167	-	213	303	3	1 380 000	1 600 000	226 000	3 200	1 480
-	-	16,5	167	-	213	303	3	1 380 000	1 600 000	226 000	3 200	1 480

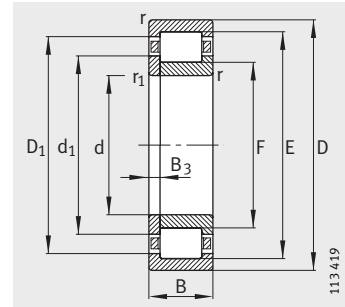


Cylindrical roller bearings with cage

Semi-locating and locating bearings

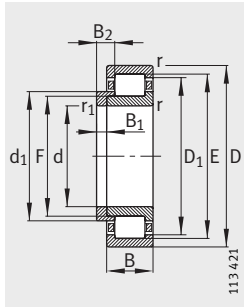


NJ
Semi-locating bearings

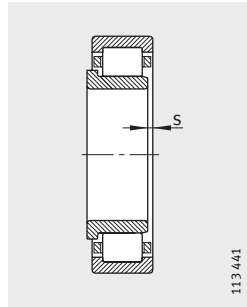


NUP
Locating bearings

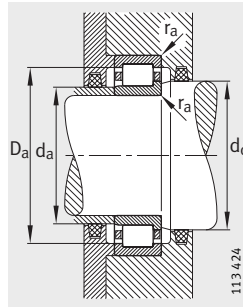
Dimension table (continued) · Dimensions in mm														
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ring ≈ kg	L-section ring ≈ kg	d	D	B	r	r ₁	s ¹⁾	E	F	D ₁	d ₁
					min.	min.							≈	≈
NJ232-E-M1	XL	–	14,8	–	160	290	48	3	3	4,1	259	195	249,6	206,8
NJ232-E-M1	XL	HJ232-E	14,8	1,47	160	290	48	3	3	–	259	195	249,6	206,8
NUP232-E-M1	XL	–	15,1	–	160	290	48	3	3	–	259	195	249,6	206,8
NJ2232-E-M1	XL	–	23,9	–	160	290	80	3	3	7,2	261	193	251,1	205,5
NJ2232-E-M1	XL	HJ2232-E	23,9	1,56	160	290	80	3	3	–	261	193	251,1	205,5
NUP2232-E-M1	XL	–	24,3	–	160	290	80	3	3	–	261	193	251,1	205,5
NJ332-E-M1	–	–	32,3	–	160	340	68	4	4	5,6	300	204	286	221,6
NJ332-E-M1	–	HJ332-E	32,3	2,58	160	340	68	4	4	–	300	204	286	221,6
NJ2332-E-M1	–	–	52,3	–	160	340	114	4	4	9,9	300	204	286	221,6
NJ2332-E-M1	–	HJ2332-E	52,3	2,85	160	340	114	4	4	–	300	204	286	221,6
NJ234-E-M1	XL	–	18,4	–	170	310	52	4	4	4,3	279	207	268,5	218,4
NJ234-E-M1	XL	HJ234-E	18,4	1,58	170	310	52	4	4	–	279	207	268,5	218,4
NUP234-E-M1	XL	–	18,6	–	170	310	52	4	4	–	279	207	268,5	218,4
NJ2234-E-M1	XL	–	29,8	–	170	310	86	4	4	7,2	281	205	269,9	219
NJ2234-E-M1	XL	HJ2234-E	29,8	1,78	170	310	86	4	4	–	281	205	269,9	219
NUP2234-E-M1	XL	–	30,2	–	170	310	86	4	4	–	281	205	269,9	219
NJ334-E-M1	–	–	38,6	–	170	360	72	4	4	6	318	218	301,6	237
NJ334-E-M1	–	HJ334-E	38,6	3,21	170	360	72	4	4	–	318	218	301,6	237
NJ2334-EX-M1	–	–	62,3	–	170	360	120	4	4	10,2	320	216	303	235,7
NJ2334-EX-M1	–	HJ2334-EX	62,3	3,53	170	360	120	4	4	–	320	216	303	235,7
NJ236-E-M1	XL	–	19,2	–	180	320	52	4	4	4,7	289	217	278,6	230,2
NJ236-E-M1	XL	HJ236-E	19,2	1,76	180	320	52	4	4	–	289	217	278,6	230,2
NUP236-E-M1	XL	–	17,3	–	180	320	52	4	4	–	289	217	278,6	230,2
NJ2236-E-M1	XL	–	30,9	–	180	320	86	4	4	7,2	291	215	280	229
NJ2236-E-M1	XL	HJ2236-E	30,9	1,87	180	320	86	4	4	–	291	215	280	229
NUP2236-E-M1	XL	–	31,4	–	180	320	86	4	4	–	291	215	280	229
NJ336-E-M1	–	–	44,6	–	180	380	75	4	4	6,1	335	231	319,8	250,5
NJ336-E-M1	–	HJ336-E	44,6	3,77	180	380	75	4	4	–	335	231	319,8	250,5
NJ2336-EX-M1	–	–	72,9	–	180	380	126	4	4	10,5	339	227	320,8	248
NJ2336-EX-M1	–	HJ2336-EX	72,9	4,05	180	380	126	4	4	–	339	227	320,8	248



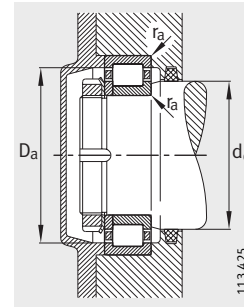
NJ and HJ
Locating bearings



1) Axial
displacement "s"
for NJ



Mounting dimensions
for NJ



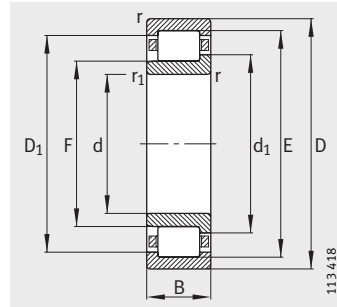
Mounting dimensions
for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B ₁	B ₂	B ₃	d _a		d _c	D _a	r _a	dyn. C _r	stat. C _{0r}	C _{ur}	n _G	n _B
			min.	max.	min.	max.	max.	N	N	N	min ⁻¹	min ⁻¹
-	-	-	174	192	210	276	2,5	590 000	670 000	93 000	4 300	2 190
12	20	-	174	-	210	276	2,5	590 000	670 000	93 000	4 300	2 190
-	-	8	174	-	210	276	2,5	590 000	670 000	93 000	4 300	2 190
-	-	-	174	192	210	276	2,5	940 000	1 170 000	171 000	3 800	1 670
12	24,5	-	174	-	210	276	2,5	940 000	1 170 000	171 000	3 800	1 670
-	-	12,5	174	-	210	276	2,5	940 000	1 170 000	171 000	3 800	1 670
-	-	-	177	200	228	323	3	865 000	1 060 000	114 000	3 000	1 790
15	25	-	177	-	228	323	3	865 000	1 060 000	114 000	3 000	1 790
-	-	-	177	200	228	323	3	1 320 000	1 830 000	204 000	3 000	1 350
15	32	-	177	-	228	323	3	1 320 000	1 830 000	204 000	3 000	1 350
-	-	-	187	204	223	293	3	700 000	780 000	107 000	3 600	2 010
12	20	-	187	-	223	293	3	700 000	780 000	107 000	3 600	2 010
-	-	8	187	-	223	293	3	700 000	780 000	107 000	3 600	2 010
-	-	-	187	204	223	293	3	1 130 000	1 400 000	198 000	3 200	1 500
12	24	-	187	-	223	293	3	1 130 000	1 400 000	198 000	3 200	1 500
-	-	12	187	-	223	293	3	1 130 000	1 400 000	198 000	3 200	1 500
-	-	-	187	215	240	343	3	965 000	1 220 000	132 000	3 000	1 630
16	27	-	187	-	240	343	3	965 000	1 220 000	132 000	3 000	1 630
-	-	-	187	214	238,3	343	3	1 500 000	2 080 000	230 000	2 800	1 230
16	33,5	-	187	-	238,3	343	3	1 500 000	2 080 000	230 000	2 800	1 230
-	-	-	197	214	233	303	3	730 000	830 000	112 000	3 600	1 880
12	20	-	197	-	233	303	3	730 000	830 000	112 000	3 600	1 880
-	-	8	197	-	233	303	3	730 000	830 000	112 000	3 600	1 880
-	-	-	197	214	233	303	3	1 180 000	1 490 000	208 000	3 200	1 390
12	24	-	197	-	233	303	3	1 180 000	1 490 000	208 000	3 200	1 390
-	-	12	197	-	233	303	3	1 180 000	1 490 000	208 000	3 200	1 390
-	-	-	197	228	254	363	3	1 040 000	1 320 000	141 000	2 800	1 520
17	28,5	-	197	-	254	363	3	1 040 000	1 320 000	141 000	2 800	1 520
-	-	-	197	225	250,6	363	3	1 660 000	2 320 000	260 000	2 800	1 130
17	35	-	197	-	250,6	363	3	1 660 000	2 320 000	260 000	2 800	1 130

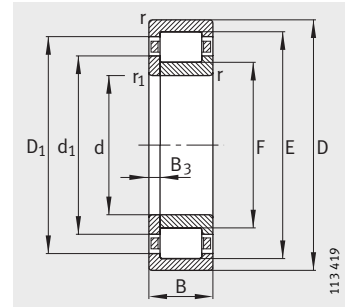


Cylindrical roller bearings with cage

Semi-locating and locating bearings

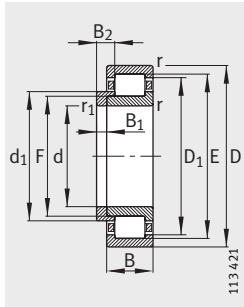


NJ
Semi-locating bearings

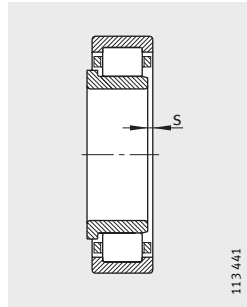


NUP
Locating bearings

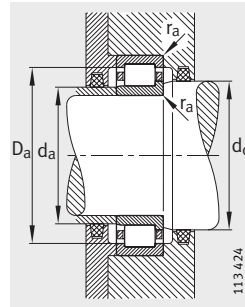
Dimension table (continued) · Dimensions in mm													
Designation		Mass m		Dimensions									
Bearing	L-section ring	Bearing ≈kg	L-section ring ≈g	d	D	B	r	r ₁	s ¹⁾	E	F	D ₁	d ₁
							min.	min.				≈	≈
NJ238-E-M1	–	23,2	–	190	340	55	4	4	4,7	306	230	295	244
NJ238-E-M1	HJ238-E	23,2	2,17	190	340	55	4	4	–	306	230	295	244
NUP238-E-M1	–	23,5	–	190	340	55	4	4	–	306	230	295	244
NJ2238-E-M1	–	37,7	–	190	340	92	4	4	8	308	228	296,4	242,7
NJ2238-E-M1	HJ2238-E	37,7	2,31	190	340	92	4	4	–	308	228	296,4	242,7
NJ2338-EX-M1	–	84,4	–	190	400	132	5	5	11	360	240	340,5	262,5
NJ2338-EX-M1	HJ2338-EX	84,4	4,8	190	400	132	5	5	–	360	240	340,5	262,5
NJ240-E-M1	–	27,5	–	200	360	58	4	4	4,8	323	243	311,5	257,6
NJ240-E-M1	HJ240-E	27,5	2,62	200	360	58	4	4	–	323	243	311,5	257,6
NUP240-E-M1	–	28	–	200	360	58	4	4	–	323	243	311,5	257,6
NJ2240-E-M1	–	45,3	–	200	360	98	4	4	8,2	325	241	312,9	256,3
NJ2240-E-M1	HJ2240-E	45,3	2,78	200	360	98	4	4	–	325	241	312,9	256,3
NJ340-E-M1	–	58,1	–	200	420	80	5	5	6,3	370	258	351,8	279
NJ340-E-M1	HJ340-E	58,1	4,94	200	420	80	5	5	–	370	258	351,8	279
NJ2340-EX-M1	–	97,2	–	200	420	138	5	5	11,3	377	253	356,9	276,1
NJ2340-EX-M1	HJ2340-EX	97,2	5,28	200	420	138	5	5	–	377	253	356,9	276,1
NJ244-E-M1	–	38,7	–	220	400	65	4	4	5,5	358	268	344,9	285,2
NJ244-E-M1	HJ244-E	38,7	3,55	220	400	65	4	4	–	358	268	344,9	285,2
NUP244-E-M1	–	39,3	–	220	400	65	4	4	–	358	268	344,9	285,2
NUP2244-EX-M1	–	63,4	–	220	400	108	4	4	–	367	259	349,4	279,4
NUP2344-EX-M1	–	124	–	220	460	145	5	5	–	413	277	391,2	302,2
NJ248-E-M1	–	52,5	–	240	440	72	4	4	6	393	293	376,6	312
NJ248-E-M1	HJ248-E	52,5	4,6	240	440	72	4	4	–	393	293	376,6	312
NJ348-E-M1	–	97	–	240	500	95	5	5	7,4	442	306	421,2	331,3
NJ348-E-M1	HJ348-E	97	8,3	240	500	95	5	5	–	442	306	421,2	331,3
NJ252-E-M1	–	69,4	–	260	480	80	5	5	6,2	429	317	410,8	336,9
NJ252-E-M1	HJ252-E	69,4	5,92	260	480	80	5	5	–	429	317	410,8	336,9
NJ356-E-M1	–	149	–	280	580	108	6	6	8,7	512	362	488	389,8
NJ356-E-M1	HJ356-E	149	13,7	280	580	108	6	6	–	512	362	488	389,8



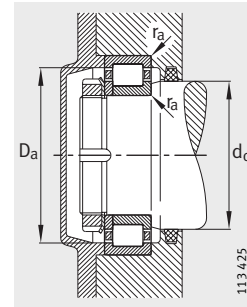
NJ and HJ
Locating bearings



1) Axial displacement "s" for NJ



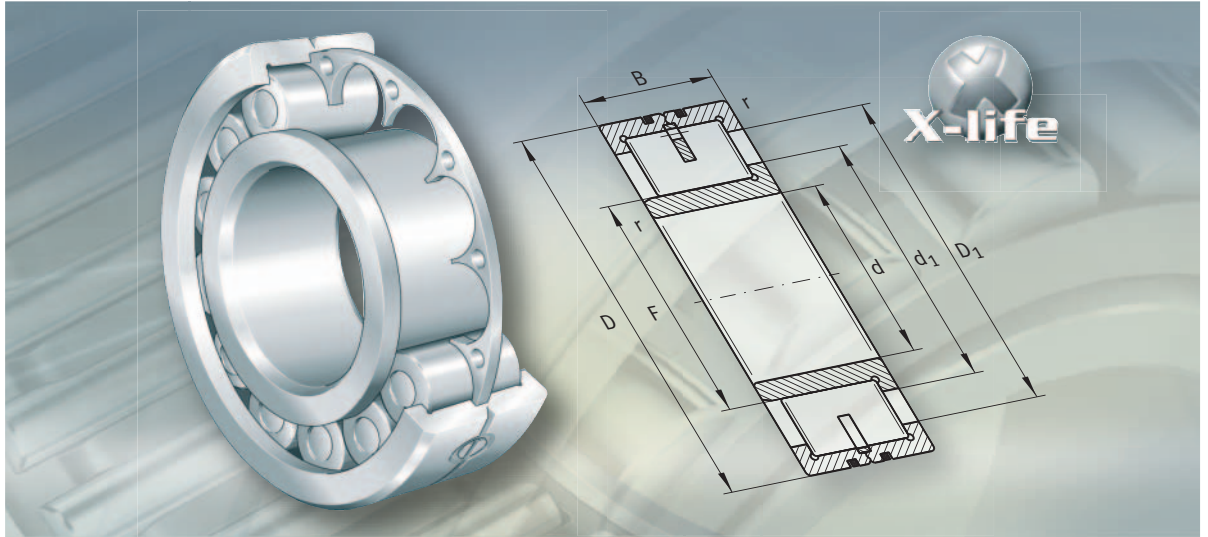
Mounting dimensions for NJ



Mounting dimensions for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B ₁	B ₂	B ₃	d _a		d _c	D _a	r _a	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	n _B min ⁻¹
			min.	max.								
-	-	-	207	227	247	323	3	680 000	930 000	100 000	3 200	1 750
13	21,5	-	207	-	247	323	3	680 000	930 000	100 000	3 200	1 750
-	-	8,5	207	-	247	323	3	680 000	930 000	100 000	3 200	1 750
-	-	-	207	227	247	323	3	1 100 000	1 660 000	184 000	3 000	1 300
13	26,5	-	207	-	247	323	3	1 100 000	1 660 000	184 000	3 000	1 300
-	-	-	210	237,8	265,3	380	4	1 900 000	2 650 000	285 000	2 600	1 030
18	36,5	-	210	-	265,3	380	4	1 900 000	2 650 000	285 000	2 600	1 030
-	-	-	217	240	261	343	3	750 000	1 040 000	110 000	3 000	1 620
14	23	-	217	-	261	343	3	750 000	1 040 000	110 000	3 000	1 620
-	-	9	217	-	261	343	3	750 000	1 040 000	110 000	3 000	1 620
-	-	-	217	240	261	343	3	1 220 000	1 860 000	206 000	2 800	1 210
14	28	-	217	-	261	343	3	1 220 000	1 860 000	206 000	2 800	1 210
-	-	-	220	255	282	400	4	1 180 000	1 530 000	161 000	2 600	1 340
18	30	-	220	-	282	400	4	1 180 000	1 530 000	161 000	2 600	1 340
-	-	-	220	250,7	279	400	4	2 040 000	2 900 000	310 000	2 400	960
18	37	-	220	-	279	400	4	2 040 000	2 900 000	310 000	2 400	960
-	-	-	237	265	288	383	3	950 000	1 320 000	134 000	2 800	1 400
15	25	-	237	-	288	383	3	950 000	1 320 000	134 000	2 800	1 400
-	-	10	237	-	288	383	3	950 000	1 320 000	134 000	2 800	1 400
-	-	14	237	-	282,3	383	3	1 630 000	2 360 000	250 000	2 600	1 020
-	-	20	240	-	305,1	440	4	2 360 000	3 350 000	340 000	2 200	840
-	-	-	257	290	315	423	3	1 140 000	1 600 000	163 000	2 600	1 240
16	27	-	257	-	315	423	3	1 140 000	1 600 000	163 000	2 600	1 240
-	-	-	260	303	335	480	4	1 730 000	2 280 000	221 000	2 200	1 010
22	35,5	-	260	-	335	480	4	1 730 000	2 280 000	221 000	2 200	1 010
-	-	-	280	314	341	460	4	1 340 000	1 900 000	191 000	2 400	1 120
18	30	-	280	-	341	460	4	1 340 000	1 900 000	191 000	2 400	1 120
-	-	-	306	359	393,4	554	5	2 160 000	3 050 000	285 000	1 900	810
26	42,5	-	306	-	393,4	554	5	2 160 000	3 050 000	285 000	1 900	810





Low friction cylindrical roller bearings

Low friction cylindrical roller bearings

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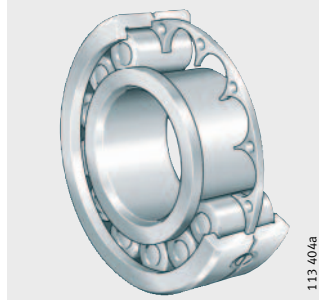


Product overview Low friction cylindrical roller bearings

Semi-locating bearings

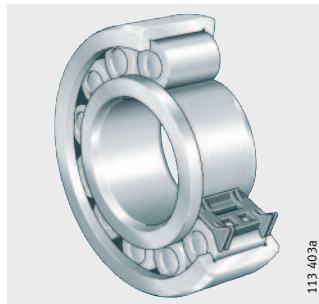
With disc cage

LSL1923



With spacers

ZSL1923



Low friction cylindrical roller bearings

Features Low friction cylindrical roller bearings LSL and ZSL are of a single row, self-retaining design and correspond to dimension series 23. The bearings have solid outer rings with two ribs, the inner rings are designed with one rib. The inner ring is removable and thus allows easier mounting of the bearings. The disc cages or spacers prevent the cylindrical rollers from coming into contact with each other during rolling.

Cylindrical roller bearings NJ23..-E and spherical roller bearings 223..-E1 have the same design envelope as LSL1923 and ZSL1923.

X-life

Numerous sizes are supplied in the X-life grade. These bearings are indicated in the dimension tables.

Bearings of X-life quality have lower roughness R_a and higher geometrical accuracy of the raceways than comparable designs that are not X-life. As a result, these bearings have higher load carrying capacity and longer life for the same dimensioning. In certain applications, this means that a smaller bearing arrangement can be designed.

Semi-locating bearings

Cylindrical roller bearings LSL1923 and ZSL1923 are semi-locating bearings and can support not only high radial forces but also large axial forces in one direction. They act as non-locating bearings in the opposite direction.

Since they have a larger number of rolling elements and larger rolling elements, LSL and ZSL bearings have higher radial and axial load carrying capacity than all comparable cylindrical roller bearing designs with a solid cage. They can withstand high shock loads and vibrations, support large centrifugal forces and allow accelerations up to 500 m/s^2 .

Due to the low frictional torque across the entire speed range and the low heat generation, the bearings have the highest limiting speeds of all cylindrical roller bearings. In addition, the optimum heat dissipation ensures thermally stable conditions in the bearing.

With disc cage

In cylindrical roller bearings LSL1923, an externally-guided flat brass disc cage prevents the cylindrical rollers from coming into contact with each other during rolling.

The cage has pockets to accommodate the rolling elements. The rolling elements are guided between the ribs on the outer ring. Due to its low mass, the cage is subjected to only minimal strain under acceleration. It therefore fulfils ideally its role as an element separating the rolling elements and supporting the inertia forces. Lubricant is exchanged via axial through holes. Good oil flow through the axially open bearing is supported by the axial holes. The outer ring is axially split and held together by fasteners.

Axial displacement

The outer and inner ring can be axially displaced relative to each other in one direction only by the dimension "s" stated in the dimension table.

Sealing/lubricant

The cylindrical roller bearings are open on both sides. They can be lubricated via the end faces.



Low friction cylindrical roller bearings

- With spacers** In cylindrical roller bearings ZSL1923, plastic spacers prevent the cylindrical rollers from coming into contact with each other during rolling.
The spacers are designed such that the rolling element set is self-retaining, so the bearing and inner ring can be mounted separately. The spacers are guided axially between the two outer ring ribs.
- Axial displacement** The outer and inner ring can be axially displaced relative to each other in one direction only by the dimension “s” stated in the dimension table.
- Sealing/lubricant** The cylindrical roller bearings are open on both sides. They can be lubricated via the end faces.
- Special design for vibratory machinery** In addition to high basic dynamic load ratings and thus long life values, bearings in vibratory machinery must also be able to compensate or support considerable shaft tilting due to load or misalignment. The bearings LSL and ZSL are therefore also available by agreement in the BIR design. In these bearings, the inner ring raceway is ground slightly spherical.
- Operating temperature** Cylindrical roller bearings with disc cage or spacers are suitable for operating temperatures from –30 °C to +120 °C.
- Suffixes** Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
BIR	Inner ring raceway ground slightly spherical	Special design ¹⁾
BR	Black oxide coated	Special design ¹⁾
C3	Radial internal clearance larger than normal	Special design ¹⁾
C4	Radial internal clearance larger than C3	Special design ¹⁾
C5	Radial internal clearance larger than C4	Special design ¹⁾
RR	Corrosion-resistant design, with Corrotect [®] plating	Special design ¹⁾

¹⁾ Available by agreement.

Design and safety guidelines

Axial load carrying capacity

Radial cylindrical roller bearings of a semi-locating bearing design can support axial forces in one direction as well as radial forces.

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements
- the sliding velocity at the ribs
- the lubrication on the contact surfaces.

Caution! Ribs subjected to load must be supported across their entire height. If severe shaft flexing is present, reversed bending loads may occur as a result of this support. Special analysis is required in this case.

The axial limiting load $F_{a \max}$ according to the formula must not be exceeded, in order to avoid impermissible pressure at the contact surfaces.

The ratio F_a/F_r should not exceed 0,4.

Continuous axial loading without simultaneous radial loading is not permissible.



Permissible and maximum axial load

$$F_{a \text{ per}} = k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{-0,6} \leq F_{a \text{ max}}$$

$$F_{a \text{ max}} = 0,075 \cdot k_B \cdot d_M^{2,1}$$

$F_{a \text{ per}}$ N
Permissible axial load

$F_{a \text{ max}}$ N
Axial limiting load

k_S –
Factor dependent on the lubrication method, see table

k_B –
Bearing factor, $k_B = 28$

d_M mm
Mean bearing diameter $(d + D)/2$ according to dimension table

n min^{-1}
Operating speed.

Factor k_S for lubrication method

Lubrication method ¹⁾	k_S
Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ($\nu < 0,5 \cdot \nu_1$)	7,5 to 10
Poor heat dissipation, oil sump lubrication, oil spray lubrication, low oil flow	10 to 15
Good heat dissipation, recirculating oil lubrication (pressurised oil lubrication)	12 to 18
Very good heat dissipation, recirculating oil lubrication with oil cooling, high operating viscosity ($\nu > 2 \cdot \nu_1$)	16 to 24

¹⁾ Doped lubricating oils should be used, e.g. CLP (DIN 51 517) and HLP (DIN 51 524) of ISO VG classes 32 to 460 and ATF oils (DIN 51 502) and gearbox oils (DIN 51 512) of SAE viscosity classes 75 W to 140 W.

Low friction cylindrical roller bearings

Equivalent dynamic bearing load Non-locating bearings

For bearings under dynamic loading, the following applies:

$$P = F_r$$

Semi-locating bearings

If an axial force F_a is present in addition to the radial force F_r , the effect on the life must be calculated using our calculation program BEARINX®.

Equivalent static bearing load Non-locating bearings

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

Semi-locating bearings

If an axial force F_{0a} is present in addition to the radial force F_{0r} , the effect on the static load safety factor must be calculated using our calculation program BEARINX®.

Minimum radial load

In continuous operation, a minimum radial load of the order of $C_{0r}/P < 60$ is necessary.

Caution! If $C_{0r}/P > 60$, please contact us.

Axial location

In order to prevent lateral creep of the bearing rings, they must be located by force or physical locking means.

The abutting shoulders (shaft/housing) should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seating to the abutting shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509. Note the minimum chamfer dimensions r as given in the dimension tables.

For semi-locating bearings, the bearings only require support on one side, on the rib supporting the axial load.

Caution! Full support must be provided for ribs transmitting forces in axially loaded bearings.

Accuracy The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620.

Radial internal clearance The radial internal clearance corresponds to internal clearance group CN.

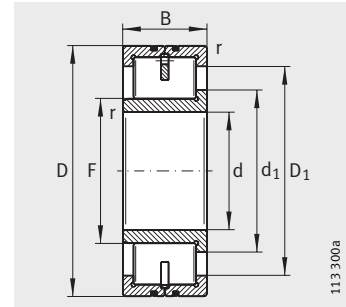
Radial internal clearance to DIN 620-4

Bore		Radial internal clearance							
d mm		CN μm		C3 μm		C4 μm		C5 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	20	45	35	60	50	75	65	90
24	30	20	45	35	60	50	75	70	95
30	40	25	50	45	70	60	85	80	105
40	50	30	60	50	80	70	100	95	125
50	65	40	70	60	90	80	110	110	140
65	80	40	75	65	100	90	125	130	165
80	100	50	85	75	110	105	140	155	190
100	120	50	90	85	125	125	165	180	220
120	140	60	105	100	145	145	190	200	245
140	160	70	120	115	165	165	215	225	275
160	180	75	125	120	170	170	220	250	300
180	200	90	145	140	195	195	250	275	330
200	225	105	165	160	220	220	280	305	365
225	250	110	175	170	235	235	300	330	395
250	280	125	195	190	260	260	330	370	440
280	315	130	205	200	275	275	350	410	485



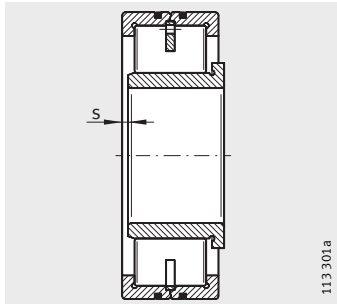
Cylindrical roller bearings

With disc cage
Semi-locating bearings



LSL1923

Dimension table · Dimensions in mm										
Designation	X-life	Mass m ≈ kg	Dimensions					Mounting dimensions		
			d	D	B	r	s ¹⁾	F	d ₁ ≈	D ₁ ≈
LSL192316	XL	6,1	80	170	58	2,1	3,5	94	104,5	134,8
LSL192317	XL	7,3	85	180	60	3	4	100	111,3	143,9
LSL192318	XL	8,6	90	190	64	3	4	105,26	117,2	152,5
LSL192319	XL	10	95	200	67	3	4	114,66	126,6	161
LSL192320	XL	12,8	100	215	73	3	4	119,3	132,7	172
LSL192322	XL	17,3	110	240	80	3	5	135,5	150,7	193,1
LSL192324	XL	22	120	260	86	3	5	147,39	164,2	213,1
LSL192326	XL	27,2	130	280	93	4	5	157,9	176	227,9
LSL192328	XL	34	140	300	102	4	7	168,45	187,5	243,2
LSL192330	–	40,7	150	320	108	4	7	182,49	203,3	263,9
LSL192332	–	48,1	160	340	114	4	7	196,38	219	284,8
LSL192334	–	57,5	170	360	120	4	7	230,55	226,6	295,4
LSL192336	–	67,4	180	380	126	4	7	221,56	245	313,3
LSL192338	–	78,1	190	400	132	5	7	224,43	250	325,5
LSL192340	–	89,3	200	420	138	5	7	238,45	265,7	345,9
LSL192344	–	108	220	460	145	5	7	266,71	297	385,9
LSL192348	–	138,6	240	500	155	5	10	280,55	312,5	406,1
LSL192352	–	168	260	540	165	6	10	315,6	351,6	457,2
LSL192356	–	206,6	280	580	175	6	12	333,1	371	485
LSL192360	–	253	300	620	185	7,5	12	350,93	390,9	508,5



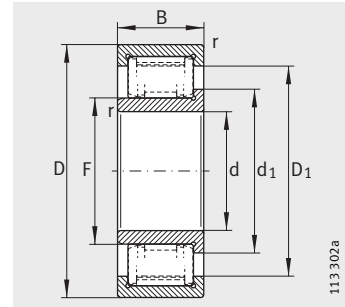
1) Axial displacement "s"

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}	n_B min^{-1}
475 000	495 000	89 000	5 700	8 800
500 000	520 000	90 000	5 400	8 300
590 000	610 000	104 000	5 000	7 900
610 000	660 000	112 000	4 750	7 500
750 000	790 000	133 000	6 300	3 300
880 000	940 000	151 000	5 700	2 950
1 060 000	1 150 000	181 000	5 300	2 600
1 190 000	1 300 000	200 000	4 900	2 400
1 340 000	1 470 000	224 000	4 550	2 240
1 420 000	1 780 000	199 000	4 250	2 010
1 600 000	2 020 000	224 000	4 000	1 850
1 750 000	2 230 000	241 000	3 750	1 720
1 850 000	2 440 000	260 000	3 550	1 610
2 110 000	2 750 000	295 000	3 400	1 490
2 350 000	3 050 000	315 000	3 250	1 390
2 500 000	3 200 000	320 000	2 950	1 280
2 750 000	3 550 000	350 000	2 700	1 170
3 400 000	4 400 000	425 000	2 500	1 020
3 700 000	4 850 000	460 000	2 330	950
4 150 000	5 600 000	510 000	2 170	850



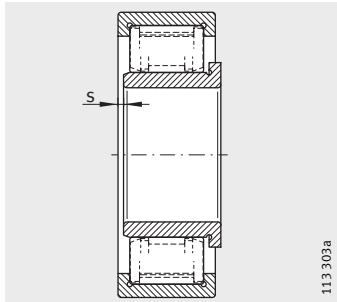
Cylindrical roller bearings

With spacers
Semi-locating bearings



ZSL1923

Dimension table · Dimensions in mm										
Designation	X-life	Mass m ≈ kg	Dimensions					Mounting dimensions		
			d	D	B	r	s ¹⁾	F	d ₁ ≈	D ₁ ≈
						min.				
ZSL192305	-	0,36	25	62	24	1,1	2	31,72	36,7	47,5
ZSL192306	-	0,55	30	72	27	1,1	2	38,3	43,5	56
ZSL192307	-	0,72	35	80	31	1,5	2	44,68	50,7	65,8
ZSL192308	-	1	40	90	33	1,5	2	51,12	57,5	75,2
ZSL192309	-	1,34	45	100	36	1,5	3	56,1	62,5	80,3
ZSL192310	-	1,76	50	110	40	2	3	60,72	68,3	89,7
ZSL192311	-	2,22	55	120	43	2	3	67,11	75,5	99,3
ZSL192312	-	2,82	60	130	46	2,1	3	73,62	82	105,8
ZSL192313	-	3,44	65	140	48	2,1	3,5	80,69	90	116,5
ZSL192314	-	4,27	70	150	51	2,1	3,5	84,14	93,5	121,6
ZSL192315	-	5,2	75	160	55	2,1	3,5	91,22	101,6	131,9
ZSL192316	XL	6,2	80	170	58	2,1	3,5	98,24	109,5	142,1
ZSL192317	XL	7,23	85	180	60	3	4	107,01	118,2	150,9
ZSL192318	XL	8,7	90	190	64	3	4	105,26	117,5	152,5
ZSL192319	XL	10	95	200	67	3	4	114,65	126,6	161,9
ZSL192320	XL	12,7	100	215	73	3	4	119,3	132,7	172,8
ZSL192322	XL	16,5	110	240	80	3	5	134,27	151,1	199,9
ZSL192324	XL	21,9	120	260	86	3	5	147,39	164,2	213,1

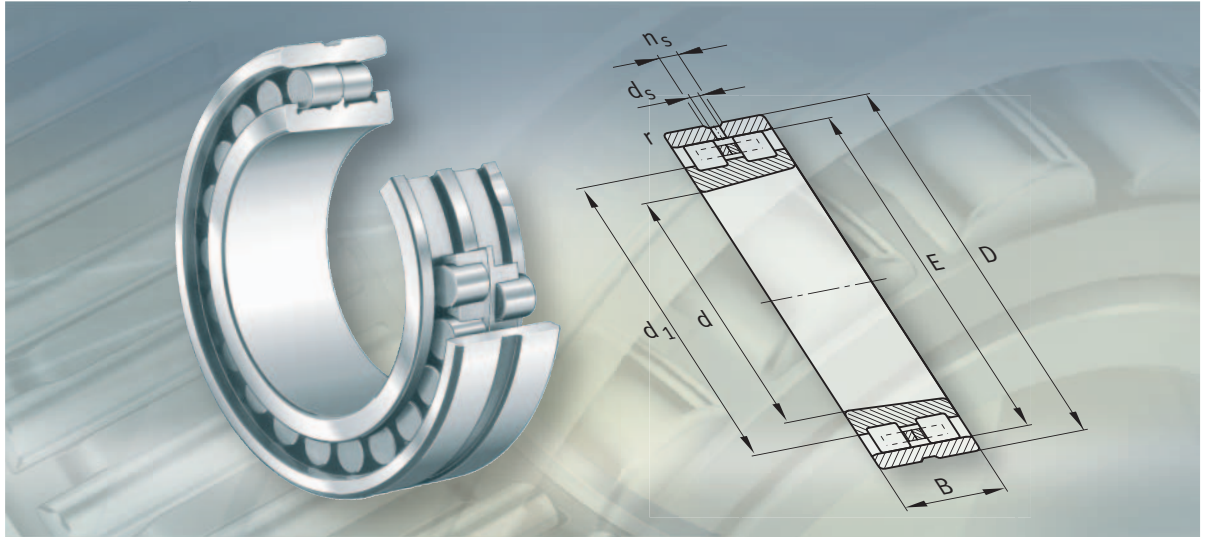


1) Axial displacement "s"

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}	n_B min^{-1}
68 000	55 000	8 700	16 100	9 600
94 000	81 000	13 400	13 700	8 300
118 000	104 000	17 500	12 200	7 700
160 000	144 000	25 000	10 800	6 600
171 000	160 000	27 500	9 700	6 200
219 000	202 000	35 500	8 800	5 800
255 000	236 000	42 000	8 000	5 400
270 000	260 000	46 500	7 400	5 100
335 000	330 000	59 000	6 800	4 650
365 000	365 000	64 000	6 400	4 450
435 000	440 000	78 000	6 000	4 200
510 000	520 000	90 000	5 600	3 900
540 000	570 000	96 000	5 300	3 700
590 000	610 000	104 000	5 000	3 550
620 000	670 000	112 000	4 750	3 300
750 000	800 000	133 000	4 450	3 050
890 000	910 000	144 000	4 000	2 700
1 060 000	1 150 000	181 000	3 700	2 380



FAG



High precision cylindrical roller bearings

Double row

High precision cylindrical roller bearings

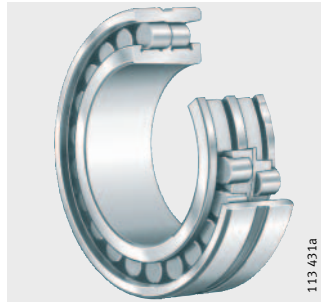
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Product overview High precision cylindrical roller bearings

Non-locating bearings

NN30..-AS-K-M-SP



High precision cylindrical roller bearings

Features Cylindrical roller bearings of this design are double row precision bearings for machine tools. They allow radially rigid, high precision bearing arrangements and are principally used to give radial support for main spindles.

The bearings comprise solid outer rings without ribs, solid inner rings with three ribs and cylindrical roller and cage assemblies with solid brass cages. For optimum setting of the radial internal clearance, the inner ring has a tapered bore with a bore taper 1:12. The cylindrical roller bearings are separable and are therefore easier to fit and dismantle. Both bearing rings can be given a tight fit by this process.

For details of other high precision cylindrical roller bearings, see catalogue AC 41130, Super Precision Bearings.

Non-locating bearings Cylindrical roller bearings NN30...AS-K-M-SP are non-locating bearings and can support radial forces only. Axial forces are normally supported by double direction axial angular contact ball bearings.

Axial displacement The outer and inner ring can be axially displaced relative to each other from the central position by the values “s” stated in the dimension tables.

Sealing/lubricant The bearings are supplied without seals. They can be lubricated from the end faces as well as through a lubrication groove and lubrication holes in the outer ring.

Operating temperature Cylindrical roller bearings with special precision (SP) can be used at operating temperatures from –30 °C to +150 °C.

Caution! For continuous operation above +120 °C, please contact us.

Cage The cylindrical roller bearings have two roller-guided solid brass cages.

Suffixes Suffixes for available designs: see table.

Available designs

Suffix	Description
A	Modified internal construction
K	Tapered bore, taper 1:12
M	Solid brass cage, roller-guided
S	Lubrication groove and lubrication holes in outer ring
SP	Tolerance class SP



High precision cylindrical roller bearings

Design and safety guidelines

Equivalent dynamic bearing load

For bearings under dynamic loading used as non-locating bearings, the following applies:

$$P = F_r$$

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

Static load safety factor

$$S_0 = \frac{C_{0r}}{P_0}$$

S_0 – Static load safety factor
 C_{0r} N Basic static load rating according to dimension tables
 P_0 N Equivalent static bearing load.

Caution! In order to achieve sufficiently smooth running, the static load safety factor should be $S_0 > 3$.

Speeds

Caution! The achievable speed depends on the radial internal clearance while warm from operation. For calculation, the values from the dimension table are multiplied by the correction factor in the table.

Correction factors

Clearance or preload in operation μm	Correction factor
0 to 5 (clearance)	1 to 1,1
-5 to 0 (preload)	0,8 to 1

Caution! The limiting speeds n_G given in the dimension tables are valid for lubrication with grease or minimal quantity lubrication with oil and must not be exceeded.

Design of tapered shaft

Recommendations for machining of the tapered shaft: see table and Figure 1.

Tapered shaft

Shaft diameter				Roundness t_2 μm	Flatness t_3 μm	Axial runout t_4 μm	Mean roughness R_a μm
d mm		Deviation of small taper diameter μm					
over	incl.	max.	min.				
18	30	+73	+64	1	1	1,5	0,2
30	40	+91	+80	1	1	1,5	0,2
40	50	+108	+97	1	1	1,5	0,2
50	65	+135	+122	1,2	1,2	2	0,2
65	80	+159	+146	1,2	1,2	2	0,2
80	100	+193	+178	1,5	1,5	2,5	0,2
100	120	+225	+210	1,5	1,5	2,5	0,2
120	140	+266	+248	2	2	3,5	0,2
140	160	+298	+280	2	2	3,5	0,2
160	180	+328	+310	2	2	3,5	0,2
180	200	+370	+350	3	3	4,5	0,2
200	225	+405	+385	3	3	4,5	0,2
225	250	+445	+425	3	3	4,5	0,2
250	280	+498	+475	4	4	6	0,4
280	315	+548	+525	4	4	6	0,4
315	355	+615	+590	5	5	7	0,4
355	400	+685	+660	5	5	7	0,4
400	450	+767	+740	6	6	8	0,4
450	500	+847	+820	6	6	8	0,4

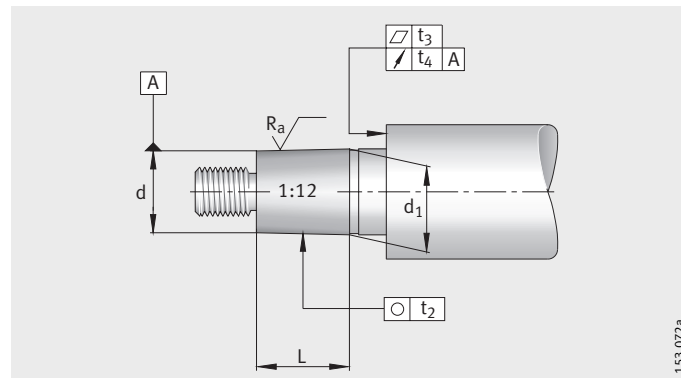


Figure 1
Design of shaft

153 072a

High precision cylindrical roller bearings

The deviation of the taper angle of the shaft seat for bearings of tolerance class SP is shown in the table.

Deviation of taper angle

Taper length L mm		Taper angle tolerance AT_D μm			
L_U over	L_O incl.	AT_{DU}		AT_{DO}	
		max.	min.	max.	min.
16	25	+2	0	+3,2	0
25	40	+2,5	0	+4	0
40	63	+3,2	0	+5	0
63	100	+4	0	+6,3	0
100	160	+5	0	+8	0
160	250	+6,3	0	+10	0

The taper angle tolerance AT_D applies vertical to the axis and is defined as the differential diameter.

If FAG taper gauges MGK132 are used, the AT_D values listed should be halved (inclination angle tolerance).

For taper lengths with nominal dimensions between the values listed in the table, the taper angle tolerance AT_D should be determined by means of interpolation.

Calculation example

Taper length of shaft seat 50 mm, tolerance class SP.

$$AT_D = AT_{DU} + \frac{AT_{DO} - AT_{DU}}{L_O - L_U} \cdot (L - L_U)$$

$$AT_D = 3,2 + \frac{5 - 3,2}{63 - 40} \cdot (50 - 40) = 3,98 \mu\text{m}$$

Taper angle tolerance $AT_D = +4 \mu\text{m}$.

Design of housing

Caution!

In order to allow assembly and dismantling of the bearings, the dimension $D_{b \min}$ in the dimension tables must be observed.

Recommendations for machining of housings: see table and Figure 2.

Housing bore

Housing bore				Cylindricity t_1 μm	Flatness t_3 μm	Axial runout t_4 μm	Coaxiality t_5 μm	Mean roughness R_a μm
D mm		Deviation μm						
over	incl.	max.	min.					
30	50	+2	-9	1,5	1,5	2,5	4	0,4
50	80	+3	-10	2	2	3	5	0,4
80	120	+2	-13	2,5	2,5	4	6	0,8
120	180	+3	-15	3,5	3,5	5	8	0,8
180	250	+2	-18	4,5	4,5	7	10	0,8
250	315	+3	-20	6	6	8	12	1,6
315	400	+3	-22	7	7	9	13	1,6
400	500	+2	-25	8	8	10	15	1,6
500	630	0	-30	9	9	11	16	1,6
630	800	0	-35	10	10	12	18	1,6

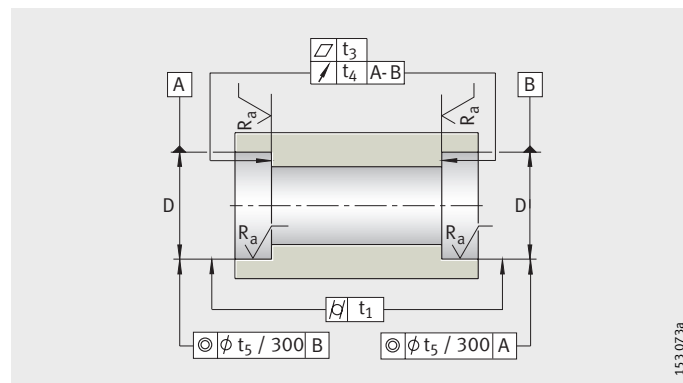


Figure 2
Design of housing

High precision cylindrical roller bearings

Accuracy The bearings correspond to the improved tolerance class SP. Bearings of tolerance class UP available by agreement.

Width tolerances

Bore		Width deviation (in relation to bore)		Width variation V_{Bs} μm
d mm		Δ_{Bs} μm		
over	incl.	max.	min.	
18	30	0	-100	5
30	50	0	-120	5
50	80	0	-150	6
80	120	0	-200	7
120	180	0	-250	8
180	250	0	-300	10
250	315	0	-350	13
315	400	0	-400	15
400	500	0	-450	17

Inner ring tolerances

Bore				Deviation		Variation V_{dp} μm	Radial runout K_{ia} μm	Axial runout	
d mm		Δ_{dmp} μm		$\Delta_{d1 mp} - \Delta_{dmp}$ μm				S_d μm	S_{ia} μm
over	incl.								
18	30	10	0	4	0	3	3	8	8
30	50	12	0	6	0	4	4	8	8
50	80	15	0	6	0	5	4	8	8
80	120	20	0	8	0	5	5	9	9
120	180	25	0	8	0	7	6	10	10
180	250	30	0	10	0	8	8	11	13
250	315	35	0	12	0	9	8	13	15
315	400	40	0	12	0	12	10	15	20
400	500	45	0	14	0	14	10	17	23

Outer ring tolerances

Outside diameter				Variation		Radial runout K_{ea} μm	Axial runout	
D mm		Outside diameter deviation Δ_{Ds} μm		V_{Dp} μm			S_D μm	S_{ea} μm
over	incl.							
30	50	0	-7	4	4	5	8	8
50	80	0	-9	5	5	5	8	10
80	120	0	-10	5	5	6	9	11
120	150	0	-11	6	6	7	10	13
150	180	0	-13	7	7	8	10	14
180	250	0	-15	8	8	10	11	15
250	315	0	-18	9	9	11	13	18
315	400	0	-20	10	10	13	13	20
400	500	0	-23	12	12	15	15	23
500	630	0	-28	14	14	17	18	25
630	800	0	-35	18	18	20	20	30

Radial internal clearance The radial internal clearance smaller than normal internal clearance corresponds to internal clearance group C1NA. The internal clearance is not stated in the designation. The bearing rings are not interchangeable.

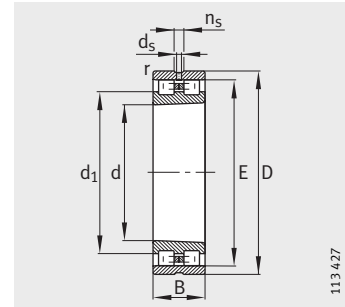
Radial internal clearance

Bore d mm		Radial internal clearance C1NA μm	
over	incl.	min.	max.
24	30	15	25
30	40	15	25
40	50	17	30
50	65	20	35
65	80	25	40
80	100	35	55
100	120	40	60
120	140	45	70
140	160	50	75
160	180	55	85
180	200	60	90
200	225	60	95
225	250	65	100
250	280	75	110
280	315	80	120
315	355	90	135
355	400	100	150
400	450	110	170
450	500	120	190



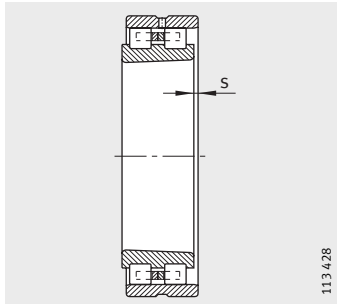
High precision cylindrical roller bearings

Double row
Non-locating bearings

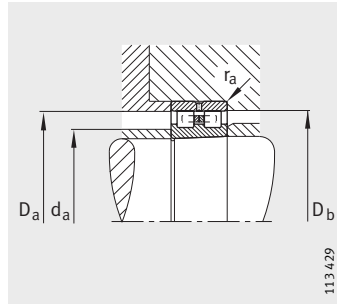


NN30..-AS-K-M-SP
Taper 1:12

Dimension table · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions								
		d	D	B	r	s ¹⁾	E	d ₁	d _s	n _s
NN3006-AS-K-M-SP	0,191	30	55	19	1	1,4	48,5	39,7	3,2	4,8
NN3007-AS-K-M-SP	0,249	35	62	20	1	1,4	55	45,4	3,2	4,8
NN3008-AS-K-M-SP	0,303	40	68	21	1	1,4	61	50,6	3,2	4,8
NN3009-AS-K-M-SP	0,393	45	75	23	1	1,7	67,5	56,3	3,2	4,8
NN3010-AS-K-M-SP	0,426	50	80	23	1	1,7	72,5	61,3	3,2	4,8
NN3011-AS-K-M-SP	0,63	55	90	26	1,1	1,9	81	68,2	3,2	4,8
NN3012-AS-K-M-SP	0,674	60	95	26	1,1	1,9	86,1	73,3	3,2	4,8
NN3013-AS-K-M-SP	0,715	65	100	26	1,1	1,9	91	78,2	3,2	4,8
NN3014-AS-K-M-SP	1,04	70	110	30	1,1	2,3	100	85,6	3,2	6,5
NN3015-AS-K-M-SP	1,09	75	115	30	1,1	2,3	105	90,6	3,2	6,5
NN3016-AS-K-M-SP	1,51	80	125	34	1,1	2,5	113	97	3,2	6,5
NN3017-AS-K-M-SP	1,58	85	130	34	1,1	2,5	118	102	3,2	6,5
NN3018-AS-K-M-SP	2,05	90	140	37	1,5	2,5	127	109,4	3,2	6,5
NN3019-AS-K-M-SP	2,14	95	145	37	1,5	2,5	132	114,4	3,2	6,5
NN3020-AS-K-M-SP	2,23	100	150	37	1,5	2,5	137	119,4	3,2	6,5
NN3021-AS-K-M-SP	2,84	105	160	41	2	2,6	146	125,2	3,2	6,5
NN3022-AS-K-M-SP	3,61	110	170	45	2	2,9	155	132,6	3,2	6,5
NN3024-AS-K-M-SP	3,94	120	180	46	2	3,1	165	142,6	3,2	6,5
NN3026-AS-K-M-SP	5,79	130	200	52	2	3,4	182	156,4	4,8	9,5
NN3028-AS-K-M-SP	6,22	140	210	53	2	3,4	192	166,4	4,8	9,5
NN3030-AS-K-M-SP	7,58	150	225	56	2,1	3,7	206	178,8	4,8	9,5
NN3032-AS-K-M-SP	9,23	160	240	60	2,1	4,2	219	190,2	4,8	9,5
NN3034-AS-K-M-SP	12,5	170	260	67	2,1	4,5	236	204	4,8	9,5
NN3036-AS-K-M-SP	16,4	180	280	74	2,1	4,8	255	218,2	6,3	12,2
NN3038-AS-K-M-SP	17,3	190	290	75	2,1	4,8	265	228,2	6,3	12,2
NN3040-AS-K-M-SP	22,2	200	310	82	2,1	5,3	282	242	6,3	12,2
NN3044-AS-K-M-SP	29,1	220	340	90	3	4,5	310	265,2	8	15
NN3048-AS-K-M-SP	31,6	240	360	92	3	6	330	285,2	8	15
NN3052-AS-K-M-SP	46,2	260	400	104	4	6,5	364	312,8	8	15
NN3056-AS-K-M-SP	49,7	280	420	106	4	6,8	384	332,8	8	15
NN3060-AS-K-M-SP	68,8	300	460	118	4	7,5	418	360,4	9,5	17,7
NN3064-AS-K-M-SP	74,2	320	480	121	4	7,9	438	380,4	9,5	17,7
NN3068-AS-K-M-SP	99,3	340	520	133	5	8,7	473	409	9,5	17,7
NN3072-AS-K-M-SP	104	360	540	134	5	8,7	493	429	9,5	17,7



1) Axial displacement "s"



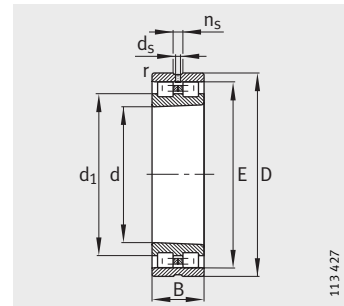
Mounting dimensions

Mounting dimensions				Basic load ratings		Fatigue limit load C_{ur} N	Limiting speeds	
d_a min.	D_a max.	D_b min.	r_a max.	dyn. C_r N	stat. C_{0r} N		n_G grease min^{-1}	n_G oil min^{-1}
35	50	49	1	29 000	34 000	4 800	16 000	19 000
40	57	56	1	35 500	44 000	6 500	14 000	17 000
45	63	62	1	45 000	58 500	8 400	12 000	15 000
50	70	69	1	54 000	72 000	10 700	11 000	14 000
55	75	74	1	57 000	80 000	11 800	10 000	13 000
61	84	82	1	72 000	100 000	15 600	9 000	11 000
66	89	87	1	75 000	110 000	17 200	8 500	10 000
71	94	92	1	76 500	116 000	18 000	8 000	9 500
76	104	102	1	98 000	150 000	22 400	7 000	8 500
81	109	107	1	100 000	156 000	23 400	6 700	8 000
86	119	115	1	120 000	186 000	28 500	6 300	7 500
91	124	120	1	125 000	200 000	30 500	6 000	7 000
98	132	129	1,5	140 000	224 000	36 000	5 600	6 700
103	137	134	1,5	143 000	236 000	37 000	5 300	6 300
108	142	139	1,5	146 000	245 000	38 000	5 300	6 300
114	151	148	2	190 000	310 000	46 000	4 800	5 600
119	161	157	2	220 000	360 000	54 000	4 500	5 300
129	171	167	2	232 000	390 000	57 000	4 300	5 000
139	191	184	2	290 000	500 000	72 000	3 800	4 500
149	201	194	2	300 000	520 000	74 000	3 600	4 300
160	215	208	2,1	335 000	585 000	83 000	3 400	4 000
170	230	222	2,1	375 000	670 000	93 000	3 200	3 800
180	250	239	2,1	450 000	800 000	111 000	3 000	3 600
190	270	258	2,1	570 000	1 000 000	134 000	2 800	3 400
200	280	268	2,1	585 000	1 040 000	138 000	2 600	3 200
210	300	285	2,1	655 000	1 200 000	161 000	2 400	3 000
232	328	313	2,5	800 000	1 460 000	187 000	2 200	2 800
252	348	334	2,5	850 000	1 560 000	199 000	2 000	2 600
275	385	368	3	1 060 000	2 000 000	249 000	1 900	2 400
295	405	388	3	1 080 000	2 080 000	255 000	1 800	2 200
315	445	422	3	1 270 000	2 400 000	290 000	1 600	1 900
335	465	442	3	1 320 000	2 600 000	310 000	1 600	1 900
357	503	477	4	1 630 000	3 250 000	380 000	1 400	1 700
377	523	497	4	1 660 000	3 350 000	390 000	1 400	1 700



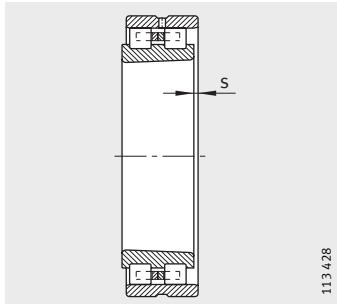
High precision cylindrical roller bearings

Double row
Non-locating bearings

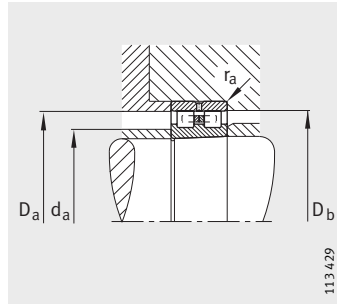


NN30..-AS-K-M-SP
Taper 1:12

Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions								
		d	D	B	r	s ¹⁾	E	d ₁	d _s	n _s
NN3076-AS-K-M-SP	110	380	560	135	5	9	513	449	9,5	17,7
NN3080-AS-K-M-SP	143	400	600	148	5	9,5	549	477	9,5	17,7
NN3084-AS-K-M-SP	150	420	620	150	5	10	569	497	9,5	17,7
NN3088-AS-K-M-SP	172	440	650	157	6	10,3	597	520,2	12,5	23,5
NN3092-AS-K-M-SP	197	460	680	163	6	10,5	624	544	12,5	23,5
NN3096-AS-K-M-SP	206	480	700	165	6	11	644	564	12,5	23,5
NN30/500-AS-K-M-SP	214	500	720	167	6	11,5	664	584	12,5	23,5



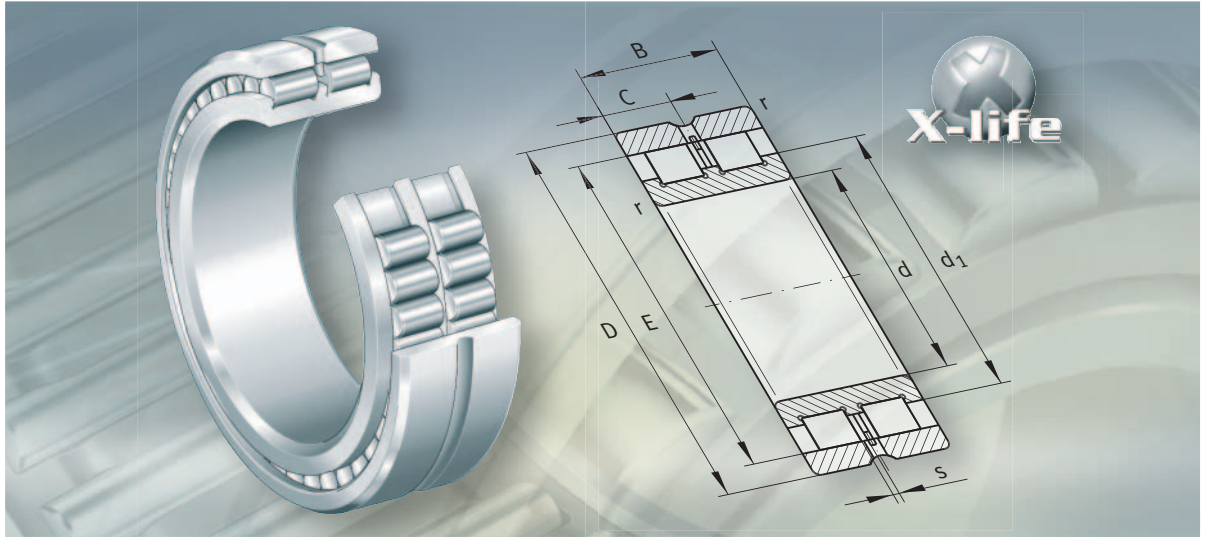
1) Axial displacement "s"



Mounting dimensions


Mounting dimensions				Basic load ratings		Fatigue limit load C_{ur} N	Limiting speeds	
d_a min.	D_a max.	D_b min.	r_a max.	dyn. C_r N	stat. C_{0r} N		n_G grease min^{-1}	n_G oil min^{-1}
397	543	517	4	1 700 000	3 450 000	400 000	1 300	1 600
417	583	553	4	2 160 000	4 500 000	490 000	1 200	1 500
437	603	573	4	2 120 000	4 500 000	490 000	1 200	1 500
463	627	601	5	2 450 000	5 100 000	550 000	1 100	1 400
483	657	628	5	2 600 000	5 400 000	590 000	1 100	1 400
503	677	648	5	2 700 000	5 850 000	630 000	1 000	1 300
523	697	668	5	2 650 000	5 850 000	620 000	1 000	1 300





Full complement cylindrical roller bearings

Full complement cylindrical roller bearings

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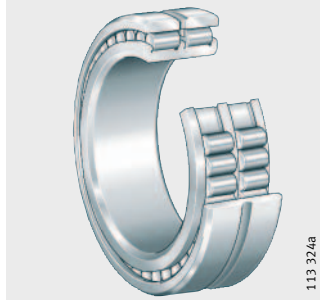


Product overview Full complement cylindrical roller bearings

Non-locating bearings

Double row

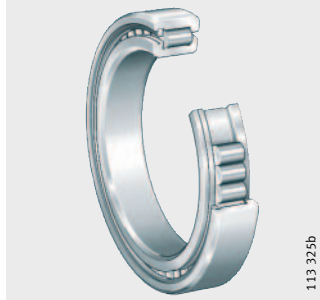
SL0248, SL0249



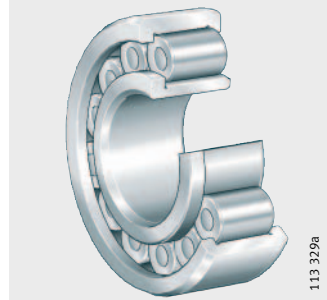
Semi-locating bearings

Single row

SL1818, SL1829, SL1830,
SL1822

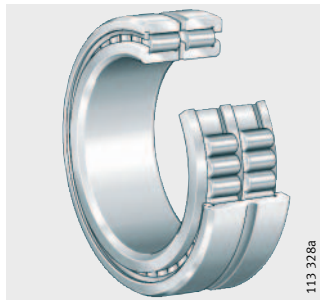


SL1923



Double row

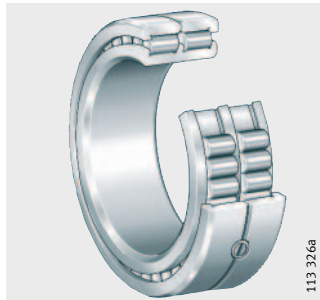
SL1850



Locating bearings

Double row

SL0148, SL0149



Full complement cylindrical roller bearings

Features Full complement cylindrical roller bearings have solid outer and inner rings and rib-guided cylindrical rollers. Since they have the maximum possible number of rolling elements, these bearings have extremely high radial load carrying capacity and high rigidity and are suitable for particularly compact designs. Due to the kinematic conditions, however, they do not achieve the high speeds that are possible when using cylindrical roller bearings with cage.

Full complement cylindrical roller bearings are available as non-locating, semi-locating and locating bearings as well as in single and double row designs.

X-life

Numerous sizes are supplied in the X-life grade. These bearings are indicated in the dimension tables. Bearings of X-life quality have lower roughness R_a and higher geometrical accuracy of the raceways than comparable designs that are not X-life. As a result, they have higher load carrying capacity and longer life for the same dimensioning. In certain applications, this means that a smaller bearing arrangement can be designed.

Non-locating bearings

Bearings SL0248 (designation to DIN 5 412-9: NNCL 48..V) and bearings SL0249 (designation to DIN 5 412-9: NNCL 49..V) are double row non-locating bearings and can support radial forces only.



Axial displacement

The outer ring without ribs can be axially displaced in both directions in relation to the inner ring. The inner ring has ribs on both sides.

Caution! The bearings are held together in handling and transport by a transport and mounting retaining device. This retaining device must not be subjected to axial load.

Sealing/lubricant

The cylindrical roller bearings are not sealed and not greased. They can be lubricated with oil or grease. For lubrication, they have a lubrication groove and lubrication holes in the outer ring.

Semi-locating bearings

Semi-locating bearings are available in single row design as SL1818 (dimension series 18), SL1829 (dimension series 29), SL1830 (dimension series 30), SL1822 (dimension series 22), SL1923 (dimension series 23) and in double row design as SL1850 (dimension series 50). They can support not only high radial forces but also axial forces in one direction and can therefore guide shafts axially in one direction. They act as non-locating bearings in the opposite direction. Series SL1923 has only one rib on the inner ring. As a result, the inner ring can be removed from the bearing. This makes fitting and dismantling considerably easier.

Caution! The bearings SL1818, SL1829, SL1830, SL1822 and SL1850 are held together in handling and transport by a transport and mounting retaining device. This retaining device must not be subjected to axial load.

Axial displacement of inner ring

The inner ring can be axially displaced in one direction only by the dimension "s" stated in the dimension table.

Sealing/lubricant

The cylindrical roller bearings are not sealed and not greased. They can be lubricated with oil or grease. The semi-locating bearings can be lubricated via the end faces, while the double row designs can additionally be lubricated via a lubrication groove and lubrication holes in the outer ring.

Full complement cylindrical roller bearings

Locating bearings Cylindrical roller bearings SL0148 (designation to DIN 5 412-9: NNC 48..V) and SL0149 (designation to DIN 5 412-9: NNC 49..V) are double row locating bearings. These bearings can support axial forces from both directions as well as radial forces.

Caution! The outer ring has ribs on both sides, is axially split and held together by fasteners. The inner ring has an additional central rib. The fasteners must not be subjected to axial load.

Sealing/lubricant The cylindrical roller bearings are not sealed and not greased. They can be lubricated with oil or grease. For lubrication, the outer ring has a lubrication groove and lubrication holes.

Operating temperature Full complement cylindrical roller bearings are suitable for operating temperatures from -30 °C to $+120\text{ °C}$.

Suffixes Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
BR	Black oxide coated	Special design ¹⁾
C3	Radial internal clearance larger than normal	Special design ¹⁾
C4	Radial internal clearance larger than C3	Special design ¹⁾
C5	Radial internal clearance larger than C4	Special design ¹⁾
E	Increased capacity design	Special design ¹⁾
RR	Corrosion-resistant design, with Corrotect [®] plating	Special design ¹⁾

¹⁾ Available by agreement.

Design and safety guidelines

Axial load carrying capacity

Radial cylindrical roller bearings used as semi-locating and locating bearings can support axial forces in one or both directions in addition to radial forces.

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements
- the sliding velocity at the ribs
- the lubrication on the contact surfaces.

Caution! Ribs subjected to load must be supported across their entire height. If severe shaft flexing is present, reversed bending stresses may occur as a result of this support. Special analysis is required in this case. The axial limiting load $F_{a\text{ max}}$ according to the formula must not be exceeded, in order to avoid impermissible pressure at the contact surfaces.

The ratio F_a/F_r should not exceed 0,4. Continuous axial loading without simultaneous radial loading is not permissible.

Permissible and maximum axial load

$$F_{a\text{ per}} = k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{-0,6} \leq F_{a\text{ max}}$$

$$F_{a\text{ max}} = 0,075 \cdot k_B \cdot d_M^{2,1}$$

$F_{a\text{ per}}$ N
 Permissible axial load
 $F_{a\text{ max}}$ N
 Axial limiting load
 k_S –
 Factor dependent on the lubrication method, see table
 k_B –
 Bearing factor: see table
 d_M mm
 Mean bearing diameter $(d + D)/2$ according to dimension table
 n min^{-1}
 Operating speed.

Factor k_S for lubrication method

Lubrication method ¹⁾	k_S
Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ($\nu < 0,5 \cdot \nu_1$)	7,5 to 10
Poor heat dissipation, oil sump lubrication, oil spray lubrication, low oil flow	10 to 15
Good heat dissipation, recirculating oil lubrication (pressurised oil lubrication)	12 to 18
Very good heat dissipation, recirculating oil lubrication with oil cooling, high operating viscosity ($\nu > 2 \cdot \nu_1$)	16 to 24



¹⁾ Doped lubricating oils should be used, e.g. CLP (DIN 51 517) and HLP (DIN 51 524) of ISO VG classes 32 to 460 and ATF oils (DIN 51 502) and gearbox oils (DIN 51 512) of SAE viscosity classes 75 W to 140 W.

Bearing factor k_B

Series	k_B
SL1818, SL0148	4,5
SL1829, SL0149	11
SL1830, SL1850	17
SL1822	20
SL1923	30

Full complement cylindrical roller bearings

Equivalent dynamic bearing load Non-locating bearings

For bearings under dynamic loading, the following applies:

$$P = F_r$$

Semi-locating and locating bearings

If an axial force F_a is present in addition to the radial force F_r , the effect on the life must be calculated using our calculation program BEARINX®.

Equivalent static bearing load Non-locating bearings

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

Semi-locating and locating bearings

If an axial force F_{0a} is present in addition to the radial force F_{0r} , the effect on the static load safety factor must be calculated using our calculation program BEARINX®.

Minimum radial load

In continuous operation, a minimum radial load of the order of $C_{0r}/P < 60$ is necessary.

Caution! If $C_{0r}/P > 60$, please contact us.

Axial location

In order to prevent lateral creep of the bearing rings, they must be located by force or physical locking means.

The abutting shoulders (shaft/housing) should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seating to the abutting shoulders must be designed with rounding to DIN 5 418 or an undercut to DIN 509. Note the minimum chamfer dimensions r as given in the dimension tables.

For semi-locating bearings, the bearings only require support on one side, on the rib supporting the axial load.

Caution! Full support must be provided for ribs transmitting forces in axially loaded bearings.

Accuracy The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620.

Radial internal clearance The radial internal clearance corresponds to internal clearance group CN.

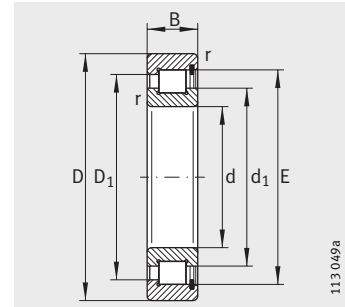
Radial internal clearance to DIN 620-4

Bore		Radial internal clearance							
d mm		CN μm		C3 μm		C4 μm		C5 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	20	45	35	60	50	75	65	90
24	30	20	45	35	60	50	75	70	95
30	40	25	50	45	70	60	85	80	105
40	50	30	60	50	80	70	100	95	125
50	65	40	70	60	90	80	110	110	140
65	80	40	75	65	100	90	125	130	165
80	100	50	85	75	110	105	140	155	190
100	120	50	90	85	125	125	165	180	220
120	140	60	105	100	145	145	190	200	245
140	160	70	120	115	165	165	215	225	275
160	180	75	125	120	170	170	220	250	300
180	200	90	145	140	195	195	250	275	330
200	225	105	165	160	220	220	280	305	365
225	250	110	175	170	235	235	300	330	395
250	280	125	195	190	260	260	330	370	440



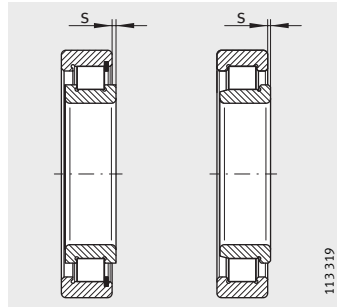
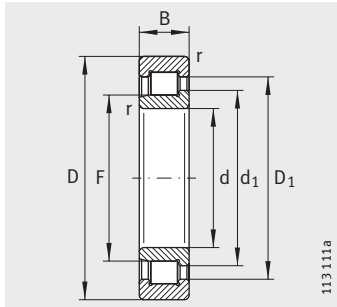
Cylindrical roller bearings

Full complement, single row
Semi-locating bearings



SL1829, SL1830, SL1822
Semi-locating bearings

Dimension table · Dimensions in mm									
Designation	X-life	Mass m ≈kg	Dimensions					Mounting dimensions	
			d	D	B	r min.	s ¹⁾	F	d ₁ ≈
SL183004	XL	0,11	20	42	16	0,6	1,5	–	28,8
SL182204	XL	0,16	20	47	18	1	1	–	30,3
SL183005	XL	0,12	25	47	16	0,6	1,5	–	34,6
SL182205	XL	0,18	25	52	18	1	1	–	35,3
SL192305	–	0,37	25	62	24	1,1	2	31,72	36,7
SL183006	XL	0,2	30	55	19	1	2	–	40
SL182206	XL	0,3	30	62	20	1	1	–	42
SL192306	–	0,56	30	72	27	1,1	2	38,3	43,5
SL183007	XL	0,26	35	62	20	1	2	–	44,9
SL182207	XL	0,44	35	72	23	1,1	1	–	47
SL192307	–	0,74	35	80	31	1,5	2	44,68	50,7
SL183008	XL	0,31	40	68	21	1	2	–	50,5
SL182208	XL	0,55	40	80	23	1,1	1	–	54
SL192308	–	1,01	40	90	33	1,5	2	51,12	57,5
SL183009	XL	0,4	45	75	23	1	2	–	55,3
SL182209	XL	0,59	45	85	23	1,1	1	–	57,5
SL192309	–	1,37	45	100	36	1,5	3	56,1	62,5
SL183010	XL	0,43	50	80	23	1	2	–	59,1
SL182210	XL	0,64	50	90	23	1,1	1	–	64,4
SL192310	–	1,81	50	110	40	2	3	60,72	68,3
SL183011	XL	0,64	55	90	26	1,1	2	–	68,5
SL182211	XL	0,87	55	100	25	1,5	1	–	70
SL192311	–	2,28	55	120	43	2	3	67,11	75,5
SL182912	XL	0,29	60	85	16	1	1	–	69
SL183012	XL	0,69	60	95	26	1,1	2	–	71,7
SL182212	XL	1,18	60	110	28	1,5	1,5	–	76,8
SL192312	–	2,88	60	130	46	2,1	3	73,62	82
SL182913	XL	0,31	65	90	16	1	1	–	75,7
SL183013	XL	0,73	65	100	26	1,1	2	–	78,1
SL182213	XL	1,57	65	120	31	1,5	1,5	–	82,3
SL192313	–	3,52	65	140	48	2,1	3,5	80,69	90
SL182914	XL	0,49	70	100	19	1	1	–	81,2
SL183014	XL	1,02	70	110	30	1,1	3	–	81,5
SL182214	–	1,66	70	125	31	1,5	1,5	–	87
SL192314	–	4,33	70	150	51	2,1	3,5	84,14	93,5



SL1923
Semi-locating bearings

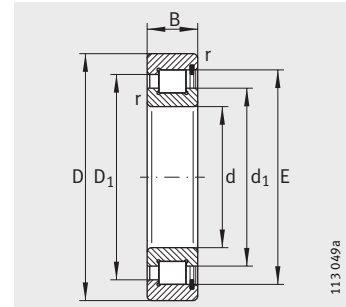
1) Axial displacement "s"

		Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
D_1	E	dyn. C_r N	stat. C_{0r} N			
≈ 32,8	36,81	30 500	26 500	4 450	10 500	7 400
36,9	41,47	45 500	37 500	6 100	9 700	6 500
38,5	42,51	35 000	32 500	5 500	9 000	6 200
41,9	46,52	51 000	45 000	7 400	8 400	5 500
47,5	–	73 000	60 000	9 400	7 400	4 650
45,4	49,6	45 000	43 000	7 500	7 600	5 600
50,6	55,19	70 000	65 000	10 200	7 000	4 550
56	–	100 000	88 000	14 500	6 400	3 950
51,3	55,52	55 000	55 000	9 400	6 700	4 850
59,3	63,97	88 000	79 000	12 700	6 100	4 200
65,8	–	126 000	112 000	19 000	5 600	3 700
57,1	61,74	66 000	68 000	11 200	6 000	4 300
66,3	70,94	97 000	93 000	14 900	5 400	3 600
75,2	–	170 000	156 000	27 000	5 000	3 150
62,2	66,85	70 000	76 000	12 500	5 400	4 050
69,8	74,43	101 000	99 000	16 000	5 000	3 300
80,3	–	181 000	169 000	30 000	4 450	3 000
67,7	72,33	88 000	96 000	15 100	5 000	3 550
76,7	81,4	109 000	113 000	18 100	4 650	3 000
89,7	–	232 000	219 000	38 500	4 050	2 750
78,8	83,54	120 000	136 000	22 600	4 450	3 150
84,1	88,81	140 000	150 000	25 000	4 200	2 650
99,3	–	270 000	255 000	45 500	3 700	2 550
74,4	78,55	63 000	78 000	13 700	4 450	2 800
82,1	86,74	123 000	145 000	23 700	4 200	2 950
93,9	99,17	169 000	180 000	31 000	3 800	2 550
105,8	–	285 000	280 000	50 000	3 400	2 450
81	85,24	67 000	86 000	15 100	4 200	2 600
88,4	93,09	130 000	159 000	26 000	3 950	2 700
100,7	106,25	198 000	214 000	37 000	3 500	2 410
116,5	–	350 000	355 000	63 000	3 150	3 200
87,8	92,31	88 000	114 000	18 800	3 800	2 490
95,6	100,28	153 000	176 000	29 500	3 600	2 700
105,2	111,45	184 000	227 000	32 000	3 300	2 270
121,6	–	385 000	390 000	69 000	2 950	2 110



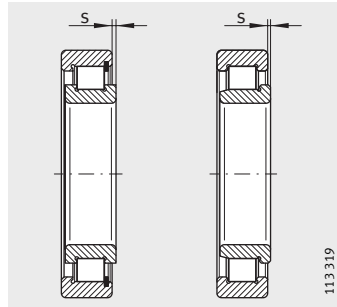
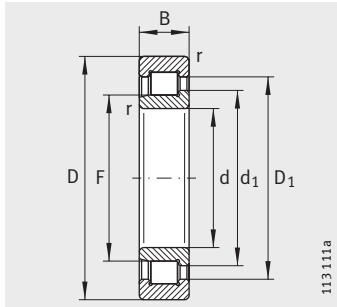
Cylindrical roller bearings

Full complement, single row
Semi-locating bearings



SL1829, SL1830, SL1822
Semi-locating bearings

Dimension table (continued) · Dimensions in mm									
Designation	X-life	Mass m ≈ kg	Dimensions					Mounting dimensions	
			d	D	B	r min.	s ¹⁾	F	d ₁ ≈
SL182915	XL	0,52	75	105	19	1	1	–	86,3
SL183015	XL	1,06	75	115	30	1,1	3	–	89
SL182215	–	1,75	75	130	31	1,5	1,5	–	91,8
SL192315	–	5,3	75	160	55	2,1	3,5	91,22	101,6
SL182916	XL	0,55	80	110	19	1	1	–	91,4
SL183016	–	1,43	80	125	34	1,1	4	–	95
SL182216	–	2,15	80	140	33	2	1,5	–	98,6
SL192316	–	6,32	80	170	58	2,1	3,5	98,24	109,5
SL182917	XL	0,81	85	120	22	1,1	1	–	96,4
SL183017	–	1,51	85	130	34	1,1	4	–	99,4
SL182217	–	2,74	85	150	36	2	1,5	–	104,4
SL192317	–	7,34	85	180	60	3	4	107,01	118,2
SL182918	XL	0,84	90	125	22	1,1	1	–	102
SL183018	–	1,97	90	140	37	1,5	4	–	106,1
SL182218	–	3,48	90	160	40	2	2,5	–	110,2
SL192318	–	8,83	90	190	64	3	4	105,26	117,5
SL182919	XL	0,86	95	130	22	1,1	1	–	106,7
SL182219	–	4,17	95	170	43	2,1	2,5	–	122
SL192319	–	10,2	95	200	67	3	4	114,65	126,6
SL182920	XL	1,14	100	140	24	1,1	1,5	–	113,4
SL183020	–	2,15	100	150	37	1,5	4	–	115,7
SL182220	–	5,13	100	180	46	2,1	2,5	–	127,5
SL192320	–	13	100	215	73	3	4	119,3	132,7
SL182922	XL	1,23	110	150	24	1,1	1,5	–	124
SL183022	–	3,5	110	170	45	2	5,5	–	127,3
SL182222	–	7,24	110	200	53	2,1	4	–	137
SL192322	–	17	110	240	80	3	5	134,27	151,1
SL182924	XL	1,73	120	165	27	1,1	1,5	–	134,8
SL183024	–	3,8	120	180	46	2	5,5	–	138,8
SL182224	–	9,08	120	215	58	2,1	4	–	150,7
SL192324	–	22,3	120	260	86	3	5	147,39	164,2
SL182926	XL	2,33	130	180	30	1,5	2	–	146
SL183026	–	5,65	130	200	52	2	5,5	–	148,6
SL182226	–	11,25	130	230	64	3	5	–	162,3



SL1923
Semi-locating bearings

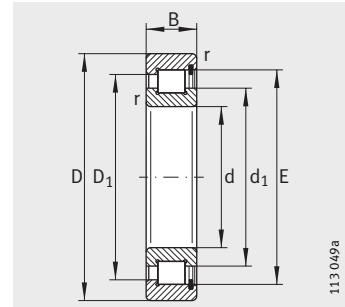
1) Axial displacement "s"

		Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min ⁻¹	Reference speed n_B min ⁻¹
D_1 ≈	E	dyn. C_r N	stat. C_{0r} N			
92,8	97,41	91 000	121 000	20 100	3 600	2 340
103,2	107,9	162 000	194 000	32 500	3 400	2 500
110	116,2	190 000	241 000	33 500	3 150	2 140
131,5	–	460 000	465 000	83 000	2 750	1 980
98	102,51	94 000	129 000	21 400	3 400	2 190
111,7	117,4	173 000	225 000	31 000	3 150	2 470
119,3	126,3	226 000	285 000	38 500	2 950	2 000
142,1	–	540 000	560 000	96 000	2 600	1 840
105	109,58	118 000	162 000	25 500	3 150	2 130
116,1	121,95	178 000	237 000	32 000	3 000	2 330
126,3	133,75	255 000	325 000	44 500	2 750	1 930
150,9	–	570 000	620 000	103 000	2 450	1 740
110,7	115,75	122 000	172 000	26 500	3 000	2 010
124,5	130,65	208 000	280 000	38 000	2 800	2 220
133,3	141,15	290 000	370 000	51 000	2 600	1 900
152,5	–	620 000	660 000	112 000	2 310	1 660
117	122,25	132 000	179 000	27 500	2 900	1 910
147,3	155,95	340 000	435 000	58 000	2 450	1 800
161,9	–	650 000	720 000	120 000	2 200	1 560
125,7	130,95	152 000	206 000	31 500	2 700	1 850
134	140,2	219 000	310 000	40 500	2 600	2 010
154,3	163,35	395 000	520 000	70 000	2 310	1 700
172,8	–	790 000	860 000	143 000	2 060	1 420
136,2	141,5	155 000	220 000	34 000	2 490	1 690
149,3	156,7	285 000	395 000	52 000	2 310	1 950
168	177,6	455 000	590 000	78 000	2 090	1 660
199,9	–	950 000	980 000	156 000	1 850	1 280
149	154,3	199 000	295 000	45 500	2 270	1 550
160,7	168,15	300 000	435 000	56 000	2 160	1 820
183	192,9	540 000	730 000	95 000	1 930	1 470
213,1	–	1 130 000	1 240 000	195 000	1 710	1 110
161,1	167,15	238 000	355 000	54 000	2 090	1 470
175,5	184,4	435 000	620 000	79 000	1 960	1 590
197	207,75	630 000	860 000	110 000	1 800	1 350



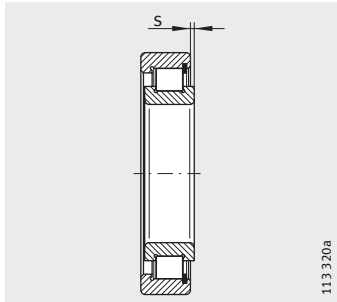
Cylindrical roller bearings

Full complement, single row
Semi-locating bearings



SL1818, SL1829, SL1830,
SL1822
Semi-locating bearings

Dimension table (continued) · Dimensions in mm									
Designation	X-life	Mass m ≈ kg	Dimensions					Mounting dimensions	
			d	D	B	r min.	s ¹⁾	d ₁ ≈	D ₁ ≈
SL182928	XL	2,42	140	190	30	1,5	2	157	174
SL183028	–	6,04	140	210	53	2	5,5	162,2	189,5
SL182228	–	14,47	140	250	68	3	5	173,9	211,1
SL182930	XL	3,77	150	210	36	2	2,5	169	189,6
SL183030	–	7,33	150	225	56	2,1	7	170	198
SL182230	–	18,43	150	270	73	3	6	185,5	225,2
SL182932	XL	4	160	220	36	2	2,5	179,7	200,5
SL183032	–	8,8	160	240	60	2,1	7	184,8	215,8
SL182232	–	23	160	290	80	3	6	208,7	253,4
SL182934	XL	4,3	170	230	36	2	2,5	190,6	211,3
SL183034	–	12,2	170	260	67	2,1	7	198,1	232,7
SL182234	–	28,65	170	310	86	4	7	220,3	267,4
SL182936	XL	6,2	180	250	42	2	3	200,7	224
SL183036	–	16,1	180	280	74	2,1	7	212,2	249,4
SL182236	–	29,8	180	320	86	4	7	232,4	279,5
SL182938	XL	6,5	190	260	42	2	2	211,5	238,5
SL183038	–	17	190	290	75	2,1	9	221,8	259
SL182238	–	35,65	190	340	92	4	9	243,5	295,5
SL181840	–	2,57	200	250	24	1,5	2	216,6	231,6
SL182940	XL	9,1	200	280	48	2,1	3	225,5	252,4
SL183040	–	21,8	200	310	82	2,1	9	236,6	276,2
SL182240	–	43,12	200	360	98	4	9	246,6	302,4
SL181844	–	2,8	220	270	24	1,5	2	237,3	252,3
SL182944	XL	9,9	220	300	48	2,1	3	246,3	273,2
SL183044	–	28,4	220	340	90	3	9	254,6	299,2
SL181848-E	–	4,29	240	300	28	2	2	260,5	281
SL182948	–	10,6	240	320	48	2,1	3	267,5	294,4
SL183048	–	30,9	240	360	92	3	11	277,5	322,1
SL181852-E	–	4,61	260	320	28	2	2	281	301,5
SL182952	–	18,5	260	360	60	2,1	5	291,5	323,4
SL183052	–	44,5	260	400	104	4	11	304	358,4
SL181856-E	–	6,89	280	350	33	2	2,5	304	327
SL182956	–	19,7	280	380	60	2,1	3,5	314	348,5
SL183056	–	48	280	420	106	4	11	319,5	372,9



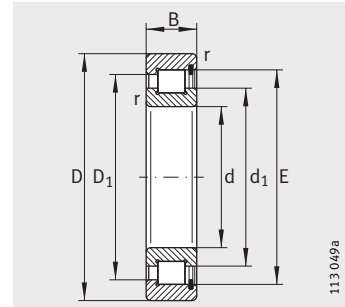
1) Axial displacement "s"

E	Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
	dyn. C_r N	stat. C_{0r} N			
180	260 000	385 000	57 000	1 960	1 360
198,4	455 000	680 000	85 000	1 850	1 460
222,55	720 000	1 020 000	127 000	1 660	1 190
196,75	340 000	490 000	73 000	1 800	1 340
207,45	480 000	710 000	88 000	1 730	1 380
237,35	830 000	1 180 000	146 000	1 540	1 080
207,6	350 000	520 000	77 000	1 710	1 260
225,45	550 000	820 000	99 000	1 620	1 260
267,1	1 030 000	1 490 000	178 000	1 440	950
218,45	365 000	560 000	80 000	1 620	1 180
243,55	710 000	1 070 000	129 000	1 510	1 110
281,9	1 150 000	1 680 000	199 000	1 350	870
231,85	455 000	690 000	100 000	1 510	1 120
261	820 000	1 260 000	149 000	1 410	1 010
294	1 190 000	1 780 000	204 000	1 300	820
244,15	510 000	790 000	112 000	1 440	1 010
270,6	840 000	1 320 000	155 000	1 350	960
311,5	1 310 000	1 920 000	223 000	1 220	780
237,6	183 000	330 000	33 500	1 440	1 020
261,6	610 000	960 000	134 000	1 350	930
288,6	960 000	1 530 000	178 000	1 270	880
319,4	1 420 000	2 040 000	235 000	1 160	740
258,5	192 000	365 000	36 000	1 320	920
282,45	650 000	1 050 000	144 000	1 250	830
213,1	1 160 000	1 840 000	209 000	1 160	780
287,5	265 000	490 000	51 000	1 200	900
303,7	610 000	1 140 000	124 000	1 160	750
336	1 220 000	2 010 000	224 000	1 080	710
308	275 000	530 000	54 000	1 120	820
333,7	790 000	1 470 000	160 000	1 050	680
375,97	1 620 000	2 550 000	280 000	980	610
335	355 000	670 000	69 000	1 030	750
359,5	920 000	1 740 000	184 000	980	590
390,3	1 670 000	2 700 000	290 000	930	570



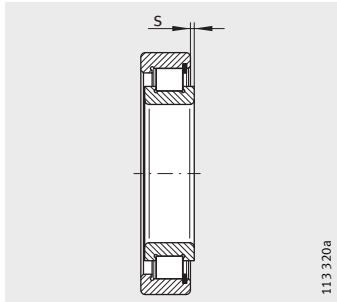
Cylindrical roller bearings

Full complement, single row
Semi-locating bearings



SL1818, SL1829, SL1830
Semi-locating bearings

Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈ kg	Dimensions					Mounting dimensions	
		d	D	B	r	s ¹⁾	d ₁ ≈	D ₁ ≈
SL181860-E	9,79	300	380	38	2,1	3	323,5	350,5
SL182960	31,2	300	420	72	3	5	338	376,9
SL183060	66,6	300	460	118	4	14	353,6	415,6
SL181864-E	10,36	320	400	38	2,1	3	344,5	371,5
SL182964	32,9	320	440	72	3	5	358,5	397,4
SL183064	71,7	320	480	121	4	14	369,5	430,1
SL181868-E	10,93	340	420	38	2,1	3	365,5	392,5
SL182968	34,7	340	460	72	3	5	379	418,7
SL183068	95,8	340	520	133	5	16	396,1	463,9
SL181872-E	11,49	360	440	38	2,1	3	387	413,5
SL182972	36,4	360	480	72	3	5	399,5	438,6
SL183072	101	360	540	134	5	16	414	481,6
SL181876-E	18,87	380	480	46	2,1	4	415,5	448
SL182976	52,1	380	520	82	4	5	426	472,1
SL183076	106	380	560	135	5	16	431,7	499,5
SL181880-E	19,81	400	500	46	2,1	4	432	464,5
SL182980	54,3	400	540	82	4	5	450	496,1
SL183080	140	400	600	148	5	18	462,5	535,1
SL181884-E	20,6	420	520	46	2,1	4	457	489,5
SL182984	56,9	420	560	82	4	5	462	509
SL181888-E	21,54	440	540	46	2,1	4	473,5	506
SL182988	78,1	440	600	95	4	7	490	544,6
SL181892-E	33,21	460	580	56	3	5	501,5	541
SL182992	81,1	460	620	95	4	7	504	559,6
SL181896-E	34,53	480	600	56	3	5	522	561
SL182996	94,7	480	650	100	5	7	538	596,6
SL1818/500-E	35,73	500	620	56	3	5	542	581,5
SL1829/500	98,3	500	670	100	5	7	553	612,7



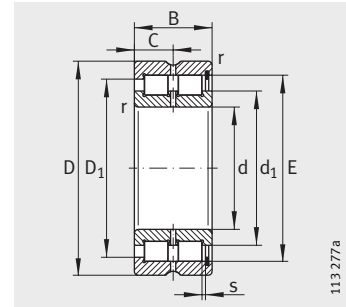
1) Axial displacement "s"

E	Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
	dyn. C_r N	stat. C_{0r} N			
360	455 000	840 000	86 000	950	700
389,45	1 180 000	2 230 000	235 000	900	530
434,85	2 040 000	3 350 000	325 000	850	500
381	470 000	900 000	90 000	900	640
409,85	1 220 000	2 370 000	246 000	850	485
449,5	2 100 000	3 500 000	340 000	810	475
402,2	485 000	960 000	94 000	850	600
430,2	1 260 000	2 500 000	255 000	810	455
485,65	2 500 000	4 150 000	400 000	750	430
423,5	500 000	1 010 000	98 000	810	550
450,6	1 290 000	2 650 000	265 000	770	420
503,45	2 550 000	4 350 000	410 000	720	405
459	650 000	1 290 000	126 000	750	510
486,7	1 670 000	3 350 000	335 000	720	375
521,25	2 600 000	4 500 000	425 000	690	385
475,5	660 000	1 340 000	130 000	720	475
510,85	1 730 000	3 560 000	350 000	690	350
558,52	3 100 000	5 400 000	500 000	650	345
500	680 000	1 420 000	135 000	690	450
522,95	1 750 000	3 600 000	355 000	660	335
517	700 000	1 470 000	139 000	660	420
562	2 110 000	4 150 000	405 000	620	320
554	940 000	1 890 000	174 000	620	405
576,3	2 140 000	4 300 000	410 000	600	305
474,5	960 000	1 970 000	185 000	600	385
614,75	2 410 000	4 850 000	460 000	570	280
594,5	980 000	2 050 000	190 000	580	365
630	2 450 000	5 000 000	470 000	550	265



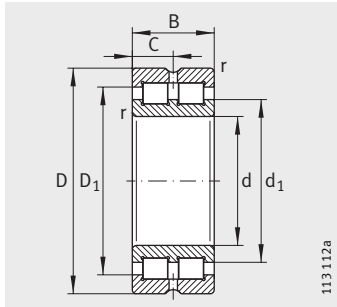
Cylindrical roller bearings

Full complement, double row
Semi-locating, locating and non-locating bearings

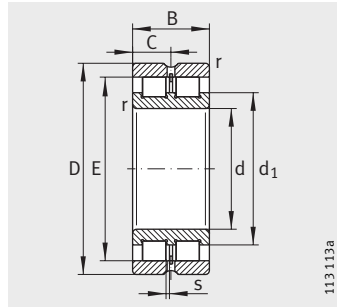


SL1850
Semi-locating bearings

Dimension table · Dimensions in mm										
Semi-locating bearings Designation	X-life	Locating bearings Designation	Non-locating bearings Designation	Designation to DIN 5 412	Mass m ≈kg	Dimensions				
						d	D	B	r min.	s
SL185004	XL	–	–	–	0,2	20	42	30	0,6	1
SL185005	XL	–	–	–	0,23	25	47	30	0,6	1
SL185006	XL	–	–	–	0,35	30	55	34	1	1,5
SL185007	XL	–	–	–	0,46	35	62	36	1	1,5
SL185008	XL	–	–	–	0,56	40	68	38	1	1,5
SL185009	XL	–	–	–	0,71	45	75	40	1	1,5
SL185010	XL	–	–	–	0,76	50	80	40	1	1,5
SL185011	XL	–	–	–	1,16	55	90	46	1,1	1,5
–	–	SL014912	–	NNC 4912 V	0,49	60	85	25	1	–
–	–	–	SL024912	NNCL 4912 V	0,47	60	85	25	1	1
SL185012	XL	–	–	–	1,24	60	95	46	1,1	1,5
SL185013	XL	–	–	–	1,32	65	100	46	1,1	1,5
–	–	SL014914	–	NNC 4914 V	0,78	70	100	30	1	–
–	–	–	SL024914	NNCL 4914 V	0,75	70	100	30	1	1
SL185014	XL	–	–	–	1,85	70	110	54	1,1	3
SL185015	XL	–	–	–	1,93	75	115	54	1,1	3
–	–	SL014916	–	NNC 4916 V	0,88	80	110	30	1	–
–	–	–	SL024916	NNCL 4916 V	0,85	80	110	30	1	1
SL185016	–	–	–	–	2,59	80	125	60	1,1	3,5
SL185017	–	–	–	–	2,72	85	130	60	1,1	3,5
–	–	SL014918	–	NNC 4918 V	1,35	90	125	35	1,1	–
–	–	–	SL024918	NNCL 4918 V	1,3	90	125	35	1,1	1,5
SL185018	–	–	–	–	3,62	90	140	67	1,5	4
–	–	SL014920	–	NNC 4920 V	1,95	100	140	40	1,1	–
–	–	–	SL024920	NNCL 4920 V	1,9	100	140	40	1,1	2
SL185020	–	–	–	–	3,94	100	150	67	1,5	4
–	–	SL014922	–	NNC 4922 V	2,15	110	150	40	1,1	–
–	–	–	SL024922	NNCL 4922 V	2,1	110	150	40	1,1	2
SL185022	–	–	–	–	6,32	110	170	80	2	5
–	–	SL014924	–	NNC 4924 V	2,95	120	165	45	1,1	–
–	–	–	SL024924	NNCL 4924 V	2,85	120	165	45	1,1	3
SL185024	–	–	–	–	6,77	120	180	80	2	5



SL0148, SL0149
Locating bearings



SL0248, SL0249
Non-locating bearings

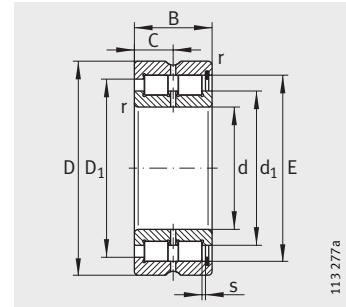
Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
C	d ₁ ≈	D ₁ ≈	E	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	n _B min ⁻¹
15	28,4	33,3	36,81	53 000	53 000	8 900	10 500	7 300
15	34,5	39	42,51	60 000	65 000	11 100	9 000	6 100
17	40	45,3	49,6	78 000	84 000	15 000	7 600	5 300
18	44,9	51,2	55,52	94 000	109 000	18 800	6 700	4 650
19	50,5	57,2	61,74	113 000	136 000	22 400	6 000	4 100
20	55,3	62,6	66,85	120 000	151 000	24 900	5 400	3 800
20	59,1	67,6	72,33	151 000	191 000	30 000	5 000	3 300
23	68,5	78,7	83,54	206 000	275 000	45 000	4 450	2 950
12,5	70,3	73,5	–	71 000	125 000	17 300	4 450	2 600
12,5	70,3	–	77,51	71 000	125 000	17 300	4 450	2 600
23	71,7	81,9	86,74	212 000	290 000	47 500	4 200	2 750
23	78,1	88,3	93,09	223 000	320 000	52 000	3 550	2 550
15	82,5	87,4	–	108 000	189 000	27 000	3 800	2 310
15	82,5	–	91,87	108 000	189 000	27 000	3 800	2 310
27	81,5	95,7	100,28	265 000	355 000	59 000	3 600	2 600
27	89	102,9	107,9	275 000	390 000	65 000	3 400	2 390
15	91,4	96,2	–	115 000	211 000	30 000	3 400	2 030
15	91,4	–	100,78	115 000	211 000	30 000	3 400	2 030
30	95	111,7	117,4	295 000	450 000	62 000	3 150	2 310
30	99	116,1	121,95	305 000	475 000	64 000	3 000	2 190
17,5	103,9	110,7	–	155 000	295 000	39 000	3 000	1 850
17,5	103	–	115,2	155 000	295 000	39 000	3 000	1 850
33,5	106,1	124,5	130,65	355 000	560 000	76 000	2 800	2 120
20	116,4	125	–	196 000	380 000	47 500	2 700	1 720
20	116,4	–	129,6	196 000	380 000	47 500	2 700	1 720
33,5	115,7	134	140,2	375 000	620 000	81 000	2 600	1 900
20	125	133,6	–	204 000	410 000	50 000	2 490	1 570
20	125	–	138,2	204 000	410 000	50 000	2 490	1 570
40	127,3	149,3	156,7	490 000	790 000	104 000	2 310	1 680
22,5	138,6	148,6	–	228 000	455 000	55 000	2 270	1 540
22,5	138,6	–	153,55	228 000	455 000	55 000	2 270	1 540
40	138,8	160,7	168,15	520 000	870 000	111 000	2 160	1 510



Cylindrical roller bearings

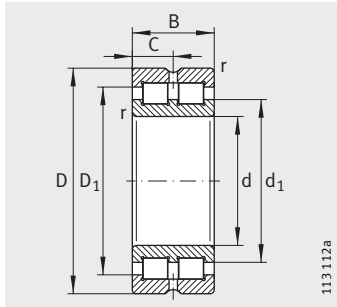
Full complement, double row

Semi-locating, locating and non-locating bearings

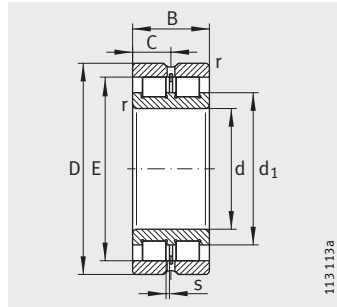


SL1850
Semi-locating bearings

Dimension table (continued) · Dimensions in mm									
Semi-locating bearings Designation	Locating bearings Designation	Non-locating bearings Designation	Designation to DIN 5 412	Mass m ≈ kg	Dimensions				
					d	D	B	r min.	s
–	SL014926	–	NNC 4926 V	3,95	130	180	50	1,5	–
–	–	SL024926	NNCL 4926 V	3,8	130	180	50	1,5	4
SL185026	–	–	–	10,2	130	200	95	2	5
–	SL014928	–	NNC 4928 V	4,2	140	190	50	1,5	–
–	–	SL024928	NNCL 4928 V	4,1	140	190	50	1,5	4
SL185028	–	–	–	11,1	140	210	95	2	5
–	SL014830	–	NNC 4830 V	2,9	150	190	40	1,1	–
–	–	SL024830	NNCL 4830 V	2,8	150	190	40	1,1	2
–	SL014930	–	NNC 4930 V	6,65	150	210	60	2	–
–	–	SL024930	NNCL 4930 V	6,45	150	210	60	2	4
SL185030	–	–	–	13,3	150	225	100	2	6
–	SL014832	–	NNC 4832 V	3,1	160	200	40	1,1	–
–	–	SL024832	NNCL 4832 V	3	160	200	40	1,1	2
–	SL014932	–	NNC 4932 V	7	160	220	60	2	–
–	–	SL024932	NNCL 4932 V	6,8	160	220	60	2	4
–	SL014834	–	NNC 4834 V	4,1	170	215	45	1,1	–
–	–	SL024834	NNCL 4834 V	3,95	170	215	45	1,1	3
–	SL014934	–	NNC 4934 V	7,35	170	230	60	2	–
–	–	SL024934	NNCL 4934 V	7,1	170	230	60	2	4
–	SL014836	–	NNC 4836 V	4,3	180	225	45	1,1	–
–	–	SL024836	NNCL 4836 V	4,15	180	225	45	1,1	3
–	SL014936	–	NNC 4936 V	10,8	180	250	69	2	–
–	–	SL024936	NNCL 4936 V	10,5	180	250	69	2	4
–	SL014838	–	NNC 4838 V	5,65	190	240	50	1,5	–
–	–	SL024838	NNCL 4838 V	5,45	190	240	50	1,5	4
–	SL014938	–	NNC 4938 V	11,2	190	260	69	2	–
–	–	SL024938	NNCL 4938 V	10,9	190	260	69	2	4
–	SL014840	–	NNC 4840 V	5,9	200	250	50	1,5	–
–	–	SL024840	NNCL 4840 V	5,7	200	250	50	1,5	4
–	SL014940	–	NNC 4940 V	15,8	200	280	80	2,1	–
–	–	SL024940	NNCL 4940 V	15,3	200	280	80	2,1	5



SL0148, SL0149
Locating bearings



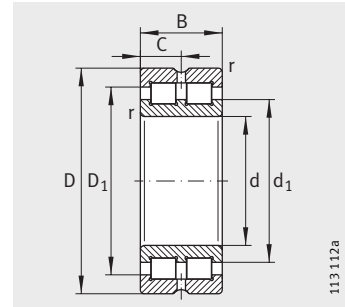
SL0248, SL0249
Non-locating bearings

Mounting dimensions				Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
C	d_1 \approx	D_1 \approx	E	dyn. C_r N	stat. C_{0r} N			
25	148,4	160	–	265 000	530 000	63 000	2 090	1 480
25	149,5	–	165,4	265 000	530 000	63 000	2 090	1 480
47,5	148,6	175,5	184,4	740 000	1 230 000	185 000	1 960	1 300
25	159	170,5	–	275 000	570 000	66 000	1 960	1 360
25	160	–	175,9	275 000	570 000	66 000	1 960	1 360
47,5	162,6	189,5	198,4	780 000	1 360 000	169 000	1 850	1 170
20	165,1	174,2	–	237 000	550 000	62 000	1 910	1 240
20	165,1	–	178,3	237 000	550 000	62 000	1 910	1 240
30	171,8	187,2	–	415 000	840 000	98 000	1 800	1 180
30	171,8	–	192,77	415 000	840 000	98 000	1 800	1 180
50	170	198	207,45	810 000	1 390 000	175 000	1 730	1 110
20	173,7	182,8	–	243 000	580 000	64 000	1 800	1 170
20	173,7	–	186,9	243 000	580 000	64 000	1 800	1 170
30	184,2	200,3	–	435 000	900 000	104 000	1 710	1 090
30	184,2	–	206,16	435 000	900 000	104 000	1 710	1 090
22,5	186,3	197	–	265 000	620 000	68 000	1 680	1 160
22,5	186,3	–	201,3	265 000	620 000	68 000	1 680	1 160
30	193,1	209,1	–	445 000	950 000	108 000	1 620	1 110
30	193,1	–	215,08	445 000	950 000	108 000	1 620	1 010
22,5	199,1	209,8	–	275 000	660 000	72 000	1 600	1 070
22,5	199,1	–	214,1	275 000	660 000	72 000	1 600	1 070
34,5	204,9	224,1	–	580 000	1 230 000	140 000	1 510	910
34,5	204,9	–	230,5	580 000	1 230 000	140 000	1 510	910
25	207,6	220,7	–	315 000	750 000	81 000	1 510	1 020
25	207,6	–	225	315 000	750 000	81 000	1 510	1 020
34,5	215	234,3	–	590 000	1 290 000	145 000	1 440	850
34,5	215	–	240,7	590 000	1 290 000	145 000	1 440	850
25	218,1	231,2	–	325 000	790 000	84 000	1 440	950
25	218,1	–	235,5	325 000	790 000	84 000	1 440	950
40	230,5	252,3	–	690 000	1 480 000	165 000	1 350	820
40	230,5	–	259,34	690 000	1 480 000	165 000	1 350	820



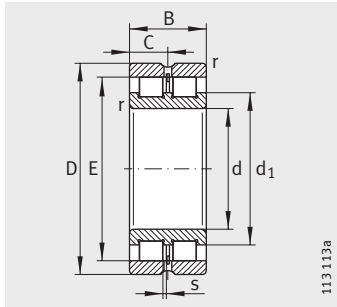
Cylindrical roller bearings

Full complement, double row
Locating and non-locating bearings



SL0148, SL0149
Locating bearings

Dimension table (continued) · Dimensions in mm								
Locating bearings Designation	Non-locating bearings Designation	Designation to DIN 5 412	Mass m ≈kg	Dimensions				
				d	D	B	r min.	s
SL014844	–	NNC 4844 V	6,4	220	270	50	1,5	–
–	SL024844	NNCL 4844 V	6,2	220	270	50	1,5	4
SL014944	–	NNC 4944 V	17,2	220	300	80	2,1	–
–	SL024944	NNCL 4944 V	16,7	220	300	80	2,1	5
SL014848	–	NNC 4848 V	10	240	300	60	2	–
–	SL024848	NNCL 4848 V	9,9	240	300	60	2	4
SL014948	–	NNC 4948 V	18,5	240	320	80	2,1	–
–	SL024948	NNCL 4948 V	17,9	240	320	80	2,1	5
SL014852	–	NNC 4852 V	11	260	320	60	2	–
–	SL024852	NNCL 4852 V	10,6	260	320	60	2	4
SL014952	–	NNC 4952 V	32	260	360	100	2,1	–
–	SL024952	NNCL 4952 V	31,2	260	360	100	2,1	6
SL014856	–	NNC 4856 V	16	280	350	69	2	–
–	SL024856	NNCL 4856 V	15,6	280	350	69	2	4
SL014956	–	NNC 4956 V	34	280	380	100	2,1	–
–	SL024956	NNCL 4956 V	33,1	280	380	100	2,1	6
SL014860	–	NNC 4860 V	23	300	380	80	2,1	–
–	SL024860	NNCL 4860 V	22	300	380	80	2,1	6
SL014960	–	NNC 4960 V	53	300	420	118	3	–
–	SL024960	NNCL 4960 V	51,9	300	420	118	3	6
SL014864	–	NNC 4864 V	24	320	400	80	2,1	–
–	SL024864	NNCL 4864 V	23,5	320	400	80	2,1	6
SL014964	–	NNC 4964 V	56	320	440	118	3	–
–	SL024964	NNCL 4964 V	54,9	320	440	118	3	6
SL014868	–	NNC 4868 V	25,5	340	420	80	2,1	–
–	SL024868	NNCL 4868 V	25	340	420	80	2,1	6
SL014968	–	NNC 4968 V	59	340	460	118	3	–
–	SL024968	NNCL 4968 V	57,8	340	460	118	3	6



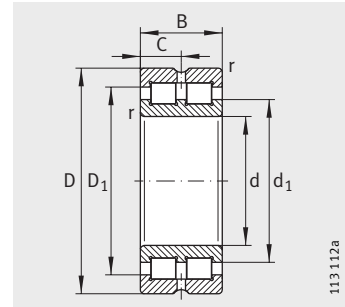
SL0248, SL0249
Non-locating bearings

Mounting dimensions				Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
C	d_1 \approx	D_1 \approx	E	dyn. C_r N	stat. C_{0r} N			
25	239,1	252,3	–	340 000	870 000	90 000	1 320	840
25	239,1	–	256,5	340 000	870 000	90 000	1 320	840
40	248	268,5	–	720 000	1 590 000	174 000	1 250	730
40	248	–	276,52	720 000	1 590 000	174 000	1 250	730
30	259,5	276,7	–	520 000	1 290 000	134 000	1 200	720
30	259,5	–	281,9	520 000	1 290 000	134 000	1 200	720
40	270,6	292,3	–	750 000	1 740 000	186 000	1 160	660
40	270,6	–	299,46	750 000	1 740 000	186 000	1 160	660
30	281,8	298,8	–	540 000	1 400 000	143 000	1 120	650
30	281,8	–	304,2	540 000	1 400 000	143 000	1 120	650
50	294,5	322,1	–	1 120 000	2 500 000	270 000	1 050	570
50	294,5	–	331,33	1 120 000	2 500 000	270 000	1 050	570
34,5	306,8	326,4	–	710 000	1 860 000	189 000	1 030	570
34,5	306,8	–	332,4	710 000	1 860 000	189 000	1 030	570
50	316,5	344,6	–	1 170 000	2 700 000	285 000	980	520
50	316,5	–	353,34	1 170 000	2 700 000	285 000	980	520
40	327,9	349,9	–	830 000	2 120 000	214 000	950	540
40	327,9	–	356,7	830 000	2 120 000	214 000	950	540
59	340,7	374,3	–	1 650 000	3 800 000	390 000	900	435
59	340,7	–	385,51	1 650 000	3 800 000	390 000	900	435
40	350,9	372,9	–	860 000	2 280 000	225 000	900	490
40	350,9	–	379,7	860 000	2 280 000	225 000	900	490
59	367,5	401,1	–	1 720 000	4 100 000	415 000	850	400
59	367,5	–	412,27	1 720 000	4 100 000	415 000	850	400
40	368,1	390,1	–	880 000	2 390 000	233 000	850	460
40	368,1	–	396,9	880 000	2 390 000	233 000	850	460
59	385,3	418,9	–	1 770 000	4 300 000	430 000	810	375
59	385,3	–	430,11	1 770 000	4 300 000	430 000	810	375



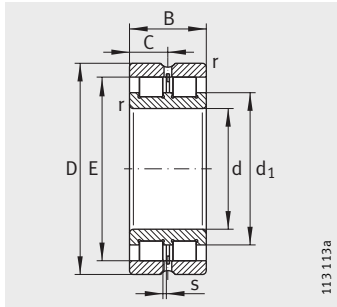
Cylindrical roller bearings

Full complement, double row
Locating and non-locating bearings



SL0148, SL0149
Locating bearings

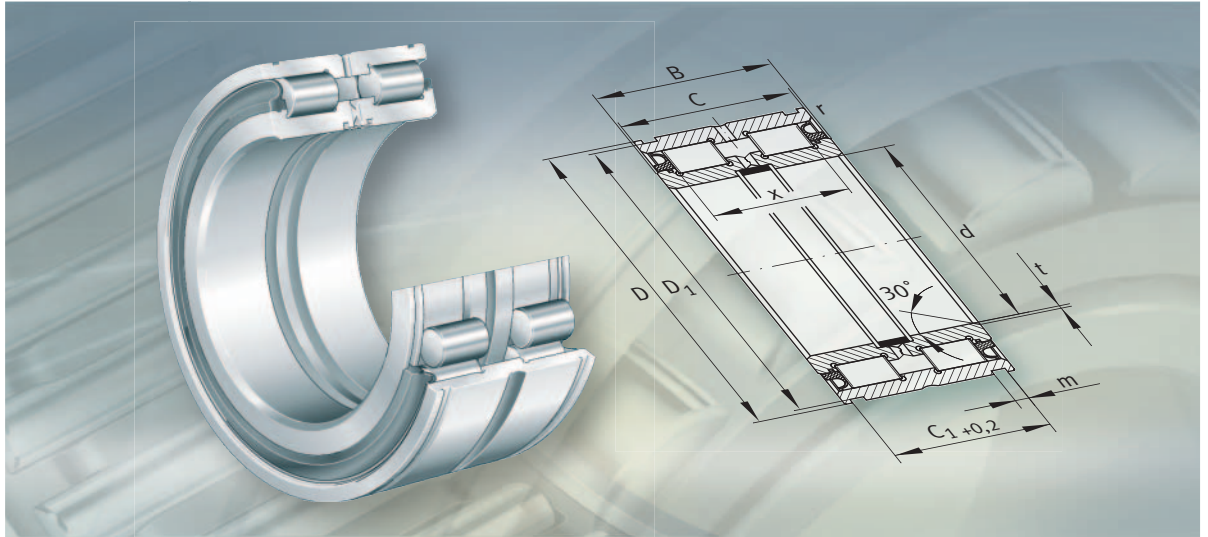
Dimension table (continued) · Dimensions in mm								
Locating bearings Designation	Non-locating bearings Designation	Designation to DIN 5 412	Mass m ≈kg	Dimensions				
				d	D	B	r min.	s
SL014872	–	NNC 4872 V	27	360	440	80	2,1	–
–	SL024872	NNCL 4872 V	26	360	440	80	2,1	6
SL014972	–	NNC 4972 V	62,1	360	480	118	3	–
–	SL024972	NNCL 4972 V	60,8	360	480	118	3	6
SL014876	–	NNC 4876 V	45,5	380	480	100	2,1	–
–	SL024876	NNCL 4876 V	44	380	480	100	2,1	6
SL014976	–	NNC 4976 V	92,4	380	520	140	4	–
–	SL024976	NNCL 4976 V	90,5	380	520	140	4	7
SL014880	–	NNC 4880 V	46,5	400	500	100	2,1	–
–	SL024880	NNCL 4880 V	45,8	400	500	100	2,1	6
SL014980	–	NNC 4980 V	96,5	400	540	140	4	–
–	SL024980	NNCL 4980 V	94,6	400	540	140	4	7



SL0248, SL0249
Non-locating bearings

Mounting dimensions				Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
C	d_1 \approx	D_1 \approx	E	dyn. C_r N	stat. C_{0r} N			
40	391	413,2	–	910 000	2 550 000	244 000	810	425
40	391	–	419,8	910 000	2 550 000	244 000	810	425
59	404	436,8	–	1 810 000	4 500 000	445 000	770	350
59	404	–	447,95	1 810 000	4 500 000	445 000	770	350
50	419	447,2	–	1 330 000	3 550 000	345 000	750	380
50	419	–	455,8	1 330 000	3 550 000	345 000	750	380
70	430,2	468,7	–	2 280 000	5 600 000	560 000	720	320
70	430,2	–	481,35	2 280 000	5 600 000	560 000	720	320
50	433,8	462	–	1 360 000	3 700 000	355 000	720	355
50	433,8	–	470,59	1 360 000	3 700 000	355 000	720	355
70	450,5	489	–	2 340 000	5 900 000	580 000	690	300
70	450,5	–	501,74	2 340 000	5 900 000	580 000	690	300





Full complement cylindrical roller bearings with snap ring grooves

Full complement cylindrical roller bearings with snap ring grooves

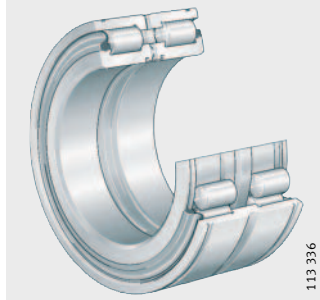
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Product overview Full complement cylindrical roller bearings with snap ring grooves

Locating bearings
Lip seals

SL0450..-PP
SL04..-PP



Full complement cylindrical roller bearings with snap ring grooves

Features Cylindrical roller bearings with snap ring grooves are full complement, double row units comprising solid outer and inner rings with ribs, rib-guided cylindrical rollers and sealing rings. The outer rings have grooves for retaining rings. The inner rings are axially split, 1 mm wider than the outer rings and held together by a rolled-in steel strip. The bearings are available as a light series SL04...-PP and in the dimension series 50 as SL0450...-PP.

Locating bearings Cylindrical roller bearings with snap ring grooves are locating bearings. These bearings are very rigid and can support axial forces in both directions as well as high radial forces. Due to their full complement design, they have the maximum possible number of rolling elements and therefore the maximum basic dynamic and static load ratings. Due to the kinematic conditions, however, they do not achieve the high speeds that are possible when using cylindrical roller bearings with cage.

Bearings for cable sheaves Due to the grooves in the outer rings, the bearing rings can easily be axially located. The bearings are therefore highly suitable for cable sheave bearing arrangements.



Sealing/lubricant Sealing rings on both sides protect the running system against contamination and moisture. The cylindrical roller bearings are greased with a lithium complex soap grease to GA08 and can be relubricated via the outer and inner ring.

Operating temperature

Caution! The cylindrical roller bearings are suitable for operating temperatures from -20 °C to $+80\text{ °C}$, limited by the grease and the seal material.

Suffixes Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
C3	Radial internal clearance larger than normal	Special design ¹⁾
C4	Radial internal clearance larger than C3	Special design ¹⁾
C5	Radial internal clearance larger than C4	Special design ¹⁾
P	Sealing ring on one side	Special design ¹⁾
PP	Sealing rings on both sides	Standard
RR	Corrosion-resistant design with Corrotect [®] plating	Special design ¹⁾
2NR	Bearings with two retaining rings WRE supplied loose	Special design ¹⁾
–	Without seals	Special design ¹⁾

¹⁾ Available by agreement.

Full complement cylindrical roller bearings with snap ring grooves

Design and safety guidelines

Radial location

The bearings normally have a circumferential load on the outer ring – for example in cable sheaves. The outer ring must therefore have a press fit.

Axial location

The abutting shoulders (shaft/housing) should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seating to the abutting shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509.

Note the minimum chamfer dimensions r as given in the dimension tables.

Caution! The split inner ring must be axially located on both sides, *Figure 1*. The fasteners on the split inner ring must not be subjected to axial load.

Location by retaining rings

The grooves allow the outer rings to be axially located using retaining rings, *Figure 1*. Suitable fasteners are WRE rings or rings to DIN 471. Locating rings are not included in the delivery. The design 2NR is supplied with two retaining rings WRE packed loose.

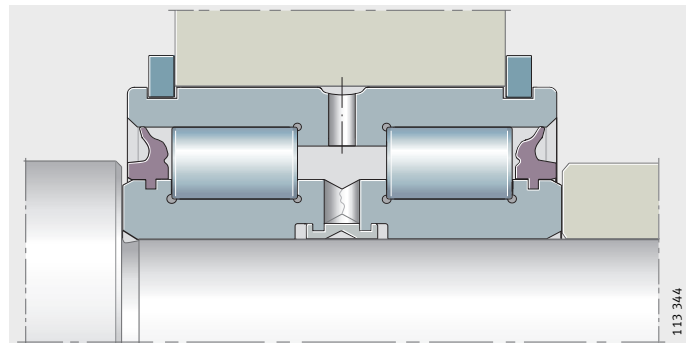


Figure 1
Axial location of inner and outer ring

Support of sealing rings

The sealing rings must be supported to a sufficient height, so that they are not pressed out during lubrication of the bearings, *Figure 2*. The dimension d_2 given in the dimension table must be observed.

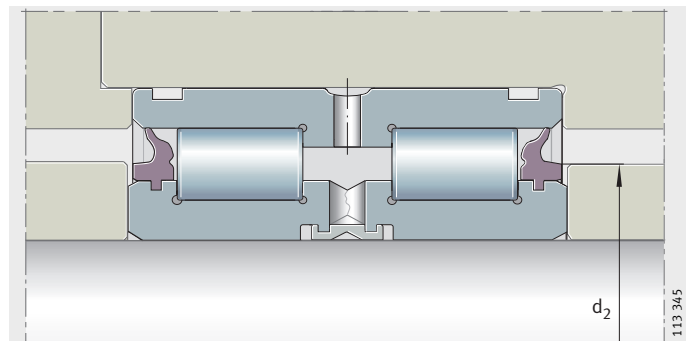


Figure 2
Support of sealing rings

Fitting and dismantling

Caution!

During fitting and dismantling of the bearings, the mounting forces must never be directed through the rolling elements, sealing rings or the fasteners on the split inner ring.

Accuracy

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620.

Radial internal clearance

The radial internal clearance corresponds to internal clearance group CN.

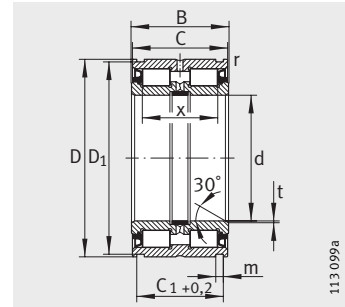
Radial internal clearance to DIN 620-4

Bore d mm		Radial internal clearance							
		CN μm		C3 μm		C4 μm		C5 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	20	45	35	60	50	75	65	90
24	30	20	45	35	60	50	75	70	95
30	40	25	50	45	70	60	85	80	105
40	50	30	60	50	80	70	100	95	125
50	65	40	70	60	90	80	110	110	140
65	80	40	75	65	100	90	125	130	165
80	100	50	85	75	110	105	140	155	190
100	120	50	90	85	125	125	165	180	220
120	140	60	105	100	145	145	190	200	245
140	160	70	120	115	165	165	215	225	275
160	180	75	125	120	170	170	220	250	300
180	200	90	145	140	195	195	250	275	330
200	225	105	165	160	220	220	280	305	365
225	250	110	175	170	235	235	300	330	395
250	280	125	195	190	260	260	330	370	440
280	315	130	205	200	275	275	350	410	485



Cylindrical roller bearings with snap ring grooves

Full complement, sealed
Locating bearings

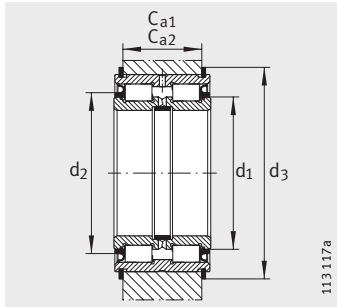


SL0450..-PP
SL04..-PP

Dimension table · Dimensions in mm											
Designation	Mass m ≈kg	Dimensions									
		d	D	B	C	C ₁	D ₁ +0,2	m	r	t	x
SL045004-PP	0,2	20	42	30	29	24,7	40,2	1,8	0,3	0,5	22,5
SL045005-PP	0,24	25	47	30	29	24,7	45,2	1,8	0,3	0,5	22,5
SL045006-PP	0,37	30	55	34	33	28,2	53	2,1	0,3	0,5	25,5
SL045007-PP	0,48	35	62	36	35	30,2	60	2,1	0,3	0,5	27,5
SL045008-PP	0,56	40	68	38	37	32,2	65,8	2,7	0,6	0,8	28,5
SL045009-PP	0,7	45	75	40	39	34,2	72,8	2,7	0,6	0,8	30,5
SL045010-PP	0,76	50	80	40	39	34,2	77,8	2,7	0,6	0,8	30,5
SL045011-PP	1,18	55	90	46	45	40,2	87,4	3,2	0,6	1	36
SL045012-PP	1,26	60	95	46	45	40,2	92,4	3,2	0,6	1	36
SL045013-PP	1,33	65	100	46	45	40,2	97,4	3,2	0,6	1	36
SL045014-PP	1,87	70	110	54	53	48,2	107,1	4,2	0,6	1	42
SL045015-PP	1,96	75	115	54	53	48,2	112,1	4,2	0,6	1	42
SL045016-PP	2,71	80	125	60	59	54,2	122,1	4,2	0,6	1,5	48
SL045017-PP	2,83	85	130	60	59	54,2	127,1	4,2	0,6	1,5	48
SL045018-PP	3,71	90	140	67	66	59,2	137	4,2	0,6	1,5	54
SL045019-PP	3,88	95	145	67	66	59,2	142	4,2	0,6	1,5	54
SL045020-PP	3,95	100	150	67	66	59,2	147	4,2	0,6	1,5	54
SL045022-PP	6,57	110	170	80	79	70,2	167	4,2	0,6	1,8	64
SL045024-PP	7,04	120	180	80	79	71,2	176	4,2	0,6	1,8	64
SL045026-PP	10,5	130	200	95	94	83,2	196	4,2	0,6	1,8	77
SL04130-PP	7,5	130	190	80	79	71,2	186	4,2	0,6	1,8	64
SL045028-PP	11,1	140	210	95	94	83,2	206	5,2	0,6	1,8	77
SL04140-PP	8	140	200	80	79	71,2	196	4,2	0,6	1,8	64
SL045030-PP	13,3	150	225	100	99	87,2	221	5,2	0,6	2	80
SL04150-PP	8,4	150	210	80	79	71,2	206	5,2	0,6	1,8	64
SL045032-PP	16,6	160	240	109	108	95,2	236	5,2	0,6	2	89
SL04160-PP	8,8	160	220	80	79	71,2	216	5,2	0,6	1,8	64

1) For snap rings WRE.

2) For retaining ring to DIN 471.



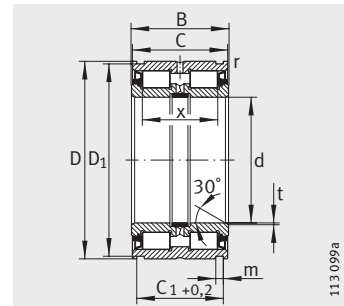
Mounting dimensions

Mounting dimensions					Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G grease min^{-1}	Snap ring WRE	Retaining ring to DIN 471
$C_{a1}^{1)}$	$C_{a2}^{2)}$	d_1	d_2	$d_3^{1)}$	dyn. C_r N	stat. C_{Or} N				
-0,2	-0,2									
21,5	21	30,55	34	47	40 500	49 000	6 900	4 000	WRE42	42X1,75
21,5	21	35,35	39	52	44 500	58 000	8 100	3 600	WRE47	47X1,75
25	24	40,6	44	60	50 000	67 000	9 500	3 000	WRE55	55X2
27	26	46,1	50	67	63 000	88 000	12 400	2 600	WRE62	62X2
28	27	51,4	55	75	76 000	103 000	16 000	2 400	WRE68	68X2,5
30	29	57	61	82	92 000	130 000	19 900	2 200	WRE75	75X2,5
30	29	61,8	66	87	97 000	142 000	21 700	2 000	WRE80	80X2,5
35	34	68,6	73	99	115 000	175 000	25 500	1 800	WRE90	90X3
35	34	73,7	79	104	120 000	189 000	27 500	1 700	WRE95	95X3
35	34	78,8	84	109	125 000	203 000	29 500	1 600	WRE100	100X3
43	40	84,5	91	119	168 000	265 000	36 000	1 400	WRE110	110X4
43	40	89,95	97	124	194 000	300 000	42 000	1 400	WRE115	115X4
49	46	97,1	105	137	203 000	325 000	45 000	1 300	WRE125	125X4
49	46	103,9	112	142	211 000	350 000	47 500	1 200	WRE130	130X4
54	51	109,3	118	152	305 000	510 000	69 000	1 100	WRE140	140X4
54	51	113,35	122	157	315 000	530 000	71 000	1 100	WRE145	145X4
54	51	117,35	128	162	330 000	550 000	73 000	1 000	WRE150	150X4
65	62	131,55	143	182	395 000	680 000	89 000	900	WRE170	170X4
65	63	140,9	153	196	410 000	740 000	94 000	900	WRE180	180X4
77	75	156,75	170	216	540 000	960 000	122 000	800	WRE200	200X4
65	63	150,55	160	206	430 000	790 000	99 000	800	WRE190	190X4
77	73	165,4	181	226	610 000	1 100 000	139 000	750	WRE210	210X5
65	63	159,95	170	216	445 000	840 000	104 000	750	WRE200	200X4
81	77	175,7	192	245	710 000	1 260 000	156 000	700	WRE225	225X5
65	61	174,4	185	226	465 000	920 000	111 000	700	WRE210	210X5
89	85	189	207	260	740 000	1 360 000	165 000	650	WRE240	240X5
65	61	184,05	196	236	480 000	970 000	116 000	700	WRE220	220X5



Cylindrical roller bearings with snap ring grooves

Full complement, sealed
Locating bearings

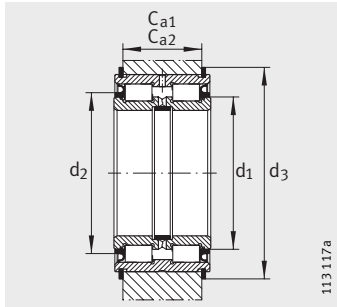


SL0450...-PP
SL04...-PP

Dimension table (continued) · Dimensions in mm											
Designation	Mass m ≈kg	Dimensions									
		d	D	B	C	C ₁	D ₁ +0,2	m	r	t	x
SL045034-PP	22,6	170	260	122	121	107,2	254	5,2	0,6	2	100
SL04170-PP	9,3	170	230	80	79	71,2	226	5,2	0,6	1,8	64
SL045036-PP	30,1	180	280	136	135	118,2	274	5,2	0,6	2	112
SL04180-PP	9,8	180	240	80	79	71,2	236	5,2	0,6	1,8	64
SL045038-PP	31,5	190	290	136	135	118,2	284	5,2	0,6	2	112
SL04190-PP	12,7	190	260	80	79	73,2	254	5,2	0,6	1,8	64
SL045040-PP	40,8	200	310	150	149	128,2	304	6,3	0,6	2	126
SL04200-PP	13,2	200	270	80	79	73,2	264	5,2	0,6	1,8	64
SL045044-PP	52,5	220	340	160	159	138,2	334	6,3	1	2	132
SL04220-PP	19,5	220	300	95	94	83,2	294	5,2	1	2	72
SL045048-PP	56	240	360	160	159	138,2	354	6,3	1	2	132
SL04240-PP	21	240	320	95	94	83,2	314	6,3	1	2	72
SL045052-PP	84,5	260	400	190	189	162,2	394	6,3	1,1	3	150
SL04260-PP	22,5	260	340	95	94	83,2	334	6,3	1	3	75
SL045056-PP	90	280	420	190	189	163,2	413	7,3	1,1	3	150
SL045060-PP	126	300	460	218	216	185,2	453	7,3	1,1	3	170
SL04300-PP	25,5	300	380	95	94	83,2	374	6,3	1	3	75

³⁾ For snap rings WRE.

⁴⁾ For retaining ring to DIN 471.

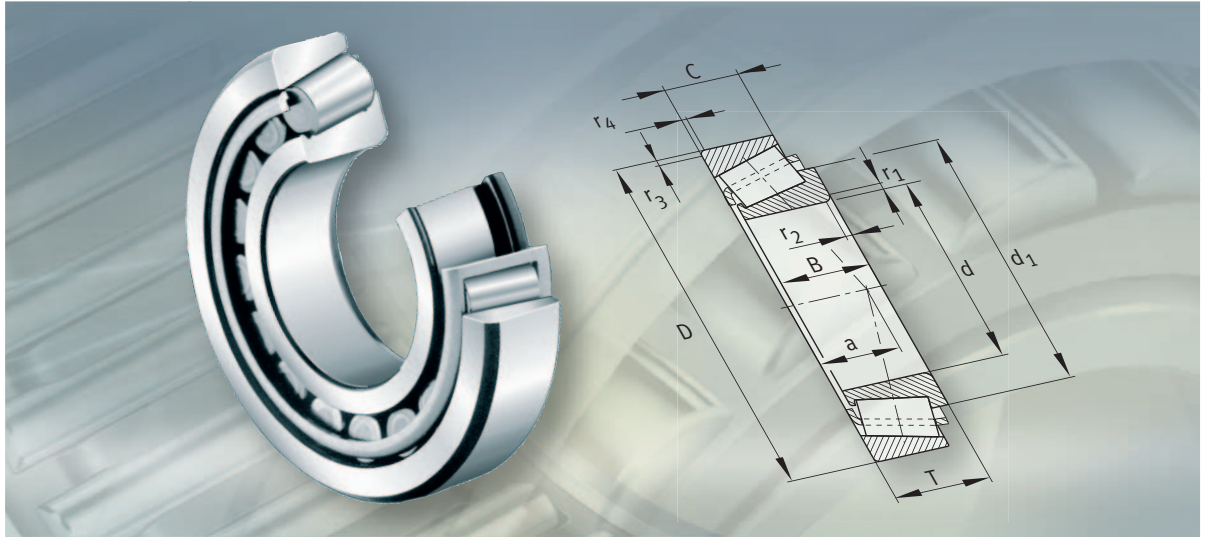


Mounting dimensions

Mounting dimensions					Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G grease min^{-1}	Snap ring WRE	Retaining ring to DIN 471
$C_{a1}^{3)}$	$C_{a2}^{4)}$	d_1	d_2	$d_3^{3)}$	dyn. C_r N	stat. C_{0r} N				
-0,2	-0,2									
99	97	200,7	220	282	960 000	1 750 000	212 000	600	WRE260	260X5
65	61	193,9	206	250	490 000	1 030 000	120 000	650	WRE230	230X5
110	108	217,8	239	302	1 140 000	2 130 000	255 000	550	WRE280	280X5
65	61	203,1	216	260	500 000	1 080 000	125 000	600	WRE240	240X5
110	108	225,65	248	312	1 160 000	2 210 000	260 000	550	WRE290	290X5
65	63	217,55	231	282	520 000	1 130 000	131 000	550	WRE260	260X5
120	116	243,05	267	336	1 350 000	2 600 000	300 000	500	WRE310	310X6
65	63	227,15	241	292	540 000	1 210 000	136 000	550	WRE270	270X5
130	126	259,85	286	366	1 570 000	3 050 000	350 000	480	WRE340	340X6
75	73	248,7	264	322	700 000	1 550 000	174 000	480	WRE300	300X5
130	126	279,25	305	386	1 630 000	3 300 000	370 000	440	WRE360	360X6
75	71	271,7	287	346	740 000	1 700 000	186 000	480	WRE320	320X6
154	150	304,95	336	426	2 380 000	4 700 000	520 000	400	WRE400	400X6
75	71	292,7	310	366	840 000	1 990 000	215 000	440	WRE340	340X6
154	149	320,95	354	453	2 600 000	5 200 000	570 000	380	WRE420	420X7
176	171	346,85	375	493	3 000 000	5 800 000	620 000	340	WRE460	460X7
75	71	328	346	406	900 000	2 250 000	234 000	380	WRE380	380X6



FAG



Tapered roller bearings

Tapered roller bearings

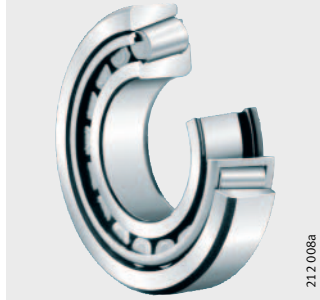
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Product overview Tapered roller bearings

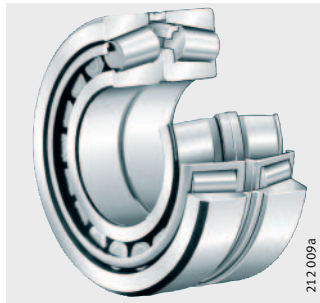
Single row

302, 303, 313, 320, 322,
323, 323..-A, 323..-B, 329,
330, 331, 332, T, K



Matched in pairs

313..-N11CA



Tapered roller bearings

Features	<p>Tapered roller bearings comprise solid inner and outer rings with tapered raceways and tapered rollers with cages made from pressed sheet steel. The bearings are not self-retaining. As a result, the inner ring with the rollers and the cage can be fitted separately from the outer ring.</p>
Radial and axial load capacity	<p>Tapered roller bearings can support axial forces in one direction and high radial forces. They must normally be axially adjusted against a second bearing fitted in a mirror image arrangement. This bearing combination is fitted in an O or X arrangement, <i>Figure 1, Figure 2, page 467.</i></p> <p>The axial load carrying capacity is dependent on the contact angle; i.e. the larger the angle, the higher the axial load to which the bearing can be subjected. The bearing-specific value e in the dimension tables indicates the contact angle and therefore the load carrying capacity. Bearings of series 313, 323.-B, T5ED and T7FC have a very high axial load carrying capacity due to their particularly large contact angle.</p>
Matched bearings	<p>Tapered roller bearings 313.-N11CA are matched in pairs in an X arrangement and can therefore support high axial forces in both directions and moment loads.</p> <p>The axial internal clearance of the bearing pair is defined by a ring between the two outer rings and is indicated in the suffix, see <i>Axial internal clearance, page 474.</i></p> <p>Speeds for matched bearings: see page 470.</p> <p>When ordering matched bearings, please state the number of bearings, not the number of bearing pairs.</p>
Metric and inch sizes	<p>Tapered roller bearings are available in metric and inch sizes. Bearings with a K in the designation are inch sizes. For new designs, bearings in metric sizes should be used in preference.</p>
Sealing/lubrication	<p>Tapered roller bearings are not sealed and not greased. They can be lubricated using oil or grease.</p>
Compensation of angular misalignments	<p>The modified line contact between the tapered rollers and the raceways ensures optimum stress distribution at the contact points, prevents edge stresses and allows the bearings to undergo angular adjustment.</p> <p>At a load ratio $P/C_r \leq 0,2$, the tilting of the bearing rings relative to each other must not exceed a maximum of 4 angular minutes. For higher loads or tilting angles, please contact us.</p>



Tapered roller bearings

Operating temperature Tapered roller bearings can be used at operating temperatures from -30 °C to $+120\text{ °C}$.

Bearings with an outside diameter of more than 90 mm are dimensionally stable up to $+150\text{ °C}$, bearings with an outside diameter of more than 120 mm up to $+200\text{ °C}$.

Cages Tapered roller bearings have pressed cages made from sheet steel. Since these project laterally to a certain extent, the mounting dimensions in the dimension tables and the cage projection, page 470, must be observed.

Suffixes Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
A	Modified internal construction	Standard
N11CA-A..	Two tapered roller bearings matched in an X arrangement, with an intermediate ring between the other rings. Axial internal clearance in μm	Standard
B	Increased contact angle	Standard
P5	Increased accuracy	Special design ¹⁾
X	Outer dimensions matched to international standards	Standard

¹⁾ Available by agreement and in certain series only.

Design and safety guidelines

Calculation of axial force

Under radial load, an internal axial force is induced in the bearing that must be supported by a second bearing and taken into consideration when calculating the equivalent bearing load.

Depending on the bearing arrangement (O or X arrangement), the axial force must first be determined for bearings adjusted clearance-free without preload, see table Load ratio and axial bearing load, *Figure 1, Figure 2*, page 467.

The following preconditions apply:

- The radial forces act at the central pressure points and are positive,
- Bearing A is subjected to a radial load F_{rA} , bearing B to F_{rB}
- F is an external axial force acting on bearing A.

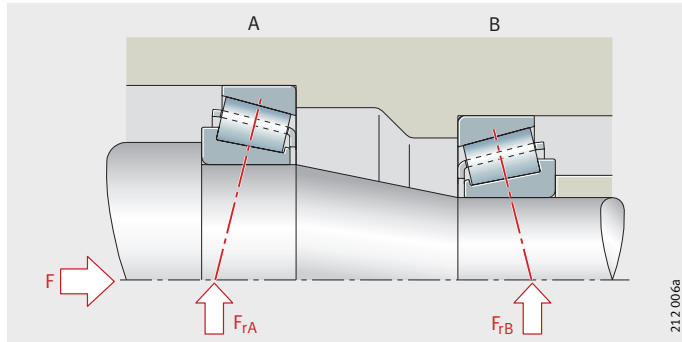


Figure 1
Bearings in O arrangement

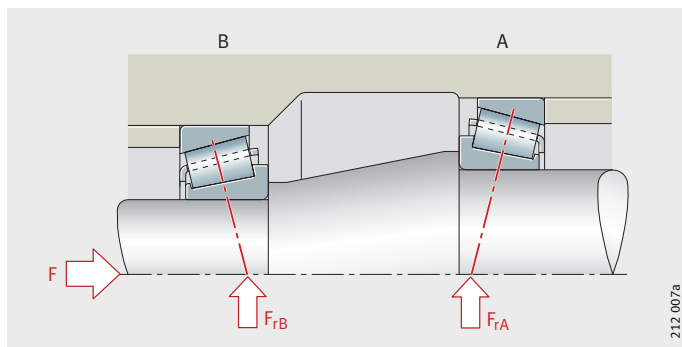


Figure 2
Bearings in X arrangement

**Load ratio
and axial bearing load**

Load ratio		Axial force F_a ¹⁾	
Radial bearing load	External axial force	Bearing A	Bearing B
$\frac{F_{rA}}{Y_A} \leq \frac{F_{rB}}{Y_B}$	$F \geq 0$	$F_a = F + 0,5 \cdot \frac{F_{rB}}{Y_B}$	2)
$\frac{F_{rA}}{Y_A} > \frac{F_{rB}}{Y_B}$	$F > 0,5 \cdot \left(\frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B} \right)$	$F_a = F + 0,5 \cdot \frac{F_{rB}}{Y_B}$	2)
	$F \leq 0,5 \cdot \left(\frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B} \right)$	2)	$F_a = 0,5 \cdot \frac{F_{rA}}{Y_A} - F$

1) Axial force F_a , to be used in calculation of the equivalent dynamic bearing load.

2) If no formula is given, the axial force is not taken into consideration.

Tapered roller bearings

Equivalent dynamic bearing load

Single bearing under dynamic load

For bearings under dynamic loading, the following applies:

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq e$	$P = F_r$
$\frac{F_a}{F_r} > e$	$P = 0,4 \cdot F_r + Y \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load
F_r N
Radial dynamic bearing load
e, Y –
Factors from dimension tables.

For bearing pairs under dynamic load in an X or O arrangement:

Bearing pairs under dynamic load

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq e$	$P = F_r + 1,12 \cdot Y \cdot F_a$
$\frac{F_a}{F_r} > e$	$P = 0,67 \cdot F_r + 1,68 \cdot Y \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load of bearing pair
F_r N
Radial dynamic bearing load of bearing pair
e, Y –
Factors for single bearings from dimension tables.

For matched bearing pairs 313..-N11CA under dynamic load:

Matched bearing pairs under dynamic load

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq e$	$P = F_r + Y_1 \cdot F_a$
$\frac{F_a}{F_r} > e$	$P = 0,67 \cdot F_r + Y_2 \cdot F_a$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load of bearing pair
F_r N
Radial dynamic bearing load of bearing pair
e, Y₁, Y₂ –
Factors for bearing pairs from dimension tables.

Equivalent static bearing load

Single bearing under static load

For single bearings under static load, the following applies:

Load ratio	Equivalent static load
$\frac{F_{0a}}{F_{0r}} \leq \frac{1}{2 \cdot Y_0}$	$P_0 = F_{0r}$
$\frac{F_{0a}}{F_{0r}} > \frac{1}{2 \cdot Y_0}$	$P_0 = 0,5 \cdot F_{0r} + Y_0 \cdot F_{0a}$

P_0 N
Equivalent static bearing load for combined load
 F_{0a} N
Axial static bearing load
 F_{0r} N
Radial static bearing load
 Y_0 –
Factor from dimension tables.

For bearing pairs under static load in an X or O arrangement:

Bearing pairs under static load

$$P_0 = F_{0r} + 2 \cdot Y_0 \cdot F_{0a}$$

P_0 N
Equivalent static bearing load for combined load
 F_{0a} N
Axial static bearing load of bearing pair
 F_{0r} N
Radial static bearing load of bearing pair
 Y_0 –
Factor for single bearings from dimension tables.



For matched bearing pairs 313..-N11CA under static load:

Matched bearing pairs under static load

$$P_0 = F_{0r} + Y_0 \cdot F_{0a}$$

P_0 N
Equivalent static bearing load for combined load
 F_{0a} N
Axial static bearing load of bearing pair
 F_{0r} N
Radial static bearing load of bearing pair
 Y_0 –
Factor for bearing pairs from dimension tables.

Tapered roller bearings

Basic dynamic and static load ratings for bearing pairs

If two bearings of the same size and design are fitted immediately adjacent to each other in an O or X arrangement, the basic dynamic load rating C_r and basic static load rating C_{0r} of the bearing pair are as follows:

- $C_r = 1,715 \cdot C_{r \text{ single bearing}}$
- $C_{0r} = 2 \cdot C_{0r \text{ single bearing}}$

Matched bearings

For matched bearing pairs 313..-N11CA, the basic dynamic and static load ratings are given in the dimension tables.

Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, a minimum radial load of the order of $P/C_r > 0,01$ is necessary for roller bearings with cage.

Speeds

Caution!

The limiting speeds n_G given in the dimension tables must not be exceeded.

Matched bearings

For matched bearings 313..-N11CA, the operating speed is approximately 20% below the calculated permissible operating speed of the single bearing.

The limiting speed n_G is possible if the less favourable thermal balance of the bearing pair is taken into consideration in the operating conditions.

Cage projection

Caution!

The cages project laterally to a certain extent. In order to prevent grazing, the lateral minimum distances C_a and C_b in the dimension tables must be taken into consideration in the design of the adjacent construction.

Accuracy
Tapered roller bearings in metric sizes

The main dimensions of the bearings conform to DIN ISO 355 and DIN 720.

The dimensional and geometrical tolerances conform to DIN 620-2.

Tapered roller bearings with width tolerance to tolerance class PN

Tapered roller bearings 303, 313, 313..-N11CA, 322, 323..-A, 323..-B, T2EE, T4CB, T4DB, T5ED and T7FC correspond to tolerance class PN.

Bearings 320, 329, 330, 331 and 332 for shaft diameters over 200 mm also have width tolerances to tolerance class PN.

Inner ring tolerances, Part 1

Bore mm d		Bore deviation μm Δ_{dmp}		Variation μm		Radial runout μm K_{ia}
over	incl.	max.	min.	V_{dp} max.	V_{dmp} max.	max.
10	18	0	-12	12	9	15
18	30	0	-12	12	9	18
30	50	0	-12	12	9	20
50	80	0	-15	15	11	25
80	120	0	-20	20	15	30
120	180	0	-25	25	19	35
180	250	0	-30	30	23	50
250	315	0	-35	35	26	60
315	400	0	-40	40	30	70



Inner ring tolerances, Part 2

Bore mm d		Width deviation μm Δ_{Bs}		Width deviation μm					
over	incl.	max.	min.	Δ_{Ts}		Δ_{T1s}		Δ_{T2s}	
				max.	min.	max.	min.	max.	min.
10	18	0	-120	+200	0	+100	0	+100	0
18	30	0	-120	+200	0	+100	0	+100	0
30	50	0	-120	+200	0	+100	0	+100	0
50	80	0	-150	+200	0	+100	0	+100	0
80	120	0	-200	+200	-200	+100	-100	+100	-100
120	180	0	-250	+350	-250	+150	-150	+200	-100
180	250	0	-300	+350	-250	+150	-150	+200	-100
250	315	0	-350	+350	-250	+150	-150	+200	-100
315	400	0	-400	+400	-400	+200	-200	+200	-200

Tapered roller bearings

Outer ring tolerances

Outside diameter mm D		Outside diameter deviation μm Δ_{Dmp}		Variation μm V_{Dp}		Radial runout μm K_{ea}
over	incl.	max.	min.	max.	V_{Dmp} max.	max.
18	30	0	-12	12	9	18
30	50	0	-14	14	11	20
50	80	0	-16	16	12	25
80	120	0	-18	18	14	35
120	150	0	-20	20	15	40
150	180	0	-25	25	19	45
180	250	0	-30	30	23	50
250	315	0	-35	35	26	60
315	400	0	-40	40	30	70
400	500	0	-45	45	34	80

The width tolerance Δ_{C_s} is identical to Δ_{B_s} for the inner ring of the same bearing.

Tapered roller bearings with width tolerance to tolerance class P6X

Tapered roller bearings 320, 329, 330, 331 and 332 for shaft diameters up to 200 mm have restricted width tolerances to tolerance class P6X.

Inner ring tolerances, Part 1

Bore mm d		Bore deviation μm Δ_{dmp}		Variation μm V_{dp}		Radial runout μm K_{ia}
over	incl.	max.	min.	max.	V_{dmp} max.	max.
10	18	0	-12	12	9	15
18	30	0	-12	12	9	18
30	50	0	-12	12	9	20
50	80	0	-15	15	11	25
80	120	0	-20	20	15	30
120	180	0	-25	25	19	35
180	200	0	-30	30	23	50

Inner ring tolerances, Part 2

Bore mm d		Width deviation μm Δ_{B_s}		Width deviation μm					
over	incl.	max.	min.	Δ_{T_s}		$\Delta_{T_{1s}}$		$\Delta_{T_{2s}}$	
				max.	min.	max.	min.	max.	min.
10	18	0	-50	+100	0	+50	0	+50	0
18	30	0	-50	+100	0	+50	0	+50	0
30	50	0	-50	+100	0	+50	0	+50	0
50	80	0	-50	+100	0	+50	0	+50	0
80	120	0	-50	+100	0	+50	0	+50	0
120	180	0	-50	+150	0	+50	0	+100	0
180	200	0	-50	+150	0	+50	0	+100	0

Outer ring tolerances

Outside diameter mm D		Outside diameter deviation μm Δ_{Dmp}		Variation μm		Radial runout μm K_{ea}	Width deviation μm Δ_{Cs}	
over	incl.	max.	min.	V_{Dp} max.	V_{Dmp} max.	max.	max.	min.
30	50	0	-14	14	11	20	0	-100
50	80	0	-16	16	12	25	0	-100
80	120	0	-18	18	14	35	0	-100
120	150	0	-20	20	15	40	0	-100
150	180	0	-25	25	19	45	0	-100
180	250	0	-30	30	23	50	0	-100
250	315	0	-35	35	26	60	0	-100

Total width tolerance of matched bearings

The tolerance for the total width of the bearing pair 313..-N11CA is determined from the axial internal clearance and the deviations of the width Δ_{Ts} of the single bearings, see Inner ring tolerances, Part 2 on page 471.

Tapered roller bearings in inch sizes

Tapered roller bearings of series K in inch sizes are manufactured as standard with normal tolerances to ANSI/ABMA.

The width deviation Δ_{Bs} and radial runout correspond to tolerance class PN in accordance with DIN 620-2.

In contrast to the metric bearings, bearings in inch sizes have plus tolerances on the bore and outside diameter.



Inner ring tolerances, Part 1

Bore mm d		Bore deviation μm Δ_{dmp}		Width deviation μm Δ_{Ts}	
over	incl.	max.	min.	max.	min.
-	81	+13	0	+200	0
81	102	+25	0	+200	0

Inner ring tolerances, Part 2

Bore mm d		Width deviation (in relation to bore) μm Δ_{Bs}		Radial runout μm K_{ia}
over	incl.	max.	min.	
10	18	0	-120	15
18	30	0	-120	18
30	50	0	-120	20
50	80	0	-150	25
80	120	0	-200	30

Tapered roller bearings

Outer ring tolerances

Outside diameter mm D		Outside diameter deviation μm Δ_{Dmp}		Radial runout μm K_{ea}
over	incl.	max.	min.	
18	30	+25	0	18
30	50	+25	0	20
50	80	+25	0	25
80	120	+25	0	35
120	150	+25	0	40

Chamfer dimensions for bearings in inch sizes

The values for the chamfer dimensions r apply to tapered roller bearings in inch sizes. Values for metric tapered roller bearings: see page 123.

Limit values for chamfer dimensions r_{\max} for the inner ring

Nominal bearing bore diameter d mm		Chamfer dimension ¹⁾	
over	incl.	r_1 mm	r_2 mm
–	50,8	+0,4	+0,9
50,8	101,6	+0,5	+1,25
101,6	254	+0,65	+1,8

1) r_{\min} : see dimension tables.

Limit values for chamfer dimensions r_{\max} for the outer ring

Nominal bearing bore diameter d mm		Chamfer dimension ¹⁾	
over	incl.	r_3 mm	r_4 mm
–	101,6	+0,6	+1,05
101,6	168,3	+0,65	+1,15
168,3	266,7	+0,85	+1,35
266,7	355,6	+1,7	+1,7

1) r_{\min} : see dimension tables.

Axial internal clearance

In tapered roller bearings, the axial internal clearance is the result of mounting against a second bearing during installation.

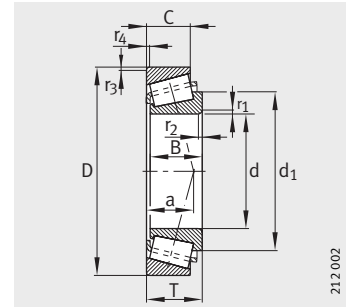
Matched bearings

The axial internal clearance is defined by an intermediate ring and is indicated in the suffix. Example: A80-120 indicates that the axial internal clearance of the bearing pair before fitting is between 80 μm and 120 μm .

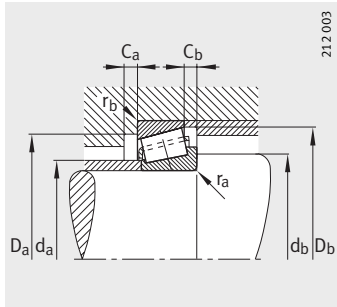
Once bearing pairs are fitted, the preset axial internal clearance is reduced by the fit conditions and the axial clamping forces.



Tapered roller bearings



Dimension table · Dimensions in mm														
Designation	Interchange designation to ISO 355	Mass m ≈kg	Dimensions									Mounting dimensions		
			d	D	B	C	T	r ₁ , r ₂ min.	r ₃ , r ₄ min.	a ≈	d ₁ ≈	d _a max.	d _b min.	D _a min.
30202-A	–	0,054	15	35	11	10	11,75	0,6	0,6	8	26,4	20	19	29
30302-A	T2FB015	0,096	15	42	13	11	14,25	1	1	10	28,2	22	21	36
30203-A	T2DB017	0,056	17	40	12	11	13,25	1	1	10	29,1	23	23	34
32203-A	T2DD017	0,105	17	40	16	14	17,25	1	1	11	28,7	22	23	34
30303-A	T2FB017	0,129	17	47	14	12	15,25	1	1	11	31,6	25	23	40
32303-A	T2FD017	0,18	17	47	19	16	20,25	1	1	12	31,5	24	23	39
32004-X	T3CC020	0,108	20	42	15	12	15	0,6	0,6	10	33	25	25	36
30204-A	T2DB020	0,092	20	47	14	12	15,25	1	1	11	34,5	27	26	40
31304	–	0,174	20	52	15	11	16,25	1,5	1,5	16	37,3	27	27	40
30304-A	T2FB020	0,188	20	52	15	13	16,25	1,5	1,5	11	36,1	28	27	44
32304-A	T2FD020	0,241	20	52	21	18	22,25	1,5	1,5	14	35,3	27	27	43
32005-X	T4CC025	0,12	25	47	15	11,5	15	0,6	0,6	12	38	30	30	40
30205-A	T3CC025	0,155	25	52	15	13	16,25	1	1	13	38,5	31	31	44
32205-A	T2CD025	0,186	25	52	18	16	19,25	1	1	14	40,2	31	31	44
33205	T2DE025	0,214	25	52	22	18	22	1	1	14	39,6	30	31	43
31305-A	T7FB025	0,297	25	62	17	13	18,25	1,5	1,5	20	46,3	34	32	47
30305-A	T2FB025	0,289	25	62	17	15	18,25	1,5	1,5	13	42,3	34	32	54
32305-A	T2FD025	0,362	25	62	24	20	25,25	1,5	1,5	16	42,3	33	32	53
320/28-X	T4CC028	0,156	28	52	16	12	16	1	1	13	41	33	34	45
32006-X	T4CC030	0,195	30	55	17	13	17	1	1	14	44,1	35	36	48
30206-A	T3DB030	0,237	30	62	16	14	17,25	1	1	14	45,6	37	36	53
32206-A	T3DC030	0,274	30	62	20	17	21,25	1	1	16	45,9	37	36	52
33206	T2DE030	0,394	30	62	25	19,5	25	1	1	16	46,1	36	36	53
31306-A	T7FB030	0,441	30	72	19	14	20,75	1,5	1,5	24	54	40	37	55
30306-A	T2FB030	0,445	30	72	19	16	20,75	1,5	1,5	15	49,3	40	37	62
32306-A	T2FD030	0,587	30	72	27	23	28,75	1,5	1,5	18	49,3	39	37	59
320/32-X	T4CC032	0,188	32	58	17	13	17	1	1	14	46,5	38	38	50
32007-X	T4CC035	0,257	35	62	18	14	18	1	1	15	50	40	41	54
30207-A	T3DB035	0,334	35	72	17	15	18,25	1,5	1,5	15	52,7	44	42	62
32207-A	T3DC035	0,482	35	72	23	19	24,25	1,5	1,5	18	53,9	43	42	61
33207	T2DE035	0,585	35	72	28	22	28	1,5	1,5	18	53	42	42	61
31307-A	T7FB035	0,582	35	80	21	15	22,75	2	1,5	26	59,9	44	44	62
30307-A	T2FB035	0,573	35	80	21	18	22,75	2	1,5	16	55,2	45	44	70
32307-B	T5FE035	0,802	35	80	31	25	32,75	2	1,5	25	59,8	42	44	61
32307-A	T2FE035	0,741	35	80	31	25	32,75	2	1,5	20	55,2	44	44	66

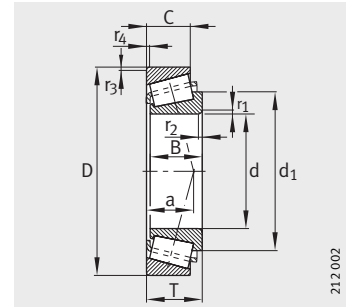


Mounting dimensions

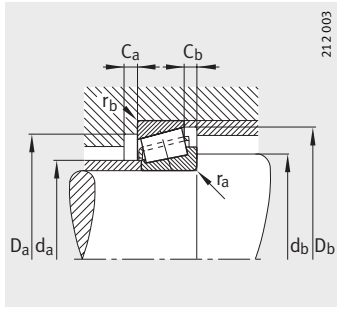
						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D _a	D _b	C _a	C _b	r _a	r _b	dyn. C _r	stat. C _{0r}	e	Y	Y ₀	C _{ur}	n _G	n _B
max.	min.	min.	min.	max.	max.	N	N				N	min ⁻¹	min ⁻¹
29	32	2	1,5	0,6	0,6	14 200	13 500	0,35	1,73	0,95	1 320	24 000	13 500
36	38	2	3	1	1	22 900	20 300	0,29	2,11	1,16	2 110	20 000	12 500
34	37	2	2	1	1	18 500	17 800	0,35	1,74	0,96	1 890	20 000	12 100
34	37	3	3	1	1	28 500	29 000	0,31	1,92	1,06	3 250	20 000	10 800
41	42	2	3	1	1	27 500	24 500	0,29	2,11	1,16	2 600	18 000	11 200
41	43	3	4	1	1	36 000	35 000	0,29	2,11	1,16	4 050	18 000	10 400
37	39	3	3	0,6	0,6	23 500	27 500	0,37	1,6	0,88	3 000	18 000	9 200
41	43	2	3	1	1	26 500	26 500	0,35	1,74	0,96	2 900	17 000	10 500
45	48	3	5	1,5	1,5	30 000	29 500	0,73	0,82	0,45	3 300	14 000	10 100
45	47	2	3	1,5	1,5	34 000	32 000	0,3	2	1,1	3 600	15 000	9 800
45	47	3	4	1,5	1,5	45 500	47 500	0,3	2	1,1	5 600	15 000	9 300
42	44	3	3,5	0,6	0,6	26 000	33 000	0,43	1,39	0,77	3 550	15 000	7 700
46	48	2	3	1	1	32 000	34 500	0,37	1,6	0,88	3 900	14 000	9 100
46	48	3	3	1	1	39 500	43 500	0,36	1,67	0,92	5 100	14 000	8 100
46	49	4	4	1	1	48 500	58 000	0,35	1,71	0,94	6 900	14 000	7 200
55	59	3	5	1,5	1,5	37 000	38 000	0,83	0,73	0,4	4 400	12 000	8 700
55	57	2	3	1,5	1,5	47 000	45 000	0,3	2	1,1	5 100	13 000	8 200
55	57	3	5	1,5	1,5	62 000	65 000	0,3	2	1,1	7 800	13 000	7 900
46	49	3	4	1	1	33 500	40 000	0,43	1,39	0,77	4 550	13 000	7 000
49	52	3	4	1	1	37 500	45 500	0,43	1,39	0,77	5 300	13 000	6 700
56	57	2	3	1	1	43 500	47 500	0,37	1,6	0,88	5 500	12 000	7 400
56	59	3	4	1	1	53 000	62 000	0,37	1,6	0,88	7 400	12 000	6 700
56	59	5	5,5	1	1	65 000	77 000	0,34	1,76	0,97	9 400	11 000	6 300
65	68	3	6,5	1,5	1,5	45 000	46 500	0,83	0,73	0,4	5 300	10 000	7 800
65	66	3	4,5	1,5	1,5	60 000	61 000	0,31	1,9	1,05	6 900	10 000	7 200
65	66	4	5,5	1,5	1,5	81 000	90 000	0,31	1,9	1,05	10 800	10 000	6 900
52	55	3	4	1	1	38 500	47 500	0,45	1,32	0,73	5 600	12 000	6 300
56	59	4	4	1	1	45 500	57 000	0,45	1,32	0,73	6 700	11 000	5 900
65	67	3	3	1,5	1,5	53 000	58 000	0,37	1,6	0,88	6 800	10 000	6 400
65	67	3	5,5	1,5	1,5	70 000	83 000	0,37	1,6	0,88	10 200	10 000	5 900
65	68	5	6	1,5	1,5	86 000	105 000	0,35	1,7	0,93	12 800	10 000	5 500
71	76	4	7,5	2	1,5	60 000	64 000	0,83	0,73	0,4	7 400	9 000	6 900
71	74	3	4,5	2	1,5	75 000	78 000	0,31	1,9	1,05	8 600	9 500	6 600
71	76	4	7,5	2	1,5	96 000	117 000	0,55	1,1	0,6	14 300	9 000	6 300
71	74	4	7,5	2	1,5	101 000	114 000	0,31	1,9	1,05	13 600	9 500	6 400



Tapered roller bearings



Dimension table (continued) - Dimensions in mm														
Designation	Interchange designation to ISO 355	Mass m ≈kg	Dimensions									Mounting dimensions		
			d	D	B	C	T	r ₁ , r ₂ min.	r ₃ , r ₄ min.	a ≈	d ₁ ≈	d _a max.	d _b min.	D _a min.
32008-XA	T3CD040	0,312	40	68	19	14,5	19	1	1	15	55	46	46	60
33108	T2CE040	0,541	40	75	26	20,5	26	1,5	1,5	18	58,7	47	47	65
30208-A	T3DB040	0,435	40	80	18	16	19,75	1,5	1,5	17	58,4	49	47	69
32208-A	T3DC040	0,551	40	80	23	19	24,75	1,5	1,5	19	59,2	48	47	68
33208	T2DE040	0,741	40	80	32	25	32	1,5	1,5	21	60,1	47	47	67
31308-A	T7FB040	0,727	40	90	23	17	25,25	2	1,5	30	68,2	51	49	71
30308-A	T2FB040	0,812	40	90	23	20	25,25	2	1,5	20	63,3	52	49	77
32308-A	T2FD040	1,06	40	90	33	27	35,25	2	1,5	23	63,3	50	49	73
32308-B	T5FD040	1,18	40	90	33	27	35,25	2	1,5	28	67	50	49	69
32009-XA	T3CC045	0,329	45	75	20	15,5	20	1	1	17	62	51	51	67
33009	T2CE045	0,432	45	75	24	19	24	1	1	16	61,8	51	51	67
33109	T3CE045	0,597	45	80	26	20,5	26	1,5	1,5	19	63,8	52	52	69
30209-A	T3DB045	0,47	45	85	19	16	20,75	1,5	1,5	18	64	54	52	74
32209-A	T3DC045	0,57	45	85	23	19	24,75	1,5	1,5	20	64,8	53	52	73
33209	T3DE045	0,895	45	85	32	25	32	1,5	1,5	22	66,2	52	52	72
T7FC045	-	0,933	45	95	26,5	20	29	2,5	2,5	33	73,6	53	59	71
31309-A	T7FB045	0,998	45	100	25	18	27,25	2	1,5	32	75,8	56	54	79
30309-A	T2FB045	1	45	100	25	22	27,25	2	1,5	21	70,7	59	54	86
32309-BA	T5FD045	1,48	45	100	36	30	38,25	2	1,5	30	74,2	55	54	76
32309-A	T2FD045	1,43	45	100	36	30	38,25	2	1,5	25	71,1	56	54	82
32010-X	T3CC050	0,384	50	80	20	15,5	20	1	1	18	67,5	56	56	72
33010	T2CE050	0,47	50	80	24	19	24	1	1	17	65,8	56	56	72
33110	T3CE050	0,604	50	85	26	20	26	1,5	1,5	20	69,1	56	57	74
30210-A	T3DB050	0,603	50	90	20	17	21,75	1,5	1,5	20	68,8	58	57	79
32210-A	T3DC050	0,602	50	90	23	19	24,75	1,5	1,5	21	70	58	57	78
33210	T3DE050	0,971	50	90	32	24,5	32	1,5	1,5	23	71,8	57	57	77
T7FC050	-	1,38	50	105	29	22	32	3	3	36	81,3	59	65	78
31310-A	T7FB050	1,23	50	110	27	19	29,25	2,5	2	35	81,4	62	60	87
30310-A	T2FB050	1,27	50	110	27	23	29,25	2,5	2	23	77,6	65	60	95
32310-B	T5FD050	1,9	50	110	40	33	42,25	2,5	2	33	82,6	60	60	83
32310-A	T2FD050	1,9	50	110	40	33	42,25	2,5	2	29	78,4	62	60	90

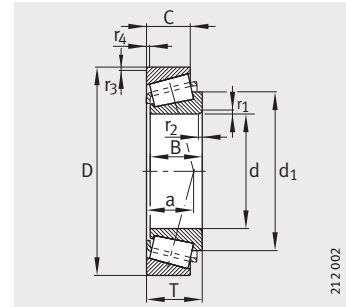


Mounting dimensions

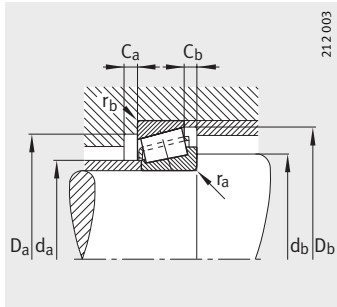
							Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D _a	D _b	C _a	C _b	r _a	r _b	dyn. C _r	stat. C _{0r}	e	Y	Y ₀	C _{ur}	n _G	n _B	
max.	min.	min.	min.	max.	max.	N	N				N	min ⁻¹	min ⁻¹	
62	65	4	4,5	1	1	52 000	68 000	0,38	1,58	0,87	8 300	10 000	5 200	
68	71	4	5,5	1,5	1,5	78 000	103 000	0,36	1,69	0,93	12 800	9 000	4 900	
73	74	3	3,5	1,5	1,5	61 000	66 000	0,37	1,6	0,88	7 600	9 000	5 900	
73	75	3	5,5	1,5	1,5	79 000	93 000	0,37	1,6	0,88	11 200	9 000	5 300	
73	76	5	7	1,5	1,5	105 000	134 000	0,36	1,68	0,92	16 600	8 500	5 100	
81	86	4	8	2	1,5	76 000	83 000	0,83	0,73	0,4	9 400	7 500	6 200	
81	82	3	5	2	1,5	92 000	103 000	0,35	1,74	0,96	11 900	8 000	5 800	
81	82	4	8	2	1,5	121 000	148 000	0,35	1,74	0,96	17 900	8 000	5 600	
81	85	4	8	2	1,5	121 000	151 000	0,55	1,1	0,6	18 200	7 500	5 500	
69	72	4	4,5	1	1	60 000	84 000	0,39	1,53	0,84	10 200	9 000	4 700	
69	71	4	5	1	1	70 000	101 000	0,29	2,04	1,12	12 600	9 000	4 450	
73	77	4	5,5	1,5	1,5	83 000	114 000	0,38	1,57	0,86	14 300	8 500	4 450	
78	80	3	4,5	1,5	1,5	70 000	82 000	0,4	1,48	0,81	9 600	8 000	5 400	
78	80	3	5,5	1,5	1,5	82 000	99 000	0,4	1,48	0,81	12 000	8 000	4 900	
78	81	5	7	1,5	1,5	107 000	146 000	0,39	1,56	0,86	18 200	8 000	4 650	
83	91	5	9	2,5	2,5	88 000	107 000	0,87	0,69	0,38	12 900	7 000	5 600	
91	95	4	9	2	1,5	95 000	107 000	0,83	0,73	0,4	12 600	6 700	5 500	
91	92	3	5	2	1,5	112 000	127 000	0,35	1,74	0,96	14 800	7 000	5 200	
91	94	5	8	2	1,5	147 000	192 000	0,55	1,1	0,6	23 500	7 000	5 000	
91	93	4	8	2	1,5	155 000	194 000	0,35	1,74	0,96	23 900	7 000	4 950	
74	77	4	4,5	1	1	62 000	91 000	0,42	1,42	0,78	11 100	8 000	4 300	
74	76	4	5	1	1	74 000	111 000	0,32	1,9	1,04	13 900	8 000	4 100	
78	82	4	6	1,5	1,5	85 000	120 000	0,41	1,46	0,8	15 100	7 500	4 100	
83	85	3	4,5	1,5	1,5	79 000	95 000	0,42	1,43	0,79	11 300	7 500	5 000	
83	85	3	5,5	1,5	1,5	87 000	109 000	0,42	1,43	0,79	13 200	7 500	4 700	
83	87	5	7,5	1,5	1,5	114 000	162 000	0,41	1,45	0,8	20 400	7 000	4 200	
91	100	5	10	3	3	106 000	132 000	0,87	0,69	0,38	16 000	6 300	5 300	
100	104	4	10	2,5	2	109 000	123 000	0,83	0,73	0,4	14 600	6 300	5 100	
100	102	4	6	2,5	2	130 000	148 000	0,35	1,74	0,96	17 600	6 300	4 800	
100	103	5	9	2,5	2	165 000	223 000	0,55	1,1	0,6	28 000	6 300	4 650	
100	102	5	9	2,5	2	187 000	237 000	0,35	1,74	0,96	29 500	6 300	4 550	



Tapered roller bearings



Dimension table (continued) · Dimensions in mm														
Designation	Interchange designation to ISO 355	Mass m ≈kg	Dimensions									Mounting dimensions		
			d	D	B	C	T	r ₁ , r ₂ min.	r ₃ , r ₄ min.	a ≈	d ₁ ≈	d _a max.	d _b min.	D _a min.
32011-X	T3CC055	0,64	55	90	23	17,5	23	1,5	1,5	20	75,8	63	62	81
33011	T2CE055	0,673	55	90	27	21	27	1,5	1,5	19	74,2	63	62	81
33111	T3CE055	0,894	55	95	30	23	30	1,5	1,5	22	76,2	62	62	83
30211-A	T3DB055	0,92	55	100	21	18	22,75	2	1,5	21	76,5	64	64	88
32211-A	T3DC055	0,87	55	100	25	21	26,75	2	1,5	23	76,2	63	64	87
33211	T3DE055	1,17	55	100	35	27	35	2	1,5	26	78,8	62	64	85
T7FC055	-	1,8	55	115	31	23,5	34	3	3	40	89	65	72	86
31311-A	T7FB055	1,57	55	120	29	21	31,5	2,5	2	39	88	68	65	94
30311-A	T2FB055	1,8	55	120	29	25	31,5	2,5	2	25	84,7	71	65	104
32311-B	T5FD055	2,47	55	120	43	35	45,5	2,5	2	36	89,6	65	65	91
32311-A	T2FD055	2,4	55	120	43	35	45,5	2,5	2	30	85	68	65	99
32012-X	T4CC060	0,614	60	95	23	17,5	23	1,5	1,5	21	80	67	67	85
33012	T2CE060	0,714	60	95	27	21	27	1,5	1,5	20	78,6	67	67	85
33112	T3CE060	1,01	60	100	30	23	30	1,5	1,5	23	81,3	67	67	88
30212-A	T3EB060	0,919	60	110	22	19	23,75	2	1,5	22	82,3	70	69	96
32212-A	T3EC060	1,18	60	110	28	24	29,75	2	1,5	24	82,8	69	69	95
33212	T3EE060	1,55	60	110	38	29	38	2	1,5	28	86,2	69	69	93
T2EE060	-	1,85	60	115	39	33	40	2,5	2,5	28	86,1	70	73	98
T7FC060	-	2,05	60	125	33,5	26	37	3	3	42	96,5	71	78	94
31312-A	T7FB060	1,94	60	130	31	22	33,5	3	2,5	41	95,6	73	72	103
30312-A	T2FB060	2,02	60	130	31	26	33,5	3	2,5	26	92,1	77	72	112
32312-BA	T5FD060	3,15	60	130	46	37	48,5	3	2,5	39	97	71	72	100
32312-A	T2FD060	3,19	60	130	46	37	48,5	3	2,5	32	92,1	74	72	107
32013-X	T4CC065	0,62	65	100	23	17,5	23	1,5	1,5	23	85,2	72	72	90
33013	T2CE065	0,766	65	100	27	21	27	1,5	1,5	21	84,6	72	72	89
33113	T3DE065	1,31	65	110	34	26,5	34	1,5	1,5	26	89,6	73	72	96
30213-A	T3EB065	1,27	65	120	23	20	24,75	2	1,5	23	90	77	74	106
32213-A	T3EC065	1,49	65	120	31	27	32,75	2	1,5	27	91	76	74	104
T5ED065	-	1,91	65	120	38	31	39	4	2,5	35	95,9	74	80	95
33213	T3EE065	2,02	65	120	41	32	41	2	1,5	30	92,5	74	74	102
31313-A	T7GB065	2,36	65	140	33	23	36	3	2,5	44	102,6	79	77	111
30313-A	T2GB065	2,4	65	140	33	28	36	3	2,5	28	99,6	83	77	122
32313-BA	T5GD065	3,7	65	140	48	39	51	3	2,5	42	104,3	77	77	109
32313-A	T2GD065	3,61	65	140	48	39	51	3	2,5	34	99,6	80	77	117

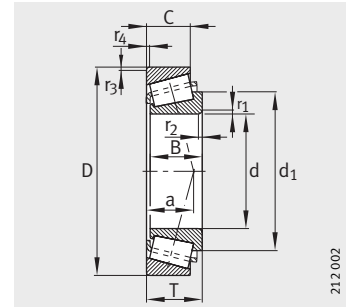


Mounting dimensions

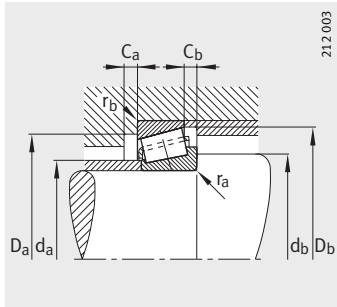
						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D _a	D _b	C _a	C _b	r _a	r _b	dyn. C _r	stat. C _{0r}	e	Y	Y ₀	C _{ur}	n _G	n _B
max.	min.	min.	min.	max.	max.	N	N				N	min ⁻¹	min ⁻¹
83	86	4	5,5	1,5	1,5	79 000	116 000	0,41	1,48	0,81	14 500	7 000	4 000
83	86	5	6	1,5	1,5	93 000	141 000	0,31	1,92	1,06	17 900	7 000	3 750
88	91	5	7	1,5	1,5	113 000	163 000	0,37	1,6	0,88	20 400	6 700	3 800
91	94	4	4,5	2	1,5	91 000	107 000	0,4	1,48	0,81	12 400	6 700	4 600
91	95	4	5,5	2	1,5	110 000	137 000	0,4	1,48	0,81	16 200	6 700	4 100
91	96	6	8	2	1,5	138 000	193 000	0,4	1,5	0,83	24 300	6 700	3 950
101	109	5	10,5	3	3	128 000	164 000	0,87	0,69	0,38	20 000	5 600	4 800
110	113	4	10,5	2,5	2	122 000	137 000	0,83	0,73	0,4	16 300	5 600	4 850
110	111	4	6,5	2,5	2	151 000	174 000	0,35	1,74	0,96	20 600	6 000	4 500
110	112	5	10,5	2,5	2	193 000	265 000	0,55	1,1	0,6	33 000	5 600	4 350
110	111	5	10,5	2,5	2	211 000	270 000	0,35	1,74	0,96	33 500	6 000	4 300
88	91	4	5,5	1,5	1,5	80 000	121 000	0,43	1,39	0,77	15 100	6 700	3 750
88	90	5	6	1,5	1,5	95 000	147 000	0,33	1,83	1,01	18 700	6 700	3 500
93	96	5	7	1,5	1,5	116 000	171 000	0,4	1,51	0,83	21 500	6 300	3 550
101	103	4	4,5	2	1,5	102 000	121 000	0,4	1,48	0,81	14 000	6 300	4 200
101	104	4	5,5	2	1,5	133 000	170 000	0,4	1,48	0,81	20 600	6 000	3 800
101	105	6	9	2	1,5	169 000	237 000	0,4	1,48	0,82	29 500	6 000	3 600
103	108	7	7	2,5	2,5	189 000	250 000	0,33	1,8	0,99	31 500	6 000	3 800
111	119	6	11	3	3	150 000	195 000	0,82	0,73	0,4	24 300	5 300	4 500
118	123	5	11,5	3	2,5	147 000	169 000	0,83	0,73	0,4	20 100	5 300	4 450
118	120	5	7,5	3	2,5	176 000	204 000	0,35	1,74	0,96	24 200	5 300	4 350
118	122	6	11,5	3	2,5	224 000	310 000	0,55	1,1	0,6	38 500	5 300	4 050
118	120	6	11,5	3	2,5	242 000	310 000	0,35	1,74	0,96	38 500	5 300	4 000
93	97	4	5,5	1,5	1,5	81 000	124 000	0,46	1,31	0,72	15 800	6 300	3 550
93	96	5	6	1,5	1,5	98 000	158 000	0,35	1,72	0,95	20 300	6 300	3 250
103	106	6	7,5	1,5	1,5	148 000	222 000	0,39	1,55	0,85	28 500	6 000	3 300
111	113	4	4,5	2	1,5	119 000	142 000	0,4	1,48	0,81	16 600	5 600	3 850
111	115	4	5,5	2	1,5	156 000	200 000	0,4	1,48	0,81	24 500	5 600	3 600
108	115	6	8	4	2,5	160 000	234 000	0,56	1,07	0,59	29 500	5 300	3 600
111	115	6	9	2	1,5	203 000	285 000	0,39	1,54	0,85	35 500	5 600	3 350
128	132	5	13	3	2,5	165 000	191 000	0,83	0,73	0,4	22 400	5 000	4 300
128	130	5	8	3	2,5	201 000	236 000	0,35	1,74	0,96	27 000	5 000	3 950
128	133	6	12	3	2,5	250 000	345 000	0,55	1,1	0,6	43 500	5 000	3 800
128	130	6	12	3	2,5	275 000	350 000	0,35	1,74	0,96	43 500	5 000	3 800



Tapered roller bearings



Dimension table (continued) - Dimensions in mm														
Designation	Interchange designation to ISO 355	Mass m ≈kg	Dimensions									Mounting dimensions		
			d	D	B	C	T	r ₁ , r ₂ min.	r ₃ , r ₄ min.	a ≈	d ₁ ≈	d _a max.	d _b min.	D _a min.
32014-X	T4CC070	0,967	70	110	25	19	25	1,5	1,5	24	92	78	77	98
33014	T2CE070	1,14	70	110	31	25,5	31	1,5	1,5	22	91	78	77	99
33114	T3DE070	1,71	70	120	37	29	37	2	1,5	28	96	79	79	104
30214-A	T3EB070	1,31	70	125	24	21	26,25	2	1,5	25	95,4	81	79	110
32214-A	T3EC070	1,82	70	125	31	27	33,25	2	1,5	28	96	80	79	108
33214	T3EE070	2,06	70	125	41	32	41	2	1,5	31	97,9	79	79	107
T7FC070	-	2,66	70	140	35,5	27	39	3	3	47	109,6	81	90	106
31314-A	T7GB070	2,9	70	150	35	25	38	3	2,5	47	109	84	82	118
30314-A	T2GB070	3,02	70	150	35	30	38	3	2,5	30	106,6	89	82	130
32314-BA	T5GD070	4,52	70	150	51	42	54	3	2,5	44	112	83	82	117
32314-A	T2GD070	4,27	70	150	51	42	54	3	2,5	37	106,6	86	82	125
32015-X	T4CC075	0,922	75	115	25	19	25	1,5	1,5	25	97,3	83	82	103
33015	T2CE075	1,16	75	115	31	25,5	31	1,5	1,5	23	96,4	83	82	104
33115	T3DE075	1,79	75	125	37	29	37	2	1,5	30	101,4	84	84	109
30215-A	T4DB075	1,55	75	130	25	22	27,25	2	1,5	27	100,1	86	84	115
32215-A	T4DC075	1,93	75	130	31	27	33,25	2	1,5	29	101,6	85	84	115
33215	T3EE075	2,47	75	130	41	31	41	2	1,5	32	104,5	83	84	111
T7FC075	-	3,23	75	150	38	29	42	3	3	51	116,2	87	96	114
31315	T7GB075	3,79	75	160	37	26	40	3	2,5	50	115,8	91	87	127
30315-A	T2GB075	3,64	75	160	37	31	40	3	2,5	32	114	95	87	139
32315-B	T5GD075	5,7	75	160	55	45	58	3	2,5	47	120,4	90	87	124
32315-A	T2GD075	5,37	75	160	55	45	58	3	2,5	39	114	91	87	133
32016-X	T3CC080	1,29	80	125	29	22	29	1,5	1,5	27	103,6	89	87	112
33016	T2CE080	1,67	80	125	36	29,5	36	1,5	1,5	26	102,6	90	87	112
33116	T3DE080	1,9	80	130	37	29	37	2	1,5	31	106,6	89	89	114
30216-A	T3EB080	1,68	80	140	26	22	28,25	2,5	2	28	106,9	91	90	124
32216-A	T3EC080	2,36	80	140	33	28	35,25	2,5	2	31	107,5	90	90	122
33216	T3EE080	2,93	80	140	46	35	46	2,5	2	35	111,8	89	90	119
T7FC080	-	4	80	160	41	31	45	3	3	54	125	93	103	121
31316	T7GB080	4,19	80	170	39	27	42,5	3	2,5	53	122,4	97	92	134
30316-A	T2GB080	4,34	80	170	39	33	42,5	3	2,5	34	121,7	102	92	148
32316-B	T5GD080	7,02	80	170	58	48	61,5	3	2,5	49	126,9	96	92	130
32316-A	T2GD080	6,57	80	170	58	48	61,5	3	2,5	42	122	98	92	142

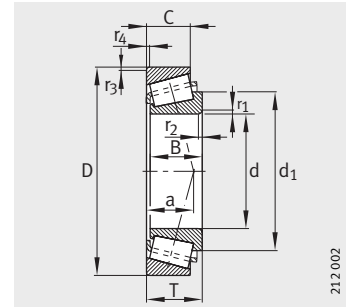


Mounting dimensions

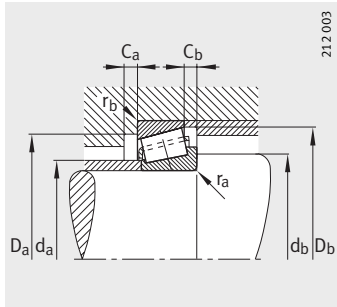
						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D _a	D _b	C _a	C _b	r _a	r _b	dyn. C _r	stat. C _{0r}	e	Y	Y ₀	C _{ur}	n _G	n _B
max.	min.	min.	min.	max.	max.	N	N				N	min ⁻¹	min ⁻¹
103	105	5	6	1,5	1,5	103 000	157 000	0,43	1,38	0,76	20 000	5 600	3 250
103	105	5	5,5	1,5	1,5	134 000	220 000	0,28	2,11	1,16	28 500	5 600	3 050
111	115	6	8	2	1,5	174 000	260 000	0,38	1,58	0,87	33 000	5 300	3 150
116	118	4	5	2	1,5	130 000	160 000	0,42	1,43	0,79	19 000	5 300	3 700
116	119	4	6	2	1,5	163 000	214 000	0,42	1,43	0,79	26 500	5 300	3 400
116	120	7	9	2	1,5	210 000	300 000	0,41	1,47	0,81	38 000	5 300	3 150
126	133	6	12	3	3	178 000	240 000	0,87	0,69	0,38	29 000	4 800	4 000
138	141	5	13	3	2,5	190 000	223 000	0,83	0,73	0,4	26 000	4 800	4 000
138	140	5	8	3	2,5	227 000	270 000	0,35	1,74	0,96	31 000	4 800	3 750
138	143	7	12	3	2,5	290 000	400 000	0,55	1,1	0,6	49 500	4 800	3 600
138	140	6	12	3	2,5	315 000	410 000	0,35	1,74	0,96	49 500	4 800	3 500
108	110	5	6	1,5	1,5	104 000	163 000	0,46	1,31	0,72	20 900	5 600	3 350
108	110	6	5,5	1,5	1,5	137 000	229 000	0,3	2,01	1,11	30 000	5 600	2 850
116	120	6	8	2	1,5	178 000	275 000	0,4	1,51	0,83	34 500	5 300	2 950
115	124	4	5	2	1,5	137 000	172 000	0,44	1,38	0,76	20 300	5 300	3 600
121	124	4	6	2	1,5	171 000	229 000	0,44	1,38	0,76	28 000	5 000	3 200
121	125	7	10	2	1,5	206 000	310 000	0,43	1,4	0,77	39 000	5 000	3 000
136	143	6	13	3	3	201 000	275 000	0,87	0,69	0,38	33 000	4 800	3 800
148	151	6	14	3	2,5	204 000	238 000	0,83	0,73	0,4	27 500	4 500	3 850
148	149	5	9	3	2,5	255 000	300 000	0,35	1,74	0,96	34 500	4 500	3 550
148	151	7	14	3	2,5	335 000	475 000	0,55	1,1	0,6	58 000	4 500	3 350
148	149	7	13	3	2,5	360 000	475 000	0,35	1,74	0,96	57 000	4 500	3 300
117	120	6	7	1,5	1,5	136 000	209 000	0,42	1,42	0,78	26 000	5 000	2 950
117	119	6	6,5	1,5	1,5	174 000	285 000	0,28	2,16	1,19	37 000	5 000	2 800
121	126	6	8	2	1,5	188 000	300 000	0,42	1,44	0,79	37 000	5 000	2 750
130	132	4	6	2,5	2	154 000	191 000	0,42	1,43	0,79	21 900	5 000	3 350
130	134	5	7	2,5	2	198 000	260 000	0,42	1,43	0,79	31 000	5 000	3 050
130	135	7	11	2,5	2	249 000	380 000	0,43	1,41	0,78	47 000	4 800	2 900
146	152	7	14	3	3	228 000	315 000	0,87	0,69	0,38	37 500	4 500	3 600
158	159	6	15,5	3	2,5	228 000	270 000	0,83	0,73	0,4	30 500	4 500	3 650
158	159	5	9,5	3	2,5	290 000	350 000	0,35	1,74	0,96	39 500	4 500	3 300
158	160	7	13,5	3	2,5	360 000	510 000	0,55	1,1	0,6	61 000	4 300	3 250
158	159	7	13,5	3	2,5	405 000	540 000	0,35	1,74	0,96	64 000	4 500	3 200



Tapered roller bearings



Dimension table (continued) · Dimensions in mm														
Designation	Interchange designation to ISO 355	Mass m ≈ kg	Dimensions									Mounting dimensions		
			d	D	B	C	T	r ₁ , r ₂ min.	r ₃ , r ₄ min.	a ≈	d ₁ ≈	d _a max.	d _b min.	D _a min.
32017-X	T4CC085	1,36	85	130	29	22	29	1,5	1,5	29	109,5	94	92	117
33017	T2CE085	1,75	85	130	36	29,5	36	1,5	1,5	26	108,5	94	92	118
33117	T3DE085	2,38	85	140	41	32	41	2,5	2	33	114,2	95	95	122
30217-A	T3EB085	2,29	85	150	28	24	30,5	2,5	2	30	114,4	97	95	132
32217-A	T3EC085	2,72	85	150	36	30	38,5	2,5	2	34	114,6	96	95	130
33217	T3EE085	3,58	85	150	49	37	49	2,5	2	37	117,8	95	95	128
T7FC085	–	0,578	85	170	45	33	48	4	4	55	131,1	100	110	131
31317	T7GB085	4,88	85	180	41	28	44,5	4	3	55	129,3	103	99	143
30317-A	T2GB085	4,83	85	180	41	34	44,5	3	3	36	127,6	107	99	156
32317-B	T5GD085	7,86	85	180	60	49	63,5	4	3	51	133,9	102	99	138
32317-A	T2GD085	7,5	85	180	60	49	63,5	4	3	44	128	103	99	150
32018-XA	T3CC090	1,76	90	140	32	24	32	2	1,5	30	115,3	100	99	125
33018	T2CE090	2,48	90	140	39	32,5	39	2	1,5	28	116	100	99	127
33118	T3DE090	3,19	90	150	45	35	45	2,5	2	36	121,5	100	100	130
30218-A	T3FB090	2,64	90	160	30	26	32,5	2,5	2	32	121,3	103	100	140
32218-A	T3FC090	3,78	90	160	40	34	42,5	2,5	2	36	122	102	100	138
T7FC090	–	5,09	90	175	45	33	48	4	4	58	136,3	104	114	134
31318	T7GB090	5,5	90	190	43	30	46,5	4	3	58	135,9	109	104	151
30318-A	T2GB090	5,83	90	190	43	36	46,5	4	3	37	135	113	104	165
32318-A	T2GD090	8,51	90	190	64	53	67,5	4	3	47	137,4	108	104	157
32919	T2BC095	0,825	95	130	23	18	23	1,5	1,5	23	113	102	102	121
32019-XA	T4CC095	1,86	95	145	32	24	32	2	1,5	32	121	105	104	130
33019	T2CE095	2,33	95	145	39	32,5	39	2	1,5	29	120,2	104	104	131
30219-A	T3FB095	3,13	95	170	32	27	34,5	3	2,5	34	128	110	107	149
32219-A	T3FC095	4,24	95	170	43	37	45,5	3	2,5	39	129,6	108	107	145
31319-A	T7GB095	7,08	95	200	45	32	49,5	4	3	61	142,5	114	109	157
30319-A	T2GB095	6,77	95	200	45	38	49,5	4	3	40	139	118	109	172
32319-A	T2GD095	10,3	95	200	67	55	71,5	4	3	49	141	115	109	166
32020-X	T4CC100	1,94	100	150	32	24	32	2	1,5	33	126,6	109	109	134
33020	T2CE100	2,42	100	150	39	32,5	39	2	1,5	29	124,7	108	109	135
T5ED100	–	3,25	100	160	40	34	42	5	3	42	133,8	110	117	135
30220-A	T3FB100	3,75	100	180	34	29	37	3	2,5	36	135	116	112	157
32220-A	T3FC100	5,15	100	180	46	39	49	3	2,5	42	138,5	114	112	154
30320-A	T2GB100	8,3	100	215	47	39	51,5	4	3	42	151	127	114	184
31320-X	T7GB100	8,81	100	215	51	35	56,5	4	3	68	159,5	121	114	168
32320-A	T2GD100	12,9	100	215	73	60	77,5	4	3	53	152	123	114	177

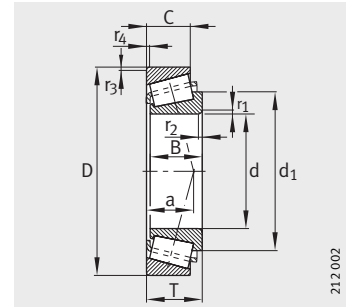


Mounting dimensions

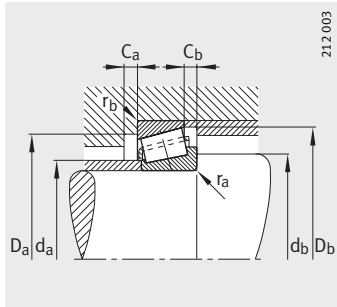
						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D _a	D _b	C _a	C _b	r _a	r _b	dyn. C _r	stat. C _{0r}	e	Y	Y ₀	C _{ur}	n _G	n _B
max.	min.	min.	min.	max.	max.	N	N				N	min ⁻¹	min ⁻¹
122	125	6	7	1,5	1,5	141 000	223 000	0,44	1,36	0,75	28 000	5 000	2 800
122	125	6	6,5	1,5	1,5	182 000	310 000	0,29	2,06	1,13	39 500	5 000	2 600
130	135	7	9	2,5	2	219 000	345 000	0,41	1,48	0,81	43 000	4 800	2 700
140	141	5	6,5	2,5	2	175 000	220 000	0,42	1,43	0,79	25 500	4 800	3 200
140	142	5	8,5	2,5	2	226 000	305 000	0,42	1,43	0,79	36 000	4 800	2 900
140	144	7	12	2,5	2	295 000	435 000	0,42	1,43	0,79	53 000	4 500	2 700
153	161	7	15	4	4	260 000	365 000	0,8	0,75	0,41	42 500	4 300	3 200
166	169	6	16,5	4	3	255 000	305 000	0,83	0,73	0,4	34 000	4 300	3 450
166	167	6	10,5	3	3	315 000	380 000	0,35	1,74	0,96	42 000	4 300	3 150
166	169	7	14,5	4	3	410 000	590 000	0,55	1,1	0,6	70 000	4 300	2 950
166	167	8	14,5	4	3	435 000	580 000	0,35	1,74	0,96	68 000	4 300	3 000
131	134	6	8	2	1,5	163 000	255 000	0,42	1,42	0,78	30 500	4 800	2 750
131	135	7	6,5	2	1,5	215 000	360 000	0,27	2,23	1,23	45 000	4 800	2 500
140	144	7	10	2,5	2	260 000	420 000	0,4	1,51	0,83	51 000	4 500	2 550
150	150	5	6,5	2,5	2	199 000	255 000	0,42	1,43	0,79	28 500	4 500	3 050
150	152	5	8,5	2,5	2	260 000	355 000	0,42	1,43	0,79	42 000	4 500	2 950
158	166	7	15	4	4	270 000	385 000	0,83	0,72	0,4	44 000	4 000	3 000
176	179	6	16,5	4	3	275 000	330 000	0,83	0,73	0,4	35 500	4 000	3 350
176	176	6	10,5	4	3	335 000	405 000	0,35	1,74	0,96	43 500	4 000	3 050
176	177	8	14,5	4	3	490 000	670 000	0,35	1,74	0,96	76 000	4 000	2 750
123	125	5	5	1,5	1,5	100 000	177 000	0,36	1,68	0,92	21 900	4 800	2 450
136	140	6	8	2	1,5	169 000	270 000	0,44	1,36	0,75	32 500	4 500	2 600
136	139	7	6,5	2	1,5	220 000	375 000	0,28	2,16	1,19	46 500	4 500	2 390
158	159	5	7,5	3	2,5	225 000	290 000	0,42	1,43	0,79	32 000	4 300	2 900
158	161	5	8,5	3	2,5	300 000	420 000	0,42	1,43	0,79	48 500	4 300	2 750
186	187	6	17,5	4	3	310 000	375 000	0,83	0,73	0,4	40 000	3 600	3 200
186	184	6	11,5	4	3	370 000	450 000	0,35	1,74	0,96	47 500	3 600	3 000
186	186	8	16,5	4	3	530 000	720 000	0,35	1,74	0,96	80 000	3 600	2 600
141	144	6	8	2	1,5	174 000	285 000	0,46	1,31	0,72	33 500	4 500	2 470
141	143	7	6,5	2	1,5	224 000	390 000	0,29	2,09	1,15	47 500	4 500	2 290
146	154	6	8	5	3	230 000	390 000	0,53	1,14	0,63	47 000	4 300	2 400
168	168	5	8	3	2,5	250 000	330 000	0,42	1,43	0,79	35 500	4 300	2 800
168	171	5	10	3	2,5	335 000	475 000	0,42	1,43	0,79	54 000	4 000	2 600
201	197	6	12,5	4	3	420 000	510 000	0,35	1,74	0,96	63 000	3 400	2 750
201	202	7	21,5	4	3	385 000	485 000	0,83	0,73	0,4	60 000	3 000	2 950
201	200	8	17,5	4	3	620 000	850 000	0,35	1,74	0,96	108 000	3 400	2 350



Tapered roller bearings



Dimension table (continued) - Dimensions in mm														
Designation	Interchange designation to ISO 355	Mass m ≈ kg	Dimensions									Mounting dimensions		
			d	D	B	C	T	r ₁ , r ₂ min.	r ₃ , r ₄ min.	a ≈	d ₁ ≈	d _a max.	d _b min.	D _a min.
32921	T2CC105	1,15	105	145	25	20	25	1,5	1,5	25	125	114	112	135
32021-X	T4DC105	2,33	105	160	35	26	35	2,5	2	35	133	116	115	143
33021	T2DE105	3,34	105	160	43	34	43	2,5	2	31	131,5	116	115	145
30221-A	T3FB105	4,23	105	190	36	30	39	3	2,5	38	143,2	122	117	165
32221-A	T3FC105	6,07	105	190	50	43	53	3	2,5	44	144,6	120	117	161
32321-A	T2GD105	15,1	105	225	77	63	81,5	4	3	56	160,9	128	119	185
32022-X	T4DC110	3,35	110	170	38	29	38	2,5	2	37	141	122	120	152
33022	T2DE110	4,16	110	170	47	37	47	2,5	2	33	139,2	123	120	152
30222-A	T3FB110	5,23	110	200	38	32	41	3	2,5	39	148,7	129	122	174
32222-A	T3FC110	7,35	110	200	53	46	56	3	2,5	46	153,5	126	122	170
30322-A	T2GB110	11	110	240	50	42	54,5	4	3	45	169,2	141	124	206
31322-X	T7GB110	12,3	110	240	57	38	63	4	3	75	178	135	124	188
32322-A	T2GD110	19	110	240	80	65	84,5	4	3	58	171,5	137	124	198
32924	T2CC120	1,82	120	165	29	23	29	1,5	1,5	29	141	128	127	154
T4CB120	-	1,97	120	170	25	19,5	27	3	3	35	144,7	130	132	157
32024-X	T4DC120	3,29	120	180	38	29	38	2,5	2	40	151	131	130	161
33024	T2DE120	4,55	120	180	48	38	48	2,5	2	36	148,5	132	130	160
30224-A	T4FB120	6,25	120	215	40	34	43,5	3	2,5	44	163	140	132	187
32224-A	T4FD120	9,28	120	215	58	50	61,5	3	2,5	51	165,2	136	132	181
30324-A	T2GB120	14,3	120	260	55	46	59,5	4	3	48	183,5	152	134	221
31324-X	T7GB120	15,4	120	260	62	42	68	4	3	82	192	145	134	203
32324	T2GD120	21,1	120	260	86	69	90,5	4	3	66	187	148	134	213
32926	T2CC130	2,4	130	180	32	25	32	2	1,5	32	154,7	141	139	167
T4CB130	-	2,53	130	185	27	21	29	3	3	38	156,3	140	143	171
32026-X	T4EC130	5,02	130	200	45	34	45	2,5	2	44	166,2	144	140	178
30226-A	T4FB130	7,08	130	230	40	34	43,75	4	3	46	177,1	152	144	203
32226-A	T4FD130	11,7	130	230	64	54	67,75	4	3	56	178	146	144	193
30326	-	17,2	130	280	58	49	63,75	5	4	53	194	164	148	239
31326-X	T7GB130	19,1	130	280	66	44	72	5	4	87	206	157	148	218
32326	-	26,7	130	280	93	78	98,75	5	4	68	197,3	160	147	230

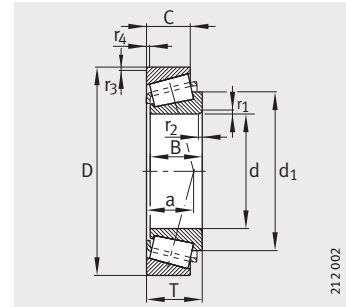


Mounting dimensions

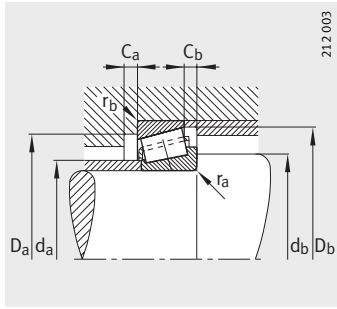
						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D _a	D _b	C _a	C _b	r _a	r _b	dyn. C _r	stat. C _{0r}	e	Y	Y ₀	C _{ur}	n _G	n _B
max.	min.	min.	min.	max.	max.	N	N				N	min ⁻¹	min ⁻¹
136	140	5	5	1,5	1,5	125 000	211 000	0,34	1,75	0,96	25 500	4 500	2 250
150	154	6	9	2,5	2	202 000	330 000	0,44	1,35	0,74	38 000	4 300	2 410
150	153	7	9	2,5	2	265 000	450 000	0,28	2,12	1,17	53 000	4 300	2 240
178	177	6	9	3	2,5	280 000	370 000	0,42	1,43	0,79	40 000	4 000	2 700
178	180	5	10	3	2,5	385 000	550 000	0,42	1,43	0,79	63 000	3 600	2 490
211	209	9	18,5	4	3	670 000	940 000	0,35	1,74	0,96	118 000	3 000	2 220
160	163	7	9	2,5	2	241 000	390 000	0,43	1,39	0,77	45 000	4 000	2 300
160	161	7	10	2,5	2	295 000	520 000	0,29	2,09	1,15	61 000	4 300	2 170
188	187	6	9	3	2,5	315 000	425 000	0,42	1,43	0,79	45 500	3 600	2 550
188	190	6	10	3	2,5	415 000	590 000	0,42	1,43	0,79	66 000	3 400	2 390
226	220	8	12,5	4	3	475 000	580 000	0,35	1,74	0,96	71 000	2 800	2 420
226	224	7	25	4	3	465 000	590 000	0,83	0,73	0,4	70 000	2 800	2 600
226	222	9	19,5	4	3	740 000	1 030 000	0,35	1,74	0,96	127 000	2 800	2 050
158	160	6	6	1,5	1,5	174 000	305 000	0,35	1,72	0,95	34 500	4 000	2 020
157	164	5	7,5	3	3	152 000	235 000	0,47	1,27	0,7	26 000	4 000	2 000
170	173	7	9	2,5	2	250 000	420 000	0,46	1,31	0,72	47 500	3 600	2 120
170	171	6	10	2,5	2	310 000	560 000	0,31	1,97	1,08	69 000	3 600	2 040
203	201	6	9,5	3	2,5	335 000	455 000	0,44	1,38	0,76	57 000	3 000	2 450
203	204	7	11,5	3	2,5	490 000	730 000	0,44	1,38	0,76	93 000	3 000	2 130
246	237	10	13,5	4	3	570 000	710 000	0,35	1,74	0,96	83 000	2 600	2 170
246	244	9	26	4	3	540 000	700 000	0,83	0,73	0,4	82 000	2 600	2 320
246	239	9	21,5	4	3	670 000	970 000	0,39	1,53	0,84	118 000	2 600	2 030
171	173	6	7	2	1,5	208 000	370 000	0,34	1,77	0,97	41 500	3 600	1 900
171	178	6	8	3	3	179 000	275 000	0,47	1,27	0,7	29 500	3 400	1 900
190	192	8	11	2,5	2	330 000	560 000	0,43	1,38	0,76	61 000	3 000	2 030
216	217	7	9,5	4	3	360 000	480 000	0,44	1,38	0,76	58 000	2 800	2 290
216	219	7	13,5	4	3	560 000	860 000	0,44	1,38	0,76	107 000	2 800	1 950
262	255	8	14,5	5	4	610 000	750 000	0,35	1,73	0,95	87 000	2 600	2 020
262	261	9	28	5	4	610 000	790 000	0,83	0,73	0,4	91 000	2 400	2 090
262	260	10	20,5	5	4	840 000	1 130 000	0,34	1,75	0,96	133 000	2 600	1 850



Tapered roller bearings



Dimension table (continued) - Dimensions in mm														
Designation	Interchange designation to ISO 355	Mass m ≈kg	Dimensions									Mounting dimensions		
			d	D	B	C	T	r ₁ , r ₂ min.	r ₃ , r ₄ min.	a ≈	d ₁ ≈	d _a max.	d _b min.	D _a min.
32928	T2CC140	2,6	140	190	32	25	32	2	1,5	34	164,8	150	149	177
T4CB140	–	2,41	140	195	27	21	29	3	3	41	167,2	150	153	180
32028-X	T4DC140	5,39	140	210	45	34	45	2,5	2	46	175,8	153	150	187
30228-A	T4FB140	8,81	140	250	42	36	45,75	4	3	48	187	163	154	219
32228-A	T4FD140	14	140	250	68	58	71,75	4	3	60	193,5	159	154	210
30328	–	20,5	140	300	62	53	67,75	5	4	52	206	176	158	255
31328-X	T7GB140	23,1	140	300	70	47	77	5	4	94	223	169	158	235
32328-A	–	37,8	140	300	102	85	107,75	5	4	74	215	170	157	247
32930	T2DC150	3,9	150	210	38	30	38	2,5	2	36	177,8	162	160	194
32030-X	T4EC150	6,47	150	225	48	36	48	3	2,5	50	188	164	162	200
30230-A	T4GB150	11,1	150	270	45	38	49	4	3	52	201	175	164	234
32230-A	T4GD150	18,5	150	270	73	60	77	4	3	64	206,7	171	164	226
30330-A	T2GB150	25,1	150	320	65	55	72	5	4	60	224	189	168	273
31330-X	T7GB150	28	150	320	75	50	82	5	4	100	237	181	168	251
32330-A	–	46,1	150	320	108	90	114	5	4	79	230	184	167	264
32932	T2DC160	4,13	160	220	38	30	38	2,5	2	38	188	173	170	204
32032-X	T4EC160	7,81	160	240	51	38	51	3	2,5	53	201	175	172	213
30232	–	13,8	160	290	48	40	52	4	3	51	216,5	189	174	252
32232-A	T4GD160	23,4	160	290	80	67	84	4	3	69	223	183	174	242
30332-A	T2GB160	29,9	160	340	68	58	75	5	4	63	237	201	178	290
T4DB170	–	4,31	170	230	30	23	32	3	3	45	199	182	185	214
32934	T3DC170	4,42	170	230	38	30	38	2,5	2	42	199	183	180	213
32034-X	T4EC170	11,4	170	260	57	43	57	3	2,5	57	216	187	182	230
30234-A	T4GB170	19,2	170	310	52	43	57	5	4	60	233	203	188	269
32234-A	T4GD170	28,6	170	310	86	71	91	5	4	74	238	196	188	259
32936	T4DC180	7,08	180	250	45	34	45	2,5	2	54	217	193	190	225
32036-X	T3FD180	14,2	180	280	64	48	64	3	2,5	60	230	199	192	247
30236-A	T4GB180	17,9	180	320	52	43	57	5	4	62	242	211	198	278
32236-A	T4GD180	32,5	180	320	86	71	91	5	4	77	249,5	204	198	267
32938	T4DC190	7,55	190	260	45	34	45	2,5	2	55	226	204	200	235
32038-X	T4FD190	14,8	190	290	64	48	64	3	2,5	63	241	209	202	257
30238	–	20,8	190	340	55	46	60	5	4	62	258	224	207	298
32238-A	T4GD190	39,1	190	340	92	75	97	5	4	81	263	216	207	286

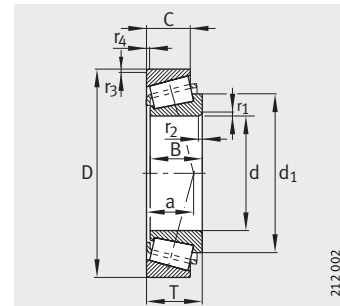


Mounting dimensions

						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D _a	D _b	C _a	C _b	r _a	r _b	dyn. C _r	stat. C _{0r}	e	Y	Y ₀	C _{ur}	n _G	n _B
max.	min.	min.	min.	max.	max.	N	N				N	min ⁻¹	min ⁻¹
181	184	6	7	2	1,5	214 000	395 000	0,36	1,67	0,92	43 000	3 400	1 780
181	189	6	8	3	3	188 000	300 000	0,5	1,19	0,66	32 000	3 000	1 800
200	202	8	11	2,5	2	340 000	600 000	0,46	1,31	0,72	44 000	2 800	1 900
236	234	9	9,5	4	3	420 000	570 000	0,44	1,38	0,76	67 000	2 600	2 030
236	238	8	13,5	4	3	650 000	1 000 000	0,44	1,38	0,76	121 000	2 600	1 740
282	273	8	14,5	5	4	590 000	740 000	0,28	2,18	1,2	84 000	2 400	1 970
282	280	9	30	5	4	690 000	890 000	0,83	0,73	0,4	101 000	2 400	1 920
282	280	10	22,5	5	4	1 170 000	1 710 000	0,35	1,74	0,96	198 000	2 400	1 460
201	202	7	8	2,5	2	285 000	495 000	0,33	1,83	1,01	61 000	2 800	1 730
213	216	8	12	3	2,5	385 000	680 000	0,46	1,31	0,72	84 000	2 600	1 730
256	250	9	11	4	3	475 000	650 000	0,44	1,38	0,76	74 000	2 600	1 870
256	254	8	17	4	3	740 000	1 160 000	0,44	1,38	0,76	138 000	2 600	1 570
302	292	9	17	5	4	810 000	1 030 000	0,35	1,74	0,96	113 000	2 200	1 650
302	300	9	32	5	4	790 000	1 040 000	0,83	0,73	0,4	115 000	2 200	1 760
302	299	12	24	5	4	1 330 000	1 950 000	0,35	1,74	0,96	221 000	2 200	1 330
210	212	7	8	2,5	2	295 000	530 000	0,35	1,73	0,95	64 000	2 600	1 630
228	231	8	13	3	2,5	430 000	750 000	0,46	1,31	0,72	91 000	2 600	1 620
276	269	9	12	4	3	410 000	580 000	0,37	1,61	0,89	66 000	2 400	1 870
276	274	10	17	4	3	870 000	1 390 000	0,44	1,38	0,76	162 000	2 400	1 420
322	310	9	17	5	4	890 000	1 140 000	0,35	1,74	0,96	123 000	2 200	1 520
216	223	6	9	3	3	231 000	395 000	0,46	1,3	0,72	46 500	2 600	1 400
220	222	7	8	2,5	2	290 000	550 000	0,38	1,57	0,86	66 000	2 600	1 540
248	249	10	14	3	2,5	510 000	890 000	0,44	1,35	0,74	106 000	2 400	1 490
292	288	8	14	5	4	600 000	840 000	0,44	1,38	0,76	92 000	2 200	1 600
292	294	10	20	5	4	990 000	1 590 000	0,44	1,38	0,76	180 000	2 200	1 310
240	241	8	11	2,5	2	360 000	710 000	0,48	1,25	0,69	84 000	2 400	1 440
268	267	10	16	3	2,5	620 000	1 090 000	0,42	1,42	0,78	128 000	2 200	1 340
302	297	9	14	5	4	620 000	880 000	0,45	1,33	0,73	95 000	2 200	1 500
302	303	10	20	5	4	1 020 000	1 670 000	0,45	1,33	0,73	188 000	2 000	1 230
249	251	8	11	2,5	2	370 000	760 000	0,48	1,26	0,69	89 000	2 400	1 350
278	279	10	16	3	2,5	630 000	1 130 000	0,44	1,36	0,75	131 000	2 200	1 280
322	318	9	14	5	4	530 000	780 000	0,39	1,56	0,86	85 000	2 200	1 510
322	323	10	22	5	4	1 150 000	1 840 000	0,44	1,38	0,76	204 000	2 000	1 140

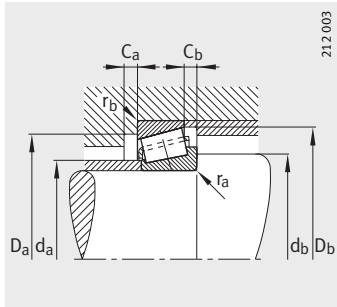


Tapered roller bearings



Dimension table (continued) - Dimensions in mm

Designation	Interchange designation to ISO 355	Mass m ≈kg	Dimensions									Mounting dimensions		
			d	D	B	C	T	r ₁ , r ₂ min.	r ₃ , r ₄ min.	a ≈	d ₁ ≈	d _a max.	d _b min.	D _a min.
T4DB200	–	5,55	200	270	34	27	37	3	3	54	234	214	218	251
32940-A	–	8,97	200	280	51	39	51	3	2,5	54	239	216	212	257
32040-X	T4FD200	19	200	310	70	53	70	3	2,5	67	256	221	212	273
30240-A	T4GB200	25,5	200	360	58	48	64	5	4	69	272	237	217	315
32240-A	T3GD200	43	200	360	98	82	104	5	4	83	274,5	226	217	302
32944	T3EC220	10,3	220	300	51	39	51	3	2,5	59	260	234	232	275
32044-X	T4FD220	24,3	220	340	76	57	76	4	3	73	280	243	234	300
30244-A	–	34,6	220	400	65	54	72	5	4	75	299	255	237	348
32244-A	–	59,5	220	400	108	90	114	5	4	95	310,5	258	237	336
32948	T4EC240	11	240	320	51	39	51	3	2,5	65	281	254	252	294
32048-X	T4FD240	28,2	240	360	76	57	76	4	3	79	300	261	254	318
32248-A	–	80,5	240	440	120	100	127	5	4	105	332	286	257	372
32952	T3EC260	18,6	260	360	63,5	48	63,5	3	2,5	70	309	279	272	328
32052-X	T4FC260	41,1	260	400	87	65	87	5	4	86	331,5	287	278	352
32252	–	102	260	480	130	106	137	6	5	113	369	306	280	401
32956	T4EC280	19,9	280	380	63,5	48	63,5	3	2,5	75	330	298	292	348
32056-X	T4FC280	40,5	280	420	87	65	87	5	4	91	349	305	298	370
32960	T3FD300	31,2	300	420	76	57	76	4	3	80	362	324	314	383
32060-X	T4GD300	57,2	300	460	100	74	100	5	4	98	375	329	318	404
32064-X	T4GD320	60,5	320	480	100	74	100	5	4	104	397,5	350	338	424



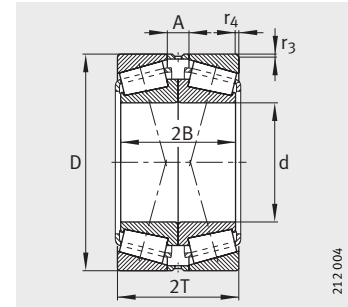
Mounting dimensions

						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D _a	D _b	C _a	C _b	r _a	r _b	dyn. C _r	stat. C _{0r}	e	Y	Y ₀	C _{ur}	n _G	n _B
max.	min.	min.	min.	max.	max.	N	N				N	min ⁻¹	min ⁻¹
254	262	7	10	3	3	305 000	550 000	0,47	1,27	0,7	61 000	2 200	1 200
268	271	9	12	3	2,5	495 000	930 000	0,39	1,52	0,84	107 000	2 200	1 240
298	297	11	17	3	2,5	760 000	1 380 000	0,43	1,39	0,77	155 000	2 200	1 150
342	336	9	16	5	4	770 000	1 080 000	0,44	1,38	0,76	115 000	2 000	1 300
342	340	11	22	5	4	1 320 000	2 070 000	0,41	1,48	0,81	225 000	2 000	1 070
288	290	9	12	3	2,5	495 000	980 000	0,43	1,41	0,78	110 000	2 000	1 120
326	326	12	19	4	3	890 000	1 640 000	0,43	1,39	0,77	179 000	2 000	1 020
382	371	10	18	5	4	950 000	1 320 000	0,42	1,43	0,79	135 000	1 700	1 140
382	380	12	24	5	4	1 540 000	2 550 000	0,44	1,38	0,76	270 000	1 500	920
308	311	9	12	3	2,5	510 000	1 050 000	0,46	1,31	0,72	116 000	2 000	1 020
346	346	12	19	4	3	900 000	1 680 000	0,46	1,31	0,72	182 000	1 700	950
422	415	14	27	5	4	1 860 000	3 150 000	0,44	1,38	0,76	320 000	1 400	800
348	347	11	15,5	3	2,5	740 000	1 490 000	0,41	1,48	0,81	160 000	1 700	880
382	383	14	22	5	4	1 160 000	2 170 000	0,43	1,38	0,76	226 000	1 500	830
458	455	14	31	6	5	2 240 000	3 800 000	0,43	1,39	0,77	380 000	1 300	700
368	368	11	15,5	3	2,5	740 000	1 520 000	0,43	1,39	0,76	162 000	1 500	820
402	402	14	22	5	4	1 210 000	2 330 000	0,46	1,31	0,72	239 000	1 400	760
406	405	12	19	4	3	980 000	2 020 000	0,39	1,52	0,84	207 000	1 300	730
442	439	15	26	5	4	1 510 000	2 900 000	0,43	1,38	0,76	290 000	1 300	680
462	461	15	26	5	4	1 570 000	3 100 000	0,46	1,31	0,72	305 000	1 200	630

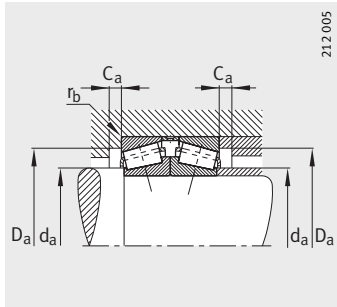


Tapered roller bearings

Matched pairs



Dimension table · Dimensions in mm									
Designation	Mass for bearing pair m ≈kg	Dimensions						Mounting dimensions	
		d	D	2B	2T	r ₃ , r ₄ min.	A	d _a max.	D _a min.
31306-A-N11CA-A50-90	0,85	30	72	38	41,5	1,5	13,5	40	55
31307-A-N11CA-A40-70	1,13	35	80	42	45,5	1,5	15,5	44	62
31308-A-N11CA-A50-90	1,52	40	90	46	50,5	1,5	16,5	51	71
31309-A-N11CA-A60-100	2,1	45	100	50	54,5	1,5	18,5	56	79
31310-A-N11CA-A60-100	2,9	50	110	54	58,5	2	20,5	62	87
31311-A-N11CA-A80-120	3,4	55	120	58	63	2	21	68	94
31312-A-N11CA-A80-120	4,2	60	130	62	67	2,5	23	73	103
31313-A-N11CA-A80-120	5,05	65	140	66	72	2,5	26	79	111
31314-A-N11CA-A100-140	6,2	70	150	70	76	2,5	26	84	118
31315-N11CA-A100-140	7,2	75	160	74	80	2,5	28	91	127
31316-N11CA-A100-140	8,9	80	170	78	85	2,5	31	97	134
31317-N11CA-A120-160	10,4	85	180	82	89	3	33	103	143
31318-N11CA-A120-160	11,8	90	190	86	93	3	33	109	151
31318-N11CA-A160-200	11,8	90	190	86	93	3	33	109	151
31319-A-N11CA-A120-160	14	95	200	90	99	3	35	114	157



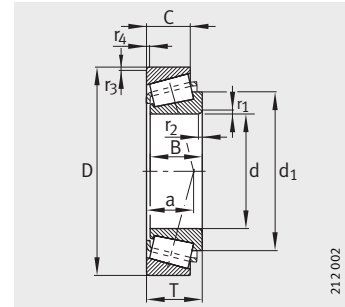
Mounting dimensions

			Basic load ratings for bearing pair		Calculation factors				Fatigue limit load	Limiting speed
D _a	C _a	r _b	dyn. C _r	stat. C _{0r}	e	Y ₁	Y ₂	Y ₀	C _{ur}	Bearing pair
max.	min.	max.	N	N					N	min ⁻¹
65	3	1,5	77 000	93 000	0,83	0,82	1,22	0,8	10 600	8 000
71	4	1,5	102 000	128 000	0,83	0,82	1,22	0,8	14 900	7 000
81	4	1,5	130 000	167 000	0,83	0,82	1,22	0,8	18 800	6 000
91	4	1,5	163 000	214 000	0,83	0,82	1,22	0,8	25 500	5 600
100	4	2	187 000	245 000	0,83	0,82	1,22	0,8	29 000	5 000
110	4	2	209 000	275 000	0,83	0,82	1,22	0,8	32 500	4 800
118	5	2,5	250 000	340 000	0,83	0,82	1,22	0,8	40 000	4 500
128	5	2,5	285 000	380 000	0,83	0,82	1,22	0,8	45 000	4 300
138	5	2,5	325 000	445 000	0,83	0,82	1,22	0,8	52 000	4 000
148	6	2,5	350 000	475 000	0,83	0,82	1,22	0,8	55 000	3 600
158	6	2,5	390 000	540 000	0,83	0,82	1,22	0,8	61 000	3 400
166	6	3	435 000	610 000	0,83	0,82	1,22	0,8	68 000	3 000
176	6	3	475 000	660 000	0,83	0,82	1,22	0,8	71 000	2 800
176	6	3	475 000	660 000	0,83	0,82	1,22	0,8	71 000	2 800
186	6	3	530 000	750 000	0,83	0,82	1,22	0,8	80 000	2 600

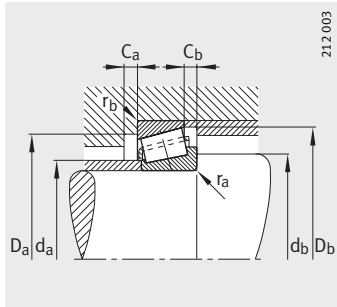


Taper roller bearings

Inch sizes



Dimension table · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions								
		d	D	B	C	T	r ₁ , r ₂ min.	r ₃ , r ₄ min.	a ≈	d ₁ ≈
KLM11749-LM11710	0,086	17,462	39,878	14,605	10,668	13,843	1,3	1,3	9	29,6
KLM11949-LM11910	0,12	19,05	45,237	16,637	12,065	15,494	1,3	1,3	10	31,8
KM12649-M12610	0,163	21,43	50,005	18,288	13,97	17,526	1,3	1,3	11	34,5
KLM12749-LM12710	0,12	21,986	45,237	16,637	12,065	15,494	1,3	1,3	10	34,8
KLM12749-LM12711	0,13	21,986	45,974	16,637	12,065	15,494	1,3	1,3	10	34,8
KL44643-L44610	0,129	25,4	50,292	14,732	10,668	14,224	1,3	1,3	11	40,1
KL44649-L44610	0,137	26,988	50,292	14,732	10,668	14,224	3,5	1,3	11	40,1
KM86649-M86610	0,375	30,162	64,292	21,433	16,67	21,433	1,5	1,5	18	50,7
KLM67048-LM67010	0,19	31,75	59,131	16,764	11,811	15,875	3,5	1,3	13	45,8
KHM88542-HM88510	0,641	31,75	73,025	27,782	23,02	29,37	1,3	3,3	24	58
KLM48548-LM48510	0,273	34,925	65,088	18,288	13,97	18,034	3,5	1,3	14	49,7
KHM88649-HM88610	0,5	34,925	72,233	25,4	19,842	25,4	2,3	2,3	21	56,8
KL68149-L68110	0,171	34,988	59,131	16,764	11,938	15,875	3,5	1,3	13	48,8
KLM29748-LM29710	0,227	38,1	65,088	18,288	13,97	18,034	3,5	1,3	13	53
KLM29749-LM29710	0,24	38,1	65,088	18,288	13,97	18,034	2,3	1,3	13	53
KLM300849-LM300811	0,255	40,987	67,975	18	13,5	17,5	3,5	1,5	14	55,8
KLM501349-LM501310	0,365	41,275	73,431	19,812	14,732	19,558	3,5	0,8	16	57,2
KHM804840-HM804810	1,19	41,275	95,25	29,37	23,02	30,162	3,5	3,3	26	73,1
KLM603049-LM603011	0,367	45,242	77,788	19,842	15,08	19,842	3,5	0,8	18	61,7
KLM503349-LM503310	0,306	45,987	74,985	18	14	18	2,3	1,5	16	61,9
KLM503349A-LM503310	0,324	45,987	74,985	18	14	18	3,5	1,5	16	61,9
KLM104949-LM104911	0,425	50,8	82,55	22,225	16,51	21,59	3,5	1,3	16	66,3
K72200-72487	2,18	50,8	123,825	32,791	25,4	36,512	3,5	3,3	38	86,8
KLM806649-LM806610	0,445	53,975	88,9	19,05	13,492	19,05	2,3	2	21	72,3
KHM911245-HM911210	2,13	60,325	130,175	33,338	23,813	36,513	5,2	3,3	42	97,3
KH913849-H913810	2,96	69,85	146,05	39,688	25,4	41,275	3,5	3,3	45	109,4
K47490-47420	1,61	71,438	120	32,545	26,195	32,545	3,5	3,3	27	95,2
KHM215249-HM215210	2,26	75,987	131,975	39	32	39	7,1	3,5	30	103,2
K34306-34478	0,932	77,788	121,442	23,012	17,462	24,608	3,5	2	26	99,7
KHM518445-HM518410	2,94	88,9	152,4	39,688	30,163	39,688	6,4	3,3	34	119,5
KHM218248-HM218210	2,57	89,975	146,975	40	32,5	40	7,1	3,5	32	119

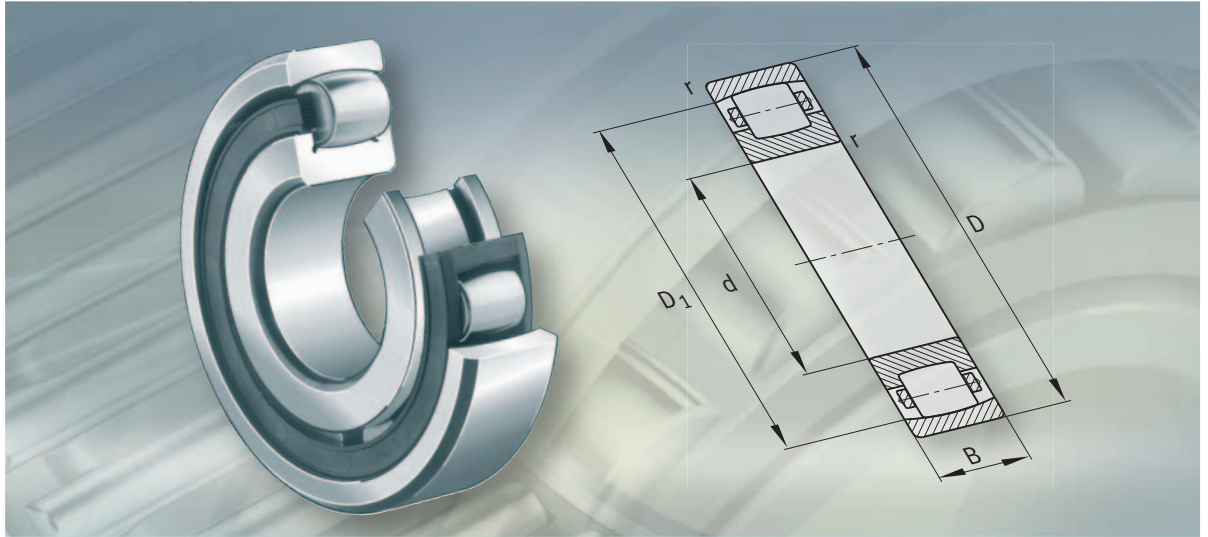


Mounting dimensions

Mounting dimensions								Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed
d _a	d _b	D _a	D _b	C _a	C _b	r _a	r _b	dyn. C _r	stat. C _{0r}	e	Y	Y ₀	C _{ur}	n _G
max.	min.	min.	min.	min.	min.	max.	max.	N	N				N	min ⁻¹
21,5	23	34	37	3	3	1,3	1,3	20 500	20 000	0,29	2,1	1,15	2 190	20 000
23,5	25	39,5	41,5	3,5	4,5	1,3	1,3	27 000	27 000	0,3	2	1,1	3 050	18 000
25,5	27,5	44	46	4	3,5	1,3	1,3	37 000	38 000	0,28	2,16	1,19	4 400	17 000
26	27,5	39,5	42	3	3	1,3	1,3	28 000	31 500	0,31	1,96	1,08	3 550	17 000
26	27,5	40	42,5	3	3	1,3	1,3	28 000	31 500	0,31	1,96	1,08	3 550	17 000
30	32	44,5	47	3	3,5	1,3	1,3	25 000	28 500	0,37	1,6	0,88	3 150	14 000
31	37,5	44,5	47	2,5	3,5	3,5	1,3	25 000	28 500	0,37	1,6	0,88	3 150	14 000
38,2	41	54	61	3	4,5	1,5	1,5	52 000	66 000	0,55	1,1	0,6	7 900	11 000
36	42,5	52	56	3,5	4,5	3,5	1,3	33 000	39 000	0,41	1,46	0,8	4 450	12 000
42,6	45,5	59	70	4	6	1,3	3,3	72 000	97 000	0,55	1,1	0,6	12 100	9 500
40	46	58	61	3	4	3,5	1,3	45 500	54 000	0,38	1,59	0,88	6 400	10 000
42,5	48,5	60	69	3	5	2,3	2,3	69 000	91 000	0,55	1,1	0,6	11 300	9 500
39	45,5	53	56	3	4	3,5	1,3	33 000	43 500	0,42	1,44	0,79	5 000	11 000
42,5	49	59	62	2	4	3,5	1,3	44 000	58 000	0,33	1,8	0,99	6 900	10 000
42,5	46	59	62	2	4	2,3	1,3	44 000	58 000	0,33	1,8	0,99	6 900	10 000
45	52	61	65	3	4	3,5	1,5	44 500	60 000	0,35	1,72	0,95	7 300	10 000
46,5	53	67	70	4	4,5	3,5	0,8	55 000	67 000	0,4	1,5	0,83	8 100	9 500
54	61	81	91	4,5	7	3,5	3,3	111 000	151 000	0,55	1,1	0,6	18 800	7 000
50	57	71	74	3	4,5	3,5	0,8	54 000	68 000	0,43	1,41	0,77	8 100	8 500
51	55	67	71	4	3,5	2,3	1,5	47 500	65 000	0,4	1,49	0,82	7 800	9 000
51	57	67	71	3,5	4	3,5	1,5	47 500	65 000	0,4	1,49	0,82	7 800	9 000
55	62	75	78	3	5	3,5	1,3	69 000	92 000	0,31	1,97	1,08	11 400	8 000
67	79	102	116	3,5	8,5	3,5	3,3	135 000	148 000	0,74	0,81	0,45	17 800	5 600
60	63	80	85	4	5,5	2,3	2	59 000	79 000	0,55	1,1	0,6	9 500	7 500
74,4	87	109	123,6	6	4	5,2	3,3	145 000	170 000	0,82	0,73	0,4	20 500	5 300
82	95	124	138	5	12,5	3,5	3,3	201 000	239 000	0,78	0,77	0,42	28 500	4 800
79	86	107	114	4	6	3,5	3,3	152 000	224 000	0,36	1,67	0,92	28 000	5 300
85	98	118	126	7	7	7,1	3,5	206 000	295 000	0,33	1,8	0,99	37 000	5 000
84	90	110	116	3	7	3,5	2	81 000	112 000	0,45	1,33	0,73	13 700	5 300
100	110	134	146	4	8,5	6,4	3,3	242 000	345 000	0,4	1,49	0,82	41 000	4 500
99	112	133	141	5,5	7,5	7,1	3,5	232 000	350 000	0,33	1,8	0,99	43 000	4 800



FAG



Barrel roller bearings

Barrel roller bearings

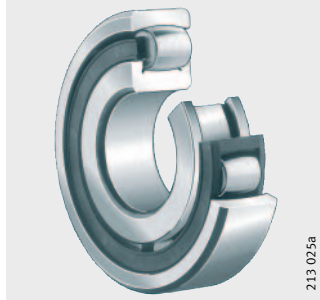
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Product overview **Barrel roller bearings**

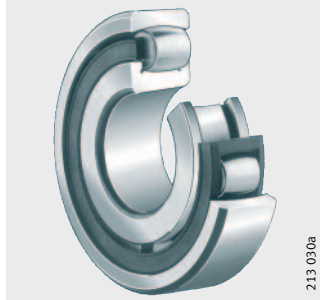
With cylindrical bore

202, 203



With tapered bore

202..-K, 203..-K



With adapter sleeve

202..-K + H, 203..-K + H



Barrel roller bearings

Features Barrel roller bearings are single row, self-aligning roller bearings. They comprise solid outer rings with a concave raceway, solid inner rings with two ribs and a cylindrical or tapered bore as well as barrel rollers with cages. The bearings cannot be dismantled.

Barrel roller bearings are particularly suitable where high radial shock type loads occur and misalignments must be compensated, see Compensation of angular misalignments. They have only a low axial load carrying capacity.

With tapered bore/with adapter sleeve Bearings with a tapered bore have a bore taper of 1:12 and the suffix K.

These bearings are also available with an adapter sleeve for location. The adapter sleeves are included in the dimension tables and must be specified in addition when ordering.

Sealing/lubrication Barrel roller bearings are not sealed and not greased. They can be lubricated using oil or grease.

Compensation of angular misalignments Under normal operating conditions and with a rotating inner ring, barrel roller bearings can swivel approx. 4° about their central position. As a result, they permit skewing between the inner and outer ring and can thus compensate misalignments, shaft deflections and housing deformations.

If the outer ring rotates or the inner ring undergoes tumbling motion, the angular adjustment facility is smaller. In this case, please contact us.

Operating temperature Barrel roller bearings with brass cages can be used at operating temperatures from -30 °C to +150 °C.

Bearing with an outside diameter over 120 mm are dimensionally stable up to +200 °C.

Caution! Bearings with cages made from glass fibre reinforced polyamide can be used up to +120 °C.

Cages The standard cages for barrel roller bearings are shown in the table Cage/bore code.

Barrel roller bearings with solid brass cages have the suffix MB. The cages are guided on the inner ring.

Solid window cages made from glass fibre reinforced polyamide are indicated by the suffix TVP.

Caution! Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

The oil change intervals must be observed.

Cage/bore code

Series	Solid window cage made from polyamide ¹⁾ Bore code	Solid brass cage ¹⁾
202	up to 16	from 17
203	up to 12	from 13

¹⁾ Other cage designs – for example brass cages instead of polyamide cages – are available by agreement. In such cages, suitability for high speeds and temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.



Barrel roller bearings

Suffixes Suffixes for the available designs: see table.

Available designs

Suffixes	Description	Design
C3	Radial internal clearance larger than normal	Standard for tapered bore
K	Tapered bore	Standard
MB	Solid brass cage	Standard
TVP	Solid window cage made from glass fibre reinforced polyamide	Standard

Design and safety guidelines
Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

$$P = F_r + 9,5 \cdot F_a$$

P N
 Equivalent dynamic bearing load for combined load
 F_a N
 Axial dynamic bearing load
 F_r N
 Radial dynamic bearing load.

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + 5 \cdot F_{0a}$$

P₀ N
 Equivalent static bearing load for combined load
 F_{0a} N
 Axial static bearing load
 F_{0r} N
 Radial static bearing load.

Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, a minimum radial load of the order of $P/C_r > 0,02$ is necessary for roller bearings with cage.

Speeds

DIN 732-1 (draft 1994-12) does not give thermal reference speeds for barrel roller bearings.

Caution!

The dimension tables therefore only state limiting speeds n_G . These values are for oil lubrication and must not be exceeded.

Location of bearings with tapered bore

Bearings with a tapered inner ring bore are:

- located either directly on tapered shaft seats or
- located on cylindrical shafts by means of an adapter sleeve.

The dimensions for support rings in the dimension tables must be observed.

Mounting dimensions

The shoulders on the adjacent construction (shaft/housing) must be sufficiently high that adequate abutment surfaces are ensured even with very large chamfer dimensions.

The maximum values for the radii r_a and the diameters of the abutment surfaces d_a , D_a are indicated in the dimension tables.

Accuracy The main dimensions of the bearings conform to DIN 635-1.
The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620-2.

Radial internal clearance of bearings with cylindrical bore The radial internal clearance corresponds to internal clearance group CN.

Radial internal clearance to DIN 620-4

Bore		Radial internal clearance							
d mm		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
-	30	2	9	9	17	17	28	28	40
30	40	3	10	10	20	20	30	30	45
40	50	3	13	13	23	23	35	35	50
50	65	4	15	15	27	27	40	40	55
65	80	5	20	20	35	35	55	55	75
80	100	7	25	25	45	45	65	65	90
100	120	10	30	30	50	50	70	70	95
120	140	15	35	35	55	55	80	80	110
140	160	20	40	40	65	65	95	95	125
160	180	25	45	45	70	70	100	100	130
180	225	30	50	50	75	75	105	105	135
225	250	35	55	55	80	80	110	110	140
250	280	40	60	60	85	85	115	115	145

Radial internal clearance of bearings with tapered bore

Bearings with a tapered bore have the internal clearance group C3.

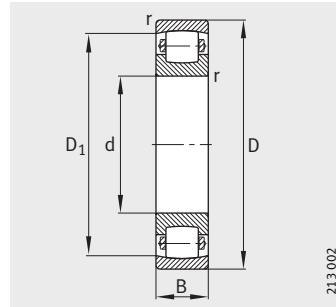
Radial internal clearance to DIN 620-4

Bore		Radial internal clearance							
d mm		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
-	30	9	17	17	28	28	40	40	55
30	40	10	20	20	30	30	45	45	60
40	50	13	23	23	35	35	50	50	65
50	65	15	27	27	40	40	55	55	75
65	80	20	35	35	55	55	75	75	95
80	100	25	45	45	65	65	90	90	120
100	120	30	50	50	70	70	95	95	125
120	140	35	55	55	80	80	110	110	140
140	160	40	65	65	95	95	125	125	155
160	180	45	70	70	100	100	130	130	160
180	225	50	75	75	105	105	135	135	165
225	250	55	80	80	110	110	140	140	170
250	280	60	85	85	115	115	145	145	175

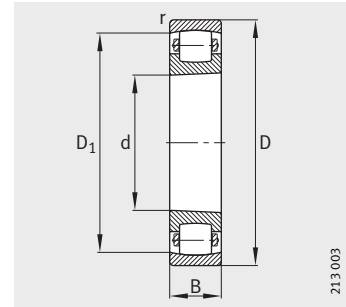


Barrel roller bearings

With cylindrical or tapered bore

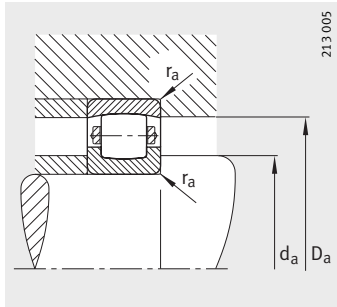


Cylindrical bore



Tapered bore
K = taper 1:12

Dimension table · Dimensions in mm						
Designation	Mass m ≈kg	Dimensions				
		d	D	B	r min.	D ₁ ≈
20204-TVP	0,114	20	47	14	1	39
20304-TVP	0,152	20	52	15	1,1	43,5
20205-K-TVP-C3	0,132	25	52	15	1	43,9
20205-TVP	0,134	25	52	15	1	43,9
20305-TVP	0,243	25	62	17	1,1	51,9
20206-K-TVP-C3	0,203	30	62	16	1	53
20206-TVP	0,207	30	62	16	1	53
20306-TVP	0,37	30	72	19	1,1	60,7
20207-K-TVP-C3	0,296	35	72	17	1,1	62,3
20207-TVP	0,301	35	72	17	1,1	62,3
20307-TVP	0,493	35	80	21	2,5	67,4
20208-K-TVP-C3	0,38	40	80	18	1,1	70,1
20208-TVP	0,386	40	80	18	1,1	70,1
20308-TVP	0,671	40	90	23	1,5	76,8
20209-K-TVP-C3	0,433	45	85	19	1,1	74,6
20209-TVP	0,441	45	85	19	1,1	74,6
20309-TVP	0,914	45	100	25	1,5	85,2
20210-K-TVP-C3	0,489	50	90	20	1,1	79,5
20210-TVP	0,499	50	90	20	1,1	79,5
20310-TVP	1,17	50	110	27	2	94,4
20211-K-TVP-C3	0,642	55	100	21	1,5	89,2
20211-TVP	0,653	55	100	21	1,5	89,2
20311-K-TVP-C3	1,49	55	120	29	2	101,7
20311-TVP	1,53	55	120	29	2	101,7
20212-K-TVP-C3	0,822	60	110	22	1,5	97,8
20212-TVP	0,836	60	110	22	1,5	97,8
20312-K-TVP-C3	1,89	60	130	31	2,1	111,2
20312-TVP	1,92	60	130	31	2,1	111,2
20213-K-TVP-C3	1,07	65	120	23	1,5	105,1
20213-TVP	1,08	65	120	23	1,5	105,1
20313-K-MB-C3	2,14	65	140	33	1,5	120,6
20313-MB	2,18	65	140	33	1,5	120,6



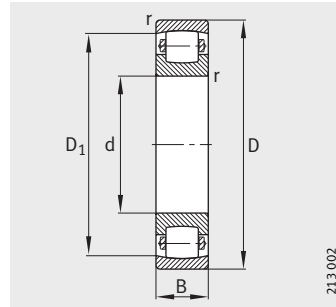
Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N		
25,6	41,4	1	20 400	19 300	1 700	7 500
27	45	1	27 000	24 500	2 300	7 000
30,6	46,4	1	24 000	25 000	2 190	6 700
30,6	46,4	1	24 000	25 000	2 190	6 700
32	55	1	36 000	34 500	3 000	6 000
35,6	56,4	1	27 500	28 500	2 850	5 600
35,6	56,4	1	27 500	28 500	2 850	5 600
37	65	1	49 000	49 000	4 250	5 000
42	65	1	40 500	43 000	4 900	4 800
42	65	1	40 500	43 000	4 900	4 800
44	71	1,5	58 500	61 000	5 400	4 500
47	73	1	49 000	53 000	5 400	4 300
47	73	1	49 000	53 000	5 400	4 300
49	81	1,5	76 500	81 500	7 200	4 000
52	78	1	52 000	57 000	5 900	4 000
52	78	1	52 000	57 000	5 900	4 000
54	91	1,5	86 500	95 000	8 500	3 600
57	83	1	58 500	68 000	7 000	3 600
57	83	1	58 500	68 000	7 000	3 600
61	99	2	108 000	118 000	10 600	3 400
64	91	1,5	73 500	85 000	9 300	3 400
64	91	1,5	73 500	85 000	9 300	3 400
66	109	2	120 000	137 000	12 400	3 000
66	109	2	120 000	137 000	12 400	3 000
69	101	1,5	85 000	100 000	10 900	3 200
69	101	1,5	85 000	100 000	10 900	3 200
72	118	2,1	146 000	170 000	15 200	2 800
72	118	2,1	146 000	170 000	15 200	2 800
74	111	1,5	95 000	116 000	12 700	3 000
74	111	1,5	95 000	116 000	12 700	3 000
77	128	2,1	170 000	196 000	17 900	2 800
77	128	2,1	170 000	196 000	17 900	2 800

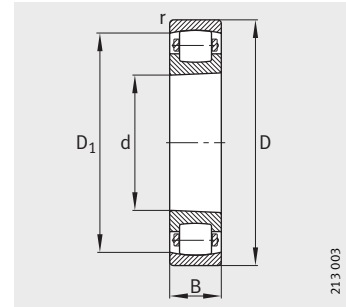


Barrel roller bearings

With cylindrical or tapered bore

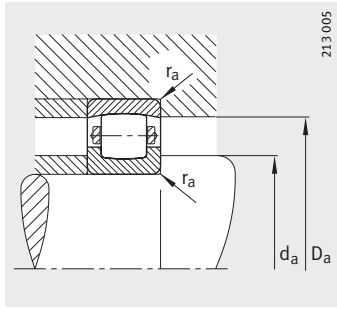


Cylindrical bore



Tapered bore
K = taper 1:12

Dimension table (continued) · Dimensions in mm						
Designation	Mass m ≈kg	Dimensions				
		d	D	B	r min.	D ₁ ≈
20214-TVP	1,17	70	125	24	1,5	111
20314-MB	3,15	70	150	35	2,1	128,7
20215-K-TVP-C3	1,25	75	130	25	1,5	115,9
20215-TVP	1,28	75	130	25	1,5	115,9
20315-MB	3,76	75	160	37	2,1	138,1
20216-K-TVP-C3	1,56	80	140	26	2	124,5
20216-TVP	1,58	80	140	26	2	124,5
20316-MB	4,58	80	170	39	2,1	147,5
20217-K-MB-C3	2,19	85	150	28	2	133,9
20217-MB	2,22	85	150	28	2	133,9
20317-MB	5,25	85	180	41	3	156,9
20218-K-MB-C3	2,68	90	160	30	2	143,8
20218-MB	2,72	90	160	30	2	143,8
20318-K-MB-C3	6,17	90	190	43	3	165,1
20318-MB	6,25	90	190	43	3	165,1
20219-MB	3,19	95	170	32	2,1	152,7
20319-MB	7,29	95	200	45	3	174,5
20220-K-MB-C3	3,9	100	180	34	2,1	160,8
20220-MB	3,96	100	180	34	2,1	160,8
20320-K-MB-C3	8,58	100	215	47	3	186,6
20320-MB	8,69	100	215	47	3	186,6
20221-MB	4,74	105	190	36	2,1	169,2
20222-K-MB-C3	5,45	110	200	38	2,1	178,6
20222-MB	5,53	110	200	38	2,1	178,6
20322-MB	11,6	110	240	50	3	208,1
20224-K-MB-C3	6,51	120	215	40	2,1	191,1
20224-MB	6,6	120	215	40	2,1	191,1
20324-MB	15,2	120	260	55	3	222,3
20226-K-MB-C3	7,21	130	230	40	3	205,7
20226-MB	7,31	130	230	40	3	205,7
20326-MB	18,4	130	280	58	4	240,3
20228-K-MB-C3	8,98	140	250	42	3	223,9
20228-MB	9,09	140	250	42	3	223,9
20328-MB	22,5	140	300	62	4	257,9



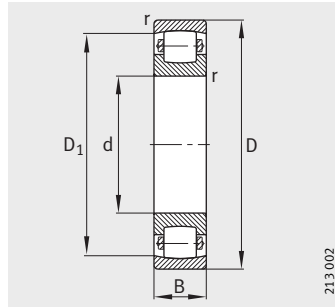
Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N		
79	116	1,5	106 000	134 000	14 100	2 800
82	138	2,1	183 000	216 000	19 600	2 600
84	121	1,5	112 000	143 000	16 100	2 800
84	121	1,5	112 000	143 000	16 100	2 800
87	148	2,1	216 000	255 000	22 400	2 200
91	129	2	125 000	163 000	17 100	2 600
91	129	2	125 000	163 000	17 100	2 600
92	158	2,1	245 000	285 000	25 500	2 000
96	139	2	156 000	200 000	20 400	2 400
96	139	2	156 000	200 000	20 400	2 400
99	166	2,5	270 000	320 000	28 500	1 900
101	149	2	173 000	220 000	22 000	2 000
101	149	2	173 000	220 000	22 000	2 000
104	176	2,5	300 000	360 000	30 500	1 900
104	176	2,5	300 000	360 000	30 500	1 900
107	158	2,1	208 000	265 000	26 000	1 900
109	186	2,5	335 000	400 000	34 000	1 800
112	168	2,1	224 000	290 000	28 000	1 900
112	168	2,1	224 000	290 000	28 000	1 900
114	201	2,5	365 000	440 000	38 000	1 700
114	201	2,5	365 000	440 000	38 000	1 700
117	178	2,1	245 000	315 000	30 500	1 800
122	188	2,1	285 000	375 000	34 500	1 700
122	188	2,1	285 000	375 000	34 500	1 700
124	226	2,5	430 000	520 000	45 500	1 500
132	203	2,1	305 000	415 000	38 000	1 600
132	203	2,1	305 000	415 000	38 000	1 600
134	246	2,5	490 000	630 000	52 000	1 400
144	216	2,5	335 000	450 000	42 500	1 500
144	216	2,5	335 000	450 000	42 500	1 500
147	263	3	550 000	720 000	59 000	1 400
154	236	2,5	390 000	530 000	50 000	1 400
154	236	2,5	390 000	530 000	50 000	1 400
157	283	3	640 000	850 000	66 000	1 300

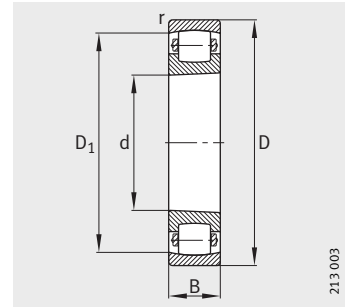


Barrel roller bearings

With cylindrical or tapered bore



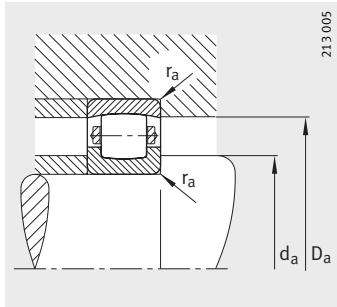
Cylindrical bore



Tapered bore
K = taper 1:12

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions				
		d	D	B	r min.	D ₁ ≈
20230-K-MB-C3	11,6	150	270	45	3	238,6
20230-MB	11,7	150	270	45	3	238,6
20330-MB	26,9	150	320	65	4	275,8
20232-K-MB-C3	14,4	160	290	48	3	256,5
20232-MB	14,5	160	290	48	3	256,5
20234-MB	17,9	170	310	52	4	273,1
20236-MB	18,4	180	320	52	4	284,3
20238-MB	22,5	190	340	55	4	301,2
20240-MB	26,7	200	360	58	4	319
20244-MB	37,4	220	400	65	4	353,5
20248-MB	50,5	240	440	72	4	388
20252-MB	68,2	260	480	80	5	421,3



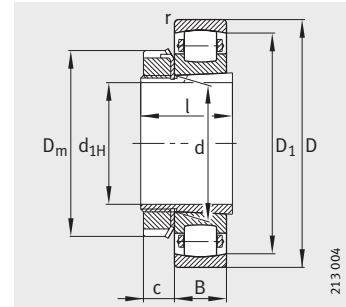
Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N		
164	256	2,5	430 000	610 000	55 000	1 300
164	256	2,5	430 000	610 000	55 000	1 300
167	303	3	720 000	950 000	74 000	1 200
174	276	2,5	500 000	720 000	64 000	1 200
174	276	2,5	500 000	720 000	64 000	1 200
187	293	3	570 000	830 000	70 000	1 100
197	303	3	585 000	850 000	74 000	1 000
207	323	3	640 000	950 000	81 000	950
217	343	3	735 000	1 080 000	91 000	950
237	383	3	880 000	1 320 000	109 000	850
257	423	3	1 060 000	1 600 000	129 000	750
280	460	4	1 270 000	1 930 000	148 000	700



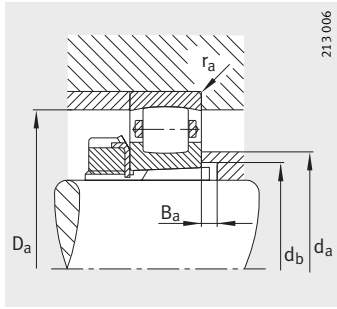
Barrel roller bearings

With adapter sleeve



With adapter sleeve

Dimension table · Dimensions in mm										
Designation		Mass m		Dimensions						
Bearing	Adapter sleeve	Bearing ≈ kg	Adapter sleeve ≈ kg	d _{1H}	d	D	B	r min.	D ₁ ≈	D _m ≈
20205-K-TVP-C3	H205	0,132	0,069	20	25	52	15	1	43,9	38
20206-K-TVP-C3	H206	0,203	0,091	25	30	62	16	1	53	45
20207-K-TVP-C3	H207	0,296	0,129	30	35	72	17	1,1	62,3	57
20208-K-TVP-C3	H208	0,38	0,17	35	40	80	18	1,1	70,1	58
20209-K-TVP-C3	H209	0,433	0,216	40	45	85	19	1,1	74,6	65
20210-K-TVP-C3	H210	0,489	0,264	45	50	90	20	1,1	79,5	70
20211-K-TVP-C3	H211	0,642	0,292	50	55	100	21	1,5	89,2	75
20311-K-TVP-C3	H311	1,49	0,35	50	55	120	29	2	101,7	75
20212-K-TVP-C3	H212	0,822	0,325	55	60	110	22	1,5	97,8	80
20312-K-TVP-C3	H312	1,89	0,373	55	60	130	31	2,1	111,2	80
20213-K-TVP-C3	H213	1,07	0,393	60	65	120	23	1,5	105,1	92
20313-K-MB-C3	H313	2,14	0,452	60	65	140	33	1,5	120,6	92
20215-K-TVP-C3	H215	1,25	0,693	65	75	130	25	1,5	115,9	98
20216-K-TVP-C3	H216	1,56	0,876	70	80	140	26	2	124,5	105
20217-K-MB-C3	H217	2,19	0,995	75	85	150	28	2	133,9	110
20218-K-MB-C3	H218	2,68	1,17	80	90	160	30	2	143,8	126
20318-K-MB-C3	H318	6,17	1,36	80	90	190	43	3	165,1	126
20220-K-MB-C3	H220	3,9	1,48	90	100	180	34	2,1	160,8	130
20320-K-MB-C3	H320	8,58	1,69	90	100	215	47	3	186,6	130
20222-K-MB-C3	H222	5,45	1,9	100	110	200	38	2,1	178,6	145
20224-K-MB-C3	H3024	6,51	1,95	110	120	215	40	2,1	191,1	145
20226-K-MB-C3	H3026	7,21	2,9	115	130	230	40	3	205,7	155
20228-K-MB-C3	H3028	8,98	3,25	125	140	250	42	3	223,9	165
20230-K-MB-C3	H3030	11,6	3,98	135	150	270	45	3	238,6	180
20232-K-MB-C3	H3032	14,4	5,33	140	160	290	48	3	256,5	190

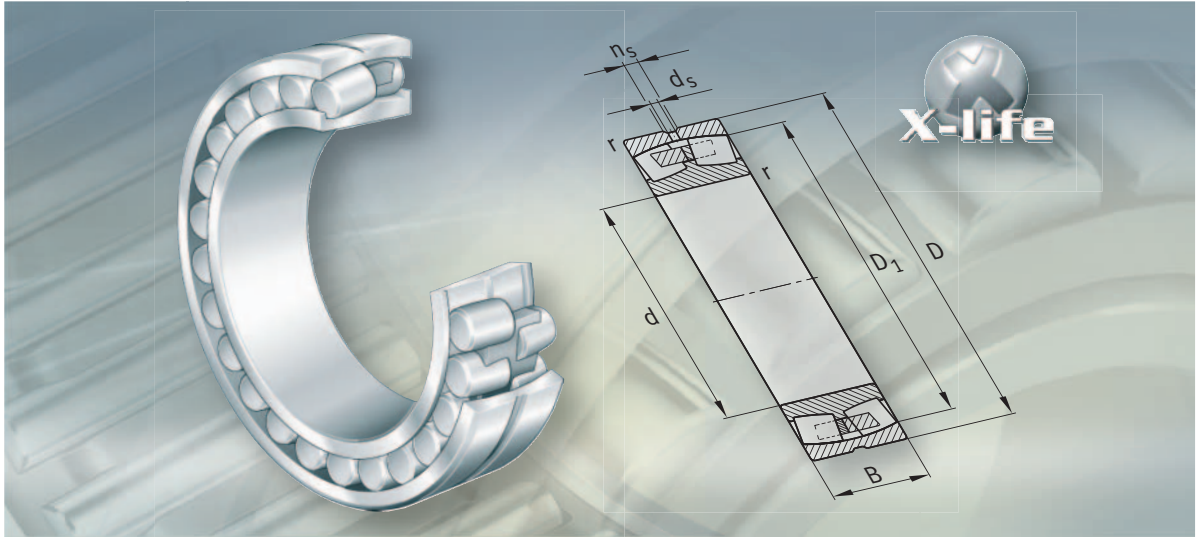


Mounting dimensions

l	c	Mounting dimensions					Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}
		d_a max.	D_a max.	d_b min.	B_a min.	r_a max.	dyn. C_r N	stat. C_{0r} N		
26	9	33	46,4	28	6	1	24 000	25 000	2 190	6 700
27	9	39	56,4	33	5	1	27 500	28 500	2 850	5 600
29	10	45	65	38	5	1	40 500	43 000	4 900	4 800
31	11	51	73	43	5	1	49 000	53 000	5 400	4 300
33	12	56	78	48	5	1	52 000	57 000	5 900	4 000
35	13	61	83	53	5	1	58 500	68 000	7 000	3 600
37	13	68	91	60	6	1,5	73 500	85 000	9 300	3 400
45	13	72	109	60	6	2	120 000	137 000	12 400	3 000
38	13	73	101	64	6	1,5	85 000	100 000	10 900	3 200
47	13	78	118	65	5	2,1	146 000	170 000	15 200	2 800
40	14	80	111	70	5	1,5	95 000	116 000	12 700	3 000
50	14	84	128	70	5	2,1	170 000	196 000	17 900	2 800
43	15	90	121	80	5	1,5	112 000	143 000	16 100	2 800
46	17	96	129	85	5	2	125 000	163 000	17 100	2 600
50	18	102	139	90	6	2	156 000	200 000	20 400	2 400
52	18	108	149	95	6	2	173 000	220 000	22 000	2 000
65	18	113	176	96	6	2,5	300 000	360 000	30 500	1 900
58	20	120	168	106	7	2,1	224 000	290 000	28 000	1 900
71	20	127	201	108	7	2,5	365 000	440 000	38 000	1 700
63	21	132	188	116	7	2,1	285 000	375 000	34 500	1 700
72	22	143	203	127	13	2,1	305 000	415 000	38 000	1 600
80	23	154	216	137	20	2,5	335 000	450 000	42 500	1 500
82	24	166	236	147	19	2,5	390 000	530 000	50 000	1 400
87	26	181	256	158	19	2,5	430 000	610 000	55 000	1 300
93	28	193	276	168	20	2,5	500 000	720 000	64 000	1 200



FAG



Spherical roller bearings

Spherical roller bearings

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Product overview Spherical roller bearings

With cylindrical bore

222, 223, 230, 231, 232, 233..-A, 239, 240, 241



X-life grade

213..-E1, 222..-E1, 223..-E1, 230..-E1, 230..-E1A, 231..-E1, 231..-E1A, 232..-E1, 232..-E1A, 240..-E1, 241..-E1



With tapered bore

222..-K, 223..-K, 230..-K, 231..-K, 232..-K, 239..-K, 240..-K30, 241..-K30



X-life grade

213..-E1-K, 222..-E1-K, 223..-E1-K, 230..-E1-K, 230..-E1A-K, 231..-E1(A)-K, 232..-E1(A)-K, 240..-E1-K30, 241..-E1-K30



With adapter sleeve

222..-K + H, 223..-K + H, 230..-K + H, 231..-K + H,
232..-K + H, 239..-K + H



213 035a

X-life grade

213..-E1-K + H, 222..-E1-K + H, 223..-E1-K + H,
230..-E1(A)-K + H, 231..-E1(A)-K + H, 232..-E1(A)-K + H



213 038a

With extraction sleeve

222..-K + AH, 223..-K + AH, 230..-K + AH, 231..-K + AH,
232..-K + AH, 239..-K + AH, 240..-K30 + AH, 241..-K30 + AH



213 034a



X-life grade

213..-E1-K + AH, 222..-E1-K + AH, 223..-E1-K + AH,
230..-E1(A)-K + AH, 231..-E1(A)-K + AH, 232..-E1(A)-K + AH,
240..-E1-K30 + AH, 241..-E1-K30 + AH



213 037a

Spherical roller bearings

Features Spherical roller bearings are double row, self-retaining units comprising solid outer rings with a concave raceway, solid inner rings and barrel rollers with cages. The inner rings have cylindrical or tapered bores. The symmetrical barrel rollers orient themselves freely on the concave outer ring raceway. As a result, shaft flexing and misalignment of the bearing seats are compensated, see Compensation of angular misalignments, page 515.

Radial and axial load capacity Spherical roller bearings can support axial forces in both directions and high radial forces. They are designed for very high load carrying capacity and, since they have the maximum possible number of large and particularly long barrel rollers, are also suitable for the heaviest loads. Due to the narrow osculation between the rollers and raceways, uniform stress distribution is achieved in the bearing.

X-life Many sizes of spherical roller bearings are classified as X-life products. These bearings do not have a central rib on the inner ring and therefore have longer barrel rollers as well as improved kinematics, optimised surfaces and are made from higher performance materials. As a result, the basic dynamic load rating and, under identical operating conditions, the basic rating life of the bearings is significantly improved. In certain applications, this means that a smaller bearing arrangement can be designed. X-life spherical roller bearings have the suffix E1 and are indicated in the dimension tables.

With cylindrical bore Spherical roller bearings of all series are available with inner rings having a cylindrical bore.

With tapered bore Spherical roller bearings are also available, with the exception of series 233...-A, with inner rings having a tapered bore. Bearings with the suffix K have a bore taper 1:12, bearings of series 240 and 241 have a bore taper 1:30 and the suffix K30.

With adapter sleeve or extraction sleeve Spherical roller bearings with a tapered bore are also available with an adapter sleeve, locknut and tab washer. Adapter and extraction sleeves must be ordered in addition to the bearing.

Sealing/lubrication Spherical roller bearings are not sealed and not greased. They can be lubricated using oil or grease. Most spherical roller bearings have a circumferential groove and three lubrication holes in the outer ring for lubrication. In bearings of series 239, 240 and 241 with an outside diameter < 320 mm, this can be identified by the suffix S. Bearings of series 213 with a bore diameter up to 35 mm do not have either a lubrication groove or lubrication holes.

Caution! If shafts with a vertical axis are supported using spherical roller bearings, particular attention must be paid to ensuring the reliable provision of lubricant. In such cases, oil lubrication should be used.

Compensation of angular misalignments

Spherical roller bearings compensate for angular misalignments. The permissible adjustment angle is given in the table for loads $P < 0,1 \cdot C_r$.

The adjustment angles are permissible under the following conditions:

- constant angular deviation (static angular misalignment)
- rotating inner ring.

Bearing series and adjustment angle

Series	Adjustment angle °
213..-E1, 222, 222..-E1, 230, 230..-E1(E1A), 239, 240, 240..-E1	1,5
223, 223..-E1, 231, 231..-E1(E1A), 232, 232..-E1(E1A), 233..-A, 241, 241..-E1	2

If the outer ring rotates, the inner ring undergoes tumbling motion or the load or adjustment angle is larger than stated in the table, the angular adjustment facility is smaller. If such applications are present, please contact us.

Operating temperature

Spherical roller bearings are dimensionally stable up to +200 °C. Bearings with metal cages can be used at operating temperatures from -30 °C to +200 °C.

Caution! Bearings with cages made from glass fibre reinforced polyamide are suitable up to +120 °C.

Cages

The standard cages for spherical roller bearings are shown in the table Cage/bore code, page 516.

Spherical roller bearings with a rigid central rib on the inner ring (design without suffix E1) have solid cages or sheet metal cages made from brass. The bearings with sheet metal cages do not have a cage suffix.

In bearings with the suffix MB, the solid brass cages are guided on the inner ring, while bearings with the suffix MA are guided on the outer ring. Bearings with the suffix M have a solid brass cage guided by the rollers.



With X-life grade

Bearings of series 222..-E1 and 223..-E1 without a cage suffix have sheet steel cages. The two cage halves are retained by a guiding ring in the outer ring. In bearings of series 223..-E1, all the cage parts are protected against wear by surface hardening or coating.

The other E1 design bearings have solid cages made from glass fibre reinforced polyamide 66 with the suffix TVPB or solid brass cages with the suffix M.

Caution! Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

The oil change intervals must be observed.

Spherical roller bearings

Cage/bore code

Series	Sheet metal cage made from		Solid cage made from			
	Steel	Brass	Poly-amide	Brass		
				Guided by rollers	Guidance on inner ring	Guidance on outer ring
Bore code						
213..-E1	08 to 18	–	04 to 07 19 to 22	–	–	–
222	–	–	–	–	from 38	–
222..-E1	up to 36	–	–	–	–	–
223	–	–	–	–	from 32	–
223..-A (T41A)	–	–	–	–	–	from 32
223..-E1	up to 30	–	–	–	–	–
223..-E1 (T41A)	up to 30	–	–	–	–	–
230	–	–	–	–	from 44	–
230..-E1	–	–	up to 40	–	–	–
230..-E1A	–	–	–	up to 40	–	–
231	–	–	–	–	from 40	–
231..-E1	–	–	up to 38	–	–	–
231..-E1A	–	–	–	up to 38	–	–
232	–	–	–	–	from 38	–
232..-E1	–	–	up to 36	–	–	–
232..-E1A	–	–	–	up to 36	–	–
233..-A (T41A)	–	–	–	–	–	from 20
239	–	–	–	–	from 36	–
240	–	–	–	–	from 24	–
240..-E1	–	–	up to 32	–	–	–
241	–	up to 88	–	–	from 92	–
241..-E1	–	–	up to 28	–	–	–

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description
A	Modified internal construction
B	Modified internal construction
E1	Increased capacity design
K	Tapered bore, taper 1:12
K30	Tapered bore, taper 1:30
M	Solid brass cage, guided by rollers
MA	Solid brass cage, guidance on outer ring
MB	Solid brass cage, guidance on inner ring
S	Lubrication groove and lubrication holes in outer ring
T41A	For oscillating load with restricted diameter tolerances, radial internal clearance C4
TVPB	Solid window cage made from glass fibre reinforced polyamide, guidance on inner ring

Design and safety guidelines
Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq e$	$P = F_r + Y_1 \cdot F_a$
$\frac{F_a}{F_r} > e$	$P = 0,67 \cdot F_r + Y_2 \cdot F_a$

P N
 Equivalent dynamic bearing load for combined load
 F_a N
 Axial dynamic bearing load
 F_r N
 Radial dynamic bearing load
 e, Y_1, Y_2 –
 Factors from dimension tables.

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + Y_0 \cdot F_{0a}$$

P_0 N
 Equivalent static bearing load for combined load
 F_{0a} N
 Axial static bearing load
 F_{0r} N
 Radial static bearing load
 Y_0 –
 Factor from dimension tables.

Axial load carrying capacity

Spherical roller bearings are suitable for axial loads. If very high loads occur in combination with very high speeds, the increased friction and bearing temperature must be taken into consideration.

Minimum load

The minimum load on the spherical roller bearings should be:

- $P = 0,02 \cdot C_r$
- $P = 0,015 \cdot C_r$ for bearings of E1 design.



Speed

Caution! The limiting speeds n_G in the dimension tables must be observed.

Mounting dimensions

In bearings without the suffix E1 or with E1A, the mounting dimensions must be not less than D_1 according to the dimension tables.

X-life bearings

In bearings with the suffix E1, the mounting dimensions must be not less than D_1 and not more than d_2 according to the dimension tables.

Location of bearings with tapered bore

Bearings with a tapered inner ring bore are:

- located directly on a tapered shaft seat
- located on cylindrical shaft seats by means of adapter sleeves or
- located on cylindrical shaft seats by means of extraction sleeves.

If high axial forces occur, a support ring can be used for adapter sleeves. For fitting, the support ring dimensions in the dimension table must be observed.

Spherical roller bearings

Reduced radial internal clearance in fitting

When bearings with a tapered bore are fitted, there is a reduction in the radial internal clearance. The values given in the table ensure firm seating on the shaft, table Reduction in radial internal clearance/displacement on taper 1:12 or 1:30, page 518 and page 519.

Reduction in radial internal clearance and displacement on taper 1:12

Nominal bearing bore diameter d mm		Reduction in radial internal clearance mm		Displacement on taper 1:12				Control value for minimum radial internal clearance after fitting		
				Shaft mm		Sleeve mm		CN mm	C3 mm	C4 mm
over	incl.	min.	max.	min.	max.	min.	max.	min.	min.	min.
24	30	0,015	0,02	0,3	0,35	0,3	0,4	0,015	0,02	0,035
30	40	0,02	0,025	0,35	0,4	0,35	0,45	0,015	0,025	0,04
40	50	0,025	0,03	0,4	0,45	0,45	0,5	0,02	0,03	0,05
50	65	0,03	0,04	0,45	0,6	0,5	0,7	0,025	0,035	0,055
65	80	0,04	0,05	0,6	0,75	0,7	0,85	0,025	0,04	0,07
80	100	0,045	0,06	0,7	0,9	0,75	1	0,035	0,05	0,08
100	120	0,05	0,07	0,7	1,1	0,8	1,2	0,05	0,065	0,1
120	140	0,065	0,09	1,1	1,4	1,2	1,5	0,055	0,08	0,11
140	160	0,075	0,1	1,2	1,6	1,3	1,7	0,055	0,09	0,13
160	180	0,08	0,11	1,3	1,7	1,4	1,9	0,06	0,1	0,15
180	200	0,09	0,13	1,4	2	1,5	2,2	0,07	0,1	0,16
200	225	0,1	0,14	1,6	2,2	1,7	2,4	0,08	0,12	0,18
225	250	0,11	0,15	1,7	2,4	1,8	2,6	0,09	0,13	0,2
250	280	0,12	0,17	1,9	2,6	2	2,9	0,1	0,14	0,22
280	315	0,13	0,19	2	3	2,2	3,2	0,11	0,15	0,24
315	355	0,15	0,21	2,4	3,4	2,6	3,6	0,12	0,17	0,26
355	400	0,17	0,23	2,6	3,6	2,9	3,9	0,13	0,19	0,29
400	450	0,2	0,26	3,1	4,1	3,4	4,4	0,13	0,2	0,31
450	500	0,21	0,28	3,3	4,4	3,6	4,8	0,16	0,23	0,35
500	560	0,24	0,32	3,7	5	4,1	5,4	0,17	0,25	0,36
560	630	0,26	0,35	4	5,4	4,4	5,9	0,2	0,29	0,41
630	710	0,3	0,4	4,6	6,2	5,1	6,8	0,21	0,31	0,45
710	800	0,34	0,45	5,3	7	5,8	7,6	0,23	0,35	0,51
800	900	0,37	0,5	5,7	7,8	6,3	8,5	0,27	0,39	0,57

Reduction in radial internal clearance and displacement on taper 1:30

Nominal bearing bore diameter d mm		Reduction in radial internal clearance mm		Displacement on taper 1:30				Control value for minimum radial internal clearance after fitting		
				Shaft mm		Sleeve mm		CN mm	C3 mm	C4 mm
over	incl.	min.	max.	min.	max.	min.	max.	min.	min.	min.
24	30	0,015	0,02	–	–	–	–	0,015	0,02	0,035
30	40	0,02	0,025	–	–	–	–	0,015	0,025	0,04
40	50	0,025	0,03	–	–	–	–	0,02	0,03	0,05
50	65	0,03	0,04	–	–	–	–	0,025	0,035	0,055
65	80	0,04	0,05	–	–	–	–	0,025	0,04	0,07
80	100	0,045	0,06	1,7	2,2	1,8	2,4	0,035	0,05	0,08
100	120	0,05	0,07	1,9	2,7	2	2,8	0,05	0,065	0,1
120	140	0,065	0,09	2,7	3,5	2,8	3,6	0,055	0,08	0,11
140	160	0,075	0,1	3	4	3,1	4,2	0,055	0,09	0,13
160	180	0,08	0,11	3,2	4,2	3,3	4,6	0,06	0,1	0,15
180	200	0,09	0,13	3,5	4,5	3,6	5	0,07	0,1	0,16
200	225	0,1	0,14	4	5,5	4,2	5,7	0,08	0,12	0,18
225	250	0,11	0,15	4,2	6	4,6	6,2	0,09	0,13	0,2
250	280	0,12	0,17	4,7	6,7	4,8	6,9	0,1	0,14	0,22
280	315	0,13	0,19	5	7,5	5,2	7,7	0,11	0,15	0,24
315	355	0,15	0,21	6	8,2	6,2	8,4	0,12	0,17	0,26
355	400	0,17	0,23	6,5	9	6,8	9,2	0,13	0,19	0,29
400	450	0,2	0,26	7,7	10	8	10,4	0,13	0,2	0,31
450	500	0,21	0,28	8,2	11	8,4	11,2	0,16	0,23	0,35
500	560	0,24	0,32	9,2	12,5	9,6	12,8	0,17	0,25	0,36
560	630	0,26	0,35	10	13,5	10,4	14	0,2	0,29	0,41
630	710	0,3	0,4	11,5	15,5	12	16	0,21	0,31	0,45
710	800	0,34	0,45	13,3	17,5	13,6	18	0,23	0,35	0,51
800	900	0,37	0,5	14,3	19,5	14,8	20	0,27	0,39	0,57



Spherical roller bearings

Accuracy

The main dimensions of the bearings conform to DIN 635-2.

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620-2.

Restricted tolerance according to specification T41A: see following table. In bearings with a tapered bore, only the outside diameter has the restricted tolerance range.

Restricted tolerance according to specification T41A

Inner ring				Outer ring			
Nominal bearing bore diameter		Deviation Δ_{dmp}		Nominal outside diameter		Deviation Δ_{Dmp}	
Dimensions in mm		Tolerances in μm		Dimensions in mm		Tolerances in μm	
over	incl.			over	incl.		
30	50	0	-7	80	150	-5	-13
50	80	0	-9	150	180	-5	-18
80	120	0	-12	180	315	-10	-23
120	180	0	-15	315	400	-13	-28
180	250	0	-18	400	500	-13	-30
250	315	0	-21	500	630	-15	-35

Radial internal clearance of bearings with cylindrical bore

The radial internal clearance corresponds to internal clearance group CN.

Radial internal clearance of bearings with cylindrical bore to DIN 620-4

Bore d mm		Radial internal clearance							
		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
18	24	10	20	20	35	35	45	45	60
24	30	15	25	25	40	40	55	55	75
30	40	15	30	30	45	45	60	60	80
40	50	20	35	35	55	55	75	75	100
50	65	20	40	40	65	65	90	90	120
65	80	30	50	50	80	80	110	110	145
80	100	35	60	60	100	100	135	135	180
100	120	40	75	75	120	120	160	160	210
120	140	50	95	95	145	145	190	190	240
140	160	60	110	110	170	170	220	220	280
160	180	65	120	120	180	180	240	240	310
180	200	70	130	130	200	200	260	260	340
200	225	80	140	140	220	220	290	290	380
225	250	90	150	150	240	240	320	320	420
250	280	100	170	170	260	260	350	350	460
280	315	110	190	190	280	280	370	370	500
315	355	120	200	200	310	310	410	410	550
355	400	130	220	220	340	340	450	450	600
400	450	140	240	240	370	370	500	500	660
450	500	140	260	260	410	410	550	550	720
500	560	150	280	280	440	440	600	600	780
560	630	170	310	310	480	480	650	650	850
630	710	190	350	350	530	530	700	700	920
710	800	210	390	390	580	580	770	770	1010
800	900	230	430	430	650	650	860	860	1120

Radial internal clearance of bearings with tapered bore

The radial internal clearance corresponds to internal clearance group CN.

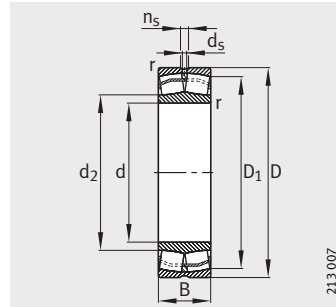
Radial internal clearance of bearings with tapered bore to DIN 620-4

Bore		Radial internal clearance							
d mm		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
18	24	15	25	25	35	35	45	45	60
24	30	20	30	30	40	40	55	55	75
30	40	25	35	35	50	50	65	65	85
40	50	30	45	45	60	60	80	80	100
50	65	40	55	55	75	75	95	95	120
65	80	50	70	70	95	95	120	120	150
80	100	55	80	80	110	110	140	140	180
100	120	65	100	100	135	135	170	170	220
120	140	80	120	120	160	160	200	200	260
140	160	90	130	130	180	180	230	230	300
160	180	100	140	140	200	200	260	260	340
180	200	110	160	160	220	220	290	290	370
200	225	120	180	180	250	250	320	320	410
225	250	140	200	200	270	270	350	350	450
250	280	150	220	220	300	300	390	390	490
280	315	170	240	240	330	330	430	430	540
315	355	190	270	270	360	360	470	470	590
355	400	210	300	300	400	400	520	520	650
400	450	230	330	330	440	440	570	570	720
450	500	260	370	370	490	490	630	630	790
500	560	290	410	410	540	540	680	680	870
560	630	320	460	460	600	600	760	760	980
630	710	350	510	510	670	670	850	850	1090
710	800	390	570	570	750	750	960	960	1220
800	900	440	640	640	840	840	1070	1070	1370

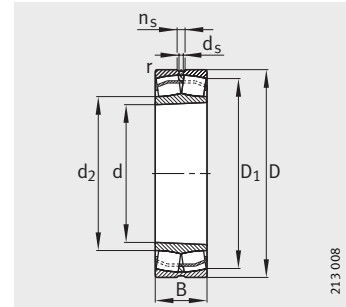


Spherical roller bearings

With cylindrical or tapered bore

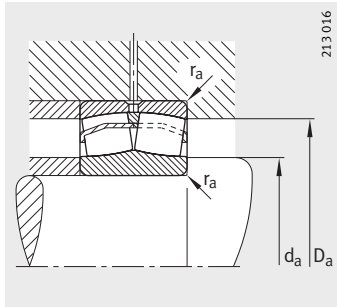


E1 design
Cylindrical bore



Tapered bore
K = taper 1:12

Dimension table · Dimensions in mm										
Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r	D ₁	d ₂	d _s	n _s
						min.	≈	≈		
21304-E1-TVPB	XL	0,16	20	52	15	1,1	43	28,9	–	–
22205-E1-K	XL	0,175	25	52	18	1	44,5	31,3	3,2	4,8
22205-E1	XL	0,18	25	52	18	1	44,5	31,3	3,2	4,8
21305-E1-TVPB	XL	0,254	25	62	17	1,1	51	35,2	–	–
22206-E1-K	XL	0,269	30	62	20	1	53,7	37,9	3,2	4,8
22206-E1	XL	0,275	30	62	20	1	53,7	37,9	3,2	4,8
21306-E1-TVPB	XL	0,386	30	72	19	1,1	59,9	41,5	–	–
22207-E1-K	XL	0,425	35	72	23	1,1	62,5	43,8	3,2	4,8
22207-E1	XL	0,434	35	72	23	1,1	62,5	43,8	3,2	4,8
21307-E1-K-TVPB	XL	0,496	35	80	21	1,5	66,6	47,4	–	–
21307-E1-TVPB	XL	0,503	35	80	21	1,5	66,6	47,4	–	–
22208-E1-K	XL	0,517	40	80	23	1,1	70,4	48,6	3,2	4,8
22208-E1	XL	0,528	40	80	23	1,1	70,4	48,6	3,2	4,8
21308-E1	XL	0,701	40	90	23	1,5	80,8	59,7	3,2	4,8
21308-E1-K	XL	0,702	40	90	23	1,5	80,8	59,7	3,2	4,8
22308-E1-K	XL	1,03	40	90	33	1,5	76	52,4	3,2	4,8
22308-E1	XL	1,05	40	90	33	1,5	76	52,4	3,2	4,8
22308-E1-T41A	XL	1,05	40	90	33	1,5	76	52,4	3,2	4,8
22209-E1-K	XL	0,577	45	85	23	1,1	75,6	54,8	3,2	4,8
22209-E1	XL	0,589	45	85	23	1,1	75,6	54,8	3,2	4,8
21309-E1-K	XL	0,845	45	100	25	1,5	89,8	67,3	3,2	4,8
21309-E1	XL	0,845	45	100	25	1,5	89,8	67,3	3,2	4,8
22309-E1-K	XL	1,36	45	100	36	1,5	84,7	58,9	3,2	6,5
22309-E1	XL	1,39	45	100	36	1,5	84,7	58,9	3,2	6,5
22309-E1-T41A	XL	1,39	45	100	36	1,5	84,7	58,9	3,2	6,5
22210-E1-K	XL	0,608	50	90	23	1,1	80,8	59,7	3,2	4,8
22210-E1	XL	0,622	50	90	23	1,1	80,8	59,7	3,2	4,8
21310-E1-K	XL	1,28	50	110	27	2	89,8	67,3	3,2	4,8
21310-E1	XL	1,28	50	110	27	2	89,8	67,3	3,2	4,8
22310-E1-K	XL	1,86	50	110	40	2	92,6	63	3,2	6,5
22310-E1	XL	1,9	50	110	40	2	92,6	63	3,2	6,5
22310-E1-T41A	XL	1,9	50	110	40	2	92,6	63	3,2	6,5
22211-E1-K	XL	0,825	55	100	25	1,5	89,8	67,3	3,2	4,8
22211-E1	XL	0,851	55	100	25	1,5	89,8	67,3	3,2	4,8
21311-E1-K	XL	1,19	55	120	29	2	98,3	71,4	3,2	6,5
21311-E1	XL	1,19	55	120	29	2	98,3	71,4	3,2	6,5



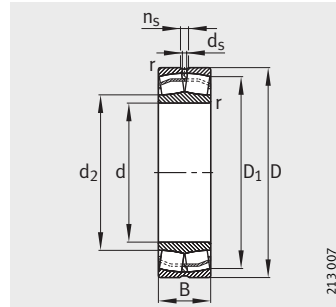
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N	e	Y_1	Y_2	Y_0			
27	45	1	40 500	33 500	0,3	2,25	3,34	2,2	3 700	15 000	10 100
30,6	46,4	1	48 000	42 500	0,34	1,98	2,94	1,93	4 800	17 000	9 500
30,6	46,4	1	48 000	42 500	0,34	1,98	2,94	1,93	4 800	17 000	9 500
32	55	1	52 000	43 000	0,28	2,43	3,61	2,37	4 750	13 000	8 700
35,6	54,6	1	64 000	57 000	0,31	2,15	3,2	2,1	6 900	13 000	8 100
35,6	56,4	1	64 000	57 000	0,31	2,15	3,2	2,1	6 900	13 000	8 100
37	65	1	72 000	63 000	0,27	2,49	3,71	2,43	7 000	11 000	7 500
42	65	1	88 000	81 500	0,31	2,16	3,22	2,12	9 400	11 000	7 300
42	65	1	88 000	81 500	0,31	2,16	3,22	2,12	9 400	11 000	7 300
44	71	1,5	83 000	73 500	0,26	2,55	3,8	2,5	8 100	9 500	7 000
44	71	1,5	83 000	73 500	0,26	2,55	3,8	2,5	8 100	9 500	7 000
47	73	1	102 000	90 000	0,28	2,41	3,59	2,35	11 800	10 000	6 400
47	73	1	102 000	90 000	0,28	2,41	3,59	2,35	11 800	10 000	6 400
49	81	1,5	108 000	106 000	0,24	2,81	4,19	2,75	14 300	9 500	6 100
49	81	1,5	108 000	106 000	0,24	2,81	4,19	2,75	14 300	9 500	6 100
49	81	1,5	156 000	150 000	0,36	1,86	2,77	1,82	13 100	7 500	5 800
49	81	1,5	156 000	150 000	0,36	1,86	2,77	1,82	13 100	7 500	5 800
49	81	1,5	156 000	150 000	0,36	1,86	2,77	1,82	13 100	7 500	5 800
52	78	1	104 000	98 000	0,26	2,62	3,9	2,56	12 700	10 000	5 800
52	78	1	104 000	98 000	0,26	2,62	3,9	2,56	12 700	10 000	5 800
54	91	1,5	129 000	129 000	0,23	2,92	4,35	2,86	17 300	8 500	5 500
54	91	1,5	129 000	129 000	0,23	2,92	4,35	2,86	17 300	8 500	5 500
54	91	1,5	186 000	183 000	0,36	1,9	2,83	1,86	16 100	6 700	5 300
54	91	1,5	186 000	183 000	0,36	1,9	2,83	1,86	16 100	6 700	5 300
54	91	1,5	186 000	183 000	0,36	1,9	2,83	1,86	16 100	6 700	5 300
57	83	1	108 000	106 000	0,24	2,81	4,19	2,75	14 300	9 500	5 300
57	83	1	108 000	106 000	0,24	2,81	4,19	2,75	14 300	9 500	5 300
61	99	2	129 000	129 000	0,23	2,92	4,35	2,86	17 300	8 500	5 300
61	99	2	129 000	129 000	0,23	2,92	4,35	2,86	17 300	8 500	5 300
61	99	2	228 000	224 000	0,36	1,86	2,77	1,82	20 300	6 000	4 950
61	99	2	228 000	224 000	0,36	1,86	2,77	1,82	20 300	6 000	4 950
61	99	2	228 000	224 000	0,36	1,86	2,77	1,82	20 300	6 000	4 950
64	91	1,5	129 000	129 000	0,23	2,92	4,35	2,86	17 300	8 500	4 850
64	91	1,5	129 000	129 000	0,23	2,92	4,35	2,86	17 300	8 500	4 850
66	109	2	170 000	166 000	0,24	2,84	4,23	2,78	21 200	6 300	4 950
66	109	2	170 000	166 000	0,24	2,84	4,23	2,78	21 200	6 300	4 950

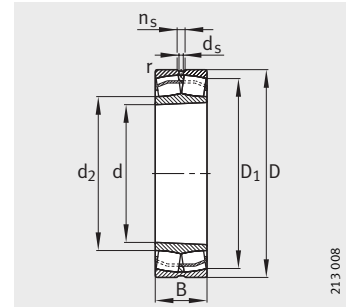


Spherical roller bearings

With cylindrical or tapered bore

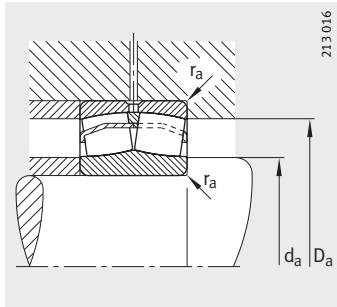


E1 design
Cylindrical bore



Tapered bore
K = taper 1:12

Dimension table (continued) · Dimensions in mm										
Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r min.	D ₁ ≈	d ₂ ≈	d _s	n _s
22311-E1-K	XL	2,22	55	120	43	2	101,4	68,9	3,2	6,5
22311-E1-K-T41A	XL	2,22	55	120	43	2	101,4	68,9	3,2	6,5
22311-E1	XL	2,27	55	120	43	2	101,4	68,9	3,2	6,5
22311-E1-T41A	XL	2,27	55	120	43	2	101,4	68,9	3,2	6,5
22212-E1-K	XL	1,09	60	110	28	1,5	98,7	71,4	3,2	6,5
22212-E1	XL	1,12	60	110	28	1,5	98,7	71,4	3,2	6,5
21312-E1-K	XL	1,78	60	130	31	2,1	112,5	84,4	3,2	6,5
21312-E1	XL	1,78	60	130	31	2,1	112,5	84,4	3,2	6,5
22312-E1-K	XL	2,83	60	130	46	2,1	110,1	74,8	3,2	6,5
22312-E1-K-T41A	XL	2,83	60	130	46	2,1	110,1	74,8	3,2	6,5
22312-E1	XL	2,89	60	130	46	2,1	110,1	74,8	3,2	6,5
22312-E1-T41A	XL	2,89	60	130	46	2,1	110,1	74,8	3,2	6,5
22213-E1-K	XL	1,52	65	120	31	1,5	107,3	79,1	3,2	6,5
22213-E1	XL	1,55	65	120	31	1,5	107,3	79,1	3,2	6,5
21313-E1-K	XL	2,42	65	140	33	2,1	126,8	94,9	3,2	6,5
21313-E1	XL	2,42	65	140	33	2,1	126,8	94,9	3,2	6,5
22313-E1-K	XL	3,49	65	140	48	2,1	119,3	83,2	4,8	9,5
22313-E1-K-T41A	XL	3,49	65	140	48	2,1	119,3	83,2	4,8	9,5
22313-E1	XL	3,57	65	140	48	2,1	119,3	83,2	4,8	9,5
22313-E1-T41A	XL	3,57	65	140	48	2,1	119,3	83,2	4,8	9,5
22214-E1-K	XL	1,61	70	125	31	1,5	112,5	84,4	3,2	6,5
22214-E1	XL	1,65	70	125	31	1,5	112,5	84,4	3,2	6,5
21314-E1-K	XL	3	70	150	35	2,1	126,2	94,9	3,2	6,5
21314-E1	XL	3	70	150	35	2,1	126,2	94,9	3,2	6,5
22314-E1-K	XL	4,12	70	150	51	2,1	128	86,7	4,8	9,5
22314-E1-K-T41A	XL	4,12	70	150	51	2,1	128	86,7	4,8	9,5
22314-E1	XL	4,21	70	150	51	2,1	128	86,7	4,8	9,5
22314-E1-T41A	XL	4,21	70	150	51	2,1	128	86,7	4,8	9,5
22215-E1-K	XL	1,68	75	130	31	1,5	117,7	89,8	3,2	6,5
22215-E1	XL	1,72	75	130	31	1,5	117,7	89,8	3,2	6,5
21315-E1-K	XL	2,86	75	160	37	2,1	135,2	99,7	3,2	6,5
21315-E1	XL	2,86	75	160	37	2,1	135,2	99,7	3,2	6,5
22315-E1-K	XL	5,06	75	160	55	2,1	136,3	92,4	4,8	9,5
22315-E1-K-T41A	XL	5,06	75	160	55	2,1	136,3	92,4	4,8	9,5
22315-E1	XL	5,18	75	160	55	2,1	136,3	92,4	4,8	9,5
22315-E1-T41A	XL	5,18	75	160	55	2,1	136,3	92,4	4,8	9,5



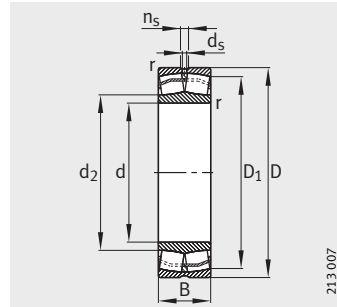
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N	e	Y_1	Y_2	Y_0			
66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 650
66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 650
66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 650
66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 650
69	101	1,5	170 000	166 000	0,24	2,84	4,23	2,78	21 200	7 500	4 650
69	101	1,5	170 000	166 000	0,24	2,84	4,23	2,78	21 200	7 500	4 650
72	118	2,1	212 000	228 000	0,23	2,95	4,4	2,89	28 000	6 300	4 500
72	118	2,1	212 000	228 000	0,23	2,95	4,4	2,89	28 000	6 300	4 500
72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 300
72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 300
72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 300
72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 300
74	111	1,5	200 000	208 000	0,24	2,81	4,19	2,75	25 500	6 700	4 400
74	111	1,5	200 000	208 000	0,24	2,81	4,19	2,75	25 500	6 700	4 400
77	128	2,1	250 000	270 000	0,22	3,14	4,67	3,07	34 000	5 000	4 200
77	128	2,1	250 000	270 000	0,22	3,14	4,67	3,07	34 000	5 000	4 200
77	128	2,1	355 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 950
77	128	2,1	355 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 950
77	128	2,1	355 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 950
77	128	2,1	355 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 950
79	116	1,5	212 000	228 000	0,23	2,95	4,4	2,89	28 000	6 300	4 100
79	116	1,5	212 000	228 000	0,23	2,95	4,4	2,89	28 000	6 300	4 100
82	138	2,1	250 000	270 000	0,22	3,14	4,67	3,07	34 000	5 000	4 100
82	138	2,1	250 000	270 000	0,22	3,14	4,67	3,07	34 000	5 000	4 100
82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 850
82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 850
82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 850
82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 850
84	121	1,5	216 000	236 000	0,22	3,1	4,62	3,03	29 500	6 300	3 900
84	121	1,5	216 000	236 000	0,22	3,1	4,62	3,03	29 500	6 300	3 900
87	148	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	3 850
87	148	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	3 850
87	148	2,1	440 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 650
87	148	2,1	440 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 650
87	148	2,1	440 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 650
87	148	2,1	440 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 650

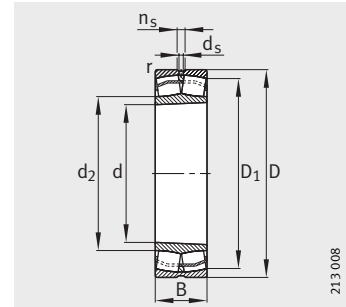


Spherical roller bearings

With cylindrical or tapered bore

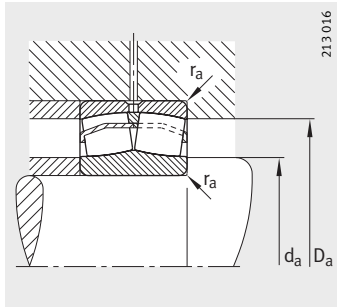


E1 design
Cylindrical bore



Tapered bore
K = taper 1:12

Dimension table (continued) · Dimensions in mm										
Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r min.	D ₁ ≈	d ₂ ≈	d _s	n _s
22216-E1-K	XL	2,08	80	140	33	2	126,8	94,9	3,2	6,5
22216-E1	XL	2,13	80	140	33	2	126,8	94,9	3,2	6,5
21316-E1-K	XL	2,65	80	170	39	2,1	135,4	99,8	3,2	6,5
21316-E1	XL	2,65	80	170	39	2,1	135,4	99,7	3,2	6,5
22316-E1-K	XL	6,05	80	170	58	2,1	145,1	98,3	4,8	9,5
22316-E1-K-T41A	XL	6,05	80	170	58	2,1	145,1	98,3	4,8	9,5
22316-E1	XL	6,27	80	170	58	2,1	145,1	98,3	4,8	9,5
22316-E1-T41A	XL	6,27	80	170	58	2,1	145,1	98,3	4,8	9,5
22217-E1-K	XL	2,59	85	150	36	2	135,4	99,7	3,2	6,5
22217-E1	XL	2,65	85	150	36	2	135,4	99,7	3,2	6,5
21317-E1-K	XL	5,37	85	180	41	3	143,9	106,1	4,8	9,5
21317-E1	XL	5,37	85	180	41	3	143,9	106,1	4,8	9,5
22317-E1	XL	7,06	85	180	60	3	154,2	104,4	4,8	9,5
22317-E1-T41A	XL	7,06	85	180	60	3	154,2	104,4	4,8	9,5
22317-E1-K	XL	7,06	85	180	60	3	154,2	104,4	4,8	9,5
22317-E1-K-T41A	XL	7,06	85	180	60	3	154,2	104,4	4,8	9,5
22218-E1-K	XL	3,35	90	160	40	2	143,9	106,1	3,2	6,5
22218-E1	XL	3,43	90	160	40	2	143,9	106,1	3,2	6,5
23218-E1-K-TVPB	XL	4,08	90	160	52,4	2	140	104,1	3,2	6,5
23218-E1-TVPB	XL	4,27	90	160	52,4	2	140	104,1	3,2	6,5
23218-E1A-K-M	XL	4,34	90	160	52,4	2	140	-	3,2	6,5
21318-E1-K	XL	6,26	90	190	43	3	152,7	112,6	4,8	9,5
21318-E1	XL	6,26	90	190	43	3	152,7	112,6	4,8	9,5
22318-E1-K	XL	8,33	90	190	64	3	162,5	110,2	6,3	12,2
22318-E1-K-T41A	XL	8,33	90	190	64	3	162,5	110,2	6,3	12,2
22318-E1	XL	8,51	90	190	64	3	162,5	110,2	6,3	12,2
22318-E1-T41A	XL	8,51	90	190	64	3	162,5	110,2	6,3	12,2
22219-E1-K	XL	4,04	95	170	43	2,1	152,7	112,6	4,8	9,5
22219-E1	XL	4,13	95	170	43	2,1	152,7	112,6	4,8	9,5
21319-E1-K-TVPB	XL	6,53	95	200	45	3	169,4	124,3	4,8	9,5
21319-E1-TVPB	XL	6,63	95	200	45	3	169,4	124,3	4,8	9,5
22319-E1-K	XL	9,46	95	200	67	3	171,2	116	6,3	12,2
22319-E1-K-T41A	XL	9,46	95	200	67	3	171,2	116	6,3	12,2
22319-E1	XL	9,69	95	200	67	3	171,2	116	6,3	12,2
22319-E1-T41A	XL	9,69	95	200	67	3	171,2	116	6,3	12,2
23120-E1-K-TVPB	XL	4,06	100	165	52	2	146,3	113,9	3,2	6,5



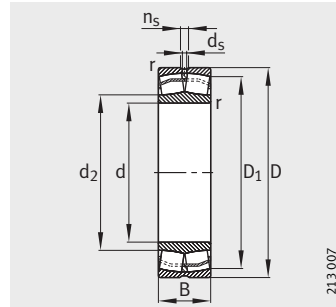
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N	e	Y_1	Y_2	Y_0			
91	129	2	250 000	270 000	0,22	3,14	4,67	3,07	34 000	5 600	3 700
91	129	2	250 000	270 000	0,22	3,14	4,67	3,07	34 000	5 600	3 700
92	158	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	3 750
92	158	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	3 750
92	158	2,1	500 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 450
92	158	2,1	500 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 450
92	158	2,1	500 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 450
92	158	2,1	500 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 450
96	139	2	305 000	325 000	0,22	3,04	4,53	2,97	38 500	5 300	3 550
96	139	2	305 000	325 000	0,22	3,04	4,53	2,97	38 500	5 300	3 550
99	166	2,5	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 550
99	166	2,5	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 550
99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 300
99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 300
99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 300
99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 300
101	149	2	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 500
101	149	2	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 500
101	149	2	440 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 700
101	149	2	440 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 700
101	149	2	440 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 700
104	176	2,5	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 450
104	176	2,5	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 450
104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 100
104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 100
104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 100
104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 100
107	158	2,1	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 400
107	158	2,1	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 400
109	186	2,5	430 000	455 000	0,22	3,04	4,53	2,97	47 500	4 000	3 300
109	186	2,5	430 000	455 000	0,22	3,04	4,53	2,97	47 500	4 000	3 300
109	186	2,5	670 000	695 000	0,33	2,03	3,02	1,98	60 000	3 000	2 900
109	186	2,5	670 000	695 000	0,33	2,03	3,02	1,98	60 000	3 000	2 900
109	186	2,5	670 000	695 000	0,33	2,03	3,02	1,98	60 000	3 000	2 900
109	186	2,5	670 000	695 000	0,33	2,03	3,02	1,98	60 000	3 000	2 900
111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 800

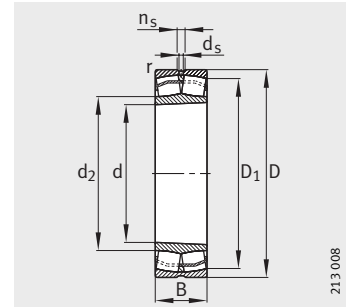


Spherical roller bearings

With cylindrical or tapered bore



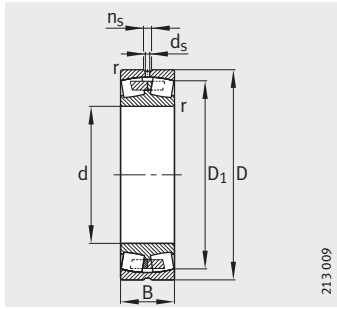
E1 design
Cylindrical bore



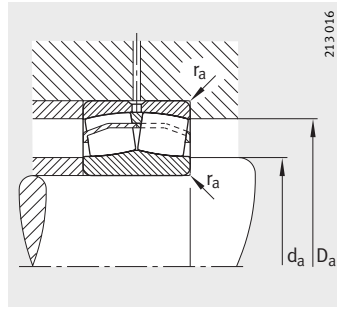
Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

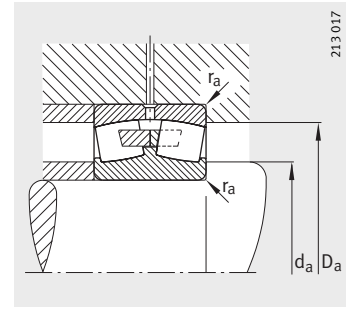
Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r min.	D ₁ ≈	d ₂ ≈	d _s	n _s
23120-E1-TVPB	XL	4,22	100	165	52	2	146,3	113,9	3,2	6,5
23120-E1A-K-M	XL	4,23	100	165	52	2	146,3	–	3,2	6,5
23120-E1A-M	XL	4,37	100	165	52	2	146,3	–	3,2	6,5
22220-E1-K	XL	4,91	100	180	46	2,1	161,4	119	4,8	9,5
22220-E1	XL	4,96	100	180	46	2,1	161,4	119	4,8	9,5
23220-E1-K-TVPB	XL	6,13	100	180	60,3	2,1	156,7	116,7	4,8	9,5
23220-E1-TVPB	XL	6,32	100	180	60,3	2,1	156,7	116,7	4,8	9,5
23220-E1A-K-M	XL	6,33	100	180	60,3	2,1	156,7	–	4,8	9,5
23220-E1A-M	XL	6,45	100	180	60,3	2,1	156,7	–	4,8	9,5
21320-E1-K-TVPB	XL	8,08	100	215	47	3	182	132	4,8	9,5
21320-E1-TVPB	XL	8,19	100	215	47	3	182	132	4,8	9,5
22320-E1	XL	13,1	100	215	73	3	184,7	130,2	6,3	12,2
22320-E1-T41A	XL	13,1	100	215	73	3	184,7	130,2	6,3	12,2
22320-E1-K	XL	13,1	100	215	73	3	184,7	130,2	6,3	12,2
22320-E1-K-T41A	XL	13,1	100	215	73	3	184,7	130,2	6,3	12,2
23320-AS-MA-T41A	–	15,5	100	215	82,6	3	179,5	–	4,8	9,5
23022-E1-TVPB	XL	3,55	110	170	45	2	154,6	123,7	3,2	6,5
23022-E1A-M	XL	3,67	110	170	45	2	154,6	–	3,2	6,5
23122-E1-K-TVPB	XL	4,95	110	180	56	2	160	124,6	4,8	9,5
23122-E1A-K-M	XL	5,1	110	180	56	2	160	–	4,8	9,5
23122-E1-TVPB	XL	5,31	110	180	56	2	160	124,6	4,8	9,5
23122-E1A-M	XL	5,51	110	180	56	2	160	–	4,8	9,5
24122-E1-K30-TVPB	XL	6,69	110	180	69	2	154,8	125,1	3,2	6,5
24122-E1-TVPB	XL	6,85	110	180	69	2	154,8	125,1	3,2	6,5
22222-E1-K	XL	6,82	110	200	53	2,1	178,7	129,4	4,8	9,5
22222-E1	XL	6,99	110	200	53	2,1	178,7	129,4	4,8	9,5
23222-E1-K-TVPB	XL	8,82	110	200	69,8	2,1	172,7	129,1	4,8	9,5
23222-E1-TVPB	XL	9,18	110	200	69,8	2,1	172,7	129,1	4,8	9,5
23222-E1A-K-M	XL	9,32	110	200	69,8	2,1	172,7	–	4,8	9,5
23222-E1A-M	XL	9,54	110	200	69,8	2,1	172,7	–	4,8	9,5
21322-E1-K-TVPB	XL	10,9	110	240	50	3	202,5	146,4	6,3	12,2
21322-E1-TVPB	XL	11,1	110	240	50	3	202,5	146,4	6,3	12,2
22322-E1-K	XL	17,4	110	240	80	3	204,9	143,1	8	15
22322-E1-K-T41A	XL	17,4	110	240	80	3	204,9	143,1	8	15
22322-E1	XL	17,7	110	240	80	3	204,9	143,1	8	15
22322-E1-T41A	XL	17,7	110	240	80	3	204,9	143,1	8	15



With central rib
Cylindrical bore



Mounting dimensions
E1 design



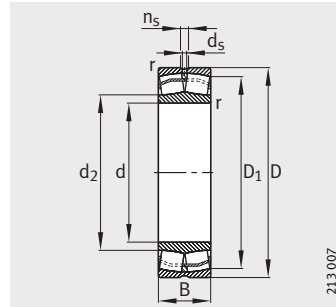
Mounting dimensions
With central rib

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. C0r	e	Y1	Y2	Y0	C _{ur}	n _G	n _B
min.	max.	max.	N	N					N	min ⁻¹	min ⁻¹
111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 800
111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 800
111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 800
112	168	2,1	430 000	475 000	0,24	2,84	4,23	2,78	52 000	4 300	3 300
112	168	2,1	430 000	475 000	0,24	2,84	4,23	2,78	52 000	4 300	3 300
112	168	2,1	550 000	655 000	0,31	2,15	3,2	2,1	60 000	3 600	2 470
112	168	2,1	550 000	655 000	0,31	2,15	3,2	2,1	60 000	3 600	2 470
112	168	2,1	550 000	655 000	0,31	2,15	3,2	2,1	60 000	3 600	2 470
112	168	2,1	550 000	655 000	0,31	2,15	3,2	2,1	60 000	3 600	2 470
114	201	2,5	490 000	530 000	0,22	3,14	4,67	3,07	61 000	3 600	3 100
114	201	2,5	490 000	530 000	0,22	3,14	4,67	3,07	61 000	3 600	3 100
114	201	2,5	815 000	915 000	0,33	2,03	3,02	1,98	75 000	3 000	2 550
114	201	2,5	815 000	915 000	0,33	2,03	3,02	1,98	75 000	3 000	2 550
114	201	2,5	815 000	915 000	0,33	2,03	3,02	1,98	75 000	3 000	2 550
114	201	2,5	815 000	915 000	0,33	2,03	3,02	1,98	75 000	3 000	2 550
114	201	2,5	680 000	900 000	0,43	1,57	2,34	1,53	69 000	2 800	–
118,8	161,2	2	400 000	530 000	0,23	2,9	4,31	2,83	52 000	4 300	3 050
118,8	161,2	2	400 000	530 000	0,23	2,9	4,31	2,83	52 000	4 300	3 050
121	169	2	530 000	680 000	0,28	2,39	3,56	2,34	61 000	4 000	2 600
121	169	2	530 000	680 000	0,28	2,41	3,59	2,35	61 000	4 000	2 600
121	169	2	530 000	680 000	0,28	2,39	3,56	2,34	61 000	4 000	2 600
121	169	2	530 000	680 000	0,28	2,41	3,59	2,35	61 000	4 000	2 600
121	169	2	620 000	900 000	0,35	1,94	2,88	1,89	67 000	2 600	1 820
121	169	2	620 000	900 000	0,35	1,94	2,88	1,89	67 000	2 600	1 820
122	188	2,1	550 000	600 000	0,25	2,71	4,04	2,65	62 000	4 000	3 100
122	188	2,1	550 000	600 000	0,25	2,71	4,04	2,65	62 000	4 000	3 100
122	188	2,1	710 000	865 000	0,33	2,06	3,06	2,01	72 000	3 000	2 150
122	188	2,1	710 000	865 000	0,33	2,06	3,06	2,01	72 000	3 000	2 150
122	188	2,1	710 000	865 000	0,33	2,06	3,06	2,01	72 000	3 000	2 150
122	188	2,1	710 000	865 000	0,33	2,06	3,06	2,01	72 000	3 000	2 150
124	226	2,5	600 000	640 000	0,21	3,24	4,82	3,16	69 000	3 000	2 750
124	226	2,5	600 000	640 000	0,21	3,24	4,82	3,16	69 000	3 000	2 750
124	226	2,5	950 000	1 060 000	0,33	2,07	3,09	2,03	91 000	2 600	2 250
124	226	2,5	950 000	1 060 000	0,33	2,07	3,09	2,03	91 000	2 600	2 250
124	226	2,5	950 000	1 060 000	0,33	2,07	3,09	2,03	91 000	2 600	2 250
124	226	2,5	950 000	1 060 000	0,33	2,07	3,09	2,03	91 000	2 600	2 250

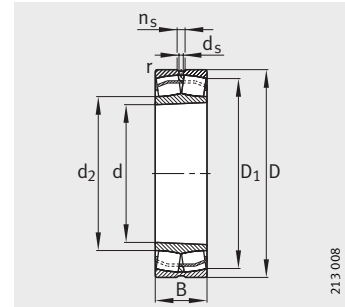


Spherical roller bearings

With cylindrical or tapered bore



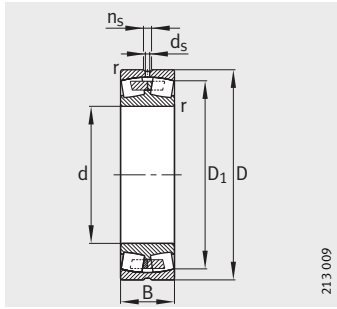
E1 design
Cylindrical bore



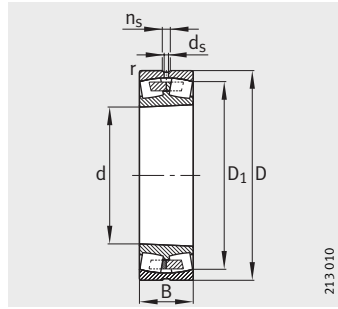
Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

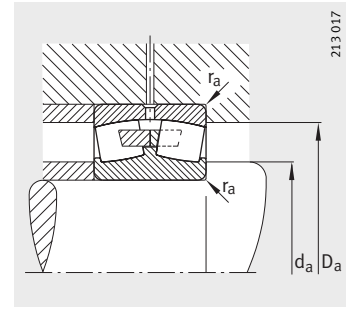
Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r min.	D ₁ ≈	d ₂ ≈	d _s	n _s
23322-AS-MA-T41A	–	21,3	110	240	92,1	3	199,6	–	6,3	12,2
23024-E1-K-TVPB	XL	3,67	120	180	46	2	164,7	133	3,2	6,5
23024-E1-TVPB	XL	3,86	120	180	46	2	164,7	133	3,2	6,5
23024-E1A-K-M	XL	4,09	120	180	46	2	164,7	–	3,2	6,5
23024-E1A-M	XL	4,17	120	180	46	2	164,7	–	3,2	6,5
24024-S-K30-MB	–	5,35	120	180	60	2	159,8	–	3,2	6,5
24024-S-MB	–	5,46	120	180	60	2	159,8	–	3,2	6,5
24024-E1-TVPB	XL	5,65	120	180	60	2	160	132	3,2	6,5
24024-E1-K30-TVPB	XL	6,11	120	180	60	2	160	132	3,2	6,5
23124-E1-K-TVPB	XL	7,06	120	200	62	2	177,4	136,2	4,8	9,5
23124-E1-TVPB	XL	7,39	120	200	62	2	177,4	136,2	4,8	9,5
23124-E1A-K-M	XL	7,57	120	200	62	2	177,4	–	4,8	9,5
23124-E1A-M	XL	7,7	120	200	62	2	177,4	–	4,8	9,5
24124-E1-K30-TVPB	XL	11,5	120	200	80	2	170,6	136,3	3,2	6,5
24124-E1-TVPB	XL	11,6	120	200	80	2	170,6	136,3	3,2	6,5
22224-E1	XL	8,84	120	215	58	2,1	192	141,8	6,3	12,2
22224-E1-K	XL	8,84	120	215	58	2,1	192	141,8	6,3	12,2
23224-E1-K-TVPB	XL	11,1	120	215	76	2,1	185,5	139	4,8	9,5
23224-E1A-K-M	XL	11,4	120	215	76	2,1	185,5	–	4,8	9,5
23224-E1-TVPB	XL	11,5	120	215	76	2,1	185,5	139	4,8	9,5
23224-E1A-M	XL	12,1	120	215	76	2,1	185,5	–	4,8	9,5
22324-E1-K	XL	22,1	120	260	86	3	222,4	150,7	8	15
22324-E1-K-T41A	XL	22,1	120	260	86	3	222,4	150,7	8	15
22324-E1	XL	22,5	120	260	86	3	222,4	150,8	8	15
22324-E1-T41A	XL	22,5	120	260	86	3	222,4	150,8	8	15
23324-AS-MA-T41A	–	29,1	120	260	106	3	213,9	–	6,3	12,2
23026-E1-K-TVPB	XL	5,42	130	200	52	2	182,3	145,9	4,8	9,5
23026-E1-TVPB	XL	5,61	130	200	52	2	182,3	145,9	4,8	9,5
23026-E1A-K-M	XL	5,7	130	200	52	2	182,3	–	4,8	9,5
23026-E1A-M	XL	5,96	130	200	52	2	182,3	–	4,8	9,5
24026-S-MB	–	7,97	130	200	69	2	175,6	–	3,2	6,5
24026-E1-K30-TVPB	XL	7,57	130	200	69	2	176,9	144,7	3,2	6,5
24026-E1-TVPB	XL	7,72	130	200	69	2	176,9	144,7	3,2	6,5
23126-E1-K-TVPB	XL	7,82	130	210	64	2	187,3	146	4,8	9,5
23126-E1A-K-M	XL	8,1	130	210	64	2	187,3	–	4,8	9,5
23126-E1-TVPB	XL	8,11	130	210	64	2	187,3	146	4,8	9,5



With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30



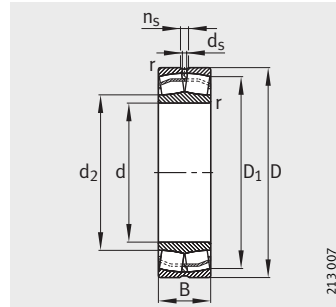
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. C0r	e	Y1	Y2	Y0	Cur	nG	nB
min.	max.	max.	N	N					N	min ⁻¹	min ⁻¹
124	226	2,5	830 000	1 080 000	0,43	1,57	2,34	1,53	86 000	2 600	–
128,8	171,2	2	430 000	585 000	0,22	3,04	4,53	2,97	58 000	4 300	2 850
128,8	171,2	2	430 000	585 000	0,22	3,04	4,53	2,97	58 000	4 300	2 850
128,8	171,2	2	430 000	585 000	0,22	3,04	4,53	2,97	58 000	4 300	2 850
128,8	171,2	2	430 000	585 000	0,22	3,04	4,53	2,97	58 000	4 300	2 850
128,8	171,2	2	405 000	710 000	0,32	2,09	3,11	2,04	40 000	2 600	2 380
128,8	171,2	2	405 000	710 000	0,32	2,09	3,11	2,04	40 000	2 600	2 380
128,8	171,2	2	540 000	800 000	0,29	2,3	3,42	2,25	72 000	3 000	2 290
128,8	171,2	2	540 000	800 000	0,29	2,3	3,42	2,25	72 000	3 000	2 290
131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 330
131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 330
131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 330
131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 330
131	189	2	780 000	1 120 000	0,37	1,84	2,74	1,8	85 000	2 200	1 610
131	189	2	780 000	1 120 000	0,37	1,84	2,74	1,8	85 000	2 200	1 610
132	203	2,1	640 000	735 000	0,25	2,71	4,04	2,65	71 000	3 400	2 800
132	203	2,1	640 000	735 000	0,25	2,71	4,04	2,65	71 000	3 400	2 800
132	203	2	815 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 940
132	203	2	815 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 940
132	203	2	815 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 940
132	203	2	815 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 940
134	246	2,5	1 080 000	1 160 000	0,33	2,06	3,06	2,01	103 000	2 600	2 080
134	246	2,5	1 080 000	1 160 000	0,33	2,06	3,06	2,01	103 000	2 600	2 080
134	246	2,5	1 080 000	1 160 000	0,33	2,06	3,06	2,01	103 000	2 600	2 080
134	246	2,5	1 080 000	1 160 000	0,33	2,06	3,06	2,01	103 000	2 600	2 080
134	246	2,5	1 020 000	1 430 000	0,45	1,5	2,23	1,46	103 000	2 400	–
138,8	191,2	2	540 000	735 000	0,23	2,95	4,4	2,89	70 000	3 600	2 650
138,8	191,2	2	540 000	735 000	0,23	2,95	4,4	2,89	70 000	3 600	2 650
138,8	191,2	2	540 000	735 000	0,23	2,95	4,4	2,89	70 000	3 600	2 650
138,8	191,2	2	540 000	735 000	0,23	2,95	4,4	2,89	70 000	3 600	2 650
138,8	191,2	2	500 000	900 000	0,34	1,99	2,96	1,94	53 000	2 600	2 140
138,8	191,2	2	680 000	1 020 000	0,31	2,21	3,29	2,16	85 000	2 600	2 050
138,8	191,2	2	680 000	1 020 000	0,31	2,21	3,29	2,16	85 000	2 600	2 050
141	199	2	680 000	900 000	0,28	2,45	3,64	2,39	79 000	3 000	2 130
141	199	2	680 000	900 000	0,28	2,45	3,64	2,39	79 000	3 000	2 130
141	199	2	680 000	900 000	0,28	2,45	3,64	2,39	79 000	3 000	2 130

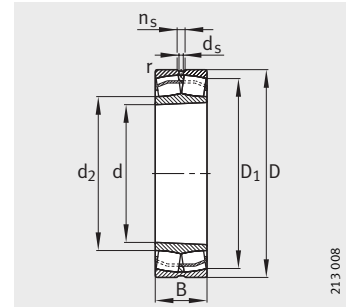


Spherical roller bearings

With cylindrical or tapered bore



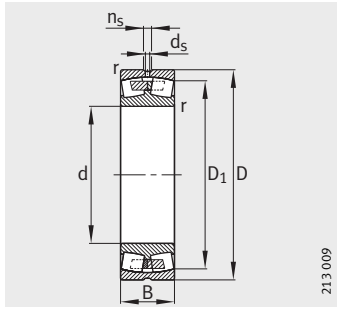
E1 design
Cylindrical bore



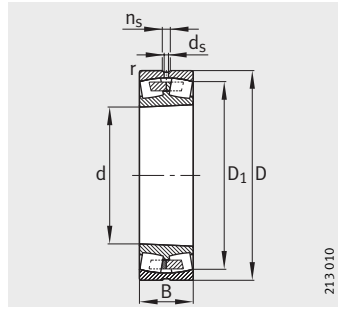
Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

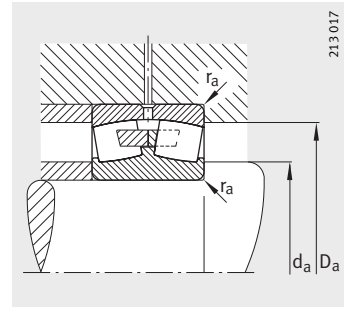
Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r min.	D ₁ ≈	d ₂ ≈	d _s	n _s
23126-E1A-M	XL	8,45	130	210	64	2	187,3	–	4,8	9,5
24126-E1-K30-TVPB	XL	10,1	130	210	80	2	181,1	146,4	3,2	6,5
24126-E1-TVPB	XL	10,6	130	210	80	2	181,1	146,4	3,2	6,5
22226-E1-K	XL	10,9	130	230	64	3	205	151,7	6,3	12,2
22226-E1	XL	11,3	130	230	64	3	205	151,7	6,3	12,2
23226-E1-K-TVPB	XL	12,6	130	230	80	3	199,3	150	4,8	9,5
23226-E1-TVPB	XL	13,4	130	230	80	3	199,3	150	4,8	9,5
23226-E1A-K-M	XL	13,6	130	230	80	3	199,3	–	4,8	9,5
23226-E1A-M	XL	14	130	230	80	3	199,3	–	4,8	9,5
22326-E1-K	XL	27,4	130	280	93	4	239,5	162,2	9,5	17,7
22326-E1-K-T41A	XL	27,4	130	280	93	4	239,5	162,2	9,5	17,7
22326-E1	XL	28	130	280	93	4	239,5	162,2	9,5	17,7
22326-E1-T41A	XL	28	130	280	93	4	239,5	162,2	9,5	17,7
23326-AS-MA-T41A	–	35,2	130	280	112	4	232,1	–	6,3	12,2
23028-E1-K-TVPB	XL	5,81	140	210	53	2	192,3	155,4	4,8	9,5
23028-E1A-K-M	XL	6	140	210	53	2	192,3	–	4,8	9,5
23028-E1-TVPB	XL	6,04	140	210	53	2	192,3	155,4	4,8	9,5
23028-E1A-M	XL	6,45	140	210	53	2	192,3	–	4,8	9,5
24028-S-K30-MB	–	8,38	140	210	69	2	186,4	–	3,2	6,5
24028-S-MB	–	8,52	140	210	69	2	186,4	–	3,2	6,5
24028-E1-K30-TVPB	XL	7,96	140	210	69	2	187,2	154,2	3,2	6,5
24028-E1-TVPB	XL	8,15	140	210	69	2	187,2	154,2	3,2	6,5
23128-E1A-K-M	XL	7,78	140	225	68	2,1	201	–	4,8	9,5
23128-E1-K-TVPB	XL	9,46	140	225	68	2,1	201	157,1	4,8	9,5
23128-E1-TVPB	XL	9,81	140	225	68	2,1	201	157,1	4,8	9,5
23128-E1A-M	XL	10,4	140	225	68	2,1	201	–	4,8	9,5
24128-E1-K30-TVPB	XL	11,8	140	225	85	2,1	194,4	157	4,8	9,5
24128-E1-TVPB	XL	12,8	140	225	85	2,1	194,4	157	4,8	9,5
22228-E1-K	XL	13,7	140	250	68	3	223,4	164,9	6,3	12,2
22228-E1	XL	14,2	140	250	68	3	223,4	164,9	6,3	12,2
23228-E1-K-TVPB	XL	17,1	140	250	88	3	216	162	6,3	12,2
23228-E1A-K-M	XL	17,6	140	250	88	3	216	–	6,3	12,2
23228-E1-TVPB	XL	17,7	140	250	88	3	216	162	6,3	12,2
23228-E1A-M	XL	18,3	140	250	88	3	216	–	6,3	12,2
22328-E1-K	XL	34,4	140	300	102	4	255,7	173,5	9,5	17,7
22328-E1-K-T41A	XL	34,4	140	300	102	4	255,7	173,5	9,5	17,7



With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30



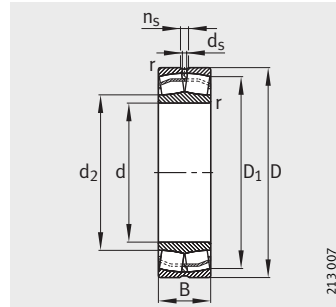
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. C0r	e	Y1	Y2	Y0	Cur	nG	nB
min.	max.	max.	N	N					N	min ⁻¹	min ⁻¹
141	199	2	680 000	900 000	0,28	2,45	3,64	2,39	79 000	3 000	2 130
141	199	2	815 000	1 200 000	0,34	1,96	2,92	1,92	93 000	2 200	1 480
141	199	2	815 000	1 200 000	0,34	1,96	2,92	1,92	93 000	2 200	1 480
144	216	2,5	750 000	900 000	0,26	2,62	3,9	2,56	79 000	3 000	2 550
144	216	2,5	750 000	900 000	0,26	2,62	3,9	2,56	79 000	3 000	2 550
144	216	2,5	900 000	1 140 000	0,33	2,07	3,09	2,03	89 000	2 600	1 780
144	216	2,5	900 000	1 140 000	0,33	2,07	3,09	2,03	89 000	2 600	1 780
144	216	2,5	900 000	1 140 000	0,33	2,07	3,09	2,03	89 000	2 600	1 780
144	216	2,5	900 000	1 140 000	0,33	2,07	3,09	2,03	89 000	2 600	1 780
147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 870
147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 870
147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 870
147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 870
147	263	3	1 160 000	1 600 000	0,45	1,51	2,25	1,48	108 000	2 200	-
148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 440
148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 440
148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 440
148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 440
148,8	201,2	2	510 000	915 000	0,32	2,1	3,13	2,06	56 000	2 400	2 000
148,8	201,2	2	510 000	915 000	0,32	2,1	3,13	2,06	56 000	2 400	2 000
148,8	201,2	2	720 000	1 100 000	0,29	2,33	3,47	2,28	93 000	2 600	1 880
148,8	201,2	2	720 000	1 100 000	0,29	2,33	3,47	2,28	93 000	2 600	1 880
152	213	2,1	765 000	1 020 000	0,27	2,49	3,71	2,43	88 000	2 800	1 960
152	213	2,1	765 000	1 020 000	0,27	2,49	3,71	2,43	88 000	2 800	1 960
152	213	2,1	765 000	1 020 000	0,27	2,49	3,71	2,43	88 000	2 800	1 960
152	213	2,1	765 000	1 020 000	0,27	2,49	3,71	2,43	88 000	2 800	1 960
152	213	2,1	930 000	1 370 000	0,34	1,98	2,94	1,93	104 000	2 000	1 340
152	213	2,1	930 000	1 370 000	0,34	1,98	2,94	1,93	104 000	2 000	1 340
154	236	2,5	880 000	1 040 000	0,25	2,67	3,97	2,61	97 000	2 400	2 320
154	236	2,5	880 000	1 040 000	0,25	2,67	3,97	2,61	97 000	2 400	2 320
154	236	2,5	1 080 000	1 400 000	0,33	2,04	3,04	2	112 000	2 400	1 580
154	236	2,5	1 080 000	1 400 000	0,33	2,04	3,04	2	112 000	2 400	1 580
154	236	2,5	1 080 000	1 400 000	0,33	2,04	3,04	2	112 000	2 400	1 580
154	236	2,5	1 080 000	1 400 000	0,33	2,04	3,04	2	112 000	2 400	1 580
157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 700
157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 700

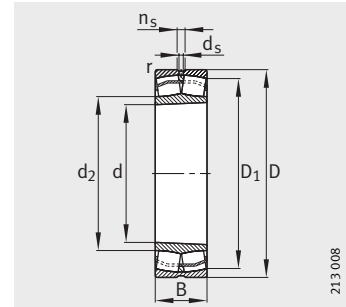


Spherical roller bearings

With cylindrical or tapered bore

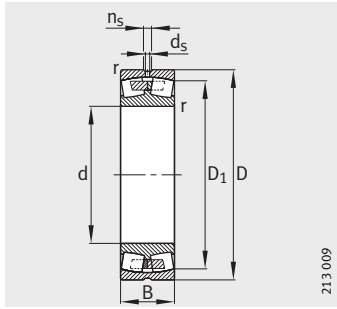


E1 design
Cylindrical bore

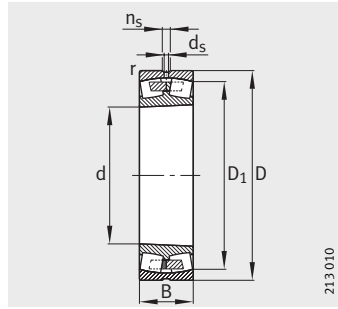


Tapered bore
K = taper 1:12, K30 = taper 1:30

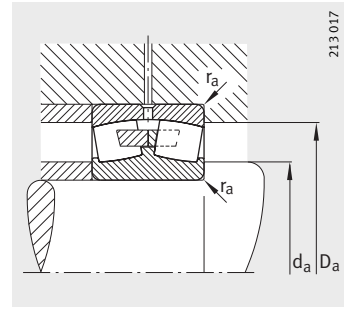
Dimension table (continued) · Dimensions in mm										
Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r min.	D ₁ ≈	d ₂ ≈	d _s	n _s
22328-E1	XL	35,1	140	300	102	4	255,7	173,5	9,5	17,7
22328-E1-T41A	XL	35,1	140	300	102	4	255,7	173,5	9,5	17,7
23328-AS-MA-T41A	-	40,9	140	300	118	4	249,2	-	6,3	12,2
23030-E1-K-TVPB	XL	7,29	150	225	56	2,1	206,3	166,6	4,8	9,5
23030-E1A-K-M	XL	7,33	150	225	56	2,1	206,3	-	4,8	9,5
23030-E1-TVPB	XL	7,63	150	225	56	2,1	206,3	166,6	4,8	9,5
23030-E1A-M	XL	7,83	150	225	56	2,1	206,3	-	4,8	9,5
24030-S-MB	-	10,4	150	225	75	2,1	199,1	-	4,8	9,5
24030-S-K30-MB	-	10,7	150	225	75	2,1	199,1	-	4,8	9,5
24030-E1-K30-TVPB	XL	10	150	225	75	2,1	200,2	165,2	4,8	9,5
24030-E1-TVPB	XL	10,2	150	225	75	2,1	200,2	165,2	4,8	9,5
23130-E1-K-TVPB	XL	14,5	150	250	80	2,1	220,8	170,1	6,3	12,2
23130-E1-TVPB	XL	15	150	250	80	2,1	220,8	170,2	6,3	12,2
23130-E1A-K-M	XL	15,8	150	250	80	2,1	220,8	-	6,3	12,2
23130-E1A-M	XL	16,2	150	250	80	2,1	220,8	-	6,3	12,2
24130-BS-K30	-	19	150	250	100	2,1	211,3	-	4,8	9,5
24130-BS	-	20	150	250	100	2,1	211,3	-	4,8	9,5
22230-E1-K	XL	17,8	150	270	73	3	240,8	177,9	8	15
22230-E1	XL	18,2	150	270	73	3	240,8	177,9	8	15
23230-E1-K-TVPB	XL	22,3	150	270	96	3	232,6	174	6,3	12,2
23230-E1A-K-M	XL	22,9	150	270	96	3	232,6	-	6,3	12,2
23230-E1-TVPB	XL	22,9	150	270	96	3	232,6	174	6,3	12,2
23230-E1A-M	XL	23,7	150	270	96	3	232,6	-	6,3	12,2
22330-E1-K	XL	41,2	150	320	108	4	273,2	185,3	9,5	17,7
22330-E1-K-T41A	XL	41,2	150	320	108	4	273,2	185,3	9,5	17,7
22330-E1	XL	42,2	150	320	108	4	273,2	185,3	9,5	17,7
22330-E1-T41A	XL	42,2	150	320	108	4	273,2	185,3	9,5	17,7
23330-A-MA-T41A	-	49,8	150	320	128	4	264,5	-	8	15
23032-E1-K-TVPB	XL	8,67	160	240	60	2,1	219,9	177	6,3	12,2
23032-E1-TVPB	XL	8,97	160	240	60	2,1	219,9	177,5	6,3	12,2
23032-E1A-K-M	XL	9,42	160	240	60	2,1	219,9	-	6,3	12,2
23032-E1A-M	XL	9,71	160	240	60	2,1	219,9	-	6,3	12,2
24032-S-K30-MB	-	12,8	160	240	80	2,1	211,2	-	4,8	9,5
24032-S-MB	-	13	160	240	80	2,1	211,2	-	4,8	9,5
24032-E1-K30-TVPB	XL	11,8	160	240	80	2,1	213,6	176	4,8	9,5
24032-E1-TVPB	XL	12,3	160	240	80	2,1	213,6	176	4,8	9,5



With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30



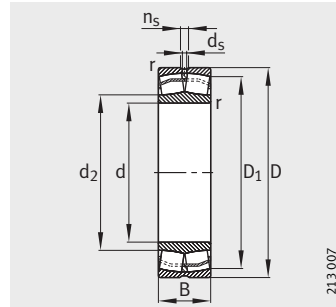
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. C0r	e	Y1	Y2	Y0	C _{ur}	n _G	n _B
min.	max.	max.	N	N					N	min ⁻¹	min ⁻¹
157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 700
157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 700
157	283	3	1 270 000	1 800 000	0,43	1,57	2,34	1,53	123 000	2 000	–
160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 260
160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 260
160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 260
160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 260
160,2	214,8	2,1	620 000	1 140 000	0,33	2,06	3,06	2,01	67 000	2 200	1 800
160,2	214,8	2,1	620 000	1 140 000	0,33	2,06	3,06	2,01	67 000	2 200	1 800
160,2	214,8	2,1	815 000	1 250 000	0,29	2,32	3,45	2,26	105 000	2 400	1 740
160,2	214,8	2,1	815 000	1 250 000	0,29	2,32	3,45	2,26	105 000	2 400	1 740
162	238	2,1	1 000 000	1 320 000	0,29	2,32	3,45	2,26	143 000	2 600	1 760
162	238	2,1	1 000 000	1 320 000	0,29	2,32	3,45	2,26	143 000	2 600	1 760
162	238	2,1	1 000 000	1 320 000	0,29	2,32	3,45	2,26	143 000	2 600	1 760
162	238	2,1	1 000 000	1 320 000	0,29	2,32	3,45	2,26	143 000	2 600	1 760
162	238	2,1	915 000	1 560 000	0,4	1,68	2,5	1,64	100 000	2 000	1 260
162	238	2,1	915 000	1 560 000	0,4	1,68	2,5	1,64	100 000	2 000	1 260
164	256	2,5	1 000 000	1 220 000	0,25	2,69	4	2,63	111 000	2 600	2 110
164	256	2,5	1 000 000	1 220 000	0,25	2,69	4	2,63	111 000	2 600	2 110
164	256	2,5	1 270 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 420
164	256	2,5	1 270 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 420
164	256	2,5	1 270 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 420
164	256	2,5	1 270 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 420
167	303	3	1 630 000	1 860 000	0,33	2,02	3	1,97	147 000	2 000	1 550
167	303	3	1 630 000	1 860 000	0,33	2,02	3	1,97	147 000	2 000	1 550
167	303	3	1 630 000	1 860 000	0,33	2,02	3	1,97	147 000	2 000	1 550
167	303	3	1 630 000	1 860 000	0,33	2,02	3	1,97	147 000	2 000	1 550
167	303	3	1 500 000	2 120 000	0,44	1,52	2,26	1,49	135 000	2 000	–
170,2	229,8	2,1	720 000	1 020 000	0,22	3,1	4,62	3,03	94 000	2 800	2 090
170,2	229,8	2,1	720 000	1 020 000	0,22	3,1	4,62	3,03	94 000	2 800	2 090
170,2	229,8	2,1	720 000	1 020 000	0,22	3,1	4,62	3,03	94 000	2 800	2 090
170,2	229,8	2,1	720 000	1 020 000	0,22	3,1	4,62	3,03	94 000	2 800	2 090
170,2	229,8	2,1	670 000	1 250 000	0,32	2,09	3,11	2,04	71 000	2 000	1 680
170,2	229,8	2,1	670 000	1 250 000	0,32	2,09	3,11	2,04	71 000	2 000	1 680
170,2	229,8	2,1	915 000	1 430 000	0,29	2,3	3,42	2,25	117 000	2 200	1 600
170,2	229,8	2,1	915 000	1 430 000	0,29	2,3	3,42	2,25	117 000	2 200	1 600

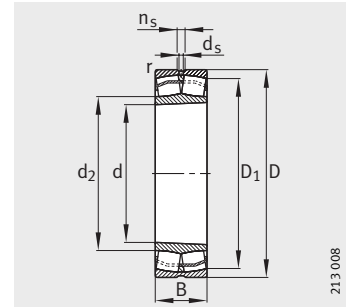


Spherical roller bearings

With cylindrical or tapered bore

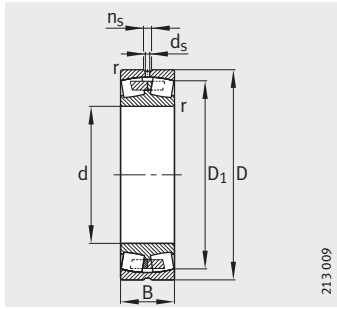


E1 design
Cylindrical bore

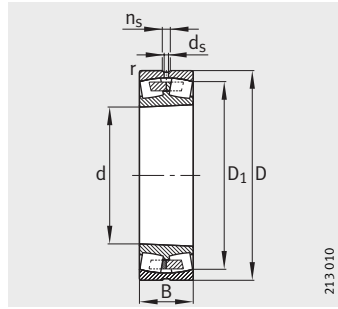


Tapered bore
K = taper 1:12, K30 = taper 1:30

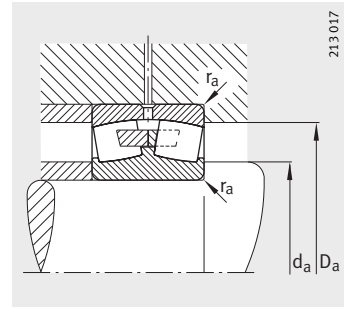
Dimension table (continued) · Dimensions in mm										
Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r min.	D ₁ ≈	d ₂ ≈	d _s	n _s
23132-E1-K-TVPB	XL	18,4	160	270	86	2,1	238,3	183,2	8	15
23132-E1A-K-M	XL	18,6	160	270	86	2,1	238,3	–	8	15
23132-E1-TVPB	XL	19,1	160	270	86	2,1	238,3	183,2	8	15
23132-E1A-M	XL	20	160	270	86	2,1	238,3	–	8	15
24132-BS	–	23	160	270	109	2,1	230,2	–	4,8	9,5
24132-BS-K30	–	25	160	270	109	2,1	230,2	–	4,8	9,5
22232-E1-K	XL	22,4	160	290	80	3	258,2	190,9	8	15
22232-E1	XL	23,3	160	290	80	3	258,2	190,9	8	15
23232-E1-K-TVPB	XL	27,7	160	290	104	3	249,3	186,7	8	15
23232-E1A-K-M	XL	28,5	160	290	104	3	249,3	–	8	15
23232-E1-TVPB	XL	28,6	160	290	104	3	249,3	186,7	8	15
23232-E1A-M	XL	29,8	160	290	104	3	249,3	–	8	15
22332-K-MB	–	50,1	160	340	114	4	288,3	–	9,5	17,7
22332-MB	–	51,1	160	340	114	4	288,3	–	9,5	17,7
22332-A-MA-T41A	–	52,4	160	340	114	4	288,3	–	9,5	17,7
23332-A-MA-T41A	–	61,3	160	340	136	4	280,6	–	9,5	17,7
23034-E1-K-TVPB	XL	11,9	170	260	67	2,1	237,2	189,8	6,3	12,2
23034-E1A-K-M	XL	12	170	260	67	2,1	237,2	–	6,3	12,2
23034-E1-TVPB	XL	12,3	170	260	67	2,1	237,2	189,8	6,3	12,2
23034-E1A-M	XL	13	170	260	67	2,1	237,2	–	6,3	12,2
24034-BS-K30-MB	–	16,8	170	260	90	2,1	228,8	–	4,8	9,5
24034-BS-MB	–	17,6	170	260	90	2,1	228,8	–	4,8	9,5
23134-E1A-K-M	XL	19,5	170	280	88	2,1	248,1	–	8	15
23134-E1-K-TVPB	XL	19,9	170	280	88	2,1	248,1	193,4	8	15
23134-E1-TVPB	XL	20,7	170	280	88	2,1	248,1	193,4	8	15
23134-E1A-M	XL	22,1	170	280	88	2,1	248,1	–	8	15
24134-BS-K30	–	25	170	280	109	2,1	239,6	–	4,8	9,5
24134-BS	–	25,8	170	280	109	2,1	239,6	–	4,8	9,5
22234-E1-K	XL	27,1	170	310	86	4	275,4	199,8	9,5	17,7
22234-E1	XL	27,8	170	310	86	4	275,4	199,8	9,5	17,7
23234-E1-K-TVPB	XL	33,1	170	310	110	4	267,4	199,8	8	15
23234-E1A-K-M	XL	34,6	170	310	110	4	267,4	–	8	15
23234-E1-TVPB	XL	34,9	170	310	110	4	267,4	199,8	8	15
23234-E1A-M	XL	36,5	170	310	110	4	267,4	–	8	15
22334-K-MB	–	56,9	170	360	120	4	304,2	–	9,5	17,7
22334-A-MA-T41A	–	59,5	170	360	120	4	304,2	–	9,5	17,7



With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30



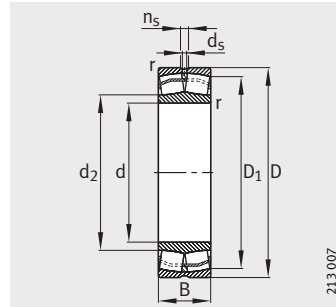
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	C _{ur}	n _G	n _B
min.	max.	max.	N	N					N	min ⁻¹	min ⁻¹
172	258	2,1	1 160 000	1 560 000	0,29	2,32	3,45	2,26	164 000	2 400	1 590
172	258	2,1	1 160 000	1 560 000	0,29	2,32	3,45	2,26	164 000	2 400	1 590
172	258	2,1	1 160 000	1 560 000	0,29	2,32	3,45	2,26	164 000	2 400	1 590
172	258	2,1	1 160 000	1 560 000	0,29	2,32	3,45	2,26	164 000	2 400	1 590
172	258	2,1	1 060 000	1 800 000	0,41	1,65	2,46	1,61	106 000	2 000	1 150
172	258	2,1	1 060 000	1 800 000	0,41	1,65	2,46	1,61	106 000	2 000	1 150
174	276	2,5	1 140 000	1 400 000	0,26	2,64	3,93	2,58	125 000	2 600	1 960
174	276	2,5	1 140 000	1 400 000	0,26	2,64	3,93	2,58	125 000	2 600	1 960
174	276	2,5	1 460 000	1 900 000	0,34	2	2,98	1,96	146 000	2 200	1 310
174	276	2,5	1 460 000	1 900 000	0,34	2	2,98	1,96	146 000	2 200	1 310
174	276	2,5	1 460 000	1 900 000	0,34	2	2,98	1,96	146 000	2 200	1 310
174	276	2,5	1 460 000	1 900 000	0,34	2	2,98	1,96	146 000	2 200	1 310
174	276	2,5	1 460 000	1 900 000	0,34	2	2,98	1,96	146 000	2 200	1 310
177	323	3	1 430 000	1 900 000	0,37	1,8	2,69	1,76	121 000	2 000	1 490
177	323	3	1 430 000	1 900 000	0,37	1,8	2,69	1,76	121 000	2 000	1 490
177	323	3	1 430 000	1 900 000	0,37	1,8	2,69	1,76	136 000	2 000	1 490
177	323	3	1 660 000	2 320 000	0,44	1,54	2,3	1,51	152 000	2 000	–
180,2	249,8	2,1	880 000	1 220 000	0,23	2,98	4,44	2,92	146 000	2 600	1 940
180,2	249,8	2,1	880 000	1 220 000	0,23	2,98	4,44	2,92	146 000	2 600	1 940
180,2	249,8	2,1	880 000	1 220 000	0,23	2,98	4,44	2,92	146 000	2 600	1 940
180,2	249,8	2,1	880 000	1 220 000	0,23	2,98	4,44	2,92	146 000	2 600	1 940
180,2	249,8	2,1	850 000	1 560 000	0,34	2	2,97	1,95	96 000	2 000	1 530
180,2	249,8	2,1	850 000	1 560 000	0,34	2	2,97	1,95	96 000	2 000	1 530
182	268	2,1	1 220 000	1 700 000	0,28	2,37	3,53	2,32	174 000	2 400	1 480
182	268	2,1	1 220 000	1 700 000	0,28	2,37	3,53	2,32	174 000	2 400	1 480
182	268	2,1	1 220 000	1 700 000	0,28	2,37	3,53	2,32	174 000	2 400	1 480
182	268	2,1	1 220 000	1 700 000	0,28	2,37	3,53	2,32	174 000	2 400	1 480
182	268	2,1	1 060 000	1 830 000	0,39	1,73	2,58	1,69	98 000	1 800	1 100
182	268	2,1	1 060 000	1 830 000	0,39	1,73	2,58	1,69	98 000	1 800	1 100
187	293	3	1 320 000	1 560 000	0,26	2,6	3,87	2,54	139 000	2 400	1 830
187	293	3	1 320 000	1 560 000	0,26	2,6	3,87	2,54	139 000	2 400	1 830
187	293	3	1 630 000	2 160 000	0,33	2,03	3,02	1,98	163 000	2 000	1 190
187	293	3	1 630 000	2 160 000	0,33	2,03	3,02	1,98	163 000	2 000	1 190
187	293	3	1 630 000	2 160 000	0,33	2,03	3,02	1,98	163 000	2 000	1 190
187	293	3	1 630 000	2 160 000	0,33	2,03	3,02	1,98	163 000	2 000	1 190
187	343	3	1 600 000	2 120 000	0,37	1,83	2,72	1,79	134 000	1 800	1 380
187	343	3	1 600 000	2 120 000	0,37	1,83	2,72	1,79	144 000	1 800	1 380

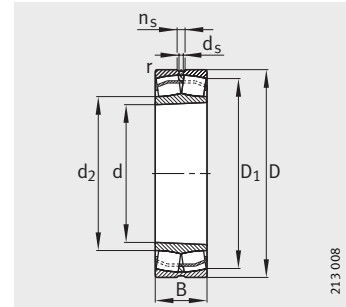


Spherical roller bearings

With cylindrical or tapered bore

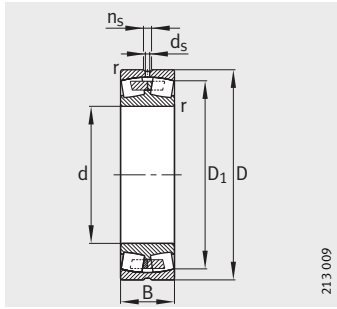


E1 design
Cylindrical bore

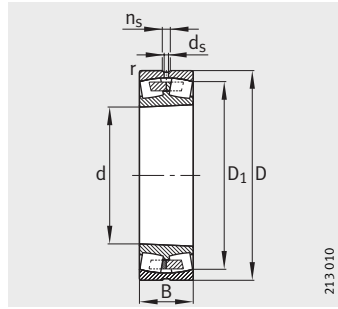


Tapered bore
K = taper 1:12, K30 = taper 1:30

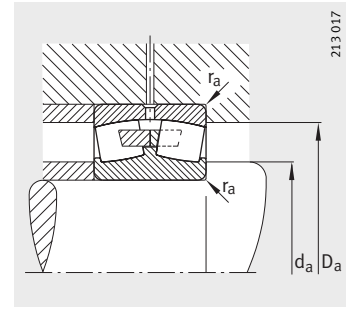
Dimension table (continued) · Dimensions in mm										
Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r min.	D ₁ ≈	d ₂ ≈	d _s	n _s
22334-MB	–	59,5	170	360	120	4	304,2	–	9,5	17,7
23936-S-K-MB	–	7,76	180	250	52	2	230,9	–	4,8	9,5
23936-S-MB	–	7,96	180	250	52	2	230,9	–	4,8	9,5
23036-E1-K-TVPB	XL	15,6	180	280	74	2,1	254,3	201,8	8	15
23036-E1-TVPB	XL	15,9	180	280	74	2,1	254,3	201,8	8	15
23036-E1A-K-M	XL	16	180	280	74	2,1	254,3	–	8	15
23036-E1A-M	XL	16,8	180	280	74	2,1	254,3	–	8	15
24036-BS-K30-MB	–	22,3	180	280	100	2,1	244,2	–	4,8	9,5
24036-BS-MB	–	22,6	180	280	100	2,1	244,2	–	4,8	9,5
23136-E1A-K-M	XL	25,5	180	300	96	3	264,8	–	8	15
23136-E1-K-TVPB	XL	25,9	180	300	96	3	264,8	204,1	8	15
23136-E1A-M	XL	26,1	180	300	96	3	264,8	–	8	15
23136-E1-TVPB	XL	27,3	180	300	96	3	264,8	204,1	8	15
24136-BS-K30	–	31,8	180	300	118	3	253,7	–	6,3	12,2
24136-BS	–	32,2	180	300	118	3	253,7	–	6,3	12,2
22236-E1-K	XL	28,5	180	320	86	4	285,9	211,3	9,5	17,7
22236-E1	XL	29,2	180	320	86	4	285,9	211,3	9,5	17,7
23236-E1-K-TVPB	XL	36	180	320	112	4	277,3	210,6	8	15
23236-E1A-K-M	XL	37	180	320	112	4	277,3	–	8	15
23236-E1-TVPB	XL	37,2	180	320	112	4	277,3	210,6	8	15
23236-E1A-M	XL	38,5	180	320	112	4	277,3	–	8	15
22336-A-MA-T41A	–	71,7	180	380	126	4	323,4	–	12,5	23,5
22336-K-MB	–	66,7	180	380	126	4	323,4	–	12,5	23,5
22336-MB	–	69	180	380	126	4	323,4	–	12,5	23,5
23938-S-MB	–	8,43	190	260	52	2	240,2	–	4,8	9,5
23038-E1-K-TVPB	XL	16,3	190	290	75	2,1	264,5	211,9	8	15
23038-E1-TVPB	XL	17,2	190	290	75	2,1	264,5	211,9	8	15
23038-E1A-K-M	XL	17,7	190	290	75	2,1	264,5	–	8	15
23038-E1A-M	XL	18,3	190	290	75	2,1	264,5	–	8	15
24038-BS-K30-MB	–	24,2	190	290	100	2,1	255	–	4,8	9,5
24038-BS-MB	–	24,5	190	290	100	2,1	255	–	4,8	9,5
23138-E1-K-TVPB	XL	30,3	190	320	104	3	281,6	217	8	15
23138-E1-TVPB	XL	32	190	320	104	3	281,6	217	8	15
23138-E1A-K-M	XL	32,4	190	320	104	3	281,6	–	8	15
23138-E1A-M	XL	33,9	190	320	104	3	281,6	–	8	15
24138-B-K30	–	41,5	190	320	128	3	270	–	6,3	12,2



With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30



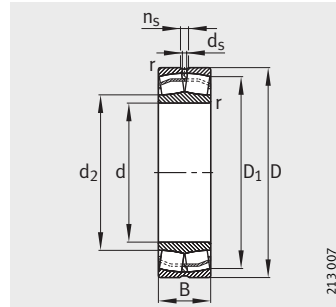
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	Cur	nG	nB
min.	max.	max.	N	N					N	min ⁻¹	min ⁻¹
187	343	3	1 600 000	2 120 000	0,37	1,83	2,72	1,79	134 000	1 800	1 380
188,8	241,2	2	440 000	850 000	0,2	3,42	5,09	3,34	57 000	2 200	2 320
188,8	241,2	2	440 000	850 000	0,2	3,42	5,09	3,34	57 000	2 200	2 320
190,2	269,8	2,1	1 040 000	1 460 000	0,23	2,9	4,31	2,83	170 000	2 600	1 790
190,2	269,8	2,1	1 040 000	1 460 000	0,23	2,9	4,31	2,83	170 000	2 600	1 790
190,2	269,8	2,1	1 040 000	1 460 000	0,23	2,9	4,31	2,83	170 000	2 600	1 790
190,2	269,8	2,1	1 040 000	1 460 000	0,23	2,9	4,31	2,83	170 000	2 600	1 790
190,2	269,8	2,1	1 000 000	1 830 000	0,36	1,9	2,83	1,86	106 000	1 800	1 420
190,2	269,8	2,1	1 000 000	1 830 000	0,36	1,9	2,83	1,86	106 000	1 800	1 420
194	286	2,5	1 430 000	1 960 000	0,29	2,32	3,45	2,26	196 000	2 200	1 370
194	286	2,5	1 430 000	1 960 000	0,29	2,32	3,45	2,26	196 000	2 200	1 370
194	286	2,5	1 430 000	1 960 000	0,29	2,32	3,45	2,26	196 000	2 200	1 370
194	286	2,5	1 430 000	1 960 000	0,29	2,32	3,45	2,26	196 000	2 200	1 370
194	286	2,5	1 250 000	2 200 000	0,4	1,68	2,5	1,64	136 000	1 700	980
194	286	2,5	1 250 000	2 200 000	0,4	1,68	2,5	1,64	136 000	1 700	980
197	303	3	1 370 000	1 660 000	0,25	2,71	4,04	2,65	148 000	2 400	1 720
197	303	3	1 370 000	1 660 000	0,25	2,71	4,04	2,65	148 000	2 400	1 720
197	303	3	1 700 000	2 360 000	0,33	2,07	3,09	2,03	173 000	2 000	1 110
197	303	3	1 700 000	2 360 000	0,33	2,07	3,09	2,03	173 000	2 000	1 110
197	303	3	1 700 000	2 360 000	0,33	2,07	3,09	2,03	173 000	2 000	1 110
197	303	3	1 700 000	2 360 000	0,33	2,07	3,09	2,03	173 000	2 000	1 110
197	363	3	1 700 000	2 240 000	0,37	1,83	2,72	1,79	229 000	1 500	1 280
197	363	3	1 760 000	2 360 000	0,37	1,83	2,72	1,79	209 000	1 500	1 280
197	363	3	1 760 000	2 360 000	0,37	1,83	2,72	1,79	209 000	1 500	1 280
198,8	251,2	2	465 000	900 000	0,18	3,66	5,46	3,58	65 000	2 000	2 180
200,2	279,8	2,1	1 080 000	1 560 000	0,23	2,98	4,44	2,92	180 000	2 400	1 690
200,2	279,8	2,1	1 080 000	1 560 000	0,23	2,98	4,44	2,92	180 000	2 400	1 690
200,2	279,8	2,1	1 080 000	1 560 000	0,23	2,98	4,44	2,92	180 000	2 400	1 690
200,2	279,8	2,1	1 080 000	1 560 000	0,23	2,98	4,44	2,92	180 000	2 400	1 690
200,2	279,8	2,1	1 040 000	1 960 000	0,34	2	2,98	1,96	110 000	1 700	1 320
200,2	279,8	2,1	1 040 000	1 960 000	0,34	2	2,98	1,96	110 000	1 700	1 320
204	306	2,5	1 600 000	2 240 000	0,3	2,28	3,39	2,23	218 000	2 000	1 270
204	306	2,5	1 600 000	2 240 000	0,3	2,28	3,39	2,23	218 000	2 000	1 270
204	306	2,5	1 600 000	2 240 000	0,3	2,28	3,39	2,23	218 000	2 000	1 270
204	306	2,5	1 600 000	2 240 000	0,3	2,28	3,39	2,23	218 000	2 000	1 270
204	306	2,5	1 400 000	2 500 000	0,41	1,66	2,47	1,62	145 000	1 500	910

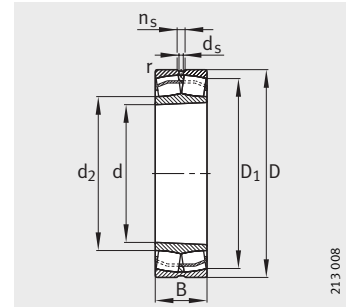


Spherical roller bearings

With cylindrical or tapered bore



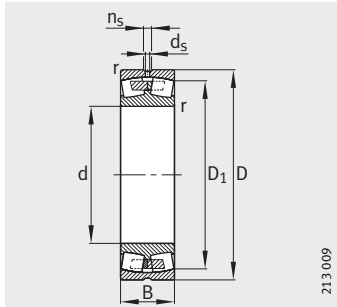
E1 design
Cylindrical bore



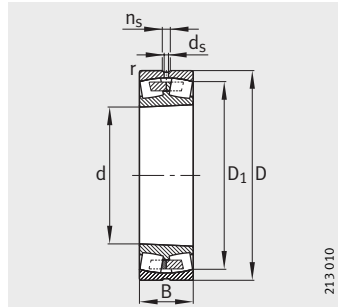
Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

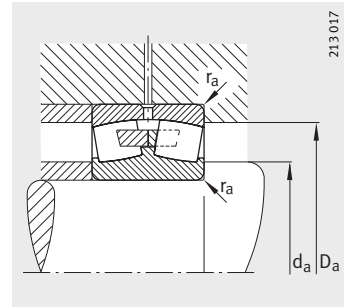
Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r min.	D ₁ ≈	d ₂ ≈	d _s	n _s
24138-B	-	42,2	190	320	128	3	270	-	6,3	12,2
22238-K-MB	-	36,2	190	340	92	4	296	-	9,5	17,7
22238-MB	-	37	190	340	92	4	296	-	9,5	17,7
23238-B-K-MB	-	46	190	340	120	4	291,2	-	9,5	17,7
23238-B-MB	-	48,4	190	340	120	4	291,2	-	9,5	17,7
22338-K-MB	-	77,3	190	400	132	5	338,2	-	12,5	23,5
22338-A-MA-T41A	-	80,5	190	400	132	5	338,2	-	12,5	23,5
22338-MB	-	80,5	190	400	132	5	338,2	-	12,5	23,5
23338-A-MA-T41A	-	97,1	190	400	155	5	331,6	-	9,5	17,7
23940-S-K-MB	-	11,5	200	280	60	2,1	256,9	-	6,3	12,2
23940-S-MB	-	11,8	200	280	60	2,1	256,9	-	6,3	12,2
23040-E1-K-TVPB	XL	20,8	200	310	82	2,1	281,6	223,4	8	15
23040-E1A-K-M	XL	21,4	200	310	82	2,1	281,6	-	8	15
23040-E1-TVPB	XL	21,5	200	310	82	2,1	281,6	223,4	8	15
23040-E1A-M	XL	22,8	200	310	82	2,1	281,6	-	8	15
24040-BS-K30-MB	-	30	200	310	109	2,1	270,8	-	6,3	12,2
24040-BS-MB	-	30,4	200	310	109	2,1	270,8	-	6,3	12,2
23140-B-K-MB	-	41,7	200	340	112	3	293,3	-	9,5	17,7
23140-B-MB	-	43	200	340	112	4	293,3	-	9,5	17,7
24140-B-K30	-	51,6	200	340	140	3	285,9	-	6,3	12,2
24140-B	-	52,4	200	340	140	3	285,9	-	6,3	12,2
22240-B-K-MB	-	42,3	200	360	98	4	312	-	9,5	17,7
22240-B-MB	-	44,2	200	360	98	4	312	-	9,5	17,7
23240-B-K-MB	-	55,8	200	360	128	4	307,5	-	9,5	17,7
23240-B-MB	-	60,5	200	360	128	4	307,5	-	9,5	17,7
22340-K-MB	-	89,5	200	420	138	5	357,4	-	12,5	23,5
22340-MB	-	91	200	420	138	5	357,4	-	12,5	23,5
22340-A-MA-T41A	-	92,4	200	420	138	5	357,4	-	12,5	23,5
23340-A-MA-T41A	-	108	200	420	165	5	350,2	-	9,5	17,7
23944-S-MB	-	12,3	220	300	60	2,1	277,4	-	6,3	12,2
23944-S-K-MB	-	12,3	220	300	60	2,1	277,4	-	6,3	12,2
23044-K-MB	-	29,9	220	340	90	3	301,8	-	8	15
23044-MB	-	31,7	220	340	90	3	301,8	-	8	15
24044-B-K30-MB	-	38,9	220	340	118	3	297,4	-	6,3	12,2
24044-B-MB	-	39,5	220	340	118	3	297,4	-	6,3	12,2
23144-B-K-MB	-	52	220	370	120	4	319,2	-	9,5	17,7



With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30



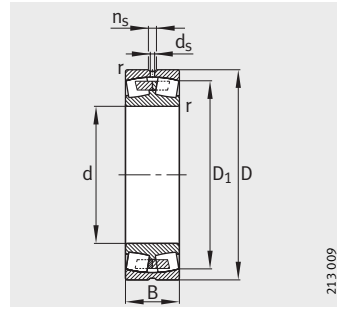
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	C _{ur}	n _G	n _B
min.	max.	max.	N	N					N	min ⁻¹	min ⁻¹
204	306	2,5	1 400 000	2 500 000	0,41	1,66	2,47	1,62	145 000	1 500	910
207	323	3	1 200 000	1 830 000	0,28	2,39	3,56	2,34	122 000	1 800	1 620
207	323	3	1 200 000	1 830 000	0,28	2,39	3,56	2,34	122 000	1 800	1 620
207	323	3	1 560 000	2 600 000	0,36	1,86	2,77	1,82	156 000	1 700	1 040
207	323	3	1 560 000	2 600 000	0,36	1,86	2,77	1,82	156 000	1 700	1 040
210	380	4	1 860 000	2 500 000	0,37	1,83	2,72	1,79	213 000	1 500	1 220
210	380	4	1 860 000	2 500 000	0,37	1,83	2,72	1,79	173 000	1 500	1 220
210	380	4	1 860 000	2 500 000	0,37	1,83	2,72	1,79	213 000	1 500	1 220
210	380	4	2 200 000	3 200 000	0,43	1,57	2,34	1,53	223 000	1 400	–
210,2	269,8	2,1	550 000	1 080 000	0,2	3,42	5,09	3,34	71 000	2 000	2 110
210,2	269,8	2,1	550 000	1 080 000	0,2	3,42	5,09	3,34	71 000	2 000	2 110
210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 580
210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 580
210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 580
210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 580
210,2	299,8	2,1	1 200 000	2 280 000	0,35	1,94	2,88	1,89	122 000	1 500	1 220
210,2	299,8	2,1	1 200 000	2 280 000	0,35	1,94	2,88	1,89	122 000	1 500	1 220
214	326	2,5	1 320 000	2 280 000	0,35	1,95	2,9	1,91	131 000	1 700	1 240
214	326	2,5	1 320 000	2 280 000	0,35	1,95	2,9	1,91	131 000	1 700	1 240
214	326	2,5	1 700 000	3 000 000	0,42	1,62	2,42	1,59	190 000	1 400	810
214	326	2,5	1 700 000	3 000 000	0,42	1,62	2,42	1,59	190 000	1 400	810
217	343	3	1 320 000	2 000 000	0,29	2,35	3,5	2,3	123 000	1 700	1 530
217	343	3	1 320 000	2 000 000	0,29	2,35	3,5	2,3	123 000	1 700	1 530
217	343	3	1 660 000	2 750 000	0,37	1,83	2,72	1,79	163 000	1 500	1 000
217	343	3	1 660 000	2 750 000	0,37	1,83	2,72	1,79	163 000	1 500	1 000
220	400	4	2 080 000	2 800 000	0,36	1,87	2,79	1,83	189 000	1 400	1 130
220	400	4	2 080 000	2 800 000	0,36	1,87	2,79	1,83	189 000	1 400	1 130
220	400	4	2 080 000	2 800 000	0,36	1,87	2,79	1,83	189 000	1 400	1 130
220	400	4	2 450 000	3 600 000	0,43	1,55	2,31	1,52	238 000	1 300	–
230,2	289,8	2,1	600 000	1 250 000	0,18	3,76	5,59	3,67	72 000	1 800	1 880
230,2	289,8	2,1	600 000	1 250 000	0,18	3,76	5,59	3,67	72 000	1 800	1 880
232,4	327,6	2,5	1 060 000	1 900 000	0,26	2,55	3,8	2,5	132 000	1 700	1 470
232,4	327,6	2,5	1 060 000	1 900 000	0,26	2,55	3,8	2,5	132 000	1 700	1 470
232,4	327,6	2,5	1 400 000	2 700 000	0,34	1,96	2,92	1,92	139 000	1 300	1 080
232,4	327,6	2,5	1 400 000	2 700 000	0,34	1,96	2,92	1,92	139 000	1 300	1 080
237	353	3	1 630 000	2 900 000	0,33	2,03	3,02	1,98	165 000	1 400	1 070

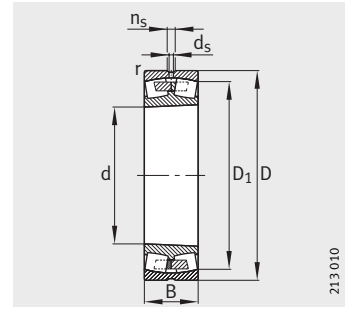


Spherical roller bearings

With cylindrical or tapered bore

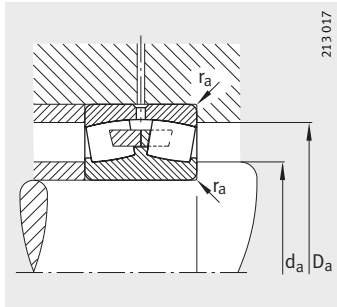


With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	d _s	n _s
23144-B-MB	54,5	220	370	120	4	319,2	9,5	17,7
24144-B-K30	64,4	220	370	150	4	311,7	6,3	12,2
24144-B	65,6	220	370	150	4	311,7	6,3	12,2
22244-B-K-MB	59,6	220	400	108	4	348,7	9,5	17,7
22244-B-MB	61,5	220	400	108	4	348,7	9,5	17,7
23244-K-MB	79	220	400	144	4	337,6	9,5	17,7
23244-MB	81,1	220	400	144	4	337,6	9,5	17,7
22344-K-MB	114	220	460	145	5	391,2	12,5	23,5
22344-A-MA-T41A	119	220	460	145	5	391,2	12,5	23,5
22344-MB	119	220	460	145	5	391,2	12,5	23,5
23948-K-MB	13,4	240	320	60	2,1	297,8	6,3	12,2
23948-MB	13,9	240	320	60	2,1	297,8	6,3	12,2
23048-K-MB	31,9	240	360	92	3	322,1	8	15
23048-MB	34,8	240	360	92	3	322,1	8	15
24048-B-K30-MB	43,2	240	360	118	3	318,9	6,3	12,2
24048-B-MB	43,6	240	360	118	3	318,9	6,3	12,2
23148-B-K-MB	65,3	240	400	128	4	346,2	9,5	17,7
23148-B-MB	67,3	240	400	128	4	346,2	9,5	17,7
24148-B-K30	78,7	240	400	160	4	338	6,3	12,2
24148-B	80,7	240	400	160	4	338	6,3	12,2
22248-B-K-MB	81,2	240	440	120	4	380,7	12,5	23,5
22248-B-MB	83,4	240	440	120	4	380,7	12,5	23,5
23248-B-K-MB	105	240	440	160	4	371	12,5	23,5
23248-B-MB	111	240	440	160	4	371	12,5	23,5
22348-K-MB	145	240	500	155	5	420	12,5	23,5
22348-MB	151	240	500	155	5	420	12,5	23,5
23952-K-MB	22,4	260	360	75	2,1	330,5	8	15
23952-MB	24,1	260	360	75	2,1	330,5	8	15
23052-K-MB	46,2	260	400	104	4	357,2	9,5	17,7
23052-MB	49,3	260	400	104	4	357,2	9,5	17,7
24052-B-K30-MB	64,5	260	400	140	4	349,1	6,3	12,2
24052-B-MB	67,2	260	400	140	4	349,1	6,3	12,2
23152-K-MB	89,6	260	440	144	4	379,7	9,5	17,7
23152-MB	92,5	260	440	144	4	379,7	9,5	17,7
24152-B-K30	112	260	440	180	4	370,3	8	15
24152-B	114	260	440	180	4	370,3	8	15



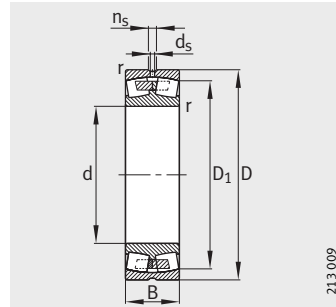
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	r _a	dyn. C _r	stat. C _{0r}	e	Y ₁	Y ₂	Y ₀	C _{ur}	n _G	n _B
min.	max.	max.	N	N					N	min ⁻¹	min ⁻¹
237	353	3	1 630 000	2 900 000	0,33	2,03	3,02	1,98	165 000	1 400	1 070
237	353	3	1 900 000	3 450 000	0,41	1,63	2,43	1,6	197 000	1 300	730
237	353	3	1 900 000	3 450 000	0,41	1,63	2,43	1,6	197 000	1 300	730
237	383	3	1 630 000	2 450 000	0,29	2,35	3,5	2,3	153 000	1 400	1 340
237	383	3	1 630 000	2 450 000	0,29	2,35	3,5	2,3	153 000	1 400	1 340
237	383	3	2 040 000	3 450 000	0,37	1,83	2,72	1,79	181 000	1 400	860
237	383	3	2 040 000	3 450 000	0,37	1,83	2,72	1,79	181 000	1 400	860
240	440	4	2 320 000	3 350 000	0,35	1,95	2,9	1,91	217 000	1 300	980
240	440	4	2 320 000	3 350 000	0,35	1,95	2,9	1,91	217 000	1 300	980
240	440	4	2 320 000	3 350 000	0,35	1,95	2,9	1,91	217 000	1 300	980
250,2	309,8	2,1	640 000	1 370 000	0,17	4,05	6,04	3,96	93 000	1 500	1 700
250,2	309,8	2,1	640 000	1 370 000	0,17	4,05	6,04	3,96	93 000	1 500	1 700
252,4	347,6	2,5	1 160 000	2 200 000	0,25	2,74	4,08	2,68	130 000	1 400	1 320
252,4	347,6	2,5	1 160 000	2 200 000	0,25	2,74	4,08	2,68	130 000	1 400	1 320
252,4	347,6	2,5	1 500 000	2 900 000	0,32	2,1	3,13	2,06	150 000	1 300	980
252,4	347,6	2,5	1 500 000	2 900 000	0,32	2,1	3,13	2,06	150 000	1 300	980
257	383	3	1 860 000	3 250 000	0,33	2,06	3,06	2,01	177 000	1 300	970
257	383	3	1 860 000	3 250 000	0,33	2,06	3,06	2,01	177 000	1 300	970
257	383	3	2 120 000	3 900 000	0,41	1,66	2,47	1,62	231 000	1 200	660
257	383	3	2 120 000	3 900 000	0,41	1,66	2,47	1,62	231 000	1 200	660
257	423	3	1 960 000	3 050 000	0,29	2,35	3,5	2,3	184 000	1 300	1 190
257	423	3	1 960 000	3 050 000	0,29	2,35	3,5	2,3	184 000	1 300	1 190
257	423	3	2 450 000	4 250 000	0,37	1,8	2,69	1,76	231 000	1 300	750
257	423	3	2 450 000	4 250 000	0,37	1,8	2,69	1,76	231 000	1 300	750
260	480	4	2 650 000	3 900 000	0,35	1,95	2,9	1,91	249 000	1 500	870
260	480	4	2 650 000	3 900 000	0,35	1,95	2,9	1,91	249 000	1 500	870
270,2	349,8	2,1	930 000	1 930 000	0,19	3,54	5,27	3,46	108 000	1 400	1 610
270,2	349,8	2,1	930 000	1 930 000	0,19	3,54	5,27	3,46	108 000	1 400	1 610
274,6	385,4	3	1 500 000	2 800 000	0,26	2,64	3,93	2,58	154 000	1 300	1 170
274,6	385,4	3	1 500 000	2 800 000	0,26	2,64	3,93	2,58	154 000	1 300	1 170
274,6	385,4	3	1 900 000	3 800 000	0,35	1,94	2,88	1,89	204 000	1 100	870
274,6	385,4	3	1 900 000	3 800 000	0,35	1,94	2,88	1,89	204 000	1 100	870
277	423	3	2 200 000	4 000 000	0,33	2,03	3,02	1,98	213 000	1 200	860
277	423	3	2 200 000	4 000 000	0,33	2,03	3,02	1,98	213 000	1 200	860
277	423	3	2 700 000	5 100 000	0,42	1,61	2,4	1,58	315 000	1 100	550
277	423	3	2 700 000	5 100 000	0,42	1,61	2,4	1,58	315 000	1 100	550

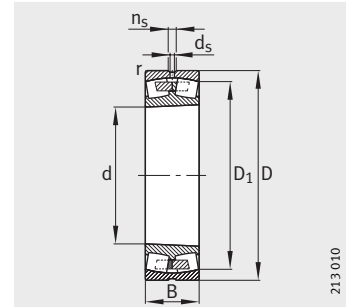


Spherical roller bearings

With cylindrical or tapered bore

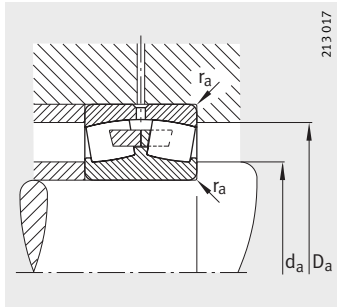


With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	d _s	n _s
22252-B-K-MB	106	260	480	130	5	415,3	12,5	23,5
22252-B-MB	110	260	480	130	5	415,3	12,5	23,5
23252-B-K-MB	136	260	480	174	5	405,4	12,5	23,5
23252-B-MB	144	260	480	174	5	405,4	12,5	23,5
22352-K-MB	177	260	540	165	6	452,1	12,5	23,5
22352-MB	181	260	540	165	6	452,1	12,5	23,5
23956-K-MB	24,7	280	380	75	2,1	350	8	15
23956-MB	25,5	280	380	75	2,1	350	8	15
23056-B-K-MB	50,3	280	420	106	4	376,5	9,5	17,7
23056-B-MB	52,9	280	420	106	4	376,5	9,5	17,7
24056-B-K30-MB	69,7	280	420	140	4	369,5	6,3	12,2
24056-B-MB	70,8	280	420	140	4	369,5	6,3	12,2
23156-B-K-MB	96,4	280	460	146	5	401,4	9,5	17,7
23156-B-MB	99,5	280	460	146	5	401,4	9,5	17,7
24156-B-K30	118	280	460	180	5	392,8	8	15
24156-B	119	280	460	180	5	392,8	8	15
22256-B-K-MB	110	280	500	130	5	435,2	12,5	23,5
22256-B-MB	113	280	500	130	5	435,2	12,5	23,5
23256-K-MB	153	280	500	176	5	426,3	12,5	23,5
23256-MB	157	280	500	176	5	426,3	12,5	23,5
22356-K-MB	224	280	580	175	6	489,3	12,5	23,5
22356-MB	233	280	580	175	6	489,3	12,5	23,5
23960-B-K-MB	39,1	300	420	90	3	384,6	9,5	17,7
23960-B-MB	40,6	300	420	90	3	384,6	9,5	17,7
23060-K-MB	72,2	300	460	118	4	412,6	9,5	17,7
23060-MB	73,8	300	460	118	4	412,6	9,5	17,7
24060-B-K30-MB	97,7	300	460	160	4	401,5	8	15
24060-B-MB	102	300	460	160	4	401,5	8	15
23160-B-K-MB	123	300	500	160	5	434,7	9,5	17,7
23160-B-MB	134	300	500	160	5	434,7	9,5	17,7
24160-B-K30	158	300	500	200	5	424,4	8	15
24160-B	159	300	500	200	5	424,4	8	15
22260-K-MB	136	300	540	140	5	468,8	12,5	23,5
22260-MB	142	300	540	140	5	468,8	12,5	23,5
23260-K-MB	192	300	540	192	5	458,7	12,5	23,5
23260-MB	198	300	540	192	5	458,7	12,5	23,5



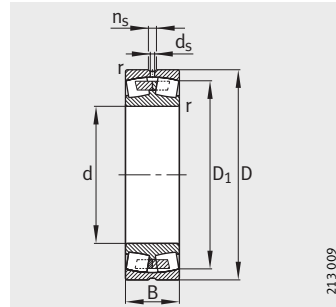
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N	e	Y_1	Y_2	Y_0			
280	460	4	2 240 000	3 450 000	0,29	2,32	3,45	2,26	217 000	1 100	1 080
280	460	4	2 240 000	3 450 000	0,29	2,32	3,45	2,26	217 000	1 100	1 080
280	460	4	2 900 000	4 900 000	0,37	1,8	2,69	1,76	270 000	1 100	680
280	460	4	2 900 000	4 900 000	0,37	1,8	2,69	1,76	270 000	1 100	680
286	514	5	3 000 000	4 400 000	0,34	2	2,98	1,96	290 000	1 100	790
286	514	5	3 000 000	4 400 000	0,34	2	2,98	1,96	290 000	1 100	790
290,2	369,8	2,1	965 000	2 040 000	0,18	3,76	5,59	3,67	129 000	1 300	1 470
290,2	369,8	2,1	965 000	2 040 000	0,18	3,76	5,59	3,67	129 000	1 300	1 470
294,6	405,4	3	1 560 000	3 000 000	0,25	2,74	4,08	2,68	156 000	1 300	1 080
294,6	405,4	3	1 560 000	3 000 000	0,25	2,74	4,08	2,68	156 000	1 300	1 080
294,6	405,4	3	2 000 000	4 000 000	0,33	2,04	3,04	2	225 000	1 100	810
294,6	405,4	3	2 000 000	4 000 000	0,33	2,04	3,04	2	225 000	1 100	810
300	440	4	2 360 000	4 400 000	0,32	2,12	3,15	2,07	241 000	1 100	790
300	440	4	2 360 000	4 400 000	0,32	2,12	3,15	2,07	241 000	1 100	790
300	440	4	2 700 000	5 200 000	0,39	1,71	2,54	1,67	365 000	1 000	520
300	440	4	2 700 000	5 200 000	0,39	1,71	2,54	1,67	365 000	1 000	520
300	480	4	2 360 000	3 650 000	0,28	2,43	3,61	2,37	238 000	1 100	1 010
300	480	4	2 360 000	3 650 000	0,28	2,43	3,61	2,37	238 000	1 100	1 010
300	480	4	3 000 000	5 300 000	0,36	1,86	2,77	1,82	260 000	1 100	630
300	480	4	3 000 000	5 300 000	0,36	1,86	2,77	1,82	260 000	1 100	630
306	554	5	3 550 000	5 400 000	0,33	2,03	3,02	1,98	335 000	950	680
306	554	5	3 550 000	5 400 000	0,33	2,03	3,02	1,98	335 000	950	680
312,4	407,6	2,5	1 270 000	2 650 000	0,2	3,42	5,09	3,34	166 000	1 200	1 400
312,4	407,6	2,5	1 270 000	2 650 000	0,2	3,42	5,09	3,34	166 000	1 200	1 400
314,6	445,4	3	1 960 000	3 650 000	0,25	2,69	4	2,63	223 000	1 100	980
314,6	445,4	3	1 960 000	3 650 000	0,25	2,69	4	2,63	223 000	1 100	980
314,6	445,4	3	2 500 000	5 200 000	0,35	1,95	2,9	1,91	300 000	1 000	710
314,6	445,4	3	2 500 000	5 200 000	0,35	1,95	2,9	1,91	300 000	1 000	710
320	480	4	2 650 000	4 900 000	0,33	2,06	3,06	2,01	270 000	1 100	730
320	480	4	2 650 000	4 900 000	0,33	2,06	3,06	2,01	270 000	1 100	730
320	480	4	3 250 000	6 300 000	0,4	1,67	2,49	1,63	540 000	900	460
320	480	4	3 250 000	6 300 000	0,4	1,67	2,49	1,63	540 000	900	460
320	520	4	2 750 000	4 400 000	0,27	2,47	3,67	2,41	300 000	1 000	900
320	520	4	2 750 000	4 400 000	0,27	2,47	3,67	2,41	300 000	1 000	900
320	520	4	3 450 000	6 200 000	0,37	1,83	2,72	1,79	300 000	1 000	560
320	520	4	3 450 000	6 200 000	0,37	1,83	2,72	1,79	300 000	1 000	560

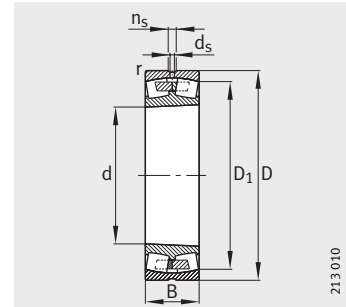


Spherical roller bearings

With cylindrical or tapered bore

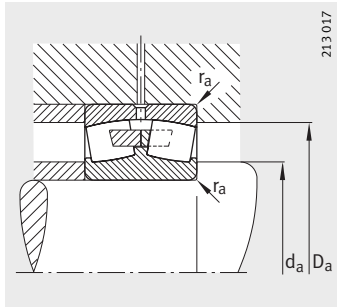


With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	d _s	n _s
23964-K-MB	41	320	440	90	3	406,2	9,5	17,7
23964-MB	41,8	320	440	90	3	406,2	9,5	17,7
23064-K-MB	77,1	320	480	121	4	432,6	9,5	17,7
23064-MB	79,9	320	480	121	4	432,6	9,5	17,7
24064-B-K30-MB	103	320	480	160	4	424	8	15
24064-B-MB	107	320	480	160	4	424	8	15
23164-K-MB	159	320	540	176	5	466,2	12,5	23,5
23164-MB	170	320	540	176	5	466,2	12,5	23,5
24164-B-K30	197	320	540	218	5	456,1	9,5	17,7
24164-B	204	320	540	218	5	456,1	9,5	17,7
22264-K-MB	166	320	580	150	5	503,5	12,5	23,5
22264-MB	177	320	580	150	5	503,5	12,5	23,5
23264-K-MB	229	320	580	208	5	489,6	12,5	23,5
23264-MB	242	320	580	208	5	489,6	12,5	23,5
23968-MB	47,8	340	460	90	3	426,7	9,5	17,7
23068-K-MB	101	340	520	133	5	464,6	12,5	23,5
23068-MB	105	340	520	133	5	464,6	12,5	23,5
24068-B-K30-MB	143	340	520	180	5	457,1	9,5	17,7
24068-B-MB	146	340	520	180	5	457,1	9,5	17,7
23168-B-K-MB	203	340	580	190	5	499,5	12,5	23,5
23168-B-MB	215	340	580	190	5	499,5	12,5	23,5
24168-B-K30	260	340	580	243	5	481,1	9,5	17,7
24168-B	266	340	580	243	5	481,1	9,5	17,7
23268-B-K-MB	291	340	620	224	6	521,2	12,5	23,5
23268-B-MB	309	340	620	224	6	521,2	12,5	23,5
23972-K-MB	45	360	480	90	3	447,1	9,5	17,7
23972-MB	46,5	360	480	90	3	447,1	9,5	17,7
23072-K-MB	107	360	540	134	5	485,2	12,5	23,5
23072-MB	112	360	540	134	5	485,2	12,5	23,5
24072-B-MB	138	360	540	180	5	478,5	9,5	17,7
23172-K-MB	217	360	600	192	5	520	12,5	23,5
23172-MB	230	360	600	192	5	520	12,5	23,5
24172-B-K30	275	360	600	243	5	503,6	9,5	17,7
24172-B	279	360	600	243	5	503,6	9,5	17,7
23272-B-K-MB	328	360	650	232	6	548,3	12,5	23,5
23272-B-MB	347	360	650	232	6	548,3	12,5	23,5



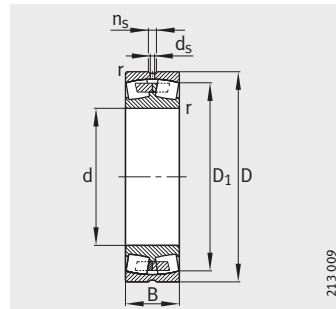
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N	e	Y_1	Y_2	Y_0			
332,4	427,6	2,5	1 320 000	2 750 000	0,19	3,62	5,39	3,54	202 000	1 100	1 300
332,4	427,6	2,5	1 320 000	2 750 000	0,19	3,62	5,39	3,54	202 000	1 100	1 300
334,6	465,4	3	2 040 000	4 000 000	0,25	2,74	4,08	2,68	243 000	1 100	910
334,6	465,4	3	2 040 000	4 000 000	0,25	2,74	4,08	2,68	243 000	1 100	910
334,6	465,4	3	2 600 000	5 400 000	0,33	2,06	3,06	2,01	360 000	950	660
334,6	465,4	3	2 600 000	5 400 000	0,33	2,06	3,06	2,01	360 000	950	660
340	520	4	3 200 000	6 000 000	0,34	1,98	2,94	1,93	305 000	950	650
340	520	4	3 200 000	6 000 000	0,34	1,98	2,94	1,93	305 000	950	650
340	520	4	3 800 000	7 350 000	0,41	1,65	2,46	1,61	530 000	850	415
340	520	4	3 800 000	7 350 000	0,41	1,65	2,46	1,61	530 000	850	415
340	560	4	3 050 000	4 900 000	0,27	2,47	3,67	2,41	345 000	950	840
340	560	4	3 050 000	4 900 000	0,27	2,47	3,67	2,41	345 000	950	840
340	560	4	3 900 000	6 950 000	0,37	1,8	2,69	1,76	330 000	950	520
340	560	4	3 900 000	6 950 000	0,37	1,8	2,69	1,76	330 000	950	520
352,4	447,6	2,5	1 370 000	3 000 000	0,18	3,85	5,73	3,76	199 000	1 100	1 210
358	502	4	2 360 000	4 550 000	0,25	2,69	4	2,63	285 000	1 000	850
358	502	4	2 360 000	4 550 000	0,25	2,69	4	2,63	285 000	1 000	850
358	502	4	3 100 000	6 550 000	0,34	1,98	2,94	1,93	530 000	850	600
358	502	4	3 100 000	6 550 000	0,34	1,98	2,94	1,93	530 000	850	600
360	560	4	3 650 000	6 950 000	0,34	1,98	2,94	1,93	570 000	900	590
360	560	4	3 650 000	6 950 000	0,34	1,98	2,94	1,93	570 000	900	590
360	560	4	4 400 000	8 500 000	0,43	1,56	2,32	1,53	680 000	800	380
360	560	4	4 400 000	8 500 000	0,43	1,56	2,32	1,53	680 000	800	380
366	594	5	4 500 000	8 150 000	0,38	1,78	2,65	1,74	650 000	850	470
366	594	5	4 500 000	8 150 000	0,38	1,78	2,65	1,74	650 000	850	470
372,4	467,6	2,5	1 430 000	3 200 000	0,17	4,05	6,04	3,96	209 000	1 000	1 130
372,4	467,6	2,5	1 430 000	3 200 000	0,17	4,05	6,04	3,96	209 000	1 000	1 130
378	522	4	2 450 000	4 800 000	0,25	2,74	4,08	2,68	295 000	950	800
378	522	4	2 450 000	4 800 000	0,25	2,74	4,08	2,68	295 000	950	800
378	522	4	3 250 000	6 800 000	0,33	2,06	3,06	2,01	530 000	800	570
380	580	4	3 800 000	7 350 000	0,33	2,06	3,06	2,01	360 000	850	560
380	580	4	3 800 000	7 350 000	0,33	2,06	3,06	2,01	360 000	850	560
380	580	4	4 500 000	9 000 000	0,41	1,63	2,43	1,6	550 000	750	355
380	580	4	4 500 000	9 000 000	0,41	1,63	2,43	1,6	550 000	750	355
386	624	5	4 900 000	9 150 000	0,38	1,78	2,65	1,74	720 000	800	425
386	624	5	4 900 000	9 150 000	0,38	1,78	2,65	1,74	720 000	800	425

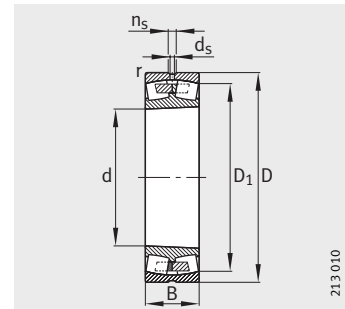


Spherical roller bearings

With cylindrical or tapered bore

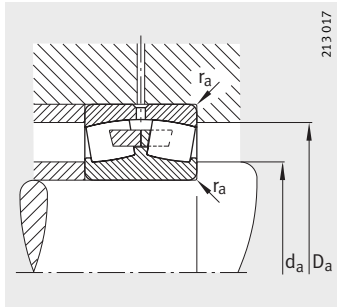


With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈ kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	d _s	n _s
23976-K-MB	66,3	380	520	106	4	477,6	9,5	17,7
23976-MB	68,5	380	520	106	4	477,6	9,5	17,7
23076-B-K-MB	113	380	560	135	5	505,6	12,5	23,5
23076-B-MB	117	380	560	135	5	505,6	12,5	23,5
24076-B-K30-MB	155	380	560	180	5	499	9,5	17,7
24076-B-MB	158	380	560	180	5	499	9,5	17,7
23176-K-MB	226	380	620	194	5	539,6	12,5	23,5
23176-MB	241	380	620	194	5	539,6	12,5	23,5
24176-B-K30	277	380	620	243	5	525,8	9,5	17,7
24176-B	279	380	620	243	5	525,8	9,5	17,7
23276-B-K-MB	367	380	680	240	6	576,4	12,5	23,5
23276-B-MB	390	380	680	240	6	576,4	12,5	23,5
23980-B-K-MB	68,2	400	540	106	4	499	9,5	17,7
23980-B-MB	72,9	400	540	106	4	499	9,5	17,7
23080-K-MB	143	400	600	148	5	540,5	12,5	23,5
23080-MB	151	400	600	148	5	540,5	12,5	23,5
24080-B-K30-MB	196	400	600	200	5	530,9	12,5	23,5
24080-B-MB	198	400	600	200	5	530,9	12,5	23,5
23180-B-K-MB	261	400	650	200	6	567,2	12,5	23,5
23180-B-MB	270	400	650	200	6	567,2	12,5	23,5
24180-B-K30	312	400	650	250	6	553,5	12,5	23,5
24180-B	326	400	650	250	6	553,5	12,5	23,5
23280-B-K-MB	442	400	720	256	6	609,8	12,5	23,5
23280-B-MB	469	400	720	256	6	609,8	12,5	23,5
23984-K-MB	78	420	560	106	4	519,5	9,5	17,7
23984-MB	80,5	420	560	106	4	519,5	9,5	17,7
23084-B-K-MB	155	420	620	150	5	560,7	12,5	23,5
23084-B-MB	162	420	620	150	5	560,7	12,5	23,5
24084-B-K30-MB	214	420	620	200	5	550,2	12,5	23,5
24084-B-MB	217	420	620	200	5	550,2	12,5	23,5
23184-K-MB	339	420	700	224	6	605,4	12,5	23,5
23184-MB	360	420	700	224	6	605,4	12,5	23,5
24184-B-K30	407	420	700	280	6	590,3	12,5	23,5
24184-B	442	420	700	280	6	590,3	12,5	23,5
23284-B-K-MB	537	420	760	272	7,5	642,2	12,5	23,5
23284-B-MB	558	420	760	272	7,5	642,2	12,5	23,5



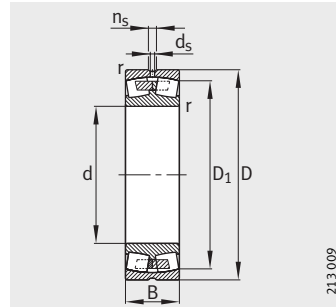
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N	e	Y_1	Y_2	Y_0			
394,6	505,4	3	1 760 000	4 000 000	0,19	3,58	5,33	3,5	265 000	950	1 090
394,6	505,4	3	1 760 000	4 000 000	0,19	3,58	5,33	3,5	265 000	950	1 090
398	542	4	2 550 000	5 300 000	0,24	2,84	4,23	2,78	430 000	900	740
398	542	4	2 550 000	5 300 000	0,24	2,84	4,23	2,78	430 000	900	740
398	542	4	3 350 000	7 200 000	0,31	2,15	3,2	2,1	580 000	750	530
398	542	4	3 350 000	7 200 000	0,31	2,15	3,2	2,1	580 000	750	530
400	600	4	4 050 000	8 150 000	0,32	2,12	3,15	2,07	385 000	800	510
400	600	4	4 050 000	8 150 000	0,32	2,12	3,15	2,07	385 000	800	510
400	600	4	4 650 000	9 500 000	0,39	1,71	2,54	1,67	770 000	700	330
400	600	4	4 650 000	9 500 000	0,39	1,71	2,54	1,67	770 000	700	330
406	654	5	5 300 000	9 800 000	0,37	1,8	2,69	1,76	780 000	750	400
406	654	5	5 300 000	9 800 000	0,37	1,8	2,69	1,76	780 000	750	400
414,6	525,4	3	1 830 000	4 150 000	0,18	3,71	5,52	3,63	275 000	900	1 030
414,6	525,4	3	1 830 000	4 150 000	0,18	3,71	5,52	3,63	275 000	900	1 030
418	582	4	3 050 000	6 200 000	0,24	2,79	4,15	2,73	365 000	800	680
418	582	4	3 050 000	6 200 000	0,24	2,79	4,15	2,73	365 000	800	680
418	582	4	3 900 000	8 500 000	0,33	2,06	3,06	2,01	670 000	700	485
418	582	4	3 900 000	8 500 000	0,33	2,06	3,06	2,01	670 000	700	485
426	624	5	4 250 000	8 500 000	0,31	2,15	3,2	2,1	670 000	750	490
426	624	5	4 250 000	8 500 000	0,31	2,15	3,2	2,1	670 000	750	490
426	624	5	5 100 000	10 400 000	0,39	1,72	2,56	1,68	790 000	670	305
426	624	5	5 100 000	10 400 000	0,39	1,72	2,56	1,68	790 000	670	305
426	694	5	5 700 000	10 800 000	0,38	1,78	2,65	1,74	820 000	700	375
426	694	5	5 700 000	10 800 000	0,38	1,78	2,65	1,74	820 000	700	375
434,6	545,4	3	1 900 000	4 500 000	0,18	3,85	5,73	3,76	300 000	850	970
434,6	545,4	3	1 900 000	4 500 000	0,18	3,85	5,73	3,76	300 000	850	970
438	602	4	3 150 000	6 550 000	0,24	2,84	4,23	2,78	395 000	800	650
438	602	4	3 150 000	6 550 000	0,24	2,84	4,23	2,78	395 000	800	650
438	602	4	4 000 000	8 800 000	0,32	2,13	3,17	2,08	710 000	670	460
438	602	4	4 000 000	8 800 000	0,32	2,13	3,17	2,08	710 000	670	460
446	674	5	5 000 000	9 650 000	0,33	2,03	3,02	1,98	465 000	700	460
446	674	5	5 000 000	9 650 000	0,33	2,03	3,02	1,98	465 000	700	460
446	674	5	6 200 000	12 700 000	0,4	1,67	2,49	1,63	980 000	630	270
446	674	5	6 200 000	12 700 000	0,4	1,67	2,49	1,63	980 000	630	270
452	728	6	6 550 000	12 200 000	0,38	1,77	2,64	1,73	930 000	670	345
452	728	6	6 550 000	12 200 000	0,38	1,77	2,64	1,73	930 000	670	345

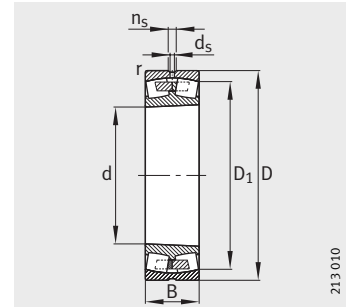


Spherical roller bearings

With cylindrical or tapered bore

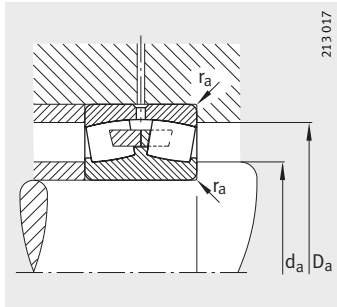


With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	d _s	n _s
23988-K-MB	98,3	440	600	118	4	552,8	12,5	23,5
23988-MB	101	440	600	118	4	552,8	12,5	23,5
23088-K-MB	177	440	650	157	6	586,8	12,5	23,5
23088-MB	190	440	650	157	6	586,8	12,5	23,5
24088-B-K30-MB	247	440	650	212	6	575,6	12,5	23,5
24088-B-MB	250	440	650	212	6	575,6	12,5	23,5
23188-K-MB	378	440	720	226	6	626	12,5	23,5
23188-MB	381	440	720	226	6	626	12,5	23,5
24188-B-K30	451	440	720	280	6	612,4	12,5	23,5
24188-B	453	440	720	280	6	612,4	12,5	23,5
23288-B-K-MB	586	440	790	280	7,5	669,3	12,5	23,5
23288-B-MB	615	440	790	280	7,5	669,3	12,5	23,5
23992-B-K-MB	103	460	620	118	4	573,3	12,5	23,5
23992-B-MB	111	460	620	118	4	573,3	12,5	23,5
23092-B-K-MB	204	460	680	163	6	612,2	12,5	23,5
23092-B-MB	208	460	680	163	6	612,2	12,5	23,5
24092-B-MB	282	460	680	218	6	603,3	12,5	23,5
23192-K-MB	420	460	760	240	7,5	661,4	12,5	23,5
23192-MB	447	460	760	240	7,5	661,4	12,5	23,5
24192-B-K30-MB	578	460	760	300	7,5	642,8	12,5	23,5
24192-B-MB	582	460	760	300	7,5	642,8	12,5	23,5
23292-K-MB	699	460	830	296	7,5	701,6	12,5	23,5
23292-MB	700	460	830	296	7,5	701,6	12,5	23,5
23996-B-K-MB	121	480	650	128	5	598,8	12,5	23,5
23996-B-MB	126	480	650	128	5	598,8	12,5	23,5
23096-K-MB	208	480	700	165	6	632,6	12,5	23,5
23096-MB	222	480	700	165	6	632,6	12,5	23,5
24096-B-K30-MB	289	480	700	218	6	625,4	12,5	23,5
24096-B-MB	291	480	700	218	6	625,4	12,5	23,5
23196-K-MB	470	480	790	248	7,5	688,3	12,5	23,5
23196-MB	508	480	790	248	7,5	688,3	12,5	23,5
24196-B-K30-MB	700	480	790	308	7,5	669,9	12,5	23,5
23296-K-MB	806	480	870	310	7,5	734,8	12,5	23,5
23296-MB	830	480	870	310	7,5	734,8	12,5	23,5
239/500-K-MB	124	500	670	128	5	619,3	12,5	23,5
239/500-MB	132	500	670	128	5	619,3	12,5	23,5



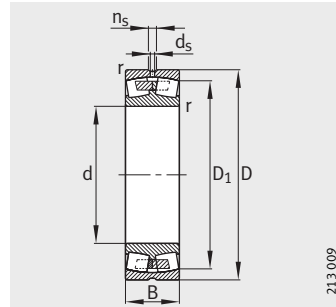
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_r N	stat. C_{0r} N	e	Y_1	Y_2	Y_0			
454,6	585,4	3	2 240 000	5 200 000	0,18	3,66	5,46	3,58	295 000	800	930
454,6	585,4	3	2 240 000	5 200 000	0,18	3,66	5,46	3,58	295 000	800	930
463	627	5	3 400 000	7 100 000	0,24	2,84	4,23	2,78	405 000	750	610
463	627	5	3 400 000	7 100 000	0,24	2,84	4,23	2,78	405 000	750	610
463	627	5	4 300 000	9 650 000	0,32	2,12	3,15	2,07	750 000	630	435
463	627	5	4 300 000	9 650 000	0,32	2,12	3,15	2,07	750 000	630	435
466	694	5	5 200 000	10 400 000	0,32	2,1	3,13	2,06	485 000	700	430
466	694	5	5 200 000	10 400 000	0,32	2,1	3,13	2,06	485 000	700	430
466	694	5	6 400 000	13 200 000	0,38	1,76	2,62	1,72	1 020 000	600	255
466	694	5	6 400 000	13 200 000	0,38	1,76	2,62	1,72	1 020 000	600	255
472	758	6	7 100 000	13 400 000	0,37	1,8	2,69	1,76	990 000	630	320
472	758	6	7 100 000	13 400 000	0,37	1,8	2,69	1,76	990 000	630	320
474,6	605,4	3	2 280 000	5 400 000	0,18	3,85	5,73	3,76	370 000	750	880
474,6	605,4	3	2 280 000	5 400 000	0,18	3,85	5,73	3,76	370 000	750	880
483	657	5	3 650 000	7 650 000	0,24	2,84	4,23	2,78	440 000	700	580
483	657	5	3 650 000	7 650 000	0,24	2,84	4,23	2,78	440 000	700	580
483	657	5	4 750 000	10 600 000	0,31	2,16	3,22	2,12	710 000	630	405
492	728	6	5 850 000	11 600 000	0,32	2,12	3,15	2,07	530 000	630	400
492	728	6	5 850 000	11 600 000	0,32	2,12	3,15	2,07	530 000	630	400
492	728	6	7 500 000	15 600 000	0,39	1,73	2,58	1,69	1 160 000	560	228
492	728	6	7 500 000	15 600 000	0,39	1,73	2,58	1,69	1 160 000	560	228
492	798	6	7 800 000	15 000 000	0,37	1,8	2,69	1,76	620 000	600	295
492	798	6	7 800 000	15 000 000	0,37	1,8	2,69	1,76	620 000	600	295
498	632	4	2 550 000	6 000 000	0,18	3,76	5,59	3,67	460 000	700	860
498	632	4	2 550 000	6 000 000	0,18	3,76	5,59	3,67	460 000	700	860
503	677	5	3 800 000	8 150 000	0,23	2,9	4,31	2,83	455 000	670	550
503	677	5	3 800 000	8 150 000	0,23	2,9	4,31	2,83	455 000	670	550
503	677	5	4 900 000	11 200 000	0,3	2,25	3,34	2,2	830 000	600	380
503	677	5	4 900 000	11 200 000	0,3	2,25	3,34	2,2	830 000	600	380
512	758	6	6 300 000	12 700 000	0,32	2,12	3,15	2,07	570 000	630	375
512	758	6	6 300 000	12 700 000	0,32	2,12	3,15	2,07	570 000	630	375
512	758	6	8 000 000	16 600 000	0,39	1,75	2,61	1,71	1 190 000	560	215
512	838	6	8 800 000	17 000 000	0,37	1,83	2,72	1,79	700 000	600	270
512	838	6	8 800 000	17 000 000	0,37	1,83	2,72	1,79	700 000	600	270
518	652	4	2 600 000	6 300 000	0,17	3,9	5,81	3,81	400 000	670	810
518	652	4	2 600 000	6 300 000	0,17	3,9	5,81	3,81	400 000	670	810

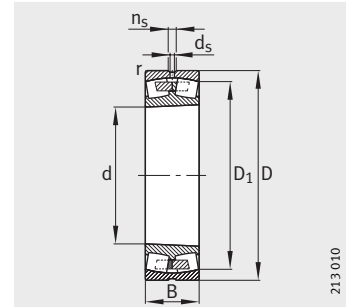


Spherical roller bearings

With cylindrical or tapered bore

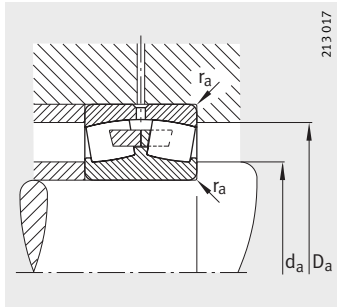


With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	d _s	n _s
230/500-B-K-MB	219	500	720	167	6	653,5	12,5	23,5
230/500-B-MB	233	500	720	167	6	653,5	12,5	23,5
240/500-B-MB	297	500	720	218	6	645,8	12,5	23,5
231/500-B-K-MB	556	500	830	264	7,5	720,9	12,5	23,5
231/500-B-MB	588	500	830	264	7,5	720,9	12,5	23,5
241/500-B-K30-MB	717	500	830	325	7,5	701,8	12,5	23,5
241/500-B-MB	725	500	830	325	7,5	701,8	12,5	23,5
239/530-K-MB	146	530	710	136	5	656,4	12,5	23,5
239/530-MB	160	530	710	136	5	656,4	12,5	23,5
230/530-K-MB	291	530	780	185	6	703,7	12,5	23,5
230/530-MB	321	530	780	185	6	703,7	12,5	23,5
240/530-B-MB	415	530	780	250	6	691,9	12,5	23,5
231/530-K-MB	643	530	870	272	7,5	756,3	12,5	23,5
241/530-B-K30-MB	845	530	870	335	7,5	739,1	12,5	23,5
239/560-B-K-MB	169	560	750	140	5	693,4	12,5	23,5
239/560-B-MB	181	560	750	140	5	693,4	12,5	23,5
230/560-B-K-MB	339	560	820	195	6	741,5	12,5	23,5
230/560-B-MB	358	560	820	195	6	741,5	12,5	23,5
240/560-B-MB	468	560	820	258	6	731,2	12,5	23,5
231/560-K-MB	737	560	920	280	7,5	800,2	12,5	23,5
231/560-MB	760	560	920	280	7,5	800,2	12,5	23,5
241/560-B-K30-MB	974	560	920	355	7,5	785	12,5	23,5
239/600-B-K-MB	210	600	800	150	5	740,5	12,5	23,5
239/600-B-MB	224	600	800	150	5	740,5	12,5	23,5
230/600-B-K-MB	388	600	870	200	6	791,9	12,5	23,5
230/600-B-MB	409	600	870	200	6	791,9	12,5	23,5
240/600-B-MB	540	600	870	272	6	773,3	12,5	23,5
231/600-K-MB	901	600	980	300	7,5	852,6	12,5	23,5
231/600-MB	929	600	980	300	7,5	852,6	12,5	23,5
241/600-B-K30-MB	1 170	600	980	375	7,5	833	12,5	23,5
241/600-B-MB	1 180	600	980	375	7,5	833	12,5	23,5
239/630-B-K-MB	283	630	850	165	6	784,5	12,5	23,5
239/630-B-MB	292	630	850	165	6	784,5	12,5	23,5
230/630-B-MB	496	630	920	212	7,5	834,3	12,5	23,5
230/630-B-K-MB	502	630	920	212	7,5	834,3	12,5	23,5
240/630-B-K30-MB	649	630	920	290	7,5	817,9	12,5	23,5



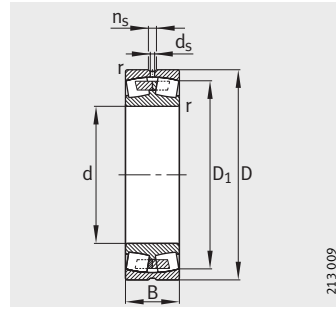
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	r _a	dyn. C _r	stat. C _{0r}	e	Y ₁	Y ₂	Y ₀	C _{ur}	n _G	n _B
min.	max.	max.	N	N					N	min ⁻¹	min ⁻¹
523	697	5	3 900 000	8 500 000	0,22	3,01	4,48	2,94	510 000	670	520
523	697	5	3 900 000	8 500 000	0,22	3,01	4,48	2,94	510 000	670	520
523	697	5	4 900 000	11 200 000	0,29	2,32	3,45	2,26	850 000	560	370
532	798	6	7 100 000	14 300 000	0,32	2,1	3,13	2,06	990 000	600	345
532	798	6	7 100 000	14 300 000	0,32	2,1	3,13	2,06	990 000	600	345
532	798	6	8 650 000	18 300 000	0,39	1,73	2,58	1,69	1 340 000	530	200
532	798	6	8 650 000	18 300 000	0,39	1,73	2,58	1,69	1 340 000	530	200
548	692	4	2 850 000	6 800 000	0,18	3,85	5,73	3,76	385 000	630	770
548	692	4	2 850 000	6 800 000	0,18	3,85	5,73	3,76	385 000	630	770
553	757	5	4 400 000	9 500 000	0,22	3,04	4,53	2,97	540 000	600	490
553	757	5	4 400 000	9 500 000	0,22	3,04	4,53	2,97	540 000	600	490
553	757	5	6 000 000	13 700 000	0,31	2,15	3,2	2,1	910 000	530	335
562	838	6	7 350 000	15 300 000	0,32	2,12	3,15	2,07	670 000	560	325
562	838	6	9 500 000	20 000 000	0,38	1,77	2,64	1,73	1 450 000	500	184
578	732	4	3 100 000	7 650 000	0,17	3,95	5,88	3,86	570 000	600	720
578	732	4	3 100 000	7 650 000	0,17	3,95	5,88	3,86	570 000	600	720
583	797	5	5 100 000	11 000 000	0,23	2,95	4,4	2,89	740 000	560	450
583	797	5	5 100 000	11 000 000	0,23	2,95	4,4	2,89	740 000	560	450
583	797	5	6 400 000	14 600 000	0,31	2,2	3,27	2,15	1 050 000	500	315
592	888	6	8 150 000	16 600 000	0,31	2,21	3,29	2,16	750 000	530	300
592	888	6	8 150 000	16 600 000	0,31	2,21	3,29	2,16	750 000	530	300
592	888	6	10 600 000	22 400 000	0,38	1,77	2,64	1,73	1 600 000	480	169
618	782	4	3 450 000	8 650 000	0,17	3,95	5,88	3,86	630 000	560	670
618	782	4	3 450 000	8 650 000	0,17	3,95	5,88	3,86	630 000	560	670
623	847	5	5 700 000	12 500 000	0,22	3,07	4,57	3	890 000	530	405
623	847	5	5 700 000	12 500 000	0,22	3,07	4,57	3	890 000	530	405
623	847	5	7 100 000	16 600 000	0,31	2,21	3,29	2,16	1 200 000	630	290
632	948	6	9 000 000	19 300 000	0,31	2,2	3,27	2,15	810 000	500	270
632	948	6	9 000 000	19 300 000	0,31	2,2	3,27	2,15	810 000	500	270
632	948	6	11 600 000	26 000 000	0,38	1,79	2,67	1,75	1 780 000	450	149
632	948	6	11 600 000	26 000 000	0,38	1,79	2,67	1,75	1 780 000	450	149
653	827	5	4 050 000	9 800 000	0,18	3,8	5,66	3,72	710 000	530	650
653	827	5	4 050 000	9 800 000	0,18	3,8	5,66	3,72	710 000	530	650
658	892	6	6 300 000	13 700 000	0,22	3,01	4,48	2,94	890 000	500	385
658	892	6	6 300 000	13 700 000	0,22	3,01	4,48	2,94	890 000	500	385
658	892	6	8 000 000	19 000 000	0,31	2,21	3,29	2,16	1 350 000	480	265

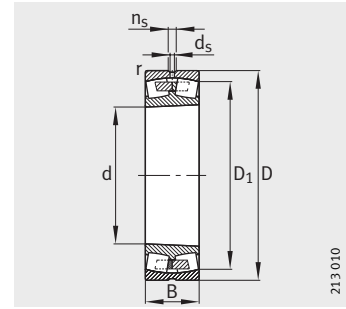


Spherical roller bearings

With cylindrical or tapered bore

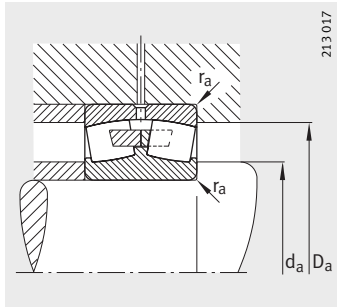


With central rib
Cylindrical bore



Tapered bore
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm								
Designation	Mass m ≈ kg	Dimensions						
		d	D	B	r min.	D ₁ ≈	d _s	n _s
240/630-B-MB	660	630	920	290	7,5	817,9	12,5	23,5
241/630-B-K30-MB	1 360	630	1 030	400	7,5	872,2	12,5	23,5
239/670-B-K-MB	310	670	900	170	6	831,5	12,5	23,5
239/670-B-MB	320	670	900	170	6	831,5	12,5	23,5
230/670-B-K-MB	590	670	980	230	7,5	888,7	12,5	23,5
230/670-B-MB	600	670	980	230	7,5	888,7	12,5	23,5
241/670-B-K30-MB	1 540	670	1 090	412	7,5	929,4	12,5	23,5
239/710-K-MB	336	710	950	180	6	877,5	12,5	23,5
239/710-MB	355	710	950	180	6	877,5	12,5	23,5
230/710-B-K-MB	650	710	1 030	236	7,5	938,8	12,5	23,5
230/710-B-MB	674	710	1 030	236	7,5	938,8	12,5	23,5
240/710-B-K30-MB	873	710	1 030	315	7,5	921,6	12,5	23,5
241/710-B-K30-MB	1 820	710	1 150	438	9,5	982	12,5	23,5
241/710-B-MB	1 830	710	1 150	438	9,5	982	12,5	23,5
239/750-K-MB	394	750	1 000	185	6	923,2	12,5	23,5
239/750-MB	426	750	1 000	185	6	923,2	12,5	23,5
230/750-K-MB	792	750	1 090	250	7,5	990,9	12,5	23,5
230/750-MB	806	750	1 090	250	7,5	990,9	12,5	23,5
240/750-B-K30-MB	1 070	750	1 090	335	7,5	976,2	12,5	23,5
239/800-B-K-MB	490	800	1 060	195	6	983,7	12,5	23,5
239/800-B-MB	506	800	1 060	195	6	983,7	12,5	23,5
230/800-K-MB	861	800	1 150	258	7,5	1 050,9	12,5	23,5
230/800-MB	899	800	1 150	258	7,5	1 050,9	12,5	23,5
240/800-B-MB	1 200	800	1 150	345	7,5	1 034,1	12,5	23,5
239/850-K-MB	554	850	1 120	200	6	1 039,9	12,5	23,5
239/850-MB	579	850	1 120	200	6	1 039,9	12,5	23,5
240/850-B-K30-MB	1 420	850	1 220	365	7,5	1 092,9	12,5	23,5
239/900-K-MB	641	900	1 180	206	6	1 098,8	12,5	23,5
239/900-MB	653	900	1 180	206	6	1 098,8	12,5	23,5



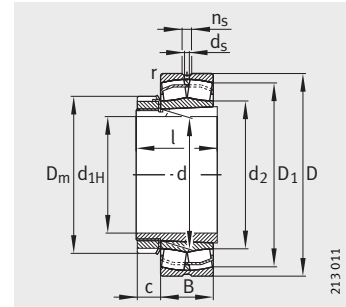
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	r _a	dyn. C _r	stat. C _{0r}	e	Y ₁	Y ₂	Y ₀	C _{ur}	n _G	n _B
min.	max.	max.	N	N					N	min ⁻¹	min ⁻¹
658	892	6	8 000 000	19 000 000	0,31	2,21	3,29	2,16	1 350 000	480	265
662	998	6	12 900 000	29 000 000	0,38	1,78	2,65	1,74	1 960 000	450	138
693	877	5	4 300 000	10 600 000	0,17	3,95	5,88	3,86	750 000	500	600
693	877	5	4 300 000	10 600 000	0,17	3,95	5,88	3,86	750 000	500	600
698	952	6	7 200 000	16 000 000	0,22	3,01	4,48	2,94	1 100 000	480	350
698	952	6	7 200 000	16 000 000	0,22	3,01	4,48	2,94	1 100 000	480	350
702	1058	6	14 000 000	31 500 000	0,37	1,83	2,72	1,79	2 120 000	430	127
733	927	5	4 800 000	12 000 000	0,18	3,85	5,73	3,76	720 000	480	570
733	927	5	4 800 000	12 000 000	0,18	3,85	5,73	3,76	720 000	480	570
738	1002	6	7 650 000	17 000 000	0,22	3,07	4,57	3	1 140 000	480	330
738	1002	6	7 650 000	17 000 000	0,22	3,07	4,57	3	1 140 000	480	330
738	1002	6	9 500 000	22 800 000	0,3	2,26	3,37	2,21	1 550 000	430	226
750	1110	8	15 600 000	35 500 000	0,38	1,79	2,67	1,75	2 340 000	400	116
750	1110	8	15 600 000	35 500 000	0,38	1,79	2,67	1,75	2 340 000	400	116
773	977	5	5 200 000	12 900 000	0,17	3,95	5,88	3,86	790 000	480	540
773	977	5	5 200 000	12 900 000	0,17	3,95	5,88	3,86	790 000	480	540
778	1062	6	8 500 000	19 000 000	0,22	3,01	4,48	2,94	1 010 000	450	305
778	1062	6	8 500 000	19 000 000	0,22	3,01	4,48	2,94	1 010 000	450	305
778	1062	6	10 800 000	26 000 000	0,3	2,26	3,37	2,21	1 730 000	400	206
823	1037	5	5 850 000	15 000 000	0,17	4,05	6,04	3,96	1 010 000	450	500
823	1037	5	5 850 000	15 000 000	0,17	4,05	6,04	3,96	1 010 000	450	500
828	1122	6	9 300 000	21 200 000	0,22	3,07	4,57	3	1 430 000	430	280
828	1122	6	9 300 000	21 200 000	0,22	3,07	4,57	3	1 430 000	430	280
828	1122	6	11 600 000	28 500 000	0,29	2,33	3,47	2,28	1 810 000	360	189
873	1097	5	6 300 000	16 300 000	0,16	4,11	6,12	4,02	960 000	430	465
873	1097	5	6 300 000	16 300 000	0,16	4,11	6,12	4,02	960 000	430	465
878	1192	6	12 900 000	32 000 000	0,29	2,33	3,47	2,28	2 060 000	480	173
923	1157	5	6 550 000	17 300 000	0,16	4,28	6,37	4,19	1 010 000	400	440
923	1157	5	6 550 000	17 300 000	0,16	4,28	6,37	4,19	1 010 000	400	440



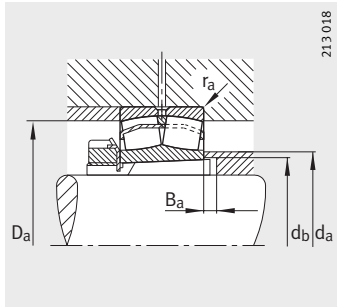
Spherical roller bearings

With adapter sleeve



E1 design

Dimension table · Dimensions in mm																
Designation			Mass m		Dimensions											
Bearing	X-life	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d _{1H}	d	D	B	r	D ₁	d ₂	d _s	n _s	D _m	l	c
					min.	≈	≈	≈	≈	≈	≈	≈	≈	≈	≈	≈
22205-E1-K	XL	H305	0,175	0,075	20	25	52	18	1	44,5	31,3	3,2	4,8	38	29	9
22206-E1-K	XL	H306	0,269	0,099	25	30	62	20	1	53,7	37,9	3,2	4,8	45	31	9
22207-E1-K	XL	H307	0,425	0,147	30	35	72	23	1,1	62,5	43,8	3,2	4,8	57	35	10
21307-E1-K-TVPB	XL	H307	0,496	0,147	30	35	80	21	1,5	66,6	47,4	—	—	57	35	10
22208-E1-K	XL	H308	0,517	0,185	35	40	80	23	1,1	70,4	48,6	3,2	4,8	58	36	11
21308-E1-K	XL	H308	0,702	0,185	35	40	90	23	1,5	80,8	59,7	3,2	4,8	58	36	11
22308-E1-K	XL	H2308	1,03	0,222	35	40	90	33	1,5	76	52,4	3,2	4,8	58	46	11
22209-E1-K	XL	H309	0,577	0,246	40	45	85	23	1,1	75,6	54,8	3,2	4,8	65	39	12
21309-E1-K	XL	H309	0,845	0,246	40	45	100	25	1,5	89,8	67,3	3,2	4,8	65	39	12
22309-E1-K	XL	H2309	1,36	0,283	40	45	100	36	1,5	84,7	58,9	3,2	6,5	65	50	12
22210-E1-K	XL	H310	0,608	0,301	45	50	90	23	1,1	80,8	59,7	3,2	4,8	70	42	13
21310-E1-K	XL	H310	1,28	0,301	45	50	110	27	2	89,8	67,3	3,2	4,8	70	42	13
22310-E1-K	XL	H2310	1,86	0,353	45	50	110	40	2	92,6	63	3,2	6,5	70	55	13
22211-E1-K	XL	H311	0,825	0,35	50	55	100	25	1,5	89,8	67,3	3,2	4,8	75	45	13
21311-E1-K	XL	H311	1,19	0,35	50	55	120	29	2	98,3	71,4	3,2	6,5	75	45	13
22311-E1-K	XL	H2311	2,22	0,426	50	55	120	43	2	101,4	68,9	3,2	6,5	75	59	13
22311-E1-K-T41A	XL	H2311	2,22	0,426	50	55	120	43	2	101,4	68,9	3,2	6,5	75	59	13
22212-E1-K	XL	H312	1,09	0,373	55	60	110	28	1,5	98,7	71,4	3,2	6,5	80	47	13
21312-E1-K	XL	H312	1,78	0,373	55	60	130	31	2,1	112,5	84,4	3,2	6,5	80	47	13
22312-E1-K	XL	H2312	2,83	0,464	55	60	130	46	2,1	110,1	74,8	3,2	6,5	80	62	13
22312-E1-K-T41A	XL	H2312	2,83	0,464	55	60	130	46	2,1	110,1	74,8	3,2	6,5	80	62	13
22213-E1-K	XL	H313	1,52	0,452	60	65	120	31	1,5	107,3	79,1	3,2	6,5	92	50	14
21313-E1-K	XL	H313	2,42	0,452	60	65	140	33	2,1	126,8	94,9	3,2	6,5	92	50	14
22313-E1-K	XL	H2313	3,49	0,553	60	65	140	48	2,1	119,3	83,2	4,8	9,5	92	65	14
22313-E1-K-T41A	XL	H2313	3,49	0,553	60	65	140	48	2,1	119,3	83,2	4,8	9,5	92	65	14
22214-E1-K	XL	H314	1,61	0,715	60	70	125	31	1,5	112,5	84,4	3,2	6,5	92	52	14
21314-E1-K	XL	H314	3	0,715	60	70	150	35	2,1	126,2	94,9	3,2	6,5	92	52	14
22314-E1-K	XL	H2314	4,12	0,895	60	70	150	51	2,1	128	86,7	4,8	9,5	98	68	14
22314-E1-K-T41A	XL	H2314	4,12	0,895	60	70	150	51	2,1	128	86,7	4,8	9,5	98	68	14
22215-E1-K	XL	H315	1,68	0,826	65	75	130	31	1,5	117,7	89,8	3,2	6,5	104	55	15
21315-E1-K	XL	H315	2,86	0,826	65	75	160	37	2,1	135,2	99,7	3,2	6,5	104	55	15
22315-E1-K	XL	H2315	5,06	1,05	65	75	160	55	2,1	136,3	92,4	4,8	9,5	98	73	15
22315-E1-K-T41A	XL	H2315	5,06	1,05	65	75	160	55	2,1	136,3	92,4	4,8	9,5	98	73	15



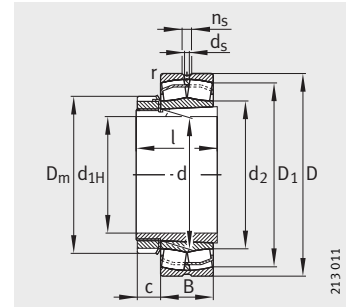
Mounting dimensions

Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	d _b	B _a	r _a	dyn. C _r	stat. C _{0r}	e	Y ₁	Y ₂	Y ₀	C _{ur}	n _G	n _B
max.	max.	min.	min.	max.	N	N					N	min ⁻¹	min ⁻¹
31	46,4	28	5	1	48 000	42 500	0,34	1,98	2,94	1,93	4 800	17 000	9 500
37	54,6	33	5	1	64 000	57 000	0,31	2,15	3,2	2,1	6 900	13 000	8 100
43	65	39	5	1	88 000	81 500	0,31	2,16	3,22	2,12	9 400	11 000	7 300
47	71	39	8	1,5	83 000	73 500	0,26	2,55	3,8	2,5	8 100	9 500	7 000
48	73	44	5	1	102 000	90 000	0,28	2,41	3,59	2,35	11 800	10 000	6 400
59	81	44	5	1,5	108 000	106 000	0,24	2,81	4,19	2,75	14 300	9 500	6 100
52	81	45	5	1,5	156 000	150 000	0,36	1,86	2,77	1,82	13 100	7 500	5 800
54	78	50	8	1	104 000	98 000	0,26	2,62	3,9	2,56	12 700	10 000	5 800
67	91	50	5	1,5	129 000	129 000	0,23	2,92	4,35	2,86	17 300	8 500	5 500
58	91	50	5	1,5	186 000	183 000	0,36	1,9	2,83	1,86	16 100	6 700	5 300
59	83	55	10	1	108 000	106 000	0,24	2,81	4,19	2,75	14 300	9 500	5 300
67	99	55	5	2	129 000	129 000	0,23	2,92	4,35	2,86	17 300	8 500	5 300
63	99	56	5	2	228 000	224 000	0,36	1,86	2,77	1,82	20 300	6 000	4 950
67	91	60	10	1,5	129 000	129 000	0,23	2,92	4,35	2,86	17 300	8 500	4 850
71	109	60	6	2	170 000	166 000	0,24	2,84	4,23	2,78	21 200	6 300	4 950
67	109	61	6	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 650
67	109	61	6	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 650
71	101	65	8	1,5	170 000	166 000	0,24	2,84	4,23	2,78	21 200	7 500	4 650
84	118	65	5	2,1	212 000	228 000	0,23	2,95	4,4	2,89	28 000	6 300	4 500
74	118	66	5	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 300
74	118	66	5	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 300
79	111	70	8	1,5	200 000	208 000	0,24	2,81	4,19	2,75	25 500	6 700	4 400
94	128	70	5	2,1	250 000	270 000	0,22	3,14	4,67	3,07	34 000	5 000	4 200
83	128	72	5	2,1	355 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 950
83	128	72	5	2,1	355 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 950
84	116	75	11	1,5	212 000	228 000	0,23	2,95	4,4	2,89	28 000	6 300	4 100
94	138	75	6	2,1	250 000	270 000	0,22	3,14	4,67	3,07	34 000	5 000	4 100
86	138	77	5	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 850
86	138	77	5	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 850
89	121	80	12	1,5	216 000	236 000	0,22	3,1	4,62	3,03	29 500	6 300	3 900
99	148	80	5	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	3 850
92	148	82	5	2,1	440 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 650
92	148	82	5	2,1	440 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 650



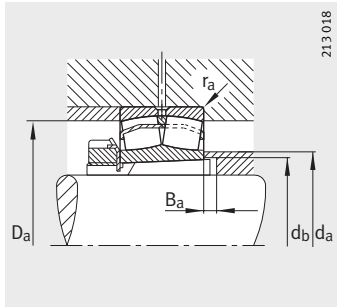
Spherical roller bearings

With adapter sleeve



E1 design

Dimension table (continued) · Dimensions in mm																
Designation			Mass m		Dimensions											
Bearing	X-life	Adapter sleeve	Bearing ≈ kg	Adapter sleeve ≈ kg	d _{1H}	d	D	B	r	D ₁	d ₂	d _s	n _s	D _m	l	c
					min.	≈	≈	≈	≈	≈	≈	≈	≈	≈	≈	
22216-E1-K	XL	H316	2,08	1,01	70	80	140	33	2	126,8	94,9	3,2	6,5	105	59	17
21316-E1-K	XL	H316	2,65	1,01	70	80	170	39	2,1	135,4	99,8	3,2	6,5	105	59	17
22316-E1-K	XL	H2316	6,05	1,27	70	80	170	58	2,1	145,1	98,3	4,8	9,5	105	78	17
22316-E1-K-T41A	XL	H2316	6,05	1,27	70	80	170	58	2,1	145,1	98,3	4,8	9,5	105	78	17
22217-E1-K	XL	H317	2,59	1,16	75	85	150	36	2	135,4	99,7	3,2	6,5	110	63	18
21317-E1-K	XL	H317	5,37	1,16	75	85	180	41	3	143,9	106,1	4,8	9,5	110	63	18
22317-E1-K	XL	H2317	7,06	1,44	75	85	180	60	3	154,2	104,4	4,8	9,5	110	82	18
22317-E1-K-T41A	XL	H2317	7,06	1,44	75	85	180	60	3	154,2	104,4	4,8	9,5	110	82	18
22218-E1-K	XL	H318	3,35	1,36	80	90	160	40	2	143,9	106,1	3,2	6,5	126	65	18
23218-E1A-K-M	XL	H2318	4,34	1,68	80	90	160	52,4	2	140	–	3,2	6,5	126	86	18
23218-E1-K-TVPB	XL	H2318	4,08	1,68	80	90	160	52,4	2	140	104,1	3,2	6,5	126	86	18
21318-E1-K	XL	H318	6,26	1,36	80	90	190	43	3	152,7	112,6	4,8	9,5	126	65	18
22318-E1-K	XL	H2318	8,33	1,68	80	90	190	64	3	162,5	110,2	6,3	12,2	126	86	18
22318-E1-K-T41A	XL	H2318	8,33	1,68	80	90	190	64	3	162,5	110,2	6,3	12,2	126	86	18
22219-E1-K	XL	H319	4,04	1,51	85	95	170	43	2,1	152,7	112,6	4,8	9,5	125	68	19
21319-E1-K-TVPB	XL	H319	6,53	1,51	85	95	200	45	3	169,4	124,3	4,8	9,5	125	68	19
22319-E1-K	XL	H2319	9,46	1,89	85	95	200	67	3	171,2	116	6,3	12,2	133	90	19
22319-E1-K-T41A	XL	H2319	9,46	1,89	85	95	200	67	3	171,2	116	6,3	12,2	133	90	19
23120-E1A-K-M	XL	H3120	4,23	1,78	90	100	165	52	2	146,3	–	3,2	6,5	130	76	20
23120-E1-K-TVPB	XL	H3120	4,06	1,78	90	100	165	52	2	146,3	113,9	3,2	6,5	130	76	20
22220-E1-K	XL	H320	4,91	1,69	90	100	180	46	2,1	161,4	119	4,8	9,5	130	71	20
23220-E1A-K-M	XL	H2320	6,33	2,17	90	100	180	60,3	2,1	156,7	–	4,8	9,5	142	97	20
23220-E1-K-TVPB	XL	H2320	6,13	2,17	90	100	180	60,3	2,1	156,7	116,7	4,8	9,5	142	97	20
21320-E1-K-TVPB	XL	H320	8,08	1,69	90	100	215	47	3	182	132	4,8	9,5	130	71	20
22320-E1-K	XL	H2320	13,1	2,17	90	100	215	73	3	184,7	130,2	6,3	12,2	142	97	20
22320-E1-K-T41A	XL	H2320	13,1	2,17	90	100	215	73	3	184,7	130,2	6,3	12,2	142	97	20
23122-E1A-K-M	XL	H3122	5,1	2,23	100	110	180	56	2	160	–	4,8	9,5	154	81	21
23122-E1-K-TVPB	XL	H3122	4,95	2,23	100	110	180	56	2	160	124,6	4,8	9,5	154	81	21
22222-E1-K	XL	H322	6,82	2,15	100	110	200	53	2,1	178,7	129,4	4,8	9,5	154	77	21
23222-E1A-K-M	XL	H2322	9,32	2,74	100	110	200	69,8	2,1	172,7	–	4,8	9,5	154	105	21
23222-E1-K-TVPB	XL	H2322	8,82	2,74	100	110	200	69,8	2,1	172,7	129,1	4,8	9,5	154	105	21
21322-E1-K-TVPB	XL	H322	10,9	2,15	100	110	240	50	3	202,5	146,4	6,3	12,2	154	77	21
22322-E1-K	XL	H2322	17,4	2,74	100	110	240	80	3	204,9	143,1	8	15	154	105	21
22322-E1-K-T41A	XL	H2322	17,4	2,74	100	110	240	80	3	204,9	143,1	8	15	154	105	21



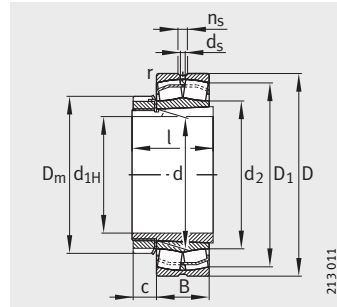
Mounting dimensions

Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	db	Ba	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	Cur	nG	nB
max.	max.	min.	min.	max.	N	N					N	min ⁻¹	min ⁻¹
94	129	85	12	2	250 000	270 000	0,22	3,14	4,67	3,07	34 000	5 600	3 700
99	158	85	5	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	3 750
98	158	88	5	2,1	500 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 450
98	158	88	5	2,1	500 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 450
99	139	91	12	2	305 000	325 000	0,22	3,04	4,53	2,97	38 500	5 300	3 550
106	166	91	6	2,5	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 550
104	166	94	6	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 300
104	166	94	6	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 300
106	149	96	10	2	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 500
107	149	100	18	2	440 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 700
104	149	100	18	2	440 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 700
112	176	96	6	2,5	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 450
110	176	100	6	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 100
110	176	100	6	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 100
112	158	102	9	2,1	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 400
124	186	102	7	2,5	430 000	455 000	0,22	3,04	4,53	2,97	47 500	4 000	3 300
115	186	105	7	2,5	670 000	695 000	0,33	2,03	3,02	1,98	60 000	3 000	2 900
115	186	105	7	2,5	670 000	695 000	0,33	2,03	3,02	1,98	60 000	3 000	2 900
115	154	107	7	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 800
113	154	107	7	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 800
118	168	108	8	2,1	430 000	475 000	0,24	2,84	4,23	2,78	52 000	4 300	3 300
120	168	110	19	2,1	550 000	655 000	0,31	2,15	3,2	2,1	60 000	3 600	2 470
116	168	110	19	2,1	550 000	655 000	0,31	2,15	3,2	2,1	60 000	3 600	2 470
131	201	108	7	2,5	490 000	530 000	0,22	3,14	4,67	3,07	61 000	3 600	3 100
129	201	110	7	2,5	815 000	915 000	0,33	2,03	3,02	1,98	75 000	3 000	2 550
129	201	110	7	2,5	815 000	915 000	0,33	2,03	3,02	1,98	75 000	3 000	2 550
127	169	117	7	2	530 000	680 000	0,28	2,41	3,59	2,35	61 000	4 000	2 600
124	169	117	7	2	530 000	680 000	0,28	2,39	3,56	2,34	61 000	4 000	2 600
129	188	118	6	2,1	550 000	600 000	0,25	2,71	4,04	2,65	62 000	4 000	3 100
130	188	121	17	2,1	710 000	865 000	0,33	2,06	3,06	2,01	72 000	3 000	2 150
129	188	121	17	2,1	710 000	865 000	0,33	2,06	3,06	2,01	72 000	3 000	2 150
146	226	118	9	2,5	600 000	640 000	0,21	3,24	4,82	3,16	69 000	3 000	2 750
135	226	121	7	2,5	950 000	1 060 000	0,33	2,07	3,09	2,03	91 000	2 600	2 250
135	226	121	7	2,5	950 000	1 060 000	0,33	2,07	3,09	2,03	91 000	2 600	2 250

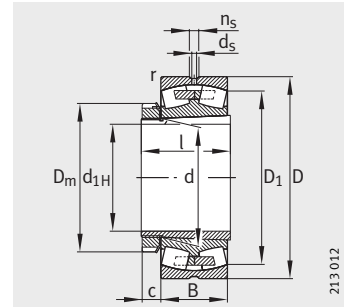


Spherical roller bearings

With adapter sleeve

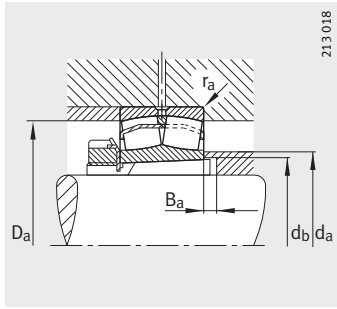


E1 design

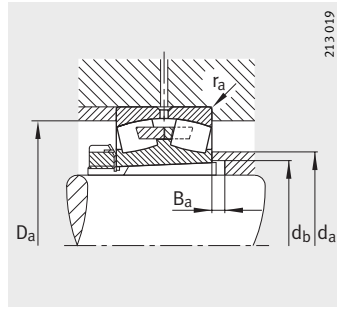


With central rib

Dimension table (continued) · Dimensions in mm																
Designation			Mass m		Dimensions											
Bearing	X-life	Adapter sleeve	Bearing	Adapter sleeve	d _{1H}	d	D	B	r	D ₁	d ₂	d _s	n _s	D _m	l	c
			≈kg	≈kg					min.	≈	≈			≈		
23024-E1A-K-M	XL	H3024	4,09	1,95	110	120	180	46	2	164,7	–	3,2	6,5	145	72	22
23024-E1-K-TVPB	XL	H3024	3,67	1,95	110	120	180	46	2	164,7	133	3,2	6,5	145	72	22
23124-E1A-K-M	XL	H3124	7,57	2,61	110	120	200	62	2	177,4	–	4,8	9,5	155	88	22
23124-E1-K-TVPB	XL	H3124	7,06	2,61	110	120	200	62	2	177,4	136,2	4,8	9,5	155	88	22
22224-E1-K	XL	H3124	8,84	2,61	110	120	215	58	2,1	192	141,8	6,3	12,2	155	88	22
23224-E1A-K-M	XL	H2324	11,4	3,18	110	120	215	76	2,1	185,5	–	4,8	9,5	155	112	22
23224-E1-K-TVPB	XL	H2324	11,1	3,18	110	120	215	76	2,1	185,5	139	4,8	9,5	155	112	22
22324-E1-K	XL	H2324	22,1	3,18	110	120	260	86	3	222,4	150,7	8	15	155	112	22
22324-E1-K-T41A	XL	H2324	22,1	3,18	110	120	260	86	3	222,4	150,7	8	15	155	112	22
23026-E1A-K-M	XL	H3026	5,7	2,9	115	130	200	52	2	182,3	–	4,8	9,5	155	80	23
23026-E1-K-TVPB	XL	H3026	5,42	2,9	115	130	200	52	2	182,3	145,9	4,8	9,5	155	80	23
23126-E1A-K-M	XL	H3126	8,1	3,63	115	130	210	64	2	187,3	–	4,8	9,5	175	92	23
23126-E1-K-TVPB	XL	H3126	7,82	3,63	115	130	210	64	2	187,3	146	4,8	9,5	175	92	23
22226-E1-K	XL	H3126	10,9	3,63	115	130	230	64	3	205	151,7	6,3	12,2	175	92	23
23226-E1A-K-M	XL	H2326	13,6	4,61	115	130	230	80	3	199,3	–	4,8	9,5	165	121	23
23226-E1-K-TVPB	XL	H2326	12,6	4,61	115	130	230	80	3	199,3	150	4,8	9,5	165	121	23
22326-E1-K	XL	H2326	27,4	4,61	115	130	280	93	4	239,5	162,2	9,5	17,7	165	121	23
22326-E1-K-T41A	XL	H2326	27,4	4,61	115	130	280	93	4	239,5	162,2	9,5	17,7	165	121	23
23028-E1A-K-M	XL	H3028	6	3,25	125	140	210	53	2	192,3	–	4,8	9,5	165	82	24
23028-E1-K-TVPB	XL	H3028	5,81	3,25	125	140	210	53	2	192,3	155,4	4,8	9,5	165	82	24
23128-E1A-K-M	XL	H3128	7,78	4,33	125	140	225	68	2,1	201	–	4,8	9,5	180	97	24
23128-E1-K-TVPB	XL	H3128	9,46	4,33	125	140	225	68	2,1	201	157,1	4,8	9,5	180	97	24
22228-E1-K	XL	H3128	13,7	4,33	125	140	250	68	3	223,4	164,9	6,3	12,2	180	97	24
23228-E1A-K-M	XL	H2328	17,6	5,6	125	140	250	88	3	216	–	6,3	12,2	180	131	24
23228-E1-K-TVPB	XL	H2328	17,1	5,6	125	140	250	88	3	216	162	6,3	12,2	180	131	24
22328-E1-K	XL	H2328	34,4	5,6	125	140	300	102	4	255,7	173,5	9,5	17,7	180	131	24
22328-E1-K-T41A	XL	H2328	34,4	5,6	125	140	300	102	4	255,7	173,5	9,5	17,7	180	131	24
23030-E1A-K-M	XL	H3030	7,33	3,98	135	150	225	56	2,1	206,3	–	4,8	9,5	180	87	26
23030-E1-K-TVPB	XL	H3030	7,29	3,98	135	150	225	56	2,1	206,3	166,6	4,8	9,5	180	87	26
23130-E1A-K-M	XL	H3130	15,8	5,49	135	150	250	80	2,1	220,8	–	6,3	12,2	195	111	26
23130-E1-K-TVPB	XL	H3130	14,5	5,49	135	150	250	80	2,1	220,8	170,1	6,3	12,2	195	111	26
22230-E1-K	XL	H3130	17,8	5,49	135	150	270	73	3	240,8	177,9	8	15	195	111	26
23230-E1A-K-M	XL	H2330	22,9	6,71	135	150	270	96	3	232,6	–	6,3	12,2	195	139	26
23230-E1-K-TVPB	XL	H2330	22,3	6,71	135	150	270	96	3	232,6	174	6,3	12,2	195	139	26
22330-E1-K	XL	H2330	41,2	6,71	135	150	320	108	4	273,2	185,3	9,5	17,7	195	139	26
22330-E1-K-T41A	XL	H2330	41,2	6,71	135	150	320	108	4	273,2	185,3	9,5	17,7	195	139	26



Mounting dimensions
E1 design



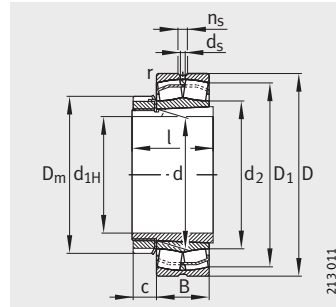
Mounting dimensions
With central rib

Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	db	Ba	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	C _{ur}	n _G	n _B
max.	max.	min.	min.	max.	N	N					N	min ⁻¹	min ⁻¹
133	171,2	127	7	2	430 000	585 000	0,22	3,04	4,53	2,97	58 000	4 300	2 850
133	171,2	127	7	2	430 000	585 000	0,22	3,04	4,53	2,97	58 000	4 300	2 850
139	189	128	7	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 330
136	189	128	7	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 330
141	203	128	11	2,1	640 000	735 000	0,25	2,71	4,04	2,65	71 000	3 400	2 800
141	203	131	17	2	815 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 940
139	203	131	17	2	815 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 940
150	246	131	7	2,5	1 080 000	1 160 000	0,33	2,06	3,06	2,01	103 000	2 600	2 080
150	246	131	7	2,5	1 080 000	1 160 000	0,33	2,06	3,06	2,01	103 000	2 600	2 080
146	191,2	137	8	2	540 000	735 000	0,23	2,95	4,4	2,89	70 000	3 600	2 650
145	191,2	137	8	2	540 000	735 000	0,23	2,95	4,4	2,89	70 000	3 600	2 650
149	199	138	8	2	680 000	900 000	0,28	2,45	3,64	2,39	79 000	3 000	2 130
145	199	138	8	2	680 000	900 000	0,28	2,45	3,64	2,39	79 000	3 000	2 130
151	216	138	8	2,5	750 000	900 000	0,26	2,62	3,9	2,56	79 000	3 000	2 550
152	216	142	21	2,5	900 000	1 140 000	0,33	2,07	3,09	2,03	89 000	2 600	1 780
150	216	142	21	2,5	900 000	1 140 000	0,33	2,07	3,09	2,03	89 000	2 600	1 780
162	263	142	8	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 870
162	263	142	8	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 870
155	201,2	147	8	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 440
155	201,2	147	8	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 440
159	213	149	8	2,1	765 000	1 020 000	0,27	2,49	3,71	2,43	88 000	2 800	1 960
157	213	149	8	2,1	765 000	1 020 000	0,27	2,49	3,71	2,43	88 000	2 800	1 960
164	236	149	8	2,5	880 000	1 040 000	0,25	2,67	3,97	2,61	97 000	2 400	2 320
162	236	152	22	2,5	1 080 000	1 400 000	0,33	2,04	3,04	2	112 000	2 400	1 580
162	236	152	22	2,5	1 080 000	1 400 000	0,33	2,04	3,04	2	112 000	2 400	1 580
169	283	152	8	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 700
169	283	152	8	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 700
166	214,8	158	8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 260
166	214,8	158	8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 260
170	238	160	8	2,1	1 000 000	1 320 000	0,29	2,32	3,45	2,26	143 000	2 600	1 760
170	238	160	8	2,1	1 000 000	1 320 000	0,29	2,32	3,45	2,26	143 000	2 600	1 760
177	256	160	15	2,5	1 000 000	1 220 000	0,25	2,69	4	2,63	111 000	2 600	2 110
174	256	163	20	2,5	1 270 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 420
174	256	163	20	2,5	1 270 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 420
185	303	163	8	3	1 630 000	1 860 000	0,33	2,02	3	1,97	147 000	2 000	1 550
185	303	163	8	3	1 630 000	1 860 000	0,33	2,02	3	1,97	147 000	2 000	1 550

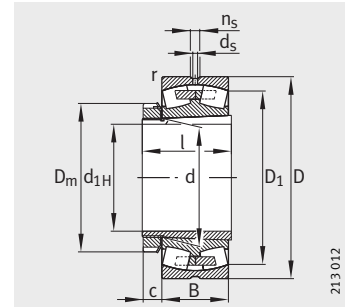


Spherical roller bearings

With adapter sleeve

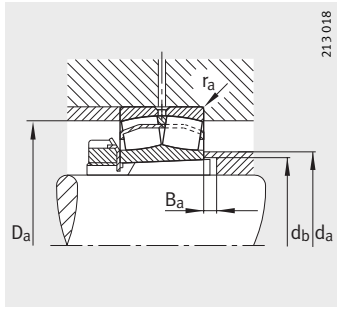


E1 design

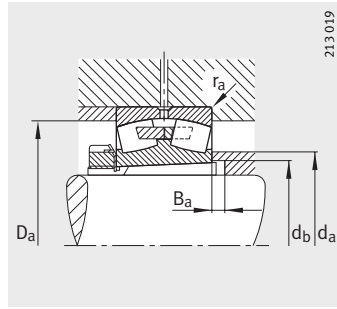


With central rib

Dimension table (continued) · Dimensions in mm																
Designation			Mass m		Dimensions											
Bearing	X-life	Adapter sleeve	Bearing	Adapter sleeve	d _{1H}	d	D	B	r	D ₁	d ₂	d _s	n _s	D _m	l	c
			≈kg	≈kg	min.	≈	≈	≈	≈	≈	≈	≈	≈	≈		
23032-E1A-K-M	XL	H3032	9,42	5,33	140	160	240	60	2,1	219,9	–	6,3	12,2	190	93	28
23032-E1-K-TVPB	XL	H3032	8,67	5,33	140	160	240	60	2,1	219,9	177	6,3	12,2	190	93	28
23132-E1A-K-M	XL	H3132	18,6	7,57	140	160	270	86	2,1	238,3	–	8	15	210	119	28
23132-E1-K-TVPB	XL	H3132	18,4	7,57	140	160	270	86	2,1	238,3	183,2	8	15	210	119	28
22232-E1-K	XL	H3132	22,4	7,57	140	160	290	80	3	258,2	190,9	8	15	210	119	28
23232-E1A-K-M	XL	H2332	28,5	9,1	140	160	290	104	3	249,3	–	8	15	210	147	28
23232-E1-K-TVPB	XL	H2332	27,7	9,1	140	160	290	104	3	249,3	186,7	8	15	210	147	28
22332-K-MB	–	H2332	50,1	9,1	140	160	340	114	4	288,3	–	9,5	17,7	210	147	28
23034-E1A-K-M	XL	H3034	12	6,13	150	170	260	67	2,1	237,2	–	6,3	12,2	211	101	29
23034-E1-K-TVPB	XL	H3034	11,9	6,13	150	170	260	67	2,1	237,2	189,8	6,3	12,2	211	101	29
23134-E1A-K-M	XL	H3134	19,5	8,35	150	170	280	88	2,1	248,1	–	8	15	220	122	29
23134-E1-K-TVPB	XL	H3134	19,9	8,35	150	170	280	88	2,1	248,1	193,4	8	15	220	122	29
22234-E1-K	XL	H3134	27,1	8,35	150	170	310	86	4	275,4	199,8	9,5	17,7	220	122	29
23234-E1A-K-M	XL	H2334	34,6	10,2	150	170	310	110	4	267,4	–	8	15	232	154	29
23234-E1-K-TVPB	XL	H2334	33,1	10,2	150	170	310	110	4	267,4	199,8	8	15	232	154	29
22334-K-MB	–	H2334	56,9	10,2	150	170	360	120	4	304,2	–	9,5	17,7	232	154	29
23936-S-K-MB	–	H3936	7,76	6,25	160	180	250	52	2	230,9	–	4,8	9,5	210	87	30
23036-E1A-K-M	XL	H3036	16	7,01	160	180	280	74	2,1	254,3	–	8	15	221	109	30
23036-E1-K-TVPB	XL	H3036	15,6	7,01	160	180	280	74	2,1	254,3	201,8	8	15	221	109	30
23136-E1A-K-M	XL	H3136	25,5	9,46	160	180	300	96	3	264,8	–	8	15	230	131	30
23136-E1-K-TVPB	XL	H3136	25,9	9,46	160	180	300	96	3	264,8	204,1	8	15	230	131	30
22236-E1-K	XL	H3136	28,5	9,46	160	180	320	86	4	285,9	211,3	9,5	17,7	230	131	30
23236-E1A-K-M	XL	H2336	37	11,4	160	180	320	112	4	277,3	–	8	15	230	161	30
23236-E1-K-TVPB	XL	H2336	36	11,4	160	180	320	112	4	277,3	210,6	8	15	230	161	30
22336-K-MB	–	H2336	66,7	11,4	160	180	380	126	4	323,4	–	12,5	23,5	230	161	30
23038-E1A-K-M	XL	H3038	17,7	7,66	170	190	290	75	2,1	264,5	–	8	15	220	112	31
23038-E1-K-TVPB	XL	H3038	16,3	7,66	170	190	290	75	2,1	264,5	211,9	8	15	220	112	31
23138-E1A-K-M	XL	H3138	32,4	10,8	170	190	320	104	3	281,6	–	8	15	252	141	31
23138-E1-K-TVPB	XL	H3138	30,3	10,8	170	190	320	104	3	281,6	217	8	15	252	141	31
22238-K-MB	–	H3138	36,2	10,8	170	190	340	92	4	296	–	9,5	17,7	252	141	31
23238-B-K-MB	–	H2338	46	12,7	170	190	340	120	4	291,2	–	9,5	17,7	240	169	31
22338-K-MB	–	H2338	77,3	12,7	170	190	400	132	5	338,2	–	12,5	23,5	240	169	31



Mounting dimensions
E1 design



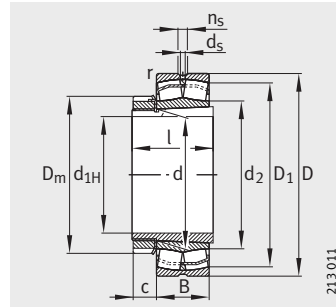
Mounting dimensions
With central rib

Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	db	Ba	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	C _{ur}	n _G	n _B
max.	max.	min.	min.	max.	N	N					N	min ⁻¹	min ⁻¹
177	229,8	168	8	2,1	720 000	1 020 000	0,22	3,1	4,62	3,03	94 000	2 800	2 090
177	229,8	168	8	2,1	720 000	1 020 000	0,22	3,1	4,62	3,03	94 000	2 800	2 090
183	258	170	8	2,1	1 160 000	1 560 000	0,29	2,32	3,45	2,26	164 000	2 400	1 590
183	258	170	8	2,1	1 160 000	1 560 000	0,29	2,32	3,45	2,26	164 000	2 400	1 590
190	276	170	14	2,5	1 140 000	1 400 000	0,26	2,64	3,93	2,58	125 000	2 600	1 960
186	276	174	18	2,5	1 460 000	1 900 000	0,34	2	2,98	1,96	146 000	2 200	1 310
186	276	174	18	2,5	1 460 000	1 900 000	0,34	2	2,98	1,96	146 000	2 200	1 310
191	323	174	8	3	1 430 000	1 900 000	0,37	1,8	2,69	1,76	121 000	2 000	1 490
190	249,8	179	8	2,1	880 000	1 220 000	0,23	2,98	4,44	2,92	146 000	2 600	1 940
189	249,8	179	8	2,1	880 000	1 220 000	0,23	2,98	4,44	2,92	146 000	2 600	1 940
193	268	180	8	2,1	1 220 000	1 700 000	0,28	2,37	3,53	2,32	174 000	2 400	1 480
193	268	180	8	2,1	1 220 000	1 700 000	0,28	2,37	3,53	2,32	174 000	2 400	1 480
199	293	180	10	3	1 320 000	1 560 000	0,26	2,6	3,87	2,54	139 000	2 400	1 830
199	293	185	18	3	1 630 000	2 160 000	0,33	2,03	3,02	1,98	163 000	2 000	1 190
199	293	185	18	3	1 630 000	2 160 000	0,33	2,03	3,02	1,98	163 000	2 000	1 190
204	343	185	8	3	1 600 000	2 120 000	0,37	1,83	2,72	1,79	134 000	1 800	1 380
198	241,2	188	8	2	440 000	850 000	0,2	3,42	5,09	3,34	57 000	2 200	2 320
201	269,8	189	8	2,1	1 040 000	1 460 000	0,23	2,9	4,31	2,83	170 000	2 600	1 790
201	269,8	189	8	2,1	1 040 000	1 460 000	0,23	2,9	4,31	2,83	170 000	2 600	1 790
204	286	180	8	2,5	1 430 000	1 960 000	0,29	2,32	3,45	2,26	196 000	2 200	1 370
204	286	191	8	2,5	1 430 000	1 960 000	0,29	2,32	3,45	2,26	196 000	2 200	1 370
211	303	191	18	3	1 370 000	1 660 000	0,25	2,71	4,04	2,65	148 000	2 400	1 720
210	303	195	22	3	1 700 000	2 360 000	0,33	2,07	3,09	2,03	173 000	2 000	1 110
210	303	195	22	3	1 700 000	2 360 000	0,33	2,07	3,09	2,03	173 000	2 000	1 110
217	363	195	8	3	1 760 000	2 360 000	0,37	1,83	2,72	1,79	209 000	1 500	1 280
211	279,8	199	9	2,1	1 080 000	1 560 000	0,23	2,98	4,44	2,92	180 000	2 400	1 690
211	279,8	199	9	2,1	1 080 000	1 560 000	0,23	2,98	4,44	2,92	180 000	2 400	1 690
216	306	202	9	2,5	1 600 000	2 240 000	0,3	2,28	3,39	2,23	218 000	2 000	1 270
216	306	202	9	2,5	1 600 000	2 240 000	0,3	2,28	3,39	2,23	218 000	2 000	1 270
223	323	202	21	3	1 200 000	1 830 000	0,28	2,39	3,56	2,34	122 000	1 800	1 620
222	323	206	21	3	1 560 000	2 600 000	0,36	1,86	2,77	1,82	156 000	1 700	1 040
228	380	206	9	4	1 860 000	2 500 000	0,37	1,83	2,72	1,79	213 000	1 500	1 220

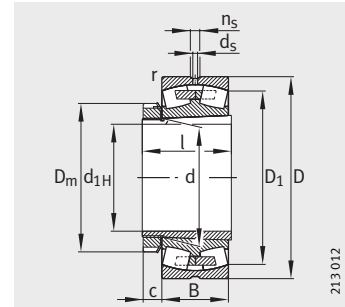


Spherical roller bearings

With adapter sleeve



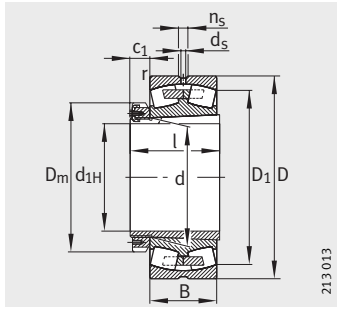
E1 design



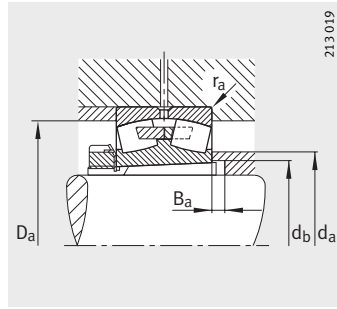
With central rib

Dimension table (continued) · Dimensions in mm

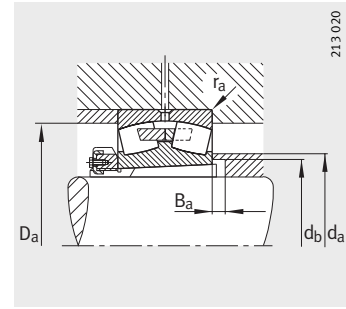
Designation			Mass m		Dimensions										
Bearing	X-life	Adapter sleeve	Bearing	Adapter sleeve	d _{1H}	d	D	B	r	D ₁	d ₂	d _s	n _s	D _m	l
			≈ kg	≈ kg	min.	≈	≈	≈	≈	≈	≈	≈	≈	≈	
23940-S-K-MB	-	H3940	11,5	7,82	180	200	280	60	2,1	256,9	-	6,3	12,2	240	98
23040-E1A-K-M	XL	H3040	21,4	9,22	180	200	310	82	2,1	281,6	-	8	15	240	120
23040-E1-K-TVPB	XL	H3040	20,8	9,22	180	200	310	82	2,1	281,6	223,4	8	15	240	120
23140-B-K-MB	-	H3140	41,7	12,1	180	200	340	112	3	293,3	-	9,5	17,7	250	150
22240-B-K-MB	-	H3140	42,3	12,1	180	200	360	98	4	312	-	9,5	17,7	250	150
23240-B-K-MB	-	H2340	55,8	14	180	200	360	128	4	307,5	-	9,5	17,7	250	176
22340-K-MB	-	H2340	89,5	14	180	200	420	138	5	357,4	-	12,5	23,5	250	176
23944-S-K-MB	-	H3944	12,3	8,27	200	220	300	60	2,1	277,4	-	6,3	12,2	260	96
23044-K-MB	-	H3044X	29,9	10,4	200	220	340	90	3	301,8	-	8	15	260	126
23144-B-K-MB	-	H3144X	52	15,4	200	220	370	120	4	319,2	-	9,5	17,7	292	161
22244-B-K-MB	-	H3144X	59,6	15,4	200	220	400	108	4	348,7	-	9,5	17,7	292	161
23244-K-MB	-	H2344X	79	17,5	200	220	400	144	4	337,6	-	9,5	17,7	280	186
22344-K-MB	-	H2344X	114	17,5	200	220	460	145	5	391,2	-	12,5	23,5	280	186
23948-K-MB	-	H3948	13,4	10,9	220	240	320	60	2,1	297,8	-	6,3	12,2	290	101
23048-K-MB	-	H3048	31,9	13,4	220	240	360	92	3	322,1	-	8	15	290	133
23148-B-K-MB	-	H3148X	65,3	18,1	220	240	400	128	4	346,2	-	9,5	17,7	312	172
22248-B-K-MB	-	H3148X	81,2	18,1	220	240	440	120	4	380,7	-	12,5	23,5	312	172
23248-B-K-MB	-	H2348X	105	20,6	220	240	440	160	4	371	-	12,5	23,5	300	199
22348-K-MB	-	H2348X	145	20,6	220	240	500	155	5	420	-	12,5	23,5	300	199
23952-K-MB	-	H3952	22,4	13,1	240	260	360	75	2,1	330,5	-	8	15	310	116
23052-K-MB	-	H3052X	46,2	15,6	240	260	400	104	4	357,2	-	9,5	17,7	310	145
23152-K-MB	-	H3152X	89,6	22,9	240	260	440	144	4	379,7	-	9,5	17,7	330	190
22252-B-K-MB	-	H3152X	106	22,9	240	260	480	130	5	415,3	-	12,5	23,5	330	190
23252-B-K-MB	-	H2352X	136	25,1	240	260	480	174	5	405,4	-	12,5	23,5	330	211
22352-K-MB	-	H2352X	177	25,1	240	260	540	165	6	452,1	-	12,5	23,5	330	211
23956-K-MB	-	H3956	24,7	15	260	280	380	75	2,1	350	-	8	15	330	121
23056-B-K-MB	-	H3056	50,3	18	260	280	420	106	4	376,5	-	9,5	17,7	330	152
23156-B-K-MB	-	H3156X	96,4	25,4	260	280	460	146	5	401,4	-	9,5	17,7	362	195
22256-B-K-MB	-	H3156X	110	25,4	260	280	500	130	5	435,2	-	12,5	23,5	362	195
23256-K-MB	-	H2356X	153	28,8	260	280	500	176	5	426,3	-	12,5	23,5	350	224
22356-K-MB	-	H2356X	224	28,8	260	280	580	175	6	489,3	-	12,5	23,5	350	224
23960-B-K-MB	-	H3960	39,1	20,3	280	300	420	90	3	384,6	-	9,5	17,7	360	140
23060-K-MB	-	H3060	72,2	23,2	280	300	460	118	4	412,6	-	9,5	17,7	360	168
23160-B-K-MB	-	H3160	123	29,9	280	300	500	160	5	434,7	-	9,5	17,7	380	208
22260-K-MB	-	H3160	136	29,9	280	300	540	140	5	468,8	-	12,5	23,5	380	208
23260-K-MB	-	H3260	192	34,1	280	300	540	192	5	458,7	-	12,5	23,5	380	240



With central rib
Locknut with retaining bracket



Mounting dimensions
With central rib



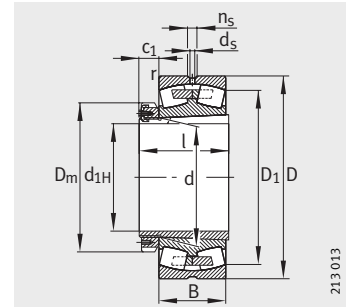
With central rib
Locknut with retaining bracket

		Mounting dimensions						Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
c	c ₁	d _a	D _a	d _b	B _a	r _a	dyn. C _r	stat. C _{0r}	e	Y ₁	Y ₂	Y ₀	C _{ur}	n _G	n _B	
≈	≈	max.	max.	min.	min.	max.	N	N					N	min ⁻¹	min ⁻¹	
32	–	220	269,8	210	9	2,1	550 000	1 080 000	0,2	3,42	5,09	3,34	71 000	2 000	2 110	
32	–	223	299,8	210	10	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 580	
32	–	223	299,8	210	10	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 580	
32	–	231	326	212	10	2,5	1 320 000	2 280 000	0,35	1,95	2,9	1,91	131 000	1 700	1 240	
32	–	234	343	212	24	3	1 320 000	2 000 000	0,29	2,35	3,5	2,3	123 000	1 700	1 530	
32	–	237	343	216	20	3	1 660 000	2 750 000	0,37	1,83	2,72	1,79	163 000	1 500	1 000	
32	–	240	400	216	10	4	2 080 000	2 800 000	0,36	1,87	2,79	1,83	189 000	1 400	1 130	
–	40	241	289,8	230	9	2,1	600 000	1 250 000	0,18	3,76	5,59	3,67	72 000	1 800	1 880	
–	40	247	327,6	231	12	2,5	1 060 000	1 900 000	0,26	2,55	3,8	2,5	132 000	1 700	1 470	
35	–	253	353	233	10	3	1 630 000	2 900 000	0,33	2,03	3,02	1,98	165 000	1 400	1 070	
35	–	258	383	233	22	3	1 630 000	2 450 000	0,29	2,35	3,5	2,3	153 000	1 400	1 340	
35	–	259	383	236	11	3	2 040 000	3 450 000	0,37	1,83	2,72	1,79	181 000	1 400	860	
35	–	272	440	236	10	4	2 320 000	3 350 000	0,35	1,95	2,9	1,91	217 000	1 300	980	
–	45	261	309,8	250	11	2,1	640 000	1 370 000	0,17	4,05	6,04	3,96	93 000	1 500	1 700	
–	45	268	347,6	251	11	2,5	1 160 000	2 200 000	0,25	2,74	4,08	2,68	130 000	1 400	1 320	
37	–	276	383	254	11	3	1 860 000	3 250 000	0,33	2,06	3,06	2,01	177 000	1 300	970	
37	–	283	423	254	19	3	1 960 000	3 050 000	0,29	2,35	3,5	2,3	184 000	1 300	1 190	
37	–	284	423	257	6	3	2 450 000	4 250 000	0,37	1,8	2,69	1,76	231 000	1 300	750	
37	–	296	480	257	11	4	2 650 000	3 900 000	0,35	1,95	2,9	1,91	249 000	1 500	870	
–	45	285	349,8	270	11	2,1	930 000	1 930 000	0,19	3,54	5,27	3,46	108 000	1 400	1 610	
–	45	291	385,4	272	13	3	1 500 000	2 800 000	0,26	2,64	3,93	2,58	154 000	1 300	1 170	
39	–	302	423	276	11	3	2 200 000	4 000 000	0,33	2,03	3,02	1,98	213 000	1 200	860	
39	–	308	460	276	25	4	2 240 000	3 450 000	0,29	2,32	3,45	2,26	217 000	1 100	1 080	
39	–	309	460	278	2	4	2 900 000	4 900 000	0,37	1,8	2,69	1,76	270 000	1 100	680	
39	–	322	514	278	11	5	3 000 000	4 400 000	0,34	2	2,98	1,96	290 000	1 100	790	
–	49	303	369,8	290	12	2,1	965 000	2 040 000	0,18	3,76	5,59	3,67	129 000	1 300	1 470	
–	49	310	405,4	292	12	3	1 560 000	3 000 000	0,25	2,74	4,08	2,68	156 000	1 300	1 080	
39	–	321	440	296	12	4	2 360 000	4 400 000	0,32	2,12	3,15	2,07	241 000	1 100	790	
39	–	324	480	296	28	4	2 360 000	3 650 000	0,28	2,43	3,61	2,37	238 000	1 100	1 010	
41	–	329	480	299	11	4	3 000 000	5 300 000	0,36	1,86	2,77	1,82	260 000	1 100	630	
41	–	349	554	299	12	5	3 550 000	5 400 000	0,33	2,03	3,02	1,98	335 000	950	680	
–	53	329	407,6	311	12	2,5	1 270 000	2 650 000	0,2	3,42	5,09	3,34	166 000	1 200	1 400	
–	53	337	445,4	313	12	3	1 960 000	3 650 000	0,25	2,69	4	2,63	223 000	1 100	980	
–	53	347	480	318	12	4	2 650 000	4 900 000	0,33	2,06	3,06	2,01	270 000	1 100	730	
–	53	352	520	318	32	4	2 750 000	4 400 000	0,27	2,47	3,67	2,41	300 000	1 000	900	
–	53	353	520	321	12	4	3 450 000	6 200 000	0,37	1,83	2,72	1,79	300 000	1 000	560	



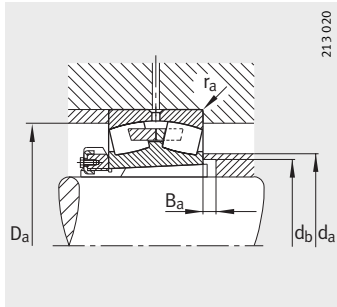
Spherical roller bearings

With adapter sleeve



With central rib
Locknut with retaining bracket

Dimension table (continued) · Dimensions in mm														
Designation		Mass m		Dimensions										
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d _{1H}	d	D	B	r	D ₁	d _s	n _s	D _m	l	c ₁
								min.	≈					≈
23964-K-MB	H3964	41	21,5	300	320	440	90	3	406,2	9,5	17,7	380	140	56
23064-K-MB	H3064	77,1	25,1	300	320	480	121	4	432,6	9,5	17,7	380	171	56
23164-K-MB	H3164	159	34,8	300	320	540	176	5	466,2	12,5	23,5	400	226	56
22264-K-MB	H3164	166	34,8	300	320	580	150	5	503,5	12,5	23,5	400	226	56
23264-K-MB	H3264	229	39,3	300	320	580	208	5	489,6	12,5	23,5	400	258	56
23068-K-MB	H3068	101	29,3	320	340	520	133	5	464,6	12,5	23,5	400	187	57
23168-B-K-MB	H3168	203	49,5	320	340	580	190	5	499,5	12,5	23,5	440	254	70
23268-B-K-MB	H3268	291	54,9	320	340	620	224	6	521,2	12,5	23,5	440	288	70
23972-K-MB	H3972	45	27,1	340	360	480	90	3	447,1	9,5	17,7	420	144	57
23072-K-MB	H3072	107	30,9	340	360	540	134	5	485,2	12,5	23,5	420	188	57
23172-K-MB	H3172	217	54,3	340	360	600	192	5	520	12,5	23,5	460	259	73
23272-B-K-MB	H3272	328	61,1	340	360	650	232	6	548,3	12,5	23,5	460	299	73
23976-K-MB	H3976	66,3	32,4	360	380	520	106	4	477,6	9,5	17,7	450	164	62
23076-B-K-MB	H3076	113	36,5	360	380	560	135	5	505,6	12,5	23,5	450	193	62
23176-K-MB	H3176	226	60,9	360	380	620	194	5	539,6	12,5	23,5	490	264	75
23276-B-K-MB	H3276	367	69,3	360	380	680	240	6	576,4	12,5	23,5	490	310	75
23980-B-K-MB	H3980	68,2	38,5	380	400	540	106	4	499	9,5	17,5	470	168	66
23080-K-MB	H3080	143	42,3	380	400	600	148	5	540,5	12,5	23,5	470	210	66
23180-B-K-MB	H3180	261	69,6	380	400	650	200	6	567,2	12,5	23,5	520	272	81
23280-B-K-MB	H3280	442	80,5	380	400	720	256	6	609,8	12,5	23,5	520	328	81
23984-K-MB	H3984	78	37,5	400	420	560	106	4	519,5	9,5	17,7	490	168	66
23084-B-K-MB	H3084X	155	44,6	400	420	620	150	5	560,7	12,5	23,5	490	212	66
23184-K-MB	H3184	339	84,5	400	420	700	224	6	605,4	12,5	23,5	540	304	89
23284-B-K-MB	H3284	537	94,8	400	420	760	272	7,5	642,2	12,5	23,5	540	352	89
23988-K-MB	H3988	98,3	58,3	410	440	600	118	4	552,8	12,5	23,5	520	189	75
23088-K-MB	H3088	177	67	410	440	650	157	6	586,8	12,5	23,5	520	228	75
23188-K-MB	H3188	378	103	410	440	720	226	6	626	12,5	23,5	560	307	89
23288-B-K-MB	H3288	586	125	410	440	790	280	7,5	669,3	12,5	23,5	560	361	89
23992-B-K-MB	H3992	103	64,7	430	460	620	118	4	573,3	12,5	23,5	540	189	75
23092-B-K-MB	H3092	204	71,6	430	460	680	163	6	612,2	12,5	23,5	540	234	75
23192-K-MB	H3192	420	120	430	460	760	240	7,5	661,4	12,5	23,5	580	326	94
23292-K-MB	H3292	699	137	430	460	830	296	7,5	701,6	12,5	23,5	580	382	94
23996-B-K-MB	H3996	121	70,2	450	480	650	128	5	598,8	12,5	23,5	560	200	75
23096-K-MB	H3096	208	75,3	450	480	700	165	6	632,6	12,5	23,5	560	237	75
23196-K-MB	H3196	470	135	450	480	790	248	7,5	688,3	12,5	23,5	620	335	94
23296-K-MB	H3296	806	154	450	480	870	310	7,5	734,8	12,5	23,5	620	397	94



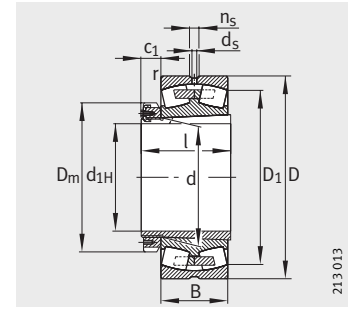
Mounting dimensions

Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	db	Ba	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	Cur	nG	nB
max.	max.	min.	min.	max.	N	N					N	min ⁻¹	min ⁻¹
349	427,6	332	12	2,5	1 320 000	2 750 000	0,19	3,62	5,39	3,54	202 000	1 100	1 300
357	465,4	334	13	3	2 040 000	4 000 000	0,25	2,74	4,08	2,68	243 000	1 100	910
369	520	338	13	4	3 200 000	6 000 000	0,34	1,98	2,94	1,93	305 000	950	650
378	560	338	39	4	3 050 000	4 900 000	0,27	2,47	3,67	2,41	345 000	950	840
378	560	343	13	4	3 900 000	6 950 000	0,37	1,8	2,69	1,76	330 000	950	520
382	502	355	14	4	2 360 000	4 550 000	0,25	2,69	4	2,63	285 000	1 000	850
395	560	360	14	4	3 650 000	6 950 000	0,34	1,98	2,94	1,93	570 000	900	590
402	594	364	14	5	4 500 000	8 150 000	0,38	1,78	2,65	1,74	650 000	850	470
389	467,6	372	14	2,5	1 430 000	3 200 000	0,17	4,05	6,04	3,96	209 000	1 000	1 130
402	522	375	14	4	2 450 000	4 800 000	0,25	2,74	4,08	2,68	295 000	950	800
416	580	380	14	4	3 800 000	7 350 000	0,33	2,06	3,06	2,01	360 000	850	560
424	624	385	14	5	4 900 000	9 150 000	0,38	1,78	2,65	1,74	720 000	800	425
415	505,4	393	15	3	1 760 000	4 000 000	0,19	3,58	5,33	3,5	265 000	950	1 090
422	542	396	15	4	2 550 000	5 300 000	0,24	2,84	4,23	2,78	430 000	900	740
436	600	401	15	4	4 050 000	8 150 000	0,32	2,12	3,15	2,07	385 000	800	510
447	654	405	15	5	5 300 000	9 800 000	0,37	1,8	2,69	1,76	780 000	750	400
435	525,4	413	15	3	1 830 000	4 150 000	0,18	3,71	5,52	3,63	275 000	900	1 030
448	582	417	15	4	3 050 000	6 200 000	0,24	2,79	4,15	2,73	365 000	800	680
457	624	421	15	5	4 250 000	8 500 000	0,31	2,15	3,2	2,1	670 000	750	490
473	694	427	15	5	5 700 000	10 800 000	0,38	1,78	2,65	1,74	820 000	700	375
455	545,4	433	15	3	1 900 000	4 500 000	0,18	3,85	5,73	3,76	300 000	850	970
468	602	437	16	4	3 150 000	6 550 000	0,24	2,84	4,23	2,78	395 000	800	650
483	674	443	16	5	5 000 000	9 650 000	0,33	2,03	3,02	1,98	465 000	700	460
495	728	449	16	6	6 550 000	12 200 000	0,38	1,77	2,64	1,73	930 000	670	345
482	585,4	454	17	3	2 240 000	5 200 000	0,18	3,66	5,46	3,58	295 000	800	930
488	627	458	17	5	3 400 000	7 100 000	0,24	2,84	4,23	2,78	405 000	750	610
504	694	463	17	5	5 200 000	10 400 000	0,32	2,1	3,13	2,06	485 000	700	430
516	758	469	17	6	7 100 000	13 400 000	0,37	1,8	2,69	1,76	990 000	630	320
500	605,4	474	17	3	2 280 000	5 400 000	0,18	3,85	5,73	3,76	370 000	750	880
509	657	478	17	5	3 650 000	7 650 000	0,24	2,84	4,23	2,78	440 000	700	580
533	728	484	17	6	5 850 000	11 600 000	0,32	2,12	3,15	2,07	530 000	630	400
541	798	490	17	6	7 800 000	15 000 000	0,37	1,8	2,69	1,76	620 000	600	295
523	632	496	18	4	2 550 000	6 000 000	0,18	3,76	5,59	3,67	460 000	700	860
529	677	499	18	5	3 800 000	8 150 000	0,23	2,9	4,31	2,83	455 000	670	550
554	758	505	18	6	6 300 000	12 700 000	0,32	2,12	3,15	2,07	570 000	630	375
568	838	512	18	6	8 800 000	17 000 000	0,37	1,83	2,72	1,79	700 000	600	270



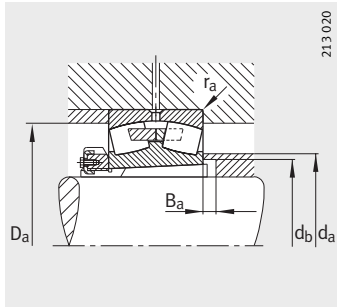
Spherical roller bearings

With adapter sleeve



With central rib

Dimension table (continued) - Dimensions in mm														
Designation		Mass m		Dimensions										
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d _{1H}	d	D	B	r	D ₁	d _s	n _s	D _m	l	c ₁
								min.	≈					≈
239/500-K-MB	H39/500	124	74,3	470	500	670	128	5	619,3	12,5	23,5	580	208	83
230/500-B-K-MB	H30/500	219	84,5	470	500	720	167	6	653,5	12,5	23,5	580	247	83
231/500-B-K-MB	H31/500	556	143	470	500	830	264	7,5	720,9	12,5	23,5	630	356	99
239/530-K-MB	H39/530	146	89,3	500	530	710	136	5	656,4	12,5	23,5	630	216	89
230/530-K-MB	H30/530	291	103	500	530	780	185	6	703,7	12,5	23,5	630	265	89
231/530-K-MB	H31/530	643	160	500	530	870	272	7,5	756,3	12,5	23,5	670	364	102
239/560-B-K-MB	H39/560	169	95,8	530	560	750	140	5	693,4	12,5	23,5	650	227	96
230/560-B-K-MB	H30/560	339	113	530	560	820	195	6	741,5	12,5	23,5	650	282	96
231/560-K-MB	H31/560	737	183	530	560	920	280	7,5	800,2	12,5	23,5	710	377	107
239/600-B-K-MB	H39/600	210	129	560	600	800	150	5	740,5	12,5	23,5	700	239	96
230/600-B-K-MB	H30/600	388	149	560	600	870	200	6	791,9	12,5	23,5	700	289	96
231/600-K-MB	H31/600	901	233	560	600	980	300	7,5	852,6	12,5	23,5	750	399	107
239/630-B-K-MB	H39/630	283	123	600	630	850	165	6	784,5	12,5	23,5	730	254	96
230/630-B-K-MB	H30/630	502	140	600	630	920	212	7,5	834,3	12,5	23,5	730	301	96
239/670-B-K-MB	H39/670	310	166	630	670	900	170	6	831,5	12,5	23,5	780	264	101
230/670-B-K-MB	H30/670	590	194	630	670	980	230	7,5	888,7	12,5	23,5	780	324	101
239/710-K-MB	H39/710	336	201	670	710	950	180	6	877,5	12,5	23,5	830	286	111
230/710-B-K-MB	H30/710	650	229	670	710	1030	236	7,5	938,8	12,5	23,5	830	342	111
239/750-K-MB	H39/750	394	215	710	750	1000	185	6	923,2	12,5	23,5	870	291	111
230/750-K-MB	H30/750	792	250	710	750	1090	250	7,5	990,9	12,5	23,5	870	356	111
239/800-B-K-MB	H39/800	490	263	750	800	1060	195	6	983,7	12,5	23,5	920	303	111
230/800-K-MB	H30/800	861	306	750	800	1150	258	7,5	1050,9	12,5	23,5	920	366	111
239/850-K-MB	H39/850	554	300	800	850	1120	200	6	1039,9	12,5	23,5	980	308	112
239/900-K-MB	H39/900	641	327	850	900	1180	206	6	1098,8	12,5	23,5	1030	326	112



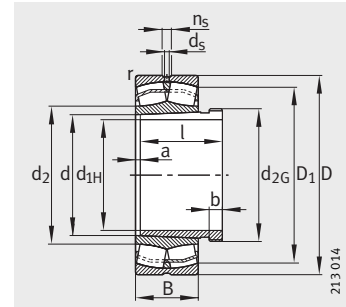
Mounting dimensions

Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	db	Ba	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	Cur	nG	nB
max.	max.	min.	min.	max.	N	N					N	min ⁻¹	min ⁻¹
543	652	516	18	4	2 600 000	6 300 000	0,17	3,9	5,81	3,81	400 000	670	810
550	697	519	18	5	3 900 000	8 500 000	0,22	3,01	4,48	2,94	510 000	670	520
578	798	527	18	6	7 100 000	14 300 000	0,32	2,1	3,13	2,06	990 000	600	345
576	692	546	18	4	2 850 000	6 800 000	0,18	3,85	5,73	3,76	385 000	630	770
589	757	550	18	5	4 400 000	9 500 000	0,22	3,04	4,53	2,97	540 000	600	490
609	838	558	18	6	7 350 000	15 300 000	0,32	2,12	3,15	2,07	670 000	560	325
609	732	577	18	4	3 100 000	7 650 000	0,17	3,95	5,88	3,86	570 000	600	720
619	797	581	18	5	5 100 000	11 000 000	0,23	2,95	4,4	2,89	740 000	560	450
644	888	589	18	6	8 150 000	16 600 000	0,31	2,21	3,29	2,16	750 000	530	300
653	782	618	20	4	3 450 000	8 650 000	0,17	3,95	5,88	3,86	630 000	560	670
661	847	622	20	5	5 700 000	12 500 000	0,22	3,07	4,57	3	890 000	530	405
693	948	629	20	6	9 000 000	19 300 000	0,31	2,2	3,27	2,15	810 000	500	270
688	827	649	20	5	4 050 000	9 800 000	0,18	3,8	5,66	3,72	710 000	530	650
696	892	653	20	6	6 300 000	13 700 000	0,22	3,01	4,48	2,94	890 000	500	385
730	877	689	20	5	4 300 000	10 600 000	0,17	3,95	5,88	3,86	750 000	500	600
741	952	694	20	6	7 200 000	16 000 000	0,22	3,01	4,48	2,94	1 100 000	480	350
770	927	730	22	5	4 800 000	12 000 000	0,18	3,85	5,73	3,76	720 000	480	570
785	1 002	735	23	6	7 650 000	17 000 000	0,22	3,07	4,57	3	1 140 000	480	330
810	977	771	23	5	5 200 000	12 900 000	0,17	3,95	5,88	3,86	790 000	480	540
828	1 062	776	23	6	8 500 000	19 000 000	0,22	3,01	4,48	2,94	1 010 000	450	305
865	1 037	822	25	5	5 850 000	15 000 000	0,17	4,05	6,04	3,96	1 010 000	450	500
879	1 122	828	25	6	9 300 000	21 200 000	0,22	3,07	4,57	3	1 430 000	430	280
917	1 097	873	25	5	6 300 000	16 300 000	0,16	4,11	6,12	4,02	960 000	430	465
972	1 157	923	27	5	6 550 000	17 300 000	0,16	4,28	6,37	4,19	1 010 000	400	440



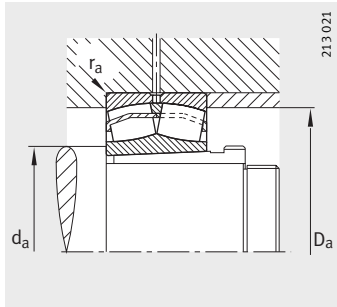
Spherical roller bearings

With extraction sleeve



E1 design

Dimension table · Dimensions in mm															
Designation			Mass m		Dimensions										
Bearing	X-life	Extraction sleeve	Bearing	Extraction sleeve	d _{1H}	d	D	B	r	D ₁	d ₂	d ₅	n _s	a	b
			≈ kg	≈ kg						min.	≈	≈		≈	
22208-E1-K	XL	AH308	0,517	0,089	35	40	80	23	1,1	70,4	48,6	3,2	4,8	3	6
21308-E1-K	XL	AH308	0,702	0,089	35	40	90	23	1,5	80,8	59,7	3,2	4,8	3	6
22308-E1-K	XL	AH2308	1,03	0,128	35	40	90	33	1,5	76	52,4	3,2	4,8	3	7
22209-E1-K	XL	AH309	0,577	0,108	40	45	85	23	1,1	75,6	54,8	3,2	4,8	3	6
21309-E1-K	XL	AH309	0,845	0,108	40	45	100	25	1,5	89,8	67,3	3,2	4,8	3	6
22309-E1-K	XL	AH2309	1,36	0,163	40	45	100	36	1,5	84,7	58,9	3,2	6,5	3	7
22210-E1-K	XL	AHX310	0,608	0,138	45	50	90	23	1,1	80,8	59,7	3,2	4,8	3	7
21310-E1-K	XL	AHX310	1,28	0,138	45	50	110	27	2	89,8	67,3	3,2	4,8	3	7
22310-E1-K	XL	AHX2310	1,86	0,213	45	50	110	40	2	92,6	63	3,2	6,5	3	9
22211-E1-K	XL	AHX311	0,825	0,164	50	55	100	25	1,5	89,8	67,3	3,2	4,8	3	7
21311-E1-K	XL	AHX311	1,19	0,164	50	55	120	29	2	98,3	71,4	3,2	6,5	3	7
22311-E1-K	XL	AHX2311	2,22	0,255	50	55	120	43	2	101,4	68,9	3,2	6,5	3	10
22311-E1-K-T41A	XL	AHX2311	2,22	0,255	50	55	120	43	2	101,4	68,9	3,2	6,5	3	10
22212-E1-K	XL	AHX312	1,09	0,195	55	60	110	28	1,5	98,7	71,4	3,2	6,5	3	8
21312-E1-K	XL	AHX312	1,78	0,195	55	60	130	31	2,1	112,5	84,4	3,2	6,5	3	8
22312-E1-K	XL	AHX2312	2,83	0,3	55	60	130	46	2,1	110,1	74,8	3,2	6,5	3	11
22312-E1-K-T41A	XL	AHX2312	2,83	0,3	55	60	130	46	2,1	110,1	74,8	3,2	6,5	3	11
22213-E1-K	XL	AH313G	1,52	0,224	60	65	120	31	1,5	107,3	79,1	3,2	6,5	3	8
21313-E1-K	XL	AH313G	2,42	0,224	60	65	140	33	2,1	126,8	94,9	3,2	6,5	3	8
22313-E1-K	XL	AH2313G	3,49	0,4	60	65	140	48	2,1	119,3	83,2	4,8	9,5	3	12
22313-E1-K-T41A	XL	AH2313G	3,49	0,4	60	65	140	48	2,1	119,3	83,2	4,8	9,5	3	12
22214-E1-K	XL	AH314G	1,61	0,25	65	70	125	31	1,5	112,5	84,4	3,2	6,5	4	8
21314-E1-K	XL	AH314G	3	0,25	65	70	150	35	2,1	126,2	94,9	3,2	6,5	4	8
22314-E1-K	XL	AHX2314G	4,12	0,407	65	70	150	51	2,1	128	86,7	4,8	9,5	4	12
22314-E1-K-T41A	XL	AHX2314G	4,12	0,407	65	70	150	51	2,1	128	86,7	4,8	9,5	4	12
22215-E1-K	XL	AH315G	1,68	0,284	70	75	130	31	1,5	117,7	89,8	3,2	6,5	4	8
21315-E1-K	XL	AH315G	2,86	0,284	70	75	160	37	2,1	135,2	99,7	3,2	6,5	4	8
22315-E1-K	XL	AHX2315G	5,06	0,5	70	75	160	55	2,1	136,3	92,4	4,8	9,5	4	12
22315-E1-K-T41A	XL	AHX2315G	5,06	0,5	70	75	160	55	2,1	136,3	92,4	4,8	9,5	4	12
22216-E1-K	XL	AH316	2,08	0,366	75	80	140	33	2	126,8	94,9	3,2	6,5	4	8
21316-E1-K	XL	AH316	2,65	0,366	75	80	170	39	2,1	135,4	99,8	3,2	6,5	4	8
22316-E1-K	XL	AHX2316	6,05	0,6	75	80	170	58	2,1	145,1	98,3	4,8	9,5	4	12
22316-E1-K-T41A	XL	AHX2316	6,05	0,6	75	80	170	58	2,1	145,1	98,3	4,8	9,5	4	12



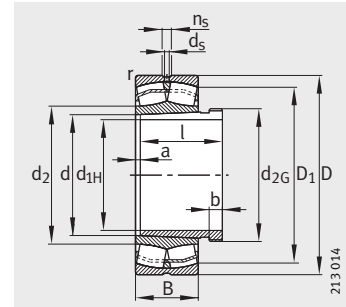
Mounting dimensions

Thread d_{2G}	l	Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
		d_a min.	D_a max.	r_a max.	C_r N	C_{0r} N	e	Y_1	Y_2	Y_0			
M45X1,5	29	47	73	1	102 000	90 000	0,28	2,41	3,59	2,35	11 800	10 000	6 400
M45X1,5	29	49	81	1,5	108 000	106 000	0,24	2,81	4,19	2,75	14 300	9 500	6 100
M45X1,5	40	49	81	1,5	156 000	150 000	0,36	1,86	2,77	1,82	13 100	7 500	5 800
M50X1,5	31	52	78	1	104 000	98 000	0,26	2,62	3,9	2,56	12 700	10 000	5 800
M50X1,5	31	54	91	1,5	129 000	129 000	0,23	2,92	4,35	2,86	17 300	8 500	5 500
M50X1,5	44	54	91	1,5	186 000	183 000	0,36	1,9	2,83	1,86	16 100	6 700	5 300
M55X2	35	57	83	1	108 000	106 000	0,24	2,81	4,19	2,75	14 300	9 500	5 300
M55X2	35	61	99	2	129 000	129 000	0,23	2,92	4,35	2,86	17 300	8 500	5 300
M55X2	50	61	99	2	228 000	224 000	0,36	1,86	2,77	1,82	20 300	6 000	4 950
M60X2	37	64	91	1,5	129 000	129 000	0,23	2,92	4,35	2,86	17 300	8 500	4 850
M60X2	37	66	109	2	170 000	166 000	0,24	2,84	4,23	2,78	21 200	6 300	4 950
M60X2	54	66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 650
M60X2	54	66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 650
M65X2	40	69	101	1,5	170 000	166 000	0,24	2,84	4,23	2,78	21 200	7 500	4 650
M65X2	40	72	118	2,1	212 000	228 000	0,23	2,95	4,4	2,89	28 000	6 300	4 500
M65X2	58	72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 300
M65X2	58	72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 300
M70X2	42	74	111	1,5	200 000	208 000	0,24	2,81	4,19	2,75	25 500	6 700	4 400
M70X2	42	77	128	2,1	250 000	270 000	0,22	3,14	4,67	3,07	34 000	5 000	4 200
M70X2	61	77	128	2,1	355 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 950
M70X2	61	77	128	2,1	355 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 950
M75X2	43	79	116	1,5	212 000	228 000	0,23	2,95	4,4	2,89	28 000	6 300	4 100
M75X2	43	82	138	2,1	250 000	270 000	0,22	3,14	4,67	3,07	34 000	5 000	4 100
M75X2	64	82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 850
M75X2	64	82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 850
M80X2	45	84	121	1,5	216 000	236 000	0,22	3,1	4,62	3,03	29 500	6 300	3 900
M80X2	45	87	148	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	3 850
M80X2	68	87	148	2,1	440 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 650
M80X2	68	87	148	2,1	440 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 650
M90X2	48	91	129	2	250 000	270 000	0,22	3,14	4,67	3,07	34 000	5 600	3 700
M90X2	48	92	158	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	3 750
M90X2	71	92	158	2,1	500 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 450
M90X2	71	92	158	2,1	500 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 450



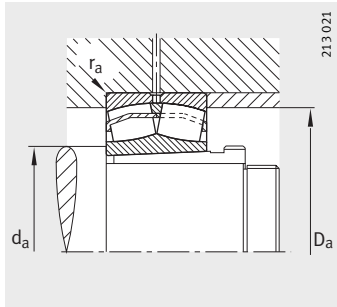
Spherical roller bearings

With extraction sleeve



E1 design

Dimension table (continued) · Dimensions in mm															
Designation			Mass m		Dimensions										
Bearing	X-life	Extraction sleeve	Bearing	Extraction sleeve	d _{1H}	d	D	B	r	D ₁	d ₂	d _s	n _s	a	b
			≈ kg	≈ kg	min.	≈	≈	≈	≈	≈	≈	≈	≈	≈	
22217-E1-K	XL	AHX317	2,59	0,43	80	85	150	36	2	135,4	99,7	3,2	6,5	4	9
21317-E1-K	XL	AHX317	5,37	0,43	80	85	180	41	3	143,9	106,1	4,8	9,5	4	9
22317-E1-K	XL	AHX2317	7,06	0,7	80	85	180	60	3	154,2	104,4	4,8	9,5	4	13
22317-E1-K-T41A	XL	AHX2317	7,06	0,7	80	85	180	60	3	154,2	104,4	4,8	9,5	4	13
22218-E1-K	XL	AHX318	3,35	0,466	85	90	160	40	2	143,9	106,1	3,2	6,5	4	9
23218-E1A-K-M	XL	AHX3218	4,34	0,6	85	90	160	52,4	2	140	-	3,2	6,5	4	10
23218-E1-K-TVPB	XL	AHX3218	4,08	0,6	85	90	160	52,4	2	140	104,1	3,2	6,5	4	10
21318-E1-K	XL	AHX318	6,26	0,466	85	90	190	43	3	152,7	112,6	4,8	9,5	4	9
22318-E1-K	XL	AHX2318	8,33	0,8	85	90	190	64	3	162,5	110,2	6,3	12,2	4	14
22318-E1-K-T41A	XL	AHX2318	8,33	0,8	85	90	190	64	3	162,5	110,2	6,3	12,2	4	14
22219-E1-K	XL	AHX319	4,04	0,54	90	95	170	43	2,1	152,7	112,6	4,8	9,5	4	10
21319-E1-K-TVPB	XL	AHX319	6,53	0,54	90	95	200	45	3	169,4	124,3	4,8	9,5	4	10
22319-E1-K	XL	AHX2319	9,46	0,894	90	95	200	67	3	171,2	116	6,3	12,2	4	16
22319-E1-K-T41A	XL	AHX2319	9,46	0,894	90	95	200	67	3	171,2	116	6,3	12,2	4	16
23120-E1A-K-M	XL	AHX3120	4,23	0,654	95	100	165	52	2	146,3	-	3,2	6,5	4	11
23120-E1-K-TVPB	XL	AHX3120	4,06	0,654	95	100	165	52	2	146,3	113,9	3,2	6,5	4	11
22220-E1-K	XL	AHX320	4,91	0,595	95	100	180	46	2,1	161,4	119	4,8	9,5	4	10
23220-E1A-K-M	XL	AHX3220	6,33	0,765	95	100	180	60,3	2,1	156,7	-	4,8	9,5	4	11
23220-E1-K-TVPB	XL	AHX3220	6,13	0,765	95	100	180	60,3	2,1	156,7	116,7	4,8	9,5	4	11
21320-E1-K-TVPB	XL	AHX320	8,08	0,595	95	100	215	47	3	182	132	4,8	9,5	4	10
22320-E1-K	XL	AHX2320	13,1	1,01	95	100	215	73	3	184,7	130,2	6,3	12,2	4	16
22320-E1-K-T41A	XL	AHX2320	13,1	1,01	95	100	215	73	3	184,7	130,2	6,3	12,2	4	16
23122-E1A-K-M	XL	AHX3122	5,1	0,774	105	110	180	56	2	160	-	4,8	9,5	4	11
23122-E1-K-TVPB	XL	AHX3122	4,95	0,774	105	110	180	56	2	160	124,6	4,8	9,5	4	11
24122-E1-K30-TVPB	XL	AH24122	6,69	0,725	105	110	180	69	2	154,8	125,1	3,2	6,5	9	13
22222-E1-K	XL	AHX3122	6,82	0,774	105	110	200	53	2,1	178,7	129,4	4,8	9,5	4	11
23222-E1A-K-M	XL	AHX3222A	9,32	0,974	105	110	200	69,8	2,1	172,7	-	4,8	9,5	4	11
23222-E1-K-TVPB	XL	AHX3222A	8,82	0,974	105	110	200	69,8	2,1	172,7	129,1	4,8	9,5	4	11
21322-E1-K-TVPB	XL	AHX322	10,9	0,663	105	110	240	50	3	202,5	146,4	6,3	12,2	4	12
22322-E1-K	XL	AHX2322G	17,4	1,24	105	110	240	80	3	204,9	143,1	8	15	4	16
22322-E1-K-T41A	XL	AHX2322G	17,4	1,24	105	110	240	80	3	204,9	143,1	8	15	4	16



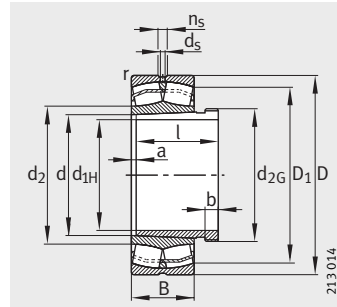
Mounting dimensions

Thread d_{2G}	l	Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
		d_a min.	D_a max.	r_a max.	C_r N	C_{0r} N	e	Y_1	Y_2	Y_0			
M95X2	52	96	139	2	305 000	325 000	0,22	3,04	4,53	2,97	38 500	5 300	3 550
M95X2	52	99	166	2,5	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 550
M95X2	74	99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 300
M95X2	74	99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 300
M100X2	53	101	149	2	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 500
M100X2	63	101	149	2	440 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 700
M100X2	63	101	149	2	440 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 700
M100X2	53	104	176	2,5	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 450
M100X2	79	104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 100
M100X2	79	104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 100
M105X2	57	107	158	2,1	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 400
M105X2	57	109	186	2,5	430 000	455 000	0,22	3,04	4,53	2,97	47 500	4 000	3 300
M105X2	85	109	186	2,5	670 000	695 000	0,33	2,03	3,02	1,98	60 000	3 000	2 900
M105X2	85	109	186	2,5	670 000	695 000	0,33	2,03	3,02	1,98	60 000	3 000	2 900
M110X2	64	111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 800
M110X2	64	111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 800
M110X2	59	112	168	2,1	430 000	475 000	0,24	2,84	4,23	2,78	52 000	4 300	3 300
M110X2	73	112	168	2,1	550 000	655 000	0,31	2,15	3,2	2,1	60 000	3 600	2 470
M110X2	73	112	168	2,1	550 000	655 000	0,31	2,15	3,2	2,1	60 000	3 600	2 470
M110X2	59	114	201	2,5	490 000	530 000	0,22	3,14	4,67	3,07	61 000	3 600	3 100
M110X2	90	114	201	2,5	815 000	915 000	0,33	2,03	3,02	1,98	75 000	3 000	2 550
M110X2	90	114	201	2,5	815 000	915 000	0,33	2,03	3,02	1,98	75 000	3 000	2 550
M120X2	68	121	169	2	530 000	680 000	0,28	2,41	3,59	2,35	61 000	4 000	2 600
M120X2	68	121	169	2	530 000	680 000	0,28	2,39	3,56	2,34	61 000	4 000	2 600
M115X2	82	121	169	2	620 000	900 000	0,35	1,94	2,88	1,89	67 000	2 600	1 820
M120X2	68	122	188	2,1	550 000	600 000	0,25	2,71	4,04	2,65	62 000	4 000	3 100
M120X2	82	122	188	2,1	710 000	865 000	0,33	2,06	3,06	2,01	72 000	3 000	2 150
M120X2	82	122	188	2,1	710 000	865 000	0,33	2,06	3,06	2,01	72 000	3 000	2 150
M120X2	63	124	226	2,5	600 000	640 000	0,21	3,24	4,82	3,16	69 000	3 000	2 750
M120X2	98	124	226	2,5	950 000	1 060 000	0,33	2,07	3,09	2,03	91 000	2 600	2 250
M120X2	98	124	226	2,5	950 000	1 060 000	0,33	2,07	3,09	2,03	91 000	2 600	2 250

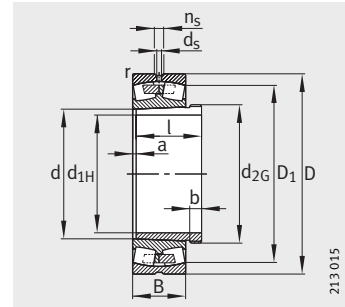


Spherical roller bearings

With extraction sleeve

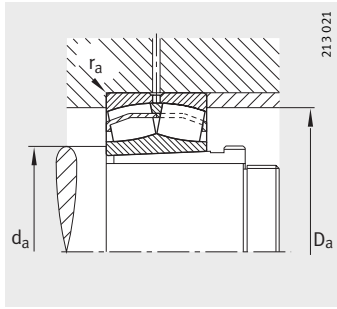


E1 design

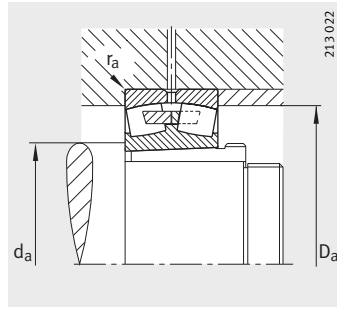


With central rib

Dimension table (continued) · Dimensions in mm															
Designation			Mass m		Dimensions										
Bearing	X-life	Extraction sleeve	Bearing ≈kg	Extraction sleeve ≈kg	d _{1H}	d	D	B	r	D ₁	d ₂	d _s	n _s	a	b
									min.	≈	≈			≈	
23024-E1A-K-M	XL	AHX3024	4,09	0,741	115	120	180	46	2	164,7	–	3,2	6,5	4	13
23024-E1-K-TVPB	XL	AHX3024	3,67	0,741	115	120	180	46	2	164,7	133	3,2	6,5	4	13
24024-E1-K30-TVPB	XL	AH24024	6,11	0,694	115	120	180	60	2	160	132	3,2	6,5	9	13
24024-S-K30-MB	–	AH24024	5,35	0,694	115	120	180	60	2	159,8	–	3,2	6,5	9	13
23124-E1A-K-M	XL	AHX3124	7,57	0,954	115	120	200	62	2	177,4	–	4,8	9,5	4	12
23124-E1-K-TVPB	XL	AHX3124	7,06	0,954	115	120	200	62	2	177,4	136,2	4,8	9,5	4	12
24124-E1-K30-TVPB	XL	AH24124	11,5	1	115	120	200	80	2	170,6	136,3	3,2	6,5	9	13
22224-E1-K	XL	AHX3124	8,84	0,954	115	120	215	58	2,1	192	141,8	6,3	12,2	4	12
23224-E1A-K-M	XL	AHX3224A	11,4	1,2	115	120	215	76	2,1	185,5	–	4,8	9,5	4	13
23224-E1-K-TVPB	XL	AHX3224A	11,1	1,2	115	120	215	76	2,1	185,5	139	4,8	9,5	4	13
22324-E1-K	XL	AHX2324G	22,1	1,5	115	120	260	86	3	222,4	150,7	8	15	4	17
22324-E1-K-T41A	XL	AHX2324G	22,1	1,5	115	120	260	86	3	222,4	150,7	8	15	4	17
23026-E1A-K-M	XL	AHX3026	5,7	0,916	125	130	200	52	2	182,3	–	4,8	9,5	4	14
23026-E1-K-TVPB	XL	AHX3026	5,42	0,916	125	130	200	52	2	182,3	145,9	4,8	9,5	4	19
24026-E1-K30-TVPB	XL	AH24026	7,57	0,875	125	130	200	69	2	176,9	144,7	3,2	6,5	10	14
23126-E1A-K-M	XL	AHX3126	8,1	1,1	125	130	210	64	2	187,3	–	4,8	9,5	4	12
23126-E1-K-TVPB	XL	AHX3126	7,82	1,1	125	130	210	64	2	187,3	146	4,8	9,5	4	12
24126-E1-K30-TVPB	XL	AH24126	10,1	1,12	125	130	210	80	2	181,1	146,4	3,2	6,5	10	14
22226-E1-K	XL	AHX3126	10,9	1,1	125	130	230	64	3	205	151,7	6,3	12,2	4	12
23226-E1A-K-M	XL	AHX3226G	13,6	1,5	125	130	230	80	3	199,3	–	4,8	9,5	4	15
23226-E1-K-TVPB	XL	AHX3226G	12,6	1,5	125	130	230	80	3	199,3	150	4,8	9,5	4	15
22326-E1-K	XL	AHX2326G	27,4	1,8	125	130	280	93	4	239,5	162,2	9,5	17,7	4	19
22326-E1-K-T41A	XL	AHX2326G	27,4	1,8	125	130	280	93	4	239,5	162,2	9,5	17,7	4	19
23028-E1A-K-M	XL	AHX3028	6	1,01	135	140	210	53	2	192,3	–	4,8	9,5	5	14
23028-E1-K-TVPB	XL	AHX3028G	5,81	1,01	135	140	210	53	2	192,3	155,4	4,8	9,5	5	14
24028-E1-K30-TVPB	XL	AH24028	7,96	0,944	135	140	210	69	2	187,2	154,2	3,2	6,5	10	14
24028-S-K30-MB	–	AH24028	8,38	0,944	135	140	210	69	2	186,4	–	3,2	6,5	10	14
23128-E1A-K-M	XL	AHX3128	7,78	1,28	135	140	225	68	2,1	201	–	4,8	9,5	5	14
23128-E1-K-TVPB	XL	AHX3128	9,46	1,28	135	140	225	68	2,1	201	157,1	4,8	9,5	5	14
24128-E1-K30-TVPB	XL	AH24128	11,8	1,28	135	140	225	85	2,1	194,4	157	4,8	9,5	10	14
22228-E1-K	XL	AHX3128	13,7	1,28	135	140	250	68	3	223,4	164,9	6,3	12,2	5	14
23228-E1A-K-M	XL	AHX3228G	17,6	1,72	135	140	250	88	3	216	–	6,3	12,2	5	15
23228-E1-K-TVPB	XL	AHX3228G	17,1	1,72	135	140	250	88	3	216	162	6,3	12,2	5	15
22328-E1-K	XL	AHX2328G	34,4	2,21	135	140	300	102	4	255,7	173,5	9,5	17,7	5	20
22328-E1-K-T41A	XL	AHX2328G	34,4	2,21	135	140	300	102	4	255,7	173,5	9,5	17,7	5	20



Mounting dimensions
E1 design



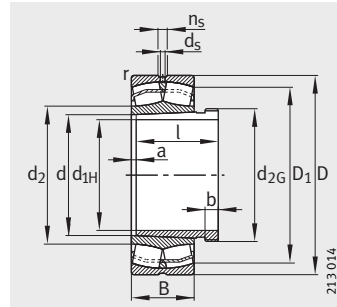
Mounting dimensions
With central rib

Thread d_{2G}	l	Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
		d_a min.	D_a max.	r_a max.	C_r N	C_{Or} N	e	Y_1	Y_2	Y_0			
M130X2	60	128,8	171,2	2	430 000	585 000	0,22	3,04	4,53	2,97	58 000	4 300	2 850
M130X2	60	128,8	171,2	2	430 000	585 000	0,22	3,04	4,53	2,97	58 000	4 300	2 850
M125X2	73	128,8	171,2	2	540 000	800 000	0,29	2,3	3,42	2,25	72 000	3 000	2 290
M125X2	73	128,8	171,2	2	405 000	710 000	0,32	2,09	3,11	2,04	40 000	2 600	2 380
M130X2	75	131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 330
M130X2	75	131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 330
M130X2	93	131	189	2	780 000	1 120 000	0,37	1,84	2,74	1,8	85 000	2 200	1 610
M130X2	75	132	203	2,1	640 000	735 000	0,25	2,71	4,04	2,65	71 000	3 400	2 800
M130X2	90	132	203	2,1	815 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 940
M130X2	90	132	203	2,1	815 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 940
M130X2	105	134	246	2,5	1 080 000	1 160 000	0,33	2,06	3,06	2,01	103 000	2 600	2 080
M130X2	105	134	246	2,5	1 080 000	1 160 000	0,33	2,06	3,06	2,01	103 000	2 600	2 080
M140X2	67	138,8	191,2	2	540 000	735 000	0,23	2,95	4,4	2,89	70 000	3 600	2 650
M140X2	67	138,8	191,2	2	540 000	735 000	0,23	2,95	4,4	2,89	70 000	3 600	2 650
M135X2	83	138,8	191,2	2	680 000	1 020 000	0,31	2,21	3,29	2,16	85 000	2 600	2 050
M140X2	78	141	199	2	680 000	900 000	0,28	2,45	3,64	2,39	79 000	3 000	2 130
M140X2	78	141	199	2	680 000	900 000	0,28	2,45	3,64	2,39	79 000	3 000	2 130
M140X2	94	141	199	2	815 000	1 200 000	0,34	1,96	2,92	1,92	93 000	2 200	1 480
M140X2	78	144	216	2,5	760 000	900 000	0,26	2,62	3,9	2,56	79 000	3 000	2 550
M140X2	98	144	216	2,5	900 000	1 140 000	0,33	2,07	3,09	2,03	89 000	2 600	1 780
M140X2	98	144	216	2,5	900 000	1 140 000	0,33	2,07	3,09	2,03	89 000	2 600	1 780
M140X2	115	147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 870
M140X2	115	147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 870
M150X2	68	148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 440
M150X2	68	148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 440
M145X2	83	148,8	201,2	2	720 000	1 100 000	0,29	2,33	3,47	2,28	93 000	2 600	1 880
M145X2	83	148,8	201,2	2	510 000	915 000	0,32	2,1	3,13	2,06	56 000	2 400	2 000
M150X2	83	152	213	2,1	765 000	1 020 000	0,27	2,49	3,71	2,43	88 000	2 800	1 960
M150X2	83	152	213	2,1	765 000	1 020 000	0,27	2,49	3,71	2,43	88 000	2 800	1 960
M150X2	99	152	213	2,1	930 000	1 370 000	0,34	1,98	2,94	1,93	104 000	2 000	1 340
M150X2	83	154	236	2,5	880 000	1 040 000	0,25	2,67	3,97	2,61	97 000	2 400	2 320
M150X2	104	154	236	2,5	1 080 000	1 400 000	0,33	2,04	3,04	2	112 000	2 400	1 580
M150X2	104	154	236	2,5	1 080 000	1 400 000	0,33	2,04	3,04	2	112 000	2 400	1 580
M150X2	125	157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 700
M150X2	125	157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 700

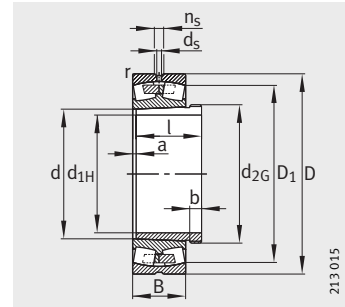


Spherical roller bearings

With extraction sleeve

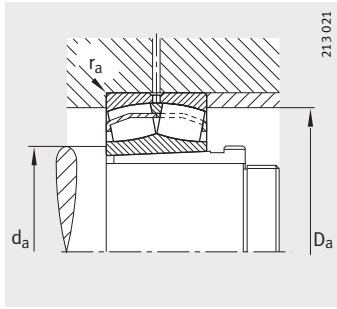


E1 design

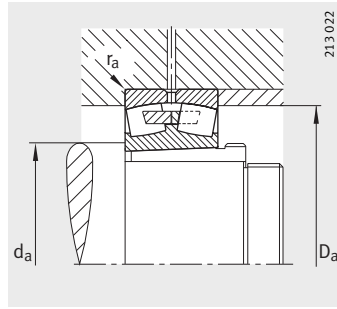


With central rib

Dimension table (continued) · Dimensions in mm															
Designation			Mass m		Dimensions										
Bearing	X-life	Extraction sleeve	Bearing ≈kg	Extraction sleeve ≈kg	d _{1H}	d	D	B	r	D ₁	d ₂	d _s	n _s	a	b
									min.	≈	≈			≈	
23030-E1A-K-M	XL	AHX3030	7,33	1,15	145	150	225	56	2,1	206,3	–	4,8	9,5	5	15
23030-E1-K-TVPB	XL	AHX3030	7,29	1,15	145	150	225	56	2,1	206,3	166,6	4,8	9,5	5	15
24030-E1-K30-TVPB	XL	AH24030	10	1,1	145	150	225	75	2,1	200,2	165,2	4,8	9,5	11	15
24030-S-K30-MB	–	AH24030	10,7	1,1	145	150	225	75	2,1	199,1	–	4,8	9,5	11	15
23130-E1A-K-M	XL	AHX3130G	15,8	1,64	145	150	250	80	2,1	220,8	–	6,3	12,2	5	15
23130-E1-K-TVPB	XL	AHX3130G	14,5	1,64	145	150	250	80	2,1	220,8	170,1	6,3	12,2	5	15
24130-BS-K30	–	AH24130	19	1,61	145	150	250	100	2,1	211,3	–	4,8	9,5	11	15
22230-E1-K	XL	AHX3130G	17,8	1,64	145	150	270	73	3	240,8	177,9	8	15	5	15
23230-E1A-K-M	XL	AHX3230G	22,9	2,07	145	150	270	96	3	232,6	–	6,3	12,2	5	17
23230-E1-K-TVPB	XL	AHX3230G	22,3	2,07	145	150	270	96	3	232,6	174	6,3	12,2	5	17
22330-E1-K	XL	AHX2330G	41,2	2,6	145	150	320	108	4	273,2	185,3	9,5	17,7	5	24
22330-E1-K-T41A	XL	AHX2330G	41,2	2,6	145	150	320	108	4	273,2	185,3	9,5	17,7	5	24
23032-E1A-K-M	XL	AH3032	9,42	2,04	150	160	240	60	2,1	219,9	–	6,3	12,2	5	16
23032-E1-K-TVPB	XL	AH3032	8,67	2,04	150	160	240	60	2,1	219,9	177	6,3	12,2	5	16
24032-E1-K30-TVPB	XL	AH24032	11,8	2,27	150	160	240	80	2,1	213,6	176	4,8	9,5	11	15
24032-S-K30-MB	–	AH24032	12,8	2,27	150	160	240	80	2,1	211,2	–	4,8	9,5	11	15
23132-E1A-K-M	XL	AH3132A	18,6	2,87	150	160	270	86	2,1	238,3	–	8	15	5	16
23132-E1-K-TVPB	XL	AH3132A	18,4	2,87	150	160	270	86	2,1	238,3	183,2	8	15	5	16
24132-BS-K30	–	AH24132	25	3,02	150	160	270	109	2,1	230,2	–	4,8	9,5	11	15
22232-E1-K	XL	AH3132A	22,4	2,87	150	160	290	80	3	258,2	190,9	8	15	5	16
23232-E1A-K-M	XL	AH3232G	28,5	3,6	150	160	290	104	3	249,3	–	8	15	6	20
23232-E1-K-TVPB	XL	AH3232G	27,7	3,6	150	160	290	104	3	249,3	186,7	8	15	6	20
22332-K-MB	–	AH2332G	50,1	4,24	150	160	340	114	4	288,3	–	9,5	17,7	6	24
23034-E1A-K-M	XL	AH3034	12	2,43	160	170	260	67	2,1	237,2	–	6,3	12,2	5	17
23034-E1-K-TVPB	XL	AH3034	11,9	2,43	160	170	260	67	2,1	237,2	189,8	6,3	12,2	5	17
24034-BS-K30-MB	–	AH24034	16,8	2,7	160	170	260	90	2,1	228,8	–	4,8	9,5	11	16
23134-E1A-K-M	XL	AH3134A	19,5	3,09	160	170	280	88	2,1	248,1	–	8	15	5	16
23134-E1-K-TVPB	XL	AH3134A	19,9	3,09	160	170	280	88	2,1	248,1	193,4	8	15	5	16
24134-BS-K30	–	AH24134	25	3,25	160	170	280	109	2,1	239,6	–	4,8	9,5	11	16
22234-E1-K	XL	AH3134A	27,1	3,09	160	170	310	86	4	275,4	199,8	9,5	17,7	5	16
23234-E1A-K-M	XL	AH3234G	34,6	4,25	160	170	310	110	4	267,4	–	8	15	6	24
23234-E1-K-TVPB	XL	AH3234G	33,1	4,25	160	170	310	110	4	267,4	199,8	8	15	6	24
22334-K-MB	–	AH2334G	56,9	4,76	160	170	360	120	4	304,2	–	9,5	17,7	6	24



Mounting dimensions
E1 design



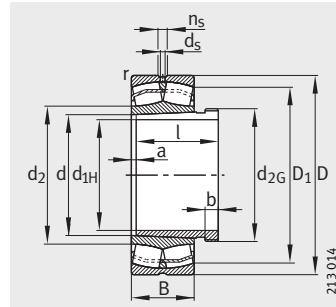
Mounting dimensions
With central rib

Thread d_{2G}	l	Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
		d_a min.	D_a max.	r_a max.	C_r N	C_{0r} N	e	Y_1	Y_2	Y_0			
M160X3	72	160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 260
M160X3	72	160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 260
M155X3	90	160,2	214,8	2,1	815 000	1 250 000	0,29	2,32	3,45	2,26	105 000	2 400	1 740
M155X3	90	160,2	214,8	2,1	620 000	1 140 000	0,33	2,06	3,06	2,01	67 000	2 200	1 800
M160X3	96	162	238	2,1	1 000 000	1 320 000	0,29	2,32	3,45	2,26	143 000	2 600	1 760
M160X3	96	162	238	2,1	1 000 000	1 320 000	0,29	2,32	3,45	2,26	143 000	2 600	1 760
M160X3	115	162	238	2,1	915 000	1 560 000	0,4	1,68	2,5	1,64	100 000	2 000	1 260
M160X3	96	164	256	2,5	1 000 000	1 220 000	0,25	2,69	4	2,63	111 000	2 600	2 110
M160X3	114	164	256	2,5	1 270 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 420
M160X3	114	164	256	2,5	1 270 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 420
M160X3	135	167	303	3	1 630 000	1 860 000	0,33	2,02	3	1,97	147 000	2 000	1 550
M160X3	135	167	303	3	1 630 000	1 860 000	0,33	2,02	3	1,97	147 000	2 000	1 550
M170X3	77	170,2	229,8	2,1	720 000	1 020 000	0,22	3,1	4,62	3,03	94 000	2 800	2 090
M170X3	77	170,2	229,8	2,1	720 000	1 020 000	0,22	3,1	4,62	3,03	94 000	2 800	2 090
M170X3	95	170,2	229,8	2,1	915 000	1 430 000	0,29	2,3	3,42	2,25	117 000	2 200	1 600
M170X3	95	170,2	229,8	2,1	670 000	1 250 000	0,32	2,09	3,11	2,04	71 000	2 000	1 680
M170X3	103	172	258	2,1	1 160 000	1 560 000	0,29	2,32	3,45	2,26	164 000	2 400	1 590
M170X3	103	172	258	2,1	1 160 000	1 560 000	0,29	2,32	3,45	2,26	164 000	2 400	1 590
M170X3	124	172	258	2,1	1 060 000	1 800 000	0,41	1,65	2,46	1,61	106 000	2 000	1 150
M170X3	103	174	276	2,5	1 140 000	1 400 000	0,26	2,64	3,93	2,58	125 000	2 600	1 960
M170X3	124	174	276	2,5	1 460 000	1 900 000	0,34	2	2,98	1,96	146 000	2 200	1 310
M170X3	124	174	276	2,5	1 460 000	1 900 000	0,34	2	2,98	1,96	146 000	2 200	1 310
M170X3	140	177	323	3	1 430 000	1 900 000	0,37	1,8	2,69	1,76	121 000	2 000	1 490
M180X3	85	180,2	249,8	2,1	880 000	1 220 000	0,23	2,98	4,44	2,92	146 000	2 600	1 940
M180X3	85	180,2	249,8	2,1	880 000	1 220 000	0,23	2,98	4,44	2,92	146 000	2 600	1 940
M180X3	106	180,2	249,8	2,1	850 000	1 560 000	0,34	2	2,97	1,95	96 000	2 000	1 530
M180X3	104	182	268	2,1	1 220 000	1 700 000	0,28	2,37	3,53	2,32	174 000	2 400	1 480
M180X3	104	182	268	2,1	1 220 000	1 700 000	0,28	2,37	3,53	2,32	174 000	2 400	1 480
M180X3	125	182	268	2,1	1 060 000	1 830 000	0,39	1,73	2,58	1,69	98 000	1 800	1 100
M180X3	104	187	293	3	1 320 000	1 560 000	0,26	2,6	3,87	2,54	139 000	2 400	1 830
M180X3	134	187	293	3	1 630 000	2 160 000	0,33	2,03	3,02	1,98	163 000	2 000	1 190
M180X3	134	187	293	3	1 630 000	2 160 000	0,33	2,03	3,02	1,98	163 000	2 000	1 190
M180X3	146	187	343	3	1 600 000	2 120 000	0,37	1,83	2,72	1,79	134 000	1 800	1 380

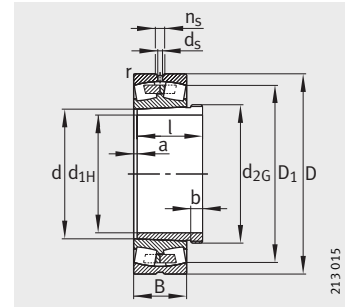


Spherical roller bearings

With extraction sleeve

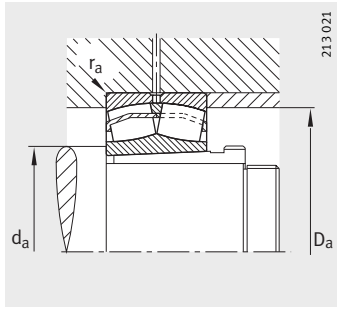


E1 design

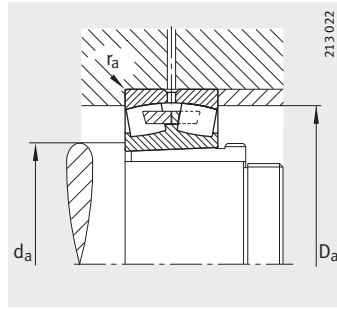


With central rib

Dimension table (continued) · Dimensions in mm															
Designation			Mass m		Dimensions										
Bearing	X-life	Extraction sleeve	Bearing	Extraction sleeve	d _{1H}	d	D	B	r	D ₁	d ₂	d _s	n _s	a	b
			≈ kg	≈ kg					min.	≈	≈		≈		
23936-S-K-MB	-	AH3936	7,76	1,91	170	180	250	52	2	230,9	-	4,8	9,5	5	13
23036-E1A-K-M	XL	AH3036	16	2,84	170	180	280	74	2,1	254,3	-	8	15	6	17
23036-E1-K-TVPB	XL	AH3036	15,6	2,84	170	180	280	74	2,1	254,3	201,8	8	15	6	17
24036-BS-K30-MB	-	AH24036	22,3	3,18	170	180	280	100	2,1	244,2	-	4,8	9,5	11	16
23136-E1A-K-M	XL	AH3136A	25,5	3,77	170	180	300	96	3	264,8	-	8	15	6	19
23136-E1-K-TVPB	XL	AH3136A	25,9	3,77	170	180	300	96	3	264,8	204,1	8	15	6	19
24136-BS-K30	-	AH24136	31,8	3,72	170	180	300	118	3	253,7	-	6,3	12,2	11	16
22236-E1-K	XL	AH2236G	28,5	3,3	170	180	320	86	4	285,9	211,3	9,5	17,7	5	17
23236-E1A-K-M	XL	AH3236G	37	4,8	170	180	320	112	4	277,3	-	8	15	6	25
23236-E1-K-TVPB	XL	AH3236G	36	4,8	170	180	320	112	4	277,3	210,6	8	15	6	25
22336-K-MB	-	AH2336G	66,7	5,4	170	180	380	126	4	323,4	-	12,5	23,5	6	26
23038-E1A-K-M	XL	AH3038G	17,7	3,16	180	190	290	75	2,1	264,5	-	8	15	6	18
23038-E1-K-TVPB	XL	AH3038G	16,3	3,16	180	190	290	75	2,1	264,5	211,9	8	15	6	18
24038-BS-K30-MB	-	AH24038	24,2	3,46	180	190	290	100	2,1	255	-	4,8	9,5	13	18
23138-E1A-K-M	XL	AH3138G	32,4	4,4	180	190	320	104	3	281,6	-	8	15	6	20
23138-E1-K-TVPB	XL	AH3138G	30,3	4,4	180	190	320	104	3	281,6	217	8	15	6	20
24138-B-K30	-	AH24138	41,5	4,37	180	190	320	128	3	270	-	6,3	12,2	13	18
22238-K-MB	-	AH2238G	36,2	3,8	180	190	340	92	4	296	-	9,5	17,7	5	18
23238-B-K-MB	-	AH3238G	46	5,3	180	190	340	120	4	291,2	-	9,5	17,7	7	25
22338-K-MB	-	AH2338G	77,3	6,04	180	190	400	132	5	338,2	-	12,5	23,5	7	26
23940-S-K-MB	-	AH3940	11,5	2,62	190	200	280	60	2,1	256,9	-	6,3	12,2	6	16
23040-E1A-K-M	XL	AH3040G	21,4	3,57	190	200	310	82	2,1	281,6	-	8	15	6	19
23040-E1-K-TVPB	XL	AH3040G	20,8	3,57	190	200	310	82	2,1	281,6	223,4	8	15	6	19
24040-BS-K30-MB	-	AH24040	30	3,93	190	200	310	109	2,1	270,8	-	6,3	12,2	13	18
23140-B-K-MB	-	AH3140	41,7	5,5	190	200	340	112	3	293,3	-	9,5	17,7	6	21
24140-B-K30	-	AH24140	51,6	5	190	200	340	140	3	285,9	-	6,3	12,2	13	18
22240-B-K-MB	-	AH2240	42,3	4,73	190	200	360	98	4	312	-	9,5	17,7	5	19
23240-B-K-MB	-	AH3240	55,8	6,59	190	200	360	128	4	307,5	-	9,5	17,7	7	24
22340-K-MB	-	AH2340	89,5	7,6	190	200	420	138	5	357,4	-	12,5	23,5	7	30



Mounting dimensions
E1 design



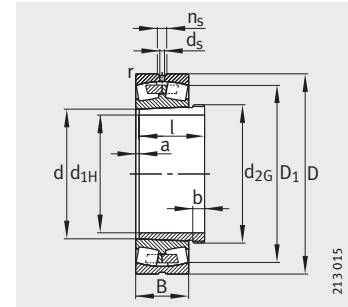
Mounting dimensions
With central rib

Thread d_{2G}	l	Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
		d_a min.	D_a max.	r_a max.	C_r N	C_{0r} N	e	Y_1	Y_2	Y_0	C_{ur} N	n_G min ⁻¹	n_B min ⁻¹
M190X3	66	188,8	241,2	2	440 000	850 000	0,2	3,42	5,09	3,34	57 000	2 200	2 320
M190X3	92	190,2	269,8	2,1	1 040 000	1 460 000	0,23	2,9	4,31	2,83	170 000	2 600	1 790
M190X3	92	190,2	269,8	2,1	1 040 000	1 460 000	0,23	2,9	4,31	2,83	170 000	2 600	1 790
M190X3	116	190,2	269,8	2,1	1 000 000	1 830 000	0,36	1,9	2,83	1,86	106 000	1 800	1 420
M190X3	116	194	286	2,5	1 430 000	1 960 000	0,29	2,32	3,45	2,26	196 000	2 200	1 370
M190X3	116	194	286	2,5	1 430 000	1 960 000	0,29	2,32	3,45	2,26	196 000	2 200	1 370
M190X3	134	194	286	2,5	1 250 000	2 200 000	0,4	1,68	2,5	1,64	136 000	1 700	980
M190X3	105	197	303	3	1 370 000	1 660 000	0,25	2,71	4,04	2,65	148 000	2 400	1 720
M190X3	140	197	303	3	1 700 000	2 360 000	0,33	2,07	3,09	2,03	173 000	2 000	1 110
M190X3	140	197	303	3	1 700 000	2 360 000	0,33	2,07	3,09	2,03	173 000	2 000	1 110
M190X3	154	197	363	3	1 760 000	2 360 000	0,37	1,83	2,72	1,79	209 000	1 500	1 280
M200X3	96	200,2	279,8	2,1	1 080 000	1 560 000	0,23	2,98	4,44	2,92	180 000	2 400	1 690
M200X3	96	200,2	279,8	2,1	1 080 000	1 560 000	0,23	2,98	4,44	2,92	180 000	2 400	1 690
M200X3	118	200,2	279,8	2,1	1 040 000	1 960 000	0,34	2	2,98	1,96	110 000	1 700	1 320
M200X3	125	204	306	2,5	1 600 000	2 240 000	0,3	2,28	3,39	2,23	218 000	2 000	1 270
M200X3	125	204	306	2,5	1 600 000	2 240 000	0,3	2,28	3,39	2,23	218 000	2 000	1 270
M200X3	146	204	306	2,5	1 400 000	2 500 000	0,41	1,66	2,47	1,62	145 000	1 500	910
M200X3	112	207	323	3	1 200 000	1 830 000	0,28	2,39	3,56	2,34	122 000	1 800	1 620
M200X3	145	207	323	3	1 560 000	2 600 000	0,36	1,86	2,77	1,82	156 000	1 700	1 040
M200X3	160	210	380	4	1 860 000	2 500 000	0,37	1,83	2,72	1,79	213 000	1 500	1 220
Tr210X4	77	210,2	269,8	2,1	550 000	1 080 000	0,2	3,42	5,09	3,34	71 000	2 000	2 110
Tr210X4	102	210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 580
Tr210X4	102	210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 580
Tr210X4	127	210,2	299,8	2,1	1 200 000	2 280 000	0,35	1,94	2,88	1,89	122 000	1 500	1 220
Tr220X4	134	214	326	2,5	1 320 000	2 280 000	0,35	1,95	2,9	1,91	131 000	1 700	1 240
Tr210X4	158	214	326	2,5	1 700 000	3 000 000	0,42	1,62	2,42	1,59	190 000	1 400	810
Tr220X4	118	217	343	3	1 320 000	2 000 000	0,29	2,35	3,5	2,3	123 000	1 700	1 530
Tr220X4	153	217	343	3	1 660 000	2 750 000	0,37	1,83	2,72	1,79	163 000	1 500	1 000
Tr220X4	170	220	400	4	2 080 000	2 800 000	0,36	1,87	2,79	1,83	189 000	1 400	1 130



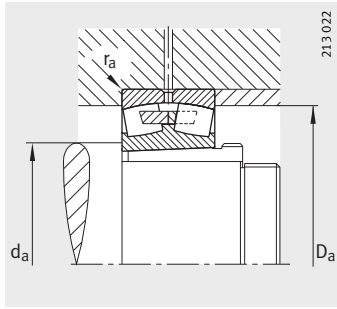
Spherical roller bearings

With extraction sleeve



With central rib

Dimension table (continued) · Dimensions in mm													
Designation		Mass m		Dimensions									
Bearing	Extraction sleeve	Bearing ≈kg	Extraction sleeve ≈kg	d _{1H}	d	D	B	r	D ₁	d _s	n _s	a	b
								min.	≈			≈	
23944-S-K-MB	AH3944	12,3	4,74	200	220	300	60	2,1	277,4	6,3	12,2	6	16
23044-K-MB	AH3044G	29,9	7,13	200	220	340	90	3	301,8	8	15	6	20
24044-B-K30-MB	AH24044	38,9	8,11	200	220	340	118	3	297,4	6,3	12,2	14	18
23144-B-K-MB	AH3144	52	10,4	200	220	370	120	4	319,2	9,5	17,7	6	23
24144-B-K30	AH24144	64,4	3,61	200	220	370	150	4	311,7	6,3	12,2	14	20
22244-B-K-MB	AH2244	59,6	9,1	200	220	400	108	4	348,7	9,5	17,7	6	20
23244-K-MB	AH2344	79	13,6	200	220	400	144	4	337,6	9,5	17,7	8	30
22344-K-MB	AH2344	114	13,6	200	220	460	145	5	391,2	12,5	23,5	8	30
23948-K-MB	AH3948	13,4	5,29	220	240	320	60	2,1	297,8	6,3	12,2	6	16
23048-K-MB	AH3048	31,9	8,8	220	240	360	92	3	322,1	8	15	7	21
24048-B-K30-MB	AH24048	43,2	8,87	220	240	360	118	3	318,9	6,3	12,2	15	20
23148-B-K-MB	AH3148	65,3	12,2	220	240	400	128	4	346,2	9,5	17,7	7	25
24148-B-K30	AH24148	78,7	12,4	220	240	400	160	4	338	6,3	12,2	15	20
22248-B-K-MB	AH2248	81,2	11,2	220	240	440	120	4	380,7	12,5	23,5	6	21
23248-B-K-MB	AH2348	105	15,6	220	240	440	160	4	371	12,5	23,5	8	30
22348-K-MB	AH2348	145	15,6	220	240	500	155	5	420	12,5	23,5	8	30
23952-K-MB	AH3952G	22,4	7,58	240	260	360	75	2,1	330,5	8	15	6	18
23052-K-MB	AH3052	46,2	10,7	240	260	400	104	4	357,2	9,5	17,7	7	23
24052-B-K30-MB	AH24052	64,5	11,8	240	260	400	140	4	349,1	6,3	12,2	16	20
23152-K-MB	AH3152G	89,6	15,1	240	260	440	144	4	379,7	9,5	17,7	7	26
24152-B-K30	AH24152	112	15,4	240	260	440	180	4	370,3	8	15	16	22
22252-B-K-MB	AH2252G	106	13,3	240	260	480	130	5	415,3	12,5	23,5	6	23
23252-B-K-MB	AH2352G	136	18,7	240	260	480	174	5	405,4	12,5	23,5	8	30
22352-K-MB	AH2352G	177	18,7	240	260	540	165	6	452,1	12,5	23,5	8	30
23956-K-MB	AH3956G	24,7	8,19	260	280	380	75	2,1	350	8	15	6	18
23056-B-K-MB	AH3056	50,3	11,9	260	280	420	106	4	376,5	9,5	17,7	8	24
24056-B-K30-MB	AH24056	69,7	12,4	260	280	420	140	4	369,5	6,3	12,2	17	22
23156-B-K-MB	AH3156G	96,4	17,6	260	280	460	146	5	401,4	9,5	17,7	8	28
24156-B-K30	AH24156	118	16,6	260	280	460	180	5	392,8	8	15	17	22
22256-B-K-MB	AH2256G	110	14,4	260	280	500	130	5	435,2	12,5	23,5	8	24
23256-K-MB	AH2356G	153	21	260	280	500	176	5	426,3	12,5	23,5	8	30
22356-K-MB	AH2356G	224	21	260	280	580	175	6	489,3	12,5	23,5	8	30



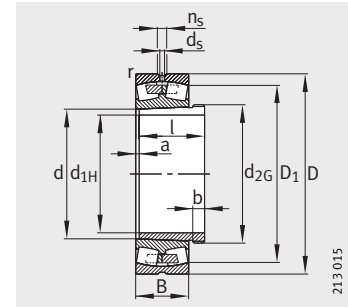
Mounting dimensions

Thread d_{2G}	l	Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
		d_a min.	D_a max.	r_a max.	C_r N	C_{0r} N	e	Y_1	Y_2	Y_0			
Tr230X4	77	230,2	289,8	2,1	600 000	1 250 000	0,18	3,76	5,59	3,67	72 000	1 800	1 880
Tr230X4	111	232,4	327,6	2,5	1 060 000	1 900 000	0,26	2,55	3,8	2,5	132 000	1 700	1 470
Tr230X4	138	232,4	327,6	2,5	1 400 000	2 700 000	0,34	1,96	2,92	1,92	139 000	1 300	1 080
Tr240X4	145	237	353	3	1 630 000	2 900 000	0,33	2,03	3,02	1,98	165 000	1 400	1 070
Tr230X4	170	237	353	3	1 900 000	3 450 000	0,41	1,63	2,43	1,6	197 000	1 300	730
Tr240X4	130	237	383	3	1 630 000	2 450 000	0,29	2,35	3,5	2,3	153 000	1 400	1 340
Tr240X4	181	237	383	3	2 040 000	3 450 000	0,37	1,83	2,72	1,79	181 000	1 400	860
Tr240X4	181	240	440	4	2 320 000	3 350 000	0,35	1,95	2,9	1,91	217 000	1 300	980
Tr250X4	77	250,2	309,8	2,1	640 000	1 370 000	0,17	4,05	6,04	3,96	93 000	1 500	1 700
Tr260X4	116	252,4	347,6	2,5	1 160 000	2 200 000	0,25	2,74	4,08	2,68	130 000	1 400	1 320
Tr250X4	138	252,4	347,6	2,5	1 500 000	2 900 000	0,32	2,1	3,13	2,06	150 000	1 300	980
Tr260X4	154	257	383	3	1 860 000	3 250 000	0,33	2,06	3,06	2,01	177 000	1 300	970
Tr260X4	180	257	383	3	2 120 000	3 900 000	0,41	1,66	2,47	1,62	231 000	1 200	660
Tr260X4	144	257	423	3	1 960 000	3 050 000	0,29	2,35	3,5	2,3	184 000	1 300	1 190
Tr260X4	189	257	423	3	2 450 000	4 250 000	0,37	1,8	2,69	1,76	231 000	1 300	750
Tr260X4	189	260	480	4	2 650 000	3 900 000	0,35	1,95	2,9	1,91	249 000	1 500	870
Tr280X4	94	270,2	349,8	2,1	930 000	1 930 000	0,19	3,54	5,27	3,46	108 000	1 400	1 610
Tr280X4	128	274,6	385,4	3	1 500 000	2 800 000	0,26	2,64	3,93	2,58	154 000	1 300	1 170
Tr270X4	162	274,6	385,4	3	1 900 000	3 800 000	0,35	1,94	2,88	1,89	204 000	1 100	870
Tr280X4	172	277	423	3	2 200 000	4 000 000	0,33	2,03	3,02	1,98	213 000	1 200	860
Tr280X4	202	277	423	3	2 700 000	5 100 000	0,42	1,61	2,4	1,58	315 000	1 100	550
Tr280X4	155	280	460	4	2 240 000	3 450 000	0,29	2,32	3,45	2,26	217 000	1 100	1 080
Tr280X4	205	280	460	4	2 900 000	4 900 000	0,37	1,8	2,69	1,76	270 000	1 100	680
Tr280X4	205	286	514	5	3 000 000	4 400 000	0,34	2	2,98	1,96	290 000	1 100	790
Tr300X4	94	290,2	369,8	2,1	965 000	2 040 000	0,18	3,76	5,59	3,67	129 000	1 300	1 470
Tr300X4	131	294,6	405,4	3	1 560 000	3 000 000	0,25	2,74	4,08	2,68	156 000	1 300	1 080
Tr290X4	162	294,6	405,4	3	2 000 000	4 000 000	0,33	2,04	3,04	2	225 000	1 100	810
Tr300X4	175	300	440	4	2 360 000	4 400 000	0,32	2,12	3,15	2,07	241 000	1 100	790
Tr300X4	202	300	440	4	2 700 000	5 200 000	0,39	1,71	2,54	1,67	365 000	1 000	520
Tr300X4	155	300	480	4	2 360 000	3 650 000	0,28	2,43	3,61	2,37	238 000	1 100	1 010
Tr300X4	212	300	480	4	3 000 000	5 300 000	0,36	1,86	2,77	1,82	260 000	1 100	630
Tr300X4	212	306	554	5	3 550 000	5 400 000	0,33	2,03	3,02	1,98	335 000	950	680



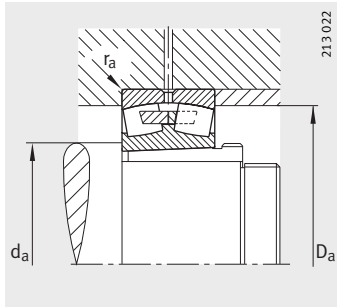
Spherical roller bearings

With extraction sleeve



With central rib

Dimension table (continued) · Dimensions in mm													
Designation		Mass m		Dimensions									
Bearing	Extraction sleeve	Bearing ≈kg	Extraction sleeve ≈kg	d _{1H}	d	D	B	r	D ₁	d _s	n _s	a	b
								min.	≈		≈		
23960-B-K-MB	AH3960G	39,1	10,7	280	300	420	90	3	384,6	9,5	17,7	7	21
23060-K-MB	AH3060	72,2	14,3	280	300	460	118	4	412,6	9,5	17,7	8	26
24060-B-K30-MB	AH24060	97,7	15,3	280	300	460	160	4	401,5	8	15	18	24
23160-B-K-MB	AH3160G	123	19,9	280	300	500	160	5	434,7	9,5	17,7	8	30
24160-B-K30	AH24160	158	20	280	300	500	200	5	424,4	8	15	18	24
22260-K-MB	AH2260G	136	17,2	280	300	540	140	5	468,8	12,5	23,5	8	26
23260-K-MB	AH3260G	192	24,6	280	300	540	192	5	458,7	12,5	23,5	8	34
23964-K-MB	AH3964G	41	11,4	300	320	440	90	3	406,2	9,5	17,7	7	21
23064-K-MB	AH3064G	77,1	15,8	300	320	480	121	4	432,6	9,5	17,7	8	27
24064-B-K30-MB	AH24064	103	16,6	300	320	480	160	4	424	8	15	18	24
23164-K-MB	AH3164G	159	23,6	300	320	540	176	5	466,2	12,5	23,5	8	31
24164-B-K30	AH24164	197	23,4	300	320	540	218	5	456,1	9,5	17,7	18	24
22264-K-MB	AH2264G	166	19,8	300	320	580	150	5	503,5	12,5	23,5	10	27
23264-K-MB	AH3264G	229	28,9	300	320	580	208	5	489,6	12,5	23,5	8	36
23068-K-MB	AH3068G	101	18,6	320	340	520	133	5	464,6	12,5	23,5	9	28
24068-B-K30-MB	AH24068	143	21,7	320	340	520	180	5	457,1	9,5	17,7	19	26
23168-B-K-MB	AH3168G	203	27,6	320	340	580	190	5	499,5	12,5	23,5	9	33
24168-B-K30	AH24168	260	27,9	320	340	580	243	5	481,1	9,5	17,7	19	26
23268-B-K-MB	AH3268G	291	33,7	320	340	620	224	6	521,2	12,5	23,5	9	38
23972-K-MB	AH3972G	45	12,8	340	360	480	90	3	447,1	9,5	17,7	7	21
23072-K-MB	AH3072G	107	20,4	340	360	540	134	5	485,2	12,5	23,5	9	30
23172-K-MB	AH3172G	217	29,9	340	360	600	192	5	520	12,5	23,5	9	35
24172-B-K30	AH24172	275	29,6	340	360	600	243	5	503,6	9,5	17,7	20	26
23272-B-K-MB	AH3272G	328	37,5	340	360	650	232	6	548,3	12,5	23,5	9	40
23976-K-MB	AH3976G	66,3	16	360	380	520	106	4	477,6	9,5	17,7	8	22
23076-B-K-MB	AH3076G	113	22,1	360	380	560	135	5	505,6	12,5	23,5	10	31
24076-B-K30-MB	AH24076	155	23,7	360	380	560	180	5	499	9,5	17,7	20	28
23176-K-MB	AH3176G	226	32,2	360	380	620	194	5	539,6	12,5	23,5	10	36
24176-B-K30	AH24176	277	31,3	360	380	620	243	5	525,8	9,5	17,7	20	28
23276-B-K-MB	AH3276G	367	41,5	360	380	680	240	6	576,4	12,5	23,5	10	42
23980-B-K-MB	AH3980G	68,2	16,9	380	400	540	106	4	499	9,5	17,7	8	22
23080-K-MB	AH3080G	143	25,4	380	400	600	148	5	540,5	12,5	23,5	10	33
24080-B-K30-MB	AH24080	196	27,1	380	400	600	200	5	530,9	12,5	23,5	20	28
23180-B-K-MB	AH3180G	261	35,3	380	400	650	200	6	567,2	12,5	23,5	10	38
24180-B-K30	AH24180	312	34,3	380	400	650	250	6	553,5	12,5	23,5	20	28
23280-B-K-MB	AH3280G	442	47,4	380	400	720	256	6	609,8	12,5	23,5	10	44



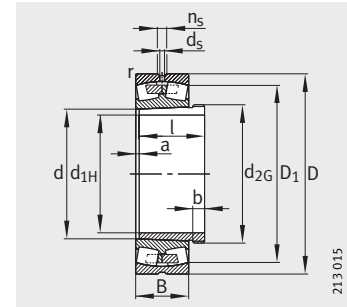
Mounting dimensions

Thread d _{2G}	l	Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C _{ur} N	Limiting speed n _G min ⁻¹	Reference speed n _B min ⁻¹
		d _a min.	D _a max.	r _a max.	C _r N	C _{0r} N	e	Y ₁	Y ₂	Y ₀			
Tr320X5	112	312,4	407,6	2,5	1 270 000	2 650 000	0,2	3,42	5,09	3,34	166 000	1 200	1 400
Tr320X5	145	314,6	445,4	3	1 960 000	3 650 000	0,25	2,69	4	2,63	223 000	1 100	980
Tr310X4	184	314,6	445,4	3	2 500 000	5 200 000	0,35	1,95	2,9	1,91	300 000	1 000	710
Tr320X5	192	320	480	4	2 650 000	4 900 000	0,33	2,06	3,06	2,01	270 000	1 100	730
Tr320X5	224	320	480	4	3 250 000	6 300 000	0,4	1,67	2,49	1,63	540 000	900	460
Tr320X5	170	320	520	4	2 750 000	4 400 000	0,27	2,47	3,67	2,41	300 000	1 000	900
Tr320X5	228	320	520	4	3 450 000	6 200 000	0,37	1,83	2,72	1,79	300 000	1 000	560
Tr340X5	112	332,4	427,6	2,5	1 320 000	2 750 000	0,19	3,62	5,39	3,54	202 000	1 100	1 300
Tr340X5	149	334,6	465,4	3	2 040 000	4 000 000	0,25	2,74	4,08	2,68	243 000	1 100	910
Tr330X5	184	334,6	465,4	3	2 600 000	5 400 000	0,33	2,06	3,06	2,01	360 000	950	660
Tr340X5	209	340	520	4	3 200 000	6 000 000	0,34	1,98	2,94	1,93	305 000	950	650
Tr340X5	242	340	520	4	3 800 000	7 350 000	0,41	1,65	2,46	1,61	530 000	850	415
Tr340X5	180	340	560	4	3 050 000	4 900 000	0,27	2,47	3,67	2,41	345 000	950	840
Tr340X5	246	340	560	4	3 900 000	6 950 000	0,37	1,8	2,69	1,76	330 000	950	520
Tr360X5	162	358	502	4	2 360 000	4 550 000	0,25	2,69	4	2,63	285 000	1 000	850
Tr360X5	206	358	502	4	3 100 000	6 550 000	0,34	1,98	2,94	1,93	530 000	850	600
Tr360X5	225	360	560	4	3 650 000	6 950 000	0,34	1,98	2,94	1,93	570 000	900	590
Tr360X5	269	360	560	4	4 400 000	8 500 000	0,43	1,56	2,32	1,53	680 000	800	380
Tr360X5	264	366	594	5	4 500 000	8 150 000	0,38	1,78	2,65	1,74	650 000	850	470
Tr380X5	112	372,4	467,6	2,5	1 430 000	3 200 000	0,17	4,05	6,04	3,96	209 000	1 000	1 130
Tr380X5	167	378	522	4	2 450 000	4 800 000	0,25	2,74	4,08	2,68	295 000	950	800
Tr380X5	229	380	580	4	3 800 000	7 350 000	0,33	2,06	3,06	2,01	360 000	850	560
Tr380X5	269	380	580	4	4 500 000	9 000 000	0,41	1,63	2,43	1,6	550 000	750	355
Tr380X5	274	386	624	5	4 900 000	9 150 000	0,38	1,78	2,65	1,74	720 000	800	425
Tr400X5	130	394,6	505,4	3	1 760 000	4 000 000	0,19	3,58	5,33	3,5	265 000	950	1 090
Tr400X5	170	398	542	4	2 550 000	5 300 000	0,24	2,84	4,23	2,78	430 000	900	740
Tr400X5	208	398	542	4	3 350 000	7 200 000	0,31	2,15	3,2	2,1	580 000	750	530
Tr400X5	232	400	600	4	4 050 000	8 150 000	0,32	2,12	3,15	2,07	385 000	800	510
Tr400X5	271	400	600	4	4 650 000	9 500 000	0,39	1,71	2,54	1,67	770 000	700	330
Tr400X5	284	406	654	5	5 300 000	9 800 000	0,37	1,8	2,69	1,76	780 000	750	400
Tr420X5	130	414,6	525,4	3	1 830 000	4 150 000	0,18	3,71	5,52	3,63	275 000	900	1 030
Tr420X5	183	418	582	4	3 050 000	6 200 000	0,24	2,79	4,15	2,73	365 000	800	680
Tr420X5	228	418	582	4	3 900 000	8 500 000	0,33	2,06	3,06	2,01	670 000	700	485
Tr420X5	240	426	624	5	4 250 000	8 500 000	0,31	2,15	3,2	2,1	670 000	750	490
Tr420X5	278	426	624	5	5 100 000	10 400 000	0,39	1,72	2,56	1,68	790 000	670	305
Tr420X5	302	426	694	5	5 700 000	10 800 000	0,38	1,78	2,65	1,74	820 000	700	375



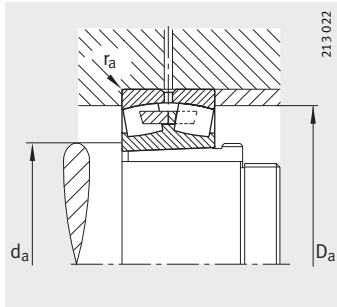
Spherical roller bearings

With extraction sleeve



With central rib

Dimension table (continued) · Dimensions in mm													
Designation		Mass m		Dimensions									
Bearing	Extraction sleeve	Bearing ≈kg	Extraction sleeve ≈kg	d _{1H}	d	D	B	r	D ₁	d _s	n _s	a	b
								min.	≈			≈	
23984-K-MB	AH3984G	78	17,8	400	420	560	106	4	519,5	9,5	17,7	8	22
23084-B-K-MB	AH3084G	155	27,2	400	420	620	150	5	560,7	12,5	23,5	10	34
24084-B-K30-MB	AH24084	214	29	400	420	620	200	5	550,2	12,5	23,5	22	30
23184-K-MB	AH3184G	339	42,3	400	420	700	224	6	605,4	12,5	23,5	10	40
24184-B-K30	AH24184	407	40,3	400	420	700	280	6	590,3	12,5	23,5	22	30
23284-B-K-MB	AH3284G	537	54	400	420	760	272	7,5	642,2	12,5	23,5	10	46
23988-K-MB	AH3988	98,3	21,2	420	440	600	118	4	552,8	12,5	23,5	8	25
23088-K-MB	AHX3088G	177	30,1	420	440	650	157	6	586,8	12,5	23,5	11	35
24088-B-K30-MB	AH24088	247	31,9	420	440	650	212	6	575,6	12,5	23,5	22	30
23188-K-MB	AHX3188G	378	45,3	420	440	720	226	6	626	12,5	23,5	11	42
24188-B-K30	AH24188	451	42,3	420	440	720	280	6	612,4	12,5	23,5	22	30
23288-B-K-MB	AHX3288G	586	58,8	420	440	790	280	7,5	669,3	12,5	23,5	11	48
23992-B-K-MB	AH3992	103	22,5	440	460	620	118	4	573,3	12,5	23,5	8	25
23092-B-K-MB	AHX3092G	204	33,1	440	460	680	163	6	612,2	12,5	23,5	11	37
23192-K-MB	AHX3192G	420	50,8	440	460	760	240	7,5	661,4	12,5	23,5	11	43
24192-B-K30-MB	AH24192	578	47,4	440	460	760	300	7,5	642,8	12,5	23,5	23	32
23292-K-MB	AHX3292G	699	66,2	440	460	830	296	7,5	701,6	12,5	23,5	11	50
23996-B-K-MB	AH3996	121	25,7	460	480	650	128	5	598,8	12,5	23,5	9	28
23096-K-MB	AHX3096G	208	35,2	460	480	700	165	6	632,6	12,5	23,5	12	38
24096-B-K30-MB	AH24096	289	36,6	460	480	700	218	6	625,4	12,5	23,5	23	32
23196-K-MB	AHX3196G	470	55,5	460	480	790	248	7,5	688,3	12,5	23,5	12	45
24196-B-K30-MB	AH24196	700	53,1	460	480	790	308	7,5	669,9	12,5	23,5	25	35
23296-K-MB	AHX3296G	806	73,3	460	480	870	310	7,5	734,8	12,5	23,5	12	52
239/500-K-MB	AH39/500	124	27,7	480	500	670	128	5	619,3	12,5	23,5	10	32
230/500-B-K-MB	AHX30/500	219	42,5	480	500	720	167	6	653,5	12,5	23,5	12	40
231/500-B-K-MB	AHX31/500	556	71,3	480	500	830	264	7,5	720,9	12,5	23,5	12	47
241/500-B-K30-MB	AH241/500	717	60,5	480	500	830	325	7,5	701,8	12,5	23,5	25	37
239/530-K-MB	AH39/530	146	43,4	500	530	710	136	5	656,4	12,5	23,5	10	37
230/530-K-MB	AH30/530A	291	61,8	500	530	780	185	6	703,7	12,5	23,5	12	45
231/530-K-MB	AH31/530A	643	93,4	500	530	870	272	7,5	756,3	12,5	23,5	12	53
241/530-B-K30-MB	AH241/530	845	89	500	530	870	335	7,5	739,1	12,5	23,5	25	40
239/560-B-K-MB	AH39/560	169	47	530	560	750	140	5	693,4	12,5	23,5	10	37
230/560-B-K-MB	AH30/560A	339	68,6	530	560	820	195	6	741,5	12,5	23,5	12	45
231/560-K-MB	AH31/560A	737	102	530	560	920	280	7,5	800,2	12,5	23,5	12	55
241/560-B-K30-MB	AH241/560	974	101	530	560	920	355	7,5	785	12,5	23,5	28	45



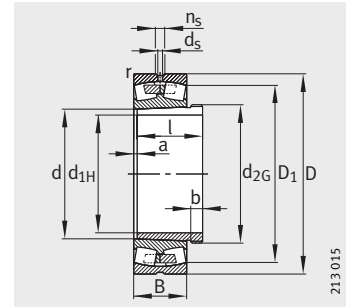
Mounting dimensions

Thread d_{2G}	l	Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
		d_a min.	D_a max.	r_a max.	C_r N	C_{0r} N	e	Y_1	Y_2	Y_0			
Tr440X5	130	434,6	545,4	3	1 900 000	4 500 000	0,18	3,85	5,73	3,76	300 000	850	970
Tr440X5	186	438	602	4	3 150 000	6 550 000	0,24	2,84	4,23	2,78	395 000	800	650
Tr440X5	230	438	602	4	4 000 000	8 800 000	0,32	2,13	3,17	2,08	710 000	670	460
Tr440X5	266	446	674	5	5 000 000	9 650 000	0,33	2,03	3,02	1,98	465 000	700	460
Tr440X5	310	446	674	5	6 200 000	12 700 000	0,4	1,67	2,49	1,63	980 000	630	270
Tr440X5	321	452	728	6	6 550 000	12 200 000	0,38	1,77	2,64	1,73	930 000	670	345
Tr460X5	145	454,6	585,4	3	2 240 000	5 200 000	0,18	3,66	5,46	3,58	295 000	800	930
Tr460X5	194	463	627	5	3 400 000	7 100 000	0,24	2,84	4,23	2,78	405 000	750	610
Tr460X5	242	463	627	5	4 300 000	9 650 000	0,32	2,12	3,15	2,07	750 000	630	435
Tr460X5	270	466	694	5	5 200 000	10 400 000	0,32	2,1	3,13	2,06	485 000	700	430
Tr460X5	310	466	694	5	6 400 000	13 200 000	0,38	1,76	2,62	1,72	1 020 000	600	255
Tr460X5	330	472	758	6	7 100 000	13 400 000	0,37	1,8	2,69	1,76	990 000	630	320
Tr480X5	145	474,6	605,4	3	2 280 000	5 400 000	0,18	3,85	5,73	3,76	370 000	750	880
Tr480X5	202	483	657	5	3 650 000	7 650 000	0,24	2,84	4,23	2,78	440 000	700	580
Tr480X5	285	492	728	6	5 850 000	11 600 000	0,32	2,12	3,15	2,07	530 000	630	400
Tr480X5	332	492	728	6	7 500 000	15 600 000	0,39	1,73	2,58	1,69	1 160 000	560	228
Tr480X5	349	492	798	6	7 800 000	15 000 000	0,37	1,8	2,69	1,76	620 000	600	295
Tr500X5	158	498	632	4	2 550 000	6 000 000	0,18	3,76	5,59	3,67	460 000	700	860
Tr500X5	205	503	677	5	3 800 000	8 150 000	0,23	2,9	4,31	2,83	455 000	670	550
Tr500X5	250	503	677	5	4 900 000	11 200 000	0,3	2,25	3,34	2,2	830 000	600	380
Tr500X5	295	512	758	6	6 300 000	12 700 000	0,32	2,12	3,15	2,07	570 000	630	375
Tr500X5	343	512	758	6	8 000 000	16 600 000	0,39	1,75	2,61	1,71	1 190 000	560	215
Tr500X5	364	512	838	6	8 800 000	17 000 000	0,37	1,83	2,72	1,79	700 000	600	270
Tr520X6	162	518	652	4	2 600 000	6 300 000	0,17	3,9	5,81	3,81	400 000	670	810
Tr540X6	209	523	697	5	3 900 000	8 500 000	0,22	3,01	4,48	2,94	510 000	670	520
Tr550X6	313	532	798	6	7 100 000	14 300 000	0,32	2,1	3,13	2,06	990 000	600	345
Tr520X6	362	532	798	6	8 650 000	18 300 000	0,39	1,73	2,58	1,69	1 340 000	530	200
Tr550X6	175	548	692	4	2 850 000	6 800 000	0,18	3,85	5,73	3,76	385 000	630	770
Tr560X6	230	553	757	5	4 400 000	9 500 000	0,22	3,04	4,53	2,97	540 000	600	490
Tr560X6	325	562	838	6	7 350 000	15 300 000	0,32	2,12	3,15	2,07	670 000	560	325
Tr550X6	375	562	838	6	9 500 000	20 000 000	0,38	1,77	2,64	1,73	1 450 000	500	184
Tr580X6	180	578	732	4	3 100 000	7 650 000	0,17	3,95	5,88	3,86	570 000	600	720
Tr590X6	240	583	797	5	5 100 000	11 000 000	0,23	2,95	4,4	2,89	740 000	560	450
Tr590X6	335	592	888	6	8 150 000	16 600 000	0,31	2,21	3,29	2,16	750 000	530	300
Tr580X6	400	592	888	6	10 600 000	22 400 000	0,38	1,77	2,64	1,73	1 600 000	480	169



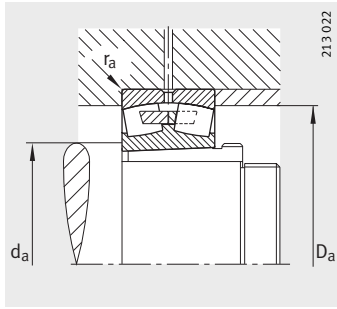
Spherical roller bearings

With extraction sleeve



With central rib

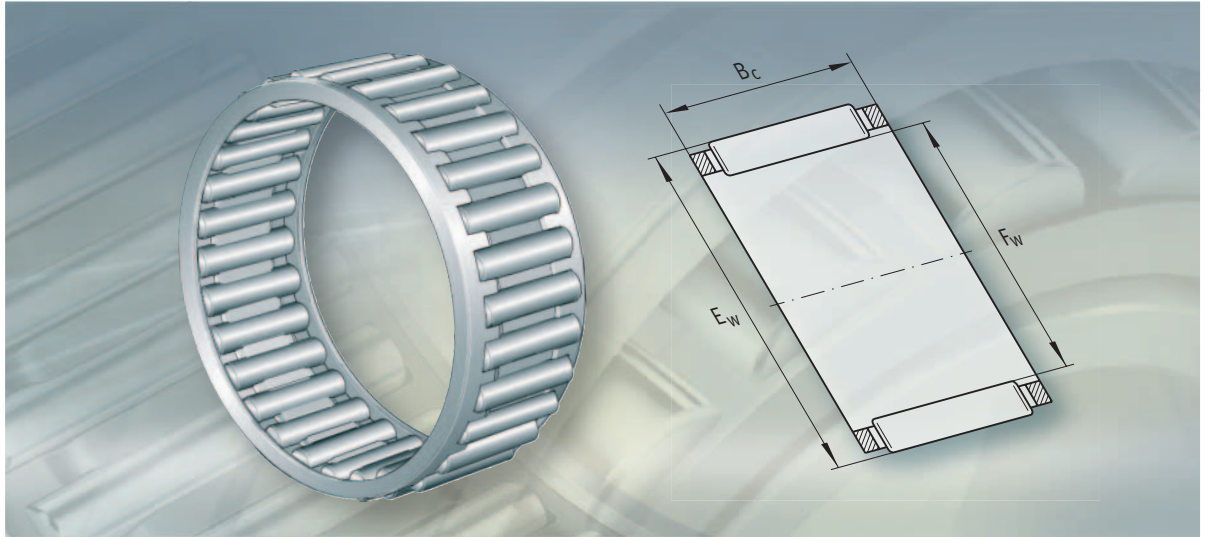
Dimension table (continued) · Dimensions in mm													
Designation		Mass m		Dimensions									
Bearing	Extraction sleeve	Bearing ≈kg	Extraction sleeve ≈kg	d _{1H}	d	D	B	r	D ₁	d _s	n _s	a	b
								min.	≈			≈	
239/600-B-K-MB	AH39/600	210	55,6	570	600	800	150	5	740,5	12,5	23,5	10	38
230/600-B-K-MB	AH30/600A	388	75,6	570	600	870	200	6	791,9	12,5	23,5	14	45
231/600-K-MB	AH31/600A	901	118	570	600	980	300	7,5	852,6	12,5	23,5	14	55
241/600-B-K30-MB	AH241/600	1 170	118	570	600	980	375	7,5	833	12,5	23,5	30	50
239/630-B-K-MB	AH39/630	283	64,7	600	630	850	165	6	784,5	12,5	23,5	12	40
230/630-B-K-MB	AH30/630A	502	87,8	600	630	920	212	7,5	834,3	12,5	23,5	14	46
240/630-B-K30-MB	AH240/630	649	95,1	600	630	920	290	7,5	817,9	12,5	23,5	30	45
241/630-B-K30-MB	AH241/630	1 360	133	600	630	1 030	400	7,5	872,2	12,5	23,5	30	50
239/670-B-K-MB	AH39/670	310	88	630	670	900	170	6	831,5	12,5	23,5	12	41
230/670-B-K-MB	AH30/670A	590	125	630	670	980	230	7,5	888,7	12,5	23,5	14	50
241/670-B-K30-MB	AH241/670	1 540	184	630	670	1 090	412	7,5	929,4	12,5	23,5	30	55
239/710-K-MB	AH39/710	336	102	670	710	950	180	6	877,5	12,5	23,5	12	43
230/710-B-K-MB	AH30/710A	650	136	670	710	1 030	236	7,5	938,8	12,5	23,5	16	50
240/710-B-K30-MB	AH240/710	873	153	670	710	1 030	315	7,5	921,6	12,5	23,5	33	50
241/710-B-K30-MB	AH241/710	1 820	209	670	710	1 150	438	9,5	982	12,5	23,5	26	45
239/750-K-MB	AH39/750	394	110	710	750	1 000	185	6	923,2	12,5	23,5	12	44
230/750-K-MB	AH30/750A	792	156	710	750	1 090	250	7,5	990,9	12,5	23,5	16	50
240/750-B-K30-MB	AH240/750	1 070	170	710	750	1 090	335	7,5	976,2	12,5	23,5	35	50
239/800-B-K-MB	AH39/800	490	146	750	800	1 060	195	6	983,7	12,5	23,5	12	45
230/800-K-MB	AH30/800A	861	200	750	800	1 150	258	7,5	1 050,9	12,5	23,5	18	50
239/850-K-MB	AH39/850	554	165	800	850	1 120	200	6	1 039,9	12,5	23,5	12	50
240/850-B-K30-MB	AH240/850	1 420	252	800	850	1 220	365	7,5	1 092,9	12,5	23,5	40	53
239/900-K-MB	AH39/900	641	180	850	900	1 180	206	6	1 098,8	12,5	23,5	12	51



Mounting dimensions

Thread d_{2G}	l	Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
		d_a	D_a	r_a	C_r	C_{Or}	e	Y_1	Y_2	Y_0			
		min.	max.	max.	N	N							
Tr625X6	192	618	782	4	3 450 000	8 650 000	0,17	3,95	5,88	3,86	630 000	560	670
Tr630X6	245	623	847	5	5 700 000	12 500 000	0,22	3,07	4,57	3	890 000	530	405
Tr630X6	355	632	948	6	9 000 000	19 300 000	0,31	2,2	3,27	2,15	810 000	500	270
Tr625X6	425	632	948	6	11 600 000	26 000 000	0,38	1,79	2,67	1,75	1 780 000	450	149
Tr655X6	210	653	827	5	4 050 000	9 800 000	0,18	3,8	5,66	3,72	710 000	530	650
Tr670X6	258	658	892	6	6 300 000	13 700 000	0,22	3,01	4,48	2,94	890 000	500	385
Tr655X6	335	658	892	6	8 000 000	19 000 000	0,31	2,21	3,29	2,16	1 350 000	480	265
Tr655X6	450	662	998	6	12 900 000	29 000 000	0,38	1,78	2,65	1,74	1 960 000	450	138
Tr695X6	216	693	877	5	4 300 000	10 600 000	0,17	3,95	5,88	3,86	750 000	500	600
Tr710X7	280	698	952	6	7 200 000	16 000 000	0,22	3,01	4,48	2,94	1 100 000	480	350
Tr710X7	467	702	1 058	6	14 000 000	31 500 000	0,37	1,83	2,72	1,79	2 120 000	430	127
Tr740X7	228	733	927	5	4 800 000	12 000 000	0,18	3,85	5,73	3,76	720 000	480	570
Tr750X7	286	738	1 002	6	7 650 000	17 000 000	0,22	3,07	4,57	3	1 140 000	480	330
Tr740X7	365	738	1 002	6	9 500 000	22 800 000	0,3	2,26	3,37	2,21	1 550 000	430	226
Tr740X7	483	750	1 110	8	15 600 000	35 500 000	0,38	1,79	2,67	1,75	2 340 000	400	116
Tr780X7	234	773	977	5	5 200 000	12 900 000	0,17	3,95	5,88	3,86	790 000	480	540
Tr800X7	300	778	1 062	6	8 500 000	19 000 000	0,22	3,01	4,48	2,94	1 010 000	450	305
Tr800X7	385	778	1 062	6	10 800 000	26 000 000	0,3	2,26	3,37	2,21	1 730 000	400	206
Tr830X7	245	823	1 037	5	5 850 000	15 000 000	0,17	4,05	6,04	3,96	1 010 000	450	500
Tr850X7	308	828	1 122	6	9 300 000	21 200 000	0,22	3,07	4,57	3	1 430 000	430	280
Tr880X7	258	873	1 097	5	6 300 000	16 300 000	0,16	4,11	6,12	4,02	960 000	430	465
Tr900X7	418	878	1 192	6	12 900 000	32 000 000	0,29	2,33	3,47	2,28	2 060 000	480	173
Tr930X8	265	923	1 157	5	6 550 000	17 300 000	0,16	4,28	6,37	4,19	1 010 000	400	440





Needle roller and cage assemblies

Needle roller and cage assemblies

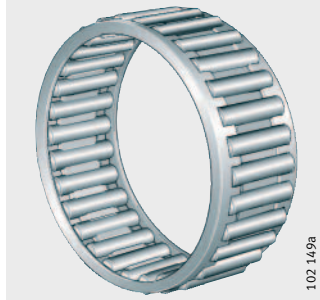
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Product overview Needle roller and cage assemblies

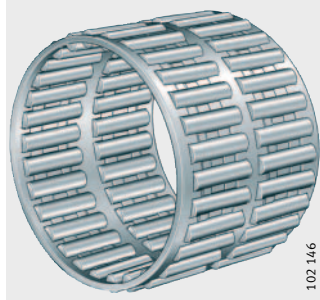
Single row

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Double row

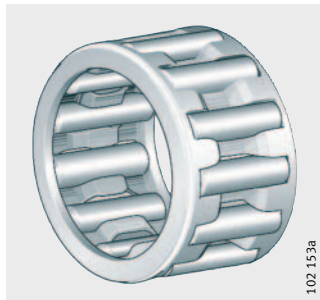
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Other products

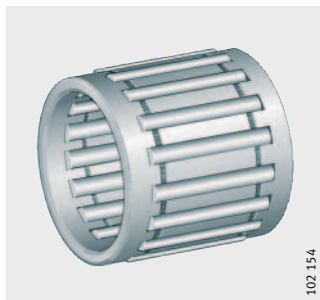
Needle roller and cage assemblies
for crank pin bearing arrangements

KZK



Needle roller and cage assemblies
for piston pin bearing arrangements

KBK



Needle roller and cage assemblies

- Features** Needle roller and cage assemblies are single or double row units comprising cages and needle rollers. The single row design is based on DIN 5 405-1.
- Very small cross-section height** Since the radial section height of needle roller and cage assemblies corresponds to the needle roller diameter, they permit bearing arrangements with a very small radial design envelope. They have high load carrying capacity, are suitable for high speeds and are particularly easy to fit.
- If the raceways are produced to high geometrical accuracy, bearing arrangements with high runout accuracy can be achieved. The radial internal clearance can be influenced by the needle roller sort as well as by the shaft and housing tolerances. Needle roller and cage assemblies require a hardened and ground raceway on the shaft and in the housing.

- Double row** Double row needle roller and cage assemblies are only available in particular enveloping circle diameters F_W . These are indicated by the suffix ZW.

- Needle rollers** Needle roller and cage assemblies are supplied with standard needle roller sorts according to the table. A needle roller and cage assembly contains needle rollers of one sort only. The sort is printed on the packaging and is colour coded according to the table.
- The sorts are indicated by the upper and lower deviation (in μm), the maximum diameter tolerance is $2 \mu\text{m}$, see table. Every two neighbouring sorts are matched as sort pairs.

Standard needle roller sorts

Sort pair Colour code	Needle roller sorts μm
Red	0 -2 / -1 -3
Blue	-2 -4 / -3 -5
White (grey)	-4 -6 / -5 -7

- Special needle roller sorts** The following sort pairs are available as special designs in accordance with the table.

Needle roller sorts

Sort pair Colour code	Needle roller sorts μm
Green	-6 -8 / -7 -9
Yellow	-8 -10 / -9 -11



Operating temperature

Needle roller and cage assemblies with plastic cage can be used at operating temperatures from $-20 \text{ }^\circ\text{C}$ to $+120 \text{ }^\circ\text{C}$.

Cages

Needle roller and cage assemblies are available with plastic cages and sheet steel cages. Plastic cages have the suffix TV and are only available in particular sizes.

Other products

Needle roller and cage assemblies are also available in designs for connecting rod bearing arrangements:

- series KZK for crank pin bearing arrangements
- series KBK for piston pin bearing arrangements.

These needle roller and cage assemblies are described in detail in Technical Product Information TPI 94.

Needle roller and cage assemblies

Suffixes Suffixes for available designs: see table.

Available designs

Suffix	Description
TV	Cage made from glass fibre reinforced polyamide 66 ¹⁾
ZW	Double row design ²⁾

1) Bearings with plastic cage: see dimension table.

2) Available in particular sizes only.

Design and safety guidelines

Raceway design

Where needle roller and cage assemblies are to be used, the housing bore and the shaft raceway must be hardened and ground. The surface hardness of the raceways must be 670 HV + 170 HV and the hardening depth CHD or Rht must be sufficiently large.

Design of raceways: see table and section Design of bearing arrangements, from page 154.

Raceway design

Shaft diameter		Bore tolerance	Shaft tolerance			Roughness	Roundness	Parallelism
Nominal dimension mm			Operating clearance					
over	incl.		Small	Normal	Large	max.	max.	max.
-	80	G6	j5	h5	g6	R _a 0,2 (R _z 1)	25% of diameter tolerance	50%
		H6	h5	g5	f6			
80	120	G6	h5	g5	f6	R _a 0,3 (R _z 1,6)		
120	-	G6	h5	g5	f6	R _a 0,4 (R _z 2,5)		
		H6	-	f5	e6			

Raceway width

The raceway width must be at least equal to the cage width B_c (B_c is produced with a minus (-) tolerance); for B_c , see dimension tables. The axial location distance should therefore be tolerated to H12, *Figure 1*.

Caution! The axial running surfaces for the needle roller and cage assemblies must be precision machined (R_a2 recommended) and resistant to wear.

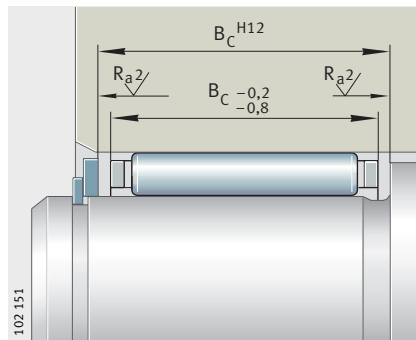


Figure 1
Raceway width and axial running surfaces

Axial location

Caution! Needle roller and cage assemblies must be axially located.

Needle roller and cage assemblies must be located by means of snap rings or an appropriate adjacent construction design, *Figure 1* and *Figure 2*.

If location is by means of a snap ring or retaining ring, a washer must be arranged in front of the ring. It must be ensured that there is sufficient interference between the retaining ring and washer.

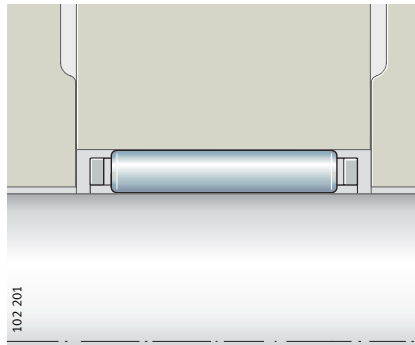


Figure 2
Axial location by adjacent construction

Accuracy

The width of the needle roller and cage assembly $B_c^{-0,2}_{-0,8}$ corresponds to DIN 5 405-1.
 B_c : see dimension tables.

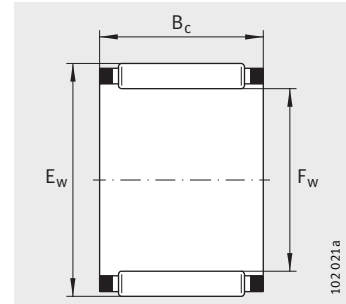
Radial internal clearance

A radial internal clearance of C2 to CN is achieved with standard needle roller sorts if the shaft and housing tolerances are in accordance with the table Raceway design, page 592.
If the actual values are on the plus side, a radial internal clearance of 0 can be achieved.



Needle roller and cage assemblies

Single row



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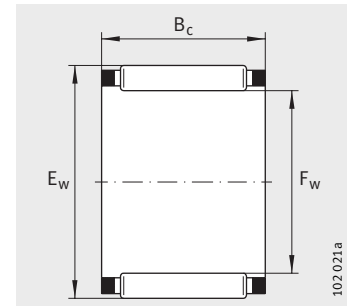
Dimension table · Dimensions in mm									
Designation	Mass m ≈g	Dimensions			Basic load ratings		Fatigue limit load C _{ur} N	Limiting speed n _G min ⁻¹	Reference speed n _B min ⁻¹
		F _w	E _w	B _c	dyn. C _r N	stat. C _{0r} N			
K3X5X7-TV	0,3	3	5	7	1 540	1 290	152	50 000	78 000
K3X5X9-TV	0,4	3	5	9	1 710	1 480	188	50 000	80 000
K3X6X7-TV	0,4	3	6	7	1 430	970	109	47 000	75 000
K4X7X7-TV	0,5	4	7	7	1 740	1 270	145	42 500	59 000
K4X7X10-TV	0,7	4	7	10	2 330	1 840	236	42 500	59 000
K5X8X8-TV	0,7	5	8	8	2 350	1 920	237	39 000	48 000
K5X8X10-TV	0,9	5	8	10	3 000	2 650	350	39 000	47 000
K6X9X8-TV	0,8	6	9	8	2 600	2 280	285	36 500	41 000
K6X9X10-TV	1,1	6	9	10	3 350	3 150	420	36 500	40 000
K6X10X13-TV	1,9	6	10	13	3 800	3 100	395	35 500	40 000
K7X9X7-TV	0,6	7	9	7	1 730	1 770	215	35 500	40 000
K7X10X8-TV	0,9	7	10	8	2 850	2 650	330	34 500	36 000
K7X10X10-TV	1	7	10	10	3 650	3 600	485	34 500	35 000
K8X11X8-TV	1	8	11	8	3 100	3 000	375	32 500	32 000
K8X11X10-TV	1,2	8	11	10	3 950	4 100	560	32 500	31 000
K8X11X13-TV	1,7	8	11	13	5 100	5 800	790	32 500	30 500
K8X12X10-TV	2	8	12	10	5 000	4 700	560	31 500	29 000
K9X12X10-TV	1,5	9	12	10	4 500	5 000	680	31 000	27 500
K9X12X13-TV	2,1	9	12	13	5 900	7 100	970	31 000	27 000
K10X13X10-TV	1,6	10	13	10	4 750	5 500	750	29 500	24 900
K10X13X13-TV	2,3	10	13	13	6 200	7 800	1 060	29 500	24 400
K10X13X16-TV	2,9	10	13	16	7 100	9 300	1 310	29 500	24 600
K10X14X10-TV	2,5	10	14	10	5 800	6 000	720	29 000	23 500
K10X14X13-TV	4,6	10	14	13	7 500	8 400	1 020	29 000	23 000
K10X16X12-TV	5,5	10	16	12	8 100	7 200	1 000	27 500	21 800
K12X15X10-TV	2,9	12	15	10	4 900	6 100	830	27 000	21 500
K12X15X13-TV	2,3	12	15	13	6 400	8 500	1 170	27 000	21 100
K12X16X13-TV	5,5	12	16	13	8 000	9 400	1 150	26 500	19 900
K12X17X13-TV	4,9	12	17	13	9 600	10 400	1 330	26 500	18 800
K12X18X12-TV	6	12	18	12	10 000	9 900	1 400	26 000	18 100

Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈g	Dimensions			Basic load ratings		Fatigue limit load C _{ur} N	Limiting speed n _G min ⁻¹	Reference speed n _B min ⁻¹
		F _w	E _w	B _c	dyn. C _r N	stat. C _{0r} N			
K14X18X10	4	14	18	10	7 100	8 500	1 060	25 000	17 300
K14X18X13	6,5	14	18	13	8 200	10 100	1 320	25 000	17 700
K14X18X15-TV	5	14	18	15	9 500	12 300	1 540	25 000	17 400
K14X18X17	8	14	18	17	10 800	14 400	1 890	25 000	17 300
K14X20X12	8,5	14	20	12	10 300	10 600	1 490	24 300	16 200
K15X18X17-TV	4,6	15	18	17	8 000	12 100	1 730	24 600	17 700
K15X19X10	5	15	19	10	7 500	9 200	1 140	24 300	16 200
K15X19X13	7	15	19	13	8 500	10 900	1 420	24 300	16 600
K15X19X17	9,5	15	19	17	11 300	15 600	2 040	24 300	16 200
K15X20X13	7	15	20	13	9 900	11 500	1 430	23 900	15 900
K15X21X15	11	15	21	15	14 300	16 400	2 210	23 600	14 700
K15X21X21	17	15	21	21	19 400	24 300	3 300	23 600	14 400
K16X20X10	5,5	16	20	10	7 800	9 900	1 230	23 600	15 200
K16X20X13	7,5	16	20	13	8 900	11 800	1 530	23 600	15 600
K16X20X17	10	16	20	17	11 700	16 800	2 190	23 600	15 200
K16X22X12	10	16	22	12	11 500	12 500	1 780	22 900	14 300
K16X22X16	12	16	22	16	14 800	17 500	2 390	22 900	14 100
K16X22X20	17	16	22	20	18 300	22 800	3 050	22 900	14 000
K16X24X20	22	16	24	20	21 400	23 500	2 950	22 400	13 200
K17X21X10	5,5	17	21	10	8 100	10 600	1 310	22 900	14 400
K17X21X13	6,5	17	21	13	10 400	14 600	1 810	22 900	14 100
K17X21X17	9,5	17	21	17	12 200	17 900	2 350	22 900	14 400
K18X22X10	6	18	22	10	8 400	11 300	1 400	22 400	13 600
K18X22X13	8	18	22	13	9 200	12 700	1 650	22 400	14 200
K18X22X17	11	18	22	17	12 100	18 000	2 360	22 400	13 900
K18X24X12	12	18	24	12	12 800	14 900	2 120	21 800	12 700
K18X24X13	13	18	24	13	13 100	15 300	1 990	21 800	12 900
K18X24X20	18	18	24	20	20 200	27 000	3 550	21 800	12 400
K18X25X22	23	18	25	22	23 100	29 000	3 750	21 600	12 200
K19X23X13	8	19	23	13	9 500	13 500	1 760	21 800	13 500
K19X23X17	11	19	23	17	12 500	19 200	2 500	21 800	13 200



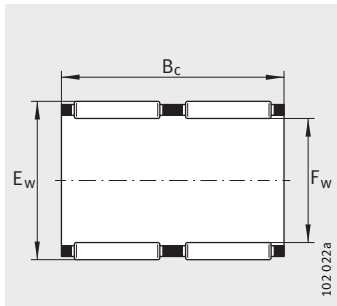
Needle roller and cage assemblies

Single row and double row



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Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈g	Dimensions			Basic load ratings		Fatigue limit load C _{ur} N	Limiting speed n _G min ⁻¹	Reference speed n _B min ⁻¹
		F _w	E _w	B _c	dyn. C _r N	stat. C _{0r} N			
K20X24X10	6,5	20	24	10	8 900	12 600	1 570	21 300	12 400
K20X24X13	9	20	24	13	9 800	14 300	1 860	21 300	12 800
K20X24X17	12	20	24	17	12 900	20 400	2 650	21 300	12 500
K20X26X12	11	20	26	12	13 400	16 200	2 310	20 900	11 700
K20X26X13	12	20	26	13	14 400	17 900	2 330	20 900	11 600
K20X26X17	16	20	26	17	19 200	26 000	3 300	20 900	11 200
K20X26X20	19	20	26	20	21 100	29 000	3 850	20 900	11 400
K20X28X16	20	20	28	16	19 800	22 400	3 000	20 400	11 100
K20X28X20	27	20	28	20	23 900	28 500	3 600	20 400	11 100
K20X28X25	32	20	28	25	30 500	39 000	5 300	20 400	10 800
K20X30X30	49	20	30	30	35 500	41 500	5 500	19 600	10 800
K21X25X13	9	21	25	13	10 100	15 100	1 970	20 900	12 300
K22X26X10	7,5	22	26	10	9 100	13 400	1 670	20 400	11 500
K22X26X13	9,5	22	26	13	10 400	15 900	2 080	20 400	11 800
K22X26X17	12	22	26	17	13 700	22 700	3 000	20 400	11 500
K22X28X17	18	22	28	17	19 400	27 000	3 450	19 600	10 500
K22X29X16	16	22	29	16	20 000	25 500	3 350	19 200	10 300
K22X30X15-TV	18	22	30	15	20 100	23 400	3 050	18 800	10 200
K22X32X24	43	22	32	24	34 000	40 000	4 900	18 100	9 700
K23X35X16-TV	29	23	35	16	24 500	23 900	2 950	16 900	9 500
K24X28X10	8,5	24	28	10	9 600	14 800	1 840	18 800	10 600
K24X28X13	10	24	28	13	11 000	17 600	2 290	18 800	10 800
K24X28X17	13	24	28	17	14 500	25 000	3 300	18 800	10 600
K24X30X17	19	24	30	17	19 500	27 500	3 500	18 100	10 000
K24X30X31-ZW	32	24	30	31	27 500	43 500	5 800	18 100	10 400



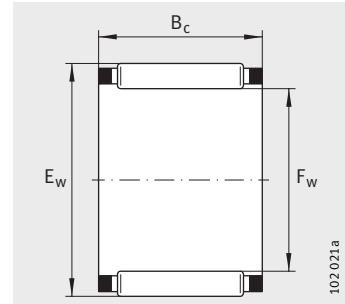
K..-ZW

Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈g	Dimensions			Basic load ratings		Fatigue limit load C _{ur} N	Limiting speed n _G min ⁻¹	Reference speed n _B min ⁻¹
		F _w	E _w	B _c	dyn. C _r N	stat. C _{0r} N			
K25X29X10	8,5	25	29	10	9 900	15 400	1 930	18 100	10 200
K25X29X13	11	25	29	13	11 300	18 400	2 400	18 100	10 400
K25X29X17	14	25	29	17	14 900	26 000	3 450	18 100	10 200
K25X30X17	16	25	30	17	18 700	30 000	3 850	17 800	9 600
K25X30X20	18	25	30	20	21 700	36 500	4 850	17 800	9 500
K25X30X26-ZW	19	25	30	26	21 400	35 500	4 500	17 800	10 400
K25X31X17	19	25	31	17	19 600	28 500	3 600	17 500	9 600
K25X31X21	20	25	31	21	24 700	38 000	5 100	17 500	9 400
K25X32X16	21	25	32	16	20 800	27 500	3 750	17 200	9 400
K25X33X20	33	25	33	20	28 500	38 000	4 850	16 900	9 000
K25X33X24	39	25	33	24	34 000	47 000	6 300	16 900	8 900
K25X35X30	65	25	35	30	47 000	62 000	8 300	16 300	8 500
K26X30X13	11	26	30	13	11 600	19 200	2 500	17 500	10 100
K26X30X17	15	26	30	17	15 200	27 500	3 600	17 500	9 800
K26X30X22-ZW	12	26	30	22	15 700	28 500	3 550	17 500	10 400
K28X33X13	13	28	33	13	15 300	24 200	3 100	16 100	9 800
K28X33X17	17	28	33	17	19 700	33 500	4 250	16 100	8 700
K28X34X17	24	28	34	17	21 800	33 500	4 300	15 800	8 600
K28X35X16	24	28	35	16	21 500	29 500	3 950	15 600	8 700
K28X35X18	27	28	35	18	24 000	34 000	4 700	15 600	8 600
K28X40X25	70	28	40	25	45 500	55 000	6 600	14 400	7 700
K30X34X13	14	30	34	13	12 300	21 700	2 850	15 300	8 900
K30X35X13	14	30	35	13	15 600	25 500	3 250	15 100	8 400
K30X35X17	19	30	35	17	19 600	34 000	4 300	15 100	8 300
K30X35X27	30	30	35	27	30 500	59 000	8 500	15 100	8 100
K30X37X16	27	30	37	16	23 100	33 500	4 450	14 600	8 000
K30X37X18	30	30	37	18	26 000	38 500	5 300	14 600	8 000
K30X40X18	48	30	40	18	32 000	40 000	5 000	14 000	7 600
K30X40X30	73	30	40	30	49 000	69 000	9 200	14 000	7 500



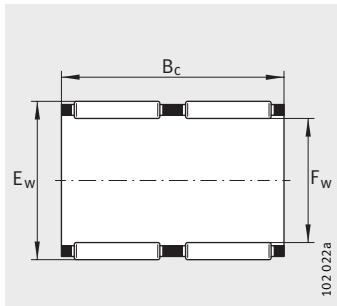
Needle roller and cage assemblies

Single row and double row



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Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈g	Dimensions			Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
		F_w	E_w	B_c	dyn. C_r N	stat. C_{0r} N			
K32X37X13	18	32	37	13	15 500	25 500	3 300	14 200	8 100
K32X37X17	19	32	37	17	19 900	35 500	4 500	14 200	7 900
K32X37X27	30	32	37	27	30 000	60 000	8 500	14 200	7 800
K32X38X20	30	32	38	20	26 500	45 000	6 000	14 000	7 700
K32X39X16	37	32	39	16	23 800	35 500	4 700	13 800	7 600
K32X39X18	31	32	39	18	26 500	41 000	5 600	13 800	7 500
K32X40X25	49	32	40	25	37 500	58 000	7 900	13 600	7 400
K32X40X42-ZW-TV	77	32	40	42	50 000	84 000	10 500	13 600	7 800
K32X46X32	119	32	46	32	66 000	84 000	11 100	12 600	6 700
K35X40X13	19	35	40	13	16 200	28 000	3 600	13 100	7 500
K35X40X17	21	35	40	17	20 800	38 500	4 900	13 100	7 400
K35X40X25	31	35	40	25	29 500	60 000	8 400	13 100	7 200
K35X40X27-TV	39	35	40	27	25 000	48 500	6 700	13 100	7 900
K35X42X16	34	35	42	16	24 400	37 500	5 000	12 700	7 100
K35X42X18	34	35	42	18	27 500	43 000	6 000	12 700	7 100
K35X42X20	37	35	42	20	30 000	49 000	6 200	12 700	7 000
K35X42X30	67	35	42	30	39 000	68 000	9 400	12 700	7 200
K35X45X20	56	35	45	20	37 000	50 000	6 500	12 300	6 800
K35X45X30	80	35	45	30	53 000	79 000	10 500	12 300	6 700
K37X42X17	22	37	42	17	22 400	43 000	5 500	12 400	6 900
K38X43X17	29	38	43	17	20 500	38 500	4 850	12 100	7 000
K38X43X27	43	38	43	27	31 500	68 000	9 600	12 100	6 800
K38X46X20	47	38	46	20	35 500	57 000	7 200	11 700	6 300
K38X46X32	76	38	46	32	55 000	99 000	14 200	11 700	6 200
K39X44X26-ZW	45	39	44	26	27 500	56 000	7 100	11 800	7 000



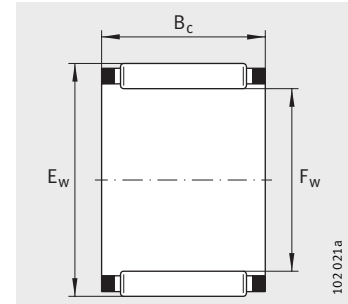
K..-ZW

Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈ g	Dimensions			Basic load ratings		Fatigue limit load C _{ur} N	Limiting speed n _G min ⁻¹	Reference speed n _B min ⁻¹
		F _w	E _w	B _c	dyn. C _r N	stat. C _{0r} N			
K40X45X13	22	40	45	13	17 600	32 500	4 200	11 500	6 600
K40X45X17	31	40	45	17	21 400	41 500	5 200	11 500	6 700
K40X45X27	46	40	45	27	33 000	73 000	10 300	11 500	6 500
K40X47X18	39	40	47	18	29 500	50 000	6 900	11 300	6 300
K40X47X20	42	40	47	20	32 500	57 000	7 200	11 300	6 200
K40X48X20	49	40	48	20	36 000	59 000	7 500	11 100	6 100
K42X47X13	18	42	47	13	17 800	33 500	4 350	11 000	6 400
K42X47X17	32	42	47	17	21 700	43 000	5 400	11 000	6 400
K42X47X30-ZW	54	42	47	30	33 500	76 000	10 000	11 000	6 400
K42X50X20	53	42	50	20	35 000	57 000	7 300	10 700	6 000
K43X48X17	30	43	48	17	21 600	43 000	5 400	10 800	6 300
K43X48X27	50	43	48	27	33 500	75 000	10 700	10 800	6 200
K45X50X17	34	45	50	17	22 500	46 000	5 800	10 300	6 100
K45X50X27	51	45	50	27	34 500	80 000	11 400	10 300	5 900
K45X52X18	42	45	52	18	31 500	57 000	7 900	10 100	5 700
K45X53X20	55	45	53	20	39 000	67 000	8 700	10 000	5 500
K45X53X21	60	45	53	21	38 500	67 000	8 600	10 000	5 600
K45X53X28	81	45	53	28	52 000	98 000	13 700	10 000	5 400
K45X59X18-TV	72	45	59	18	44 000	54 000	6 900	9 400	5 400
K45X59X32	148	45	59	32	73 000	103 000	13 800	9 400	5 300
K47X52X17	35	47	52	17	23 300	49 000	6 100	9 900	5 800
K47X52X27	51	47	52	27	35 000	83 000	11 800	9 900	5 700



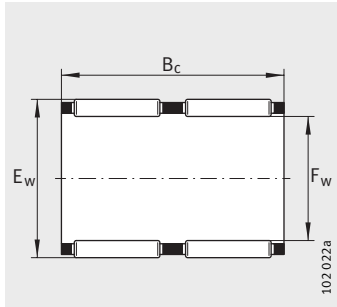
Needle roller and cage assemblies

Single row and double row



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Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈g	Dimensions			Basic load ratings		Fatigue limit load C _{ur} N	Limiting speed n _G min ⁻¹	Reference speed n _B min ⁻¹
		F _w	E _w	B _c	dyn. C _r N	stat. C _{0r} N			
K50X55X13,5	30	50	55	13,5	18 200	36 500	4 600	9 300	5 700
K50X55X17	35	50	55	17	22 100	47 000	7 300	9 300	5 700
K50X55X20	43	50	55	20	26 500	60 000	7 800	9 300	5 500
K50X55X30	65	50	55	30	39 000	97 000	13 900	9 300	5 400
K50X57X18	47	50	57	18	33 500	63 000	8 800	9 200	5 200
K50X58X20	75	50	58	20	35 500	62 000	8 800	9 100	5 400
K50X58X25	90	50	58	25	44 000	81 000	10 800	9 100	5 300
K52X57X12	24	52	57	12	18 000	36 500	4 600	9 000	5 400
K55X60X20	40	55	60	20	28 500	66 000	8 600	8 500	5 100
K55X60X27	60	55	60	27	38 000	97 000	13 600	8 500	4 950
K55X60X30	71	55	60	30	41 000	108 000	15 400	8 500	4 950
K55X62X18	52	55	62	18	35 500	70 000	9 800	8 400	4 750
K55X63X20	67	55	63	20	40 000	74 000	9 500	8 300	4 800
K55X63X25	80	55	63	25	51 000	101 000	13 700	8 300	4 700
K55X63X32	102	55	63	32	62 000	130 000	18 600	8 300	4 650
K58X65X18	52	58	65	18	35 000	70 000	9 800	8 000	4 650
K58X65X36-ZW	127	58	65	36	49 000	107 000	14 600	8 000	5 100
K60X65X20	52	60	65	20	29 500	72 000	9 300	7 800	4 750
K60X65X30	77	60	65	30	42 500	116 000	16 600	7 800	4 650
K60X66X33-ZW	104	60	66	33	46 000	112 000	15 100	7 800	4 800
K60X66X40-ZW	116	60	66	40	58 000	151 000	19 900	7 800	4 650
K60X68X20	71	60	68	20	43 500	85 000	11 000	7 700	4 400
K60X68X23	94	60	68	23	49 500	101 000	13 500	7 700	4 350
K60X68X25	89	60	68	25	53 000	111 000	15 200	7 700	4 350
K60X68X30-ZW	129	60	68	30	44 500	88 000	11 300	7 700	4 950
K60X75X42	240	60	75	42	118 000	199 000	27 000	7 300	4 050
K62X70X40-ZW	174	62	70	40	66 000	146 000	20 500	7 400	4 550
K64X70X16	53	64	70	16	28 000	60 000	8 100	7 300	4 500



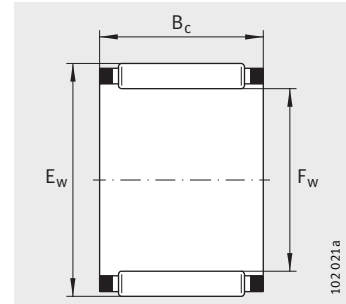
K..-ZW

Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈g	Dimensions			Basic load ratings		Fatigue limit load C _{ur} N	Limiting speed n _G min ⁻¹	Reference speed n _B min ⁻¹
		F _w	E _w	B _c	dyn. C _r N	stat. C _{0r} N			
K65X70X20	56	65	70	20	30 500	77 000	10 000	7 300	4 450
K65X70X30	83	65	70	30	44 000	124 000	17 800	7 300	4 350
K65X73X23	108	65	73	23	46 000	94 000	12 200	7 100	4 300
K65X73X30	141	65	73	30	57 000	123 000	17 100	7 100	4 300
K68X74X20	71	68	74	20	35 500	84 000	11 000	6 900	4 200
K68X74X30	100	68	74	30	46 500	118 000	16 900	6 900	4 300
K68X74X35-ZW	120	68	74	35	48 500	125 000	17 200	6 900	4 450
K70X76X20	71	70	76	20	36 000	86 000	11 300	6 700	4 100
K70X76X30	110	70	76	30	52 000	139 000	20 100	6 700	4 000
K70X78X30	148	70	78	30	60 000	135 000	18 800	6 600	4 000
K72X80X20	98	72	80	20	41 500	85 000	11 900	6 400	4 050
K73X79X20	75	73	79	20	37 000	90 000	11 800	6 400	4 000
K75X81X20	79	75	81	20	37 500	94 000	12 300	6 300	3 850
K75X81X30	114	75	81	30	52 000	143 000	20 400	6 300	3 850
K75X83X23	124	75	83	23	50 000	109 000	14 200	6 200	3 800
K75X83X30	147	75	83	30	62 000	143 000	20 000	6 200	3 800
K75X83X35-ZW	182	75	83	35	63 000	147 000	19 900	6 200	3 950
K75X83X40-ZW	211	75	83	40	73 000	177 000	25 000	6 200	3 900
K80X86X20	60	80	86	20	38 500	98 000	12 900	5 900	3 700
K80X88X30	138	80	88	30	71 000	176 000	25 000	5 800	3 400
K80X88X40-ZW	227	80	88	40	76 000	192 000	27 000	5 800	3 700
K80X88X46-ZW	260	80	88	46	88 000	231 000	30 000	5 800	3 650
K85X92X20	102	85	92	20	44 500	108 000	15 100	5 500	3 450
K90X97X20	109	90	97	20	45 000	113 000	15 800	5 200	3 300
K90X98X27	150	90	98	27	61 000	150 000	20 300	5 200	3 300
K90X98X30	172	90	98	30	68 000	172 000	24 000	5 200	3 300
K95X103X30	165	95	103	30	69 000	180 000	25 000	4 950	3 150
K95X103X40-ZW	266	95	103	40	83 000	228 000	32 500	4 950	3 200



Needle roller and cage assemblies

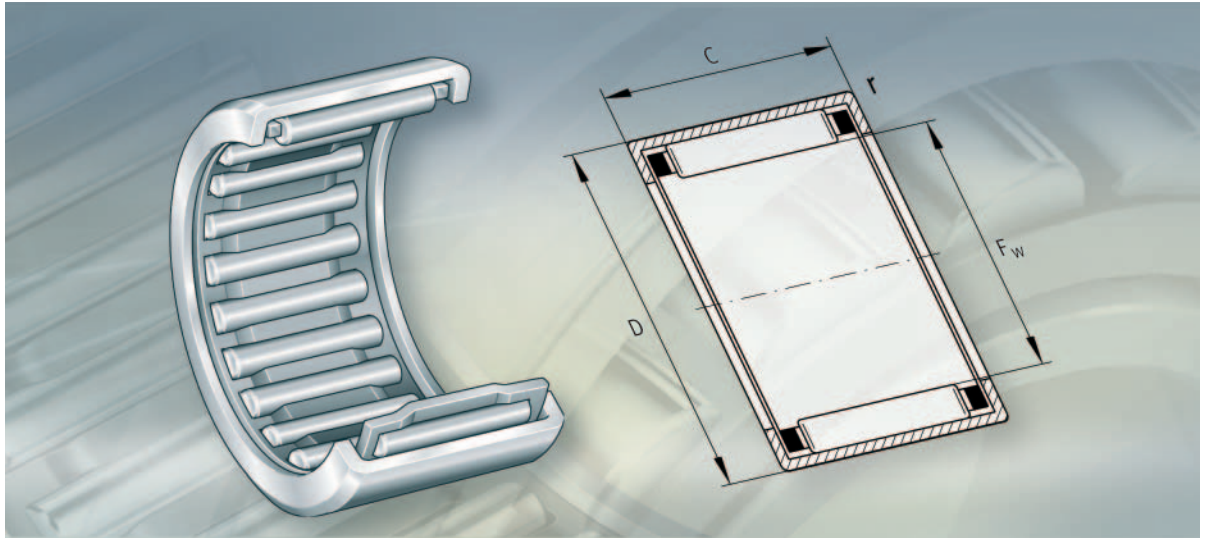
Single row



K

Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈g	Dimensions			Basic load ratings		Fatigue limit load C _{ur} N	Limiting speed n _G min ⁻¹	Reference speed n _B min ⁻¹
		F _w	E _w	B _c	dyn. C _r N	stat. C _{0r} N			
K100X107X21	120	100	107	21	48 000	127 000	17 600	4 750	3 100
K100X108X27	185	100	108	27	57 000	143 000	18 900	4 700	3 200
K100X108X30	180	100	108	30	71 000	188 000	26 000	4 700	3 050
K105X112X21	129	105	112	21	47 500	127 000	17 400	4 500	3 000
K110X117X24	172	110	117	24	56 000	158 000	19 800	4 300	2 850
K110X118X30	217	110	118	30	78 000	219 000	29 500	4 300	2 750
K115X123X27	200	115	123	27	63 000	170 000	21 600	4 100	2 850
K120X127X24	165	120	127	24	59 000	174 000	21 400	3 950	2 650
K125X133X35	275	125	133	35	86 000	260 000	34 500	3 800	2 600
K130X137X24	170	130	137	24	61 000	186 000	22 300	3 650	2 500
K135X143X35	300	135	143	35	91 000	290 000	37 500	3 550	2 390
K145X153X26	262	145	153	26	74 000	225 000	27 000	3 300	2 280
K150X160X46	570	150	160	46	147 000	470 000	60 000	3 150	2 100
K155X163X26	265	155	163	26	75 000	236 000	28 000	3 100	2 180
K160X170X46	550	160	170	46	152 000	510 000	63 000	2 950	1 970
K165X173X26	320	165	173	26	81 000	265 000	30 500	2 900	2 030
K175X183X32	400	175	183	32	99 000	350 000	41 500	2 750	1 930
K185X195X37	607	185	195	37	128 000	425 000	48 500	2 600	1 840
K195X205X37	620	195	205	37	133 000	450 000	51 000	2 450	1 760
K210X220X42	740	210	220	42	154 000	560 000	63 000	2 280	1 590
K220X230X42	790	220	230	42	158 000	590 000	66 000	2 180	1 510
K240X250X42	850	240	250	42	164 000	630 000	69 000	2 000	1 390
K265X280X50	1810	265	280	50	255 000	860 000	91 000	1 800	1 160





**Drawn cup needle roller bearings
with open ends**
**Drawn cup needle roller bearings
with closed end**

Drawn cup needle roller bearings

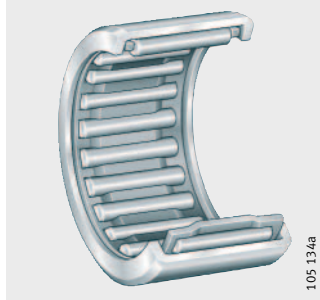
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Full complement drawn cup needle roller bearings with open ends	618



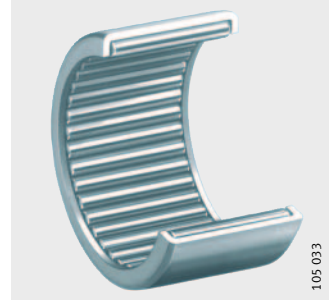
Product overview Drawn cup needle roller bearings

**Drawn cup
needle roller bearing
with open ends**
With cage or full complement

HK

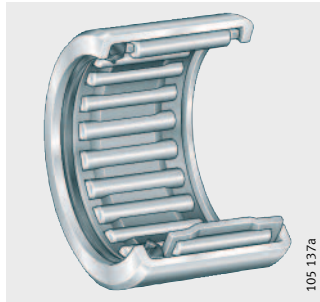


HN

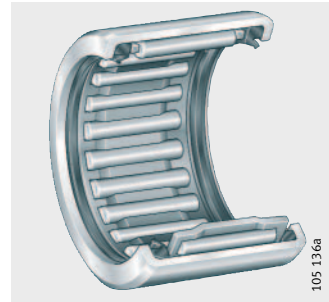


With cage
Lip seals

HK..-RS

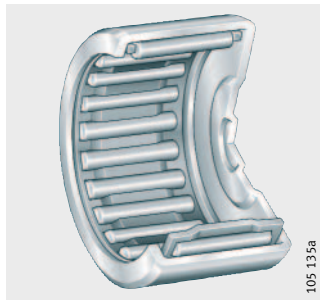


HK..-2RS



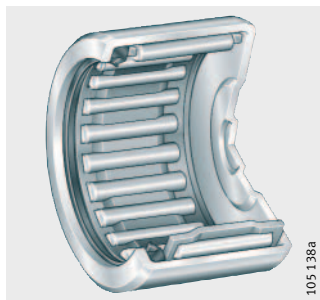
**Drawn cup
needle roller bearings
with closed end**
With cage

BK



With cage
Lip seals

BK..-RS



Drawn cup needle roller bearings

Features	<p>Drawn cup needle roller bearings with open ends and with closed end are complete units comprising thin-walled, drawn cup outer rings and needle roller and cage assemblies. Drawn cup needle roller bearings are also available in a full complement design. The majority of the bearings are of a single row design.</p> <p>Drawn cup needle roller bearings are available in open and sealed designs. Open designs correspond to DIN 618-1/ISO 3 245. In order to support axial forces, the bearings can also be combined with axial needle roller bearings AXW.</p>
Particularly low cross-section height	<p>Due to the thin-walled outer cup and the design without an inner ring, drawn cup needle roller bearings have extremely small radial dimensions. They have high load carrying capacity, are suitable for high speeds and are particularly easy to fit. If axial means of location such as shoulders, snap rings etc. are not used, the housing bore can be produced easily and particularly economically.</p> <p>Double row designs have a lubrication hole and the suffix ZW.</p> <p>Drawn cup needle roller bearings require a hardened and ground bearing raceway on the shaft. If the shaft cannot be used as a raceway, they can be combined with inner rings IR or LR. Suitable inner rings: see pages starting 690.</p>
Drawn cup needle roller bearings with open ends	<p>Drawn cup needle roller bearings HK are open on both sides.</p>
Sealing/lubricant	<p>Sealed drawn cup needle roller bearings with open ends correspond to DIN 618-2. They have lip seals on one or both sides and are therefore protected against contamination and spray water. They are greased using a lithium complex soap grease to GA08.</p>
Drawn cup needle roller bearings with closed end	<p>Drawn cup needle roller bearings BK are closed at one end. They are thus suitable for closing off the shaft ends of bearing arrangements. This gives protection against injury by rotating shafts and protects the bearing against contamination and moisture.</p> <p>Depending on the size, the base is either smooth or lock-beaded (stiffened). Due to the profiled base design, low axial guidance forces can be supported.</p>
Sealing/lubricant	<p>Sealed drawn cup roller bearings with closed end have lip seals and are therefore protected against contamination and spray water. They are greased using a lithium complex soap grease to GA08.</p>
Full complement drawn cup needle roller bearings with open ends	<p>Full complement drawn cup needle roller bearings with open ends comprise thin-walled drawn outer rings and needle rollers without any mechanical means of needle retention. The needle rollers are secured for transport and fitting by means of a special grease (DIN 51 825-K1/2K-30). However, this does not have adequate long term lubrication capacity. Relubrication is therefore recommended as appropriate after fitting.</p>
For maximum load carrying capacity	<p>Since full complement drawn cup needle roller bearings have the maximum number of needle rollers, they therefore offer extremely high load carrying capacity within a very small design envelope. However, their use at high speeds is restricted.</p>



Drawn cup needle roller bearings

- Operating temperature** Drawn cup needle roller bearings without seals can be used at operating temperatures from -25 °C to $+140\text{ °C}$.
- Caution!** Sealed drawn cup needle roller bearings are suitable for operating temperatures from -20 °C to $+100\text{ °C}$, restricted by the seal material.
- Drawn cup needle roller bearings with plastic cages are suitable for operating temperatures from -25 °C to $+120\text{ °C}$.
- Cages** With a few exceptions, drawn cup needle roller bearings have sheet steel cages. Plastic cages are indicated in the dimension tables by the suffix TV.
- Special designs** The following special designs are available by agreement (see also the table Suffixes):
- unsealed bearings, greased using lithium complex soap grease to GA08
 - bearings with lubrication holes – suffix AS1 – from size HK0609. Suffixes for available designs: see dimension tables.
- Special bearings** In addition to the catalogue designs, special designs are available by agreement:
- in the enveloping circle range from 2 mm to 100 mm
 - for special noise requirements, with special noise testing.
- Universal joint bearings** For universal joints, universal joint bearings of series BU and BBU are available by agreement.
- Suffixes** Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
AS1	With lubrication hole from HK0609	Special design
RS	Contact seal on one side	Standard
GA08	Unsealed, greased bearings for operating temperatures from -25 °C to $+140\text{ °C}$	Special design
TV	Cage made from glass fibre reinforced polyamide 66	Standard
ZW	Double row	Standard
2RS	Contact seals on both sides	Standard

Design and safety guidelines
Raceway for bearings without inner ring

Where bearings without an inner ring are to be used, the rolling element raceway on the shaft must be hardened and ground. The surface hardness must be at least 670 HV, the hardening depth CHD or Rht must be sufficiently large.

Shaft and housing design: see the table and section Design of bearing arrangements, page 125.

Caution! In order to utilise the load carrying capacity of the bearings to the full, rigid support must be provided for the thin-walled outer ring.

Note the recommended bore tolerance according to the table for the shaft raceway/housing bore.

Tolerances for shaft raceway/housing bore

Housing material	Shaft tolerance for bearings without inner ring	Bore tolerance
Steel or cast iron	h6	N6
Light metal		R6
Al Mg		S6

Surface for shaft raceway/housing bore

Surface quality	Shaft raceway for bearings without inner ring	Housing bore
Roughness max.	R _a 0,2 (R _z 1)	R _a 0,8 (R _z 4)
Roundness	IT 3	IT 5/2
Parallelism	IT 3	IT 5/2

Static load safety factor

$$S_0 = \frac{C_{0r}}{P_0}$$

S₀ – Static load safety factor
 C_{0r} – N Basic static load rating according to dimension tables
 P₀ – N Equivalent static bearing load.

Caution! In order to achieve sufficiently smooth running, a static load safety factor S₀ ≥ 3 is necessary.

Speeds

Caution! The speeds in the dimension tables are valid for oil lubrication. If grease lubrication is used, 60% of the stated value is permissible.

Radial location

Drawn cup needle roller bearings are pressed into the housing bore and require no further axial location.



Drawn cup needle roller bearings

Installation with fitting mandrel

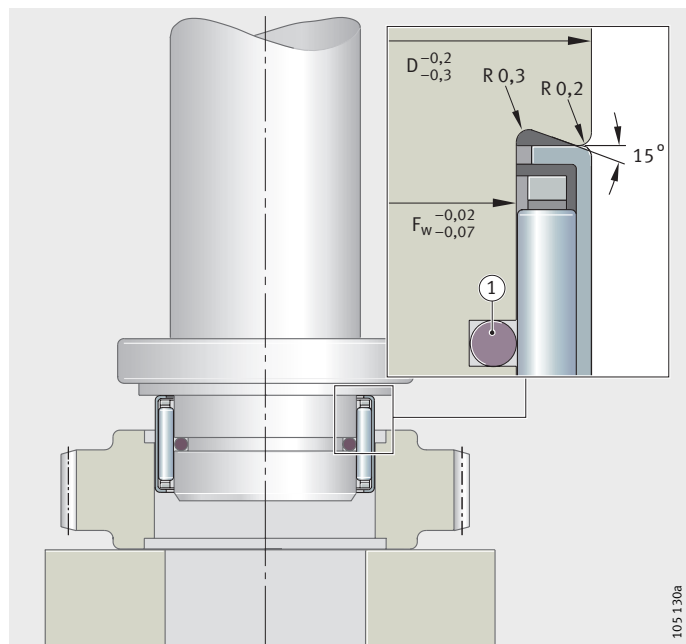
The bearings should be installed using a special fitting mandrel, *Figure 1*. The shoulder of the fitting mandrel should rest on the bearing end face marked with the designation.

A round section seal ① should be used to retain the bearing. The length and oversize of the round section seal must be matched by the customer to the dimensions and mass of the bearing.

Before installation, the bearings should be lubricated with grease, if grease lubrication is to be used.

Caution! Do not tilt drawn cup bearings during fitting.

Forces occurring during the fitting process are dependent on several variables. The fitting situation should be arranged so that the bearing rib on the end face is not deformed.



① Round section seal

Figure 1
Installation using a fitting mandrel

Accuracy The main bearing dimensions conform to DIN 618/ISO 3 245.
The thin-walled outer rings adopt the dimensional and geometrical accuracy of the housing bore.

Enveloping circle In the case of bearings without inner ring, the enveloping circle dimension F_w is used instead of the radial internal clearance.
The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway.
Once fitted, the enveloping circle diameter F_w is approximately in tolerance zone F8 (assuming bore tolerances according to the table, page 609).
The enveloping circle is determined in accordance with the inspection dimensions in the table; see table Inspection dimensions for drawn cup needle roller bearings.

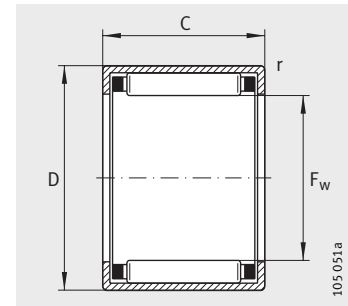
Caution! Bearings intended for enveloping circle measurement should not be repeatedly pushed in and out of the gauge. Bearings which have been checked in the ring gauge should not be used again.

Inspection dimensions for drawn cup needle roller bearings

Enveloping circle diameter F_w mm	Bearing outside diameter D mm	Ring gauge bore Actual dimension mm	Enveloping circle diameter	
			Upper deviation μm	Lower deviation μm
3	6,5	6,484	+24	+6
4	8	7,984	+28	+10
5	9	8,984	+28	+10
6	10	9,984	+28	+10
7	11	10,980	+31	+13
8	12	11,980	+31	+13
9	13	12,980	+31	+13
10	14	13,980	+31	+13
12	16	15,980	+34	+16
12	18	17,980	+34	+16
13	19	18,976	+34	+16
14	20	19,976	+34	+16
15	21	20,976	+34	+16
16	22	21,976	+34	+16
17	23	22,976	+34	+16
18	24	23,976	+34	+16
20	26	25,976	+41	+20
22	28	27,976	+41	+20
25	32	31,972	+41	+20
28	35	34,972	+41	+20
30	37	36,972	+41	+20
32	39	38,972	+50	+25
35	42	41,972	+50	+25
40	47	46,972	+50	+25
45	52	51,967	+50	+25
50	58	57,967	+50	+25
55	63	62,967	+60	+30
60	68	67,967	+60	+30



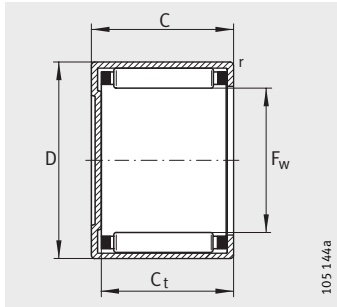
**Drawn cup needle roller bearings
with open ends**
**Drawn cup needle roller bearings
with closed end**



HK

Dimension table · Dimensions in mm								
Drawn cup needle roller bearings with open ends		Drawn cup needle roller bearing with closed end		Dimensions				
Designation	Mass m ≈g	Designation	Mass m ≈g	F _w	D	C -0,3	C _t min.	r min.
+ HK0306-TV	1	+ BK0306	1	3	6,5	6	5,2	0,3
+ HK0408	2	+ BK0408	2,1	4	8	8	6,4	0,3
+ HK0509	2	+ BK0509	2,1	5	9	9	7,4	0,4
+ HK0606	1,5	-	-	6	10	6	-	0,4
+ HK0608	2,1	-	-	6	10	8	-	0,4
HK0609	2,5	BK0609	2,6	6	10	9	7,4	0,4
HK0709	2,6	BK0709	2,9	7	11	9	7,4	0,4
HK0808	2,7	BK0808	3	8	12	8	6,4	0,4
HK0810	3	BK0810	3,4	8	12	10	8,4	0,4
HK0908	3	-	-	9	13	8	-	0,4
HK0910	4	BK0910	4,3	9	13	10	8,4	0,4
HK0912	4,6	BK0912	4,9	9	13	12	10,4	0,4
HK1010	4,1	BK1010	4,3	10	14	10	8,4	0,4
HK1012	4,8	BK1012	5	10	14	12	10,4	0,4
HK1015	6	BK1015	6,2	10	14	15	13,4	0,4
HK1210	4,6	BK1210	5,2	12	16	10	8,4	0,4
HK1212	9	BK1212	10	12	18	12	9,3	0,8
HK1312	10	BK1312	11	13	19	12	9,3	0,8
HK1412	10,5	BK1412	12	14	20	12	9,3	0,8
HK1512	11	BK1512	13	15	21	12	9,3	0,8
HK1516	15	BK1516	17	15	21	16	13,3	0,8
HK1522-ZW	20	-	-	15	21	22	-	0,8
HK1612	12	BK1612	14	16	22	12	9,3	0,8
HK1616	16	BK1616	18	16	22	16	13,3	0,8
HK1622-ZW	22	BK1622-ZW	24	16	22	22	19,3	0,8
HK1712	12	-	-	17	23	12	-	0,8
HK1812	13	BK1812	15	18	24	12	9,3	0,8
HK1816	18	BK1816	20	18	24	16	13,3	0,8
HK2010	12	-	-	20	26	10	-	0,8
HK2012	14	-	-	20	26	12	-	0,8
HK2016	19	BK2016	22	20	26	16	13,3	0,8
HK2020	24	BK2020	27	20	26	20	17,3	0,8
HK2030-ZW	35	-	-	20	26	30	-	0,8

+ Not available with lubrication hole.

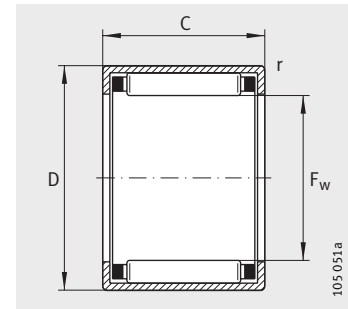


BK

Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}	Suitable inner rings (to be ordered separately)	
dyn. C_r N	stat. C_{Or} N				LR Designation	IR Designation
1 230	840	113	46 000	49 500	–	–
1 780	1 310	114	41 000	38 500	–	–
2 400	1 990	239	38 000	32 000	–	–
1 610	1 220	167	35 000	28 500	–	–
2 030	1 650	184	35 000	28 500	–	–
2 850	2 600	310	35 000	27 000	–	–
3 100	2 950	355	31 000	24 000	–	–
2 750	2 600	290	28 000	21 800	–	–
3 800	3 950	500	28 000	21 200	–	IR5X8X12
3 550	3 750	440	25 500	19 000	–	–
4 250	4 650	600	25 500	19 000	–	–
5 300	6 300	860	25 500	18 700	–	IR6X9X12
4 400	5 100	650	23 300	17 400	LR7X10X10,5	IR7X10X10,5
5 500	6 800	930	23 300	17 100	–	IR7X10X12
6 800	8 800	1 210	23 300	17 000	–	IR7X10X16
4 950	6 200	800	20 000	14 800	LR8X12X10,5	IR8X12X10,5
6 500	7 300	860	18 700	13 800	LR8X12X12,5	IR8X12X12,5
6 800	7 900	940	17 500	12 900	LR10X13X12,5	IR10X13X12,5
7 100	8 500	1 010	16 500	12 100	–	IR10X14X13
7 900	9 400	1 150	15 600	11 400	LR12X15X12,5	IR12X15X12,5
10 500	14 400	1 780	15 600	11 200	LR12X15X16,5	IR12X15X16,5
13 400	19 500	2 380	15 600	11 200	LR12X15X22,5	IR12X15X22,5
7 600	9 700	1 160	14 700	10 900	–	IR12X16X13
10 900	15 300	1 900	14 700	10 600	–	IR12X16X16
13 100	19 400	2 320	14 700	10 700	–	IR12X16X22
7 900	10 300	1 230	14 000	10 300	–	–
8 100	10 900	1 300	13 300	9 800	LR15X18X12,5	–
11 600	17 300	2 140	13 300	9 600	LR15X18X16,5	IR15X18X16,5
6 400	8 200	1 040	12 200	9 300	–	–
8 600	12 100	1 450	12 200	9 000	–	IR15X20X13
12 700	20 100	2 500	12 200	8 700	LR17X20X16,5	IR17X20X16,5
15 700	26 000	3 500	12 200	8 600	LR17X20X20,5	IR17X20X20,5
21 800	40 000	5 000	12 200	8 600	LR17X20X30,5	IR17X20X30,5

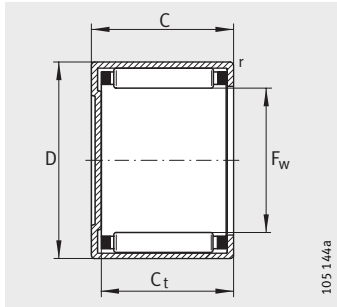


**Drawn cup needle roller bearings
with open ends**
**Drawn cup needle roller bearings
with closed end**

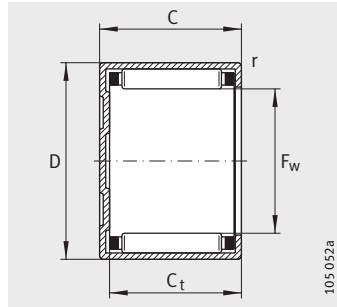


HK

Dimension table (continued) · Dimensions in mm								
Drawn cup needle roller bearings with open ends		Drawn cup needle roller bearing with closed end		Dimensions				
Designation	Mass m ≈g	Designation	Mass m ≈g	F _w	D	C -0,3	C _t min.	r min.
HK2210	13	-	-	22	28	10	-	0,8
HK2212	15	BK2212	18	22	28	12	9,3	0,8
HK2216	21	BK2216	24	22	28	16	13,3	0,8
HK2220	26	-	-	22	28	20	-	0,8
HK2512	20	-	-	25	32	12	-	0,8
HK2516	27	BK2516	32	25	32	16	13,3	0,8
HK2520	33	BK2520	38	25	32	20	17,3	0,8
HK2526	44	BK2526	48	25	32	26	23,3	0,8
HK2538-ZW	64	BK2538-ZW	68	25	32	38	35,3	0,8
HK2816	29	-	-	28	35	16	-	0,8
HK2820	36	-	-	28	35	20	-	0,8
HK3012	23	BK3012	28	30	37	12	9,3	0,8
HK3016	31	BK3016	38	30	37	16	13,3	0,8
HK3020	39	BK3020	47	30	37	20	17,3	0,8
HK3022	42	-	-	30	37	22	-	0,8
HK3026	51	BK3026	58	30	37	26	23,3	0,8
HK3038-ZW	76	BK3038-ZW	84	30	37	38	35,3	0,8
HK3220	40,6	-	-	32	39	20	-	0,8
HK3224	49	-	-	32	39	24	-	0,8
HK3512	27	-	-	35	42	12	-	0,8
HK3516	36	-	-	35	42	16	-	0,8
HK3520	44	BK3520	53	35	42	20	17,3	0,8
HK4012	30	-	-	40	47	12	-	0,8
HK4016	39	-	-	40	47	16	-	0,8
HK4020	54	BK4020	62	40	47	20	17,3	0,8
HK4512	33	-	-	45	52	12	-	0,8
HK4516	46	-	-	45	52	16	-	0,8
HK4520	56	BK4520	72	45	52	20	17,3	0,8
HK5020	70	-	-	50	58	20	-	0,8
HK5025	90	-	-	50	58	25	-	0,8
HK5520	74	-	-	55	63	20	-	0,8
HK5528	105	-	-	55	63	28	-	0,8
HK6012	49	-	-	60	68	12	-	0,8
HK6020	81	-	-	60	68	20	-	0,8
HK6032	136	-	-	60	68	32	-	0,8



BK with $F_w < 25$ mm



BK with $F_w \geq 25$ mm

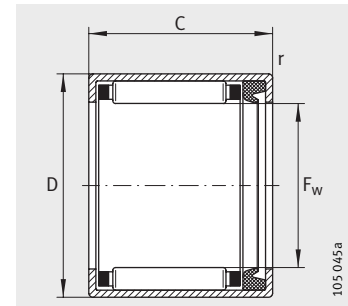
Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}	Suitable inner rings (to be ordered separately)	
dyn. C_r N	stat. C_{Or} N				LR Designation	IR Designation
7 500	10 500	1 360	11 200	8 400	–	–
9 100	13 400	1 600	11 200	8 300	–	IR17X22X13
13 400	22 100	2 800	11 200	8 000	–	IR17X22X16
16 500	29 000	3 850	11 200	7 900	–	IR17X22X23
11 000	15 200	1 990	9 800	7 300	LR20X25X12,5	–
15 600	24 000	3 150	9 800	7 100	LR20X25X16,5	IR20X25X17
19 900	33 000	4 200	9 800	7 000	LR20X25X20,5	IR20X25X20,5
25 500	45 000	6 200	9 800	6 900	LR20X25X26,5	IR20X25X26,5
34 000	66 000	8 400	9 800	6 900	LR20X25X38,5	IR20X25X38,5
16 400	26 500	3 450	8 900	6 500	–	IR22X28X17
20 900	36 000	4 650	8 900	6 400	LR22X28X20,5	IR22X28X20,5
12 100	18 200	2 390	8 400	6 300	LR25X30X12,5	–
17 200	29 000	3 750	8 400	6 100	LR25X30X16,5	IR25X30X17
22 000	39 500	5 100	8 400	6 000	LR25X30X20,5	IR25X30X20,5
24 800	46 000	6 100	8 400	5 900	–	–
28 000	54 000	7 400	8 400	5 900	LR25X30X26,5	IR25X30X26,5
37 500	79 000	10 100	8 400	5 900	LR25X30X38,5	IR25X30X38,5
23 000	42 500	5 500	7 900	5 700	LR28X32X20	–
27 500	54 000	7 300	7 900	5 600	–	–
13 100	21 300	2 800	7 300	5 500	LR30X35X12,5	–
18 700	33 500	4 400	7 300	5 400	LR30X35X16,5	IR30X35X17
23 800	46 000	5 900	7 300	5 300	LR30X35X20,5	IR30X35X20,5
14 000	24 300	3 200	6 400	4 950	LR35X40X12,5	–
20 000	38 500	5 000	6 400	4 800	LR35X40X16,5	IR35X40X17
25 500	52 000	6 800	6 400	4 750	LR35X40X20,5	IR35X40X20,5
14 900	27 500	3 600	5 800	4 500	–	–
21 300	43 000	5 700	5 800	4 400	LR40X45X16,5	IR40X45X17
27 000	59 000	7 600	5 800	4 300	LR40X45X20,5	IR40X45X20,5
31 000	63 000	8 200	5 200	3 950	LR45X50X20,5	–
38 500	84 000	11 700	5 200	3 900	LR45X50X25,5	IR45X50X25,5
31 500	67 000	8 700	4 750	3 650	LR50X55X20,5	–
44 000	103 000	14 700	4 750	3 600	–	–
17 400	32 000	4 250	4 400	3 650	–	–
33 500	75 000	9 800	4 400	3 400	–	–
53 000	135 000	19 700	4 400	3 300	–	–



Drawn cup needle roller bearings with open ends

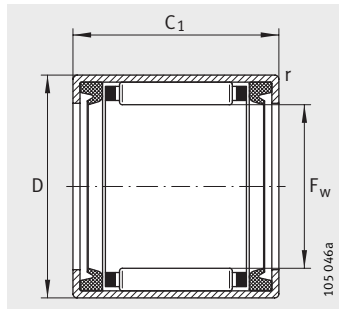
Drawn cup needle roller bearings with closed end

Sealed

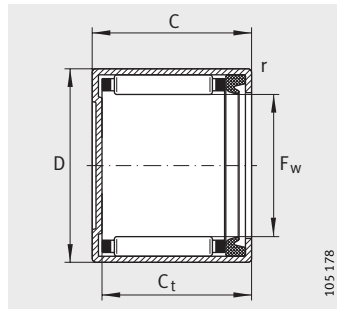


HK..-RS

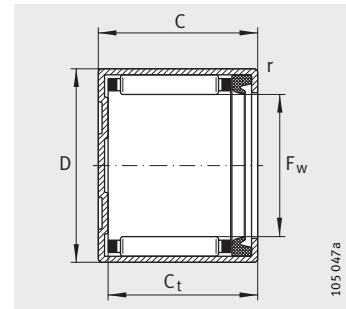
Dimension table · Dimensions in mm									
Drawn cup needle roller bearings with open ends				Drawn cup needle roller bearing with closed end		Dimensions			
Sealed on one side		Sealed on both sides		Sealed		F _w	D	C	C ₁
Designation	Mass m ≈g	Designation	Mass m ≈g	Designation	Mass m ≈g				
–	–	HK0810-2RS	3,2	–	–	8	12	–	10
HK0810-RS	3	HK0812-2RS	3,3	–	–	8	12	10	12
HK0812-RS	3,1	–	–	–	–	8	12	12	–
–	–	HK1012-2RS	4,3	–	–	10	14	–	12
HK1012-RS	4,2	HK1014-2RS	4,6	BK1012-RS	4,3	10	14	12	14
–	–	HK1214-2RS	8	–	–	12	16	–	14
HK1214-RS	10	HK1216-2RS	11	–	–	12	18	14	16
HK1414-RS	12	HK1416-2RS	13	BK1414-RS	13	14	20	14	16
HK1514-RS	12	HK1516-2RS	15	–	–	15	21	14	16
HK1518-RS	16	HK1520-2RS	18	–	–	15	21	18	20
HK1614-RS	13	HK1616-2RS	14	BK1614-RS	15	16	22	14	16
–	–	HK1620-2RS	18	–	–	16	22	–	20
HK1814-RS	14	HK1816-2RS	15	–	–	18	24	14	16
–	–	HK2016-2RS	18	–	–	20	26	–	16
HK2018-RS	21	HK2020-2RS	23	BK2018-RS	24	20	26	18	20
HK2214-RS	16	HK2216-2RS	18	–	–	22	28	14	16
HK2218-RS	24	HK2220-2RS	26	–	–	22	28	18	20
–	–	HK2516-2RS	27	–	–	25	32	–	16
HK2518-RS	29	HK2520-2RS	31	BK2518-RS	34	25	32	18	20
–	–	HK2524-2RS	40	–	–	25	32	–	24
–	–	HK2530-2RS	47	–	–	25	32	–	30
HK2818-RS	31	HK2820-2RS	34	–	–	28	35	18	20
–	–	HK3016-2RS	31	–	–	30	37	–	16
HK3018-RS	37	HK3020-2RS	36	–	–	30	37	18	20
–	–	HK3024-2RS	44	–	–	30	37	–	24
–	–	HK3516-2RS	32	–	–	35	42	–	16
HK3518-RS	39	HK3520-2RS	41	–	–	35	42	18	20
–	–	HK4016-2RS	37	–	–	40	47	–	16
HK4018-RS	45	HK4020-2RS	48	–	–	40	47	18	20
HK4518-RS	50	HK4520-2RS	54	–	–	45	52	18	20
HK5022-RS	76	HK5024-2RS	81	–	–	50	58	22	24



HK..-2RS



BK..-RS with $F_w < 25$ mm



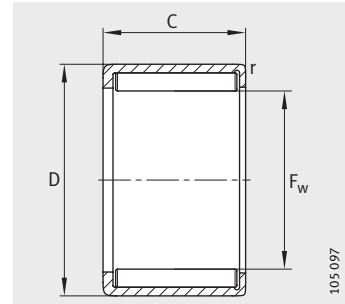
BK..-RS with $F_w \geq 25$ mm

		Basic load ratings		Fatigue limit load	Limiting speed	Suitable inner rings (to be ordered separately)		
C_t	r	dyn. C_r	stat. C_{0r}	C_{ur}	n_G grease	For HK..-RS and HK..-2RS		For BK..-RS, LR, IR
min.	min.	N	N	N	min^{-1}	LR Designation	IR Designation	Designation
-	0,4	2 180	1 930	265	28 000	-	-	-
-	0,4	2 750	2 600	290	28 000	-	-	-
-	0,4	3 800	3 950	500	28 000	-	-	-
-	0,4	3 200	3 350	380	23 300	-	-	-
-	0,4	4 400	5 100	650	23 300	-	-	-
-	0,4	4 950	6 200	800	20 000	-	-	-
-	0,8	6 500	7 300	860	18 700	-	-	-
11,3	0,8	7 100	8 500	1 010	16 500	-	-	-
-	0,8	7 800	9 800	1 190	15 600	LR12X15X16,5	IR12X15X16,5	LR12X15X12,5
-	0,8	10 500	14 400	1 780	15 600	-	-	-
11,3	0,8	7 600	9 700	1 160	14 700	-	IR12X16X20	IR12X16X13
-	0,8	10 900	15 300	1 900	14 700	-	-	-
-	0,8	8 100	10 900	1 300	13 300	LR15X18X16,5	IR15X18X16,5	-
-	0,8	8 600	12 100	1 450	12 200	LR17X20X16,5	IR17X20X16,5	-
15,3	0,8	12 700	20 100	2 500	12 200	LR17X20X20,5	IR17X20X20,5	LR17X20X16,5
-	0,8	9 100	13 400	1 600	11 200	-	IR17X22X16	-
-	0,8	13 400	22 100	2 800	11 200	-	IR17X22X23	-
-	0,8	11 000	15 200	1 990	9 800	LR20X25X16,5	IR20X25X17	-
15,3	0,8	15 600	24 000	3 150	9 800	LR20X25x20,5	IR20X25X20,5	LR20X25X16,5
-	0,8	19 900	33 000	4 200	9 800	-	-	-
-	0,8	25 500	45 000	6 200	9 800	-	IR20X25X30	-
-	0,8	16 400	26 500	3 450	8 900	LR22X28X20,5	IR22X28X20,5	-
-	0,8	12 100	18 200	2 390	8 400	LR25X30X16,5	IR25X30X17	-
-	0,8	17 200	29 000	3 750	8 400	LR25X30X20,5	IR25X30X20,5	-
-	0,8	22 000	39 500	5 100	8 400	-	-	-
-	0,8	13 100	21 300	2 800	7 300	LR30X35X16,5	IR30X35X17	-
-	0,8	18 700	33 500	4 400	7 300	LR30X35X20,5	IR30X35X20,5	-
-	0,8	14 000	24 300	3 200	6 400	LR35X40X16,5	IR35X40X17	-
-	0,8	20 000	38 500	5 000	6 400	LR35X40X20,5	IR35X40X20,5	-
-	0,8	21 300	43 000	5 700	5 800	LR40X45X20,5	IR40X45X20,5	-
-	0,8	31 000	63 000	8 200	5 200	LR45X50X25,5	IR45X50X25,5	-



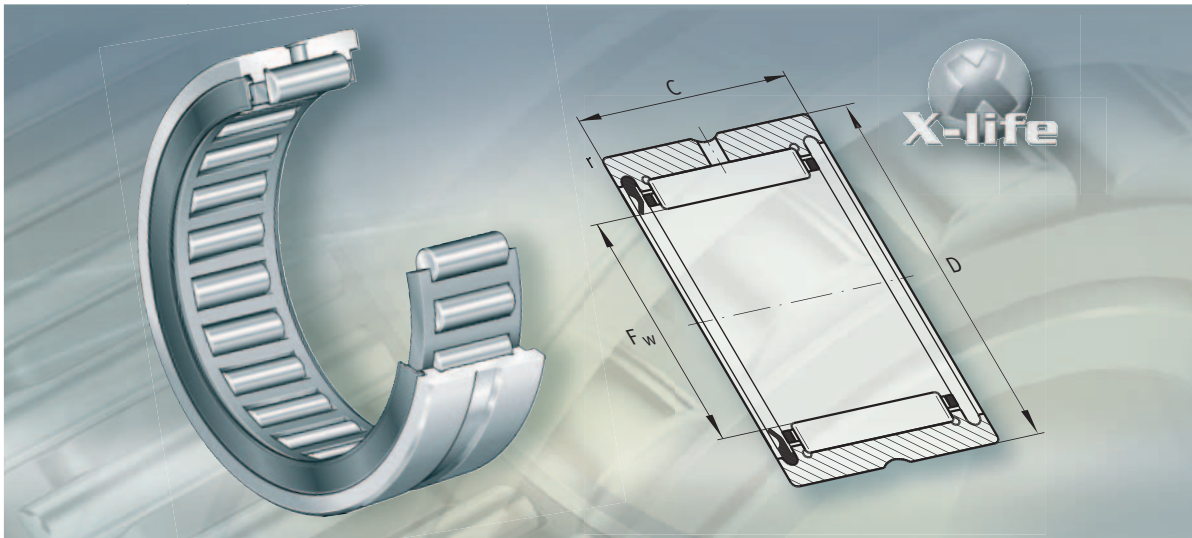
Drawn cup needle roller bearings with open ends

Full complement needle roller set



HN

Dimension table · Dimensions in mm										
Designation	Mass m ≈g	Dimensions				Basic load ratings		Fatigue limit load C _{ur} N	Limiting speed n _G grease min ⁻¹	Reference speed n _B min ⁻¹
		F _w	D	C	r min.	dyn. C _r N	stat. C _{0r} N			
HN1010	4,6	10	14	10	0,4	7 200	11 100	1 540	10 000	13 300
HN1210	5,3	12	16	10	0,4	8 000	13 400	1 850	8 600	11 300
HN1212	10,5	12	18	12	0,8	10 200	15 200	1 950	8 000	10 800
HN1412	12	14	20	12	0,8	11 000	17 500	2 260	7 100	9 500
HN1516	14	15	21	16	0,8	15 400	27 500	3 600	6 700	8 700
HN1612	13	16	22	12	0,8	12 000	20 300	2 600	6 300	8 400
HN1816	20	18	24	16	0,8	17 000	32 500	4 250	5 700	7 500
HN2016	22	20	26	16	0,8	18 100	36 500	4 750	5 200	6 800
HN2020	29,5	20	26	20	0,8	22 400	48 000	6 600	5 200	6 700
HN2520	39,6	25	32	20	0,8	28 000	59 000	7 900	4 200	5 500
HN2820	44	28	35	20	0,8	30 000	67 000	9 000	3 800	4 950
HN3520	54	35	42	20	0,8	33 500	83 000	11 100	3 100	4 100
HN4020	60,5	40	47	20	0,8	36 000	95 000	12 700	2 750	3 650
HN4520	66	45	52	20	0,8	38 500	108 000	14 500	2 470	3 300
HN4525	85	45	52	25	0,8	47 000	139 000	19 500	2 470	3 250
HN5020	85,3	50	58	20	0,8	44 500	119 000	16 200	2 220	3 000
HN5025	107	50	58	25	0,8	54 000	152 000	21 700	2 220	2 950



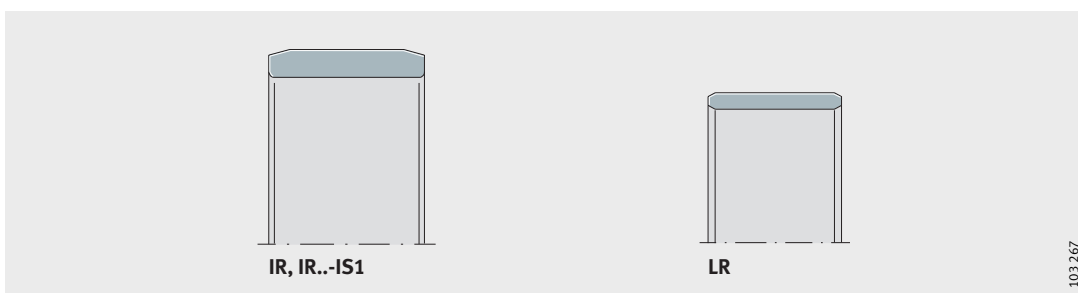
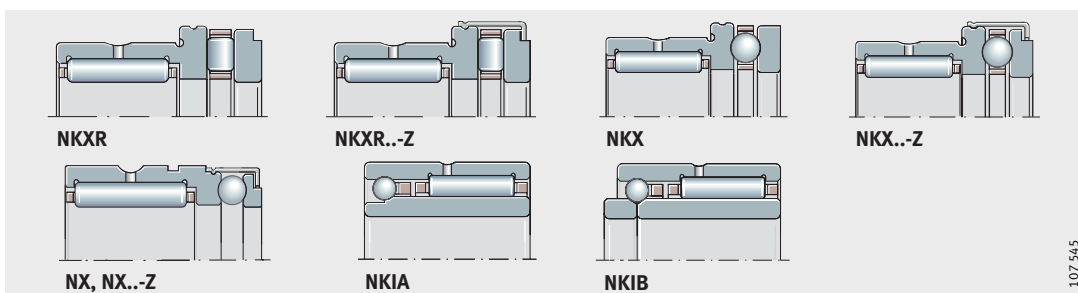
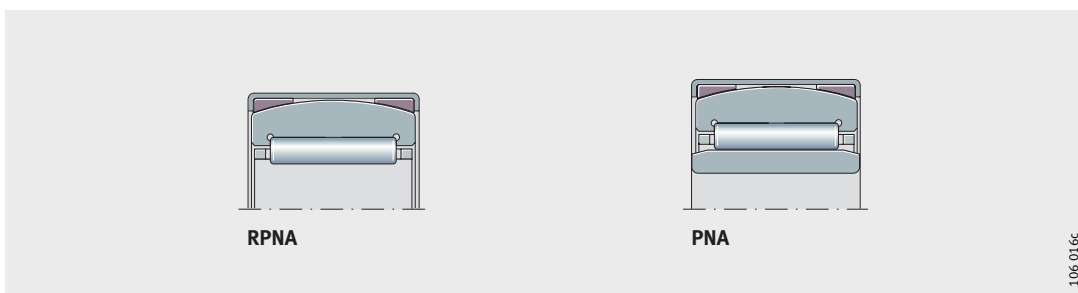
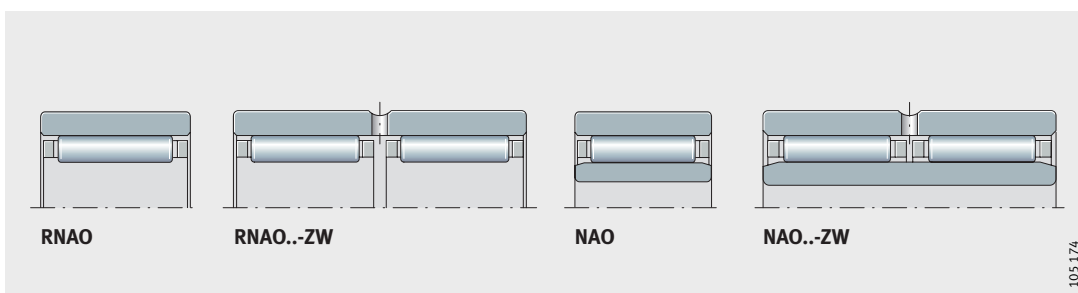
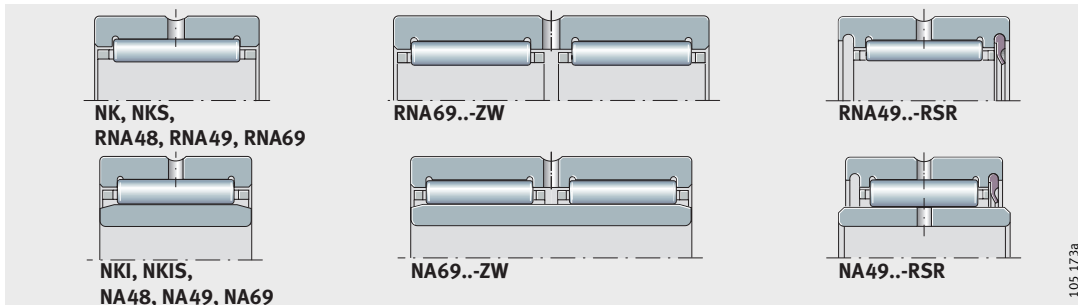
Machined needle roller bearings

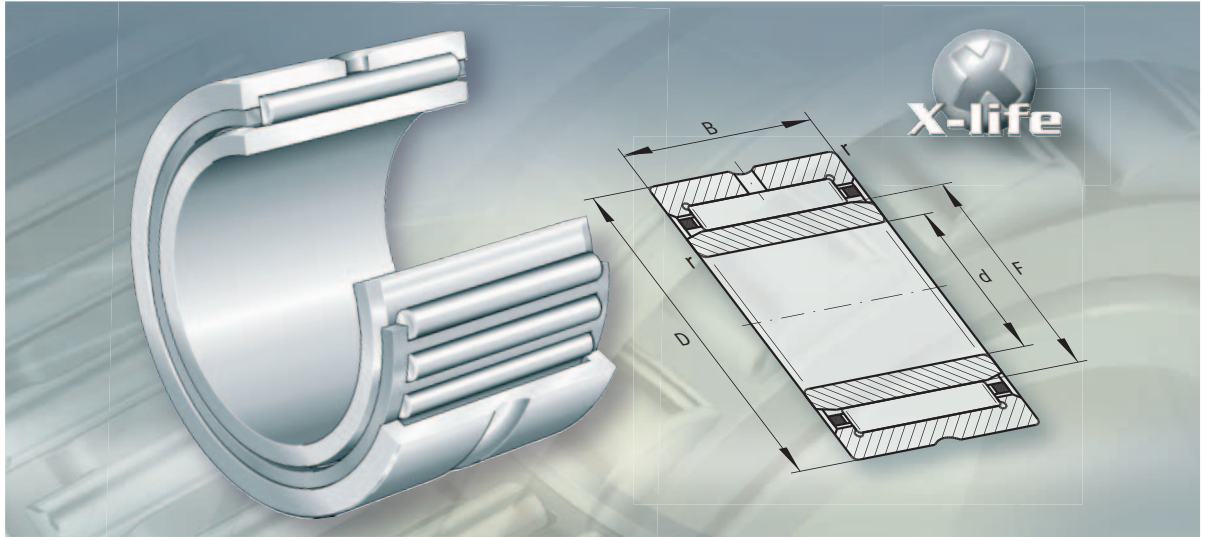
- Needle roller bearings with ribs
- Needle roller bearings without ribs
- Aligning needle roller bearings
- Combined needle roller bearings
- Inner rings



Machined needle roller bearings

X-life Needle roller bearings with ribs	..... 622
	<p>In needle roller bearings with ribs, the outer ring and the needle roller and cage assembly form a self-retaining unit. These bearings with low radial height and high load capacity are highly suitable for designs with limited radial space. The bearings are available with and without inner rings and in sealed and open versions.</p> <p>Bearings without an inner ring are the best solution for bearing arrangements where the shaft can be hardened and ground.</p> <p>Needle roller bearings with inner ring are used if the shaft cannot be configured as a rolling bearing raceway.</p>
X-life Needle roller bearings without ribs	..... 656
	<p>Needle roller bearings without ribs on the outer ring are not self-retaining. This means that the outer ring, needle roller and cage assembly and inner ring can be fitted independently of each other. This makes fitting of the bearings considerably easier.</p> <p>The bearings are available with and without inner rings and in single and double row versions. Bearings without an inner ring are used if the shaft can be hardened and ground.</p>
X-life Aligning needle roller bearings	..... 668
	<p>Aligning needle roller bearings have a raceway ring with a spherical outside surface and a concave support ring. As a result, they can compensate for static misalignment of the bearing axis by up to 3°, but are not suitable for supporting swivel or wobble type motion.</p> <p>The bearings are available with and without inner ring.</p> <p>Bearings without an inner ring are used if the shaft can be hardened and ground.</p>
X-life Combined needle roller bearings	..... 674
	<p>Combined needle roller bearings are radial bearings with an axial component capable of supporting loads. Combined needle roller bearings are used as semi-locating or locating bearings. They do not permit any skewing between the shaft and housing.</p> <p>The bearings are available with and without inner ring.</p> <p>Bearings without an inner ring are used if the shaft can be hardened and ground.</p>
Inner rings	..... 690
	<p>Inner rings are used as raceways for rolling elements or seal lips where the shaft is unsuitable for this purpose.</p> <p>Where there is considerable axial displacement between the shaft and housing, wider inner rings can be used.</p>





Needle roller bearings with ribs

Needle roller bearings with ribs

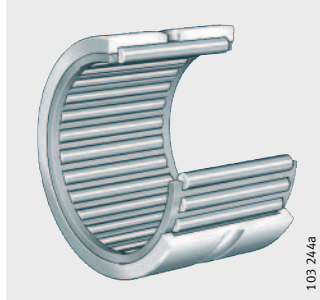
		Page
Product overview	Needle roller bearings with ribs	624
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	Needle roller bearing with inner ring	625
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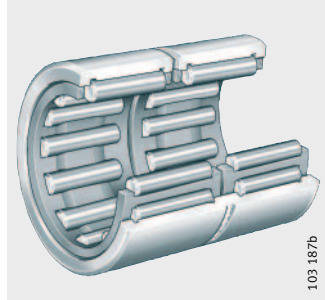
Product overview Needle roller bearings with ribs

Without inner ring
Single row and double row

**NK, NKS, RNA48, RNA49,
RNA69**

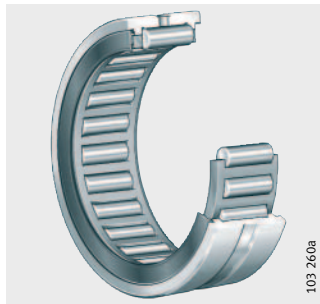


RNA69..-ZW

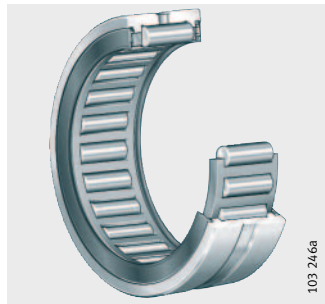


Lip seals

RNA49..-RSR

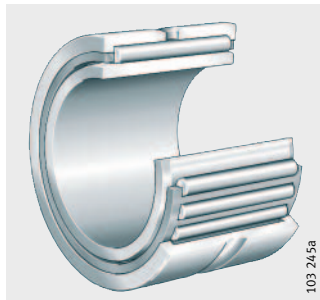


RNA49..-2RSR

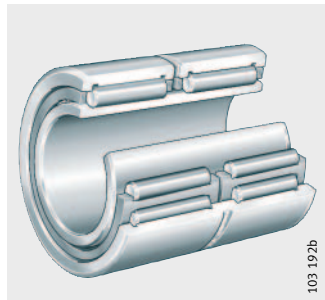


With inner ring
Single row and double row

**NKI, NKIS, NA48, NA49,
NA69**

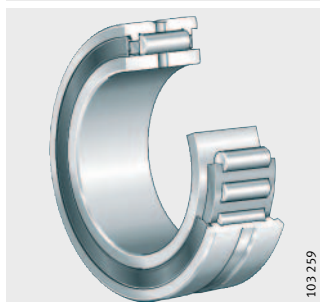


NA69..-ZW

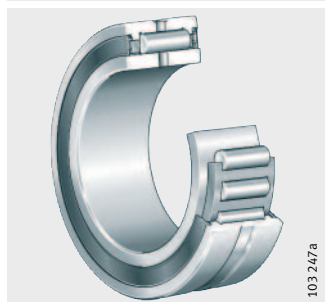


Lip seals


NA49..-RSR



NA49..-2RSR



Needle roller bearings with ribs

Features	Needle roller bearings with ribs are single or double row units comprising machined outer rings with ribs, needle roller and cage assemblies and removable inner rings. The bearings are available in open and sealed designs.
	Needle roller bearings with ribs are X-life bearings. In these bearings, the raceways have optimised roughness and geometrical accuracy. This gives higher load carrying capacity and longer life.
Needle roller bearings without inner ring	Bearings without inner ring have particularly compact radial dimensions. However, they require a shaft raceway that is hardened and ground. Bearings RNA69 are double row units with $F_w \geq 40$ mm.
Sealing/lubricant	Bearings RNA49..-RSR are sealed on one side and bearings RNA49..-2RSR on both sides by contact seals. They are greased using a lithium complex soap grease to GA08 and can be lubricated. For lubrication, the bearings have a lubrication groove and lubrication hole in the outer ring, with the exception of: NK with $F_w \leq 10$ mm.
Needle roller bearings with inner ring	Bearings with inner ring are used if the shaft cannot be configured as a rolling bearing raceway. Bearings NA69 are double row units with $d \geq 32$ mm.
Sealing/lubricant	Bearings NA49..-RSR are sealed on one side and bearings NA49..-2RSR on both sides by contact seals. They are greased using a lithium complex soap grease to GA08 and can be lubricated. For lubrication, the bearings have a lubrication groove and lubrication hole in the outer ring, with the exception of: NKI with $d \leq 7$ mm.
Displacement of the inner ring	The standard inner ring allows axial displacement within the values "s" stated in the dimension tables. Where larger displacements occur, the standard ring can be replaced by a wider inner ring IR. Inner rings: see page 690.
Operating temperature	Unsealed bearings can be used at operating temperatures from -20 °C to $+120$ °C.
Caution!	Sealed needle roller bearings are suitable for operating temperatures from -20 °C to $+100$ °C, restricted by the grease and seal material.
Cages	The cages are made from sheet steel or plastic. Plastic cages have the suffix TV.
Caution!	Before using bearings with plastic cages, check the compatibility of the lubricant used with the cage material (PA66-GF/H).



Needle roller bearings with ribs

Suffixes

Suffixes for the available designs: see table.

Available designs

Suffixes	Description	Design
C3	Radial internal clearance larger than normal	Special design ¹⁾
P5	High dimensional and geometrical accuracy	Special design ¹⁾
RSR	Contact seal on one side	Standard
TV ²⁾	Cage made from glass fibre reinforced polyamide 66	Standard
ZW ³⁾	Double row	Standard
2RSR	Contact seals on both sides	Standard

1) Available by agreement.

2) Bearings with plastic cage: see dimension tables.

3) Dependent on size.

Design and safety guidelines Raceway for bearings without inner ring

Where bearings without an inner ring are to be used, the rolling element raceway on the shaft must be hardened and ground. The surface hardness of the raceway must be 670 HV + 170 HV, the hardening depth CHD or Rht must be sufficiently large.

Raceway design

Shaft diameter Nominal dimension mm		Shaft tolerance Operating clearance			Roughness max.	Roundness max.	Parallelism max.
over	incl.	Small	Normal	Large			
–	65	k5	h5	g6	R _a 0,1 (R _z 0,4)	IT3	IT3
65	80	k5	h5	f6			
80	120	k5	g5	f6	R _a 0,15 (R _z 0,63)	IT3	IT3
120	160	k5	g5	f6	R _a 0,2 (R _z 1)		
160	180	k5	g5	e6			
180	200	j5	g5	e6			
200	250	j5	f6	e6			
250	315	h5	f6	e6			
315	415	g5	f6	d6			

Caution! The values apply to housing tolerances up to K7. For tighter housing bores, the operating clearance should be checked by either calculation or measurement.

Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum radial load $F_{r \min}$. This applies in particular to high speed bearings since, if the radial load is insufficient or not present, damaging sliding motion may occur between the rolling elements and raceways. In continuous operation, a minimum radial load of the order of $C_r/P < 50$ is necessary.

Speeds

Caution! The limiting speeds n_G for series RNA49..-RSR (2RSR) and NA49..-RSR (2RSR) are valid for grease lubrication.

Sealing rings/ wider inner rings

Sealing rings of series G, GR and SD are matched to the bearing dimensions and can be combined with wider inner rings. The outer surface of the inner rings can be used as the sliding surface for seal lips.

Sealing rings: see publication GSD, inner rings: see page 690.

Radial location

Needle roller bearings with inner ring are radially located by means of a close fit on the shaft and in the housing.

Axial location

In order to prevent lateral creep of the bearing rings, they must be located by means of physical locking, *Figure 1* and *Figure 2*.

The abutting shoulders (shaft/housing) should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seating to the abutting shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509. Note the minimum chamfer dimensions r as given in the dimension tables.

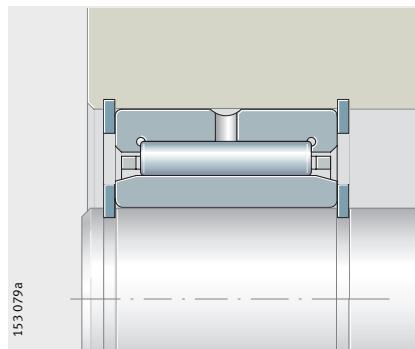
The overlap between the snap rings and the end faces of the bearing rings must be sufficiently large.

Maximum inner ring chamfer dimensions to DIN 620-6 must be taken into consideration.

NKI

Figure 1

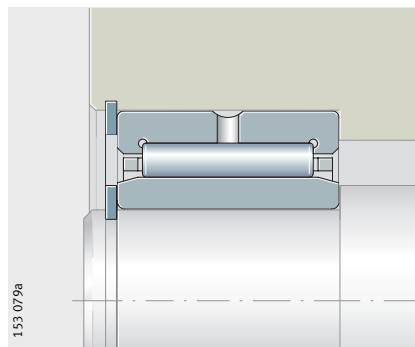
Axial location by snap rings



NKI

Figure 2

Axial location by snap rings
and abutting shoulders



Fitting instruction

Caution!

Combined needle roller bearings are not self-retaining. Since the individual bearing parts are matched to each other, the parts of bearings of identical size must not be interchanged during fitting.



Needle roller bearings with ribs

Accuracy The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620.

Radial internal clearance Bearings with inner ring have a radial internal clearance of CN.

Radial internal clearance
to DIN 620-4

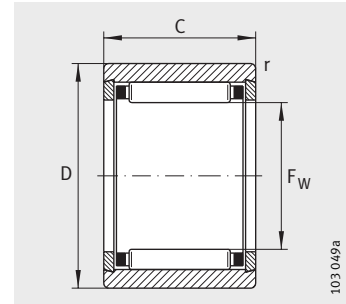
Bore d mm		Radial internal clearance			
		CN μm		C3 μm	
over	incl.	min.	max.	min.	max.
–	24	20	45	35	60
24	30	20	45	35	60
30	40	25	50	45	70
40	50	30	60	50	80
50	65	40	70	60	90
65	80	40	75	65	100
80	100	50	85	75	110
100	120	50	90	85	125
120	140	60	105	100	145
140	160	70	120	115	165
160	180	75	125	120	170
180	200	90	145	140	195
200	225	105	165	160	220
225	250	110	175	170	235
250	280	125	195	190	260
280	315	130	205	200	275
315	355	145	225	225	305
355	400	190	280	280	370
400	450	210	310	310	410
450	500	220	330	330	440

Enveloping circle In the case of bearings without inner ring, the enveloping circle dimension F_w is used instead of the radial internal clearance. The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway. For bearings before fitting, the enveloping circle F_w is in the tolerance zone F6.



Needle roller bearings

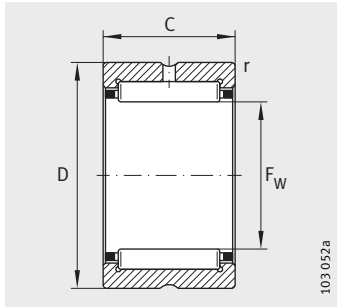
Without inner ring



NK ($F_w \leq 10 \text{ mm}$)

Dimension table · Dimensions in mm								
Designation			X-life	Mass m ≈ g	Dimensions			
					F_w	D	C	r min.
NK5/10-TV ¹⁾	–	–	XL	3,1	5	10	10	0,15
NK5/12-TV ¹⁾	–	–	XL	3,7	5	10	12	0,15
NK6/10-TV ¹⁾	–	–	XL	4,7	6	12	10	0,15
NK6/12-TV ¹⁾	–	–	XL	5,7	6	12	12	0,15
NK7/10-TV ¹⁾	–	–	XL	6,9	7	14	10	0,3
NK7/12-TV ¹⁾	–	–	XL	8,2	7	14	12	0,3
NK8/12-TV ¹⁾	–	–	XL	8,7	8	15	12	0,3
NK8/16-TV ¹⁾	–	–	XL	12	8	15	16	0,3
NK9/12-TV ¹⁾	–	–	XL	10,3	9	16	12	0,3
NK9/16-TV ¹⁾	–	–	XL	12,8	9	16	16	0,3
NK10/12-TV ¹⁾	–	–	XL	10,1	10	17	12	0,3
NK10/16-TV ¹⁾	–	–	XL	13,3	10	17	16	0,3
NK12/12	–	–	XL	12,1	12	19	12	0,3
NK12/16	–	–	XL	15,9	12	19	16	0,3
NK14/16	–	–	XL	20,7	14	22	16	0,3
NK14/20	–	–	XL	25,5	14	22	20	0,3
–	RNA4900	–	XL	16,5	14	22	13	0,3
NK15/16	–	–	XL	21,8	15	23	16	0,3
NK15/20	–	–	XL	26,6	15	23	20	0,3
NK16/16	–	–	XL	22,4	16	24	16	0,3
NK16/20	–	–	XL	28,4	16	24	20	0,3
–	RNA4901	–	XL	17,4	16	24	13	0,3
–	–	RNA6901	XL	31	16	24	22	0,3
NK17/16	–	–	XL	23,7	17	25	16	0,3
NK17/20	–	–	XL	29,8	17	25	20	0,3
NK18/16	–	–	XL	24,9	18	26	16	0,3
NK18/20	–	–	XL	31,4	18	26	20	0,3
NK19/16	–	–	XL	26,1	19	27	16	0,3
NK19/20	–	–	XL	32,2	19	27	20	0,3

¹⁾ With closing rings, without lubrication hole and groove.



NK ($F_w \geq 12 \text{ mm}$),
RNA49, RNA69

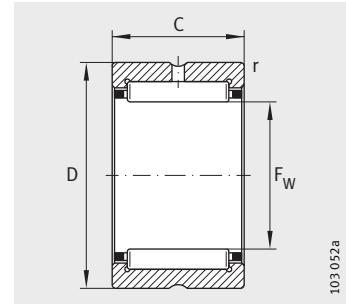
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Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}	n_B min^{-1}
2 650	1 920	295	36 500	43 500
3 400	2 650	435	36 500	42 500
2 950	2 280	355	33 500	35 500
3 800	3 150	520	33 500	35 000
3 250	2 650	410	31 000	30 000
4 150	3 600	600	31 000	29 500
4 450	4 100	690	29 500	27 000
5 800	5 800	970	29 500	26 500
5 100	5 000	840	28 500	24 200
6 600	7 100	1 190	28 500	23 900
5 300	5 500	930	27 000	22 300
7 000	7 800	1 310	27 000	22 000
7 200	7 100	1 280	25 500	19 000
10 100	11 000	1 920	25 500	18 400
11 400	11 500	2 100	23 600	16 100
14 500	15 600	2 700	23 600	15 900
9 600	9 200	1 630	23 600	15 400
12 100	12 700	2 320	22 900	15 200
15 400	17 200	3 000	22 900	14 900
12 800	13 900	2 550	22 400	14 300
16 300	18 800	3 250	22 400	14 000
10 600	10 900	1 940	22 400	13 500
18 100	21 600	3 800	22 400	12 600
13 500	15 000	2 750	21 800	13 600
17 100	20 400	3 550	21 800	13 300
14 100	16 200	3 000	21 300	12 900
17 900	22 000	3 850	21 300	12 600
14 700	17 400	3 200	20 900	12 300
18 700	23 600	4 150	20 900	12 000



Needle roller bearings

Without inner ring



NK, NKS, RNA49, RNA69

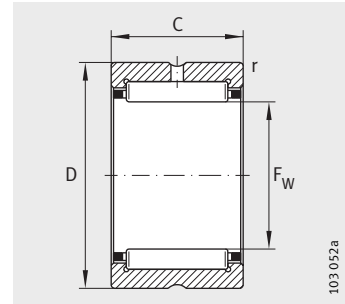
Dimension table (continued) · Dimensions in mm										
Designation					X-life	Mass m ≈ g	Dimensions			
							F _w	D	C	r min.
NK20/16	–	–	–	XL	27	20	28	16	0,3	
NK20/20	–	–	–	XL	33,9	20	28	20	0,3	
–	RNA4902	–	–	XL	21,7	20	28	13	0,3	
–	–	RNA6902	–	XL	39,7	20	28	23	0,3	
–	–	–	NKS20	XL	48,7	20	32	20	0,6	
NK21/16	–	–	–	XL	28,1	21	29	16	0,3	
NK21/20	–	–	–	XL	35,2	21	29	20	0,3	
NK22/16	–	–	–	XL	30	22	30	16	0,3	
NK22/20	–	–	–	XL	37	22	30	20	0,3	
–	RNA4903	–	–	XL	22,2	22	30	13	0,3	
–	–	RNA6903	–	XL	42,4	22	30	23	0,3	
–	–	–	NKS22	XL	61,5	22	35	20	0,6	
NK24/16	–	–	–	XL	31,9	24	32	16	0,3	
NK24/20	–	–	–	XL	40	24	32	20	0,3	
–	–	–	NKS24	XL	65,5	24	37	20	0,6	
NK25/16	–	–	–	XL	32,6	25	33	16	0,3	
NK25/20	–	–	–	XL	42	25	33	20	0,3	
–	RNA4904	–	–	XL	52,3	25	37	17	0,3	
–	–	RNA6904	–	XL	100	25	37	30	0,3	
–	–	–	NKS25	XL	68,1	25	38	20	0,6	
NK26/16	–	–	–	XL	34	26	34	16	0,3	
NK26/20	–	–	–	XL	42	26	34	20	0,3	
NK28/20	–	–	–	XL	52,2	28	37	20	0,3	
NK28/30	–	–	–	XL	82	28	37	30	0,3	
–	RNA49/22	–	–	XL	50,2	28	39	17	0,3	
–	–	RNA69/22	–	XL	98	28	39	30	0,3	
–	–	–	NKS28	XL	83,6	28	42	20	0,6	
NK29/20-TV	–	–	–	XL	50	29	38	20	0,3	
NK29/30	–	–	–	XL	84,3	29	38	30	0,3	
NK30/20-TV	–	–	–	XL	61	30	40	20	0,3	
NK30/30-TV	–	–	–	XL	92,4	30	40	30	0,3	
–	RNA4905	–	–	XL	61	30	42	17	0,3	
–	–	RNA6905	–	XL	112	30	42	30	0,3	
–	–	–	NKS30	XL	104	30	45	22	0,6	

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}	n_B min^{-1}
14 600	17 500	3 200	20 400	11 900
18 600	23 800	4 150	20 400	11 600
12 000	13 600	2 430	20 400	10 800
19 500	25 500	4 450	20 400	10 600
26 000	25 000	4 400	18 800	10 700
15 200	18 700	3 450	19 600	11 400
19 300	25 500	4 450	19 600	11 100
15 800	19 900	3 650	18 800	10 900
20 000	27 000	4 700	18 800	10 700
12 400	14 600	2 600	18 800	9 900
21 100	29 000	5 100	18 800	9 500
27 500	28 000	4 900	17 200	9 700
16 900	22 300	4 100	17 500	10 100
21 400	30 500	5 300	17 500	9 800
29 500	31 000	5 400	16 100	9 100
16 800	22 400	4 150	16 900	9 800
21 300	30 500	5 300	16 900	9 600
23 700	25 500	4 600	15 800	8 900
40 500	51 000	9 100	15 800	8 500
31 000	33 500	5 800	15 600	8 700
17 300	23 600	4 350	16 300	9 500
22 000	32 000	5 600	16 300	9 300
24 800	34 000	5 900	15 100	8 600
37 000	57 000	10 500	15 100	8 400
26 000	29 500	5 300	14 600	8 000
42 000	55 000	9 900	14 600	7 800
32 500	36 500	6 400	14 000	7 900
27 500	39 000	6 800	14 600	8 500
37 000	57 000	10 600	14 600	8 100
28 000	41 000	7 200	14 600	8 200
42 000	69 000	12 700	14 000	7 500
26 500	31 500	5 700	13 600	7 400
44 000	59 000	10 600	13 600	7 200
36 500	40 000	6 900	13 100	7 600



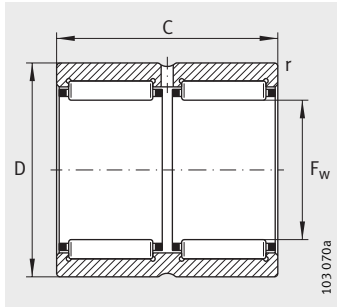
Needle roller bearings

Without inner ring



NK, NKS, RNA49, RNA69

Dimension table (continued) · Dimensions in mm										
Designation					X-life	Mass m ≈g	Dimensions			
							F _w	D	C	r min.
NK32/20-TV	–	–	–	XL	64	32	42	20	0,3	
NK32/30	–	–	–	XL	102	32	42	30	0,3	
–	RNA49/28	–	–	XL	73,2	32	45	17	0,3	
–	–	RNA69/28	–	XL	135	32	45	30	0,3	
–	–	–	NKS32	XL	110	32	47	22	0,6	
NK35/20-TV	–	–	–	XL	69,4	35	45	20	0,3	
NK35/30-TV	–	–	–	XL	106	35	45	30	0,3	
–	RNA4906	–	–	XL	69,4	35	47	17	0,3	
–	–	RNA6906	–	XL	126	35	47	30	0,3	
–	–	–	NKS35	XL	118	35	50	22	0,6	
NK37/20	–	–	–	XL	77	37	47	20	0,3	
NK37/30	–	–	–	XL	113	37	47	30	0,3	
–	–	–	NKS37	XL	123	37	52	22	0,6	
NK38/20	–	–	–	XL	79,4	38	48	20	0,3	
NK38/30	–	–	–	XL	116	38	48	30	0,3	
NK40/20-TV	–	–	–	XL	78	40	50	20	0,3	
NK40/30	–	–	–	XL	125	40	50	30	0,3	
–	RNA49/32	–	–	XL	89,1	40	52	20	0,6	
–	–	RNA69/32-ZW	–	XL	162	40	52	36	0,6	
–	–	–	NKS40	XL	129	40	55	22	0,6	
NK42/20	–	–	–	XL	85,8	42	52	20	0,3	
NK42/30	–	–	–	XL	130	42	52	30	0,3	
–	RNA4907	–	–	XL	107	42	55	20	0,6	
–	–	RNA6907-ZW	–	XL	193	42	55	36	0,6	
NK43/20	–	–	–	XL	86	43	53	20	0,3	
NK43/30	–	–	–	XL	133	43	53	30	0,3	
–	–	–	NKS43	XL	139	43	58	22	0,6	
NK45/20-TV	–	–	–	XL	85,3	45	55	20	0,3	
NK45/30-TV	–	–	–	XL	132	45	55	30	0,3	
–	–	–	NKS45	XL	145	45	60	22	0,6	
NK47/20	–	–	–	XL	94,5	47	57	20	0,3	
NK47/30	–	–	–	XL	142	47	57	30	0,3	
–	RNA4908	–	–	XL	140	48	62	22	0,6	
–	–	RNA6908-ZW	–	XL	256	48	62	40	0,6	



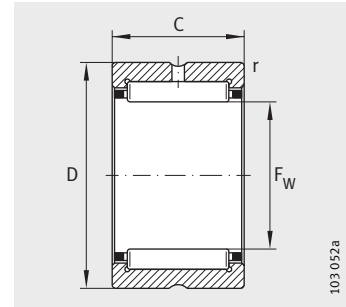
RNA69..-ZW

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}	n_B min^{-1}
29 500	44 500	7 800	13 200	7 700
39 000	63 000	11 700	13 200	7 500
27 500	33 500	6 100	12 700	6 900
45 500	63 000	11 400	12 700	6 700
38 000	43 500	7 400	12 400	7 200
31 000	48 500	8 500	12 300	6 800
46 000	81 000	15 000	12 300	6 600
28 500	35 500	6 400	12 000	6 400
49 000	71 000	12 900	12 000	6 100
39 500	47 000	8 000	11 500	6 700
28 000	43 500	7 600	11 700	6 900
42 000	73 000	13 500	11 700	6 600
41 500	50 000	8 600	11 000	6 400
29 000	45 000	7 900	11 400	6 700
43 000	76 000	14 000	11 400	6 500
33 500	56 000	9 800	10 900	6 100
44 000	79 000	14 600	10 900	6 200
34 500	47 500	8 900	10 700	6 000
53 000	82 000	15 100	10 700	6 000
42 500	54 000	9 200	10 300	6 100
30 000	49 000	8 600	10 400	6 200
44 500	82 000	15 200	10 400	6 000
35 500	50 000	9 400	10 100	5 600
54 000	86 000	15 900	10 100	5 700
30 500	51 000	8 900	10 200	6 000
45 500	85 000	15 800	10 200	5 900
44 000	57 000	9 800	9 700	5 800
35 000	62 000	10 800	9 800	5 600
52 000	103 000	19 100	9 800	5 400
45 500	60 000	10 400	9 300	5 600
32 500	56 000	9 900	9 400	5 600
48 500	94 000	17 500	9 400	5 400
48 500	67 000	11 500	8 900	5 000
74 000	116 000	19 400	8 900	5 100



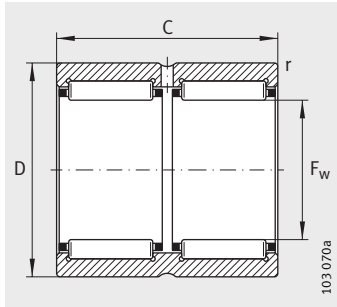
Needle roller bearings

Without inner ring



NK, NKS, RNA49

Dimension table (continued) · Dimensions in mm										
Designation					X-life	Mass m ≈g	Dimensions			
							F _w	D	C	r min.
NK50/25-TV	–	–	–	XL	146	50	62	25	0,6	
NK50/35-TV	–	–	–	XL	207	50	62	35	0,6	
–	–	–	NKS50	XL	157	50	65	22	1	
–	RNA4909	–	–	XL	182	52	68	22	0,6	
–	–	RNA6909-ZW	–	XL	338	52	68	40	0,6	
NK55/25	–	–	–	XL	180	55	68	25	0,6	
NK55/35	–	–	–	XL	250	55	68	35	0,6	
–	–	–	NKS55	XL	221	55	72	22	1	
–	RNA4910	–	–	XL	163	58	72	22	0,6	
–	–	RNA6910-ZW	–	XL	310	58	72	40	0,6	
NK60/25-TV	–	–	–	XL	170	60	72	25	0,6	
NK60/35	–	–	–	XL	258	60	72	35	0,6	
–	–	–	NKS60	XL	335	60	80	28	1,1	
–	RNA4911	–	–	XL	255	63	80	25	1	
–	–	RNA6911-ZW	–	XL	470	63	80	45	1	
NK65/25	–	–	–	XL	221	65	78	25	0,6	
NK65/35	–	–	–	XL	310	65	78	35	0,6	
–	–	–	NKS65	XL	356	65	85	28	1,1	
NK68/25	–	–	–	XL	241	68	82	25	0,6	
NK68/35	–	–	–	XL	338	68	82	35	0,6	
–	RNA4912	–	–	XL	275	68	85	25	1	
–	–	RNA6912-ZW	–	XL	488	68	85	45	1	
NK70/25	–	–	–	XL	260	70	85	25	0,6	
NK70/35	–	–	–	XL	370	70	85	35	0,6	
–	–	–	NKS70	XL	380	70	90	28	1,1	
–	RNA4913	–	–	XL	312	72	90	25	1	
–	–	RNA6913-ZW	–	XL	580	72	90	45	1	
NK73/25	–	–	–	XL	302	73	90	25	1	
NK73/35	–	–	–	XL	428	73	90	35	1	
NK75/25	–	–	–	XL	315	75	92	25	1	
NK75/35	–	–	–	XL	445	75	92	35	1	
–	–	–	NKS75	XL	402	75	95	28	1,1	



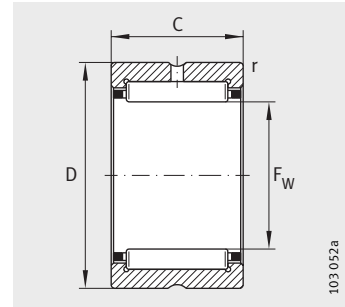
RNA69..-ZW

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}	n_B min^{-1}
48 500	87 000	14 800	8 800	5 000
67 000	132 000	23 900	8 800	4 900
48 000	67 000	11 500	8 500	5 100
51 000	73 000	12 600	8 200	4 550
79 000	127 000	21 400	8 200	4 600
45 500	82 000	14 000	8 000	4 850
60 000	118 000	21 300	8 000	4 800
51 000	74 000	12 700	7 700	4 700
53 000	80 000	13 800	7 500	4 100
82 000	139 000	23 400	7 500	4 150
53 000	103 000	17 500	7 400	4 350
63 000	130 000	23 500	7 400	4 500
71 000	98 000	17 300	7 000	4 350
65 000	100 000	17 300	6 900	3 900
102 000	176 000	30 000	6 900	3 900
50 000	98 000	16 700	6 900	4 250
66 000	142 000	25 500	6 900	4 200
75 000	108 000	19 100	6 500	4 100
49 500	89 000	15 200	6 500	4 250
70 000	139 000	25 500	6 500	4 100
68 000	108 000	18 800	6 400	3 600
106 000	191 000	32 500	6 400	3 600
50 000	92 000	15 700	6 300	4 100
71 000	144 000	26 500	6 300	4 000
77 000	113 000	20 000	6 100	3 900
69 000	112 000	19 500	6 000	3 400
108 000	198 000	33 500	6 000	3 400
60 000	100 000	17 500	6 000	3 900
85 000	156 000	27 000	6 000	3 750
61 000	104 000	18 200	5 900	3 800
87 000	162 000	28 000	5 900	3 700
81 000	123 000	21 900	5 800	3 700



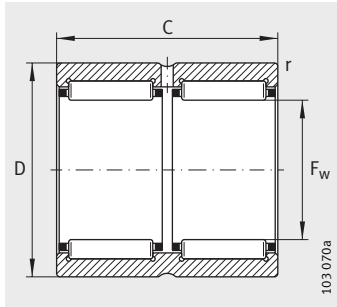
Needle roller bearings

Without inner ring



NK, RNA49

Dimension table (continued) · Dimensions in mm									
Designation				X-life	Mass m ≈ g	Dimensions			
						F _w	D	C	r min.
NK80/25	–	–	XL	301	80	95	25	1	
NK80/35	–	–	XL	425	80	95	35	1	
–	RNA4914	–	XL	460	80	100	30	1	
–	–	RNA6914-ZW	XL	857	80	100	54	1	
NK85/25	–	–	XL	425	85	105	25	1	
NK85/35	–	–	XL	600	85	105	35	1	
–	RNA4915	–	XL	489	85	105	30	1	
–	–	RNA6915-ZW	XL	935	85	105	54	1	
NK90/25	–	–	XL	450	90	110	25	1	
NK90/35	–	–	XL	630	90	110	35	1	
–	RNA4916	–	XL	516	90	110	30	1	
–	–	RNA6916-ZW	XL	987	90	110	54	1	
NK95/26	–	–	XL	490	95	115	26	1	
NK95/36	–	–	XL	680	95	115	36	1	
NK100/26	–	–	XL	515	100	120	26	1	
NK100/36	–	–	XL	715	100	120	36	1	
–	RNA4917	–	XL	657	100	120	35	1,1	
–	–	RNA6917-ZW	XL	1 200	100	120	63	1,1	
NK105/26	–	–	XL	540	105	125	26	1	
NK105/36	–	–	XL	713	105	125	36	1	
–	RNA4918	–	XL	745	105	125	35	1,1	
–	–	RNA6918-ZW	XL	1 330	105	125	63	1,1	
NK110/30	–	–	XL	650	110	130	30	1,1	
NK110/40	–	–	XL	830	110	130	40	1,1	
–	RNA4919	–	XL	719	110	130	35	1,1	
–	–	RNA6919-ZW	XL	1 460	110	130	63	1,1	



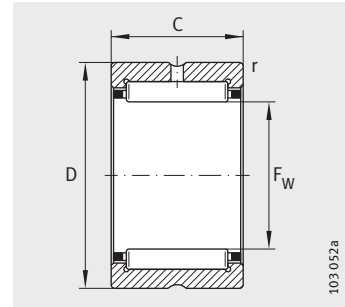
RNA69..-ZW

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}	n_B min^{-1}
63 000	119 000	19 600	5 600	3 600
89 000	184 000	32 500	5 600	3 450
95 000	156 000	27 500	5 400	3 200
145 000	265 000	47 500	5 400	3 250
78 000	123 000	21 700	5 200	3 350
111 000	193 000	34 500	5 200	3 250
97 000	162 000	28 500	5 200	3 050
147 000	275 000	49 500	5 200	3 050
81 000	132 000	23 300	4 900	3 200
116 000	208 000	37 000	4 900	3 100
101 000	174 000	30 500	4 900	2 850
153 000	300 000	53 000	4 900	2 850
83 000	137 000	24 000	4 650	3 150
121 000	223 000	39 500	4 650	2 950
86 000	146 000	25 000	4 450	3 000
125 000	237 000	41 500	4 450	2 850
125 000	237 000	41 500	4 450	2 650
188 000	400 000	71 000	4 450	2 700
89 000	155 000	26 500	4 250	2 900
129 000	250 000	43 500	4 250	2 750
129 000	250 000	43 500	4 250	2 500
195 000	425 000	74 000	4 250	2 700
111 000	210 000	35 500	4 100	2 700
143 000	290 000	50 000	4 100	2 650
131 000	260 000	44 500	4 100	2 410
197 000	440 000	76 000	4 100	2 450



Needle roller bearings

Without inner ring



RNA49, RNA48

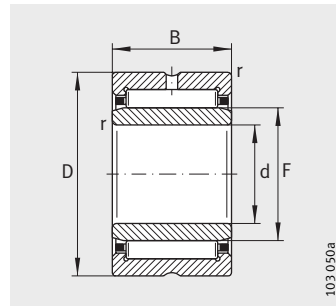
Dimension table (continued) · Dimensions in mm							
Designation		X-life	Mass m ≈ g	Dimensions			
				F _w	D	C	r min.
RNA4920	–	XL	1 150	115	140	40	1,1
–	RNA4822	XL	670	120	140	30	1
RNA4922	–	XL	1 240	125	150	40	1,1
–	RNA4824	XL	730	130	150	30	1
RNA4924	–	XL	1 860	135	165	45	1,1
–	RNA4826	XL	990	145	165	35	1,1
RNA4926	–	XL	2 210	150	180	50	1,5
–	RNA4828	XL	1 050	155	175	35	1,1
RNA4928	–	XL	2 350	160	190	50	1,5
–	RNA4830	XL	1 600	165	190	40	1,1
–	RNA4832	XL	1 700	175	200	40	1,1
–	RNA4834	XL	2 540	185	215	45	1,1
–	RNA4836	XL	2 680	195	225	45	1,1
–	RNA4838	XL	3 210	210	240	50	1,5
–	RNA4840	XL	3 350	220	250	50	1,5
–	RNA4844	XL	3 620	240	270	50	1,5
–	RNA4848	XL	5 400	265	300	60	2
–	RNA4852	XL	5 800	285	320	60	2
–	RNA4856	XL	9 300	305	350	69	2
–	RNA4860	XL	12 700	330	380	80	2,1
–	RNA4864	XL	13 400	350	400	80	2,1
–	RNA4868	XL	14 000	370	420	80	2,1
–	RNA4872	XL	14 800	390	440	80	2,1
–	RNA4876	XL	26 000	415	480	100	2,1

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}	n_B min^{-1}
144 000	270 000	45 500	3 850	2 500
106 000	216 000	36 000	3 750	2 220
149 000	290 000	47 500	3 550	2 290
112 000	239 000	39 000	3 500	2 030
205 000	390 000	64 000	3 250	2 110
134 000	310 000	48 500	3 150	1 920
229 000	470 000	74 000	2 950	1 970
136 000	325 000	50 000	2 950	1 800
237 000	500 000	78 000	2 800	1 810
172 000	400 000	62 000	2 750	1 750
181 000	435 000	66 000	2 600	1 630
209 000	510 000	75 000	2 450	1 550
219 000	550 000	80 000	2 330	1 430
255 000	690 000	100 000	2 180	1 290
260 000	720 000	102 000	2 090	1 220
275 000	790 000	110 000	1 920	1 080
400 000	1 080 000	150 000	1 730	940
415 000	1 160 000	158 000	1 620	860
510 000	1 300 000	175 000	1 500	810
700 000	1 770 000	235 000	1 380	710
710 000	1 850 000	242 000	1 310	660
730 000	1 940 000	249 000	1 240	620
740 000	2 020 000	255 000	1 180	580
1 130 000	2 900 000	370 000	1 090	500

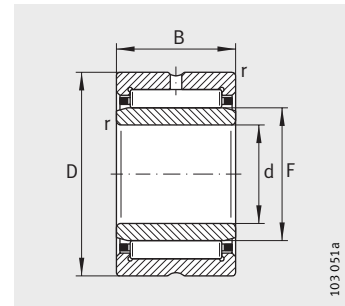


Needle roller bearings

With inner ring



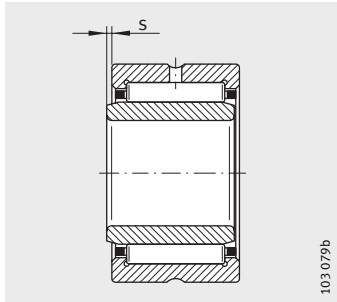
NKI ($d \leq 7 \text{ mm}$)



NKI ($d \geq 9 \text{ mm}$), NKIS, NA49, NA69 ($d \leq 30 \text{ mm}$)

Dimension table · Dimensions in mm								
Designation					Mass m ≈ g	Dimensions		
						d	F	D
NKI5/12-TV ¹⁾	–	–	–	XL	11,5	5	8	15
NKI5/16-TV ¹⁾	–	–	–	XL	15,3	5	8	15
NKI6/12-TV ¹⁾	–	–	–	XL	13,5	6	9	16
NKI6/16-TV ¹⁾	–	–	–	XL	17,4	6	9	16
NKI7/12-TV ¹⁾	–	–	–	XL	13,7	7	10	17
NKI7/16-TV ¹⁾	–	–	–	XL	18,2	7	10	17
NKI9/12	–	–	–	XL	16,6	9	12	19
NKI9/16	–	–	–	XL	21,9	9	12	19
NKI10/16	–	–	–	XL	29,4	10	14	22
NKI10/20	–	–	–	XL	37,1	10	14	22
–	NA4900	–	–	XL	23	10	14	22
NKI12/16	–	–	–	XL	33,3	12	16	24
NKI12/20	–	–	–	XL	41,9	12	16	24
–	NA4901	–	–	XL	26	12	16	24
–	–	NA6901	–	XL	46	12	16	24
NKI15/16	–	–	–	XL	38,8	15	19	27
NKI15/20	–	–	–	XL	48,7	15	19	27
–	NA4902	–	–	XL	34	15	20	28
–	–	NA6902	–	XL	63,6	15	20	28
–	–	–	NKIS15	XL	92	15	22	35
NKI17/16	–	–	–	XL	42,4	17	21	29
NKI17/20	–	–	–	XL	53,4	17	21	29
–	NA4903	–	–	XL	37	17	22	30
–	–	NA6903	–	XL	72	17	22	30
–	–	–	NKIS17	XL	98	17	24	37

¹⁾ With closing rings, without lubrication hole and groove.



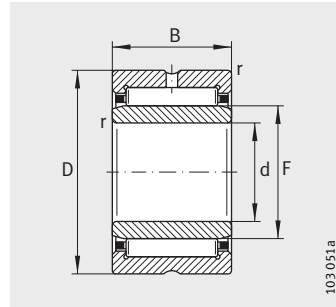
2) Axial displacement "s"

B	r min.	s ²⁾	Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
			dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	n _B min ⁻¹
12	0,3	1,5	4 450	4 100	690	31 500	29 500
16	0,3	2	5 800	5 800	970	31 500	29 500
12	0,3	1,5	5 100	5 000	840	30 000	26 500
16	0,3	2	6 600	7 100	1 190	30 000	26 000
12	0,3	1,5	5 300	5 500	930	29 000	24 100
16	0,3	2	7 000	7 800	1 310	29 000	23 800
12	0,3	1,5	7 200	7 100	1 280	26 500	22 200
16	0,3	2	10 100	11 000	1 920	26 500	19 500
16	0,3	0,5	11 400	11 500	2 100	25 000	17 300
20	0,3	0,5	14 500	15 600	2 700	25 000	17 000
13	0,3	0,5	9 600	9 200	1 630	25 000	17 300
16	0,3	0,5	12 800	13 900	2 550	23 600	15 200
20	0,3	0,5	16 300	18 800	3 250	23 600	14 900
13	0,3	0,5	10 600	10 900	1 940	23 600	14 900
22	0,3	1	18 100	21 600	3 800	23 600	13 900
16	0,3	0,5	14 700	17 400	3 200	21 800	12 800
20	0,3	0,5	18 700	23 600	4 150	21 800	12 600
13	0,3	0,5	12 000	13 600	2 430	21 600	12 000
23	0,3	1	19 500	25 500	4 450	21 600	11 700
20	0,6	0,5	27 500	28 000	4 900	19 600	10 300
16	0,3	0,5	15 200	18 700	3 450	20 900	11 800
20	0,3	0,5	19 300	25 500	4 450	20 900	11 600
13	0,3	0,5	12 400	14 600	2 600	20 600	10 900
23	0,3	1	21 100	29 000	5 100	20 600	10 500
20	0,6	0,5	29 500	31 000	5 400	18 100	9 500

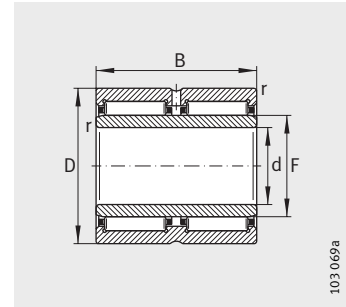


Needle roller bearings

With inner ring

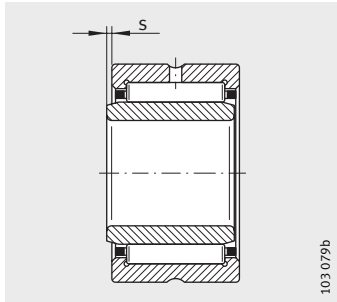


NKI, NKIS, NA49,
NA69 ($d \leq 30$ mm)



NA69..-ZW

Dimension table (continued) · Dimensions in mm								
Designation					Mass m ≈g	Dimensions		
						d	F	D
NKI20/16	–	–	–	XL	49	20	24	32
NKI20/20	–	–	–	XL	61	20	24	32
–	NA4904	–	–	XL	75,2	20	25	37
–	–	NA6904	–	XL	141	20	25	37
–	–	–	NKIS20	XL	129	20	28	42
NKI22/16	–	–	–	XL	52	22	26	34
NKI22/20	–	–	–	XL	65,4	22	26	34
–	NA49/22	–	–	XL	80	22	28	39
–	–	NA69/22	–	XL	150	22	28	39
NKI25/20-TV	–	–	–	XL	75,8	25	29	38
NKI25/30	–	–	–	XL	124	25	29	38
–	NA4905	–	–	XL	88	25	30	42
–	–	NA6905	–	XL	161	25	30	42
–	–	–	NKIS25	XL	162	25	32	47
NKI28/20-TV	–	–	–	XL	92,4	28	32	42
NKI28/30	–	–	–	XL	146	28	32	42
–	NA49/28	–	–	XL	97,7	28	32	45
–	–	NA69/28	–	XL	182	28	32	45
NKI30/20-TV	–	–	–	XL	108	30	35	45
NKI30/30-TV	–	–	–	XL	165	30	35	45
–	NA4906	–	–	XL	101	30	35	47
–	–	NA6906	–	XL	192	30	35	47
–	–	–	NKIS30	XL	184	30	37	52
NKI32/20	–	–	–	XL	118	32	37	47
NKI32/30	–	–	–	XL	180	32	37	47
–	NA49/32	–	–	XL	158	32	40	52
–	–	NA69/32-ZW	–	XL	288	32	40	52
NKI35/20-TV	–	–	–	XL	122	35	40	50
NKI35/30	–	–	–	XL	193	35	40	50
–	NA4907	–	–	XL	170	35	42	55
–	–	NA6907-ZW	–	XL	310	35	42	55
–	–	–	NKIS35	XL	220	35	43	58



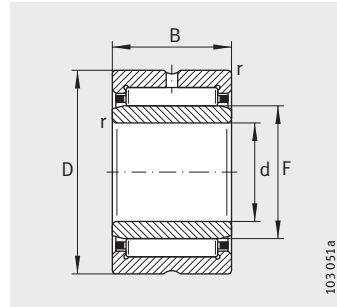
1) Axial displacement "s"

B	r min.	s ¹⁾	Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
			dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	n _B min ⁻¹
16	0,3	0,5	16 900	22 300	4 100	18 800	10 400
20	0,3	0,5	21 400	30 500	5 300	18 800	10 200
17	0,3	0,8	23 700	25 500	4 600	17 200	9 600
30	0,3	1	40 500	51 000	9 100	17 200	9 200
20	0,6	0,5	32 500	36 500	6 400	15 800	8 300
16	0,3	0,5	17 300	23 600	4 350	17 500	9 800
20	0,3	0,5	22 000	32 000	5 600	17 500	9 500
17	0,3	0,8	26 000	29 500	5 300	16 100	8 700
30	0,3	0,5	42 000	55 000	9 900	16 100	8 500
20	0,3	1	27 500	39 000	6 800	15 600	8 300
30	0,3	1,5	37 000	57 000	10 600	15 600	8 400
17	0,3	0,8	26 500	31 500	5 700	14 600	7 900
30	0,3	1	44 000	59 000	10 600	14 600	7 700
22	0,6	1	38 000	43 500	7 400	13 600	7 400
20	0,3	1	29 500	44 500	7 800	14 000	7 500
30	0,3	1,5	39 000	63 000	11 700	14 000	7 600
17	0,3	0,8	27 500	33 500	6 100	13 400	7 200
30	0,3	1	45 500	63 000	11 400	13 400	7 000
20	0,3	0,5	31 000	48 500	8 500	13 100	7 000
30	0,3	1	46 000	81 000	15 000	13 100	6 700
17	0,3	0,8	28 500	35 500	6 400	12 700	6 800
30	0,3	1	49 000	71 000	12 900	12 700	6 400
22	0,6	1	41 500	50 000	8 600	12 000	6 600
20	0,3	0,5	28 000	43 500	7 600	12 400	7 000
30	0,3	1	42 000	73 000	13 500	12 400	6 800
20	0,6	0,8	34 500	47 500	8 900	11 700	6 500
36	0,6	0,5	53 000	82 000	15 100	11 700	6 500
20	0,3	0,5	33 500	56 000	9 800	11 500	6 200
30	0,3	1	44 000	79 000	14 600	11 500	6 300
20	0,6	0,8	35 500	50 000	9 400	10 900	6 000
36	0,6	0,5	54 000	86 000	15 900	10 900	6 100
22	0,6	0,5	44 000	57 000	9 800	10 500	5 900

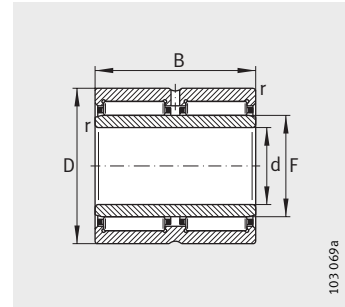


Needle roller bearings

With inner ring

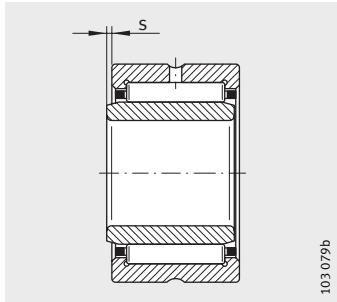


NKI, NKIS, NA49



NA69..-ZW

Dimension table (continued) · Dimensions in mm								
Designation					Mass m ≈g	Dimensions		
						d	F	D
				X-life				
NKI38/20	-	-	-	XL	136	38	43	53
NKI38/30	-	-	-	XL	207	38	43	53
NKI40/20-TV	-	-	-	XL	136	40	45	55
NKI40/30-TV	-	-	-	XL	216	40	45	55
-	NA4908	-	-	XL	230	40	48	62
-	-	NA6908-ZW	-	XL	430	40	48	62
-	-	-	NKIS40	XL	281	40	50	65
NKI42/20	-	-	-	XL	148	42	47	57
NKI42/30	-	-	-	XL	222	42	47	57
NKI45/25-TV	-	-	-	XL	217	45	50	62
NKI45/35-TV	-	-	-	XL	308	45	50	62
-	NA4909	-	-	XL	271	45	52	68
-	-	NA6909-ZW	-	XL	495	45	52	68
-	-	-	NKIS45	XL	336	45	55	72
NKI50/25	-	-	-	XL	270	50	55	68
NKI50/35	-	-	-	XL	379	50	55	68
-	NA4910	-	-	XL	274	50	58	72
-	-	NA6910-ZW	-	XL	515	50	58	72
-	-	-	NKIS50	XL	518	50	60	80
NKI55/25-TV	-	-	-	XL	255	55	60	72
NKI55/35	-	-	-	XL	379	55	60	72
-	NA4911	-	-	XL	393	55	63	80
-	-	NA6911-ZW	-	XL	780	55	63	80
-	-	-	NKIS55	XL	558	55	65	85
NKI60/25	-	-	-	XL	394	60	68	82
NKI60/35	-	-	-	XL	553	60	68	82
-	NA4912	-	-	XL	426	60	68	85
-	-	NA6912-ZW	-	XL	808	60	68	85
-	-	-	NKIS60	XL	560	60	70	90



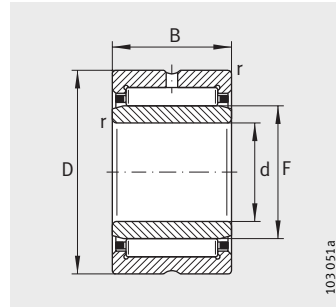
1) Axial displacement "s"

B	r min.	s ¹⁾	Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
			dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	n _B min ⁻¹
20	0,3	0,5	30 500	51 000	8 900	10 800	6 200
30	0,3	1	45 500	85 000	15 800	10 800	6 000
20	0,3	0,5	35 000	62 000	10 800	10 300	5 600
30	0,3	1	52 000	103 000	19 100	10 300	5 500
22	0,6	1	48 500	67 000	11 500	9 600	5 300
40	0,6	0,5	74 000	116 000	19 400	9 600	5 400
22	1	0,5	48 000	67 000	11 500	9 300	5 200
20	0,3	0,5	32 500	56 000	9 900	9 900	5 700
30	0,3	1	48 500	94 000	17 500	9 900	5 500
25	0,6	1,5	48 500	87 000	14 800	9 200	5 100
35	0,6	2	67 000	132 000	23 900	9 200	4 950
22	0,6	1	51 000	73 000	12 600	8 700	4 750
40	0,6	0,5	79 000	127 000	21 400	8 700	4 850
22	1	0,5	51 000	74 000	12 700	8 400	4 750
25	0,6	1,5	45 500	82 000	14 000	8 300	4 900
35	0,6	2	60 000	118 000	21 300	8 300	4 850
22	0,6	1	53 000	80 000	13 800	8 000	4 350
40	0,6	0,5	82 000	139 000	23 400	8 000	4 400
28	1,1	2	71 000	98 000	17 300	7 500	4 450
25	0,6	1,5	47 500	90 000	15 400	7 700	4 600
35	0,6	2	63 000	130 000	23 500	7 700	4 550
25	1	1,5	65 000	100 000	17 300	7 300	4 100
45	1	1,5	102 000	176 000	30 000	7 300	4 100
28	1,1	2	75 000	108 000	22 200	7 000	4 150
25	0,6	1	49 500	89 000	15 200	6 900	4 300
35	0,6	1	70 000	139 000	25 500	6 900	4 150
25	1	1,5	68 000	108 000	18 800	6 800	3 750
45	1	1,5	106 000	191 000	32 500	6 800	3 750
28	1,1	2	77 000	113 000	23 400	6 500	3 950

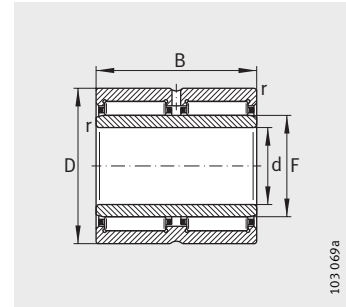


Needle roller bearings

With inner ring

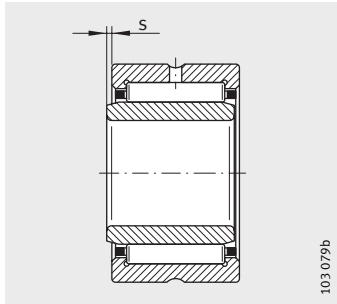


NKI, NKIS, NA49



NA69..-ZW

Dimension table (continued) · Dimensions in mm									
Designation					X-life	Mass m ≈ g	Dimensions		
							d	F	D
NKI65/25	–	–	–	XL	467	65	73	90	
NKI65/35	–	–	–	XL	659	65	73	90	
–	NA4913	–	–	XL	456	65	72	90	
–	–	NA6913-ZW	–	XL	833	65	72	90	
–	–	–	NKIS65	XL	641	65	75	95	
NKI70/25	–	–	–	XL	521	70	80	95	
NKI70/35	–	–	–	XL	737	70	80	95	
–	NA4914	–	–	XL	728	70	80	100	
–	–	NA6914-ZW	–	XL	1 340	70	80	100	
NKI75/25	–	–	–	XL	641	75	85	105	
NKI75/35	–	–	–	XL	908	75	85	105	
–	NA4915	–	–	XL	775	75	85	105	
–	–	NA6915-ZW	–	XL	1 450	75	85	105	
NKI80/25	–	–	–	XL	677	80	90	110	
NKI80/35	–	–	–	XL	959	80	90	110	
–	NA4916	–	–	XL	878	80	90	110	
–	–	NA6916-ZW	–	XL	1 522	80	90	110	
NKI85/26	–	–	–	XL	743	85	95	115	
NKI85/36	–	–	–	XL	1 040	85	95	115	
–	NA4917	–	–	XL	1 250	85	100	120	
–	–	NA6917-ZW	–	XL	2 200	85	100	120	
NKI90/26	–	–	–	XL	778	90	100	120	
NKI90/36	–	–	–	XL	1 090	90	100	120	
–	NA4918	–	–	XL	1 312	90	105	125	
–	–	NA6918-ZW	–	XL	2 310	90	105	125	
NKI95/26	–	–	–	XL	816	95	105	125	
NKI95/36	–	–	–	XL	1 145	95	105	125	
–	NA4919	–	–	XL	1 371	95	110	130	
–	–	NA6919-ZW	–	XL	2 500	95	110	130	



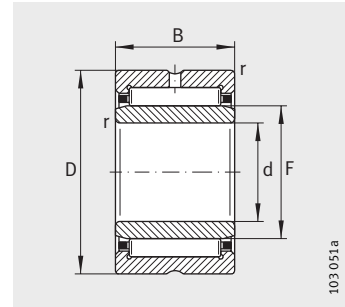
1) Axial displacement "s"

B	r min.	s ¹⁾	Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
			dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	n _B min ⁻¹
25	1	1	60 000	100 000	17 500	6 300	3 950
35	1	1	85 000	156 000	27 000	6 300	3 800
25	1	1,5	69 000	112 000	19 500	6 300	3 500
45	1	1,5	108 000	198 000	33 500	6 300	3 550
28	1,1	2	81 000	123 000	25 500	6 100	3 700
25	1	0,8	63 000	119 000	19 600	5 900	3 600
35	1	0,8	89 000	184 000	32 500	5 900	3 500
30	1	1,5	95 000	156 000	27 500	5 800	3 350
54	1	1	145 000	265 000	47 500	5 800	3 400
25	1	1	78 000	123 000	23 500	5 400	3 400
35	1	1	111 000	193 000	40 000	5 400	3 250
30	1	1,5	97 000	162 000	28 500	5 400	3 150
54	1	1	147 000	275 000	49 500	5 400	3 200
25	1	1	81 000	132 000	27 500	5 200	3 250
35	1	1	116 000	208 000	43 000	5 200	3 100
30	1	1,5	101 000	174 000	30 500	5 200	2 950
54	1	1	153 000	300 000	53 000	5 200	3 000
26	1	1,5	83 000	137 000	28 000	4 900	3 150
36	1	1,5	121 000	223 000	46 000	4 900	3 000
35	1,1	1	125 000	237 000	41 500	4 800	2 800
63	1,1	1	188 000	400 000	71 000	4 800	2 850
26	1	1,5	86 000	146 000	29 500	4 650	3 050
36	1	1,5	125 000	237 000	48 000	4 650	2 850
35	1,1	1	129 000	250 000	43 500	4 550	2 650
63	1,1	1	195 000	425 000	74 000	4 550	2 700
26	1	1,5	89 000	155 000	31 000	4 450	2 900
36	1	1,5	129 000	250 000	50 000	4 450	2 750
35	1,1	1	131 000	260 000	44 500	4 350	2 550
63	1,1	1	197 000	440 000	76 000	4 350	2 600



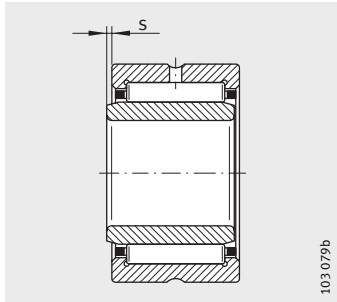
Needle roller bearings

With inner ring



NKI, NA49, NA48

Dimension table (continued) · Dimensions in mm								
Designation				X-life	Mass m ≈g	Dimensions		
						d	F	D
NKI100/30	–	–	XL	990	100	110	130	
NKI100/40	–	–	XL	1 330	100	110	130	
–	NA4920	–	XL	1 900	100	115	140	
–	NA4922	–	XL	2 070	110	125	150	
–	–	NA4822	XL	1 080	110	120	140	
–	NA4924	–	XL	2 860	120	135	165	
–	–	NA4824	XL	1 170	120	130	150	
–	NA4926	–	XL	3 900	130	150	180	
–	–	NA4826	XL	1 810	130	145	165	
–	NA4928	–	XL	4 150	140	160	190	
–	–	NA4828	XL	1 920	140	155	175	
–	–	NA4830	XL	2 720	150	165	190	
–	–	NA4832	XL	2 890	160	175	200	
–	–	NA4834	XL	3 960	170	185	215	
–	–	NA4836	XL	4 200	180	195	225	
–	–	NA4838	XL	5 610	190	210	240	



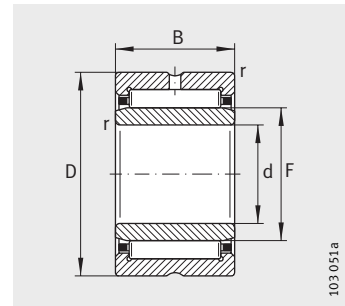
1) Axial displacement "s"

B	r min.	s ¹⁾	Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
			dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	n _B min ⁻¹
30	1,1	1,5	111 000	210 000	41 500	4 250	2 700
40	1,1	2	143 000	290 000	58 000	4 250	2 650
40	1,1	2	144 000	270 000	45 500	4 100	2 600
40	1,1	2	149 000	290 000	47 500	3 750	2 400
30	1	0,8	106 000	216 000	36 000	3 900	2 300
45	1,1	2	205 000	390 000	64 000	3 450	2 200
30	1	0,8	112 000	239 000	39 000	3 650	2 090
50	1,5	1,5	229 000	470 000	74 000	3 150	2 080
35	1,1	1	134 000	310 000	48 500	3 300	2 000
50	1,5	1,5	237 000	500 000	78 000	2 950	1 920
35	1,1	1	136 000	325 000	50 000	3 100	1 870
40	1,1	1,5	172 000	400 000	62 000	2 900	1 810
40	1,1	1,5	181 000	435 000	66 000	2 700	1 680
45	1,1	1,5	209 000	510 000	75 000	2 550	1 610
45	1,1	1,5	219 000	550 000	80 000	2 420	1 490
50	1,5	1,5	255 000	690 000	100 000	2 280	1 350



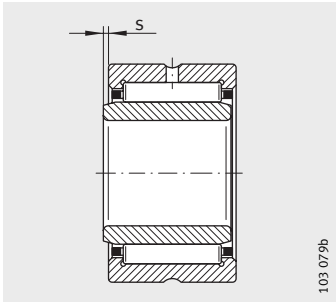
Needle roller bearings

With inner ring



NA48

Dimension table (continued) · Dimensions in mm								
Designation	X-life	Mass m ≈g	Dimensions					
			d	F	D	B	r min.	s ¹⁾
NA4840	XL	5 840	200	220	250	50	1,5	1,5
NA4844	XL	6 380	220	240	270	50	1,5	1,5
NA4848	XL	10 000	240	265	300	60	2	2
NA4852	XL	10 600	260	285	320	60	2	2
NA4856	XL	15 300	280	305	350	69	2	2,5
NA4860	XL	21 800	300	330	380	80	2,1	2
NA4864	XL	23 000	320	350	400	80	2,1	2
NA4868	XL	24 200	340	370	420	80	2,1	2
NA4872	XL	25 600	360	390	440	80	2,1	2
NA4876	XL	42 600	380	415	480	100	2,1	2



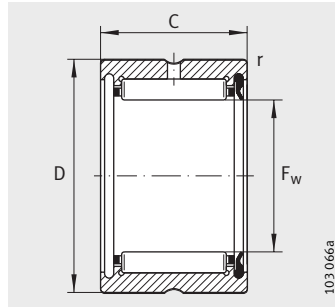
1) Axial displacement "s"

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. C_r N	stat. C_{0r} N	C_{ur} N	n_G min^{-1}	n_B min^{-1}
260 000	720 000	102 000	2 180	1 270
275 000	790 000	110 000	2 000	1 130
400 000	1 080 000	150 000	1 810	990
415 000	1 160 000	158 000	1 690	890
510 000	1 300 000	175 000	1 560	840
700 000	1 770 000	235 000	1 440	730
710 000	1 850 000	242 000	1 360	680
730 000	1 940 000	249 000	1 290	640
740 000	2 020 000	255 000	1 230	600
1 130 000	2 900 000	370 000	1 140	520

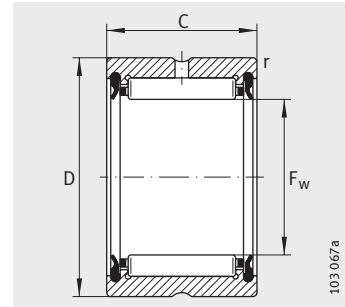


Needle roller bearings

Without inner ring,
sealed



RNA49...-RSR



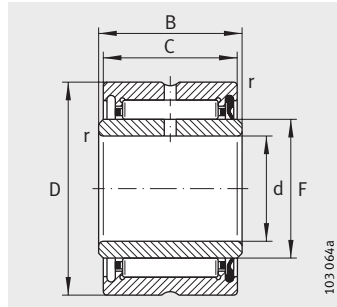
RNA49...-2RSR

Dimension table · Dimensions in mm

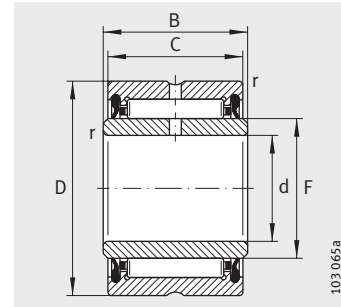
Designation		X-life	Mass m ≈ g	Dimensions				Basic load ratings		Fatigue limit load C _{ur} N	Limiting speed n _{G grease} min ⁻¹
				F _w	D	C	r	dyn. C _r N	stat. C _{0r} N		
RNA4900-RSR	RNA4900-2RSR	XL	16	14	22	13	0,3	7 700	6 900	1 360	13 000
RNA4901-RSR	RNA4901-2RSR	XL	18	16	24	13	0,3	8 600	8 300	1 630	12 000
RNA4902-RSR	RNA4902-2RSR	XL	21,5	20	28	13	0,3	9 700	10 300	2 040	10 000
RNA4903-RSR	RNA4903-2RSR	XL	23	22	30	13	0,3	10 000	11 000	2 180	9 000
RNA4904-RSR	RNA4904-2RSR	XL	56	25	37	17	0,3	19 500	19 900	3 750	7 500
RNA4905-RSR	RNA4905-2RSR	XL	60	30	42	17	0,3	21 800	24 200	4 550	6 500
RNA4906-RSR	RNA4906-2RSR	XL	69	35	47	17	0,3	23 900	28 500	5 400	5 500
RNA4907-RSR	RNA4907-2RSR	XL	107	42	55	20	0,6	29 500	39 500	7 200	4 800
RNA4908-RSR	RNA4908-2RSR	XL	154	48	62	22	0,6	41 000	53 000	8 800	4 200
RNA4909-RSR	RNA4909-2RSR	XL	157	52	68	22	0,6	43 000	59 000	9 700	3 900
RNA4910-RSR	RNA4910-2RSR	XL	160	58	72	22	0,6	45 000	64 000	10 600	3 500

Needle roller bearings

With inner ring, sealed



NA49..-RSR

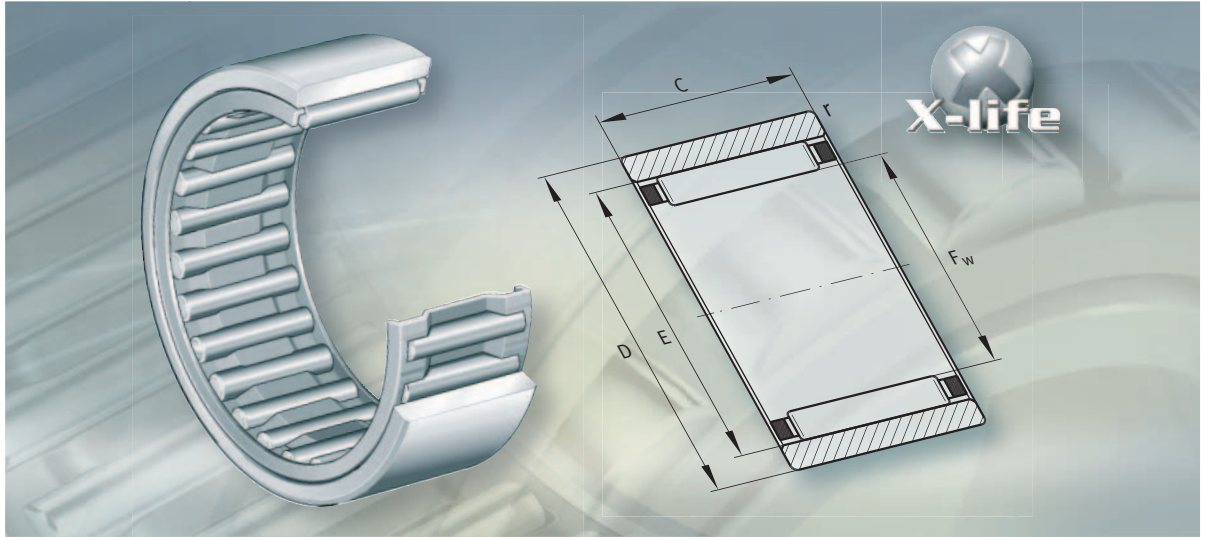


NA49..-2RSR

Dimension table · Dimensions in mm

Designation		X-life	Mass m ≈ g	Dimensions					Basic load ratings		Fatigue limit load C _{ur} N	Limiting speed n _{G grease} min ⁻¹	
				d	F	D	C	B	r	dyn. C _r N			stat. C _{0r} N
NA4900-RSR	NA4900-2RSR	XL	24,5	10	14	22	13	14	0,3	7 700	6 900	1 360	13 000
NA4901-RSR	NA4901-2RSR	XL	27,5	12	16	24	13	14	0,3	8 600	8 300	1 630	12 000
NA4902-RSR	NA4902-2RSR	XL	37	15	20	28	13	14	0,3	9 700	10 300	2 040	10 000
NA4903-RSR	NA4903-2RSR	XL	40	17	22	30	13	14	0,3	10 000	11 000	2 180	9 000
NA4904-RSR	NA4904-2RSR	XL	80	20	25	37	17	18	0,3	19 500	19 900	3 750	7 500
NA4905-RSR	NA4905-2RSR	XL	89,5	25	30	42	17	18	0,3	21 800	24 200	4 550	6 500
NA4906-RSR	NA4906-2RSR	XL	104	30	35	47	17	18	0,3	23 900	28 500	5 400	5 500
NA4907-RSR	NA4907-2RSR	XL	175	35	42	55	20	21	0,6	29 500	39 500	7 200	4 800
NA4908-RSR	NA4908-2RSR	XL	252	40	48	62	22	23	0,6	41 000	53 000	8 800	4 200
NA4909-RSR	NA4909-2RSR	XL	290	45	52	68	22	23	0,6	43 000	59 000	9 700	3 900
NA4910-RSR	NA4910-2RSR	XL	295	50	58	72	22	23	0,6	45 000	64 000	10 600	3 500





Needle roller bearings without ribs

Needle roller bearings without ribs

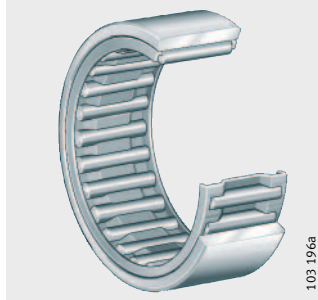
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Product overview Needle roller bearings without ribs

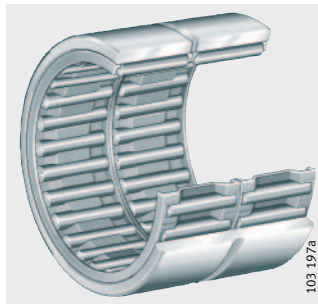
Without inner ring
Single row

RNAO



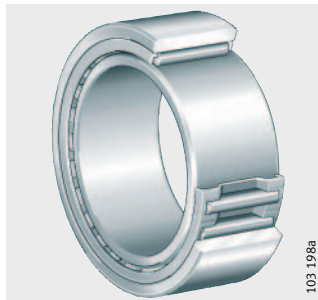
Double row

RNAO..-ZW-ASR1



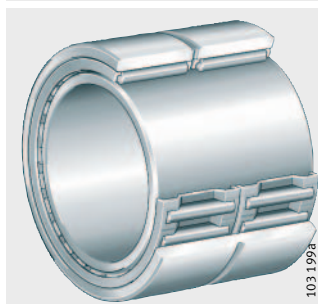
With inner ring
Single row

NAO




Double row

NAO..-ZW-ASR1



Needle roller bearings without ribs

Features	<p>Needle roller bearings without ribs are single or double row units comprising machined outer rings without ribs, needle roller and cage assemblies and removable inner rings.</p> <p>The bearings are not self-retaining. This means that the outer ring, needle roller and cage assembly and inner ring can be fitted independently of each other.</p>
	<p>Needle roller bearings without ribs are X-life bearings. In these bearings, the raceways have optimised roughness and geometrical accuracy. This gives higher load carrying capacity and longer life.</p>
Sealing/lubricant	<p>Needle roller bearings without ribs are not sealed and not greased. Double row bearings can be lubricated via a lubrication groove and lubrication hole in the outer ring. These bearings have the suffix ZW-ASR1.</p>
Needle roller bearings without inner ring	<p>Bearings RNAO have particularly compact radial dimensions. However, they require a shaft raceway that is hardened and ground. The needle roller and cage assembly can be fitted either together with the outer ring or with the shaft. It can also be subsequently slid between the outer ring and shaft.</p> <p>The double row design is indicated by the suffix ZW, the lubrication hole and lubrication groove are indicated by the suffix ASR1.</p>
Needle roller bearings with inner ring	<p>Bearings NAO are used if the shaft cannot be configured as a rolling bearing raceway. The needle roller and cage assembly can be fitted either together with the outer ring or with the inner ring. It can also be subsequently slid between the outer ring and inner ring.</p> <p>Bearings with a lubrication hole in the inner ring have the suffix IS1. The double row design is indicated by the suffix ZW, the lubrication hole and lubrication groove in the outer ring are indicated by the suffix ASR1.</p>
Displacement of the inner ring	<p>The standard inner ring allows axial displacement within the values “s” stated in the dimension tables. Where larger displacements occur, the standard ring can be replaced by a wider inner ring IR. Inner rings: see page 690.</p>



Needle roller bearings without ribs

Operating temperature Bearings with plastic cage can be used at operating temperatures from -20 °C to $+120\text{ °C}$.

Cages The cages are made from sheet steel or plastic. Plastic cages have the suffix TV.

Suffixes Suffixes for the available designs: see table.

Available designs

Suffix	Description
ASR1 ²⁾	Lubrication hole and lubrication groove in outer ring
IS1 ²⁾	Lubrication hole in inner ring
TV ¹⁾²⁾	Cage made from glass fibre reinforced polyamide 66
ZW ²⁾	Double row

1) Bearings with plastic cage: see dimension tables.

2) Dependent on size.

Design and safety guidelines
Raceway for bearings without inner ring

Where bearings without an inner ring are to be used, the rolling element raceway on the shaft must be hardened and ground. The surface hardness of the raceway must be $670\text{ HV} + 170\text{ HV}$ and the hardening depth CHD or Rht must be sufficiently large.

Raceway design

Shaft-diameter Nominal dimension mm		Shaft tolerance Operating clearance			Roughness max.	Round-ness max.	Parallelism max.
over	incl.	Small	Normal	Large			
–	65	k5	h5	g6	R _a 0,1 (R _z 0,4)	IT3	IT3
65	80	k5	h5	f6			
80	120	k5	g5	f6	R _a 0,15 (R _z 0,63)		

Caution! The values apply to housing tolerances up to K7. For tighter housing bores, the operating clearance should be checked by either calculation or measurement.

Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum radial load $F_{r\text{ min}}$. This applies in particular to high speed bearings since, if the radial load is insufficient or not present, damaging sliding motion may occur between the rolling elements and raceways. In continuous operation, a minimum radial load of the order of $C_r/P < 50$ is necessary.

**Sealing rings/
wider inner rings**

Sealing rings of series G, GR and SD are matched to the bearing dimensions and can be combined with wider inner rings IR. The outer surface of the inner rings can be used as the sliding surface for seal lips.

Sealing rings: see publication GSD, inner rings: see page 690.

Caution! Sealing rings must not be used as running surfaces for the cage.

Axial guidance of needle roller and cage assemblies

In bearings without ribs, the needle roller and cage assemblies must be axially guided on lateral, burr-free running surfaces, see dimension tables.

Caution! The axial running surfaces for the cage must be precision machined (R_a2) and resistant to wear. Note the mounting dimensions in the dimension tables.

Radial location

Needle roller bearings with inner ring are radially located by means of a close fit on the shaft and in the housing.

Axial location

In order to prevent lateral creep of the bearing rings, they must be located by means of physical locking.

The abutting shoulders (shaft/housing) should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seating to the abutting shoulder must have rounding to DIN 5 418 or an undercut to DIN 509. Note the minimum chamfer dimensions r in the dimension tables.

The overlap between the snap rings and the end faces of the bearing rings must be sufficiently large.

Maximum inner ring chamfer dimensions to DIN 620-6 must be taken into consideration.

Fitting note

Caution! Needle roller bearings without ribs are not self-retaining. Since the individual parts are matched to each other, parts of bearings of equal size must not be interchanged during fitting.

Accuracy

The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620.

Radial internal clearance

Bearings with inner ring have a radial internal clearance of CN.

Radial internal clearance to DIN 620-4

Bore d mm		Radial internal clearance CN μm	
over	incl.	min.	max.
–	24	20	45
24	30	20	45
30	40	25	50
40	50	30	60
50	65	40	70
65	80	40	75
80	100	50	85
100	120	50	90

Enveloping circle

In the case of bearings without inner ring, the enveloping circle dimension F_w is used instead of the radial internal clearance.

The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway.

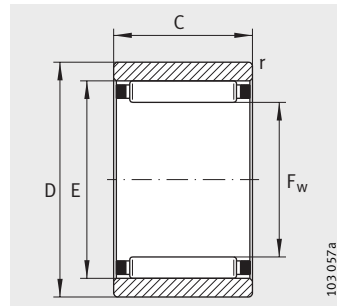
For bearings before fitting, the enveloping circle F_w is in the tolerance zone F6.

Caution! If the enveloping circle diameter must be in tolerance zone F6, the parts as delivered (outer ring/needle roller and cage assembly matched pair) must not be interchanged with other matched pairs.

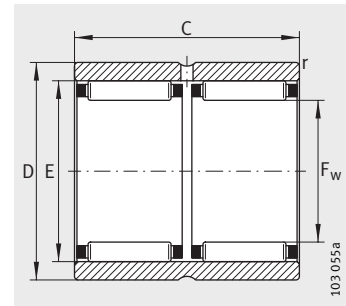


Needle roller bearings without ribs

Without inner ring

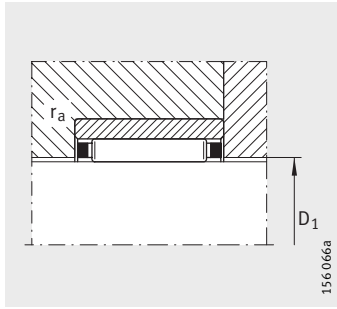


RNAO

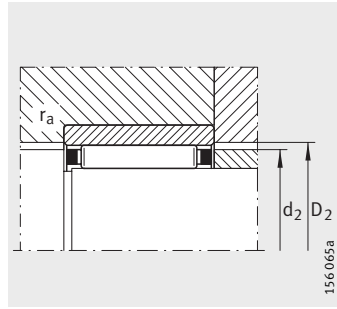


RNAO..-ZW-ASR1

Dimension table · Dimensions in mm									
Designation	X-life	Mass m ≈g	Dimensions					Mounting dimensions	
			F _w	D	C	E	r min.	D ₁	d ₂
RNAO5X10X8-TV	XL	3	5	10	8	8	0,15	5,3	7,7
RNAO6X13X8-TV	XL	6	6	13	8	9	0,3	6,3	8,7
RNAO7X14X8-TV	XL	6	7	14	8	10	0,3	7,3	9,7
RNAO8X15X10-TV	XL	8	8	15	10	11	0,3	8,3	10,7
RNAO10X17X10-TV	XL	10	10	17	10	13	0,3	10,3	12,7
RNAO12X22X12-TV	XL	19	12	22	12	18	0,3	12,3	17,6
RNAO15X23X13	XL	20	15	23	13	19	0,3	15,4	18,6
RNAO16X24X13	XL	21	16	28	12	20	0,3	16,4	19,6
RNAO16X28X12	XL	32	16	28	12	22	0,3	16,4	21,6
RNAO17X25X13	XL	22	17	25	13	21	0,3	17,4	20,6
RNAO18X30X24-ZW-ASR1	XL	69	18	30	24	24	0,3	18,4	23,6
RNAO20X28X13	XL	25	20	28	13	24	0,3	20,4	23,6
RNAO20X28X26-ZW-ASR1	XL	50	20	28	26	24	0,3	20,4	23,6
RNAO20X32X12	XL	38	20	32	12	26	0,3	20,4	25,6
RNAO22X30X13	XL	27	22	30	13	26	0,3	22,4	25,6
RNAO22X35X16	XL	59	22	35	16	29	0,3	22,4	28,4
RNAO25X35X17	XL	53	25	35	17	29	0,3	25,6	28,4
RNAO25X35X26-ZW-ASR1	XL	76	25	35	26	29	0,3	25,6	28,4
RNAO25X37X16	XL	60	25	37	16	32	0,3	25,6	31,4
RNAO30X40X17	XL	60	30	40	17	35	0,3	30,6	34,4
RNAO30X42X16	XL	59	30	42	16	37	0,3	30,6	36,4
RNAO30X42X32-ZW-ASR1	XL	137	30	42	32	37	0,3	30,6	36,4
RNAO35X45X13	XL	53	35	45	13	40	0,3	35,6	39,4
RNAO35X45X17	XL	69	35	45	17	40	0,3	35,6	39,4
RNAO35X45X26-ZW-ASR1	XL	91	35	45	26	40	0,3	35,6	39,4
RNAO35X47X16	XL	78	35	47	16	42	0,3	35,6	41,4
RNAO35X47X18	XL	89	35	47	16	42	0,3	35,6	41,4
RNAO35X47X32-ZW-ASR1	XL	156	35	47	32	42	0,3	35,6	41,4



Axial guidance of needle roller and cage assembly in housing



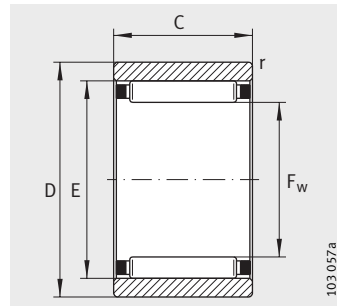
Axial guidance of needle roller and cage assembly on shaft

		Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
D_2	r_a max.	dyn. C_r N	stat. C_{0r} N			
8,3	0,1	2 650	1 920	295	37 000	60 000
9,3	0,3	2 950	2 280	355	32 000	55 000
10,3	0,3	3 250	2 650	410	31 000	48 000
11,3	0,3	4 450	4 100	690	29 000	41 000
13,3	0,3	5 300	5 500	930	27 000	33 000
18,3	0,3	11 300	9 900	1 740	24 000	23 000
19,3	0,3	9 700	10 900	1 760	22 900	15 000
20,3	0,3	10 100	11 800	1 890	22 400	14 200
22,3	0,3	13 000	12 500	2 210	21 300	12 600
21,3	0,3	11 700	14 600	2 240	21 800	13 000
24,5	0,3	24 800	30 000	5 300	20 400	17 300
24,3	0,3	11 100	14 300	2 310	20 400	11 900
24,3	0,3	19 000	28 500	4 600	20 000	16 000
26,5	0,3	15 100	16 200	2 850	18 800	10 500
26,3	0,3	11 800	15 900	2 550	18 800	10 900
29,5	0,3	22 600	25 500	4 200	17 200	9 400
29,5	0,3	16 800	26 000	4 250	16 300	9 300
29,5	0,3	21 900	37 000	5 900	16 000	13 000
32,5	0,3	23 800	28 000	4 650	15 800	8 700
35,5	0,3	22 100	34 000	5 300	14 000	7 800
37,5	0,3	26 000	33 500	5 500	13 600	7 600
37,5	0,3	45 000	67 000	11 100	14 000	10 000
40,5	0,3	18 300	28 000	4 550	12 300	7 100
40,5	0,3	23 500	38 500	6 100	12 300	7 000
40,5	0,3	31 500	56 000	8 900	12 000	9 000
42,5	0,3	27 500	37 500	6 200	12 000	6 800
42,5	0,3	31 000	43 000	7 400	12 000	6 700
42,5	0,3	47 500	75 000	12 400	12 000	9 000

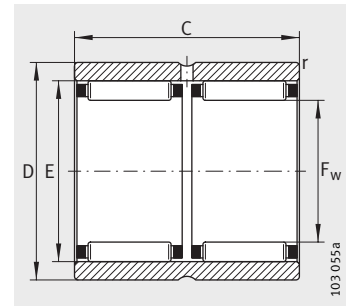


Needle roller bearings without ribs

Without inner ring



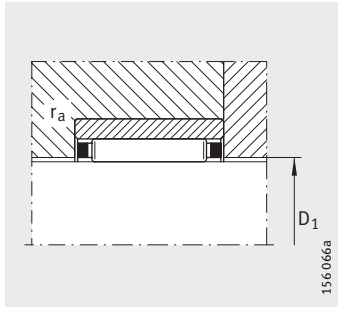
RNAO



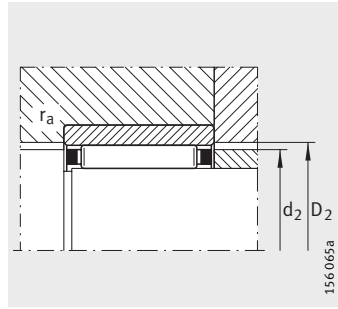
RNAO..-ZW-ASR1

Dimension table (continued) · Dimensions in mm

Designation	X-life	Mass m ≈g	Dimensions					Mounting dimensions	
			F _w	D	C	E	r min.	D ₁	d ₂
RNAO40X50X17	XL	74	40	50	17	45	0,3	40,6	44,4
RNAO40X50X34-ZW-ASR1	XL	152	40	50	34	45	0,3	40,6	44,4
RNAO40X55X20	XL	145	40	55	20	47	0,3	40,6	46,2
RNAO40X55X40-ZW-ASR1	XL	275	40	55	40	48	0,3	40,6	47,2
RNAO45X55X17	XL	83	45	55	17	50	0,3	45,6	49,2
RNAO45X62X40-ZW-ASR1	XL	377	45	62	40	53	0,3	45,6	52,2
RNAO50X62X20	XL	140	50	62	20	55	0,3	50,6	54,2
RNAO50X65X20	XL	168	50	65	20	58	0,3	50,6	57,2
RNAO50X65X40-ZW-ASR1	XL	355	50	65	40	58	0,6	50,6	57,2
RNAO55X68X20	XL	166	55	68	20	60	0,6	55,8	59,4
RNAO60X78X20	XL	255	60	78	20	68	1	60,8	67,2
RNAO60X78X40-ZW-ASR1	XL	435	60	78	40	68	1	60,8	67,2
RNAO65X85X30	XL	464	65	85	30	73	1	66	72,2
RNAO70X90X30	XL	499	70	90	30	78	1	71	77,2
RNAO80X100X30	XL	580	80	100	30	88	1	81	87,2
RNAO90X105X26	XL	373	90	105	26	98	1	91	97,2
RNAO90X110X30	XL	610	90	110	30	98	1	91	97,2
RNAO100X120X30	XL	694	100	120	30	108	1	101	107,2



Axial guidance of needle roller and cage assembly in housing



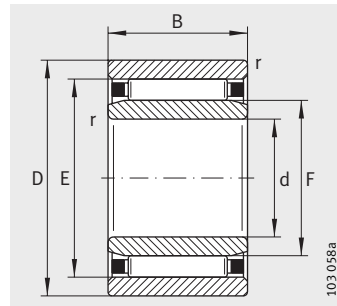
Axial guidance of needle roller and cage assembly on shaft

		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
D ₂	r _a max.	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	n _B min ⁻¹
		45,5	0,3				24 200	41 500	6 400	10 900	6 400
45,5	0,3	41 500	83 000	12 900	11 000	7 000
47,5	0,3	37 000	57 000	8 900	10 300	5 800
47,5	0,3	70 000	118 000	18 700	10 000	7 500
50,5	0,3	25 500	46 000	7 100	9 800	5 800
53,5	0,3	76 000	135 000	21 500	9 000	7 000
55,8	0,3	30 000	60 000	9 600	8 800	5 300
58,5	0,3	40 500	62 000	10 800	8 500	5 100
58,5	0,6	69 000	124 000	21 700	8 500	6 500
60,8	0,6	32 000	66 000	10 700	8 000	4 850
68,8	1	49 500	85 000	13 600	7 100	4 150
68,8	1	85 000	171 000	27 500	7 000	5 500
73,8	1	64 000	123 000	21 100	6 500	4 000
78,8	1	68 000	135 000	23 200	6 100	3 750
89	1	80 000	176 000	31 000	5 400	3 250
99	1	69 000	150 000	25 000	5 000	3 200
99	1	76 000	172 000	29 500	4 900	3 100
109	1	80 000	188 000	32 000	4 500	3 700

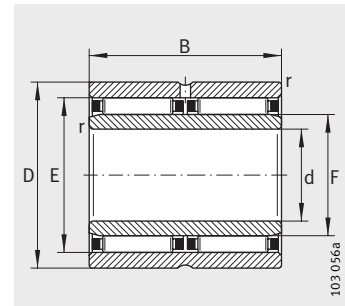


Needle roller bearings without ribs

With inner ring



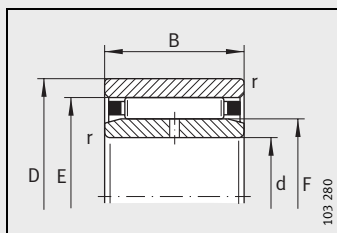
NAO



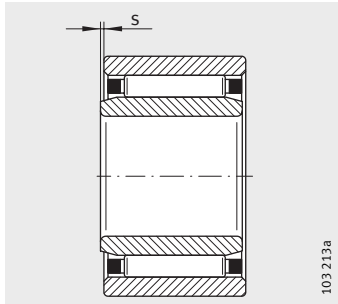
NAO..-ZW-ASR1

Dimension table · Dimensions in mm

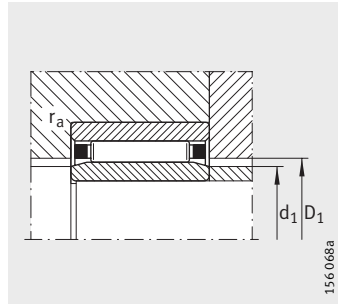
Designation	X-life	Mass m ≈ g	Dimensions						
			d	D	B	F	E	r min.	s ¹⁾
NAO6X17X10-TV-IS1	XL	14	6	17	10	10	13	0,3	0,5
NAO9X22X12-TV	XL	23,5	9	22	12	12	18	0,3	0,5
NAO12X24X13	XL	30	12	24	13	16	20	0,3	0,5
NAO12X28X12-IS1	XL	40	12	28	12	16	22	0,3	0,5
NAO15X28X13	XL	29	15	28	13	20	24	0,3	0,5
NAO15X32X12-IS1	XL	50	15	32	12	20	26	0,3	0,5
NAO17X30X13	XL	42	17	30	13	22	26	0,3	0,5
NAO17X35X16	XL	78	17	35	16	22	29	0,3	0,5
NAO20X35X17	XL	76	20	35	17	25	29	0,3	0,5
NAO20X37X16	XL	82	20	37	16	25	32	0,3	0,5
NAO25X40X17	XL	88	25	40	17	30	35	0,3	0,8
NAO25X42X16-IS1	XL	86	25	42	16	30	37	0,3	0,8
NAO25X42X32-ZW-ASR1	XL	190	25	43	32	30	37	0,3	0,8
NAO30X45X17	XL	102	30	45	17	35	40	0,3	0,8
NAO30X45X26-ZW-ASR1	XL	157	30	45	26	35	40	0,3	0,8
NAO30X47X16	XL	109	30	47	16	35	42	0,3	0,8
NAO30X47X18	XL	119	30	47	18	35	42	0,3	0,8
NAO35X50X17	XL	113	35	50	17	40	45	0,3	0,8
NAO35X55X20	XL	190	35	55	20	40	47	0,3	0,8
NAO40X55X17	XL	127	40	55	17	45	50	0,3	0,8
NAO50X68X20-IS1	XL	230	50	68	20	55	60	0,6	1
NAO70X100X30	XL	850	70	100	30	80	88	1	1
NAO80X110X30	XL	920	80	110	30	90	98	1	1
NAO90X120X30	XL	1044	90	120	30	100	108	1	1



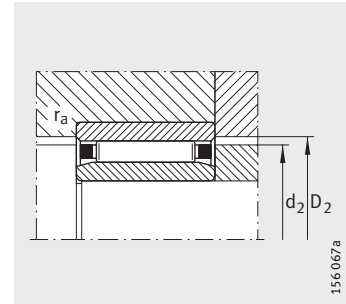
NAO..-IS1



1) Axial displacement "s"



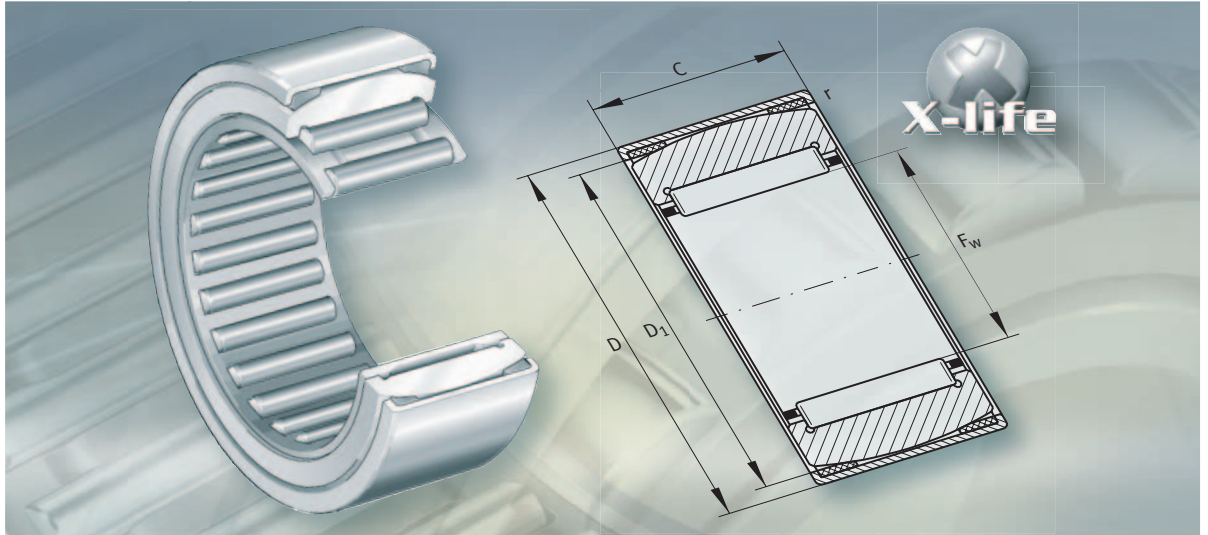
Axial guidance of needle roller and cage assembly in housing



Axial guidance of needle roller and cage assembly on shaft

Mounting dimensions					Basic load ratings		Fatigue limit load C_{ur} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_1	D_1	d_2	D_2	r_a max.	dyn. C_r N	stat. C_{0r} N			
9,7	10,3	12,7	13,3	0,3	5 300	5 500	930	29 000	28 000
11,7	12,3	17,6	18,3	0,3	11 300	9 900	1 740	25 000	21 000
15,7	16,4	19,6	20,3	0,3	10 100	11 800	1 890	24 000	18 000
15,7	16,4	21,6	22,3	0,3	13 000	12 500	2 210	22 000	17 000
19,7	20,4	23,6	24,3	0,3	11 100	14 300	2 310	22 000	14 000
19,7	20,4	25,6	26,5	0,3	15 100	16 200	2 850	21 000	13 000
21,5	22,4	25,6	26,3	0,3	11 800	15 900	2 550	21 000	13 000
21,5	22,4	28,4	29,5	0,3	22 600	25 500	4 200	19 000	12 000
24,5	25,6	28,4	29,5	0,3	16 800	26 000	4 250	18 000	12 000
24,5	25,6	31,4	32,5	0,3	23 800	28 000	4 650	17 000	11 000
29,5	30,6	34,4	35,5	0,3	22 100	34 000	5 300	15 000	9 500
29,5	30,6	36,4	37,5	0,3	26 000	33 500	5 500	15 000	9 000
29,5	30,6	36,4	37,5	0,3	45 000	67 000	11 100	15 000	9 000
34,5	35,6	39,4	40,5	0,3	23 500	38 500	6 100	13 000	8 500
34,5	35,6	39,4	40,5	0,3	31 500	56 000	8 900	13 000	8 500
34,5	35,6	41,4	42,5	0,3	27 500	37 500	6 200	13 000	8 000
34,5	35,6	41,4	42,5	0,3	31 000	43 000	7 400	13 000	8 000
39,5	40,6	44,4	45,5	0,3	24 200	41 500	6 400	12 000	7 500
39,5	40,6	46,2	47,5	0,3	37 000	57 000	8 900	11 000	7 500
44,5	45,6	49,2	50,5	0,3	25 500	46 000	7 100	10 000	7 000
54,5	55,8	59,2	60,8	0,6	32 000	66 000	10 700	8 500	6 000
79,3	81	87,2	89	1	80 000	176 000	31 000	6 000	3 900
89,3	91	97,2	99	1	76 000	172 000	29 500	5 000	3 800
99,3	101	107,2	109	1	80 000	188 000	32 000	4 700	3 500





Aligning needle roller bearings

Aligning needle roller bearings

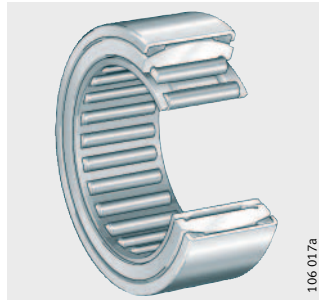
	Page
Product overview	Aligning needle roller bearings 670
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	Needle roller bearings with/without inner ring 671
	Operating temperature 671
	Cages 671
Design and safety guidelines	Compensation of misalignments 671
	Raceway for bearings without inner ring 671
	Minimum radial load 672
	Speeds 672
	Radial and axial location 672
	Installation with fitting mandrel 672
Accuracy	Radial internal clearance 672
	Enveloping circle 672
Dimension tables	Aligning needle roller bearings without inner ring 673
	Aligning needle roller bearings with inner ring 673



Product overview **Aligning needle roller bearings**

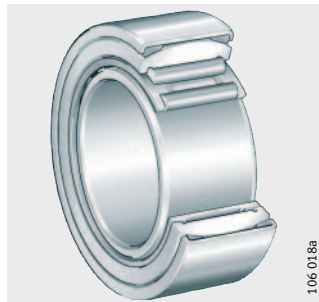
Without inner ring

RPNA



With inner ring

PNA



Aligning needle roller bearings

Features	<p>Aligning needle roller bearings are units comprising drawn outer cups, plastic support rings with a concave inner profile, outer rings with a spherical outside surface, needle roller and cage assemblies and removable inner rings.</p> <p>The bearings can compensate static misalignments and can thus tolerate misalignment of the shaft relative to the housing; see Compensation of misalignments.</p> <p>Aligning needle roller bearings are firmly seated in the housing bore. The bore can therefore be produced easily and economically.</p>
X-life	<p>Aligning needle roller bearings are X-life bearings. In these bearings, the raceways have optimised roughness and geometrical accuracy. This gives higher load carrying capacity and longer life.</p>
Sealing/lubricant	<p>Aligning needle roller bearings are unsealed and are not supplied greased. They can be lubricated with grease or oil.</p>
Needle roller bearings with/without inner ring	<p>Bearings RPNA do not have an inner ring and are therefore particularly compact. However, they require a raceway that is hardened and ground.</p> <p>Bearings PNA have an inner ring. They are used if the shaft cannot be configured as a rolling bearing raceway.</p>
Displacement of the inner ring	<p>The standard inner ring allows axial displacement within the values “s” stated in the dimension tables. Where larger displacements occur, the standard ring can be replaced by a wider inner ring IR. Inner rings: see page 690.</p>
Operating temperature	<p>Caution! Aligning needle roller bearings are suitable for operating temperatures from -20 °C to $+100\text{ °C}$; this is limited by the plastic support rings.</p>
Cages	<p>The bearings have sheet steel cages.</p>
Design and safety guidelines	
Compensation of misalignments	<p>Due to the spherical outer ring and the concave support ring, aligning needle roller bearings can compensate static shaft misalignments of up to 3°.</p> <p>Caution! The bearings must not be used to support swivel or tumbling motion. During adjustment motion between the outer cup and the ring, a breakaway torque occurs.</p> <p>In order that adjustment motion can take place, the tolerances for the housing bore according to the table must be observed.</p>
Raceway for bearings without inner ring	<p>Where bearings without an inner ring are to be used, the rolling element raceway on the shaft must be hardened and ground. The surface hardness of the raceway must be $670\text{ HV} + 170\text{ HV}$ and the hardening depth CHD or Rht must be sufficiently large.</p>



Aligning needle roller bearings

Tolerances for shaft raceway/ housing bore

Housing material	Shaft tolerance for bearings without inner ring	Bore tolerance
Steel or cast iron	h6	N6
Light metal		R6

Surface for shaft raceway/ housing bore

Surface quality	Shaft raceway for bearings without inner ring	Housing bore
Roughness max.	$R_a 0,1$ ($R_z 0,4$)	$R_a 0,8$ ($R_z 4$)
Roundness max.	IT3	IT 5/2
Parallelism max.	IT3	IT 5/2

Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum radial load $F_{r\min}$. This applies in particular to high speed bearings since, if the radial load is insufficient or not present, damaging sliding motion may occur between the rolling elements and raceways. For continuous operation, therefore, a ratio $C_r/P < 50$ is necessary.

Speeds

The speeds n_G in the dimension tables are valid for oil lubrication.

Caution!

With grease lubrication, the permissible value is taken as 60% of the value given in the table.

Radial and axial location

Aligning needle roller bearings are firmly seated in the housing bore. No further axial location is required.

Caution!

Aligning needle roller bearings are not self-retaining. Since the individual bearing parts are matched to each other, the parts of bearings of identical size must not be interchanged during fitting.

Installation with fitting mandrel

Due to the drawn outer cup, the bearings must be fitted using a special pressing mandrel: see the section Drawn cup needle roller bearings, page 610. The marked side of the bearing should be in contact with the flange of the mandrel. A toroidal ring on the mandrel holds the bearing securely on the mandrel.

Accuracy

The dimensional and geometrical tolerances are in accordance with PN to DIN 620, apart from the outside diameter and width of the outer cup. The width has a tolerance of $\pm 0,5$ mm.

Radial internal clearance

Bearings with inner ring have a radial internal clearance of CN.

Radial internal clearance to DIN 620-4

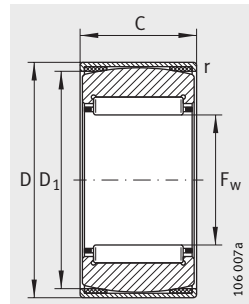
Bore d mm		Radial internal clearance CN μm	
over	incl.	min.	max.
–	24	20	45
24	30	20	45
30	40	25	50
40	50	30	60

Enveloping circle

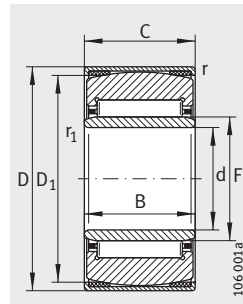
In the case of bearings without inner ring, the enveloping circle dimension F_w is used instead of the radial internal clearance. The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway. For bearings before fitting, the enveloping circle F_w is in the tolerance zone F6.

Aligning needle roller bearings

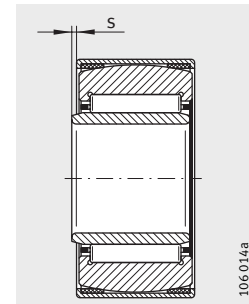
With or
without inner ring



RPNA



PNA



1) Axial displacement "s"

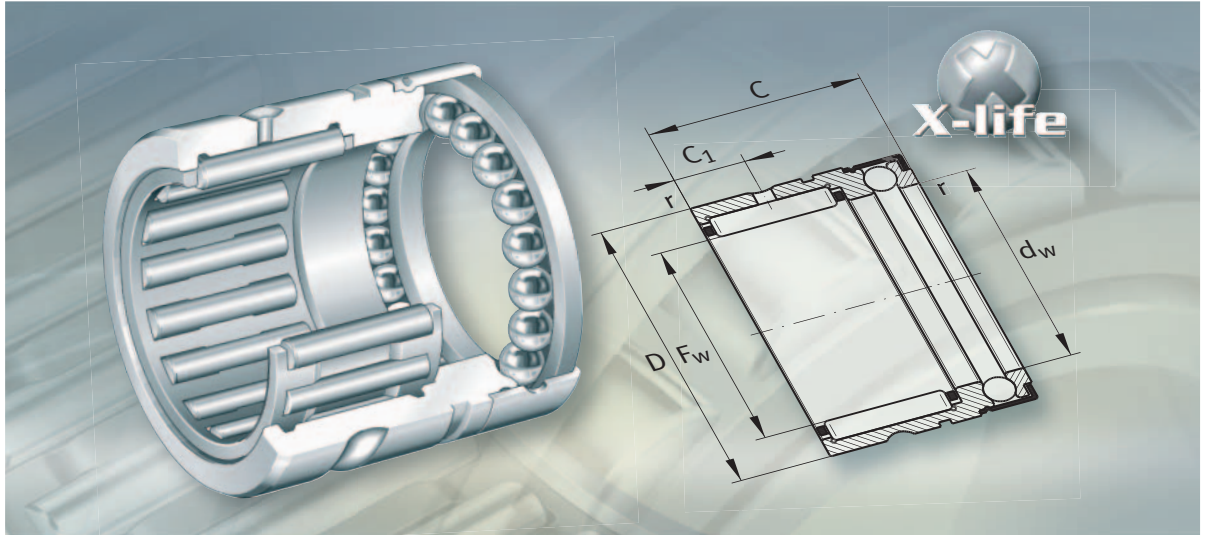
Dimension table · Dimensions in mm

Designation	X-life	Mass m ≈ g	Dimensions					Basic load ratings		Fatigue limit load C _{ur} N	Limiting speed n _G min ⁻¹
			F _w	D	C ±0,5	D ₁	r min.	dyn. C _r N	stat. C _{0r} N		
RPNA15/28	XL	32	15	28	12	24,5	0,8	7 800	7 900	1 430	24 000
RPNA18/32	XL	52	18	32	16	27	0,8	14 100	16 200	3 000	22 000
RPNA20/35	XL	62	20	35	16	30,5	0,8	14 600	17 500	3 200	21 000
RPNA25/42	XL	109	25	42	20	36,5	0,8	21 300	30 500	5 300	18 000
RPNA28/44	XL	112	28	44	20	38,5	0,8	24 800	34 000	5 900	16 000
RPNA30/47	XL	125	30	47	20	42	0,8	25 500	36 000	6 300	15 000
RPNA35/52	XL	131	35	52	20	47,5	0,8	27 500	41 500	7 300	13 000
RPNA40/55	XL	141	40	55	20	50,5	0,8	29 500	47 000	8 300	11 000
RPNA45/62	XL	176	45	62	20	58	0,8	31 000	53 000	9 300	10 000

Dimension table · Dimensions in mm


Designation	X-life	Mass m ≈ g	Dimensions									Basic load ratings		Fatigue limit load C _{ur} N	Limiting speed n _G min ⁻¹
			d	F	D	C ±0,5	B	D ₁	r min.	r ₁ min.	s ¹⁾ min.	dyn. C _r N	stat. C _{0r} N		
PNA12/28	XL	37	12	15	28	12	12	24,5	0,8	0,3	0,5	7 800	7 900	1 430	24 000
PNA15/32	XL	62	15	18	32	16	16	27	0,8	0,3	0,5	14 100	16 200	3 000	22 000
PNA17/35	XL	73	17	20	35	16	16	30,5	0,8	0,3	0,5	14 600	17 500	3 200	21 000
PNA20/42	XL	136	20	25	42	20	20	36,5	0,8	0,3	0,5	21 300	30 500	5 300	18 000
PNA22/44	XL	145	22	28	44	20	20	38,5	0,8	0,3	0,5	24 800	34 000	5 900	16 000
PNA25/47	XL	157	25	30	47	20	20	42	0,8	0,3	0,5	25 500	36 000	6 300	15 000
PNA30/52	XL	181	30	35	52	20	20	47,5	0,8	0,3	0,5	27 500	41 500	7 300	13 000
PNA35/55	XL	177	35	40	55	20	20	50,5	0,8	0,3	0,5	29 500	47 000	8 300	11 000
PNA40/62	XL	227	40	45	62	20	20	58	0,8	0,3	0,5	31 000	53 000	9 300	10 000





Combined needle roller bearings

Combined needle roller bearings

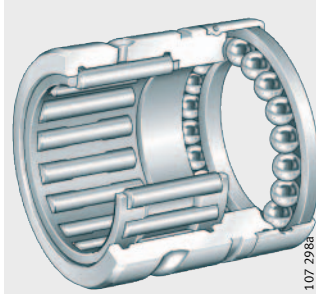
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Product overview Combined needle roller bearings

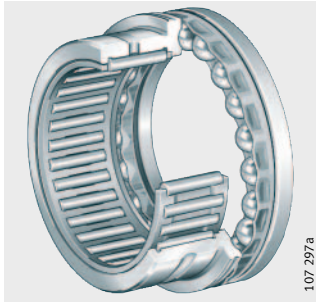
**Needle roller/
axial deep groove
ball bearings**
Without inner ring
With or without end cap

NX, NX..-Z



107 298a

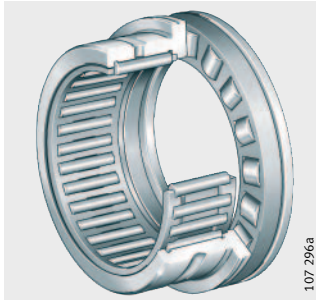
NKX., NKX..-Z



107 297a

**Needle roller/
axial cylindrical
roller bearings**
Without inner ring
With or without end cap

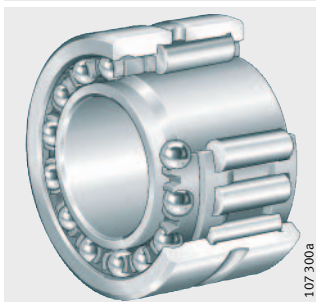
NKXR, NKXR..-Z



107 296a

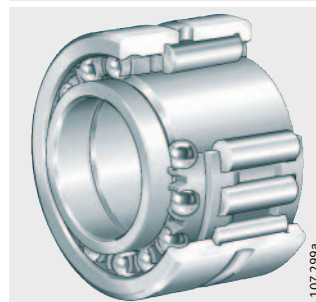
**Needle roller/
angular contact ball bearings**
With inner ring

NKIA



107 300a

NKIB



107 299a

Combined needle roller bearings

Features Combined needle roller bearings are units comprising radial needle roller bearings with a rolling bearing component capable of supporting axial loads.

Radial and axial load carrying capacity The bearings can support high radial forces as well as axial forces in one direction, while NKIB bearings can support axial forces from both directions, and are used as locating or semi-locating bearings, *Figure 1*.

X-life Combined needle roller bearings are X-life bearings. In these bearings, the raceways have optimised roughness and geometrical accuracy. This gives higher load carrying capacity and longer life.

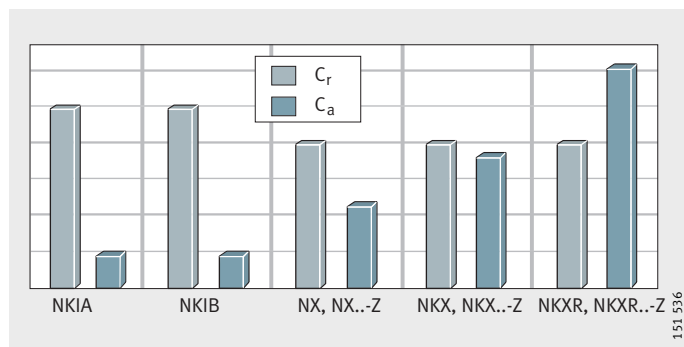


Figure 1
Dynamic load carrying capacity C_r and C_a

Needle roller/axial deep groove ball bearings

These bearings do not have an inner ring. Bearings without inner ring have particularly compact radial dimensions. However, they require a shaft raceway that is hardened and ground. Bearings NX and NX..-Z have a full complement axial ball bearing component and end caps.

Bearings NKX (NAXK to DIN 5 429-1) and NKX..-Z (NAXK..-Z to DIN 5 429-1) have an axial bearing component comprising a ball and cage assembly with a sheet steel or plastic cage. Series NKX..-Z also has an end cap on the axial bearing component.

Sealing/lubricant

For lubrication, the bearings have a lubrication groove and lubrication hole in the outer ring.

Series NX and NKX are lubricated with oil. The end cap in series NX has lubrication holes.

Series NX..-Z and NKX..-Z are lubricated with grease. The axial bearing component is greased using a lithium complex soap grease to GA08. The end caps do not have lubrication holes.



Combined needle roller bearings

Needle roller/ axial cylindrical roller bearings	<p>These bearings do not have an inner ring. Bearings without inner ring have particularly compact radial dimensions. However, they require a shaft raceway that is hardened and ground. Bearings NKXR (NAXR to DIN 5 429-1) and NKXR..-Z (NAXR..-Z to DIN 5 429-1) have an axial bearing component comprising a roller and cage assembly with a plastic cage; NKXR..-Z also has an end cap on the axial bearing component.</p>						
Sealing/lubricant	<p>For lubrication, the bearings have a lubrication groove and lubrication hole in the outer ring.</p> <p>Series NKXR is lubricated with oil.</p> <p>Series NKXR..-Z is lubricated with grease. The axial bearing component is greased using a lithium complex soap grease to GA08. The end cap does not have lubrication holes.</p>						
Needle roller/ angular contact ball bearings	<p>Combined bearings NKIA and NKIB have an inner ring.</p> <p>Series NKIA corresponds to DIN 5 429-2. It can support axial loads from one direction.</p> <p>Bearings NKIB have one narrow inner ring and one wide inner ring. The axial bearing component has a plastic ball cage. At the point where the inner rings join, there is a shoulder on both sides for guidance of the ball and cage assembly. As a result, these bearings are also suitable for supporting axial forces alternating in direction. The bearings guide the shaft with an axial clearance of 0,08 mm to 0,25 mm.</p>						
Sealing/lubricant	<p>Bearings NKIA and NKIB can be lubricated with grease or oil. For lubrication, the outer ring has a lubrication groove and a lubrication hole.</p>						
Operating temperature	<p>The bearings can be used at operating temperatures from –20 °C to +120 °C.</p>						
Cages	<p>Bearings with plastic cage are indicated by the suffix TV in the dimension tables.</p>						
Suffixes	<p>Suffixes for the available designs: see table.</p>						
Available designs	<table border="1"> <thead> <tr> <th>Suffix</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>TV¹⁾</td> <td>Cage made from glass fibre reinforced polyamide 66</td> </tr> <tr> <td>Z</td> <td>Bearing with end cap, axial bearing component greased with lithium complex soap grease to GA08</td> </tr> </tbody> </table>	Suffix	Description	TV ¹⁾	Cage made from glass fibre reinforced polyamide 66	Z	Bearing with end cap, axial bearing component greased with lithium complex soap grease to GA08
Suffix	Description						
TV ¹⁾	Cage made from glass fibre reinforced polyamide 66						
Z	Bearing with end cap, axial bearing component greased with lithium complex soap grease to GA08						

¹⁾ Bearings with plastic cage: see dimension tables.

Design and safety guidelines
Raceway for bearings without inner ring

Where bearings without an inner ring are to be used, the rolling element raceway on the shaft must be hardened and ground. The surface hardness of the raceway must be 670 HV + 170 HV and the hardening depth CHD or Rht must be sufficiently large.

Tolerances for shaft raceway/housing bore

Series	Shaft tolerance		Bore tolerance
	for bearings without inner ring	for bearings with inner ring	
NKIA, NKIB	–	k6	M6
NX, NKX, NKXR	k6	k6	K6, M6 for rigid bearing arrangements

Caution! For bearings NKIA, NKIB, the shaft tolerance must not be greater than k6 and the bore tolerance must not be less than M6.

Surface for shaft raceway/housing bore

Surface quality	Shaft raceway		Housing bore
	for bearings without inner ring	for bearings with inner ring	
Roughness max.	R _a 0,1 (R _z 0,4)	–	–
Roundness max.	IT3	IT 4/2	IT 5/2
Parallelism max.	IT3	IT 4	IT 4

If the shaft cannot be configured as a raceway, inner rings of series IR or LR can be used. The inner rings must be ordered separately. Inner rings: see page 690.

Support of axial forces

The axial bearing component must be preloaded to 1% of the axial basic static load rating C_{0a}. The basic load ratings C_{0a} are stated in the dimension tables.

Needle roller/axial deep groove ball bearings, needle roller/axial cylindrical roller bearings

In order to support axial forces, the bearing must be abutted by means of snap rings on the outer ring or a housing shoulder. If there is little distance between the shaft centres, the snap rings should be shortened. Snap rings WR and SW are available from trade outlets.

If the bearings are to support axial forces from alternating directions, two bearings must be fitted opposed to each other. The unloaded bearing must be axially preloaded, for example by means of springs. This allows compensation of thermal expansion.

In order to avoid double fits on NKX and NKXR, the axial bearing component should be free in the housing (outside diameter D₁ or D₂ +0,5 mm min.).



Combined needle roller bearings

Needle roller/ angular contact ball bearings

Bearings NKIA can support axial forces in one direction, bearings NKIB can support axial forces in both directions.

If bearings NKIA are to support axial forces from alternating directions, two bearings must be fitted opposed to each other, *Figure 2*.

In the case of NKIB, the wide and narrow inner ring must be axially clamped against each other. The narrow inner ring has a larger bore diameter. This results in an interference fit if a shaft tolerance of k6 is used.

Axial static load safety factor

Caution!

The axial load must not exceed 25% of the radial load.

The axial static load safety factor S_0 must be $> 1,5$.

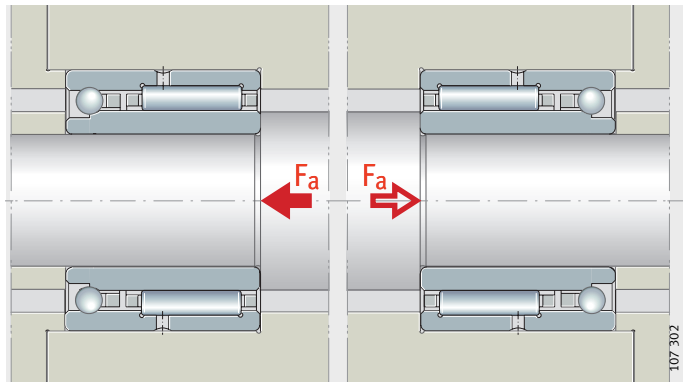


Figure 2

NKIA, two bearings fitted opposed to each other

Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum radial load $F_{r\min}$. This applies in particular to high speed bearings since, if the radial load is insufficient or not present, damaging sliding motion may occur between the rolling elements and raceways. In continuous operation, a minimum radial load of the order of $C_r/P < 50$ is necessary.

Speeds

The speeds n_G in the dimension tables are valid for oil lubrication.

Caution!

With grease lubrication, the permissible value is taken as 60% of the value given in the table. For NKXR, NKXR...Z, NKIA, NKIB, the reference speed n_B is given in the dimension tables. In order to calculate the thermally safe speed n_{per} , bearings NKXR(Z) must be regarded as axial bearings and NKIA, NKIB as radial bearings.

Radial location Combined needle roller bearings with inner ring are radially located by means of a close fit on the shaft and in the housing.

Axial location In order to prevent lateral creep of the bearing rings, they must be located by means of physical locking.
 The abutting shoulders (shaft, housing) should be sufficiently high and perpendicular to the bearing axis.
 The transition from the bearing seating to the abutting shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509. Note the minimum chamfer dimensions r as given in the dimension tables.
 The overlap between the snap rings and the end faces of the bearing rings must be sufficiently large.
 Maximum inner ring chamfer dimensions to DIN 620-6 must be taken into consideration.

Fitting note

Caution! Combined needle roller bearings are not self-retaining. Since the individual bearing parts are matched to each other, the parts of bearings of identical size must not be interchanged during fitting.

Lubrication

Before operation, the radial component should be greased using a grease of equivalent quality to that used in the axial component.
 In order to determine the relubrication interval, values must be calculated separately for the axial and radial component and the lower value should be used.

Accuracy

The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620. This excludes bearings NKIB, the bore d_1 of the narrow inner ring and the width $(-0,3 \text{ mm})$ over both inner rings as well as bearings NKX and NKXR for the diameters D_1, D_2 .

Radial internal clearance

Bearings with inner ring have a radial internal clearance of CN.

Radial internal clearance to DIN 620-4

Bore d mm		Radial internal clearance CN μm	
over	incl.	min.	max.
–	24	20	45
24	30	20	45
30	40	25	50
40	50	30	60
50	65	40	70
65	80	40	75
80	100	50	85

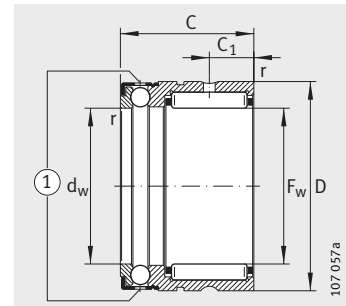
Enveloping circle

In the case of bearings without inner ring, the enveloping circle dimension F_w is used instead of the radial internal clearance.
 The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway. For bearings before fitting, the enveloping circle F_w is in the tolerance zone F6.



Needle roller/ axial deep groove ball bearings

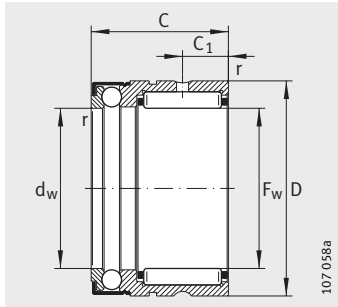
Without inner ring



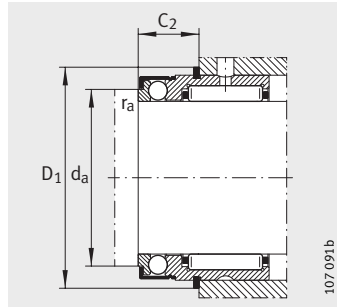
NX

① Oil lubrication holes

Dimension table · Dimensions in mm													
Designation				Dimensions						Mounting dimensions			
For oil lubrication	For grease lubrication	X-life	Mass m ≈g	F _w	D	C	C ₁	d _w	r	C ₂	D ₁	d _a	r _a
NX7-TV	NX7-Z-TV	XL	14	7	14	18	4,7	7	0,3	10	16,5	9,6	0,3
NX10	NX10-Z	XL	25	10	19	18	4,7	10	0,3	10	21,9	14,6	0,3
NX12	NX12-Z	XL	28	12	21	18	4,7	12	0,3	10	23,7	16,6	0,3
NX15	NX15-Z	XL	48	15	24	28	8	15	0,3	12,2	26,5	19	0,3
NX17	NX17-Z	XL	53	17	26	28	8	17	0,3	12,2	28,5	21	0,3
NX20	NX20-Z	XL	68	20	30	28	8	20	0,3	12,2	33,6	25	0,3
NX25	NX25-Z	XL	115	25	37	30	8	25	0,3	14,2	40,4	31,6	0,3
NX30	NX30-Z	XL	130	30	42	30	10	30	0,3	14,2	45,1	36,5	0,3
NX35	NX35-Z	XL	160	35	47	30	10	35	0,3	14,2	50,1	40,5	0,3



NX..-Z



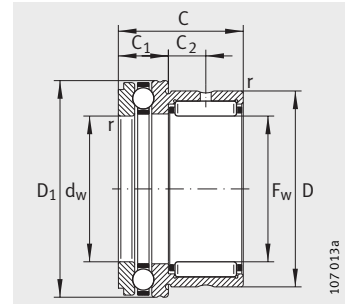
Mounting dimensions
Snap ring in outer ring

Basic load ratings				Fatigue limit load		Limiting speed n_G min ⁻¹	Recommended inner rings Designation	Suitable snap rings
radial		axial		C_{ur} N	C_{ua} N			
dyn. C_r N	stat. C_{0r} N	dyn. C_a N	stat. C_{0a} N					
3 250	2 650	3 150	4 300	410	190	15 000	–	WR14, SW14
6 000	3 700	4 600	7 200	720	320	11 000	IR6X10X10-IS1	WR19, SW19
5 400	4 300	4 850	8 200	830	365	9 500	IR8X12X10-IS1	WR21, SW21
12 100	12 700	5 600	10 400	2 320	460	8 000	IR12X15X16	WR24, SW24
13 500	15 000	5 800	11 500	2 750	510	7 500	IR14X17X17	WR26, SW26
14 600	17 500	7 000	14 700	3 200	650	6 500	IR17X20X16	WR30, SW30
16 800	22 400	11 100	24 300	4 150	1 080	4 900	IR20X25X16-IS1	WR37, SW37
25 500	36 000	11 700	28 000	6 300	1 230	4 300	IR25X30X20	WR42, SW42
27 500	41 500	12 400	32 500	7 300	1 440	3 700	IR30X35X20	WR47, SW47



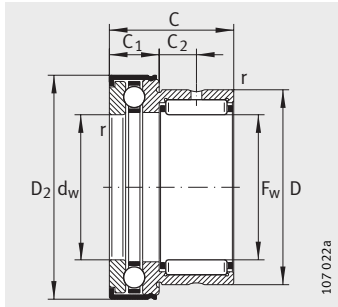
Needle roller/ axial deep groove ball bearings

Without inner ring
With or without end cap

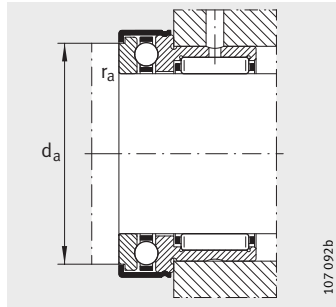


NKX

Dimension table · Dimensions in mm													
Without end cap Designation	X-life	Designation to DIN 5 429	Mass m ≈g	With end cap Designation	X-life	Designation to DIN 5 429	Mass m ≈g	Dimensions					
								F _w	D	D ₁ max.	D ₂ max.	C -0,25	C ₁ -0,2
NKX10-TV	XL	NAXK10TN	34	NKX10-Z-TV	XL	NAXK10ZTN	36	10	19	24,1	25,2	23	9
NKX12	XL	NAXK12	38	NKX12-Z	XL	NAXK12Z	40	12	21	26,1	27,2	23	9
NKX15	XL	NAXK15	44	NKX15-Z	XL	NAXK15Z	47	15	24	28,1	29,2	23	9
NKX17	XL	NAXK17	53	NKX17-Z	XL	NAXK17Z	55	17	26	30,1	31,2	25	9
NKX20	XL	NAXK20	83	NKX20-Z	XL	NAXK20Z	90	20	30	35,1	36,2	30	10
NKX25	XL	NAXK25	125	NKX25-Z	XL	NAXK25Z	132	25	37	42,1	43,2	30	11
NKX30	XL	NAXK30	141	NKX30-Z	XL	NAXK30Z	148	30	42	47,1	48,2	30	11
NKX35	XL	NAXK35	163	NKX35-Z	XL	NAXK35Z	168	35	47	52,1	53,2	30	12
NKX40	XL	NAXK40	200	NKX40-Z	XL	NAXK40Z	208	40	52	60,1	61,2	32	13
NKX45	XL	NAXK45	252	NKX45-Z	XL	NAXK45Z	265	45	58	65,2	66,5	32	14
NKX50	XL	NAXK50	280	NKX50-Z	XL	NAXK50Z	300	50	62	70,2	71,5	35	14
NKX60	XL	NAXK60	360	NKX60-Z	XL	NAXK60Z	380	60	72	85,2	86,5	40	17
NKX70	XL	NAXK70	500	NKX70-Z	XL	NAXK70Z	520	70	85	95,2	96,5	40	18



NKX..-Z



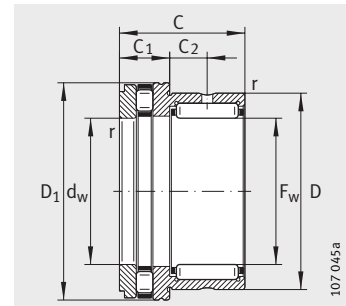
Mounting dimensions

			Mounting dimensions		Basic load ratings				Fatigue limit load		Limiting speed	Recommended inner rings Designation
C ₂	d _w	r	d _a	r _a	radial		axial		C _{ur}	C _{ua}	n _G	
					dyn. C _r	stat. C _{0r}	dyn. C _a	stat. C _{0a}					N	N	min^{-1}
6,5	10	0,3	19,7	0,3	7 000	7 800	10 000	14 000	1 310	670	12 400	IR7X10X16
6,5	12	0,3	21,7	0,3	10 100	11 000	10 300	15 400	1 920	740	10 900	IR9X12X16
6,5	15	0,3	23,7	0,3	12 100	12 700	10 500	16 800	2 320	810	9 200	IR12X15X16
8	17	0,3	25,7	0,3	13 500	15 000	10 800	18 200	2 750	870	8 400	IR14X17X17
10,5	20	0,3	30,7	0,3	18 600	23 800	14 300	24 700	4 150	1 190	7 200	IR17X20X20
9,5	25	0,6	37,7	0,6	21 300	30 500	19 600	37 500	5 300	1 790	5 800	IR20X25X20
9,5	30	0,6	42,7	0,6	25 500	36 000	20 400	42 000	6 300	2 030	5 000	IR25X30X20
9	35	0,6	47,7	0,6	27 500	41 500	21 200	47 000	7 300	2 270	4 400	IR30X35X20
10	40	0,6	55,7	0,6	29 500	47 000	27 000	63 000	8 300	3 000	3 900	IR35X40X20
9	45	0,6	60,5	0,6	31 000	53 000	28 000	69 000	9 300	3 350	3 500	IR40X45X20
10	50	0,6	65,5	0,6	43 000	74 000	29 000	75 000	12 700	3 650	3 200	IR45X50X25
12	60	1	80,5	1	47 500	90 000	41 500	113 000	15 400	5 400	2 750	IR50X60X25
11	70	1	90,5	1	50 000	92 000	43 000	127 000	15 700	6 100	2 320	IR60X70X25



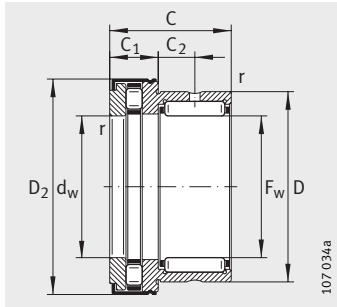
Needle roller/ axial cylindrical roller bearings

Without inner ring
With or without end cap

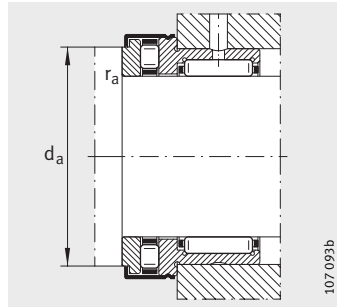


NKXR

Dimension table · Dimensions in mm												
Without end cap Designation	X-life	Designation to DIN 5 429	Mass m ≈g	With end cap Designation	X-life	Designation to DIN 5 429	Mass m ≈g	Dimensions				
								F _w	D	D ₁ max.	D ₂ max.	C -0,25
NKXR15	XL	NAXR15	42	NKXR15-Z	XL	NAXR15Z	45	15	24	28,1	29,2	23
NKXR17	XL	NAXR17	50	NKXR17-Z	XL	NAXR17Z	53	17	26	30,1	31,2	25
NKXR20	XL	NAXR20	80	NKXR20-Z	XL	NAXR20Z	84	20	30	35,1	36,2	30
NKXR25	XL	NAXR25	120	NKXR25-Z	XL	NAXR25Z	125	25	37	42,1	43,2	30
NKXR30	XL	NAXR30	135	NKXR30-Z	XL	NAXR30Z	141	30	42	47,1	48,2	30
NKXR35	XL	NAXR35	157	NKXR35-Z	XL	NAXR35Z	165	35	47	52,1	53,2	30
NKXR40	XL	NAXR40	204	NKXR40-Z	XL	NAXR40Z	214	40	52	60,1	61,2	32
NKXR45	XL	NAXR45	244	NKXR45-Z	XL	NAXR45Z	260	45	58	65,2	66,5	32
NKXR50	XL	NAXR50	268	NKXR50-Z	XL	NAXR50Z	288	50	62	70,2	71,5	35



NKXR..-Z

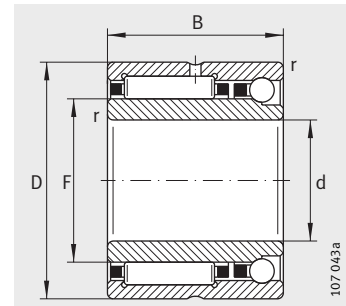


Mounting dimensions

				Mounting dimensions		Basic load ratings				Fatigue limit load		Limiting speed	Reference speed	Recommended inner rings Designation
C ₁	C ₂	d _w	r	d _a	r _a	radial		axial		C _{ur}	C _{ua}	n _G	n _B	
-0,2		E8	min.		max.	dyn. C _r	stat. C _{0r}	dyn. C _a	stat. C _{0a}	N	N	min ⁻¹	min ⁻¹	
9	6,5	15	0,3	23,7	0,3	12 100	12 700	14 400	28 500	2 320	4 000	9 200	6 500	IR12X15X16
9	8	17	0,3	25,7	0,3	13 500	15 000	15 900	33 500	2 750	4 650	8 400	5 500	IR14X17X17
10	10,5	20	0,3	30,7	0,3	18 600	23 800	24 900	53 000	4 150	7 300	7 200	4 200	IR17X20X20
11	9,5	25	0,6	37,7	0,6	21 300	30 500	33 500	76 000	5 300	7 100	5 800	3 400	IR20X25X20
11	9,5	30	0,6	42,7	0,6	25 500	36 000	35 500	86 000	6 300	8 000	5 000	2 900	IR25X30X20
12	9	35	0,6	47,7	0,6	27 500	41 500	39 000	101 000	7 300	9 500	4 400	2 500	IR30X35X20
13	10	40	0,6	55,7	0,6	29 500	47 000	56 000	148 000	8 300	14 500	3 900	2 000	IR35X40X20
14	9	45	0,6	60,6	0,6	31 000	53 000	59 000	163 000	9 300	16 000	3 500	1 900	IR40X45X20
14	10	50	0,6	65,5	0,6	43 000	74 000	61 000	177 000	12 700	17 400	3 200	1 700	IR45X50X25

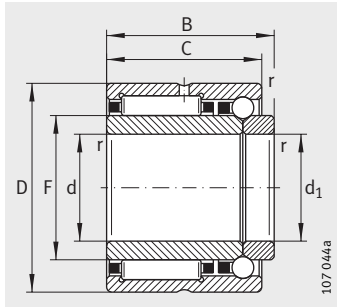


Needle roller/ angular contact ball bearings



NKIA
Single direction

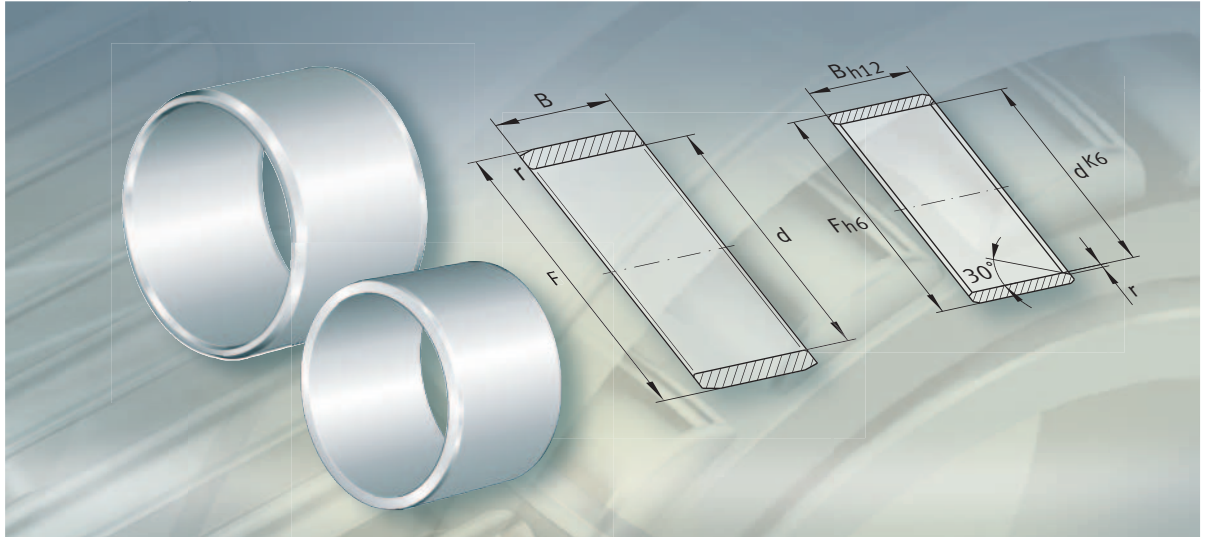
Dimension table · Dimensions in mm										
Designation	X-life	Mass m ≈g	Dimensions						Basic load ratings	
			d	F	D	B	C	r	radial	
									dyn. C _r N	stat. C _{0r} N
									min.	
NKIA5901	XL	40	12	16	24	16	–	0,3	10 600	10 900
NKIB5901	XL	43	12	16	24	17,5	16	0,3	10 600	10 900
NKIA5902	XL	50	15	20	28	18	–	0,3	12 000	13 600
NKIB5902	XL	52	15	20	28	20	18	0,3	12 000	13 600
NKIA5903	XL	56	17	22	30	18	–	0,3	12 400	14 600
NKIB5903	XL	58	17	22	30	20	18	0,3	12 400	14 600
NKIA5904	XL	103	20	25	37	23	–	0,3	23 700	25 500
NKIB5904	XL	107	20	25	37	25	23	0,3	23 700	25 500
NKIA59/22	XL	118	22	28	39	23	–	0,3	26 000	29 500
NKIB59/22	XL	122	22	28	39	25	23	0,3	26 000	29 500
NKIA5905	XL	130	25	30	42	23	–	0,3	26 500	31 500
NKIB5905	XL	134	25	30	42	25	23	0,3	26 500	31 500
NKIA5906	XL	147	30	35	47	23	–	0,3	28 500	35 500
NKIB5906	XL	151	30	35	47	25	23	0,3	28 500	35 500
NKIA5907	XL	243	35	42	55	27	–	0,6	35 500	50 000
NKIB5907	XL	247	35	42	55	30	27	0,6	35 500	50 000
NKIA5908	XL	315	40	48	62	30	–	0,6	48 500	67 000
NKIB5908	XL	320	40	48	62	34	30	0,6	48 500	67 000
NKIA5909	XL	375	45	52	68	30	–	0,6	51 000	73 000
NKIB5909	XL	380	45	52	68	34	30	0,6	51 000	73 000
NKIA5910	XL	380	50	58	72	30	–	0,6	53 000	80 000
NKIB5910	XL	385	50	58	72	34	30	0,6	53 000	80 000
NKIA5911	XL	550	55	63	80	34	–	1	65 000	100 000
NKIB5911	XL	555	55	63	80	38	34	1	65 000	100 000
NKIA5912	XL	590	60	68	85	34	–	1	68 000	108 000
NKIB5912	XL	595	60	68	85	38	34	1	68 000	108 000
NKIA5913	XL	635	65	72	90	34	–	1	69 000	112 000
NKIB5913	XL	640	65	72	90	38	34	1	69 000	112 000
NKIA5914	XL	980	70	80	100	40	–	1	95 000	156 000
NKIB5914	XL	985	70	80	100	45	40	1	95 000	156 000



NKIB
Double direction

axial		Fatigue limit load		Limiting speed	Reference speed
dyn. C_a N	stat. C_{0a} N	C_{ur} N	C_{ua} N	n_G min^{-1}	n_B min^{-1}
2 700	3 450	1 940	152	23 600	21 000
2 700	3 450	1 940	152	23 600	21 000
2 900	4 200	2 430	186	21 600	17 000
2 900	4 200	2 430	186	21 600	17 000
3 150	4 900	2 600	216	20 600	15 000
3 150	4 900	2 600	216	20 600	15 000
4 900	7 400	4 600	330	17 200	14 000
4 900	7 400	4 600	330	17 200	14 000
5 300	8 600	5 300	380	16 100	12 000
5 300	8 600	5 300	380	16 100	12 000
5 400	9 300	5 700	410	14 600	12 000
5 400	9 300	5 700	410	14 600	12 000
5 900	11 200	6 400	495	12 700	10 000
5 900	11 200	6 400	495	12 700	10 000
7 400	14 900	9 400	660	10 900	9 000
7 400	14 900	9 400	660	10 900	9 000
9 200	19 400	11 500	860	9 600	7 500
9 200	19 400	11 500	860	9 600	7 500
9 600	21 400	12 600	950	8 700	7 000
9 600	21 400	12 600	950	8 700	7 000
10 100	24 300	13 800	1 080	8 000	6 500
10 100	24 300	13 800	1 080	8 000	6 500
12 100	29 500	17 300	1 300	7 300	6 000
12 100	29 500	17 300	1 300	7 300	6 000
12 400	32 000	18 800	1 510	6 800	5 500
12 400	32 000	18 800	1 510	6 800	5 500
12 800	34 000	19 500	1 410	6 300	5 500
12 800	34 000	19 500	1 410	6 300	5 500
16 800	44 500	27 500	1 970	5 800	4 900
16 800	44 500	27 500	1 970	5 800	4 900





Inner rings

Inner rings

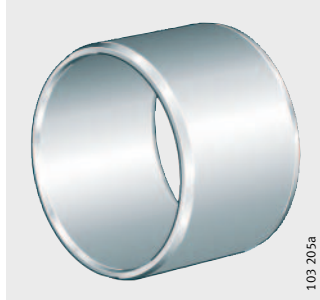
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Product overview Inner rings

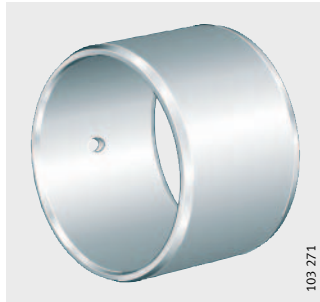
Precision machined

IR



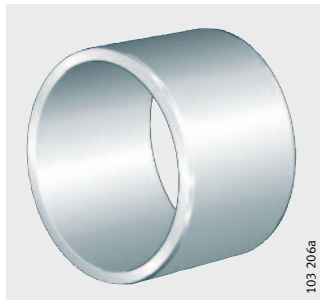
With lubrication hole

IR..-IS1



Ground

LR



Inner rings

Features

Inner rings are made from hardened rolling bearing steel and have precision machined or ground raceways.

They are used where:

- the shaft cannot be used as a raceway for needle roller and cage assemblies, drawn cup needle roller bearings with open ends or with closed end and needle roller bearings
- needle roller bearings must be combined with wider inner rings in order to allow larger axial displacements of the shaft in relation to the housing
- optimum running surfaces are required for seal lips.

Inner rings, precision machined

Inner rings IR have a precision machined raceway. Chamfers on the end faces allow easy insertion into the bearing and prevent damage to the seal lips of the bearing. Inner rings are available with and without a lubrication hole. Rings with a lubrication hole in the inner ring have the suffix IS1.

Inner rings, ground

Inner rings LR have a ground raceway. The end faces are turned and the edges are broken.

These rings have larger tolerances than the rings IR. They are thus suitable for applications that allow larger width tolerances and less demanding requirements for axial runout.

Machining allowance on raceway

Inner rings are available as a special design with a machining allowance z on the raceway (suffix VGS). The size of the allowance is dependent on the raceway diameter.

Machining allowance

Raceway diameter		Machining allowance	Preground raceway diameter
F mm		z mm	F_{VGS}
over	incl.		
–	50	0,1	$F_{VGS} = F + z$ (tolerance h7)
50	80	0,15	
80	180	0,2	
180	250	0,25	
250	315	0,3	
315	400	0,35	
400	500	0,4	

Suffixes

Suffixes for the available designs: see table.

Available designs

Suffix	Description	Design
C3, C4	Radial internal clearance larger than normal	Special design ¹⁾
C2	Radial internal clearance smaller than normal	Special design ¹⁾
EGS	Surface ground free from spiral marks for rotary shaft seals to DIN 3 760 and DIN 3 761	Special design ¹⁾
IS1	With one lubrication hole	Special design ¹⁾
VGS	With machining allowance z on raceway ²⁾	Special design ¹⁾

¹⁾ Available by agreement.

²⁾ See table Machining allowance on raceway.



Inner rings

Design and safety guidelines Axial location

In order to prevent lateral creep of the bearing rings, they must be located by means of physical locking.

The abutting shoulders on the shaft should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seating to the abutting shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509. Note the minimum chamfer dimensions r as given in the dimension tables.

The overlap between the snap rings and the end faces of the bearing rings must be sufficiently large.

Maximum inner ring chamfer dimensions to DIN 620-6 must be taken into consideration.

Accuracy Standard tolerances to DIN 620

The dimensional and geometrical tolerances of inner rings IR correspond to tolerance class PN to DIN 620.

Radial internal clearance

When combined with INA needle roller bearings, inner rings have an internal clearance of CN.

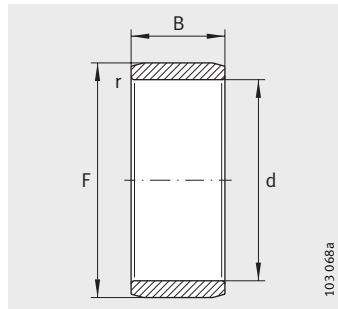
When combined with INA drawn cup needle roller bearings with open ends or closed end, inner rings have a radial internal clearance of C2 or C3 depending on the raceway diameter.

Radial internal clearance to DIN 620-4

Bore d mm		Radial internal clearance							
		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	0	25	20	45	35	60	50	75
24	30	0	25	20	45	35	60	50	75
30	40	5	30	25	50	45	70	60	85
40	50	5	35	30	60	50	80	70	100
50	65	10	40	40	70	60	90	80	110
65	80	10	45	40	75	65	100	90	125
80	100	15	50	50	85	75	110	105	140
100	120	15	55	50	90	85	125	125	165
120	140	15	60	60	105	100	145	145	190
140	160	20	70	70	120	115	165	165	215
160	180	25	75	75	125	120	170	170	220
180	200	35	90	90	145	140	195	195	250
200	225	45	105	105	165	160	220	220	280
225	250	45	110	110	175	170	235	235	300
250	280	55	125	125	195	190	260	260	330
280	315	55	130	130	205	200	275	275	350
315	355	65	145	145	225	225	305	305	385
355	400	100	190	190	280	280	370	370	460
400	450	110	210	210	310	310	410	410	510

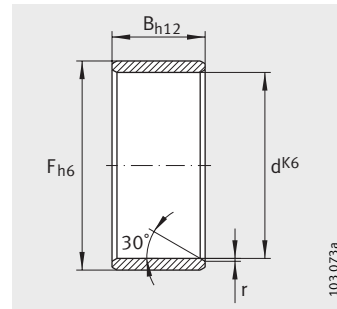
Inner rings

Without lubrication hole



IR

103 068a



LR

103 073a

Dimension table · Dimensions in mm

Designation	Mass m ≈g	Dimensions				Tolerance of raceway F μm	
		d	F	B	r	min.	
						upper	lower
IR5X8X12	2,8	5	8	12	0,3	-7	-23
IR5X8X16	3,7	5	8	16	0,3	-7	-23
IR6X9X12	3	6	9	12	0,3	-7	-23
IR6X9X16	4,3	6	9	16	0,3	-7	-23
IR7X10X10,5	3,1	7	10	10,5	0,3	-7	-23
LR7X10X10,5	3,1	7	10	10,5	0,3	-	-
IR7X10X12	3,6	7	10	12	0,3	-7	-23
IR7X10X16	4,9	7	10	16	0,3	-7	-23
IR8X12X10,5	5	8	12	10,5	0,3	-4	-18
LR8X12X10,5	5	8	12	10,5	0,3	-	-
IR8X12X12,5	5,9	8	12	12,5	0,3	-4	-18
LR8X12X12,5	5	8	12	12,5	0,3	-	-
IR9X12X12	4,4	9	12	12	0,3	-4	-18
IR9X12X16	6	9	12	16	0,3	-4	-18
IR10X13X12,5	5,2	10	13	12,5	0,3	-4	-18
LR10X13X12,5	5,2	10	13	12,5	0,3	-	-
IR10X14X13	7,4	10	14	13	0,3	-4	-18
IR10X14X16	9,2	10	14	16	0,3	-4	-18
IR10X14X20	11,5	10	14	20	0,3	-4	-18
IR12X15X12	5,7	12	15	12	0,3	-4	-18
IR12X15X12,5	6,1	12	15	12,5	0,3	-4	-18
LR12X15X12,5	6,1	12	15	12,5	0,3	-	-
IR12X15X16	7,6	12	15	16	0,3	-4	-18
IR12X15X16,5	8,1	12	15	16,5	0,3	-4	-18
LR12X15X16,5	8,1	12	15	16,5	0,3	-	-
IR12X15X22,5	10,9	12	15	22,5	0,3	-4	-18
LR12X15X22,5	10,9	12	15	22,5	0,3	-	-
IR12X16X13	8,5	12	16	13	0,3	-4	-18
IR12X16X16	10,7	12	16	16	0,3	-4	-18
IR12X16X20	13,5	12	16	20	0,3	-4	-18
IR12X16X22	14,9	12	16	22	0,3	-4	-18
IR14X17X17	9,5	14	17	17	0,3	-4	-18

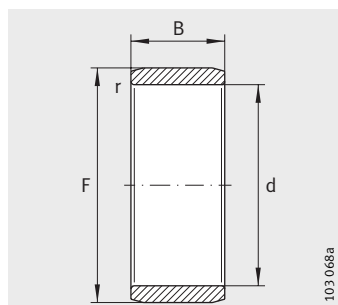
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈g	Dimensions				Tolerance of raceway F μm	
		d	F	B	r	min.	
						upper	lower
LR15X18X12,5	7,2	15	18	12,5	0,3	-	-
IR15X18X16	9,4	15	18	16	0,3	-4	-18
IR15X18X16,5	9,8	15	18	16,5	0,3	-4	-18
LR15X18X16,5	9,8	15	18	16,5	0,3	-	-
IR15X19X16	12,9	15	19	16	0,3	0	-12
IR15X19X20	16,3	15	19	20	0,3	0	-12
IR15X20X13	13,5	15	20	13	0,3	0	-12
IR15X20X23	24,4	15	20	23	0,3	0	-12
IR17X20X16	10,6	17	20	16	0,3	0	-12
IR17X20X16,5	11,1	17	20	16,5	0,3	0	-12
LR17X20X16,5	11,1	17	20	16,5	0,3	-	-
IR17X20X20	13,5	17	20	20	0,3	0	-12
IR17X20X20,5	13,8	17	20	20,5	0,3	0	-12
LR17X20X20,5	13,8	17	20	20,5	0,3	-	-
IR17X20X30,5	20,6	17	20	30,5	0,3	0	-12
LR17x20X30,5	20,6	17	20	30,5	0,3	-	-
IR17X21X16	15	17	21	16	0,3	0	-12
IR17X21X20	18	17	21	20	0,3	0	-12
IR17X22X13	14,9	17	22	13	0,3	0	-12
IR17X22X16	18,4	17	22	16	0,3	0	-12
IR17X22X23	27,1	17	22	23	0,3	0	-12
IR17X24X20	33,8	17	24	20	0,6	0	-12

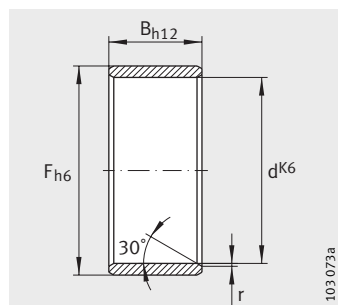


Inner rings

Without lubrication hole



IR



LR

Dimension table (continued) · Dimensions in mm

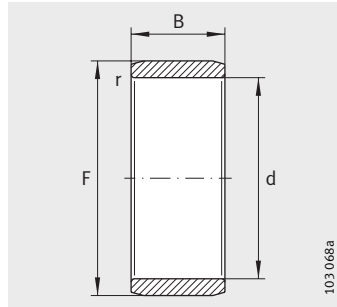
Designation	Mass m ≈g	Dimensions				Tolerance of raceway F μm	
		d	F	B	r	upper	lower
		min.					
IR20X24X16	15	20	24	16	0,3	0	-12
IR20X24X20	21,3	20	24	20	0,3	0	-12
LR20X25X12,5	16,3	20	25	12,5	0,3	-	-
LR20X25X16,5	21,7	20	25	16,5	0,3	-	-
IR20X25X17	25	20	25	17	0,3	0	-12
IR20X25X20	27,5	20	25	20	0,3	0	-12
IR20X25X20,5	27,4	20	25	20,5	0,3	0	-12
LR20X25X20,5	27,4	20	25	20,5	0,3	-	-
IR20X25X26,5	38	20	25	26,5	0,3	0	-12
LR20X25X26,5	38	20	25	26,5	0,3	-	-
IR20X25X30	40,4	20	25	30	0,3	0	-12
IR20X25X38,5	52,5	20	25	38,5	0,3	0	-12
LR20X25X38,5	52,5	20	25	38,5	0,3	-	-
IR20X28X20	45,2	20	28	20	0,6	0	-12
IR22X26X16	18,2	22	26	16	0,3	0	-12
IR22X26X20	23	22	26	20	0,3	0	-12
IR22X28X17	29,5	22	28	17	0,3	0	-12
IR22X28X20	35	22	28	20	0,3	0	-12
IR22X28X20,5	36	22	28	20,5	0,3	0	-12
LR22X28X20,5	36	22	28	20,5	0,3	-	-
IR22X28X30	54,4	22	28	30	0,3	0	-12

Dimension table (continued) · Dimensions in mm

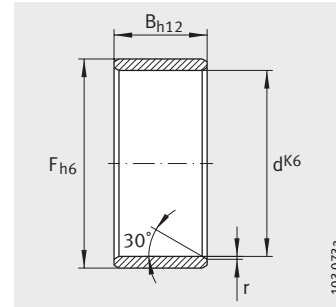
Designation	Mass m ≈g	Dimensions				Tolerance of raceway F μm	
		d	F	B	r	upper	lower
		min.					
IR25X29X20	25,9	25	29	20	0,3	0	-12
IR25X29X30	39,3	25	29	30	0,3	0	-12
LR25X30X12,5	20	25	30	12,5	0,3	-	-
LR25X30X16,5	26,7	25	30	16,5	0,3	-	-
IR25X30X20	27,4	25	30	17	0,3	0	-12
IR25X30X20	32,8	25	30	20	0,3	0	-12
IR25X30X20,5	33,4	25	30	20,5	0,3	0	-12
LR25X30X20,5	33,4	25	30	20,5	0,3	-	-
IR25X30X26,5	46	25	30	26,5	0,3	0	-12
LR25X30X26,5	46	25	30	26,5	0,3	-	-
IR25X30X30	53	25	30	30	0,3	0	-12
IR25X30X32	56	25	30	32	0,3	0	-12
IR25X30X38,5	64,5	25	30	38,5	0,3	0	-12
LR25X30X38,5	64,5	25	30	38,5	0,3	-	-
IR25X32X22	52,5	25	32	22	0,6	+5	-4
IR28X32X17	24,5	28	32	17	0,3	+5	-4
IR28X32X20	28,5	28	32	20	0,3	+5	-4
IR28X32X30	43,5	28	32	30	0,3	+5	-4
LR30x35X12,5	23,3	30	35	12,5	0,3	-	-
IR30X35X13	25	30	35	13	0,3	+5	-4
IR30X35X16	34	30	35	16	0,3	+5	-4
LR30X35X16,5	31,4	30	35	16,5	0,3	-	-
IR30X35X17	36	30	35	17	0,3	+5	-4
IR30X35X20	39	30	35	20	0,3	+5	-4
IR30X35X20,5	39,7	30	35	20,5	0,3	+5	-4
LR30X35X20,5	39,7	30	35	20,5	0,3	-	-
IR30X35X26	50,4	30	35	26	0,3	+5	-4
IR30X35X30	58,5	30	35	30	0,3	+5	-4
IR30X37X18	50	30	37	18	0,6	+5	-4
IR30X37X22	61,6	30	37	22	0,6	+5	-4
IR32X37X20	42	32	37	20	0,3	0	-9
IR32x37X30	62	32	37	30	0,3	0	-9
IR32X40X20	68	32	40	20	0,6	0	-9
IR32X40X36	124	32	40	36	0,6	0	-9
IR33X37X13	21,9	33	37	13	0,3	0	-9

Inner rings

Without lubrication hole



IR



LR

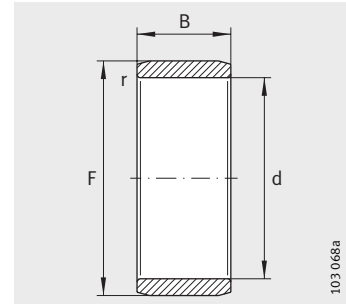
Dimension table (continued) · Dimensions in mm							
Designation	Mass m ≈g	Dimensions				Tolerance of raceway F μm	
		d	F	B	r	upper	lower
		min.					
LR35X40X12,5	27,2	35	40	12,5	0,3	-	-
LR35X40X16,5	37,4	35	40	16,5	0,3	-	-
IR35X40X17	37,8	35	40	17	0,3	0	-9
IR35X40X20	44,2	35	40	20	0,3	0	-9
IR35X40X20,5	46,1	35	40	20,5	0,3	0	-9
LR35X40X20,5	46,1	35	40	20,5	0,3	-	-
IR35X40X30	67,1	35	40	30	0,3	0	-9
IR35X42X36	117	35	42	36	0,6	0	-9
IR35X43X22	82	35	43	22	0,6	0	-9
IR38X43X20	48,1	38	43	20	0,3	0	-9
IR38X43X30	73,6	38	43	30	0,3	0	-9
LR40X45X16,5	41,4	40	45	16,5	0,3	-	-
IR40X45X17	42,5	40	45	17	0,3	0	-9
IR40X45X20	50,8	40	45	20	0,3	0	-9
IR40X45X20,5	51,8	40	45	20,5	0,3	0	-9
LR40X45X20,5	51,8	40	45	20,5	0,3	-	-
IR40X45X30	84	40	45	30	0,3	0	-9
IR40X48X22	91,6	40	48	22	0,6	0	-9
IR40X48X40	170	40	48	40	0,6	0	-9
IR40X50X22	118	40	50	22	1	0	-9
IR42X47X20	52,8	42	47	20	0,3	-5	-19
IR42X47X30	81	42	47	30	0,3	-5	-19
LR45X50X20,5	58,8	45	50	20,5	0,3	-	-
IR45X50X25	70,8	45	50	25	0,6	-5	-19
IR45X50X25,5	75,1	45	50	25,5	0,3	-5	-19
LR45X50X25,5	75,1	45	50	25,5	0,3	-	-
IR45X50X35	101	45	50	35	0,6	-5	-19
IR45X52X22	89	45	52	22	0,6	0	-11
IR45X52X40	164	45	52	40	0,6	0	-11
IR45X55X22	129	45	55	22	1	0	-11
LR50X55X20,5	64,1	50	55	20,5	0,6	-	-
IR50X55X25	78	50	55	25	0,6	0	-11
IR50X55X35	112	50	55	35	0,6	0	-11

Dimension table (continued) · Dimensions in mm							
Designation	Mass m ≈g	Dimensions				Tolerance of raceway F μm	
		d	F	B	r	upper	lower
		min.					
IR50X58X22	115	50	58	22	0,6	0	-11
IR50X58X40	208	50	58	40	0,6	0	-11
IR50X60X25	162	50	60	25	1	0	-11
IR50X60X28	181	50	60	28	1,1	0	-11
IR55X60X25	85,5	55	60	25	0,6	-10	-21
IR55X60X35	121	55	60	35	0,6	-10	-21
IR55X63X25	141	55	63	25	1	-10	-21
IR55X63X45	256	55	63	45	1	-10	-21
IR55X65X28	198	55	65	28	1,1	-10	-21
IR60X68X25	152	60	68	25	1	-10	-21
IR60X68X35	213	60	68	35	0,6	-10	-21
IR60X68X45	276	60	68	45	1	-10	-21
IR60X70X25	195	60	70	25	1	-10	-21
IR60X70X28	215	60	70	28	1,1	-10	-21
IR65X72X25	141	65	72	25	1	-10	-21
IR65X72X45	259	65	72	45	1	-10	-21
IR65X73X25	164	65	73	25	1	-10	-21
IR65X73X35	231	65	73	35	1	-10	-21
IR65X75X28	229	65	75	28	1,1	-10	-21
IR70X80X25	221	70	80	25	1	-10	-26
IR70X80X30	267	70	80	30	1	-10	-26
IR70X80X35	312	70	80	35	1	-10	-26
IR70X80X54	488	70	80	54	1	-10	-26
IR75X85X25	238	75	85	25	1	-4	-17
IR75X85X30	287	75	85	30	1	-4	-17
IR75X85X35	336	75	85	35	1	-4	-17
IR75X85X54	520	75	85	54	1	-4	-17
IR80X90X25	253	80	90	25	1	-4	-17
IR80X90X30	304	80	90	30	1	-4	-17
IR80X90X35	355	80	90	35	1	-4	-17
IR80X90X54	556	80	90	54	1	-4	-17
IR85X95X26	277	85	95	26	1	-14	-27
IR85X95X36	388	85	95	36	1	-14	-27
IR85X100X35	582	85	100	35	1,1	-14	-27
IR85X100X63	1054	85	100	63	1,1	-14	-27



Inner rings

Without lubrication hole

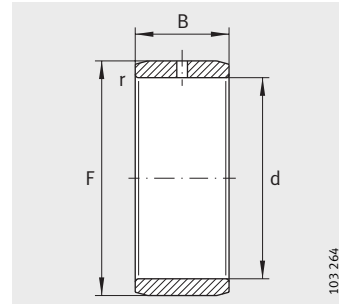


IR

Dimension table (continued) · Dimensions in mm							
Designation	Mass m ≈g	Dimensions				Tolerance of raceway F	
		d	F	B	r min.	μm	
						upper	lower
IR90X100X26	294	90	100	26	1	-14	-27
IR90X100X30	340	90	100	30	1	-14	-27
IR90X100X36	406	90	100	36	1	-14	-27
IR90X105X35	610	90	105	35	1,1	-14	-27
IR90X105X63	1 110	90	105	63	1,1	-14	-27
IR95X105X26	313	95	105	26	1	-14	-27
IR95X105X36	431	95	105	36	1	-14	-27
IR95X110X35	657	95	110	35	1,1	-14	-27
IR95X110X63	1 170	95	110	63	1,1	-14	-27
IR100X110X30	350	100	110	30	1,1	-14	-27
IR100X110X40	505	100	110	40	1,1	-14	-27
IR100X115X40	797	100	115	40	1,1	-14	-27
IR110X120X30	409	110	120	30	1	-14	-32
IR110X125X40	840	110	125	40	1,1	-7	-22
IR120X130X30	442	120	130	30	1	-7	-22
IR120X135X45	1 044	120	135	45	1,1	-7	-22
IR130X145X35	855	130	145	35	1,1	-17	-37
IR130X150X50	1 690	130	150	50	1,5	-17	-37
IR140X155X35	917	140	155	35	1,1	-17	-37
IR140X160X50	1 800	140	160	50	1,5	-17	-37
IR150X165X40	1 122	150	165	40	1,1	-27	-52
IR160X175X40	1 200	160	175	40	1,1	-27	-52
IR170X185X45	1 441	170	185	45	1,1	-25	-46
IR180X195X45	1 510	180	195	45	1,1	-25	-46
IR190X210X50	2 410	190	210	50	1,5	-40	-66
IR200X220X50	2 518	200	220	50	1,5	-40	-66
IR220X240X50	2 753	220	240	50	1,5	-55	-86
IR240X265X60	4 600	240	265	60	2	-55	-86
IR260X285X60	4 980	260	285	60	2	-69	-107
IR280X305X69	6 100	280	305	69	2	-69	-107
IR300X330X80	9 200	300	330	80	2,1	-69	-107
IR320X350X80	9 800	320	350	80	2,1	-83	-127
IR340X370X80	10 200	340	370	80	2,1	-83	-127
IR360X390X80	10 900	360	390	80	2,1	-128	-182
IR380X415X100	16 700	380	415	100	2,1	-122	-172

Inner rings

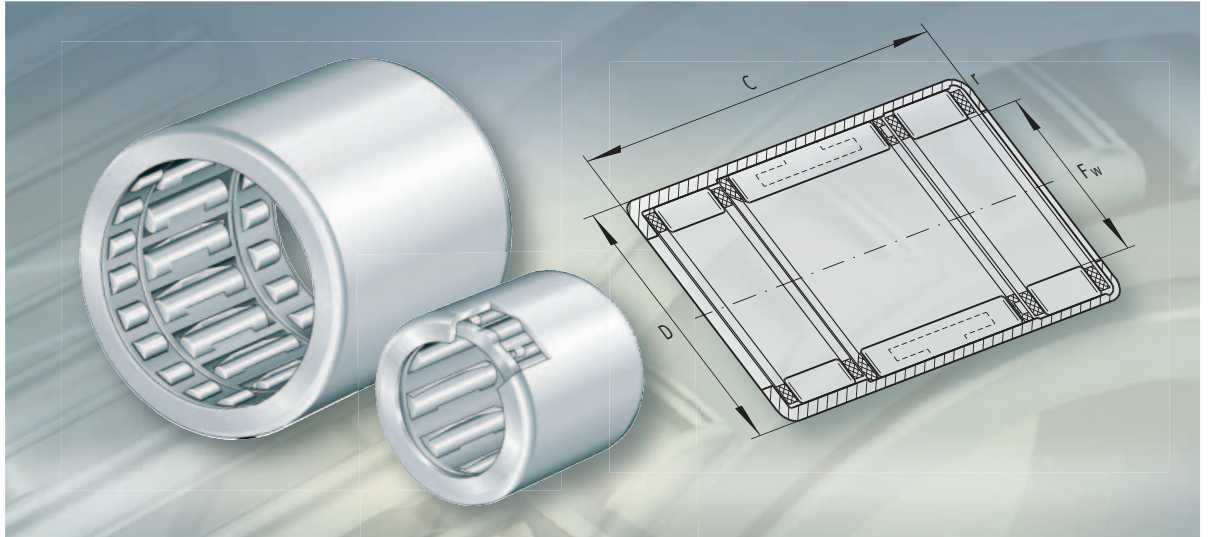
With lubrication hole



IR..-IS1

Dimension table · Dimensions in mm							
Designation	Mass m ≈g	Dimensions				Tolerance of raceway F	
		d	F	B	r min.	μm	
						upper	lower
IR6X10X10-IS1	3,7	6	10	10	0,3	-7	-23
IR8X12X10-IS1	4,8	8	12	10	0,3	-4	-18
IR10X14X12-IS1	7,3	10	14	12	0,3	-4	-18
IR12X16X12-IS1	7,9	12	16	12	0,3	-4	-18
IR15X20X12-IS1	12,2	15	20	12	0,3	0	-12
IR20X25X16-IS1	24	20	25	16	0,3	0	-12
IR25X30X16-IS1	25,7	25	30	16	0,3	0	-12
IR30X38X20-IS1	77	30	38	20	0,6	+5	-4
IR35X42X20-IS1	63,9	35	42	20	0,6	0	-9
IR40X50X20-IS1	106	40	50	20	1	0	-9
IR45X55X20-IS1	117	45	55	20	1	0	-11
IR50X55X20-IS1	62,5	50	55	20	0,6	0	-11
IR50X60X20-IS1	128	50	60	20	1	0	-11





Drawn cup roller clutches

Drawn cup roller clutches

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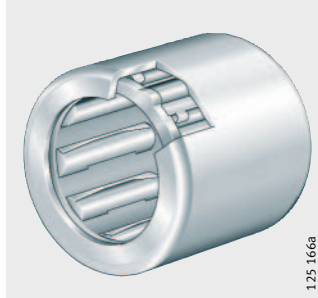


Product overview Drawn cup roller clutches

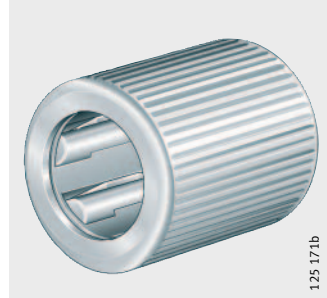
Without bearing arrangement

With and without knurling
With steel springs

HF

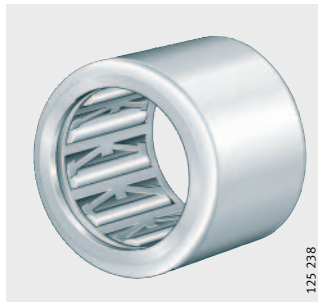


HF..-R

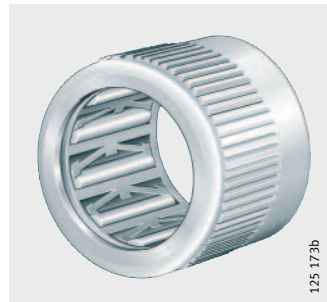


With and without knurling
With plastic springs

HF..-KF



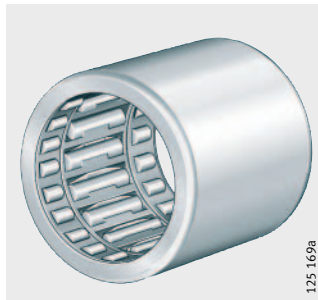
HF..-KFR



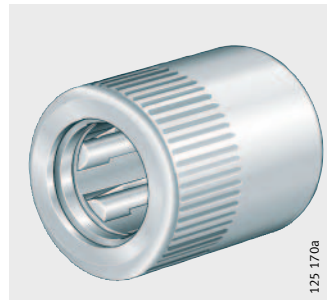
With bearing arrangement

With and without knurling
With steel springs

HFL

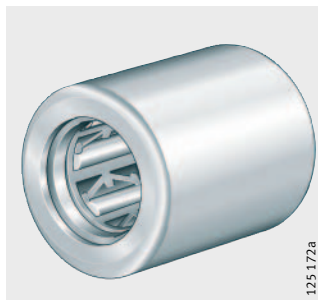


HFL..-R

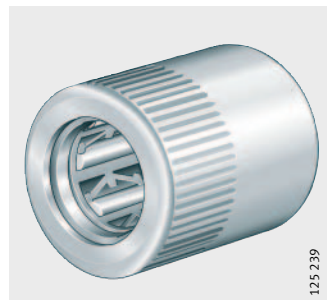


With and without knurling
With plastic springs

HFL..-KF



HFL..-KFR



Drawn cup roller clutches

Features Drawn cup roller clutches are one-way clutches comprising thin-walled, drawn outer rings with ramps on the inside diameter, plastic cages, pressure springs and needle rollers. They can transmit torques in one direction and are radially compact. The roller clutches are available with and without bearing arrangements.

Drawn cup roller clutches give very precise indexing, since the individual spring loading of the needle rollers ensures continuous contact between the shaft, needle rollers and ramps. They allow high indexing frequencies due to their low mass and the resulting low moment of inertia of the clamping elements. They also have a low overrunning frictional torque.

Drawn cup roller clutches can be used in various applications such as indexing clutches, back-stopping clutches and overrunning clutches. In these cases, the drawn cup roller clutch performs an overrunning or locking function.

Sealing/lubricant Drawn cup roller clutches are greased using a lithium soap grease to GA26. For applications with oil lubrication, roller clutches are available without greasing. These roller clutches are coated with a preservative.

In many cases, the initial greasing is sufficient to last the operating life of the roller clutches.

Drawn cup roller clutches without bearing arrangement Drawn cup roller clutches HF are roller clutches without a bearing arrangement. They can only transmit torques.

Caution! In the case of drawn cup roller clutches without a bearing arrangement, concentricity to the shaft axis must be secured by additional rolling bearings or drawn cup roller clutches with a bearing arrangement must be used.

Without knurling/with knurling Drawn cup roller clutches HF have steel pressure springs, roller clutches HF..KF have plastic pressure springs. Roller clutches with a knurled outside surface have the suffix R and are suitable for use with plastic housings.

Drawn cup roller clutches with bearing arrangement Drawn cup roller clutches HFL are roller clutches with a bearing arrangement. Due to the integrated rolling or plain bearings, they can support torques as well as additional radial forces.

Without knurling/with knurling Drawn cup roller clutches HFL have steel pressure springs, roller clutches HFL..KF have plastic pressure springs. Roller clutches with a knurled outside surface have the suffix R and are suitable for use with plastic housings.

Operating temperature

Caution! Due to the grease used, drawn cup roller clutches are suitable for operating temperatures from -10 °C to $+70\text{ °C}$.

Suffixes Suffixes for available designs: see table.

Available designs

Suffixes	Description	Design
–	Steel springs	Standard
KF	Plastic springs	Standard
R	Knurled outside surface	Standard
RR	Drawn cup roller clutch with Corrotect® coating	Special design ¹⁾

¹⁾ Available by agreement.



Drawn cup roller clutches

Design and safety guidelines

Caution! Drawn cup roller clutches should not be used if a malfunction could lead to personal injury.
New applications, especially those involving extreme conditions, should first be verified by tests.
Correct functioning can only be guaranteed if there is only a small concentricity defect between the support bearing and the shaft.

Retention for transport

Drawn cup roller clutches are normally packed individually in the case of small quantities.
Where larger quantities are involved, drawn cup roller clutches are placed in a specific orientation in blister packaging and delivered in this form. The blister packaging serves to retain the parts in position during transport.

Limiting load

Caution! In the case of drawn cup roller clutches with plain bearings, the product calculated from the actual speed n and radial load F_r must not exceed the value stated for the limiting load $(F_r \cdot n)_{\max}$. The operating limits are determined by the limiting speeds stated in the dimension tables and the permissible radial load.

Indexing frequency and indexing accuracy

In order not to overload the roller clutch, the inertia of the entire system must be taken into consideration. The high indexing accuracy is due to the individual spring loading of the needle rollers, which ensures continuous contact between the shaft, needle rollers and clamping surface.

The indexing accuracy is influenced by the indexing frequency, lubrication, fitting tolerances, adjacent construction, elastic deformation of the adjacent parts and the drive method, either through the shaft or the housing. Optimum accuracy is achieved if the drive is via the shaft.

Transmissible torque

Transmission of torque requires a rigid housing. The transmissible torque is therefore dependent on the shaft and housing material, the shaft hardness, the wall thickness of the housing and the shaft and housing tolerances.

Caution! When calculating the torque, the maximum drive torque and the moment of inertia of the masses during acceleration must be taken into consideration.

Frictional energy

The frictional torque curve is shown in *Figure 1*.

The frictional energy during idling is dependent on whether the shaft or the outer ring is rotating, *Figure 2*.

If the outer ring rotates, the frictional energy increases at first as the speed increases but then decreases gradually due to centrifugal force until it approaches zero.

At this speed, there is no longer any frictional contact between the needle rollers and the shaft. Due to the increasing centrifugal force, the needle rollers lift from the shaft.

M_R = frictional torque during idling
d = shaft diameter

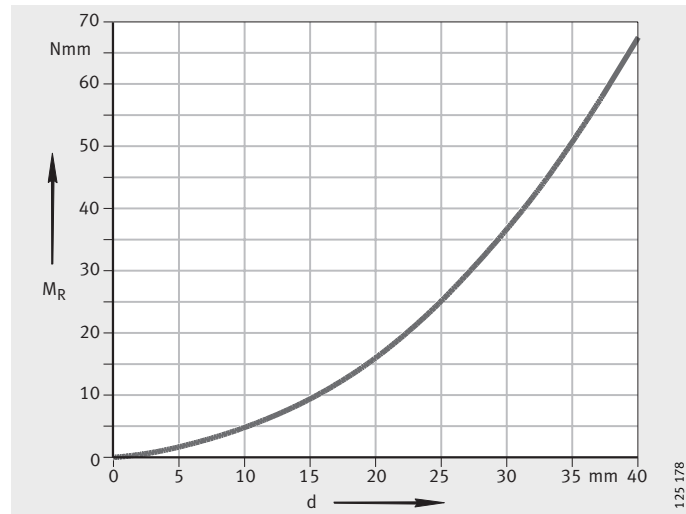


Figure 1
Frictional torque during idling,
as a function of shaft diameter

n = speed
 N_R = frictional energy during idling
 n_{GA} = limiting speed with
rotating outer ring
 n_{GW} = limiting speed with
rotating shaft

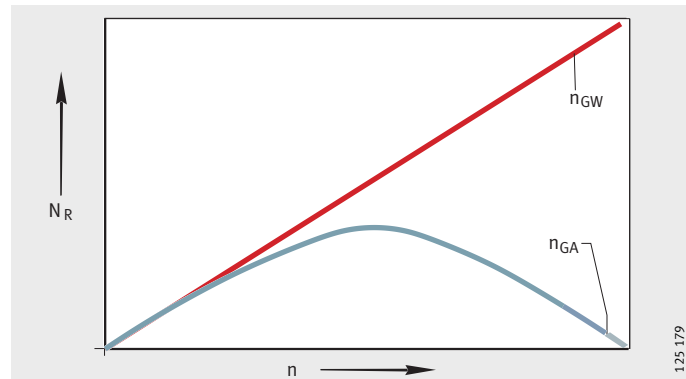


Figure 2
Frictional energy during idling,
as a function of speed

Speeds

Caution!

The limiting speeds n_{GW} and n_{GA} in the dimension tables are valid for oil and grease lubrication.

The limiting speed n_{GW} is valid for a rotating shaft.

The limiting speed n_{GA} is valid for a rotating outer ring.



Drawn cup roller clutches

Housing design

The accuracy of the locating bore essentially determines the geometrical accuracy of the drawn cup and thus the functioning of the clutch.

Housing bore

The housing bore should have a chamfer of 15°. The bore tolerances should be in accordance with the table and have a surface quality of $R_a 0,8$.

The cylindricity tolerance of the housing bore in metal housings should be within the tolerance grade IT 5/2.

Bore tolerances

Series	Springs	Bore Housing material		
		Steel Cast iron	Light metal	Max. bore in plastic ²⁾
HF, HFL	Steel	N6 (N7) ¹⁾	R6 (R7) ¹⁾	–
HF..-KF, HFL..-KF	Plastic	N7	R7	–
HF..-R, HFL..-R	Steel	–	–	D _{-0,05}
HF..-KFR, HFL..-KFR	Plastic	–	–	D _{-0,05}
HFLO606-KFR, HFL0806-KFR	Plastic	–	–	D _{-0,05}

1) The values in brackets can be used if the actual torque is up to 50% of the permissible torque $M_{d\ per}$ (see dimension tables).

2) Guide values dependent on the plastic used.
Outside diameter D: see dimension tables.

Minimum wall thickness – metal and plastic housings

Caution!

For metal housings, the minimum wall thickness is determined according to *Figure 3*. Calculation examples: see page 707.

The comparative stress σ_v must not exceed the yield stress of the housing material.

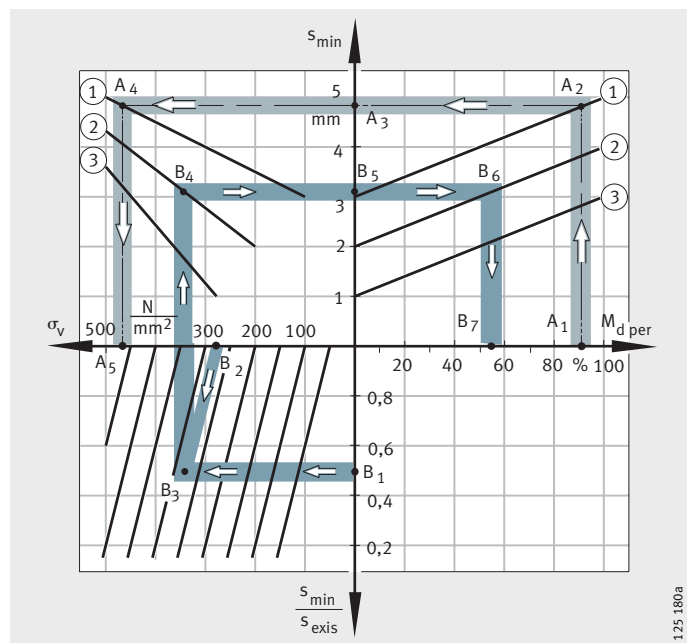
For plastic housings, drawn cup roller clutches with a partially or fully knurled outside surface should be used.

- ① HF2520 to HF3520, HFL2530 to HFL3530
- ② HF1216 to HF2016, HFL1226 to HFL2026
- ③ Up to HF1012, up to HFL1220

$M_{d\ per}$ = permissible torque
 σ_v = comparative stress
 s_{min} = minimum wall thickness
 s_{min}/s_{exis} = ratio of wall thicknesses

Figure 3

Minimum wall thicknesses of metal housings, as a function of torque



Calculation example
Calculation example A

Lines A₁ to A₄, *Figure 3*:

Given:

- Drawn cup roller clutch HF3020
- Permissible torque $M_{d\ per} = 90\ \text{Nm}$
- Torque $M_d = 81\ \text{Nm}$
(= 90% of permissible torque $M_{d\ per}$)
- Metal housing.

Required:

- Minimum wall thickness s_{\min} and comparative stress σ_v .

Result:

- $s_{\min} = 4,8\ \text{mm}$ and $\sigma_v = 460\ \text{N/mm}^2$.

Calculation example B

Lines B₁ to B₇, *Figure 3*:

Given:

- Drawn cup roller clutch HF1416
- Permissible torque $M_{d\ per} = 17,3\ \text{Nm}$
- Ratio of wall thicknesses $s_{\min}/s_{\text{exis}} = 0,5$
- Permissible housing stress $R_{p0,2} = 280\ \text{N/mm}^2$
- Metal housing.

Required:

- Minimum wall thickness s_{\min} and transmissible torque M_d .

Result:

- $s_{\min} = 3,1\ \text{mm}$ and $M_d = 9,6\ \text{Nm}$.

Shaft design

The raceway on the shaft must be hardened and ground. The surface hardness of the raceway must be 670 HV + 170 HV, the hardening depth CHD or Rht must be sufficiently large ($\text{CHD} \geq 0,3\ \text{mm}$).

The end face of the shaft must be chamfered to approx. 1 mm and 15°.

Shaft design: see table Shaft tolerances.

Shaft tolerances

Series	Springs	Shaft			
		Tolerances	Roughness max.	Roundness max.	Parallelism max.
HF, HFL	Steel	h5 (h6) ¹⁾	Ra0,4 (Rz2)	25% of diameter tolerance	25% of diameter tolerance
HF..-KF, HFL..-KF	Plastic	h8			
HF..-R, HFL..-R	Steel	h5 (h6) ¹⁾			
HF..-KFR, HFL..-KFR	Plastic	h8			
HFL0606-KFR, HFL0806-KFR	Plastic	h9			

¹⁾ The values in brackets can be used if the actual torque is up to 50% of the permissible torque $M_{d\ per}$ (see dimension tables).

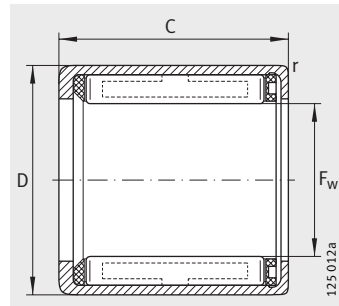


Drawn cup roller clutches

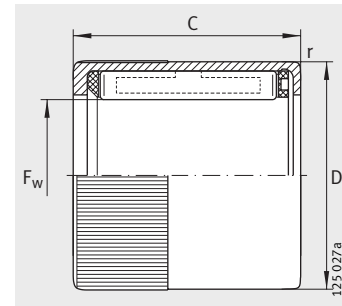
Axial location	Drawn cup roller clutches are pressed into the housing bore and require no further axial location (if the recommendations in the table Bore tolerances, page 706 are observed).								
Sealing of the bearing position	If there is a risk of contamination, sealing rings of series G or SD should be fitted. The sealing rings are matched to the dimensions of the roller clutches and can be combined with wider inner rings IR.								
Lubrication	<p>In order to ensure optimum function, different lubricants may be required. The suitability of the lubricant must be verified by tests. For general applications (mixed operation involving locking and overrunning), the INA initial greasing has proved effective. For applications in which one operating condition (overrunning or locking) is heavily predominant, a special greasing should be used. In this case, please contact us.</p> <p>It is not possible to calculate the grease operating life or lubrication interval for drawn cup roller clutches.</p> <p>Caution! If drawn cup roller clutches are to be relubricated, only oil lubrication should be used or lubrication should be changed to oil. For temperatures $< -10\text{ °C}$ and speeds $> 0,7 n_G$, a lubricant recommendation should be requested.</p> <p>For temperatures over $+70\text{ °C}$, oil lubrication should be used. The oil level should such that, when the roller clutch is stationary and the axis is horizontal, it is immersed approx. $\frac{1}{3}$ in the oil bath. Suitable oils are CL and CLP to DIN 51 517 or HL and HLP to DIN 51 524. Viscosity classes: see table.</p>								
Viscosity classes	<table border="1"> <thead> <tr> <th>Operating temperature</th> <th>Viscosity class</th> </tr> </thead> <tbody> <tr> <td>+15 °C to +30 °C</td> <td>ISO VG 10</td> </tr> <tr> <td>+15 °C to +90 °C</td> <td>ISO VG 32</td> </tr> <tr> <td>+60 °C to +120 °C</td> <td>ISO VG 100</td> </tr> </tbody> </table>	Operating temperature	Viscosity class	+15 °C to +30 °C	ISO VG 10	+15 °C to +90 °C	ISO VG 32	+60 °C to +120 °C	ISO VG 100
Operating temperature	Viscosity class								
+15 °C to +30 °C	ISO VG 10								
+15 °C to +90 °C	ISO VG 32								
+60 °C to +120 °C	ISO VG 100								
Installation using a fitting mandrel	<p>Caution! Drawn cup roller clutches should only be fitted in the locating bore using a special fitting mandrel, see Drawn cup needle roller bearings, page 610. Note the clamping direction of the roller clutch. The clamping direction is indicated by an arrow on the end face.</p>								
Guidelines for fitting	<p>Drawn cup roller clutches should be protected against dust, contaminants and moisture. Contaminants can impair the function and operating life of roller clutches.</p> <p>Caution! Pressing-in forces must never be directed through the rolling elements. Roller clutches should not be tilted during fitting.</p>								
Accuracy	The thin-walled outer rings adopt the dimensional and geometrical accuracy of the housing bore.								
Enveloping circle	<p>In roller clutches with a rolling bearing arrangement, the enveloping circle diameter F_w of the fitted bearings (in a heavy-section ring gauge) is approximately in tolerance zone F8 (for values according to table, Bore tolerances, page 706 and Shaft tolerances, page 707).</p> <p>The enveloping circle is the inner inscribed circle of the support bearing needle rollers in clearance-free contact with the outer raceway.</p>								

Drawn cup roller clutches

Without bearing arrangement
With or without knurling



HF, HF..-KF



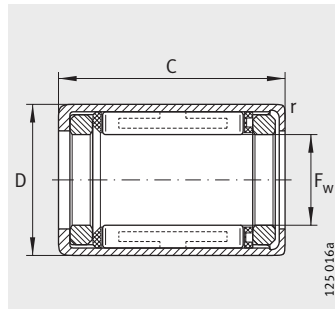
HF..-R, HF..-KFR
With knurling

Dimension table · Dimensions in mm										
Spring design		Mass m ≈g	Dimensions				Permissible torque M_d per Nm	Limiting speeds		Drawn cup needle roller bearings for radial bearing arrangement Designation
Plastic springs Designation	Steel springs Designation		F_w	D	C -0,3	r min.		n_{GW} min^{-1}	n_{GA} min^{-1}	
HF0306-KF	-	1	3	6,5	6	0,3	0,18	45 000	8 000	HK0306-TV
HF0306-KFR	-	1	3	6,5	6	0,3	0,06	45 000	8 000	HK0306-TV
HF0406-KF	-	1	4	8	6	0,3	0,34	34 000	8 000	HK0408
HF0406-KFR	-	1	4	8	6	0,3	0,1	34 000	8 000	HK0408
HF0612-KF	HF0612	3	6	10	12	0,3	1,76	23 000	13 000	HK0608
HF0612-KFR	HF0612-R	3	6	10	12	0,3	0,6	23 000	13 000	HK0608
HF0812-KF	HF0812	3,5	8	12	12	0,3	3,15	17 000	12 000	HK0808
HF0812-KFR	HF0812-R	3,5	8	12	12	0,3	1	17 000	12 000	HK0808
HF1012-KF	HF1012	4	10	14	12	0,3	5,3	14 000	11 000	HK1010
-	HF1216	11	12	18	16	0,3	12,2	11 000	8 000	HK1212
-	HF1416	13	14	20	16	0,3	17,3	9 500	8 000	HK1412
-	HF1616	14	16	22	16	0,3	20,5	8 500	7 500	HK1612
-	HF1816	16	18	24	16	0,3	24,1	7 500	7 500	HK1812
-	HF2016	17	20	26	16	0,3	28,5	7 000	6 500	HK2010
-	HF2520	30	25	32	20	0,3	66	5 500	5 500	HK2512
-	HF3020	36	30	37	20	0,3	90	4 500	4 500	HK3012
-	HF3520	40	35	42	20	0,3	121	3 900	3 900	HK3512

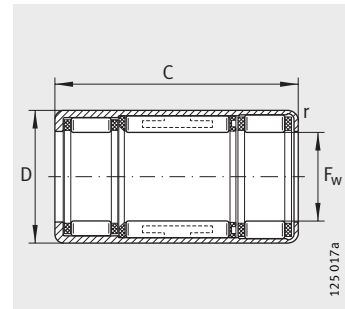


Drawn cup roller clutches

With bearing arrangement
With or without knurling



HFL, HFL...-KF, with plain bearing arr. (HFL0308-KF, HFL0408-KF, HFL0615-KF, HFL0615)



HFL, HFL...-KF, with rolling bearing arr. ($F_w \geq 8$ mm and $C \geq 22$ mm) and HFL0822-KFR, HFL0822-R

Dimension table (continued) · Dimensions in mm

Spring design		Mass m ≈g	Dimensions				Permissible torque $M_{d\ per}$ Nm
Plastic springs	Steel springs		F_w	D	C	r	
Designation	Designation				-0,3	min.	
HFL0308-KF	–	1,4	3	6,5	8	0,3	0,18
HFL0308-KFR	–	1,4	3	6,5	8	0,3	0,06
HFL0408-KF	–	1,6	4	8	8	0,3	0,34
HFL0408-KFR	–	1,6	4	8	8	0,3	0,1
HFL0606-KFR	–	1	6	10	6	0,3	0,5
HFL0615-KF	HFL0615	4	6	10	15	0,3	1,76
HFL0615-KFR	HFL0615-R	4	6	10	15	0,3	0,6
HFL0806-KFR	–	2	8	12	6	0,3	0,7
HFL0822-KF	HFL0822	7	8	12	22	0,3	3,15
HFL0822-KFR	HFL0822-R	7	8	12	22	0,3	1
–	HFL1022	8	10	14	22	0,3	5,3
–	HFL1226	18	12	18	26	0,3	12,2
–	HFL1426	20	14	20	26	0,3	17,3
–	HFL1626	22	16	22	26	0,3	20,5
–	HFL1826	25	18	24	26	0,3	24,1
–	HFL2026	27	20	26	26	0,3	28,5
–	HFL2530	44	25	32	30	0,3	66
–	HFL3030	51	30	37	30	0,3	90
–	HFL3530	58	35	42	30	0,3	121

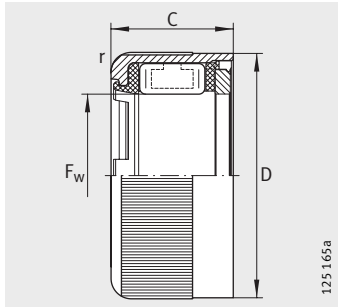
1) Caution!

Drawn cup roller clutches with plain bearings: During operation, the product of the actual speed n and the radial load F_r must not exceed the stated operating limit $(F_r \cdot n)_{\max}$.

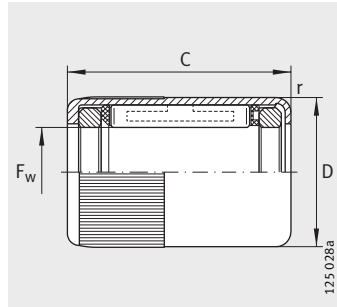
The operating limits are determined by the limiting speeds stated and the permissible radial load.

2) Drawn cup roller clutches with rolling bearings.

3) No arrow on end face.



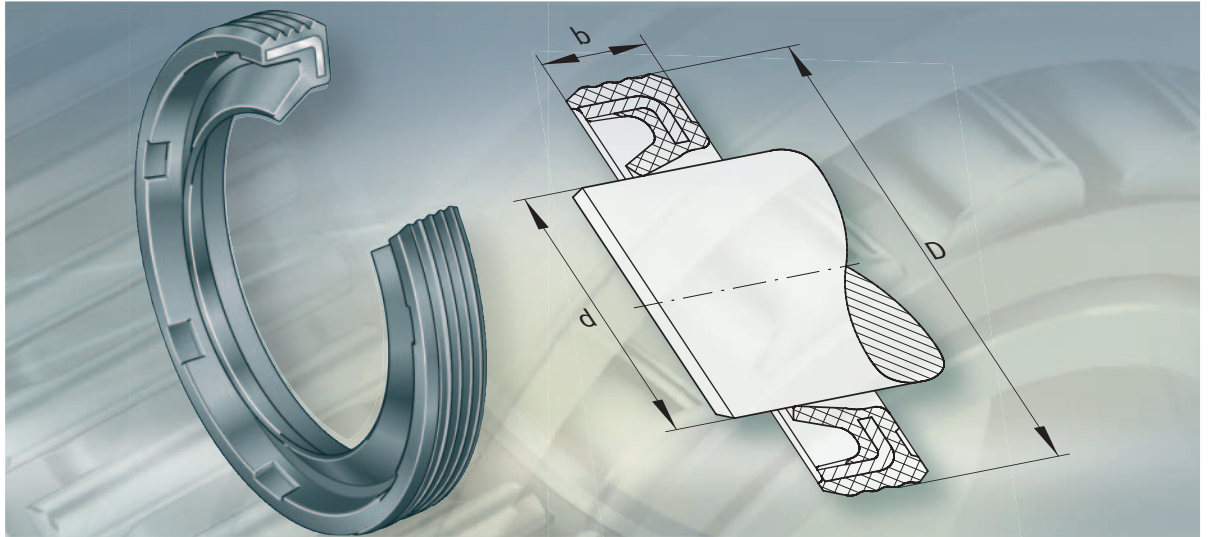
HFL0606-KFR³⁾, HFL0806-KFR³⁾



HFL0308-KFR, HFL0408-KFR,
HFL0615-R, HFL0615-KFR

Limiting speeds		Permissible radial load ¹⁾ $F_{r \max}$ N	Limiting load $(F_r \cdot n)_{\max}^{1)}$ N/min	Basic load ratings ²⁾		Fatigue limit load C_{ur} N
n_{GW} min ⁻¹	n_{GA} min ⁻¹			dyn. C_r N	stat. C_{0r} N	
45 000	8 000	60	16 000	–	–	–
45 000	8 000	60	16 000	–	–	–
34 000	8 000	80	16 000	–	–	–
34 000	8 000	80	16 000	–	–	–
23 000	13 000	40	4 200	–	–	–
23 000	13 000	110	18 000	–	–	–
23 000	13 000	110	18 000	–	–	–
17 000	12 000	54	4 200	–	–	–
17 000	12 000	–	–	3 650	3 950	550
17 000	12 000	–	–	3 650	3 950	550
14 000	11 000	–	–	3 950	4 500	630
11 000	8 000	–	–	6 300	6 700	920
9 500	8 000	–	–	6 800	7 800	1 080
8 500	7 500	–	–	7 400	9 000	1 250
7 500	7 500	–	–	8 000	10 200	1 420
7 000	6 500	–	–	8 500	11 400	1 590
5 500	5 500	–	–	10 600	14 000	1 900
4 500	4 500	–	–	11 600	16 900	2 290
3 900	3 900	–	–	12 200	18 800	2 550





Sealing rings

Sealing rings

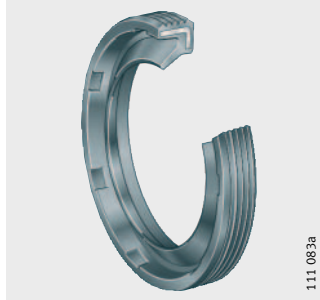
	Page
Product overview	Sealing rings 714
Features	Sealing rings, single lip 715
	Sealing rings, double lip..... 715
	Operating temperature 715
	Suffixes..... 715
Design and safety guidelines	Resistance/leakage..... 716
	Sealing lip orientation 716
	Shaft and housing design..... 716
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Product overview Sealing rings

Single lip

G



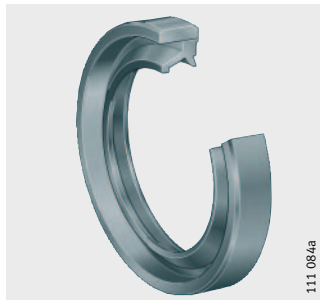
With external steel reinforcement

GR



Double lip

SD



Sealing rings

Features Sealing rings are designed as contact seals. They protect the bearing position against contamination, spray water and the excessive loss of grease.

Sealing rings are matched to the low radial dimensions of drawn cup needle roller bearings and needle roller bearings. They are very easy to fit, since they are simply pressed into the housing bore.

Sealing rings allow circumferential speeds at the seal lip of up to 10 m/s, depending on the surface quality of the shaft.

Sealing rings, single lip Sealing rings G and GR are single lip seals made from synthetic NBR elastomer (coloured green).

The design GR is suitable for shaft diameters up to 7 mm and has an external steel reinforcement for stiffening purposes.

Sealing rings G are suitable for shaft diameters over 8 mm and have a rubber-encased steel reinforcement with a rubber wave profile for stiffening purposes. This provides good sealing on the outside diameter. At the same time, it also reduces the forces required for fitting.

Sealing rings, double lip Sealing rings SD have a contact lip and a non-contact dust shield lip facing the shaft (on the marked side). They comprise two plastic components.

The seal carrier is made from reinforced polyamide (coloured black), while the seal lip area is made from thermoplastic PU elastomer (coloured green).

Sealing rings SD can also be used as wipers on shafts with axial motion. Stroke speeds up to 3 m/s are possible, dependent on the condition of the shaft.

Operating temperature The permissible operating temperature is dependent on the interaction between the medium and the temperature and its effect on the sealing ring material. The suitability of the sealing rings should be checked by tests as extremes of operation are approached.

Caution! Sealing rings G and GR are suitable for operating temperatures from -30 °C to $+110\text{ °C}$, depending on the medium acting on the sealing ring.

Sealing rings SD are suitable for operating temperatures from -30 °C to $+110\text{ °C}$, depending on the medium acting on the sealing ring.

Suffixes Suffixes for available designs: see table.

Available designs

Suffixes	Description	Design
FPM	Sealing rings G and GR for temperatures from -20 °C to $+160\text{ °C}$ or circumferential speeds up to 16 m/s	Special design ¹⁾

¹⁾ Available by agreement.

Further information Further information on sealing rings and the basic principles of sealing ring technology is given in publication GSD.



Sealing rings

Design and safety guidelines Resistance/leakage

Sealing rings are resistant to undoped lubricants with a mineral oil base. For other media, please check the resistance of the sealing rings.

Low leakage rates are possible (grease or fluid film). The sealing effect is aided by a grease collar.

Sealing lip orientation

A sealing lip facing outwards protects the bearing against ingress of contaminants, *Figure 1*, ①. A sealing lip facing inwards prevents egress of lubricant from the bearing, *Figure 1*, ②.

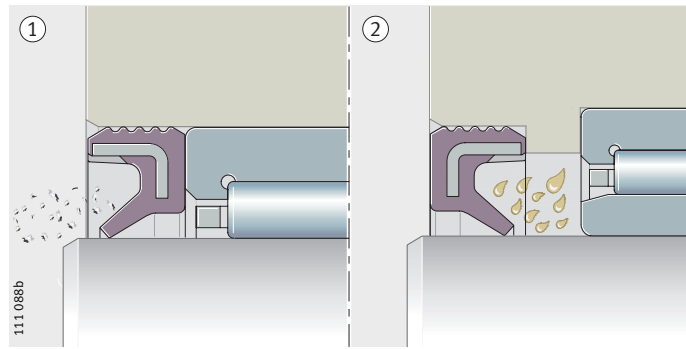


Figure 1

- ① Sealing lip facing outwards
- ② Sealing lip facing inwards

Shaft and housing design

The sliding surface for the sealing lips must be free from cracks and damage such as impact points, scratches, cracks, rust, raised areas.

Tolerances and surface quality

Sealing ring	Shaft movement	Bore tolerance	Shaft		
			Tolerance	Roughness	Hardness
G, GR, SD	Rotation only	G7 to R7	g7 to k7	$0,2 \leq R_a \leq 0,8$	55 HRC or 600 HV
SD	Axial motion			$R_a 0,3$	

In order to protect the sealing lips during fitting, the shaft ends and the housing bore should be chamfered in accordance with DIN 3 761, see table and *Figure 2*.

Chamfer dimensions

Chamfer	$D \leq 30$ mm	$D > 30$ mm	$d \leq 30$ mm	$d > 30$ mm
v min.	0,3	1% of D	–	–
w min.	–	–	0,3	0,5

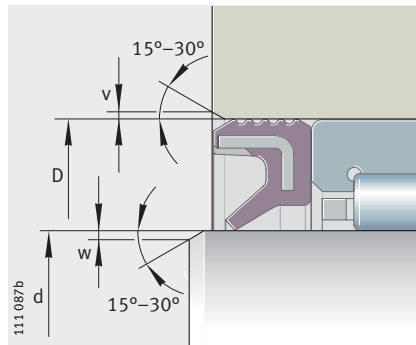
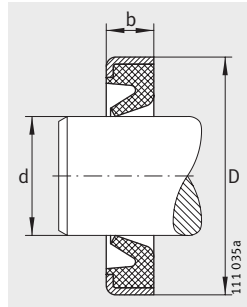


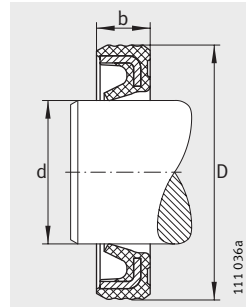
Figure 2

Chamfers on housing bore and shaft end

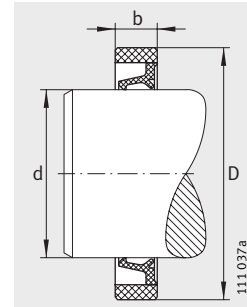
Sealing rings



GR ($d \leq 7 \text{ mm}$)



G ($d \geq 8 \text{ mm}$)

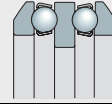


SD

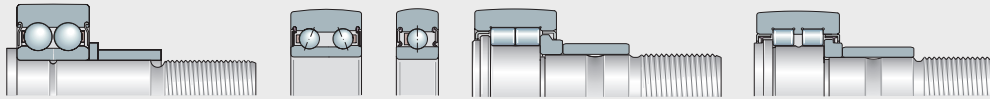
Dimension table · Dimensions in mm						
Single lip NBR elastomer		Double lip Plastic		Dimensions		
Designation	Mass m ≈g	Designation	Mass m ≈g	d	D	b +0,4 -0,2
GR4X8X2	0,2	-	-	4	8	2
GR5X9X2	0,2	-	-	5	9	2
GR5X10X2	0,2	-	-	5	10	2
GR6X10X2	0,2	-	-	6	10	2
GR6X12X2	0,4	-	-	6	12	2
GR7X11X2	0,3	-	-	7	11	2
GR7X14X2	0,5	-	-	7	14	2
G8X12X3	0,4	-	-	8	12	3
G8X15X3	0,7	SD8X15X3	0,3	8	15	3
G9X13X3	0,5	-	-	9	13	3
G9X16X3	0,7	-	-	9	16	3
G10X14X3	0,5	-	-	10	14	3
G10X17X3	0,9	SD10X17X3	0,4	10	17	3
G12X16X3	0,6	-	-	12	16	3
G12X18X3	0,9	SD12X18X3	0,4	12	18	3
G12X19X3	1	SD12X19X3	0,5	12	19	3
G13X19X3	0,9	-	-	13	19	3
G14X20X3	1	SD14X20X3	0,5	14	20	3
G14X21X3	1,1	-	-	14	21	3
G14X22X3	1,3	SD14X22X3	0,7	14	22	3
G15X21X3	1	SD15X21X3	0,5	15	21	3
G15X23X3	1,3	SD15X23X3	0,7	15	23	3
G16X22X3	1,3	SD16X22X3	0,6	16	22	3
G16X24X3	1,3	SD16X24X3	0,7	16	24	3
G16X25X3	1,6	-	-	16	25	3
G17X23X3	1,3	SD17X23X3	0,6	17	23	3
G17X25X3	1,5	SD17X25X3	0,8	17	25	3
G18X24X3	1,2	SD18X24X3	0,6	18	24	3
G18X26X4	1,8	SD18X26X4	1,1	18	26	4
G19X27X4	2	SD19X27X4	1,1	19	27	4
G20X26X4	1,8	SD20X26X4	0,8	20	26	4
G20X28X4	2,1	SD20X28X4	1,1	20	28	4
G21X29X4	2,2	-	-	21	29	4

Dimension table (continued) · Dimensions in mm						
Single lip NBR elastomer		Double lip Plastic		Dimensions		
Designation	Mass m ≈g	Designation	Mass m ≈g	d	D	b +0,4 -0,2
G22X28X4	1,8	SD22X28X4	0,9	22	28	4
G22X30X4	2,2	SD22X30X4	1,3	22	30	4
G24X32X4	2,5	-	-	24	32	4
G25X32X4	2,3	SD25X32X4	1,3	25	32	4
G25X33X4	2,5	SD25X33X4	1,3	25	33	4
G25X35X4	2,6	SD25X35X4	1,9	25	35	4
G26X34X4	2,6	SD26X34X4	1,4	26	34	4
G28X35X4	2,4	SD28X35X4	1,3	28	35	4
G28X37X4	3,1	-	-	28	37	4
G29X38X4	3,2	-	-	29	38	4
G30X37X4	2,7	SD30X37X4	1,3	30	37	4
G30X40X4	3,6	SD30X40X4	2,1	30	40	4
G32X42X4	3,7	SD32X42X4	2,4	32	42	4
G32X45X4	5,1	-	-	32	45	4
G35X42X4	3	SD35X42X4	1,5	35	42	4
G35X45X4	4,1	SD35X45X4	2,5	35	45	4
G37X47X4	4	SD37X47X4	2,7	37	47	4
G38X48X4	4,4	SD38X48X4	2,8	38	48	4
G40X47X4	3,3	SD40X47X4	1,7	40	47	4
G40X50X4	4,6	SD40X50X4	2,9	40	50	4
G40X52X5	4,8	SD40X52X5	4,5	40	52	5
G42X52X4	4,7	SD42X52X4	3	42	52	4
G43X53X4	4,8	-	-	43	53	4
G45X52X4	3,8	SD45X52X4	1,9	45	52	4
G45X55X4	5,2	SD45X55X4	3,2	45	55	4
G50X58X4	4,5	SD50X58X4	2,4	50	58	4
G50X62X5	10,4	SD50X62X5	5,5	50	62	5
G55X63X5	7,1	-	-	55	63	5
G70X78X5	9	-	-	70	78	5





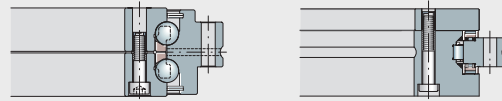
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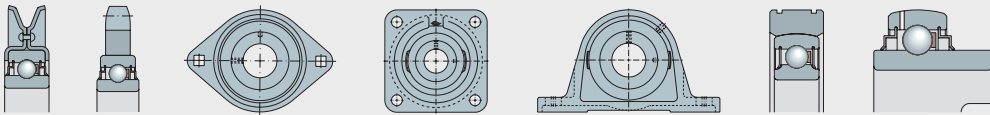
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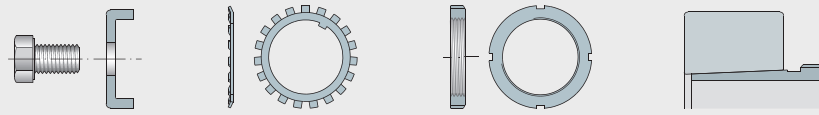
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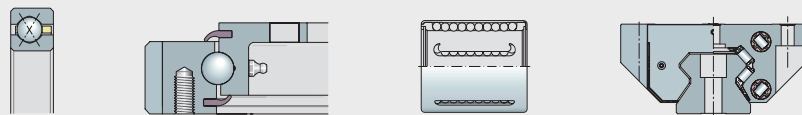
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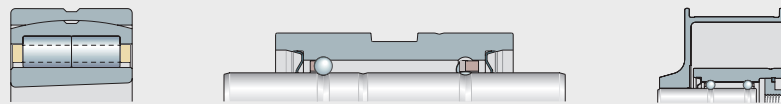
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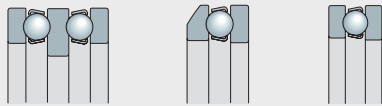
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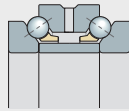


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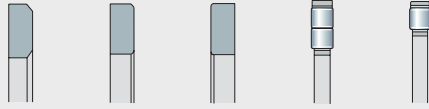
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Axial deep groove ball bearings



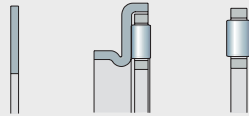
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Axial angular contact ball bearings



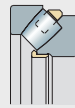
191 596

Axial cylindrical roller bearings



191 579

Axial needle roller and cage assemblies



191 559

Axial spherical roller bearings



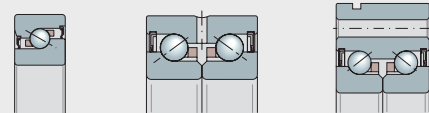
191 577

Crossed roller bearings



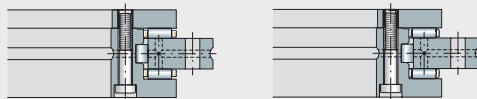
191 576

Track rollers



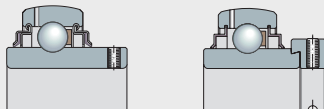
191 564

Bearings for screw drives



191 597

Rotary table bearings



191 573

Insert bearings and housing units
Idler sprocket units, idler pulley units



191 558

Bearing housings



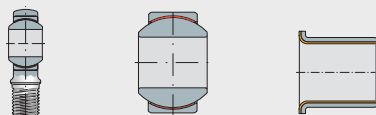
191 570

Fasteners and retainers



191 598

Arcanol rolling bearing greases



191 584

Other products

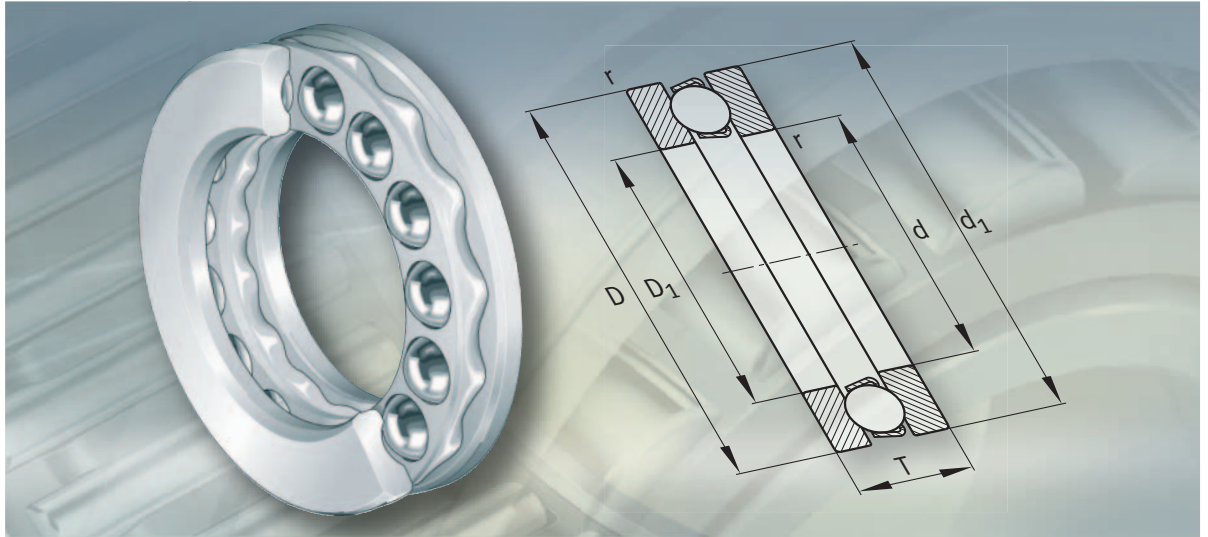


191 599

Market sectors

Appendix

FAG



Axial deep groove ball bearings



Axial deep groove ball bearings

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Product overview Axial deep groove ball bearings

Single direction
With flat housing locating washer

511, 512
513, 514



With spherical housing locating washer
Without and with seating washer

532
533

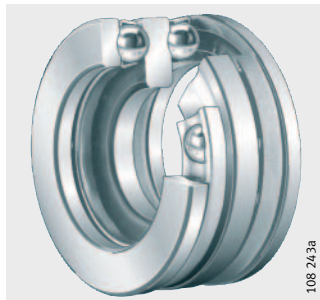


532 + U2
533 + U3



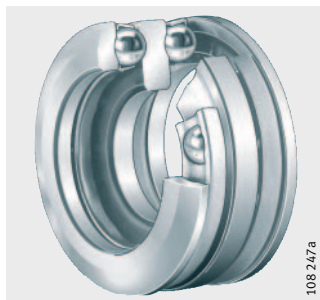
Double direction
With flat housing locating washers

522
523

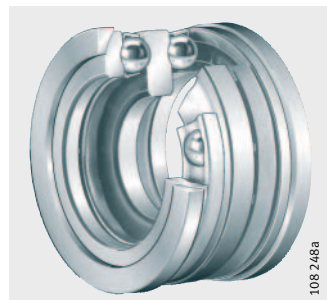


With spherical housing locating washers
Without and with seating washers

542
543



542 + U2
543 + U3





Axial deep groove ball bearings

Features Axial deep groove ball bearings comprise shaft locating washers, housing locating washers and ball and cage assemblies. The bearings are not self-retaining; the ball and cage assembly and bearing washers can therefore be fitted separately.

In addition to the series with flat washers, series are also available with spherical housing locating washers for the compensation of static angular misalignment. These designs are normally used in conjunction with seating washers.

Axial deep groove ball bearings are available in single and double direction designs. Both designs can support high axial forces but cannot be subjected to radial loads.

Single direction bearings Single direction axial deep groove ball bearings can support axial forces in one direction.

Bearings of series 511, 512, 513 and 514 have a flat housing locating washer. They do not permit angular misalignment or skewing between the shaft and housing.

Angular adjustment facility Bearings of series 532 and 533 have a spherical housing locating washer. With an appropriate housing design and in conjunction with seating washers U2 and U3, they allow angular adjustment and can therefore compensate static misalignments between the shaft and housing.

Double direction bearings Double direction axial deep groove ball bearings can support axial forces in both directions.

Bearings of series 522 and 523 have two flat housing locating washers and do not allow angular adjustment.

Angular adjustment facility Bearings of series 542 and 543 have spherical housing locating washers. With an appropriate housing design and in conjunction with seating washers U2 and U3, they allow angular adjustment and can therefore compensate static misalignments between the shaft and housing.

Operating temperature Axial deep groove ball bearings can be used at operating temperatures from $-30\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$, restricted by the lubricant.

Cages Bearings with sheet steel cages do not have a cage suffix. Solid brass window cages are indicated by the suffix MP, see table Suffixes, page 724.

The cage design as a function of the bore code is shown in the table Cage/bore code.

Cage/bore code

Series	Sheet steel cage	Solid brass cage
	Bore code	
511	up to 28	from 30
512	up to 28	from 30
513	up to 20	from 22
514	up to 11	from 12
522	up to 28	from 30
523	up to 20	from 22
532	up to 28	from 30
533	up to 20	from 22
542	all	–
543	up to 20	22

Axial deep groove ball bearings

Suffixes Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
MP	Solid brass window cage, ball-guided	Standard
P5	Higher accuracy to tolerance class P5	Special design ¹⁾
P6	Higher accuracy to tolerance class P6	Special design ¹⁾

¹⁾ Available by agreement.

Design and safety guidelines
Equivalent dynamic bearing load

Axial deep groove ball bearings can support axial forces only. The following applies:

$$P = F_a$$

P N
Equivalent dynamic bearing load
F_a N
Axial dynamic bearing load.

Equivalent static bearing load

Axial deep groove ball bearings can support axial forces only. The following applies:

$$P_0 = F_{0a}$$

P₀ N
Equivalent static bearing load
F_{0a} N
Axial static bearing load.

Minimum axial load

At higher speeds, detrimental sliding movements can occur between the rolling elements and the raceways due to centrifugal forces and gyroscopic moments. In order to avoid this, the bearings must be subjected to a minimum load F_{a min}. This can be achieved by means of preloading – for example using springs.

The minimum load factor A is given in the dimension tables. For n_{max}, the maximum operating speed must be used.

$$F_{a \min} = A \cdot \left(\frac{n_{\max}}{1000} \right)^2$$

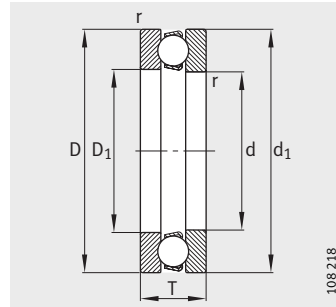
F_{a min} N
Minimum axial load
A –
Minimum load factor according to dimension tables
n_{max} min⁻¹
Maximum operating speed.



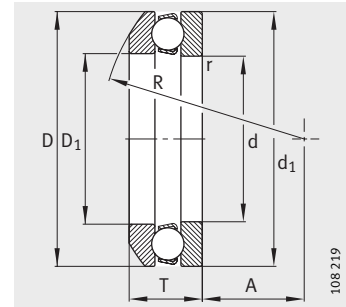
Speeds	ISO 15 312 does not give thermal reference speeds for these bearings.
Caution!	The dimension tables only state limiting speeds n_G . These values are for oil lubrication and must not be exceeded.
Design of adjacent parts	<p>The shoulders on the adjacent construction (shaft/housing) must be sufficiently high that the shaft and housing locating washers are supported over at least half their height.</p> <p>The abutting shoulders should be rigid, flat and perpendicular to the axis of rotation.</p> <p>The maximum values for the radii r_a and the diameters of the abutment surfaces d_a, D_a are indicated in the dimension tables.</p>
Locating bore tolerance	The tolerance of the locating bore is dependent on the running accuracy to be achieved. For normal running accuracy, the tolerance should be in the tolerance zone E8, for high running accuracy it should be in the tolerance zone H6.
Shaft tolerances	For single direction bearings, the shaft tolerance should be j6, for double direction bearings the shaft tolerance should be k6.
Accuracy	<p>The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620-3.</p> <p>The main dimensions for single direction bearings and seating washers conform to ISO 104/DIN 711, for double direction bearings they conform to DIN 715.</p>

Axial deep groove ball bearings

Single direction

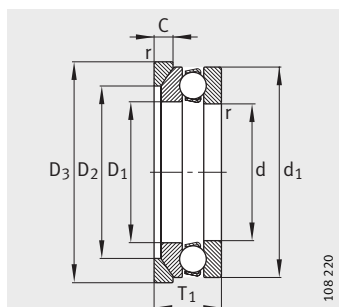


511, 512, 513, 514

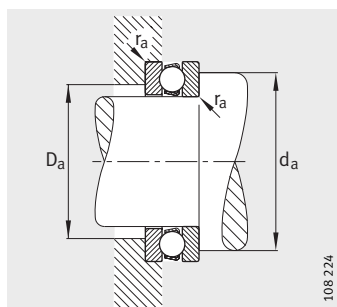


532, 533
Spherical housing locating washer

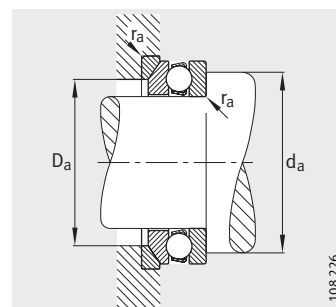
Dimension table · Dimensions in mm												
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D ₁	d ₁	r min.	R	A	D ₂
51100	–	0,018	–	10	24	9	11	24	0,3	–	–	–
51200	–	0,029	–	10	26	11	12	26	0,6	–	–	–
53200	–	0,028	–	10	26	11,6	12	26	0,6	22	8,5	–
53200	U200	0,028	0,01	10	26	11,6	12	26	0,6	22	8,5	18
51101	–	0,021	–	12	26	9	13	26	0,3	–	–	–
51201	–	0,032	–	12	28	11	14	28	0,6	–	–	–
53201	–	0,03	–	12	28	11,4	14	28	0,6	25	11,5	–
53201	U201	0,03	0,012	12	28	11,4	14	28	0,6	25	11,5	20
51102	–	0,024	–	15	28	9	16	28	0,3	–	–	–
51202	–	0,043	–	15	32	12	17	32	0,6	–	–	–
53202	–	0,046	–	15	32	13,3	17	32	0,6	28	12	–
53202	U202	0,046	0,014	15	32	13,3	17	32	0,6	28	12	24
51103	–	0,024	–	17	30	9	18	30	0,3	–	–	–
51203	–	0,05	–	17	35	12	19	35	0,6	–	–	–
53203	–	0,052	–	17	35	13,2	19	35	0,6	32	16	–
53203	U203	0,052	0,015	17	35	13,2	19	35	0,6	32	16	26
51104	–	0,037	–	20	35	10	21	35	0,3	–	–	–
51204	–	0,082	–	20	40	14	22	40	0,6	–	–	–
53204	–	0,081	–	20	40	14,7	22	40	0,6	36	18	–
53204	U204	0,081	0,021	20	40	14,7	22	40	0,6	36	18	30
51105	–	0,055	–	25	42	11	26	42	0,6	–	–	–
51205	–	0,114	–	25	47	15	27	47	0,6	–	–	–
53205	–	0,121	–	25	47	16,7	27	47	0,6	40	19	–
53205	U205	0,121	0,032	25	47	16,7	27	47	0,6	40	19	36
51305	–	0,154	–	25	52	18	27	52	1	–	–	–
53305	–	0,203	–	25	52	19,8	27	52	1	45	21	–
53305	U305	0,203	0,044	25	52	19,8	27	52	1	45	21	38
51405	–	0,295	–	25	60	24	27	60	1	–	–	–



532, 533
Spherical housing locating
washer, seating washer U2, U3



Mounting dimensions

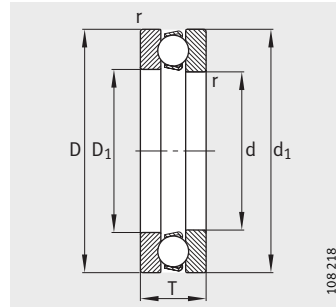


Mounting dimensions

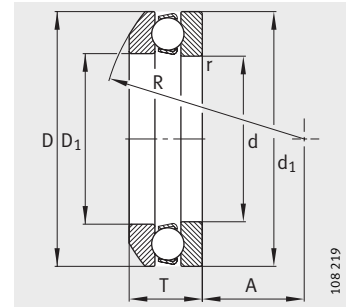
			Mounting dimensions			Basic load ratings		Fatigue limit load C_{ua} N	Minimum load factor A	Limiting speed n_G min^{-1}
D_3	C	T_1	d_a min.	D_a max.	r_a max.	dyn. C_a N	stat. C_{0a} N			
-	-	-	18	16	0,3	10 000	14 000	620	0,001	13 000
-	-	-	20	16	0,6	12 700	17 000	760	0,002	11 000
-	-	-	20	18	0,6	12 700	17 000	760	0,002	11 000
28	3,5	13	20	18	0,6	12 700	17 000	760	0,002	11 000
-	-	-	20	18	0,3	10 400	15 300	690	0,001	13 000
-	-	-	22	18	0,6	13 200	19 000	840	0,002	10 000
-	-	-	22	20	0,6	13 200	19 000	840	0,002	10 000
30	3,5	13	22	20	0,6	13 200	19 000	840	0,002	10 000
-	-	-	23	20	0,3	10 600	16 600	750	0,002	12 000
-	-	-	25	22	0,6	16 600	25 000	1 100	0,004	9 000
-	-	-	25	24	0,6	16 600	25 000	1 100	0,004	9 000
35	4	15	25	24	0,6	16 600	25 000	1 100	0,004	9 000
-	-	-	25	22	0,3	11 400	19 600	870	0,002	11 000
-	-	-	28	24	0,6	17 300	27 500	1 210	0,004	8 500
-	-	-	28	26	0,6	17 300	27 500	1 210	0,004	8 500
38	4	15	28	26	0,6	17 300	27 500	1 210	0,004	8 500
-	-	-	29	26	0,3	15 000	26 500	1 180	0,004	9 500
-	-	-	32	28	0,6	22 400	37 500	1 660	0,01	7 500
-	-	-	32	30	0,6	22 400	37 500	1 660	0,01	7 500
42	5	17	32	30	0,6	22 400	37 500	1 660	0,01	7 500
-	-	-	35	32	0,6	18 000	35 500	1 570	0,006	9 000
-	-	-	38	34	0,6	28 000	50 000	2 220	0,01	6 700
-	-	-	38	36	0,6	28 000	50 000	2 220	0,013	6 700
50	5,5	19	38	36	0,6	28 000	50 000	2 220	0,013	6 700
-	-	-	41	36	1	34 500	55 000	2 450	0,019	5 300
-	-	-	41	38	1	34 500	55 000	2 450	0,019	5 300
55	6	22	41	38	1	34 500	55 000	2 450	0,019	5 300
-	-	-	46	39	1	45 500	67 000	2 950	0,032	4 500

Axial deep groove ball bearings

Single direction

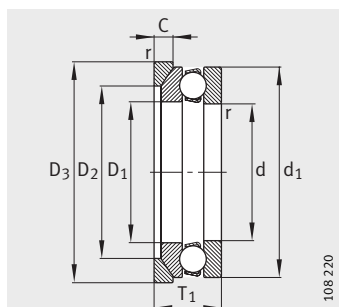


511, 512, 513, 514

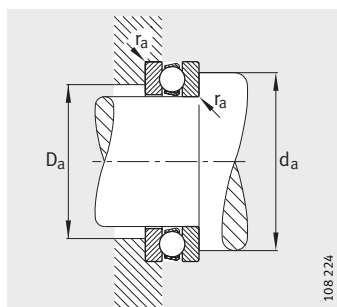


532, 533
Spherical housing locating washer

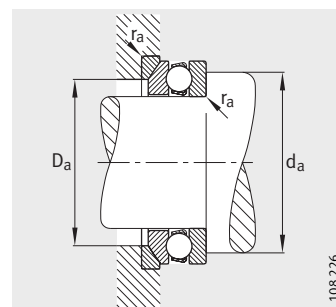
Dimension table (continued) · Dimensions in mm												
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D ₁	d ₁	r	R	A	D ₂
									min.			
51106	–	0,063	–	30	47	11	32	47	0,6	–	–	–
51206	–	0,136	–	30	52	16	32	52	0,6	–	–	–
53206	–	0,147	–	30	52	17,8	32	52	0,6	45	22	–
53206	U206	0,147	0,038	30	52	17,8	32	52	0,6	45	22	42
51306	–	0,244	–	30	60	21	32	60	1	–	–	–
53306	–	0,303	–	30	60	22,6	32	60	1	50	22	–
53306	U306	0,303	0,056	30	60	22,6	32	60	1	50	22	45
51406	–	0,49	–	30	70	28	32	70	1	–	–	–
51107	–	0,08	–	35	52	12	37	52	0,6	–	–	–
51207	–	0,198	–	35	62	18	37	62	1	–	–	–
53207	–	0,265	–	35	62	19,9	37	62	1	50	24	–
53207	U207	0,265	0,057	35	62	19,9	37	62	1	50	24	48
51307	–	0,351	–	35	68	24	37	68	1	–	–	–
53307	–	0,437	–	35	68	25,6	37	68	1	56	24	–
53307	U307	0,437	0,083	35	68	25,6	37	68	1	56	24	52
51407	–	0,709	–	35	80	32	37	80	1,1	–	–	–
51108	–	0,114	–	40	60	13	42	60	0,6	–	–	–
51208	–	0,257	–	40	68	19	42	68	1	–	–	–
53208	–	0,259	–	40	68	20,3	42	68	1	56	28,5	–
53208	U208	0,259	0,071	40	68	20,3	42	68	1	56	28,5	55
51308	–	0,536	–	40	78	26	42	78	1	–	–	–
53308	–	0,561	–	40	78	28,5	42	78	1	64	28	–
53308	U308	0,561	0,12	40	78	28,5	42	78	1	64	28	60
51408	–	1,03	–	40	90	36	42	90	1,1	–	–	–
51109	–	0,087	–	45	65	14	47	65	0,6	–	–	–
51209	–	0,279	–	45	73	20	47	73	1	–	–	–
53209	–	0,278	–	45	73	21,3	47	73	1	56	26	–
53209	U209	0,278	0,088	45	73	21,3	47	73	1	56	26	60
51309	–	0,612	–	45	85	28	47	85	1	–	–	–
53309	–	0,783	–	45	85	30,1	47	85	1	64	25	–
53309	U309	0,783	0,173	45	85	30,1	47	85	1	64	25	65
51409	–	1,36	–	45	100	39	47	100	1,1	–	–	–



532, 533
Spherical housing locating
washer, seating washer U2, U3



Mounting dimensions

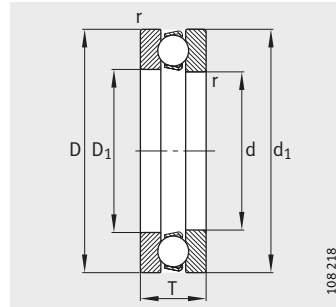


Mounting dimensions

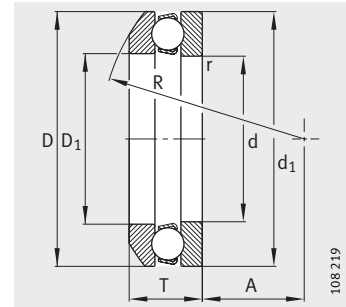
			Mounting dimensions			Basic load ratings		Fatigue limit load C_{ua} N	Minimum load factor A	Limiting speed n_G min^{-1}
D_3	C	T_1	d_a min.	D_a max.	r_a max.	dyn. C_a N	stat. C_{0a} N			
-	-	-	40	37	0,6	19 000	40 000	1 770	0,009	8 000
-	-	-	43	39	0,6	25 000	46 500	2 040	0,01	6 300
-	-	-	43	42	0,6	25 000	46 500	2 040	0,01	6 300
55	5,5	20	43	42	0,6	25 000	46 500	2 040	0,01	6 300
-	-	-	48	42	1	38 000	65 500	2 850	0,028	5 000
-	-	-	48	45	1	38 000	65 500	2 850	0,028	5 000
62	7	25	48	45	1	38 000	65 500	2 850	0,028	5 000
-	-	-	54	46	1	69 500	112 000	5 000	0,075	3 800
-	-	-	45	42	0,6	20 000	46 500	2 060	0,011	7 500
-	-	-	51	46	1	35 500	67 000	3 000	0,028	5 300
-	-	-	51	48	1	35 500	67 000	3 000	0,028	5 300
65	7	22	51	48	1	35 500	67 000	3 000	0,028	5 300
-	-	-	55	48	1	50 000	88 000	3 900	0,05	4 500
-	-	-	55	52	1	50 000	88 000	3 900	0,05	4 500
72	7,5	28	55	52	1	50 000	88 000	3 900	0,05	4 500
-	-	-	62	53	1	76 500	127 000	5 600	0,11	3 600
-	-	-	52	48	0,6	27 000	63 000	2 750	0,02	6 300
-	-	-	57	51	1	46 500	98 000	4 300	0,05	4 800
-	-	-	57	55	1	46 500	98 000	4 300	0,05	4 800
72	7	23	57	55	1	46 500	98 000	4 300	0,05	4 800
-	-	-	63	55	1	61 000	112 000	5 000	0,08	4 000
-	-	-	63	60	1	61 000	112 000	5 000	0,08	4 000
82	8,5	31	63	60	1	61 000	112 000	5 000	0,08	4 000
-	-	-	70	60	1	96 500	170 000	7 500	0,18	3 400
-	-	-	57	53	0,6	28 000	69 500	3 050	0,024	6 000
-	-	-	62	56	1	39 000	80 000	3 550	0,043	4 800
-	-	-	62	60	1	39 000	80 000	3 550	0,043	4 800
78	7,5	24	62	60	1	39 000	80 000	3 550	0,043	4 800
-	-	-	69	61	1	75 000	140 000	6 300	0,12	3 600
-	-	-	69	65	1	75 000	140 000	6 300	0,12	3 600
90	10	33	69	65	1	75 000	140 000	6 300	0,12	3 600
-	-	-	78	67	1	122 000	220 000	9 800	0,3	3 000

Axial deep groove ball bearings

Single direction

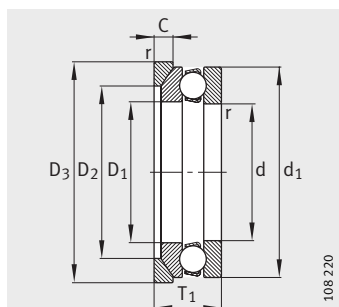


511, 512, 513, 514

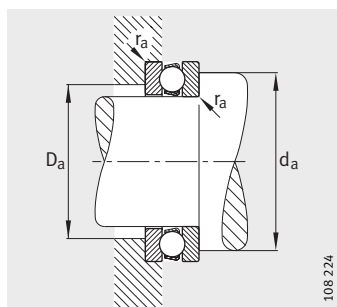


532, 533
Spherical housing locating washer

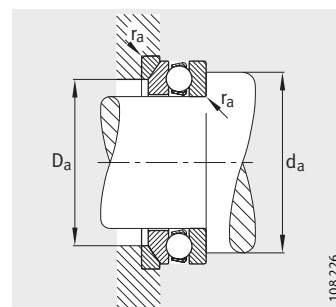
Dimension table (continued) · Dimensions in mm												
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D ₁	d ₁	r min.	R	A	D ₂
51110	–	0,151	–	50	70	14	52	70	0,6	–	–	–
51210	–	0,346	–	50	78	22	52	78	1	–	–	–
53210	–	0,341	–	50	78	23,5	52	78	1	64	32,5	–
53210	U210	0,341	0,098	50	78	23,5	52	78	1	64	32,5	62
51310	–	0,932	–	50	95	31	52	95	1,1	–	–	–
53310	–	0,97	–	50	95	34,3	52	95	1,1	72	28	–
53310	U310	0,97	0,225	50	95	34,3	52	95	1,1	72	28	72
51410	–	1,81	–	50	110	43	52	110	1,5	–	–	–
51111	–	0,208	–	55	78	16	57	78	0,6	–	–	–
51211	–	0,382	–	55	90	25	57	90	1	–	–	–
53211	–	0,609	–	55	90	27,3	57	90	1	72	35	–
53211	U211	0,609	0,152	55	90	27,3	57	90	1	72	35	72
51311	–	1,3	–	55	105	35	57	105	1,1	–	–	–
53311	–	1,38	–	55	105	39,3	57	105	1,1	80	30	–
53311	U311	1,38	0,277	55	105	39,3	57	105	1,1	80	30	80
51411	–	2,83	–	55	120	48	57	120	1,5	–	–	–
51112	–	0,278	–	60	85	17	62	85	1	–	–	–
51212	–	0,649	–	60	95	26	62	95	1	–	–	–
53212	–	0,655	–	60	95	28	62	95	1	72	32,5	–
53212	U212	0,655	0,165	60	95	28	62	95	1	72	32,5	78
51312	–	1,36	–	60	110	35	62	110	1,1	–	–	–
53312	–	1,41	–	60	110	38,3	62	110	1,1	90	41	–
53312	U312	1,41	0,31	60	110	38,3	62	110	1,1	90	41	85
51412-MP	–	3,51	–	60	130	51	62	130	1,5	–	–	–
51113	–	0,3	–	65	90	18	67	90	1	–	–	–
51213	–	0,684	–	65	100	27	67	100	1	–	–	–
53213	–	0,855	–	65	100	28,7	67	100	1	80	40	–
53213	U213	0,855	0,184	65	100	28,7	67	100	1	80	40	82
51313	–	1,39	–	65	115	36	67	115	1,1	–	–	–
53313	–	1,78	–	65	115	39,4	67	115	1,1	90	38,5	–
53313	U313	1,78	0,338	65	115	39,4	67	115	1,1	90	38,5	90
51413-MP	–	4,47	–	65	140	56	68	140	2	–	–	–



532, 533
Spherical housing locating
washer, seating washer U2, U3



Mounting dimensions

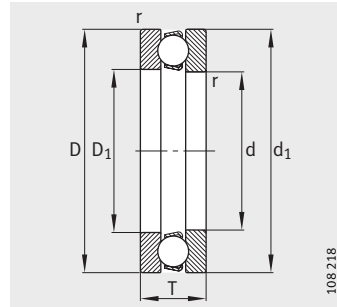


Mounting dimensions

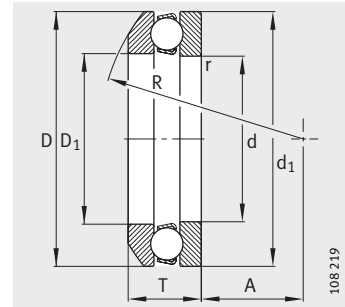
			Mounting dimensions			Basic load ratings		Fatigue limit load C_{ua} N	Minimum load factor A	Limiting speed n_G min^{-1}
D_3	C	T_1	d_a min.	D_a max.	r_a max.	dyn. C_a N	stat. C_{0a} N			
-	-	-	62	58	0,6	29 000	75 000	3 300	0,03	5 600
-	-	-	67	61	1	50 000	106 000	4 700	0,07	4 300
-	-	-	67	62	1	50 000	106 000	4 700	0,07	4 300
82	7,5	26	67	62	1	50 000	106 000	4 700	0,07	4 300
-	-	-	77	68	1	86 500	170 000	7 500	0,18	3 400
-	-	-	77	72	1	86 500	170 000	7 500	0,18	3 400
100	11	37	77	72	1	86 500	170 000	7 500	0,18	3 400
-	-	-	86	74	1,5	137 000	255 000	11 400	0,4	2 800
-	-	-	69	64	0,6	30 500	75 000	3 300	0,036	5 300
-	-	-	76	69	1	61 000	134 000	6 100	0,11	3 800
-	-	-	76	72	1	61 000	134 000	6 100	0,11	3 800
95	9	30	76	72	1	61 000	134 000	6 100	0,11	3 800
-	-	-	85	75	1	102 000	208 000	9 000	0,26	3 200
-	-	-	85	80	1	102 000	208 000	9 000	0,26	3 200
110	11,5	42	85	80	1	102 000	208 000	9 000	0,26	3 200
-	-	-	94	81	1,5	180 000	360 000	19 000	0,67	2 600
-	-	-	75	70	1	41 500	112 000	5 000	0,063	4 800
-	-	-	81	74	1	62 000	140 000	6 200	0,12	3 800
-	-	-	81	78	1	62 000	140 000	6 200	0,12	3 800
100	9	31	81	78	1	62 000	140 000	6 200	0,12	3 800
-	-	-	90	80	1	100 000	208 000	9 000	0,28	3 200
-	-	-	90	85	1	100 000	208 000	9 000	0,28	3 200
115	11,5	42	90	85	1	100 000	208 000	9 000	0,28	3 200
-	-	-	102	88	1,5	200 000	400 000	21 300	1	2 200
-	-	-	80	75	1	38 000	100 000	4 400	0,063	4 500
-	-	-	86	79	1	64 000	150 000	6 600	0,14	3 600
-	-	-	86	82	1	64 000	150 000	6 600	0,14	3 600
105	9	32	86	82	1	64 000	150 000	6 600	0,14	3 600
-	-	-	95	85	1	106 000	220 000	9 700	0,32	3 000
-	-	-	95	90	1	106 000	220 000	9 700	0,32	3 000
120	12,5	43	95	90	1	106 000	220 000	9 700	0,32	3 000
-	-	-	110	95	2	216 000	450 000	23 500	1,1	2 000

Axial deep groove ball bearings

Single direction

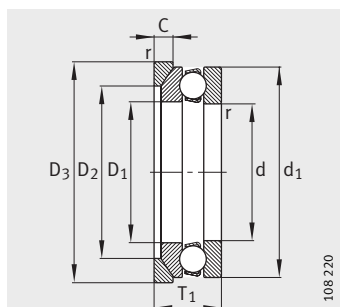


511, 512, 513, 514

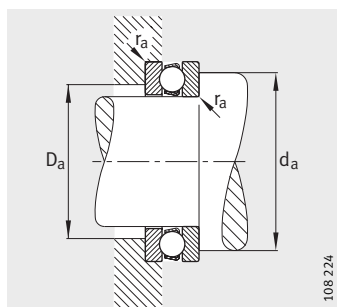


532, 533
Spherical housing locating washer

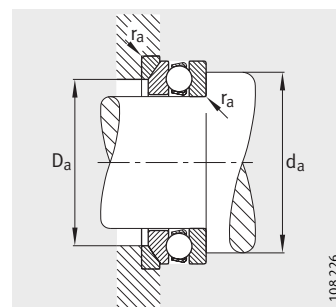
Dimension table (continued) · Dimensions in mm												
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D ₁	d ₁	r min.	R	A	D ₂
51114	–	0,352	–	70	95	18	72	95	1	–	–	–
51214	–	0,727	–	70	105	27	72	105	1	–	–	–
53214	–	0,903	–	70	105	28,8	72	105	1	80	38	–
53214	U214	0,903	0,187	70	105	28,8	72	105	1	80	38	88
51314	–	1,9	–	70	125	40	72	125	1,1	–	–	–
53314	–	2,09	–	70	125	44,2	72	125	1,1	100	43	–
53314	U314	2,09	0,408	70	125	44,2	72	125	1,1	100	43	98
51414-MP	–	5,49	–	70	150	60	73	150	2	–	–	–
51115	–	0,365	–	75	100	19	77	100	1	–	–	–
51215	–	0,819	–	75	110	27	77	110	1	–	–	–
53215	–	1,01	–	75	110	28,3	77	110	1	90	49	–
53215	U215	1,01	0,21	75	110	28,3	77	110	1	90	49	92
51315	–	2,59	–	75	135	44	77	135	1,5	–	–	–
53315	–	3,19	–	75	135	48,1	77	135	1,5	100	37	–
53315	U315	3,19	0,544	75	135	48,1	77	135	1,5	100	37	105
51415-MP	–	6,82	–	75	160	65	78	160	2	–	–	–
51116	–	0,384	–	80	105	19	82	105	1	–	–	–
51216	–	0,908	–	80	115	28	82	115	1	–	–	–
53216	–	0,903	–	80	115	29,5	82	115	1	90	46	–
53216	U216	0,903	0,218	80	115	29,5	82	115	1	90	46	98
51316	–	2,69	–	80	140	44	82	140	1,5	–	–	–
53316	–	2,75	–	80	140	47,6	82	140	1,5	112	50	–
53316	U316	2,75	0,57	80	140	47,6	82	140	1,5	112	50	110
51416-MP	–	7,95	–	80	170	68	83	170	2,1	–	–	–
51117	–	0,404	–	85	110	19	87	110	1	–	–	–
51217	–	1,21	–	85	125	31	88	125	1	–	–	–
53217	–	1,22	–	85	125	33,1	88	125	1	100	52	–
53217	U217	1,22	0,29	85	125	33,1	88	125	1	100	52	105
51317	–	3,48	–	85	150	49	88	150	1,5	–	–	–
53317	–	3,51	–	85	150	53,1	88	150	1,5	112	43	–
53317	U317	3,51	0,803	85	150	53,1	88	150	1,5	112	43	115
51417-MP	–	9,3	–	85	180	72	88	177	2,1	–	–	–



532, 533
Spherical housing locating
washer, seating washer U2, U3



Mounting dimensions

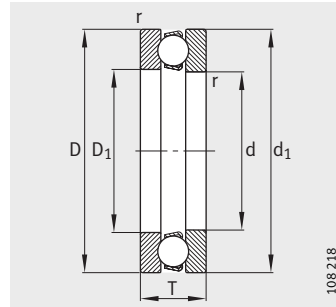


Mounting dimensions

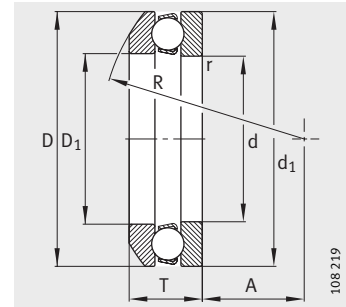
			Mounting dimensions			Basic load ratings		Fatigue limit load C_{ua} N	Minimum load factor A	Limiting speed n_G min^{-1}
D_3	C	T_1	d_a min.	D_a max.	r_a max.	dyn. C_a N	stat. C_{0a} N			
-	-	-	85	80	1	40 000	110 000	4 850	0,075	4 300
-	-	-	91	84	1	65 500	160 000	7 000	0,16	3 600
-	-	-	91	88	1	65 500	160 000	7 000	0,16	3 600
110	9	32	91	88	1	65 500	160 000	7 000	0,16	3 600
-	-	-	103	92	1	134 000	290 000	12 900	0,5	2 800
-	-	-	103	98	1	134 000	290 000	12 900	0,5	2 800
130	13	48	103	98	1	134 000	290 000	12 900	0,5	2 800
-	-	-	118	102	2	236 000	500 000	25 500	1,4	1 900
-	-	-	90	85	1	44 000	122 000	5 500	0,095	4 000
-	-	-	96	89	1	67 000	170 000	7 500	0,18	3 400
-	-	-	96	92	1	67 000	170 000	7 500	0,18	3 400
115	9,5	32	96	92	1	67 000	170 000	7 500	0,18	3 400
-	-	-	111	99	1,5	163 000	360 000	15 400	0,75	2 400
-	-	-	111	105	1,5	163 000	360 000	15 400	0,75	2 400
140	15	52	111	105	1,5	163 000	360 000	15 400	0,75	2 400
-	-	-	126	109	2	250 000	560 000	27 000	1,8	1 800
-	-	-	95	90	1	45 000	129 000	5 700	0,1	4 000
-	-	-	101	94	1	75 000	190 000	8 500	0,22	3 400
-	-	-	101	98	1	75 000	190 000	8 500	0,22	3 400
120	10	33	101	98	1	75 000	190 000	8 500	0,22	3 400
-	-	-	116	104	1,5	160 000	360 000	15 100	0,8	2 400
-	-	-	116	110	1,5	160 000	360 000	15 100	0,8	2 400
145	15	52	116	110	1,5	160 000	360 000	15 100	0,8	2 400
-	-	-	134	116	2,1	270 000	620 000	29 000	2,2	1 700
-	-	-	100	95	1	45 500	134 000	6 000	0,11	3 800
-	-	-	109	101	1	98 000	250 000	10 900	0,38	3 000
-	-	-	109	105	1	98 000	250 000	10 900	0,38	3 000
130	11	37	109	105	1	98 000	250 000	10 900	0,38	3 000
-	-	-	124	111	1,5	186 000	415 000	16 700	1,1	2 200
-	-	-	124	115	1,5	186 000	415 000	16 700	1,1	2 200
155	17,5	58	124	115	1,5	186 000	415 000	16 700	1,1	2 200
-	-	-	142	123	2,1	290 000	680 000	32 000	2,8	1 700

Axial deep groove ball bearings

Single direction

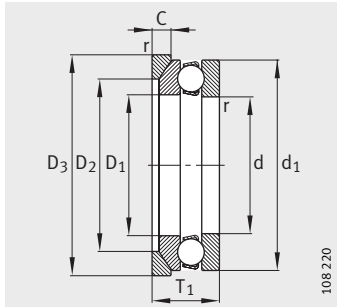


511, 512, 513, 514

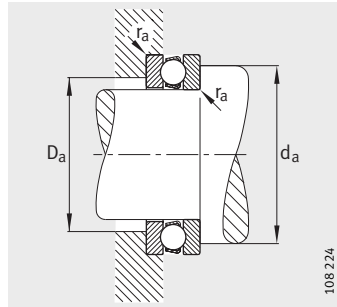


532, 533
Spherical housing locating washer

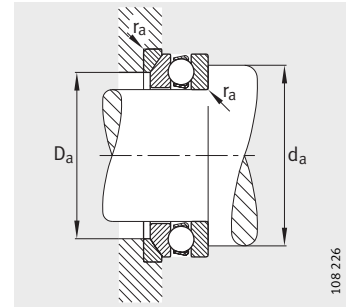
Dimension table (continued) · Dimensions in mm												
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D ₁	d ₁	r min.	R	A	D ₂
51118	–	0,617	–	90	120	22	92	120	1	–	–	–
51218	–	1,66	–	90	135	35	93	135	1,1	–	–	–
53218	–	1,7	–	90	135	38,5	93	135	1,1	100	45	–
53218	U218	1,7	0,425	90	135	38,5	93	135	1,1	100	45	110
51318	–	3,75	–	90	155	50	93	155	1,5	–	–	–
53318	–	3,81	–	90	155	54,6	93	155	1,5	112	40	–
53318	U318	3,81	0,83	90	155	54,6	93	155	1,5	112	40	120
51418-MP	–	11,1	–	90	190	77	93	187	2,1	–	–	–
51120	–	1,26	–	100	135	25	102	135	1	–	–	–
51220	–	2,21	–	100	150	38	103	150	1,1	–	–	–
53220	–	2,23	–	100	150	40,9	103	150	1,1	112	52	–
53220	U220	2,23	0,507	100	150	40,9	103	150	1,1	112	52	125
51320	–	4,94	–	100	170	55	103	170	1,5	–	–	–
53320	–	4,99	–	100	170	59,2	103	170	1,5	125	46	–
53320	U320	4,99	0,95	100	170	59,2	103	170	1,5	125	46	135
51420-MP	–	14,8	–	100	210	85	103	205	3	–	–	–
51122	–	1,45	–	110	145	25	112	145	1	–	–	–
51222	–	2,28	–	110	160	38	113	160	1,1	–	–	–
53222	–	2,24	–	110	160	40,2	113	160	1,1	125	65	–
53222	U222	2,24	0,56	110	160	40,2	113	160	1,1	125	65	135
51322-MP	–	7,85	–	110	190	63	113	187	2	–	–	–
53322-MP	–	7,85	–	110	190	67,2	113	187	2	140	51	–
53322-MP	U322	7,85	1,28	110	190	67,2	113	187	2	140	51	150
51422-MP	–	19,9	–	110	230	95	113	225	3	–	–	–
51124	–	1,54	–	120	155	25	122	155	1	–	–	–
51224	–	2,66	–	120	170	39	123	170	1,1	–	–	–
53224	–	2,58	–	120	170	40,8	123	170	1,1	125	61	–
53224	U224	2,58	0,65	120	170	40,8	123	170	1,1	125	61	145
51324-MP	–	9,3	–	120	210	70	123	205	2,1	–	–	–
53324-MP	–	9,18	–	120	210	74,1	123	205	2,1	160	63	–
53324-MP	U324	9,18	2,02	120	210	74,1	123	205	2,1	160	63	165
51424-MP	–	25,1	–	120	250	102	123	245	4	–	–	–



532, 533
Spherical housing locating
washer, seating washer U2, U3



Mounting dimensions

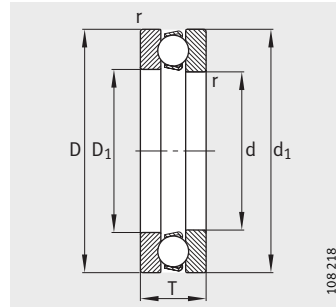


Mounting dimensions

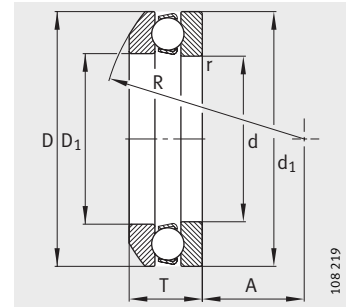
			Mounting dimensions			Basic load ratings		Fatigue limit load C_{ua} N	Minimum load factor A	Limiting speed n_G min^{-1}
D_3	C	T_1	d_a min.	D_a max.	r_a max.	dyn. C_a N	stat. C_{0a} N			
-	-	-	108	102	1	45 500	140 000	6 100	0,13	3 800
-	-	-	117	108	1	118 000	300 000	12 300	0,53	2 800
-	-	-	117	110	1	118 000	300 000	12 300	0,53	2 800
140	13,5	42	117	110	1	118 000	300 000	12 300	0,53	2 800
-	-	-	129	116	1,5	193 000	455 000	17 700	1,2	2 000
-	-	-	129	120	1,5	193 000	455 000	17 700	1,2	2 000
160	18	59	129	120	1,5	193 000	455 000	17 700	1,2	2 000
-	-	-	150	130	2,1	305 000	750 000	34 000	3,4	1 600
-	-	-	121	114	1	85 000	270 000	13 000	0,36	3 200
-	-	-	130	120	1	122 000	320 000	14 400	0,67	2 600
-	-	-	130	125	1	122 000	320 000	14 400	0,67	2 600
155	14	45	130	125	1	122 000	320 000	14 400	0,67	2 600
-	-	-	142	128	1,5	240 000	585 000	21 900	1,9	1 900
-	-	-	142	135	1,5	240 000	585 000	21 900	1,9	1 900
175	18	64	142	135	1,5	240 000	585 000	21 900	1,9	1 900
-	-	-	166	144	2,5	365 000	965 000	41 000	5,3	1 500
-	-	-	131	124	1	86 500	290 000	13 400	0,43	3 200
-	-	-	140	130	1	134 000	365 000	16 000	0,85	2 400
-	-	-	140	135	1	134 000	365 000	16 000	0,85	2 400
165	14	45	140	135	1	134 000	365 000	16 000	0,85	2 400
-	-	-	158	142	2	280 000	750 000	27 000	3	1 700
-	-	-	158	150	2	280 000	750 000	27 000	3	1 700
195	20,5	72	158	150	2	280 000	750 000	27 000	3	1 700
-	-	-	182	158	2,5	415 000	1 140 000	46 500	7,5	1 300
-	-	-	141	134	1	90 000	310 000	13 900	0,48	3 000
-	-	-	150	140	1	134 000	390 000	14 200	0,95	2 200
-	-	-	150	145	1	134 000	390 000	14 200	0,95	2 200
175	15	46	150	145	1	134 000	390 000	14 200	0,95	2 200
-	-	-	174	156	2,1	325 000	915 000	31 500	4,5	1 600
-	-	-	174	165	2,1	325 000	915 000	31 500	4,5	1 600
220	22	80	174	165	2,1	325 000	915 000	31 500	4,5	1 600
-	-	-	198	172	3	425 000	1 220 000	47 500	9	1 200

Axial deep groove ball bearings

Single direction

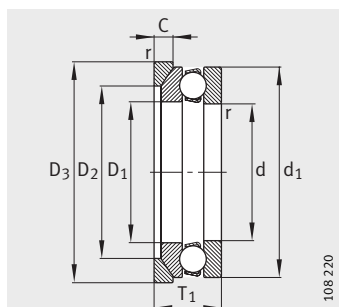


511, 512, 513

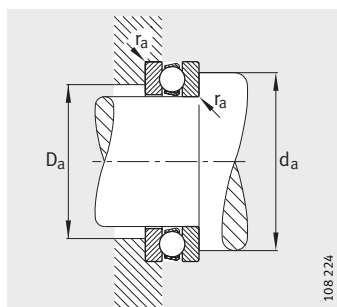


532, 533
Spherical housing locating washer

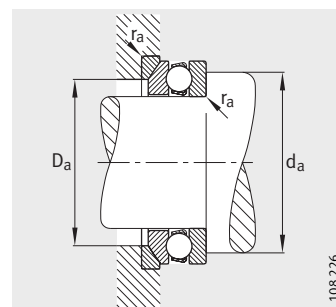
Dimension table (continued) · Dimensions in mm												
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D ₁	d ₁	r min.	R	A	D ₂
51126	–	2,28	–	130	170	30	132	170	1	–	–	–
51226	–	3,96	–	130	190	45	133	187	1,5	–	–	–
53226	–	3,9	–	130	190	47,9	133	187	1,5	140	67	–
53226	U226	3,9	0,9	130	190	47,9	133	187	1,5	140	67	160
51326-MP	–	13	–	130	225	75	134	220	2,1	–	–	–
51128	–	2,51	–	140	180	31	142	178	1	–	–	–
51228	–	4,3	–	140	200	46	143	197	1,5	–	–	–
53228	–	4,25	–	140	200	48,6	143	197	1,5	160	87	–
53228	U228	4,25	1,22	140	200	48,6	143	197	1,5	160	87	170
51328-MP	–	15,6	–	140	240	80	144	235	2,1	–	–	–
51130-MP	–	2,17	–	150	190	31	152	188	1	–	–	–
51230-MP	–	6,08	–	150	215	50	153	212	1,5	–	–	–
53230-MP	–	5,95	–	150	215	53,3	153	212	1,5	160	79	–
53230-MP	U230	5,95	1,69	150	215	53,3	153	212	1,5	160	79	180
51330-MP	–	16,2	–	150	250	80	154	245	2,1	–	–	–
53330-MP	–	12,8	–	150	250	83,7	154	245	2,1	200	89,5	–
53330-MP	U330	12,8	3,1	150	250	83,7	154	245	2,1	200	89,5	200
51132-MP	–	2,29	–	160	200	31	162	198	1	–	–	–
51232-MP	–	6,53	–	160	225	51	163	222	1,5	–	–	–
53232-MP	–	6,45	–	160	225	54,7	163	222	1,5	160	74	–
53232-MP	U232	6,45	1,81	160	225	54,7	163	222	1,5	160	74	190
51332-MP	–	21,2	–	160	270	87	164	265	3	–	–	–
51134-MP	–	3,08	–	170	215	34	172	213	1,1	–	–	–
51234-MP	–	8,12	–	170	240	55	173	237	1,5	–	–	–
53234-MP	–	7,91	–	170	240	58,7	173	237	1,5	180	91	–
53234-MP	U234	7,91	2,14	170	240	58,7	173	237	1,5	180	91	200
51334-MP	–	22,2	–	170	280	87	174	275	3	–	–	–



532, 533
Spherical housing locating
washer, seating washer U2, U3



Mounting dimensions

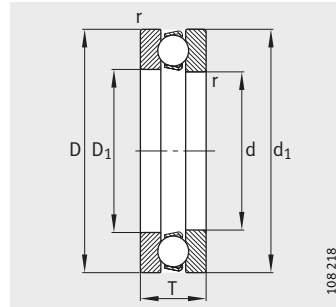


Mounting dimensions

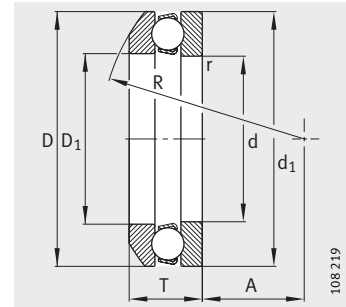
			Mounting dimensions			Basic load ratings		Fatigue limit load C_{ua} N	Minimum load factor A	Limiting speed n_G min^{-1}
D_3	C	T_1	d_a min.	D_a max.	r_a max.	dyn. C_a N	stat. C_{0a} N			
-	-	-	154	146	1	112 000	390 000	17 200	0,75	2 800
-	-	-	166	154	1,5	183 000	540 000	18 900	1,7	1 900
-	-	-	166	160	1,5	183 000	540 000	18 900	1,7	1 900
195	17	53	166	160	1,5	183 000	540 000	18 900	1,7	1 900
-	-	-	187	168	2,1	360 000	1 060 000	35 000	6	1 500
-	-	-	164	156	1	112 000	400 000	16 900	0,85	2 600
-	-	-	176	164	1,5	190 000	570 000	19 200	1,9	1 900
-	-	-	176	170	1,5	190 000	570 000	19 200	1,9	1 900
210	17	55	176	170	1,5	190 000	570 000	19 200	1,9	1 900
-	-	-	200	180	2,1	405 000	1 250 000	40 000	8	1 400
-	-	-	174	166	1	110 000	400 000	16 700	0,9	2 400
-	-	-	189	176	1,5	236 000	735 000	24 200	2,8	1 800
-	-	-	189	180	1,5	236 000	735 000	24 200	2,8	1 800
225	20,5	60	189	180	1,5	236 000	735 000	24 200	2,8	1 800
-	-	-	210	190	2,1	415 000	1 340 000	41 500	9,5	1 400
-	-	-	210	200	2,1	415 000	1 340 000	41 500	9,5	1 400
260	26	92	210	200	2,1	415 000	1 340 000	41 500	9,5	1 400
-	-	-	184	176	1	112 000	430 000	17 200	1	2 200
-	-	-	199	186	1,5	240 000	765 000	24 700	3,2	1 700
-	-	-	199	190	1,5	240 000	765 000	24 700	3,2	1 700
235	21	61	199	190	1,5	240 000	765 000	24 700	3,2	1 700
-	-	-	226	204	2,5	465 000	1 560 000	47 000	13	1 200
-	-	-	197	188	1	132 000	500 000	19 400	1,4	2 000
-	-	-	212	198	1,5	285 000	930 000	28 500	4,5	1 600
-	-	-	212	200	1,5	285 000	930 000	28 500	4,5	1 600
250	21,5	65	212	200	1,5	285 000	930 000	28 500	4,5	1 600
-	-	-	236	214	2,5	465 000	1 560 000	46 000	13	1 200

Axial deep groove ball bearings

Single direction

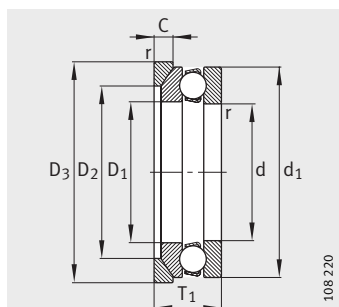


511, 512, 513

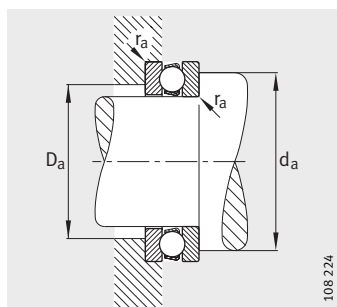


532
Spherical housing locating washer

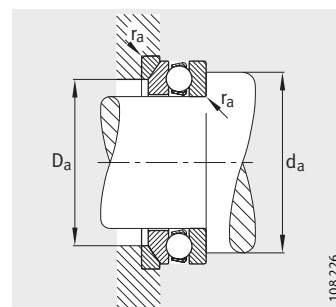
Dimension table (continued) · Dimensions in mm												
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D ₁	d ₁	r min.	R	A	D ₂
51136-MP	–	3,06	–	180	225	34	183	222	1,1	–	–	–
51236-MP	–	8,56	–	180	250	56	183	245	1,5	–	–	–
53236-MP	–	8,19	–	180	250	58,2	183	245	1,5	200	112	–
53236-MP	U236	8,19	1,25	180	250	58,2	183	245	1,5	200	112	210
51336-MP	–	24,8	–	180	300	95	184	295	3	–	–	–
51138-MP	–	3,94	–	190	240	37	193	237	1,1	–	–	–
51238-MP	–	11,6	–	190	270	62	194	265	2	–	–	–
53238-MP	–	11,5	–	190	270	65,7	195	265	2	200	98	–
53238-MP	U238	11,5	2,65	190	270	65,7	195	265	2	200	98	230
51338-MP	–	31,9	–	190	320	105	195	315	4	–	–	–
51140-MP	–	4,12	–	200	250	37	203	247	1,1	–	–	–
51240-MP	–	12	–	200	280	62	204	275	2	–	–	–
51340-MP	–	40,9	–	200	340	110	205	335	4	–	–	–
51144-MP	–	4,54	–	220	270	37	223	267	1,1	–	–	–
51244-MP	–	13,1	–	220	300	63	224	295	2	–	–	–
51148-MP	–	7,41	–	240	300	45	243	297	1,5	–	–	–
51248-MP	–	22,9	–	240	340	78	244	335	2,1	–	–	–
51152-MP	–	7,89	–	260	320	45	263	317	1,5	–	–	–
51252-MP	–	24,8	–	260	360	79	264	355	2,1	–	–	–
51156-MP	–	12	–	280	350	53	283	347	1,5	–	–	–
51256-MP	–	23,7	–	280	380	80	284	375	2,1	–	–	–
51160-MP	–	17,1	–	300	380	62	304	376	2	–	–	–
51260-MP	–	41,8	–	300	420	95	304	415	3	–	–	–
51164-MP	–	18,5	–	320	400	63	324	396	2	–	–	–
51264-MP	–	44,6	–	320	440	95	325	435	3	–	–	–



532
Spherical housing locating
washer, seating washer U2



Mounting dimensions

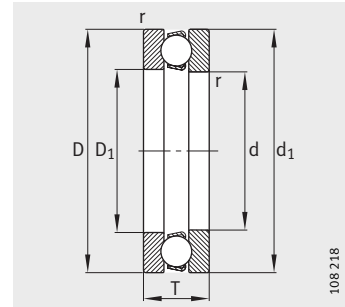


Mounting dimensions

			Mounting dimensions			Basic load ratings		Fatigue limit load C_{ua} N	Minimum load factor A	Limiting speed n_G min^{-1}
D_3	C	T_1	d_a min.	D_a max.	r_a max.	dyn. C_a N	stat. C_{0a} N			
-	-	-	207	198	1	134 000	530 000	20 100	1,5	2 000
-	-	-	222	208	1,5	305 000	1 040 000	31 500	5,3	1 600
-	-	-	222	210	1,5	305 000	1 040 000	31 500	5,3	1 600
260	21,5	66	222	210	1,5	305 000	1 040 000	31 500	5,3	1 600
-	-	-	252	228	2,5	520 000	1 830 000	52 000	18	1 100
-	-	-	220	210	1	170 000	655 000	23 200	2,4	1 800
-	-	-	238	222	2	335 000	1 160 000	34 500	7	1 500
-	-	-	238	230	2	335 000	1 160 000	34 500	7	1 500
280	23	73	238	230	2	335 000	1 160 000	34 500	7	1 500
-	-	-	268	242	3	600 000	2 200 000	61 000	26	1 000
-	-	-	230	220	1	170 000	655 000	22 700	2,4	1 800
-	-	-	248	232	2	340 000	1 220 000	35 000	8	1 400
-	-	-	284	256	3	620 000	2 400 000	65 000	30	950
-	-	-	250	240	1	176 000	735 000	24 500	3	1 700
-	-	-	268	252	2	355 000	1 340 000	36 500	9,5	1 300
-	-	-	276	264	1,5	232 000	965 000	31 000	5	1 600
-	-	-	300	280	2,1	465 000	1 860 000	48 000	18	1 100
-	-	-	296	284	1,5	236 000	1 020 000	31 500	5,6	1 500
-	-	-	320	300	2,1	490 000	2 040 000	52 000	22	1 000
-	-	-	322	308	1,5	315 000	1 340 000	40 500	10	1 300
-	-	-	340	320	2,1	490 000	2 160 000	53 000	24	950
-	-	-	348	332	2	365 000	1 600 000	46 000	14	1 200
-	-	-	372	348	2,5	585 000	2 700 000	63 000	38	850
-	-	-	368	352	2	375 000	1 700 000	47 500	16	1 100
-	-	-	392	368	2,5	600 000	2 800 000	64 000	43	850

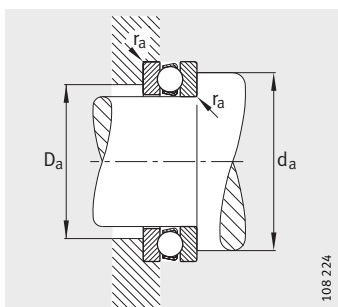
Axial deep groove ball bearings

Single direction



511, 512

Dimension table (continued) · Dimensions in mm							
Designation	Mass m ≈kg	Dimensions					
		d	D	T	D ₁	d ₁	r min.
51168-MP	19,9	340	420	64	344	416	2
51268-MP	47,6	340	460	96	345	455	3
51172-MP	21,5	360	440	65	364	436	2
51272-MP	70,4	360	500	110	365	495	4
51176-MP	22,4	380	460	65	384	456	2
51180-MP	23,5	400	480	65	404	476	2
51184-MP	24,4	420	500	65	424	495	2
51192-MP	37,2	460	560	80	464	555	2,1
511/500-MP	44,9	500	600	80	505	595	2,1
511/530-MP	55,9	530	640	85	535	635	3
511/560-MP	58,8	560	670	85	565	665	3

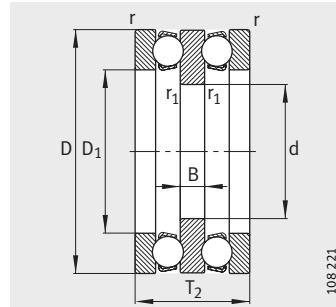


Mounting dimensions

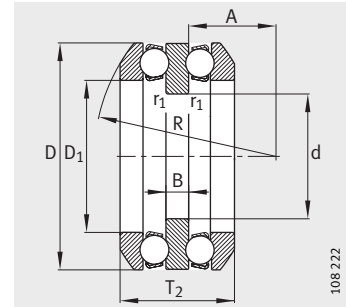
Mounting dimensions			Basic load ratings		Fatigue limit load C_{ua} N	Minimum load factor A	Limiting speed n_G min^{-1}
d_a min.	D_a max.	r_a max.	dyn. C_a N	stat. C_{0a} N			
388	372	2	380 000	1 800 000	49 000	18	1 000
412	388	2,5	620 000	3 050 000	67 000	50	800
408	392	2	405 000	2 000 000	45 000	22	1 000
444	416	3	720 000	3 650 000	79 000	70	700
428	412	2	430 000	2 240 000	48 500	24	950
448	432	2	440 000	2 320 000	49 500	28	900
468	452	2	440 000	2 450 000	51 000	30	900
520	500	2,1	530 000	3 100 000	61 000	50	800
560	540	2,1	550 000	3 350 000	63 000	56	750
596	574	2,5	620 000	3 900 000	73 000	80	670
626	604	2,5	630 000	4 150 000	74 000	85	670

Axial deep groove ball bearings

Double direction

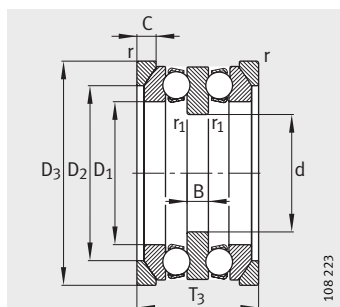


522, 523

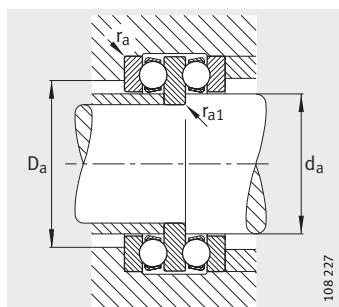


542, 543
Spherical housing locating washers

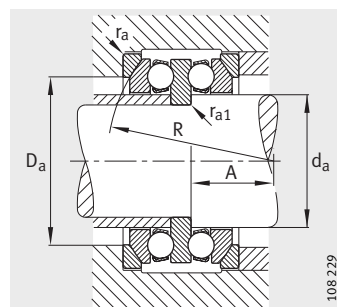
Dimension table · Dimensions in mm											
Designation		Mass m		Dimensions							
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T ₂	D ₁	B	r min.	r ₁ min.	R
52202	–	0,076	–	10	32	22	17	5	0,6	0,3	–
52204	–	0,145	–	15	40	26	22	6	0,6	0,3	–
52205	–	0,215	–	20	47	28	27	7	0,6	0,3	–
54205	–	0,221	–	20	47	31,4	27	7	0,6	0,3	40
54205	U205	0,221	0,032	20	47	31,4	27	7	0,6	0,3	40
52305	–	0,291	–	20	52	34	27	8	1	0,3	–
54305	–	0,303	–	20	52	37,6	27	8	1	0,3	45
54305	U305	0,303	0,044	20	52	37,6	27	8	1	0,3	45
52206	–	0,236	–	25	52	29	32	7	0,6	0,3	–
54206	–	0,269	–	25	52	32,6	32	7	0,6	0,3	45
54206	U206	0,269	0,038	25	52	32,6	32	7	0,6	0,3	45
52306	–	0,435	–	25	60	38	32	9	1	0,3	–
54306	–	0,553	–	25	60	41,2	32	9	1	0,3	50
54306	U306	0,553	0,056	25	60	41,2	32	9	1	0,3	50
52207	–	0,371	–	30	62	34	37	8	1	0,3	–
54207	–	0,749	–	30	62	37,8	37	8	1	0,3	50
54207	U207	0,749	0,057	30	62	37,8	37	8	1	0,3	50
52307	–	0,63	–	30	68	44	37	10	1	0,3	–
54307	–	0,802	–	30	68	47,2	37	10	1	0,3	56
54307	U307	0,802	0,083	30	68	47,2	37	10	1	0,3	56
52208	–	0,509	–	30	68	36	42	9	1	0,6	–
54208	–	0,513	–	30	68	38,6	42	9	1	0,6	56
54208	U208	0,513	0,071	30	68	38,6	42	9	1	0,6	56
52308	–	1,02	–	30	78	49	42	12	1	0,6	–
52209	–	0,539	–	35	73	37	47	9	1	0,6	–
54209	–	0,537	–	35	73	39,6	47	9	1	0,6	56
54209	U209	0,537	0,088	35	73	39,6	47	9	1	0,6	56
52309	–	1,15	–	35	85	52	47	12	1	0,6	–
54309	–	2,15	–	35	85	56,2	47	12	1	0,6	64
54309	U309	2,15	0,173	35	85	56,2	47	12	1	0,6	64



542, 543
Spherical housing locating
washers, seating washers U2, U3



Mounting dimensions

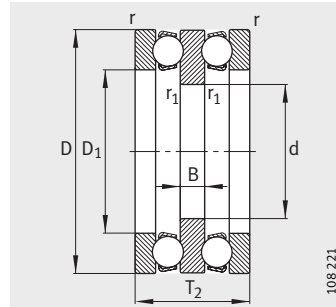


Mounting dimensions

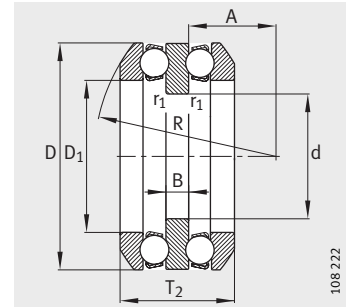
					Mounting dimensions				Basic load ratings		Fatigue limit load C_{ua} N	Minimum load factor A	Limiting speed min^{-1}
A	D_2	D_3	C	T_3	d_a	D_a max.	r_a max.	r_{a1} max.	dyn. C_a N	stat. C_{0a} N			
-	-	-	-	-	15	22	0,6	0,3	16 600	25 000	1 100	0,003	9 000
-	-	-	-	-	20	28	0,6	0,3	22 400	37 500	1 660	0,01	7 500
-	-	-	-	-	25	34	0,6	0,3	28 000	50 000	2 220	0,013	6 700
16,5	-	-	-	-	25	36	0,6	0,3	28 000	50 000	2 220	0,013	6 700
16,5	36	50	5,5	36	25	36	0,6	0,3	28 000	50 000	2 220	0,013	6 700
-	-	-	-	-	25	36	1	0,3	34 500	55 000	2 450	0,019	5 300
18	-	-	-	-	25	38	1	0,3	34 500	55 000	2 450	0,019	5 300
18	38	55	6	42	25	38	1	0,3	34 500	55 000	2 450	0,019	5 300
-	-	-	-	-	30	39	0,6	0,3	25 000	46 500	2 040	0,01	6 300
20	-	-	-	-	30	42	0,6	0,3	25 000	46 500	2 040	0,01	6 300
20	42	55	5,5	37	30	42	0,6	0,3	25 000	46 500	2 040	0,01	6 300
-	-	-	-	-	30	42	1	0,3	38 000	65 500	2 850	0,028	5 000
19,5	-	-	-	-	30	45	1	0,3	38 000	65 500	2 850	0,028	5 000
19,5	45	62	7	46	30	45	1	0,3	38 000	65 500	2 850	0,028	5 000
-	-	-	-	-	35	46	1	0,3	35 500	67 000	3 000	0,028	5 300
21	-	-	-	-	35	48	1	0,3	35 500	67 000	3 000	0,028	5 300
21	48	65	7	42	35	48	1	0,3	35 500	67 000	3 000	0,028	5 300
-	-	-	-	-	35	48	1	0,3	50 000	88 000	3 900	0,05	4 500
21	-	-	-	-	35	52	1	0,3	50 000	88 000	3 900	0,05	4 500
21	52	72	7,5	52	35	52	1	0,3	50 000	88 000	3 900	0,05	4 500
-	-	-	-	-	40	51	1	0,6	46 500	98 000	4 300	0,05	4 800
25	-	-	-	-	40	55	1	0,6	46 500	98 000	4 300	0,05	4 800
25	55	72	7	44	40	55	1	0,6	46 500	98 000	4 300	0,05	4 800
-	-	-	-	-	40	55	1	0,6	61 000	112 000	5 000	0,08	4 000
-	-	-	-	-	45	56	1	0,6	39 000	80 000	3 550	0,043	4 800
23	-	-	-	-	45	60	1	0,6	39 000	80 000	3 550	0,043	4 800
23	60	78	7,5	45	45	60	1	0,6	39 000	80 000	3 550	0,043	4 800
-	-	-	-	-	45	61	1	0,6	75 000	140 000	6 300	0,12	3 600
21	-	-	-	-	45	65	1	0,6	75 000	140 000	6 300	0,12	3 600
21	65	90	10	62	45	65	1	0,6	75 000	140 000	6 300	0,12	3 600

Axial deep groove ball bearings

Double direction

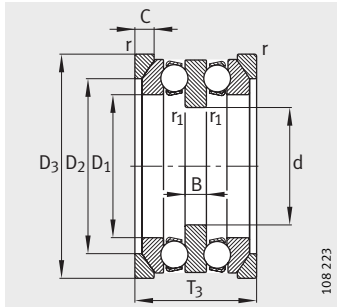


522, 523

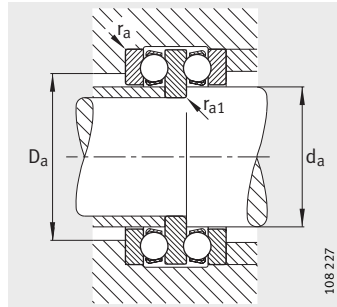


542, 543
Spherical housing locating washers

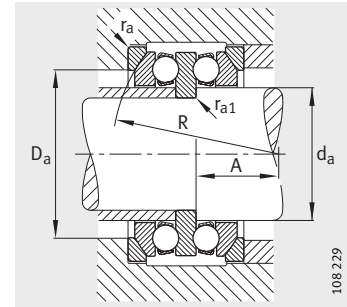
Dimension table (continued) · Dimensions in mm											
Designation		Mass m		Dimensions							
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T ₂	D ₁	B	r min.	r ₁ min.	R
52210	–	0,635	–	40	78	39	52	9	1	0,6	–
54210	–	0,625	–	40	78	42	52	9	1	0,6	64
54210	U210	0,625	0,098	40	78	42	52	9	1	0,6	64
52310	–	1,76	–	40	95	58	52	14	1,1	0,6	–
54310	–	1,84	–	40	95	64,6	52	14	1,1	0,6	72
54310	U310	1,84	0,225	40	95	64,6	52	14	1,1	0,6	72
52211	–	0,571	–	45	90	45	57	10	1	0,6	–
54211	–	1,02	–	45	90	49,6	57	10	1	0,6	72
54211	U211	1,02	0,152	45	90	49,6	57	10	1	0,6	72
52311	–	2,37	–	45	105	64	57	15	1,1	0,6	–
54311	–	2,53	–	45	105	72,6	57	15	1,1	0,6	80
54311	U311	2,53	0,277	45	105	72,6	57	15	1,1	0,6	80
52212	–	1,12	–	50	95	46	62	10	1	0,6	–
54212	–	1,17	–	50	95	50	62	10	1	0,6	72
54212	U212	1,17	0,165	50	95	50	62	10	1	0,6	72
52312	–	2,49	–	50	110	64	62	15	1,1	0,6	–
54312	–	2,59	–	50	110	70,6	62	15	1,1	0,6	90
54312	U312	2,59	0,31	50	110	70,6	62	15	1,1	0,6	90
52213	–	1,19	–	55	100	47	67	10	1	0,6	–
52313	–	2,5	–	55	115	65	67	15	1,1	0,6	–
52214	–	1,3	–	55	105	47	72	10	1	1	–
52314	–	3,55	–	55	125	72	72	16	1,1	1	–
54314	–	3,77	–	55	125	80,4	72	16	1,1	1	100
54314	U314	3,77	0,408	55	125	80,4	72	16	1,1	1	100
52215	–	1,48	–	60	110	47	77	10	1	1	–
54215	–	1,87	–	60	110	49,6	77	10	1	1	90
54215	U215	1,87	0,21	60	110	49,6	77	10	1	1	90
52315	–	4,72	–	60	135	79	77	18	1,5	1	–
54315	–	5,92	–	60	135	87,2	77	18	1,5	1	100
54315	U315	5,92	0,544	60	135	87,2	77	18	1,5	1	100
52216	–	1,55	–	65	115	48	82	10	1	1	–
54216	–	1,6	–	65	115	51	82	10	1	1	90
54216	U216	1,6	0,218	65	115	51	82	10	1	1	90
52316	–	4,82	–	65	140	79	82	18	1,5	1	–
54316	–	4,93	–	65	140	86,2	82	18	1,5	1	112
54316	U316	4,93	0,57	65	140	86,2	82	18	1,5	1	112



542, 543
Spherical housing locating
washers, seating washers U2, U3



Mounting dimensions

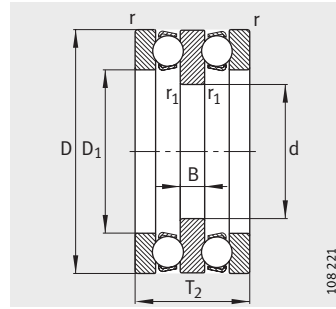


Mounting dimensions

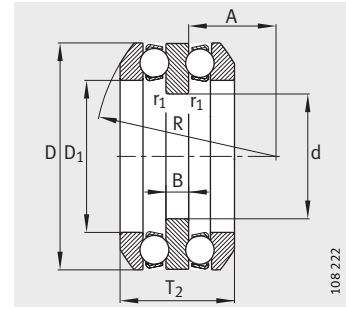
					Mounting dimensions				Basic load ratings		Fatigue limit load C_{ua} N	Minimum load factor A	Limiting speed min^{-1}
A	D_2	D_3	C	T_3	d_a	D_a max.	r_a max.	r_{a1} max.	dyn. C_a N	stat. C_{0a} N			
-	-	-	-	-	50	61	1	0,6	50 000	106 000	4 700	0,07	4 300
30,5	-	-	-	-	50	62	1	0,6	50 000	106 000	4 700	0,07	4 300
30,5	62	82	7,5	47	50	62	1	0,6	50 000	106 000	4 700	0,07	4 300
-	-	-	-	-	50	68	1	0,6	86 500	170 000	7 500	0,18	3 400
23	-	-	-	-	50	72	1	0,6	86 500	170 000	7 500	0,18	3 400
23	72	100	11	70	50	72	1	0,6	86 500	170 000	7 500	0,18	3 400
-	-	-	-	-	55	69	1	0,6	61 000	134 000	6 100	0,11	3 800
32,5	-	-	-	-	55	72	1	0,6	61 000	134 000	6 100	0,11	3 800
32,5	72	95	9	55	55	72	1	0,6	61 000	134 000	6 100	0,11	3 800
-	-	-	-	-	55	75	1	0,6	102 000	208 000	9 000	0,26	3 200
25,5	-	-	-	-	55	80	1	0,6	102 000	208 000	9 000	0,26	3 200
25,5	80	110	11,5	78	55	80	1	0,6	102 000	208 000	9 000	0,26	3 200
-	-	-	-	-	60	74	1	0,6	62 000	140 000	6 200	0,12	3 800
30,5	-	-	-	-	60	78	1	0,6	62 000	140 000	6 200	0,12	3 800
30,5	78	100	9	56	60	78	1	0,6	62 000	140 000	6 200	0,12	3 800
-	-	-	-	-	60	80	1	0,6	100 000	208 000	9 000	0,28	3 200
36,5	-	-	-	-	60	85	1	0,6	100 000	208 000	9 000	0,28	3 200
36,5	85	115	11,5	78	60	85	1	0,6	100 000	208 000	9 000	0,28	3 200
-	-	-	-	-	65	79	1	0,6	64 000	150 000	6 600	0,14	3 600
-	-	-	-	-	65	85	1	0,6	106 000	220 000	9 700	0,32	3 000
-	-	-	-	-	70	84	1	1	65 500	160 000	7 000	0,16	3 600
-	-	-	-	-	70	92	1	1	134 000	290 000	12 900	0,5	2 800
39	-	-	-	-	70	98	1	1	134 000	290 000	12 900	0,5	2 800
39	98	130	13	88	70	98	1	1	134 000	290 000	12 900	0,5	2 800
-	-	-	-	-	75	89	1	1	67 000	170 000	7 500	0,18	3 400
47,5	-	-	-	-	75	92	1	1	67 000	170 000	7 500	0,18	3 400
47,5	92	115	9,5	57	75	92	1	1	67 000	170 000	7 500	0,18	3 400
-	-	-	-	-	75	99	1,5	1	163 000	360 000	15 400	0,75	2 400
32,5	-	-	-	-	75	105	1,5	1	163 000	360 000	15 400	0,75	2 400
32,5	105	140	15	95	75	105	1,5	1	163 000	360 000	15 400	0,75	2 400
-	-	-	-	-	80	94	1	1	75 000	190 000	8 500	0,22	3 400
45	-	-	-	-	80	98	1	1	75 000	190 000	8 500	0,22	3 400
45	98	120	10	58	80	98	1	1	75 000	190 000	8 500	0,22	3 400
-	-	-	-	-	80	104	1,5	1	160 000	360 000	15 100	0,8	2 400
45,5	-	-	-	-	80	110	1,5	1	160 000	360 000	15 100	0,8	2 400
45,5	110	145	15	95	80	110	1,5	1	160 000	360 000	15 100	0,8	2 400

Axial deep groove ball bearings

Double direction

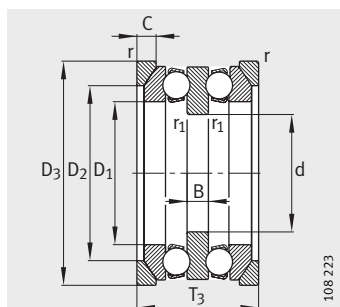


522, 523

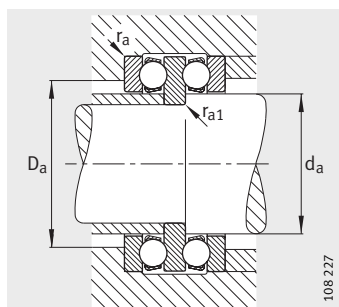


542, 543
Spherical housing locating washers

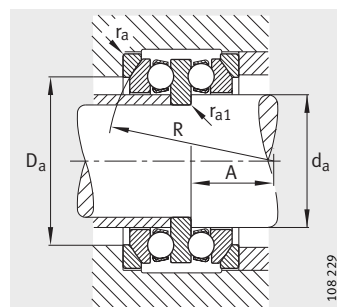
Dimension table (continued) · Dimensions in mm											
Designation		Mass m		Dimensions							
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T ₂	D ₁	B	r min.	r ₁ min.	R
52217	–	2,23	–	70	125	55	88	12	1	1	–
54217	–	2,25	–	70	125	59,2	88	12	1	1	100
54217	U217	2,25	0,29	70	125	59,2	88	12	1	1	100
52317	–	6,21	–	70	150	87	88	19	1,5	1	–
54317	–	6,27	–	70	150	95,2	88	19	1,5	1	112
54317	U317	6,27	0,803	70	150	95,2	88	19	1,5	1	112
52218	–	3,05	–	75	135	62	93	14	1,1	1	–
54218	–	3,11	–	75	135	69	93	14	1,1	1	100
54218	U218	3,11	0,425	75	135	69	93	14	1,1	1	100
52318	–	6,62	–	75	155	88	93	19	1,5	1	–
54318	–	6,74	–	75	155	97,2	93	19	1,5	1	112
54318	U318	6,74	0,83	75	155	97,2	93	19	1,5	1	112
52220	–	3,83	–	85	150	67	103	15	1,1	1	–
54220	–	3,87	–	85	150	72,8	103	15	1,1	1	112
54220	U220	3,87	0,507	85	150	72,8	103	15	1,1	1	112
52320	–	8,71	–	85	170	97	103	21	1,5	1	–
54320	–	8,81	–	85	170	105,4	103	21	1,5	1	125
54320	U320	8,81	0,95	85	170	105,4	103	21	1,5	1	125
52222	–	4,06	–	95	160	67	113	15	1,1	1	–
52322-MP	–	14	–	95	190	110	113	24	2	1	–
54322-MP	–	14	–	95	190	118,4	113	24	2	1	140
54322-MP	U322	14	1,28	95	190	118,4	113	24	2	1	140
52224	–	4,82	–	100	170	68	123	15	1,1	1,1	–
52324-MP	–	16,8	–	100	210	123	123	27	2,1	1,1	–
52226	–	7,26	–	110	190	80	133	18	1,5	1,1	–
52326-MP	–	22	–	110	225	130	134	30	2,1	1,1	–
52228	–	7,78	–	120	200	81	143	18	1,5	1,1	–
52328-MP	–	28,3	–	120	240	140	144	31	2,1	1,1	–
52230-MP	–	10,7	–	130	215	89	153	20	1,5	1,1	–
52330-MP	–	29,4	–	130	250	140	154	31	2,1	1,1	–
52232-MP	–	12,2	–	140	225	90	163	20	1,5	1,1	–
52234-MP	–	14	–	150	240	97	173	21	1,5	1,1	–



542, 543
Spherical housing locating
washers, seating washers U2, U3



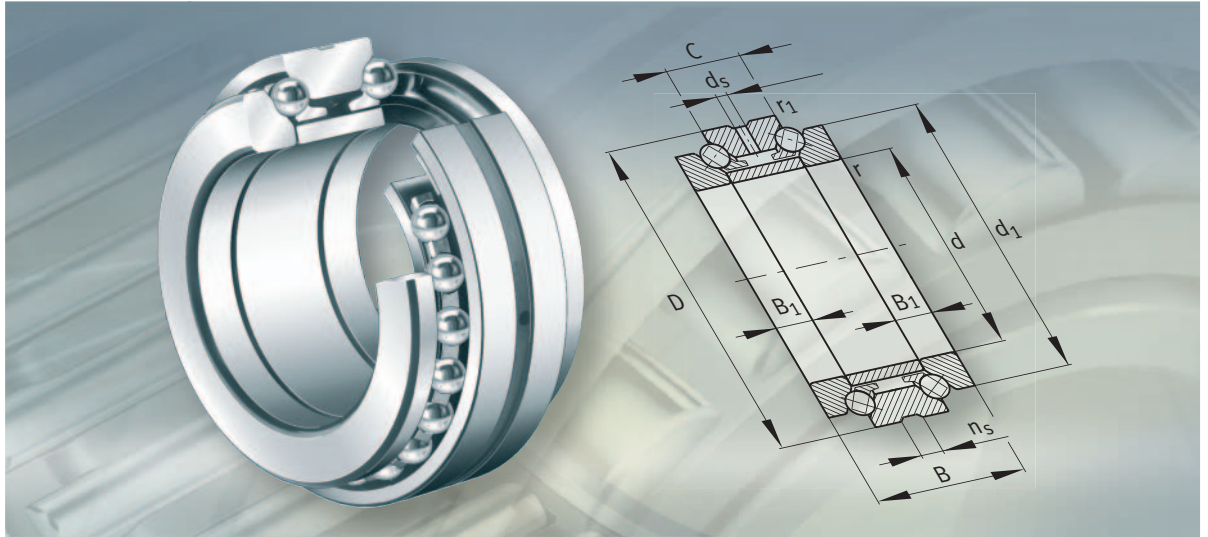
Mounting dimensions



Mounting dimensions

					Mounting dimensions				Basic load ratings		Fatigue limit load C_{ua} N	Minimum load factor A	Limiting speed min^{-1}
A	D_2	D_3	C	T_3	d_a	D_a max.	r_a max.	r_{a1} max.	dyn. C_a N	stat. C_{0a} N			
-	-	-	-	-	85	101	1	1	98 000	250 000	10 900	0,38	3 000
49,5	-	-	-	-	85	105	1	1	98 000	250 000	10 900	0,38	3 000
49,5	105	130	11	67	85	105	1	1	98 000	250 000	10 900	0,38	3 000
-	-	-	-	-	85	111	1,5	1	186 000	415 000	16 700	1,1	2 200
39	-	-	-	-	85	115	1,5	1	186 000	415 000	16 700	1,1	2 200
39	115	155	17,5	105	85	115	1,5	1	186 000	415 000	16 700	1,1	2 200
-	-	-	-	-	90	108	1	1	118 000	300 000	12 300	0,53	2 800
42	-	-	-	-	90	110	1	1	118 000	300 000	12 300	0,53	2 800
42	110	140	13,5	76	90	110	1	1	118 000	300 000	12 300	0,53	2 800
-	-	-	-	-	90	116	1,5	1	193 000	455 000	17 700	1,2	2 000
36,5	-	-	-	-	90	120	1,5	1	193 000	455 000	17 700	1,2	2 000
36,5	120	160	18	106	90	120	1,5	1	193 000	455 000	17 700	1,2	2 000
-	-	-	-	-	100	120	1	1	122 000	320 000	14 400	0,67	2 600
49	-	-	-	-	100	125	1	1	122 000	320 000	14 400	0,67	2 600
49	125	155	14	81	100	125	1	1	122 000	320 000	14 400	0,67	2 600
-	-	-	-	-	100	128	1,5	1	240 000	585 000	21 900	1,9	1 900
42	-	-	-	-	100	135	1,5	1	240 000	585 000	21 900	1,9	1 900
42	135	175	18	115	100	135	1,5	1	240 000	585 000	21 900	1,9	1 900
-	-	-	-	-	110	130	1	1	134 000	365 000	16 000	0,85	2 400
-	-	-	-	-	110	142	2	1	280 000	750 000	27 000	3	1 700
47	-	-	-	-	110	150	2	1	280 000	750 000	27 000	3	1 700
47	150	195	20,5	128	110	150	2	1	280 000	750 000	27 000	3	1 700
-	-	-	-	-	120	140	1	1	134 000	390 000	14 200	0,95	2 200
-	-	-	-	-	120	156	2,1	1	325 000	915 000	31 500	4,5	1 600
-	-	-	-	-	130	154	1,5	1	183 000	540 000	18 900	1,7	1 900
-	-	-	-	-	130	168	2,1	1	360 000	1 060 000	35 000	6	1 500
-	-	-	-	-	140	164	1,5	1	190 000	570 000	19 200	1,9	1 900
-	-	-	-	-	140	180	2,1	1	405 000	1 250 000	40 000	8	1 400
-	-	-	-	-	150	176	1,5	1	236 000	735 000	24 200	2,8	1 800
-	-	-	-	-	150	190	2,1	1	415 000	1 340 000	41 500	9,5	1 400
-	-	-	-	-	160	186	1,5	1	240 000	765 000	24 700	3,2	1 700
-	-	-	-	-	170	198	1,5	1	285 000	930 000	28 500	4,5	1 600

FAG



Axial angular contact ball bearings



Axial angular contact ball bearings

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Product overview Axial angular contact ball bearings

Double direction

2344, 2347



Axial angular contact ball bearings



- Features** Double direction axial angular contact ball bearings are precision bearings without self-retention and with restricted tolerances to class SP. They comprise solid shaft locating washers, a spacer ring, a housing locating washer and ball and cage assemblies with solid brass cages. The bearing parts are matched to each other and can be fitted separately, but must not be interchanged with parts from bearings of the same size.
- High axial load carrying capacity** The contact angle is 60°. As a result, these highly rigid axial angular contact ball bearings can support high axial forces in both directions.
- The double direction precision bearings are therefore particularly suitable for precision spindle bearing arrangements in machine tools. In this case, the axial angular contact ball bearing is combined with a double row cylindrical roller bearing with a tapered bore, which supports the radial forces.
- Two designs** Axial angular contact ball bearings are available in two designs. Series 2344 can be fitted on the small diameter of the shaft taper and series 2347 on the large diameter.
- These series have the same nominal outside diameter as cylindrical roller bearings NN30...-AS-K. However, the outside diameter tolerance is designed to give a loose fit when the seats of the axial angular contact ball bearing and the cylindrical roller bearing are machined together. Guide values for the machining tolerances of the bearing seats are given in the publication Super Precision Bearings AC 41 130.
- Sealing/lubrication** The bearings are not sealed and not greased. They can be lubricated using oil or grease. Higher speeds can be achieved with oil lubrication. In order to allow oil to flow between the two rows of balls, the housing locating washer has a lubrication groove and lubrication holes.
- At high speeds, overlubrication of the radial bearing can be prevented if the installation space is separated between the axial angular contact ball bearing and the cylindrical roller bearing.
- Operating temperature** Axial angular contact ball bearings can be used at operating temperatures from -30 °C to +150 °C, restricted by the lubricant.
- Cages** Each row of rolling elements has a ball-guided solid brass cage. The cage is indicated by the suffix M and, together with the lubrication, has a considerable influence on the speed suitability of the bearing.
- Suffixes** Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
M	Solid brass cage, ball-guided	Standard
SP	Restricted tolerance class SP	Standard
UP	Restricted tolerance class UP	Special design ¹⁾

¹⁾ Available by agreement.

Axial angular contact ball bearings

Design and safety guidelines Equivalent dynamic bearing load

Axial angular contact ball bearings, installed adjacent to a cylindrical roller bearing, support axial forces only:

$$P = F_a$$

P N
Equivalent dynamic bearing load
 F_a N
Axial dynamic bearing load.

Equivalent static bearing load

Axial angular contact ball bearings, installed adjacent to a cylindrical roller bearing, support axial forces only:

$$P_0 = F_{0a}$$

P_0 N
Equivalent static bearing load
 F_{0a} N
Axial static bearing load.

Static load safety factor

In order to achieve sufficiently smooth running of the bearings, a static load safety factor $S_0 \geq 2,5$ is required:

$$S_0 = \frac{C_{0a}}{P_0}$$

S_0 –
Static load safety factor
 C_{0a} N
Basic static load rating according to dimension tables
 P_0 N
Equivalent static bearing load.

Speeds

Double direction axial angular contact ball bearings are suitable for high speeds. Under certain circumstances, the high values may not be achieved if the cylindrical roller bearing arranged adjacent to the axial angular contact ball bearing is preloaded.

Caution!

The limiting speeds n_G given in the dimension tables are valid for lubrication with grease or for minimal quantity lubrication with oil and must not be exceeded.

Preload

The preload is determined by the spacer ring arranged between the two shaft locating washers.

Mounting dimensions

The maximum values for the radii r_a and the diameters of the abutment surfaces d_a , D_a are indicated in the dimension tables.



Accuracy The dimensional and geometrical tolerances correspond to the Schaeffler Group tolerance class SP.

Tolerances for shaft locating washer

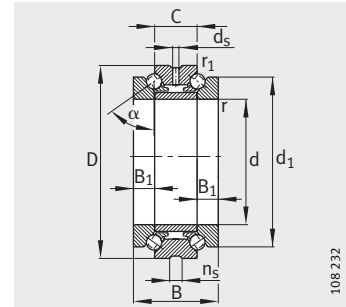
Bore		Bore deviation		Variation V_{dp} μm	Wall thickness S_i μm	Width deviation	
d mm		Δ_{dmp} μm				Δ_{Hs} μm	
over	incl.	min.	max.			min.	max.
18	30	-8	0	6	3	-150	+50
30	50	-10	0	8	3	-200	+75
50	80	-12	0	9	4	-250	+100
80	120	-15	0	11	4	-300	+125
120	180	-18	0	14	5	-350	+150
180	250	-22	0	17	5	-400	+175
250	315	-25	0	19	7	-450	+200
315	400	-30	0	22	7	-600	+250
400	500	-35	0	26	9	-750	+300

Tolerances for housing locating washer

Outside diameter		Deviation of outside diameter		Variation V_{Dp} μm	Wall thickness variation S_e μm
D mm		Δ_{Dmp} μm			
over	incl.	min.	max.		
50	80	-43	-24	6	The wall thickness variation S_e for the housing locating washer is identical to S_i for the shaft locating washer
80	120	-50	-28	8	
120	180	-58	-33	9	
180	250	-66	-37	10	
250	315	-73	-41	12	
315	400	-82	-46	13	
400	500	-90	-50	15	
500	630	-99	-55	16	

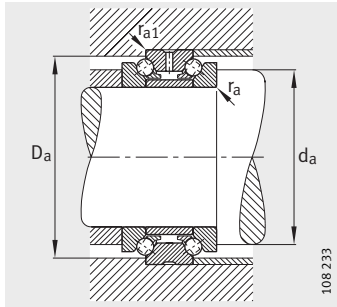
Axial angular contact ball bearings

Double direction



2344, 2347
Contact angle $\alpha = 60^\circ$

Dimension table · Dimensions in mm									
Designation	Mass m ≈kg	Dimensions							
		d	D	B	C	d ₁	B ₁	r min.	r ₁ min.
234406-M-SP	0,297	30	55	32	16	47	8	1	0,15
234706-M-SP	0,232	32	55	32	16	47	8	1	0,15
234407-M-SP	0,318	35	62	34	17	53	8,5	1	0,15
234707-M-SP	0,302	37	62	34	17	53	8,5	1	0,15
234408-M-SP	0,39	40	68	36	18	58,5	9	1	0,15
234708-M-SP	0,371	42	68	36	18	58,5	9	1	0,15
234409-M-SP	0,486	45	75	38	19	65	9,5	1	0,15
234709-M-SP	0,472	47	75	38	19	65	9,5	1	0,15
234410-M-SP	0,485	50	80	38	19	70	9,5	1	0,15
234710-M-SP	0,408	52	80	38	19	70	9,5	1	0,15
234411-M-SP	0,944	55	90	44	22	78	11	1,1	0,3
234711-M-SP	0,884	57	90	44	22	78	11	1,1	0,3
234412-M-SP	0,884	60	95	44	22	83	11	1,1	0,3
234712-M-SP	0,852	62	95	44	22	83	11	1,1	0,3
234413-M-SP	0,898	65	100	44	22	88	11	1,1	0,3
234713-M-SP	0,862	67	100	44	22	88	11	1,1	0,3
234414-M-SP	1,22	70	110	48	24	97	12	1,1	0,3
234714-M-SP	1,16	73	110	48	24	97	12	1,1	0,3
234415-M-SP	1,22	75	115	48	24	102	12	1,1	0,3
234715-M-SP	1,22	78	115	48	24	102	12	1,1	0,3
234416-M-SP	1,79	80	125	54	27	110	13,5	1,1	0,3
234716-M-SP	1,69	83	125	54	27	110	13,5	1,1	0,3
234417-M-SP	1,85	85	130	54	27	115	13,5	1,1	0,3
234717-M-SP	1,77	88	130	54	27	115	13,5	1,1	0,3
234418-M-SP	2,45	90	140	60	30	123	15	1,5	0,3
234718-M-SP	2,35	93	140	60	30	123	15	1,5	0,3
234419-M-SP	2,55	95	145	60	30	128	15	1,5	0,3
234719-M-SP	2,45	98	145	60	30	128	15	1,5	0,3
234420-M-SP	2,66	100	150	60	30	133	15	1,5	0,3
234720-M-SP	2,54	103	150	60	30	133	15	1,5	0,3
234421-M-SP	3,41	105	160	66	33	142	16,5	2	0,6
234721-M-SP	3,24	109	160	66	33	142	16,5	2	0,6



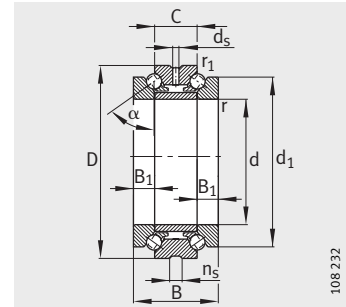
Mounting dimensions



		Mounting dimensions				Basic load ratings		Fatigue limit load C_{ua} N	Limiting speeds	
d_s	n_s	d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_a N	stat. C_{0a} N		n_G grease min^{-1}	n_G oil min^{-1}
3,2	4,8	40,5	50,5	1	0,15	15 300	36 000	3 250	11 000	16 000
3,2	4,8	40,5	50,5	1	0,15	15 300	36 000	3 250	11 000	16 000
3,2	4,8	46,5	57	1	0,15	18 900	47 000	4 250	9 500	14 000
3,2	4,8	46,5	57	1	0,15	18 900	47 000	4 250	9 500	14 000
3,2	4,8	51,5	63,5	1	0,15	22 900	59 000	5 300	8 500	12 000
3,2	4,8	51,5	63,5	1	0,15	22 900	59 000	5 300	8 500	12 000
3,2	4,8	57,5	70	1	0,15	25 000	67 000	6 000	7 500	10 000
3,2	4,8	57,5	70	1	0,15	25 000	67 000	6 000	7 500	10 000
3,2	4,8	62,5	75	1	0,15	26 000	72 000	6 500	7 000	9 500
3,2	4,8	62,5	75	1	0,15	26 000	72 000	6 500	7 000	9 500
3,2	6,5	69	84,5	1	0,3	36 500	99 000	8 900	6 300	8 500
3,2	6,5	69	84,5	1	0,3	36 500	99 000	8 900	6 300	8 500
3,2	6,5	74	89,5	1	0,3	36 000	98 000	8 900	6 000	8 000
3,2	6,5	74	89,5	1	0,3	36 000	98 000	8 900	6 000	8 000
3,2	6,5	79	94,5	1	0,3	38 500	111 000	10 000	5 600	7 500
3,2	6,5	79	94,5	1	0,3	38 500	111 000	10 000	5 600	7 500
3,2	6,5	86,5	103,5	1	0,3	46 000	134 000	12 100	5 300	7 000
3,2	6,5	86,5	103,5	1	0,3	46 000	134 000	12 100	5 300	7 000
3,2	6,5	91,5	108,5	1	0,3	47 500	144 000	12 900	5 000	6 700
3,2	6,5	91,5	108,5	1	0,3	47 500	144 000	12 900	5 000	6 700
3,2	6,5	98,5	117	1	0,3	56 000	175 000	15 500	4 500	6 000
3,2	6,5	98,5	117	1	0,3	56 000	175 000	15 500	4 500	6 000
4,8	9,5	103,5	122	1	0,3	57 000	181 000	15 600	4 500	6 000
4,8	9,5	103,5	122	1	0,3	57 000	181 000	15 600	4 500	6 000
4,8	9,5	110,5	130,5	1,5	0,3	66 000	213 000	17 700	4 000	5 300
4,8	9,5	110,5	130,5	1,5	0,3	66 000	213 000	17 700	4 000	5 300
4,8	9,5	115,5	135,5	1,5	0,3	66 000	219 000	17 900	4 000	5 300
4,8	9,5	115,5	135,5	1,5	0,3	66 000	219 000	17 900	4 000	5 300
4,8	9,5	120,5	140,5	1,5	0,3	67 000	226 000	18 100	3 800	5 000
4,8	9,5	120,5	140,5	1,5	0,3	67 000	226 000	18 100	3 800	5 000
4,8	9,5	128	150	2	0,6	74 000	250 000	19 500	3 600	4 800
4,8	9,5	128	150	2	0,6	74 000	250 000	19 500	3 600	4 800

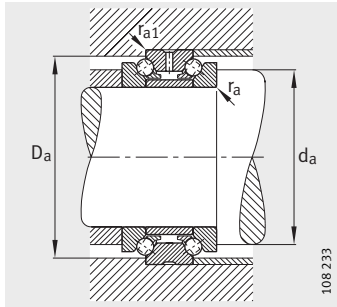
Axial angular contact ball bearings

Double direction



2344, 2347
Contact angle $\alpha = 60^\circ$

Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈ kg	Dimensions							
		d	D	B	C	d ₁	B ₁	r min.	r ₁ min.
234422-M-SP	4,75	110	170	72	36	150	18	2	0,6
234722-M-SP	4,51	114	170	72	36	150	18	2	0,6
234424-M-SP	4,72	120	180	72	36	160	18	2	0,6
234724-M-SP	4,46	124	180	72	36	160	18	2	0,6
234426-M-SP	6,86	130	200	84	42	177	21	2	0,6
234726-M-SP	6,52	135	200	84	42	177	21	2	0,6
234428-M-SP	8,78	140	210	84	42	187	21	2,1	0,6
234728-M-SP	8,07	145	210	84	42	187	21	2,1	0,6
234430-M-SP	9,21	150	225	90	45	200	22,5	2,1	0,6
234730-M-SP	8,79	155	225	90	45	200	22,5	2,1	0,6
234432-M-SP	11,1	160	240	96	48	212	24	2,1	0,6
234732-M-SP	10,7	165	240	96	48	212	24	2,1	0,6
234434-M-SP	15,3	170	260	108	54	230	27	2,1	0,6
234734-M-SP	14,6	176	260	108	54	230	27	2,1	0,6
234436-M-SP	20,5	180	280	120	60	248	30	2,1	0,6
234736-M-SP	19,6	187	280	120	60	248	30	2,1	0,6
234438-M-SP	24,1	190	290	120	60	258	30	2,1	0,6
234738-M-SP	21,2	197	290	120	60	258	30	2,1	0,6
234440-M-SP	30,9	200	310	132	66	274	33	2,1	0,6
234740-M-SP	28,6	207	310	132	66	274	33	2,1	0,6
234444-M-SP	36,9	220	340	144	72	304	36	3	1,1
234744-M-SP	35,3	228	340	144	72	304	36	3	1,1
234448-M-SP	38,9	240	360	144	72	322	36	3	1,1
234748-M-SP	37,2	248	360	144	72	322	36	3	1,1
234452-M-SP	56,5	260	400	164	82	354	41	4	1,5
234752-M-SP	54,1	269	400	164	82	354	41	4	1,5
234456-M-SP	57,1	280	420	164	82	374	41	4	1,5
234756-M-SP	54,5	289	420	164	82	374	41	4	1,5
234460-M-SP	90,7	300	460	190	95	406	47,5	4	1,5
234760-M-SP	86,5	310	460	190	95	406	47,5	4	1,5
234464-M-SP	90,3	320	480	190	95	426	47,5	4	1,5
234764-M-SP	86,5	330	480	190	95	426	47,5	4	1,5



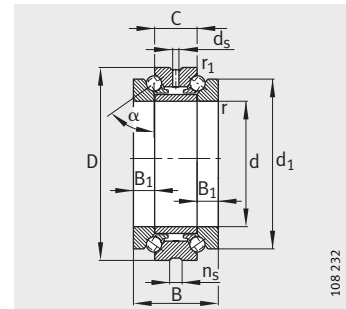
Mounting dimensions



		Mounting dimensions				Basic load ratings		Fatigue limit load C_{ua} N	Limiting speeds	
d_s	n_s	d_a h12	D_a H12	r_a max.	r_{a1} max.	dyn. C_a N	stat. C_{0a} N		n_G grease min^{-1}	n_G oil min^{-1}
4,8	9,5	134,5	160	2	0,6	98 000	325 000	24 400	3 400	4 500
4,8	9,5	134,5	160	2	0,6	98 000	325 000	24 400	3 400	4 500
4,8	9,5	144,5	170	2	0,6	101 000	345 000	25 000	3 200	4 300
4,8	9,5	144,5	170	2	0,6	101 000	345 000	25 000	3 200	4 300
6,3	12,2	159	188	2	0,6	128 000	440 000	30 500	2 800	3 800
6,3	12,2	159	188	2	0,6	128 000	440 000	30 500	2 800	3 800
6,3	12,2	169	198	2,1	0,6	132 000	470 000	31 500	2 600	3 600
6,3	12,2	169	198	2,1	0,6	132 000	470 000	31 500	2 600	3 600
8	15	181	211,5	2,1	0,6	142 000	520 000	34 000	2 600	3 600
8	15	181	211,5	2,1	0,6	142 000	520 000	34 000	2 600	3 600
8	15	192,5	226	2,1	0,6	168 000	600 000	38 000	2 400	3 400
8	15	192,5	226	2,1	0,6	168 000	600 000	38 000	2 400	3 400
8	15	206,5	245	2,1	0,6	207 000	740 000	45 500	2 200	3 200
8	15	206,5	245	2,1	0,6	207 000	740 000	45 500	2 200	3 200
8	15	221	263	2,1	0,6	235 000	840 000	49 500	2 000	3 000
8	15	221	263	2,1	0,6	235 000	840 000	49 500	2 000	3 000
8	15	231	273	2,1	0,6	244 000	900 000	52 000	1 900	2 800
8	15	231	273	2,1	0,6	244 000	900 000	52 000	1 900	2 800
8	15	245	291,5	2,1	0,6	285 000	1 060 000	59 000	1 800	2 600
8	15	245	291,5	2,1	0,6	285 000	1 060 000	59 000	1 800	2 600
9,5	17,7	269	318	2,5	1	340 000	1 330 000	71 000	1 600	2 200
9,5	17,7	269	318	2,5	1	340 000	1 330 000	71 000	1 600	2 200
9,5	17,7	289	338	2,5	1	350 000	1 420 000	73 000	1 500	2 000
9,5	17,7	289	338	2,5	1	350 000	1 420 000	73 000	1 500	2 000
9,5	17,7	317,5	374,5	3	1,5	400 000	1 680 000	83 000	1 400	1 900
9,5	17,7	317,5	374,5	3	1,5	400 000	1 680 000	83 000	1 400	1 900
9,5	17,7	337,5	394,5	3	1,5	415 000	1 790 000	86 000	1 300	1 800
9,5	17,7	337,5	394,5	3	1,5	415 000	1 790 000	86 000	1 300	1 800
9,5	17,7	366	428,5	3	1,5	480 000	2 170 000	99 000	1 200	1 700
9,5	17,7	366	428,5	3	1,5	480 000	2 170 000	99 000	1 200	1 700
9,5	17,7	386	448,5	3	1,5	495 000	2 310 000	103 000	1 200	1 700
9,5	17,7	386	448,5	3	1,5	495 000	2 310 000	103 000	1 200	1 700

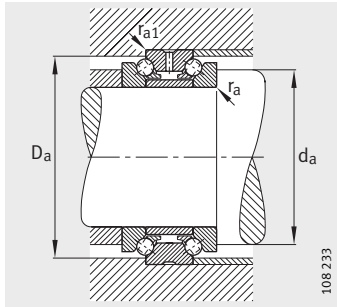
Axial angular contact ball bearings

Double direction



2344, 2347
Contact angle $\alpha = 60^\circ$

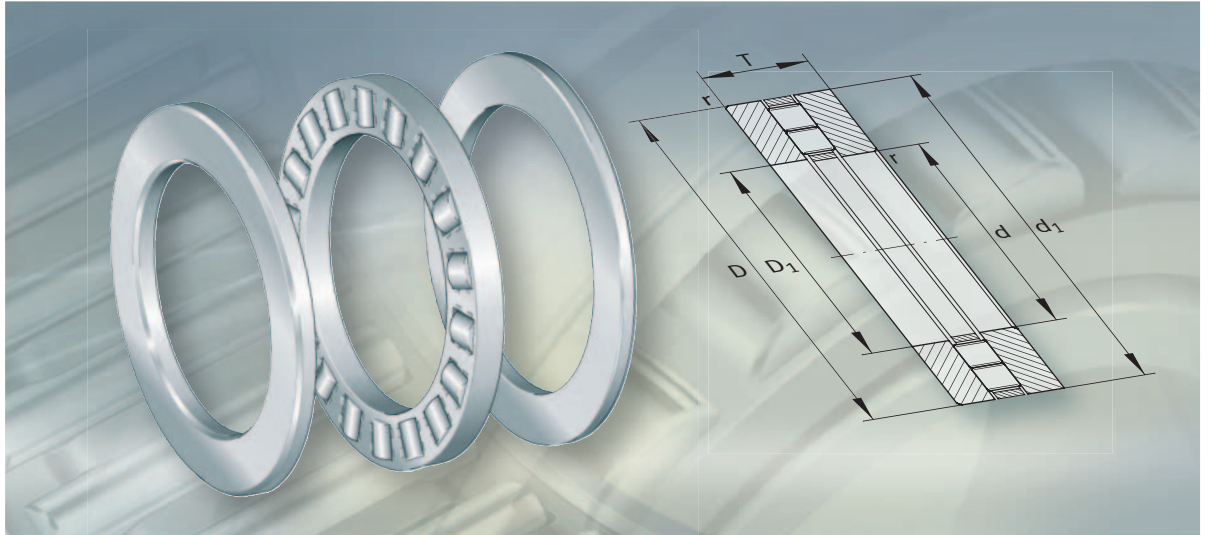
Dimension table (continued) · Dimensions in mm									
Designation	Mass m ≈ kg	Dimensions							
		d	D	B	C	d ₁	B ₁	r min.	r ₁ min.
234468-M-SP	122	340	520	212	106	459	53	4	1,5
234768-M-SP	117	350	520	212	106	459	53	4	1,5
234472-M-SP	128	360	540	212	106	479	53	4	1,5
234772-M-SP	123	370	540	212	106	479	53	4	1,5
234476-M-SP	133	380	560	212	106	499	53	4	1,5
234776-M-SP	128	390	560	212	106	499	53	4	1,5
234480-M-SP	198	400	600	236	118	532	59	5	2
234780-M-SP	187	410	600	236	118	532	59	5	2



Mounting dimensions



		Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speeds	
d _s	n _s	d _a h12	D _a H12	r _a max.	r _{a1} max.	dyn. C _a N	stat. C _{0a} N	C _{ua} N	n _G grease min ⁻¹	n _G oil min ⁻¹
9,5	17,7	413	485,5	3	1,5	580 000	2 850 000	124 000	1 100	1 600
9,5	17,7	413	485,5	3	1,5	580 000	2 850 000	124 000	1 100	1 600
9,5	17,7	433	505,5	3	1,5	590 000	2 950 000	125 000	1 000	1 500
9,5	17,7	433	505,5	3	1,5	590 000	2 950 000	125 000	1 000	1 500
9,5	17,7	453	525,5	3	1,5	610 000	3 150 000	130 000	1 000	1 500
9,5	17,7	453	525,5	3	1,5	610 000	3 150 000	130 000	1 000	1 500
9,5	17,7	480	561,5	4	2	680 000	3 650 000	147 000	900	1 300
9,5	17,7	480	561,5	4	2	680 000	3 650 000	147 000	900	1 300



Axial cylindrical roller bearings
Axial cylindrical roller
and cage assemblies
Axial bearing washers

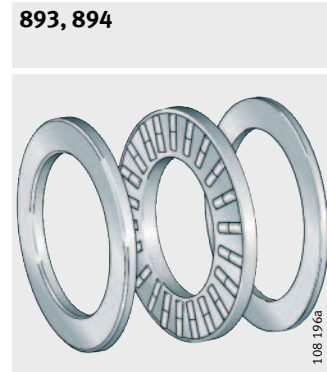


Axial cylindrical roller bearings, roller and cage assemblies, bearing washers

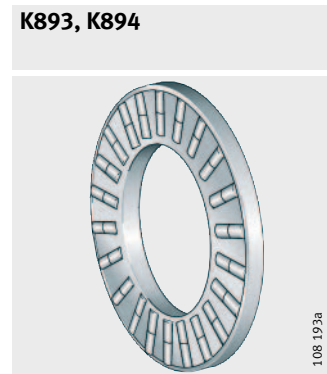
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Product overview **Axial cylindrical roller bearings, roller and cage assemblies, bearing washers**

Axial cylindrical roller bearings
Single row and double row



Axial cylindrical roller and cage assemblies
Single row and double row



Housing locating washers
Shaft locating washers



Bearing washers



Axial cylindrical roller bearings, roller and cage assemblies, bearing washers



Features Axial cylindrical roller bearings

Axial cylindrical roller bearings comprise axial cylindrical roller and cage assemblies K, housing locating washers GS and shaft locating washers WS.

Bearings 811, 812 are single row bearings and correspond to DIN 722/ISO 104, bearings 893, 894 are double row bearings and correspond to DIN 616/ISO 104.

The cages are made from plastic or brass.

Plastic cages have the suffix TV, brass cages have the suffix M.

The bearings have very low axial section height, high load capacity, high rigidity and can support axial forces in one direction.

Axial cylindrical roller and cage assemblies

The cage assemblies comprise axial cages and one or two rows of cylindrical rollers. The diameter series 1, 2, 3, 4 correspond to DIN 616/ISO 104.

The cages are made from plastic or brass.

The cage assemblies have very low axial section height, high load capacity and high rigidity. They can support axial forces in one direction and act as a non-locating bearing in a radial direction.

Axial cage assemblies are combined with shaft or housing locating washers or are integrated directly in the adjacent construction.

If they are used without axial bearing washers, the raceway must be produced as a rolling bearing raceway.

Housing locating washers

Housing locating washers are produced by machining, the outside surface is ground and the running surface is precision machined. The diameter series 1, 2, 3, 4 correspond to DIN 616/ISO 104. They are centred on their outer edge and are combined with axial cage assemblies if the adjacent surface cannot be used as a raceway.

Shaft locating washers

Shaft locating washers are produced by machining, the bore is ground and the running surface is precision machined. The diameter series 1, 2, 3, 4 correspond to DIN 616/ISO 104. They are centred on their inner edge and are combined with axial cage assemblies if the adjacent surface cannot be used as a raceway.

Bearing washers

Bearing washers can be used as housing and shaft locating washers. The bore and outside surface are turned, the running surface is ground. Bearing washers can be used with axial cylindrical roller and cage assemblies K811 and axial needle roller bearings AXK.

Operating temperature

Axial cylindrical roller bearings and axial cylindrical roller and cage assemblies can be used at operating temperatures from -30 °C to $+150\text{ °C}$.

Caution! Bearings with plastic cages (suffix TV) are suitable up to $+120\text{ °C}$.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
M ¹⁾	Brass cage	Standard
TV ¹⁾	Plastic cage made from glass fibre reinforced polyamide 66	Standard
P5	High dimensional and geometrical accuracy	Special design ²⁾

¹⁾ Depending on series and size.

²⁾ By agreement for axial bearing washers GS, WS.

Axial cylindrical roller bearings, roller and cage assemblies, bearing washers

Design and safety guidelines Design of adjacent parts

Axial bearing washers must always be fully supported on their entire abutment surface. The abutting shoulders should be rigid, flat and perpendicular to the axis of rotation.

Radial cage running surfaces should be precision machined and resistant to wear (R_z4 ($R_a0,8$)).

Caution! If axial cylindrical roller and cage assemblies run directly on the adjacent construction, the running surfaces must be produced as rolling bearing raceways. The surface hardness of the raceway must be 670 HV +170 HV and the hardening depth CHD or Rht must be sufficiently large.

Tolerances for shaft and housing bore

The tolerances for the housing bore and shaft must be applied in accordance with the table.

Housing bore and shaft tolerances

Bearing component		Shaft tolerance	Bore tolerance
K811, K812, K893, K894	Guided on shaft	h8	–
GS811, GS812, GS893, GS894	–	–	H9
WS811, WS812, WS893, WS894	–	h8	–
LS	As housing locating washer	Clear of shaft	H9
	As shaft locating washer	h8	Clear of housing

Limiting speed

The limiting speeds n_G given in the dimension tables are for oil lubrication.

Caution! With grease lubrication, the permissible value is 25% of the value given in the table.

Minimum axial load

A minimum axial load $F_{a\min}$ according to the formula must be applied.

$$F_{a\min} = 0,0005 \cdot C_{0a} + k_a \left(\frac{C_{0a} \cdot n}{10^8} \right)^2$$

$F_{a\min}$ Minimum axial load N
 k_a Factor for determining the minimum load: see table –
 C_{0a} Basic static load rating N
 n Speed. min^{-1}

Factor k_a for determining the minimum load

Series	k_a
K811	1,4
K812	0,9
K893	0,7
K894	0,5

Orientation of washers

Caution! Axial washers should be fitted with the raceway facing towards the rolling elements.



Accuracy

The dimensional and geometrical tolerances of axial bearing washers GS and WS are in accordance with tolerance class PN to DIN 620.

The bore, external and height tolerances of the bearing components are shown in the table and *Figure 1*.

Tolerances for bearing components

Series	Tolerance					
	Bore		Outside diameter		Height	
K811, K812, K893, K894	D_{c1}	$E11^{1)}$	D_c	$a13^{1)}$	D_w	to DIN 5 402-1
GS811, GS812, GS893, GS894	D_1	–	D	to DIN 620	B	$h11$
WS811, WS812, WS893, WS894	d	to DIN 620	d_1	–	B	$h11$
LS	d	$E12^{1)}$	D	$a12^{1)}$	B	$h11$

¹⁾ Deviation from mean diameter.

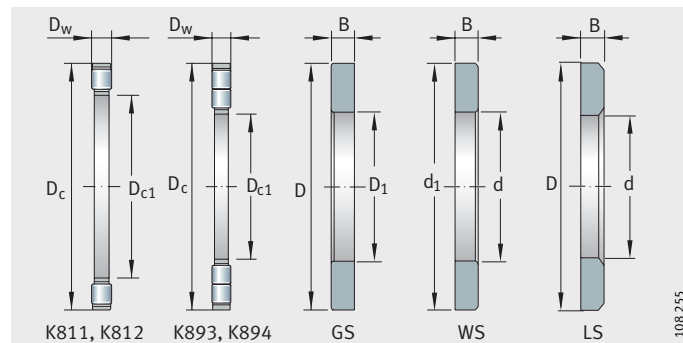
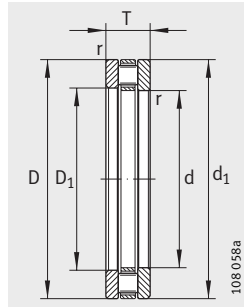


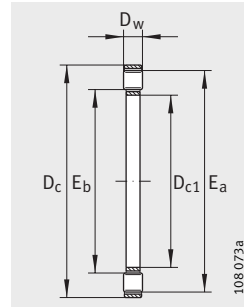
Figure 1
Axial bearing washers

108 255

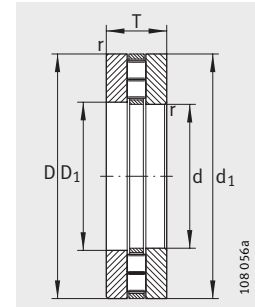
Axial cylindrical roller bearings



811, 812

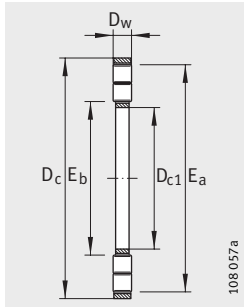


K811, K812

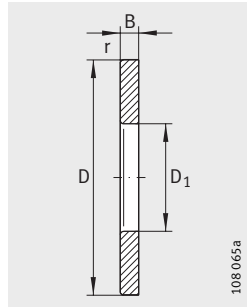


893, 894

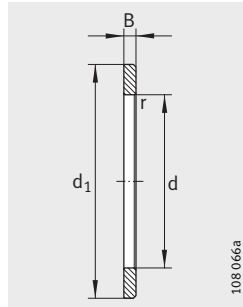
Dimension table · Dimensions in mm										
Axial cylindrical roller bearings				Axial cylindrical roller bearing and cage assembly		Axial bearing washers				
Complete bearings				Mass m	Designation	Mass m	Housing locating washer	Shaft locating washer	Bearing washer	Mass m
Designation				≈kg		≈kg	Designation	Designation	Designation	≈kg
81102-TV	–	–	–	0,024	K81102-TV	0,006	GS81102	WS81102	LS1528	0,008
81103-TV	–	–	–	0,027	K81103-TV	0,009	GS81103	WS81103	LS1730	0,009
81104-TV	–	–	–	0,037	K81104-TV	0,013	GS81104	WS81104	LS2035	0,012
81105-TV	–	–	–	0,053	K81105-TV	0,015	GS81105	WS81105	LS2542	0,019
81106-TV	–	–	–	0,057	K81106-TV	0,017	GS81106	WS81106	LS3047	0,02
–	81206-TV	–	–	0,123	K81206-TV	0,033	GS81206	WS81206	–	0,045
–	–	89306-TV	–	0,24	K89306-TV	0,04	GS89306	WS89306	–	0,095
81107-TV	–	–	–	0,073	K81107-TV	0,019	GS81107	WS81107	LS3552	0,027
–	81207-TV	–	–	0,195	K81207-TV	0,043	GS81207	WS81207	–	0,076
–	–	89307-TV	–	0,34	K89307-TV	0,053	GS89307	WS89307	–	0,134
81108-TV	–	–	–	0,105	K81108-TV	0,031	GS81108	WS81108	LS4060	0,037
–	81208-TV	–	–	0,249	K81208-TV	0,081	GS81208	WS81208	–	0,084
–	–	89308-TV	–	0,484	K89308-TV	0,098	GS89308	WS89308	–	0,193
81109-TV	–	–	–	0,13	K81109-TV	0,035	GS81109	WS81109	LS4565	0,047
–	81209-TV	–	–	0,287	K81209-TV	0,085	GS81209	WS81209	–	0,101
–	–	89309-TV	–	0,615	K89309-TV	0,121	GS89309	WS89309	–	0,247
81110-TV	–	–	–	0,14	K81110-TV	0,038	GS81110	WS81110	LS5070	0,051
–	81210-TV	–	–	0,356	K81210-TV	0,098	GS81210	WS81210	–	0,129
–	–	89310-TV	–	0,887	K89310-TV	0,175	GS89310	WS89310	–	0,356
81111-TV	–	–	–	0,218	K81111-TV	0,045	GS81111	WS81111	LS5578	0,082
–	81211-TV	–	–	0,568	K81211-TV	0,166	GS81211	WS81211	–	0,201
–	–	89311-TV	–	1,18	K89311-TV	0,195	GS89311	WS89311	–	0,485
81112-TV	–	–	–	0,266	K81112-TV	0,082	GS81112	WS81112	LS6085	0,092
–	81212-TV	–	–	0,642	K81212-TV	0,176	GS81212	WS81212	–	0,233
–	–	89312-TV	–	1,26	K89312-TV	0,21	GS89312	WS89312	–	0,517
–	–	–	89412-TV	2,818	K89412-TV	0,538	GS89412	WS89412	–	1,115



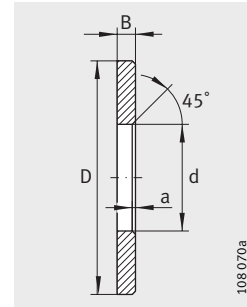
K893, K894



GS811, GS812,
GS893, GS894



WS811, WS812,
WS893, WS894

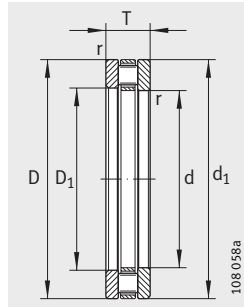


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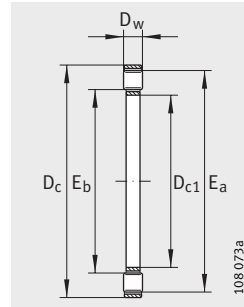


Dimensions									Raceway dimensions		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$\frac{D_{c1}}{d}$	D_1	$\frac{D_c}{D}$	d_1	T	D_w	B	$\frac{a}{r}$	min.	E_b	E_a	dyn. C_a	stat. C_{0a}	C_{ua}	n_G	n_B
											N	N	N	min^{-1}	min^{-1}
15	16	28	28	9	3,5	2,75	0,3		16	27	14 400	28 500	4 000	13 400	6 300
17	18	30	30	9	3,5	2,75	0,3		18	29	15 900	33 500	4 650	12 300	5 400
20	21	35	35	10	4,5	2,75	0,3		21	34	24 900	53 000	7 300	10 500	4 300
25	26	42	42	11	5	3	0,6		26	41	33 500	76 000	7 100	8 600	3 500
30	32	47	47	11	5	3	0,6		31	46	35 500	86 000	8 000	7 500	3 050
30	32	52	52	16	7,5	4,25	0,6		31	50	64 000	141 000	14 100	7 000	2 650
30	32	60	60	18	5,5	6,25	1		33	59	69 000	197 000	18 900	6 400	2 600
35	37	52	52	12	5	3,5	0,6		36	51	39 000	101 000	9 500	6 600	2 600
35	37	62	62	18	7,5	5,25	1		39	58	80 000	199 000	20 000	5 900	2 320
35	37	68	68	20	6	7	1		38	67	80 000	237 000	23 200	5 600	2 390
40	42	60	60	13	6	3,5	0,6		42	58	56 000	148 000	14 500	5 800	2 190
40	42	68	68	19	9	5	1		43	66	107 000	265 000	23 300	5 300	1 860
40	42	78	78	22	7	7,5	1		44	77	122 000	385 000	39 000	4 900	1 780
45	47	65	65	14	6	4	0,6		47	63	59 000	163 000	16 000	5 200	1 970
45	47	73	73	20	9	5,5	1		48	70	105 000	265 000	23 300	4 900	1 820
45	47	85	85	24	7,5	8,25	1		49	83	139 000	445 000	44 500	4 450	1 620
50	52	70	70	14	6	4	0,6		52	68	61 000	177 000	17 400	4 800	1 810
50	52	78	78	22	9	6,5	1		53	75	117 000	315 000	27 500	4 500	1 550
50	52	95	95	27	8	9,5	1,1		56	92	167 000	560 000	58 000	3 950	1 460
55	57	78	78	16	6	5	0,6		57	77	90 000	300 000	31 000	4 350	1 330
55	57	90	90	25	11	7	1		59	85	154 000	405 000	38 500	3 950	1 510
55	57	105	105	30	9	10,5	1,1		61	103	184 000	600 000	52 000	3 600	1 490
60	62	85	85	17	7,5	4,75	1		62	82	103 000	315 000	32 000	3 950	1 360
60	62	95	95	26	11	7,5	1		64	91	172 000	480 000	45 500	3 700	1 300
60	62	110	110	30	9	10,5	1,1		66	108	196 000	670 000	58 000	3 400	1 350
60	62	130	130	42	14	14	1,5		65	126	390 000	1 220 000	121 000	3 050	1 080

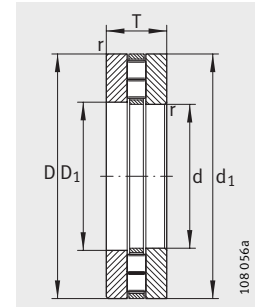
Axial cylindrical roller bearings



811, 812

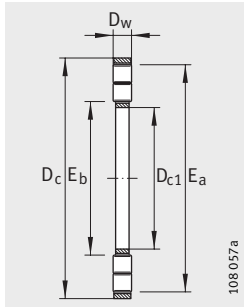


K811, K812



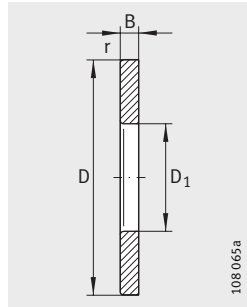
893, 894

Dimension table (continued) · Dimensions in mm										
Axial cylindrical roller bearings				Axial cylindrical roller bearing and cage assembly		Axial bearing washers				
Complete bearings				Mass m	Designation	Mass m	Housing locating washer	Shaft locating washer	Bearing washer	Mass m
Designation				≈kg		≈kg	Designation	Designation	Designation	≈kg
81113-TV	–	–	–	0,31	K81113-TV	0,09	GS81113	WS81113	LS6590	0,11
–	81213-TV	–	–	0,721	K81213-TV	0,185	GS81213	WS81213	–	0,268
–	–	89313-TV	–	1,33	K89313-TV	0,21	GS89313	WS89313	–	0,535
–	–	–	89413-TV	3,52	K89413-TV	0,72	GS89413	WS89413	–	1,4
81114-TV	–	–	–	0,332	K81114-TV	0,092	GS81114	WS81114	LS7095	0,12
–	81214-TV	–	–	0,768	K81214-TV	0,212	GS81214	WS81214	–	0,278
–	–	89314-TV	–	1,82	K89314-TV	0,29	GS89314	WS89314	–	0,8
–	–	–	89414-TV	4,18	K89414-TV	0,76	GS89414	WS89414	–	1,73
81115-TV	–	–	–	0,393	K81115-TV	0,096	GS81115	WS81115	LS75100	0,136
–	81215-TV	–	–	0,8	K81215-TV	0,195	GS81215	WS81215	–	0,293
–	–	89315-TV	–	2,23	K89315-TV	0,375	GS89315	WS89315	–	0,97
–	–	–	89415-M	5,96	K89415-M	1,78	GS89415	WS89415	–	2,09
81116-TV	–	–	–	0,4	K81116-TV	0,095	GS81116	WS81116	LS80105	0,144
–	81216-TV	–	–	0,9	K81216-TV	0,234	GS81216	WS81216	–	0,333
–	–	89316-TV	–	2,37	K89316-TV	0,42	GS89316	WS89316	–	1,02
–	–	–	89416-M	7,04	K89416-M	2,04	GS89416	WS89416	–	2,5
81117-TV	–	–	–	0,42	K81117-TV	0,118	GS81117	WS81117	LS85110	0,151
–	81217-TV	–	–	1,26	K81217-TV	0,28	GS81217	WS81217	–	0,49
–	–	89317-M	–	3,39	K89317-M	0,93	GS89317	WS89317	–	1,23
–	–	–	89417-M	8,65	K89417-M	2,71	GS89417	WS89417	–	2,97
81118-TV	–	–	–	0,62	K81118-TV	0,15	GS81118	WS81118	LS90120	0,225
–	81218-TV	–	–	1,77	K81218-TV	0,54	GS81218	WS81218	–	0,614
–	–	89318-M	–	3,63	K89318-M	0,97	GS89318	WS89318	–	1,33
–	–	–	89418-M	9,94	K89418-M	3,04	GS89418	WS89418	–	3,45
81120-TV	–	–	–	0,95	K81120-TV	0,25	GS81120	WS81120	LS100135	0,35
–	81220-TV	–	–	2,2	K81220-TV	0,6	GS81220	WS81220	–	0,8
–	–	89320-M	–	4,56	K89320-M	1,18	GS89320	WS89320	–	1,69
–	–	–	89420-M	13,4	K89420-M	3,92	GS89420	WS89420	–	4,75



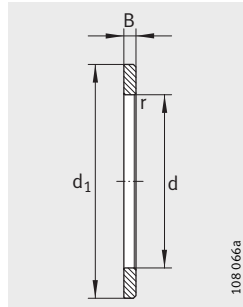
K893, K894

108 057a



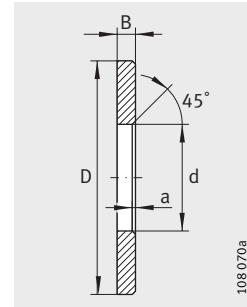
GS811, GS812,
GS893, GS894

108 065a



WS811, WS812,
WS893, WS894

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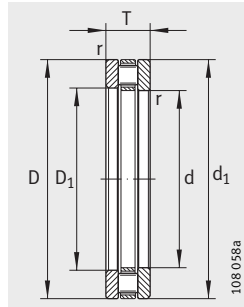
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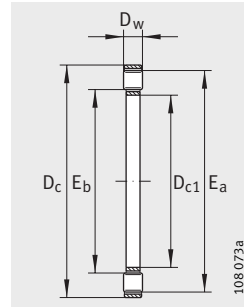


Dimensions								Raceway dimensions		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
D _{c1}	D ₁	D _c	d ₁	T	D _w	B	a	E _b	E _a	dyn. C _a	stat. C _{0a}	C _{ua}	n _G	n _B
d		D					min.			N	N	N	min ⁻¹	min ⁻¹
65	67	90	90	18	7,5	5,25	1	67	87	107 000	340 000	34 000	3 700	1 260
65	67	100	100	27	11	8	1	69	96	177 000	500 000	48 000	3 500	1 240
65	67	115	115	30	9	10,5	1,1	71	113	194 000	670 000	58 000	3 200	1 330
65	68	140	140	45	15	15	2	70	135	445 000	1 410 000	139 000	2 800	1 000
70	72	95	95	18	7,5	5,25	1	72	92	111 000	365 000	36 500	3 500	1 170
70	72	105	105	27	11	8	1	74	102	187 000	550 000	53 000	3 300	1 130
70	72	125	125	34	10	12	1,1	76	123	239 000	830 000	74 000	2 950	1 200
70	73	150	150	48	16	16	2	76	147	475 000	1 500 000	148 000	2 600	1 000
75	77	100	100	19	7,5	5,75	1	78	97	107 000	350 000	35 500	3 300	1 190
75	77	110	110	27	11	8	1	79	106	172 000	500 000	48 000	3 100	1 210
75	77	135	135	36	11	12,5	1,5	81	132	285 000	1 010 000	92 000	2 750	1 080
75	78	160	160	51	17	17	2	82	156	500 000	1 580 000	150 000	2 450	1 000
80	82	105	105	19	7,5	5,75	1	83	102	106 000	350 000	35 500	3 100	1 170
80	82	115	115	28	11	8,5	1	84	112	201 000	630 000	60 000	2 950	990
80	82	140	140	36	11	12,5	1,5	86	137	305 000	1 110 000	99 000	2 600	990
80	83	170	170	54	18	18	2,1	88	165	560 000	1 770 000	169 000	2 300	950
85	87	110	110	19	7,5	5,75	1	87	108	112 000	385 000	39 000	2 950	1 070
85	88	125	125	31	12	9,5	1	90	119	217 000	660 000	64 000	2 750	1 060
85	88	150	150	39	12	13,5	1,5	93	146	325 000	1 140 000	104 000	2 450	1 030
85	88	180	180	58	19	19,5	2,1	93	175	620 000	1 980 000	188 000	2 170	900
90	92	120	120	22	9	6,5	1	93	117	141 000	465 000	40 000	2 750	1 070
90	93	135	135	35	14	10,5	1,1	95	129	290 000	890 000	88 000	2 550	910
90	93	155	155	39	12	13,5	1,5	98	151	335 000	1 200 000	108 000	2 350	980
90	93	190	190	60	20	20	2,1	99	185	680 000	2 200 000	207 000	2 060	850
100	102	135	135	25	11	7	1	104	131	199 000	650 000	59 000	2 450	920
100	103	150	150	38	15	11,5	1,1	107	142	340 000	1 080 000	104 000	2 300	840
100	103	170	170	42	13	14,5	1,5	109	166	380 000	1 400 000	122 000	2 130	910
100	103	210	210	67	22	22,5	3	111	205	850 000	2 850 000	265 000	1 860	720

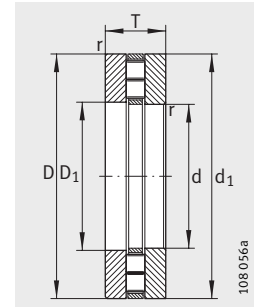
Axial cylindrical roller bearings



811, 812

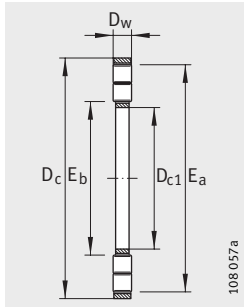


K811, K812

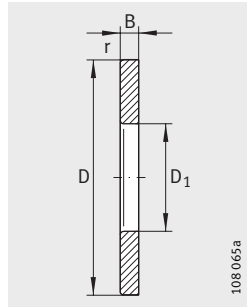


893, 894

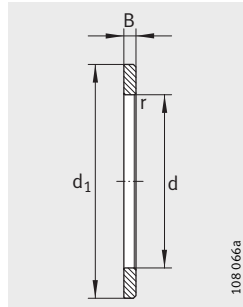
Dimension table (continued) · Dimensions in mm											
Axial cylindrical roller bearings					Axial cylindrical roller bearing and cage assembly		Axial bearing washers				
Complete bearings					Mass m	Designation	Mass m	Housing locating washer	Shaft locating washer	Bearing washer	Mass m
Designation					≈kg		≈kg	Designation	Designation	Designation	≈kg
81122-TV	-	-	-	1,04	K81122-TV	0,27	GS81122	WS81122	LS110145	0,385	
-	81222-TV	-	-	2,29	K81222-TV	0,53	GS81222	WS81222	-	0,88	
-	-	89322-M	-	6,7	K89322-M	1,83	GS89322	WS89322	-	2,44	
-	-	-	89422-M	17,4	K89422-M	5,11	GS89422	WS89422	-	6,15	
81124-TV	-	-	-	1,12	K81124-TV	0,29	GS81124	WS81124	LS120155	0,415	
-	81224-TV	-	-	2,54	K81224-TV	0,58	GS81224	WS81224	-	0,98	
-	-	89324-M	-	9,44	K89324-M	2,64	GS89324	WS89324	-	3,4	
-	-	-	89424-M	21,9	K89424-M	6,37	GS89424	WS89424	-	7,7	
81126-TV	-	-	-	1,67	K81126-TV	0,38	GS81126	WS81126	LS130170	0,643	
-	81226-TV	-	-	3,98	K81226-TV	0,92	GS81226	WS81226	-	1,53	
-	-	89326-M	-	11,2	K89326-M	2,09	GS89326	WS89326	-	4,045	
-	-	-	89426-M	27,1	K89426-M	7,96	GS89426	WS89426	-	9,5	
81128-TV	-	-	-	1,9	K81128-TV	0,4	GS81128	WS81128	LS140180	0,749	
-	81228-M	-	-	5,07	K81228-M	1,8	GS81228	WS81228	-	1,635	
-	-	89328-M	-	13,2	K89328-M	2,57	GS89328	WS89328	-	4,8	
-	-	-	89428-M	29,8	K89428-M	8,53	GS89428	WS89428	-	10,6	
81130-TV	-	-	-	2,2	K81130-TV	0,43	GS81130	WS81130	LS150190	0,796	
-	81230-M	-	-	7,17	K81230-M	2,81	GS81230	WS81230	-	2,18	
-	-	89330-M	-	13,9	K89330-M	3,75	GS89330	WS89330	-	5,06	
-	-	-	89430-M	35,4	K89430-M	10,4	GS89430	WS89430	-	12,5	
81132-TV	-	-	-	2,12	K81132-TV	0,44	GS81132	WS81132	LS160200	0,842	
-	81232-M	-	-	7,6	K81232-M	3,01	GS81232	WS81232	-	2,3	
-	-	89432-M	-	42	K89432-M	12,4	GS89432	WS89432	-	14,8	
81134-TV	-	-	-	2,41	K81134-TV	0,66	GS81134	WS81134	-	1,1	
-	81234-M	-	-	9,3	K81234-M	3,5	GS81234	WS81234	-	2,9	
-	-	-	89434-M	51,9	K89434-M	14,9	GS89434	WS89434	-	18,5	



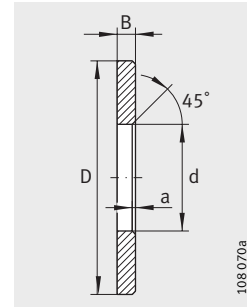
K893, K894



GS811, GS812,
GS893, GS894



WS811, WS812,
WS893, WS894

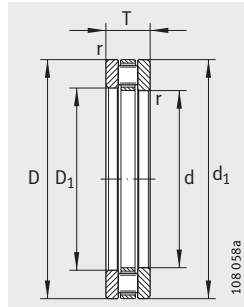


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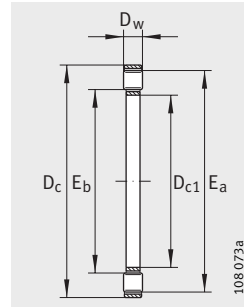


Dimensions					Raceway dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed		
D _{c1}	D ₁	D _c	d ₁	T	D _w	B	a	E _b	E _a	dyn. C _a	stat. C _{0a}	C _{ua}	n _G	n _B
d		D					r			N	N	N	min ⁻¹	min ⁻¹
							min.							
110	112	145	145	25	11	7	1	114	141	207 000	700 000	62 000	2 260	850
110	113	160	160	38	15	11,5	1,1	117	152	325 000	1 030 000	98 000	2 130	860
110	113	190	190	48	15	16,5	2	120	185	500 000	1 870 000	166 000	1 920	790
110	113	230	230	73	24	24,5	3	121	223	1 000 000	3 400 000	315 000	1 690	640
120	122	155	155	25	11	7	1	124	151	214 000	760 000	65 000	2 090	780
120	123	170	170	39	15	12	1,1	127	162	340 000	1 120 000	104 000	1 990	790
120	123	210	210	54	17	18,5	2,1	132	205	640 000	2 420 000	210 000	1 750	690
120	123	250	250	78	26	26	4	133	243	1 160 000	4 000 000	365 000	1 560	580
130	132	170	170	30	12	9	1	135	165	250 000	900 000	79 000	1 920	760
130	133	190	187	45	19	13	1,5	137	181	480 000	1 520 000	143 000	1 800	710
130	134	225	225	58	18	20	2,1	141	219	710 000	2 700 000	237 000	1 620	650
130	134	270	270	85	28	28,5	4	145	263	1 330 000	4 600 000	405 000	1 440	530
140	142	180	178	31	12	9,5	1	145	175	260 000	960 000	83 000	1 800	710
140	143	200	197	46	19	13,5	1,5	151	195	455 000	1 450 000	133 000	1 690	730
140	144	240	240	60	19	20,5	2,1	152	234	820 000	3 200 000	275 000	1 520	570
140	144	280	280	85	28	28,5	4	155	273	1 380 000	4 950 000	430 000	1 370	490
150	152	190	188	31	12	9,5	1	155	185	270 000	1 020 000	86 000	1 690	660
150	153	215	212	50	21	14,5	1,5	162	210	590 000	1 940 000	175 000	1 580	650
150	154	250	250	60	19	20,5	2,1	162	244	840 000	3 350 000	285 000	1 440	510
150	154	300	300	90	30	30	4	167	293	1 570 000	5 700 000	495 000	1 280	445
160	162	200	198	31	12	9,5	1	165	195	260 000	990 000	82 000	1 600	670
160	163	225	222	51	21	15	1,5	171	219	600 000	2 030 000	181 000	1 500	610
160	164	320	320	95	32	31,5	5	179	313	1 780 000	6 500 000	560 000	1 200	410
170	172	215	213	34	14	10	1,1	176	209	360 000	1 380 000	116 000	1 500	570
170	173	240	237	55	22	16,5	1,5	184	233	680 000	2 340 000	207 000	1 400	600
170	174	340	340	103	34	34,5	5	191	333	1 990 000	7 400 000	640 000	1 130	375

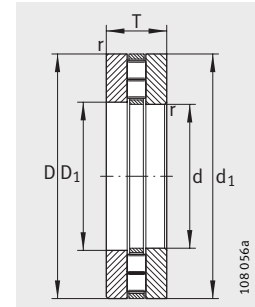
Axial cylindrical roller bearings



811, 812

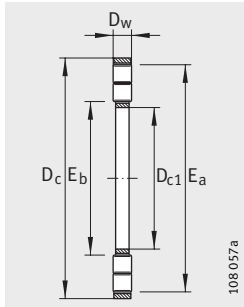


K811, K812

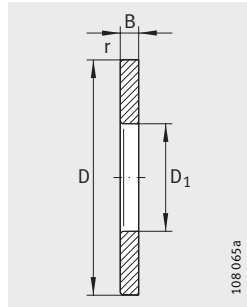


893, 894

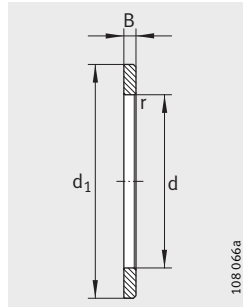
Dimension table (continued) · Dimensions in mm								
Axial cylindrical roller bearings				Axial cylindrical roller bearing and cage assembly		Axial bearing washers		
Complete bearings			Mass m	Designation	Mass m	Housing locating washer	Shaft locating washer	Mass m
Designation			≈kg		≈kg	Designation	Designation	≈kg
81136-M	–	–	3,3	K81136-M	1,46	GS81136	WS81136	1,12
–	81236-M	–	9,9	K81236-M	3,67	GS81236	WS81236	3,13
–	–	89436-M	60	K89436-M	17,6	GS89436	WS89436	21,3
81138-M	–	–	4,74	K81138-M	1,84	GS81138	WS81138	1,45
–	81238-M	–	12,8	K81238-M	5,17	GS81238	WS81238	3,835
–	–	89438-M	72,1	K89438-M	20,9	GS89438	WS89438	25,6
81140-M	–	–	4,95	K81140-M	1,93	GS81140	WS81140	1,51
–	81240-M	–	14,2	K81240-M	5,4	GS81240	WS81240	4,41
–	–	89440-M	82,6	K89440-M	24	GS89440	WS89440	29,3
81144-M	–	–	5,22	K81144-M	2,04	GS81144	WS81144	1,59
–	81244-M	–	15,3	K81244-M	5,8	GS81244	WS81244	4,75
–	–	89444-M	90,1	K89444-M	25,7	GS89444	WS89444	32,2
81148-M	–	–	8,45	K81148-M	3,32	GS81148	WS81148	2,57
–	81248-M	–	26,2	K81248-M	9,94	GS81248	WS81248	8,15
–	–	89448-M	95,9	K89448-M	27,3	GS89448	WS89448	34,3
81152-M	–	–	9,08	K81152-M	3,55	GS81152	WS81152	2,765
–	81252-M	–	28,6	K81252-M	10,8	GS81252	WS81252	8,9
–	–	89452-M	125	K89452-M	36,8	GS89452	WS89452	44,25
81156-M	–	–	12,6	K81156-M	5,31	GS81156	WS81156	3,65
–	81256-M	–	31	K81256-M	11,5	GS81256	WS81256	9,75
–	–	89456-M	159	K89456-M	47,5	GS89456	WS89456	55,6
81160-M	–	–	19,4	K81160-M	7,6	GS81160	WS81160	5,92
–	81260-M	–	48,25	K81260-M	17,8	GS81260	WS81260	15,2
–	–	89460-M	170	K89460-M	49,8	GS89460	WS89460	60,15
81164-M	–	–	20,7	K81164-M	8,04	GS81164	WS81164	6,35
–	–	89464-M	203	K89464-M	80,3	GS89464	WS89464	61,5



K893, K894



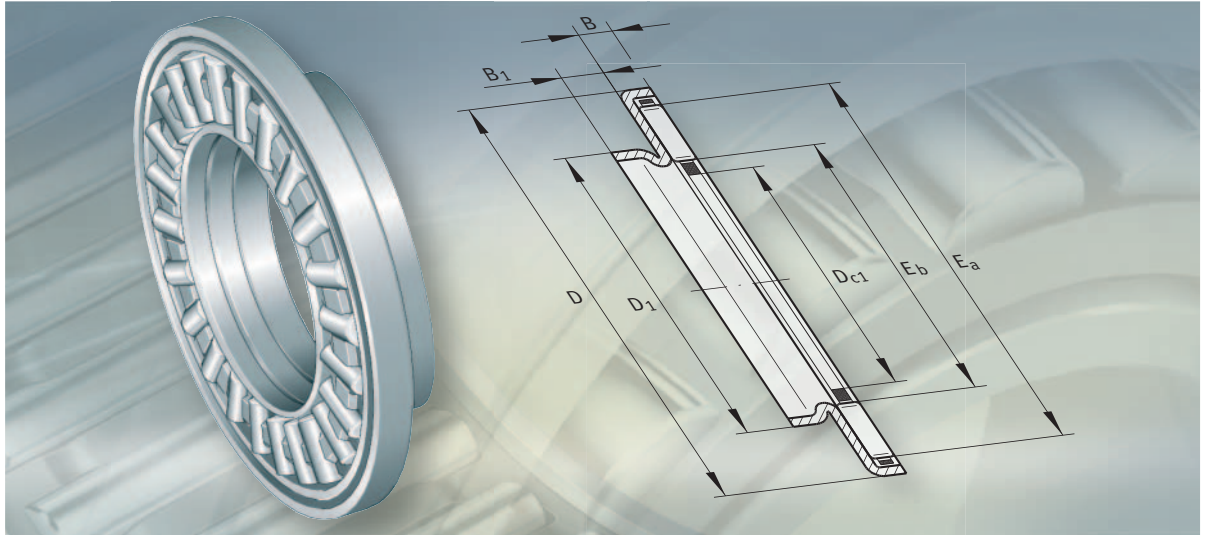
GS811, GS812,
GS893, GS894



WS811, WS812,
WS893, WS894



Dimensions					Raceway dimensions		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed			
D _{c1}	D ₁	D _c	d ₁	T	D _w	B	a	E _b	E _a	dyn. C _a	stat. C _{0a}	C _{ua}	n _G	n _B
d		D					r			N	N	N	min ⁻¹	min ⁻¹
							min.							
180	183	225	222	34	14	10	1,1	186	220	340 000	1 300 000	107 000	1 420	590
180	183	250	247	56	22	17	1,5	194	243	690 000	2 440 000	213 000	1 340	580
180	184	360	360	109	36	36,5	5	200	351	2 210 000	8 200 000	690 000	1 070	360
190	193	240	237	37	15	11	1,1	198	234	385 000	1 500 000	123 000	1 340	570
190	194	270	267	62	26	18	2	205	263	880 000	3 000 000	270 000	1 250	530
190	195	380	380	115	38	38,5	5	212	371	2 450 000	9 200 000	770 000	1 100	330
200	203	250	247	37	15	11	1,1	208	244	390 000	1 550 000	125 000	1 280	530
200	204	280	277	62	26	18	2	215	273	900 000	3 150 000	280 000	1 200	485
200	205	400	400	122	40	41	5	224	391	2 700 000	10 200 000	840 000	960	315
220	223	270	267	37	15	11	1,1	228	264	420 000	1 730 000	137 000	1 180	470
220	224	300	297	63	26	18,5	2	236	294	940 000	3 450 000	295 000	1 110	435
220	225	420	420	122	40	41	6	244	411	2 900 000	11 500 000	940 000	900	270
240	243	300	297	45	18	13,5	1,5	253	294	600 000	2 500 000	199 000	1 070	440
240	244	340	335	78	32	23	2,1	263	333	1 370 000	5 000 000	425 000	990	395
240	245	440	440	122	40	41	6	264	431	3 000 000	12 200 000	980 000	850	250
260	263	320	317	45	18	13,5	1,5	272	314	620 000	2 650 000	205 000	990	390
260	264	360	355	79	32	23,5	2,1	281	351	1 440 000	5 400 000	455 000	930	355
260	265	480	480	132	44	44	6	286	468	3 600 000	14 700 000	1 160 000	780	224
280	283	350	347	53	22	15,5	1,5	294	344	860 000	3 650 000	285 000	910	345
280	284	380	375	80	32	24	2,1	301	371	1 460 000	5 600 000	465 000	870	335
280	285	520	520	145	48	48,5	6	309	508	4 200 000	17 600 000	1 360 000	720	199
300	304	380	376	62	25	18,5	2	316	372	1 060 000	4 500 000	355 000	850	330
300	304	420	415	95	38	28,5	3	329	412	1 930 000	7 300 000	600 000	800	305
300	305	540	540	145	48	48,5	6	329	528	4 350 000	18 500 000	1 420 000	690	188
320	324	400	396	63	25	19	2	336	392	1 100 000	4 750 000	370 000	800	290
320	325	580	575	155	68	43,5	7,5	343	566	5 500 000	19 900 000	1 430 000	640	185



Axial needle roller and cage assemblies
Axial bearing washers
Axial needle roller bearings

Axial needle roller and cage assemblies, washers, axial needle roller bearings



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Product overview Axial needle roller and cage assemblies,
washers, axial needle roller bearings

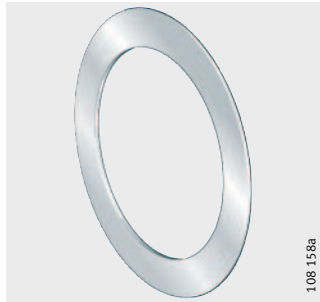
**Axial needle roller
and cage assemblies**

AXK



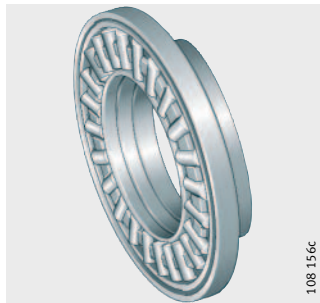
Axial bearing washers

AS



**Axial needle roller bearings
With centring spigot**

AXW



Other products

AX



Axial needle roller and cage assemblies, washers, axial needle roller bearings



Features

Axial needle roller and cage assemblies

Axial needle roller and cage assemblies AXK correspond to DIN 5 405-2. They comprise plastic or metal axial cages with integral needle rollers and have a very low axial section height.

The cage assemblies can support high axial forces in one direction. Radial loads must be supported by separate means.

Axial needle roller and cage assemblies require hardened and ground running surfaces as a raceway.

Axial bearing washers

Axial bearing washers AS are punched, through hardened, polished and suitable for use as shaft or housing locating washers. They correspond to DIN 5 405-3 and are suitable for use with axial needle roller and cage assemblies AXK.

These washers are suitable for use where the adjacent machine part is unhardened but is sufficiently rigid and geometrically accurate.

Axial needle roller bearings

Axial needle roller bearings AXW are units comprising axial needle roller and cage assemblies AXK and axial bearing washers with centring spigot. They can be combined with drawn cup needle roller bearings with open ends or with closed end, and with needle roller bearings.

The running surface for the needle roller and cage assembly must be hardened and ground.

Operating temperature

Needle roller and cage assemblies and needle roller bearings with plastic cage are suitable for operating temperatures from -20 °C to $+120\text{ °C}$.

Cages

Cage assemblies with a plastic cage have the suffix TV.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffixes	Description	Design
TV ¹⁾	Plastic cage made from glass fibre reinforced polyamide 66	Standard
RR	Corrosion-resistant design, with Corrotect [®] plating	Special design ²⁾

¹⁾ Axial needle roller and cage assemblies with plastic cage: see dimension table.

²⁾ Available by agreement.

Other products

Axial needle roller bearings are available in a special range with two raceways in various sizes; see Technical Publication API 18.

Axial needle roller and cage assemblies, washers, axial needle roller bearings

Design and safety guidelines

Axial bearing washers AS must always be fully supported on their entire abutment surface.

The abutment shoulders should be rigid, flat and perpendicular to the axis of rotation.

Running surfaces

Radial cage running surfaces should be precision machined and resistant to wear, $R_a 0,8$ ($R_z 4$).

Raceways for axial needle roller and cage assemblies should be precision machined and resistant to wear:

- raceway hardness 58 HRC to 64 HRC
- hardening depth $R_{ht} \geq 140 \cdot D_W / R_{p0,2}$
 - R_{ht} , hardening depth in mm
 - D_W , rolling element diameter in mm
 - $R_{p0,2}$, proof stress in N/mm^2
- roughness $R_a 0,2$ ($R_z 1$)
- raceway dimensions E_a and E_b according to the dimension table must be observed
- runout tolerances to ISO tolerance grade IT 5, for special requirements to IT 4, in relation to the inside diameter of the cage assemblies (D_{c1}) must be observed.

Tolerances for shaft and housing bore

If axial needle roller bearings AXW are combined with drawn cup needle roller bearings or machined needle roller bearings, the same tolerances must be selected for the housing bore on the centring spigot as for the radial bearings.

Housing bore and shaft tolerances

Bearing component		Shaft tolerance	Bore tolerance
AXK	Guided on shaft	h8	–
AS	As housing locating washer	Clear of shaft	H9
	As shaft locating washer	h8	Clear of housing

Speeds

Caution!

The limiting speeds n_G given in the dimension tables for AXK and AXW are for oil lubrication.

With grease lubrication, the permissible value is 25% of the value given in the table. Higher speeds may be possible by agreement.

Minimum axial load

A minimum axial load $F_{a \min}$ according to the formula must be applied.

$$F_{a \min} = 0,0005 \cdot C_{0a} + k_a \left(\frac{C_{0a} \cdot n}{10^8} \right)^2$$

$F_{a \min}$	N
Minimum axial load	
k_a	–
Factor for determining the minimum load; $k_a = 3$	
C_{0a}	N
Basic static load rating, axial	
n	min^{-1}
Speed.	

Orientation of washers

Axial bearing washers AS are suitable as raceways on both sides.

**Accuracy
Tolerances for
bearing components**

Tolerances for bearing components: see table and *Figure 1*.

The diameter sort tolerance of the needle rollers in the axial needle roller and cage assembly AXK is 2 μm.

Axial bearing washers AS match themselves to the accuracy of the contact surface. They are flat under a minimum concentric load of 200 N.



Tolerances

Series	Bore		Outside diameter		Height	
		Tolerance		Tolerance		Tolerance
AXK	D_{c1}	E12	D_c	c13	D_w	-0,01 mm
AXW	D_{c1}	E12	-	-	B	-0,2 mm
AS	d	E13	D	e13	B_1	±0,05 mm

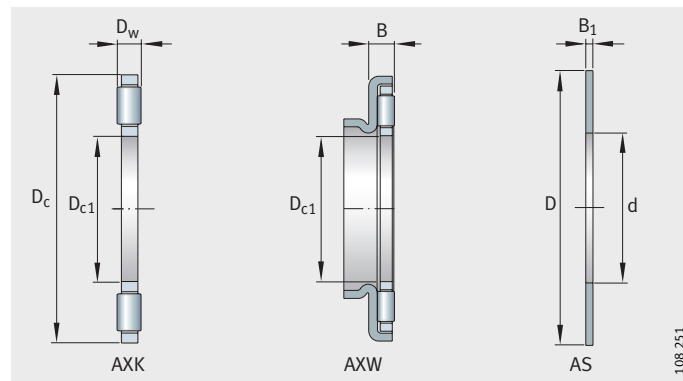
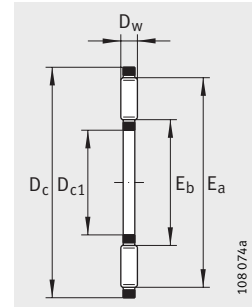


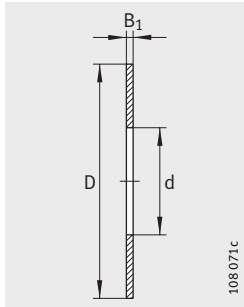
Figure 1
Bearing components

Axial needle roller and cage assemblies Axial bearing washers



AXK

Dimension table · Dimensions in mm							
Axial needle roller and cage assemblies		Axial bearing washers		Dimensions			
Designation	Mass m ≈g	Designation	Mass m ≈g	D _{c1} /d	D _c /D	D _w	B ₁
AXK0414-TV	0,7	AS0414	1	4	14	2	1
AXK0515-TV	0,8	AS0515	1	5	15	2	1
AXK0619-TV	1	AS0619	2	6	19	2	1
AXK0821-TV	2	AS0821	2	8	21	2	1
AXK1024	3	AS1024	3	10	24	2	1
AXK1226	3	AS1226	3	12	26	2	1
AXK1528	4	AS1528	3	15	28	2	1
AXK1730	4	AS1730	4	17	30	2	1
AXK2035	5	AS2035	5	20	35	2	1
AXK2542	7	AS2542	7	25	42	2	1
AXK3047	8	AS3047	8	30	47	2	1
AXK3552	10	AS3552	9	35	52	2	1
AXK4060	16	AS4060	12	40	60	3	1
AXK4565	18	AS4565	13	45	65	3	1
AXK5070	20	AS5070	14	50	70	3	1
AXK5578	28	AS5578	18	55	78	3	1
AXK6085	33	AS6085	22	60	85	3	1
AXK6590	35	AS6590	24	65	90	3	1
AXK7095	60	AS7095	25	70	95	4	1
AXK75100	61	AS75100	27	75	100	4	1
AXK80105	63	AS80105	28	80	105	4	1
AXK85110	67	AS85110	29	85	110	4	1
AXK90120	86	AS90120	39	90	120	4	1
AXK100135	104	AS100135	50	100	135	4	1
AXK110145	122	AS110145	55	110	145	4	1
AXK120155	131	AS120155	59	120	155	4	1
AXK130170	205	AS130170	65	130	170	5	1
AXK140180	219	AS140180	79	140	180	5	1
AXK150190	232	AS150190	84	150	190	5	1
AXK160200	246	AS160200	89	160	200	5	1



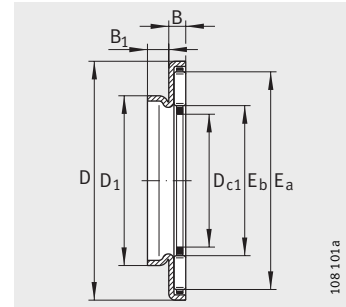
AS



Raceway dimensions		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
E_b	E_a	dyn. C_a N	stat. C_{0a} N	C_{ua} N	n_G min^{-1}	n_B min^{-1}
5	13	4 400	8 000	940	21 400	14 900
6	14	4 750	9 200	1 070	20 500	13 000
7	18	6 800	15 500	1 580	18 800	10 800
9	20	7 800	19 400	1 970	17 700	8 800
12	23	9 200	25 500	2 500	16 900	7 400
14	25	9 900	29 000	2 850	15 200	6 500
17	27	11 300	36 000	3 600	13 400	5 100
19	29	11 900	39 500	3 950	12 300	4 600
22	34	13 100	46 500	4 750	10 500	4 350
29	41	14 700	58 000	5 900	8 600	3 850
34	46	16 300	70 000	7 100	7 500	3 200
39	51	17 800	81 000	8 300	6 600	2 800
45	58	28 000	114 000	11 800	5 800	2 440
50	63	30 000	128 000	13 300	5 200	2 170
55	68	32 000	143 000	14 800	4 800	1 950
60	76	38 000	186 000	20 300	4 350	1 780
65	83	44 500	234 000	26 500	3 950	1 590
70	88	46 500	255 000	28 500	3 700	1 470
74	93	54 000	255 000	26 500	3 500	1 430
79	98	55 000	265 000	28 000	3 300	1 350
84	103	56 000	280 000	29 500	3 100	1 280
89	108	58 000	290 000	30 500	2 950	1 220
94	118	73 000	405 000	44 500	2 750	1 120
105	133	91 000	560 000	58 000	2 450	980
115	143	97 000	620 000	63 000	2 260	890
125	153	102 000	680 000	68 000	2 090	810
136	167	133 000	840 000	75 000	1 920	760
146	177	138 000	900 000	79 000	1 800	710
156	187	143 000	960 000	82 000	1 690	660
166	197	148 000	1 020 000	86 000	1 600	620

Axial needle roller bearings

With centring spigot

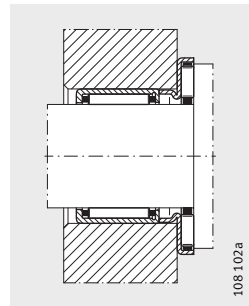


AXW

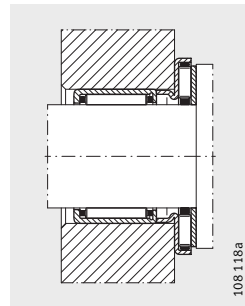
Dimension table · Dimensions in mm													
Designation	Mass m ≈ g	Dimensions					Raceway dimensions		Basic load ratings		Fatigue limit load C_{ua} N	Limiting speed n_G min ⁻¹	Reference speed n_B min ⁻¹
		D_{c1}	D_1	D	B	B_1	E_b	E_a	dyn. C_a N	stat. C_{0a} N			
AXW10	8,3	10	14	27	3,2	3	12	23	9 200	25 500	2 500	15 600	8 300
AXW12	9,1	12	16	29	3,2	3	14	25	9 900	29 000	2 850	14 000	7 300
AXW15	10	15	21	31	3,2	3,5	17	27	11 300	36 000	3 600	12 500	5 800
AXW17	11	17	23	33	3,2	3,5	19	29	11 900	39 500	3 950	11 500	5 300
AXW20	14	20	26	38	3,2	3,5	22	34	13 100	46 500	4 750	9 900	4 900
AXW25	20	25	32	45	3,2	4	29	41	14 700	58 000	5 900	8 200	4 250
AXW30	22	30	37	50	3,2	4	34	46	16 300	70 000	7 100	7 200	3 600
AXW35	27	35	42	55	3,2	4	39	51	17 800	81 000	8 300	6 400	3 100
AXW40	39	40	47	63	4,2	4	45	58	28 000	114 000	11 800	5 600	2 700
AXW45	43	45	52	68	4,2	4	50	63	30 000	128 000	13 300	5 100	2 400
AXW50	49	50	58	73	4,2	4,5	55	68	32 000	143 000	14 800	4 700	2 160

¹⁾ Dimensions for axial bearing washers AS, for drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with open end and needle roller bearings: see corresponding product section.

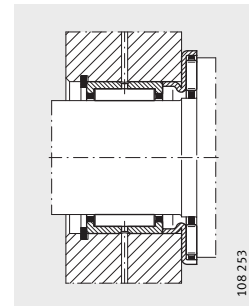
Combination with radial needle roller bearings



AXW with HK



AXW with AS and HK



AXW with NK, NKS, RNA49, RNA69

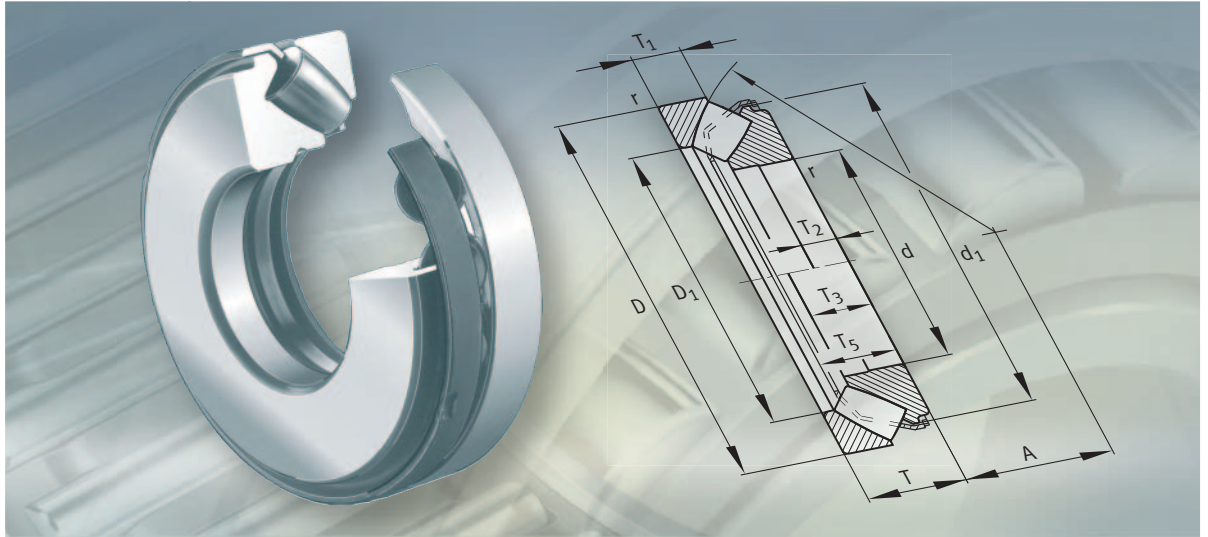


Combination with drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end and with needle roller bearings

Designation

AS	HK	HK...RS	BK	NK, NKS, RNA49, RNA69 Needle roller bearings ¹⁾	NKI, NKIS, NA49, NA69 Needle roller bearings ¹⁾
AS1024	HK1010, HK1012	–	BK1010, BK1012	NK7/10TV	–
–	HK1015	–	BK1015	NK7/12TV	–
AS1226	HK1210	–	BK1210	NK9/12TV	NKI6/12TV
–	–	–	–	NK9/16TV	NKI6/16TV
AS1528	HK1512, HK1516	HK1514-RS	BK1512, BK1516	–	–
–	HK1522-ZW	–	–	–	–
AS1730	HK1712	–	–	NK15/16, NK15/20	–
AS2035	HK2012, HK2016	HK2018-RS	BK2016	NK18/16, NK18/20	–
–	HK2020	–	BK2020	–	–
–	HK2030-ZW	–	–	–	–
AS2542	HK2512, HK2516	HK2518-RS	–	NK24/16, NK24/20	NKI20/16
–	HK2520, HK2526	–	BK2520, BK2526	NKS20	NKI20/20
–	HK2538-ZW	–	BK2538-ZW	–	–
AS3047	HK3012, HK3016	HK3018-RS	BK3012, BK3016	NK28/20, NK28/30	NA4904
–	HK3020, HK3026	–	BK3020, BK3026	NKS 24	NA6904
–	HK3038-ZW	–	BK3038-ZW	RNA4904, RNA6904	–
AS3552	HK3512, HK3516	HK3518-RS	–	NK32/20, NK32/30	NKIS20, NA4905
–	HK3520	–	BK3520	NKS28	NA6905
–	–	–	–	RNA4905, RNA6905	NKI28/20 NKI28/30
AS4060	HK4012, HK4016	HK4018-RS	–	NK37/20, NK37/30	NKIS25, NA4906
–	HK4020	–	BK4020	NKS32	NA6906
–	–	–	–	RNA4906, RNA6906	NKI32/20
–	–	–	–	–	NKI32/30
AS4565	HK4516, HK4520	HK4518-RS	BK4520	NK42/20, NK42/30	NKIS30
–	–	–	–	NKS37	NA49/32
–	–	–	–	RNA49/32, RNA69/32	NA69/32
AS5070	HK5020, HK5025	HK5022-RS	–	NKS43	NKIS35

FAG



Axial spherical roller bearings

Axial spherical roller bearings

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Product overview Axial spherical roller bearings

Increased capacity design

292..-E, 293..-E, 294..-E



Axial spherical roller bearings

Features Axial spherical roller bearings are single row, self-aligning roller bearings. They comprise solid shaft and housing locating washers and asymmetrical barrel rollers with cages. The cage holds the roller and cage assembly and the shaft locating washer together. The bearings can be dismantled. As a result, the bearing components can be fitted separately.

Axial and radial load capacity Axial spherical roller bearings can support very high axial loads and allow relatively high speeds. Since the raceways are inclined relative to the bearing axis, the bearings can also support radial loads. Radial loading: see page 788.

Sealing/lubrication Axial spherical roller bearings are not sealed and not greased. They must be lubricated using oil.

Compensation of angular misalignments Axial spherical roller bearings can be swivelled about their central position by a few degrees, see table Permissible skewing. As a result, they permit skewing between the housing and shaft locating washer and can thus compensate misalignments, shaft deflections and housing deformations.

The adjustment angles in the table are permissible under the following conditions:

- P or $P_0 \leq 0,05 \cdot C_{0a}$
- constant angular deviation (static angular misalignment)
- rotating shaft locating washer.

The lower values are valid for large bearings.

Permissible skewing

Series	Permissible skewing ¹⁾
292..-E	1° to 1,5°
293..-E	1,5° to 2,5°
294..-E	2° to 3°

¹⁾ If the housing locating washer rotates or the shaft locating washer undergoes tumbling motion, the angular adjustment facility is smaller.

Operating temperature

Axial spherical roller bearings can be used at operating temperatures from -30 °C to +150 °C, restricted by the lubricant.

Cages

The standard cages for axial spherical roller bearings are shown in the table Cage/bore code.

Bearings with solid brass cages have the suffix MB. The other bearings have sheet steel cages and do not have a cage suffix.

Cage/bore code

Series	Sheet steel cage	Solid brass cage
	Bore code	
292..-E	-	all
293..-E	up to 64	from 68
294..-E	up to 68	from 72

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description
E	Increased capacity design
MB	Solid brass cage



Axial spherical roller bearings

Design and safety guidelines Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

$$P = F_a + 1,2 \cdot F_r$$

P N
Equivalent dynamic bearing load for combined load
F_a N
Axial dynamic bearing load
F_r N
Radial dynamic bearing load.

Radial load

Caution!

The radial bearing load must not exceed 55% of the axial load:
 $F_r \leq 0,55 \cdot F_a$.

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0a} + 2,7 \cdot F_{0r}$$

P₀ N
Equivalent static bearing load for combined load
F_{0a} N
Axial static bearing load
F_{0r} N
Radial static bearing load.

Radial load

Caution!

The radial bearing load must not exceed 55% of the axial load:
 $F_{0r} \leq 0,55 \cdot F_{0a}$.

Static load safety factor

For the static load safety factor S₀, the following values must be observed:

Static load safety factor

Static load safety factor S ₀	Conditions
S ₀ ≥ 8	Axial support by the abutting shoulders in accordance with the bearing tables (d _a and D _a)
S ₀ ≥ 6	Full axial support of the housing and shaft locating washers by the entire mating surface, dimensions D ₁ and d ₁ (see dimension table)
S ₀ ≥ 4	Full axial support, dimensions D ₁ and d ₁ (see dimension table) together with good radial support of the housing locating washer (housing tolerance K7)

Minimum axial load

At higher speeds, harmful sliding movement can occur between the rolling elements and raceways due to centrifugal forces and gyroscopic moments. To avoid this, the bearings must be subjected to a minimum load $F_{a\ min}$ according to the formula. The minimum load can be applied by preloading.

$$F_{a\ min} = \frac{C_{0a}}{1400} + A \left(\frac{D \cdot T \cdot n}{10^6} \right)^2$$

$F_{a\ min}$	N
Minimum axial load	
C_{0a}	N
Basic static load rating, see dimension table	
A	–
Factor dependent on the series, see table	
D	mm
Outside diameter of housing locating washer	
T	mm
Total height	
n	min ⁻¹
Maximum speed.	



Factor dependent on series

Series	Factor A
292...E	2,7
293...E	3,1
294...E	2,1

Speeds

Caution!

The limiting speeds n_G given in the dimension tables must not be exceeded. The values are for oil lubrication.

The reference speeds n_B were calculated according to ISO 15 312.

Design of adjacent parts

The abutting shoulders should be rigid, flat and perpendicular to the axis of rotation.

A recess of diameter $D_{b\ min}$ according to the dimension table must be provided above the housing locating washer in the housing bore. Otherwise, the rollers will foul the housing when the shaft swivels.

Tolerances for shaft and housing

The runout tolerances of the abutting shoulders should be to IT5 or better. The tolerances for the shaft and locating bore must be applied in accordance with the table.

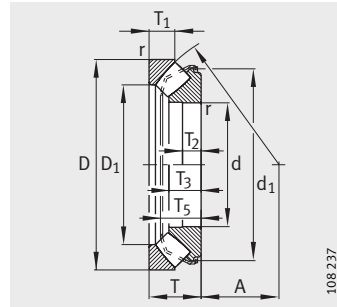
Shaft/housing tolerances

Adjacent part	Load type	Operating conditions	Tolerance
Shaft	Combined load	Point load for shaft locating washer	j6
		Circumferential load for shaft locating washer, shaft diameter up to 200 mm	j6 (k6)
		Circumferential load for shaft locating washer, shaft diameter from 200 mm	k6 (m6)
Housing	Axial load	Normal load	E8
		High load	G7
	Combined load	Point load for housing locating washer	H7
		Circumf. load for housing locating washer	K7

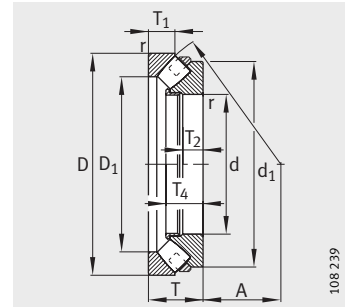
Accuracy

The main dimensions of the bearings conform to ISO 104 and DIN 728. The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620-3.

Axial spherical roller bearings

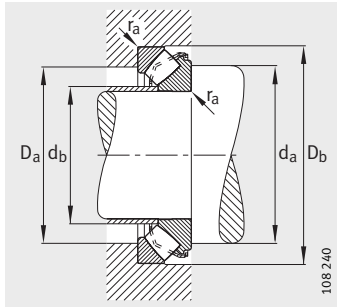


293...-E, 294...-E

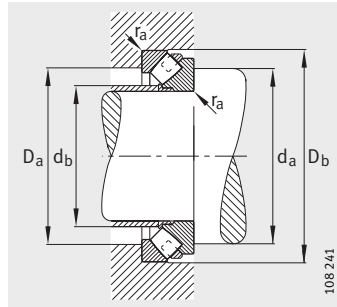


292...-E-MB

Dimension table · Dimensions in mm													
Designation	Mass m ≈kg	Dimensions											
		d	D	T	D ₁	d ₁	r	T ₁	T ₂	T ₃	T ₄	T ₅	A
29412-E	2,23	60	130	42	88	115	1,5	20	15	27	–	36	38
29413-E	3,03	65	140	45	94	125	2	21	16	29,5	–	38	42
29414-E	3,71	70	150	48	102	135	2	23	17	31	–	40	44
29415-E	4,4	75	160	51	108	140	2	24	18	33,5	–	43	47
29416-E	5,28	80	170	54	116	150	2,1	26	19	35	–	45	50
29317-E	2,54	85	150	39	111	135	1,5	19	14	24,5	–	33	50
29417-E	5,89	85	180	58	123	160	2,1	28	21	37	–	48	54
29318-E	2,65	90	155	39	115	140	1,5	19	14	24,5	–	33	52
29418-E	7,38	90	190	60	130	170	2,1	29	22	39	–	50	56
29320-E	3,38	100	170	42	129	155	1,5	20,8	15	26	–	36	58
29420-E	10	100	210	67	142	185	3	32	24	43	–	55	62
29322-E	5,04	110	190	48	142	175	2	23	17	30,3	–	41	64
29422-E	13,1	110	230	73	158	205	3	35	26	47	–	60	69
29324-E	6,9	120	210	54	158	190	2,1	26	19	34	–	46	70
29424-E	16,3	120	250	78	172	220	4	37	28	50,5	–	64	74
29326-E	8,49	130	225	58	169	205	2,1	28	21	36,5	–	49	76
29426-E	19	130	270	85	187	240	4	41	31	54	–	69	81
29328-E	9,87	140	240	60	181	220	2,1	29	22	38,5	–	51	82
29428-E	21,9	140	280	85	194	250	4	41	31	54	–	69	86
29330-E	10,5	150	250	60	192	230	2,1	29	22	38	–	51	87
29430-E	26,9	150	300	90	211	270	4	44	32	58	–	74	92
29332-E	13,6	160	270	67	206	245	3	32	24	42	–	56	92
29432-E	31,6	160	320	95	224	285	5	45	34	60,5	–	78	99
29334-E	14,2	170	280	67	215	255	3	32	24	42	–	57	96
29434-E	39,2	170	340	103	239	305	5	50	37	65,5	–	84	104
29336-E	18,4	180	300	73	230	275	4	35	26	46	–	61	103
29436-E	46,2	180	360	109	253	320	5	52	39	69,5	–	89	110
29338-E	22,8	190	320	78	243	295	4	38	28	49	–	66	110
29438-E	54,9	190	380	115	268	340	5	55	41	73	–	94	117
29240-E-MB	8,15	200	280	48	236	265	2	24	17	29	45	–	108
29340-E	28	200	340	85	258	310	4	41	31	53,5	–	71	116
29440-E	64,7	200	400	122	282	360	5	59	44	77	–	99	122
29244-E-MB	9,18	220	300	48	254	285	2	24	17	30	35	–	117
29344-E	29,9	220	360	85	279	330	4	41	31	53	–	71	125
29444-E	67,4	220	420	122	303	375	6	58	44	76,5	–	99	132



Mounting dimensions
293..-E, 294..-E

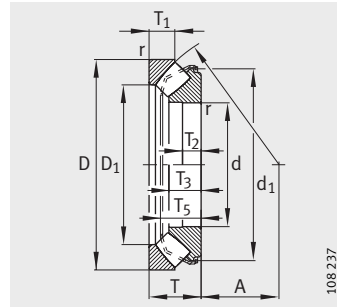


Mounting dimensions
292..-E-MB

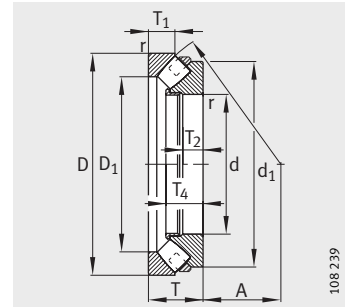


Mounting dimensions					Basic load ratings		Fatigue limit load C_{ua} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	D_b min.	d_b max.	r_a max.	dyn. C_a N	stat. C_{0a} N			
90	107	133	70	1,5	335 000	900 000	65 000	3 600	2 750
100	115	143	73	2	380 000	1 020 000	77 000	3 400	2 650
105	124	153	80	2	430 000	1 200 000	87 000	3 000	2 480
115	132	163	86	2	490 000	1 370 000	100 000	2 800	2 280
120	141	173	91	2,1	550 000	1 560 000	110 000	2 800	2 170
115	129	153	93	1,5	345 000	1 060 000	72 000	3 400	2 210
130	150	183	97	2,1	600 000	1 730 000	122 000	2 600	2 090
118	135	158	99	1,5	355 000	1 100 000	74 000	3 400	2 130
135	158	193	103	2,1	670 000	1 930 000	134 000	2 400	2 010
132	148	173	109	1,5	405 000	1 340 000	91 000	3 000	1 930
150	175	214	112	2,5	830 000	2 450 000	167 000	2 200	1 800
145	165	193	119	2	530 000	1 700 000	112 000	2 600	1 850
165	192	234	125	2,5	950 000	2 800 000	189 000	2 000	1 710
160	182	213	132	2,1	640 000	2 080 000	135 000	2 400	1 680
180	210	254	135	3	1 120 000	3 350 000	224 000	1 800	1 550
170	195	228	141	2,1	720 000	2 360 000	154 000	2 200	1 600
195	227	275	151	3	1 250 000	3 900 000	255 000	1 700	1 440
185	208	244	152	2,1	800 000	2 700 000	175 000	2 000	1 510
205	237	285	158	3	1 290 000	4 050 000	265 000	1 700	1 370
195	220	254	163	2,1	815 000	2 850 000	179 000	2 000	1 420
220	253	306	171	3	1 460 000	4 800 000	305 000	1 500	1 250
210	236	274	174	2,5	965 000	3 350 000	210 000	2 000	1 330
230	271	326	181	4	1 660 000	5 300 000	335 000	1 400	1 180
220	247	284	184	2,5	1 000 000	3 450 000	217 000	1 800	1 270
245	288	346	191	4	1 860 000	6 000 000	385 000	1 300	1 110
235	263	304	193	2,5	1 180 000	4 150 000	255 000	1 500	1 180
260	305	366	202	4	2 080 000	6 800 000	430 000	1 300	1 020
250	281	325	206	3	1 320 000	4 650 000	285 000	1 500	1 140
275	322	386	214	4	2 320 000	7 500 000	470 000	1 200	970
235	258	284	211	2	655 000	2 650 000	152 000	2 000	1 260
265	298	348	215	3	1 530 000	5 300 000	325 000	1 400	1 060
290	338	406	225	4	2 550 000	8 500 000	510 000	1 100	920
260	277	304	229	2	720 000	3 150 000	173 000	2 000	1 130
285	316	368	235	3	1 560 000	5 600 000	335 000	1 400	980
310	360	428	243	5	2 600 000	8 500 000	520 000	1 100	860

Axial spherical roller bearings



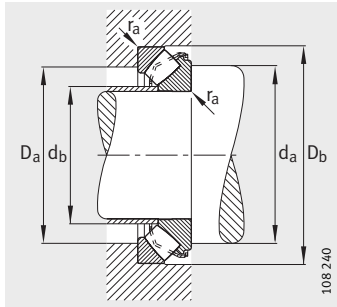
293...-E, 294...-E



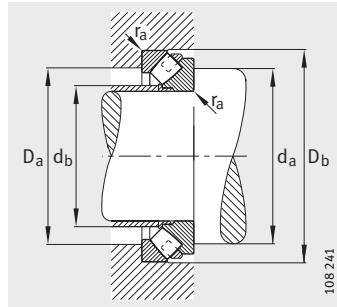
292...-E-MB, 293...-E-MB,
294...-E-MB

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions											
		d	D	T	D ₁	d ₁	r	T ₁	T ₂	T ₃	T ₄	T ₅	A
29248-E-MB	16,1	240	340	60	282	320	2,1	30	22	38	44	–	130
29348-E	32,5	240	380	85	299	350	4	41	31	53	–	71	135
29448-E	73,5	240	440	122	321	400	6	59	44	78	–	99	142
29252-E-MB	17	260	360	60	302	340	2,1	30	22	38	44	–	139
29352-E	45,2	260	420	95	327	385	5	45	34	61	–	79	148
29452-E	93,6	260	480	132	353	435	6	64	48	83	–	107	154
29256-E-MB	19,2	280	380	60	322	360	2,1	30	22	38	44	–	150
29356-E	48,8	280	440	95	346	405	5	46	34	61	–	79	158
29456-E	121	280	520	145	380	470	6	68	52	92	–	118	166
29260-E-MB	28,6	300	420	73	353	395	3	38	26	44	51	–	162
29360-E	66,4	300	480	109	378	440	5	50	39	69	–	90	168
29460-E	129	300	540	145	398	490	6	70	52	93	–	118	175
29264-E-MB	30,3	320	440	73	372	415	3	38	26	44,5	51	–	172
29364-E	71	320	500	109	396	465	5	53	39	68	–	90	180
29464-E	158	320	580	155	432	525	7,5	75	56	97	–	126	191
29268-E-MB	32	340	460	73	391	435	3	37	26	45	52	–	183
29368-E-MB	98,9	340	540	122	426	500	5	59	44	75	85	–	192
29468-E	200	340	620	170	458	560	7,5	82	61	106	–	138	201
29272-E-MB	46,5	360	500	85	423	475	4	44	31	51	59	–	194
29372-E-MB	103	360	560	122	446	520	5	59	44	75	86	–	202
29472-E-MB	219	360	640	170	475	580	7,5	82	61	108	121	–	210
29276-E-MB	48,4	380	520	85	440	490	4	42	31	53	81	–	202
29376-E-MB	132	380	600	132	474	555	6	63	48	83	94	–	216
29476-E-MB	248	380	670	175	500	610	7,5	85	63	111	124	–	230
29280-E-MB	51,2	400	540	85	460	510	4	42	31	53,5	62	–	212
29380-E-MB	137	400	620	132	493	575	6	64	48	83	94	–	225
29480-E-MB	294	400	710	185	530	645	7,5	89	67	117	131	–	236
29284-E-MB	73,4	420	580	95	489	550	5	46	34	60,5	70	–	225
29384-E-MB	157	420	650	140	520	600	6	68	50	85	97	–	235
29484-E-MB	305	420	730	185	550	665	7,5	89	67	117	132	–	244
29288-E-MB	74	440	600	95	506	570	5	49	34	61	70	–	235
29388-E-MB	176	440	680	145	548	630	6	70	52	87	100	–	245
29488-E-MB	393	440	780	206	585	710	9,5	100	74	128	144	–	260
29292-E-MB	76,3	460	620	95	528	590	5	46	34	61	70	–	245
29392-E-MB	203	460	710	150	567	660	6	72	54	94,5	108	–	257
29492-E-MB	407	460	800	206	605	730	9,5	100	74	128	144	–	272



Mounting dimensions
293..-E, 294..-E

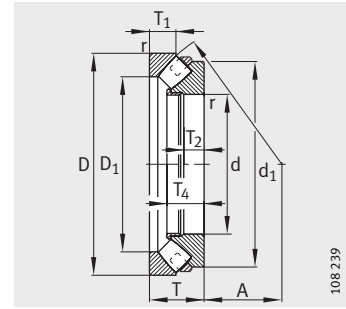


Mounting dimensions
292..-E-MB, 293..-E-MB,
294..-E-MB



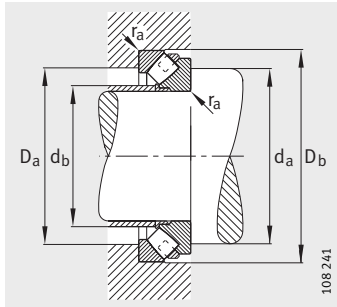
Mounting dimensions					Basic load ratings		Fatigue limit load C_{ua} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	D_b min.	d_b max.	r_a max.	dyn. C_a N	stat. C_{0a} N			
285	311	344	251	2,1	1 040 000	4 500 000	249 000	1 700	1 040
300	337	390	256	3	1 630 000	6 100 000	355 000	1 400	890
330	381	448	265	5	2 700 000	9 500 000	570 000	1 100	790
305	331	365	272	2,1	1 060 000	4 750 000	260 000	1 700	960
330	372	430	277	4	2 040 000	7 650 000	445 000	1 200	810
360	419	488	291	5	3 100 000	11 000 000	650 000	1 000	730
325	351	385	291	2,1	1 120 000	5 100 000	270 000	1 500	890
350	394	450	298	4	2 120 000	8 300 000	470 000	1 200	750
390	446	530	310	5	3 650 000	12 900 000	750 000	900	670
355	386	426	317	2,5	1 430 000	6 550 000	345 000	1 400	830
380	429	490	320	4	2 550 000	9 650 000	540 000	1 100	700
410	471	550	326	5	3 900 000	14 000 000	810 000	900	620
375	406	450	336	2,5	1 500 000	6 950 000	360 000	1 300	770
400	449	510	340	4	2 650 000	10 600 000	580 000	1 100	660
435	507	590	354	6	4 300 000	15 600 000	890 000	800	590
395	427	470	353	2,5	1 560 000	7 350 000	385 000	1 300	730
430	484	550	364	4	3 250 000	12 900 000	750 000	950	600
465	541	630	373	6	5 200 000	19 000 000	1 070 000	750	530
420	461	510	380	3	1 900 000	8 800 000	455 000	1 200	700
450	504	572	384	4	3 350 000	13 400 000	720 000	900	570
485	560	650	391	6	5 400 000	20 400 000	1 130 000	750	495
440	480	530	395	3	2 080 000	9 650 000	495 000	1 100	650
480	538	612	404	5	3 900 000	16 000 000	860 000	850	530
510	587	682	415	6	5 850 000	22 400 000	1 220 000	700	465
460	500	550	415	3	2 120 000	10 200 000	510 000	1 100	610
500	557	634	424	5	4 000 000	16 600 000	880 000	850	510
540	622	722	441	6	6 400 000	25 000 000	1 330 000	670	440
490	534	590	437	4	2 650 000	12 500 000	620 000	1 000	580
525	585	664	447	5	4 300 000	18 000 000	940 000	800	475
560	643	742	455	6	6 700 000	26 000 000	1 390 000	630	420
510	554	610	458	4	2 650 000	13 400 000	660 000	1 000	550
548	614	695	470	5	4 550 000	19 000 000	990 000	750	460
595	684	794	486	8	7 650 000	30 000 000	1 570 000	600	395
530	575	632	477	4	2 700 000	13 400 000	660 000	950	530
575	638	726	487	5	5 000 000	21 200 000	1 120 000	700	440
615	704	815	502	8	7 800 000	31 000 000	1 620 000	600	380

Axial spherical roller bearings



292..-E-MB, 293..-E-MB,
294..-E-MB

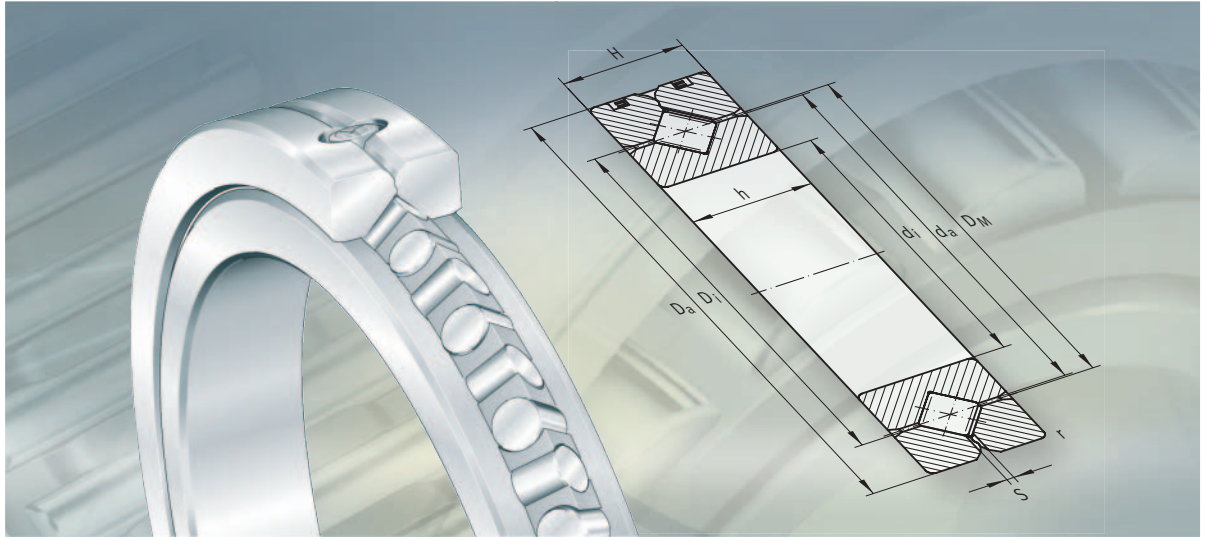
Dimension table (continued) - Dimensions in mm												
Designation	Mass m ≈kg	Dimensions										
		d	D	T	D ₁	d ₁	r min.	T ₁	T ₂	T ₃	T ₄	A
29296-E-MB	90,9	480	650	103	556	620	5	55	37	62	71	259
29396-E-MB	208	480	730	150	587	675	6	72	54	94	107	270
29496-E-MB	511	480	850	224	630	770	9,5	108	81	142	159	280
292/500-E-MB	93,5	500	670	103	574	640	5	55	37	63	72	268
293/500-E-MB	216	500	750	150	610	700	6	74	54	92	105	280
294/500-E-MB	525	500	870	224	654	790	9,5	107	81	142	160	290
292/530-E-MB	110	530	710	109	612	675	5	57	39	64	74	288
293/530-E-MB	266	530	800	160	646	745	7,5	76	58	101,5	116	295
294/530-E-MB	621	530	920	236	690	840	9,5	114	85	150,5	169	309
292/560-E-MB	131	560	750	115	642	715	5	60	41	71	111	302
294/560-E-MB	733	560	980	250	729	890	12	120	90	163	182	328
292/600-E-MB	154	600	800	122	688	760	5	65	44	71,5	82	321
294/600-E-MB	839	600	1030	258	782	940	12	127	93	162	182	347
292/630-E-MB	195	630	850	132	724	805	6	67	48	82	94	338
294/630-E-MB	1030	630	1090	280	820	995	12	136	101	176,5	198	365
292/670-E-MB	228	670	900	140	773	855	6	74	50	81	93	364
294/710-E-MB	1420	710	1220	308	916	1115	15	150	111	198	221	415
292/750-E-MB	299	750	1000	150	861	955	6	81	54	88	100	406
293/750-E-MB	716	750	1120	224	909	1045	9,5	108	81	140	159	415
292/800-E-MB	341	800	1060	155	915	1010	7,5	81	56	96	110	426
293/800-E-MB	801	800	1180	230	961	1100	9,5	112	83	145,5	165	440
293/850-E-MB	933	850	1250	243	1021	1165	12	118	87	152	173	468



Mounting dimensions



Mounting dimensions					Basic load ratings		Fatigue limit load C_{ua} N	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
d_a min.	D_a max.	D_b min.	d_b max.	r_a max.	dyn. C_a N	stat. C_{0a} N			
555	603	662	508	4	2 800 000	14 600 000	700 000	900	510
593	660	746	507	5	5 200 000	22 400 000	1 160 000	700	410
645	744	865	521	8	9 300 000	36 500 000	1 920 000	530	350
575	622	682	527	4	2 900 000	15 300 000	740 000	900	490
615	683	768	532	5	5 100 000	22 800 000	1 160 000	700	400
670	765	886	542	8	9 300 000	37 500 000	1 930 000	530	340
611	661	722	560	4	3 100 000	16 300 000	770 000	850	465
650	724	818	561	6	6 000 000	26 500 000	1 350 000	630	375
700	810	937	573	8	10 200 000	41 500 000	2 160 000	500	320
645	697	762	586	4	3 650 000	19 300 000	910 000	800	435
750	860	997	606	10	11 800 000	49 000 000	2 480 000	480	290
690	744	814	633	4	3 800 000	20 400 000	960 000	750	410
800	900	1 055	653	10	12 200 000	52 000 000	2 600 000	450	275
730	789	864	657	5	4 800 000	25 500 000	1 180 000	670	375
840	960	1 115	681	10	14 000 000	58 500 000	2 850 000	430	260
775	836	915	710	5	4 900 000	26 000 000	1 190 000	630	365
925	1 073	1 250	768	12	17 300 000	75 000 000	3 600 000	400	224
863	930	1 017	798	5	5 600 000	32 000 000	1 410 000	600	325
915	1 015	1 142	795	8	10 800 000	51 000 000	2 420 000	450	255
918	987	1 078	837	6	6 550 000	37 500 000	1 640 000	530	295
970	1 070	1 202	842	8	11 800 000	57 000 000	2 700 000	450	232
1 028	1 137	1 273	896	10	12 900 000	64 000 000	2 900 000	430	215



Crossed roller bearings

Crossed roller bearings

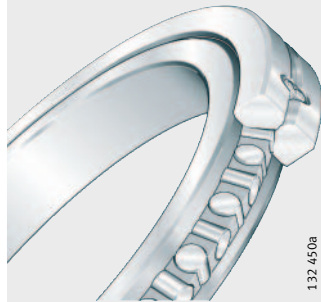
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Product overview **Crossed roller bearings**

Dimension series 18

SX



Crossed roller bearings

Features

Crossed roller bearings SX are bearings for high precision applications, whose dimensions conform to ISO dimension series 18 to DIN 616. They comprise outer rings, inner rings, rolling elements and plastic spacers. The outer ring is split and is held together by three retaining rings.

Rollers in X arrangement

Due to the X arrangement of the cylindrical rollers, these bearings can support axial forces from both directions as well as radial forces, tilting moment loads and any combination of loads by means of a single bearing position. As a result, designs involving two bearing positions can be reduced to a single bearing position, *Figure 1*, *Figure 2*.

Crossed roller bearings are very rigid, have high running accuracy and are supplied with normal clearance, low clearance or preload. Preloaded bearings have the suffix VSP.

The bearing outer rings are easily fixed to the adjacent construction using clamping rings.

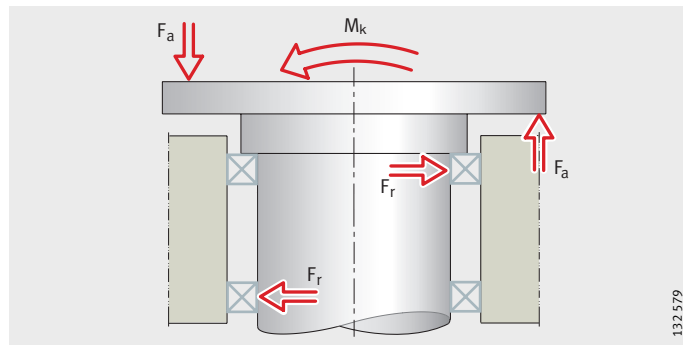


Figure 1
Bearing arrangement with two bearing positions

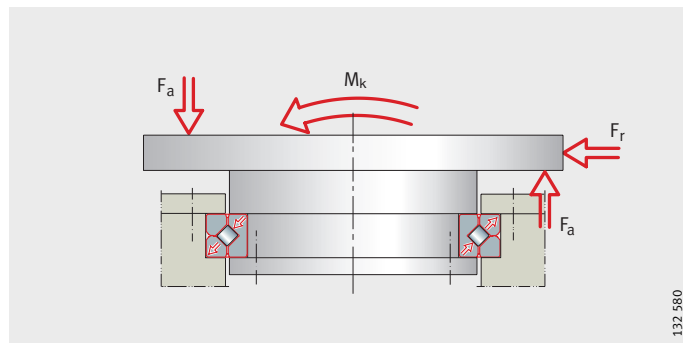


Figure 2
Bearing arrangement with one crossed roller bearing SX

The circumferential speed depends on the variant of the bearing (normal clearance or preloaded) and on the lubrication (grease or oil), see table Circumferential speed.

Circumferential speed

Normal clearance	Preload	Circumferential speed
Oil lubrication	–	up to 8 m/s ($n \cdot D_M = 152\,800$)
Grease lubrication	–	up to 4 m/s ($n \cdot D_M = 76\,400$)
–	Oil lubrication	up to 4 m/s ($n \cdot D_M = 76\,400$)
–	Grease lubrication	up to 2 m/s ($n \cdot D_M = 38\,200$)

Crossed roller bearings

Corrosion-resistant Crossed roller bearings are also available in a corrosion-resistant version with the INA special plating Corrotect®. These bearings have the suffix RR.

Sealing/lubricant The bearings are not sealed. If sealing of the bearing position is necessary, this can be freely designed as part of the adjacent construction.

Crossed roller bearings are supplied preserved with oil. Bearings should be lubricated before being put into operation. For grease lubrication, a high quality lithium soap grease DIN 51825-KP2N-20 is suitable, for example Arcanol LOAD220. For oil lubrication, suitable oils are type CLP to DIN 51517 or HLP to DIN 51524 of viscosity class ISO VG 10 to 100.

Operating temperature Crossed roller bearings are suitable for operating temperatures from -30 °C to +80 °C.

Suffixes Suffixes for available designs: see table.

Available designs

Suffixes	Description	Design
RR	Corrosion-resistant design, with Corrotect® plating	Special design ¹⁾
RLO	Low clearance	Standard
VSP	Preloaded	Standard

¹⁾ Available by agreement.

Design and safety guidelines

Static load carrying capacity

Crossed roller bearings that undergo rotary motion only infrequently, undergo slow swivel motion, rotate only slowly or are subjected to load while stationary are dimensioned on the basis of their static load carrying capacity.

The size of a statically loaded crossed roller bearing can therefore be checked in approximate terms using the basic static load ratings C_0 and the static limiting load diagrams.

Checking the static load carrying capacity

It can be checked in approximate terms if the load arrangement is in accordance with *Figure 3* and all the requirements relating to clamping rings, location, fitting and lubrication are fulfilled.

Caution! Where load arrangements are more complex or the conditions are not fulfilled, please contact us.

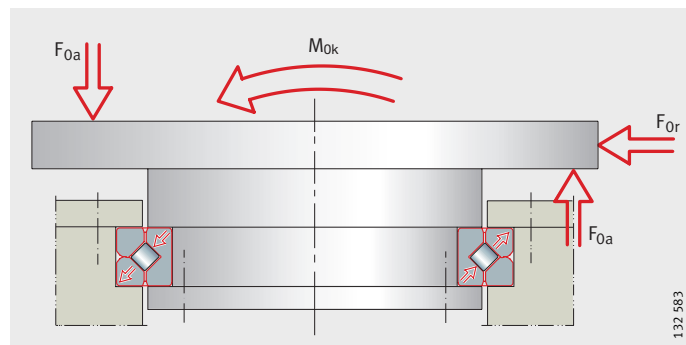


Figure 3
Load arrangement

**Determining
the equivalent static bearing load
without radial load**

In order to check the static load carrying capacity, the following equivalent static operating values must be determined:

- the equivalent static bearing load F_{0q}
- the equivalent static tilting moment load M_{0q} .

Checking is possible for applications with or without radial load.

If only axial and tilting moment loads are present, the following apply:

$$F_{0q} \triangleq F_{0a} \cdot f_A \cdot f_S$$

$$M_{0q} \triangleq M_{0k} \cdot f_A \cdot f_S$$

F_{0q} kN

Equivalent axial bearing load (static)

F_{0a} kN

Static axial bearing load

f_A –

Application factor, see table, page 804

f_S –

Factor for additional safety, see page 804

M_{0q} kNm

Equivalent tilting moment load (static)

M_{0k} kNm

Static tilting moment load.



Using the values for F_{0q} and M_{0q} , determine the load point in the static limiting load diagram Raceway, see dimension tables.

In addition to the raceway, the dimensioning of the fixing screws must also be checked.

The static limiting load diagrams for the raceway and the fixing screws are indicated in the dimension tables.

Caution! The load point must be below the raceway curve.

Crossed roller bearings

Determining the equivalent static bearing load with radial load

Caution!

Radial loads can only be taken into consideration if the radial load F_{0r} is smaller than the basic static radial load rating C_{0r} according to the dimension table.

The equivalent static bearing load with radial load is determined as follows:

- Calculate the load eccentricity parameter ϵ using the formula.
- Determine the static radial load factor f_{0r} . To do this:
 - determine the ratio F_{0r}/F_{0a} in *Figure 4* or *Figure 5*
 - from the ratio F_{0r}/F_{0a} and ϵ , determine the static radial load factor f_{0r} from *Figure 4* or *Figure 5*.
- Determine the application factor f_A according to the table, page 804, and the safety factor f_S if required.
- Calculate the equivalent axial bearing load F_{0q} and the equivalent tilting moment load M_{0q} according to the formulae.
- Using the values for F_{0q} and M_{0q} , determine the load point in the static limiting load diagram Raceway (see dimension tables).

Caution!

The load point must be below the raceway curve.

$$\epsilon = \frac{2000 \cdot M_{0k}}{F_{0a} \cdot D_M}$$

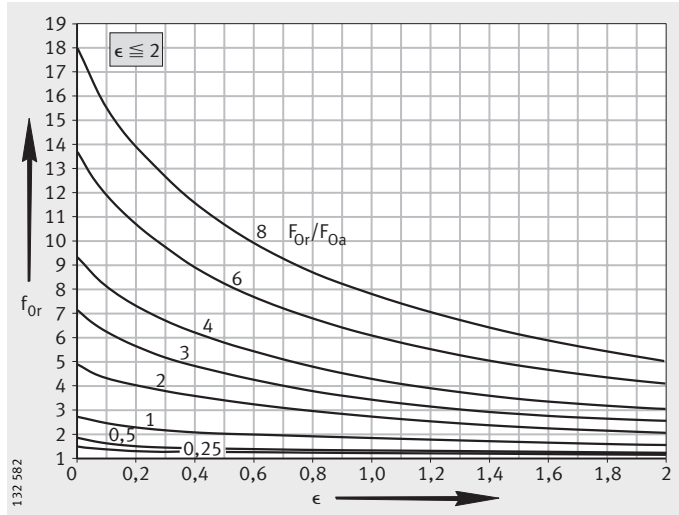
$$F_{0q} = F_{0a} \cdot f_A \cdot f_S \cdot f_{0r}$$

$$M_{0q} = M_{0k} \cdot f_A \cdot f_S \cdot f_{0r}$$

ϵ	–
Load eccentricity parameter	
M_{0k}	kNm
Static tilting moment load	
F_{0a}	kN
Static bearing load (axial)	
D_M	mm
Rolling element pitch circle diameter, see dimension table	
F_{0q}	kN
Equivalent bearing load (static)	
f_A	–
Application factor, see table, page 804	
f_S	–
Factor for additional safety, see page 804	
f_{0r}	–
Static radial load factor, see <i>Figure 4</i> and <i>Figure 5</i> , page 803	
M_{0q}	kNm
Equivalent tilting moment load (static).	

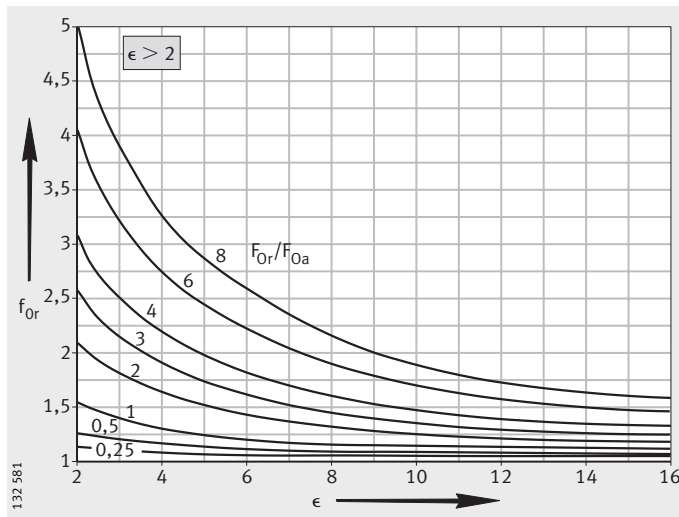
f_{Or} = static radial load factor
 ϵ = load eccentricity parameter; $\epsilon \leq 2$

Figure 4
 Static radial load factor



f_{Or} = static radial load factor
 ϵ = load eccentricity parameter; $\epsilon > 2$

Figure 5
 Static radial load factor



Crossed roller bearings

Application factors The application factors f_A in the table are empirical values. They take account of the most important requirements, e.g. the type and severity of operation, rigidity, running accuracy. If the precise requirements of an application are known, the values may be altered accordingly.

Caution! Application factors < 1 must not be used.

A large proportion of applications can be statically calculated using a factor of 1 – such as bearings for gearboxes and rotary tables.

In addition to static calculation, the life should also always be checked, see Dynamic load carrying capacity.

Application factors f_A

Application	Operating/ requirement criteria	Application factor f_A
Robots	Rigidity	1,25
Antennae	Accuracy	1,5
Machine tools	Accuracy	1,5
Measuring equipment	Smooth running	2
Medical equipment	Smooth running	1,5

Safety factors The factor for additional safety is $f_S = 1$.

It is not normally necessary to factor in any additional safety in calculation.

Caution! In special cases, such as approval specifications, internal specifications, requirements stipulated by inspection bodies etc., the appropriate safety factor should be used.

Dynamic load carrying capacity

Dynamically loaded crossed roller bearings – i.e. bearings undergoing predominantly rotary motion – are dimensioned in accordance with their dynamic load carrying capacity.

The size of a dynamically loaded bearing can therefore be checked in approximate terms using the basic dynamic load ratings C and the basic rating life L or L_h .

Determining the basic rating life

The life formulae for L and L_h are only valid:

- with a load arrangement in accordance with *Figure 6*
- if all the requirements are fulfilled in relation to location (the bearing rings must be rigid or firmly connected to the adjacent construction), fitting, lubrication and sealing
- if the load and speed can be regarded as constant during operation. If the load and speed are not constant, equivalent operating values can be determined that will result in the same fatigue conditions as the actual loads (see Equivalent operating values)
- if the load ratio is $F_r/F_a \leq 8$.

Caution! If more complex load arrangements are present, if the ratio is $F_r/F_a > 8$ or if the conditions differ from those stated, please contact us.

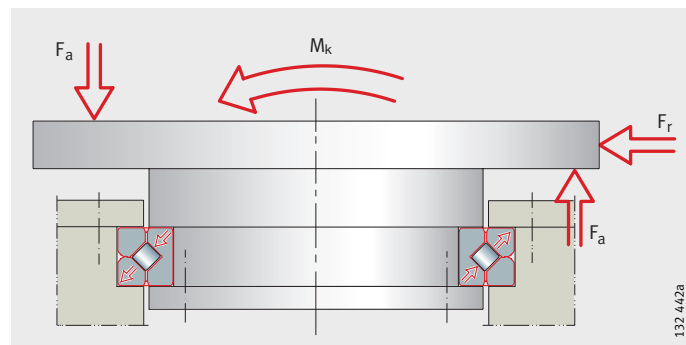


Figure 6
Load arrangement

Determining the basic rating life for bearings subjected to combined loads

For bearings subjected to combined loads – bearings with axial, radial and tilting moment loads – the life L and L_h is calculated as follows:

- Calculate the load eccentricity parameter ϵ according to the formula, page 806.
- Determine the ratio of the dynamic radial bearing load F_r to the dynamic axial bearing load F_a (F_r/F_a).
- Based on the values for ϵ and the ratio F_r/F_a , determine the dynamic load factor k_F , *Figure 7*, page 807.
- Calculate the equivalent dynamic bearing load $P_{axial} = k_F \cdot F_a$ according to the formula, page 806.
- Enter the equivalent dynamic bearing load P_{axial} and the basic dynamic axial load rating C_a in the life formulae L and L_h and calculate the life, page 806.

If swivel operation is present, enter the operating speed n calculated according to the formula in the life formula L_h , page 806.

Crossed roller bearings

Determining the basic rating life for bearings subjected to radial loads only

For slewing rings subjected to radial loads only, the following values are entered in the life formulae for L and L_h:

- instead of the equivalent dynamic axial bearing load P_{axial}, the equivalent dynamic radial bearing load P_{radial} (i. e. F_r)
 - P_{radial} = F_r
- the basic dynamic radial load rating C_r.

$$\epsilon = \frac{2000 \cdot M_k}{F_a \cdot D_M}$$

$$P_{axial} = k_F \cdot F_a$$

$$L = \left(\frac{C_a}{P_{axial}} \right)^p \text{ or } L = \left(\frac{C_r}{P_{radial}} \right)^p$$

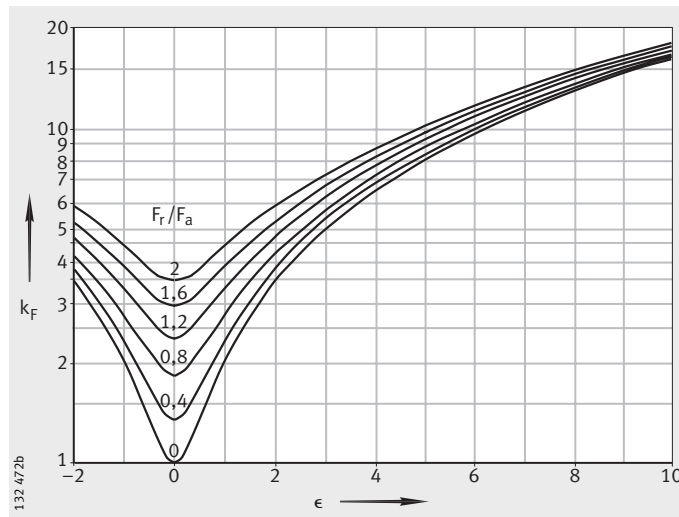
$$L_h = \frac{16666}{n} \cdot \left(\frac{C_a}{P_{axial}} \right)^p \text{ or } L_h = \frac{16666}{n} \cdot \left(\frac{C_r}{P_{radial}} \right)^p$$

$$n = n_{osc} \cdot \frac{\gamma}{90^\circ}$$

ε	–
Load eccentricity parameter	
M _k	kNm
Dynamic tilting moment load	
F _a	kN
Dynamic bearing load (axial)	
D _M	mm
Rolling element pitch circle diameter, see dimension table	
P _{axial}	kN
Equivalent dynamic axial bearing load.	
For bearings subjected to radial load only, enter P _{radial}	
k _F	–
Dynamic load factor, see <i>Figure 7</i>	
L	10 ⁶ revolutions
Basic rating life in millions of revolutions	
C _a , C _r	kN
Basic dynamic axial or radial load rating according to dimension table.	
For bearings subjected to radial load only, enter C _r	
p	–
Life exponent for crossed roller bearings: p = 10/3	
L _h	h
Basic rating life in operating hours	
n	min ⁻¹
Operating speed	
n _{osc}	min ⁻¹
Frequency of to and fro movement	
γ	°
Half of swivel angle	
P _{radial}	kN
Equivalent dynamic radial bearing load	
F _r	kN
Dynamic bearing load (radial).	

k_F = dynamic load factor
 ϵ = load eccentricity parameter

Figure 7
 Dynamic load factor



Load carrying capacity of fixing screws

In addition to the raceway, the load carrying capacity of the fixing screws must also be checked. This is based on the information in the section Static load carrying capacity, page 800.

The load carrying capacity of the fixing screws can be checked if the following conditions are fulfilled:

- the criteria in the section Static load carrying capacity are fulfilled
- the screws are tightened as specified using a torque wrench – screw tightening factor $\alpha_A = 1,6$.
tightening torques according to table, page 812 and page 813.
- the permissible contact pressure is not exceeded
- screws of the recommended size, quantity and grade are used.

Indicator of load carrying capacity

The load carrying capacity of the screws is described by:

- the curves in the limiting load diagrams for fixing screws in the dimension tables
- the maximum permissible radial load $F_{r\ per}$ (friction locking).

The screw curves are shown in the static limiting load diagrams Fixing screws. The curves are based on screws of grade 10.9, tightened to 90% of their proof stress including the torsion content.

If screws of grade 8.8 or 12.9 are used, the equivalent static loads F_{0q} and M_{0q} (see Static load carrying capacity, page 801), must be converted using the following factors:

- grade 8.8 ($F_{0q} \times 1,65$, $M_{0q} \times 1,65$)
- grade 12.9 ($F_{0q} \times 0,8$, $M_{0q} \times 0,8$).

Crossed roller bearings

Checking the static load carrying capacity of the screws

The static load carrying capacity of the screw is limited by its proof stress.

Static load carrying capacity for applications with and without radial load

Determine the equivalent static bearing loads F_{0q} and M_{0q} . Using the values for F_{0q} and M_{0q} , determine the load point in the static limiting load diagram Fixing screws according to the dimension table. The load point must be below the appropriate screw curve.

Influence of radial load on the static load carrying capacity of the screws

If radial loads occur in uncentred bearing rings, the screw connections must prevent displacement of the bearing rings on the adjacent construction.

In order to check this:

- multiply the radial bearing load by an application factor f_A according to the table, page 804
- compare the values determined with the maximum permissible radial load $F_{r\text{ per}}$.

Caution! The maximum permissible radial load $F_{r\text{ per}}$ of the fixing screws is dependent on their friction locking and not on the radial load carrying capacity of the bearing.
If the radial load on the bearing is higher than the friction locking of the fixing screws or very high radial loads are present ($F_r/F_a > 4$), please contact us.

Checking the dynamic load carrying capacity of the screws

The dynamic load carrying capacity of the screws corresponds to the fatigue strength of the screw.

Dynamic load carrying capacity

Based on the dynamic loads present, the equivalent loads F_{0q} and M_{0q} are determined.

Instead of the application factor f_A , the operating load must always be increased by the following factor:

- grade 8.8 (factor 1,8)
- grade 10.9 (factor 1,6)
- grade 12.9 (factor 1,5).

Check the load carrying capacity in the static limiting load diagram Fixing screws, see dimension tables.

Caution! The load point must be below the appropriate screw curve.

Shaft and housing tolerances for normal applications

For normal applications, sufficient tolerances are K7 for the housing and h7 for the shaft, see tables Fitting tolerances.

Shaft and housing tolerances for precision applications

In precision applications, the bearing seat in the housing should be designed to tolerance K6 and the bearing seat on the shaft to h6, see tables Fitting tolerances.

Fitting tolerances for the shaft

Nominal dimension range		Nominal deviations			
>	≤	h6		h7	
mm	mm	upper μm	lower μm	upper μm	lower μm
65	80	0	-19	0	-30
80	100	0	-22	0	-35
100	120	0	-22	0	-35
120	140	0	-25	0	-40
140	160	0	-25	0	-40
160	180	0	-25	0	-40
180	200	0	-29	0	-46
200	225	0	-29	0	-46
225	250	0	-29	0	-46
250	280	0	-32	0	-52
280	315	0	-32	0	-52
315	355	0	-36	0	-57
355	400	0	-36	0	-57
400	450	0	-40	0	-63
450	500	0	-40	0	-63



Fitting tolerances for the housing bore

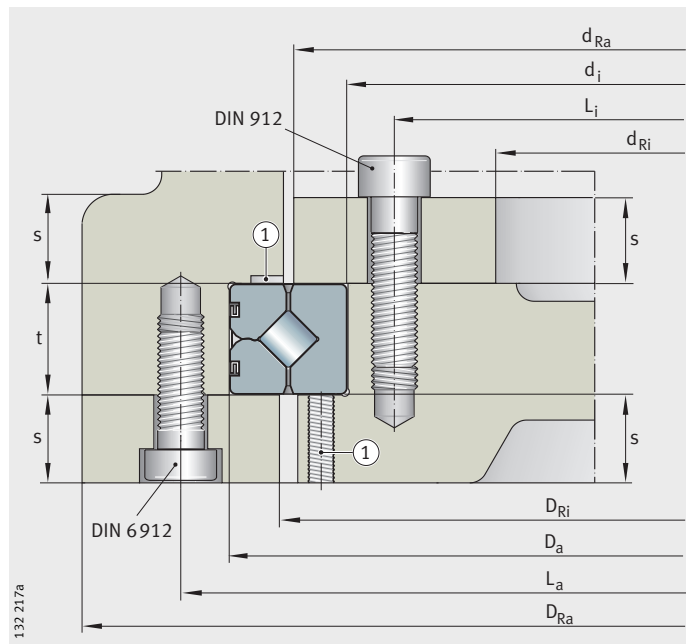
Nominal dimension range		Nominal deviations			
>	≤	K6		K7	
mm	mm	upper μm	lower μm	upper μm	lower μm
80	100	+4	-18	+10	-25
100	120	+4	-18	+10	-25
120	140	+4	-21	+12	-28
140	160	+4	-21	+12	-28
160	180	+4	-21	+12	-28
180	200	+5	-24	+13	-33
200	225	+5	-24	+13	-33
225	250	+5	-24	+13	-33
250	280	+5	-27	+16	-36
280	315	+5	-27	+16	-36
315	355	+7	-29	+17	-40
355	400	+7	-29	+17	-40
400	450	+8	-32	+18	-45
450	500	+8	-32	+18	-45
500	560	0	-44	0	-70
560	630	0	-44	0	-70

Crossed roller bearings

Location using clamping rings	<p>For location of crossed roller bearings SX, clamping rings have proved effective, <i>Figure 8</i>, page 811.</p> <p>Caution! Bearing rings must always be rigidly and uniformly supported over their entire circumference and width.</p> <p>The thickness of the clamping rings and mounting flanges must not be less than the minimum thickness, table Mounting dimensions, <i>Figure 8</i>.</p> <p>Counterbores to DIN 74, type J, for screws to DIN 6 912 are permissible. For deeper counterbores, the thickness of the clamping rings must be increased by the additional counterbore depth.</p> <p>For mounting dimensions, see table and <i>Figure 8</i>, for minimum strength of the clamping rings, see section Minimum strength.</p>
Bearing seat depth	<p>In order that the clamping rings retain the bearing securely, the bearing seat depth t must be in accordance with the table, table Mounting dimensions and <i>Figure 8</i>.</p> <p>Caution! The depth of the bearing seat influences the bearing clearance and the rotational resistance.</p> <p>Preloaded bearings (suffix VSP) have a considerably higher rotational resistance.</p> <p>If particular requirements for rotational resistance apply, the depth t must be produced to match the relevant height of the bearing ring. It has proved useful to tolerance the depth t to deviations that are the same as or further restricted compared to the dimension h in the dimension tables. For safety, internal tests should in any case be carried out.</p>
Minimum strength of clamping rings	<p>For screws of grade 10.9, the minimum strength under the screw heads or nuts must be 500 N/mm^2. Washers are not necessary for these screws.</p> <p>For fixing screws of grade 12.9, the minimum strength must not be less than 850 N/mm^2 or quenched and tempered washers must be used under the screw heads or nuts.</p>

Mounting dimensions

Designation	Mounting dimensions									
	d_i h7 (h6)	D_a K7 (K6)	t	s min.	d_{Ra}	d_{Ri}	D_{Ri}	D_{Ra}	L_i max.	L_a min.
SX011814	70	90	$10_{-0,015}^{-0,005}$	8	78	42	82	118	60	100
SX011818	90	115	$13_{-0,020}^{-0,005}$	10	100	61	104	144	80	125
SX011820	100	125	$13_{-0,020}^{-0,005}$	10	110	71	114	154	90	135
SX011824	120	150	$16_{-0,025}^{-0,005}$	12	132	84	138	186	108	162
SX011828	140	175	$18_{-0,030}^{-0,005}$	14	154	94	160	221	124	191
SX011832	160	200	$20_{-0,05}^{-0,02}$	15	177	111	183	249	144	216
SX011836	180	225	$22_{-0,06}^{-0,02}$	17	199	121	205	284	160	245
SX011840	200	250	$24_{-0,06}^{-0,02}$	18	221	139	229	311	180	270
SX011848	240	300	$28_{-0,06}^{-0,02}$	21	226	166	274	374	216	324
SX011860	300	380	$38_{-0,10}^{-0,04}$	29	335	201	345	479	268	412
SX011868	340	420	$38_{-0,10}^{-0,04}$	29	375	241	385	519	308	452
SX011880	400	500	$46_{-0,10}^{-0,04}$	35	445	275	455	625	360	540
SX0118/500	500	620	$56_{-0,10}^{-0,04}$	42	554	350	566	700	452	668



① Slots, threaded extraction holes or similar for dismantling purposes

Figure 8
Clamping rings, bearing seat depth,
mounting dimensions

Crossed roller bearings

Fixing screws For location of the bearing or clamping rings, screws of grade 10.9 are suitable, see table Fixing screws.

Caution! Any deviations from the recommended size, grade and quantity of screws will considerably reduce the load carrying capacity and operating life of the bearings.

For screws of grade 12.9, observe the minimum strength of the clamping rings or use quenched and tempered washers.

Fixing screws

Crossed roller bearing	Fixing screws Grade 10.9		Tightening torque M _A Nm
	Size	Quantity	
SX011814	M5	18	7
SX011818	M5	24	7
SX011820	M5	24	7
SX011824	M6	24	11,7
SX011828	M8	24	27,8
SX011832	M8	24	27,8
SX011836	M10	24	55,6
SX011840	M10	24	55,6
SX011848	M12	24	98,4
SX011860	M16	24	247
SX011868	M16	24	247
SX011880	M20	24	481
SX0118/500	M24	24	831

Securing of screws Normally, the screws are adequately secured by the correct preload. If regular shock loads or vibrations occur, however, additional securing of the screws may be necessary.

Caution! Not every method of securing screws is suitable for crossed roller bearings.

Never use spring washers or split washers.

General information on securing of screws is given in DIN 25 201, and securing by means of adhesive in particular is described in DIN 25 203, issued 1992.

If these are to be used, please consult the relevant companies.

**Tightening torques M_A
for torque-controlled tightening
of set screws**

Fixing screw	Clamping cross-section A_s mm ²	Core cross-section A_{d3} mm ²	Tightening torque $M_A^{1)}$ in Nm for grade		
			8.8	10.9	12.9
M4	8,78	7,75	2,25	3,31	3,87
M5	14,2	12,7	4,61	6,77	7,92
M6	20,1	17,9	7,8	11,5	13,4
M8	36,6	32,8	19,1	28	32,8
M10	58	52,3	38	55,8	65,3
M12	84,3	76,2	66,5	97,7	114
M14	115	105	107	156	183
M16	157	144	168	246	288
M18	192	175	229	336	394
M20	245	225	327	481	562
M22	303	282	450	661	773
M24	353	324	565	830	972



¹⁾ M_A to VDI Guideline 2 230 (July 1986) for $\mu_K = 0,08$ and $\mu_G = 0,12$.

**Assembly preload forces F_M
for torque-controlled tightening
of set screws**

Fixing screw	Clamping cross-section A_s mm ²	Core cross-section A_{d3} mm ²	Assembly preload force $F_M^{1)}$ in kN for grade		
			8.8	10.9	12.9
M4	8,78	7,75	4,05	5,95	6,96
M5	14,2	12,7	6,63	9,74	11,4
M6	20,1	17,9	9,36	13,7	16,1
M8	36,6	32,8	17,2	25,2	29,5
M10	58	52,3	27,3	40,2	47
M12	84,3	76,2	39,9	58,5	68,5
M14	115	105	54,7	80,4	94,1
M16	157	144	75,3	111	129
M18	192	175	91,6	134	157
M20	245	225	118	173	202
M22	303	282	147	216	253
M24	353	324	169	249	291

¹⁾ F_M according to VDI Guideline 2 230 (July 1986) for $\mu_G = 0,12$.

Crossed roller bearings

Fitting of crossed roller bearings

The bores and edges of the adjacent components must be free from burrs. The support surfaces for the bearing rings must be clean.

Lightly oil or grease the bearing seat and locating surfaces on the adjacent construction.

Lightly oil the thread of the fixing screws in order to prevent varying friction factors (do not oil or grease screws that will be secured by means of adhesive).

Caution! Ensure that all adjacent components and lubrication ducts are free from cleaning agents, solvents and washing emulsions. The bearing seating surfaces can rust or the raceway system can become contaminated.

Assembly forces must only be applied to the bearing ring to be fitted; they must never be directed through the rolling elements or seals. Direct blows on the bearing rings must be avoided.

Bearing rings should be located consecutively and without external load.

The outer ring is split and is held together by three retaining rings ①, Figure 9. Never apply tensile loads to the retaining rings.

Locating the outer bearing ring

Fitting of the ring, see Figure 9:

- Insert or press the bearing ② into the external adjacent construction ③ with the outer ring first
- Position the external clamping ring ④
- Insert the fixing screws ⑤ in the clamping ring and tighten in steps up to the specified tightening torque M_A
 - tighten the screws in a crosswise sequence in order to prevent unacceptable fluctuations in the screw tensioning forces
 - tightening torques M_A for fixing screws: see tables, page 813.

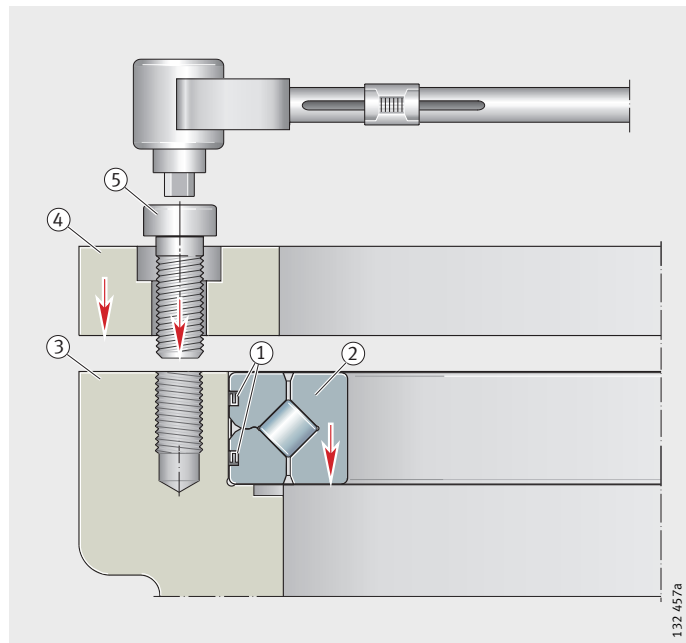


Figure 9
Locating the outer bearing ring

Locating the inner bearing ring

Fitting of the ring, see *Figure 10*:

- Insert the bearing ② into the internal adjacent construction ⑥
- Position the internal clamping ring ⑦
- Insert the fixing screws ⑧ in the clamping ring and tighten in steps up to the specified tightening torque M_A
 - tighten the screws in a crosswise sequence in order to prevent unacceptable fluctuations in the screw tensioning forces.

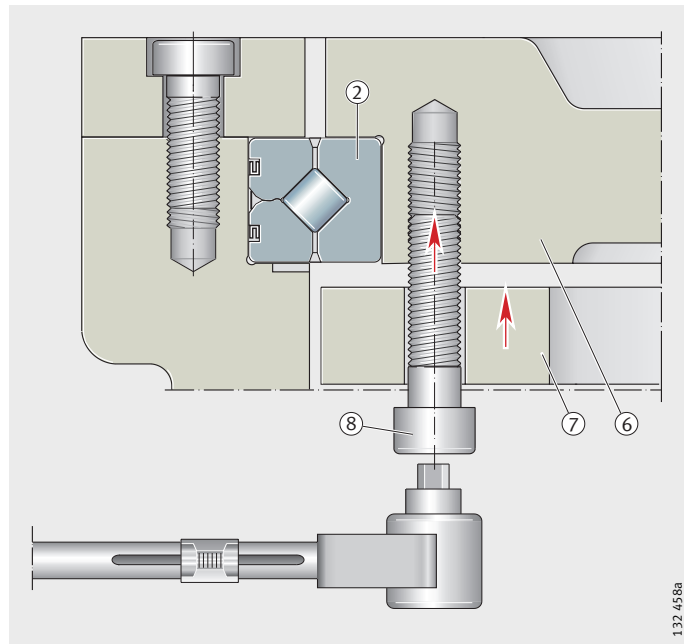


Figure 10
Locating the inner bearing ring

Checking operation

Once assembly is complete, the operation of the fitted crossed roller bearing must be checked.

Caution! If the bearing runs irregularly or roughly, or the temperature in the bearing shows an unusual increase, dismantle and check the bearing and reassemble the bearing in accordance with the fitting guidelines described.

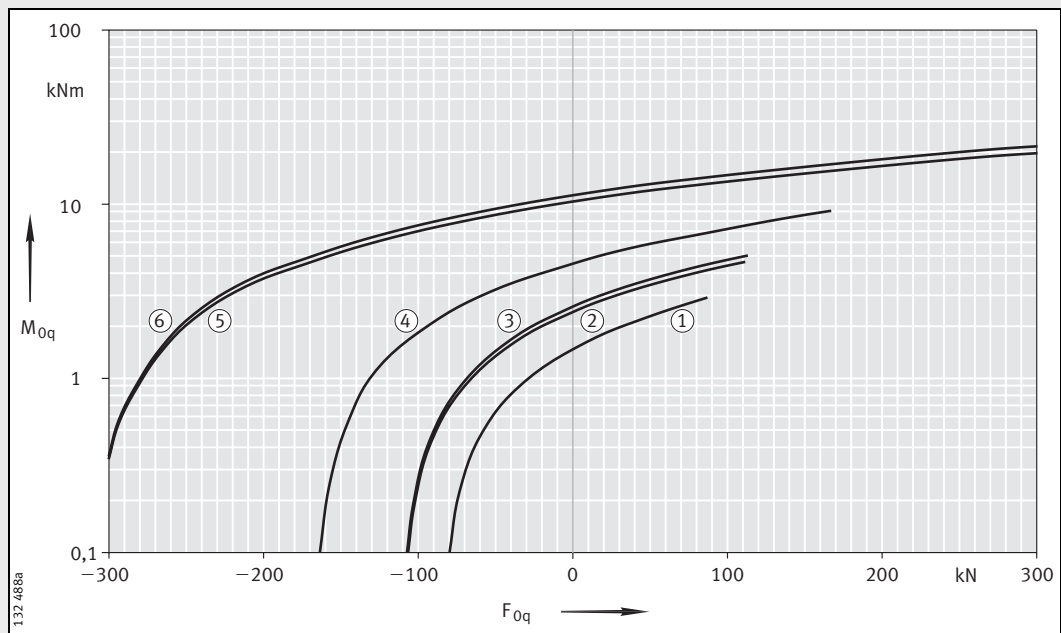
Accuracy

The dimensional and geometrical tolerances are based on DIN 620-2 and DIN 620-3 and are within the range P6 to P5. The main dimensions conform to DIN 616, dimension series 18.

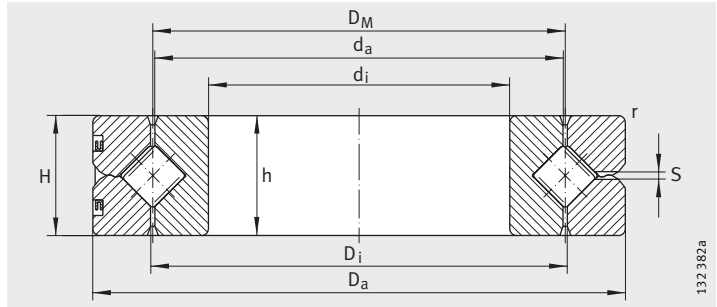
Crossed roller bearings

Dimension table · Dimensions in mm													
Designation	No. ¹⁾	Mass m ≈kg	Dimensions									Running accuracy	
			D _M	d _i K6	D _a h6	H ²⁾	h ²⁾ E8	d _a	D _i	r min.	S ³⁾	radial	axial
SX011814	①	0,3	80	70 ^{+0,004} _{-0,015}	90 _{-0,022}	10±0,10	10 _{-0,01}	79,5	80,5	0,6	1,2	0,010	0,010
SX011818	②	0,4	102	90 ^{+0,004} _{-0,018}	115 _{-0,022}	13±0,12	13 _{-0,01}	101,5	102,5	1	1,2	0,010	0,010
SX011820	③	0,5	112	100 ^{+0,004} _{-0,018}	125 _{-0,025}	13±0,12	13 _{-0,01}	111,5	112,5	1	1,2	0,010	0,010
SX011824	④	0,8	135	120 ^{+0,004} _{-0,018}	150 _{-0,025}	16±0,12	16 _{-0,01}	134,4	135,5	1	1,5	0,010	0,010
SX011828	⑤	1,1	157	140 ^{+0,004} _{-0,021}	175 _{-0,025}	18±0,12	18 _{-0,01}	156,3	157,7	1,1	1,5	0,015	0,010
SX011832	⑥	1,7	180	160 ^{+0,004} _{-0,021}	200 _{-0,029}	20±0,12	20 _{-0,025}	179,2	180,8	1,1	1,5	0,015	0,010

- 1) Curve in the static limiting load load diagram for the raceway and fixing screws.
- 2) H: section height of bearing,
h: height of individual ring.
- 3) Lubrication hole: 3 holes spaced evenly about the circumference.
- 4) Basic load ratings, radial: for radial loads only.



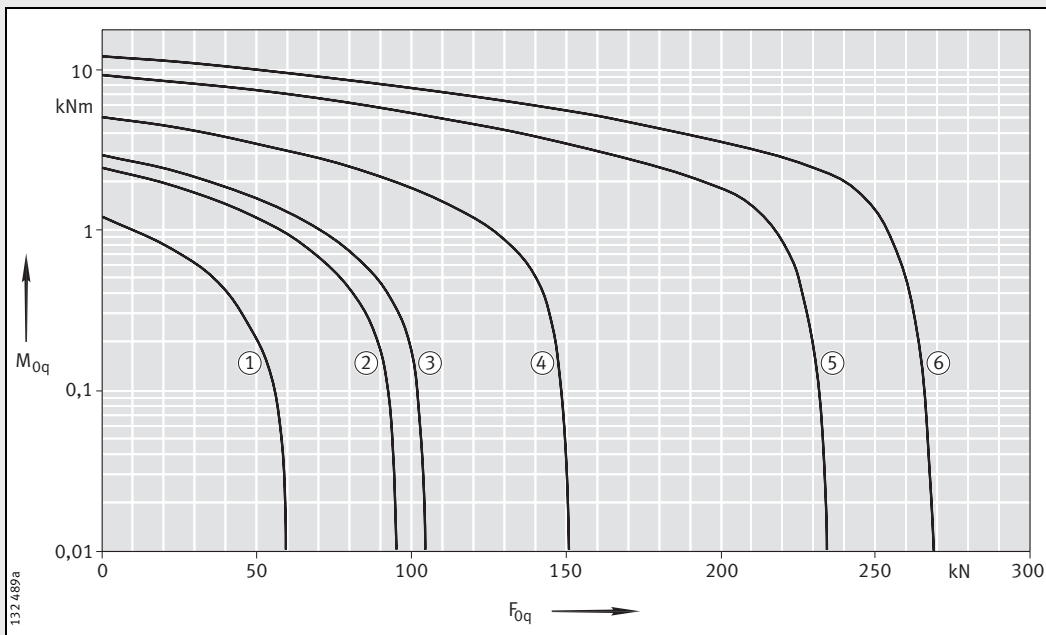
Static limiting load diagram for fixing screws – compressive load



SX

132.382a

Normal clearance				Low clearance RLO		Preload VSP		Basic load ratings				Limiting speeds				Dimensions identical to ISO dimension series 18
Radial clearance		Axial tilting clearance		Radial clearance	Pre-load	min.	max.	axial		radial ⁽⁴⁾		With normal clearance		With preload		
min.	max.	min.	max.					dyn. C _a	stat. C _{0a}	dyn. C _r	stat. C _{0r}	n _G oil min ⁻¹	n _G grease min ⁻¹	n _G oil min ⁻¹	n _G grease min ⁻¹	
0,003	0,015	0,006	0,03	0,003	0,006	0,003	0,015	18	60	12	30	1 910	955	955	475		618 14
0,003	0,015	0,006	0,03	0,003	0,006	0,003	0,015	26	96	17	47	1 500	750	750	375	618 18
0,005	0,020	0,010	0,04	0,004	0,008	0,005	0,020	28	106	18	52	1 360	680	680	340	818 20
0,005	0,020	0,010	0,04	0,004	0,008	0,005	0,020	41	153	26	75	1 130	565	565	280	618 24
0,005	0,020	0,010	0,04	0,004	0,008	0,005	0,020	64	237	41	116	975	485	485	240	618 28
0,005	0,020	0,010	0,04	0,004	0,008	0,005	0,020	69	272	44	133	850	425	425	210	618 32



Static limiting load diagram for raceway – compressive load

Crossed roller bearings

Dimension table (continued) - Dimensions in mm

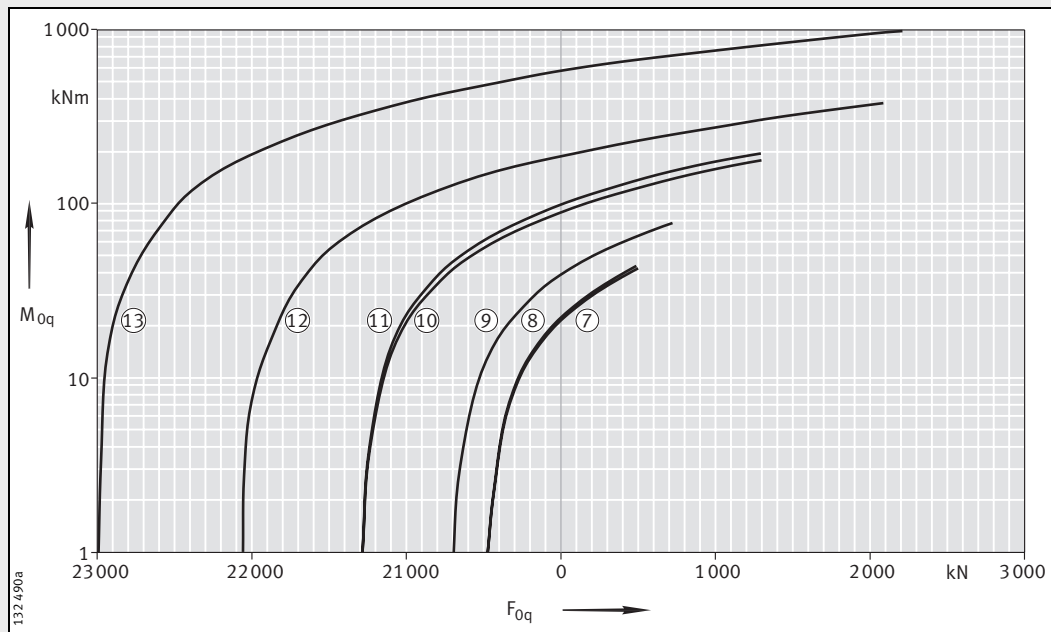
Designation	No. ¹⁾	Mass m ≈kg	Dimensions										Running accuracy	
			D _M	d _i	D _a	H ²⁾	h ²⁾	d _a	D _i	r	S ³⁾	radial	axial	
				K6	h6		E8			min.				
SX011836	⑦	2,3	202	180 ^{+0,004} _{-0,021}	225 _{-0,029}	22±0,13	22 _{-0,025}	201,2	202,8	1,1	2	0,015	0,010	
SX011840	⑧	3,1	225	200 ^{+0,004} _{-0,024}	250 _{-0,029}	24±0,13	24 _{-0,025}	224,2	225,8	1,5	2	0,015	0,010	
SX011848	⑨	5,3	270	240 ^{+0,005} _{-0,024}	300 _{-0,032}	28±0,13	28 _{-0,025}	269,2	270,8	2	2	0,020	0,010	
SX011860	⑩	12	340	300 ^{+0,005} _{-0,027}	380 _{-0,036}	38±0,14	38 _{-0,05}	339,2	340,8	2,1	2,5	0,020	0,010	
SX011868	⑪	13,5	380	340 ^{+0,007} _{-0,029}	420 _{-0,040}	38±0,14	38 _{-0,05}	379,2	380,8	2,1	2,5	0,025	0,010	
SX011880	⑫	24	450	400 ^{+0,007} _{-0,029}	500 _{-0,040}	46±0,15	46 _{-0,05}	449	451	2,1	2,5	0,030	0,010	
SX0118/500	⑬	44	560	500 ^{+0,008} _{-0,032}	620 _{-0,044}	56±0,16	56 _{-0,05}	558,8	561,2	3	2,5	0,040	0,010	

1) Curve in the static limiting load diagram for the raceway and fixing screws.

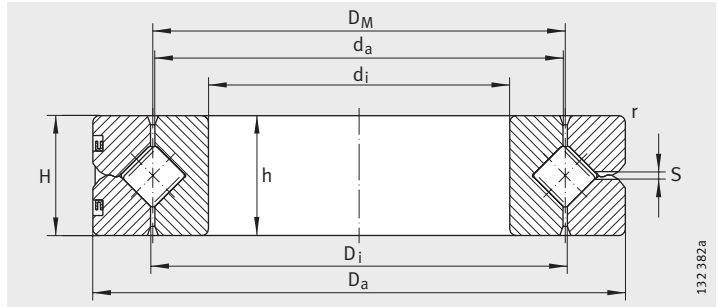
2) H: section height of bearing,
h: height of individual ring.

3) Lubrication hole: 3 holes spaced evenly about the circumference.

4) Basic load ratings, radial: for radial loads only.

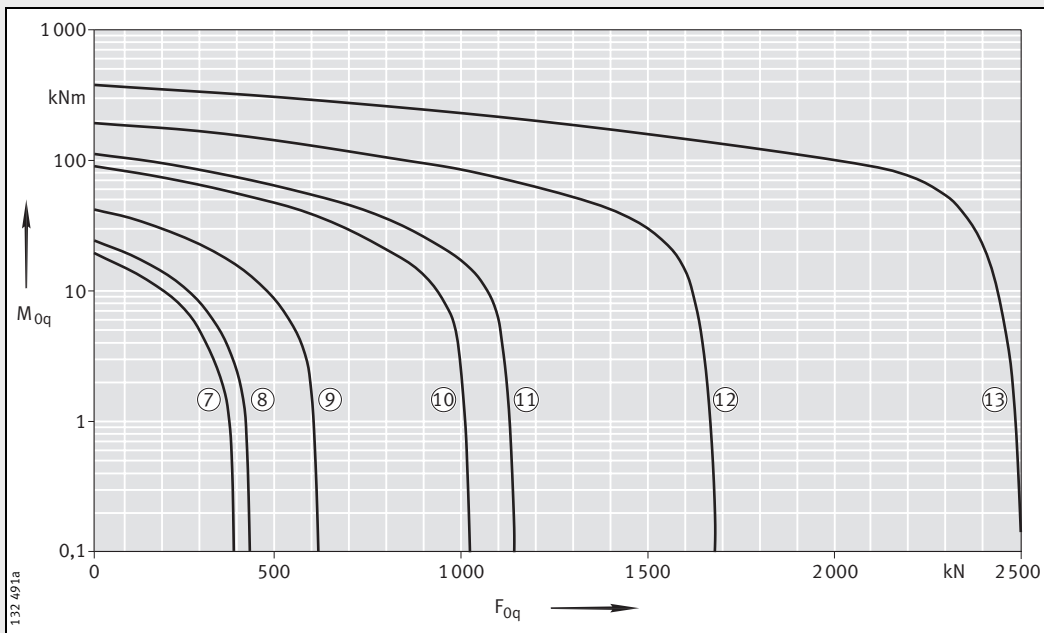


Static limiting load diagram for fixing screws – compressive load

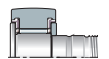
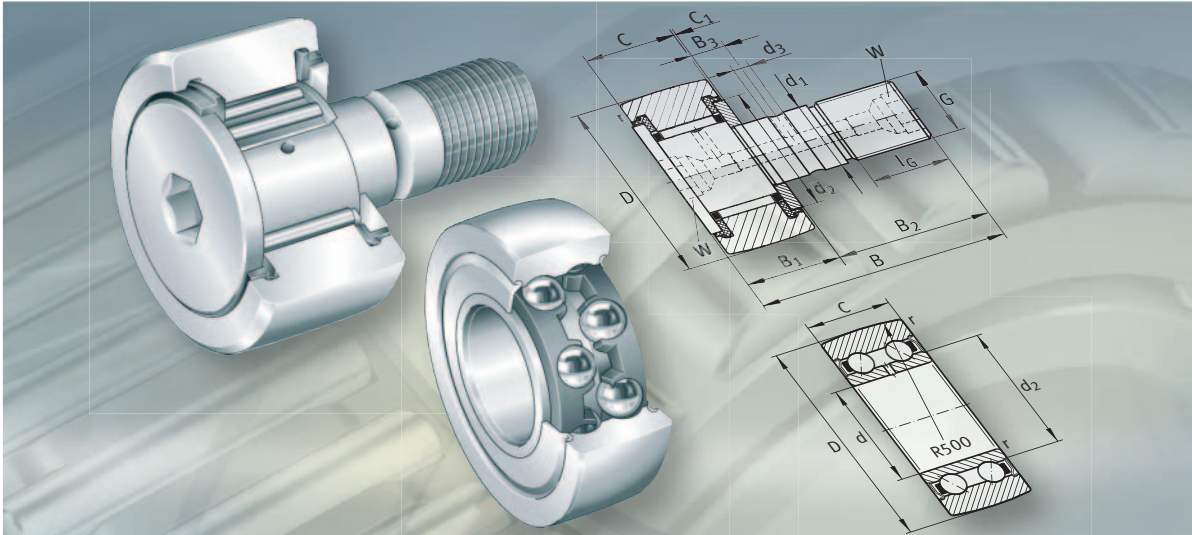


SX

Normal clearance				Low clearance RLO		Preload VSP		Basic load ratings				Limiting speeds				Dimensions identical to ISO dimension series 18
Radial clearance		Axial tilting clearance		Radial clearance	Pre-load	min.	max.	axial		radial ⁽⁴⁾		With normal clearance		With preload		
min.	max.	min.	max.					dyn. C _a	stat. C _{0a}	dyn. C _r	stat. C _{0r}	n _G oil	n _G grease	n _G oil	n _G grease	
				max.	max.			kN	kN	kN	kN	min ⁻¹	min ⁻¹	min ⁻¹	min ⁻¹	
0,005	0,025	0,010	0,05	0,005	0,010	0,005	0,025	98	381	63	187	755	375	375	185	618 36
0,005	0,025	0,010	0,05	0,005	0,010	0,005	0,025	106	425	68	208	680	340	340	170	618 40
0,010	0,030	0,020	0,06	0,005	0,010	0,005	0,025	149	612	95	300	565	280	280	140	618 48
0,010	0,040	0,020	0,08	0,005	0,010	0,005	0,025	245	1 027	156	504	450	225	225	110	618 60
0,010	0,040	0,020	0,08	0,005	0,010	0,005	0,025	265	1 148	167	563	400	200	200	100	618 68
0,010	0,050	0,020	0,10	0,005	0,010	0,005	0,025	385	1 699	244	833	340	170	170	85	618 80
0,015	0,060	0,030	0,12	0,006	0,012	0,005	0,030	560	2 538	355	1 244	275	135	135	65	618/500



Static limiting load diagram for raceway – compressive load



Track rollers

- Yoke type track rollers
- Stud type track rollers
- Ball bearing track rollers

Track rollers

Yoke type track rollers 824

Yoke type track rollers are ready-to-fit needle and cylindrical roller bearings with a particularly thick-walled outer ring and are used in cam gears, bed ways, conveying equipment, linear guidance systems etc. In addition to high radial loads, they can also support axial loads which are due, for example, to slight misalignment defects, skewed running or brief contact running impacts.

Yoke type track rollers are available with and without axial guidance of the outer ring and in both sealed and open versions.

The outside surface of the outer rings is crowned and corresponds in the majority of designs to the optimised INA profile. In these bearings, the Hertzian pressure, edge load under tilting and wear of the mating track are reduced and the operating life of the mating track is increased.

Yoke type track rollers are mounted on a shaft or stud and are supplied with or without an inner ring.

Stud type track rollers 824

Stud type track rollers correspond in their design to yoke type track rollers with axial guidance but, in place of the inner ring, they have a heavy-section roller stud. The stud has a fixing thread and, in most cases, a hexagonal socket on both ends. It is also available with a shrink-fitted eccentric collar. Due to the eccentric collar, the outside surface of the outer ring can be adjusted to match the mating track on the adjacent construction.

Stud type track rollers are available with labyrinth, gap or contact seals.

The outside surface of the outer rings is crowned and corresponds in the majority of designs to the optimised INA profile.

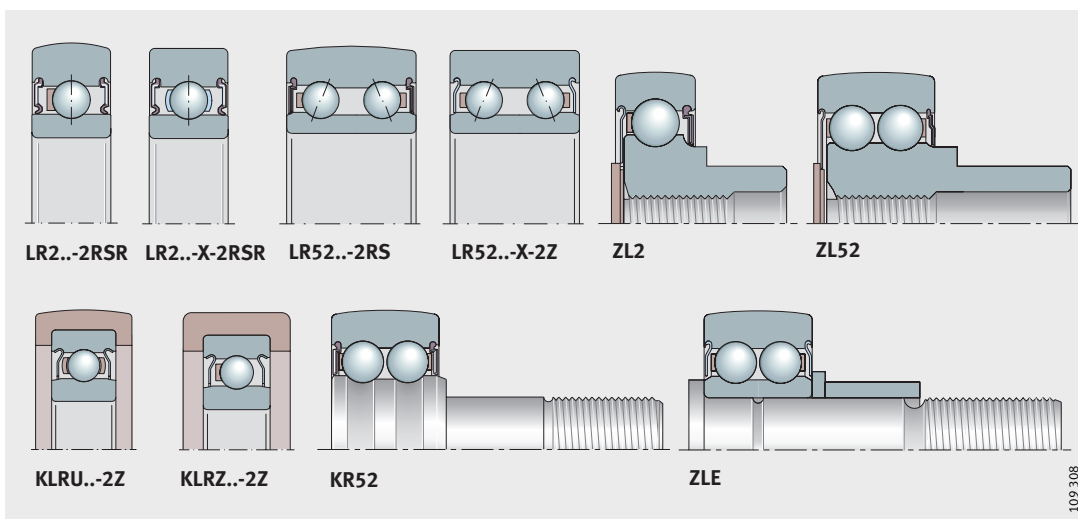
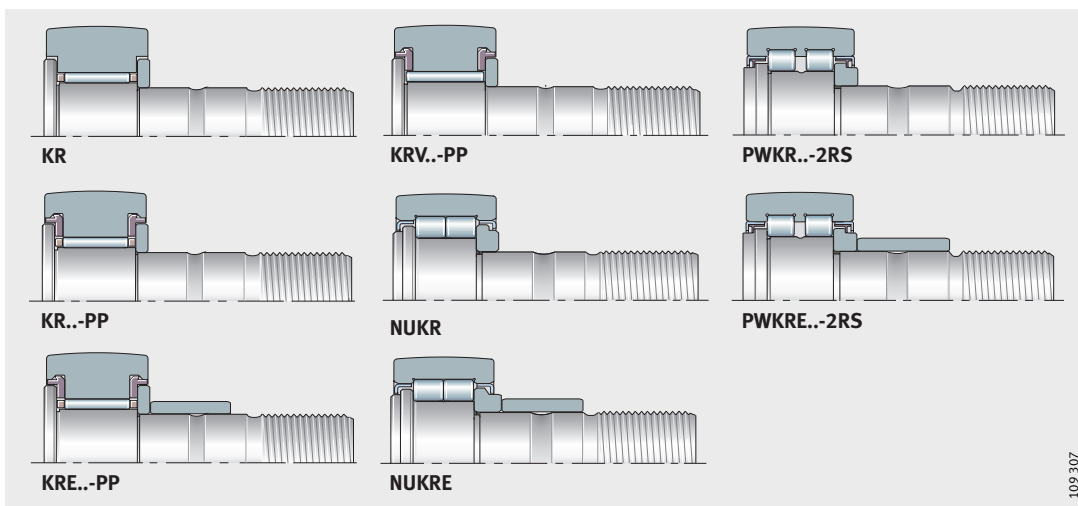
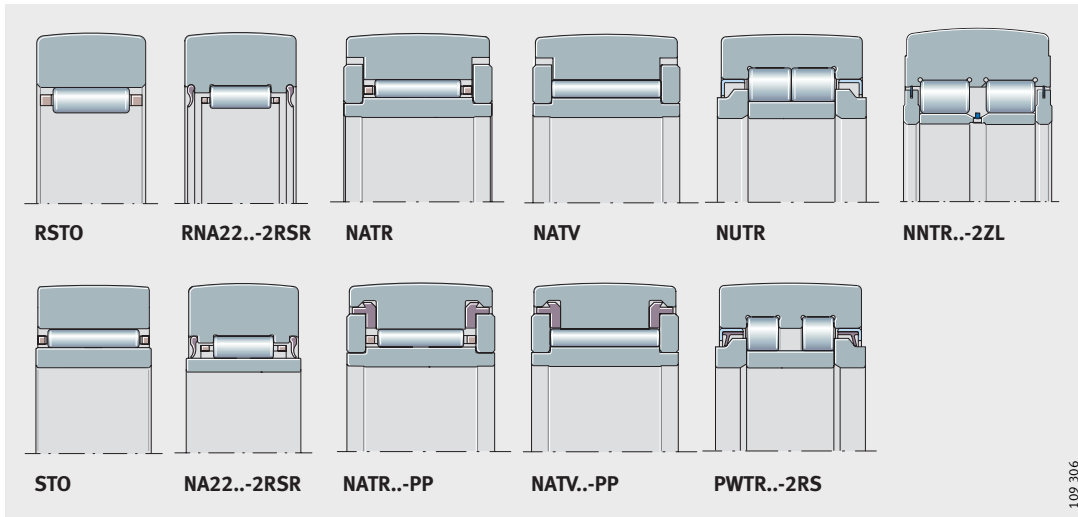
Ball bearing track rollers 874

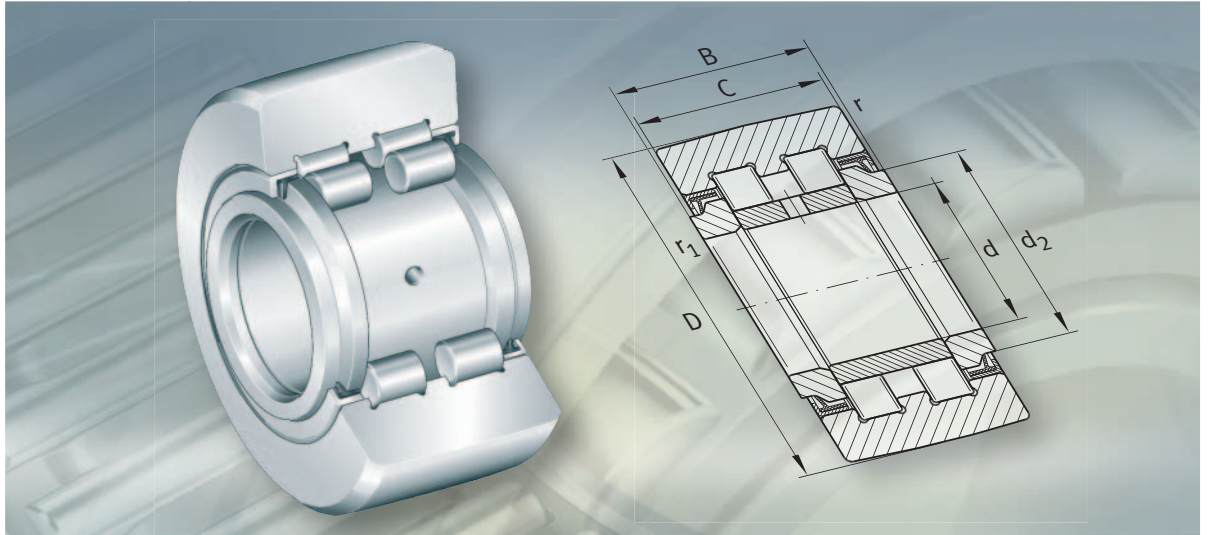
These track rollers correspond in their design to deep groove or angular contact ball bearings but have thick-walled outer rings with a crowned outside surface. They can support high radial forces as well as axial forces in both directions. The bearings are sealed.

Ball bearing track rollers are available with and without a stud and with a plastic tyre.

Track rollers without a stud are mounted on a shaft or stud.

Track rollers with a plastic tyre are used if the bearings are required to run with particularly low noise.





Yoke type track rollers
Stud type track rollers

Yoke type track rollers Stud type track rollers

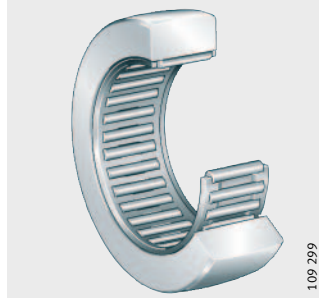
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	Operating temperature	829
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Product overview Yoke type track rollers

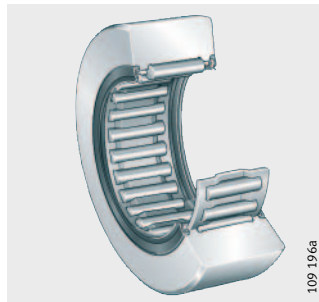
Without axial guidance
Without inner ring

RSTO



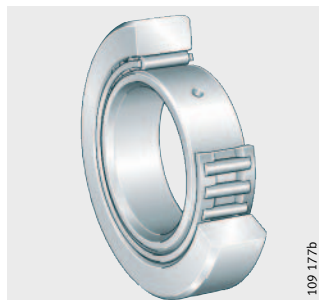
Lip seals

RNA22...-2RSR



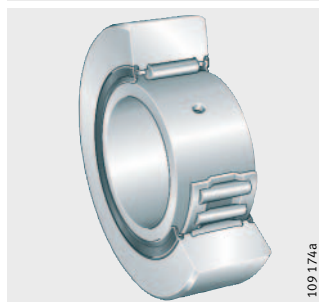
With inner ring

STO



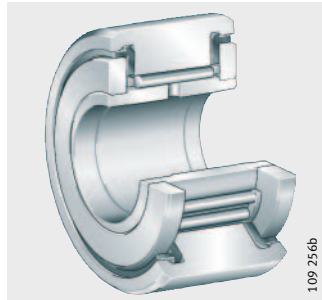
Lip seals

NA22...-2RSR

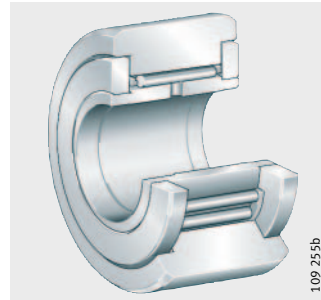


With axial guidance
 With cage
 Plastic axial plain washers/
 gap seals

NATR..-PP

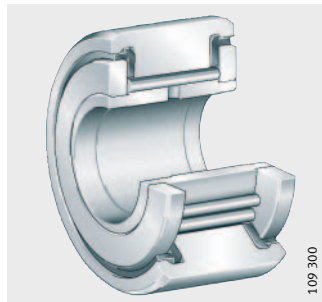


NATR

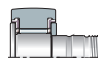
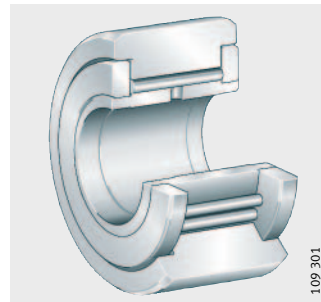


Full complement
 needle roller set
 Plastic axial plain washers/
 gap seals

NATV..-PP

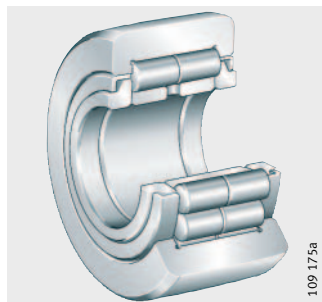


NATV



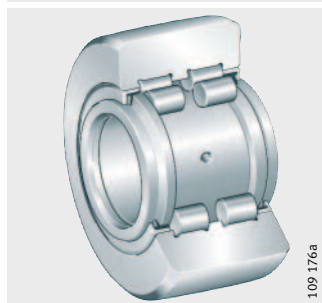
Full complement
 cylindrical roller set
 Labyrinth seals

NUTR

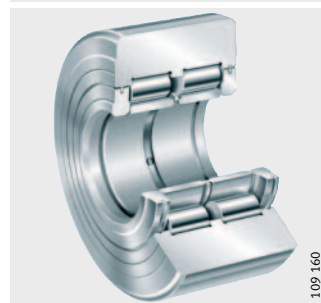


Full complement
 cylindrical roller set,
 with central rib
 Protected lip seals/
 sealing shields with lamellar ring

PWTR..-2RS



NNTR..-2ZL



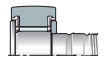
Yoke type track rollers

Features	<p>Yoke type track rollers are single or double row units mounted on shafts or studs. They comprise thick-walled outer rings with a profiled outside surface and needle roller and cage assemblies or full complement needle roller or cylindrical roller sets.</p> <p>Yoke type track rollers can support high radial loads as well as axial loads arising from slight misalignment and skewed running; they are suitable for cam gears, bed ways, conveying equipment etc.</p> <p>The bearings are available with and without an inner ring and in both sealed and open versions.</p>
Outside surface profile of the outer ring	<p>Yoke type track rollers with a crowned outside surface are predominantly used since they are often inclined in relation to the mating track and edge stresses must be avoided.</p> <p>The radius of curvature of the outside surface is $R = 500$ mm.</p> <p>In series NNTR..-2ZL, the radius is indicated in the dimension table.</p> <p>In series NATR..-PP, NATV..-PP, NUTR and PWTR..-2RS, the outside surface has the optimised INA profile.</p> <p>In yoke type track rollers with this curvature profile, <i>Figure 1 to Figure 6</i>, page 834 and page 835:</p> <ul style="list-style-type: none">■ the Hertzian pressure is lower■ edge loading under tilting is lower■ wear of the mating track is reduced■ the operating life of the mating track is extended.
Yoke type track rollers without inner ring	<p>Yoke type track rollers RSTO and RNA22..-2RSR do not have an inner ring. They are particularly compact but require a hardened and ground raceway on the shaft or stud.</p> <p>Series RSTO is not self-retaining. The outer ring, needle roller and cage assembly and inner ring can therefore be fitted independently.</p>
With cage/axial guidance of outer ring	<p>Yoke type track rollers RSTO and RNA22..-2RSR have a cage. These designs do not have axial guidance of the outer ring. Axial guidance of the outer ring and needle roller and cage assembly must be provided in the adjacent component; see Adjacent construction for yoke type track rollers, page 846.</p>
Sealing/lubricant	<p>Yoke type track rollers RSTO are not sealed, series RNA22..-2RSR has lip seals on both sides.</p> <p>They are greased using a lithium complex soap grease to GA08.</p>
Yoke type track rollers with inner ring	<p>These yoke type track rollers are used if the shaft or stud does not have a hardened and ground raceway.</p> <p>Series STO is not self-retaining. This means that the outer ring, needle roller and cage assembly and inner ring can be fitted independently of each other.</p>
With cage/with full complement needle roller set/with full complement cylindrical roller set	<p>Yoke type track rollers STO, NA22..-2RSR, NATR and NATR..-PP have a cage. Series NATV and NATV..-PP have a full complement needle roller set, yoke type track rollers NUTR, PWTR..-2RS and NNTR..-2ZL have a full complement cylindrical roller set.</p> <p>Bearings without a cage have the largest possible number of rolling elements and therefore have particularly high load carrying capacity. Due to the kinematic conditions, however, the speeds achievable with these bearings are somewhat lower than those achievable with the cage-guided yoke type track rollers.</p>

Axial guidance of outer ring Series STO and NA22..-2RSR do not have axial guidance of the outer ring. This must be provided in the adjacent construction; see Adjacent construction for yoke type track rollers, page 846.
In NATR and NATV, axial guidance is provided by contact washers and plain washers. In NUTR, the outer ring is guided by the rolling elements, in PWTR..-2RS and NNTR..-2ZL this function is performed by the central rib and the rolling elements.

With anti-corrosion protection Series PWTR..-2RS-RR is protected against corrosion by the INA special plating Corrotect[®], see page 859.

Sealing/lubricant Yoke type track rollers STO are not sealed. Series NA22..-2RSR has lip seals, PWTR..-2RS has protected lip seals on both sides.
NATR..-PP and NATV..-PP have three-stage seals with plastic axial plain washers. NATR, NATV have gap seals, NUTR has labyrinth seals and NNTR..-2ZL has sealing shields with lamellar rings.
In the three-stage concept, there is a gap seal between the plastic axial plain washer and the outer ring and a labyrinth seal between the formed seal lip and the undercut in the outer ring.
The disc spring shape of the axial plain washers gives a preloaded contact seal as the third stage. It also provides axial sliding contact between the outer ring and contact washers, thus reducing wear and grease consumption.
They are greased using a lithium complex soap grease to GA08 and can be lubricated via the inner ring.



Operating temperature Yoke type track rollers have an operating temperature range from -30 °C to +140 °C. In sealed bearings (suffixes 2RS and 2RSR) and bearings with a plastic cage (suffix TV), the temperature range is restricted to between -30 °C and +120 °C.
Note the information on the operating temperature range in Technical Principles, Lubrication.

Caution! Yoke type track rollers NATR..-PP and NATV..-PP are suitable for operating temperatures from -30 °C to +100 °C, restricted by the grease and seal material.

Suffixes Suffixes for the available designs: see table.

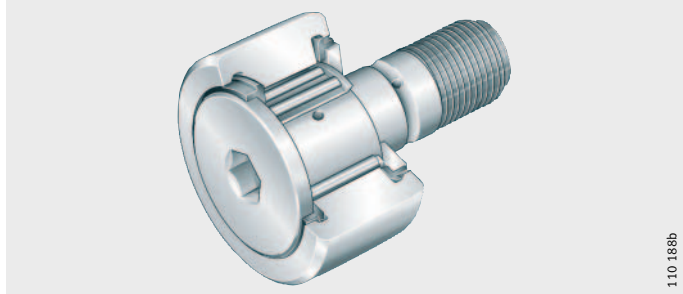
Available designs

Suffix	Description
PP	Plastic axial plain washer with formed seal lip on both sides of the yoke type track roller, giving a three-stage seal
RR	Corrosion-resistant design with INA special plating Corrotect [®]
TV	Plastic cage
2RS	Protected lip seal on both sides of the yoke type track roller
2RSR	Radial contact lip seal on both sides of the yoke type track roller
2ZL	Sealing shield with lamellar rings on both sides of the track roller

Product overview Stud type track rollers

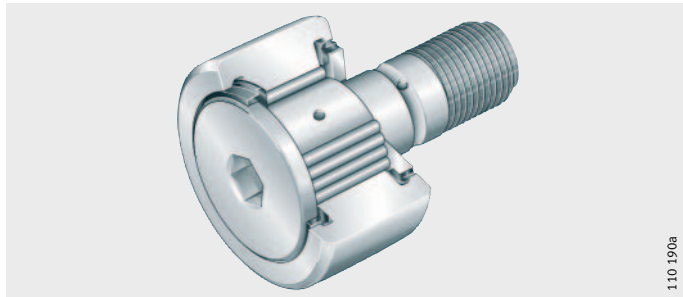
Without eccentric collar
With cage
Plastic axial plain washers/
gap seals

KR..-PP
KR



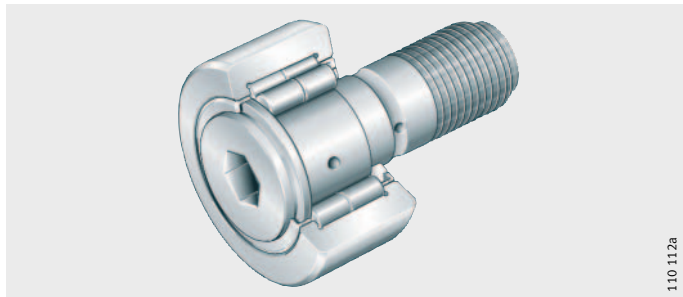
Full complement
needle roller set
Plastic axial plain washers

KRV..-PP



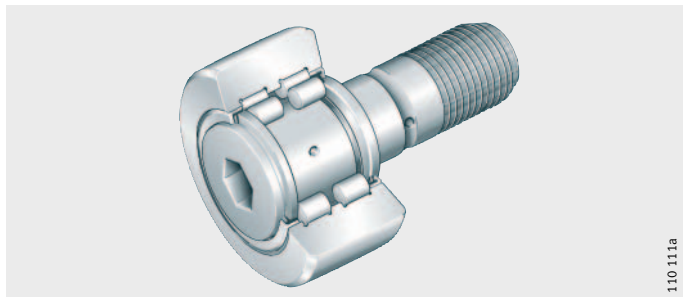
Full complement
cylindrical roller set
Labyrinth seals

NUKR



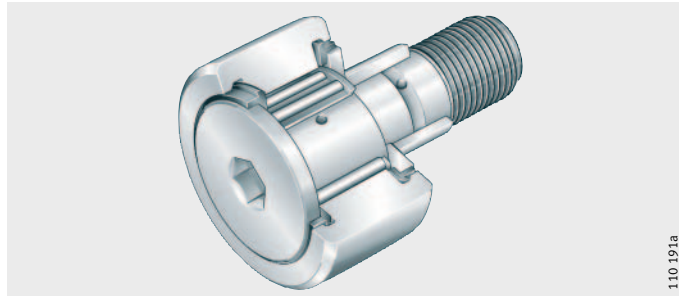
Full complement
cylindrical roller set,
with central rib
Protected lip seals

PWKR..-2RS



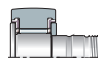
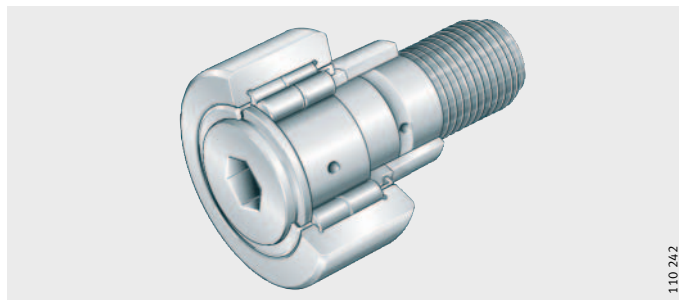
With eccentric collar
With cage
Plastic axial plain washers

KRE..-PP



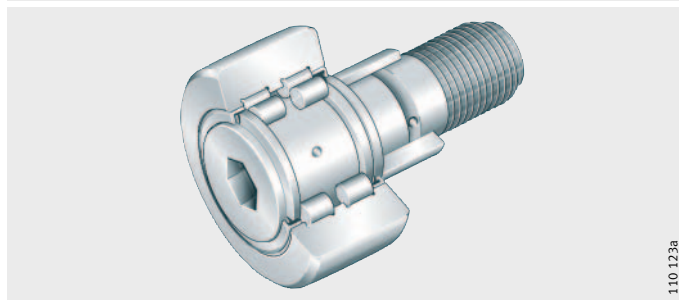
Full complement
cylindrical roller set
Labyrinth seals

NUKRE



Full complement
cylindrical roller set,
with central rib
Protected lip seals

PWKRE..-2RS



Stud type track rollers

Features Stud type track rollers comprise thick-walled outer rings with a profiled outside surface, heavy-section roller studs with a fixing thread, contact washers and needle roller and cage assemblies or single or double row full complement needle roller or cylindrical roller sets.

They can support high radial loads as well as axial loads arising from slight misalignment and skewed running; they are suitable for cam gears, bed ways, conveying equipment etc.

The bearings are available in several designs as well as with or without an eccentric collar.

Outside surface profile of the outer ring

Stud type track rollers with a crowned outside surface are predominantly used since they are often inclined in relation to the mating track and edge stresses must be avoided.

In series KR, the radius of curvature is $R = 500 \text{ mm}$.

In series KR..-PP, KRE..-PP, KRV..-PP, NUKR, NUKRE, PWKR..-2RS and PWKRE..-2RS, the outside surface has the optimised INA profile.

In stud type track rollers with this curvature profile, *Figure 1 to Figure 6*, page 834 and page 835:

- the Hertzian pressure is lower
- edge loading under tilting is lower
- wear of the mating track is reduced
- the operating life of the mating track is extended.

Stud type track rollers without eccentric collar

Stud type track rollers without an eccentric collar do not have a defined adjustment facility in relation to the mating track on the adjacent construction.

With cage/ with full complement needle roller set/ with full complement cylindrical roller set

Stud type track rollers KR and KR..-PP have a cage, the design KRV..-PP has a full complement needle roller set. Series NUKR and PWKR..-2RS have a full complement cylindrical roller set.

Stud type track rollers without a cage have the largest possible number of rolling elements and therefore have particularly high load carrying capacity. Due to the kinematic conditions, however, the speeds achievable with these bearings are somewhat lower than those achievable with the cage-guided stud type track rollers.

Axial guidance of outer ring

In series KR, KR..-PP and KRV..-PP, axial guidance is provided by the contact flange and contact washers.

The outer rings of series NUKR and PWKR..-2RS are guided by the rolling elements and central rib.

With anti-corrosion protection

Series PWKR..-2RS-RR is protected against corrosion by the INA special plating Corrotect[®], see page 859.

Sealing/lubricant

The stud type track rollers are sealed on both sides. Series KR has gap seals, KR..-PP has a three-stage seal with plastic axial plain washers having formed seal lips on both sides of the bearing, NUKR has labyrinth seals and PWKR..-2RS has protected lip seals. Description of the three-stage PP seal: see page 829.

They are greased using a lithium complex soap grease to GA08 and can be lubricated via the roller stud.

Stud type track rollers with eccentric collar

Designs with an eccentric collar can be adjusted by means of a hexagonal socket on the flange/thread side of the roller stud. The outer ring outside surface can thus be adjusted against the mating track; this allows less accurate manufacturing tolerances on the adjacent construction. Furthermore, this gives improved load distribution when using several stud type track rollers and also allows preloaded linear systems to be easily realised.

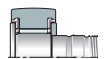
The highest point of the eccentric collar is indicated by the position of the INA logo and the eccentricity *e* is stated in the dimension tables.

With cage/with full complement cylindrical roller set

Stud type track rollers KRE..-PP have a cage. Series NUKRE and PWKRE..-2RS have a full complement cylindrical roller set. Stud type track rollers without a cage have the largest possible number of rolling elements and therefore have particularly high load carrying capacity. Due to the kinematic conditions, however, the speeds achievable with these bearings are somewhat lower than those achievable with the cage-guided stud type track rollers.

Axial guidance of outer ring

In series KRE..-PP, axial guidance is provided by the contact rib and contact washers. The outer rings of series NUKRE and PWKRE..-2RS are axially guided by the rolling elements and central rib.



Sealing/lubricant

The stud type track rollers are sealed on both sides. Series KRE..-PP has a three-stage seal with plastic axial plain washers having formed lips on both sides of the bearing, NUKRE has labyrinth seals and PWKRE..-2RS has protected lip seals. Description of the three-stage PP seal: see page 829. They are greased using a lithium complex soap grease to GA08 and can be lubricated via the roller stud.

Caution! The eccentric collar covers the radial lubrication hole in the shank. Relubrication must therefore be carried out via the end faces.

Operating temperature

Stud type track rollers have an operating temperature range from -30 °C to +140 °C. In sealed bearings (suffix 2RS), the temperature range is restricted to between -30 °C and +120 °C. Note the information on the operating temperature range in Technical Principles, Lubrication.

Caution! Stud type track rollers KR..-PP, KRV..-PP and KRE..-PP are suitable for operating temperatures from -30 °C to +100 °C, restricted by the lubricant and seal material.

Suffixes

Suffixes for the available designs: see table.

Available designs

Suffix	Description
PP	Plastic axial plain washer with formed seal lip on both sides of the stud type track roller, giving a three-stage seal
RR	Corrosion-resistant design with INA special plating Corrotect®
SK	Hexagonal socket only on the flange-side end face. No relubrication facility
2RS	Protected lip seal on both sides of the stud type track roller

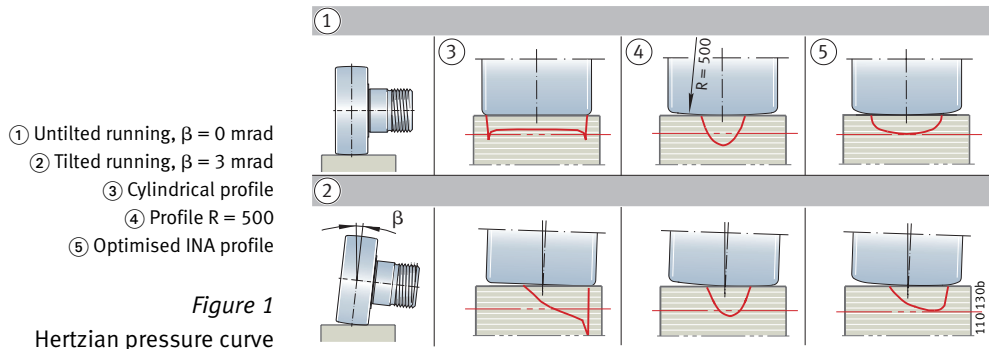
Yoke type track rollers Stud type track rollers

Advantages of the optimised INA profile

- Lower maximum Hertzian pressure under tilting, *Figure 1* and *Figure 2*.
- Higher basic rating life of the outer ring and mating track, *Figure 3*.
- Reduced wear between the outer ring outside surface and mating track, *Figure 4* and *Figure 5*.
- Increased rigidity of outer ring contact, *Figure 6*.

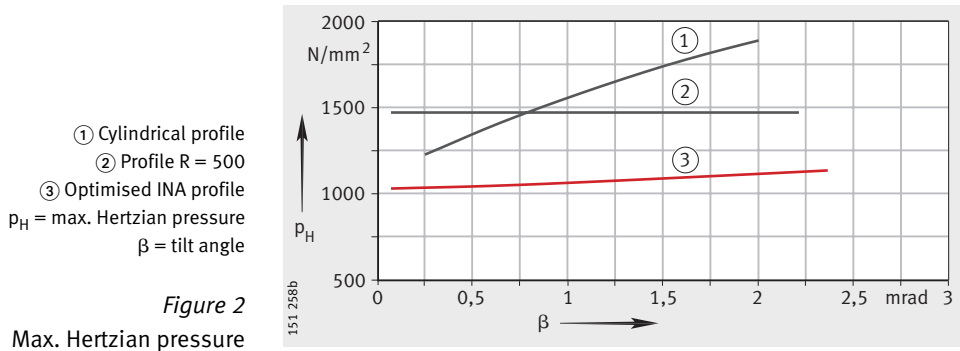
Hertzian pressure curve

Comparison: Cylindrical profile/profile R = 500 mm; optimised INA profile ($C_{rw}/P_r = 5$), *Figure 1*.



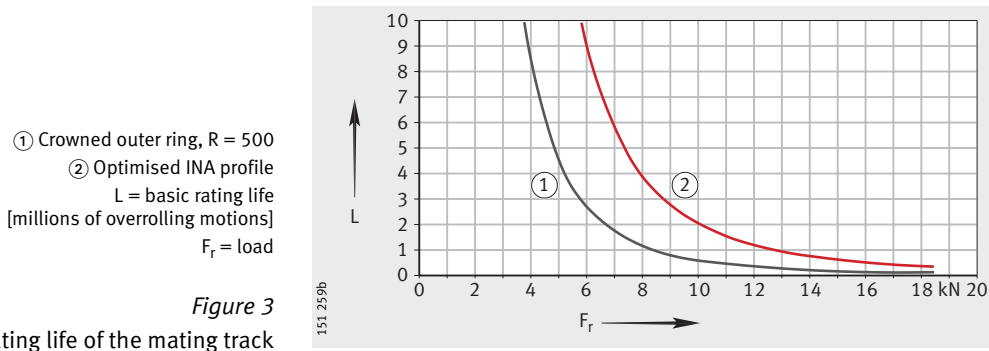
Max. Hertzian pressure

Stud type track roller NUKR80, radial load $F_r = 13\,800$ N ($C_{rw}/P_r = 5$), *Figure 2*.



Basic rating life of mating track

Yoke type track roller NUTR15, mating track made from 42CrMo4V, hardness 350 HV, *Figure 3*.



Wear of mating track

Mating track made from GGG-50.
Mean value from several test runs after 360 000 overrolling motions, *Figure 4.*

- ① Outer ring with R = 500
 - ② Optimised INA profile
 - ③ Low load F_r
 - ④ High load F_r
- $g = \text{wear}$

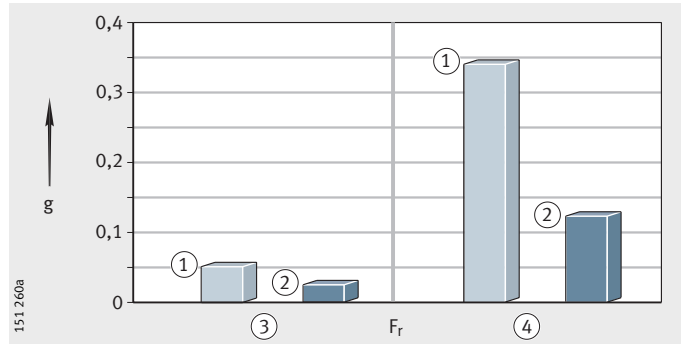


Figure 4

Wear of mating track

Mating track made from 58CrV4.
Mean value from several test runs after 8 000 000 overrolling motions, *Figure 5.*

- ① Outer ring with R = 500
 - ② Optimised INA profile
 - ③ Low load F_r
 - ④ High load F_r
- $g = \text{wear}$

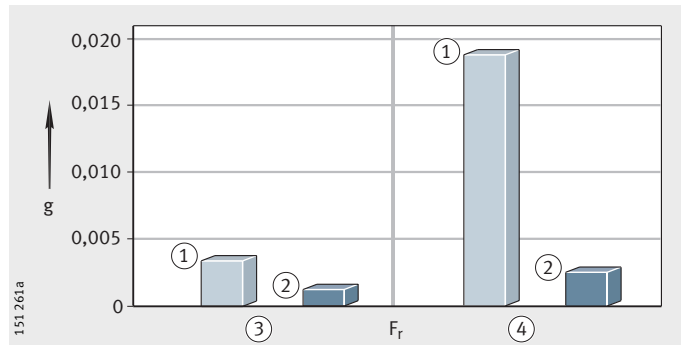
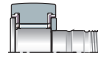


Figure 5

Wear of mating track



Rigidity in outer ring contact

Yoke type track roller NUTR15, radial deflection of outer ring and rolling element set, *Figure 6.*

- ① Crowned outer ring, R = 500
 - ② Optimised INA profile
- $\delta_r = \text{radial deflection}$
 $F_r = \text{load}$

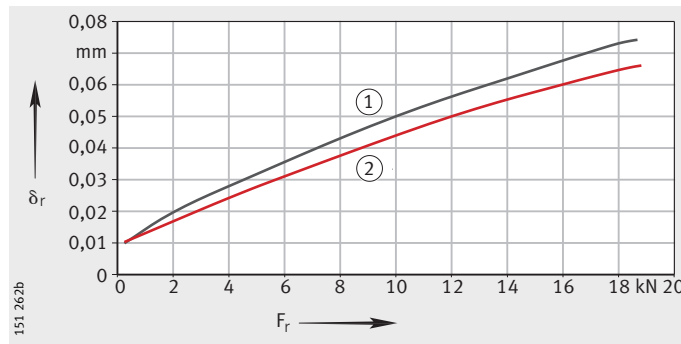


Figure 6

Rigidity in outer ring contact

Yoke type track rollers Stud type track rollers

Design and safety guidelines Installation as yoke or stud type track roller

The thick-walled outer rings of yoke and stud type track rollers can support high radial loads. If these track rollers are used on a flat mating track, the outer rings undergo elastic deformation, *Figure 7*. Compared to rolling bearings supported in a housing bore, track rollers have the following characteristics:

- modified load distribution in the bearing.
This is taken into consideration by the effective load ratings C_{rw} and C_{0rw} used in life calculation.
- bending stresses in the outer ring. These are taken into consideration by the permissible radial loads $F_{r\text{per}}$ and $F_{0r\text{per}}$. The bending stresses must not exceed the permissible strength values of the material.

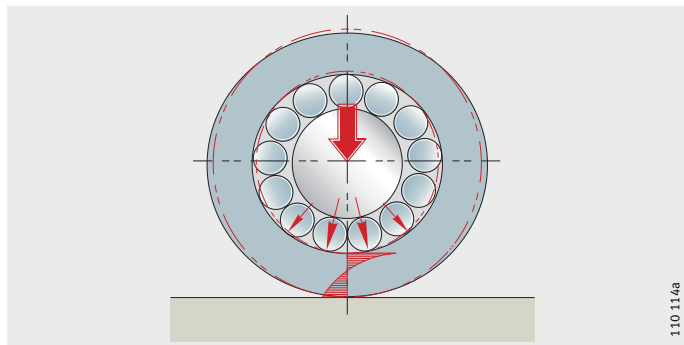


Figure 7
Deformation of
the outer ring when used against
a flat mating track

Permissible dynamic radial load

For bearings under dynamic – rotating – load, the effective dynamic load rating C_{rw} is used. C_{rw} is used to calculate the basic rating life.

Caution! The permissible dynamic radial load $F_{r\text{per}}$ must not be exceeded. If a value for $F_{r\text{per}}$ is not given, the basic dynamic load rating C_{rw} is used as a substitute. The radial load acting on the bearing must not exceed this value.

If the basic static load rating C_{0rw} is lower than the basic dynamic load rating C_{rw} , then C_{0rw} applies.

Permissible static radial load

For bearings under static load – stationary or with only infrequent rotary motion – the effective static load rating C_{0rw} applies. C_{0rw} is used to calculate the static load safety factor S_0 .

Caution! The permissible static radial load $F_{0r\text{per}}$ must not be exceeded. If no value for $F_{0r\text{per}}$ is given, the basic static load rating C_{0rw} is used as a substitute. The radial load acting on the bearing must not exceed this value.

In addition to the permissible radial load of the bearing, the permissible radial load of the mating track must also be taken into consideration (Design of mating track, page 848).

Load carrying capacity and life

The methods for calculating the rating life are:

- the basic rating life to DIN ISO 281
- the adjusted basic rating life to DIN ISO 281
- the expanded calculation of the adjusted reference life to DIN ISO 281-4.

These methods are described in Technical Principles, Load carrying capacity and life.

For yoke type track rollers, stud type track rollers and yoke type track rollers based on balls, the following values must be replaced:

- $C_r = C_{rw}$
effective dynamic load rating, see page 836
- $C_{0r} = C_{0rw}$
effective static load rating, see page 836
- $C_{ur} = C_{urw}$
fatigue limit load as track roller according to the dimension tables.

Other formulae for calculating the basic rating life

$$L_s = 0,0314 \cdot D \cdot \left(\frac{C_{rw}}{P_r} \right)^p$$

or

$$L_h = 26,18 \cdot \frac{D}{H \cdot n_{osc}} \cdot \left(\frac{C_{rw}}{P_r} \right)^p$$

or

$$L_h = 52,36 \cdot \frac{D}{\bar{v}} \cdot \left(\frac{C_{rw}}{P_r} \right)^p$$

L_s 10^5 m
Basic rating life in 10^5 metres

L_h h
Basic rating life in operating hours

C_{rw} N
Effective dynamic load rating.

C_{rw} is that load of constant magnitude and direction which a sufficiently large group of apparently identical track rollers can endure for a basic rating life of one million revolutions

P_r N
Equivalent dynamic load (radial load)

p -
Life exponent:

$p = 3$ for yoke and stud type track rollers based on balls

$p = 10/3$ for yoke and stud type track rollers based on needle or cylindrical rollers

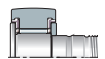
n min^{-1}
Operating speed

D mm
Outside diameter of track roller

H m
Single stroke length for reciprocating motion

n_{osc} min^{-1}
Number of return strokes per minute

\bar{v} m/min
Mean travel velocity.



Yoke type track rollers Stud type track rollers

Operating life The operating life is the life actually achieved by a rolling bearing. This can deviate significantly from the calculated basic rating life. This may be due to wear and/or fatigue as a result of:

- deviating operating conditions
- misalignment between the track roller and mating track
- insufficient or excessive operating clearance
- contamination of the track roller
- inadequate lubrication
- excessive operating temperature
- oscillating bearing motion with a very small pivoting angle – false brinelling
- wear between the outer ring outside surface and the mating track
- high vibration and false brinelling
- very high shock loads – leading to static overloading
- prior damage during installation.

Due to the variety of installation and operating conditions, it is not possible to precisely predetermine the operating life. The most reliable way of arriving at a close estimate is by comparison with similar applications.

Static load safety factor The parameter for the static load is the static load safety factor S_0 . It indicates the security against impermissible permanent deformation of the bearing:

$$S_0 = \frac{C_{0r w}}{F_{0r}}$$

S_0 – Static load safety factor
 $C_{0r w}$ N Effective static load rating: see dimension tables
 F_{0r} N Maximum radial load on track roller.

Track rollers are regarded as highly loaded at a static load safety factor of $S_0 < 8$.

Caution! Static load safety factors of $S_0 < 1$ cause plastic deformation of the rolling elements and the raceway, which can impair smooth running. This is only permissible for bearings with small rotary motions or in secondary applications.

For a static load safety factor $S_0 < 2$, please contact us.

Minimum load In order to ensure that the outer ring is driven and no slippage occurs or the track roller does not lift from the mating track, track rollers must be subjected to a minimum load in dynamic operation.

Caution! In general, the minimum load is calculated using the ratio $C_{0r w}/F_r < 60$.

Skewed running

Skewed running leads to additional axial load on the rolling bearing and axial slippage in the rolling contact between the outer ring and mating track, *Figure 8*. Depending on the skewed running angle α and lubrication, wear may occur in this case.

A complete loss of adhesive friction between the outer ring and raceway with correspondingly severe wear is to be expected with a skewed running angle $\alpha \cong 1,4 \cdot 10^{-4} \cdot p_H$ ($^{\circ}$) or

$$\alpha \cong 2,5 \cdot 10^{-3} \cdot p_H \text{ (mrad)}$$

α $^{\circ}$ or mrad

Skewed running angle

p_H N/mm²

Hertzian pressure according to the nomogram, page 849.

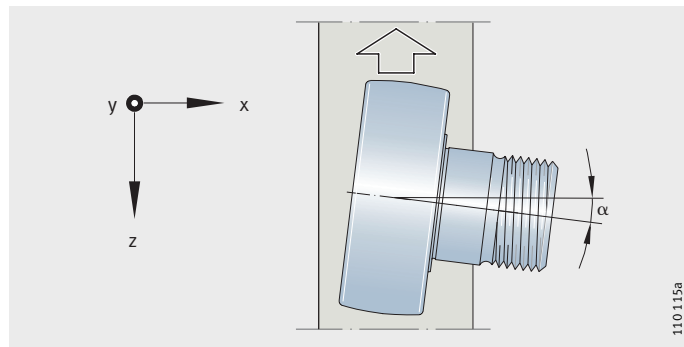


Figure 8
Skewed running angle α

Tilting

If tilting occurs during running, increased edge stresses occur, especially in track rollers with cylindrical outer rings.

Track rollers with a crowned outer ring are less sensitive to tilting and should therefore be used in preference to track rollers with a cylindrical outer ring.

In practice, track rollers with cylindrical outside surfaces and tilting angles of $\beta > 0,1^{\circ}$ (1,7 mrad) and track rollers with crowned outside surfaces and tilting angles of $\beta > 0,25^{\circ}$ (4,4 mrad) have proved susceptible to damage, *Figure 9*.

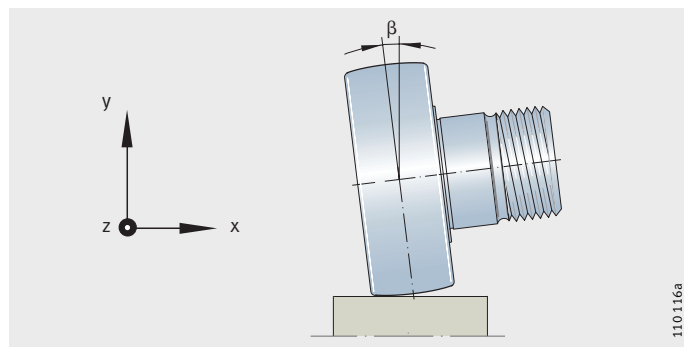


Figure 9
Tilting angle β

Yoke type track rollers Stud type track rollers

Speeds The maximum permissible speed for track rollers is largely determined by the permissible operating temperature of the rolling bearings.
The temperature thus depends on the type of bearing, the load, the lubrication conditions and the cooling conditions.

Speed during continuous operation The speeds n_{DG} in the dimension tables are guide values. They were determined for:

- grease lubrication
- loads during continuous operation of $< 0,05 \cdot C_{Orw}$
- skewed running angles of $\alpha < 0,03^\circ (< 0,5 \text{ mrad})$
- ambient temperatures of $+20 \text{ }^\circ\text{C}$
- outer ring temperatures of $+70 \text{ }^\circ\text{C}$
- lubricated mating track
- no external axial load.

The speed must be reduced if the following apply:

- loads higher than $0,05 \cdot C_{Orw}$
- additional axial forces – skewed running
- insufficient heat dissipation.

Higher speeds can be achieved with intermittent operation and oil impulse lubrication.

Speed with lip seals The speed of track rollers with lip seals is additionally restricted by the permissible sliding speed at the seal lip.

Frictional torque

The frictional torque M_R of a track roller depends on many influencing factors such as load, speed and track roller type, as well as the lubrication conditions and seal friction. Due to the wide range of these influencing factors, the frictional torque can only be calculated approximately.

For track rollers without contact seals, the frictional torque can be calculated under normal operating conditions and moderate speed range using the following formula:

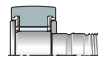
$$M_R = f \cdot F_r \cdot \frac{d_M}{2}$$

M_R	Nmm
Frictional torque of track roller	
f	–
Coefficient of friction, see table	
F_r	N
Radial load	
d_M	mm
Mean bearing diameter $(d + D)/2$ of the track roller.	

Caution! The values in the table Coefficient of friction f are valid for track rollers under radial load and without seals.

If sealed track rollers are used, higher values must be expected.

Additional axial forces – e.g. under large skewed running angles – can lead to a substantial increase in the values, especially in the case of track rollers based on needle rollers. Track rollers based on balls can support axial loads without a significant change in friction.



Coefficient of friction f

Type of track roller	Coefficient f
Ball bearing, single row	0,0015 to 0,002
Ball bearing, double row	0,002 to 0,003
Cylindrical roller bearing, full complement	0,002 to 0,003
Needle roller bearing with cage	0,003 to 0,004
Needle roller bearing, full complement	0,005 to 0,007

Displacement resistance

When a track roller rolls on a track, it must overcome not only the friction within the bearing but also the rolling friction between the outer ring and the track.

The displacement resistance F_v is determined according to the following formula:

$$F_v = \frac{2 \cdot (f_R \cdot F_r + M_R)}{D}$$

F_v	N
Displacement resistance	
f_R	mm
Coefficient of rolling friction for tracks made from hardened steel:	
$f_R = 0,05$ mm	
F_r	N
Radial load	
M_R	Nmm
Frictional torque of track roller	
D	mm
Outside diameter of track roller, see dimension tables.	

Yoke type track rollers Stud type track rollers

Lubrication

Yoke and stud type track rollers based on ball bearings are greased using a lithium soap grease with a mineral oil base to GA13.

For yoke and stud type track rollers based on needle and cylindrical rollers, a lithium complex soap grease with a mineral oil base and EP additives to GA08 is used.

Greases for initial greasing: see Technical Principles, Lubrication.

Arcanol rolling bearing greases for relubrication

Arcanol grease	Designation to DIN 51 825	Type of grease	Track roller
LOAD220	KP2N-20	Lithium-calcium soap grease with mineral oil base	Yoke and stud type track rollers based on needle and cylindrical rollers
MULTI3	K3N-30	Lithium soap grease with mineral oil base	Yoke and stud type track rollers based on balls

Two contact zones in track rollers

For track rollers, two contact zones must be lubricated and considered separately:

- the rolling elements and the rolling element raceway
- the outside surface of the track roller and the mating track.

The contact zone between the rolling elements and the rolling element raceway is covered in Technical Principles, Lubrication.

Lubrication of mating track

For lubrication of the mating track, all lubricants suitable for rolling bearing lubrication may be used. However, there are applications in which the mating track must not be lubricated.

Caution! If the contact point cannot be lubricated, wear must be anticipated, especially under high loads and at high speeds.

Oil lubrication

For oil lubrication, oils of type CLP to DIN 51 517 are recommended.

Grease lubrication

For grease lubrication, lithium soap greases to DIN 51 825 should be used. Relubrication intervals can only be determined under operating conditions.

Relubrication must be carried out at the latest when fretting corrosion first occurs – this can be identified by a reddish discolouration of the mating track or the outer ring.

Solid lubricants/ anti-friction coatings

These materials can also be used for lubrication. However, these only provides effective lubrication for a significantly shorter period than oil or grease lubrication under high traverse speeds or speeds.

Central lubrication adapter for stud type track rollers

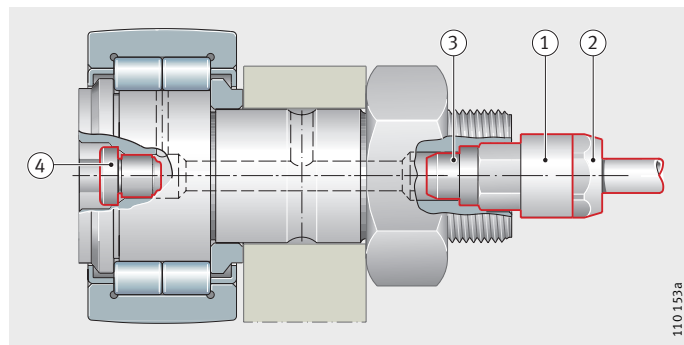
If a central lubrication system is to be used, a patented central lubrication adapter can be used to connect the standard roller stud of stud type track rollers with hexagonal sockets on both sides, *Figure 10*. This comprises a connection adapter with a hexagonal end and a rapid-fit connection cartridge.

The connection adapter is connected to the roller stud on one end of the stud type track roller by replacing the funnel type lubrication nipple with the fitting cylinder. The hexagonal end prevents rotation of the adapter. The other end of the stud type track roller is closed off using the supplied funnel type lubrication nipple, *Figure 10*.

The connection adapter has an M10×1 internal thread. This is used for screw mounting and sealing of the rapid-fit connection cartridge. The rapid-fit connection cartridge gives rigid retention and sealing of the plastic tube. It is therefore not necessary to screw the pipe and adapter onto each other.

- ① Connection adapter with M10×1 internal thread
- ② Rapid-fit connection cartridge
- ③ Fitting cylinder
- ④ Funnel type lubrication nipple

Figure 10
Central lubrication adapter/
funnel type lubrication nipple



Dimensions of adapter: see table and *Figure 11*.

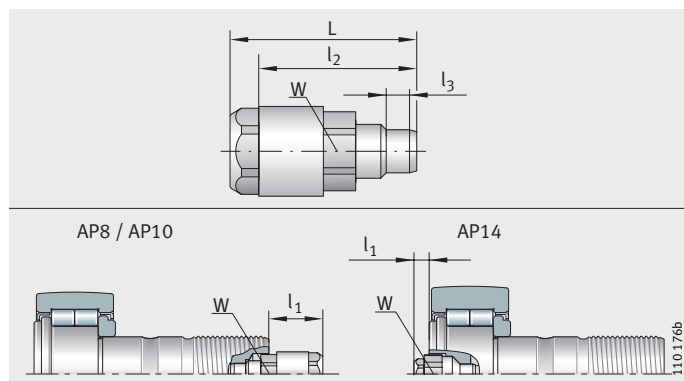
Dimensions of adapter

Central lubrication adapter Designation	W	L	l_1 max.	l_2	l_3 approx.	For polyamide pipe DIN 73 378 $d_1 \times s_{nom}^{1)}$
AP8	8	27	16	22	4	4×0,75
AP10	10	27	15	22	5	4×0,75
AP14	14	25	8	20	6	4×0,75

¹⁾ Hard PA pipes should preferably be used.

Note the operating limits in DIN 73 378 and the manufacturer's guidance.
Maximum excess pressure for pipes made from PA 11/12 at +23 °C:
31 bar to 62 bar. Maximum excess pressure when using other screw-in
connectors: 80 bar.

Figure 11
Central lubrication adapter –
dimensions



Yoke type track rollers Stud type track rollers

Simplified calculation of relubrication intervals

The table Allocation to stud type track rollers shows the relubrication quantity for central lubrication using flowable grease and its conversion to the number of relubrication impulses for conventional metering nipple sizes.

The data are valid for a lithium soap flowable grease with EP additives and mineral oil base of classes ISO VG 100 to ISO VG 220 and NLGI classes 00 or 000.

Allocation to stud type track rollers

Series ¹⁾	Outside diameter D mm	Central lubrication adapter	Re-lubrication quantity g ²⁾	Relubrication impulses for metering nipple of size	
				30 mm ³	50 mm ³
NUKR/NUKRE	35 and 40	AP8	1,1	40	24
	47 and 52	AP10	2,4	89	53
	62 to 90	AP14	7,3	271	163
KR/KRE	35 and 40	AP8	1,2	44	27
	47 and 52	AP10	1,6	60	36
	62 to 90	AP14	6	222	133
KRV/KRVE	35 and 40	AP8	0,7	26	16
	47 and 52	AP10	1	37	22
	62 to 90	AP14	3,2	120	72

¹⁾ For stud type track rollers with hexagonal socket on both sides.

²⁾ Relubrication quantity and relubrication intervals for central lubrication using flowable grease for the majority of applications. Note the quantity required to fill the feed lines.

Relubrication periods

The approximate relubrication periods for single shift operation and a majority of load cases are shown in the table Relubrication period for calculation of relubrication intervals.

The number of relubrication impulses derived from the table Allocation to stud type track rollers should be evenly distributed within these periods.

Relubrication period for calculation of relubrication intervals¹⁾

Load ratio C_{Orw}/P_r	Maximum operating speed n_{max} in % of n_{DG}			
	10	25	50	100
$5 > C_{Orw}/P_r \geq 3$	6 months	–	–	–
$10 > C_{Orw}/P_r \geq 5$	1 year	4 months	1 month	–
$C_{Orw}/P_r \geq 10$	1 year	8 months	2 months	14 days

¹⁾ The data are valid for single shift operation; the relubrication quantity and relubrication intervals are valid for the majority of applications. They are based on approximate calculation of the relubrication interval t_{RR} ; for relubrication interval see Technical Principles, Lubrication.

Periods in single shift operation

Months	Weeks	Working days	Working hours
1/2	2	10	80
1	4	20	160
2	8	40	320
4	16	80	640
6	24	120	960
8	32	160	1280
12	48	240	1920

**Fitting of
central lubrication adapter**

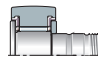
The unused relubrication hole in the roller stud must be closed off using the funnel type lubrication nipple supplied.

Caution! Only the lubrication nipples supplied should be used.

The central lubrication adapter should preferably be pressed in using a lever press under low, uniform pressure or, if necessary, carefully driven with a plastic hammer using light blows into the unused hexagonal socket bore of the roller stud; note the press-in depth l_3 and position of the hexagon, *Figure 11* and table Dimensions of adapter, page 843.

Fit the stud type track roller. Cut the plastic pipe straight across and insert it into the cartridge until it stops.

Caution! Only use polyamide pipe to DIN 73 378. Check the seating of the pipe. Note maximum pressures, maximum temperatures and minimum bending radius. Maximum pipe length to distributor approx. 1 m.



Yoke type track rollers Stud type track rollers

Adjacent construction for yoke type track rollers

For stud type track rollers without an inner ring, the rolling element raceway on the shaft or stud must be hardened and ground. The surface hardness must be 670 HV + 170 HV, the hardening depth CHD or Rht must be sufficiently large.

Design of shaft or stud: see table Tolerances and surface for the shaft or stud raceway.

Tolerances and surface for the shaft or stud raceway

Diameter tolerance of shafts or studs		Roughness max.	Roundness max.	Parallelism max.
Without inner ring	With inner ring			
k5	g6 (with point load)	$R_a0,4$ (R_z2)	25% of diameter tolerance	50% of diameter tolerance

Location of yoke type track rollers without axial guidance

For yoke type track rollers without axial guidance, the outer ring and needle roller and cage assembly must be laterally guided, *Figure 12*. The axial contact surfaces for the outer rings must be precision machined, wear-resistant and lubricated (R_z2 recommended).

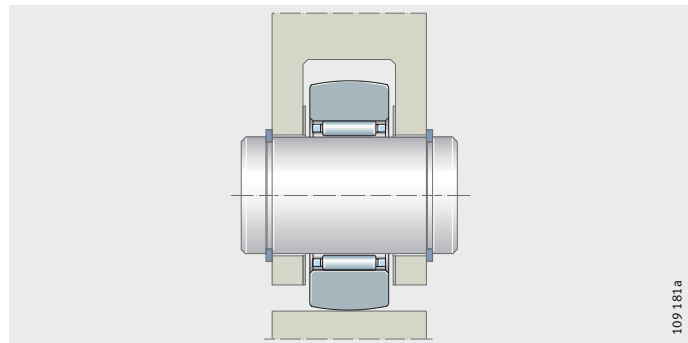


Figure 12

Lateral guidance of outer ring and needle roller and cage assembly

Location of yoke type track rollers with axial guidance

Yoke type track rollers with axial guidance must be axially clamped in place. The thrust washers must be axially supported if axial loads occur. The dimension d_2 according to the dimension table must be observed, *Figure 13*.

Yoke type track rollers NATR and NATV can be located using conventional fasteners such as snap rings, *Figure 13*.

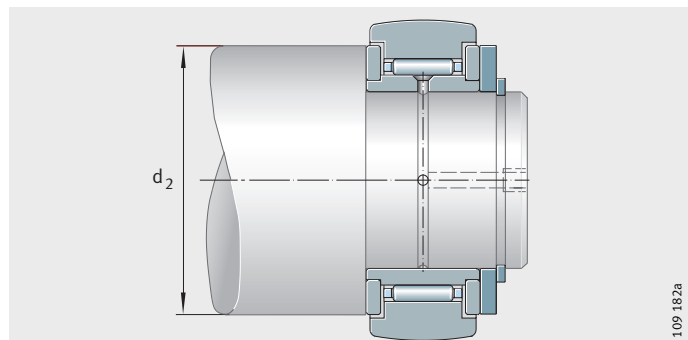


Figure 13

Location by snap rings

For NNTR..-2ZL, NUTR, PWTR..-2RS, the inner ring and thrust washer must be axially located, *Figure 14*.

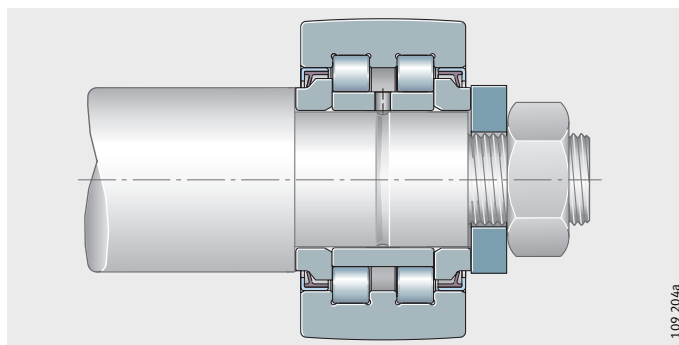


Figure 14
Clamping of
inner ring and thrust washer

Adjacent construction for stud type track rollers

The bore tolerance H7 produces a clearance fit since the stud tolerance is h7 for studs without eccentric collar and h9 for studs with eccentric collar.

The locating surfaces for stud type track rollers must be flat, perpendicular and of sufficient height. The strength of the nut locating surface must be sufficiently high. The dimension must not be less than the dimension d_2 in the dimension tables.

The entry chamfer on the locating bore must not be more than $0,5 \times 45^\circ$.

Axial location

Stud type track rollers must be axially secured using a hexagonal nut. The nuts – grade 8 to ISO 4 032 (M6, M8) or ISO 8 673 – are not included in delivery; the nuts must be ordered separately. If heavy vibration occurs, the stud type track rollers can be located using self-locking nuts to DIN 985 or special locking washers.

Caution!

For self-locking nuts, the higher tightening torque must be observed – the advice given by the nut manufacturer must be followed.

Position of lubrication hole

The position of the radial lubrication hole is indicated by the INA logo, *Figure 15*. This must not be positioned in the loaded zone.

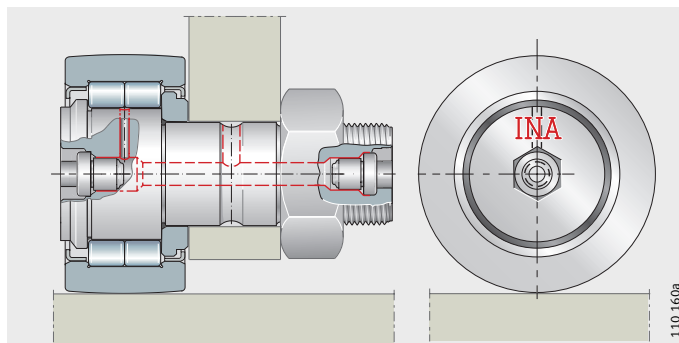


Figure 15
Position of lubrication hole

Yoke type track rollers Stud type track rollers

Design of mating track

When designing the mating track – material (strength), heat treatment, surface – the Hertzian pressure p_H must be taken into consideration. It is dependent on the load, the contact geometry (point contact or line contact) and the modulus of elasticity of the materials.

Nomogram

The Hertzian pressure p_H can be derived from the nomogram, *Figure 17*, or can be calculated.

The nomogram is valid for mating tracks made from steel. For mating tracks made from other materials see table Correction factor k , page 850.

Other conditions:

- Point contact
- Radius of curvature $R = 500$;
radius of curvature $R > 500$, see page 850
- Mating track flat in the direction of the track roller axis
- Signs according to *Figure 16*.

Example

- Stud type track roller NUKR35 with optimised INA profile, $D = 35$ mm
- Outer ring width $C = 18$ mm
- Load $F_r = 2\,500$ N
- Cam plate, radius $r_L = 80$ mm.

Curvature sum

$$\frac{1}{r_L} + \frac{2}{D} = \frac{1}{80} + \frac{2}{35} = 0,07 \text{ mm}^{-1}$$

$$p_{H500} = 1\,250 \text{ N/mm}^2$$

$$p_{H \text{ opt. INA profile}} \approx 1\,250 \text{ N/mm}^2 \cdot k_{pH}$$

$$= 1\,250 \text{ N/mm}^2 \cdot 0,85$$

$$= 1\,063 \text{ N/mm}^2$$

($1\,025 \text{ N/mm}^2$ from calculation program BEARINX[®]), k_{pH} see page 850.

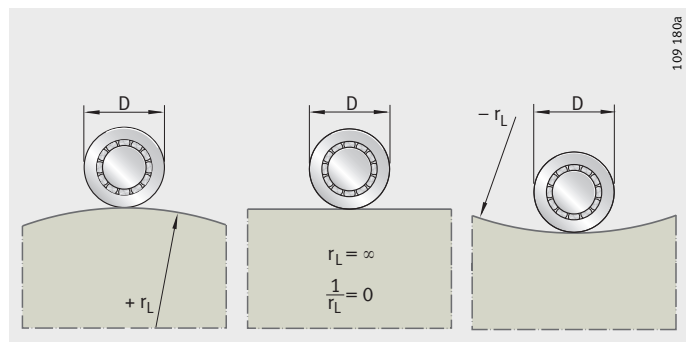


Figure 16
Raceway radii and signs

F_r	N
Radial load	
D	mm
Outside diameter of the yoke/stud type track roller	
r_L	mm
Raceway radius (<i>Figure 16</i>)	
p_H	N/mm^2
Hertzian pressure.	

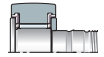
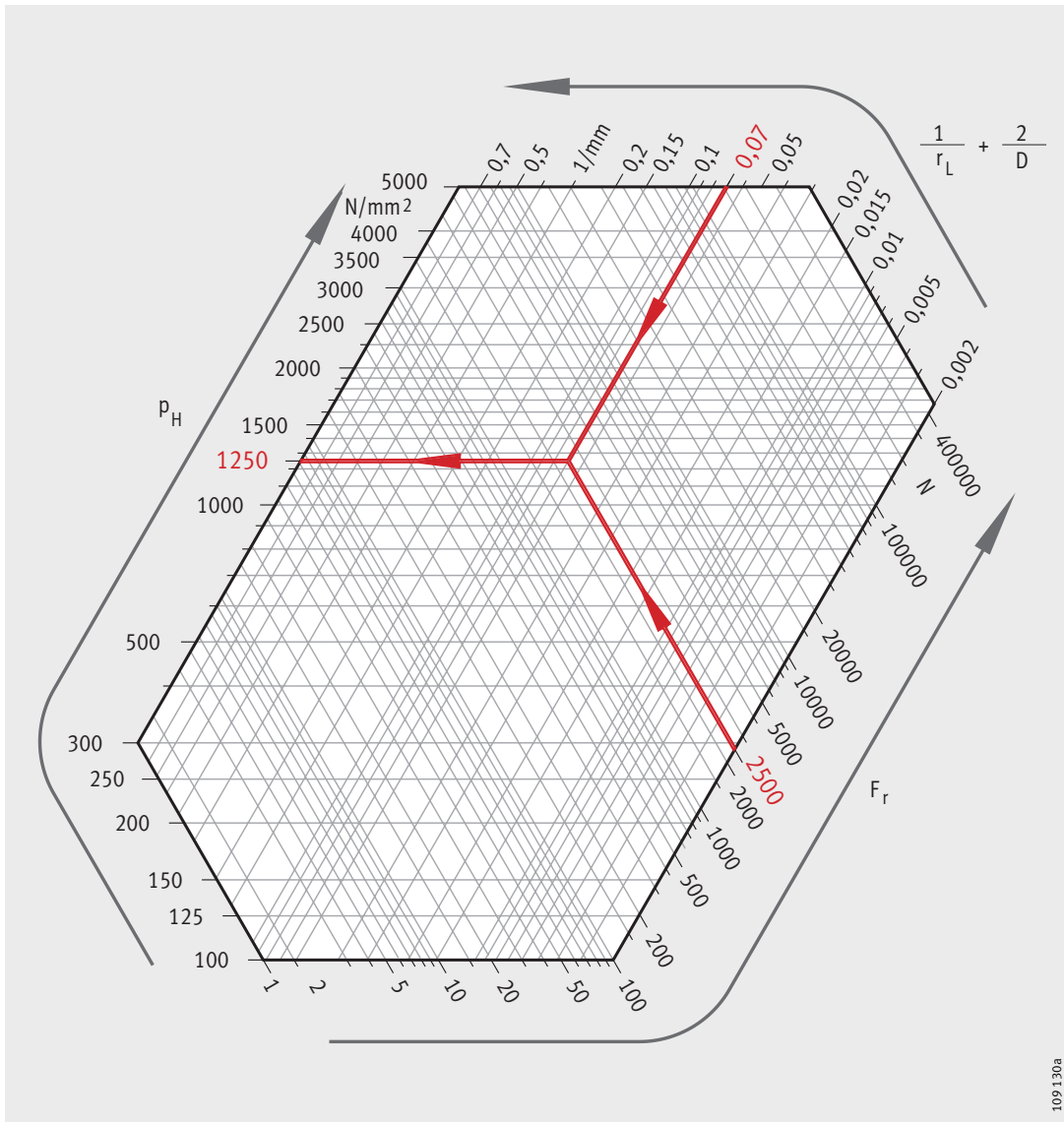


Figure 17
 Nomogram for
 determining Hertzian pressure
 Calculation example (red)

109 130a

Yoke type track rollers Stud type track rollers

Track rollers with optimised INA profile

For the optimised INA profile, the following calculation provides sufficiently precise values; for k_{pH} see table Pressure factor:

$$P_{H \text{ opt. INA profile}} \approx k_{pH} \cdot P_{H500}$$

Pressure factor k_{pH}

Outer ring width C mm	Pressure factor k_{pH}
10 incl. 15	1
over 15 incl. 20	0,85
over 20 incl. 30	0,83
over 30 incl. 35	0,8

Curvature radius $R > 500$

For $R > 500$ mm, the following applies:

$$P_{HR} = P_{H500} \cdot \left(\frac{500}{R} \right)^{0,185}$$

Materials for mating track

The mating track is subjected to high load during overrolling. This produces high Hertzian contact pressures. The strength and surface hardness of the material must be matched to this load.

For raceways subjected to high loads, through hardened steels, case hardened steels and steels for flame or induction hardening are recommended.

For raceways subjected to low loads, construction steels and cast steel or cast iron materials can be used:

$$p_H = k \cdot p_H (\text{steel/steel})$$

p_H N/mm²
Max. Hertzian pressure

k –
Correction factor for mating track material.

Correction factor k

Material	Correction factor for	
	Point contact	Line contact
GG-20	0,74	0,8
GG-30	0,81	0,85
GG-40	0,85	0,88
G GG-40	0,92	0,94
G GG-60	0,94	0,96
G GG-80	0,96	0,97

Guide values for permissible Hertzian pressure

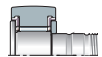
Selection of materials – guide values for permissible Hertzian pressure – is shown in the table Materials/guide values. The values were determined on steel test samples with achieved loadings of 10^7 .

Based on calculation of the load carrying capacity of rolling bearings, this gives:

- $P_{Hstat.}$
for predominantly static load
- $P_{Hdyn.}$
for predominantly dynamic load.

Materials/guide values

Material		Hertzian pressure		Proof stress of material $R_{p0,2}$ N/mm ²
		$P_{Hstat.}$ N/mm ²	$P_{Hdyn.}$ N/mm ²	
Cast iron	GG-15	850	340	120
	GG-20	1 050	420	150
	GG-25	1 200	480	190
	GG-30	1 350	540	220
	GG-35	1 450	580	250
	GG-40	1 500	600	280
Spheroidal graphite cast iron	GGG-40	1 000	490	250
	GGG-50	1 150	560	320
	GGG-60	1 400	680	380
	GGG-70	1 550	750	440
	GGG-80	1 650	800	500
Cast steel	GS-38	780	380	200
	GS-45	920	450	230
	GS-52	1 050	510	260
	GS-60	1 250	600	300
	GS-62	1 300	630	350
	GS-70	1 450	700	420
Construction steel	St 37-2	690	340	235
	St 44-2	860	420	275
	St 52-3	980	480	355
Quenched and tempered steel	C 45 V	1 400	670	500
	Cf 53 V	1 450	710	520
	Cf 56 V	1 550	760	550
	C 60 V	1 600	780	580
	46 Cr 2 V	1 750	850	650
	42 CrMo 4 V	2 000	980	900
	50 CrV 4 V	2 000	980	900
Hardened steel	100 Cr 6 H	4 000	1 500	1 900
	16 MnCr 5 E	4 000	1 500	770
	Cf 53 Hl	4 000	1 500	730
	Cf 56 Hl	4 000	1 500	760



Yoke type track rollers Stud type track rollers

Hardenable materials

The following materials with a purity level corresponding to that of alloyed construction steels may be used:

- Through hardening steels to ISO 683-17, e.g. 100Cr6.
In special cases, surface hardening of these rolling bearing steels is possible.
- Case hardening steels to ISO 683-17, e.g. 17MnCr5 or EN 10 084, e.g. 16MnCr5.
In addition to the hardenability, the core strength must also be taken into consideration. For case hardening, a fine grained hardening structure and a case hardening depth CHD according to the formula below is necessary.
- Steels for flame or induction hardening to ISO 683-17, e.g. Cf54 or DIN 17 212, e.g. Cf53.
For flame or induction hardening, only the parts of the machine component to be used as raceways must be hardened.
The material should be quenched and tempered before hardening. The effective hardening depth Rht is determined using the formula below.

Heat treatment of the mating track

The following apply for hardened mating tracks:

- a surface hardness of 670 HV + 170 HV
- a hardening depth CHD or Rht according to the following formulae
 - in accordance with DIN 50 190, the depth of the hardened surface zone at which there is still a hardness of 550 HV
- hardness curves presented in schematic form in *Figure 18* and *Figure 19*
- a hardening depth of $\geq 0,3$ mm.

The formulae are based on the hardness curves normally achieved with professional heat treatment.

Case hardening:

$$\text{CHD} \geq 2,73 \cdot 10^{-5} \cdot \frac{p_H}{\left(\frac{1}{r_L} + \frac{2}{D}\right)}$$

Flame and induction hardening:

$$\text{Rht} \geq 10^{-5} \cdot \frac{\left(4,4 \cdot \frac{p_H^2}{R_{p0,2}} - 3,5 \cdot p_H\right)}{\left(\frac{1}{r_L} + \frac{2}{D}\right)}$$

p_H	N/mm ²
Max. Hertzian pressure	
CHD	mm
Case hardening depth	
Rht	mm
Effective hardening depth	
D	mm
Outside diameter of track roller, see dimension tables	
$R_{p0,2}$	N/mm ²
Proof stress of mating track material, see table, page 851	
r_L	mm
Radius of mating track – the raceway must be flat in the direction of the track roller axis, see also <i>Figure 16</i> , page 848.	

- ① Case hardening
 - ② Required hardness
 - ③ Hardness
 - ④ Distance from surface
- CHD = case hardening depth with hardness 550 HV

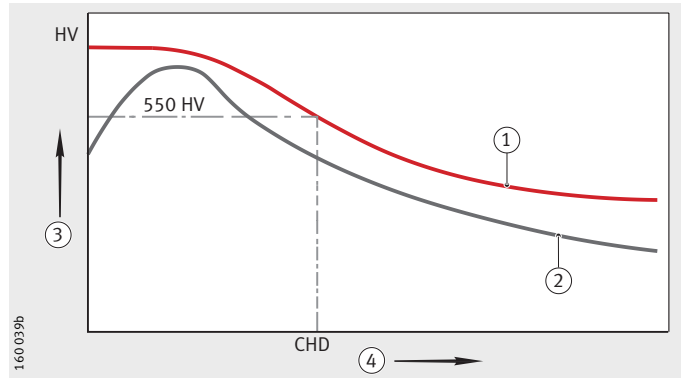


Figure 18
Case hardening depth CHD – hardness curve

- ① Flame or induction hardening
 - ② Required hardness
 - ③ Hardness
 - ④ Distance from surface
- Rht = effective hardening depth

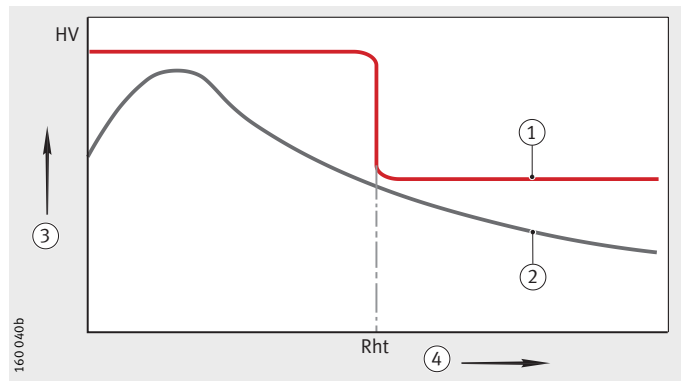
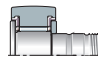


Figure 19
Effective hardening depth Rht – hardness curve



INA guideways as mating tracks

These guideways are ready-to-fit units from the INA linear range. They are to the appropriate grade Q20 for yoke and stud type track rollers and correspond to the dimensions of standard profiles:

- parallelism 20 $\mu\text{m}/\text{m}$
- surface quality $R_a 0,8$
- hardness 58 HRC to 62 HRC
- angular misalignment between the raceways max. 1 mrad (1 $\mu\text{m}/\text{mm}$)
- deviations of the guideway cross-section +0,015/+0,05
- length tolerance of the individual guideway +1 mm/m.

Enquiries

Please direct enquiries to:

- **Schaeffler KG**
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Fax 0180 5003873

Yoke type track rollers Stud type track rollers

Protection of mating track

Caution!

The mating track should be protected against contamination – covers or if necessary wipers, for example made from felt, should be placed ahead of the track roller, *Figure 20*.

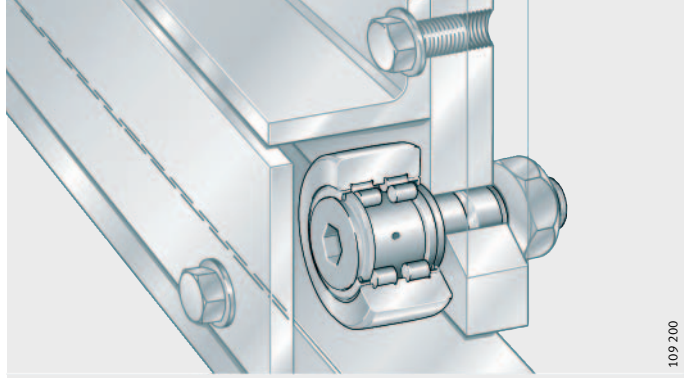


Figure 20

Protection of mating track
against contamination

Fitting

Track rollers are precision machine elements. These products must be very carefully handled before and during fitting. Their trouble-free operation depends largely on the care taken during fitting.

The assembly area must be kept clean and free from dust.

Caution!

Protect bearings from dust, contaminants and moisture. Contaminants have a detrimental influence on the running and operating life of rolling bearings.

Do not cool the bearings excessively. Moisture due to condensation can lead to corrosion in the bearings and bearing seats.

Check the seat of the axis for dimensional and geometrical accuracy and cleanliness.

Lightly oil the bearing ring seating surfaces or rub with solid lubricant.

After fitting, charge ungreased rolling bearings with lubricant. Check the correct functioning of the bearing arrangement.

Fitting tools

- Induction heaters; note the manufacturer's guidance on grease and seals
- Heating cupboard; heating up to +80 °C
- Mechanical or hydraulic press; use fitting sleeves that cover the whole circumference of the bearing ring end faces
- Hammer and fitting sleeve; blows should only be applied concentrically to the sleeve.

Caution!

Fitting forces must never be directed through the rolling elements. Direct blows on the bearing rings must be avoided. It must be ensured that the seals are not damaged during fitting.

Guidelines for dismantling

Dismantling should be taken into consideration in the original design of the bearing position.

If the bearing is to be reused:

- do not apply direct blows to the bearing rings
- do not apply dismantling forces through the rolling elements
- carefully clean the bearings after dismantling
- do not use a concentrated or "hard" flame.

Fitting and dismantling of yoke type track rollers (needle and cylindrical roller types)

If the tolerances are unfavourable, the yoke type track roller should be pressed onto the shaft or stud using a press, *Figure 21*. The inner ring must be fitted such that the pressing-in force is distributed uniformly on the end face of the inner ring.

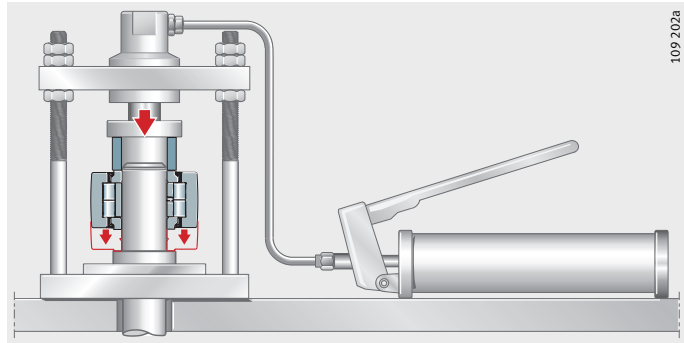


Figure 21
Fitting a yoke type track roller using a press – yoke type track roller NUTR

The bearing should be fitted such that the lubrication holes are positioned in the unloaded zone. For yoke type track rollers PWTR and NNTR, there is no need for defined positioning of the lubrication hole.

Yoke type track rollers NUTR, PWTR and NNTR should be axially secured as instructed; example according to *Figure 22*.

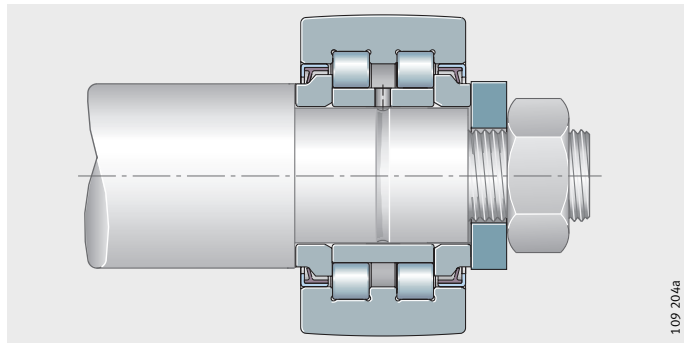
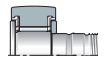


Figure 22
Axial location – yoke type track roller PWTR..-2RS

Fitting and dismantling of stud type track rollers (needle and cylindrical roller types)

The stud type track roller should be fitted using a press if possible (similar to *Figure 21*).

Caution!

Blows on the flange of the roller stud must be avoided.

The position of the lubrication hole is indicated by the INA logo. It must not lie in the loaded zone, see *Figure 15*, page 847.

Yoke type track rollers Stud type track rollers

Drive fit lubrication nipple for stud type track rollers

Caution!

Stud type track rollers are supplied with loose drive fit lubrication nipples that must be pressed in correctly before fitting the bearings.

Only these lubrication nipples should be used, see *Figure 23* and table Drive fit lubrication nipples.

If relubrication is to be carried out via the locating bore, the axial lubrication holes in the stud type track roller must be closed off using the lubrication nipples before fitting, *Figure 23*.

For lubrication, only needle-point nozzles with an opening angle of max. 60° should be used.

Central lubrication adapter for stud type track rollers: see page 843.

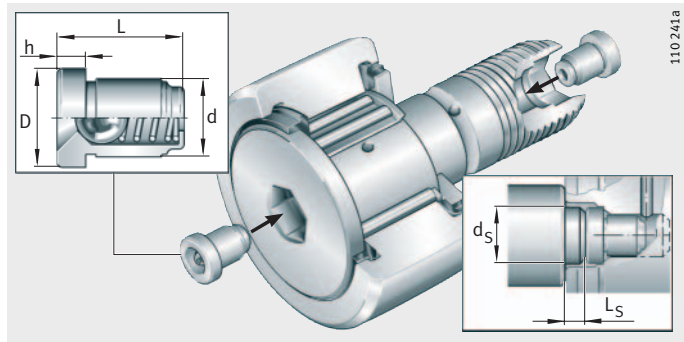


Figure 23

Stud type track roller KR..-PP with drive fit lubrication nipple and dimensions for pressing mandrel

Drive fit lubrication nipples

Lubrication nipple	Dimensions in mm						Suitable for outside diameter D
	D	d	L	h	$d_s \pm 0,1$	L_s	
NIPA1	6	4	6	1,5 ¹⁾	–	–	16 and 19
NIPA1×4,5	4,7	4	4,5	1	4,5	5	22 to 32
NIPA2×7,5	7,5	6	7,5	2	7,5	6	35 to 52
NIPA3×9,5	10	8	9,5	3	10	9	62 to 90

¹⁾ Projection of lubrication nipple, see page 869, figure bottom left.

Axial location of stud type track rollers

Stud type track rollers must be axially secured using a hexagon nut. The slot or hexagonal socket on the ends of the roller stud can be used to hold the bearing by means of a key while tightening the fixing nut and to adjust the eccentric collar, *Figure 24*.

Caution! It is absolutely essential that the tightening torque for the fixing nuts as specified in the dimension table is adhered to. It is only in this way that the permissible radial load can be ensured. If the tightening torque cannot be adhered to, an interference fit is required.

If heavy vibration occurs, self-locking nuts to DIN 985 or special locking washers can be used.

Caution! For self-locking nuts, the higher tightening torque must be observed – the advice given by the nut manufacturer must be followed.

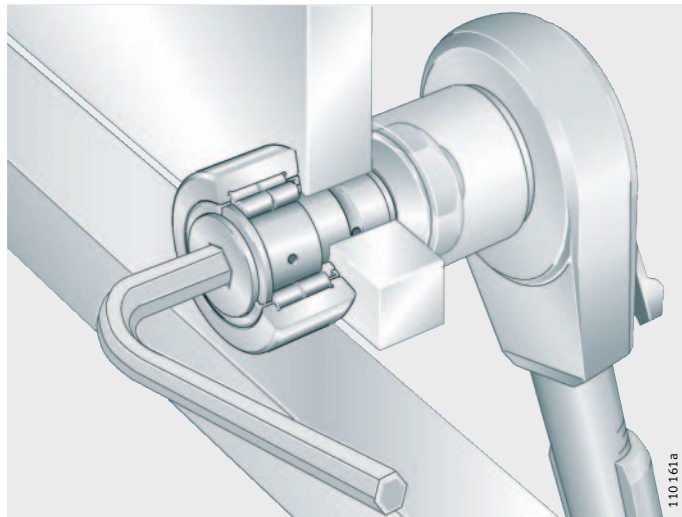


Figure 24
Holding the bearing using an Allen key

Stud type track rollers with eccentric collar

The highest point on the eccentric collar is indicated by the INA logo, see *Figure 15*, page 847.

Yoke type track rollers Stud type track rollers

Initial operation/relubrication

Stud type track rollers have a lubrication hole for relubrication:

- on the flange side of the roller stud
- on the thread-side end face – from an outside diameter of 22 mm
- on the shank of the roller stud – from an outside diameter of 30 mm with an additional lubrication groove.

Caution! Stud type track rollers with an eccentric collar cannot be relubricated via the shank. The eccentric collar covers the lubrication hole.

For lubrication, only grease guns with needle-point nozzles having an opening angle of max. 60°, *Figure 25* should be used.

Before initial operation, the lubrication holes and feed pipes must be filled with grease in order to ensure corrosion protection and lubrication can be carried out at the same time.

Relubrication of yoke and stud type track rollers may present difficulties if a rolling element is located over the radial lubrication hole. Relubrication should therefore be carried out with the bearing still warm from operation and rotating if safe to do so, before the bearing comes to rest if safe to do so and before extended breaks in operation.

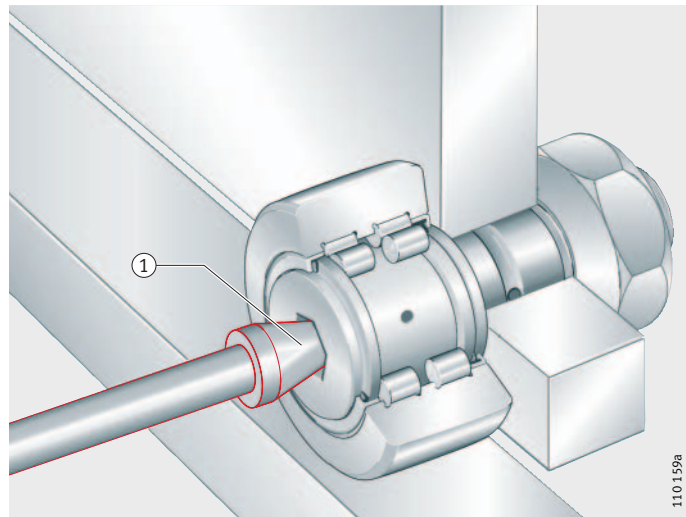
The grease used for relubrication should be the same as that used for initial greasing; if a different grease is to be used, its miscibility and compatibility must be checked, see page 842.

Relubrication should continue until a fresh collar of grease appears at the seal gaps. Old grease must be able to leave the bearing unhindered.

① Needle-point nozzle, opening angle $\leq 60^\circ$

Figure 25

Relubrication using a grease gun



110 159a

Anti-corrosion protection by Corrotect® plating

Track rollers are often subjected to aggressive media. In such applications, corrosion protection is therefore a decisive factor in achieving a long operating life of the bearings.

In principle, corrosion-resistant steels may be used for track rollers. In many applications, however, the INA special plating Corrotect® is more cost-effective. For a comprehensive description of the plating, see Technical Principles, Anti-corrosion protection, page 104.

Corrotect® is an extremely thin, electroplated surface coating – coating thickness 0,5 µm to 3 µm.

The coating is effective against moisture, contaminated water, salt spray and weakly alkaline and weakly acidic cleaning agents.

Yoke type track rollers PWTR and stud type track rollers PWKR with the suffix RR are coated as standard with Corrotect®. Other yoke and stud type track rollers with Corrotect® plating are treated as special designs.

Figure 26 shows an uncoated stud type track roller after a salt spray test, Figure 27 shows a stud type track roller with Corrotect® coating after the salt spray test.

Fitting of coated track rollers

In order to reduce the press-in force required, the surface of the parts should be lightly greased – the tolerances are increased by the thickness of the plating.

Caution! Before fitting, the compatibility of track rollers with Corrotect® plating with the media concerned should be checked.

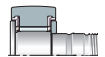
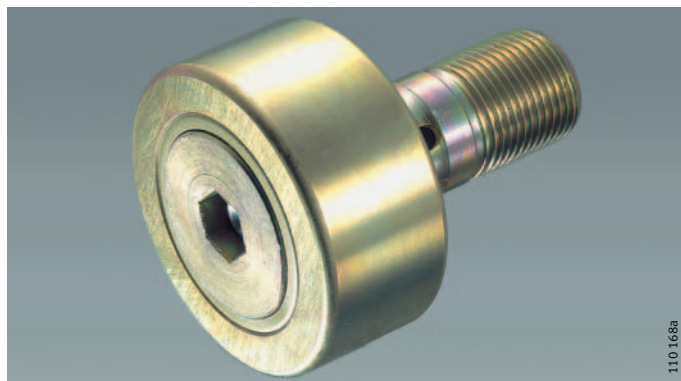


Figure 26
NUKR52 without
plating after salt spray test



Figure 27
PWKR52-2RS-RR
with Corrotect® plating after
salt spray test



Yoke type track rollers Stud type track rollers

Accuracy The dimensional and geometrical tolerances correspond to tolerance class PN in accordance with DIN 620, for KR(E) and KRV to ISO 7 063.

The following deviations from DIN 620 apply:

- the diameter tolerance of the profiled outside surface
0/-0,05 mm
- for NNTR, the diameter tolerance to h10
- for NATR, NATV, NUTR, PWTR..-2RS, the width tolerance B to h12
- for NATR, NATV, the roundness of the inner ring
- for stud type track rollers, the tolerance of the shank diameter to h7 and the eccentric collar diameter to h9.

For PWTR..-2RS-RR and PWKR..-2RS-RR, the tolerances are increased by the thickness of the INA special plating Corrotect®.

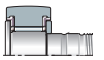
Radial internal clearance The radial internal bearing clearance corresponds approximately to class C2, for STO and NA22..-2RSR to class CN.

**Radial internal clearance to
DIN 620-4**

Bore d mm		Radial internal clearance							
		CN μm		C3 μm		C4 μm		C2 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	20	45	35	60	50	75	0	25
24	30	20	45	35	60	50	75	0	25
30	40	25	50	45	70	60	85	5	30
40	50	30	60	50	80	70	100	5	35
50	65	40	70	60	90	80	110	10	40
65	80	40	75	65	100	90	125	10	45
80	100	50	85	75	110	105	140	15	50
100	120	50	90	85	125	125	165	15	55
120	140	60	105	100	145	145	190	15	60

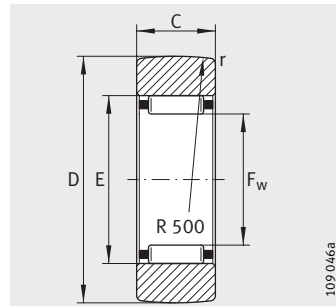
Enveloping circle For RSTO and RNA22..-2RSR, the needle roller enveloping circle F_w is in the tolerance zone F6.

The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the adjacent construction.

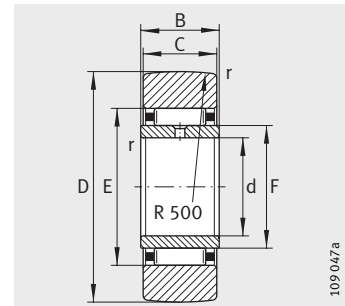


Yoke type track rollers

Without axial guidance



RSTO



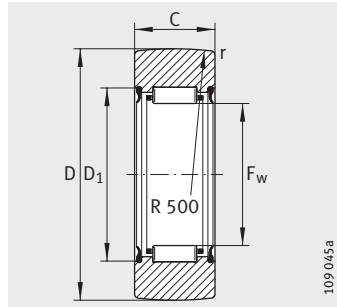
STO

Dimension table · Dimensions in mm														
Without inner ring Designation	Mass m ≈g	With inner ring Designation	Mass m ≈g	Dimensions							Basic load ratings		Fatigue limit load C _{urw} N	Speed n _{DG} min ⁻¹
				D	d	C	B	F ¹⁾ F _w	E	r min.	dyn. C _{rw} N	stat. C _{0rw} N		
RSTO5-TV	8,5	–	–	16	–	7,8	–	7	10	0,3	2 550	2 550	310	16 000
RSTO6-TV	12,5	STO6-TV	17	19	6	9,8	10	10	13	0,3	3 750	4 750	570	10 000
RSTO8-TV	21	STO8-TV	26	24	8	9,8	10	12	15	0,3	4 200	5 400	700	8 000
RSTO10	42	STO10	49	30	10	11,8	12	14	20	0,3	8 400	9 200	1 170	5 500
RSTO12	49	STO12	57	32	12	11,8	12	16	22	0,3	9 000	10 100	1 300	4 500
RSTO15	50	STO15	63	35	15	11,8	12	20	26	0,3	9 100	10 700	1 370	3 300
RSTO17	88	STO17	107	40	17	15,8	16	22	29	0,3	14 200	17 700	2 190	2 800
RSTO20	130	STO20	152	47	20	15,8	16	25	32	0,3	16 200	21 500	2 700	2 400
RSTO25	150	STO25	177	52	25	15,8	16	30	37	0,3	16 400	22 900	2 850	1 800
RSTO30	255	STO30	308	62	30	19,8	20	38	46	0,6	23 300	34 500	3 950	1 300
RSTO35	375	STO35	441	72	35	19,8	20	42	50	0,6	25 500	40 000	4 650	1 100
RSTO40	420	STO40	530	80	40	19,8	20	50	58	1	23 900	39 000	4 950	850
RSTO45	453	STO45	576	85	45	19,8	20	55	63	1	25 500	43 000	5 000	750
RSTO50	481	STO50	617	90	50	19,8	20	60	68	1	26 000	46 000	5 400	650

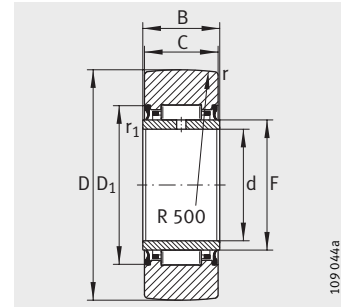
1) F = Raceway diameter of the inner ring,
F_w = Needle roller enveloping circle in tolerance zone F6.

Yoke type track rollers

Without axial guidance,
sealed



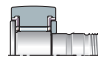
RNA22..-2RSR



NA22..-2RSR

Dimension table · Dimensions in mm

Without inner ring Designation	Mass m ≈g	Dimensions							Basic load ratings		Fatigue limit load C_{urw} N	Speed n_{DG} min^{-1}	
		D	d	C	B	$F^{1)}$ F_w	D_1 min.	r min.	r_1 min.	dyn. C_{rw} N			stat. C_{orw} N
RNA22/6-2RSR	18	19	6	11,8	12	10	16	0,3	0,3	3 900	3 650	520	9 000
RNA22/8-2RSR	29	24	8	11,8	12	12	18	0,3	0,3	4 800	4 800	860	7 000
RNA2200-2RSR	52	30	10	13,8	14	14	20	0,6	0,3	7 000	8 000	1 170	5 500
RNA2201-2RSR	57	32	12	13,8	14	16	22	0,6	0,3	7 500	9 000	1 030	4 700
RNA2202-2RSR	60	35	15	13,8	14	20	26	0,6	0,3	7 600	9 500	1 380	3 400
RNA2203-2RSR	94	40	17	15,8	16	22	28	1	0,3	9 900	13 700	1 870	3 000
RNA2204-2RSR	152	47	20	17,8	18	25	33	1	0,3	15 200	18 300	2 600	2 300
RNA2205-2RSR	179	52	25	17,8	18	30	38	1	0,3	15 700	19 900	2 850	1 800
RNA2206-2RSR	284	62	30	19,8	20	35	43	1	0,3	18 400	25 500	3 300	1 400
RNA2207-2RSR	432	72	35	22,7	23	42	50	1,1	0,6	23 000	35 500	4 800	1 100
RNA2208-2RSR	530	80	40	22,7	23	48	57	1,1	0,6	27 500	40 500	5 000	850



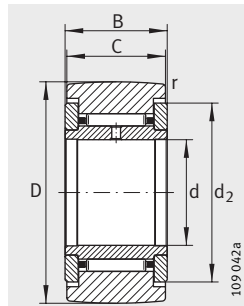
Dimension table · Dimensions in mm

With inner ring Designation	Mass m ≈g	Dimensions							Basic load ratings		Fatigue limit load C_{urw} N	Speed n_{DG} min^{-1}	
		D	d	C	B	$F^{1)}$ F_w	D_1 min.	r min.	r_1 min.	dyn. C_{rw} N			stat. C_{orw} N
NA22/6-2RSR	22	19	6	11,8	12	10	16	0,3	0,3	3 900	3 650	520	9 000
NA22/8-2RSR	34	24	8	11,8	12	12	18	0,3	0,3	4 800	4 800	860	7 000
NA2200-2RSR	60	30	10	13,8	14	14	20	0,6	0,3	7 000	8 000	1 170	5 500
NA2201-2RSR	67	32	12	13,8	14	16	22	0,6	0,3	7 500	9 000	1 030	4 700
NA2202-2RSR	75	35	15	13,8	14	20	26	0,6	0,3	7 600	9 500	1 380	3 400
NA2203-2RSR	112	40	17	15,8	16	22	28	1	0,3	9 900	13 700	1 870	3 000
NA2204-2RSR	177	47	20	17,8	18	25	33	1	0,3	15 200	18 300	2 600	2 300
NA2205-2RSR	209	52	25	17,8	18	30	38	1	0,3	15 700	19 900	2 850	1 800
NA2206-2RSR	324	62	30	19,8	20	35	43	1	0,3	18 400	25 500	3 300	1 400
NA2207-2RSR	505	72	35	22,7	23	42	50	1,1	0,6	23 000	35 500	4 800	1 100
NA2208-2RSR	628	80	40	22,7	23	48	57	1,1	0,6	27 500	40 500	5 000	850
NA2210-2RSR	690	90	50	22,7	23	58	68	1,1	0,6	28 000	42 500	5 300	650

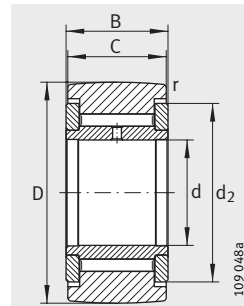
1) F = Raceway diameter of the inner ring,
 F_w = Needle roller enveloping circle in tolerance zone F6.

Yoke type track rollers

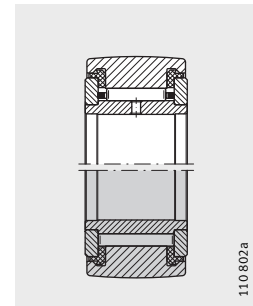
With axial guidance



NATR
(R = 500 mm)



NATV
(R = 500 mm)



NATR..-PP (optimised
NATV..-PP INA profile)

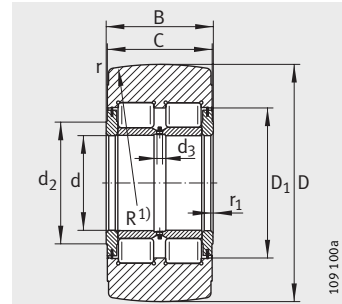
Dimension table · Dimensions in mm													
Designation ¹⁾	Mass m ≈g	Designation ²⁾	Mass m ≈g	Dimensions						Basic load ratings		Fatigue limit load C _{urw} N	Speed n _{DG} min ⁻¹
				D	d	B	C	d ₂	r	dyn. C _{rw} N	stat. C _{0rw} N		
NATR5	14	NATR5-PP	14	16	5	12	11	12,5	0,15	3 150	3 300	415	14 000
NATV5	15	NATV5-PP	15	16	5	12	11	12,5	0,15	4 900	6 500	860	3 800
NATR6	20	NATR6-PP	19	19	6	12	11	15	0,15	3 500	3 900	485	11 000
NATV6	21	NATV6-PP	21	19	6	12	11	15	0,15	5 400	7 900	1 040	3 100
NATR8	41	NATR8-PP	38	24	8	15	14	19	0,3	5 500	6 400	810	7 500
NATV8	42	NATV8-PP	41	24	8	15	14	19	0,3	7 800	11 400	1 430	2 500
NATR10	64	NATR10-PP	61	30	10	15	14	23	0,6	6 800	8 400	1 070	5 500
NATV10	65	NATV10-PP	64	30	10	15	14	23	0,6	9 500	14 600	1 840	2 100
NATR12	71	NATR12-PP	66	32	12	15	14	25	0,6	6 900	8 800	1 720	4 500
NATV12	72	NATV12-PP	69	32	12	15	14	25	0,6	9 700	15 400	1 950	1 800
NATR15	104	NATR15-PP	95	35	15	19	18	27,6	0,6	9 800	14 100	1 700	3 600
NATV15	109	NATV15-PP	101	35	15	19	18	27,6	0,6	12 800	23 000	2 900	1 600
NATR17	144	NATR17-PP	139	40	17	21	20	31,5	1	10 900	15 500	1 850	2 900
NATV17	152	NATV17-PP	147	40	17	21	20	31,5	1	14 800	26 500	3 050	1 400
NATR20	246	NATR20-PP	236	47	20	25	24	36,5	1	15 500	25 500	3 000	2 400
NATV20	254	NATV20-PP	245	47	20	25	24	36,5	1	20 600	42 000	5 200	1 300
NATR25	275	NATR25-PP	271	52	25	25	24	41,5	1	15 400	26 500	3 010	1 800
NATV25	285	NATV25-PP	281	52	25	25	24	41,5	1	20 500	44 000	5 400	1 000
NATR30	470	NATR30-PP	444	62	30	29	28	51	1	23 400	38 500	4 650	1 300
NATV30	481	NATV30-PP	468	62	30	29	28	51	1	30 500	62 000	7 800	850
-	-	NATR35-PP	547	72	35	29	28	58	1,1	25 000	44 000	5 300	1 000
-	-	NATV35-PP	630	72	35	29	28	58	1,1	33 000	71 000	8 900	750
-	-	NATR40-PP	795	80	40	32	30	66	1,1	32 500	58 000	7 000	850
-	-	NATV40-PP	832	80	40	32	30	66	1,1	41 000	88 000	11 000	650
-	-	NATR50-PP	867	90	50	32	30	76	1,1	31 500	59 000	7 100	650
-	-	NATV50-PP	969	90	50	32	30	76	1,1	40 000	92 000	11 600	550

¹⁾ Bearings with gap seals and radius of curvature of R = 500 mm.

²⁾ Bearings with plastic axial plain washer and optimised INA profile.
Permissible operating temperature: -30 °C to +100 °C (continuous operation).

Yoke type track rollers

With axial guidance,
sealed

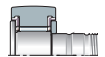


NNTR...2ZL

Dimension table · Dimensions in mm

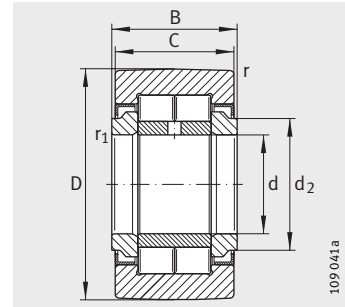
Designation ¹⁾	Mass m ≈kg	Dimensions						Mounting dimensions			Number of lubrication holes	Basic load ratings		Speed n _{DG} min ⁻¹
		D	d	B	C	r	r ₁	d ₂	D ₁	d ₃		dyn. C _{rw} N	stat. C _{0rw} N	
NNTR50X130X65-2ZL	5,2	130	50	65	63	3	2	63	80	3	3	192 000	250 000	1 100
NNTR55X140X70-2ZL	6,4	140	55	70	68	3	2	73	91	4	3	223 000	300 000	850
NNTR60X150X75-2ZL	7,8	150	60	75	73	3	2	78	97	4	3	255 000	350 000	800
NNTR65X160X75-2ZL	8,8	160	65	75	73	3	2	82	103	5	3	275 000	370 000	700
NNTR70X180X85-2ZL	13	180	70	85	83	3	2	92	115	5	3	350 000	490 000	600
NNTR80X200X90-2ZL	16,8	200	80	90	88	4	2	102	127	5	3	410 000	580 000	500
NNTR90X220X100-2ZL	22,5	220	90	100	98	4	2,5	119	146	5	3	495 000	720 000	400
NNTR100X240X105-2ZL	28	240	100	105	103	4	2,5	132	160	6	6	560 000	830 000	340
NNTR110X260X115-2ZL	35,6	260	110	115	113	4	2,5	143	174	6	6	670 000	1 020 000	300
NNTR120X290X135-2ZL	52,8	290	120	135	133	4	3	155	191	8	6	890 000	1 370 000	260
NNTR130X310X146-2ZL	65,2	310	130	146	144	5	3	165	204	8	6	1 020 000	1 600 000	240

¹⁾ Radius of curvature R = 10 000 for NNTR50X130X65-2ZL to NNTR110X260X115-2ZL
R = 15 000 for NNTR120X290X135-2ZL and NNTR130X310X146-2ZL.



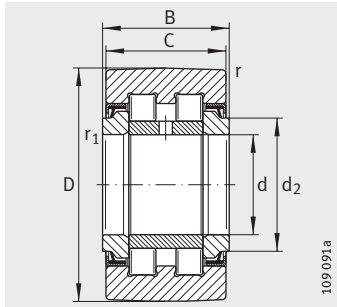
Yoke type track rollers

With axial guidance,
sealed



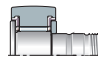
NUTR
(optimised INA profile)

Dimension table · Dimensions in mm														
Designation	Mass m ≈g	Dimensions							Basic load ratings				Fatigue limit load C _{urw} N	Speed n _{DG} min ⁻¹
		D	d	B	C	d ₂	r	r ₁	dyn. C _{r w} N	stat. C _{0r w} N	dyn. F _{r per} N	stat. F _{0r per} N		
NUTR15	99	35	15	19	18	20	0,6	0,3	15 000	16 800	8 600	16 800	2 220	6 500
PWTR15-2RS	99	35	15	19	18	20	0,6	0,3	11 600	11 300	9 400	11 300	1 780	6 000
NUTR17	147	40	17	21	20	22	1	0,5	18 400	22 600	13 100	22 600	2 900	5 500
PWTR17-2RS	147	40	17	21	20	22	1	0,5	13 200	13 800	13 800	13 800	2 200	5 000
NUTR1542	158	42	15	19	18	20	0,6	0,3	18 100	21 900	21 900	21 900	2 900	6 500
PWTR1542-2RS	158	42	15	19	18	20	0,6	0,3	13 500	14 100	14 100	14 100	2 230	6 000
NUTR1747	220	47	17	21	20	22	1	0,5	21 300	28 000	28 000	28 000	3 600	5 500
PWTR1747-2RS	220	47	17	21	20	22	1	0,5	14 800	16 400	16 400	16 400	2 600	5 000
NUTR20	245	47	20	25	24	27	1	0,5	28 000	35 000	16 400	33 000	4 400	4 200
PWTR20-2RS	245	47	20	25	24	27	1	0,5	23 200	25 500	18 300	25 500	3 600	3 800
NUTR2052	321	52	20	25	24	27	1	0,5	31 500	41 000	38 500	41 000	5 200	4 200
PWTR2052-2RS	321	52	20	25	24	27	1	0,5	25 500	29 500	29 500	29 500	4 150	3 800
NUTR25	281	52	25	25	24	31	1	0,5	29 000	37 500	17 300	34 500	4 700	4 200
PWTR25-2RS	281	52	25	25	24	31	1	0,5	24 200	28 000	19 300	28 000	3 900	3 800
NUTR2562	450	62	25	25	24	31	1	0,5	35 500	50 000	50 000	50 000	6 300	4 200
PWTR2562-2RS	450	62	25	25	24	31	1	0,5	29 000	36 000	36 000	36 000	5 000	3 800
NUTR30	465	62	30	29	28	38	1	0,5	40 000	50 000	23 500	46 500	6 300	2 600
PWTR30-2RS	465	62	30	29	28	38	1	0,5	35 000	39 500	25 500	39 500	5 400	2 200



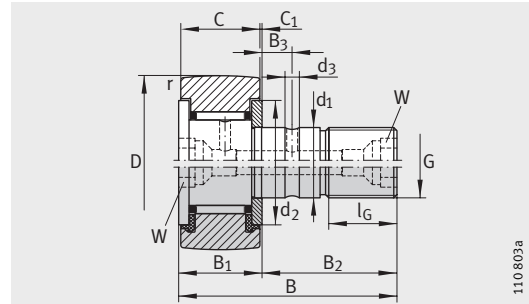
PWTR...-2RS
(optimised INA profile)

Dimension table (continued) · Dimensions in mm														
Designation	Mass m ≈g	Dimensions							Basic load ratings				Fatigue limit load C _{urw} N	Speed n _{DG} min ⁻¹
		D	d	B	C	d ₂	r	r ₁	dyn. C _{rw} N	stat. C _{0rw} N	dyn. F _{r per} N	stat. F _{0r per} N		
NUTR3072	697	72	30	29	28	38	1	0,5	47 500	64 000	64 000	64 000	8 100	2 600
PWTR3072-2RS	697	72	30	29	28	38	1	0,5	41 000	49 000	49 000	49 000	6 700	2 200
NUTR35	630	72	35	29	28	44	1,1	0,6	44 500	60 000	32 000	60 000	7 600	2 100
PWTR35-2RS	630	72	35	29	28	44	1,1	0,6	38 500	46 500	34 500	46 500	6 300	1 800
NUTR3580	836	80	35	29	28	44	1,1	0,6	51 000	72 000	72 000	72 000	9 100	2 100
PWTR3580-2RS	836	80	35	29	28	44	1,1	0,6	43 500	55 000	55 000	55 000	7 500	1 800
NUTR40	816	80	40	32	30	50,5	1,1	0,6	55 000	75 000	30 500	60 000	9 400	1 600
PWTR40-2RS	816	80	40	32	30	50,5	1,1	0,6	44 500	53 000	35 000	53 000	7 100	1 500
NUTR45	883	85	45	32	30	55,2	1,1	0,6	56 000	78 000	31 500	61 000	9 700	1 400
PWTR45-2RS	883	85	45	32	30	55,2	1,1	0,6	45 000	55 000	36 000	55 000	7 400	1 300
NUTR4090	1 129	90	40	32	30	50,5	1,1	0,6	66 000	95 000	84 000	95 000	11 900	1 600
PWTR4090-2RS	1 129	90	40	32	30	50,5	1,1	0,6	52 000	66 000	66 000	66 000	8 800	1 500
NUTR50	950	90	50	32	30	59,8	1,1	0,6	57 000	81 000	32 000	62 000	10 100	1 300
PWTR50-2RS	950	90	50	32	30	59,8	1,1	0,6	45 500	57 000	37 000	57 000	7 700	1 100
NUTR45100	1 396	100	45	32	30	55,2	1,1	0,6	71 000	107 000	106 000	107 000	13 300	1 400
PWTR45100-2RS	1 396	100	45	32	30	55,2	1,1	0,6	56 000	74 000	74 000	74 000	9 900	1 300
NUTR50110	1 690	110	50	32	30	59,8	1,1	0,6	76 000	120 000	120 000	120 000	14 900	1 300
PWTR50110-2RS	1 690	110	50	32	30	59,8	1,1	0,6	59 000	82 000	82 000	82 000	11 000	1 100



Needle roller stud type track rollers

With axial guidance



from D = 22 mm KR... (R = 500 mm)
KR...-PP (optimised INA profile)

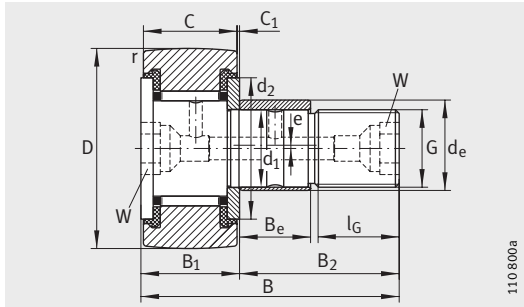
Dimension table · Dimensions in mm														
Designation	Mass m ≈g	With eccentric collar Designation	Mass m ≈g	Dimensions										
				D	d ₁ h7	B	B ₁ max.	B ₂	B ₃	C	C ₁	r min.	d ₂	d ₃
KR16 ³⁾	19	–	–	16	6	28	12,2	16	–	11	0,6	0,15	12,5	–
KR16-PP ³⁾	18	KRE16-PP ³⁾	20	16	6	28	12,2	16	–	11	0,6	0,15	12,5	–
KR16-SK-PP ⁴⁾	19	–	–	16	6	28	12,2	16	–	11	0,6	0,15	12,5	–
KRV16-PP ³⁾	19	–	–	16	6	28	12,2	16	–	11	0,6	0,15	12,5	–
KR19 ³⁾	29	–	–	19	8	32	12,2	20	–	11	0,6	0,15	15	–
KR19-PP ³⁾	29	KRE19-PP ³⁾	32	19	8	32	12,2	20	–	11	0,6	0,15	15	–
KR19-SK-PP ⁴⁾	29	–	–	19	8	32	12,2	20	–	11	0,6	0,15	15	–
KRV19-PP ³⁾	31	–	–	19	8	32	12,2	20	–	11	0,6	0,15	15	–
KR22	45	–	–	22	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KR22-PP	43	KRE22-PP	47	22	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KRV22-PP	45	–	–	22	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KR26	59	–	–	26	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KR26-PP	57	KRE26-PP	62	26	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KRV26-PP	59	–	–	26	10	36	13,2	23	–	12	0,6	0,3	17,5	–
KR30	92	–	–	30	12	40	15,2	25	6	14	0,6	0,6	23	3
KR30-PP	88	KRE30-PP	93	30	12	40	15,2	25	6	14	0,6	0,6	23	3
KRV30-PP	91	–	–	30	12	40	15,2	25	6	14	0,6	0,6	23	3
KR32	103	–	–	32	12	40	15,2	25	6	14	0,6	0,6	23	3
KR32-PP	98	KRE32-PP	104	32	12	40	15,2	25	6	14	0,6	0,6	23	3
KRV32-PP	101	–	–	32	12	40	15,2	25	6	14	0,6	0,6	23	3

1) Drive fit lubrication nipples are supplied loose. Only these lubrication nipples should be used.

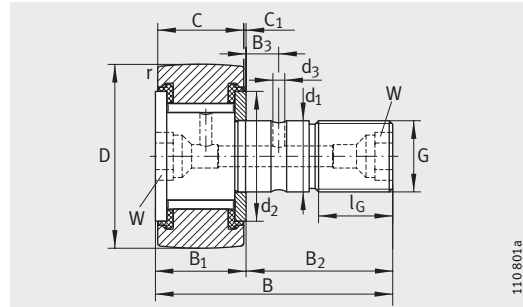
2) Nominal dimension for hexagonal socket.

3) Relubrication hole only on the flange-side end face with slot for countertensioning during fitting.

4) Hexagonal socket only on the flange-side end face. No relubrication facility.

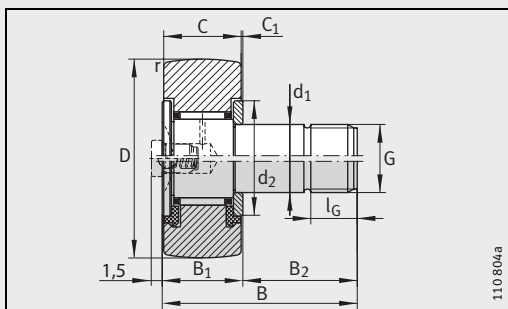
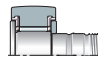


from D = 22 mm KRE..-PP (optimised INA profile)

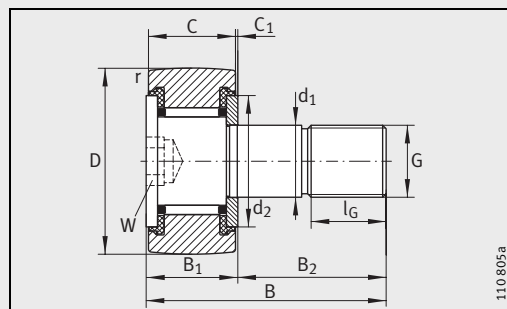


from D = 22 mm KRV..-PP (optimised INA profile)

G	l _G	W ²⁾	Eccentric collar			Drive fit lubrication nipple ¹⁾	Nut tightening torque M _A Nm	Basic load ratings		Fatigue limit load C _{urw} N	Speed n _{D G} min ⁻¹
			d _e h9	B _e	e			dyn. C _{r w} N	stat. C _{0 r w} N		
M6(X1)	8	-	-	-	-	NIPA1	3	3 150	3 300	415	14 000
M6(X1)	8	-	9	7	0,5	NIPA1	3	3 150	3 300	415	14 000
M6(X1)	8	4	-	-	-	-	3	3 150	3 300	415	14 000
M6(X1)	8	-	-	-	-	NIPA1	3	4 900	6 500	860	3 800
M8(X1,25)	10	-	-	-	-	NIPA1	8	3 500	3 900	485	11 000
M8(X1,25)	10	-	11	9	0,5	NIPA1	8	3 500	3 900	485	11 000
M8(X1,25)	10	4	-	-	-	-	8	3 500	3 900	485	11 000
M8(X1,25)	10	-	-	-	-	NIPA1	8	5 400	7 900	1 040	3 100
M10X1	12	5	-	-	-	NIPA1X4,5	15	4 500	5 200	650	8 000
M10X1	12	5	13	10	0,5	NIPA1X4,5	15	4 500	5 200	650	8 000
M10X1	12	5	-	-	-	NIPA1X4,5	15	6 200	9 100	1 110	2 600
M10X1	12	5	-	-	-	NIPA1X4,5	15	5 100	6 200	770	8 000
M10X1	12	5	13	10	0,5	NIPA1X4,5	15	5 100	6 200	770	8 000
M10X1	12	5	-	-	-	NIPA1X4,5	15	7 300	11 300	1 380	2 600
M12X1,5	13	6	-	-	-	NIPA1X4,5	22	6 800	8 400	1 070	5 500
M12X1,5	13	6	15	11	0,5	NIPA1X4,5	22	6 800	8 400	1 070	5 500
M12X1,5	13	6	-	-	-	NIPA1X4,5	22	9 500	14 600	1 840	2 100
M12X1,5	13	6	-	-	-	NIPA1X4,5	22	7 100	8 900	1 140	5 500
M12X1,5	13	6	15	11	0,5	NIPA1X4,5	22	7 100	8 900	1 140	5 500
M12X1,5	13	6	-	-	-	NIPA1X4,5	22	10 000	15 800	1 990	2 100



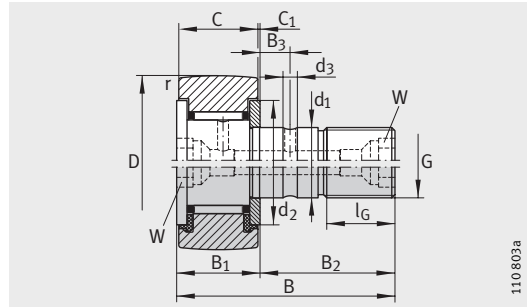
KR16, KR19
KR16-PP, KR19-PP (KRV16-PP, KRV19-PP)



KR16-SK-PP, KR19-SK-PP

Needle roller stud type track rollers

With axial guidance



KR _____ (R = 500 mm)
KR...-PP (optimised INA profile)

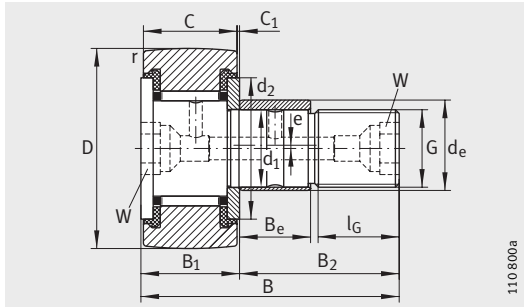
110 803a

Dimension table (continued) · Dimensions in mm														
Designation	Mass m ≈g	With eccentric collar Designation	Mass m ≈g	Dimensions										
				D	d ₁ h7	B	B ₁ max.	B ₂	B ₃	C	C ₁	r min.	d ₂	d ₃
KR35	173	–	–	35	16	52	19,6	32,5	8	18	0,8	0,6	27,6	3
KR35-PP	164	KRE35-PP	177	35	16	52	19,6	32,5	8	18	0,8	0,6	27,6	3
KRV35-PP	166	–	–	35	16	52	19,6	32,5	8	18	0,8	0,6	27,6	3
KR40	247	–	–	40	18	58	21,6	36,5	8	20	0,8	1	31,5	3
KR40-PP	239	KRE40-PP	255	40	18	58	21,6	36,5	8	20	0,8	1	31,5	3
KRV40-PP	247	–	–	40	18	58	21,6	36,5	8	20	0,8	1	31,5	3
KR47-PP	381	KRE47-PP	400	47	20	66	25,6	40,5	9	24	0,8	1	36,5	4
KRV47-PP	390	–	–	47	20	66	25,6	40,5	9	24	0,8	1	36,5	4
KR52-PP	454	KRE52-PP	473	52	20	66	25,6	40,5	9	24	0,8	1	36,5	4
KRV52-PP	463	–	–	52	20	66	25,6	40,5	9	24	0,8	1	36,5	4
KR62-PP	770	KRE62-PP	798	62	24	80	30,6	49,5	11	29	0,8	1	44	4
KRV62-PP	787	–	–	62	24	80	30,6	49,5	11	29	0,8	1	44	4
KR72-PP	1010	KRE72-PP	1038	72	24	80	30,6	49,5	11	29	0,8	1,1	44	4
KRV72-PP	1027	–	–	72	24	80	30,6	49,5	11	29	0,8	1,1	44	4
KR80-PP	1608	KRE80-PP	1665	80	30	100	37	63	15	35	1	1,1	53	4
KRV80-PP	1636	–	–	80	30	100	37	63	15	35	1	1,1	53	4
KR90-PP	1975	KRE90-PP	2032	90	30	100	37	63	15	35	1	1,1	53	4
KRV90-PP	2003	–	–	90	30	100	37	63	15	35	1	1,1	53	4

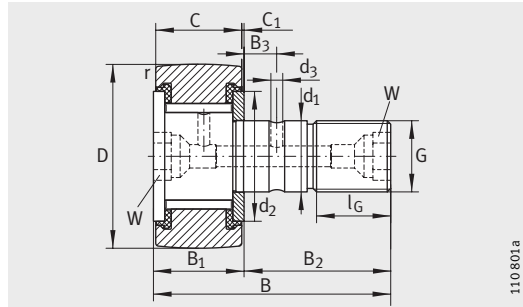
1) Drive fit lubrication nipples are supplied loose. Only these lubrication nipples should be used.

2) Nominal dimension for hexagonal socket.

Suitable central lubrication adapter for connection to a central lubrication system, see page 843.

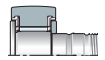


KRE..-PP (optimised INA profile)



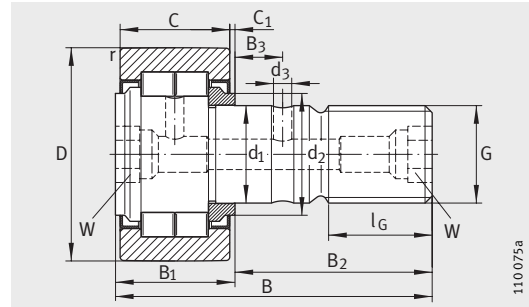
KRV..-PP (optimised INA profile)

G	l _G	W ²⁾	Eccentric collar			Drive fit lubrication nipple ¹⁾	Nut tightening torque M _A Nm	Basic load ratings		Fatigue limit load C _{urw} N	Speed n _{D G} min ⁻¹
			d _e h9	B _e	e			dyn. C _{r w} N	stat. C _{0 r w} N		
M16X1,5	17	8	-	-	-	NIPA2X7,5	58	9 800	14 100	1 700	3 600
M16X1,5	17	8	20	14	1	NIPA2X7,5	58	9 800	14 100	1 700	3 600
M16X1,5	17	8	-	-	-	NIPA2X7,5	58	12 800	23 000	2 900	1 600
M18X1,5	19	8	-	-	-	NIPA2X7,5	87	10 900	15 500	1 850	2 900
M18X1,5	19	8	22	16	1	NIPA2X7,5	87	10 900	15 500	1 850	2 900
M18X1,5	19	8	-	-	-	NIPA2X7,5	87	14 800	26 500	3 050	1 400
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	15 500	25 500	3 000	2 400
M20X1,5	21	10	-	-	-	NIPA2X7,5	120	20 600	42 000	5 200	1 300
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	16 700	29 000	3 400	2 400
M20X1,5	21	10	-	-	-	NIPA2X7,5	120	22 600	48 000	5 900	1 300
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	26 500	48 000	6 100	1 900
M24X1,5	25	14	-	-	-	NIPA3X9,5	220	34 000	75 000	9 800	1 100
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	28 000	53 000	6 700	1 900
M24X1,5	25	14	-	-	-	NIPA3X9,5	220	36 500	85 000	11 100	1 100
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	39 000	77 000	9 900	1 300
M30X1,5	32	14	-	-	-	NIPA3X9,5	450	49 500	117 000	15 300	850
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	41 000	83 000	10 600	1 300
M30X1,5	32	14	-	-	-	NIPA3X9,5	450	52 000	129 000	16 900	850



Cylindrical roller stud type track rollers

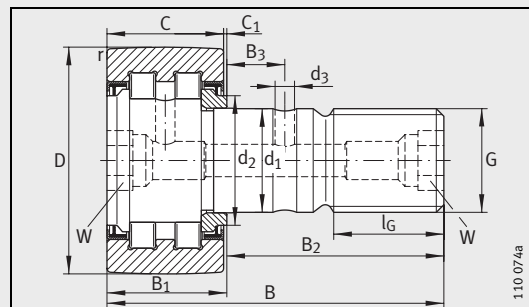
With axial guidance



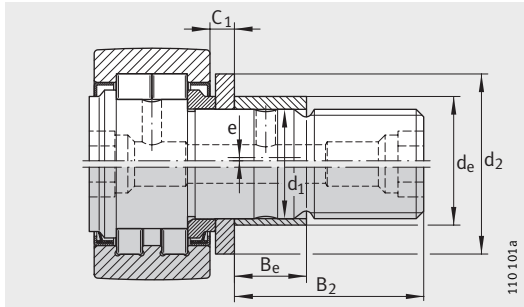
NUKR (optimised INA profile)

Dimension table · Dimensions in mm															
Designation	Mass m ≈g	With eccentric collar Designation	Mass m ≈g	Dimensions											
				D	d ₁ h7	B	B ₁ max.	B ₂	B ₃	C	C ₁	r min.	d ₂	d ₃	G
NUKR35	164	–	–	35	16	52	19,6	32,5	7,8	18	0,8	0,6	20	3	M16X1,5
–	–	NUKRE35	177	35	16	52	22,6	29,5	–	18	3,8	0,6	27,6	–	M16X1,5
PWKR35-2RS	164	–	–	35	16	52	19,6	32,5	7,8	18	0,8	0,6	20	3	M16X1,5
–	–	PWKRE35-2RS	177	35	16	52	22,6	29,5	–	18	3,8	0,6	27,6	–	M16X1,5
NUKR40	242	–	–	40	18	58	21,6	36,5	8	20	0,8	1	22	3	M18X1,5
–	–	NUKRE40	258	40	18	58	24,6	33,5	–	20	3,8	1	30	–	M18X1,5
PWKR40-2RS	242	–	–	40	18	58	21,6	36,5	8	20	0,8	1	22	3	M18X1,5
–	–	PWKRE40-2RS	258	40	18	58	24,6	33,5	–	20	3,8	1	30	–	M18X1,5
NUKR47	380	NUKRE47	400	47	20	66	25,6	40,5	9	24	0,8	1	27	4	M20X1,5
PWKR47-2RS	380	PWKRE47-2RS	400	47	20	66	25,6	40,5	9	24	0,8	1	27	4	M20X1,5
NUKR52	450	NUKRE52	470	52	20	66	25,6	40,5	9	24	0,8	1	31	4	M20X1,5
PWKR52-2RS	450	PWKRE52-2RS	470	52	20	66	25,6	40,5	9	24	0,8	1	31	4	M20X1,5
NUKR62	795	NUKRE62	824	62	24	80	30,6	49,5	11	28	1,3	1	38	4	M24X1,5
PWKR62-2RS	795	PWKRE62-2RS	824	62	24	80	30,6	49,5	11	28	1,3	1	38	4	M24X1,5
NUKR72	1020	NUKRE72	1050	72	24	80	30,6	49,5	11	28	1,3	1,1	44	4	M24X1,5
PWKR72-2RS	1020	PWKRE72-2RS	1050	72	24	80	30,6	49,5	11	28	1,3	1,1	44	4	M24X1,5
NUKR80	1600	NUKRE80	1670	80	30	100	37	63	15	35	1	1,1	47	4	M30X1,5
PWKR80-2RS	1600	PWKRE80-2RS	1670	80	30	100	37	63	15	35	1	1,1	47	4	M30X1,5
NUKR90	1960	NUKRE90	2020	90	30	100	37	63	15	35	1	1,1	47	4	M30X1,5
PWKR90-2RS	1960	PWKRE90-2RS	2020	90	30	100	37	63	15	35	1	1,1	47	4	M30X1,5

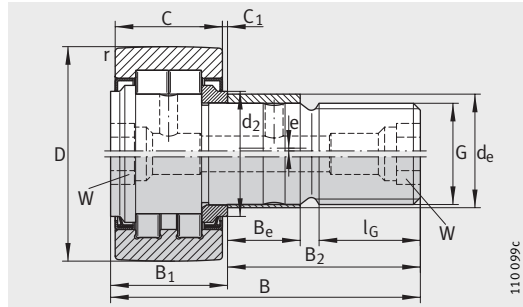
- 1) Drive fit lubrication nipples are supplied loose. Only these lubrication nipples should be used.
- 2) Nominal dimension for hexagonal socket. Suitable central lubrication adapter for connection to a central lubrication system, see page 843.



PWKR..-2RS (optimised INA profile)

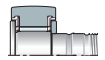


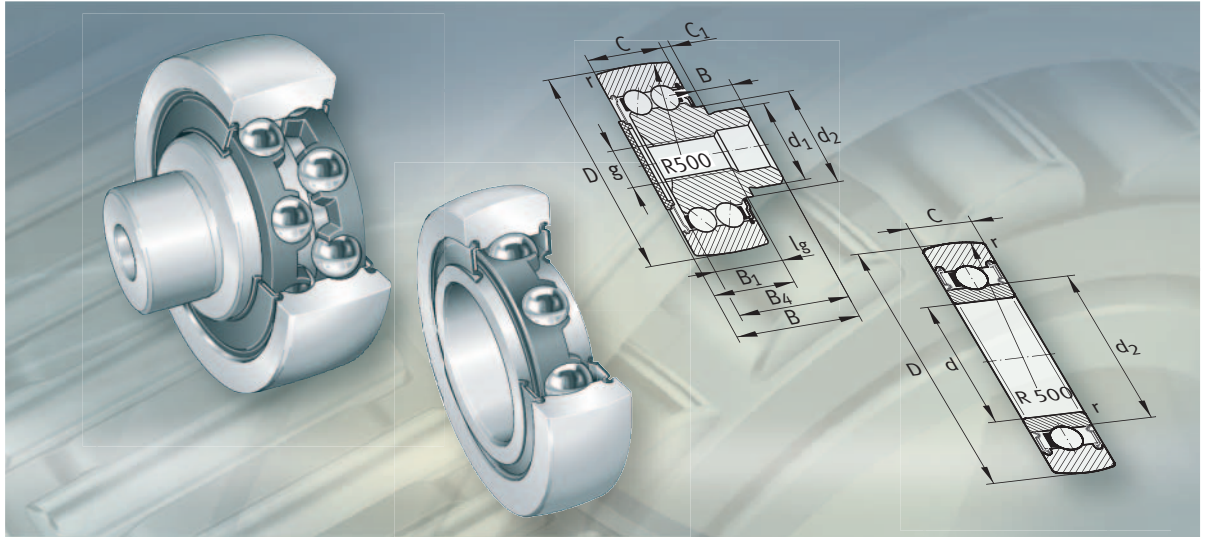
NUKRE35/NUKRE40
PWKRE35...2RS/PWKRE40...2RS
(optimised INA profile)



NUKRE
PWKRE...2RS
(optimised INA profile)

l _G	W ²⁾	Eccentric collar			Drive fit lubrication nipple ¹⁾	Nut tightening torque M _A Nm	Basic load ratings				Fatigue limit load C _{urw} N	Speed n _{DG} min ⁻¹
		d _e h9	B _e	e			dyn. C _r w N	stat. C ₀ r w N	dyn. F _r per N	stat. F ₀ r per N		
17	8	-	-	-	NIPA2X7,5	58	15 000	16 800	8 600	16 800	2 220	6 500
17	8	20	12	1	NIPA2X7,5	58	15 000	16 800	8 600	16 800	2 220	6 500
17	8	-	-	-	NIPA2X7,5	58	11 600	11 300	9 400	11 300	1 780	6 000
17	8	20	12	1	NIPA2X7,5	58	11 600	11 300	9 400	11 300	1 780	6 000
19	8	-	-	-	NIPA2X7,5	87	18 400	22 600	13 100	22 600	2 900	5 500
19	8	22	14	1	NIPA2X7,5	87	18 400	22 600	13 100	22 600	2 900	5 500
19	8	-	-	-	NIPA2X7,5	87	13 200	13 800	13 800	13 800	2 200	5 000
19	8	22	14	1	NIPA2X7,5	87	13 200	13 800	13 800	13 800	2 200	5 000
21	10	24	18	1	NIPA2X7,5	120	28 000	35 000	16 400	33 000	4 400	4 200
21	10	24	18	1	NIPA2X7,5	120	23 200	25 500	18 300	25 500	3 600	3 800
21	10	24	18	1	NIPA2X7,5	120	29 000	37 500	17 300	34 500	4 700	4 200
21	10	24	18	1	NIPA2X7,5	120	24 200	28 000	19 300	28 000	3 900	3 800
25	14	28	22	1	NIPA3X9,5	220	40 000	50 000	23 500	46 500	6 300	2 600
25	14	28	22	1	NIPA3X9,5	220	35 000	39 500	25 500	39 500	5 400	2 200
25	14	28	22	1	NIPA3X9,5	220	44 500	60 000	32 000	60 000	7 600	2 600
25	14	28	22	1	NIPA3X9,5	220	38 500	46 500	46 500	46 500	6 300	2 200
32	14	35	29	1,5	NIPA3X9,5	450	69 000	98 000	47 500	96 000	12 100	1 800
32	14	35	29	1,5	NIPA3X9,5	450	56 000	70 000	53 000	70 000	9 100	1 800
32	14	35	29	1,5	NIPA3X9,5	450	79 000	117 000	77 000	117 000	14 400	1 800
32	14	35	29	1,5	NIPA3X9,5	450	63 000	82 000	82 000	82 000	10 700	1 800

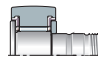




Ball bearing track rollers

Ball bearing track rollers

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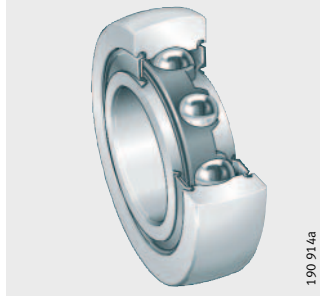


Product overview Yoke type track rollers, stud type track rollers

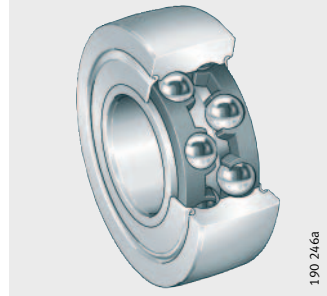
Yoke type track rollers

Single row and double row
Lip seals/
sealing shields

LR6, LR60,
LR2



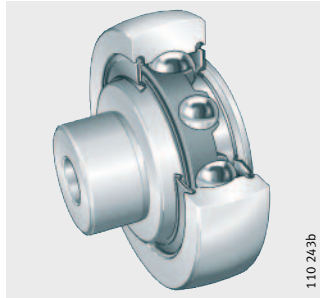
LR50, LR52, LR53



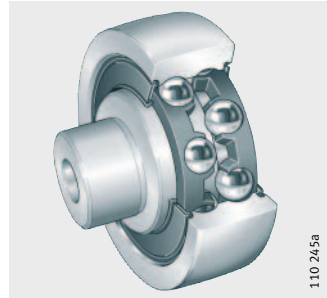
Stud type track rollers

Single row and double row
Without eccentric collar
Lip seals/
sealing shield and cover

ZL2...-DRS

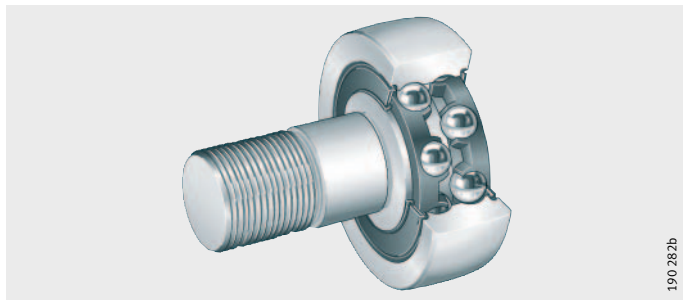


ZL52...-DRS



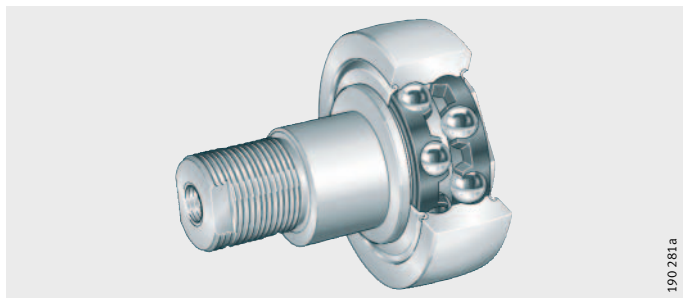
Lip seals

KR52...-2RS



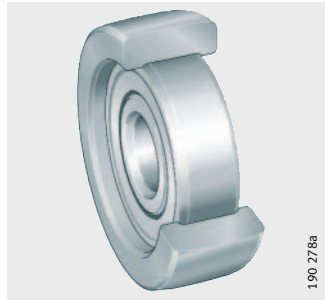
With eccentric collar/
sealing shields

ZLE52...-ZZ

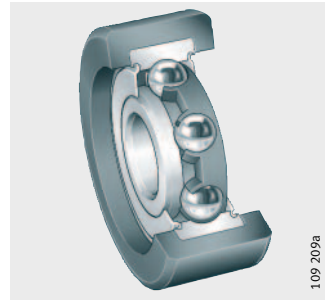


Track rollers with plastic outer tyre
Cylindrical or crowned outside surface
Lip seals/
sealing shields

KLRU

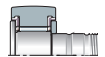
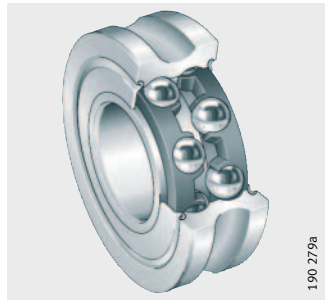


KLRZ



Other products
Track rollers with
profiled outer ring

LFR5



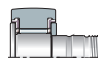
Ball bearing track rollers

Features	<p>Ball bearing track rollers are self-retaining, single or double row units with particularly thick-walled outer rings. In addition to high radial forces, these bearings can also support axial forces in both directions.</p> <p>The outer rings have a crowned or cylindrical outside surface. Designs with a crowned outside surface are used where they are inclined in relation to the mating track and edge stresses must be avoided.</p> <p>Ball bearing track rollers are available with an inner ring, with a stud and with a plastic tyre on the outer ring.</p>
Yoke type track rollers	<p>Yoke type track rollers have outer rings with a crowned or cylindrical outside surface, inner rings and ball and cage assemblies with plastic cages. They are similar in construction to deep groove or angular contact ball bearings and are mounted on shafts or studs.</p> <p>Yoke type track rollers LR6, LR60 and LR2 are single row units, LR50, LR52 and LR53 are double row units.</p>
Outer ring outside surface profile	<p>Yoke type track rollers with a crowned outside surface have a curvature radius of $R = 500$ mm.</p> <p>Yoke type track rollers with a cylindrical outside surface have the suffix X.</p>
With anti-corrosion protection	<p>For applications requiring increased protection against corrosion, yoke type track rollers with the INA special plating Corrotect[®] are available by agreement as a special design.</p> <p>For further information on Corrotect[®], see page 859.</p>
Sealing/lubricant	<p>Yoke type track rollers with the suffix 2RSR have lip seals on both sides. In some sizes, RS seals are fitted for reasons of space.</p> <p>Double row yoke type track rollers with the suffix 2Z have sealing shields on both sides, bearings with the suffix 2RS have lip seals on both sides.</p> <p>The yoke type track rollers are greased using a lithium soap grease to GA13. Double row yoke type track rollers can in some cases be relubricated via the inner ring.</p>
Stud type track rollers with or without eccentric collar	<p>Stud type track rollers have outer rings with a crowned outside surface, heavy-section roller studs and ball and cage assemblies with plastic cages. The stud type track rollers are available with and without an eccentric collar.</p> <p>For ease of fitting, the roller stud has a thread or a threaded bore. For countertensioning during fitting, there is a slot, hexagonal socket or a flat area on the external thread.</p> <p>Track rollers ZL2 are single row units, track rollers ZL52, ZLE52 and KR52 are double row units.</p>
Outer ring outside surface profile	<p>The stud type track rollers have a curvature radius of $R = 500$ mm.</p>

Without eccentric collar Stud type track rollers without an eccentric collar are suitable for applications where a defined requirement for adjustment in relation to the mating track on the adjacent construction is not required.

With eccentric collar Stud type track rollers ZLE52 have an eccentric collar. The eccentric collar can be used to set the outside surface of the outer ring clearance-free against the mating track. This gives optimum geometrical locking between the track roller and mating track. Furthermore, larger manufacturing tolerances can be tolerated in the adjacent construction. In addition, more uniform load distribution is achieved when using more than one stud type track roller.
For countertensioning during fitting, this series has flat areas on both sides of the roller stud.

Sealing/lubricant Stud type track rollers ZL2 and ZL52 have lip seals on the stud side and the suffix DRS. The opposite side can be sealed using the plastic cover supplied.
Series KR52 is sealed on both sides by lip seals and has the suffix 2RS.
Stud type track rollers ZLE52 have sealing shields on both sides and the suffix 2Z.
The stud type track rollers are greased using a lithium soap grease to GA13, ZLE52 can be lubricated via the roller stud.



Track rollers with plastic outer tyre

Track rollers KLRU and KLRZ comprise single row deep groove ball bearings with a shrink-fitted polyamide outer ring (PA). Polyamide can tolerate higher specific contact pressures than elastomer and is relatively resistant to abrasion.
These track rollers are mounted on shafts or studs and are used where low loads are present and the bearings are required to run particularly quietly.

Outer ring outside surface profile Track rollers KLRU have an outer ring with a crowned outside surface. The curvature radius is indicated in the dimension table.
Series KLRZ has a cylindrical outside surface.

Maximum radial load
Caution! The maximum radial load is determined by the permissible contact pressure; $F_{r\text{per}}$ must not be exceeded.

Sealing/lubricant The track rollers have gap seals on both sides with the suffix 2Z or lip seals with the suffix 2RSR.
They are greased using a lithium soap grease to GA13 and cannot be relubricated.

Ball bearing track rollers

Operating temperature Track rollers are suitable for a temperature range from $-20\text{ }^{\circ}\text{C}$ to $+120\text{ }^{\circ}\text{C}$, restricted by the grease, cage material and sealing ring material. Note the information on operating temperature range in Technical Principles, Lubrication.

Caution! Track rollers with plastic tyre KLRU and KLRZ are suitable for operating temperatures from $-20\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$, restricted by the grease, cage material, sealing ring material and the plastic tyre.

Suffixes Suffixes for the available designs: see table.

Available designs

Suffix	Description	Design
DRS	Lip seal on the stud side	Standard
RR	Corrosion-resistant design with INA special plating Corrotect®	Special design
X	Cylindrical outer ring	Standard
2RS	Lip seals on both sides giving axial sealing action	Standard
2RSR	Lip seals on both sides giving radial sealing action	Standard
2Z	Sealing shields on both sides	Standard

Other products INA also supplies profiled track rollers LFR5 in which the outer ring has a gothic arch profile.

These profiled track rollers are preferably used with a shaft or circular section mating track.

Enquiries Please direct enquiries to:

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Fax 0180 5003873

Design and safety guidelines

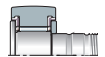
Caution!

For reliable and problem-free operation of track rollers, it is essential that attention is paid to the following items:

- Installation as yoke or stud type track roller, page 836
- Permissible dynamic or static radial load, page 836
- Load carrying capacity and life, page 837
- Operating life, page 838
- Minimum load, page 838
- Skewed running and tilting, page 839
- Speeds, page 840
- Lubrication, page 842.

Adjacent construction for yoke type track rollers

Yoke type track rollers LR can be axially clamped or located by means of conventional fasteners – such as snap rings. The abutment surfaces for the bearings must be flat and perpendicular. Due to the contact pressure occurring, the actual dimension must not be less than the dimension d_2 according to the dimension tables.



Shaft tolerances

In general, track rollers have point load on the inner ring. In order to ensure adequate support and to substantially avoid fretting corrosion, shaft tolerances to h6 are suitable.

Adjacent construction for stud type track rollers

Caution!

Stud type track rollers ZL and KR must be axially clamped. The abutment surfaces for the nut must have sufficiently high strength and the tightening torque M_A for the fixing nut given in the dimension table must be observed. The roller stud can only transmit the permissible radial load if the correct tightening torque is applied. If the tightening torque cannot be adhered to, an interference fit is required.

The abutment surfaces for the track rollers must be flat and perpendicular. Due to the contact pressure occurring, the actual dimension must not be less than the dimension d_2 according to the dimension table.

The entry chamfer on the locating bore must not be more than $0,5 \times 45^\circ$.

Bore tolerance

For the locating bore, tolerances according to the table Stud and bore tolerances are suitable.

Stud and bore tolerances

Series	Tolerance	
	Shank	Bore (recommended)
ZL2	r6	H7
ZL52	r6	H7
KR52	h7	H7
ZLE52	h9	H7

Ball bearing track rollers

Fitting If the tolerances are unfavourable, the yoke type track roller should be pressed onto the shaft or stud using a press, *Figure 1*. The inner ring must be fitted such that the pressing-in force is distributed uniformly on the end face of the inner ring.

Caution! Fitting forces must never be directed through the rolling elements. Ensure that the seals are not damaged. The yoke type track rollers must be secured axially.

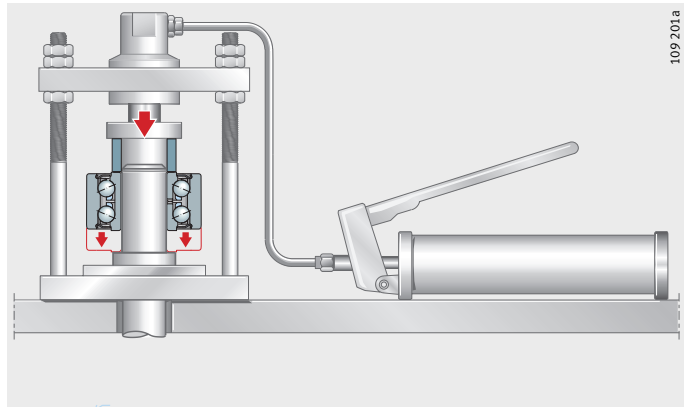


Figure 1
Pressing the yoke type track roller on using a fitting press

Stud type track rollers Stud type track rollers are fitted and dismantled by methods to those used for yoke type track rollers, *Figure 2*.

Caution! The tightening torques given in the dimension table must be observed. It is only in this way that the permissible radial load can be ensured. Screws and nuts of grade 8.8 or better must be used.

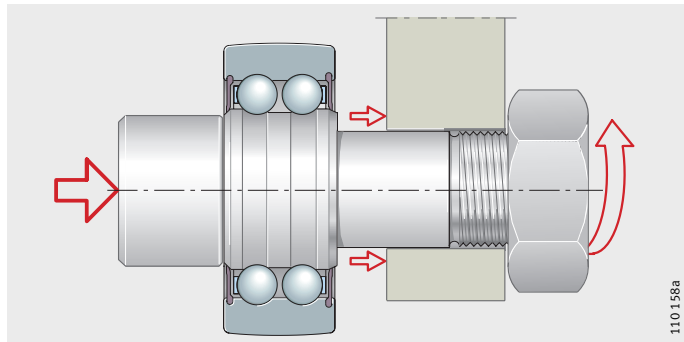


Figure 2
Fitting of stud type track roller

Accuracy

The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620.

In a deviation from DIN 620, the diameter tolerance of the profiled outside surface is $-0,05$ mm.

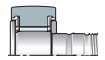
Stud tolerance for stud type track rollers and bore tolerances, see table Stud and bore tolerances, page 881.

Radial internal clearance

The radial internal clearance corresponds to class CN.

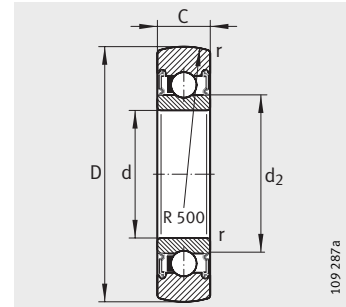
Radial internal clearance to DIN 620-4

Bore		Radial internal clearance									
d mm		C2 μm		CN μm		C3 μm		C4 μm		C5 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
2,5	10	0	7	2	13	8	23	14	29	20	37
10	18	0	9	3	18	11	25	18	33	25	45
18	24	0	10	5	20	13	28	20	36	28	48
24	30	1	11	5	20	13	28	23	41	30	53
30	40	1	11	6	20	15	33	28	46	40	64
40	50	1	11	6	23	18	36	30	51	45	73
50	65	1	15	8	28	23	43	38	61	55	90



Yoke type track rollers

Single row



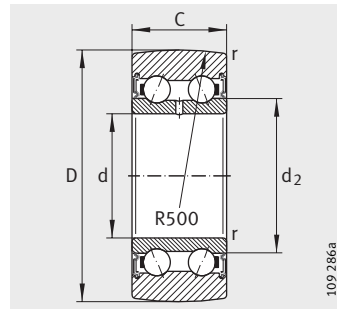
LR6..-2RSR, LR2...-2RSR,
LR2...-X-2RSR¹⁾

Dimension table · Dimensions in mm										
Designation	Mass m ≈g	Dimensions					Basic load ratings		Fatigue limit load C _{urw} N	Speed n _{DG} min ⁻¹
		D	d	C	d ₂	r min.	dyn. C _{rw} N	stat. C _{0rw} N		
LR604-2RSR	10	13	4	4	6,1	0,2	870	350	14,5	24 000
LR605-2RSR	10	16	5	5	7,5	0,2	1 220	510	21,1	23 000
LR606-2RSR	10	19	6	6	8,7	0,3	1 830	790	32,5	22 000
LR607-2RSR	10	22	7	6	9	0,3	2 130	880	35,5	20 000
LR608-2RSR	20	24	8	7	10	0,3	2 750	1 240	52	19 000
LR6000-2RSR	20	28	10	8	14,6	0,3	3 650	2 490	157	17 000
LR6001-2RSR	30	30	12	8	16,6	0,3	3 850	2 750	173	16 000
LR200-2RS	50	32	10	9	15,4	0,6	4 400	2 150	89	13 000
LR200-X-2RS ¹⁾	50	32	10	9	15,4	0,6	4 400	2 150	89	13 000
LR201-2RSR	50	35	12	10	18,3	0,6	5 600	2 700	112	12 000
LR201-X-2RSR ¹⁾	50	35	12	10	18,3	0,6	5 600	2 700	112	12 000
LR202-2RSR	70	40	15	11	21	0,6	6 600	3 350	133	11 000
LR202-X-2RSR ¹⁾	70	40	15	11	21	0,6	6 600	3 350	133	11 000
LR203-2RSR	110	47	17	12	24	0,6	8 500	4 450	185	9 000
LR203-X-2RSR ¹⁾	110	47	17	12	24	0,6	8 500	4 450	185	9 000
LR204-2RSR	150	52	20	14	29	1	10 600	5 700	238	8 000
LR204-X-2RSR ¹⁾	150	52	20	14	29	1	10 600	5 700	238	8 000
LR205-2RSR	230	62	25	15	33,5	1	12 500	7 100	290	7 000
LR205-X-2RSR ¹⁾	230	62	25	15	33,5	1	12 500	7 100	290	7 000
LR206-2RS	330	72	30	16	37,4	1	16 600	9 700	400	5 500
LR206-X-2RS ¹⁾	330	72	30	16	37,4	1	16 600	9 700	400	5 500
LR207-2RS	400	80	35	17	42,4	1,1	20 400	12 100	500	4 500
LR207-X-2RS ¹⁾	400	80	35	17	42,4	1,1	20 400	12 100	500	4 500
LR209-2RS	500	90	45	19	53,2	1,1	22 400	13 700	560	3 600
LR209-X-2RS ¹⁾	500	90	45	19	53,2	1,1	22 400	13 700	560	3 600

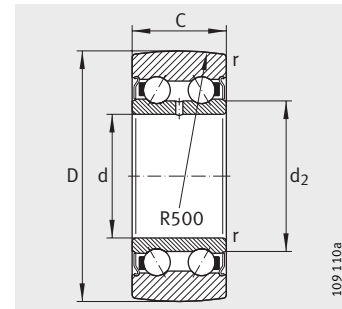
¹⁾ Track roller with cylindrical outside surface.

Yoke type track rollers

Double row



LR50..-2RSR



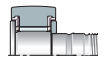
LR52..-2Z,
LR52..-X-2Z¹⁾

Dimension table · Dimensions in mm

Designation	Mass m ≈g	Dimensions					Basic load ratings		Fatigue limit load C _{urw} N	Speed n _{D G} min ⁻¹
		D	d	C	d ₂ min.	r	dyn. C _{r w} N	stat. C _{0 r w} N		
LR50/5-2RSR	10	17	5	7	8,2	0,2	1 690	940	39	12 000
LR50/6-2RSR	20	19	6	9	9,3	0,3	2 700	1 370	56	11 000
LR50/7-2RSR	20	22	7	10	10,5	0,3	3 350	1 720	70	10 000
LR50/8-2RSR ²⁾	30	24	8	11	10,5	0,3	4 300	2 390	99	10 000
LR5000-2RS	30	28	10	12	13,5	0,3	4 800	2 850	118	9 000
LR5001-2RS	30	30	12	12	15,5	0,3	5 100	3 100	128	8 500
LR5200-2Z	70	32	10	14	15,4	0,6	6 800	4 100	170	11 000
LR5200-X-2Z ¹⁾	70	32	10	14	15,4	0,6	6 800	4 100	170	11 000
LR5200-2RS	70	32	10	14	15,4	0,6	6 800	4 100	170	8 000
LR5002-2RS	50	35	15	13	20,4	0,3	6 600	4 150	172	7 000
LR5201-2Z	80	35	12	15,9	17,1	0,6	8 700	5 200	215	10 000
LR5201-X-2Z ¹⁾	80	35	12	15,9	17,1	0,6	8 700	5 200	215	10 000
LR5201-2RS	80	35	12	15,9	17,1	0,6	8 700	5 200	215	7 500
LR5003-2RS	70	40	17	14	21,6	0,3	7 800	5 300	218	6 000
LR5202-2Z	110	40	15	15,9	20	0,6	10 000	6 300	260	10 000
LR5202-X-2Z ¹⁾	110	40	15	15,9	20	0,6	10 000	6 300	260	10 000
LR5202-2RS	110	40	15	15,9	20	0,6	10 000	6 300	260	7 000

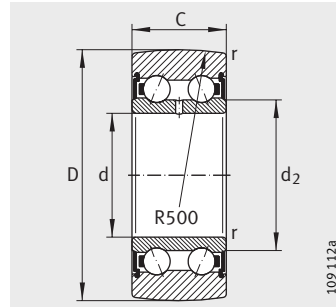
¹⁾ Track roller with cylindrical outside surface.

²⁾ Without lubrication hole.

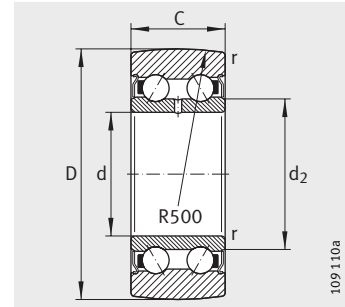


Yoke type track rollers

Double row



LR50...-2RS, LR52...-2RS,
LR53...-2RS



LR52...-2Z, LR53...-2Z,
LR52...-X-2Z¹⁾

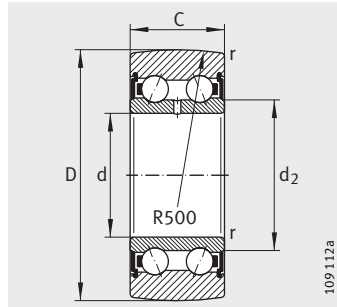
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈g	Dimensions					Basic load ratings		Fatigue limit load C _{urw} N	Speed n _{DG} min ⁻¹
		D	d	C	d ₂	r min.	dyn. C _{rw} N	stat. C _{0rw} N		
LR5004-2RS	120	47	20	16	25,2	0,6	11 700	7 700	315	5 500
LR5203-2Z	170	47	17	17,5	22,5	0,6	12 800	8 300	345	7 500
LR5203-X-2Z ¹⁾	170	47	17	17,5	22,5	0,6	12 800	8 300	345	7 500
LR5203-2RS	170	47	17	17,5	22,5	0,6	12 800	8 300	345	5 500
LR5005-2RS	150	52	25	16	29,8	0,6	11 800	8 200	335	4 700
LR5204-2Z	230	52	20	20,6	26,5	1	16 200	10 700	440	7 000
LR5204-X-2Z ¹⁾	230	52	20	20,6	26,5	1	16 200	10 700	440	7 000
LR5204-2RS	230	52	20	20,6	26,5	1	16 200	10 700	440	5 000
LR5303-2RS	210	52	17	22,2	23,5	1	17 600	11 300	465	4 700
LR5006-2RS	250	62	30	19	35,5	1	16 100	11 900	495	4 000
LR5205-2Z	340	62	25	20,6	30,3	1	18 800	13 200	540	6 500
LR5205-X-2Z ¹⁾	340	62	25	20,6	30,3	1	18 800	13 200	540	6 500
LR5205-2RS	340	62	25	20,6	30,3	1	18 800	13 200	540	4 500
LR5304-2Z	340	62	20	22,2	29	1,1	21 600	14 800	620	6 500
LR5304-2RS	340	62	20	22,2	29	1,1	21 600	14 800	620	4 500
LR5007-2RS	300	68	35	20	41,7	1	17 900	13 300	550	4 300

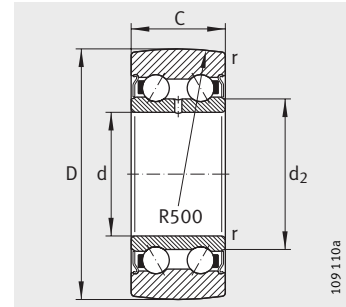
¹⁾ Track roller with cylindrical outside surface.

Yoke type track rollers

Double row



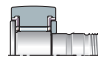
LR52..-2RS, LR53..-2RS



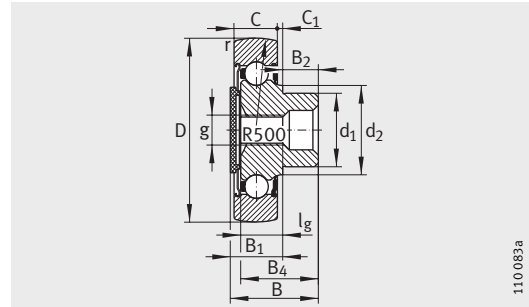
LR52..-2Z, LR53..-2Z,
LR52..-X-2Z¹⁾

Dimension table (continued) · Dimensions in mm											
Designation	Mass m ≈g	Dimensions					Basic load ratings			Fatigue limit load C _{urw} N	Speed n _{DG} min ⁻¹
		D	d	C	d ₂	r min.	dyn. C _{rw} N	stat. C _{0rw} N	F _{r per} N		
LR5206-2Z	510	72	30	23,8	37,4	1	25 000	18 000	–	740	5 000
LR5206-X-2Z ¹⁾	510	72	30	23,8	37,4	1	25 000	18 000	–	740	5 000
LR5206-2RS	510	72	30	23,8	37,4	1	25 000	18 000	–	740	3 500
LR5305-2Z	500	72	25	25,4	34,4	1,1	28 000	19 900	–	830	5 500
LR5305-2RS	500	72	25	25,4	34,4	1,1	28 000	19 900	–	830	3 900
LR5207-2Z	660	80	35	27	42,4	1,1	31 000	22 800	–	940	3 900
LR5207-X-2Z ¹⁾	660	80	35	27	42,4	1,1	31 000	22 800	–	940	3 900
LR5207-2RS	660	80	35	27	42,4	1,1	31 000	22 800	–	940	2 800
LR5306-2Z	670	80	30	30,2	41,4	1,1	36 000	25 500	–	1 060	4 300
LR5306-2RS	670	80	30	30,2	41,4	1,1	36 000	25 500	–	1 060	3 100
LR5208-2Z	750	85	40	30,2	48,4	1,1	35 000	26 000	20 800	1 070	3 500
LR5208-X-2Z ¹⁾	750	85	40	30,2	48,4	1,1	35 000	26 000	20 800	1 070	3 500
LR5208-2RS	750	85	40	30,2	48,4	1,1	35 000	26 000	20 800	1 070	2 500
LR5307-2Z	970	90	35	34,9	47,7	1,5	44 000	32 500	–	1 350	3 600
LR5307-2RS	970	90	35	34,9	47,7	1,5	44 000	32 500	–	1 350	2 500
LR5308-2Z	1 200	100	40	36,5	52,4	1,5	55 000	40 500	–	1 690	3 300
LR5308-2RS	1 200	100	40	36,5	52,4	1,5	55 000	40 500	–	1 690	2 300

¹⁾ Track roller with cylindrical outside surface.

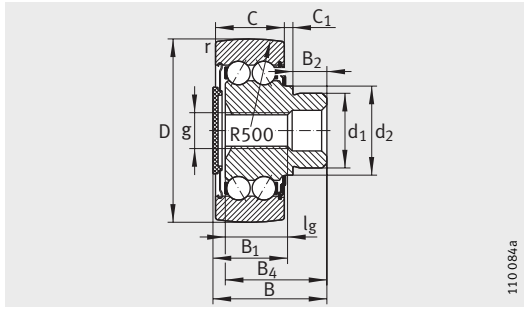


Stud type track rollers

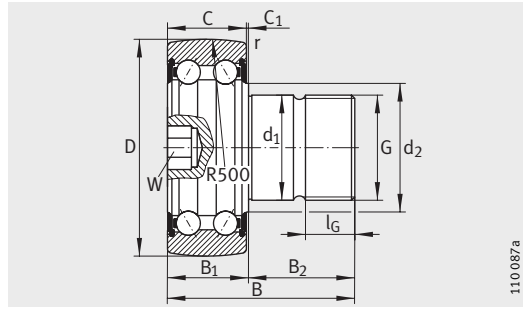


ZL2..-DRS

Dimension table · Dimensions in mm													
Designation	Mass m ≈g	Dimensions											
		D	d ₁	B	B ₁ max.	B ₂	B ₄	C	C ₁	d ₂	r min.	G	
ZL5201-DRS	90	35	14	33,2	19,5	14	31	15,9	2,6	17,1	0,6	–	
KR5201-2RS	120	35	12	49,2	17	32,5	–	15,9	0,8	17,1	0,6	M12X1,5	
ZL202-DRS	80	40	16	23,8	14	10	21,5	11	2	20	0,6	–	
ZL5202-DRS	120	40	16	36,2	20,5	16	34	15,9	3,5	20	0,6	–	
KR5202-2RS	190	40	16	53,2	17	36,5	–	15,9	0,8	20	0,6	M16X1,5	
ZL203-DRS	120	47	18	26,5	14,5	12	24,5	12	2	22,9	0,6	–	
ZL5203-DRS	190	47	18	39,5	21,5	18	37,5	17,5	3,5	22,9	0,6	–	
KR5203-2RS	290	47	18	58,8	18,5	40,5	–	17,5	0,8	22,9	0,6	M18X1,5	
ZL204-DRS	170	52	20	30,7	17	14	28,5	14	2	26,8	1	–	
ZL5204-DRS	250	52	20	45,3	25,5	20	43	20,6	4	26,8	1	–	
KR5204-2RS	380	52	20	63,6	22,5	41,5	–	20,6	1,5	26,8	1	M20X1,5	
ZL205-DRS	250	62	25	33,8	18	16	31	15	2	30,3	1	–	
ZL5205-DRS	380	62	25	50,4	25,5	25	47,5	20,6	4	30,3	1	–	
KR5205-2RS	580	62	24	70,9	21,5	49,5	–	20,6	0,8	30,3	1	M24X1,5	
ZL5206-DRS	550	72	30	59	29	30	56,5	23,8	4,5	37,3	1	–	
KR5206-2RS	800	72	24	74,1	25	49,5	–	23,8	0,8	37,3	1	M24X1,5	
ZL5207-DRS	710	80	35	69,2	33,5	36	66,5	27	5,5	42,4	1,1	–	
KR5207-2RS	1 200	80	30	91	28	63	–	27	1	42,4	1,1	M30X1,5	

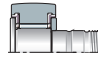


ZL52..-DRS



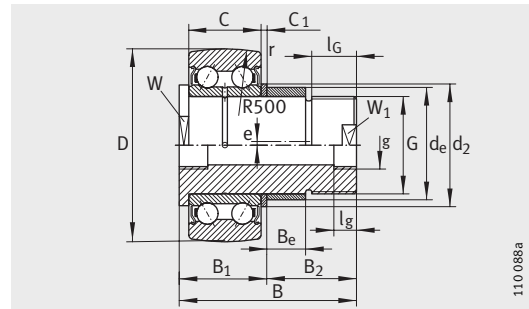
KR52..-2RS

				Tightening torque M_A Nm	Basic load ratings		Fatigue limit load C_{urw} N	Speed n_{DG} min^{-1}
l_g	g	l_g	W		dyn. C_{rw} N	stat. C_{orw} N		
-	M8	14	-	-	8 700	5 200	260	7 500
17	-	-	6	45	8 700	5 200	260	7 500
-	M8	15	-	-	6 600	3 350	139	8 500
-	M8	15	-	-	10 000	6 300	320	7 000
19	-	-	8	70	10 000	6 300	320	7 000
-	M8	16	-	-	8 500	4 450	185	6 500
-	M8	15	-	-	12 800	8 400	425	5 500
21	-	-	8	115	12 800	8 400	425	5 500
-	M10	18	-	-	10 600	5 700	238	6 000
-	M10	18	-	-	16 100	10 700	540	5 000
21	-	-	10	160	16 100	10 700	540	5 000
-	M10	19	-	-	12 500	7 100	290	5 500
-	M10	18	-	-	18 800	13 300	670	4 500
25	-	-	10	290	18 800	13 200	660	4 500
-	M16	20	-	-	25 000	18 100	910	3 500
25	-	-	10	290	25 000	18 100	910	3 500
-	M16	20	-	-	31 000	22 800	1 160	2 800
32	-	-	12	600	31 000	22 800	1 160	2 800



Stud type track rollers

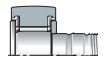
With eccentric collar



ZLE52..-2Z

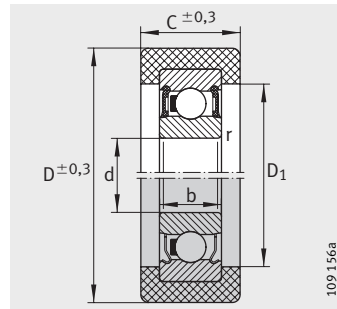
Dimension table · Dimensions in mm												
Designation	Mass m ≈ g	Dimensions										
		D	d _e	B	B ₁ max.	B ₂	C	C ₁	d ₂	r min.	W	W ₁
ZLE5201-2Z	250	35	18	65,5	20,5	45	15,9	2	25	0,6	15	9
ZLE5202-2Z	350	40	22	66,5	21,5	45	15,9	2,5	27	0,6	17	10
ZLE5204-2Z	460	52	24	76	26	50	20,6	2,5	30	1	22	17
ZLE5205-2Z	640	62	24	88	32	56	20,6	8	30	1	22	17
ZLE5207-2Z	1 300	80	35	99	35	64	27	3	45	1,1	40	27

e	B _e	g	l _g	G	l _G min.	Tightening torque	Basic load ratings		Fatigue limit load	Speed
						M _A Nm	dyn. C _{rw} N	stat. C _{0rw} N	C _{urw} N	n _{D G} min ⁻¹
1	18	M6	6	M12X1,5	24	30	8 700	5 200	260	10 000
1	16	M8X1	8	M14	25	40	10 000	6 300	320	10 000
1	18	M8X1	8	M20X1,5	29	150	16 200	10 700	540	7 000
1	25	M8X1	8	M20X1,5	28	150	18 800	13 200	670	6 500
1,5	29	M8X1	8	M30X1,5	32	540	31 000	22 800	1 160	3 900

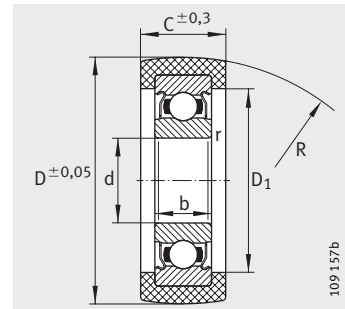


Track rollers

With plastic outer tyre



KLRZ..-2RSR
KLRZ..-2Z



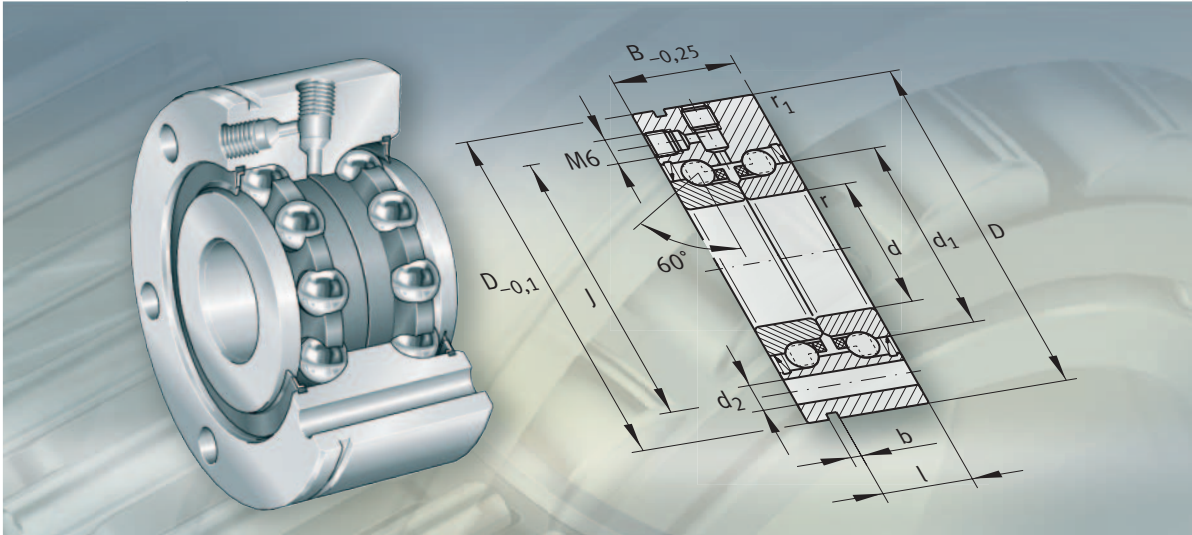
KLRU..-2Z

Dimension table · Dimensions in mm

Designation	Mass m ≈g	Dimensions							Basic load ratings of track roller ¹⁾ F _{r per} N	Deep groove ball bearing fitted	Basic load ratings of deep groove ball bearing	
		D	d	C	b	D ₁	R	r min.			dyn. C _r N	stat. C _{0r} N
KLRU08X28X11-2Z	16	27,5	8	11	7	20	500	0,3	250	608-2Z	3 200	1 250
KLRZ10X30X10-2Z	50	30	10	10	8	24	–	0,3	250	6000-2Z	4 600	1 970
KLRU12X35X12-2Z	30	34,8	12	12	8	26	300	0,3	340	6001-2Z	5 100	2 370
KLRZ12X41X16-2RSR	50	41	12	16	10	29,5	–	0,6	500	6201-2RSR	7 100	3 100
KLRU12X47X20-2Z	45	46,8	12	20	10	28,5	300	0,6	500	6201-2Z	7 100	3 100
KLRU15X47X20-2Z	50	46,8	15	20	11	31,5	300	0,6	500	6202-2Z	7 700	3 500

¹⁾ Valid for installation as track roller.

The values apply for operating temperatures up to max. +40 °C.

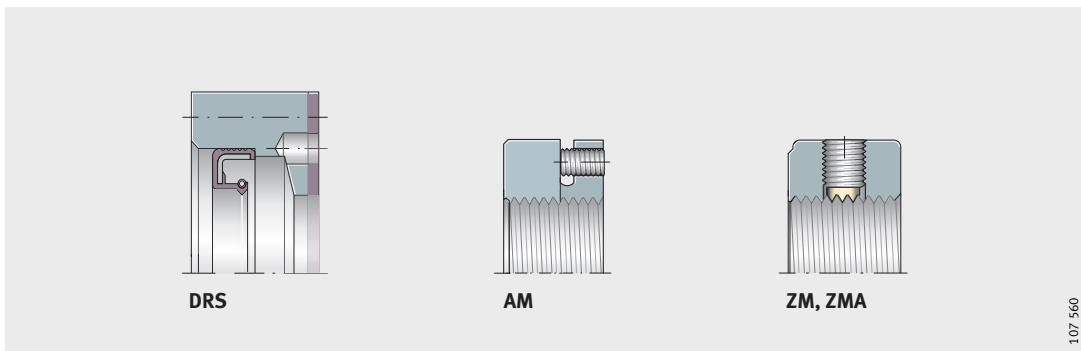
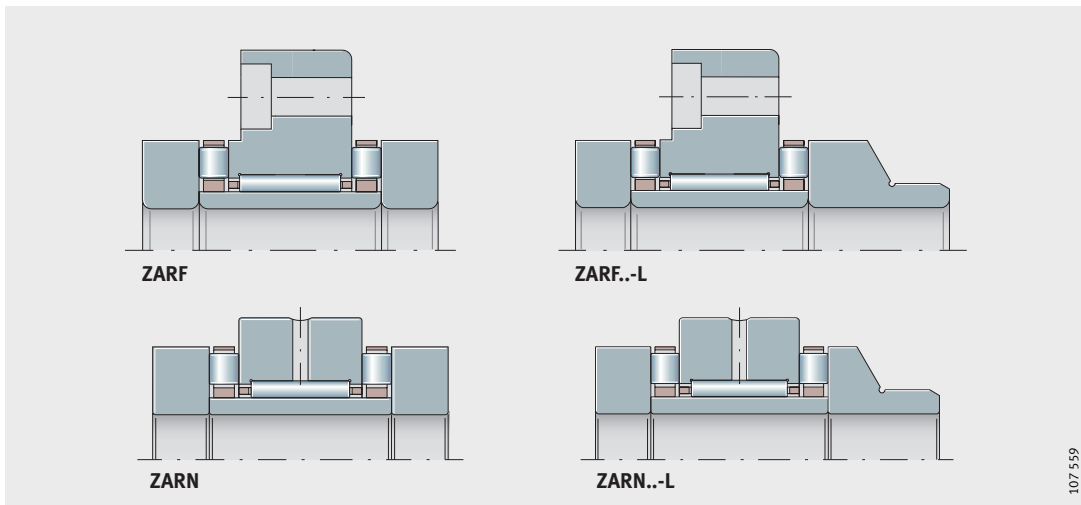
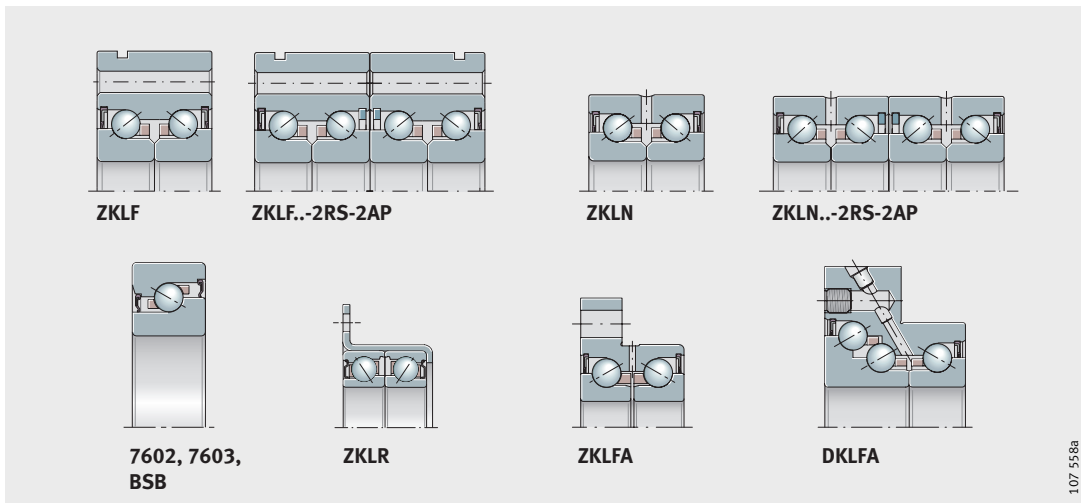


Bearings for screw drives

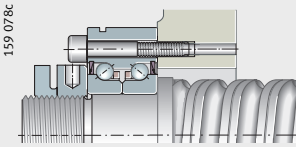
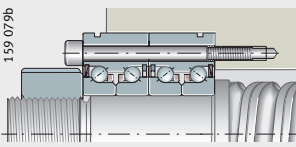
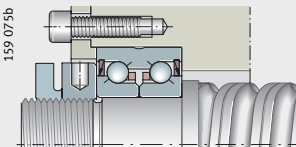
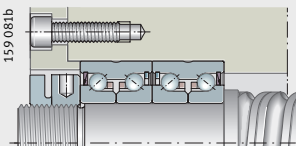
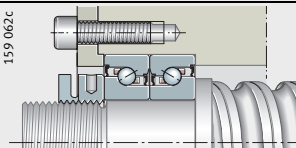
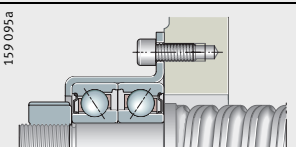
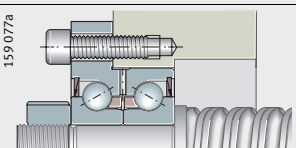
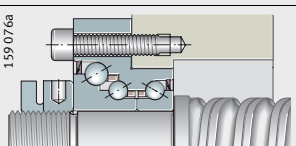
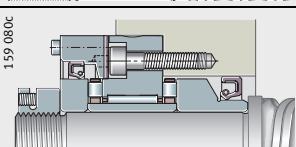
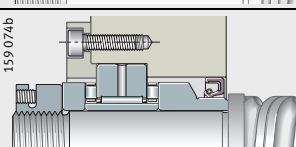
- Axial angular contact ball bearings
- Needle roller/axial cylindrical roller bearings
- Seal carrier assemblies
- Precision locknuts

Bearings for screw drives

Matrix for preselection of bearings	..... 896
A matrix structured in terms of applications allows rapid preselection of the suitable bearing for a specific application.	
Axial angular contact ball bearings	..... 898
Axial angular contact ball bearings are precision bearings for screw drives. Depending on the series, they can support high radial forces as well as axial forces from one or both sides. The inner ring is matched to the ball and cage assemblies and the outer ring. As a result, the bearings can be set to a defined axial preload. Contact seals protect the rolling element system against contamination and moisture. For higher speeds, gap seals can be used.	
The bearings are available with and without fixing holes in the outer ring. Bearings with holes are screw mounted directly on the adjacent construction. This solution is particularly economical since there is no need for the locating bore otherwise required or for the bearing cover with the associated matching work.	
For applications in the handling sector, for woodworking machinery and transport type screw drives, a bearing arrangement with a lower level of precision is often sufficient. For this purpose, there are versions with less stringent tolerances.	
Needle roller/axial cylindrical roller bearings	..... 950
Needle roller/axial cylindrical roller bearings are double direction precision axial cylindrical roller bearings with a radial bearing component. The inner ring, outer ring and cylindrical roller and cage assemblies are matched to each other such that the bearings can be set to a defined axial preload using a precision locknut.	
The bearings are available with and without fixing holes in the outer ring. Bearings with holes are screw mounted directly on the adjacent construction. The large contact surface and the small pitch of the holes allows a connection to the adjacent construction that is extremely rigid and with low tendency to settling. The bearing cover that would otherwise be required to hold the bearing, and the matching work required, can therefore be dispensed with.	
Needle roller/axial cylindrical roller bearings are also available with a stepped, extended shaft locating washer on one side. These bearings are used where the axial support of the shaft locating washer is insufficient or a seal raceway is required.	
Seal carrier assemblies Precision locknuts	..... 976
Seal carrier assemblies DRS are complete sealing sets that are screw mounted on the outer ring of needle roller/axial cylindrical roller bearings ZARF(L). They are precisely centred in this position and seal the bearings against external influences.	
The precision locknuts AM, ZM, ZMA for axial or radial locking are used to set bearings for screw drives to a defined axial preload.	
They are also used where high axial forces must be supported and high runout accuracy and rigidity are required.	



Matrix for preselection of bearings

Application	Series	
For standard applications	 159 078c	ZKLf..-2Z ZKLf..-2RS ZKLf..-2RS-PE
	 159 079b	ZKLf..-2RS-2AP
	 159 075b	ZKLn..-2Z ZKLn..-2RS ZKLn..-2RS-PE
	 159 081b	ZKLn..-2RS-2AP
	 159 062c	7602 7602-2RS 7603 7603-2RS BSB BSB-2RS
For special applications	 159 095a	ZKLr..-2Z ZKLr..-2RS
	 159 077a	ZKLfA..-2Z ZKLfA..-2RS
	 159 076a	DKLFA..-2RS
For applications requiring very high accuracy and rigidity	 159 080c	ZARF (L)
	 159 074b	ZARN (L)

Definition of symbols

- +++ very good
- ++ good
- + satisfactory
- sufficient

Caution!

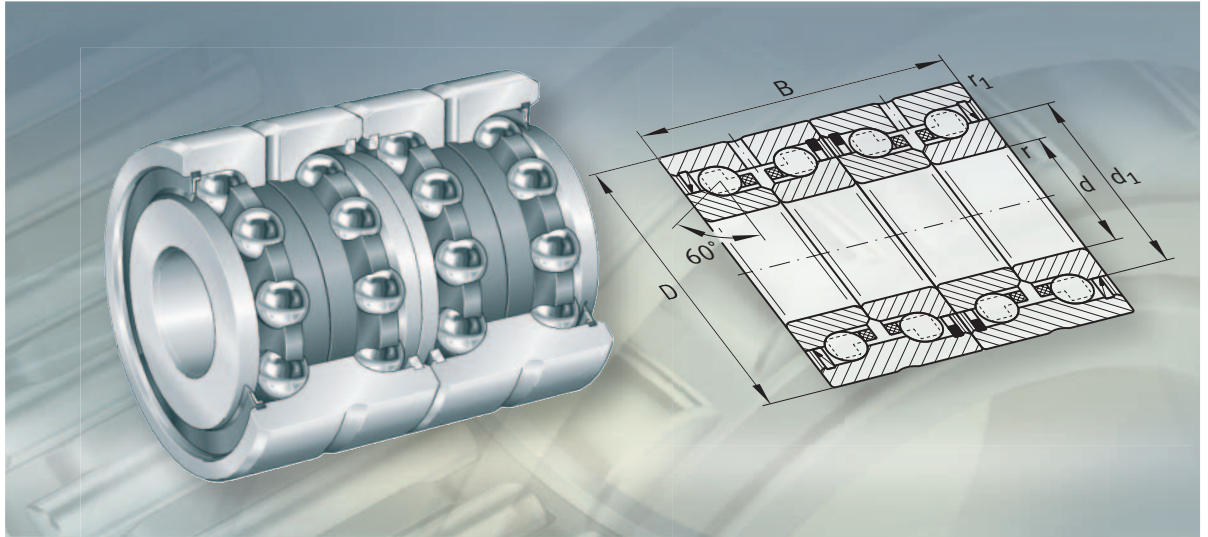
This selection matrix is a general overview for preliminary assessment of whether bearings can be considered for the required purpose. For the specific application, the data in the product sections and the technical principles must always be taken into consideration.

Features	Characteristics					
	High runout accuracy	High speeds and low friction	High rigidity and load carrying capacity	Work on adjacent construction and mounting	Low lubricant consumption	For description, see page
<ul style="list-style-type: none"> – Outer ring for flange mounting – Gap seals or contact seals on both sides – Greased, with relubrication facility – Most economical type of screw drive bearing arrangement 	++ ++ +	+++ ++ ++	+ + +	+++ +++ +++	++ ++ ++	902
<ul style="list-style-type: none"> – As ZKLF, but in matched pair – Significantly higher load carrying capacity and rigidity than ZKLF 	++	++	++	++	++	903
<ul style="list-style-type: none"> – Gap seals or contact seals on both sides – Greased, with relubrication facility – Easier to fit than single row bearings, e.g. for plummer block housings 	++ ++ +	+++ ++ ++	+ + +	+ + +	++ ++ ++	904
<ul style="list-style-type: none"> – As ZKLN, but in matched pair – Significantly higher load carrying capacity and rigidity than ZKLN 	++	++	++	+	++	904
<ul style="list-style-type: none"> – Open or sealed on both sides – Highly suitable for mounting in pairs to form wide range of contact angle combinations 	++ ++ ++ ++ ++ ++	+++ ++ +++ ++ +++ ++	+ + + + + +	– – – – – –	++ ++ ++ ++ ++ ++	906
<ul style="list-style-type: none"> – Particularly economical alternative to solutions with individual ball bearings – Gap seals or contact seals on both sides – Simple to fit – For applications with comparatively low loads, but high positional accuracy 	+ +	+++ ++	– –	+++ +++	++ ++	907
<ul style="list-style-type: none"> – Outer ring for flange mounting – Stepped outer ring with flattened areas on both sides – Gap seals or contact seals on both sides 	++ ++	+++ ++	+ +	+++ +++	++ ++	908
<ul style="list-style-type: none"> – Higher load capacity on one side – Outer ring for flange mounting – Sealed on both sides – For vertical axes – For locating/locating bearing arrangements 	+	++	++	+++	++	908
<ul style="list-style-type: none"> – Outer ring for flange mounting – Very high accuracy, rigidity and load carrying capacity – Bearing prepared for sealing 	+++	+	+++	+	–	953
<ul style="list-style-type: none"> – Very high accuracy, rigidity and load carrying capacity – Bearing prepared for sealing 	+++	+	+++	–	–	954





FAG



Axial angular contact ball bearings

Axial angular contact ball bearings

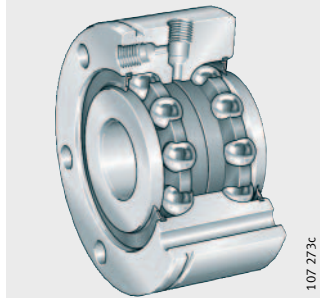
		Page	
Product overview	Axial angular contact ball bearings.....	900	
	Features		
	Double row axial ang. contact ball bearings, screw mount.....	902	
	Double row axial ang. contact ball bearings, cover mount	904	
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Double row axial angular contact ball bearings with flange, screw mount		946	
Triple row axial angular contact ball bearings with flange, screw mount		948	



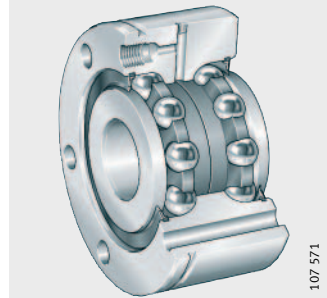
Product overview Axial angular contact ball bearings

**Double row,
for screw mounting**
Lip seals or gap seals

ZKLF..-2RS, ZKLF..-2Z

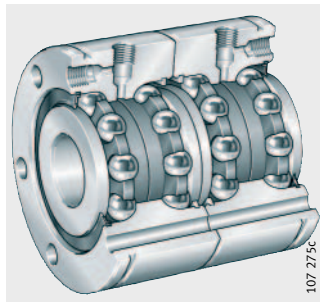


ZKLF..-2RS-PE



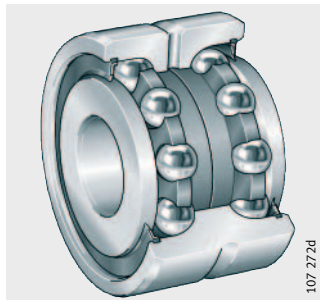
Matched pair

ZKLF..-2RS-2AP



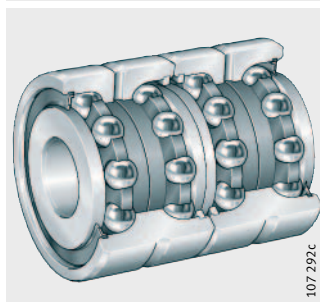
**Double row,
not for screw mounting**
Lip seals or gap seals

ZKLN...-2RS, ZKLN...-2Z
ZKLN...-2RS-PE



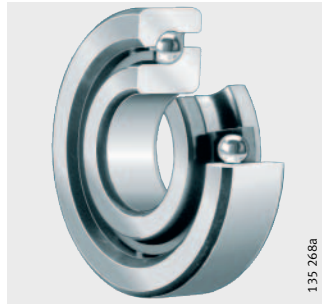
Matched pair

ZKLN...-2RS-2AP

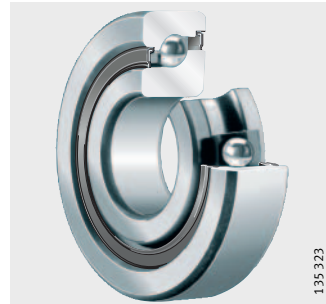


**Single row,
for matching in pairs**
Without/with lip seals

7602, 7603, BSB

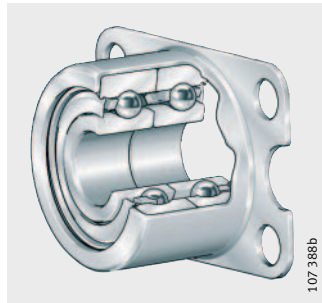


**7602..-2RS, 7603..-2RS,
BSB..-2RS**



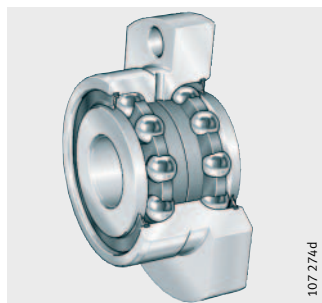
**Double row angular
contact ball bearing unit,
for screw mounting**
Lip seals or gap seals

**ZKLR..-2RS
ZKLR..-2Z**



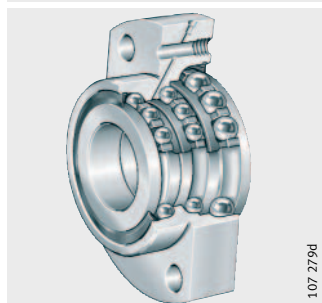
**Double or triple row,
flange with flattened areas,
for screw mounting**
Double row
Lip seals or gap seals

**ZKLFA..-2RS
ZKLFA..-2Z**



**Triple row
Lip seals**

DKLFA..-2RS



Axial angular contact ball bearings

Features Screw drive bearing arrangements are subjected to requirements that often cannot be optimally fulfilled by the design construction of conventional bearings. For the design of bearing arrangements for the highly dynamic operating conditions in screw drives that have high accuracy, high load carrying capacity, high rigidity, low friction, are easy to fit and maintenance-free or low-maintenance, there is a wide range of INA/FAG axial angular contact ball bearings. With this well thought-out product range, ideal application-specific solutions can be found to all the technical and economic demands placed on the bearing arrangements of screw drives.

Single row and multi-row designs Axial angular contact ball bearings are available as single, double or triple row ready-to-fit units. They are self-retaining and comprise thick-walled, geometrically stable outer rings, ball and cage assemblies and one-piece or two-piece inner rings. In several series, the outer ring has through holes for simple flange mounting to the adjacent construction.

The bearing rings are matched to each other such that a defined preload is achieved when the rings are clamped in place using a precision locknut.

Radial and axial load carrying capacity Due to the contact angle of 60°, the bearings can support not only radial forces but high axial forces as well.

Double row axial angular contact ball bearings, for screw mounting Axial angular contact ball bearings ZKLF are screw mounted directly on the adjacent construction or in a radial locating bore, *Figure 1* and *Figure 2*. The cover that would otherwise be required and the associated matching work can therefore be dispensed with.

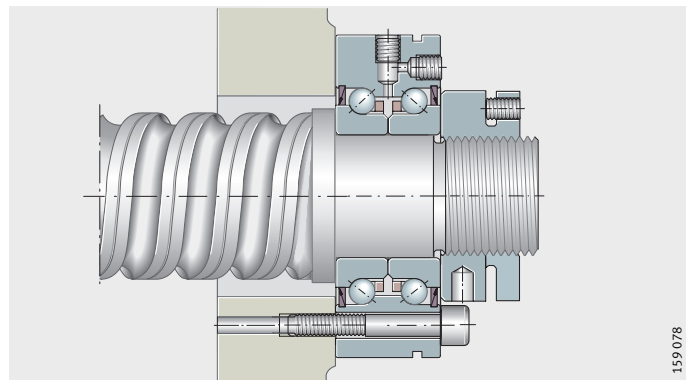
In order to aid removal of the bearings from a locating bore, the outer ring has a circumferential extraction slot.

Relubrication is facilitated by radial and axial threaded connectors with detachable grub screws.

ZKLF.-2RS
ZKLF.-2Z

Figure 1

Outer ring screw mounted on flat adjacent construction, preloaded using locknut



With less stringent tolerances Axial angular contact ball bearings ZKLF.-2RS-PE correspond to series ZKLF but have a runout tolerance within P5 to DIN 620, less stringent diameter tolerances and the suffix PE. They are used where a lower positional accuracy is acceptable. As a result, the adjacent construction does not need to be as accurate with these bearings.

Relubrication is facilitated by an axial threaded connector. The radial lubrication duct is firmly closed off.

ZKLF..-2RS-PE

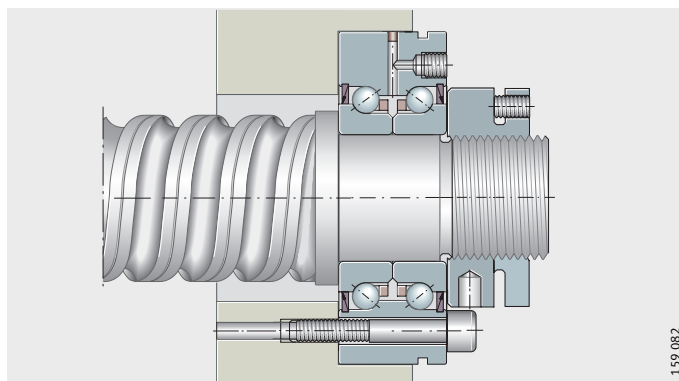


Figure 2
Outer ring screw mounted in bore, preloaded using locknut

Heavy series Axial angular contact ball bearings ZKLF..-2RS and ZKLF..-2Z are also available in a heavy series. For the same shaft diameter, they have a larger cross-section and thus higher basic load ratings.

Matched pairs Bearings of series ZKLF..-2RS-2AP comprise a matched pair of bearings ZKLF..-2RS, *Figure 3*. The individual bearings are matched to each other.

Matched bearings have an arrow marking on the outside surface of the outer rings. When the bearings are arranged correctly, the lip seals face outwards. During fitting, the hole pattern of the two bearings must match, not the marking.



ZKLF..-2RS-2AP

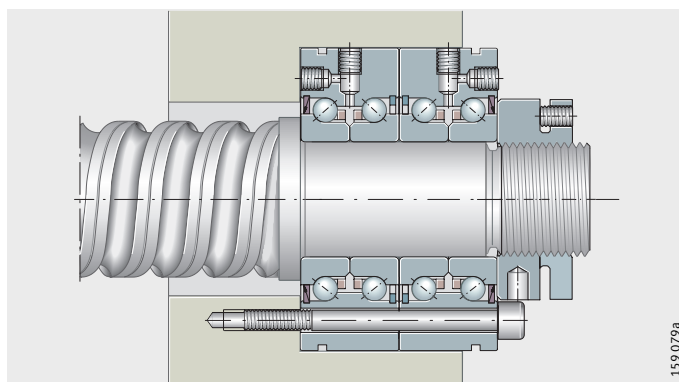


Figure 3
Matched pair, outer ring screw mounted in bore, preloaded using locknut

Sealing/lubricant Bearings with the suffix 2RS have lip seals and highly effective sealing.

Bearings with the suffix 2Z are sealed using gap seals and are suitable for higher speeds.

The bearings are greased using a lithium soap grease to GA28 and can be lubricated via the lubrication connectors in the outer ring. For the majority of applications, the initial greasing is sufficient for the whole bearing operating life.

Axial angular contact ball bearings

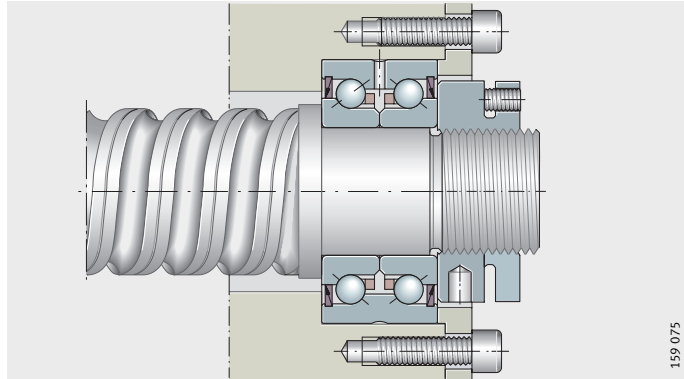
Double row axial angular contact ball bearings, not for screw mounting

Axial angular contact ball bearings ZKLN are mounted in a housing bore, *Figure 4*. The bearing outer ring is axially located by a cover.

ZKLN..-2RS
ZKLN..-2Z

Figure 4

Outer ring located using cover, preloaded using locknut



With less stringent tolerances

Axial angular contact ball bearings ZKLN..-2RS-PE correspond to series ZKLN but have a runout tolerance within P5 to DIN 620, less stringent diameter tolerances and the suffix PE. They are used where a lower positional accuracy is acceptable. As a result, the adjacent construction does not need to be as accurate with these bearings.

Heavy series

Axial angular contact ball bearings ZKLN..-2RS and ZKLN..-2Z are also available in a heavy series. For the same shaft diameter, they have a larger cross-section and thus higher basic load ratings.

Matched pairs

Bearings of series ZKLN..-2RS-2AP comprise a matched pair of bearings ZKLN..-2RS, *Figure 5*. The individual bearings are matched to each other.

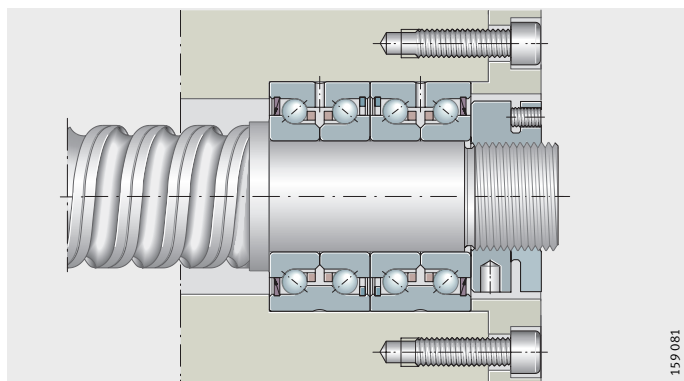
Matched bearings have an arrow marking on the outside surface of the outer rings. When the bearings are arranged correctly, the lip seals face outwards.

The bearing outer rings are axially clamped by a cover, *Figure 5*.

ZKLN..-2RS-2AP

Figure 5

Matched pair, outer rings located using cover, preloaded using locknut



Sealing/lubricant

Bearings with the suffix 2RS have lip seals and highly effective sealing.

Bearings with the suffix 2Z are sealed using gap seals and are suitable for higher speeds.

The bearings are greased using a lithium soap grease to GA28 and can be lubricated via a lubrication slot and lubrication holes in the outer ring. For the majority of applications, the initial greasing is sufficient for the whole bearing operating life.



Axial angular contact ball bearings

Single row axial angular contact ball bearings, for combination in pairs

Bearings 7602, 7603 and BSB are designed as universal bearings, *Figure 6* and *Figure 7*.

They can be combined in a wide range of sets for different requirements, *Figure 7*.

7602..-2RS, 7603..-2RS, BSB..-2RS

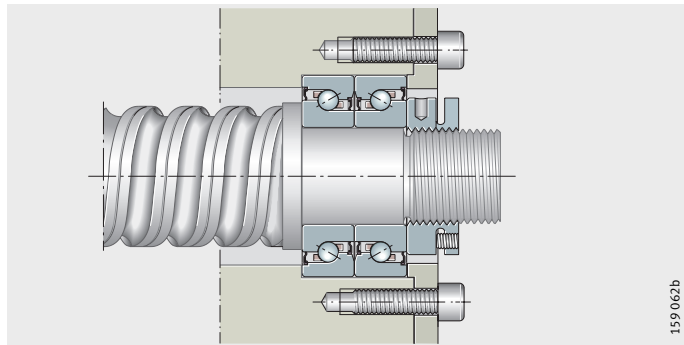
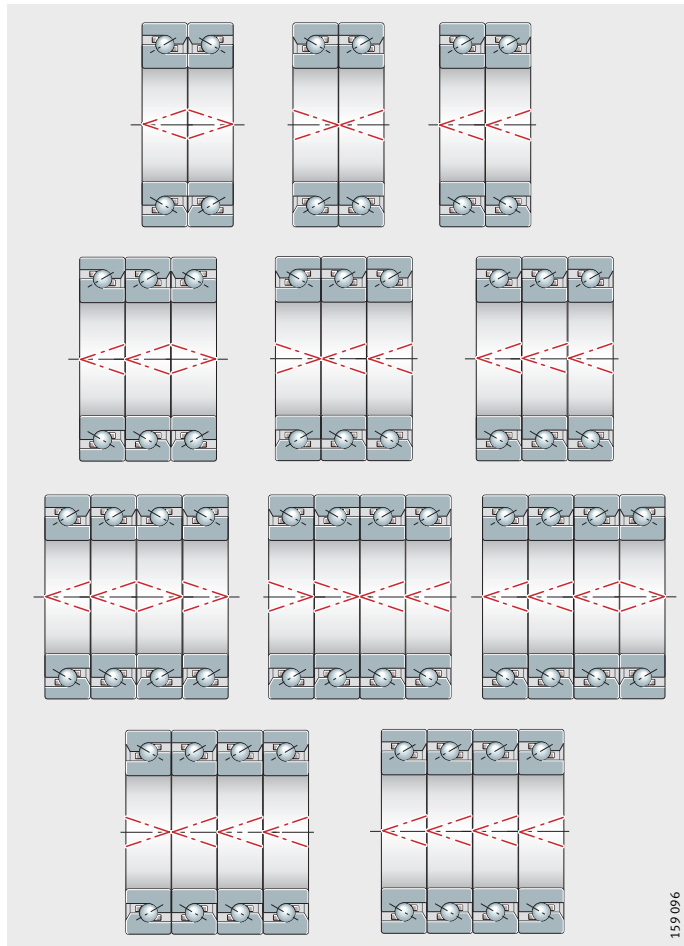


Figure 6
Single row axial angular contact ball bearings, two-bearing set in O arrangement



7602, 7603, BSB

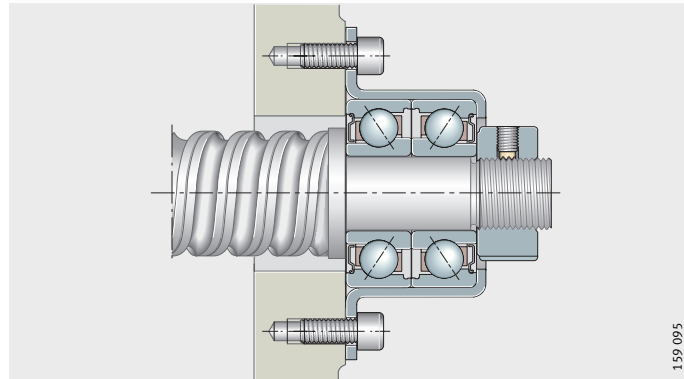
Figure 7
Set combinations

Sealing/lubricant

Single row axial angular contact ball bearings are not sealed and are not supplied greased. However, some sizes are fitted with seals. These bearings are greased for life with Arcanol L55.

Angular contact ball bearing unit, for screw mounting

Angular contact ball bearing units ZKLR are low-cost bearings and therefore particularly economical. They comprise a deep drawn sheet steel housing with an integral matched pair of angular contact ball bearings in an X arrangement, *Figure 8*. The housing is plated with Corrotect® and is thus protected against rust. The ball bearings are sealed on both sides by lip seals or gap seals. The bearing assembly is preloaded clearance-free.



ZKLR...-2RS
ZKLR...-2Z

Figure 8

Angular contact ball bearing unit

Particularly easy to fit

The units are particularly easy to fit. They:

- are directly flange mounted, for example on the milled face of the adjacent construction. This eliminates the need for precise, costly fits and additional flange covers for seating and axial location of the bearings
- require no additional parts for location of the bearings in the housing
- reduce errors in fitting due to the smaller number of components compared to conventional solutions
- are self-aligning by means of the screw drive nut during fitting. This effectively eliminates any warping due to misalignment of the bearing seats
- have a defined preload. It is not necessary to preload the bearing during fitting as is usually the case with screw drive bearing arrangements
- require only clearance-free axial location on the threaded spindle.



Sealing/lubricant

Bearings with the suffix 2RS have lip seals and highly effective sealing. Bearings with the suffix 2Z are sealed using gap seals and are suitable for higher speeds. The bearings are greased using a lithium soap grease to DIN 51825-K2N-40.

Areas of application

The units are highly suitable, due to their dimensions and design, for space-saving and simple bearing arrangements in highly dynamic screw drives, for example:

- in inspection and measuring equipment
- in small machine tools
- in medical and laboratory equipment
- in precision engineering and electronic components manufacture
- where complete units will give a simpler bearing arrangement.

Axial angular contact ball bearings

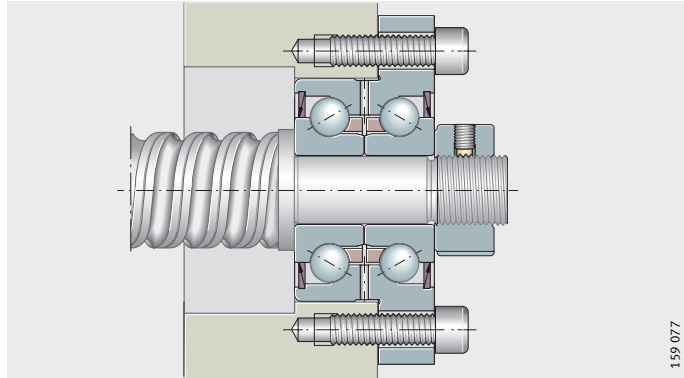
Double row axial angular contact ball bearings with flange, for screw mounting

Series ZKLFA has a stepped outer ring. It can therefore be screw mounted easily on the adjacent construction, *Figure 9*. The flange has flattened areas on both sides, so the radial design envelope in the adjacent construction can be kept very small.

ZKLFA..-2RS
ZKLFA..-2Z

Figure 9

Outer ring screw mounted on adjacent construction, preloaded using locknut



159 077

Sealing/lubricant

Bearings with the suffix 2RS have lip seals and highly effective sealing. Bearings with the suffix 2Z are sealed using gap seals and are suitable for higher speeds.

The bearings are greased using a lithium soap grease to GA28 and can be lubricated via a lubrication slot and lubrication holes in the outer ring. For the majority of applications, the initial greasing is sufficient for the whole bearing operating life.

Triple row axial angular contact ball bearings with flange, for screw mounting

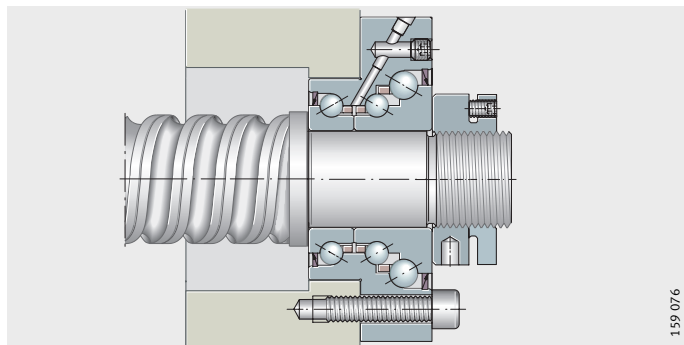
Axial angular contact ball bearings DKLFA..-2RS have, in addition to two rows of balls with a contact angle of 60° in an O arrangement, an extra row of balls, *Figure 10*. Due to this additional row, the bearings can support higher axial loads in one direction.

Due to the stepped outer ring, the bearings can be easily flange mounted on the adjacent construction. The flange has flattened areas on both sides. As a result, it requires only a small design envelope in the adjacent construction.

DKLFA..-2RS

Figure 10

Outer ring screw mounted on adjacent construction, preloaded using locknut



159 076

Caution! In order to make full use of the load carrying capacity of bearings DKLFA.-2RS, their design requires that they are subjected to continuous load in the main load direction. They are therefore used mainly in screw drives with a locating/locating bearing arrangement and tensioned spindles or in vertically arranged screw drive bearing arrangements.
For design of the bearing arrangement, please contact us.

Sealing/lubricant The bearings have lip seals on both sides. They are greased using a lithium soap grease to GA28. If necessary, lubrication can be carried out via a threaded connector for central lubrication systems on the flange side.

Caution! For calculation of relubrication intervals based on a stated load spectrum (speed, load, operating duration, environmental conditions), please contact us.

Operating temperature Sealed axial angular contact ball bearings are suitable for operating temperatures from -30 °C to $+120\text{ °C}$, restricted by the grease, the seal material and the plastic cages in the ball and cage assemblies.

Caution! The operating temperature influences the dynamic bearing characteristics. The values given in the dimension table are based on a room temperature of $+20\text{ °C}$.

Cages The axial angular contact ball bearings have plastic cages. The cage design is not indicated in the suffix.
In series 7602, 7603 and BSB, the polyamide cages are indicated by the suffix TVP/T.



Suffixes Suffixes for the available designs: see table.

Available designs

Suffix	Description
PE	Less stringent bearing design
T, TVP	Polyamide cage, guided by balls
2AP	Axial angular contact ball bearings, matched pair (ZKLN, ZKLF)
2RS	Contact seals on both sides
2Z	Gap seals on both sides

Axial angular contact ball bearings

Design and safety guidelines Basic rating life

The decisive factors in determining the bearing size are the basic rating life, the static load safety factor and the axial limiting load. The basic rating life L and L_h are calculated as follows:

$$L = \left(\frac{C}{P}\right)^p$$

$$L_h = \frac{16666}{n} \cdot \left(\frac{C}{P}\right)^p$$

- L 10⁶ revolutions
- Basic rating life in millions of revolutions
- L_h h
- Basic rating life in operating hours
- C_r, C_a N
- Basic dynamic radial or axial load rating according to dimension table
- C_r is valid for a contact angle $\alpha \leq 45^\circ$, C_a is valid for a contact angle $\alpha > 45^\circ$
- P N
- Equivalent dynamic bearing load
- p –
- Life exponent $p = 3$
- n min⁻¹
- Operating speed.

Resultant and equivalent bearing load P for ZKLR

Bearing unit Designation	Factor P
ZKLR0624-2Z	$P = 140 + 0,13 F_a^{1,4} + 0,003 \cdot F_r^{1,9}$
ZKLR0828-2Z	$P = 210 + 0,28 F_a^{1,27} + 0,002 \cdot F_r^{1,9}$
ZKLR1035-2Z	$P = 240 + 0,47 F_a^{1,17} + 0,0015 \cdot F_r^{1,9}$
ZKLR1244-2RS	$P = 580 + 0,046 F_a^{1,3} + 0,076 \cdot F_r^{1,28}$
ZKLR1547-2RS	$P = 540 + 0,011 F_a^{1,5} + 0,022 \cdot F_r^{1,45}$
ZKLR2060-2RS	$P = 960 + 0,0082 F_a^{1,5} + 0,017 \cdot F_r^{1,45}$

Static limiting load diagrams for ZKLR

The easy-to-use static limiting load diagrams allow quick verification of the bearing size of series ZKLR – as a function of the axial and radial operating load, *Figure 21* to *Figure 23*, page 916. The decisive requirement is that the intersection between the axial and radial load must be below the limit line.

Example: If the operating loads F_a and F_r are below the limit line, the bearing size is suitable for the application, see example *Figure 23*, page 916.

Resultant and equivalent bearing load P for ZKLN, ZKLF, ZKLFA, DKLFA, BSB, 7602, 7603

The bearings are axially preloaded to a defined value if the recommended precision locknuts are used and the correct nut tightening torque is applied. The resultant axial bearing load $F_{a\ res}$ is determined from the axial operating load F_{aB} and taking account of the axial preload according to *Figure 11* to *Figure 15*, page 912 and page 913. For series 7602, 7603 and BSB, the $F_{a\ res}$ diagrams are based on two-bearing sets in an O or X arrangement, *Figure 7*, page 906. For calculation of other set combinations, please contact us.

Caution! A load in excess of the limit value will lead to the rolling element row without load lifting off the raceway. As a result, higher wear will occur under rapid acceleration. For extreme moment loads and statically overdefined systems (locating/locating bearing arrangements), please contact us. The calculation program BEARINX® can give a precise design in this case.

Axial and radial operating loads

Under purely axial load, $P = F_{a\ res}$. If additional radial operating loads are present, the equivalent bearing load P must be calculated using the following formula:

$$P = X \cdot F_r + Y \cdot F_{a\ res}$$

The values X and Y are given in the following table:

Factors X and Y

Load ratio	Factor	
	X	Y
$\frac{F_{a\ res}}{F_r} \leq 2,17$	1,9	0,55
$\frac{F_{a\ res}}{F_r} > 2,17$	0,92	1



Load varying in steps

If the load values vary in steps, the equivalent load P and speed n are calculated using the following formulae (q = time duration %):

$$P = \sqrt[3]{\frac{q_1 \cdot n_1 \cdot P_1^3 + \dots + q_z \cdot n_z \cdot P_z^3}{q_1 \cdot n_1 + \dots + q_z \cdot n_z}}$$

$$n = \frac{q_1 \cdot n_1 + \dots + q_z \cdot n_z}{100}$$

Static load safety factor

The static load safety factor S_0 indicates the security against impermissible permanent deformations in the bearing.

It is determined using the following formula:

$$S_0 = \frac{C_0}{P_0}$$

S_0 – Static load safety factor
 C_0, C_{0a} – N Basic static radial or axial load rating according to dimension table
 C_0 is valid for a contact angle $\alpha \leq 45^\circ$, C_{0a} is valid for a contact angle $\alpha > 45^\circ$
 P_0 – N Maximum static load of bearing.

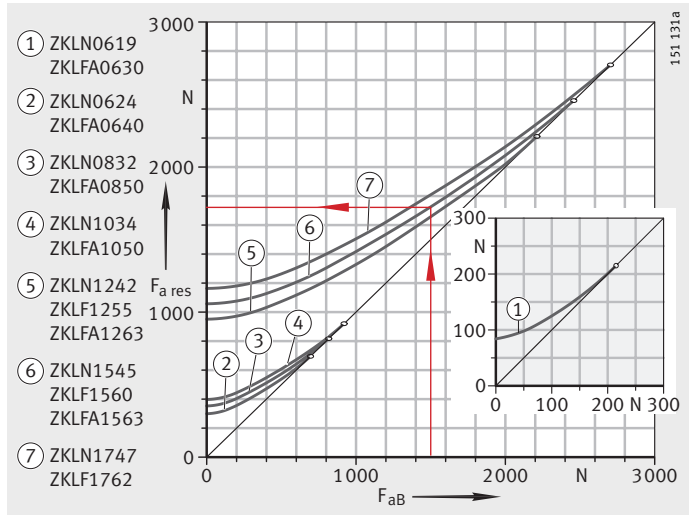
Caution! In machine tools, S_0 should be ≥ 4 .

Axial angular contact ball bearings

Resultant bearing load – diagrams

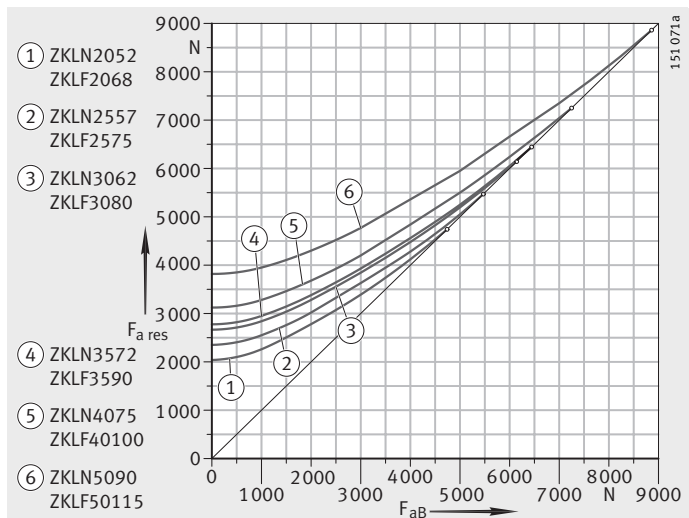
Example 1
 Bearing ZKLN1545
 Axial operating load $F_{aB} = 1,5 \text{ kN}$
 $F_{a \text{ res}} = \text{approx. } 1,75 \text{ kN}$
 Loading by operating load and preload
 $F_{aB} = \text{operating load}$
 $F_{a \text{ res}} = \text{resultant bearing load}$
 $\circ = \text{limit value}$

Figure 11
 Resultant bearing load
 ZKLN, ZKLF and ZKLFA,
 up to $d = 17 \text{ mm}$



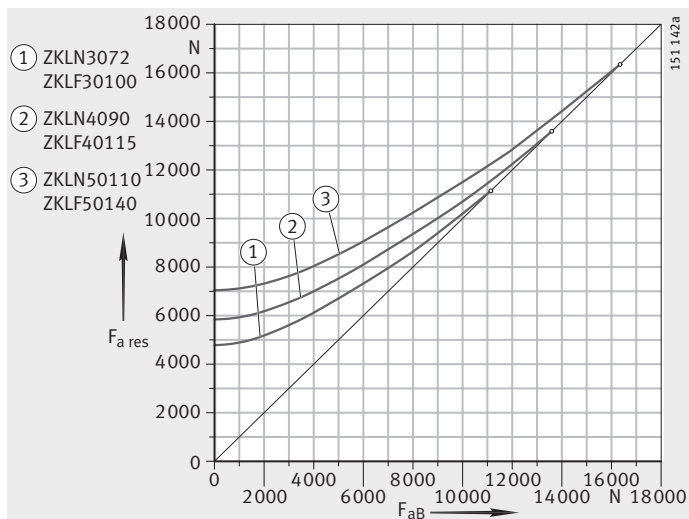
$F_{aB} = \text{operating load}$
 $F_{a \text{ res}} = \text{resultant bearing load}$
 $\circ = \text{limit value}$

Figure 12
 Resultant bearing load
 ZKLN, ZKLF,
 from $d = 20 \text{ mm}$ to 50 mm



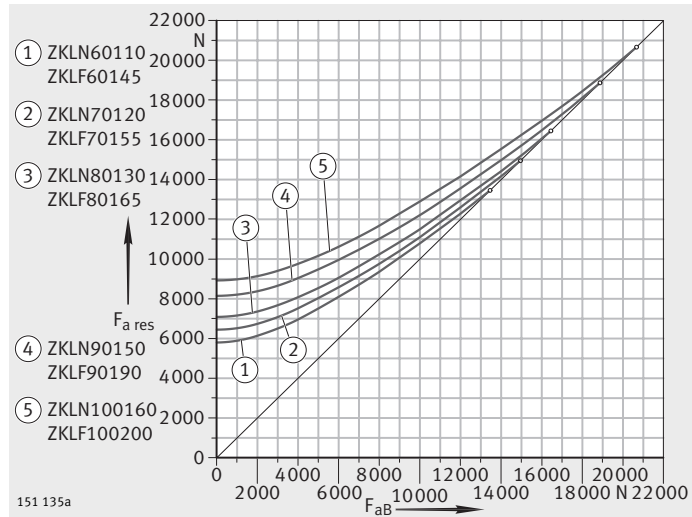
$F_{aB} = \text{operating load}$
 $F_{a \text{ res}} = \text{resultant bearing load}$
 $\circ = \text{limit value}$

Figure 13
 Resultant bearing load
 ZKLN, ZKLF, heavy series



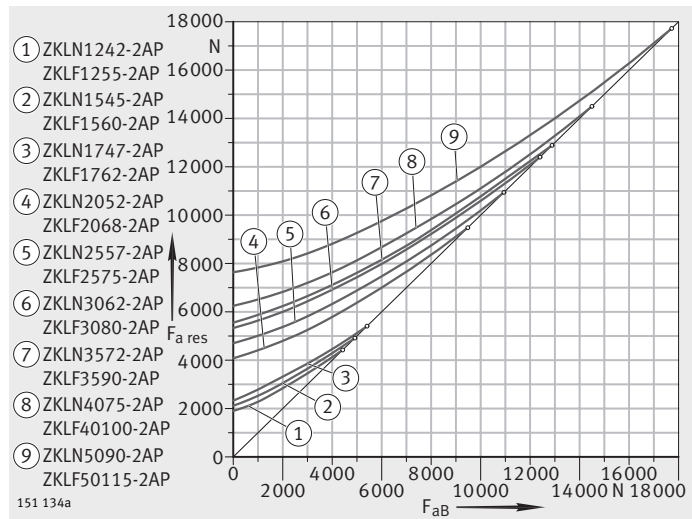
F_{aB} = operating load
 $F_{a\text{ res}}$ = resultant bearing load
 ° = limit value

Figure 14
 Resultant bearing load
 ZKLN, ZKLF, from $d = 60$ mm

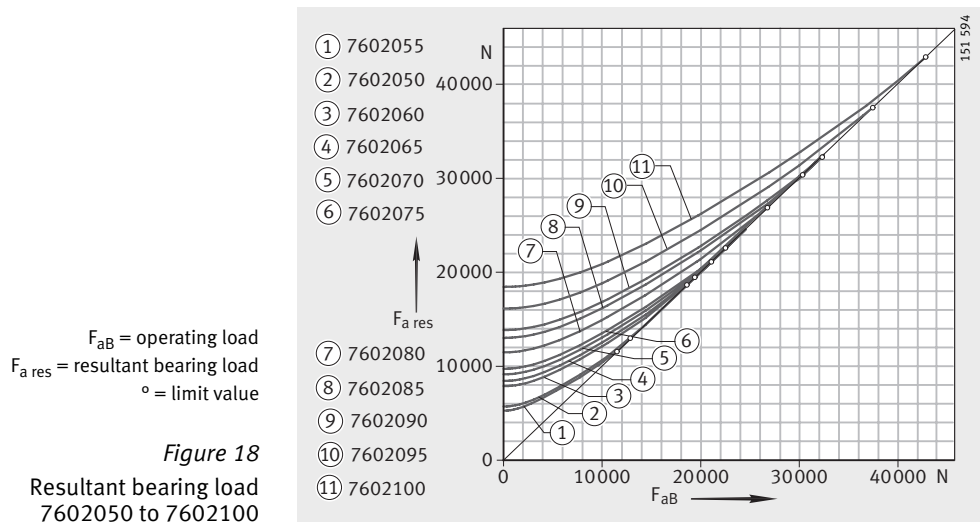
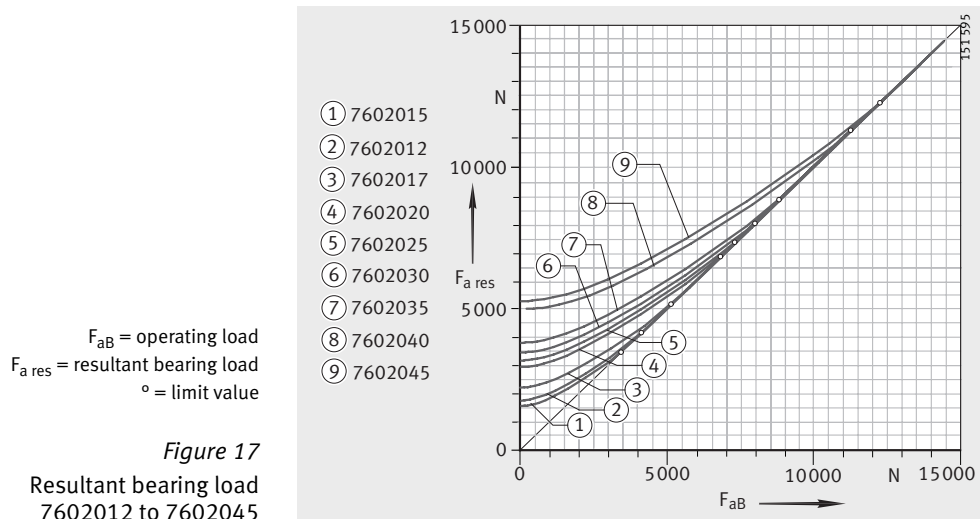
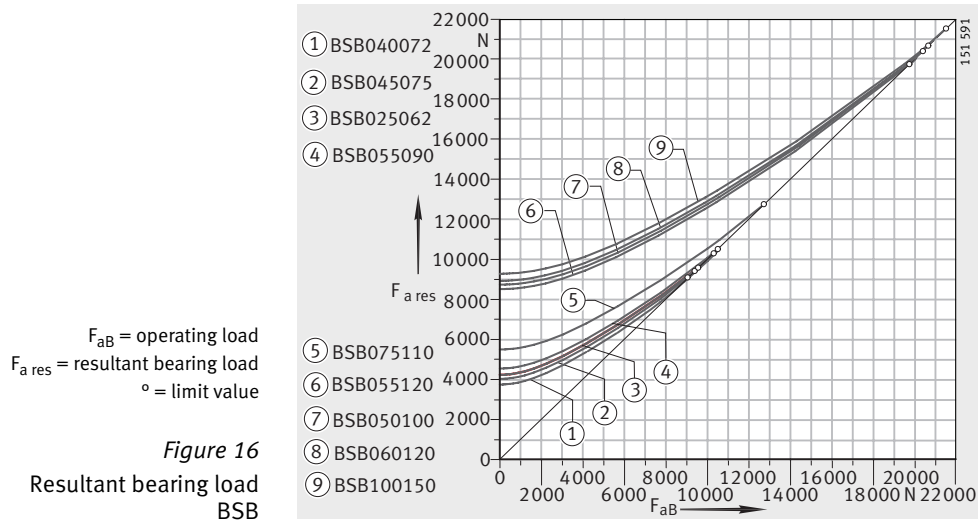


F_{aB} = operating load
 $F_{a\text{ res}}$ = resultant bearing load
 ° = limit value

Figure 15
 Resultant bearing load
 ZKLN...-2AP and ZKLF...-2AP

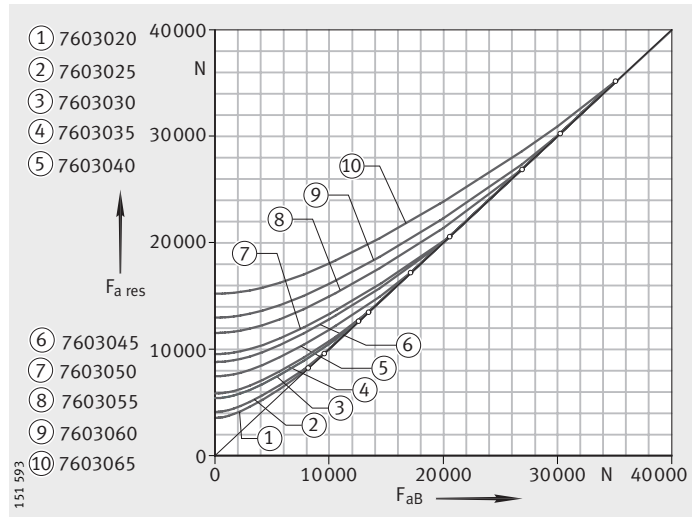


Axial angular contact ball bearings



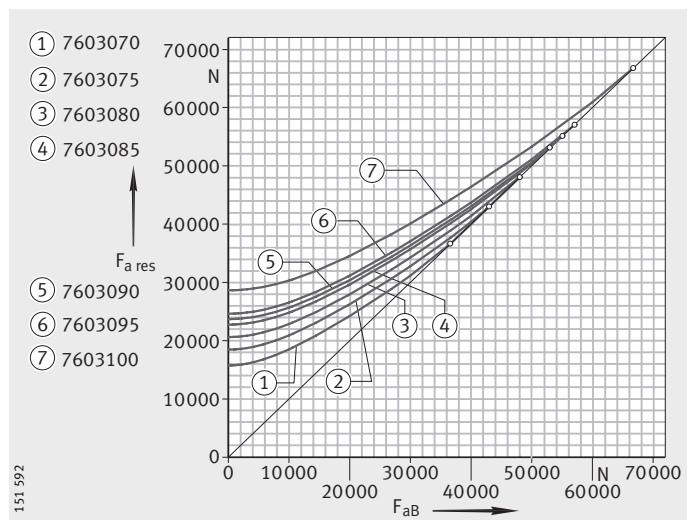
F_{aB} = operating load
 $F_{a\text{res}}$ = resultant bearing load
 ° = limit value

Figure 19
 Resultant bearing load
 7603020 to 7603065



F_{aB} = operating load
 $F_{a\text{res}}$ = resultant bearing load
 ° = limit value

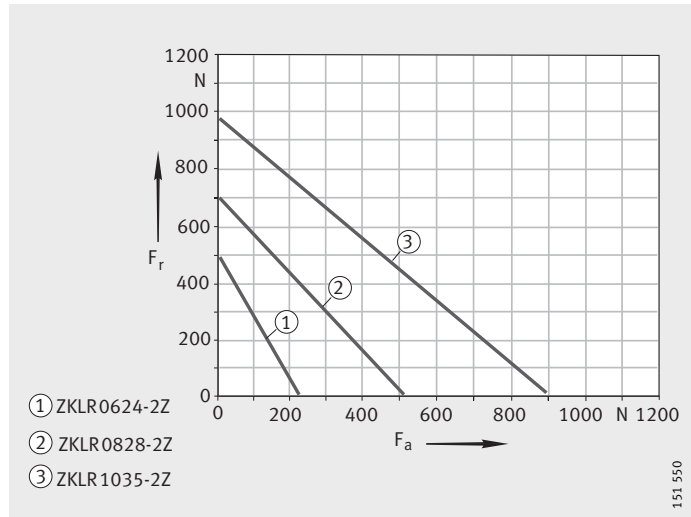
Figure 20
 Resultant bearing load
 7603070 to 7603100



Axial angular contact ball bearings

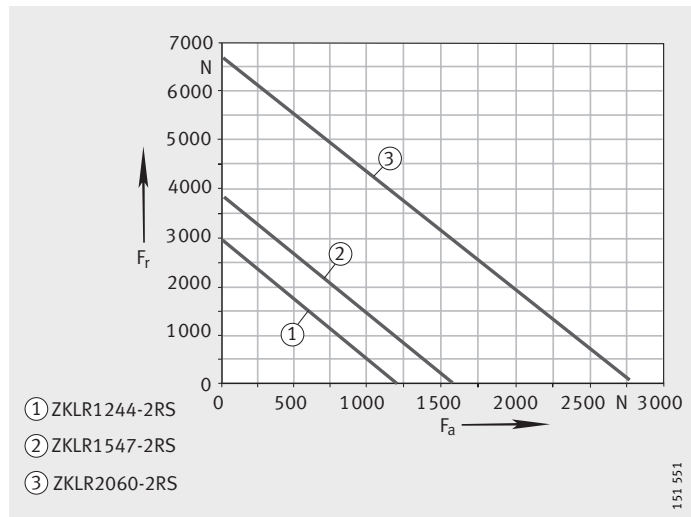
F_r = radial load
 F_a = axial load

Figure 21
 Static limiting load diagrams ZKLR



F_r = radial load
 F_a = axial load

Figure 22
 Static limiting load diagrams ZKLR



F_r = 600 N
 F_a = 300 N
 Bearing is suitable in static terms since the intersection F_a/F_r is below the limit line.

Figure 23
 Static limiting load diagram – example ZKLR1035-2Z



Maximum radial load on screw connections for ZKLF

If bearings of series ZKLF are screw mounted on a flat adjacent construction, the maximum radial load that can be supported by the screw connections must be taken into consideration.

If the screws used are as stated in the dimension tables to DIN EN ISO 4 762, the maximum radial load that can be supported before the outer ring moves is restricted to approx. $0,1 \times C_{0a}$. If the outer ring is additionally bonded in place, for example using Loctite 638, the maximum radial load that can be supported increases to approx. $0,5 \times C_{0a}$.

If the maximum radial loads that can be supported (without any axial load content) are considered in relation to the rolling element set, it can be seen that:

- With a static load safety factor of $S_0 \geq 4$ as required for machine tools, the load that can be supported by the screw connections of the outer ring is in any case greater than the radial load restricted by the rolling element set.

This means that (at least in theory) radial loads can be supported that, in relation to the rolling element set, will lead to a static load safety factor of $S_0 \leq 1$ (incipient plastic deformation of rolling elements), if the outer ring is additionally bonded in place.

This means that, under normal design criteria and with the decisive static load safety factor for the corresponding areas of application (e.g. $S_0 = 4$ for machine tools), the rolling element set is always the decisive criterion.

Permissible static axial load for ZKLF

For bearings of series ZKLF, the permissible static axial load in the direction of the screw connections, *Figure 24*, is:

$$P_{0\text{per}} \leq \frac{C_{0a}}{2}$$

The basic static axial load rating C_{0a} is stated in the dimension tables.



ZKLF

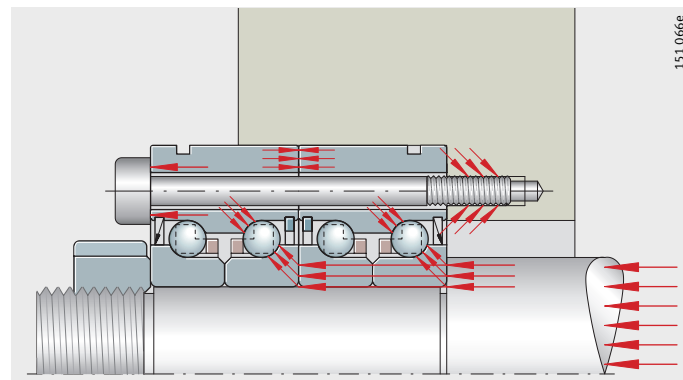


Figure 24
Static axial load in the direction of the screw connections

Axial angular contact ball bearings

Design of adjacent construction	<p>The adjacent construction (the shaft and housing) must be designed in accordance with the data in the dimension tables.</p> <p>The abutment diameters for the shaft and housing shoulders d_a and D_a must be in accordance with the dimension tables.</p> <p>Caution! D_a and d_a are recommended minimum abutment diameters. If these values are not used, the rib diameter d_1 according to the dimension table must be observed.</p>												
Matched bearings	<p>In matched bearing pairs of series ZKLN and ZKLF, the depth of the housing bore must be defined such that the outer ring of the outermost bearing is radially supported to at least $1/4$ of its width.</p>												
Speeds	<p>The limiting speeds n_G given in the dimension tables are based on the following conditions:</p> <ul style="list-style-type: none"> ■ bearing preloaded, no external operating load ■ operating duration 25% ■ max. equilibrium temperature +50 °C. <p>Under favourable environmental influences, a bearing with gap seals (suffix 2Z) can be used instead of contact seals. The limiting speed of these bearings is approximately twice that of axial angular contact ball bearings with contact seals.</p>												
Friction	<p>In most applications, preloading of bearings by means of the locknut tightening torque gives sufficiently accurate setting values. The reference here is the tightening torque M_A according to the dimension table in conjunction with an INA precision locknut.</p> <p>The frictional torque M_{RL} given in the dimension tables is a guide value. The frictional torques are based, for bearings of series ZKLN, ZKLF, ZKLFA, DKLFA, 7602..-2RS, 7603..-2RS, BSB..-2RS and ZKLR on grease lubrication, measured at a speed of $n = 5 \text{ min}^{-1}$.</p> <p>For unsealed bearings of series 7602, 7603 and BSB, the frictional torque M_{RL} is based on lightly oiled raceways.</p> <p>For dimensioning of the drive, the starting frictional torque and the frictional torque at high speeds of 2 to $3 \times M_{RL}$ must be taken into consideration.</p>												
Seal friction	<p>In axial angular contact ball bearings with contact seals (suffix 2RS), the extent of seal friction must not be neglected. Sealing influences the limiting speeds.</p>												
Frictional energy	<p>The frictional energy N_R of the bearings can be calculated as follows:</p> <div style="background-color: #f0f0f0; padding: 10px; margin: 10px 0;"> $N_R = \frac{M_{RL} \cdot n}{9,55}$ </div> <table border="0" style="margin-left: 20px;"> <tr> <td style="padding-right: 20px;">N_R</td> <td>W</td> </tr> <tr> <td>Frictional energy</td> <td></td> </tr> <tr> <td style="padding-right: 20px;">M_{RL}</td> <td>Nm</td> </tr> <tr> <td>Bearing frictional torque</td> <td></td> </tr> <tr> <td style="padding-right: 20px;">n</td> <td>min^{-1}</td> </tr> <tr> <td>Operating speed.</td> <td></td> </tr> </table> <p>In any analysis of the thermal balance, the various operating speeds n_i must be taken into consideration with their time durations q_i.</p>	N_R	W	Frictional energy		M_{RL}	Nm	Bearing frictional torque		n	min^{-1}	Operating speed.	
N_R	W												
Frictional energy													
M_{RL}	Nm												
Bearing frictional torque													
n	min^{-1}												
Operating speed.													

Lubrication Bearings for screw drives can be lubricated with grease or oil. In machine tools, however, the mean bearing temperature should not exceed +50 °C. If this is the case, a lubrication method without heat dissipation such as grease lubrication or oil impulse lubrication can be selected.

Caution! For higher bearing temperatures and unsealed bearings, recirculating oil lubrication should be used.

Grease lubrication Bearings with a relubrication facility of series ZKLN, ZKLF, ZKLFA and DKLFA are greased with a lithium soap grease to GA28 and are preferably run with grease lubrication. In most cases, the initial greasing is sufficient for the whole operating life of the bearing. Under certain application conditions, relubrication may be necessary. In this case, Arcanol MULTITOP is suitable. The initial greasing is compatible with greases with a mineral oil base.

For checking by calculation of the grease operating life or relubrication interval, please contact us.

Relubrication interval The relubrication intervals cannot be determined precisely in advance. They are dependent to a significant extent on the operating conditions and the environmental influences such as temperature, contamination, dust, water, etc.

Caution! Bearings must always be relubricated:

- before and after long stoppage periods
- in conditions of high humidity
- within the defined lubrication intervals as stated in the technical proposal letter.

For the following conditions, please contact us:

- if the bearings are stationary
- vibrations
- very small oscillating movements.

Relubrication quantity If bearings of series ZKLN, ZKLF, ZKLFA and DKLFA must be relubricated due to the application conditions, please contact us regarding the relubrication quantities.

Oil lubrication Other lubrication methods such as oil impulse lubrication or recirculating oil lubrication are also possible. For oil lubrication, good results have been obtained with oils CLP to DIN 51 517 and HLP to DIN 51 524 in classes ISO VG 32 to ISO VG 100. If oil impulse lubrication is intended for series ZKLN and ZKLF, gap seals are advantageous. They prevent contamination entering the bearing and allow oil to leave the bearing. This prevents overlubrication.



Axial angular contact ball bearings

Mounting guidelines

Caution!

Bearings should only be fitted and dismantled in accordance with the Fitting and Maintenance Manual TPI 100. This TPI is available upon request.

During fitting of bearings, mounting forces should be applied only to the bearing ring to be fitted. Mounting forces must never be directed through the rolling elements or sealing rings.

The characteristics of the bearings are only valid when used in combination with INA precision locknuts and the associated tightening torques given in the dimension tables.

Axial angular contact ball bearings are self-retaining and the individual bearing components are matched to each other. The inner rings must not be removed from the bearing during fitting and dismantling. If individual bearing components are removed from the bearing, please contact us before carrying out any reassembly.

Location of outer ring using ring nut for 7602, 7603, BSB

Axial angular contact ball bearings 7602, 7603 and BSB must be located clearance-free in the housing and on the shaft and must be axially preloaded during fitting. The axial preload force must be distributed evenly over the circumference in order to avoid deformation of the raceways.

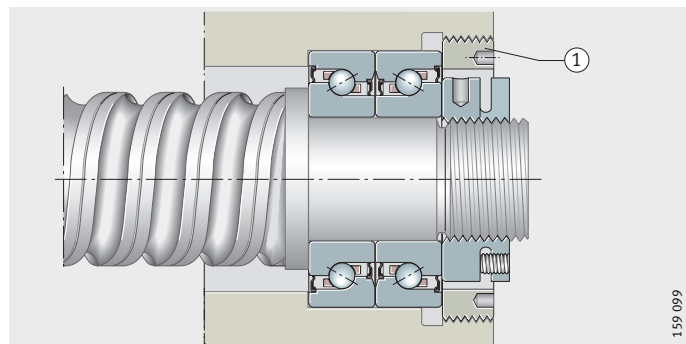
Outer rings are axially tensioned to the preload force given in the dimension table by means of a ring nut (not supplied), *Figure 25*. The ring nut must be secured against loosening (e.g. using Loctite 638).

Ring nuts with a runout of max. 5 µm apply the preload force evenly over the bearing rings and should therefore be used in preference to location by means of a cover.

① Ring nut
7602, 7603, BSB

Figure 25

Two-bearing set in O arrangement, locknut, ring nut



Location of outer ring using a cover

Clamping of the outer rings using a cover and cap screws leads to deformation of the raceways, *Figure 26*. In order to minimise the deformation and achieve the calculated life:

- the cover should be designed with adequate rigidity
- the number of fixing screws should be selected in accordance with the load but at least four should be used
- the screws should be tightened in a cross-wise sequence in four stages (finger tight, 40%, 70%, 100% of M_A).

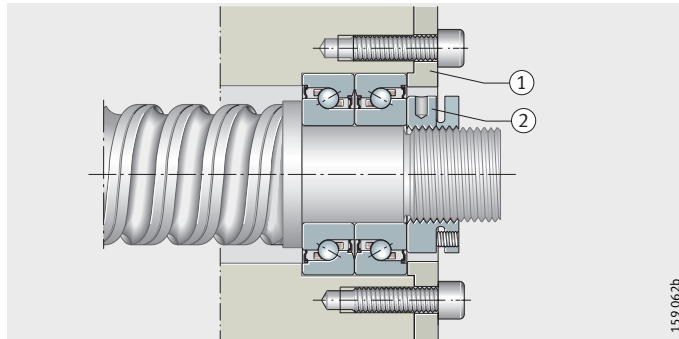
Caution!

Observe the axial preload force in the dimension table. If other values are used, this will influence the bearing preload, bearing friction and heat generation in the bearing position.

- ① Cover
 - ② Locknut
- 7602, 7603, BSB**

Figure 26

Two-bearing set in O arrangement, locknut, cover



Location of inner ring using locknut

Axial angular contact ball bearings must be axially preloaded during fitting by means of a precision locknut.

When preloading the bearings by means of the recommended precision locknut, the tightening torques given in the dimension tables must be observed. The tightening torques for the individual bearing sizes are only valid for the INA precision locknuts listed.

The preload force for series DKLFA is determined specifically on the basis of the operating conditions (load spectrum). Please contact us.

In order to counteract settling, it is recommended that the locknut should initially be tightened to twice the tightening torque M_A and then relieved of load again. It should only then be tightened again to the stated tightening torque M_A . Finally, the precision locknut should be secured against rotation by the torque-controlled tightening of the set screws.

The characteristics of the bearings are only valid if the preload forces specified in the dimension tables are observed. The tightening torques for INA precision locknuts required for this purpose are also given in the dimension tables.

Caution! If other suitable locknuts are used, the manufacturer's guidance on calculation of the necessary tightening torque should be observed. Only locknuts with a minimum accuracy of the end face to the thread of $5 \mu\text{m}$ should be used.

Fixing screws

The fixing screws for the outer ring must be tightened in a crosswise sequence. They may be loaded up to 70% of their elastic limit. If the bearing outer ring is supported by an additional housing cover, it must be ensured that the fixing screws are sufficiently well dimensioned.



Axial angular contact ball bearings

Fitting of angular contact ball bearing units

Angular contact ball bearing units ZKLR require no additional preload after fitting. They can often therefore be located on the spindle simply by means of clearance-free clamping.

Caution! The type of axial location depends on the load to be supported.

The adjacent construction can be a milled flat face or, if necessary, even an unmachined screw mounting surface without radial centring.

Fitting

Locate the bearing unit using a locknut ① or clearance-free clamping on the threaded spindle ②, *Figure 27*.

Screw mount the bearing unit on the adjacent construction; tighten the screws only finger tight ③.

Move the screw drive nut ④ towards the bearing unit (the position of the screw drive is the datum for the linear guidance system, the nut serves as a functional element for alignment).

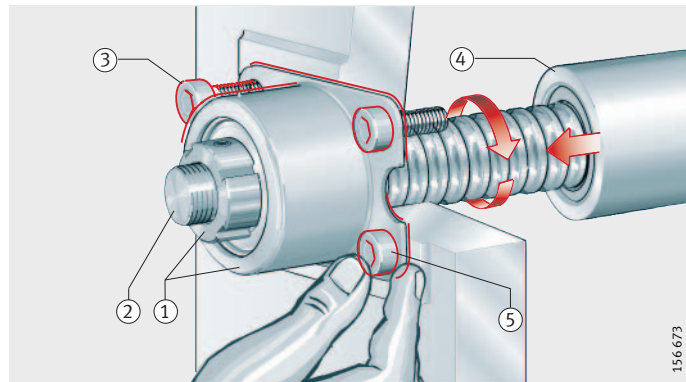
The bearing will align itself to the optimum radial position (due to the constraining forces exerted by the datum).

Screw the bearing unit to the adjacent construction using the tightening torque specified in the assembly drawing ⑤.

- ① Locknut
- ② Threaded spindle
- ③ Tightening of fixing screws finger tight
- ④ Screw drive nut
- ⑤ Tightening of fixing screws

ZKLR

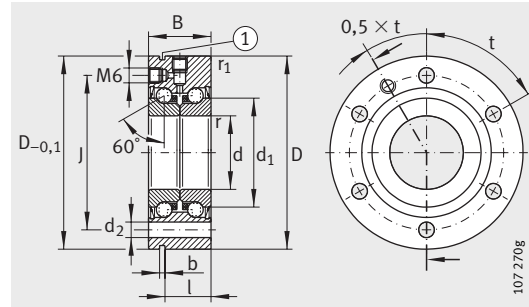
Figure 27
Fitting of bearing unit





Axial angular contact ball bearings

For screw mounting



ZKLF..-2RS, ZKLF..-2Z, ($d \leq 50$ mm)

① Extraction slot

Pitch t: see dimension table

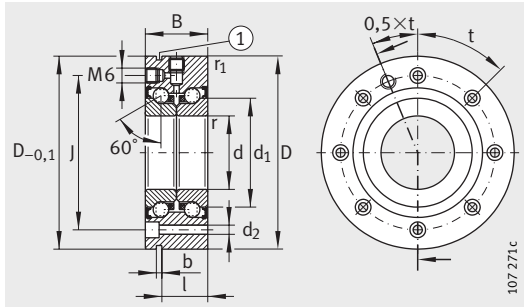
Dimension table · Dimensions in mm															
Designation	Mass m ≈ kg	Dimensions										Mounting dimensions		Fixing screws ¹⁾ DIN 912-10.9	
		d	D	B	d ₁	r	r ₁	J	d ₂	b	l	D _a	d _a	Size	Quantity
				-0,25		min.	min.					max.	min.		
ZKLF1255-2RS	0,37	12 _{-0,005}	55 _{-0,01}	25	25	0,3	0,6	42	6,8	3	17	33	16	M6	3
ZKLF1255-2Z	0,37	12 _{-0,005}	55 _{-0,01}	25	25	0,3	0,6	42	6,8	3	17	33	16	M6	3
ZKLF1560-2RS	0,43	15 _{-0,005}	60 _{-0,01}	25	28	0,3	0,6	46	6,8	3	17	35	20	M6	3
ZKLF1560-2Z	0,43	15 _{-0,005}	60 _{-0,01}	25	28	0,3	0,6	46	6,8	3	17	35	20	M6	3
ZKLF1762-2RS	0,45	17 _{-0,005}	62 _{-0,01}	25	30	0,3	0,6	48	6,8	3	17	37	23	M6	3
ZKLF1762-2Z	0,45	17 _{-0,005}	62 _{-0,01}	25	30	0,3	0,6	48	6,8	3	17	37	23	M6	3
ZKLF2068-2RS	0,61	20 _{-0,005}	68 _{-0,01}	28	34,5	0,3	0,6	53	6,8	3	19	43	25	M6	4
ZKLF2068-2Z	0,61	20 _{-0,005}	68 _{-0,01}	28	34,5	0,3	0,6	53	6,8	3	19	43	25	M6	4
ZKLF2575-2RS	0,72	25 _{-0,005}	75 _{-0,01}	28	40,5	0,3	0,6	58	6,8	3	19	48	32	M6	4
ZKLF2575-2Z	0,72	25 _{-0,005}	75 _{-0,01}	28	40,5	0,3	0,6	58	6,8	3	19	48	32	M6	4
ZKLF3080-2RS	0,78	30 _{-0,005}	80 _{-0,01}	28	45,5	0,3	0,6	63	6,8	3	19	53	40	M6	6
ZKLF3080-2Z	0,78	30 _{-0,005}	80 _{-0,01}	28	45,5	0,3	0,6	63	6,8	3	19	53	40	M6	6
ZKLF30100-2RS ³⁾	1,63	30 _{-0,005}	100 _{-0,01}	38	51	0,3	0,6	80	8,8	3	30	64	47	M8	8
ZKLF30100-2Z	1,63	30 _{-0,005}	100 _{-0,01}	38	51	0,3	0,6	80	8,8	3	30	64	47	M8	8
ZKLF3590-2RS	1,13	35 _{-0,005}	90 _{-0,01}	34	52	0,3	0,6	75	8,8	3	25	62	45	M8	4
ZKLF3590-2Z	1,13	35 _{-0,005}	90 _{-0,01}	34	52	0,3	0,6	75	8,8	3	25	62	45	M8	4
ZKLF40100-2RS	1,46	40 _{-0,005}	100 _{-0,01}	34	58	0,3	0,6	80	8,8	3	25	67	50	M8	4
ZKLF40100-2Z	1,46	40 _{-0,005}	100 _{-0,01}	34	58	0,3	0,6	80	8,8	3	25	67	50	M8	4
ZKLF40115-2RS ³⁾	2,2	40 _{-0,005}	115 _{-0,01}	46	65	0,6	0,6	94	8,8	3	36	80	56	M8	12
ZKLF40115-2Z ³⁾	2,2	40 _{-0,005}	115 _{-0,01}	46	65	0,6	0,6	94	8,8	3	36	80	56	M8	12
ZKLF50115-2RS	1,86	50 _{-0,005}	115 _{-0,01}	34	72	0,3	0,6	94	8,8	3	25	82	63	M8	6
ZKLF50115-2Z	1,86	50 _{-0,005}	115 _{-0,01}	34	72	0,3	0,6	94	8,8	3	25	82	63	M8	6
ZKLF50140-2RS ³⁾	4,7	50 _{-0,005}	140 _{-0,01}	54	80	0,6	0,6	113	11	3	45	98	63	M10	12
ZKLF50140-2Z ³⁾	4,7	50 _{-0,005}	140 _{-0,01}	54	80	0,6	0,6	113	11	3	45	98	63	M10	12
ZKLF60145-2Z	4,3	60 _{-0,005}	145 _{-0,015}	45	85	0,6	0,6	120	8,8	3	35	100	82	M8	8
ZKLF70155-2Z	4,9	70 _{-0,008}	155 _{-0,015}	45	85	0,6	0,6	130	8,8	3	35	110	92	M8	8
ZKLF80165-2Z	5,3	80 _{-0,008}	165 _{-0,015}	45	105	0,6	0,6	140	8,8	3	35	120	102	M8	8
ZKLF90190-2Z	8,7	90 _{-0,008}	190 _{-0,015}	55	120	0,6	0,6	165	11	3	45	138	116	M10	8
ZKLF100200-2Z	9,3	100 _{-0,008}	200 _{-0,015}	55	132	0,6	0,6	175	11	3	45	150	128	M10	8

1) Tightening torque of fixing screws according to manufacturer's data.
Screws are not included in the delivery.

2) Mass moment of inertia for rotating inner ring.

3) Heavy series.

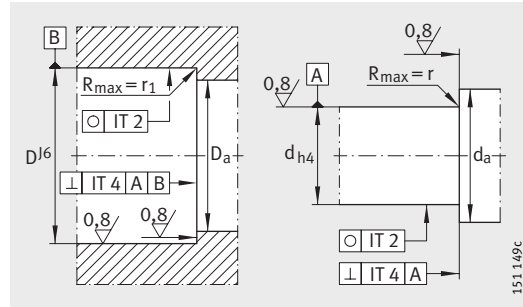
4) Only valid in conjunction with INA precision locknuts.



ZKL.-2Z, (60 mm ≤ d ≤ 100 mm)

① Extraction slot

Pitch t: see dimension table



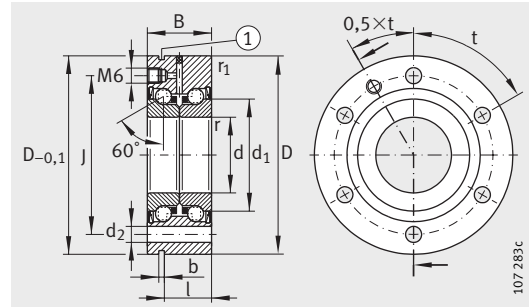
Design of adjacent construction

Pitch t	Basic load ratings axial		Limiting speed n _G grease min ⁻¹	Bearing frictional torque M _{RL} Nm	Rigid-ity axial c _{aL} N/μm	Tilting rigid-ity c _{kL} Nm/mrad	Mass moment of inertia ²⁾ M _m kg · cm ²	Axial runout μm	Recommended INA locknut; to be ordered separately			
	dyn. C _a N	stat. C _{0a} N							Designation	Tight-ening torque ⁴⁾ M _A Nm	Axial pre-load force N	
3X120°	16900	24 700	3800	0,16	375	50	0,068	2	ZM12	–	8	5 038
3X120°	16900	24 700	7600	0,08	375	50	0,068	2	ZM12	–	8	5 038
3X120°	17900	28 000	3500	0,2	400	65	0,102	2	ZM15	AM15	10	5 484
3X120°	17900	28 000	7000	0,1	400	65	0,102	2	ZM15	AM15	10	5 484
3X120°	18800	31 000	3300	0,24	450	80	0,132	2	ZM17	AM17	15	7 157
3X120°	18800	31 000	6600	0,12	450	80	0,132	2	ZM17	AM17	15	7 157
4X 90°	26000	47 000	3000	0,3	650	140	0,273	2	ZM20	AM20	18	9 079
4X 90°	26000	47 000	5400	0,15	650	140	0,273	2	ZM20	AM20	18	9 079
4X 90°	27 500	55 000	2600	0,4	750	200	0,486	2	ZM25	AM25	25	9 410
4X 90°	27 500	55 000	4700	0,2	750	200	0,486	2	ZM25	AM25	25	9 410
6X 60°	29000	64 000	2200	0,5	850	300	0,73	2,5	ZM30	AM30	32	10 451
6X 60°	29000	64 000	4300	0,25	850	300	0,73	2,5	ZM30	AM30	32	10 451
8X 45°	59000	108 000	2100	0,8	950	400	1,91	2,5	ZMA30/52	AM30	65	19 509
8X 45°	59000	108 000	4000	0,4	950	400	1,91	2,5	ZMA30/52	AM30	65	19 509
4X 90°	41 000	89 000	2000	0,6	900	400	1,51	2,5	ZM35	AM35/58	40	10 770
4X 90°	41 000	89 000	3800	0,3	900	400	1,51	2,5	ZM35	AM35/58	40	10 770
4X 90°	43 000	101 000	1800	0,7	1000	550	2,26	2,5	ZM40	AM40	55	13 412
4X 90°	43 000	101 000	3300	0,35	1000	550	2,26	2,5	ZM40	AM40	55	13 412
12X 30°	72 000	149 000	1600	1,3	1200	750	5,5	2,5	ZMA40/62	AM40	110	25 185
12X 30°	72 000	149 000	3100	0,65	1200	750	5,5	2,5	ZMA40/62	AM40	110	25 815
6X 60°	46 500	126 000	1500	0,9	1250	1000	5,24	2,5	ZM50	AM50	85	17 009
6X 60°	46 500	126 000	3000	0,45	1250	1000	5,24	2,5	ZM50	AM50	85	17 009
12X 30°	113 000	250 000	1200	2,6	1400	1500	15,2	2,5	ZMA50/75	AM50	150	29 436
12X 30°	113 000	250 000	2500	1,3	1400	1500	15,2	2,5	ZMA50/75	AM50	150	29 436
8X 45°	84 000	214 000	3000	1	1300	1650	13,7	3	ZMA60/98	AM60	100	17 893
8X 45°	88 000	241 000	2800	1,2	1450	2250	19,8	3	ZMA70/110	AM70	130	19 717
8X 45°	91 000	265 000	2700	1,4	1600	3000	27,6	3	ZMA80/120	AM80	160	20 604
8X 45°	135 000	395 000	2300	2,3	1700	4400	59,9	3	ZMA90/130	AM90	200	25 198
8X 45°	140 000	435 000	2150	2,6	1900	5800	85,3	3	ZMA100/140	AM100	250	28 760



Axial angular contact ball bearings

For screw mounting
Less stringent tolerances



ZKLF..-2RS-PE

① Extraction slot

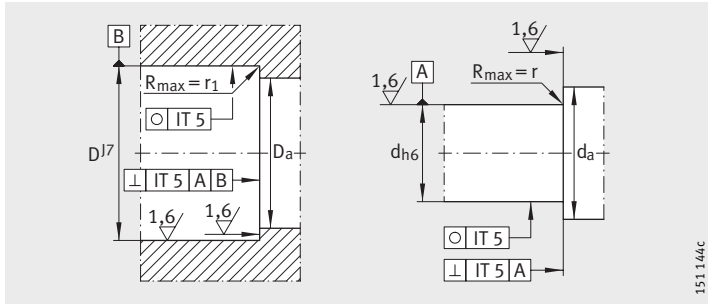
Pitch t: see dimension table

Dimension table · Dimensions in mm															
Designation	Mass m ≈kg	Dimensions										Mounting dimensions		Fixing screws ¹⁾ DIN 912-10.9	
		d	D	B	d ₁	r	r ₁	J	d ₂	b	l	D _a max.	d _a min.	Size	Quantity
ZKLF1255-2RS-PE	0,37	12	55 _{-0,013}	25	25	0,3	0,6	42	6,8	3	17	33	16	M6	3
ZKLF1560-2RS-PE	0,43	15	60 _{-0,013}	25	28	0,3	0,6	46	6,8	3	17	35	20	M6	3
ZKLF1762-2RS-PE	0,45	17	62 _{-0,013}	25	30	0,3	0,6	48	6,8	3	17	37	23	M6	3
ZKLF2068-2RS-PE	0,61	20	68 _{-0,013}	28	34,5	0,3	0,6	53	6,8	3	19	43	25	M6	4
ZKLF2575-2RS-PE	0,72	25	75 _{-0,013}	28	40,5	0,3	0,6	58	6,8	3	19	48	32	M6	4
ZKLF3080-2RS-PE	0,78	30	80 _{-0,013}	28	45,5	0,3	0,6	63	6,8	3	19	53	40	M6	6
ZKLF3590-2RS-PE	1,13	35	90 _{-0,015}	34	52	0,3	6,8	75	8,8	3	25	62	45	M8	4
ZKLF40100-2RS-PE	1,46	40	100 _{-0,015}	34	58	0,3	6,8	80	8,8	3	25	67	50	M8	4
ZKLF50115-2RS-PE	1,86	50	115 _{-0,015}	34	72	0,3	6,8	94	8,8	3	25	82	63	M8	6

¹⁾ Tightening torque of fixing screws according to manufacturer's data.
Screws are not included in the delivery.

²⁾ Mass moment of inertia for rotating inner ring.

³⁾ Only valid in conjunction with INA precision locknuts.



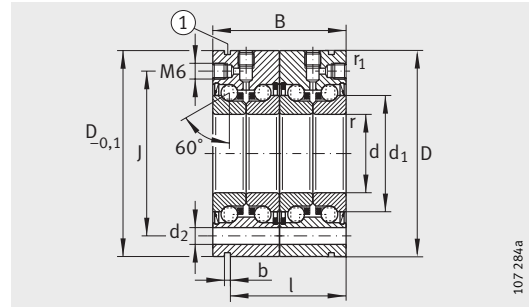
Design of adjacent construction

Pitch t	Basic load ratings axial		Limiting speed n_G grease min^{-1}	Bearing frictional torque M_{RL} Nm	Rigid-ity axial c_{aL} $\text{N}/\mu\text{m}$	Tilting rigidity c_{kL} Nm/mrad	Mass moment of inertia ²⁾ M_m $\text{kg} \cdot \text{cm}^2$	Axial runout μm	Recommended INA locknut; to be ordered separately		
	dyn. C_a N	stat. C_{0a} N							Designation	Tight-ening torque ³⁾ M_A Nm	Axial pre-load force N
3X120°	16 900	24 700	3800	0,16	375	50	0,068	5	ZM12 –	8	5 038
3X120°	17 900	28 000	3500	0,2	400	65	0,102	5	ZM15 AM15	10	5 484
3X120°	18 800	31 000	3300	0,24	450	80	0,132	5	ZM17 AM17	15	7 157
4X 90°	26 000	47 000	3000	0,3	650	140	0,273	5	ZM20 AM20	18	9 079
4X 90°	27 500	55 000	2600	0,4	750	200	0,486	5	ZM25 AM25	25	9 410
6X 60°	29 000	64 000	2200	0,5	850	300	0,73	5	ZM30 AM30	32	10 451
4X 90°	41 000	89 000	2000	0,6	900	400	1,51	5	ZM35 AM35/58	40	10 770
4X 90°	43 000	101 000	1800	0,7	1000	550	2,26	5	ZM40 AM40	55	13 412
6X 60°	46 500	126 000	1500	0,9	1250	1000	5,24	5	ZM50 AM50	85	17 009



Axial angular contact ball bearings

For screw mounting
Matched pair



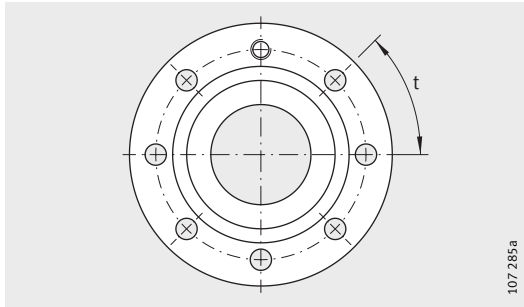
ZKLF..-2RS-2AP
① Extraction slot

Dimension table · Dimensions in mm															
Designation	Mass m ≈kg	Dimensions										Mounting dimensions		Fixing screws ¹⁾ DIN 912-10.9	
		d	D	B	d ₁	r	r ₁	J	d ₂	l	b	D _a max.	d _a min.	Size	Quantity
ZKLF1762-2RS-2AP	0,9	17	62	50	30	0,3	0,6	48	6,8	42	3	37	23	M6X60	5
ZKLF2068-2RS-2AP	1,22	20	68	56	34,5	0,3	0,6	53	6,8	47	3	43	25	M6X70	7
ZKLF2575-2RS-2AP	1,44	25	75	56	40,5	0,3	0,6	58	6,8	47	3	48	32	M6X70	7
ZKLF3080-2RS-2AP	1,56	30	80	56	45,5	0,3	0,6	63	6,8	47	3	53	40	M6X70	11
ZKLF3590-2RS-2AP	2,26	35	90	68	52	0,3	0,6	75	8,8	59	3	62	45	M8X80	7
ZKLF40100-2RS-2AP	2,92	40	100	68	58	0,3	0,6	80	8,8	59	3	67	50	M8X80	7
ZKLF50115-2RS-2AP	3,72	50	115	68	72	0,3	0,6	94	8,8	59	3	82	63	M8X80	11

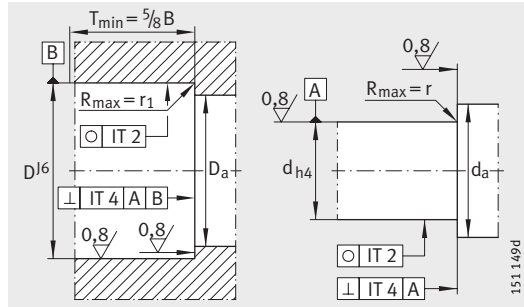
1) Tightening torque of fixing screws according to manufacturer's data.
Screws are not included in the delivery.

2) Mass moment of inertia for rotating inner ring.

3) Only valid in conjunction with INA precision locknuts.



Hole pattern
Pitch t: see dimension table



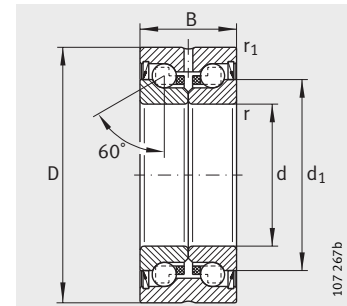
Design of adjacent construction

Pitch t	Basic load ratings axial		Limiting speed n_G grease	Bearing frictional torque M_{RL}	Rigid-ity axial c_{aL}	Tilting rigidity c_{kL}	Mass moment of inertia ²⁾ M_m	Axial runout μm	Recommended INA locknut; to be ordered separately			
	dyn. C_a	stat. C_{0a}							Designation	Tight-ening torque ³⁾ M_A Nm	Axial pre-load force N	
QuantityXt	N	N	min^{-1}	Nm	N/ μm	Nm/mrad	$\text{kg} \cdot \text{cm}^2$	μm				
6X60°	30 500	62 000	3300	0,36	800	200	0,264	2	ZM17	AM17	15	7 157
8X45°	42 000	94 000	3000	0,45	1150	320	0,564	2	ZMA20/38	AM20	18	9 079
8X45°	44 500	111 000	2600	0,6	1300	450	0,972	2	ZMA25/45	AM25	25	9 410
12X30°	47 500	127 000	2200	0,75	1500	620	1,46	2,5	ZMA30/52	AM30	32	10 451
8X45°	66 000	177 000	2000	0,9	1600	900	3,02	2,5	ZMA35/58	AM35/58	40	10 770
8X45°	70 000	202 000	1800	1,05	1750	1200	4,52	2,5	ZMA40/62	AM40	55	13 412
12X30°	76 000	250 000	1500	1,35	2200	2250	10,48	2,5	ZMA50/75	AM50	85	17 009



Axial angular contact ball bearings

Not for screw mounting



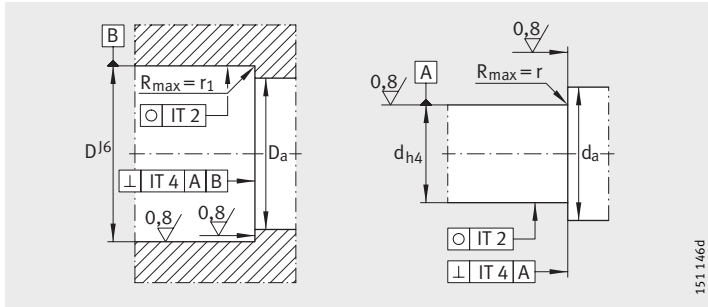
ZKLN...-2RS
ZKLN...-2Z

Dimension table · Dimensions in mm											
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		Basic load ratings axial	
		d	D	B	d ₁	r	r ₁	D _a	d _a	dyn. C _a	stat. C _{0a}
		-0,005	-0,010	-0,25		min.	min.	max.	min.	N	N
ZKLN0619-2Z	0,02	6 ^{+0,002} _{-0,003}	19	12	12	0,3	0,3	16	9	4 900	6 100
ZKLN0624-2RS	0,03	6 ^{+0,002} _{-0,003}	24	15	14	0,3	0,6	19	9	6 900	8 500
ZKLN0624-2Z	0,03	6 ^{+0,002} _{-0,003}	24	15	14	0,3	0,6	19	9	6 900	8 500
ZKLN0832-2RS	0,09	8	32	20	19	0,3	0,6	26	11	12 500	16 300
ZKLN0832-2Z	0,09	8	32	20	19	0,3	0,6	26	11	12 500	16 300
ZKLN1034-2RS	0,1	10	34	20	21	0,3	0,6	28	14	13 400	18 800
ZKLN1034-2Z	0,1	10	34	20	21	0,3	0,6	28	14	13 400	18 800
ZKLN1242-2RS	0,2	12	42	25	25	0,3	0,6	33	16	17 000	24 700
ZKLN1242-2Z	0,2	12	42	25	25	0,3	0,6	33	16	17 000	24 700
ZKLN1545-2RS	0,21	15	45	25	28	0,3	0,6	35	20	17 900	28 000
ZKLN1545-2Z	0,21	15	45	25	28	0,3	0,6	35	20	17 900	28 000
ZKLN1747-2RS	0,22	17	47	25	30	0,3	0,6	37	23	18 800	31 000
ZKLN1747-2Z	0,22	17	47	25	30	0,3	0,6	37	23	18 800	31 000
ZKLN2052-2RS	0,31	20	52	28	34,5	0,3	0,6	43	25	26 000	47 000
ZKLN2052-2Z	0,31	20	52	28	34,5	0,3	0,6	43	26	26 000	47 000
ZKLN2557-2RS	0,34	25	57	28	40,5	0,3	0,6	48	32	27 500	55 000
ZKLN2557-2Z	0,34	25	57	28	40,5	0,3	0,6	48	32	27 500	55 000
ZKLN3062-2RS	0,39	30	62	28	45,5	0,3	0,6	53	40	29 000	64 000
ZKLN3062-2Z	0,39	30	62	28	45,5	0,3	0,6	53	40	29 000	64 000
ZKLN3072-2RS ²⁾	0,72	30	72	38	51	0,3	0,6	64	47	59 000	108 000
ZKLN3072-2Z ²⁾	0,72	30	72	38	51	0,3	0,6	64	47	59 000	108 000
ZKLN3572-2RS	0,51	35	72	34	52	0,3	0,6	62	45	41 000	89 000
ZKLN3572-2Z	0,51	35	72	34	52	0,3	0,6	62	45	41 000	89 000

1) Mass moment of inertia for rotating inner ring.

2) Heavy series.

3) Only valid in conjunction with INA precision locknuts.



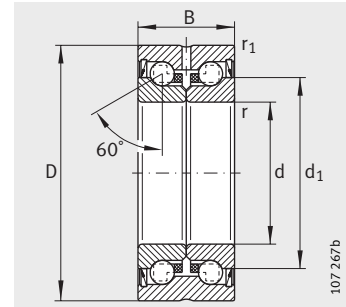
Design of adjacent construction

Limiting speed n_G grease min^{-1}	Bearing frictional torque M_{RL} Nm	Rigidity axial c_{aL} N/ μm	Tilting rigidity c_{kL} Nm/mrad	Mass moment of inertia ¹⁾ M_m kg · cm ²	Axial runout μm	Recommended INA locknut; to be ordered separately		
						Designation	Tightening torque ³⁾ M_A Nm	Axial preload force N
14 000	0,01	150	4	0,0019	2	ZM06 –	2	916
6 800	0,04	200	8	0,0044	2	ZM06 –	2	2 404
12 000	0,02	200	8	0,0044	2	ZM06 –	2	2 404
5 100	0,08	250	20	0,02	2	ZM08 –	4	2 216
9 500	0,04	250	20	0,02	2	ZM08 –	4	2 216
4 600	0,12	325	25	0,029	2	ZM10 –	6	4 891
8 600	0,06	325	25	0,029	2	ZM10 –	6	4 891
3 800	0,16	375	50	0,068	2	ZM12 –	8	5 038
7 600	0,08	375	50	0,068	2	ZM12 –	8	5 038
3 500	0,2	400	65	0,102	2	ZM15 AM15	10	5 484
7 000	0,1	400	65	0,102	2	ZM15 AM15	10	5 484
3 300	0,24	450	80	0,132	2	ZM17 AM17	15	7 157
6 600	0,12	450	80	0,132	2	ZM17 AM17	15	7 157
3 000	0,3	650	140	0,273	2	ZM20 AM20	18	9 079
5 400	0,15	650	140	0,273	2	ZM20 AM20	18	9 079
2 600	0,4	750	200	0,486	2	ZM25 AM25	25	9 410
4 700	0,2	750	200	0,486	2	ZM25 AM25	25	9 410
2 200	0,5	850	300	0,73	2,5	ZM30 AM30	32	10 451
4 300	0,25	850	300	0,73	2,5	ZM30 AM30	32	10 451
2 100	0,8	950	400	1,91	2,5	ZMA30/52 AM30	65	19 509
4 000	0,4	950	400	1,91	2,5	ZMA30/52 AM30	65	19 509
2 000	0,6	900	400	1,51	2,5	ZM35 AM35/58	40	10 770
3 800	0,3	900	400	1,51	2,5	ZM35 AM35/58	40	10 770



Axial angular contact ball bearings

Not for screw mounting



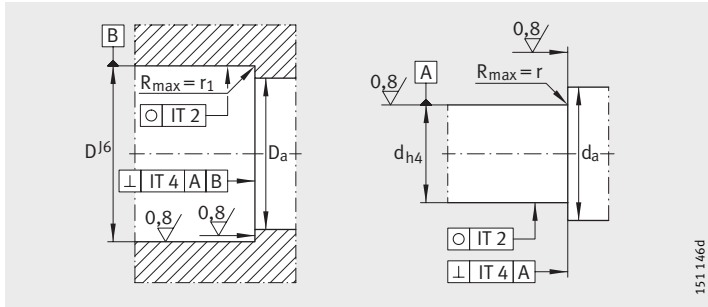
ZKLN...-2RS
ZKLN...-2Z

Dimension table (continued) · Dimensions in mm											
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		Basic load ratings axial	
		d	D	B	d ₁	r	r ₁	D _a	d _a	dyn. C _a	stat. C _{0a}
				-0,25		min.	min.	max.	min.	N	N
ZKLN4075-2RS	0,61	40 _{-0,005}	75 _{-0,01}	34	58	0,3	0,6	67	50	43 000	101 000
ZKLN4075-2Z	0,61	40 _{-0,005}	75 _{-0,01}	34	58	0,3	0,6	67	50	43 000	101 000
ZKLN4090-2RS ²⁾	0,95	40 _{-0,005}	90 _{-0,01}	46	65	0,6	0,6	80	56	72 000	149 000
ZKLN4090-2Z ²⁾	0,95	40 _{-0,005}	90 _{-0,01}	46	65	0,6	0,6	80	56	72 000	149 000
ZKLN5090-2RS	0,88	50 _{-0,005}	90 _{-0,01}	34	72	0,3	0,6	82	63	46 500	126 000
ZKLN5090-2Z	0,88	50 _{-0,005}	90 _{-0,01}	34	72	0,3	0,6	82	63	46 500	126 000
ZKLN50110-2RS ²⁾	2,5	50 _{-0,005}	110 _{-0,01}	54	80	0,6	0,6	98	63	113 000	250 000
ZKLN50110-2Z ²⁾	2,5	50 _{-0,005}	110 _{-0,01}	54	80	0,6	0,6	98	63	113 000	250 000
ZKLN60110-2Z	2,2	60 _{-0,008}	110 _{-0,015}	45	85	0,6	0,6	100	82	84 000	214 000
ZKLN70120-2Z	2,4	70 _{-0,008}	120 _{-0,015}	45	95	0,6	0,6	110	92	88 000	241 000
ZKLN80130-2Z	2,7	80 _{-0,008}	130 _{-0,015}	45	105	0,6	0,6	120	102	91 000	265 000
ZKLN90150-2Z	4,5	90 _{-0,008}	150 _{-0,015}	55	120	0,6	0,6	138	116	135 000	395 000
ZKLN100160-2Z	4,9	100 _{-0,008}	160 _{-0,015}	55	132	0,6	0,6	150	128	140 000	435 000

¹⁾ Mass moment of inertia for rotating inner ring.

²⁾ Heavy series.

³⁾ Only valid in conjunction with INA precision locknuts.



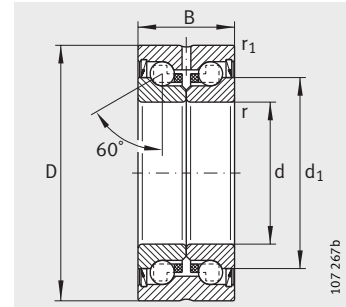
Design of adjacent construction

Limiting speed n_G grease min^{-1}	Bearing frictional torque M_{RL} Nm	Rigidity axial c_{aL} N/ μm	Tilting rigidity c_{kL} Nm/mrad	Mass moment of inertia ¹⁾ M_m kg · cm ²	Axial runout μm	Recommended INA locknut; to be ordered separately			
						Designation		Tightening torque ³⁾ M_A Nm	Axial preload force N
1800	0,7	1000	550	2,26	2,5	ZM40	AM40	55	13 412
3300	0,35	1000	550	2,26	2,5	ZM40	AM40	55	13 412
1600	1,3	1200	750	5,5	2,5	ZMA40/62	AM40	110	25 185
3100	0,65	1200	750	5,5	2,5	ZMA40/62	AM40	110	25 185
1500	0,9	1250	1000	5,24	2,5	ZM50	AM50	85	17 009
3000	0,45	1250	1000	5,24	2,5	ZM50	AM50	85	17 009
1200	2,6	1400	1500	15,2	2,5	ZMA50/75	AM50	150	29 436
2500	1,3	1400	1500	15,2	2,5	ZMA50/75	AM50	150	29 436
3000	1	1300	1650	13,7	3	ZMA60/98	AM60	100	17 893
2800	1,2	1450	2250	19,8	3	ZMA70/110	AM70	130	19 171
2700	1,4	1600	3000	27,6	3	ZMA80/120	AM80	160	20 604
2300	2,3	1700	4400	59,9	3	ZMA90/130	AM90	200	25 198
2150	2,6	1900	5800	85,3	3	ZMA100/140	AM100	250	28 760



Axial angular contact ball bearings

Not for screw mounting
Less stringent tolerances

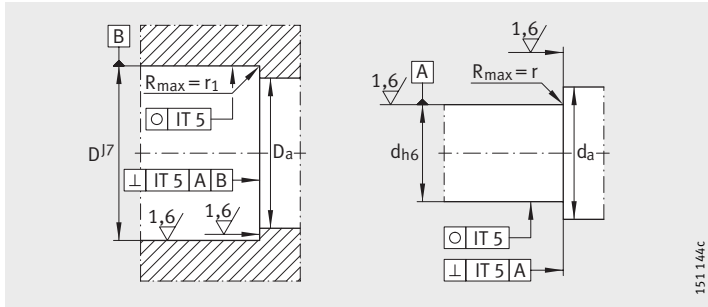


ZKLN...-2RS-PE

Dimension table · Dimensions in mm											
Designation	Mass m ≈ kg	Dimensions						Mounting dimensions		Basic load ratings axial	
		d -0,01	D	B	d ₁	r min.	r ₁ min.	D _a max.	d _a min.	dyn. C _a N	stat. C _{0a} N
ZKLN0624-2RS-PE	0,03	6	24 _{-0,01}	15	14	0,3	0,6	19	9	6 900	8 500
ZKLN1034-2RS-PE	0,1	10	34 _{-0,011}	20	21	0,3	0,6	28	14	13 400	18 800
ZKLN1242-2RS-PE	0,2	12	42 _{-0,011}	25	25	0,3	0,6	33	16	16 900	24 700
ZKLN1545-2RS-PE	0,21	15	45 _{-0,011}	25	28	0,3	0,6	35	20	17 900	28 000
ZKLN1747-2RS-PE	0,22	17	47 _{-0,011}	25	30	0,3	0,6	37	23	18 800	31 000
ZKLN2052-2RS-PE	0,31	20	52 _{-0,013}	28	34,5	0,3	0,6	43	25	26 000	47 000
ZKLN2557-2RS-PE	0,34	25	57 _{-0,013}	28	40,5	0,3	0,6	48	32	27 500	55 000
ZKLN3062-2RS-PE	0,39	30	62 _{-0,013}	28	45,5	0,3	0,6	53	40	29 000	64 000
ZKLN3572-2RS-PE	0,51	35	72 _{-0,013}	34	52	0,3	0,6	62	45	41 000	89 000
ZKLN5090-2RS-PE	0,88	50	90 _{-0,015}	34	72	0,3	0,6	82	63	46 500	126 000

1) Mass moment of inertia for rotating inner ring.

2) Only valid in conjunction with INA precision locknuts.



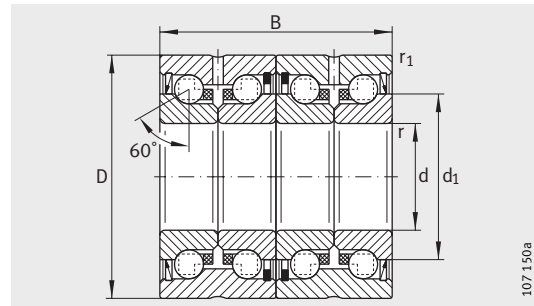
Design of adjacent construction

Limiting speed n_G grease min^{-1}	Bearing frictional torque M_{RL} Nm	Rigidity axial c_{aL} N/ μm	Tilting rigidity c_{kL} Nm/mrad	Mass moment of inertia ¹⁾ M_m kg · cm ²	Axial runout μm	Recommended INA locknut; to be ordered separately		
						Designation	Tightening torque ²⁾ M_A Nm	Axial preload force N
6800	0,04	200	8	0,0044	5	ZM06 –	2	2 404
4600	0,12	325	25	0,029	5	ZM10 –	6	4 891
3800	0,16	375	50	0,068	5	ZM12 –	8	5 038
3500	0,2	400	65	0,102	5	ZM15 AM15	10	5 484
3300	0,24	450	80	0,132	5	ZM17 AM17	15	7 157
3000	0,3	650	140	0,273	5	ZM20 AM20	18	9 079
2600	0,4	750	200	0,486	5	ZM25 AM25	25	9 410
2200	0,5	850	300	0,73	5	ZM30 AM30	32	10 451
2000	0,6	900	400	1,51	5	ZM35 AM35/38	40	10 770
1500	0,9	1250	1000	5,24	5	ZM50 AM50	85	17 009



Axial angular contact ball bearings

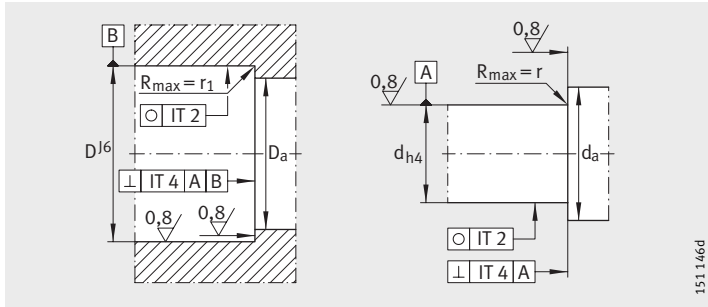
Not for screw mounting
Matched pair



ZKLN...-2RS-2AP

Dimension table · Dimensions in mm											
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		Basic load ratings axial	
		d	D	B	d ₁	r	r ₁	D _a	d _a	dyn. C _a	stat. C _{0a}
		-0,005	-0,01	-0,5		min.	min.	max.	min.	N	N
ZKLN1747-2RS-2AP	0,44	17	47	50	30	0,3	0,6	37	23	30 500	62 000
ZKLN2052-2RS-2AP	0,62	20	52	56	34,5	0,3	0,6	43	25	42 000	94 000
ZKLN2557-2RS-2AP	0,68	25	57	56	40,5	0,3	0,6	48	32	44 500	111 000
ZKLN3062-2RS-2AP	0,78	30	62	56	45,5	0,3	0,6	53	40	47 500	127 000
ZKLN3572-2RS-2AP	1,02	35	72	68	52	0,3	0,6	62	45	66 000	177 000
ZKLN4075-2RS-2AP	1,22	40	75	68	58	0,3	0,6	67	50	70 000	202 000
ZKLN5090-2RS-2AP	1,76	50	90	68	72	0,3	0,6	82	63	76 000	250 000

- 1) Mass moment of inertia for rotating inner ring.
2) Only valid in conjunction with INA precision locknuts.



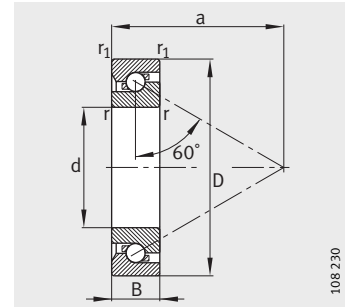
Design of adjacent construction

Limiting speed n_G grease min^{-1}	Bearing frictional torque M_{RL} Nm	Rigidity axial c_{aL} N/ μm	Tilting rigidity c_{kL} Nm/mrad	Mass moment of inertia ¹⁾ M_m kg · cm ²	Axial runout μm	Recommended INA locknut; to be ordered separately		
						Designation	Tightening torque ²⁾ M_A Nm	Axial preload force N
3300	0,36	800	200	0,264	2	ZM17 AM17	15	7157
3000	0,45	1150	320	0,546	2	ZMA20/38 AM20	18	9079
2600	0,6	1300	450	0,972	2	ZMA25/45 AM25	25	9410
2200	0,75	1500	620	1,46	2,5	ZMA30/52 AM30	32	10451
2000	0,9	1600	900	3,02	2,5	ZMA35/58 AM35/58	40	10770
1800	1,05	1750	1200	4,52	2,5	ZMA40/62 AM40	55	13412
1500	1,35	2200	2250	10,48	2,5	ZMA50/75 AM50	85	17009



Axial angular contact ball bearings

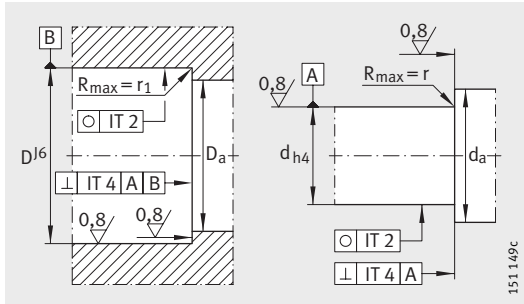
Single direction
Unsealed



7602, 7603, BSB

Dimension table · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions					Mounting dimensions		Basic load ratings axial	
		d	D	B	r, r ₁ min.	a ≈	D _a H12	d _a h12	stat. C _a N	dyn. C _{0a} N
7602012-TVP	0,042	12 _{-0,004}	32 _{-0,006}	10 _{-0,08}	0,6	24	27	17	12 200	20 700
7602015-TVP	0,052	15 _{-0,004}	36 _{-0,006}	11 _{-0,08}	0,6	27,5	30	20,5	13 100	24 700
7602017-TVP	0,074	17 _{-0,004}	40 _{-0,006}	12 _{-0,08}	0,6	31	34,5	23	17 200	32 500
7602020-TVP	0,139	20 _{-0,005}	47 _{-0,006}	14 _{-0,12}	1	36	39,5	27,5	19 100	38 000
BSB020047T	0,13	20 _{-0,005}	47 _{-0,006}	15 _{-0,12}	1	36,5	39,5	27,5	20 800	43 000
7603020-TVP	0,17	20 _{-0,005}	52 _{-0,007}	15 _{-0,12}	1,1	39,5	43,5	30,5	25 500	53 000
7602025-TVP	0,147	25 _{-0,005}	52 _{-0,007}	15 _{-0,12}	1	41	45	32	23 200	50 000
BSB025062-T	0,24	25 _{-0,005}	62 _{-0,007}	15 _{-0,12}	1	46,5	52	38	29 500	68 000
7603025-TVP	0,275	25 _{-0,005}	62 _{-0,007}	17 _{-0,12}	1,1	47,5	52	38	29 500	68 000
BSB030062-T	0,22	30 _{-0,005}	62 _{-0,007}	15 _{-0,12}	1	47,5	52,5	39,5	27 500	66 000
7602030-TVP	0,232	30 _{-0,005}	62 _{-0,007}	16 _{-0,12}	1	48	52,5	39,5	27 500	66 000
7603030-TVP	0,409	30 _{-0,005}	72 _{-0,007}	19 _{-0,12}	1,1	55,5	61	45	36 500	89 000
BSB035072-T	0,3	35 _{-0,006}	72 _{-0,007}	15 _{-0,12}	1	54	60,5	46,5	31 500	81 000
7602035-TVP	0,339	35 _{-0,006}	72 _{-0,007}	17 _{-0,12}	1,1	55	60,5	46,5	31 500	81 000
7603035-TVP	0,546	35 _{-0,006}	80 _{-0,007}	21 _{-0,12}	1,5	61,5	67	51	38 000	100 000
BSB040072-T	0,26	40 _{-0,006}	72 _{-0,007}	15 _{-0,12}	1	56	62,5	49	29 500	82 000
7602040-TVP	0,418	40 _{-0,006}	80 _{-0,007}	18 _{-0,12}	1,1	62,5	69,5	53,5	39 000	106 000
BSB040090-T	0,65	40 _{-0,006}	90 _{-0,008}	20 _{-0,12}	1,5	67	75,5	56,5	52 000	138 000
7603040-TVP	0,751	40 _{-0,006}	90 _{-0,008}	23 _{-0,12}	1,5	68,5	75,5	56,5	52 000	138 000
BSB045075-T	0,26	45 _{-0,006}	75 _{-0,007}	15 _{-0,12}	1	59,5	68	52	30 000	85 000
7602045-TVP	0,488	45 _{-0,006}	85 _{-0,008}	19 _{-0,12}	1,1	66	73	57	39 500	111 000
BSB045100-T	0,81	45 _{-0,006}	100 _{-0,008}	20 _{-0,12}	1,5	75	85,5	64,5	62 000	172 000
7603045-TVP	0,992	45 _{-0,006}	100 _{-0,008}	25 _{-0,12}	1,5	77,5	85,5	64,5	62 000	172 000
7602050-TVP	0,557	50 _{-0,006}	90 _{-0,008}	20 _{-0,12}	1,1	71,5	79	63	41 000	122 000
BSB050100-T	0,75	50 _{-0,006}	100 _{-0,008}	20 _{-0,12}	1,5	75	85,5	64,5	62 000	172 000
7603050-TVP	1,29	50 _{-0,006}	110 _{-0,008}	27 _{-0,12}	2	85,5	94	72	72 000	203 000
BSB055090-T	0,38	55 _{-0,007}	90 _{-0,008}	15 _{-0,15}	1,0	70,5	80	65	33 500	98 000
7602055-TVP	0,74	55 _{-0,007}	100 _{-0,008}	21 _{-0,15}	1,5	77,5	85,5	69,5	42 000	132 000
BSB055120-T	1,2	55 _{-0,007}	120 _{-0,008}	20 _{-0,15}	2,0	86	97,5	77	63 000	188 000
7603055-TVP	1,67	55 _{-0,007}	120 _{-0,008}	29 _{-0,15}	2	91,5	101	77	85 000	255 000

- 1) Valid for matched pair of bearings in O or X arrangement.
- 2) Valid for individual bearing with stated preload force, bearing lightly oiled.
- 3) Only valid in conjunction with INA precision locknuts.



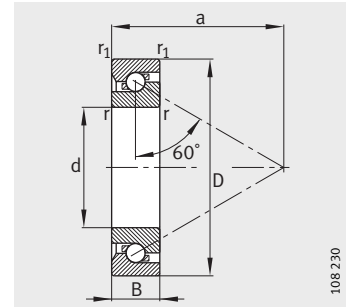
Design of adjacent construction

Limiting speed n_G grease min^{-1}	Bearing frictional torque ²⁾ M_{RL} Nm	Rigidity ¹⁾ axial c_{aL} $\text{N}/\mu\text{m}$	Axial runout μm	Recommended INA locknut; to be ordered separately		
				Designation	Tightening torque ³⁾ M_A Nm	Axial preload force N
8 000	0,015	476	2	ZM12 AM12	8	5 676
6 700	0,02	516	2	ZM15 AM15	10	5 777
6 000	0,03	596	2	ZM17 AM17	15	7 888
5 000	0,05	703	2	ZM20 AM20	18	8 387
5 600	0,05	703	2	ZM20 AM20	18	8 387
4 500	0,06	787	2	ZM20 AM20	25	9 423
4 500	0,065	772	2	ZM25 AM25	25	9 341
4 300	0,085	917	2	ZM25 AM25	40	11 837
3 800	0,085	917	2	ZM25 AM25	40	11 837
4 200	0,085	893	2	ZM30 AM30	32	10 200
3 800	0,085	893	2	ZM30 AM30	32	10 200
3 200	0,13	1073	2	ZM30 AM30	55	13 517
3 700	0,115	1020	2	ZM35 AM35	40	11 064
3 200	0,115	1020	2	ZM35 AM35	40	11 064
3 000	0,17	1192	2	ZM35 AM35	65	12 781
3 500	0,115	1016	2	ZM40 AM40	40	11 214
2 800	0,17	1190	2	ZM40 AM40	55	12 943
3 100	0,225	1292	2	ZM40 AM40	110	20 710
2 600	0,225	1292	2	ZM40 AM40	110	20 710
3 300	0,13	1072	2	ZM45 AM45	50	9 799
2 600	0,19	1247	2	ZM45 AM45	65	14 970
2 700	0,3	1473	2	ZM45 AM45	120	19 287
2 200	0,3	1473	2	ZM45 AM45	120	19 287
2 400	0,23	1360	2	ZM50 AM50	85	16 535
2 700	0,33	1473	2	ZM50 AM50	120	17 670
2 000	0,36	1601	2	ZM50 AM50	150	28 928
2 800	0,19	1246	3	ZM55 AM55	60	11 369
2 200	0,25	1394	3	ZM55 AM55	85	15 647
2 400	0,36	1553	3	ZM55 AM55	110	16 361
1 900	0,46	1723	3	ZM55 AM55	130	31 446



Axial angular contact ball bearings

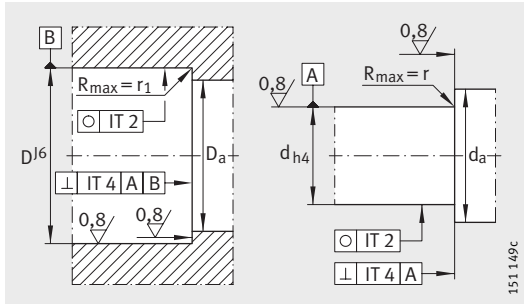
Single direction
Unsealed



7602, 7603, BSB

Dimension table (continued) · Dimensions in mm								
Designation ⁴⁾	Mass m ≈kg	Dimensions					Mounting dimensions	
		d	D	B	r, r ₁ min.	a ≈	D _a H12	d _a h12
7602060-TVP	0,94	60 _{-0,007}	110 _{-0,008}	22 _{-0,15}	1,5	86	96	77
BSB060120-T	1,1	60 _{-0,007}	120 _{-0,009}	22 _{-0,15}	1,5	88	100,5	79,5
7603060-TVP	2,08	60 _{-0,007}	130 _{-0,009}	31 _{-0,15}	2,1	98	107,5	82,5
7602065-TVP	1,19	65 _{-0,007}	120 _{-0,009}	23 _{-0,15}	1,5	92,5	103	84
7603065-TVP	2,58	65 _{-0,007}	140 _{-0,009}	33 _{-0,15}	2,1	107,5	118,5	91,5
7602070-TVP	1,3	70 _{-0,007}	125 _{-0,009}	24 _{-0,15}	1,5	96,5	108	87
7603070-TVP	3,16	70 _{-0,007}	150 _{-0,009}	35 _{-0,15}	2,1	113	124,5	95,5
BSB075110-T	0,47	75 _{-0,007}	110 _{-0,008}	15 _{-0,15}	1,5	87,5	99,5	85
7602075-TVP	1,42	75 _{-0,007}	130 _{-0,009}	25 _{-0,15}	1,5	102,5	114,5	93,5
7603075-TVP	3,74	75 _{-0,007}	160 _{-0,01}	37 _{-0,15}	2,1	123	135,5	105,5
7602080-TVP	1,72	80 _{-0,007}	140 _{-0,009}	26 _{-0,15}	2	109	122	100
7603080-TVP	4,5	80 _{-0,007}	170 _{-0,01}	39 _{-0,15}	2,1	129,5	143	111
7602085-TVP	2,17	85 _{-0,008}	150 _{-0,009}	28 _{-0,2}	2	117	131	107
7603085-TVP	5,24	85 _{-0,008}	180 _{-0,01}	41 _{-0,2}	3	136	151	116
7602090-TVP	2,67	90 _{-0,008}	160 _{-0,01}	30 _{-0,2}	2	124	138,5	113,5
7603090-TVP	6,18	90 _{-0,008}	190 _{-0,011}	43 _{-0,2}	3	142,5	157,5	122,5
7602095-TVP	3,25	95 _{-0,008}	170 _{-0,01}	32 _{-0,2}	2,1	131	146,5	119,5
7603095-TVP	7,22	95 _{-0,008}	200 _{-0,011}	45 _{-0,2}	3	150	165	130
BSB100150-T	1,4	100 _{-0,008}	150 _{-0,009}	22,5 _{-0,2}	2	119,5	135	114,5
7602100-TVP	3,9	100 _{-0,008}	180 _{-0,01}	34 _{-0,2}	2,1	138	154,5	125,5
7603100-TVP	8,78	100 _{-0,008}	215 _{-0,011}	47 _{-0,2}	3	161	178	140

- 1) Valid for matched pair of bearings in O or X arrangement.
- 2) Valid for individual bearing with stated preload force, bearing lightly oiled.
- 3) Only valid in conjunction with INA precision locknuts.
- 4) Available by agreement.



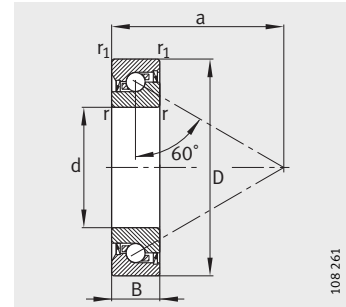
Design of adjacent construction

Basic load ratings axial		Limiting speed n_G grease min^{-1}	Bearing frictional torque ²⁾ M_{RL} Nm	Rigidity ¹⁾ axial c_{aL} N/ μm	Axial runout μm	Recommended INA locknut; to be ordered separately		
dyn. C_a N	stat. C_{0a} N					Designation	Tightening torque ³⁾ M_A Nm	Axial preload force N
58 000	183 000	2 000	0,35	1623	3	ZM60 AM60	100	17 273
64 000	196 000	2 300	0,38	1623	3	ZM60 AM60	120	15 356
92 000	270 000	1 800	0,54	1840	3	ZM60 AM60	150	27 145
60 000	197 000	1 800	0,41	1753	3	ZM65 AM65	110	18 203
106 000	330 000	1 600	0,7	2052	3	ZM65 AM65	150	27 725
68 000	220 000	1 800	0,44	1753	3	ZM70 AM70	115	19 632
117 000	360 000	1 600	0,76	2108	3	ZM70 AM70	180	30 071
37 000	133 000	2 300	0,29	1534	3	ZM75 AM75	140	12 357
70 000	236 000	1 600	0,48	1888	3	ZM75 AM75	160	19 819
132 000	425 000	1 400	0,92	2335	3	ZM75 AM75	200	32 191
81 000	275 000	1 500	0,6	2047	3	ZM80 AM80	160	21 867
144 000	465 000	1 400	1,1	2466	3	ZM80 AM80	220	33 617
95 000	340 000	1 400	0,76	2209	3	ZM85 AM85	250	23 249
169 000	550 000	1 300	1,25	2539	3	ZM85 AM85	280	36 911
102 000	365 000	1 400	0,79	2275	3	ZM90 AM90	250	24 552
172 000	580 000	1 200	1,3	2654	3	ZM90 AM90	300	37 503
116 000	410 000	1 300	0,95	2435	3	–	–	27 457
175 000	600 000	1 200	1,45	2770	3	–	–	38 299
73 000	265 000	1 800	0,6	2052	3	ZM100 AM100	200	16 937
128 000	465 000	1 200	1,1	2594	3	ZM100 AM100	255	28 724
201 000	700 000	1 100	1,7	2965	3	ZM100 AM100	305	45 106



Axial angular contact ball bearings

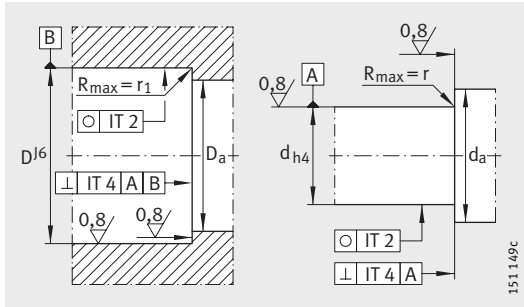
Single direction
Sealed on both sides



7602..-2RS, 7603..-2RS,
BSB..-2RS

Dimension table · Dimensions in mm								
Designation	Mass m ≈kg	Dimensions					Mounting dimensions	
		d	D	B	r, r ₁ min.	a ≈	D _a H12	d _a h12
7602012-2RS-TVP	0,042	12_{-0,004}	32 _{-0,006}	10 _{-0,08}	0,6	24	27	17
7602015-2RS-TVP	0,052	15_{-0,004}	35 _{-0,006}	11 _{-0,08}	0,6	27,5	30	20,5
7602020-2RS-TVP	0,12	20_{-0,005}	47 _{-0,006}	14 _{-0,12}	1	36	39,5	27,5
7603020-2RS-TVP	0,17	20_{-0,005}	52 _{-0,007}	15 _{-0,12}	1,1	36,5	43,5	30,5
7602025-2RS-TVP	0,15	25_{-0,005}	52 _{-0,007}	15 _{-0,12}	1	41	45	32
BSB025062-2RS-T	0,24	25_{-0,005}	62 _{-0,007}	15 _{-0,12}	1	46,5	52	38
7603025-2RS-TVP	0,27	25_{-0,005}	62 _{-0,007}	17 _{-0,12}	1,1	47,5	52	38
BSB030062-2RS-T	0,22	30_{-0,005}	62 _{-0,007}	15 _{-0,12}	1	47,5	52,5	39,5
7602030-2RS-TVP	0,23	30_{-0,005}	62 _{-0,007}	16 _{-0,12}	1	48	52,5	39,5
BSB035072-2RS-T	0,3	35_{-0,006}	72 _{-0,007}	15 _{-0,12}	1	54	60,5	46,5
BSB040072-2RS-T	0,26	40_{-0,006}	72 _{-0,007}	15 _{-0,12}	1	56	62,5	49

- 1) Valid for matched pair of bearings in O or X arrangement.
- 2) Valid for individual bearing with stated preload force, bearing lightly oiled.
- 3) Only valid in conjunction with INA precision locknuts.



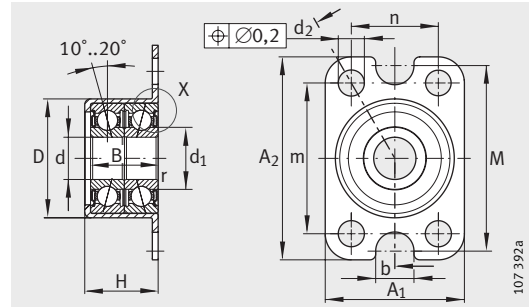
Design of adjacent construction

Basic load ratings axial		Limiting speed n_G grease	Bearing frictional torque ²⁾ M_{RL}	Rigidity ¹⁾ axial c_{aL}	Axial runout μm	Recommended INA locknut; to be ordered separately			
dyn. C_a	stat. C_{0a}					Designation		Tightening torque ³⁾ M_A Nm	Axial preload force N
N	N	min^{-1}	Nm	N/ μm					
12 200	20 700	8 000	0,018	476	2	ZM12	AM12	8	5 676
13 100	24 700	6 700	0,024	516	2	ZM15	AM15	10	5 777
19 100	38 000	5 000	0,06	703	2	ZM20	AM20	18	8 387
25 500	53 000	4 500	0,07	787	2	ZM20	AM20	18	8 387
23 200	50 000	3 800	0,08	772	2	ZM25	AM25	25	9 341
29 500	68 000	4 300	0,1	917	2	ZM25	AM25	40	11 837
29 500	68 000	3 800	0,1	917	2	ZM25	AM25	40	11 837
27 500	66 000	4 200	0,1	893	2	ZM30	AM30	32	10 200
27 500	66 000	3 800	0,1	893	2	ZM30	AM30	32	10 200
31 500	81 000	3 700	0,14	1020	2	ZM35	AM35	40	11 064
29 500	82 000	3 500	0,14	1016	2	ZM40	AM40	40	11 214



Angular contact ball bearing units

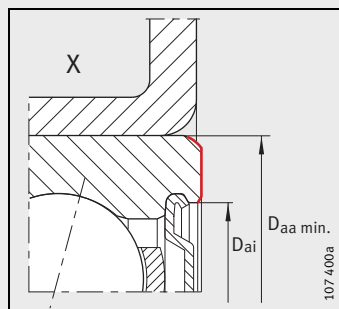
For screw mounting



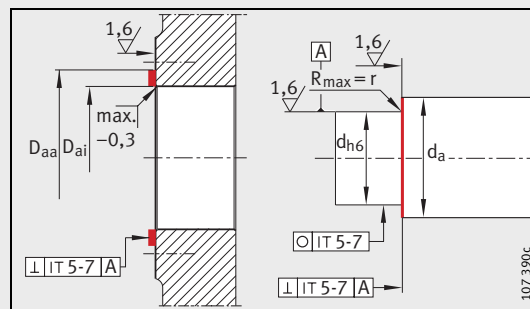
ZKLR0624-2Z, ZKLR0828-2Z

Dimension table · Dimensions in mm														
Designation	Mass m ≈ kg	Dimensions												
		d	A ₁	A ₂	D	B	d ₁	r	d ₂	b	m	n	M	H
ZKLR0624-2Z	23	6 _{-0,008}	24	35	20,5 ^{+0,03} _{-0,01}	12 _{-0,25}	10,4	0,3	4,5	6,6	26	15	32	13 _{-0,5}
ZKLR0828-2Z	30	8 _{-0,008}	28	35	23,9	14	11,8	0,3	4,5	6,6	26	20	35	15,5
ZKLR1035-2Z	50	10 _{-0,008}	35	35	28,14	16	14,7	0,3	4,5	–	26	26	–	17,5
ZKLR1244-2RS	120	12 _{-0,007}	44	50	35,45	20	16,6	0,3	6,6	–	38	32	–	22
ZKLR1547-2RS	140	15 _{-0,007}	47	51	38,45	22	18	0,3	6,6	–	39	35	–	24
ZKLR2060-2RS	300	20 _{-0,008}	60	60	50,45	28	24,4	0,3	6,6	–	47	47	–	30

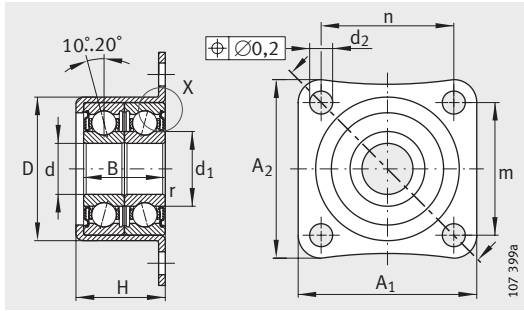
- 1) Tightening torque for the fixing screws as recommended by the manufacturer.
Screws must be ordered separately.
- 2) Mass moment of inertia for rotating inner ring.
- 3) The locknut is only used to axially locate the bearing unit.
It has no influence on the bearing preload.
- 4) Stated geometrical tolerances only required in diameter area between D_{ai} and D_{aa}.
- 5) Only valid in conjunction with INA precision locknuts.



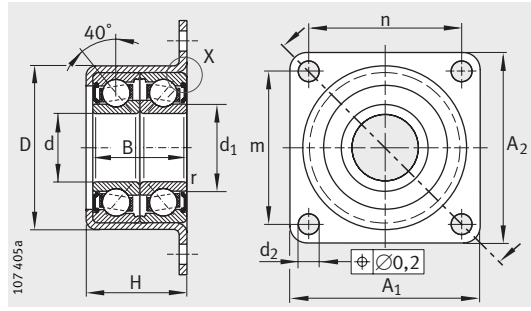
Axial abutment area of outer ring



Design of adjacent construction⁴⁾



ZKLR1035-2Z



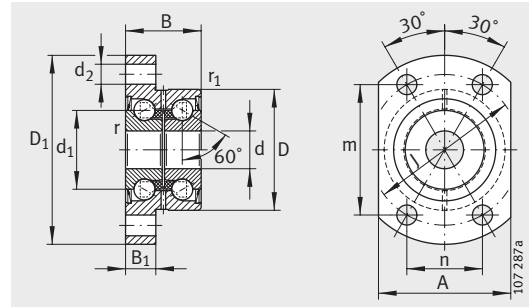
ZKLR1244-2RS, ZKLR1547-2RS, ZKLR2060-2RS

			Fixing screws DIN 912 ¹⁾		Basic load ratings				Bearing frictional torque	Rigidity axial	Mass moment of inertia ²⁾	Recommended INA locknut; to be ordered separately ³⁾	
					radial		axial					Designation	Tightening torque ⁵⁾
d _a	D _{ai}	D _{aa}	Size	Quan- tity	dyn. C _r	stat. C _{0r}	dyn. C _a	stat. C _{0a}	M _{RL}	c _{aL}	M _m			M_{A}
		min.			N	N	N	N	Nm	N/μm	kg · cm ²	Nm	
8	16	19	M4 M6	4 2	3 850	1 870	1 340	1 250	0,04	17	0,0014	ZM06	2
10,4	18	22	M4 M6	4 2	4 900	2 280	1 810	1 520	0,08	20	0,0028	ZM08	4
12,4	22	26	M4	4	7 400	3 600	2 550	2 420	0,12	26	0,0075	ZM10	6
14	27	32	M6	4	13 600	8 500	13 200	17 900	0,16	200	0,0102	ZM12	8
17,5	29	35	M6	4	16 700	10 700	16 400	22 400	0,2	130	0,0178	ZM15	10
24	39	47	M6	4	28 000	19 100	27 500	40 000	0,3	250	0,263	ZM20	18



Double row axial angular contact ball bearings with flange

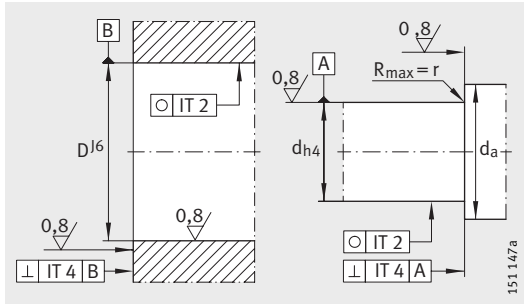
For screw mounting



ZKLFA..-2RS, ZKLFA..-2Z

Dimension table · Dimensions in mm																
Designation	Mass m ≈kg	Dimensions													Mounting dimensions	
		d	D	B	d ₁	D ₁	r	r ₁	B ₁	d ₂	m	J	n	A	d _a	
		-0,005	-0,01	-0,25			min.	min.								min.	max.
ZKLFA0630-2Z	0,05	6	19	12	12	30	0,3	0,3	5	3,5	21	24	12	22	9	15
ZKLFA0640-2RS	0,08	6	24	15	14	40	0,3	0,6	6	4,5	27,5	32	16	27	9	18
ZKLFA0640-2Z	0,08	6	24	15	14	40	0,3	0,6	6	4,5	27,5	32	16	27	9	18
ZKLFA0850-2RS	0,17	8	32	20	19	50	0,3	0,6	8	5,5	34,5	40	20	35	11	25
ZKLFA0850-2Z	0,17	8	32	20	19	50	0,3	0,6	8	5,5	34,5	40	20	35	11	25
ZKLFA1050-2RS	0,18	10	32	20	21	50	0,3	0,6	8	5,5	34,5	40	20	35	14	27
ZKLFA1050-2Z	0,18	10	32	20	21	50	0,3	0,6	8	5,5	34,5	40	20	35	14	27
ZKLFA1263-2RS	0,3	12	42	25	25	63	0,3	0,6	10	6,8	46	53	26,5	45	16	31
ZKLFA1263-2Z	0,3	12	42	25	25	63	0,3	0,6	10	6,8	46	53	26,5	45	16	31
ZKLFA1563-2RS	0,31	15	42	25	28	63	0,3	0,6	10	6,8	46	53	26,5	45	20	34
ZKLFA1563-2Z	0,31	15	42	25	28	63	0,3	0,6	10	6,8	46	53	26,5	45	20	34

- 1) Tightening torque for the fixing screws as recommended by the manufacturer. Screws must be ordered separately.
- 2) Mass moment of inertia for rotating inner ring.
- 3) Only valid in conjunction with INA precision locknuts.



Design of adjacent construction

Fixing screws ¹⁾ DIN 912-10.9		Basic load ratings axial		Limiting speed n_G grease min^{-1}	Bearing frictional torque M_{RL} Nm	Rigidity axial c_{aL} $\text{N}/\mu\text{m}$	Tilting rigidity c_{kL} Nm/mrad	Mass moment of inertia ²⁾ M_m $\text{kg} \cdot \text{cm}^2$	Axial runout μm	Recommended INA locknut; to be ordered separately		
		dyn. C_a N	stat. C_{0a} N							Designation	Tightening torque ³⁾ M_A Nm	Axial pre-load force N
M3	4	4 900	6 100	14 000	0,01	150	4	0,0019	2	ZM06 –	2	916
M4	4	6 900	8 500	6 800	0,04	200	8	0,0044	2	ZM06 –	2	2 404
M4	4	6 900	8 500	12 000	0,02	200	8	0,0044	2	ZM06 –	2	2 404
M5	4	12 500	16 300	5 100	0,08	250	20	0,02	2	ZM08 –	4	2 216
M5	4	12 500	16 300	9 500	0,04	250	20	0,02	2	ZM08 –	4	2 216
M5	4	13 400	18 800	4 600	0,12	325	25	0,029	2	ZM10 –	6	4 891
M5	4	13 400	18 800	8 600	0,06	325	25	0,029	2	ZM10 –	6	4 891
M6	4	16 900	24 700	3 800	0,16	375	50	0,068	2	ZM12 –	8	5 038
M6	4	16 900	24 700	7 600	0,08	375	50	0,068	2	ZM12 –	8	5 038
M6	4	17 600	28 000	3 500	0,2	400	65	0,102	2	ZM15 AM15	10	5 484
M6	4	17 900	28 000	7 000	0,1	400	65	0,102	2	ZM15 AM15	10	5 484

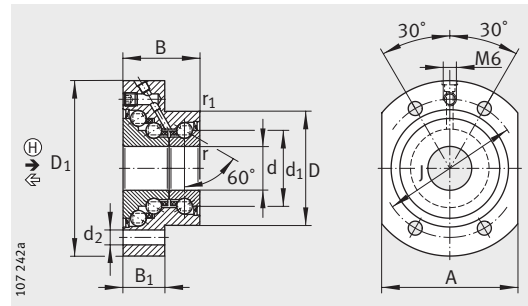


Triple row axial angular contact ball bearings with flange

For screw mounting

Caution!

The bearings require continuous load in the main load direction \oplus .



DKLFA...-2RS ($d \leq 20$ mm)

Dimension table · Dimensions in mm														
Designation	Mass m ≈kg	Dimensions											Mounting dimensions	
		d	D	B	d ₁	D ₁	r	r ₁	B ₁	d ₂	J	A	d _a	
		-0,010	-0,013	-0,25			min.	min.					min.	max.
DKLFA1575-2RS	0,53	15	45	32	28	75	0,3	0,6	18	6,8	58	55	20	35
DKLFA2080-2RS	0,7	20	52	35	34,5	80	0,3	0,6	19	6,8	63	62	25	43
DKLFA2590-2RS	0,9	25	57	38	40,5	90	0,3	0,6	22	8,8	75	70	32	48
DKLFA30100-2RS	1	30	62	38	45,5	100	0,3	0,6	22	8,8	80	72	40	53
DKLFA30110-2RS ³⁾	2,5	30	75	56	51	110	0,3	0,6	35	8,8	95	85	47	64
DKLFA40115-2RS	1,5	40	72	42	58	115	0,3	0,6	23	8,8	94	90	50	67
DKLFA40140-2RS ³⁾	4,2	40	90	60	65	140	0,3	0,6	35	11	118	110	56	80

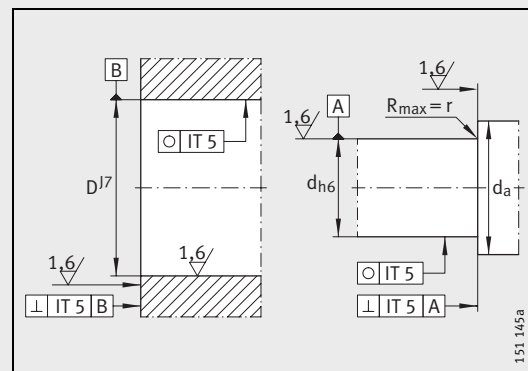
1) Tightening torque for the fixing screws as recommended by the manufacturer. Screws must be ordered separately.

2) Mass moment of inertia for rotating inner ring.

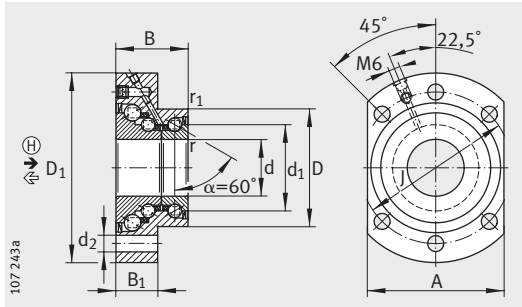
3) Heavy series.

INA locknuts (accessories)

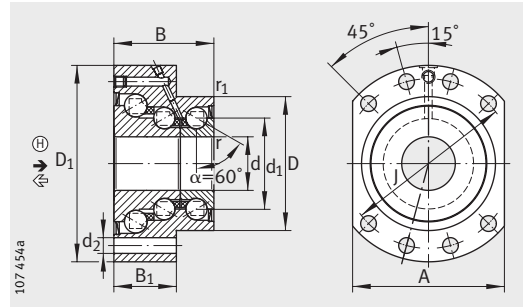
Triple row angular contact ball bearing Designation	Recommended INA locknut; to be ordered separately Designation		
	①	②	
DKLFA1575-2RS	AM15	ZMA15/33	ZM17
DKLFA2080-2RS	AM20	ZMA20/38	ZM25
DKLFA2590-2RS	AM25	ZMA25/45	AM30
DKLFA30100-2RS	AM30	ZMA30/52	ZM35
DKLFA30110-2RS	AM30/65	-	ZM35
DKLFA40115-2RS	AM40	ZMA40/62	ZM45
DKLFA40140-2RS	AM40/85	-	ZM45



Design of adjacent construction

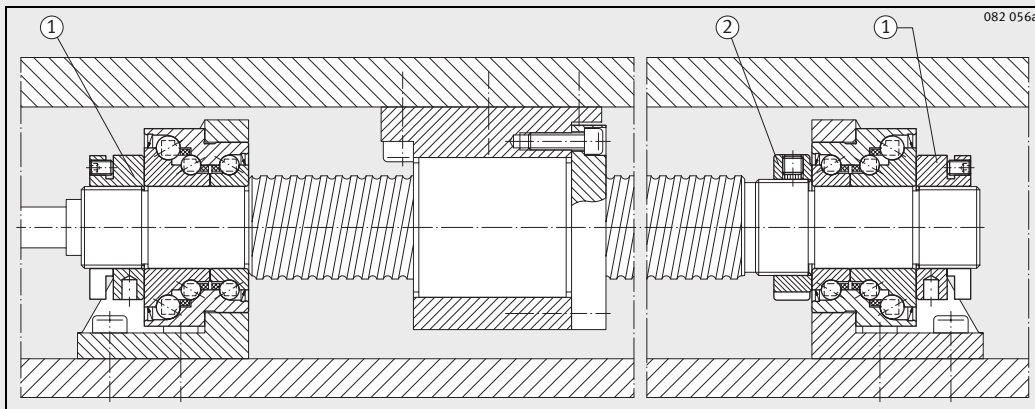


DKLFA..-2RS (d ≥ 25 mm)



DKLFA..-2RS
Heavy series

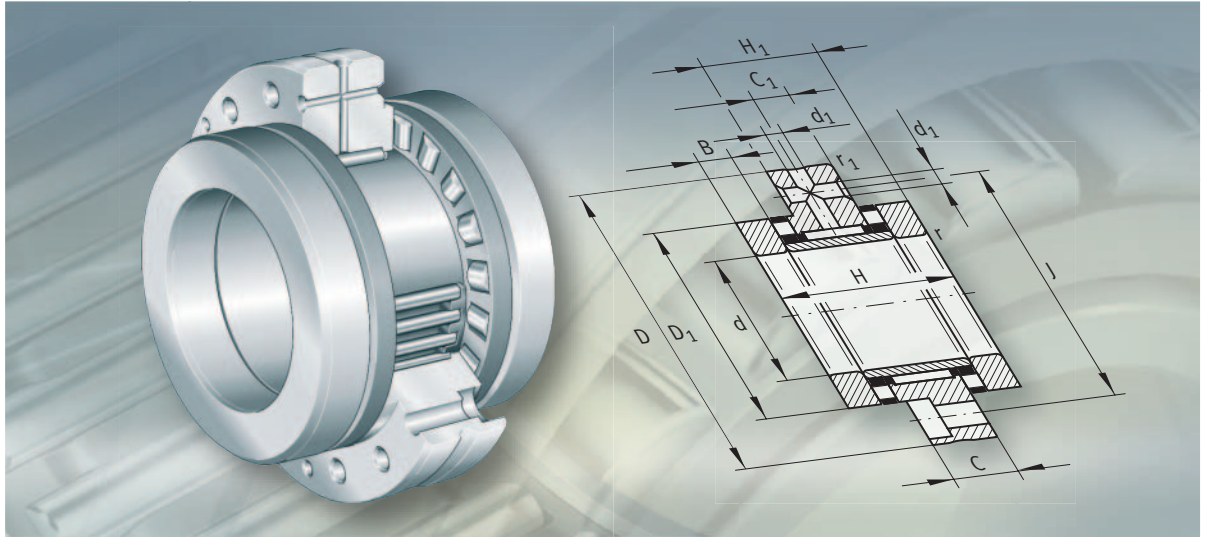
Fixing screws ¹⁾ DIN 912-10.9		Basic load ratings				Limiting speed	Bearing frictional torque	Rigidity	Rigidity	Tilting rigidity	Mass moment of inertia ²⁾	Axial runout
		axial ⇐		axial ⇨								
		dyn. C _a	stat. C _{0a}	dyn. C _a	stat. C _{0a}							
Size	Quan- tity	N	N	N	N	n _G grease min ⁻¹	M _{RL} Nm	c _{aL} N/μm	c _{aL} N/μm	c _{kL} Nm/ mrad	M _m kg · cm ²	μm
M6	4	17 900	28 000	37 000	83 000	2600	0,35	500	950	140	0,278	5
M6	4	26 000	47 000	44 500	110 000	2200	0,45	750	1 100	260	0,553	5
M8	6	27 500	55 000	52 000	144 000	2000	0,6	850	1 200	370	1,12	5
M8	6	29 000	64 000	55 000	165 000	1800	0,75	900	1 400	500	1,7	5
M8	8	59 000	108 000	106 000	250 000	1 600	1,5	1 300	1 600	650	3,23	5
M8	6	43 000	101 000	73 000	227 000	1 500	1	1 100	1 700	1 000	4,23	5
M10	8	72 000	149 000	126 000	363 000	1 200	2,5	1 800	2 000	1 370	9,32	5



Ball screw drive spindle with locating bearing arrangement on both sides
For meaning of circled numbers, see accessories table, page 948



FAG



**Needle roller/
axial cylindrical roller bearings**

Needle roller/ axial cylindrical roller bearings

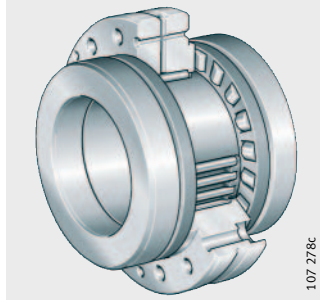
		Page
Product overview	Needle roller/axial cylindrical roller bearings.....	952
Features	Needle roller/axial cylindrical roller bearings, for screw mounting.....	953
	Needle roller/axial cylindrical roller bearings, not for screw mounting.....	954
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Design and safety guidelines	Basic rating life	955
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	Needle roller/axial cylindrical roller bearings, light series	968
	Needle roller/axial cylindrical roller bearings, heavy series	972



Product overview Needle roller/ axial cylindrical roller bearings

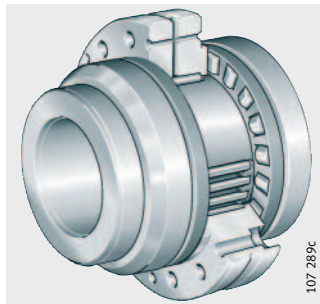
For screw mounting

ZARF



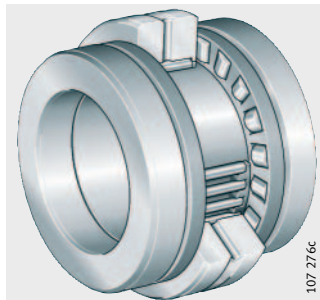
With extended
shaft locating washer

ZARF..-L



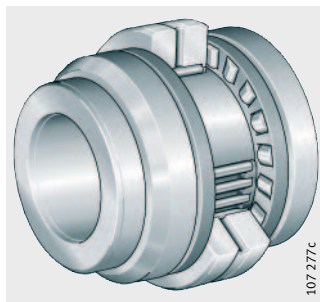
Not for screw mounting

ZARN



With extended
shaft locating washer

ZARN..-L



Needle roller/ axial cylindrical roller bearings

Features Needle roller/axial cylindrical roller bearings comprise an outer ring with radial and axial raceways, two shaft locating washers, an inner ring, a radial needle roller and cage assembly and two axial cylindrical roller and cage assemblies. The bearings are available in versions for screw mounting and not for screw mounting.

Radial and axial load carrying capacity In addition to radial forces, the bearings can also support axial forces from both directions and tilting moments.

Preload/internal clearance The outer ring, inner ring and axial cages are matched to each other such that the bearing is axially clearance-free after preloading by means of an INA precision locknut. The radial internal clearance is C2 according to DIN 620.

Needle roller/axial cylindrical roller bearings, for screw mounting Needle roller/axial cylindrical roller bearings ZARF(L) have holes in the outer ring. These are used for screw mounting directly on the adjacent construction or in a radial locating bore, *Figure 1*.

Due to screw mounting of the outer ring, the cover that would otherwise be required and the matching work can therefore be dispensed with.

The bearings are preloaded against the shaft shoulder by means of a precision locknut AM or ZM(A).

With seal carrier assembly In the interests of a simpler design, a seal carrier assembly DRS, *Figure 1*, ①, is recommended. The seal carrier assembly is centred on the outer ring and seals the bearing against outside influences.



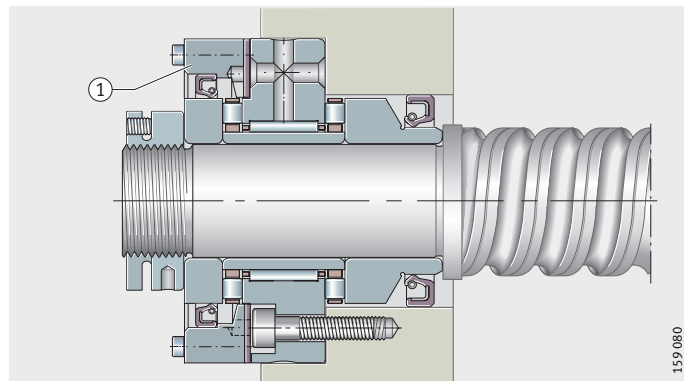
① Seal carrier assembly DRS

ZARF.-L

Figure 1

With DRS

Outer ring screw mounted in bore,
preloaded using locknut.
Stepped shaft locating washer
with sealing ring



With extended shaft locating washer

ZARF.-L has an extended and stepped shaft locating washer, *Figure 1*. These series are used in preference where the shaft locating washers are not adequately supported axially by the shaft shoulder or the bearing unit cannot be sealed on the outside surface of the normal shaft locating washer due to space conditions in the adjacent construction.

Heavy series

ZARF(L) is also available in a heavy series.

The heavy series has a larger cross-section for the same shaft diameter and therefore higher basic load ratings.

Needle roller/ axial cylindrical roller bearings

Needle roller/axial cylindrical roller bearings, not for screw mounting

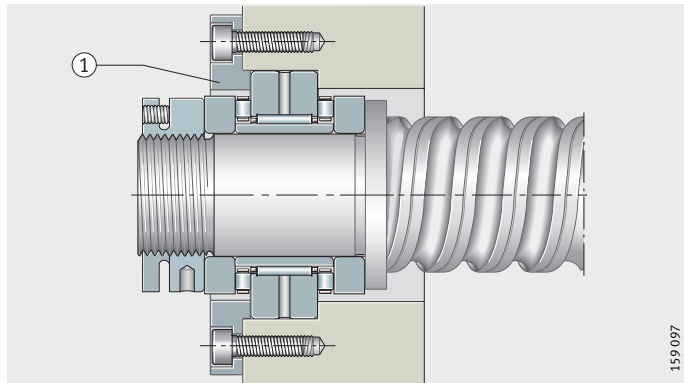
Series ZARN(L) is mounted in a housing bore and the outer ring is located using a cover, *Figure 2*.

The bearings are preloaded against the shaft shoulder by means of a precision locknut AM or ZM(A).

① Cover
ZARN

Figure 2

Outer ring located using cover,
preloaded using locknut



159 097

With extended shaft locating washer

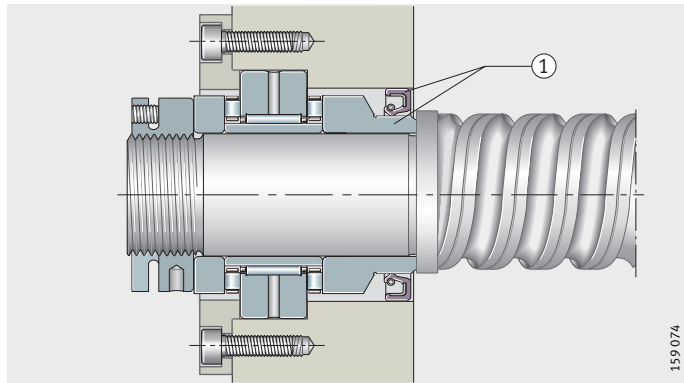
ZARN..-L has an extended and stepped shaft locating washer, *Figure 3*.

This series is used in preference where the shaft locating washer is not adequately supported axially by the shaft shoulder or the bearing unit cannot be sealed on the outside surface of the normal shaft locating washer due to space conditions in the adjacent construction.

① Extended,
stepped shaft locating washer with seal
ZARN..-L

Figure 3

Outer ring located using cover,
preloaded using locknut.
Stepped shaft locating washer
with sealing ring



159 074

Heavy series

ZARN(L) is also available in a heavy series.

The heavy series has a larger cross-section for the same shaft diameter and therefore higher basic load ratings.

Operating temperature

The bearings are suitable for operating temperatures from -30 °C to $+120\text{ °C}$.

Suffixes

Suffixes for the available designs: see table.

Available designs

Suffix	Description
L	Extended, stepped shaft locating washer
TV	Cages made from glass fibre reinforced polyamide 66

Design and safety guidelines

Basic rating life

The decisive factors in determining the bearing size are the basic rating life, the static load safety factor and the axial limiting load. The basic rating life L and L_h are calculated as follows:

$$L = \left(\frac{C}{P}\right)^p$$

$$L_h = \frac{16666}{n} \cdot \left(\frac{C}{P}\right)^p$$

L	10^6 revolutions
	Basic rating life in millions of revolutions
L_h	h
	Basic rating life in operating hours
C_r, C_a	N
	Basic dynamic radial or axial load rating according to dimension table
P	N
	Equivalent dynamic bearing load
p	–
	Life exponent $p = 10/3$
n	min^{-1}
	Operating speed.

Resultant and equivalent bearing load

The resultant axial bearing load $F_{a \text{ res}}$ is determined from the axial operating load F_{aB} and taking account of the axial preload, *Figure 4* to *Figure 6*, page 956.

Under purely axial load, $P = F_{a \text{ res}}$. If additional radial operating loads are present, these must be calculated separately using the radial basic load ratings.

The limit values up to which the axial load can be supported clearance-free are shown, *Figure 4* to *Figure 6*.

Caution! A load in excess of the limit value will lead to the rolling element row without load lifting off the raceway. As a result, higher wear will occur under rapid acceleration. For extreme moment loads and statically overdefined systems (locating/locating bearing arrangements), please contact us. The calculation program BEARINX® can give a precise design in this case.

Load varying in steps

If the load values vary in steps, the equivalent load P and speed n are calculated using the following formulae (q = time duration %):

$$P = \sqrt[p]{\frac{q_1 \cdot n_1 \cdot P_1^p + \dots + q_z \cdot n_z \cdot P_z^p}{q_1 \cdot n_1 + \dots + q_z \cdot n_z}}$$

$$n = \frac{q_1 \cdot n_1 + \dots + q_z \cdot n_z}{100}$$

Static load safety factor

The static load safety factor S_0 is calculated using the following formula (see also page 911):

$$S_0 = \frac{C_0}{P_0}$$

Caution! In machine tools, S_0 should be ≥ 4 .

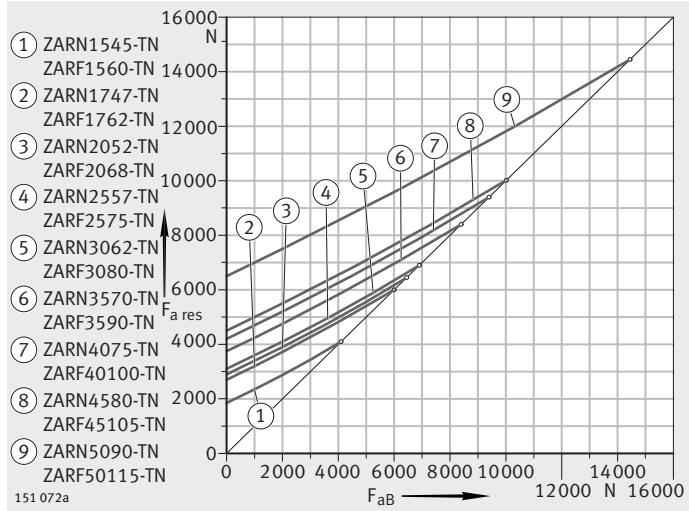


Needle roller/ axial cylindrical roller bearings

Resultant bearing load – diagrams

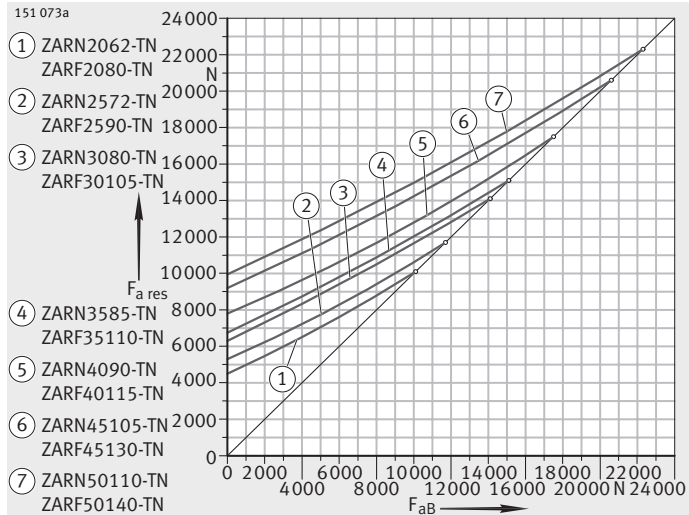
F_{aB} = operating load
 $F_{a\text{ res}}$ = resultant bearing load
 ° = limit value

Figure 4
 Resultant bearing load
 ZARN, ZARF, heavy series



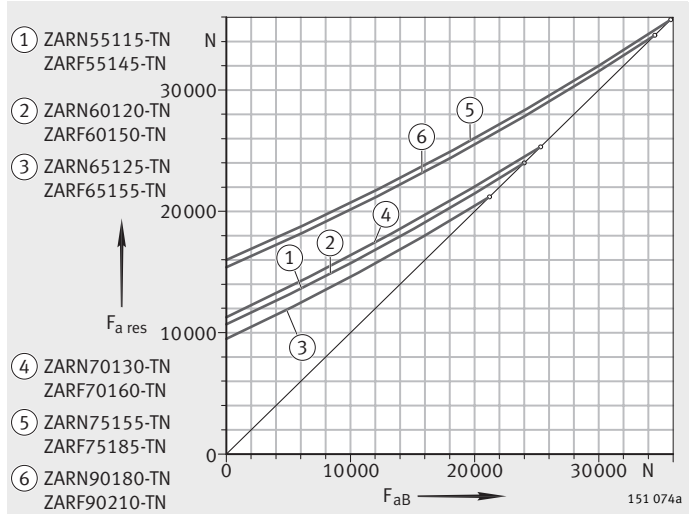
F_{aB} = operating load
 $F_{a\text{ res}}$ = resultant bearing load
 ° = limit value

Figure 5
 Resultant bearing load
 ZARN, ZARF,
 heavy series up to $d = 50$ mm



F_{aB} = operating load
 $F_{a\text{ res}}$ = resultant bearing load
 ° = limit value

Figure 6
 Resultant bearing load
 ZARN, ZARF,
 heavy series from $d = 55$ mm



Design of adjacent construction

The adjacent construction (the shaft and housing) must be designed in accordance with the data in the dimension tables.

The abutment diameters for the shaft and housing shoulders d_a and D_a must be in accordance with the dimension tables.

Caution! The permissible contact pressure for the adjacent construction must be observed.

Examples of possible lubricant feeds: see *Figure 7* and *Figure 8*, page 958.

Sealing of the bearing position

The bearings are sealed, *Figure 1*, page 953:

- in the direction of the spindle by a rotary shaft seal on the outside surface machined free from spiral marks of the extended shaft locating washer (ZARN...L, ZARF...L)
- in the direction of the drive by the seal carrier assembly DRS.

Speeds

The limiting speeds n_G given in the dimension tables are based on the following conditions:

- bearing preloaded, no external operating load
- operating duration 25%
- max. equilibrium temperature +50 °C.

Caution! The limiting speeds n_G are valid for oil lubrication with adequate cooling.

Friction

In most applications, preloading of bearings by means of the locknut tightening torque gives sufficiently accurate setting values.

The reference here is the tightening torque M_A according to the dimension tables in conjunction with an INA precision locknut.

The frictional torque M_{RL} given in the dimension tables is a guide value. It is based on lightly oiled bearings, measured at a speed of $n = 5 \text{ min}^{-1}$.

For dimensioning of the drive, the starting frictional torque and the frictional torque at high speeds of 2 to $3 \times M_{RL}$ must be taken into consideration.



Frictional torque and bearing preload

For applications in which the frictional torque is decisive (e.g. temperature development, frictional torque compensation between different bearing positions, etc.), it is recommended that the bearing preload should be set in accordance with the bearing frictional torque M_{RL} .

Frictional energy

The frictional energy N_R of the bearings can be calculated as follows:

$$N_R = \frac{M_{RL} \cdot n}{9,55}$$

N_R	W
Frictional energy	
M_{RL}	Nm
Bearing frictional torque	
n	min^{-1}
Operating speed.	

In any analysis of the thermal balance, the various operating speeds n_i must be taken into consideration with their time durations q_i .

Needle roller/ axial cylindrical roller bearings

Lubrication Needle roller/axial cylindrical roller bearings can be relubricated via the outer ring. They are supplied with oil-based or dry preservative and should preferably be lubricated with oil.

Good results have been obtained with oils CLP to DIN 51 517 and HLP to DIN 51 524 of classes ISO VG 32 to ISO VG 100.

Relubrication for grease lubrication Relubrication should be carried out with the bearing rotating and still warm from operation in order to achieve good replacement and distribution of grease.

The relubrication interval and quantity can only be determined under operating conditions since it is not possible to calculate all the influences in advance. Relubrication: see Fitting and Maintenance Manual TPI 100.

Caution! Where a vertical axis of rotation is used in conjunction with automatic lubrication systems, the lubrication impulse should be selected such that the supply to the upper axial bearing is sufficient.

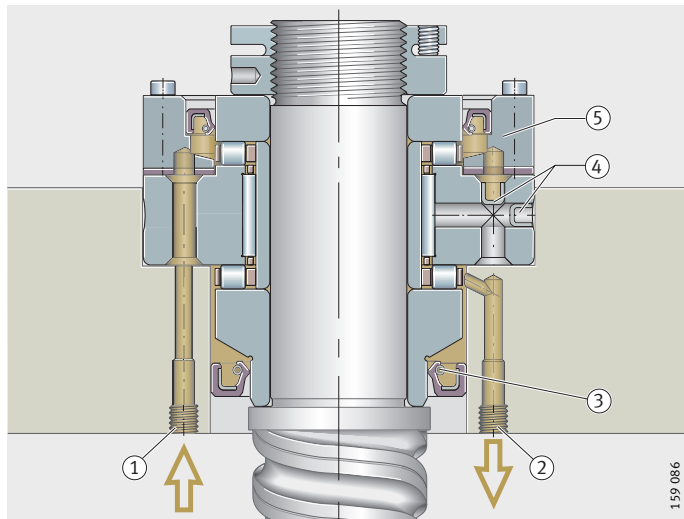
Lubricant feed Examples of lubricant feeds for ZARF(L) are shown in *Figure 7*, *Figure 8*.

Caution! Before initial operation, it must be ensured that all raceways are adequately supplied with lubricant.

- ① Oil inlet
- ② Oil outlet
- ③ Rotary shaft seal
- ④ Cover
- ⑤ Seal carrier assembly

ZARF.-L

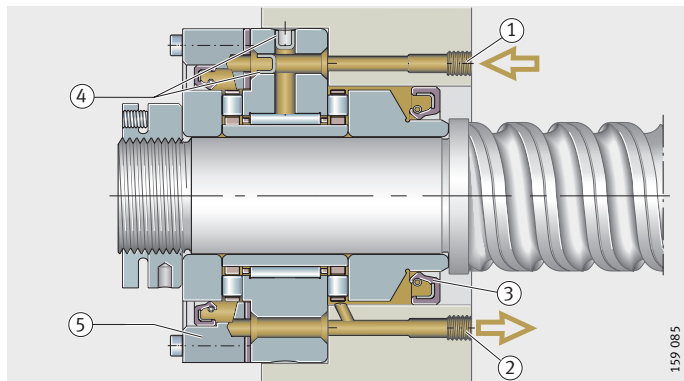
Figure 7
Lubricant feed for vertical mounting position



- ① Oil inlet
- ② Oil outlet
- ③ Rotary shaft seal
- ④ Cover
- ⑤ Seal carrier assembly

ZARF.-L

Figure 8
Lubricant feed for horizontal mounting position



Mounting guidelines

Caution!

Bearings should only be fitted and dismantled in accordance with Fitting and Maintenance Manual TPI 100. This TPI is available upon request.

During fitting of bearings, mounting forces should be applied only to the bearing ring to be fitted. Mounting forces must never be directed through the rolling elements.

The characteristics of the bearings are only valid when used in combination with INA precision locknuts and the associated tightening torques given in the dimension tables.

ZARN and ZARF are not self-retaining. The individual bearing components are matched to each other. The individual parts of different bearings must not be interchanged during fitting.

Setting the axial preload

Caution!

The preload in the axial component of ZARF (L) bearings is decisive for the function. It must therefore be set with sufficient accuracy.

Since direct force measurement of these values in fitting is not cost-effective, the axial preload is set indirectly using the following methods:

- either by means of the tightening torque M_A of the precision locknut. The frictional torque may deviate from the value given in the dimension table
- or by means of the bearing frictional torque M_{RL} .

Preloading by locknut

Needle roller/axial cylindrical roller bearings must be axially preloaded during fitting by means of a precision locknut.

When preloading the bearing unit by means of the bearing inner rings using the recommended precision locknut, the tightening torques given in the dimension tables must be observed or the preload must be set using the bearing frictional torque given in the dimension tables. The tightening torques given for the individual bearing sizes are only valid for the INA precision locknuts listed.

In order to counteract settling, it is recommended that the locknut should initially be tightened to twice the tightening torque M_A and then relieved of load again. It should only then be tightened again to the stated tightening torque M_A . Finally, the precision locknut should be secured against rotation by the torque-controlled tightening of the set screws.

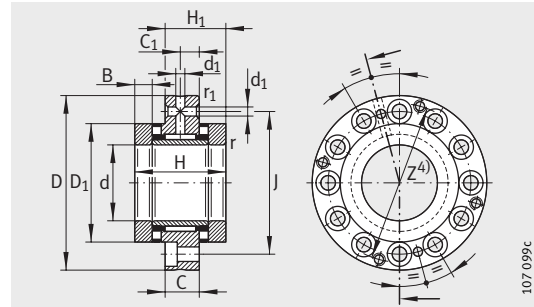
Fixing screws

The fixing screws for the outer ring must be tightened in a crosswise sequence. They may be loaded up to 70% of their elastic limit. If the bearing outer ring is supported by an additional housing cover, it must be ensured that the fixing screws are sufficiently well dimensioned.



Needle roller/ axial cylindrical roller bearings

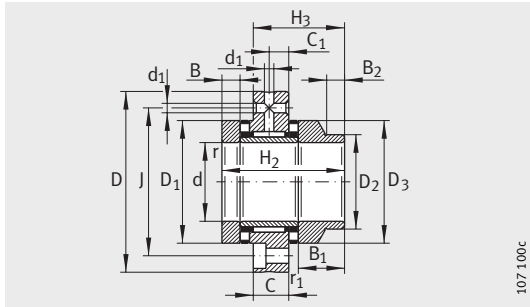
Light series
For screw mounting



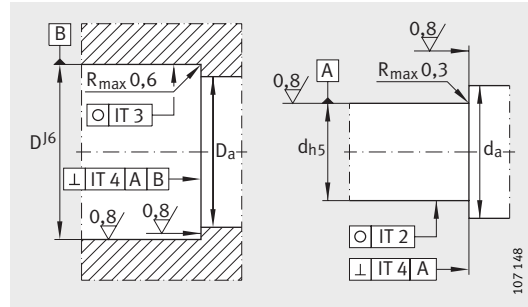
ZARF

Dimension table · Dimensions in mm																			
Designation	Mass m ≈kg	Dimensions																	
		d	D	H	H ₁	H ₂	H ₃	C	C ₁	D ₁	D ₂	D ₃	B	B ₁	B ₂	r	r ₁	d ₁	J
ZARF1560-TV	0,42	15	60	40	26	–	–	14	8	35	–	–	7,5	–	–	0,3	0,6	3,2	46
ZARF1560-L-TV	0,45	15	60	–	–	53	39	14	8	35	24	34	7,5	20,5	11	0,3	0,6	3,2	46
ZARF1762-TV	0,49	17	62	43	27,5	–	–	14	8	38	–	–	9	–	–	0,3	0,6	3,2	48
ZARF1762-L-TV	0,52	17	62	–	–	57	41,5	14	8	38	28	38	9	23	11	0,3	0,6	3,2	48
ZARF2068-TV	0,56	20	68	46	29	–	–	14	8	42	–	–	10	–	–	0,3	0,6	3,2	53
ZARF2068-L-TV	0,61	20	68	–	–	60	43	14	8	42	30	40	10	24	11	0,3	0,6	3,2	53
ZARF2575-TV	0,78	25	75	50	33	–	–	18	10	47	–	–	10	–	–	0,3	0,6	3,2	58
ZARF2575-L-TV	0,84	25	75	–	–	65	48	18	10	47	36	45	10	25	11	0,3	0,6	3,2	58
ZARF3080-TV	0,85	30	80	50	33	–	–	18	10	52	–	–	10	–	–	0,3	0,6	3,2	63
ZARF3080-L-TV	0,9	30	80	–	–	65	48	18	10	52	40	50	10	25	11	0,3	0,6	3,2	63

- 1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.
- 2) Tightening torque of fixing screws according to manufacturer's data.
Screws are not included in the delivery.
- 3) Mass moment of inertia for rotating inner ring.
- 4) Mounting dimension for seal carrier assembly DRS.
Seal carrier assemblies: see page 979 and page 983.
- 5) Only valid in conjunction with INA precision locknuts.



ZARF.-L



Design of adjacent construction

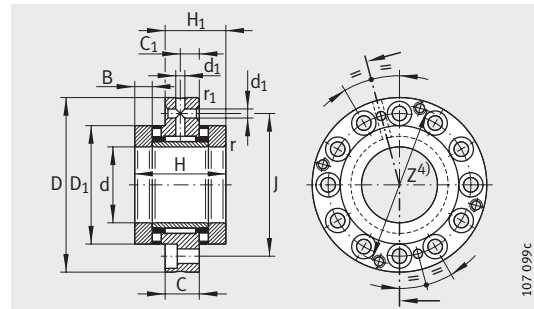
Mounting dimensions ¹⁾		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia ³⁾	Axial runout
		axial		radial								
D _a	d _a	dyn. C _a	stat. C _{0a}	dyn. C _r	stat. C _{0r}	n _G oil	n _G grease	M _{RL}	c _{aL}	c _{kL}	M _m	
max.	min.	N	N	N	N	min ⁻¹	min ⁻¹	Nm	N/μm	Nm/mrad	kg · cm ²	μm
36	28	24 900	53 000	13 000	17 500	8 500	2 200	0,35	1 400	110	0,24	1
36	22	24 900	53 000	13 000	17 500	8 500	2 200	0,35	1 400	110	0,274	1
39	28	26 000	57 000	14 000	19 900	7 800	2 100	0,4	1 600	160	0,373	1
39	26	26 000	57 000	14 000	19 900	7 800	2 100	0,4	1 600	160	0,464	1
43	33	33 500	76 000	14 900	22 400	7 000	2 000	0,5	1 800	230	0,615	1
43	28	33 500	76 000	14 900	22 400	7 000	2 000	0,5	1 800	230	0,683	1
48	39	35 500	86 000	22 600	36 000	6 000	1 900	0,55	1 900	350	0,989	1
48	34	35 500	86 000	22 600	36 000	6 000	1 900	0,55	1 900	350	1,15	1
53	44	39 000	101 000	24 300	41 500	5 500	1 800	0,65	2 200	520	1,46	1
53	38	39 000	101 000	24 300	41 500	5 500	1 800	0,65	2 200	520	1,7	1



Designation	Recommended INA locknut; to be ordered separately			Rotary shaft seal to DIN 3 760; to be ordered separately	Fixing screws ²⁾ DIN 912-10.9	
	Designation	Tightening torque ⁵⁾	Axial preload force		Size	Quantity
		M _A Nm	N			
ZARF1560-TV	ZMA15/33 AM15	10	6 506	–	M6	6
ZARF1560-L-TV	ZMA15/33 AM15	10	6 506	24X35X7	M6	6
ZARF1762-TV	ZM17 AM17	12	7 078	–	M6	6
ZARF1762-L-TV	ZM17 AM17	12	7 078	28X40X7	M6	6
ZARF2068-TV	ZMA20/38 AM20	18	9 376	–	M6	8
ZARF2068-L-TV	ZMA20/38 AM20	18	9 376	30X42X7	M6	8
ZARF2575-TV	ZMA25/45 AM25	25	10 470	–	M6	8
ZARF2575-L-TV	ZMA25/45 AM25	25	10 470	36X47X7	M6	8
ZARF3080-TV	ZMA30/52 AM30	32	11 091	–	M6	12
ZARF3080-L-TV	ZMA30/52 AM30	32	11 091	40X52X7	M6	12

Needle roller/ axial cylindrical roller bearings

Light series
For screw mounting



ZARF

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions																	
		d	D	H	H ₁	H ₂	H ₃	C	C ₁	D ₁	D ₂	D ₃	B	B ₁	B ₂	r	r ₁	d ₁	J
ZARF3590-TV	1,12	35	90	54	35	–	–	18	10	60	–	–	11	–	–	0,3	0,6	3,2	73
ZARF3590-L-TV	1,25	35	90	–	–	70	51	18	10	60	45	58	11	27	12	0,3	0,6	3,2	73
ZARF40100-TV	1,35	40	100	54	35	–	–	18	10	65	–	–	11	–	–	0,3	0,6	3,2	80
ZARF40100-L-TV	1,45	40	100	–	–	70	51	18	10	65	50	63	11	27	12	0,3	0,6	3,2	80
ZARF45105-TV	1,7	45	105	60	40	–	–	22,5	12,5	70	–	–	11,5	–	–	0,3	0,6	6	85
ZARF45105-L-TV	1,85	45	105	–	–	75	55	22,5	12,5	70	56	68	11,5	26,5	12	0,3	0,6	6	85
ZARF50115-TV	2,1	50	115	60	40	–	–	22,5	12,5	78	–	–	11,5	–	–	0,3	0,6	6	94
ZARF50115-L-TV	2,45	50	115	–	–	78	58	22,5	12,5	78	60	78	11,5	29,5	12	0,3	0,6	6	94

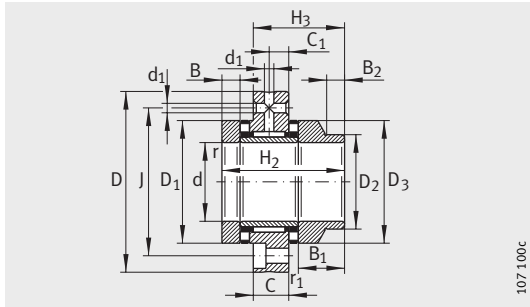
1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.

2) Tightening torque of fixing screws according to manufacturer's data.
Screws are not included in the delivery.

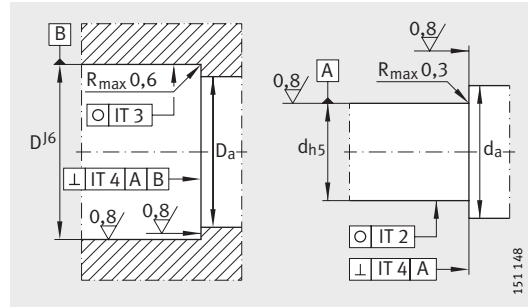
3) Mass moment of inertia for rotating inner ring.

4) Mounting dimension for seal carrier assembly DRS.
Seal carrier assemblies: see page 979 and page 983.

5) Only valid in conjunction with INA precision locknuts.



ZARF.-L



Design of adjacent construction

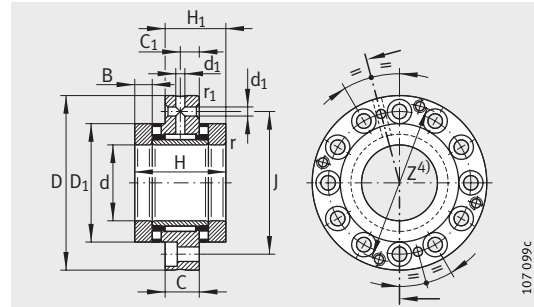
Mounting dimensions ¹⁾		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia ³⁾	Axial runout
		axial		radial								
D _a	d _a	dyn. C _a	stat. C _{0a}	dyn. C _r	stat. C _{0r}	n _G oil	n _G grease	M _{RL}	c _{aL}	c _{kL}	M _m	
max.	min.	N	N	N	N	min ⁻¹	min ⁻¹	Nm	N/μm	Nm/mrad	kg · cm ²	μm
61	50	56 000	148 000	26 000	47 000	4 800	1 700	0,9	2 600	740	2,8	1
61	43	56 000	148 000	26 000	47 000	4 800	1 700	0,9	2 600	740	3,21	1
66	55	59 000	163 000	27 500	53 000	4 400	1 600	1	2 800	1 030	3,78	1
66	48	59 000	163 000	27 500	53 000	4 400	1 600	1	2 800	1 030	4,35	1
71	60	61 000	177 000	38 000	74 000	4 000	1 500	1,2	3 000	1 340	5,33	1
71	54	61 000	177 000	38 000	74 000	4 000	1 500	1,2	3 000	1 340	6,03	1
79	67	90 000	300 000	40 000	82 000	3 600	1 200	2,2	4 800	2 470	8,42	1
79	58	90 000	300 000	40 000	82 000	3 600	1 200	2,2	4 800	2 470	10,46	1



Designation	Recommended INA locknut; to be ordered separately			Rotary shaft seal to DIN 3 760; to be ordered separately	Fixing screws ²⁾ DIN 912-10.9	
	Designation	Tightening torque ⁵⁾	Axial preload force		Size	Quantity
		M _A Nm	N			
ZARF3590-TV	ZMA35/58 AM35/58	42	12 486	–	M6	12
ZARF3590-L-TV	ZMA35/58 AM35/58	42	12 486	45X60X8	M6	12
ZARF40100-TV	ZMA40/62 AM40	55	14 240	–	M8	8
ZARF40100-L-TV	ZMA40/62 AM40	55	14 240	50X65X8	M8	8
ZARF45105-TV	ZMA45/68 AM45	65	15 765	–	M8	8
ZARF45105-L-TV	ZMA45/68 AM45	65	15 765	56X70X8	M8	8
ZARF50115-TV	ZMA50/75 AM50	85	18 410	–	M8	12
ZARF50115-L-TV	ZMA50/75 AM50	85	18 410	60X80X8	M8	12

Needle roller/ axial cylindrical roller bearings

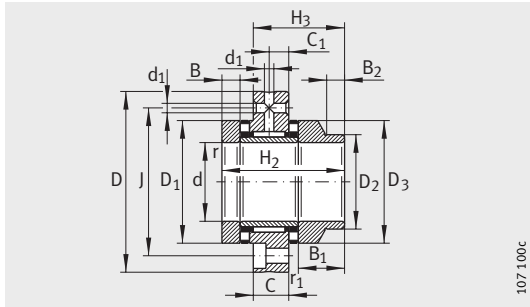
Heavy series
For screw mounting



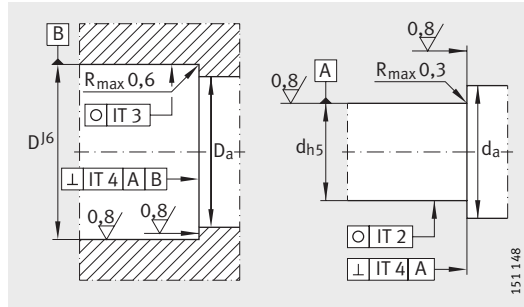
ZARF

Dimension table · Dimensions in mm																		
Designation	Mass m ≈kg	Dimensions																
		d	D	H	H ₁	H ₂	H ₃	C	C ₁	D ₁	D ₂	D ₃	B	B ₁	B ₂	r	r ₁	
																	min.	min.
ZARF2080-TV	1,1	20	80	60	38	–	–	18	10	52	–	–	12,5	–	–	0,3	0,6	
ZARF2080-L-TV	1,22	20	80	–	–	75	53	18	10	52	40	50	12,5	27,5	11	0,3	0,6	
ZARF2590-TV	1,6	25	90	60	38	–	–	18	10	62	–	–	12,5	–	–	0,3	0,6	
ZARF2590-L-TV	1,75	25	90	–	–	75	53	18	10	62	48	60	12,5	27,5	11	0,3	0,6	
ZARF30105-TV	1,95	30	105	66	41	–	–	18	10	68	–	–	14	–	–	0,3	0,6	
ZARF30105-L-TV	2,15	30	105	–	–	82	57	18	10	68	52	66	14	30	12	0,3	0,6	
ZARF35110-TV	1,6	35	110	66	41	–	–	18	10	73	–	–	14	–	–	0,3	0,6	
ZARF35110-L-TV	1,85	35	110	–	–	82	57	18	10	73	60	73	14	30	12	0,3	0,6	
ZARF40115-TV	2,7	40	115	75	47,5	–	–	22,5	12,5	78	–	–	16	–	–	0,3	0,6	
ZARF40115-L-TV	3	40	115	–	–	93	65,5	22,5	12,5	78	60	78	16	34	12	0,3	0,6	
ZARF45130-TV	3,9	45	130	82	51	–	–	22,5	12,5	90	–	–	17,5	–	–	0,3	0,6	
ZARF45130-L-TV	4,3	45	130	–	–	103	72	22,5	12,5	90	70	88	17,5	38,5	14	0,3	0,6	

- 1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.
- 2) Tightening torque of fixing screws according to manufacturer's data.
Screws are not included in the delivery.
- 3) Mass moment of inertia for rotating inner ring.
- 4) Mounting dimension for seal carrier assembly DRS.
Seal carrier assemblies: see page 979 and page 983.
- 5) Only valid in conjunction with INA precision locknuts.



ZARF.-L



Design of adjacent construction

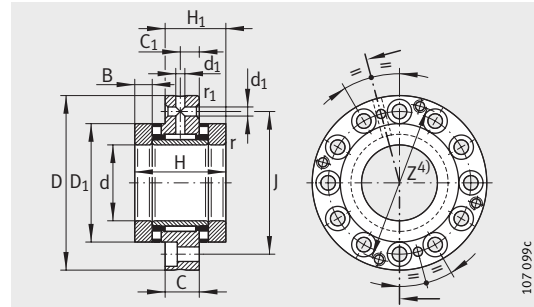
	Mounting dimensions ¹⁾		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia ³⁾	Axial runout	
			axial		radial		n_G oil	n_G grease						
d_1	J	d_a max.	d_a min.	dyn. C_a	stat. C_{0a}	dyn. C_r	stat. C_{0r}	n_G oil	n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m	μm
				N	N	N	N	min ⁻¹	min ⁻¹	Nm	N/ μm	Nm/mrad	kg · cm ²	μm
3,2	63	53	38	64 000	141 000	22 600	36 000	6 000	1 500	1,3	2 300	400	1,98	1
3,2	63	53	38	64 000	141 000	22 600	36 000	6 000	1 500	1,3	2 300	400	2,27	1
3,2	73	63	45	80 000	199 000	24 300	41 500	4 900	1 400	1,6	3 000	800	3,88	1
3,2	73	63	45	80 000	199 000	24 300	41 500	4 900	1 400	1,6	3 000	800	4,51	1
3,2	85	69	52	107 000	265 000	26 000	47 000	4 400	1 300	2,1	3 300	1 100	6,53	1
3,2	85	69	50	107 000	265 000	26 000	47 000	4 400	1 300	2,1	3 300	1 100	7,43	1
3,2	88	74	60	105 000	265 000	27 500	53 000	4 000	1 250	2,3	2 500	1 300	8,47	1
3,2	88	74	58	105 000	265 000	27 500	53 000	4 000	1 250	2,3	3 500	1 300	10,4	1
6	94	79	65	117 000	315 000	38 000	74 000	3 700	1 200	2,5	3 800	1 800	13,3	1
6	94	79	58	117 000	315 000	38 000	74 000	3 700	1 200	2,5	3 800	1 800	15,5	1
6	105	91	70	154 000	405 000	40 000	82 000	3 300	1 150	3,5	4 000	2 100	23,7	1
6	105	91	68	154 000	405 000	40 000	82 000	3 300	1 150	3,5	4 000	2 100	28,1	1



Designation	Recommended INA locknut; to be ordered separately			Rotary shaft seal to DIN 3 760; to be ordered separately	Fixing screws ²⁾ DIN 912-10.9		
	Designation	Tightening torque ⁵⁾ M_A Nm	Axial preload force N		Size	Quantity	
ZARF2080-TV	ZMA20/52	AM20	38	18 448	–	M6	12
ZARF2080-L-TV	ZMA20/52	AM20	38	18 448	40X52X7	M6	12
ZARF2590-TV	ZMA25/58	AM25	55	20 790	–	M6	12
ZARF2590-L-TV	ZMA25/58	AM25	55	20 790	48X62X8	M6	12
ZARF30105-TV	ZMA30/65	AM30	75	24 287	–	M8	12
ZARF30105-L-TV	ZMA30/65	AM30	75	24 287	52X68X8	M8	12
ZARF35110-TV	ZMA35/70	AM35	100	27 480	–	M8	12
ZARF35110-L-TV	ZMA35/70	AM35	100	27 480	60X75X8	M8	12
ZARF40115-TV	ZMA40/75	AM40	120	29 834	–	M8	12
ZARF40115-L-TV	ZMA40/75	AM40	120	29 834	60X80X8	M8	12
ZARF45130-TV	ZMA45/85	AM45	150	33 549	–	M8	12
ZARF45130-L-TV	ZMA45/85	AM45	150	33 549	70X90X10	M8	12

Needle roller/ axial cylindrical roller bearings

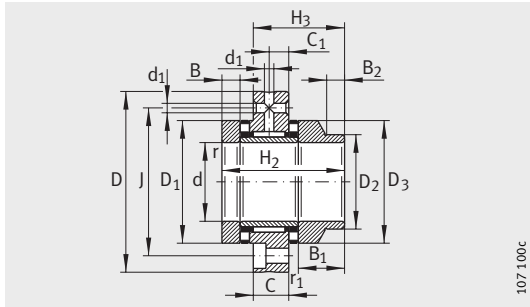
Heavy series
For screw mounting



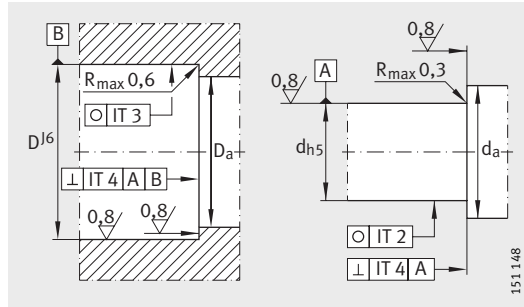
ZARF

Dimension table (continued) · Dimensions in mm																			
Designation	Mass m ≈kg	Dimensions																	
		d	D	H	H ₁	H ₂	H ₃	C	C ₁	D ₁	D ₂	D ₃	B	B ₁	B ₂	r	r ₁	d ₁	J
																	min.	min.	
ZARF50140-TV	4,2	50	140	82	51	–	–	22,5	12,5	95	–	–	17,5	–	–	0,3	0,6	6	113
ZARF50140-L-TV	4,65	50	140	–	–	103	72	22,5	12,5	95	75	93	17,5	38,5	14	0,3	0,6	6	113
ZARF55145-TV	4,5	55	145	82	51	–	–	22,5	12,5	100	–	–	17,5	–	–	0,3	0,6	6	118
ZARF55145-L-TV	5	55	145	–	–	103	72	22,5	12,5	100	80	98	17,5	38,5	14	0,3	0,6	6	118
ZARF60150-TV	4,7	60	150	82	51	–	–	22,5	12,5	105	–	–	17,5	–	–	0,3	0,6	6	123
ZARF60150-L-TV	5,35	60	150	–	–	103	72	22,5	12,5	105	90	105	17,5	38,5	16	0,3	0,6	6	123
ZARF65155-TV	5,1	65	155	82	51	–	–	22,5	12,5	110	–	–	17,5	–	–	0,3	0,6	6	128
ZARF65155-L-TV	5,7	65	155	–	–	103	72	22,5	12,5	110	90	108	17,5	38,5	16	0,3	0,6	6	128
ZARF70160-TV	5,2	70	160	82	51	–	–	22,5	12,5	115	–	–	17,5	–	–	0,3	0,6	6	133
ZARF70160-L-TV	5,95	70	160	–	–	103	72	22,5	12,5	115	100	115	17,5	38,5	16	0,3	0,6	6	133
ZARF75185-TV	9,4	75	185	100	62	–	–	27	15	135	–	–	21	–	–	0,3	1	6	155
ZARF75185-L-TV	10,6	75	185	–	–	125	87	27	15	135	115	135	21	46	16	0,3	1	6	155
ZARF90210-TV	13,7	90	210	110	69,5	–	–	32	17,5	160	–	–	22,5	–	–	0,3	1	8	180
ZARF90210-L-TV	15,1	90	210	–	–	135	94,5	32	17,5	160	130	158	22,5	47,5	16	0,3	1	8	180

- 1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.
- 2) Tightening torque of fixing screws according to manufacturer's data.
Screws are not included in the delivery.
- 3) Mass moment of inertia for rotating inner ring.
- 4) Mounting dimension for seal carrier assembly DRS.
Seal carrier assemblies: see page 979 and page 983.
- 5) Only valid in conjunction with INA precision locknuts.



ZARF.-L



Design of adjacent construction

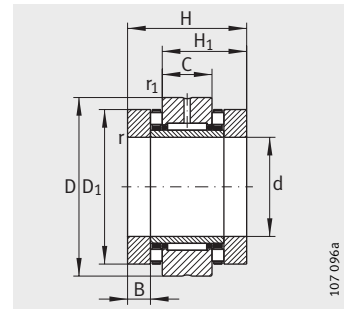
Mounting dimensions ¹⁾		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia ³⁾	Axial runout
		axial		radial								
Da	da	dyn. C _a	stat. C _{0a}	dyn. C _r	stat. C _{0r}	n _G oil	n _G grease	M _{RL}	c _{aL}	c _{kL}	M _m	
max.	min.	N	N	N	N	min ⁻¹	min ⁻¹	Nm	N/μm	Nm/mrad	kg · cm ²	μm
96	75	172 000	480 000	42 000	90 000	3 100	1 100	3,8	4 600	2 900	29,8	1
96	73	172 000	480 000	42 000	90 000	3 100	1 100	3,8	4 600	2 900	35,3	1
101	85	177 000	500 000	44 000	98 000	2 900	1 000	4	4 900	3 600	36,1	1
101	78	177 000	500 000	44 000	98 000	2 900	1 000	4	4 900	3 600	43	1
106	90	187 000	550 000	44 500	92 000	2 700	950	4,2	5 300	4 300	43,8	1
106	88	187 000	550 000	44 500	92 000	2 700	950	4,2	5 300	4 300	54,5	1
111	97	172 000	500 000	54 000	104 000	2 600	900	4	4 800	4 000	51	1
111	88	172 000	500 000	54 000	104 000	2 600	900	4	4 800	4 000	60,1	1
116	100	201 000	630 000	56 000	119 000	2 400	800	4,8	5 800	6 000	62,2	1
116	98	201 000	630 000	56 000	119 000	2 400	800	4,8	5 800	6 000	77,3	1
136	113	290 000	890 000	72 000	132 000	2 100	700	8	6 600	8 500	149	2
136	110	290 000	890 000	72 000	132 000	2 100	700	8	6 600	8 500	188	2
161	130	325 000	1 030 000	98 000	210 000	1 800	700	10,5	7 700	14 500	312	2
161	125	325 000	1 030 000	98 000	210 000	1 800	700	10,5	7 700	14 500	372	2



Designation	Recommended INA locknut; to be ordered separately			Rotary shaft seal to DIN 3 760; to be ordered separately	Fixing screws ²⁾ DIN 912-10.9		
	Designation	Tightening torque ⁵⁾	Axial preload force		Size	Quantity	
		M _A Nm	N				
ZARF50140-TV	ZMA50/92	AM50	180	37 109	–	M10	12
ZARF50140-L-TV	ZMA50/92	AM50	180	37 109	75X95X10	M10	12
ZARF55145-TV	ZMA55/98	AM55	220	40 772	–	M10	12
ZARF55145-L-TV	ZMA55/98	AM55	220	40 772	80X100X10	M10	12
ZARF60150-TV	ZMA60/98	AM60	250	42 190	–	M10	12
ZARF60150-L-TV	ZMA60/98	AM60	250	42 190	90X110X12	M10	12
ZARF65155-TV	ZMA65/105	AM65	270	41 778	–	M10	12
ZARF65155-L-TV	ZMA65/105	AM65	270	41 778	90X110X12	M10	12
ZARF70160-TV	ZMA70/110	AM70	330	47 692	–	M10	12
ZARF70160-L-TV	ZMA70/110	AM70	330	47 692	100X120X12	M10	12
ZARF75185-TV	ZMA75/125	AM75	580	76 339	–	M12	12
ZARF75185-L-TV	ZMA75/125	AM75	580	76 339	115X140X12	M12	12
ZARF90210-TV	ZMA90/155	AM90	960	102 468	–	M12	16
ZARF90210-L-TV	ZMA90/155	AM90	960	102 468	130X160X12	M12	16

Needle roller/axial cylindrical roller bearings

Light series

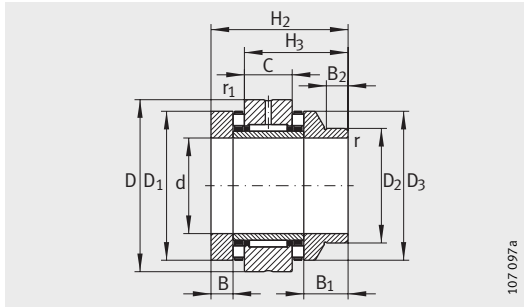


ZARN

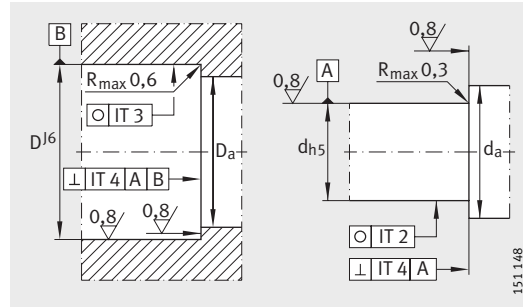
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Dimension table · Dimensions in mm																
Designation	Mass m ≈kg	Dimensions														
		d	D	H	H ₁	H ₂	H ₃	C	D ₁	D ₂	D ₃	B	B ₁	B ₂	r	r ₁
															min.	min.
ZARN1545-TV	0,34	15	45	40	28	–	–	16	35	–	–	7,5	–	–	0,3	0,6
ZARN1545-L-TV	0,37	15	45	–	–	53	41	16	35	24	34	7,5	20,5	11	0,3	0,6
ZARN1747-TV	0,37	17	47	43	29,5	–	–	16	38	–	–	9	–	–	0,3	0,6
ZARN1747-L-TV	0,41	17	47	–	–	57	43,5	16	38	28	38	9	23	11	0,3	0,6
ZARN2052-TV	0,41	20	52	46	31	–	–	16	42	–	–	10	–	–	0,3	0,6
ZARN2052-L-TV	0,46	20	52	–	–	60	45	16	42	30	40	10	24	11	0,3	0,6
ZARN2557-TV	0,53	25	57	50	35	–	–	20	47	–	–	10	–	–	0,3	0,6
ZARN2557-L-TV	0,59	25	57	–	–	65	50	20	47	36	45	10	25	11	0,3	0,6
ZARN3062-TV	0,6	30	62	50	35	–	–	20	52	–	–	10	–	–	0,3	0,6
ZARN3062-L-TV	0,75	30	62	–	–	65	50	20	52	40	50	10	25	11	0,3	0,6

- 1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.
- 2) Mass moment of inertia for rotating inner ring.
- 3) Only valid in conjunction with INA precision locknuts.



ZARN...L



Design of adjacent construction

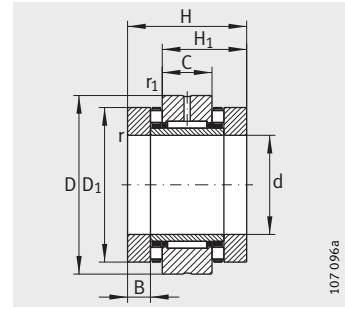
Mounting dimensions ¹⁾		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia ²⁾	Axial runout
		axial		radial								
D _a	d _a	dyn. C _a	stat. C _{0a}	dyn. C _r	stat. C _{0r}	n _G oil	n _G grease	M _{RL}	c _{aL}	c _{kL}	M _m	
max.	min.	N	N	N	N	min ⁻¹	min ⁻¹	Nm	N/μm	Nm/mrad	kg·cm ²	μm
36	28	24 900	53 000	13 000	17 500	8 500	2 200	0,35	1 400	110	0,24	1
36	22	24 900	53 000	13 000	17 500	8 500	2 200	0,35	1 400	110	0,274	1
39	28	26 000	57 000	14 000	19 900	7 800	2 100	0,4	1 600	160	0,373	1
39	26	26 000	57 000	14 000	19 900	7 800	2 100	0,4	1 600	160	0,464	1
43	33	33 500	76 000	14 900	22 400	7 000	2 000	0,5	1 800	230	0,615	1
43	28	33 500	76 000	14 900	22 400	7 000	2 000	0,5	1 800	230	0,683	1
48	39	35 500	86 000	22 600	36 000	6 000	1 900	0,55	1 900	350	0,989	1
48	34	35 500	86 000	22 900	36 000	6 000	1 900	0,55	1 900	350	1,15	1
53	44	39 000	101 000	24 300	41 500	5 500	1 800	0,65	2 200	520	1,46	1
53	38	39 000	101 000	24 300	41 500	5 500	1 800	0,65	2 200	520	1,7	1



Designation	Recommended INA locknut; to be ordered separately			Rotary shaft seal to DIN 3 760; to be ordered separately
	Designation	Tightening torque ³⁾	Axial preload force	
		M _A Nm	N	
ZARN1545-TV	ZMA15/33 AM15	10	6 506	–
ZARN1545-L-TV	ZMA15/33 AM15	10	6 506	24X35X7
ZARN1747-TV	ZM17 AM17	12	7 078	–
ZARN1747-L-TV	ZM17 AM17	12	7 078	28X40X7
ZARN2052-TV	ZMA20/38 AM20	18	9 376	–
ZARN2052-L-TV	ZMA20/38 AM20	18	9 376	30X42X7
ZARN2557-TV	ZMA25/45 AM25	25	10 470	–
ZARN2557-L-TV	ZMA25/45 AM25	25	10 470	36X47X7
ZARN3062-TV	ZMA30/52 AM30	32	11 091	–
ZARN3062-L-TV	ZMA30/52 AM30	32	11 091	40X52X7

Needle roller/axial cylindrical roller bearings

Light series

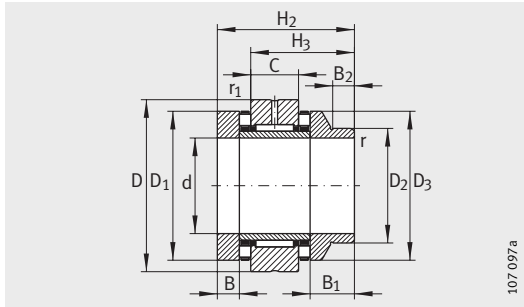


ZARN

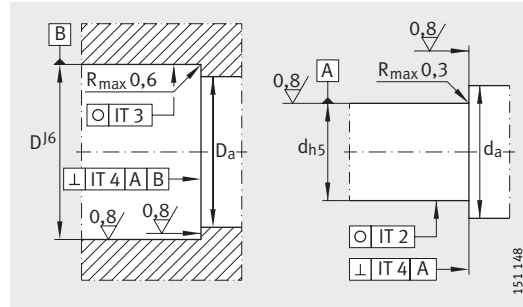
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Dimension table (continued) · Dimensions in mm																
Designation	Mass m ≈kg	Dimensions														
		d	D	H	H ₁	H ₂	H ₃	C	D ₁	D ₂	D ₃	B	B ₁	B ₂	r	r ₁
															min.	min.
ZARN3570-TV	0,8	35	70	54	37	–	–	20	60	–	–	11	–	–	0,3	0,6
ZARN3570-L-TV	0,93	35	70	–	–	70	53	20	60	45	58	11	27	12	0,3	0,6
ZARN4075-TV	0,9	40	75	54	37	–	–	20	65	–	–	11	–	–	0,3	0,6
ZARN4075-L-TV	1	40	75	–	–	70	53	20	65	50	63	11	27	12	0,3	0,6
ZARN4580-TV	1,12	45	80	60	42,5	–	–	25	70	–	–	11,5	–	–	0,3	0,6
ZARN4580-L-TV	1,27	45	80	–	–	75	57,5	25	70	56	68	11,5	26,5	12	0,3	0,6
ZARN5090-TV	1,43	50	90	60	42,5	–	–	25	78	–	–	11,5	–	–	0,3	0,6
ZARN5090-L-TV	1,78	50	90	–	–	78	60,5	25	78	60	78	11,5	29,5	12	0,3	0,6

- 1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.
- 2) Mass moment of inertia for rotating inner ring.
- 3) Only valid in conjunction with INA precision locknuts.



ZARN...L



Design of adjacent construction

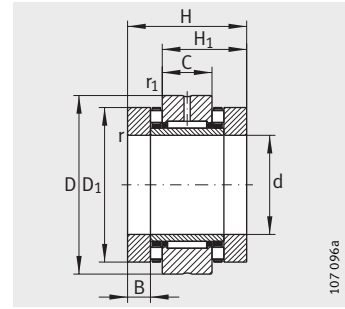
Mounting dimensions ¹⁾		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia ²⁾	Axial runout
		axial		radial								
D _a	d _a	dyn. C _a	stat. C _{0a}	dyn. C _r	stat. C _{0r}	n _G oil	n _G grease	M _{RL}	c _{aL}	c _{kL}	M _m	
max.	min.	N	N	N	N	min ⁻¹	min ⁻¹	Nm	N/μm	Nm/mrad	kg · cm ²	μm
61	50	56 000	148 000	26 000	47 000	4 800	1 700	0,9	2 600	740	2,8	1
61	43	56 000	148 000	26 000	47 000	4 800	1 700	0,9	2 600	740	3,21	1
66	55	59 000	163 000	27 500	53 000	4 400	1 600	1	2 800	1 030	3,78	1
66	48	59 000	163 000	27 500	53 000	4 400	1 600	1	2 800	1 030	4,35	1
71	60	61 000	177 000	38 000	74 000	4 000	1 500	1,2	3 000	1 340	5,33	1
71	54	61 000	177 000	38 000	74 000	4 000	1 500	1,2	3 000	1 340	6,03	1
79	67	90 000	300 000	40 000	82 000	3 600	1 200	2,2	4 800	2 470	8,42	1
79	58	90 000	300 000	40 000	82 000	3 600	1 200	2,2	4 800	2 470	10,46	1



Designation	Recommended INA locknut; to be ordered separately			Rotary shaft seal to DIN 3 760; to be ordered separately
	Designation	Tightening torque ³⁾	Axial preload force	
		M _A Nm	N	
ZARN3570-TV	ZMA35/58	AM35/58	42	12 486
ZARN3570-L-TV	ZMA35/58	AM35/58	42	12 486
ZARN4075-TV	ZMA40/62	AM40	55	14 240
ZARN4075-L-TV	ZMA40/62	AM40	55	14 240
ZARN4580-TV	ZMA45/68	AM45	65	15 765
ZARN4580-L-TV	ZMA45/68	AM45	65	15 765
ZARN5090-TV	ZMA50/75	AM50	85	18 410
ZARN5090-L-TV	ZMA50/75	AM50	85	18 410

Needle roller/axial cylindrical roller bearings

Heavy series

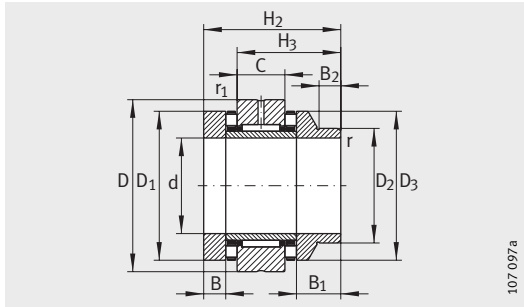


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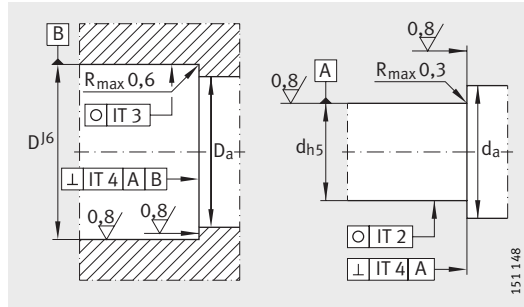
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Dimension table · Dimensions in mm																
Designation	Mass m ≈kg	Dimensions														
		d	D	H	H ₁	H ₂	H ₃	C	D ₁	D ₂	D ₃	B	B ₁	B ₂	r	r ₁
															min.	min.
ZARN2062-TV	0,87	20	62	60	40	–	–	20	52	–	–	12,5	–	–	0,3	0,6
ZARN2062-L-TV	0,99	20	62	–	–	75	55	20	52	40	50	12,5	27,5	11	0,3	0,6
ZARN2572-TV	1,17	25	72	60	40	–	–	20	62	–	–	12,5	–	–	0,3	0,6
ZARN2572-L-TV	1,32	25	72	–	–	75	55	20	62	48	60	12,5	27,5	11	0,3	0,6
ZARN3080-TV	1,5	30	80	66	43	–	–	20	68	–	–	14	–	–	0,3	0,6
ZARN3080-L-TV	1,7	30	80	–	–	82	59	20	68	52	66	14	30	12	0,3	0,6
ZARN3585-TV	1,65	35	85	66	43	–	–	20	73	–	–	14	–	–	0,3	0,6
ZARN3585-L-TV	1,8	35	85	–	–	82	59	20	73	60	73	14	30	12	0,3	0,6
ZARN4090-TV	2,09	40	90	75	50	–	–	25	78	–	–	16	–	–	0,3	0,6
ZARN4090-L-TV	2,39	40	90	–	–	93	68	25	78	60	78	16	34	12	0,3	0,6
ZARN45105-TV	3,02	45	105	82	53,5	–	–	25	90	–	–	17,5	–	–	0,3	0,6
ZARN45105-L-TV	3,42	45	105	–	–	103	74,5	25	90	70	88	17,5	38,5	14	0,3	0,6
ZARN50110-TV	3,3	50	110	82	53,5	–	–	25	95	–	–	17,5	–	–	0,3	0,6
ZARN50110-L-TV	3,75	50	110	–	–	103	74,5	25	95	75	93	17,5	38,5	14	0,3	0,6

1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.
 2) Mass moment of inertia for rotating inner ring.
 3) Only valid in conjunction with INA precision locknuts.



ZARN...-L



Design of adjacent construction

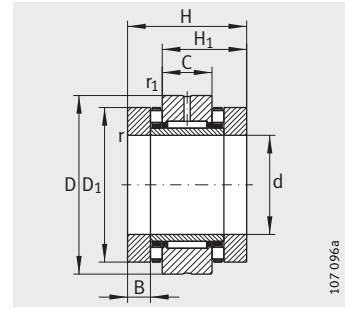
Mounting dimensions ¹⁾		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia ²⁾	Axial runout
		axial		radial		n_G oil	n_G grease					
D_a	d_a	dyn. C_a	stat. C_{0a}	dyn. C_r	stat. C_{0r}	n_G oil	n_G grease	M_{RL}	c_{aL}	c_{kL}	M_m	
max.	min.	N	N	N	N	min^{-1}	min^{-1}	Nm	$\text{N}/\mu\text{m}$	Nm/mrad	$\text{kg} \cdot \text{cm}^2$	μm
53	38	64 000	141 000	22 600	36 000	6 000	1 500	1,3	2 300	400	1,98	1
53	38	64 000	141 000	26 600	36 000	6 000	1 500	1,3	2 300	400	2,27	1
63	45	80 000	199 000	24 300	41 500	4 900	1 400	1,6	3 000	800	3,88	1
63	45	80 000	199 000	24 300	41 500	4 900	1 400	1,6	3 000	800	4,51	1
69	52	107 000	265 000	26 000	47 000	4 400	1 300	2,1	3 300	1 100	6,53	1
69	50	107 000	265 000	26 000	47 000	4 400	1 300	2,1	3 300	1 100	7,43	1
74	60	105 000	265 000	27 500	53 000	4 000	1 250	2,3	3 500	1 300	8,47	1
74	58	105 000	265 000	27 500	53 000	4 000	1 250	2,3	3 500	1 300	10,4	1
79	65	117 000	315 000	38 000	74 000	3 700	1 200	2,5	3 800	1 800	13,3	1
79	58	117 000	315 000	38 000	74 000	3 700	1 200	2,5	3 800	1 800	15,5	1
91	70	154 000	405 000	40 000	82 000	3 300	1 150	3,5	4 000	2 100	23,7	1
91	68	154 000	405 000	40 000	82 000	3 300	1 150	3,5	4 000	2 100	28,1	1
96	75	172 000	480 000	42 000	90 000	3 100	1 100	3,8	4 600	2 900	29,8	1
96	73	172 000	480 000	42 000	90 000	3 100	1 100	3,8	4 600	2 900	35,3	1



Designation	Recommended INA locknut; to be ordered separately			Rotary shaft seal to DIN 3 760; to be ordered separately
	Designation	Tightening torque ³⁾	Axial preload force	
		M_A Nm	N	
ZARN2062-TV	ZMA20/52 AM20	38	18 448	–
ZARN2062-L-TV	ZMA20/52 AM20	38	18 448	40X52X7
ZARN2572-TV	ZMA25/58 AM25	55	20 790	–
ZARN2572-L-TV	ZMA25/58 AM25	55	20 790	48X62X8
ZARN3080-TV	ZMA30/65 AM30	75	24 287	–
ZARN3080-L-TV	ZMA30/65 AM30	75	24 287	52X68X8
ZARN3585-TV	ZMA35/70 AM35	100	27 480	–
ZARN3585-L-TV	ZMA35/70 AM35	100	27 480	60X75X8
ZARN4090-TV	ZMA40/75 AM40	120	29 834	–
ZARN4090-L-TV	ZMA40/75 AM40	120	29 834	60X80X8
ZARN45105-TV	ZMA45/85 AM45	150	33 549	–
ZARN45105-L-TV	ZMA45/85 AM45	150	33 549	70X90X10
ZARN50110-TV	ZMA50/92 AM50	180	37 109	–
ZARN50110-L-TV	ZMA50/92 AM50	180	37 109	75X95X10

Needle roller/axial cylindrical roller bearings

Heavy series



ZARN

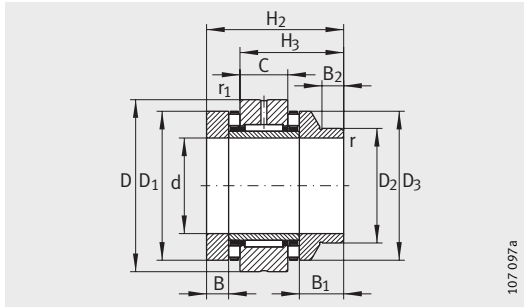
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Dimension table (continued) · Dimensions in mm																
Designation	Mass m ≈kg	Dimensions														
		d	D	H	H ₁	H ₂	H ₃	C	D ₁	D ₂	D ₃	B	B ₁	B ₂	r	r ₁
															min.	min.
ZARN55115-TV	3,5	55	115	82	53,5	–	–	25	100	–	–	17,5	–	–	0,3	0,6
ZARN55115-L-TV	4	55	115	–	–	103	74,5	25	100	80	98	17,5	38,5	14	0,3	0,6
ZARN60120-TV	3,7	60	120	82	53,5	–	–	25	105	–	–	17,5	–	–	0,3	0,6
ZARN60120-L-TV	4,85	60	120	–	–	103	74,5	25	105	90	105	17,5	38,5	16	0,3	0,6
ZARN65125-TV	4	65	125	82	53,5	–	–	25	110	–	–	17,5	–	–	0,3	0,6
ZARN65125-L-TV	4,6	65	125	–	–	103	74,5	25	110	90	108	17,5	38,5	16	0,3	0,6
ZARN70130-TV	4,1	70	130	82	53,5	–	–	25	115	–	–	17,5	–	–	0,3	0,6
ZARN70130-L-TV	4,85	70	130	–	–	103	74,5	25	115	100	115	17,5	38,5	16	0,3	0,6
ZARN75155-TV	7,9	75	155	100	65	–	–	30	135	–	–	21	–	–	0,3	1
ZARN75155-L-TV	9,1	75	155	–	–	125	90	30	135	115	135	21	46	16	0,3	1
ZARN90180-TV	11,8	90	180	110	72,5	–	–	35	160	–	–	22,5	–	–	0,3	1
ZARN90180-L-TV	13,2	90	180	–	–	135	97,5	35	160	130	158	22,5	47,5	16	0,3	1

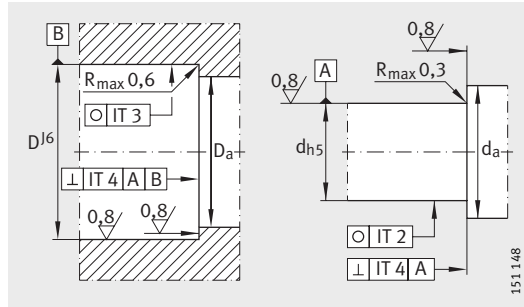
1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.

2) Mass moment of inertia for rotating inner ring.

3) Only valid in conjunction with INA precision locknuts.



ZARN...L



Design of adjacent construction

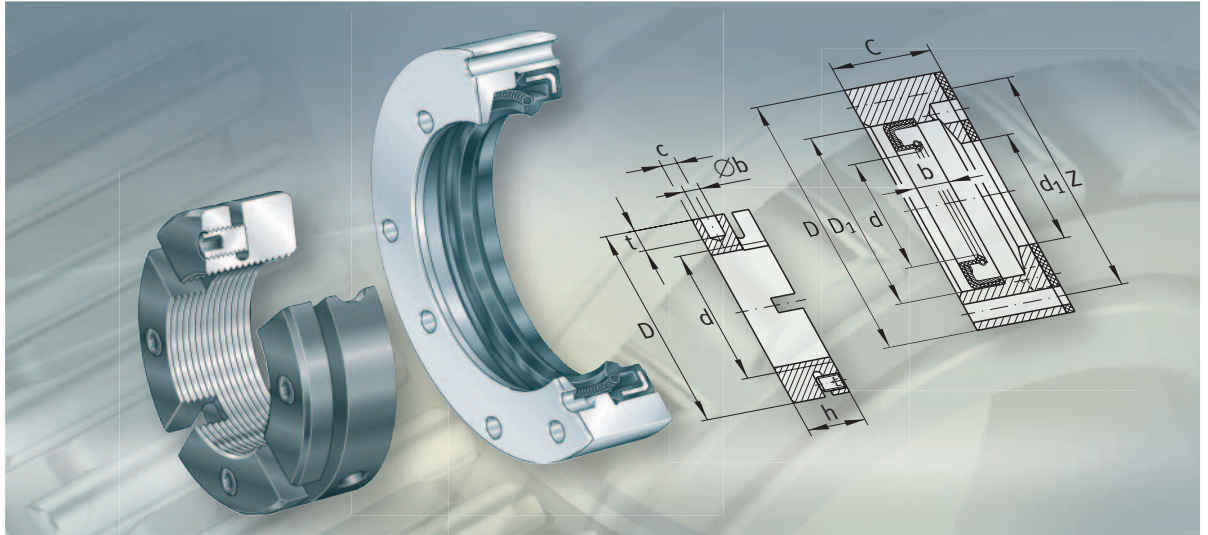
Mounting dimensions ¹⁾		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia ²⁾	Axial runout
		axial		radial								
D _a	d _a	dyn. C _a	stat. C _{0a}	dyn. C _r	stat. C _{0r}	n _{G oil}	n _{G grease}	M _{RL}	c _{aL}	c _{kL}	M _m	
max.	min.	N	N	N	N	min ⁻¹	min ⁻¹	Nm	N/μm	Nm/mrad	kg·cm ²	μm
101	85	177 000	500 000	44 000	98 000	2 900	1 000	4	4 900	3 600	36,1	1
101	78	177 000	500 000	44 000	98 000	2 900	1 000	4	4 900	3 600	43	1
106	90	187 000	550 000	44 500	92 000	2 700	950	4,2	5 300	4 300	43,8	1
106	88	187 000	550 000	44 500	92 000	2 700	950	4,2	5 300	4 300	54,5	1
111	97	172 000	500 000	54 000	104 000	2 600	900	4	4 800	4 000	51	1
111	88	172 000	500 000	54 000	104 000	2 600	900	4	4 800	4 000	60,1	1
116	100	201 000	630 000	56 000	119 000	2 400	800	4,8	5 800	6 000	62,2	1
116	98	201 000	630 000	56 000	119 000	2 400	800	4,8	5 800	6 000	77,3	1
136	113	290 000	890 000	72 000	132 000	2 100	700	8	6 600	8 500	149	2
136	110	290 000	890 000	72 000	132 000	2 100	700	8	6 600	8 500	188	2
161	130	325 000	1 030 000	98 000	210 000	1 800	700	10,5	7 700	14 500	312	2
161	125	325 000	1 030 000	98 000	210 000	1 800	700	10,5	7 700	14 500	372	2



Designation	Recommended INA locknut; to be ordered separately			Rotary shaft seal to DIN 3 760; to be ordered separately
	Designation	Tightening torque ³⁾	Axial preload force	
		M _A Nm	N	
ZARN55115-TV	ZMA55/98 AM55	220	40 772	–
ZARN55115-L-TV	ZMA55/98 AM55	220	40 772	80X100X10
ZARN60120-TV	ZMA60/98 AM60	250	42 190	–
ZARN60120-L-TV	ZMA60/98 AM60	250	42 190	90X110X12
ZARN65125-TV	ZMA65/105 AM65	270	41 778	–
ZARN65125-L-TV	ZMA65/105 AM65	270	41 778	90X110X12
ZARN70130-TV	ZMA70/110 AM70	330	47 692	–
ZARN70130-L-TV	ZMA70/110 AM70	330	47 692	100X120X12
ZARN75155-TV	ZMA75/125 AM75	580	76 339	–
ZARN75155-L-TV	ZMA75/125 AM75	580	76 339	115X140X12
ZARN90180-TV	ZMA90/155 AM90	960	102 246	–
ZARN90180-L-TV	ZMA90/155 AM90	960	102 246	130X160X12



FAG



Seal carrier assemblies Precision locknuts

Seal carrier assemblies Precision locknuts

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Product overview	Seal carrier assemblies, precision locknuts	978
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	Precision locknuts	980
Design and safety guidelines	Breakaway torque	981
	Ultimate axial load	981
	Fitting and dismantling.....	981
Accuracy	.....	982
Dimension tables	Seal carrier assemblies DRS	983
	Precision locknuts AM	984
	Adapters AMS	985
	Precision locknuts ZM, ZMA.....	986



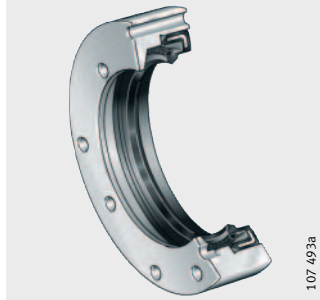
Product overview

Seal carrier assemblies

Precision locknuts

Seal carrier assemblies

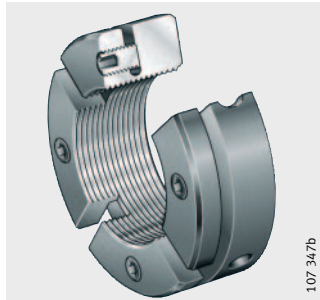
DRS



Precision locknuts

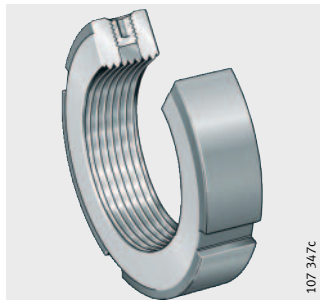
For axial locking

AM



For radial locking

ZM, ZMA



Seal carrier assemblies Precision locknuts

Features

Seal carrier assemblies

Seal carrier assemblies DRS are screw mounted to the outer ring of needle roller/axial cylindrical roller bearings ZARF(L) and precisely centred in this position, *Figure 1*, ①. They seal the bearings against outside influences.

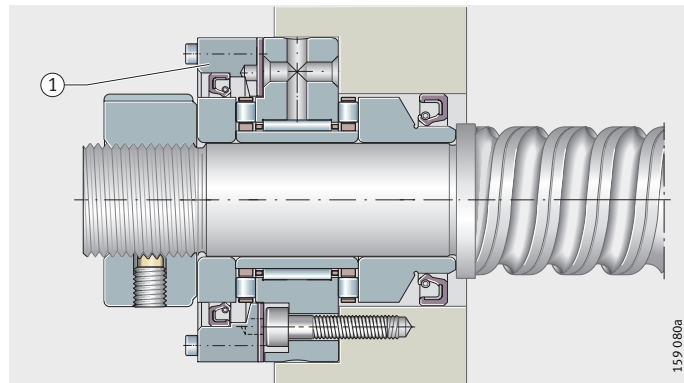
The sealing elements are supplied as a complete kit and comprise a seal carrier with an integral rotary shaft seal, a gasket and hexagonal socket cap screws for fixing the carrier to the central washer of the bearing.

① Seal carrier assembly DRS

DRS
ZMA
ZARF.-L

Figure 1

Needle roller/
axial cylindrical roller bearing,
seal carrier assembly, locknut



Operating temperature

Seal carrier assemblies are suitable for operating temperatures from -30 °C to $+120\text{ °C}$, restricted by the seal material.

Seal carrier assemblies

Precision locknuts

Precision locknuts

Precision locknuts are used where high axial forces must be supported and high runout accuracy and rigidity are required, *Figure 2*, ①, *Figure 3*, ①.

The thread and the axial face of the locknut in contact with the rolling bearing are produced in a single clamping operation. This allows very high runout accuracy to be achieved.

Locknuts are available in the designs AM, ZM and ZMA. If handled correctly, they can be reused several times.

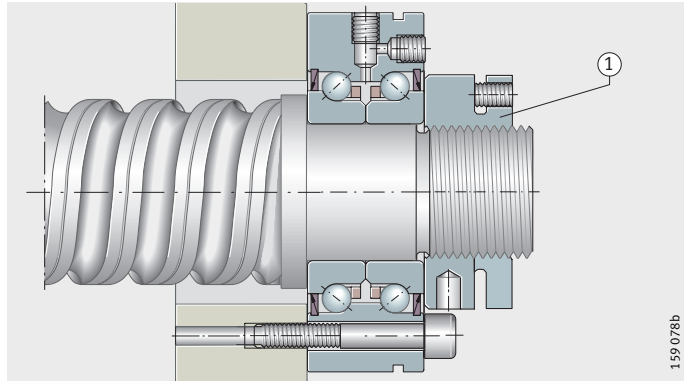
Axial locking by segments

Locknuts of series AM are divided into several segments for applying the locking forces. When the hexagonal socket set screws are tightened, the segments are elastically deformed. As a result, the thread flanks of the segments are pressed against the flanks of the shaft thread and give a high frictional force that acts to prevent loosening of the nut. The runout of the nut is not affected by this method of locking.

① Precision locknut AM

AM
ZKLF.-2RS

Figure 2
Axial angular
contact ball bearing ZKLF
with locknut



159 078b

Locking by radial locking pegs

Locknuts ZM and ZMA are secured against rotation by means of two radially acting locking pegs, *Figure 3*, ①. ZMA is the heavy series.

The locking pegs are manufactured together with the internal thread of the locknut. They mesh in the thread of the shaft without affecting the runout or damaging the thread, *Figure 3*, ②.

The locking pegs are secured by set screws with a hexagonal socket arranged concentrically over the locking pegs, *Figure 3*, ③.

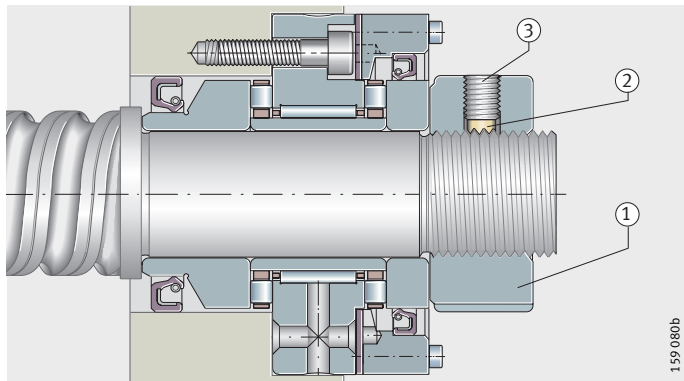
① Precision locknut ZMA

② Locking peg

③ Set screw

DRS
ZMA
ZARF.-L

Figure 3
Needle roller/
axial cylindrical roller bearing ZARF
with seal carrier assembly, locknut



159 080b

Design and safety guidelines

Shaft threads for the precision locknuts must be precision machined; see table.

Recommended shaft thread

Shaft thread	
Tolerance class "medium"	Tolerance class "fine"
6g DIN 13 T21-24	4h DIN 13 T21-24

Caution! The journal thread must support the locknut over its whole width.

Breakaway torque

The breakaway torques M_L given in the dimension tables are based on a locknut tightened against a rigid shaft shoulder to the reference tightening torque M_{AL} and secured.

Ultimate axial load

The ultimate axial loads F_{aB} are valid for a journal thread with a tolerance of 6g or better and a minimum strength of 700 N/mm^2 . For dynamic loading, the permissible value can be taken as 75% of the ultimate axial load F_{aB} .

Fitting and dismantling

Caution! For the fitting and dismantling of bearings and precision locknuts, the information in Fitting and Maintenance Manual TPI 100 must be observed.

Locknuts must be fully screwed onto the shaft thread.



Precision locknuts with axial locking

Locknuts AM can be tightened using a hook wrench to DIN 1810B that engages in four, six or eight holes around the circumference. The set screws are then tightened in a crosswise sequence to the specified tightening torque M_m using an Allan key. Dismantling is carried out by uniformly loosening set screws of all segments in order to prevent a single segment being left tensioned.

Caution! Tightening by means of just one segment is not permissible. For tightening, an adapter of series AMS can be used that ensures uniform loading of all segments. The adapter AMS must be ordered separately, see dimension table, page 985.

For tightening using the adapter AMS, a hook wrench to DIN 1810A or to DIN 1810B can be used.

If precision locknuts AM are fitted using the adapter AMS, a maximum tightening torque of twice the value given in the dimension table for the bearing is permissible.

Segments can be axially deformed if the set screws are not tightened uniformly in a crosswise sequence or the locknut AM is not fully screwed onto the shaft thread. The specified tightening torque M_m according to the dimension table must be observed.

Seal carrier assemblies

Precision locknuts

Precision locknuts with radial locking

Locknuts ZM and ZMA can be tightened using a hook wrench to DIN 1810A that engages in one of the four slots around the circumference.

The two set screws are then tightened alternately to the specified tightening torque M_m using an Allan key; for M_m , see dimension tables for the bearings.

For dismantling, the two set screws are first loosened and the locking pegs loosened by light impacts with a plastic hammer on the outside surface of the locknut (in the vicinity of the screw holes).

The locknut can then be easily unscrewed without damaging the journal thread.

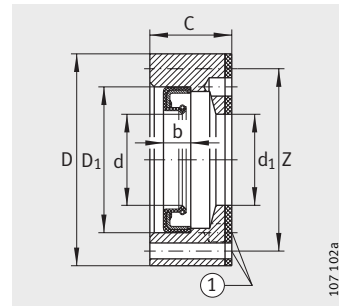
Accuracy

The accuracy of the precision locknuts is shown in the table.

Runout/thread

Axial runout Thread/axial face μm	Metric ISO thread "fine"
5	5H, DIN 13 T21-24

Seal carrier assemblies



DRS¹⁾
① 4 holes, offset by 90°

Dimension table · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions				Rotary shaft seal				Corresponding bearing in standard or L design Designation
		D	C	d ₁	Z ²⁾	d	D ₁	b	Socket head screws DIN 912 each 4 pieces	
DRS1560	0,16	60	14	35	52,4	35	45	7	M3X20	ZARF1560-TV
DRS1762	0,18	62	15,5	38	54,4	38	47	7	M3X25	ZARF1762-TV
DRS2068	0,11	68	17	42	60,4	42	55	8	M3X25	ZARF2068-TV
DRS2080	0,2	80	22	52	73,4	52	68	8	M3X30	ZARF2080-TV
DRS2575	0,16	75	17	47	67,4	47	62	6	M3X25	ZARF2575-TV
DRS2590	0,3	90	22	62	81	62	75	10	M3X30	ZARF2590-TV
DRS3080	0,15	80	17	52	73,4	52	68	8	M3X25	ZARF3080-TV
DRS30105	0,35	105	25	68	95	68	85	10	M4X35	ZARF30105-TV
DRS3590	0,15	90	19	60	80	60	72	8	M4X30	ZARF3590-TV
DRS35110	0,3	110	25	73	101	73	95	10	M3X30	ZARF35110-TV
DRS40100	0,25	100	19	65	90	65	80	8	M4X30	ZARF40100-TV
DRS40115	0,5	115	27,5	78	106	78	100	10	M3X35	ZARF40115-TV
DRS45105	0,3	105	20	70	95	70	85	8	M4X30	ZARF45105-TV
DRS45130	0,7	130	31	90	120	90	110	12	M4X40	ZARF45130-TV
DRS50115	0,2	115	20	78	106	78	100	10	M3X30	ZARF50115-TV
DRS50140	0,8	140	30	95	127,5	95	115	13	M5X40	ZARF50140-TV
DRS55145	0,9	145	30	100	132,5	100	120	12	M5X40	ZARF55145-TV
DRS60150	0,9	150	30	105	137,5	105	125	12	M5X40	ZARF60150-TV
DRS65155	1	155	30	110	142,5	110	130	12	M5X40	ZARF65155-TV
DRS70160	1	160	30	115	147,5	115	135	13	M5X40	ZARF70160-TV
DRS75185	1,8	185	36	135	172,5	135	160	15	M5X50	ZARF75185-TV
DRS90210	2,7	210	38	160	194	160	180	15	M5X50	ZARF90210-TV

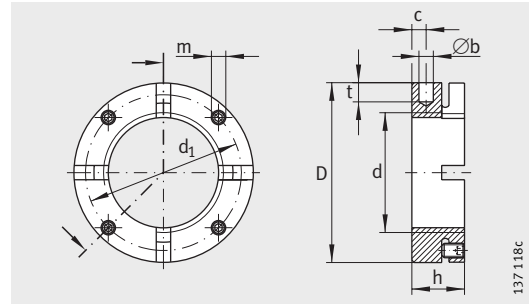
1) The seal carrier assembly is supplied as a kit comprising:

- seal carrier
- rotary shaft seal
- flange seal
- socket head screws.

2) Four holes offset by 90°.



Precision locknuts



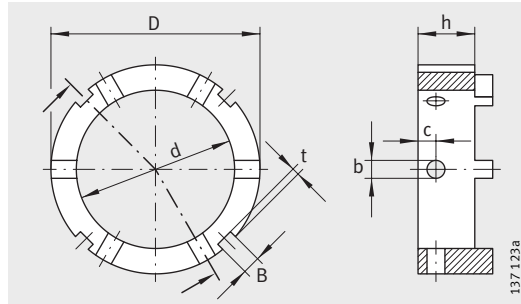
AM15 to AM40 with 4 segments
 AM45 to AM90 with 6 segments
 AM100 to AM130 with 8 segments

Dimension table · Dimensions in mm														
Designation	Nut thread	Mass	Dimensions							Grub screw	Locknut ¹⁾			
			D	h	b	t	d ₁	c	m		Tightening torque	Axial rupture load	Tightening torque	Reference tightening torque	Mass moment of inertia
	d	m ≈kg			H11					M _m	F _{aB}	M _L at	M _{AL}	M _M
										Nm	N	Nm	Nm	kg · cm ²
AM15	M15X1	0,06	30	18	4	5	24	5	M5	3	100 000	20	10	0,09
AM17	M17X1	0,07	32	18	4	5	26	5	M5	3	120 000	25	15	0,11
AM20	M20X1	0,13	38	18	4	6	31	5	M6	5	145 000	45	18	0,23
AM25	M25X1,5	0,16	45	20	5	6	38	6	M6	5	205 000	60	25	0,49
AM30	M30X1,5	0,20	52	20	5	7	45	6	M6	5	250 000	70	32	0,86
AM30/65	M30X1,5	0,50	65	30	6	8	45	6	M6	5	400 000	70	32	2,8
AM35/58	M35X1,5	0,23	58	20	5	7	51	6	M6	5	280 000	90	40	1,3
AM35	M35X1,5	0,33	65	22	6	8	58	6	M6	5	330 000	100	40	2,4
AM40	M40X1,5	0,30	65	22	6	8	58	6	M6	5	350 000	120	55	2,3
AM40/85	M40X1,5	0,75	85	32	6	8	58	6	M6	5	570 000	120	55	7,6
AM45	M45X1,5	0,34	70	22	6	8	63	6	M6	5	360 000	220	65	2,9
AM50	M50X1,5	0,43	75	25	6	8	68	8	M6	5	450 000	280	85	4,3
AM55	M55X2	0,60	85	26	6	8	75	8	M8	15	520 000	320	95	7,7
AM60	M60X2	0,65	90	26	6	8	80	8	M8	15	550 000	365	100	9,4
AM65	M65X2	0,83	100	26	8	10	88	8	M8	15	560 000	400	120	14,6
AM70	M70X2	0,79	100	28	8	10	90	9	M8	15	650 000	450	130	14,7
AM75	M75X2	1,23	115	30	8	10	102	10	M10	20	750 000	610	150	29
AM80	M80X2	0,93	110	30	8	10	98	10	M10	20	670 000	770	160	21,3
AM85	M85X2	0,97	115	30	8	10	102	10	M10	20	690 000	930	180	24,8
AM90	M90X2	1,53	130	32	8	10	118	13	M10	20	900 000	1100	200	48
AM100	M100X2	1,12	130	30	8	10	118	10	M10	20	740 000	1200	250	38
AM110	M110X2	1,22	140	30	8	10	128	10	M10	20	770 000	1300	250	48
AM120	M120X2	1,56	155	30	8	10	142	10	M10	20	880 000	1450	250	75
AM130	M130X2	1,67	165	30	8	10	152	10	M10	20	900 000	1600	250	92

¹⁾ Note!

If precision locknuts AM are fitted using the adapter AMS, a maximum tightening torque of twice the value given in the dimension table for the bearing is permissible.

Adapters

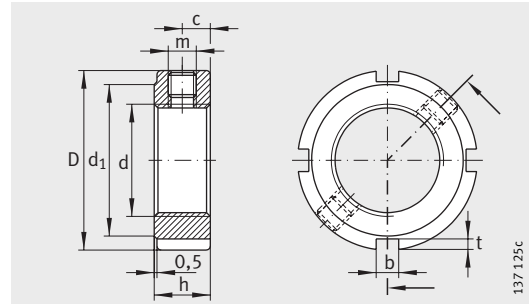


AMS

Dimension table · Dimensions in mm									
Designation	Mass m ≈kg	Dimensions							For precision locknuts
		D	h	d	b H11	c	B	t	
AMS20	0,047	32	14	22	4	5	4	2	AM15, AM17, AM20
AMS30	0,093	45	15	35	5	5	5	2	AM25, AM30, AM35/58, AM30/65
AMS40	0,217	65	16	45	6	6	6	2,5	AM35, AM40
AMS50	0,245	70	19	53	6	6	6	2,5	AM45, AM50
AMS60	0,37	85	20	65	6	6	7	3	AM55, AM60
AMS70	0,615	98	25	75	8	10	8	3,5	AM65, AM70
AMS80	0,755	110	25	85	8	10	8	3,5	AM75, AM80, AM85
AMS90	1,215	130	25	95	8	10	10	4	AM90
AMS110	0,74	130	25	110	8	10	10	4	AM100, AM110
AMS130	1,485	155	25	130	8	10	12	5	AM120, AM130



Precision locknuts

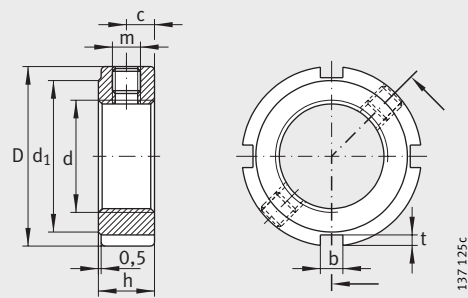


ZM, ZMA

Dimension table · Dimensions in mm														
Designation	Thread	Mass m ≈kg	Dimensions							Grub screw Tight- ening torque M _m Nm	Locknut			
			D	h	b	t	d ₁	c	m		Axial rupture load F _{aB} N	Tight- ening torque M _L at Nm	Reference tightening torque M _{AL} Nm	Mass moment of inertia M _M kg · cm ²
ZM06	M6X0,5	0,01	16	8	3	2	11	4	M4	1	17 000	20	2	0,004
ZM08 ¹⁾	M8X0,75	0,01	16	8	3	2	11	4	M4	1	23 000	25	4	0,004
ZM10 ¹⁾	M10X1	0,01	18	8	3	2	14	4	M4	1	31 000	30	6	0,006
ZM12	M12X1	0,015	22	8	3	2	18	4	M4	1	38 000	30	8	0,013
ZM15	M15X1	0,018	25	8	3	2	21	4	M4	1	50 000	30	10	0,021
ZMA15/33	M15X1	0,08	33	16	4	2	28	8	M5	3	106 000	30	10	0,14
ZM17	M17X1	0,028	28	10	4	2	23	5	M5	3	57 000	30	15	0,401
ZM20	M20X1	0,035	32	10	4	2	27	5	M5	3	69 000	40	18	0,068
ZMA20/38	M20X1	0,12	38	20	5	2	33	10	M5	3	174 000	40	18	0,297
ZMA20/52	M20X1	0,32	52	25	5	2	47	12,5	M5	3	218 000	40	18	1,38
ZM25	M25X1,5	0,055	38	12	5	2	33	6	M6	5	90 000	60	25	0,157
ZMA25/45	M25X1,5	0,16	45	20	5	2	40	10	M6	5	211 000	60	25	0,572
ZMA25/58	M25X1,5	0,43	58	28	6	2,5	52	14	M6	5	305 000	60	25	2,36
ZM30	M30X1,5	0,075	45	12	5	2	40	6	M6	5	112 000	70	32	0,304
ZMA30/52	M30X1,5	0,22	52	22	5	2	47	11	M6	5	270 000	70	32	1,1
ZMA30/65	M30X1,5	0,55	65	30	6	2,5	59	15	M6	5	390 000	70	32	3,94
ZM35	M35X1,5	0,099	52	12	5	2	47	6	M6	5	134 000	80	40	0,537
ZMA35/58	M35X1,5	0,26	58	22	6	2,5	52	11	M6	5	300 000	80	40	1,66
ZMA35/70	M35X1,5	0,61	70	30	6	2,5	64	15	M6	5	460 000	80	40	5,2
ZM40	M40X1,5	0,14	58	14	6	2,5	52	7	M6	5	157 000	95	55	0,945
ZMA40/62	M40X1,5	0,27	62	22	6	2,5	56	11	M8	15	310 000	95	55	2,07
ZMA40/75	M40X1,5	0,67	75	30	6	2,5	69	15	M8	15	520 000	95	55	6,72
ZM45	M45X1,5	0,17	65	14	6	2,5	59	7	M6	5	181 000	110	65	1,48
ZMA45/68	M45X1,5	0,35	68	24	6	2,5	62	12	M8	15	360 000	110	65	3,2
ZMA45/85	M45X1,5	0,92	85	32	7	3	78	16	M8	15	630 000	110	65	11,9
ZM50	M50X1,5	0,19	70	14	6	2,5	64	7	M6	5	205 000	130	85	1,92
ZMA50/75	M50X1,5	0,43	75	25	6	2,5	68	12,5	M8	15	415 000	130	85	4,89
ZMA50/92	M50X1,5	1,06	92	32	8	3,5	84	16	M8	15	680 000	130	85	16,1
ZM55	M55X2	0,23	75	16	7	3	68	8	M6	5	229 000	150	95	2,77
ZMA55/98	M55X2	1,17	98	32	8	3,5	90	16	M8	15	620 000	150	95	20,5

¹⁾ When clamped, the grub screw protrudes by approx. 0,5 mm.

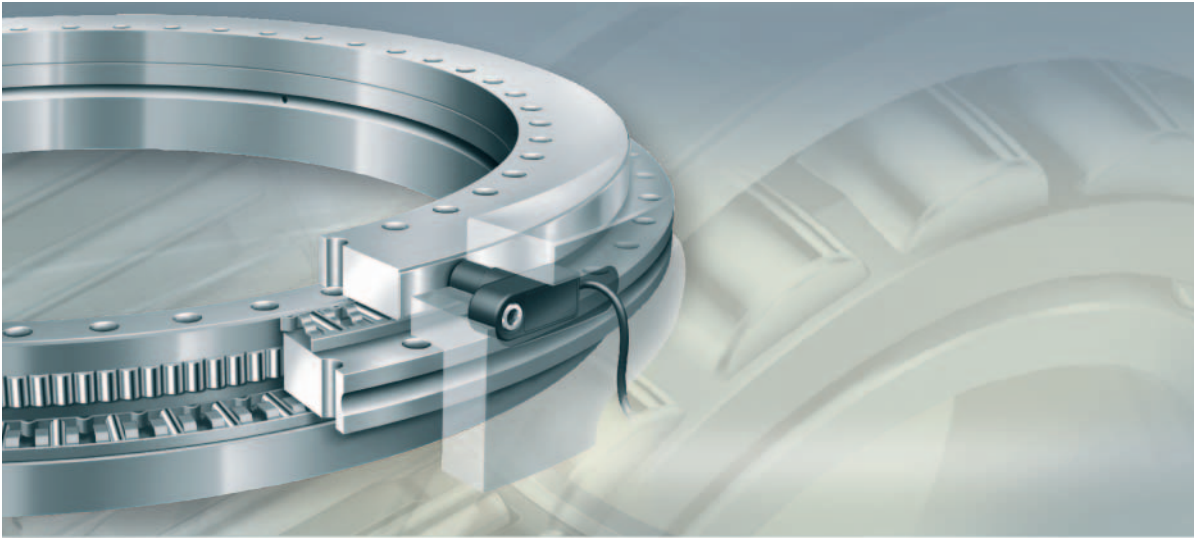
Precision locknuts



ZM, ZMA

Dimension table (continued) · Dimensions in mm														
Designation	Thread	Mass m ≈kg	Dimensions							Grub screw Tightening torque M _m Nm	Locknut			
			D	h	b	t	d ₁	c	m		Axial rupture load F _{aB} N	Tightening torque M _L at Nm	Reference tightening torque M _{AL} Nm	Mass moment of inertia M _M kg · cm ²
ZM60	M60X2	0,25	80	16	7	3	73	8	M6	5	255 000	180	100	3,45
ZMA60/98	M60X2	1,07	98	32	8	3,5	90	16	M8	15	680 000	180	100	19,6
ZM65	M65X2	0,27	85	16	7	3	78	8	M6	5	280 000	200	120	4,24
ZMA65/105	M65X2	1,21	105	32	8	3,5	97	16	M8	15	750 000	200	120	25,6
ZM70	M70X2	0,36	92	18	8	3,5	85	9	M8	15	305 000	220	130	6,61
ZMA70/110	M70X2	1,4	110	35	8	3,5	102	17,5	M8	15	810 000	220	130	33
ZM75	M75X2	0,4	98	18	8	3,5	90	9	M8	15	331 000	260	150	8,41
ZMA75/125	M75X2	2,11	125	38	8	3,5	117	19	M8	15	880 000	260	150	62,2
ZM80	M80X2	0,46	105	18	8	3,5	95	9	M8	15	355 000	285	160	11,2
ZMA80/120	M80X2	1,33	120	35	8	4	105	17,5	M8	15	810 000	285	160	44,6
ZM85	M85X2	0,49	110	18	8	3,5	102	9	M8	15	385 000	320	190	13,1
ZM90	M90X2	0,7	120	20	10	4	108	10	M8	15	410 000	360	200	21,8
ZMA90/130	M90X2	2,01	130	38	10	4	120	19	M8	15	910 000	360	200	64,1
ZMA90/155	M90X2	3,36	155	38	10	4	146	19	M8	15	1 080 000	360	200	150
ZM100	M100X2	0,77	130	20	10	4	120	10	M8	15	465 000	425	250	28,6
ZMA100/140	M100X2	2,23	140	38	12	5	128	19	M10	20	940 000	425	250	82,8
ZM105	M105X2	1,05	140	22	12	5	126	11	M10	20	495 000	475	300	44,5
ZM110	M110X2	1,09	145	22	12	5	133	11	M10	20	520 000	510	350	50,1
ZM115	M115X2	1,13	150	22	12	5	137	11	M10	20	550 000	550	400	56,2
ZM120	M120X2	1,28	155	24	12	5	138	12	M10	20	580 000	600	450	68,4
ZM125	M125X2	1,33	160	24	12	5	148	12	M10	20	610 000	640	500	76,1
ZM130	M130X2	1,36	165	24	12	5	149	12	M10	20	630 000	700	550	84,3
ZM140	M140X2	1,85	180	26	14	6	160	13	M12	38	690 000	800	600	133
ZM150	M150X2	2,24	195	26	14	6	171	13	M12	38	750 000	900	650	188





High precision bearings for combined loads



Axial/radial bearings
Axial angular contact ball bearings
Axial/radial bearings
with integral angular measuring system

High precision bearings for combined loads

Axial/radial bearings 992

Axial/radial bearings are double direction axial bearings for screw mounting, with a radial guidance bearing. These ready-to-fit, pregreased units are very rigid, have high load carrying capacity and run with particularly high accuracy. They can support radial forces, axial forces from both directions and tilting moments free from clearance. The bearings are available in several series.

For applications with low speeds and small operating durations – such as indexing tables and swivel type milling heads – series YRT is generally the most suitable.

Where comparatively lower friction and high speeds are required, RTC bearings can be used. For higher requirements in accuracy, these bearings are also available with restricted axial runout accuracy.

For the bearing arrangements of direct drive axes, there is the series YRT_{Speed}. Due to their high limiting speeds and very low, uniform frictional torque across the whole speed range, these bearings are particularly suitable for combination with torque motors.

Axial angular contact ball bearings 992

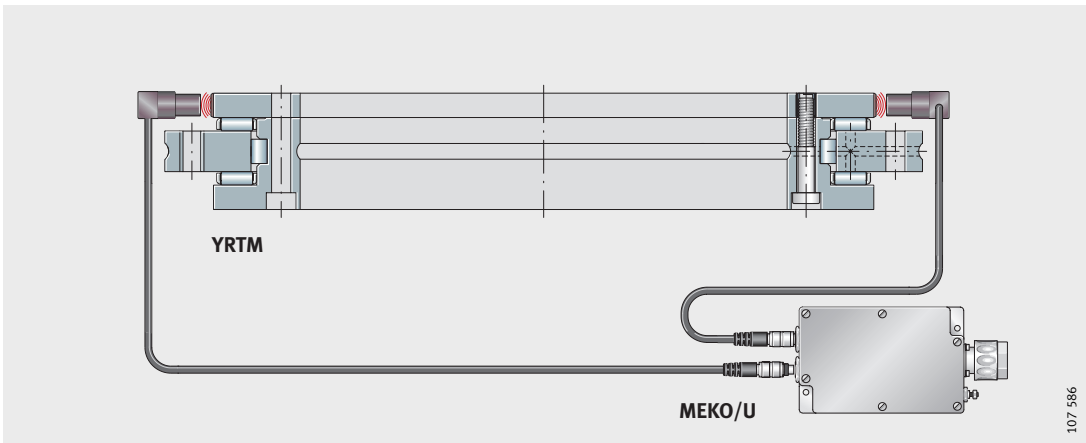
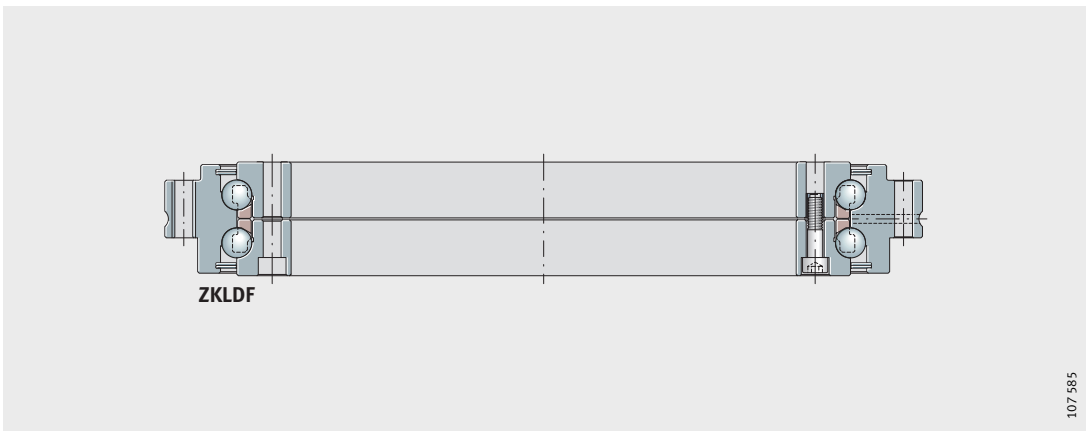
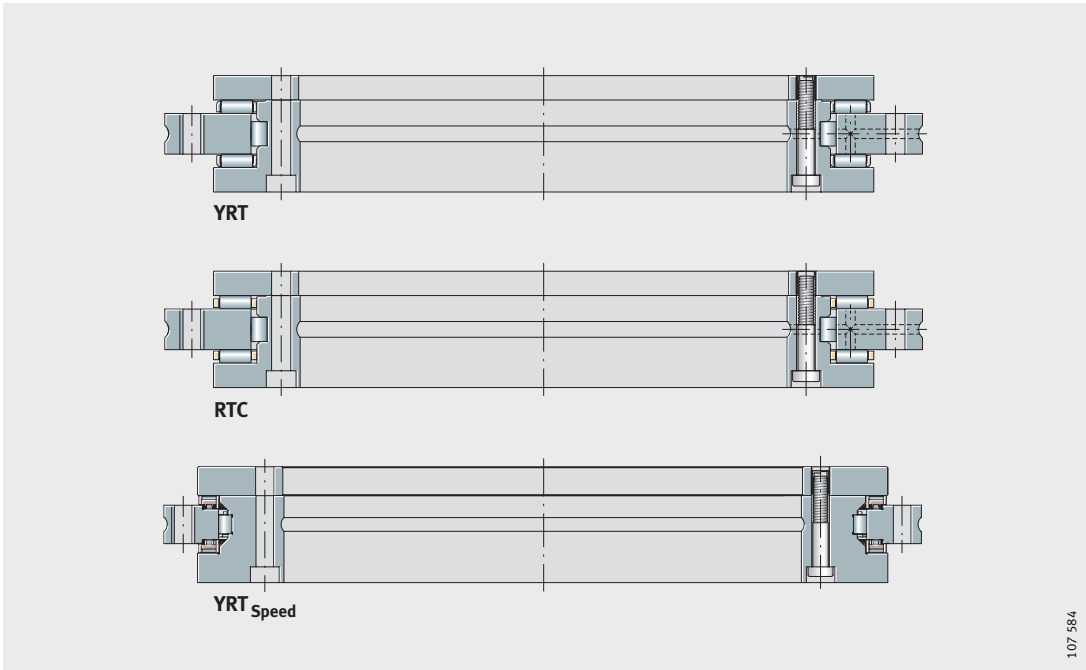
Axial angular contact ball bearings ZKLDF are low-friction, ready-to-fit, pregreased bearing units with high accuracy for very high speeds, high axial and radial loads and high demands on tilting rigidity.

Axial angular contact ball bearings are particularly suitable for precision applications involving combined loads. Their preferred areas of use are bearing arrangements in rotary tables, milling, grinding and honing heads as well as measurement and testing equipment.

Axial/radial bearings with integral angular measuring system 1020

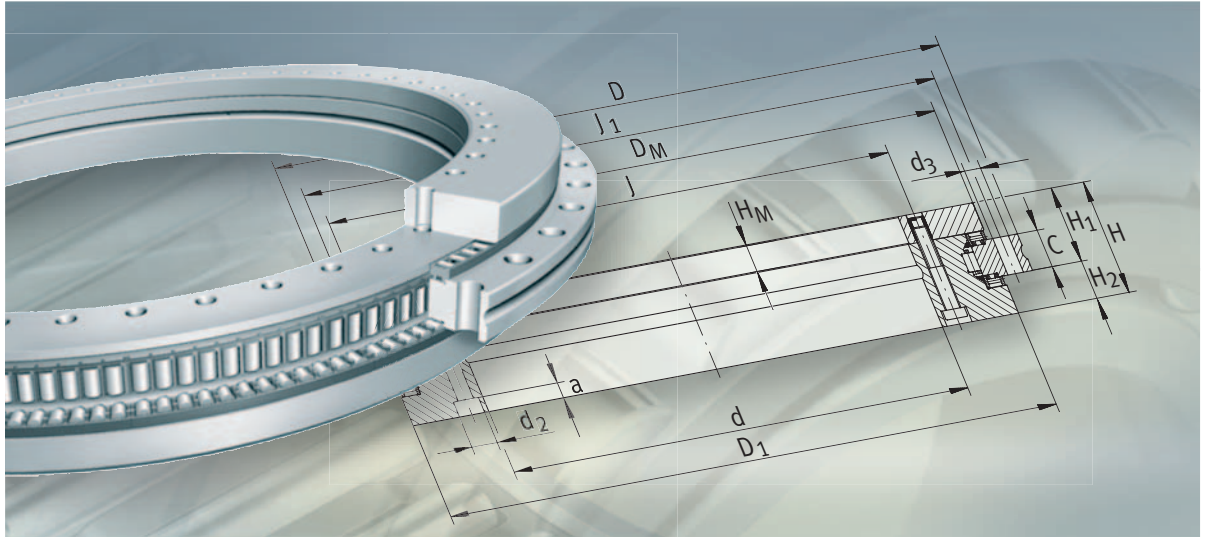
Axial/radial bearings with integral measuring system YRTM correspond in mechanical terms to series YRT but are additionally fitted with an angular measuring system. The measuring system can measure angles to an accuracy of a few angular seconds by non-contact, magneto-resistive means.

The unit comprises an axial/radial bearing with a dimensional scale and a MEKO/U electronic measuring system. The electronic measuring system consists of two measuring heads and an electronic evaluation system.





FAG



Axial/radial bearings

Axial angular contact ball bearings

Axial/radial bearings Axial angular contact ball bearings

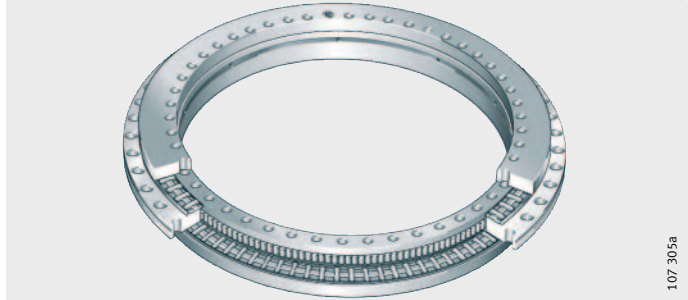
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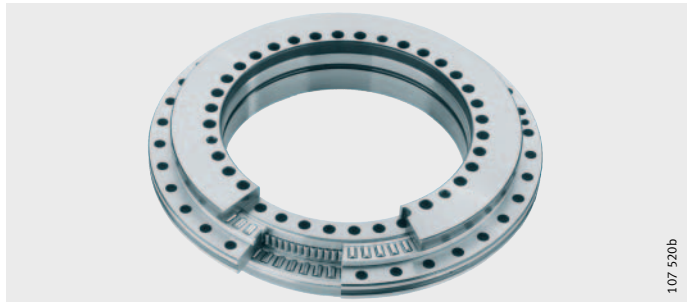
Product overview **Axial/radial bearings**
Axial angular contact ball bearings

Axial/radial bearings

YRT



RTC



For higher speeds

YRT_{Speed}



Axial angular contact ball bearings

ZKLDf



Axial/radial bearings

Axial angular contact ball bearings

Features Axial/radial bearings YRT, RTC and YRT_{Speed} and axial angular contact ball bearings ZKLDF are ready-to-fit high precision bearings for high precision applications with combined loads. They can support radial loads, axial loads from both sides and tilting moments without clearance and are particularly suitable for bearing arrangements for running accuracy, such as rotary tables, face plates, milling heads and reversible clamps. Due to the fixing holes in the bearing rings, the units are very easy to fit. The bearings are radially and axially preloaded after fitting. The mounting dimensions of all series are identical.

With angular measuring system Axial/radial bearings are also available with an angular measuring system. The measuring system can measure angles to an accuracy of a few angular seconds by non-contact, magneto-resistive means, see page 1020.

Areas of application For standard applications with low speeds and small operating durations – such as indexing tables and swivel type milling heads – series YRT is generally the most suitable, *Figure 1*. These bearings are available in two axial and radial runout accuracies.

Where comparatively lower friction and higher speeds are required, RTC bearings can be used, *Figure 1*. For higher requirements in accuracy, these bearings are also available with restricted axial runout accuracy.

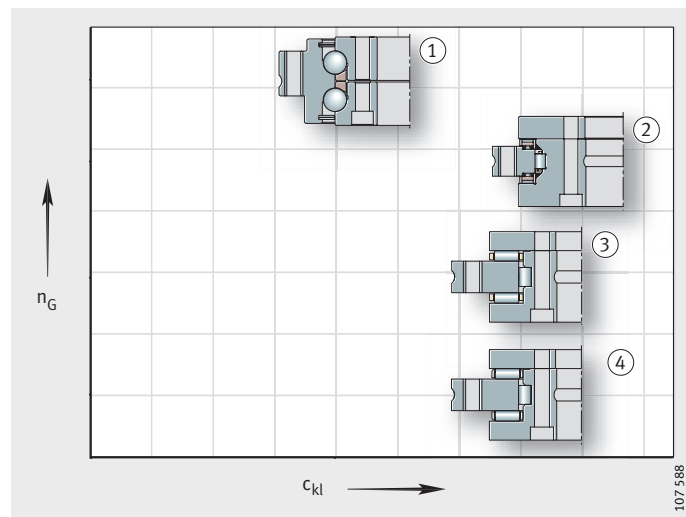
For the bearing arrangements of direct drive axes, there is the series YRT_{Speed}. Due to their high limiting speeds and very low, uniform frictional torque across the whole speed range, these bearings are particularly suitable for combination with torque motors, *Figure 1*.

Axial angular contact ball bearings ZKLDF are particularly suitable for high speed applications with long operating duration, *Figure 1*. They are characterised by high tilting rigidity, low friction and low lubricant consumption.



- ① ZKLDF
 - ② YRT_{Speed}
 - ③ RTC
 - ④ YRT
- n_G = limiting speed
 c_{kl} = tilting rigidity

Figure 1
 Speed and tilting rigidity – comparison



Axial/radial bearings Axial angular contact ball bearings

Axial/radial bearings Axial/radial bearings YRT, RTC and YRT_{Speed} have an axial component and a radial component.
The axial component comprises an axial needle roller or cylindrical roller and cage assembly, an outer ring, L-section ring and shaft locating washer and is axially preloaded after fitting.
The radial component is a full complement (YRT, RTC) or cage-guided, preloaded cylindrical roller set. The outer ring, L-section ring and shaft locating washer have fixing holes.
The unit is located by means of retaining screws for transport and safe handling.

Sealing/lubricant Axial/radial bearings are supplied without seals.
Bearings of series YRT and YRT_{Speed} are greased using a lithium complex soap grease to GA08 and can be lubricated via the outer ring and L-section ring.
Bearings of series RTC are greased with Arcanol MULTITOP.

Axial angular contact ball bearings Axial angular contact ball bearings ZKLDF comprise a single-piece outer ring, a two-piece inner ring and two ball and cage assemblies with a contact angle of 60°. The outer ring and inner ring have fixing holes for screw mounting of the bearing on the adjacent construction.
The unit is located by means of retaining screws for transport and safe handling.

Sealing/lubricant Axial angular contact ball bearings have sealing shields on both sides. They are greased using a barium complex soap grease to DIN 51825–KPE2K–30 and can be lubricated via the outer ring.

Operating temperature Axial/radial bearings and axial angular contact ball bearings are suitable for operating temperatures from –30 °C to +120 °C.

Suffixes Suffixes and additional text for available designs: see table.

Available designs

Suffixes	Description	Design
H ₁ ...	Reduced tolerance on mounting dimension H ₁ (postscript: H ₁ with tolerance ± ...) Restricted tolerance value according to table, page 1010	Special design ¹⁾
H ₂ ...	Reduced tolerance on mounting dimension H ₂ (postscript: H ₂ with tolerance ± ...) Restricted tolerance value according to table, page 1010	Special design ¹⁾
–	Axial and radial runout tolerances restricted by 50% (additional text: axial/radial runout 50%)	Special design ¹⁾

¹⁾ Available by agreement.

Design and safety guidelines
Basic rating life

The load carrying capacity and life must be checked for the radial and axial bearing component.

Please contact us in relation to checking of the basic rating life. The speed, load and operating duration must be given.

Static load safety factor

The static load safety factor S_0 indicates the security against impermissible permanent deformations in the bearing.

It is determined as follows:

$$S_0 = \frac{C_{0r}}{F_{0r}} \text{ or } \frac{C_{0a}}{F_{0a}}$$

S_0 – Static load safety factor
 C_{0r}, C_{0a} – Basic static load rating according to dimension tables
 F_{0r}, F_{0a} – Maximum static load on the radial or axial bearing.

Caution! In machine tools and similar areas of application, S_0 should be > 4 .

Static limiting load diagrams

The static limiting load diagrams can be used:

- for rapid checking of the selected bearing size under predominantly static load
- for calculation of the tilting moment M_k that can be supported by the bearing in addition to the axial load.

The limiting load diagrams are based on a rolling element set with a static load safety factor $S_0 \geq 4$, as well as the screw and bearing ring strength.

Caution! The static limiting load must not be exceeded when dimensioning the bearing arrangement. Example: see *Figure 2*.

Axial/radial bearings

The static limiting load diagrams for YRT, YRTS and RTC are shown in *Figure 3*, page 998 to *Figure 9*, page 1000.

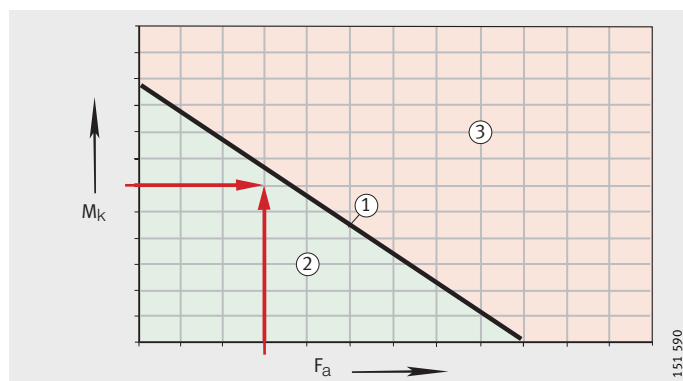
Axial angular contact ball bearings

The static limiting load diagrams for the series ZKLDf are shown in *Figure 10* and *Figure 11*, page 1001.



- ① Bearing/size
 - ② Permissible range
 - ③ Impermissible range
- M_k = max. tilting moment
 F_a = axial load

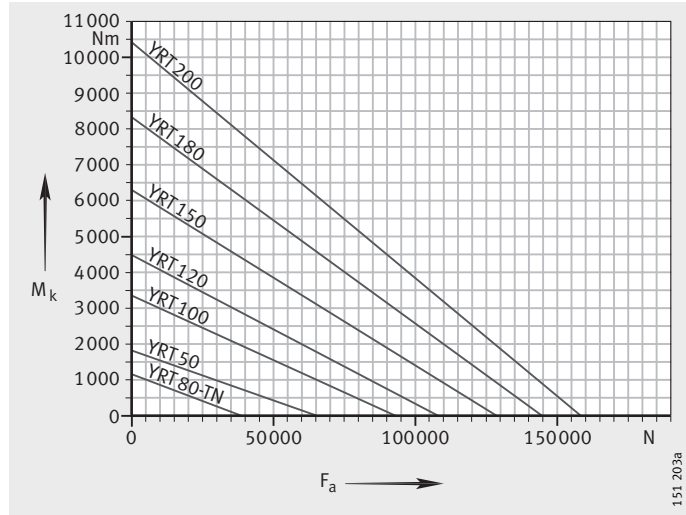
Figure 2
 Static limiting load diagram – example



Axial/radial bearings Axial angular contact ball bearings

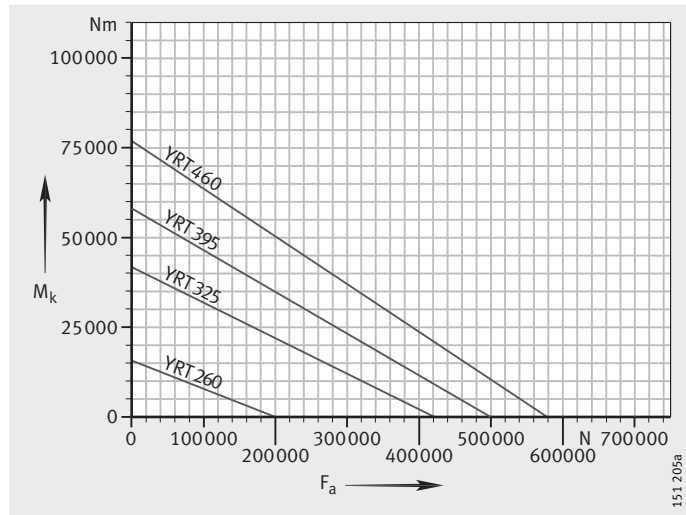
M_k = max. tilting moment
 F_a = axial load

Figure 3
Static limiting load diagram –
YRT50 to YRT200



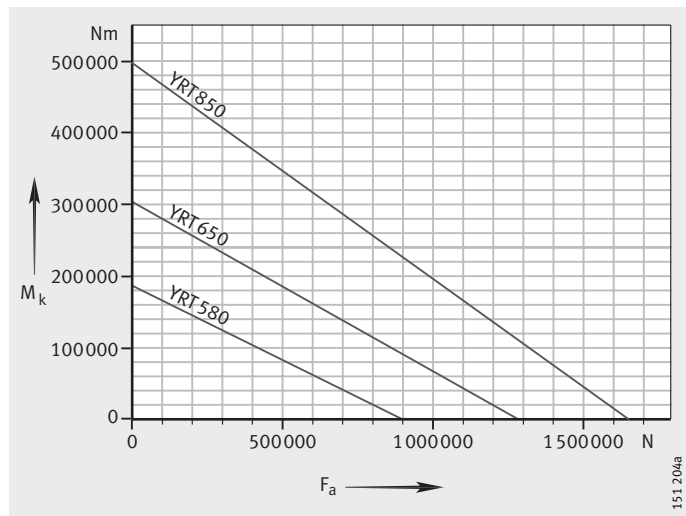
M_k = max. tilting moment
 F_a = axial load

Figure 4
Static limiting load diagram –
YRT260 to YRT460



M_k = max. tilting moment
 F_a = axial load

Figure 5
Static limiting load diagram –
YRT580 to YRT850



M_k = max. tilting moment
 F_a = axial load

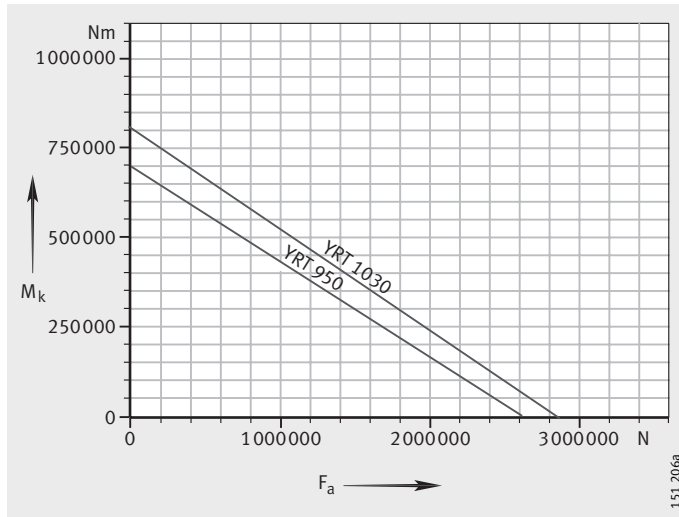


Figure 6
 Static limiting load diagram –
 YRT950 and YRT1030

M_k = max. tilting moment
 F_a = axial load

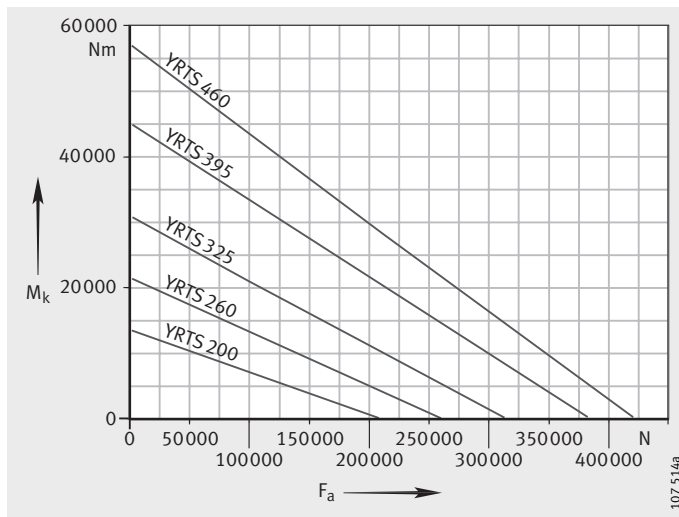
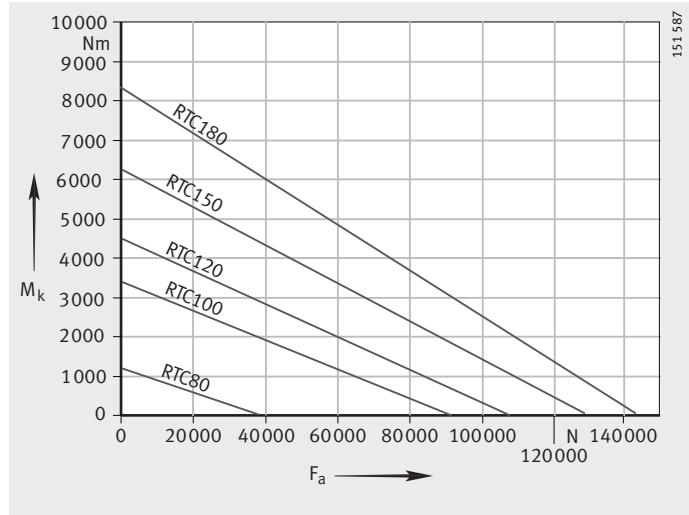


Figure 7
 Static limiting load diagram –
 YRT_{Speed}200 to YRT_{Speed}460

Axial/radial bearings Axial angular contact ball bearings

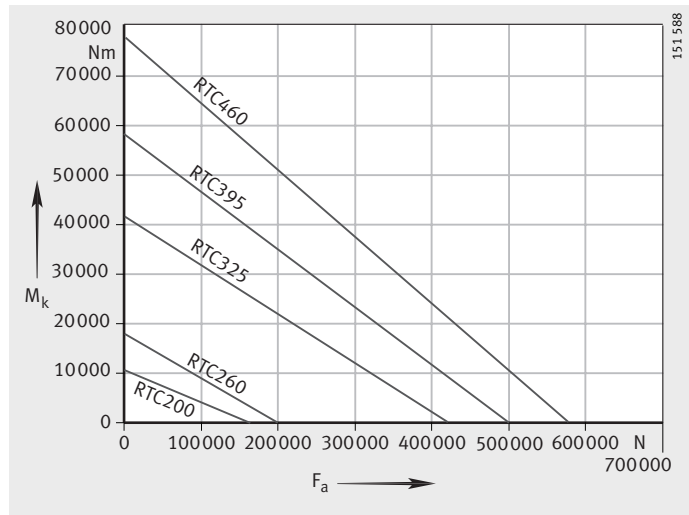
M_k = max. tilting moment
 F_a = axial load

Figure 8
Static limiting load diagram –
RTC80 to RTC180



M_k = max. tilting moment
 F_a = axial load

Figure 9
Static limiting load diagram –
RTC200 to RTC460



M_k = max. tilting moment
 F_a = axial load

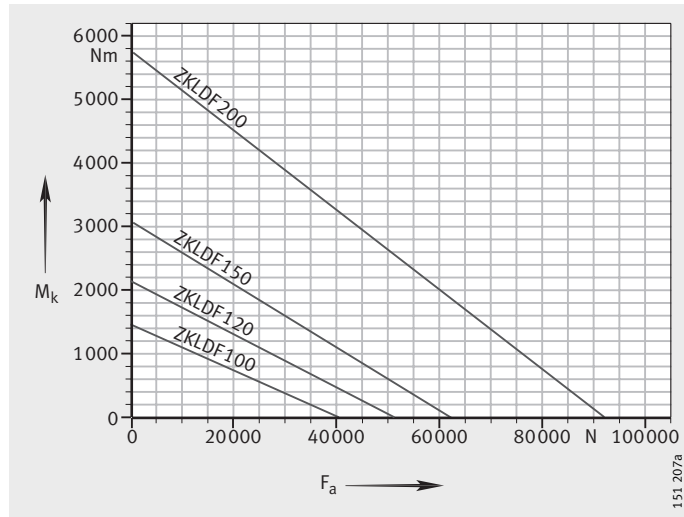


Figure 10

Static limiting load diagram –
 ZKLDF100 to ZKLDF200

M_k = max. tilting moment
 F_a = axial load

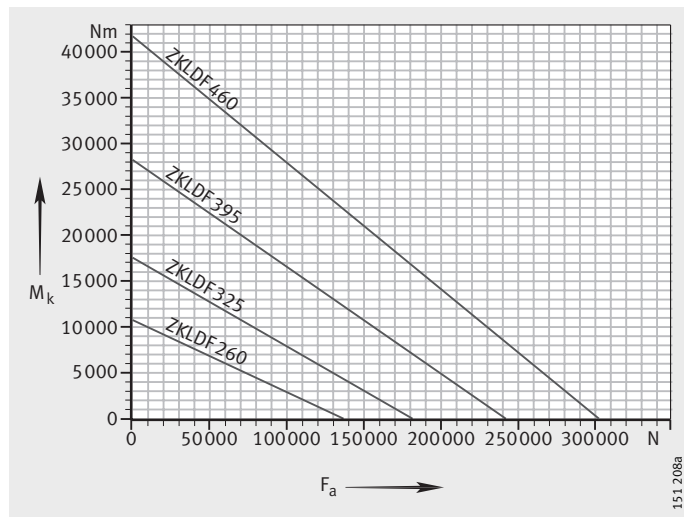


Figure 11

Static limiting load diagram –
 ZKLDF260 to ZKLDF460

Axial/radial bearings

Axial angular contact ball bearings

Limiting speeds

The bearings allow the limiting speeds n_G given in the dimension tables. The operating temperatures occurring are heavily dependent on the environmental conditions. Calculation is possible by means of a thermal balance analysis based on frictional torque data.

Caution! If the environmental conditions deviate from the specifications in relation to, for example, adjacent construction tolerances, lubrication, ambient temperature/heat dissipation or differ from the operating conditions normal for machine tools, checking must be carried out again. Please contact us.

Bearing preload

Once the bearings have been fitted and fully screw mounted, they are radially and axially clearance-free and preloaded.

Temperature differences

Temperature differences between the shaft and housing influence the radial bearing preload and thus the operating behaviour of the bearing arrangement.

If the shaft temperature is higher than the housing temperature, the radial preload will increase proportionally, so there will be an increase in the rolling element load, bearing friction and bearing temperature.

If the shaft temperature is lower than the housing temperature, the radial preload will decrease proportionally, so the rigidity will decrease to bearing clearance and wear will increase.

Frictional torque

The bearing frictional torque M_{RL} is influenced primarily by the viscosity and quantity of the lubricant and the bearing preload:

- The lubricant viscosity and quantity are dependent on the lubricant grade and operating temperature.
- The bearing preload is dependent on the mounting fits, the geometrical accuracy of the adjacent parts, the temperature difference between the inner and outer ring, the screw tightening torque and the mounting situation (bearing inner ring axially supported on one or both sides).

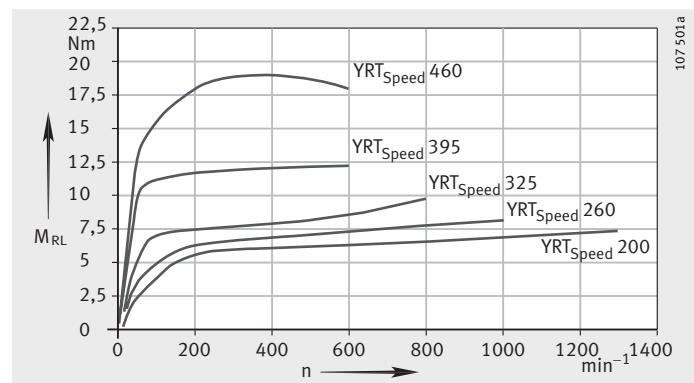
The frictional torques M_{RL} in the dimension tables are statistically determined guide values for bearings with grease lubrication (measurement speed $n_{const} = 5 \text{ min}^{-1}$). Figure 12 shows measured frictional torques for mounting with an unsupported L-section ring for YRT_{Speed} .

Caution! Any deviations in the tightening torque of the fixing screws will have a detrimental effect on the preload and the frictional torque.

M_{RL} = frictional torque
n = speed

Figure 12

Frictional torques as guide values for YRT_{Speed} – statistically determined values from series of measurements



Frictional torque and dimensioning of the drive

Caution!

For YRT and RTC bearings, it must be taken into consideration that the frictional torque can increase by a factor of 2 to 2,5 with increasing speed.

For ZKLDF bearings, it must be taken into consideration that the starting frictional torque can be 1,5 times as high as the values M_{RL} in the dimension tables.

Lubrication

Axial/radial bearings YRT, RTC and YRT_{Speed} can be relubricated via the L-section ring and outer ring.

Axial angular contact ball bearings ZKLDF can be relubricated via the outer ring.

The initial greasing is compatible with lubricating oils having a mineral oil base.

For calculation of the relubrication quantities and intervals based on a stated load spectrum (speed, load, operating duration) and the environmental conditions, please contact us.

Overlubrication

If the bearing is inadvertently overlubricated, the bearing frictional torque and temperature will increase.

In order to achieve the original frictional torque again, a running-in cycle in accordance with *Figure 13* should be applied.

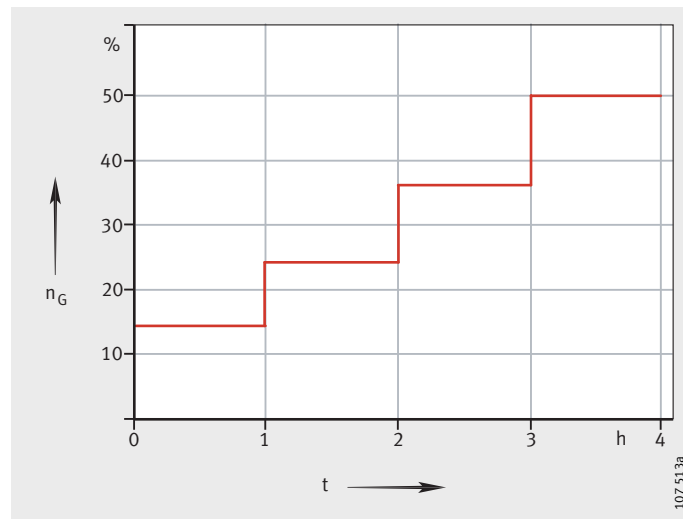
Caution!

Please note the further information on lubrication in *Technical Principles, Lubrication*.

n_G = limiting speed according to dimension tables
 t = time

Figure 13

Running-in cycle after overlubrication



Axial/radial bearings Axial angular contact ball bearings

Design of adjacent construction

Caution!

YRT, RTC, YRT_{Speed} and ZKLDF have the same mounting dimensions.

Geometrical defects in the screw mounting surfaces and fits will influence the running accuracy, preload and running characteristics of the bearing arrangement. The accuracy of the adjacent surfaces must therefore be matched to the overall accuracy requirement of the subassembly.

The adjacent construction should be produced in accordance with *Figure 14* and the tolerances must be in accordance with the tables from page 1006. Any deviations will influence the bearing frictional torque, running accuracy and running characteristics.

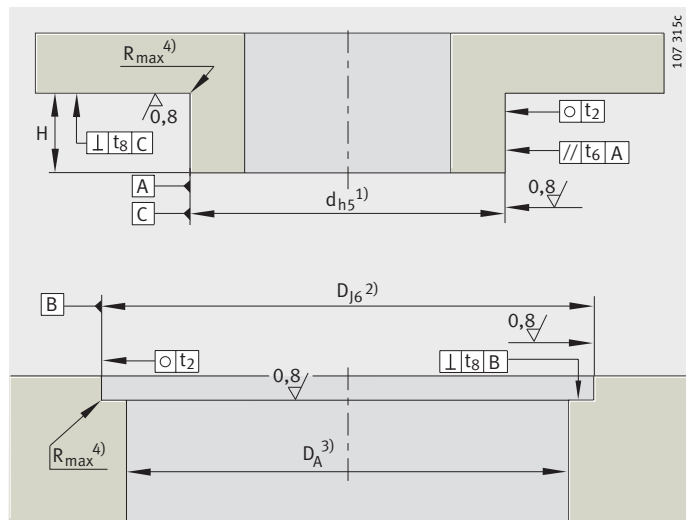


Figure 14
Requirements for the adjacent construction – YRT, RTC, YRT_{Speed}, ZKLDF

Legend to *Figure 14*

- 1) Support over whole bearing height. It must be ensured that the means of support has adequate rigidity.
- 2) A precise fit is only necessary if radial support due to the load or a precise bearing position is required.
- 3) Note the bearing diameter D_1 according to the dimension tables. Ensure that there is sufficient distance between the rotating bearing rings and the adjacent construction.
- 4) For values, see table Maximum corner radii of fit surfaces, page 1007.

Fits

The selection of fits leads to transition fits, i.e. depending on the actual dimensional position of the bearing diameter and mounting dimensions, clearance fits or interference fits can arise.

Caution!

The fit influences, for example, the running accuracy of the bearing and its dynamic characteristics.

An excessively tight fit will increase the radial bearing preload. This means that:

- there is an increase in bearing friction and heat generation in the bearing as well as the load on the raceway system and wear
- there will be a decrease in the achievable speed and the bearing operating life.

In order to achieve very high running accuracy, the fit clearance should be as close as possible to zero.

For easier matching of the adjacent construction to the actual bearing dimensions, each bearing of series RTC and YRT_{Speed} is supplied with a measurement record (this is supplied by agreement for other series).

Recommended fits for shafts

The shaft should be produced to tolerance zone h5 and for series YRT_{Speed} in accordance with the table, page 1007.

If there are special requirements, the fit clearance must be further restricted within the tolerance zone h5:

- Requirements for running accuracy:
 - For maximum running accuracy and a rotating bearing inner ring, the fit clearance should be as close as possible to zero. The fit clearance may otherwise increase the bearing runout. With normal requirements for running accuracy or a static bearing inner ring, the shaft should be produced to h5.
- Requirements for dynamic characteristics:
 - For swivel type operation ($n \times d < 35\,000$, operating duration $ED < 10\%$) the shaft should be produced to h5.
 - For higher speeds and longer operating durations, the fit clearance must not exceed 0,01 mm. For series YRT_{Speed}, the fit clearance must not exceed 0,005 mm.

For series ZKLDF, the fit clearance should be based on the inner ring with the smallest bore dimension.

Recommended fits for housings

The housing should be produced to tolerance zone J6, for series YRT_{Speed} in accordance with the table Recommended fits, page 1007.

If there are special requirements, the fit clearance must be further restricted within the tolerance zone J6:

- Requirements for running accuracy:
 - For maximum running accuracy and a rotating bearing outer ring, the fit clearance should be as close as possible to zero. With a static bearing outer ring, a clearance fit or a design without radial centring should be selected.
- Requirements for dynamic characteristics:
 - For predominantly swivel type operation ($n \times d < 35\,000$, operating duration $ED < 10\%$) and a rotating bearing outer ring, the housing fit should be produced to J6.
 - For higher speeds and longer operating duration, the bearing outer ring should not be radially centred or the housing fit should be produced as a clearance fit with at least 0,02 mm clearance. This reduces the increase in preload when heat is generated in the bearing position.



Fit selection depending on the screw connection of the bearing rings

If the bearing outer ring is screw mounted on the static component, a fit seating is not required or a fit seating in accordance with the table Recommended fits for adjacent construction, page 1007, can be produced. If the values in the table are used, this will give a transition fit with a tendency towards clearance fit. This generally allows easy fitting.

If the bearing inner ring is screw mounted on the static component, it should nevertheless for functional reasons be supported by the shaft over the whole bearing height. The shaft dimensions should then be selected in accordance with the tables from page 1006. If these values in the table are used, this will give a transition fit with a tendency towards clearance fit.

Axial/radial bearings Axial angular contact ball bearings

Geometrical and positional accuracy of the adjacent construction

The values given in the following tables for the geometrical and positional accuracy of the adjacent construction have proved effective in practice and are adequate for the majority of applications.

Caution!

The geometrical tolerances influence the axial and radial runout accuracy of the subassembly as well as the bearing frictional torque and the running characteristics.

Geometrical and positional accuracy for shafts – YRT, RTC, ZKLDF

Nominal shaft diameter d mm		Deviation d for tolerance zone h5 μm	Roundness Parallelism Perpendicularity t ₂ , t ₆ , t ₈ μm
over	incl.		
50	80	⁰ ₋₁₃	3
80	120	⁰ ₋₁₅	4
120	150	⁰ ₋₁₈	5
150	180	⁰ ₋₁₈	5
180	250	⁰ ₋₂₀	7
250	315	⁰ ₋₂₃	8
315	400	⁰ ₋₂₅	9
400	500	⁰ ₋₂₇	10
500	630	⁰ ₋₂₈	11
630	800	⁰ ₋₃₂	12
800	1000	⁰ ₋₃₆	14

Geometrical and positional accuracy for housings – YRT, RTC, ZKLDF

Nominal housing bore diameter D mm		Deviation D for tolerance zone J6 μm	Roundness Perpendicularity t ₂ , t ₈ μm
over	incl.		
120	150	⁺¹⁸ ₋₇	5
150	180	⁺¹⁸ ₋₇	5
180	250	⁺²² ₋₇	7
250	315	⁺²⁵ ₋₇	8
315	400	⁺²⁹ ₋₇	9
400	500	⁺³³ ₋₇	10
500	630	⁺³⁴ ₋₇	11
630	800	⁺³⁸ ₋₈	12
800	1000	⁺⁴⁴ ₋₁₂	14
1000	1250	⁺⁵² ₋₁₄	16

Recommended fits for shaft and housing bore – YRT_{Speed}

Axial/radial bearing	Shaft diameter d mm	Housing bore D mm
YRT _{Speed} 200	200 ^{-0,01} _{-0,024}	300 ^{+0,011} _{-0,005}
YRT _{Speed} 260	260 ^{-0,013} _{-0,029}	385 ^{+0,013} _{-0,005}
YRT _{Speed} 325	325 ^{-0,018} _{-0,036}	450 ^{+0,015} _{-0,005}
YRT _{Speed} 395	395 ^{-0,018} _{-0,036}	525 ^{+0,017} _{-0,005}
YRT _{Speed} 460	460 ^{-0,018} _{-0,038}	600 ^{+0,017} _{-0,005}

Geometrical and positional accuracy for shafts – YRT_{Speed}

Axial/radial bearing	Roundness t ₂ μm	Parallelism t ₆ μm	Perpendicularity t ₈ μm
YRT _{Speed} 200	6	5	5
YRT _{Speed} 260 to YRT _{Speed} 460	8	5	7

Geometrical and positional accuracy for housings – YRT_{Speed}

Axial/radial bearing	Roundness t ₂ μm	Perpendicularity t ₈ μm
YRT _{Speed} 200 to YRT _{Speed} 460	6	8

Maximum corner radii of fit surfaces – YRT, RTC, YRT_{Speed}, ZKLDF

Bore diameter d mm	Max. corner radius R _{max} mm
50 incl. 150	0,1
over 150 incl. 460	0,3
over 460 incl. 950	1



Mounting dimensions H₁, H₂

Caution!

If the height variation must be as small as possible, the H₁ dimensional tolerance must conform to the tables, page 1010, page 1011 and Figure 15.

The mounting dimension H₂ defines the position of any worm wheel used, Figure 15, see also Figure 16, L-section ring with support ring.

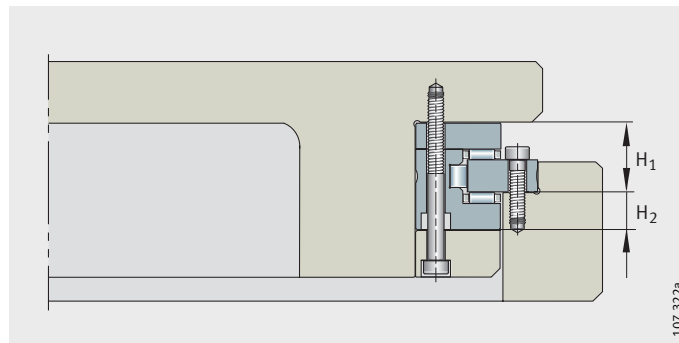


Figure 15
Mounting dimension H₁, H₂

Axial/radial bearings Axial angular contact ball bearings

L-section ring without support ring / with support ring

The L-section ring of bearings YRT and RTC can be mounted unsupported or supported over its whole surface, *Figure 16*. If the L-section ring is supported, the tilting rigidity is higher. The support ring (e.g. worm wheel) must be ordered separately.

Depending on the application, series YRT and RTC require bearings with a different preload match in order to achieve the same preload forces in the axial bearing.

For series YRT_{Speed} and ZKLDF, there is only one preload match. The increase in rigidity and friction in YRT_{Speed} bearings is small and can normally be ignored.

In bearings of series ZKLDF, the rigidity and frictional torque are not influenced by the support ring.

L-section ring without support ring

For an arrangement “L-section ring without support ring”, the bearing designation is:

- YRT <bore diameter> or
- RTC <bore diameter>.

L-section ring with support ring

For an arrangement “L-section ring with support ring”, the bearing designation is:

- YRT <bore diameter> **VSP**
- RTC <bore diameter> **EB**.

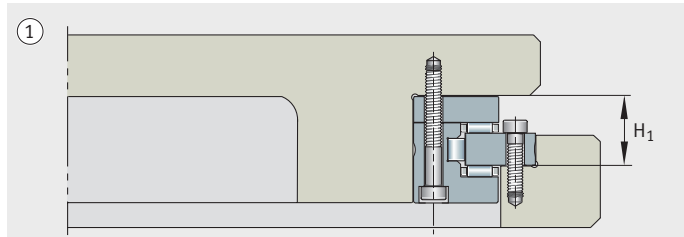
For RTC with an additionally restricted axial and radial runout, the bearing designation is:

- RTC <bore diameter> **T52EA**.

Caution!

For bearing arrangements with a supported L-section ring, only bearings with the suffix VSP, EB or T52EA can be ordered. If the normal design is mounted with a supported L-section ring, there will be a considerable increase in the bearing frictional torque. The support ring should be at least twice as high as the shaft locating washer of the bearing.

YRT
RTC



YRT..VSP
RTC..EB
RTC..T52EA

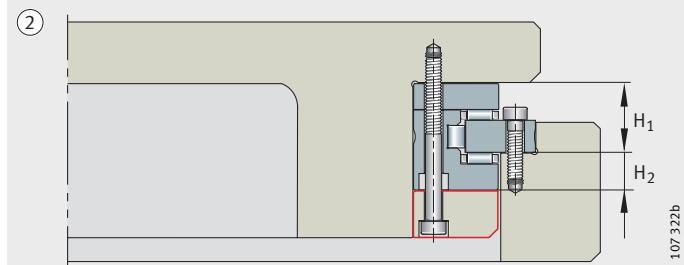


Figure 16

- ① L-section ring without support ring,
- ② L-section ring with support ring/
for YRT, RTC

107 322b

Fitting Retaining screws secure the bearing components during transport. For easier centring of the bearing, the screws should be loosened before fitting and either secured again or removed after fitting. Tighten the fixing screws in crosswise sequence using a torque wrench in three stages to the specified tightening torque M_A , while rotating the bearing ZKLDF, *Figure 17*:

- Stage 1 40% of M_A
- Stage 2 70% of M_A
- Stage 3 100% of M_A .

Observe the correct grade of the fixing screws.

Caution! Mounting forces must only be applied to the bearing ring to be fitted, never through the rolling elements.

Bearing components must not be separated or interchanged during fitting and dismantling.

If the bearing is unusually difficult to move, loosen the fixing screws and tighten them again in steps in a crosswise sequence. This will eliminate any distortion.

Bearings should only be fitted in accordance with TPI 103, Fitting and Maintenance Manual.

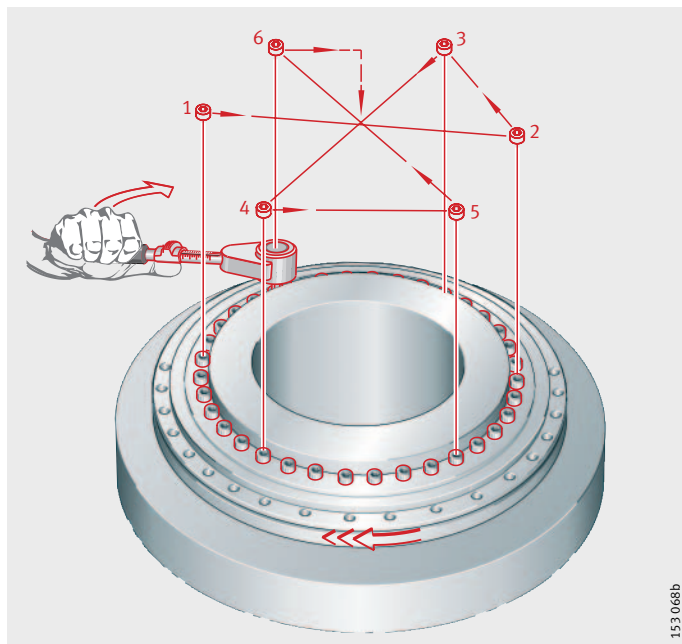


Figure 17
Tightening of fixing screws

Axial/radial bearings

Axial angular contact ball bearings

Accuracy The dimensional tolerances are derived from tolerance class P5. The running tolerances correspond to P4 in accordance with DIN 620, see table Dimensional tolerances, mounting dimensions, axial and radial runout.

The axial and radial runout accuracy is influenced by:

- the running accuracy of the bearing
- the geometrical accuracy of the adjacent surfaces
- the fit between the rotating bearing ring and the adjacent component.

Caution! In order to achieve very high running accuracy, the fit clearance should be as close as possible to zero.

The bearing bore in the series YRT, RTC and YRT_{Speed} may be slightly conical when delivered. This is typical of the bearing design and is a result of the radial bearing preload forces. The bearing will regain its ideal geometry when fitted.

Dimensional tolerances,
mounting dimensions,
axial and radial runout –
YRT, ZKLDF

Dimensional tolerances				Mounting dimensions					Axial and radial runout ¹⁾	
Bore		Outside diameter		H ₁	Δ _{H1s}	Re-strict-ed ²⁾	H ₂	Re-strict-ed ²⁾	Nor-mal	Re-strict-ed ²⁾
d	Δ _{ds}	D	Δ _{Ds}							
50	-0,008	126	-0,011	20	±0,125	±0,025	10	±0,02	2	1
80	-0,009	146	-0,011	23,35	±0,15	±0,025	11,7	±0,02	3	1,5
100	-0,01	185	-0,015	25	±0,175	±0,025	13	±0,02	3	1,5
120	-0,01	210	-0,015	26	±0,175	±0,025	14	±0,02	3	1,5
150	-0,013	240	-0,015	26	±0,175	±0,03	14	±0,02	3	1,5
180	-0,013	280	-0,018	29	±0,175	±0,03	14	±0,025	4	2
200	-0,015	300	-0,018	30	±0,175	±0,03	15	±0,025	4	2
260	-0,018	385	-0,02	36,5	±0,2	±0,04	18,5	±0,025	6	3
325	-0,023	450	-0,023	40	±0,2	±0,05	20	±0,025	6	3
395	-0,023	525	-0,028	42,5	±0,2	±0,05	22,5	±0,025	6	3
460	-0,023	600	-0,028	46	±0,225	±0,06	24	±0,03	6	3
580	-0,025	750	-0,035	60	±0,25	±0,075	30	±0,03	10	5 ³⁾
650	-0,038	870	-0,05	78	±0,25	±0,1	44	±0,03	10	5 ³⁾
850	-0,05	1095	-0,063	80,5	±0,3	±0,12	43,5	±0,03	12	6 ³⁾
950	-0,05	1200	-0,063	86	±0,3	±0,12	46	±0,03	12	6 ³⁾
1030	-0,063	1300	-0,08	92,5	±0,3	±0,15	52,5	±0,03	12	6 ³⁾

1) For rotating inner and outer ring, measured on fitted bearing, with ideal adjacent construction.

2) Special design, YRT only.

3) By agreement only for rotating outer ring.

**Dimensional tolerances,
mounting dimensions,
axial and radial runout –
RTC**

Dimensional tolerances						Mounting dimensions		Axial and radial runout ¹⁾ Normal	Axial runout ¹⁾ Re-strict-ed
Bore		Outside diameter		Bearing height		H ₁	ΔH _{1s}		
d	Δ _{ds}	D	Δ _{Ds}	H	Δ _{Hs}			H ₁	ΔH _{1s}	μm	μm
mm	mm	mm	mm	mm	mm	mm	mm		
80	-0,009	146	-0,011	35	+0,025 -0,15	23,35	±0,025	3	1,5
100	-0,01	185	-0,015	38	+0,025 -0,15	25	±0,025	3	1,5
120	-0,01	210	-0,015	40	+0,03 -0,175	26	±0,025	3	1,5
150	-0,013	240	-0,015	40	+0,03 -0,175	26	±0,03	3	1,5
180	-0,013	280	-0,018	43	+0,03 -0,175	29	±0,03	4	2
200	-0,015	300	-0,018	45	+0,03 -0,175	30	±0,03	4	2
260	-0,018	385	-0,020	55	+0,04 -0,25	36	±0,04	5	3
325	-0,023	450	-0,023	60	+0,05 -0,3	40	±0,05	5	3
395	-0,023	525	-0,028	65	+0,05 -0,3	42,5	±0,05	5	3
460	-0,027	600	-0,028	70	+0,06 -0,35	46	±0,06	6	3

¹⁾ For rotating inner and outer ring, measured on fitted bearing, with ideal adjacent construction.

**Dimensional tolerances, mounting
dimensions, axial and radial runout
– YRT_{Speed}**

Dimensional tolerances				Mounting dimensions			Axial and radial runout ¹⁾
Bore		Outside diameter		H ₁	ΔH _{1s}	H ₂	
d	Δ _{ds}	D	Δ _{Ds}				H ₁	ΔH_{1s}	H_{2}
mm	mm	mm	mm	mm	mm	mm	μm
200	-0,015	300	-0,018	30	+0,04 -0,06	15	4
260	-0,018	385	-0,02	36,5	+0,05 -0,07	18,5	6
325	-0,023	450	-0,023	40	+0,06 -0,07	20	6
395	-0,023	525	-0,028	42,5	+0,06 -0,07	22,5	6
460	-0,023	600	-0,028	46	+0,07 -0,08	24	6

¹⁾ For rotating inner and outer ring, measured on fitted bearing, with ideal adjacent construction.

Special designs

Available by agreement:

For YRT, axial and radial runout tolerance restricted by 50%.

Additional text: axial/radial runout 50%.

For RTC, axial runout tolerance restricted by 50%.

Additional text: axial runout 50%.

For YRT, closer tolerance on mounting dimension H₁ and H₂.

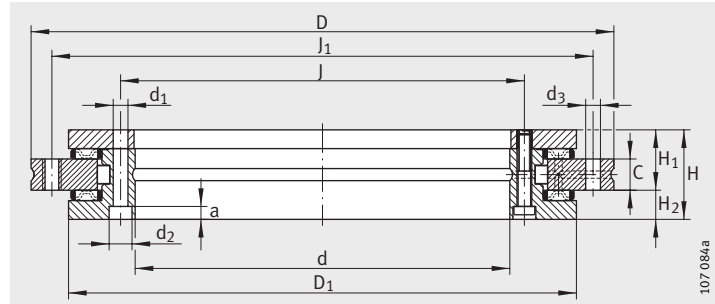
Additional text: H₁ with tolerance ± ..., H₂ with tolerance ± ...

For restricted tolerance value, see table, page 1010.



Axial/radial bearings

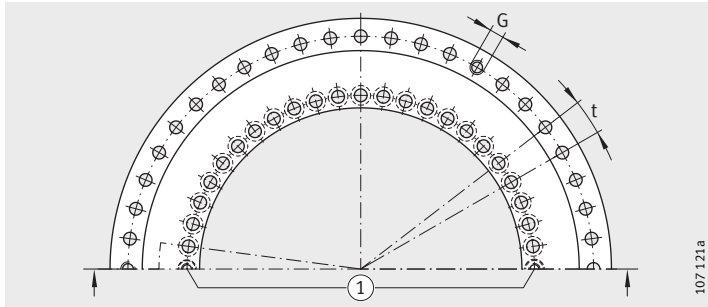
Double direction



YRT

Dimension table · Dimensions in mm																
Designation	Mass m ≈ kg	Dimensions									Fixing holes					
		d	D	H	H ₁	H ₂	C	D ₁ max.	J	J ₁	Inner ring				Outer ring	
											d ₁	d ₂	a	Quantity ⁴⁾	d ₃	Quantity ⁴⁾
YRT50	1,6	50	126	30	20	10	10	105	63	116	5,6	–	–	10	5,6	12
YRT80-TV⁵⁾	2,4	80	146	35	23,35	11,65	12	130	92	138	5,6	10	4	10	4,6	12
YRT100⁵⁾	4,1	100	185	38	25	13	12	160	112	170	5,6	10	5,4	16	5,6	15
YRT120	5,3	120	210	40	26	14	12	184	135	195	7	11	6,2	22	7	21
YRT150	6,2	150	240	40	26	14	12	214	165	225	7	11	6,2	34	7	33
YRT180	7,7	180	280	43	29	14	15	244	194	260	7	11	6,2	46	7	45
YRT200	9,7	200	300	45	30	15	15	274	215	285	7	11	6,2	46	7	45
YRT260	18,3	260	385	55	36,5	18,5	18	345	280	365	9,3	15	8,2	34	9,3	33
YRT325⁵⁾	25	325	450	60	40	20	20	415	342	430	9,3	15	8,2	34	9,3	33
YRT395	33	395	525	65	42,5	22,5	20	486	415	505	9,3	15	8,2	46	9,3	45
YRT460	45	460	600	70	46	24	22	560	482	580	9,3	15	8,2	46	9,3	45
YRT580	89	580	750	90	60	30	30	700	610	720	11,4	18	11	46	11,4	42
YRT650	170	650	870	122	78	44	34	800	680	830	14	20	13	46	14	42
YRT850	253	850	1095	124	80,5	43,5	37	1018	890	1055	18	26	17	58	18	54
YRT950 ⁷⁾	312	950	1200	132	86	46	40	1130	990	1160	18	26	17	58	18	54
YRT1030	375	1 030	1300	145	92,5	–	40	1215	1075	1255	18	26	17	60	18	66

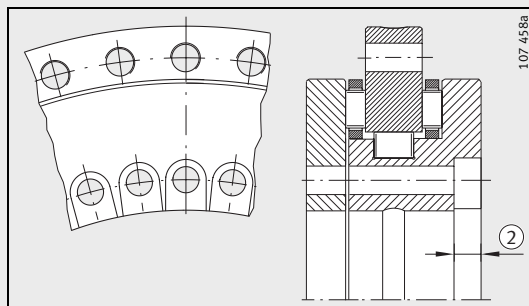
- 1) Including retaining screws and threaded extraction holes.
- 2) Tightening torque for screws to DIN 912, grade 10.9.
- 3) Rigidity values taking account of the rolling element set, deformation of the bearing rings and the screw connections.
- 4) Caution!
For fixing holes in the adjacent construction.
Pay attention to the pitch of the bearing holes.
- 5) Screw counterbores in the L-section ring open to the bearing bore (see figure, page 1013).
Bearing inside diameter is unsupported in this area ②.
- 6) For high operating durations or continuous operation, please contact us.
- 7) Available by agreement only.



Hole pattern

① Two retaining screws per size

Pitch $t^{1)}$	Threaded extraction hole		Screw tightening torque $M_A^{2)}$ Nm	Basic load ratings				Limiting speed ⁶⁾ n_G min ⁻¹	Bearing frictional torque M_{RL} Nm	Axial rigidity ³⁾ c_{aL} kN/ μ m	Radial rigidity ³⁾ c_{rL} kN/ μ m	Tilting rigidity ³⁾ c_{kL} kNm/mrad
	G	Quantity		axial		radial						
				dyn. C_a N	stat. C_{0a} N	dyn. C_r N	stat. C_{0r} N					
12X30°	–	–	8,5	56 000	280 000	28 500	49 500	440	2,5	1,3	1,1	1,25
12X30°	–	–	8,5/4,5	38 000	158 000	44 000	98 000	350	3	1,6	1,8	2,5
18X20°	M5	3	8,5	73 000	370 000	52 000	108 000	280	3	2	2	5
24X15°	M8	3	14	80 000	445 000	70 000	148 000	230	7	2,1	2,2	7
36X10°	M8	3	14	85 000	510 000	77 000	179 000	210	13	2,3	2,6	11
48X 7,5°	M8	3	14	92 000	580 000	83 000	209 000	190	14	2,6	3	17
48X 7,5°	M8	3	14	98 000	650 000	89 000	236 000	170	15	3	3,5	23
36X10°	M12	3	34	109 000	810 000	102 000	310 000	130	25	3,5	4,5	45
36X10°	M12	3	34	186 000	1 710 000	134 000	415 000	110	48	4,3	5	80
48X 7,5°	M12	3	34	202 000	2 010 000	133 000	435 000	90	55	4,9	6	130
48X 7,5°	M12	3	34	217 000	2 300 000	187 000	650 000	80	70	5,7	7	200
48X 7,5°	M12	6	68	390 000	3 600 000	211 000	820 000	60	140	6,9	9	380
48X 7,5°	M12	6	116	495 000	5 200 000	415 000	1 500 000	55	200	7,6	10	550
60X 6°	M12	6	284	560 000	6 600 000	475 000	1 970 000	40	300	9,3	13	1 100
60X 6°	M12	6	284	1 040 000	10 300 000	600 000	2 450 000	40	600	10,4	14	1 500
72X 5°	M16	6	284	1 080 000	11 000 000	620 000	2 650 000	35	800	11,2	16	1 900

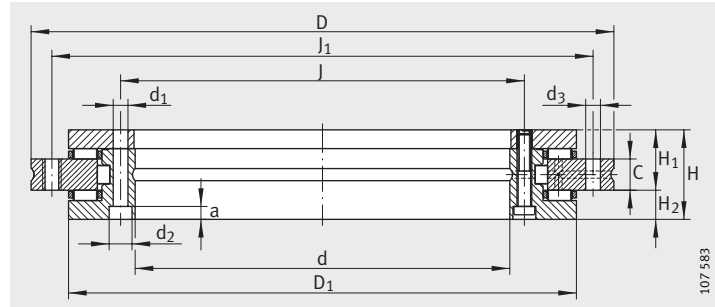


Screw counterbore open

Bearing inside diameter unsupported in area ②

Axial/radial bearings

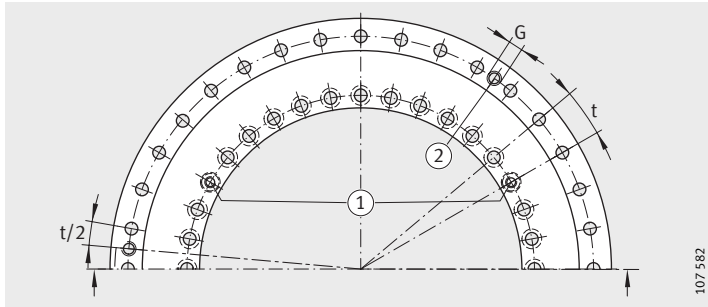
Double direction



RTC

Dimension table · Dimensions in mm															
Designation	Mass m ≈kg	Dimensions ⁷⁾								Fixing holes					
		d	D	H	H ₁	C	D ₁	J	J ₁	Inner ring				Outer ring	
										d ₁	d ₂	a	Quantity ⁴⁾	d ₃	Quantity ⁴⁾
RTC80 ⁵⁾	2	80	146	35	23,35	12	130	92	138	5,6	10	5,7	12	4,6	12
RTC100 ⁵⁾	4	100	185	38	25	12	160	112	170	5,6	10	5,7	15	5,6	18
RTC120	5	120	210	40	26	12	184	135	195	7	11	7	21	7	24
RTC150	5,8	150	240	40	26	12	212	165	225	7	11	7	33	7	36
RTC180	8	180	280	43	29	15	242	194	260	7	11	7	45	7	48
RTC200	9,3	200	300	45	30	15	272	215	285	7	11	7	45	4	48
RTC260	18	260	385	55	36,5	18	343	280	365	9,3	15	9,3	33	9,3	36
RTC325 ⁵⁾	25	325	450	60	40	20	413	342	430	9,3	15	9,3	33	9,3	36
RTC395	33	395	525	65	42,5	20	484	415	505	9,3	15	9,3	45	9,3	48
RTC460	48	460	600	70	46	22	558	482	580	9,3	15	9,3	45	9,3	48

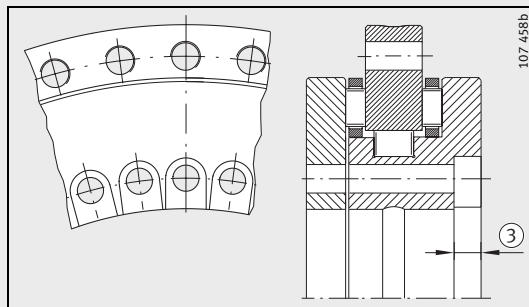
- 1) Including retaining screws and threaded extraction holes.
- 2) Tightening torque for screws to DIN 912, grade 10.9.
- 3) Rigidity values taking account of the rolling element set, deformation of the bearing rings and the screw connections.
- 4) Caution!
For fixing holes in the adjacent construction.
Pay attention to the pitch of the bearing holes.
- 5) Screw counterbores in the L-section ring open to the bearing bore (see figure, page 1015).
Bearing inside diameter is unsupported in this area ③.
- 6) For high operating durations or continuous operation, please contact us.
- 7) Sizes $d > 460$ mm available by agreement.



Hole pattern

- ① Retaining screws $3 \times 120^\circ$
- ② Threaded extraction holes

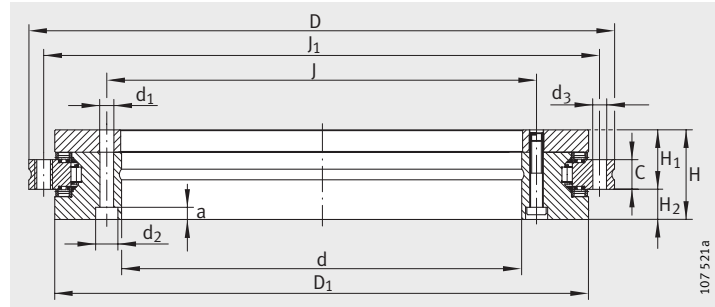
Pitch $t^{1)}$	Retaining screws	Threaded extraction hole		Screw tightening torque	Basic load ratings				Limiting speed ⁶⁾	Bearing frictional torque	Axial rigidity ³⁾	Radial rigidity ³⁾	Tilting rigidity ³⁾	
		G	Quantity		$M_A^{2)}$	axial		radial						
						dyn. C_a	stat. C_{0a}	dyn. C_r						stat. C_{0r}
QuantityXt	Quantity			Nm	N	N	N	N	n_G	M_{RL}	c_{aL}	c_{rL}	c_{kL}	
									min^{-1}	Nm	$\text{kN}/\mu\text{m}$	$\text{kN}/\mu\text{m}$	kNm/mrad	
12X30°	3	–	–	8,5	56 000	255 000	42 500	100 000	530	1	0,71	1,8	1,6	
18X20°	3	M5	3	8,5	76 500	415 000	47 500	120 000	430	4	1,2	2	5	
24X15°	3	M6	3	14	102 000	540 000	52 000	143 000	340	5	1,3	2,2	7	
36X10°	3	M6	3	14	112 000	630 000	56 000	170 000	320	7	1,5	2,6	11	
48X 7,5°	3	M6	3	14	118 000	710 000	69 500	200 000	280	9	1,7	3	17	
48X 7,5°	3	M6	3	14	120 000	765 000	81 500	220 000	260	11	1,8	3,5	23	
36X10°	3	M8	3	34	160 000	1 060 000	93 000	290 000	200	16	2,1	4,5	45	
36X10°	3	M8	3	34	275 000	1 930 000	120 000	345 000	170	27	2,8	5	80	
48X 7,5°	3	M8	3	34	300 000	2 280 000	186 000	655 000	140	42	3,4	6	130	
48X 7,5°	3	M8	3	34	355 000	2 800 000	200 000	765 000	120	55	3,9	7	200	



Screw counterbore open
Bearing inside diameter unsupported in area ③

Axial/radial bearings

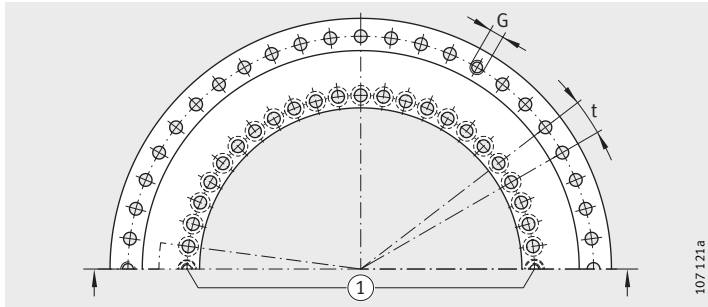
Double direction



YRT_{Speed}

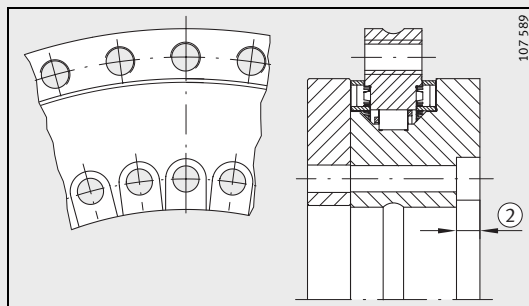
Dimension table · Dimensions in mm																		
Designation	Mass m ≈kg	Dimensions										Fixing holes						Retaining screws Quantity
		d	D	H	H ₁	H ₂	C	D ₁	J	J ₁	Inner ring				Outer ring			
											d ₁	d ₂	a	Quantity ³⁾	d ₃	Quantity ³⁾		
YRTS200	9,7	200_{-0,015}	300 _{-0,018}	45	30	15	15	274	215	285	7	11	6,2	46	7	45	2	
YRTS260	18,3	260_{-0,018}	385 _{-0,02}	55	36,5	18,5	18	345	280	365	9,3	15	8,2	34	9,3	33	2	
YRTS325⁵⁾	25	325_{-0,023}	450 _{-0,023}	60	40	20	20	415	342	430	9,3	15	8,2	34	9,3	33	2	
YRTS395	33	395_{-0,023}	525 _{-0,028}	65	42,5	22,5	20	486	415	505	9,3	15	8,2	46	9,3	45	2	
YRTS460	45	460_{-0,023}	600 _{-0,023}	70	46	24	22	560	482	580	9,3	15	8,2	46	9,3	45	2	

- 1) Including retaining screws and threaded extraction holes.
- 2) For screws to DIN 912, grade 10.9.
- 3) Caution!
For fixing holes in the adjacent construction.
Pay attention to the pitch of the bearing holes.
- 4) Rigidity values taking account of the rolling element set, deformation of the bearing rings and the screw connections.
- 5) Screw counterbores in the L-section ring open to the bearing bore, see figure, page 1017.
Bearing inside diameter is unsupported in this area ②.



Hole pattern
 ① Retaining screws

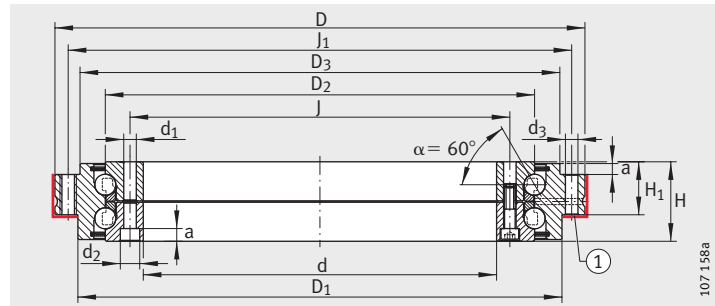
Pitch t ¹⁾	Threaded extraction hole		Screw tightening torque	Basic load ratings				Limiting speed	Axial rigidity ⁴⁾	Radial rigidity ⁴⁾	Tilting rigidity ⁴⁾	Mass moment of inertia for rotating	
	G	Quantity		axial		radial						Inner ring IR	Outer ring AU
				dyn. C _a	stat. C _{0a}	dyn. C _r	stat. C _{0r}						
48X 7,5°	M8	3	14	155 000	840 000	94 000	226 000	1 160	4	1,2	29	667	435
36X10°	M12	3	34	173 000	1 050 000	110 000	305 000	910	5,4	1,6	67	2 074	1 422
36X10°	M12	3	34	191 000	1 260 000	109 000	320 000	760	6,6	1,8	115	4 506	2 489
48X 7,5°	M12	3	34	214 000	1 540 000	121 000	390 000	650	7,8	2	195	8 352	4 254
48X 7,5°	M12	3	34	221 000	1 690 000	168 000	570 000	560	8,9	1,8	280	15 738	7 379



Screw counterbore open
 Bearing inside diameter unsupported in area ②

Axial angular contact ball bearings

Double direction

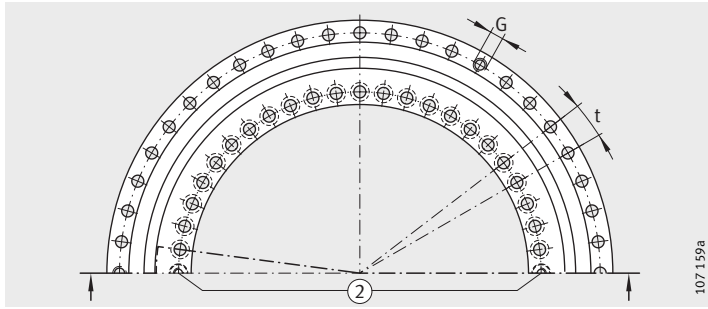


ZKLDF

① Contact surface/centring diameter

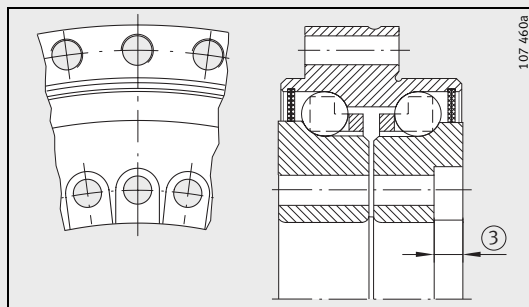
Dimension table · Dimensions in mm															
Designation	Mass m ≈ kg	Dimensions										Inner ring			
		d	D	H	H ₁	D ₁	D ₂	D ₃	J	J ₁	a	Fixing holes			Retain- ing screws
												d ₁	d ₂	Quan- tity ⁴⁾	Quan- tity
ZKLDF100 ⁵⁾	4,5	100	185	38	25	160	136	158	112	170	5,4	5,6	10	16	2
ZKLDF120	6	120	210	40	26	184	159	181	135	195	6,2	7	11	22	2
ZKLDF150	7,5	150	240	40	26	214	188	211	165	225	6,2	7	11	34	2
ZKLDF200	11	200	300	45	30	274	243	271	215	285	6,2	7	11	46	2
ZKLDF260	22	260	385	55	36,5	345	313	348	280	365	8,2	9,3	15	34	2
ZKLDF325 ⁵⁾	28	325	450	60	40	415	380	413	342	430	8,2	9,3	15	34	2
ZKLDF395	39	395	525	65	42,5	486	450	488	415	505	8,2	9,3	15	46	2
ZKLDF460 ⁶⁾	50	460	600	70	46	560	520	563	482	580	8,2	9,3	15	46	2

- 1) Including retaining screws and threaded extraction holes.
- 2) Tightening torque for screws to DIN 912, grade 10.9.
- 3) Rigidity values taking account of the rolling element set, deformation of the bearing rings and the screw connections.
- 4) Caution!
For fixing holes in the adjacent construction.
Pay attention to the pitch of the bearing holes.
- 5) Screw counterbores in the L-section ring open to the bearing bore, see figure, page 1019.
Bearing inside diameter is unsupported in this area ③.
- 6) Sizes d > 460 mm available by agreement.
- 7) Valid for adapted adjacent construction.



Hole pattern
① Retaining screws

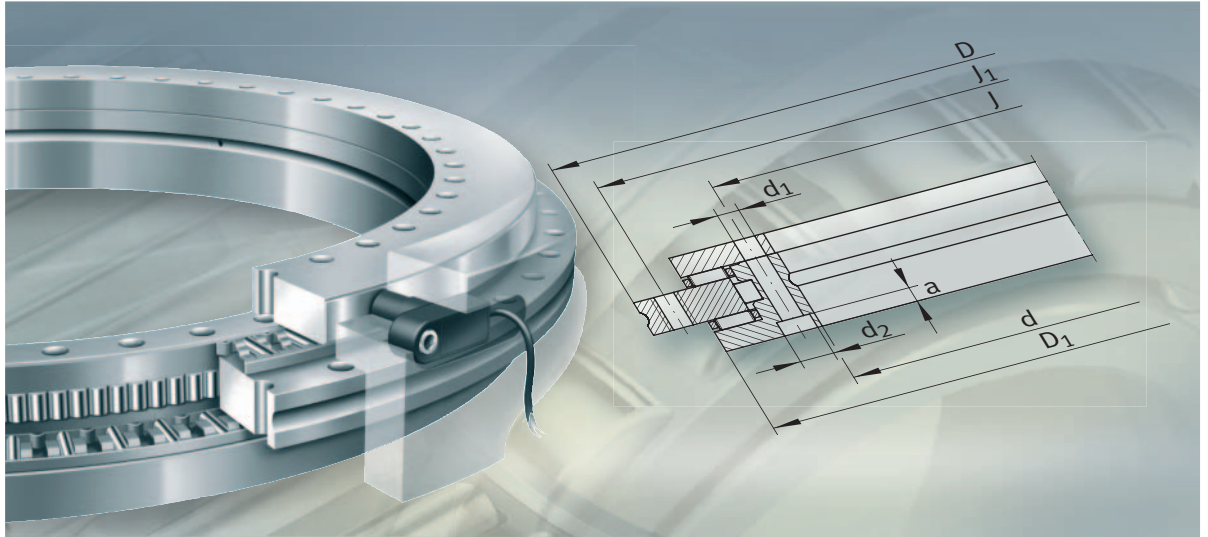
Outer ring		Pitch t ¹⁾		Screw tightening torque	Basic load ratings		Limiting speed ⁷⁾	Bearing frictional torque	Axial rigidity ³⁾	Radial rigidity ³⁾	Tilting rigidity ³⁾	
Fixing holes		Threaded extraction hole			axial							
d ₃	Quantity ⁴⁾	G	Quantity		QuantityXt	M _A ²⁾						dyn. C _a	stat. C_{0a}	n_{G}	M_{RL}	C_{aL}	C_{rL}	C_{kL}
					Nm	N	N	min ⁻¹	Nm	kN/μm	kN/μm	kNm/mrad
5,6	15	M5	3	18X20°	8,5	71 000	265 000	2 800	1,6	1,2	0,35	3,6
7	21	M8	3	24X15°	14	76 000	315 000	2 400	2	1,5	0,4	5,5
7	33	M8	3	36X10°	14	81 000	380 000	2 000	3	1,7	0,5	7,8
7	45	M8	3	48X 7,5°	14	121 000	610 000	1 600	4,5	2,5	0,7	17,5
9,3	33	M12	3	36X10°	34	162 000	920 000	1 200	7,5	3,2	0,9	40
9,3	33	M12	3	36X10°	34	172 000	1 110 000	1 000	11	4	1	60
9,3	45	M12	3	48X 7,5°	34	241 000	1 580 000	800	16	4,5	1,3	100
9,3	45	M12	3	48X 7,5°	34	255 000	1 860 000	700	21	5,3	1,6	175



Screw counterbore open
Bearing inside diameter unsupported in area ③



FAG



**Axial/radial bearings
with integral measuring system**

Axial/radial bearings with integral measuring system

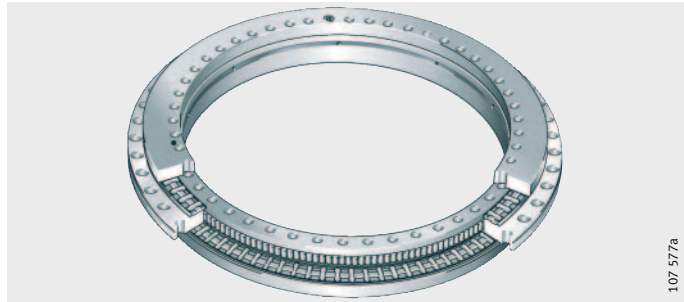
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Advantages of the angular measuring system.....	1023
Axial/radial bearings with integral measuring system.....	1024
MEKO/U electronic measuring system	1024
Measurement accuracy	1025
Technical Product Information on axial/radial bearings with integral measuring system	1026



Product overview Axial/radial bearings with integral measuring system

Axial/radial bearings
With magnetic dimensional scale

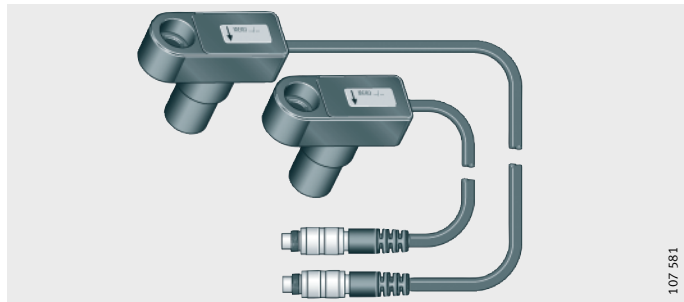
YRTM



107_577a

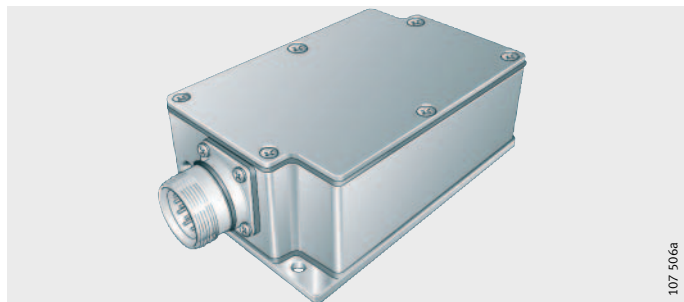
MEKO/U
electronic measuring system
Measuring heads

MEKO/U



107_581

Electronic evaluation system



107_506a

Axial/radial bearings with integral measuring system

Features

Axial/radial bearings with integral measuring system comprise:

- an axial/radial bearing YRTM with a dimensional scale and a MEKO/U electronic measuring system. The electronic measuring system consists of two measuring heads, a set of shims and an electronic evaluation system.

Bearings of series YRTM correspond in mechanical terms to axial bearings YRT but are additionally fitted with a magnetic dimensional scale. The measuring system can measure angles to an accuracy of a few angular seconds by non-contact, magneto-resistive means.

For the mechanical part of axial/radial bearings YRTM, please refer to the information from page 995 to page 1011.

Advantages of the angular measuring system

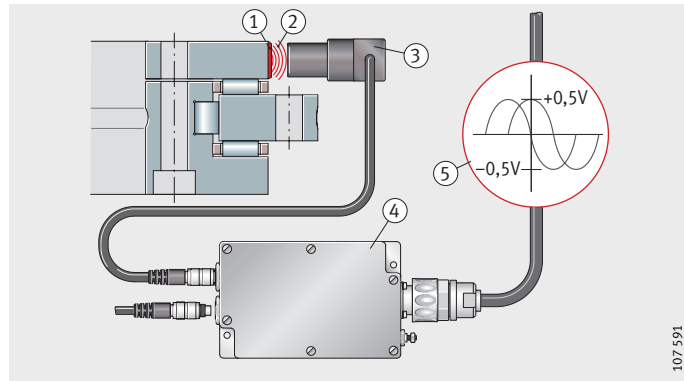
The measuring system, *Figure 1*:

- operates by non-contact means and is therefore not subject to wear
- carries out measurement irrespective of tilting and position
- has automatically self-adjusting electronics
- has a self-centring function
- is unaffected by lubricants
- is easy to fit, the measuring heads are easily adjustable, there is no need for alignment of the bearing and a separate measuring system
- requires no additional parts
 - the dimensional scale and measuring heads are integrated in the bearing and adjacent construction respectively
 - the resulting space saved can be used for the machining area of the machine
- does not give any problems relating to supply cables. The cables can be laid within the adjacent construction directly through the large bearing bore
- gives savings on design envelope size and costs due to the compact, integrated design requiring fewer components.



- ① Magnetic scale
- ② Magnetic field lines
- ③ Measuring head with magneto-resistive sensor
- ④ Electronic evaluation system
- ⑤ Analogue signals at output

Figure 1
Measurement principle



Axial/radial bearings with integral measuring system

Axial/radial bearings with integral measuring system

Dimensional scale

The dimensional scale is applied without seams or joins to the outside diameter of the shaft locating washer. Magnetic poles are present as angle references, *Figure 2* on the magnetisable, electroplated coating at a pitch of 250 μm .

The angular position is measured incrementally, i.e. by counting the individual increments. For a fixed datum point for the angular position after the machine is switched on, an additional reference mark is therefore also required.

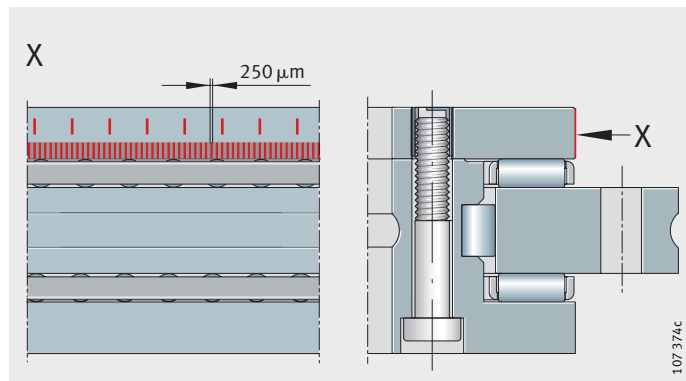


Figure 2
Dimensional scale

Reference marks

The system has pitch-coded reference marks in order to quickly create the absolute datum point. Every 15°, reference marks are applied with defined different pitches, so that the absolute datum point is achieved by passing over two adjacent reference marks (maximum 30°).

MEKO/U electronic measuring system

Measuring heads with magneto-resistive sensors

The two measuring heads are designed for optimum use of space. They are fixed in a slot in the adjacent construction by means of a fixing screw.

The small magnetic fields are detected as a result of the magneto-resistive effect (MR effect). Compared with magnetic heads, the MR sensors allow static measurement of magnetic fields, i.e. electrical signals are derived without movement, in contrast to magnetic heads.

The resistance layer of the MR sensors is designed such that the resistance changes when a magnetic field is perpendicular to the current flow.

When the magnetic pitch moves past the MR sensor, two sine wave signals with a phase offset of 90° are generated with a period length of 500 μm .

Electronic evaluation system	<p>The electronic evaluation system operates with the aid of a digital signal processor (DSP).</p> <p>The input signals are digitised by an analogue/digital converter. The high performance processor (DSP) automatically compares the sensor signals and calculates the effective angular value from the sensor signals by means of vector addition. Correction is carried out, for example, on the offset of the analogue signals. A digital/analogue converter generates synthetic analogue signals as a $1 V_{SS}$ value.</p> <p>The electronic evaluation system can be positioned at any location or within the adjacent construction. It is connected to the controller by means of a conventional 12-pin extension cable.</p> <p>The connections for transmitting the voltage signals from the electronic evaluation system to the electronic post-processor can be up to 100 m long.</p>
Cable for signal transmission	<p>Each measuring head is fitted with a 2 m, 2,5 m or 3 m long cable with a plug.</p> <p>The shielded cables of the measuring system components are made from polyurethane (PUR) and, in accordance with VDO 0672, resistant to oil, hydrolysis and microbes.</p> <p>The cables are suitable for fixed laying free from forces or torsion. The minimum bending radius $R \geq 40$ mm must be observed. For other requirements, please contact us.</p>
Plug connectors	<p>INA plug connectors are robust and designed for use in industrial environments. When connected, they conform to protection grade IP 65 (EN 60 529).</p> <p>The large sheathed areas of the plugs ensure effective shielding.</p>
Measurement accuracy	<p>The more accurate the angular measurement, the more accurately a rotary axis can be positioned. The accuracy of angular measurement is essentially determined by:</p> <ol style="list-style-type: none"> ① the quality of the dimensional scale ② the quality of scanning ③ the quality of the electronic evaluation system ④ the eccentricity of the dimensional scale to the bearing raceway system ⑤ the runout deviation of the bearing arrangement ⑥ the elasticity of the measurement system shaft and its linkage to the shaft to be measured ⑦ the elasticity of the stator shaft and shaft coupling. <p>For the measuring system YRTM, only points ① to ③ are relevant. The eccentricity in point ④ is completely eliminated by the diametrically opposed arrangement of the MR sensors. Points ⑤ to ⑦ play only a very minor role in the INA measuring system.</p>



Axial/radial bearings with integral measuring system

Positional deviations

Positional deviations within a revolution are the absolute measurement errors over one revolution of the system (measured at +20 °C ambient temperature)

■ YRTM150 $\cong \pm 6''$

■ YRTM180 $\cong \pm 5''$

■ YRTM200, YRTM260, YRTM325, YRTM395, YRTM460 $\cong \pm 3''$.

Since the dimensional scale is directly connected, i.e. without any compensation elements, to the rolling bearing, deflections in the bearing raceway system due to machining forces can affect the measurement result. This effect is eliminated by the diametrically opposed arrangement of the measuring heads in the electronic evaluation system.

Measurement record

Each INA measuring system is supplied with an accuracy measurement record, *Figure 3*.

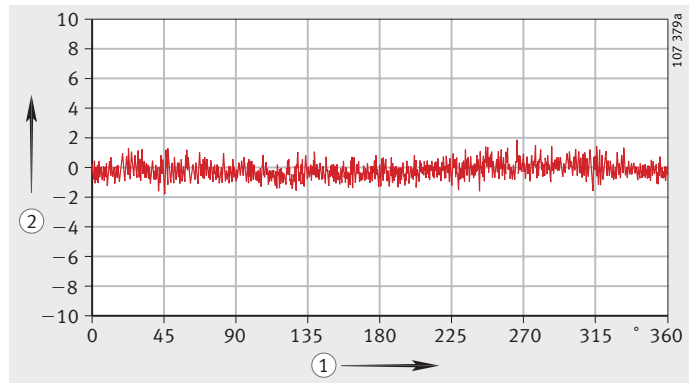
The accuracy is measured on the coded washer of the YRTM bearing when the coding is applied and is documented.

The measurement trace shows the pitch error of the coding.

- ① Measurement travel in degrees
- ② Deviation in angular seconds

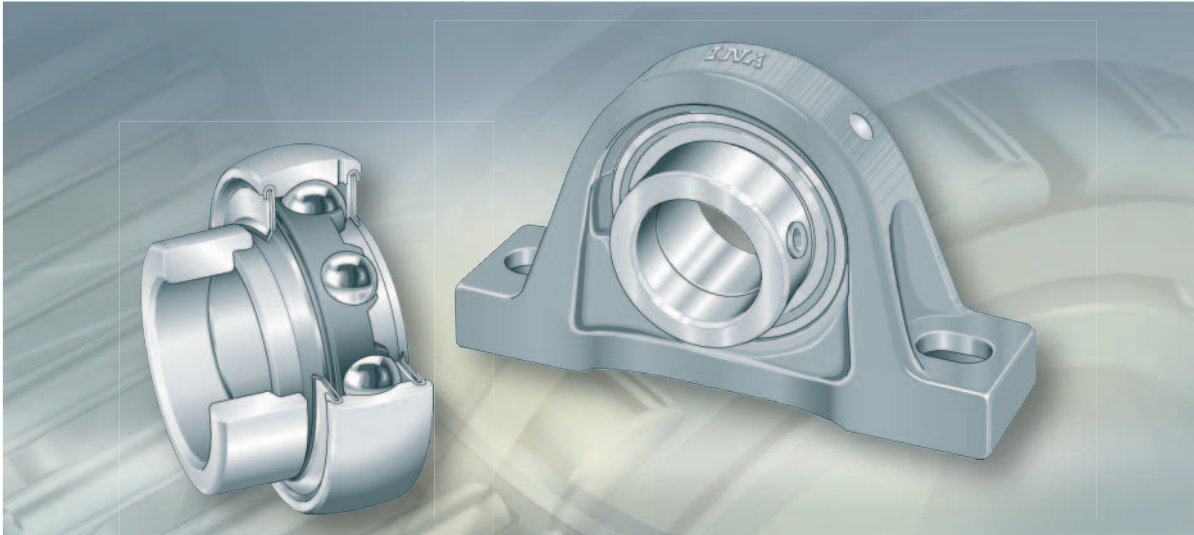
Figure 3

Excerpt from a measurement trace –
example
YRTM 395 – S.Nr. 03/09/004



Technical Product Information on axial/radial bearings with integral measuring system

Comprehensive information on axial/radial bearings with an integral measuring system is given in TPI 120, High precision bearings for combined loads. This publication is available on request.



Radial insert ball bearings Housed bearing units



Radial insert ball bearings Housed bearing units

Radial insert ball bearings 1030

INA radial insert ball bearings are ready-to-fit rolling bearings for the design of particularly economical bearing arrangements. These robust machine elements are available in numerous designs that differ essentially in the outside surface of the outer ring, the method of location on the shaft and the sealing arrangement.

Radial insert ball bearings with a spherical outer ring, fitted in housings with a concave bore, can compensate for static misalignment of the shaft. They can be relubricated if necessary and are particularly easy to fit due to the special location methods. Operation even under difficult operating conditions is ensured by seals of a three-piece design that are matched to the application. The classic areas of application for these bearings include the agricultural, construction and mining sectors, conveying equipment, textile, paper and woodworking machinery as well as machines for the filling, timber and packaging industries.

Housing units 1080

with cast iron housings
with sheet steel housings

Housing units comprise INA cast iron or sheet steel housings with a concave bore in which INA insert bearings are mounted. These units are matched to each other and are available as plummer block, flanged and take-up housing units. Due to the wide range of housing designs, the right solution can be found for any specific application. The areas of application of the units correspond to those of the insert bearings.

Cast iron housings are single-piece units that can support high loads. Sheet steel housings are two-piece units that are used where the priority is not the load carrying capacity of the housing but the low mass of the unit.

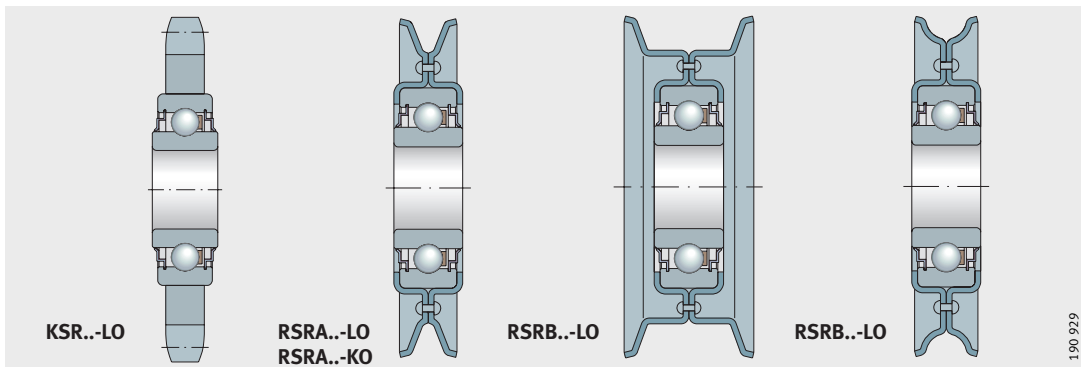
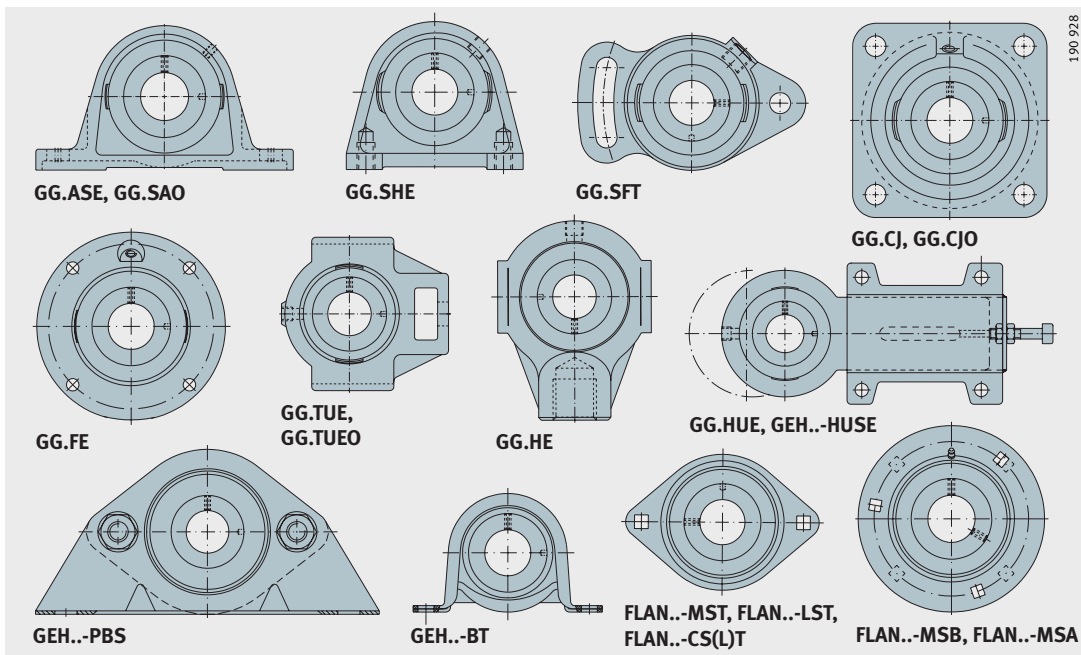
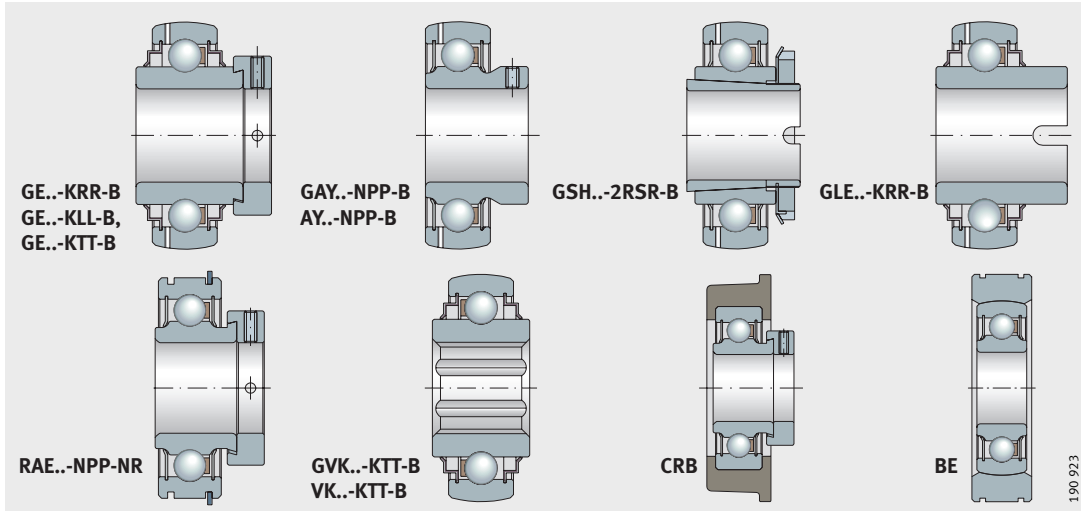
Depending on the series, INA take-up housing units have integral fixing eyes with holes, slots and guide surfaces. They can therefore be moved in an axial direction or swivelled in a radial direction.

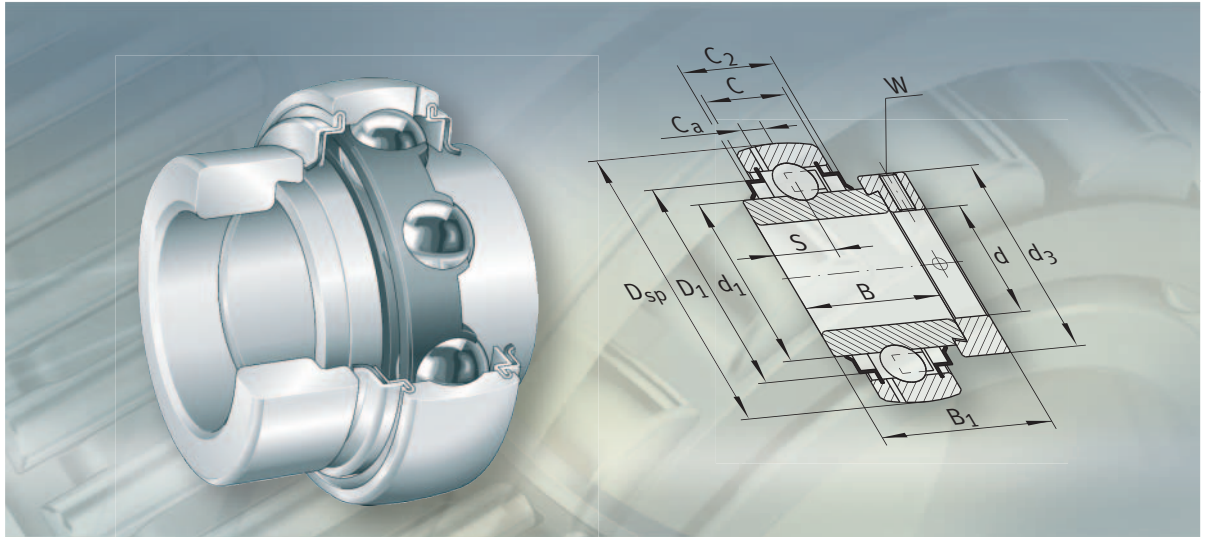
Roller chain idler sprocket units Idler pulley units 1172

Roller chain idler sprocket units are guidance and return units for roller bush chains and roller chains. They can compensate for chain stretch resulting from operation and give smoother running under high loads and speeds.

Idler pulley units are tensioning systems for belt drives and idler pulleys. They are suitable for V-belts, flat or round belts, steel and hemp cables. Idler pulley units increase the wrap angle, compensate for belt stretch resulting from operation, allow shorter centre distances and reduce belt wear.

Product range – selection





Radial insert ball bearings

Radial insert ball bearings

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	Radial insert ball bearings with grub screws in inner ring..... 1038
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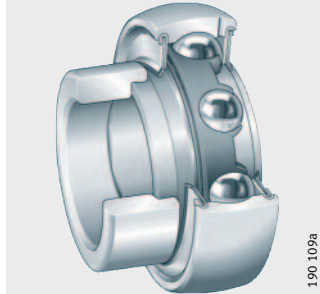


Product overview Radial insert ball bearings

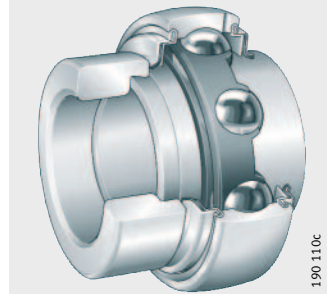
With eccentric locking collar
Spherical outer ring

Features: see page 1037

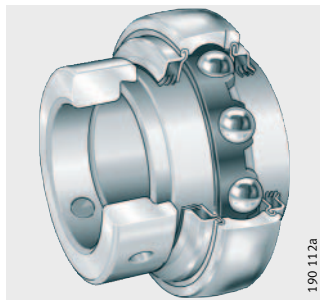
**GRAE..-NPP-B, RAE..-NPP-B,
RALE..-NPP-B**



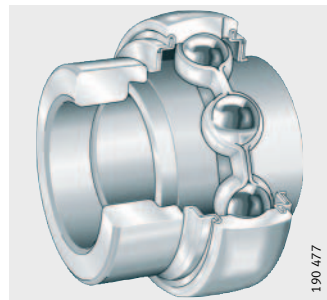
**GE..-KRR-B, GNE..-KRR-B,
E..-KRR-B, NE..-KRR-B**



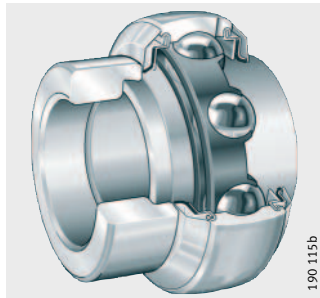
GE..-KTT-B



GE..-KLL-B



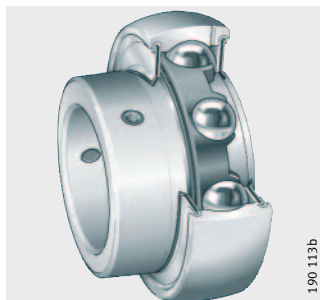
GE..-KRR-B-2C



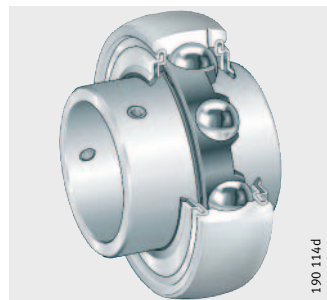
**With grub screws
in inner ring**
Spherical outer ring

Features: see page 1038

GAY..-NPP-B, AY..-NPP-B



GYE..-KRR-B

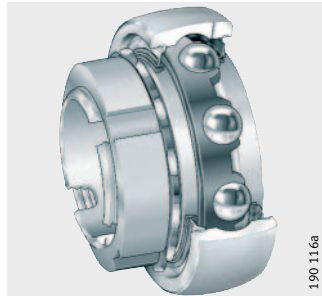


With integral adapter sleeve

Spherical outer ring

Features: see page 1039

GSH..-2RSR-B

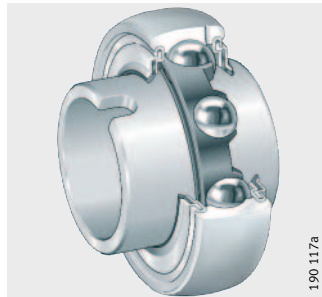


With drive slot

Spherical outer ring

Features: see page 1040

GLE..-KRR-B

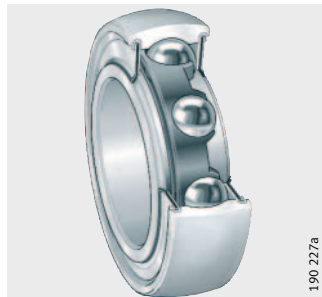


**Self-aligning
deep groove ball bearings**

Spherical outer ring
With fit

Features: see page 1041

2..-NPP-B



Spherical outer ring
With square or hexagonal bore

Features: see page 1041

GVK..-KTT-B, VK..-KTT-B



SK..-KRR-B



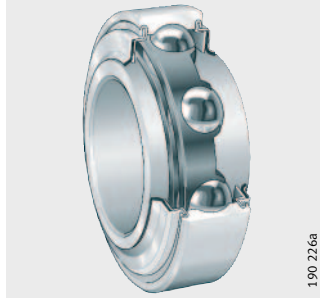
Product overview Radial insert ball bearings

Deep groove ball bearings with extended inner ring

Cylindrical outer ring

Features: see page 1042

2..-KRR, 2..-KRR-AH

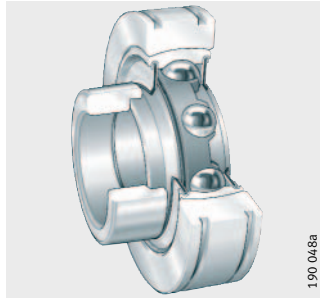


With steel aligning ring

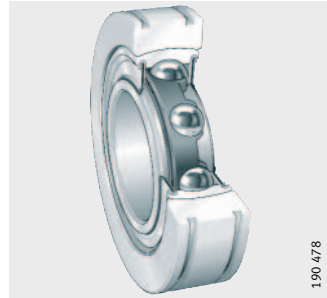
Cylindrical outer ring

Features: see page 1043

PE



BE

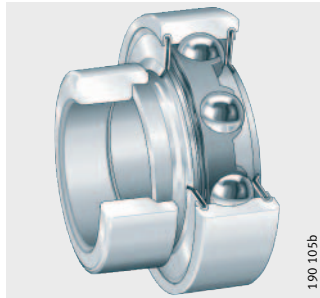


With eccentric locking collar

Cylindrical outer ring

Features: see page 1037

RAE..-NPP, RALE..-NPP

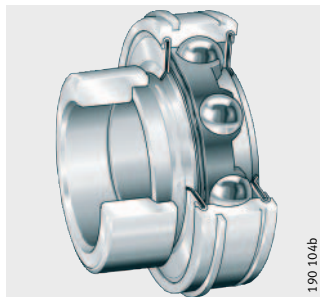


With eccentric locking collar

Cylindrical outer ring
Two snap rings on outer ring

Features: see page 1043

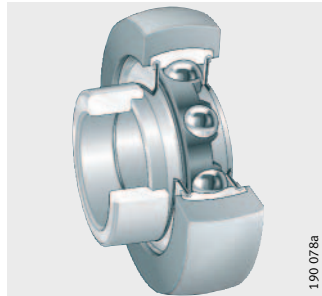
RAE..-NPP-NR



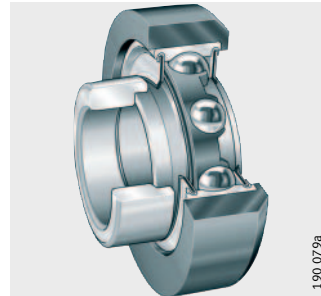
With rubber interliner

Features: see page 1044

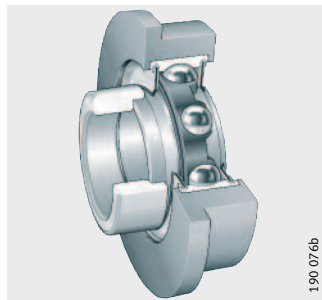
RABRA, RABRB



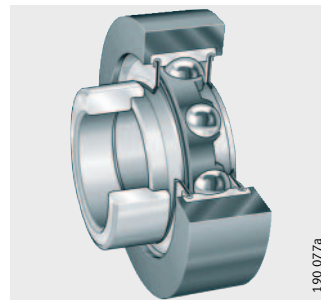
RCRA, RCRB



CRB



RCSMA, RCSMB

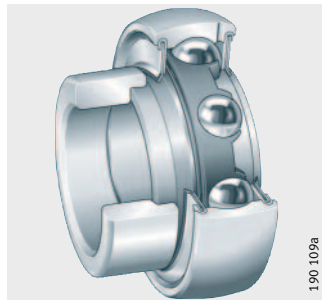


Inch size radial insert ball bearings

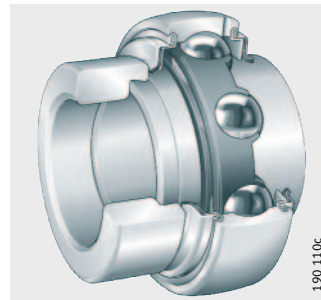
Spherical or cylindrical outer ring

Features: see page 1037 and page 1038

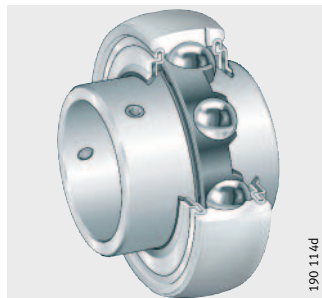
**GRA...NPP-B-AS2/V,
RA...NPP-B**



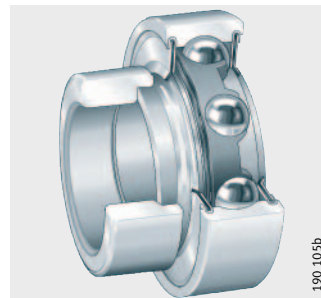
G...KRR-B-AS2/V



GY...KRR-B-AS2/V



RA...NPP, RAL...NPP



Radial insert ball bearings

Features Radial insert ball bearings are single row, ready-to-fit units comprising a solid outer ring, an inner ring extended on one or both sides, cages made from plastic or sheet steel and seals of type P, R, L or T. Bearings with an inner ring extended on both sides undergo less tilting of the inner ring and therefore run more smoothly.

The outer ring has a spherical or cylindrical outside surface. In combination with an INA housing matched to the design, bearings with a spherical outer ring can compensate for misalignment of the shaft; see Compensation of misalignments, page 1048.

With only a few exceptions, radial insert ball bearings can be relubricated. For this purpose, they have two lubrication holes in the outer ring offset by 180°.

Radial insert ball bearings are particularly easy to fit and are suitable for drawn shafts of grade h6 to h9. They are located on the shaft by means of eccentric locking collars, grub screws in the inner ring, adapter sleeves, drive slots or fit.

Caution! The features of the series are presented in detail in the product overview on pages 1046 and 1047. Please take these into consideration.

Inch size designs Some series with eccentric locking collar or grub screws in the inner ring are also available with inch size bore dimensions, see dimension tables, page 1068 to page 1070.

Corrosion-resistant radial insert ball bearings For corrosion-resistant bearing arrangements and for applications in the food and drink industry, bearings are available with Corrotect® plating and the suffix FA125 as well as in the VA design using corrosion-resistant materials.

Corrotect® plating The special INA plating Corrotect® is an economical alternative to traditional forms of corrosion protection for radial insert ball bearings. The thickness of the plating is between 0,5 µm and 3 µm.

- Advantages of the Corrotect® plating**
- All-round rust protection including machined surfaces on chamfers and radii
 - Long-term prevention of rust penetration beneath seals
 - Small bright spots are protected against corrosion by the cathodic protection mechanism
 - Anti-corrosion protection allows a significantly longer operating life compared to unplated parts
 - Unplated bearings and housings are fully interchangeable with the plated versions of the same design
 - Bearings and housings made from corrosion-resistant rolling bearing steel are often no longer required.

In radial insert ball bearings of variant VA, the bearing rings and rolling elements are made from corrosion-resistant, high alloy rolling bearing steel with an increased chromium and molybdenum content.

Corrosion-resistant radial insert ball bearings are suitable where moisture, contaminated water, salt spray mist or weakly alkaline and weakly acidic cleaning agents are present.

For information on Corrotect® see also section Anti-corrosion protection, page 104.

Radial insert ball bearings for high and low temperatures

At high temperatures, rolling bearings undergo an increase in volume that can be attributed to a change in the material micro-structure. Furthermore – depending on the location of the heat source – there can be a significant temperature difference between the inner and outer ring.

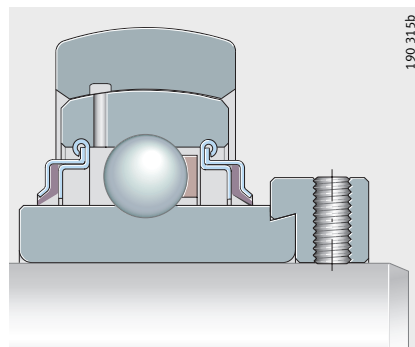
The radial insert ball bearings have cages made from metal or a high temperature plastic, increased radial internal clearance, lubricants with improved thermal resistance and special seals.

These bearings have the suffix FA164 or FA101. Series GLE...KRR-B and GE...KLL-B also have an extended temperature range.

Radial insert ball bearings with eccentric locking collar

These “classic” INA radial insert ball bearings are located on the shaft by means of a locking collar, *Figure 1*. They are particularly suitable for bearing arrangements with a constant direction of rotation or, under low speed and load, for an alternating direction of rotation.

The locking collar is preferably tightened in the direction of rotation and secured by means of a grub screw. This location method prevents damage to the shaft and can be easily loosened again.



GE...KRR-B

Figure 1
Location using eccentric locking collar

Sealing/lubrication

The radial insert ball bearings are fitted with P, R, L or T type seals and, with the exception of a few series, can be relubricated. In series GE...KRR-B-2C, the R seals are fitted with Corrotect® plated flinger shields to protect against mechanical damage.



Corrosion-resistant radial insert ball bearings

Several series are also available in a corrosion-resistant design. These bearings have the suffix FA125.

Inner rings up to d = 60 mm, as well as locking collars in general, are plated with Corrotect® and are thus protected against fretting corrosion; the exception is series RALE...NPP(-B).

Radial insert ball bearings for high and low temperatures

Bearings for high and low temperatures have the suffix FA164 or FA101.

Cylindrical outer ring

In addition to the bearings with a spherical outer ring, there are also the following series with a cylindrical outer ring: RAE...NPP, RALE...NPP, E...KRR and E...KLL.

Inch size designs

The series GRA...NPP-B-AS2/V, RA...NPP-B, G...KRR-B-AS2/V, RA...NPP, RAL...NPP have inch size bore dimensions, see dimension tables, page 1068 to page 1070.

Radial insert ball bearings

Radial insert ball bearings with grub screws in the inner ring

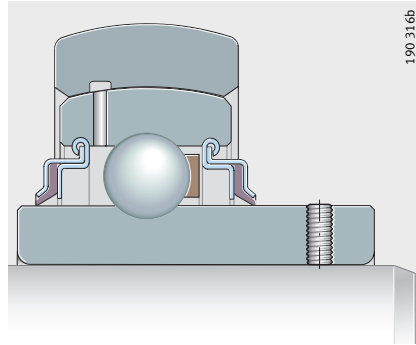
In these insert bearings, the inner ring is located on the shaft, *Figure 2* by means of two grub screws offset by 120°. This location method is suitable for bearing arrangements with a constant direction of rotation or, under low speed and load, for an alternating direction of rotation.

The grub screws are self-retaining and have a fine pitch thread with cup point for secure location of the bearings.

GYE..-KRR-B

Figure 2

Location using grub screws in the inner ring



Sealing/lubrication

The radial insert ball bearings are fitted with P or R type seals and, with the exception of one series, can be relubricated.

Corrosion-resistant radial insert ball bearings

These bearings have the suffix VA. The VA design is sealed on both sides with RSR seals and has additional flinger shields made from corrosion-resistant steel.

Radial insert ball bearings for high and low temperatures

Some radial insert ball bearings are also available for higher temperatures. These bearings have the suffix FA164.

Inch size designs

Series GY..-KRR-B-AS2/V has an inch size bore, see dimension tables, page 1068 to page 1070.

Radial insert ball bearings with integral adapter sleeve

In this series, the inner ring is located on the shaft by an adapter sleeve with a locknut and a tab washer, *Figure 3*.

The adapter sleeve and locknut give concentric, force locking location of the bearing inner ring on the shaft.

As a result, the speeds that can be achieved are the same as with deep groove ball bearings. These bearings also give quieter running than normal radial insert ball bearings. The adapter sleeve, locknut and tab washer are all zinc plated.

Due to the integral adapter sleeve, the bearings have the same radial dimensions and basic load ratings as radial insert ball bearings with an eccentric locking collar or with grub screws in the inner ring and are interchangeable with these bearings.

GSH...2RSR-B

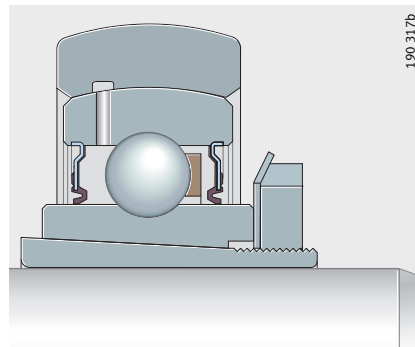


Figure 3

Location using adapter sleeve and locknut

Sealing/lubrication

The bearings are sealed with RSR seals and can be lubricated.

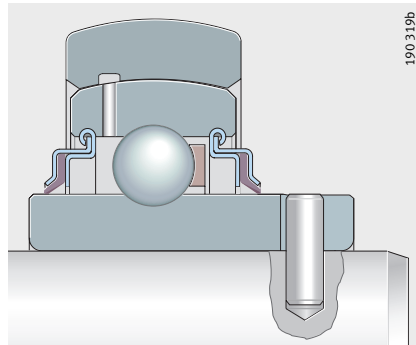


Radial insert ball bearings

Radial insert ball bearings with drive slot

Radial insert ball bearings with a drive slot in the inner ring are non-locating bearings with good high temperature characteristics, *Figure 4*. Non-locating bearings are used at low speeds and loads to compensate for thermal elongation of the shaft.

Due to the slot, they are easy to locate in a radial direction. Rotation is prevented by a drive pin on the shaft or a set collar with a pin. The non-locating bearings are suitable for drawn shafts up to grade h7.



GLE.-KRR-B

Figure 4
Location using drive slot

Anti-corrosion protection

Up to a bore diameter of 60 mm, the inner ring is plated with Corrotect[®] and is thus protected against fretting corrosion.

Sealing/lubrication

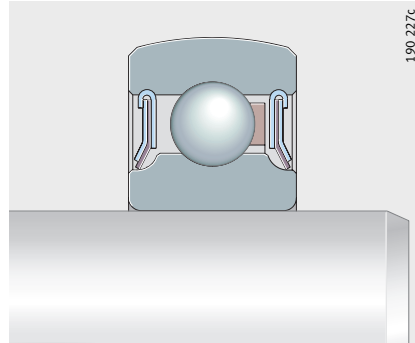
The bearings have R type seals with Teflon seal lips and can be lubricated.

Self-aligning deep groove ball bearings

Self-aligning deep groove ball bearings are available with a cylindrical bore for a fit seat, *Figure 5* or with a reamed square or hexagonal bore, *Figure 6*.

With fit

Bearings with a fit seat on the shaft allow speeds equivalent to those of standard ball bearings, are suitable for bearing arrangements with an alternating direction of rotation and offer smooth running.



2...-NPP-B

Figure 5
Self-aligning deep groove ball bearings

Seals

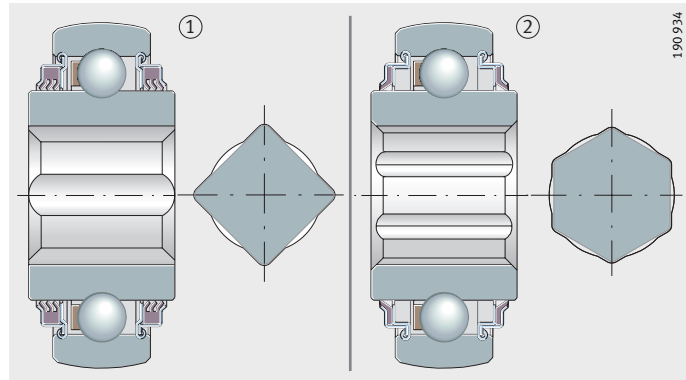
The bearings are sealed on both sides using P type seals with a vulcanised seal lip or three-piece designs.

Caution!

For self-aligning deep groove ball bearings with a fit seat, the fit data for ball bearings apply.

With square or hexagonal bore

Bearings with a profiled bore are used where shafts must transmit very high torques and this is only possible using square or hexagonal shafts, *Figure 6*. Rotation is prevented by the geometrical locking effect.



VK...-KTT-B
SK...-KRR-B

Figure 6
① Square bore
② Hexagonal bore

Anti-corrosion protection

The bearings are plated with Corrotect®.

Sealing/lubrication

Self-aligning deep groove ball bearings are sealed using R or T type seals. The bearings are greased to their maximum, some designs can be relubricated.

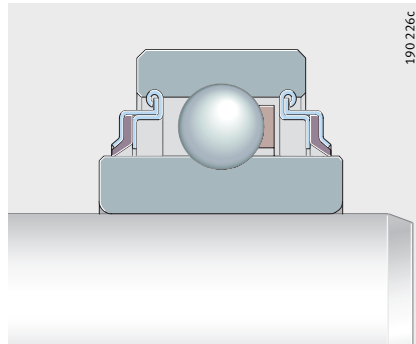
Radial insert ball bearings

Deep groove ball bearings with extended inner ring

These bearings have a cylindrical outer ring and are fitted in cylindrical bores, *Figure 7*. The inner ring is extended on both sides and is located on the shaft using a location fit. Due to the extended inner ring, additional axial spacer rings are not required.

The concentric seat allows speeds equivalent to those of standard ball bearings, while the load can be either constant or alternating. Smooth running is also achieved.

The inner ring bore tolerance corresponds to tolerance class PN in accordance with DIN 620.



2..-KRR
2..-KRR-AH

Figure 7

Deep groove ball bearings with extended inner ring

Sealing/lubrication

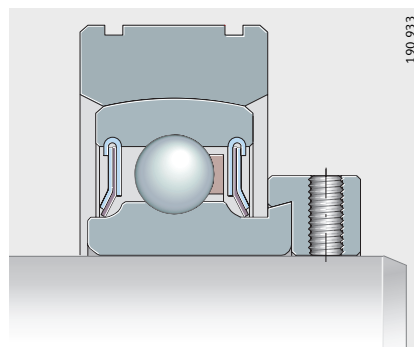
The bearings are sealed on both sides using R type seals. The sheet steel washers extended outwards and angled downwards form a large grease reservoir.

Radial insert ball bearings with steel aligning ring

These bearings are based on radial insert ball bearings with an eccentric locking collar or on self-aligning deep groove ball bearings, but additionally have an axially split outer ring as an aligning ring, *Figure 8*. They are mounted in cylindrical bores and can compensate for static misalignment of the shaft up to $\pm 5^\circ$.

Due to the annular slots in the outer ring, they are highly suitable for sheet metal constructions. In this case, they are axially located using snap rings to DIN 5 417.

In series PE, the inner ring is located on the shaft using a locking collar, in series BE by a location fit.



PE

Figure 8

Radial insert ball bearings with steel aligning ring

Anti-corrosion protection

The aligning ring is plated with Corrotect® and is thus protected against fretting corrosion. In series PE, the inner ring and locking collar are also plated.

Sealing/lubrication

The bearings are sealed on both sides using P type seals. Radial insert ball bearings with an aligning ring cannot be relubricated.

Caution!

The fit tolerances of the aligning rings are those of the deep groove ball bearings. Select the fit for the shaft and housing such that the outer ring of the insert bearing can undergo self-alignment.

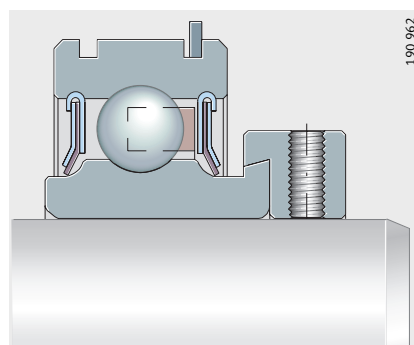
Radial insert ball bearings with eccentric locking collar, cylindrical outer ring and slots in outer ring

The basic design of series RAE...NPP-NR is a radial insert ball bearing with an eccentric locking collar and an inner ring extended on one side, *Figure 9*. The outer ring has a cylindrical outside surface and two slots to DIN 616. The bearings are fitted in cylindrical bores and axially located by easy-to-fit snap rings. The bearing is supplied with one snap ring to DIN 5 417 already fitted.



Sealing/lubrication

The bearings are sealed on both sides using P type seals. The insert bearings are greased and cannot be relubricated.



RAE...NPP-NR

Figure 9

Radial insert ball bearings with cylindrical outer ring and two slots in outer ring

Radial insert ball bearings

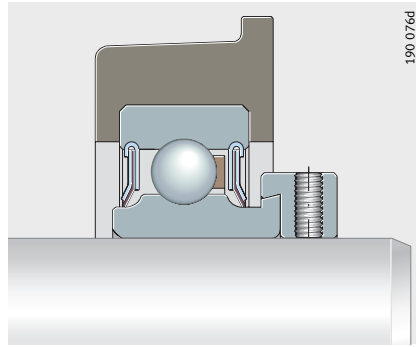
Radial insert ball bearings with rubber interliner

These radial insert ball bearings are located on the shaft using an eccentric locking collar. The outer ring is encased in a thick-walled NBR interliner, *Figure 10*.

The interliner absorbs vibrations and shocks and thus gives damping of running noises.

The interliners have a spherical or cylindrical outside surface.

For roll bearing arrangements, one series has a locating shoulder on the rubber ring.



CRB

Figure 10

Radial insert ball bearings with rubber interliner

Anti-corrosion protection

The inner ring and locking collar are plated with Corrotect® and are thus protected against fretting corrosion; this excludes insert bearing series RALE..-NPP(-B).

Sealing/lubrication

The radial insert ball bearings are sealed on both sides using P type seals. Bearings with rubber interliners cannot be lubricated.

Caution! Note the tube and housing diameters for radial insert ball bearings with rubber interliner:

■ CRB, tube inside diameter D –0,6 to 1,6

■ RABR, RCR, RCSM, housing diameter D –0,25 to 0,35.

Suffixes

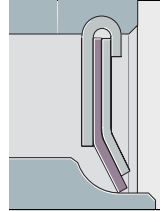
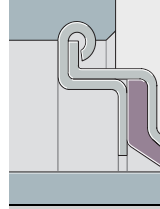
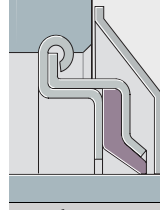
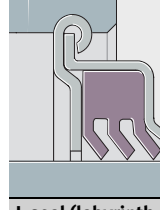
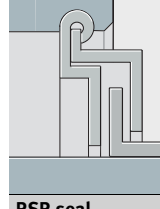
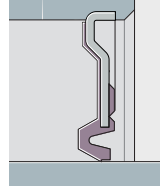
Suffixes for the available radial insert ball bearing designs: see table.

Available designs

Suffix	Description
AS2/V	Bearing outer ring with 2 lubrication holes in offset planes
B	Bearing with spherical outer ring
2C	Flinger shields on both sides
FA101	High/low temperature design –40 °C to +150 °C
FA106	Bearing subjected to special noise testing
FA107	Bearing with lubrication holes on the locating side
FA125	With Corrotect® plating, protected against corrosion
FA164	High temperature design up to +250 °C
KRR	Lip seals on both sides (R type seal)
KLL	Labyrinth seals on both sides (L type seal)
KTT	Triple lip seals on both sides (T type seal)
NR	Slot and snap ring for insert bearings with cylindrical outer ring
NPP	Lip seals on both sides (P type seal)
OSE	Bearing without locating element (e.g. eccentric locking collar)
2RSR	Lip seals on both sides (vulcanised)
VA	Corrosion-resistant design made from high alloy rolling bearing steel

Seals Seals for radial insert ball bearings are of a three-piece design. This concept offers, due to the rigidly rolled-in sheet steel washer, optimum seating in the bearing as well as concentric alignment of the seal lip to the inner ring.

Seal types

 <p>190 308a</p>	<p>P seal</p> <p>Two zinc-plated sheet steel washers with intermediate NBR part, seal lip axially preloaded.</p> <p>In order to protect the seal lip from mechanical damage, the outer sheet steel washer extends a considerable distance down towards the bearing inner ring.</p> <p>Used in narrow radial insert ball bearings with inner ring extended on one side.</p>
 <p>190 309b</p>	<p>R seal</p> <p>Two zinc-plated sheet steel washers extended outwards and angled downwards with intermediate NBR part and radially preloaded seal lip. Better protection against mechanical damage.</p> <p>Substantial grease reservoir due to the space between the extended and angled sheet steel washers.</p> <p>Used in radial insert ball bearings with inner ring extended on both sides.</p>
 <p>190 318a</p>	<p>R seal with C shield</p> <p>As R seal, but with outer flinger shield with anti-corrosion protection.</p> <p>Additional sealing action without restriction on speed and with additional protection against mechanical damage.</p>
 <p>190 310c</p>	<p>T seal</p> <p>Two zinc-plated sheet steel washers with intermediate NBR part and three radially preloaded seal lips for heavily contaminated conditions.</p> <p>For better protection of the seal lip against mechanical damage, the outer sheet steel washer is angled outwards.</p> <p>Lower speeds due to higher friction.</p>
 <p>190 311b</p>	<p>L seal (labyrinth seal)</p> <p>Two zinc-plated sheet steel washers extended outwards in the outer ring with an intermediate sheet steel L-section ring pressed onto the inner ring.</p> <p>Substantial grease reservoir due to the space between the extended and angled sheet steel washers.</p> <p>Used in radial insert ball bearings with inner ring extended on both sides. For increased temperatures and lower friction.</p>
 <p>190 314d</p>	<p>RSR seal</p> <p>Single-piece, zinc-plated sheet steel washer with moulded, radially preloaded NBR seal lip.</p> <p>Used in radial insert ball bearings with integral adapter sleeve.</p>



Radial insert ball bearings

Features of radial insert ball bearings – comparison of series

Series	For shaft diameters from ... to ...	Compensation of misalignment	Internal clearance		
GRAE..-NPP-B	12 mm – 60 mm	yes	C3		
GRAE..-NPP-B-FA125.5	20 mm – 60 mm				
GRA..-NPP-B-AS2/V	$5/8$ inch – $1\ 3/4$ inch				
RAE..-NPP-B	12 mm – 50 mm				
RA..-NPP-B	$3/4$ inch – $1\ 1/2$ inch				
RALE..-NPP-B	20 mm – 30 mm				
GE..-KRR-B	17 mm – 120 mm				
GE..-KRR-B-FA125.5	20 mm – 50 mm				
GE..-KRR-B-FA164	17 mm – 90 mm			C5	
GE..-KRR-B-FA101	20 mm – 120 mm			C4	
G1..-KRR-B-AS2/V	$1\ 5/16$ inch – $2\ 15/16$ inch			C3	
GE..-KRR-B-2C	25 mm – 40 mm				
E..-KRR-B	25 mm – 40 mm				
GNE..-KRR-B	30 mm – 100 mm				
GE..-KTT-B	20 mm – 80 mm				
GE..-KLL-B	20 mm – 50 mm			C5	
GYE..-KRR-B	12 mm – 90 mm			yes	C3
GY1..-KRR-B-AS2/V	$3/4$ inch – 2 inch				
GYE..-KRR-B-VA	12 mm – 40 mm				
GAY..-NPP-B	12 mm – 60 mm				
GAY..-NPP-B-FA164	12 mm, 15 mm	C5			
AY..-NPP-B	12 mm – 30 mm	C3			
GSH..-2RSR-B	20 mm – 50 mm	yes	C4		
GLE..-KRR-B	20 mm – 70 mm	yes	C4		
2..-NPP-B	12 mm – 50 mm	yes	CN		
GVK..-KTT-B	25,4 mm – 40,5 mm	yes	C3		
VK..-KTT-B	25,4 mm				
SK..-KRR-B	17 mm – 31,8 mm	yes	C3		
RABRA	30 mm	yes	C3		
RABRB	12 mm – 50 mm				
PE	20 mm – 40 mm				
BE	20 mm – 40 mm	yes	CN		
RAE..-NPP	12 mm – 60 mm	no	C3		
RA..-NPP	$5/8$ inch – $1\ 1/2$ inch				
RALE..-NPP	20 mm – 30 mm				
RAL..-NPP	$3/4$ inch				
RAE..-NPP-NR	20 mm – 40 mm				
E..-KRR	20 mm – 70 mm				
E..-KLL	20 mm – 50 mm				
RCRA	20 mm				
RCRB	25 mm				
CRB	20 mm – 35 mm				
RCSMA	30 mm				
RCSMB	15 mm – 25 mm				
2..-KRR(-AH)	13 mm – 60 mm			no	CN

Location	Sealing	Cage material	Greasing ¹⁾	Relubrication facility	Temperature ²⁾ °C	Comments	Dimension table		
Eccentric locking collar	P	PA66	GA13	yes	-20 to +120		1052		
			GA47				With anti-corrosion protection	1052	
			GA13	no			1068		
							1052		
							1068		
								Light series	1052
			R	Steel		GA47	yes		With anti-corrosion protection	1052
	GA11	+150 to +250			Teflon [®] seal lip	1052			
	LO14	-40 to +150			Teflon [®] seal lip	1052			
	T	PA66	GA13			-20 to +120		1068	
								Flinger shields	1052
									1052
								Heavy series	1054
	L	Steel	LO86			-40 to +180		1052	
Grub screws	R	PA66	GA13	yes	-20 to +120		1060		
								1068	
	RSR	VA steel					With anti-corrosion protection, flinger shields	1060	
	P	Steel	PA66					1060	
			GA11	+150 to +250	Teflon [®] seal lip	1060			
	PA66	GA13	no		-20 to +120		1060		
Adapter sleeve	RSR	PA66	GA13	yes	-20 to +120		1064		
Drive slot	R	PAES	LO14	yes	-40 to +150	Teflon [®] seal lip	1065		
Fit	P	PA66	GA13	no	-20 to +120		1078		
Square bore	T	PA66	GA13	yes	-20 to +120	With anti-corrosion protection, with maximum grease filling	1076		
				no			1076		
Hexagonal bore	R	PA66	GA13	no	-20 to +120	With anti-corrosion protection, with maximum grease filling	1076		
Eccentric locking collar	P	PA66	GA13	no	-20 to +85	Light series	1072		
							1072		
							-20 to +120	Annular slots in aligning ring	1074
Fit	P	PA66	GA13	no	-20 to +120	Annular slots in aligning ring	1074		
Eccentric locking collar	P	PA66	GA13	no	-20 to +120		1066		
							1068		
							1066		
							1068		
							Two slots, one snap ring	1066	
								1066	
								1066	
	R	PA66	GA13	no	-20 to +85	Light series, lead chamfer	1072		
						Lead chamfer	1072		
						Abutment shoulder	1072		
						Light series	1072		
						1072			
Fit	R	PA66	GA13	no	-20 to +120		1075		



¹⁾ Precise information on greasing is given in the section Lubrication.

²⁾ **Caution! Recommended temperature. Regular relubrication if > +100 °C.**

Radial insert ball bearings

Design and safety guidelines Compensation of misalignments

Bearings with a spherical outer ring, fitted in housings with a concave bore, can compensate for static misalignment of the shaft, *Figure 11*:

- if relubrication is used, up to $\pm 2,5^\circ$
- if relubrication is not used, up to $\pm 5^\circ$.

Caution! The units must not be used to support swivelling or tumbling motion.

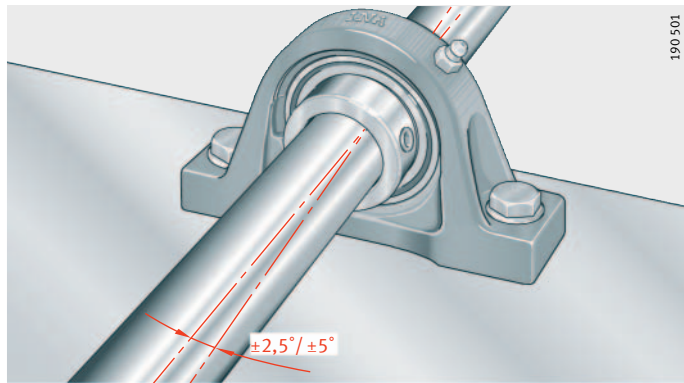


Figure 11
Compensation of static shaft misalignment

Axial load carrying capacity of radial insert ball bearings

The axial load carrying capacity F_a of radial insert ball bearings depends essentially on how they are located on the shaft. The load carrying capacity of the locating method is shown in *Figure 12*.

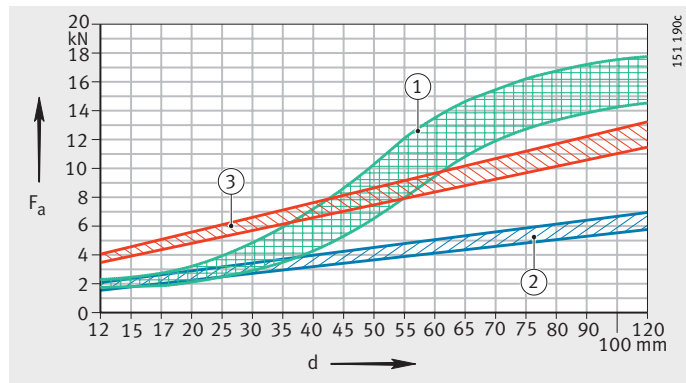
The precondition for this is that:

- the shaft design complies with the data in *Figure 12*
- the bearings are located using the specified tightening torque M_A .

Caution! For very high axial loads, the forces should be directed through a shoulder on the shaft. Maximum permissible axial load on the bearing; please contact us.

- ① Locking collar and adapter sleeve
 - ② Grub screw/hard, ground shafts
 - ③ Grub screw/soft shaft
- d = bearing bore diameter
 F_a = axial load carrying capacity of bearing

Figure 12
Axial load carrying capacity of locating method



Speed limits for radial insert ball bearings – guide values

The speed limits are dependent on the load, the clearance between the bearing bore and shaft and the friction of the seals in bearings with contact seals.

Figure 13 gives guide values for the permissible speeds. For load ratios $C_r/P > 13$, the speeds can be increased. For these applications, please contact us.

For $C_r/P < 5$, location by means of a location fit is recommended.

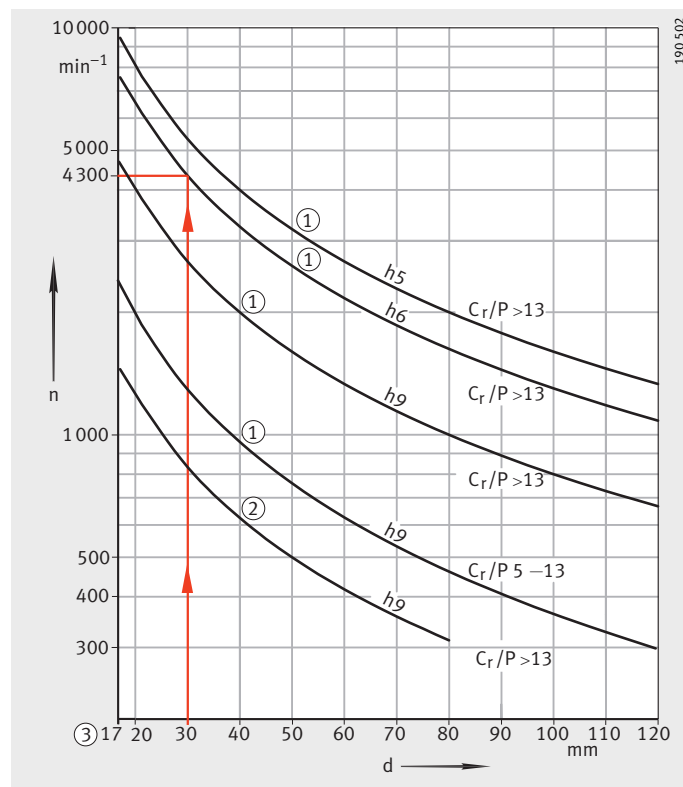
Example of permissible speed calculation

Given:

■ Shaft tolerance	h6
■ Radial insert ball bearing	GRAE30-NPP-B
■ Basic dynamic load rating C_r	19 500 N
■ Load P	1300 N
■ Seals	P seals.

Required:

■ Load ratio	$C_r/P = 19\,500\text{ N}/1300\text{ N}$	$C_r/P > 13$
■ Permissible speed		$n \approx 4\,300\text{ min}^{-1}$, Figure 13.



- ① For insert bearings with L, P, R seals
- ② For insert bearings with T seals
- ③ Ball set identical for $d = 12\text{ mm}, 15\text{ mm}, 17\text{ mm}$
 $d =$ bearing bore diameter
 $n =$ permissible speed

Figure 13
Permissible speeds of radial insert ball bearings

Shaft tolerances for radial insert ball bearings – recommendations

The permissible shaft tolerance is dependent on the speed and load. Tolerances from h6 to h9 are possible.

Conventional drawn shafts will suffice for most applications.

Radial insert ball bearings

Accuracy Standard tolerances of radial insert ball bearings

The outside diameter of the bearings corresponds to tolerance class PN in accordance with DIN 620-2. The inner ring bore has a plus tolerance to facilitate mounting of the bearing.

Standard tolerances for the bearings are shown in the table.

Tolerances of radial insert ball bearings

Inner ring				Outer ring			
Nominal dimension d mm		Bore ¹⁾ μm		Nominal dimension D mm		Outside diameter ²⁾ μm	
over	incl.	min.	max.	over	incl.	max.	min.
12	18	0	+18	30	50	0	-11
18	24	0	+18	50	80	0	-13
24	30	0	+18	80	120	0	-15
30	40	0	+18	120	150	0	-18
40	50	0	+18	150	180	0	-25
50	60	0	+18	180	250	0	-30
60	90	0	+25	-	-	-	-
90	120	0	+30	-	-	-	-

¹⁾ This corresponds to the arithmetic mean value derived from the largest and smallest diameters (measured using a two-point measuring device).

²⁾ In the case of sealed bearings, the largest and smallest values of the outside diameter can deviate from the mean value by approximately 0,03 mm.

Radial internal clearance of radial insert ball bearings

The radial internal clearance is given in the table.

The radial internal clearance of most series is C3 and is thus larger than for normal deep groove ball bearings, see table.

The larger internal clearance allows better support of angular misalignment and shaft deflection.

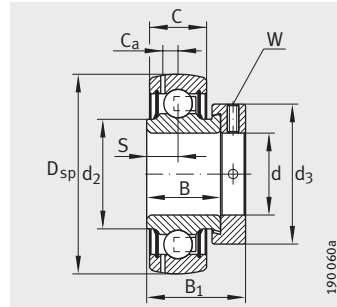
Radial internal clearance

Bore		Radial internal clearance							
d mm		CN μm		C3 μm		C4 μm		C5 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
2,5	10	2	13	8	23	14	29	20	37
10	18	3	18	11	25	18	33	25	45
18	24	5	20	13	28	20	36	28	48
24	30	5	20	13	28	23	41	30	53
30	40	6	20	15	33	28	46	40	64
40	50	6	23	18	36	30	51	45	73
50	65	8	28	23	43	38	61	55	90
65	80	10	30	25	51	46	71	65	105
80	100	12	36	30	58	53	84	75	120
100	120	15	41	36	66	61	97	90	140
120	140	18	48	41	81	71	114	105	160
140	160	18	53	46	91	81	130	120	180

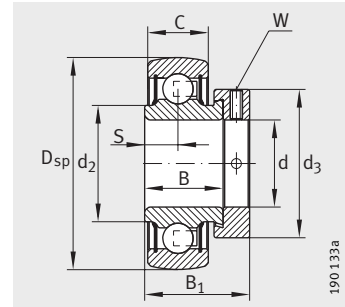


Radial insert ball bearings with eccentric locking collar

Spherical outer ring



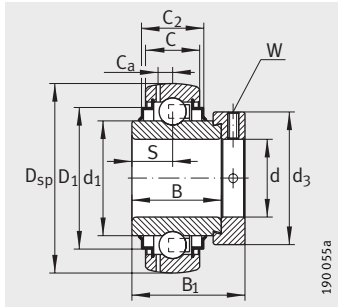
GRAE..-NPP-B



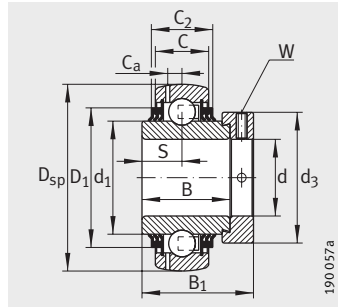
RAE..-NPP-B, RALE..-NPP-B

Dimension table · Dimensions in mm							
Designation ¹⁾	Mass m ≈kg	Dimensions					
		d	D _{sp}	C	C ₂	B	S
GRAE12-NPP-B	0,12	12	40	12	–	19	6,5
RAE12-NPP-B	0,12	12	40	12	–	19	6,5
GRAE15-NPP-B	0,12	15	40	12	–	19	6,5
RAE15-NPP-B	0,12	15	40	12	–	19	6,5
GRAE17-NPP-B	0,12	17	40	12	–	19	6,5
RAE17-NPP-B	0,12	17	40	12	–	19	6,5
GE17-KRR-B	0,16	17	40	12	16,6	27,8	13,9
GE17-KRR-B-FA164	0,16	17	40	12	16,6	27,8	13,9
GRAE20-NPP-B	0,16	20	47	14	–	21,4	7,5
GRAE20-NPP-B-FA125.5	0,16	20	47	14	–	21,4	7,5
RAE20-NPP-B	0,16	20	47	14	–	21,4	7,5
RALE20-NPP-B	0,09	20	42	12	–	16,7	6
GE20-KRR-B	0,2	20	47	14	16,6	34,1	17,1
GE20-KRR-B-FA125.5	0,2	20	47	14	16,6	34,1	17,1
GE20-KRR-B-FA164	0,2	20	47	14	16,6	34,1	17,1
GE20-KTT-B	0,2	20	47	14	16,6	34,1	17,1
GE20-KLL-B	0,2	20	47	14	16,6	34,1	17,1
GRAE25-NPP-B	0,19	25	52	15	–	21,4	7,5
GRAE25-NPP-B-FA125.5	0,19	25	52	15	–	21,4	7,5
RAE25-NPP-B	0,19	25	52	15	–	21,4	7,5
RALE25-NPP-B	0,12	25	47	12	–	17,5	6
E25-KRR-B	0,25	25	52	15	16,7	34,9	17,5
GE25-KRR-B	0,25	25	52	15	16,7	34,9	17,5
GE25-KRR-B-FA125.5	0,25	25	52	15	16,7	34,9	17,5
GE25-KRR-B-FA164	0,25	25	52	15	16,7	34,9	17,5
GE25-KRR-B-FA101	0,25	25	52	15	16,7	34,9	17,5
GE25-KTT-B	0,25	25	52	15	20,2	34,9	17,5
GE25-KRR-B-2C	0,25	25	52	15	24,6	34,9	17,5
GE25-KLL-B	0,25	25	52	15	20,2	34,9	17,5

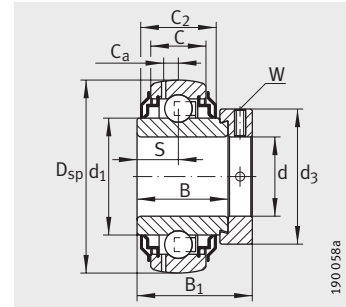
¹⁾ Permissible speeds of radial insert ball bearings: see page 1049.



GE..-KRR-B, E..-KRR-B, GE..-KLL-B



GE..-KTT-B



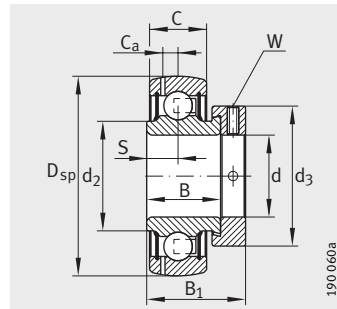
GE..-KRR-B-2C

							Basic load ratings	
d ₁	d ₂	D ₁	C _a	B ₁	d ₃ max.	W	dyn. C _r N	stat. C _{0r} N
-	23	-	3,4	28,6	28	3	9 800	4 750
-	23	-	-	28,6	28	3	9 800	4 750
-	23	-	3,4	28,6	28	3	9 800	4 750
-	23	-	-	28,6	28	3	9 800	4 750
-	23	-	3,4	28,6	28	3	9 800	4 750
-	23	-	-	28,6	28	3	9 800	4 750
23,9	-	31,6	3,4	37,4	28	3	9 800	4 750
23,9	-	31,6	3,4	37,4	28	3	9 800	4 750
-	26,9	-	4	31	33	3	12 800	6 600
-	26,9	-	4	31	33	3	12 800	6 600
-	26,9	-	-	31	33	3	12 800	6 600
-	25,4	-	-	24,5	30	2,5	9 400	5 000
27,6	-	37,4	4	43,7	33	3	12 800	6 600
27,6	-	37,4	4	43,7	33	3	12 800	6 600
27,6	-	37,4	4	43,7	33	3	12 800	6 600
27,6	-	37,4	4	43,7	33	3	12 800	6 600
27,6	-	37,4	4	43,7	33	3	12 800	6 600
-	30,5	-	3,9	31	37,5	3	14 000	7 800
-	30,5	-	3,9	31	37,5	3	14 000	7 800
-	30,5	-	-	31	37,5	3	14 000	7 800
-	30	-	-	25,5	36	2,5	10 100	5 900
33,8	-	42,5	-	44,5	37,5	3	14 000	7 800
33,8	-	42,5	3,9	44,5	37,5	3	14 000	7 800
33,8	-	42,5	3,9	44,5	37,5	3	14 000	7 800
33,8	-	42,5	3,9	44,5	37,5	3	14 000	7 800
33,8	-	42,5	3,9	44,5	37,5	3	14 000	7 800
33,8	-	42,5	3,9	44,5	37,5	3	14 000	7 800
33,8	-	-	3,9	44,5	37,5	3	14 000	7 800
33,8	-	42,5	3,9	44,5	37,5	3	14 000	7 800

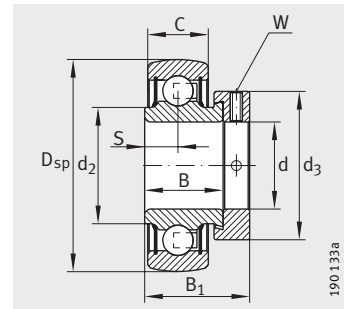


Radial insert ball bearings with eccentric locking collar

Spherical outer ring



GRAE..-NPP-B

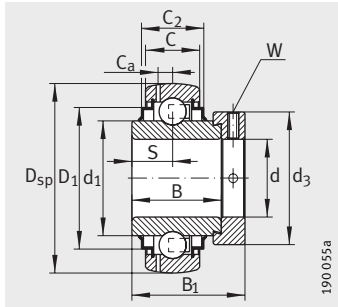


RAE..-NPP-B, RALE..-NPP-B

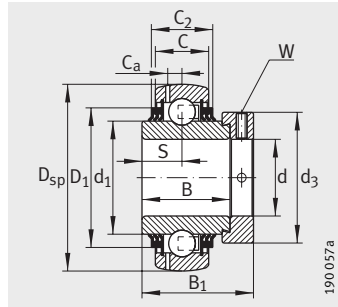
Dimension table (continued) · Dimensions in mm

Designation ¹⁾	Mass m ≈kg	Dimensions					
		d	D _{sp}	C	C ₂	B	S
GRAE30-NPP-B	0,31	30	62	18	–	23,8	9
GRAE30-NPP-B-FA125.5	0,31	30	62	18	–	23,8	9
RAE30-NPP-B	0,31	30	62	18	–	23,8	9
RALE30-NPP-B	0,17	30	55	13	–	18,5	6,5
E30-KRR-B	0,38	30	62	18	20,7	36,5	18,3
GE30-KRR-B	0,38	30	62	18	20,7	36,5	18,3
GE30-KRR-B-FA125.5	0,38	30	62	18	20,7	36,5	18,3
GE30-KRR-B-FA164	0,38	30	62	18	20,7	36,5	18,3
GE30-KRR-B-FA101	0,38	30	62	18	20,7	36,5	18,3
GNE30-KRR-B	0,54	30	72	20	24	36,6	17,5
GE30-KTT-B	0,38	30	62	18	20,7	36,5	18,3
GE30-KRR-B-2C	0,38	30	62	18	27,2	36,5	18,3
GE30-KLL-B	0,38	30	62	18	20,6	36,5	18,3
GRAE35-NPP-B	0,48	35	72	19	–	25,4	9,5
GRAE35-NPP-B-FA125.5	0,48	35	72	19	–	25,4	9,5
RAE35-NPP-B	0,48	35	72	19	–	25,4	9,5
E35-KRR-B	0,55	35	72	19	22,5	37,7	18,8
GE35-KRR-B	0,55	35	72	19	22,5	37,7	18,8
GE35-KRR-B-FA125.5	0,55	35	72	19	22,5	37,7	18,8
GE35-KRR-B-FA164	0,55	35	72	19	22,5	37,7	18,8
GNE35-KRR-B	0,73	35	80	22	25	38,1	18,3
GE35-KTT-B	0,55	35	72	19	22,5	37,7	18,8
GE35-KRR-B-2C	0,55	35	72	19	29,2	37,7	18,8
GE35-KLL-B	0,55	35	72	19	25,4	37,7	18,8

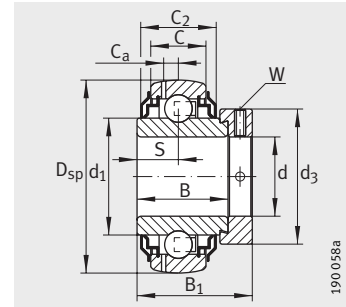
¹⁾ Permissible speeds of radial insert ball bearings: see page 1049.



GE..-KRR-B, GNE...-KRR-B,
E...-KRR-B, GE...-KLL-B



GE...-KTT-B



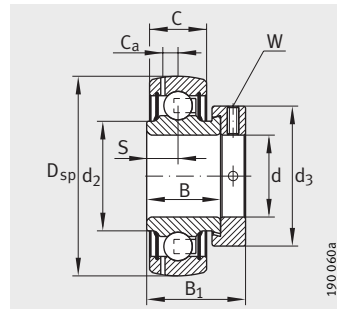
GE...-KRR-B-2C

							Basic load ratings	
d ₁	d ₂	D ₁	C _a	B ₁	d ₃ max.	W	dyn. C _r N	stat. C _{0r} N
-	37,4	-	4,7	35,8	44	4	19 500	11 300
-	37,4	-	4,7	35,8	44	4	19 500	11 300
-	37,4	-	-	35,8	44	4	19 500	11 300
-	35,7	-	-	26,5	42,5	2,5	13 200	8 300
40,2	-	52	-	48,5	44	4	19 500	11 300
40,2	-	52	4,7	48,5	44	4	19 500	11 300
40,2	-	52	4,7	48,5	44	4	19 500	11 300
40,2	-	52	4,7	48,5	44	4	19 500	11 300
40,2	-	52	4,7	48,5	44	4	19 500	11 300
44	-	60,2	6,2	50,2	51	5	29 500	16 700
40,2	-	52	4,7	48,5	44	4	19 500	11 300
40,2	-	-	4,7	48,5	44	4	19 500	11 300
40,2	-	52	4,7	48,5	44	4	19 500	11 300
-	44,6	-	5,6	39	51	5	25 500	15 300
-	44,6	-	5,6	39	51	5	25 500	15 300
-	44,6	-	-	39	51	5	25 500	15 300
46,8	-	60,3	-	51,3	51	5	25 500	15 300
46,8	-	60,3	5,6	51,3	51	5	25 500	15 300
46,8	-	60,3	5,6	51,3	51	5	25 500	15 300
46,8	-	60,3	5,6	51,3	51	5	25 500	15 300
48	-	66,6	6,9	51,6	55	5	36 500	20 900
46,8	-	60,3	5,6	51,3	51	5	25 500	15 300
46,8	-	-	5,6	51,3	51	5	25 500	15 300
46,8	-	60,3	5,6	51,3	51	5	25 500	15 300

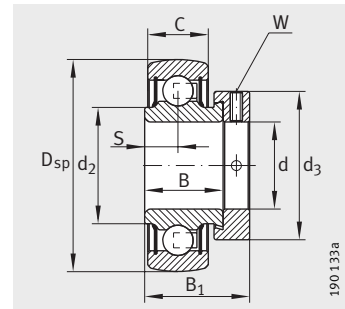


Radial insert ball bearings with eccentric locking collar

Spherical outer ring



GRAE..-NPP-B

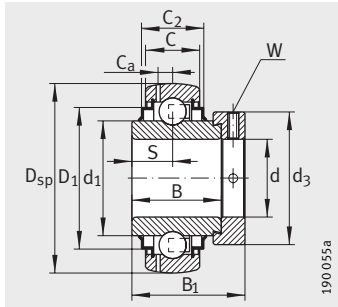


RAE..-NPP-B

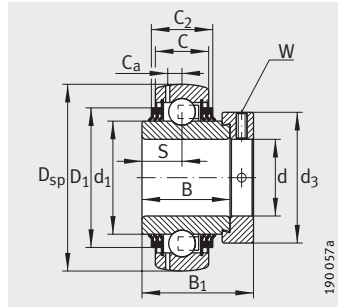
Dimension table (continued) · Dimensions in mm

Designation ¹⁾	Mass m ≈kg	Dimensions					
		d	D _{sp}	C	C ₂	B	S
GRAE40-NPP-B	0,62	40	80	21	–	30,2	11
GRAE40-NPP-B-FA125.5	0,62	40	80	21	–	30,2	11
RAE40-NPP-B	0,62	40	80	21	–	30,2	11
E40-KRR-B	0,74	40	80	21	23,5	42,9	21,4
GE40-KRR-B	0,74	40	80	21	23,5	42,9	21,4
GE40-KRR-B-FA125.5	0,74	40	80	21	23,5	42,9	21,4
GE40-KRR-B-FA164	0,74	40	80	21	23,5	42,9	21,4
GE40-KRR-B-FA101	0,74	40	80	21	23,5	42,9	21,4
GNE40-KRR-B	1,09	40	90	23	26	41	18
GE40-KTT-B	0,74	40	80	21	28,1	42,9	21,4
GE40-KRR-B-2C	0,74	40	80	21	31,9	42,9	21,4
GE40-KLL-B	0,74	40	80	21	28,1	42,9	21,4
GRAE45-NPP-B	0,69	45	85	22	–	30,2	11
GRAE45-NPP-B-FA125.5	0,69	45	85	22	–	30,2	11
GE45-KRR-B	0,81	45	85	22	26,4	42,9	21,4
GE45-KRR-B-FA125.5	0,81	45	85	22	26,4	42,9	21,4
GE45-KTT-B	0,86	45	85	22	26,4	42,9	21,4
GE45-KLL-B	0,81	45	85	22	26,4	42,9	21,4
GRAE50-NPP-B	0,77	50	90	22	–	30,2	11
GRAE50-NPP-B-FA125.5	0,77	50	90	22	–	30,2	11
RAE50-NPP-B	0,77	50	90	22	–	30,2	11
GE50-KRR-B	1	50	90	22	26,4	49,2	24,6
GE50-KRR-B-FA125.5	1	50	90	22	26,4	49,2	24,6
GE50-KRR-B-FA164	1	50	90	22	26,4	49,2	24,6
GE50-KRR-B-FA101	1	50	90	22	26,4	49,2	24,6
GNE50-KRR-B	1,87	50	110	29	31	49,2	24,6
GE50-KTT-B	1,06	50	90	22	26,4	49,2	24,6
GE50-KLL-B	1	50	90	22	26,4	49,2	24,6
GRAE55-NPP-B	0,81	55	100	25	–	32,5	12
GE55-KRR-B	1,42	55	100	25	29	55,5	27,8
GE55-KTT-B	1,42	55	100	25	29	55,5	27,8

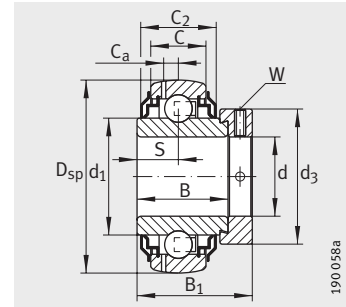
¹⁾ Permissible speeds of radial insert ball bearings: see page 1049.



GE..-KRR-B, GNE...-KRR-B,
E...-KRR-B, GE...-KLL-B



GE...-KTT-B



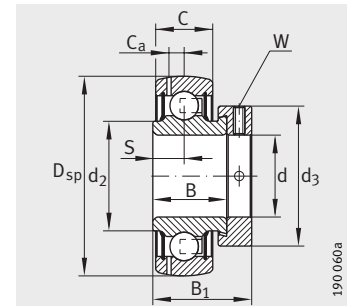
GE...-KRR-B-2C

							Basic load ratings	
d ₁	d ₂	D ₁	C _a	B ₁	d ₃ max.	W	dyn. C _r N	stat. C _{0r} N
-	49,4	-	6,4	43,8	58	5	32 500	19 800
-	49,4	-	6,4	43,8	58	5	32 500	19 800
-	49,4	-	-	43,8	58	5	32 500	19 800
52,3	-	68,3	-	56,5	58	5	32 500	19 800
52,3	-	68,3	6,4	56,5	58	5	32 500	19 800
52,3	-	68,3	6,4	56,5	58	5	32 500	19 800
52,3	-	68,3	6,4	56,5	58	5	32 500	19 800
52,3	-	68,3	6,4	56,5	58	5	32 500	19 800
53,8	-	74,5	7,5	54,6	63	5	44 500	26 000
52,3	-	68,3	6,4	56,5	58	5	32 500	19 800
52,3	-	-	6,4	56,5	58	5	32 500	19 800
52,3	-	68,3	6,4	56,5	58	5	32 500	19 800
-	54,3	-	6,4	43,8	63	5	32 500	20 400
-	54,3	-	6,4	43,8	63	5	32 500	20 400
57,9	-	72,3	6,4	56,5	63	5	32 500	20 400
57,9	-	72,3	6,4	56,5	63	5	32 500	20 400
57,9	-	72,3	6,4	56,5	63	5	32 500	20 400
57,9	-	72,3	6,4	56,5	63	5	32 500	20 400
-	59,4	-	6,9	43,8	69	5	35 000	23 200
-	59,4	-	6,9	43,8	69	5	35 000	23 200
-	59,4	-	-	43,8	69	5	35 000	23 200
62,8	-	77,3	6,9	62,8	69	5	35 000	23 200
62,8	-	77,3	6,9	62,8	69	5	35 000	23 200
62,8	-	77,3	6,9	62,8	69	5	35 000	23 200
62,8	-	77,3	6,9	62,8	69	5	35 000	23 200
68,8	-	92,7	8,7	66,5	75,8	5	62 000	38 000
62,8	-	77,3	6,9	62,8	69	5	35 000	23 200
62,8	-	77,3	6,9	62,8	69	5	35 000	23 200
-	66	-	7	48,4	76	5	43 500	29 000
69,8	-	85,9	7	71,4	76	5	43 500	29 000
69,8	-	85,9	7	71,4	76	5	43 500	29 000



Radial insert ball bearings with eccentric locking collar

Spherical outer ring

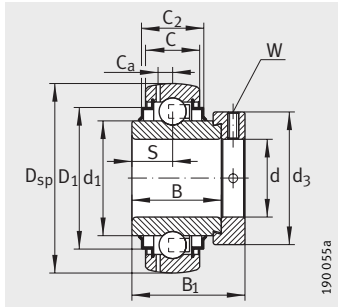


GRAE...-NPP-B

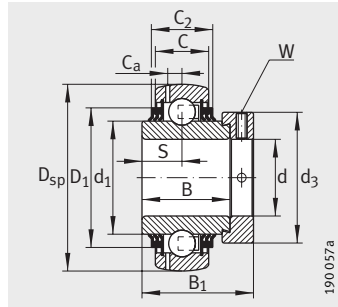
Dimension table (continued) · Dimensions in mm							
Designation ¹⁾	Mass m ≈kg	Dimensions					
		d	D _{sp}	C	C ₂	B	S
GRAE60-NPP-B	1,4	60	110	24	—	37,1	13,5
GRAE60-NPP-B-FA125.5	1,4	60	110	24	—	37,1	13,5
GE60-KRR-B	1,84	60	110	24	29	61,9	31
GE60-KRR-B-FA164	1,84	60	110	24	29	61,9	31
GE60-KRR-B-FA101	1,84	60	110	24	29	61,9	31
GNE60-KRR-B	2,97	60	130	33	37,2	52	23
GE60-KTT-B	1,84	60	110	24	29	61,9	31
GE65-214-KRR-B	2,71	65	125	28	32	48,5	21,5
GE65-214-KRR-B-FA164	2,71	65	125	28	32	48,5	21,5
GE65-214-KTT-B	2,71	65	125	28	32	48,5	21,5
GE70-KRR-B	2,45	70	125	28	32	48,5	21,5
GE70-KRR-B-FA164	2,45	70	125	28	32	48,5	21,5
GE70-KRR-B-FA101	2,45	70	125	28	32	48,5	21,5
GNE70-KRR-B	4,37	70	150	37	41	58	26
GE70-KTT-B	2,45	70	125	28	32	48,5	21,5
GE75-KRR-B	2,65	75	130	28	30,5	49,5	21,5
GE75-KRR-B-FA164	2,65	75	130	28	30,5	49,5	21,5
GE75-KRR-B-FA101	2,65	75	130	28	30,5	49,5	21,5
GE75-KTT-B	2,65	75	130	28	30,5	49,5	21,5
GE80-KRR-B	2,95	80	140	30	38	53,2	23,4
GE80-KRR-B-AH01-FA164	2,95	80	140	30	38	53,2	23,4
GNE80-KRR-B ²⁾	7,1	80	170	41	51	73	34
GE80-KTT-B	2,95	80	140	30	38	53,2	23,4
GE90-KRR-B ²⁾	3,72	90	160	32	35	52	23
GE90-KRR-B-FA164 ²⁾	3,72	90	160	32	35	52	23
GNE90-KRR-B ²⁾	8,07	90	190	45	52,6	77,5	35,5
GE100-KRR-B ²⁾	4,65	100	180	36	39	57,5	25,5
GNE100-KRR-B ²⁾	12,3	100	215	49	59,4	86	39,5
GE120-KRR-B ²⁾	6,93	120	215	40	45	63,5	28,5
GE120-KRR-B-FA101 ²⁾	6,93	120	215	40	45	63,5	28,5

¹⁾ Permissible speeds of radial insert ball bearings: see page 1049.

²⁾ Lubrication groove in outer ring.



GE..-KRR-B, GNE..-KRR-B



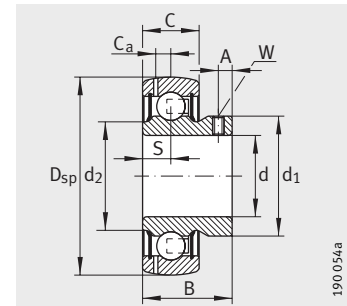
GE..-KTT-B

							Basic load ratings	
d ₁	d ₂	D ₁	C _a	B ₁	d ₃	W	dyn. C _r N	stat. C _{0r} N
-	72	-	7,2	53,1	84	5	52 000	36 000
-	72	-	7,2	53,1	84	5	52 000	36 000
76,5	-	94,5	7,2	77,9	84	5	52 000	36 000
76,5	-	94,5	7,2	77,9	84	5	52 000	36 000
76,5	-	94,5	7,2	77,9	84	5	52 000	36 000
79,4	-	109	11,2	68	89	5	82 000	52 000
76,5	-	94,5	7,2	77,9	84	5	52 000	36 000
85,2	-	109	8,9	66	96	6	62 000	44 000
85,2	-	109	8,9	66	96	6	62 000	44 000
85,2	-	109	8,9	66	96	6	62 000	44 000
85,2	-	109	8,9	66	96	6	62 000	44 000
85,2	-	109	8,9	66	96	6	62 000	44 000
85,2	-	109	8,9	66	96	6	62 000	44 000
92,2	-	127	12	75,5	102	6	104 000	68 000
85,2	-	109	8,9	66	96	6	62 000	44 000
90	-	113	8,5	67	100	6	62 000	44 500
90	-	113	8,5	67	100	6	62 000	44 500
90	-	113	8,5	67	100	6	62 000	44 500
90	-	113	8,5	67	100	6	62 000	44 500
97	-	120	8,8	70,7	108	6	72 000	54 000
97	-	120	8,8	70,7	108	6	72 000	54 000
109	-	142,8	13,2	93,6	108	6	123 000	87 000
97	-	120	8,8	70,7	108	6	72 000	54 000
109,4	-	138	10	69,5	118	6	96 000	72 000
109,4	-	138	10	69,5	118	6	96 000	72 000
122,2	-	161,3	14,3	101	132	6	143 000	107 000
122,2	-	155,5	11,2	75	132	6	122 000	93 000
137,1	-	182,8	16,7	109,4	145	6	174 000	140 000
146,4	-	186,5	12,8	81	152	6	155 000	131 000
146,4	-	186,5	12,8	81	152	6	155 000	131 000



Radial insert ball bearings with grub screws in inner ring

Spherical outer ring

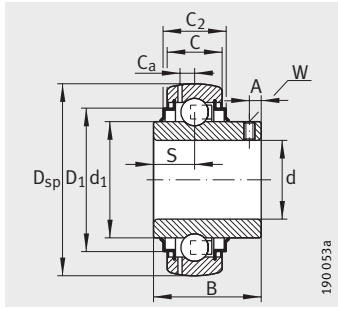


GAY..-NPP-B, AY..-NPP-B

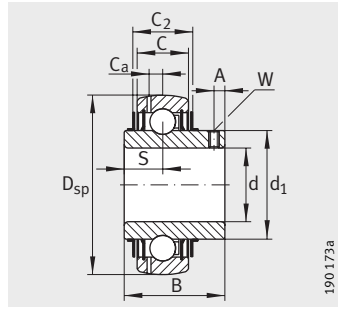
Dimension table · Dimensions in mm							
Designation ¹⁾	Mass m ≈kg	Dimensions					
		d	D _{sp}	C	C ₂	B	S
GAY12-NPP-B	0,1	12	40	12	–	22	6
GAY12-NPP-B-FA164	0,1	12	40	12	–	22	6
AY12-NPP-B	0,1	12	40	12	–	22	6
GYE12-KRR-B	0,11	12	40	12	16,6	27,4	11,5
GYE12-KRR-B-VA	0,11	12	40	12	13,5	25	9,6
GAY15-NPP-B	0,09	15	40	12	–	22	6
GAY15-NPP-B-FA164	0,09	15	40	12	–	22	6
AY15-NPP-B	0,09	15	40	12	–	22	6
GYE15-KRR-B	0,1	15	40	12	16,6	27,4	11,5
GYE15-KRR-B-VA	0,1	15	40	12	13,5	25	9,6
GYE16-KRR-B	0,1	16	40	12	16,6	27,4	11,5
GAY17-NPP-B	0,08	17	40	12	–	22	6
AY17-NPP-B	0,08	17	40	12	–	22	6
GYE17-KRR-B	0,09	17	40	12	16,6	27,4	11,5
GYE17-KRR-B-VA	0,09	17	40	12	13,5	25	9,6
GAY20-NPP-B	0,13	20	47	14	–	25	7
AY20-NPP-B	0,13	20	47	14	–	25	7
GYE20-KRR-B	0,17	20	47	14	16,6	31	12,7
GYE20-KRR-B-VA ²⁾	0,18	20	47	16	17,5	31	12,7
GAY25-NPP-B	0,16	25	52	15	–	27	7,5
AY25-NPP-B	0,16	25	52	15	–	27	7,5
GYE25-KRR-B	0,2	25	52	15	16,7	34,1	14,3
GYE25-KRR-B-VA ²⁾	0,21	25	52	17	18,5	34	14,3
GAY30-NPP-B	0,25	30	62	18	–	30	9
AY30-NPP-B	0,25	30	62	18	–	30	9
GYE30-KRR-B	0,33	30	62	18	20,7	38,1	15,9
GYE30-KRR-B-VA ²⁾	0,4	30	62	19	20,5	38,1	15,9
GAY35-NPP-B	0,39	35	72	19	–	35	9,5
GYE35-KRR-B	0,49	35	72	19	22,5	42,9	17,5
GYE35-KRR-B-VA ²⁾	0,43	35	72	20	21,5	42,9	17,5

¹⁾ Permissible speeds of radial insert ball bearings: see page 1049.

²⁾ Lubrication groove in outer ring.



GYE..-KRR-B



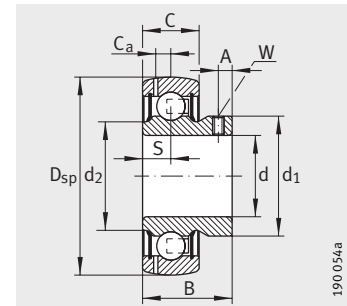
GYE..-KRR-B-VA

						Basic load ratings	
d ₁	d ₂	D ₁	C _a	A	W	dyn. C _r N	stat. C _{0r} N
23,9	22,9	-	3,4	4,2	2,5	9 800	4 750
23,9	22,9	-	3,4	4,2	2,5	9 800	4 750
23,9	22,9	-	-	4	2,5	9 800	4 750
23,9	-	31,6	3,4	4	2,5	9 800	4 750
23,9	-	-	3,4	4	2,5	9 800	4 750
23,9	22,9	-	3,4	4	2,5	9 800	4 750
23,9	22,9	-	3,4	4	2,5	9 800	4 750
23,9	22,9	-	-	4	2,5	9 800	4 750
23,9	-	31,6	3,4	4	2,5	9 800	4 750
24	-	-	3,4	4	2,5	9 800	4 750
23,9	-	31,6	3,4	4	2,5	9 800	4 750
23,9	22,9	-	3,4	4	2,5	9 800	4 750
23,9	22,9	-	-	4	2,5	9 800	4 750
23,9	-	31,6	3,4	4	2,5	9 800	4 750
23,9	-	-	3,4	4	2,5	9 800	4 750
28,3	26,7	-	4	4,5	2,5	12 800	6 600
28,3	26,7	-	-	4,5	2,5	12 800	6 600
27,6	-	37,4	4	4,5	2,5	12 800	6 600
29	-	-	4	5	2,5	12 800	6 600
33,5	30,4	-	3,9	5	2,5	14 000	7 800
33,5	30,4	-	-	5	2,5	14 000	7 800
33,8	-	42,5	3,9	5	2,5	14 000	7 800
34	-	-	4,5	5,5	2,5	14 000	7 800
39,4	37,3	-	4,7	5,8	3	19 500	11 300
39,4	37,3	-	-	5,8	3	19 500	11 300
40,2	-	52	4,7	5,8	3	19 500	11 300
40,4	-	-	5,2	6	3	19 500	11 300
46,9	44,5	-	5,6	6	3	25 500	15 300
46,8	-	60,3	5,6	6	3	25 500	15 300
47,4	-	-	5,6	6,5	3	25 500	15 300



Radial insert ball bearings with grub screws in inner ring

Spherical outer ring

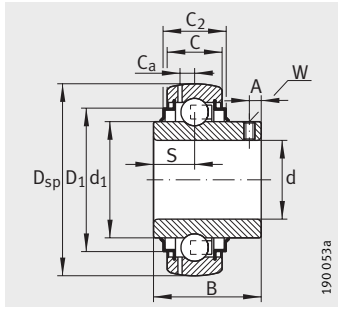


GAY..-NPP-B

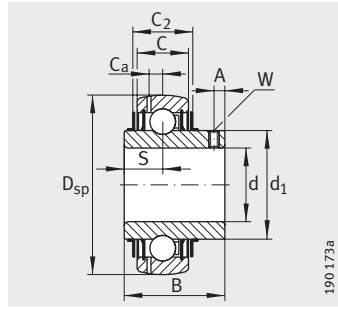
Dimension table (continued) · Dimensions in mm							
Designation ¹⁾	Mass m ≈kg	Dimensions					
		d	D _{sp}	C	C ₂	B	S
GAY40-NPP-B	0,51	40	80	21	–	39,5	10,5
GYE40-KRR-B	0,65	40	80	21	23,5	49,2	19
GYE40-KRR-B-VA²⁾	0,63	40	80	21	22,5	49,2	19
GAY45-NPP-B	0,55	45	85	22	–	41,5	11
GYE45-KRR-B	0,7	45	85	22	26,4	49,2	19
GYE45-210-KRR-B	0,8	45	90	22	26,4	51,6	19
GAY50-NPP-B	0,62	50	90	22	–	43	11
GYE50-KRR-B	0,8	50	90	22	26,4	51,6	19
GYE55-KRR-B	1,1	55	100	25	29	55,6	22,2
GAY60-NPP-B	1,07	60	110	24	–	47	13
GYE60-KRR-B	1,32	60	110	24	29	65,1	25,4
GYE65-214-KRR-B	2,25	65	125	28	32	74,6	30,2
GYE70-KRR-B	1,95	70	125	28	32	74,6	30,2
GYE75-KRR-B	2,19	75	130	28	30,5	77,8	33,3
GYE80-KRR-B	2,93	80	140	30	38	82,6	33,3
GYE90-KRR-B²⁾	4,2	90	160	32	35	96	39,7

¹⁾ Permissible speeds of radial insert ball bearings: see page 1049.

²⁾ Lubrication groove in outer ring.



GYE..-KRR-B



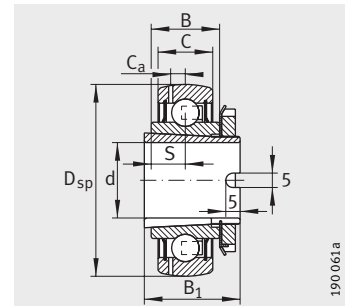
GYE..-KRR-B-VA

						Basic load ratings	
d ₁	d ₂	D ₁	C _a	A	W	dyn. C _r N	stat. C _{0r} N
52,4	49,3	-	6,4	8	4	32 500	19 800
52,3	-	68,3	6,4	8	4	32 500	19 800
52,7	-	-	5,9	8	4	32 500	19 800
57	54,3	-	6,4	8	4	32 500	20 400
57	-	72,3	6,4	8	4	32 500	20 400
62,9	-	77,3	6,9	8,5	4	35 000	23 200
62	59,3	-	6,9	9	4	35 000	23 200
62,8	-	77,3	6,9	8,5	4	35 000	23 200
69,8	-	85,9	7	9	4	43 500	29 000
76	73,6	-	7,2	10	5	52 000	36 000
76,5	-	94,5	7,2	10,1	5	52 000	36 000
85,2	-	109	8,9	12,1	5	62 000	44 000
85,2	-	109	8,9	12	5	62 000	44 000
90	-	113	8,5	12,7	5	62 000	44 500
97	-	120	8,8	12	5	72 000	54 000
109,4	-	138	10	12	6	96 000	72 000



Radial insert ball bearings with integral adapter sleeve

Spherical outer ring



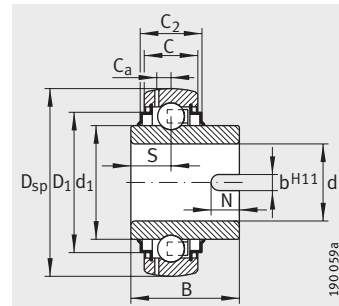
GSH..-2RSR-B

Dimension table · Dimensions in mm											
Designation ¹⁾	Mass m ≈kg	Dimensions							Limiting speed n _{G grease} min ⁻¹	Basic load ratings	
		d	D _{sp}	C	B	S	C _a	B ₁		dyn. C _r N	stat. C _{0r} N
GSH20-2RSR-B	0,14	20	47	14	15	7,5	4	28	10 000	12 700	6 600
GSH25-2RSR-B	0,17	25	52	15	15	7,5	3,9	28	8 000	13 600	7 800
GSH30-2RSR-B	0,27	30	62	18	18	9	4,7	32	6 600	18 900	11 300
GSH35-2RSR-B	0,43	35	72	19	19	9,5	5,8	34	5 700	24 900	15 300
GSH40-2RSR-B	0,54	40	80	21	22	11	6,4	38	5 000	29 500	19 800
GSH50-2RSR-B	0,64	50	90	22	22	11	6,5	40	4 000	33 000	19 900

¹⁾ Permissible speeds of radial insert ball bearings: see page 1049.

Radial insert ball bearings with drive slot

Non-locating bearings
Spherical outer ring



GLE..-KRR-B

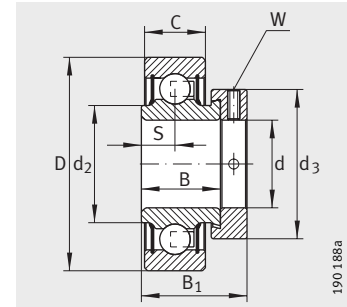
Dimension table · Dimensions in mm															
Designation ¹⁾	Mass m ≈kg	Dimensions											Basic load ratings		
		d	D _{sp}	C	C ₂	B	S	d ₁	D ₁	C _a	N	b	dyn. C _r N	stat. C _{0r} N	
GLE20-KRR-B	0,16	20	47	14	16,6	34,1	15,6	27,6	37,4	4	7	7	12 800	6 600	
GLE25-KRR-B	0,19	25	52	15	16,7	34,9	14,7	33,8	42,5	3,9	8	7	14 000	7 800	
GLE30-KRR-B	0,3	30	62	18	20,7	36,5	14,5	40,2	52	4,7	8	7	19 500	11 300	
GLE35-KRR-B	0,43	35	72	19	22,5	37,7	15,7	46,8	60,3	5,6	8	7	25 500	15 300	
GLE40-KRR-B	0,58	40	80	21	23,5	42,9	15,9	52,3	68,3	6,4	9	7	32 500	19 800	
GLE45-KRR-B	0,66	45	85	22	26,4	42,9	17,4	57,9	72,3	6,4	9	7	32 500	20 400	
GLE50-KRR-B	0,76	50	90	22	26,4	49,2	19	62,8	77,3	6,9	10	7	35 000	23 200	
GLE60-KRR-B	1,52	60	110	24	29	61,9	24,6	76,5	95,9	7,2	12	9	52 000	36 000	
GLE70-KRR-B	2,25	70	125	28	32	68,2	27	85,2	109	8,9	12	9	62 000	44 000	

¹⁾ Permissible speeds of radial insert ball bearings: see page 1049.



Radial insert ball bearings with eccentric locking collar

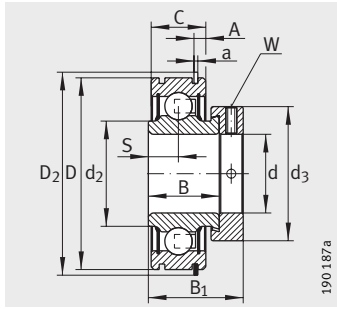
Cylindrical outer ring



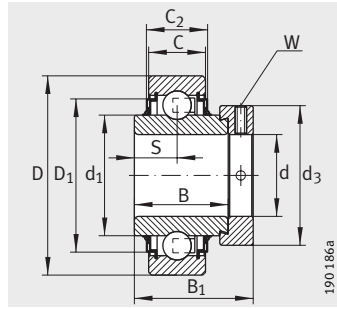
RAE..-NPP, RALE..-NPP

Dimension table · Dimensions in mm								
Designation ¹⁾	Mass m ≈kg	Dimensions						
		d	D	D ₂	C	C ₂	A	a
RAE12-NPP-FA106	0,12	12	40	–	12	–	–	–
RAE15-NPP-FA106	0,12	15	40	–	12	–	–	–
RAE17-NPP-FA106	0,12	17	40	–	12	–	–	–
RAE20-NPP-FA106	0,16	20	47	–	14	–	–	–
RAE20-NPP-NR	0,16	20	47	52,7	14	–	3,58 _{-0,25}	1,12
RALE20-NPP-FA106	0,09	20	42	–	12	–	–	–
E20-KLL	0,2	20	47	–	14	16,6	–	–
E20-KRR	0,2	20	47	–	14	16,6	–	–
RAE25-NPP-FA106	0,19	25	52	–	15	–	–	–
RAE25-NPP-NR	0,19	25	52	57,9	15	–	3,58 _{-0,25}	1,12
RALE25-NPP	0,12	25	47	–	12	–	–	–
E25-KLL	0,25	25	52	–	15	20,2	–	–
E25-KRR	0,25	25	52	–	15	16,7	–	–
RAE30-NPP-FA106	0,31	30	62	–	18	–	–	–
RAE30-NPP-NR	0,31	30	62	67,7	18	–	4,98 _{-0,3}	1,7
RALE30-NPP-FA106	0,17	30	55	–	13	–	–	–
E30-KLL	0,38	30	62	–	18	20,6	–	–
E30-KRR	0,38	30	62	–	18	20,7	–	–
RAE35-NPP-FA106	0,48	35	72	–	19	–	–	–
RAE35-NPP-NR	0,48	35	72	78,6	19	–	4,98 _{-0,3}	1,7
E35-KLL	0,55	35	72	–	19	25,4	–	–
E35-KRR	0,55	35	72	–	19	21,7	–	–
RAE40-NPP-FA106	0,62	40	80	–	21	–	–	–
RAE40-NPP-NR	0,62	40	80	86,6	21	–	4,98 _{-0,3}	1,7
E40-KLL	0,74	40	80	–	21	28,1	–	–
E40-KRR	0,74	40	80	–	21	23,5	–	–
RAE45-NPP-FA106	0,69	45	85	–	22	–	–	–
E45-KLL	0,81	45	85	–	22	26,4	–	–
E45-KRR	0,81	45	85	–	22	26,4	–	–
RAE50-NPP-FA106	0,77	50	90	–	22	–	–	–
E50-KLL	1	50	90	–	22	26,4	–	–
E50-KRR	1	50	90	–	22	26,4	–	–
RAE60-NPP	1,4	60	110	–	24	–	–	–
E60-KRR	1,84	60	110	–	24	29	–	–
E70-KRR	2,45	70	125	–	28	32	–	–

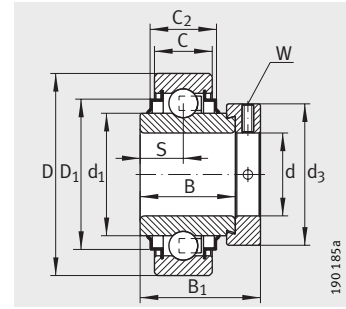
¹⁾ Permissible speeds of radial insert ball bearings: see page 1049.



RAE..NPP-NR



E..-KLL



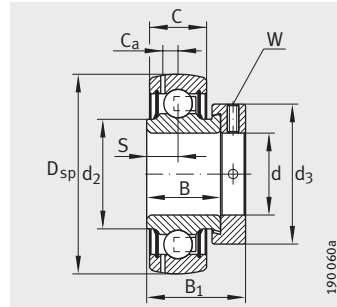
E..-KRR

								Basic load ratings	
B	S	d ₁	d ₂	D ₁	B ₁	d ₃ max.	W	dyn. C _r N	stat. C _{0r} N
19	6,5	-	23	-	28,6	28	3	9 800	4 750
19	6,5	-	23	-	28,6	28	3	9 800	4 750
19	6,5	-	23	-	28,6	28	3	9 800	4 750
21,4	7,5	-	26,9	-	31	33	3	12 800	6 600
21,4	7,5	-	26,9	-	31	33	3	12 800	6 600
16,7	6	-	25,4	-	24,5	30	2,5	9 400	5 000
34,1	17,1	27,6	-	37,4	43,7	33	3	12 800	6 600
34,1	17,1	27,6	-	37,4	43,7	33	3	12 800	6 600
21,4	7,5	-	30,5	-	31	37,5	3	14 000	7 800
21,4	7,5	-	30,5	-	31	37,5	3	14 000	7 800
17,5	6	-	30	-	25,5	36	2,5	10 100	5 900
34,9	17,5	33,8	-	42,5	44,5	37,5	3	14 000	7 800
34,9	17,5	33,8	-	42,5	44,5	37,5	3	14 000	7 800
23,8	9	-	37,4	-	35,8	44	4	19 500	11 300
23,8	9	-	37,4	-	35,8	44	4	19 500	11 300
18,5	6,5	-	35,7	-	26,5	42,5	2,5	13 200	8 300
36,5	18,3	40,2	-	52	48,5	44	4	19 500	11 300
36,5	18,3	40,2	-	52	48,5	44	4	19 500	11 300
25,4	9,5	-	44,6	-	39	51	5	25 500	15 300
25,4	9,5	-	44,6	-	39	51	5	25 500	15 300
37,7	18,8	46,8	-	60,3	51,3	51	5	25 500	15 300
37,7	18,8	46,8	-	60,3	51,3	51	5	25 500	15 300
30,2	11	-	49,4	-	43,8	58	5	32 500	19 800
30,2	11	-	49,4	-	43,8	58	5	32 500	19 800
42,9	21,4	52,3	-	68,3	56,5	58	5	32 500	19 800
42,9	21,4	52,3	-	68,3	56,5	58	5	32 500	19 800
30,2	11	-	54,5	-	43,8	63	5	32 500	20 400
42,9	21,4	57,9	-	72,3	56,5	63	5	32 500	20 400
42,9	21,4	57,9	-	72,3	56,5	63	5	32 500	20 400
30,2	11	-	59,4	-	43,8	69	5	35 000	23 200
49,2	24,6	62,8	-	77,3	62,8	69	5	35 000	23 200
49,2	24,6	62,8	-	77,3	62,8	69	5	35 000	23 200
37,1	13,5	-	72	-	53,1	84	5	52 000	36 000
61,9	31	76,5	-	94,5	77,9	84	5	52 000	36 000
48,5	21,5	85,2	-	109	66	96	6	62 000	44 000

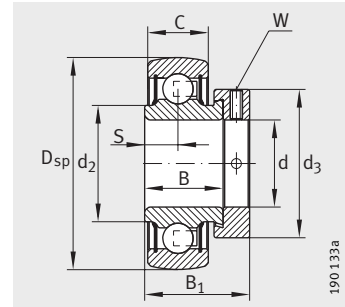


Inch size radial insert ball bearings

Spherical or cylindrical outer ring



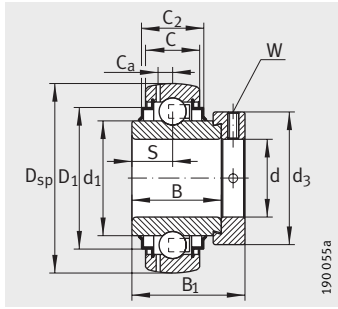
GRA..-NPP-B-AS2/V



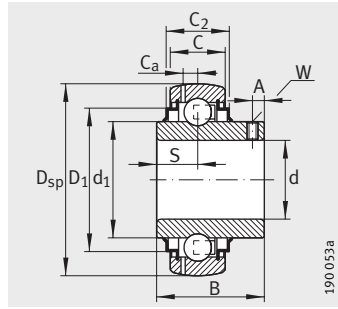
RA..-NPP-B

Dimension table · Dimensions in mm										
Shaft diameter d		Designation ¹⁾	Mass m ≈kg	Dimensions						
				D _{sp}	D	B	B ₁	C	C _a	C ₂
inch	mm									
5/8	15,8750	GRA010-NPP-B-AS2/V	0,12	40	–	19	28,6	12	3,4	–
		RA010-NPP	0,12	–	40	19	28,6	12	–	–
3/4	19,0500	GRA012-NPP-B-AS2/V	0,16	47	–	21,4	31	14	3,4	–
		GY1012-KRR-B-AS2/V	0,17	47	–	31	–	14	3,4	16,6
		RAL012-NPP	0,09	–	42	16,7	24,6	12	–	–
		RA012-NPP	0,16	–	47	21,4	31	14	–	–
7/8	22,2250	GRA014-NPP-B-AS2/V	0,19	52	–	21,4	31	15	3,9	–
		RA014-NPP	0,19	–	52	21,4	31	15	–	–
15/16	23,8125	G1015-KRR-B-AS2/V	0,25	52	–	34,9	44,5	15	3,9	16,7
1	25,4000	GRA100-NPP-B-AS2/V	0,19	52	–	21,4	31	15	3,9	–
		G1100-KRR-B-AS2/V	0,25	52	–	34,9	44,5	15	3,9	16,7
		GY1100-KRR-B-AS2/V	0,2	52	–	34,1	–	15	3,9	16,7
		RA100-NPP	0,19	–	52	21,4	31	15	–	–
		RA100-NPP-B	0,19	52	–	21,4	31	15	–	–
1 ¹ /16	26,9875	RA101-NPP	0,31	–	62	23,8	35,8	18	–	–
1 ¹ /8	28,5750	GRA102-NPP-B-AS2/V	0,31	62	–	23,8	35,8	18	4,7	–
		G1102-KRR-B-AS2/V	0,38	62	–	36,5	48,5	18	4,7	20,7
		RA102-NPP	0,31	–	62	23,8	35,8	18	–	–
1 ³ /16	30,1625	GRA103-NPP-B-AS2/V	0,31	62	–	23,8	35,8	18	4,7	–
		G1103-KRR-B-AS2/V	0,38	62	–	36,5	48,5	18	4,7	20,7
		RA103-NPP	0,31	–	62	23,8	35,8	18	–	–
1 ¹ /4	31,7500	GRA104-206-NPP-B-AS2/V	0,31	62	–	23,8	35,8	18	4,7	–
		G1104-206-KRR-B-AS2/V	0,38	62	–	36,5	48,5	18	4,7	20,7
		GY1104-206-KRR-B-AS2/V	0,33	62	–	38,1	–	18	4,7	20,7
		GRA104-NPP-B-AS2/V	0,48	72	–	25,4	39	19	5,6	–
		G1104-KRR-B-AS2/V	0,55	72	–	37,7	51,3	19	5,6	22,5
		GY1104-KRR-B-AS2/V	0,49	72	–	42,9	–	19	5,6	22,5
		RA104-NPP-B	0,48	72	–	25,4	39	19	–	–
		RA104-NPP	0,48	–	72	25,4	39	19	–	–
		RA104-206-NPP-B	0,31	62	–	23,8	35,8	18	–	–
		RA104-206-NPP	0,31	–	62	23,8	35,8	18	–	9

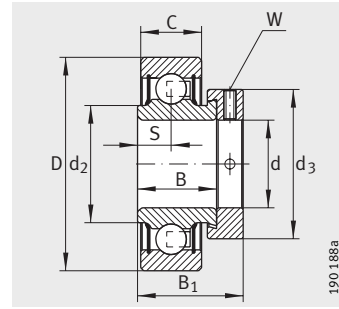
¹⁾ Permissible speeds of radial insert ball bearings: see page 1049.



G.-KRR-B-AS2/V



GY.-KRR-B-AS2/V



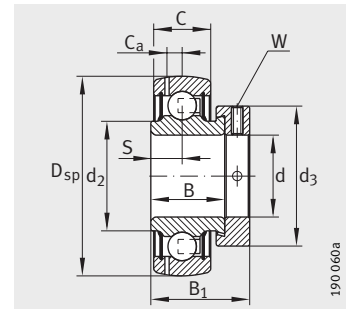
RA.-NPP, RAL.-NPP

S	d ₁	d ₂	D ₁	d ₃ max.	A	W "	Basic load ratings		Shaft diameter	
							dyn. C _r N	stat. C _{0r} N	d	
									inch	mm
6,5	-	23	-	28	-	1/8	9 800	4 750	5/8	15,8750
6,5	-	23	-	28	-	1/8	9 800	4 750		
7,5	-	26,9	-	33	-	1/8	12 800	6 600	3/4	19,0500
12,7	27,6	-	37,4	-	4,5	3/32	12 800	6 600		
6	-	25,4	-	30	-	1/8	9 400	5 000		
7,5	-	26,9	-	33	-	1/8	12 800	6 600		
7,5	-	30,5	-	37,5	-	1/8	14 000	7 800	7/8	22,2250
7,5	-	30,5	-	37,5	-	1/8	14 000	7 800		
17,5	33,8	-	42,5	37,5	-	1/8	14 000	7 800	15/16	23,8125
7,5	-	30,5	-	37,5	-	1/8	14 000	7 800	1	25,4000
17,5	33,8	-	42,5	37,5	-	1/8	14 000	7 800		
14,3	33,8	-	42,5	-	5	3/32	14 000	7 800		
7,5	-	30,5	-	37,5	-	1/8	14 000	7 800		
7,5	-	30,5	-	37,5	-	1/8	14 000	7 800		
9	-	37,4	-	44	-	5/32	19 500	11 300	1 1/16	26,9875
9	-	37,4	-	44	-	5/32	19 500	11 300	1 1/8	28,5750
18,3	40,2	-	52	44	-	5/32	19 500	11 300		
9	-	37,4	-	44	-	5/32	19 500	11 300		
9	-	37,4	-	44	-	5/32	19 500	11 300	1 3/16	30,1625
18,3	40,2	-	52	44	-	5/32	19 500	11 300		
9	-	37,4	-	44	-	5/32	19 500	11 300		
9	-	37,4	-	44	-	5/32	19 500	11 300	1 1/4	31,7500
18,3	40,2	-	52	44	-	5/32	19 500	11 300		
15,9	40,2	-	52	-	5	1/8	19 500	11 300		
9,5	-	44,6	-	51	-	3/16	25 500	15 300		
18,8	46,8	-	60,3	51	-	3/16	25 500	15 300		
17,5	46,8	-	60,3	-	6	1/8	25 500	15 300		
9,5	-	44,6	-	51	-	3/16	25 500	15 300		
9,5	-	44,6	-	51	-	3/16	25 500	15 300		
9	-	37,4	-	44	-	5/32	19 500	11 300		
9	-	37,4	-	44	-	5/32	19 500	11 300		



Inch size radial insert ball bearings

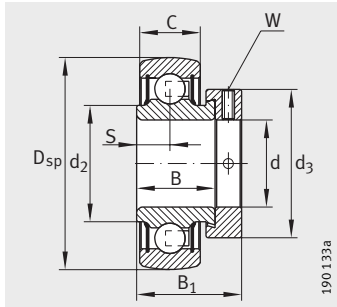
Spherical or cylindrical outer ring



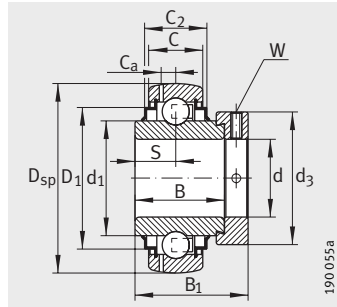
GRA..-NPP-B-AS2/V

Dimension table (continued) · Dimensions in mm										
Shaft diameter d		Designation ¹⁾	Mass m ≈kg	Dimensions						
				D _{sp}	D	B	B ₁	C	C _a	C ₂
inch	mm									
1 ³ / ₈	34,9250	GRA106-NPP-B-AS2/V	0,48	72	–	25,4	39	19	5,6	–
		G1106-KRR-B-AS2/V	0,55	72	–	37,7	51,3	19	5,6	22,5
1 ⁷ / ₁₆	36,5125	GRA107-NPP-B-AS2/V	0,48	72	–	25,4	39	19	5,6	–
		G1107-KRR-B-AS2/V	0,55	72	–	37,7	51,3	19	5,6	22,5
		RA107-NPP	0,48	–	72	25,4	39	19	–	–
1 ¹ / ₂	38,1000	GRA108-NPP-B-AS2/V	0,62	80	–	30,2	43,8	21	6,4	–
		G1108-KRR-B-AS2/V	0,74	80	–	42,9	56,5	21	6,4	23,5
		GY1108-KRR-B-AS2/V	0,65	80	–	49,2	–	21	6,4	23,5
		RA108-NPP-B	0,62	80	–	30,2	43,8	21	–	–
		RA108-NPP	0,62	–	80	30,2	43,8	21	–	–
1 ⁵ / ₈	41,2750	G1110-KRR-B-AS2/V	0,81	85	–	42,9	56,5	22	6,4	26,4
1 ¹¹ / ₁₆	42,8625	G1111-KRR-B-AS2/V	0,81	85	–	42,9	56,5	22	6,4	26,4
1 ³ / ₄	44,4500	GRA112-NPP-B-AS2/V	0,69	85	–	30,2	43,8	22	6,4	–
		G1112-KRR-B-AS2/V	0,81	85	–	42,9	56,5	22	6,4	26,4
		GY1112-KRR-B-AS2/V	0,7	85	–	49,2	–	22	6,4	26,4
1 ¹⁵ / ₁₆	49,2125	G1115-KRR-B-AS2/V	1	90	–	49,2	62,8	22	6,9	26,4
2	50,8000	G1200-KRR-B-AS2/V	1,42	100	–	55,5	71,4	25	7	29
		GY1200-KRR-B-AS2/V	1,1	100	–	55,6	–	25	7	29
2 ³ / ₁₆	55,5625	G1203-KRR-B-AS2/V	1,42	100	–	55,5	71,4	25	7	29
2 ⁷ / ₁₆	61,9125	G1207-KRR-B-AS2/V	1,84	110	–	61,9	77,9	24	7,2	29
2 ¹⁵ / ₁₆	74,6125	G1215-KRR-B-AS2/V	2,65	130	–	49,5	67	28	8,5	30,5
		GY1215-KRR-B-AS2/V	1,97	130	–	77,8	–	28	8,5	31,5

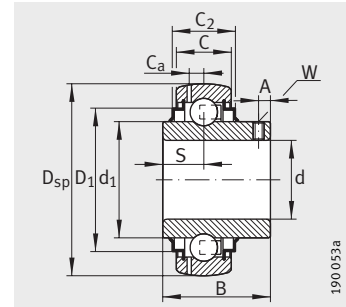
¹⁾ Permissible speeds of radial insert ball bearings: see page 1049.



RA..-NPP-B



G..-KRR-B-AS2/V



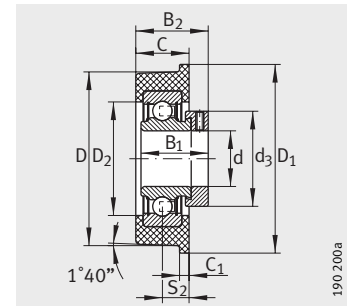
GY..-KRR-B-AS2/V

S	d ₁	d ₂	D ₁	d ₃ max.	A	W "	Basic load ratings		Shaft diameter d	
							dyn. C _r N	stat. C _{0r} N	inch	mm
							9,5	-	44,6	-	51	-	^{3}/_{8}	25 500	15 300	1^{3}/_{8}	34,9250
18,8	46,8	-	60,3	51	-	³ / ₁₆	25 500	15 300		
9,5	-	44,6	-	51	-	³ / ₁₆	25 500	15 300	1⁷/₁₆	36,5125
18,8	46,8	-	60,3	51	-	³ / ₁₆	25 500	15 300		
9,5	-	44,6	-	51	-	³ / ₁₆	25 500	15 300		
11	-	49,4	-	58	-	³ / ₁₆	32 500	19 800	1¹/₂	38,1000
21,4	52,3	-	68,3	58	-	³ / ₁₆	32 500	19 800		
19	52,3	-	68,3	-	8	⁵ / ₃₂	32 500	19 800		
11	-	49,4	-	58	-	³ / ₁₆	32 500	19 800		
11	-	49,4	-	58	-	³ / ₁₆	32 500	19 800		
21,4	57,9	-	72,3	63	-	³ / ₁₆	32 500	20 400	1⁵/₈	41,2750
21,4	57,9	-	72,3	63	-	³ / ₁₆	32 500	20 400	1¹¹/₁₆	42,8625
11	-	54,5	-	63	-	³ / ₁₆	32 500	20 400	1³/₄	44,4500
21,4	57,9	-	72,3	63	-	³ / ₁₆	32 500	20 400		
19	57,9	-	72,3	-	8	⁵ / ₃₂	32 500	20 400		
24,6	62,8	-	77,3	69	-	³ / ₁₆	35 000	23 200	1¹⁵/₁₆	49,2125
27,8	69,8	-	85,9	76	-	³ / ₁₆	43 500	29 000	2	50,8000
22,2	69,8	-	85,9	-	9	⁵ / ₃₂	43 500	29 000		
27,8	69,8	-	85,9	76	-	³ / ₁₆	43 500	29 000	2³/₁₆	55,5625
31	76,5	-	94,5	84	-	³ / ₁₆	52 000	36 000	2⁷/₁₆	61,9125
21,5	90	-	113	100	-	¹ / ₄	62 000	44 500	2¹⁵/₁₆	74,6125
33,4	90	-	113	-	12,7	³ / ₁₆	62 000	44 500		



Radial insert ball bearings with rubber interliner

Spherical or
cylindrical outside surface of rubber interliner



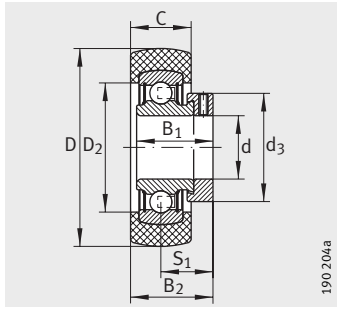
CRB

Dimension table · Dimensions in mm									
Designation ¹⁾		Mass m ≈kg	Dimensions						
Unit ²⁾	Radial insert ball bearing		d	D	D ₁	C	C ₂	C ₁	
	RABRB12/47-FA106	RAE12-NPP-B-FA106	0,15	12	47,3	–	17,6	–	–
	RCSMB15/65-FA106	RAE15-NPP-FA106	0,18	15	65,1	–	25,4	–	–
	RABRB15/47-FA106	RAE15-NPP-B-FA106	0,15	15	47,3	–	18	–	–
	RCSMB17/65-FA106	RAE17-NPP-FA106	0,18	17	65,1	–	25,4	–	–
	CRB20/83	RAE20-NPP	0,3	20	83,6	87,4	25,4	–	4,8
	CRB20/76	RAE20-NPP	0,3	20	77,5	80	25,4	–	5
	RCSMB20/65-FA106	RAE20-NPP-FA106	0,22	20	65,1	–	25,4	–	–
	RCRA20/46-FA106	RAE20-NPP-FA106	0,14	20	46	–	18,3	16	–
	RABRB20/52-FA106	RAE20-NPP-B-FA106	0,2	20	52,3	–	17,6	–	–
	CRB25/83	RAE25-NPP	0,32	25	83,6	87,4	25,4	–	4,8
	CRB25/70	RAE25-NPP	0,32	25	71,5	76	25	–	5
	CRB25/72	RAE25-NPP	0,32	25	73	80	25	–	5
	RCSMB25/65-FA106	RAE25-NPP-FA106	0,24	25	65,1	–	25,4	–	–
	RCRB25/57-FA106	RAE25-NPP-FA106	0,21	25	57,3	–	19,8	17,5	–
	RABRB25/62-FA106	RAE25-NPP-B-FA106	0,24	25	62,2	–	20,8	–	–
	CRB30/83	RAE30-NPP	0,41	30	83,6	87,4	28	–	4,8
	CRB30/92	RAE30-NPP	0,41	30	93	98	28	–	5
	RCSMA30/65-FA106	RAE30-NPP-FA106	0,32	30	65,1	–	25,4	–	–
	RABRA30/62-FA106	RAE30-NPP-B-FA106	0,3	30	62,2	–	20,8	–	–
	RABRB30/72-FA106	RAE30-NPP-B-FA106	0,38	30	72,2	–	23	–	–
	CRB35/110	RAE35-NPP	0,56	35	112,3	120	30	–	5
	RABRB35/80-FA106	RAE35-NPP-B-FA106	0,57	35	80,2	–	24	–	–
	RABRB40/85-FA106	RAE40-NPP-B-FA106	0,73	40	85	–	27	–	–
	RABRB50/100-FA106	RAE50-NPP-B-FA106	0,92	50	100,2	–	30	–	–

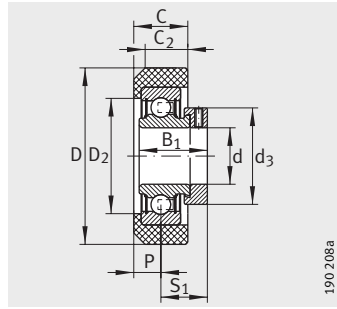
1) Permissible speeds of radial insert ball bearings: see page 1049.

2) Operating temperature from –20 °C to +85 °C.

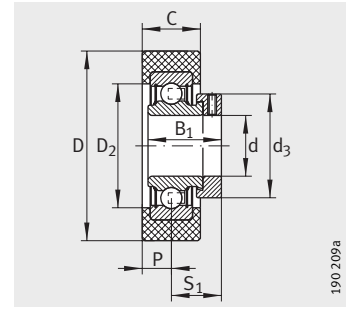
3) Also available by agreement in NBR80.



RABRA, RABRB



RCRA, RCRB

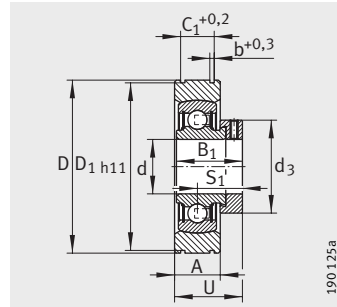


RCSMA, RCSMB

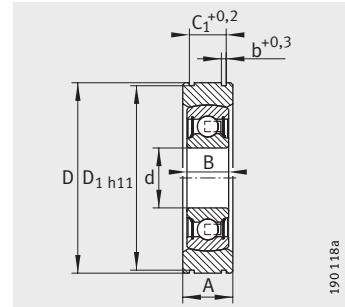
							Rubber ring		Basic load ratings	
S ₁	D ₂	B ₁	P	d ₃	S ₂	B ₂	Hardness Shore A	Load carrying capacity C _G	dyn. C _r	stat. C _{0r}
				max.			°	N	N	N
22,1	33,5	28,6	–	28	–	30,9	70	840	9 800	4 750
22,1	35	28,6	12,7	28	–	–	70	900	9 800	4 750
22,1	33,5	28,6	–	28	–	31,1	70	840	9 800	4 750
22,1	35	28,6	12,7	28	–	–	70	900	9 800	4 750
–	40	31	–	33	12,7	36,2	80	750	12 800	6 600
–	40	31	–	33	12,5	36	80	750	12 800	6 600
23,5	40	31	12,7	33	–	–	70	1 200	12 800	6 600
18,6	35	24,5	10	30	–	–	70	900	9 400	5 000
23,5	39	31	–	33	–	32,3	70	1 160	12 800	6 600
–	46	31	–	37,5	12,7	36,2	80	1 000	14 000	7 800
–	46	31	–	37,5	12,5	36	80	1 000	14 000	7 800
–	46	31	–	37,5	12,5	36	80	1 000	14 000	7 800
23,5	46	31	12,7	37,5	–	–	70	1 400	14 000	7 800
23,5	44,5	31	9,8	37,5	–	–	70	1 400	14 000	7 800
23,5	44,5	31	–	37,5	–	33,9	70 ³⁾	1 390	14 000	7 800
–	56	35,8	–	44	14	40,7	80	1 400	19 500	11 300
–	56	35,8	–	44	14	40,7	80	1 400	19 500	11 300
20	47,6	26,5	15	42,5	–	–	70	1 400	13 200	8 300
20	47	26,5	–	42,5	–	30,4	70	1 390	13 200	8 300
26,7	54	35,8	–	44	–	38,2	70 ³⁾	1 980	19 500	11 300
–	64	39	–	51	15	44,4	80	1 500	25 500	15 300
29,4	62	39	–	51	–	41,4	70	2 700	25 500	15 300
32,7	70	43,8	–	58	–	46,7	70 ³⁾	3 500	32 500	19 800
32,7	80	43,8	–	69	–	47,7	70 ³⁾	4 100	35 000	23 200



Radial insert ball bearings with steel aligning ring



PE



BE

Dimension table · Dimensions in mm

Designation	Mass Unit	Dimensions											Basic load ratings	
		d	D ³⁾	A	C ₁	b	D ₁	B	B ₁	S ₁	d ₃	U	dyn. C _r N	stat. C _{0r} N
PE20 ¹⁾	0,24	20	55	16	11,2	1,6	53,5	–	31	23,5	33	31,5	12 800	6 600
BE20 ²⁾	0,19	20	55	16	11,2	1,6	53,5	14	–	–	–	–	12 800	6 600
PE25 ¹⁾	0,31	25	62	17	11,2	1,6	60,5	–	31	23,5	37,5	32	14 000	7 800
BE25 ²⁾	0,25	25	62	17	11,2	1,6	60,5	15	–	–	–	–	14 000	7 800
PE30 ¹⁾	0,48	30	72	21	14,4	2,2	70,2	–	35,8	26,7	44	37,2	19 500	11 300
BE30 ²⁾	0,37	30	72	21	14,4	2,2	70,2	16	–	–	–	–	19 500	11 300
PE35 ¹⁾	0,64	35	80	21	14,4	2,2	78,2	–	39	29,4	51	40	25 500	15 300
BE35 ²⁾	0,45	35	80	21	14,4	2,2	78,2	17	–	–	–	–	25 500	15 300
PE40 ¹⁾	0,88	40	90	25	15,4	2,7	88	–	43,8	32,7	58	45,2	32 500	19 800
BE40 ²⁾	0,63	40	90	25	15,4	2,7	88	18	–	–	–	–	32 500	19 800

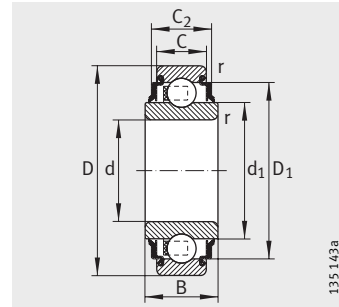
1) Permissible speeds of radial insert ball bearings RAE..NPP-B: see page 1049.

2) Permissible speeds of radial insert ball bearings 2..NPP-B: see page 1078.

3) Before splitting, dimension D corresponds to tolerance class PN according to DIN 620-2.

Deep groove ball bearings with extended inner ring

Cylindrical outer ring



2..-KRR, 2..-KRR-AH..

Dimension table · Dimensions in mm												
Designation	Mass m ≈kg	Dimensions								Limiting speed n _G grease min ⁻¹	Basic load ratings	
		d	D	C	C ₂	d ₁	D ₁	B	r _{min}		dyn. C _r N	stat. C _{0r} N
203-KRR-AH05	0,08	13 ²⁾	40	12	12	24,5	30,6	18,3	0,6	13 000	9 800	4 750
202-KRR	0,05	15	35	11	11	21,5	28,8	14,4	0,6	14 600	7 600	3 700
203-KRR-AH02	0,07	16,2 ³⁾	40	12	12	24,5	32,6	18,3	0,6	13 000	9 800	4 750
203-KRR	0,07	17	40	12	12	24,5	32,9	18,3	0,6	13 000	9 800	4 750
204-KRR	0,12	20	47	14	14	28,7	38,7	17,7	1	11 000	12 800	6 600
205-KRR	0,16	25	52	15	16,7	33,8	42,6	21	1	8 800	14 000	7 800
206-KRR	0,24	30	62	16	19,6	40,2	52	24	1	7 300	19 500	11 300
207-KRR-AH03 ¹⁾	0,35	35	72	17	19,7	46,8	60,3	25	2	6 300	25 500	15 300
208-KRR-AH04 ¹⁾	0,46	38,892	80	21	21,2	52,3	68,2	27,5	1	5 500	32 500	19 800
208-KRR	0,44	40	80	18	20,5	52,3	68,2	27	1,1	5 500	32 500	19 800
209-KRR	0,53	45	85	19	26,4	57,9	72,3	30	1,1	4 900	32 500	20 400
210-KRR	0,58	50	90	20	24	62,8	77,6	30	1,1	4 400	35 000	23 200
211-KRR	0,85	55	100	21	27,5	69,8	85,9	36	1,5	4 000	43 500	29 000
212-KRR	1,1	60	110	22	30	76,5	94,7	36	1,5	3 700	52 000	36 000

1) With steel cage.

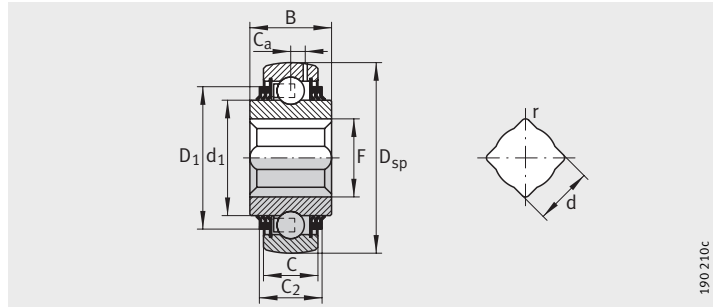
2) $d^{+0,08}_{-0,05}$.

3) $d^{+0,1}$.



Self-aligning deep groove ball bearings

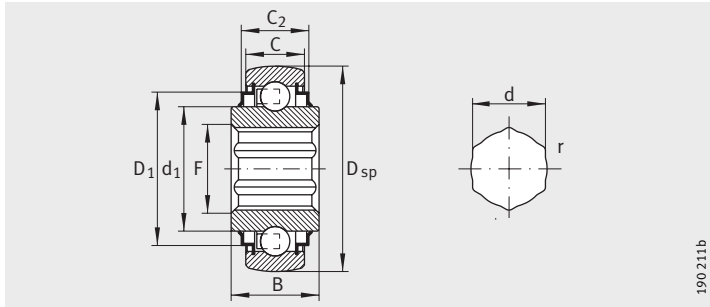
Spherical outer ring
With square or
hexagonal bore



190 210c

GVK..-KTT-B(-AH..), VK..-KTT-B(-AH..)

Dimension table · Dimensions in mm									
Width across flats of shaft d		Designation	Mass m ≈kg	Dimensions					
				d	d	D _{sp}	C	C ₂	d ₁
inch	mm				Deviation				
–	17,0000	SKE17-204-KRR-B	0,12	17,0000	+0,15 +0,05	47	14	–	28,7
7/8	22,2250	SK014-205-KRR-B	0,2	22,2250	+0,15 +0,05	52	15	16,7	33,8
1	25,4000	GVK100-208-KTT-B	0,74	25,4000	+0,9 +0,6	80	21	28,1	52,3
		VK100-208-KTT-B-AH10	0,72	25,4000	+0,9 +0,6	80	18	25,3	52,3
		SK100-206-KRR-B-AH11	0,32	25,4000	+0,15 +0,03	62	16	18,7	40,2
1 1/8	28,5750	GVK102-208-KTT-B-AH10	0,68	28,5750	+0,9 +0,6	80	18	25,3	52,3
		SK102-207-KRR-B-AH10	0,45	28,5750	+0,175 +0,03	72	17	20,5	46,8
1 1/4	31,7500	GVK104-209-KTT-B	0,71	31,7500	+0,9 +0,6	85	22	27,4	57,9
		SK104-207-KRR-B-AH12	0,45	31,7500	+0,2 +0,1	72	17	20,5	46,8
1 9/16	39,6875	GVK109-211-KTT-B	1,25	39,6875	+1,1 +0,8	100	25	29	69,8



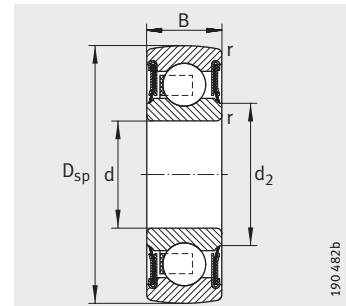
SK..-KRR-B(-AH)

F	D ₁	C _a	B	r	Limiting speed n _G grease min ⁻¹	Basic load ratings		Width across flats of shaft	
						dyn. C _r N	stat. C _{0r} N	d	
								inch	mm
20,2	–	–	17,7	0,13	900	12 800	6 600	–	17,0000
26,2	42,6	–	25,4	0,13	900	14 000	7 800	⁷ / ₈	22,2250
35,4	68,3	6,4	36,5	2,5	500	32 500	19 800	1	25,4000
35,4	68,3	–	36,5	2,5	500	32 500	19 800		
30,5	52	–	24	0,13	800	19 500	11 300		
41,3	68,3	5,8	36,5	2,5	500	32 500	19 800	¹ / ₈	28,5750
38	60,3	–	37,7	0,25	800	25 500	15 300	¹ / ₄	31,7500
44,3	72,3	6,4	36,5	2,5	500	32 500	20 400		
38	60,3	–	25	0,12	800	25 500	15 300		
55,2	85,9	7,1	36	2,5	450	43 500	29 000	¹ ⁹ / ₁₆	39,6875



Self-aligning deep groove ball bearings

Spherical outer ring
Bore for fit



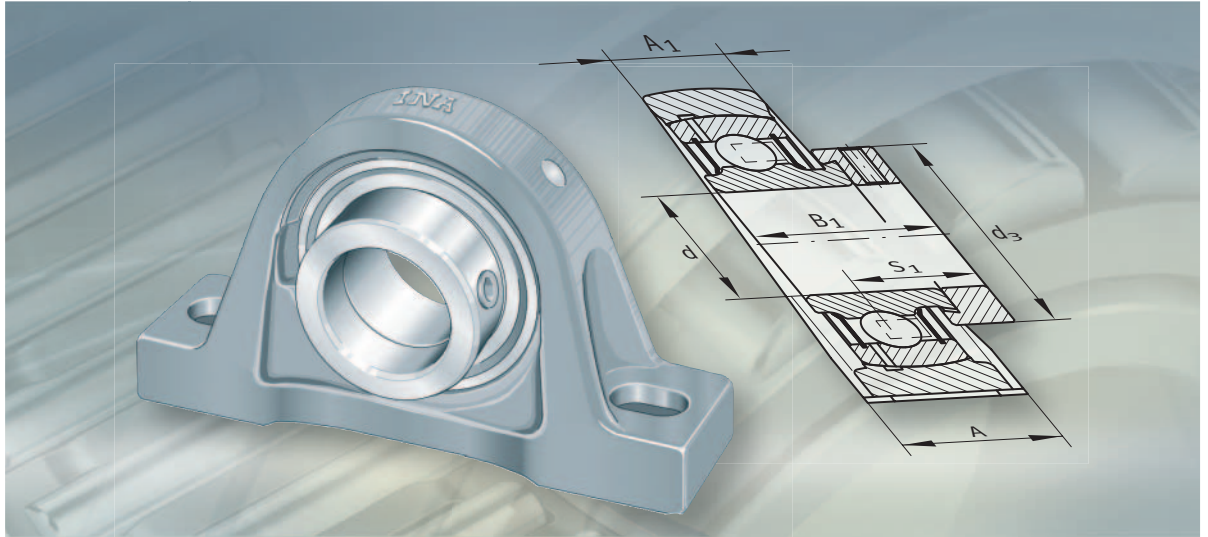
2..-NPP-B

Dimension table · Dimensions in mm									
Designation	Mass m ≈ kg	Dimensions					Limiting speed n _G grease min ⁻¹	Basic load ratings	
		d	D _{sp}	B	d ₂	r _{min}		dyn. C _r N	stat. C _{0r} N
201-NPP-B¹⁾	0,04	12	32	10	17,1	0,6	18 300	6 800	3 050
203-NPP-B²⁾	0,06	17	40	12	22,5	0,6	13 000	9 800	4 750
204-NPP-B²⁾	0,11	20	47	14	26,5	1	11 000	12 800	6 600
205-NPP-B²⁾	0,13	25	52	15	30,3	1	8 800	14 000	7 800
206-NPP-B¹⁾	0,2	30	62	16	37,4	1	7 300	19 500	11 300
207-NPP-B¹⁾	0,29	35	72	17	42,4	1	6 300	25 500	15 300
208-NPP-B¹⁾	0,37	40	80	18	48,4	1,1	5 500	32 500	19 800
209-NPP-B¹⁾	0,41	45	85	19	53,2	1,1	4 900	32 500	20 400
210-NPP-B¹⁾	0,46	50	90	20	58,2	1,1	4 400	35 000	23 200

1) One-piece seal with moulded seal lip.

2) Three-piece P seal.





Housing units

Housing units

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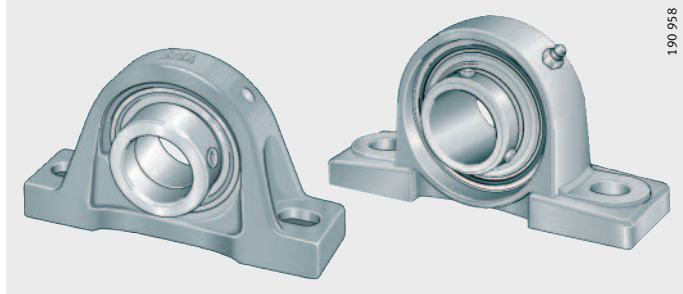
Product overview Housing units

Plummer block housing units

Cast iron housings with long base

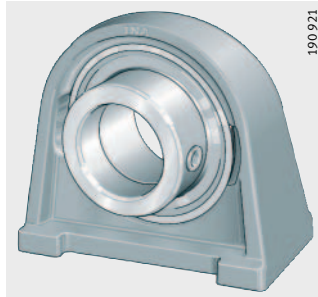
Combinations
of bearings and housings
see page 1090

PASE, PASEY, RASE, RASEL, RASEA, RASEY, TASE, LASE, RSAO,
RASEY..-JIS



Cast iron housings with short base

PSHE, PSHEY, RSHE, RSHEY,
TSHE

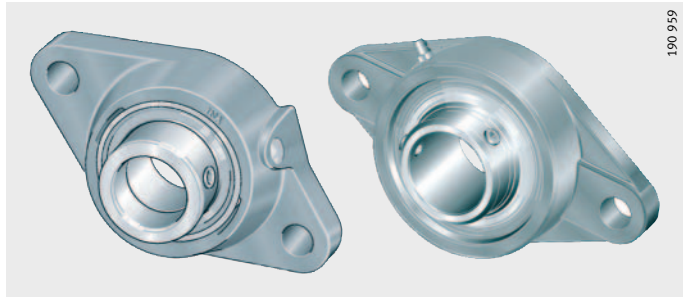


Two-bolt flanged housing units

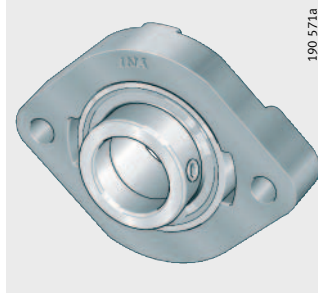
Cast iron housings

Combinations
of bearings and housings
see page 1090

PCJT, PCJTY, RCJTZ, RCJT, RCJTA, RCJTY, PCFT, TCJT, LCJT,
RCJTY..-JIS



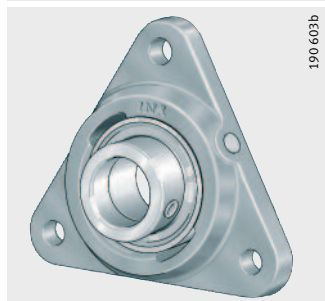
FLCTE, FLCTEY, GLCTE



**Three-bolt
flanged housing units**
Cast iron housings

Combinations
of bearings and housings
see page 1090

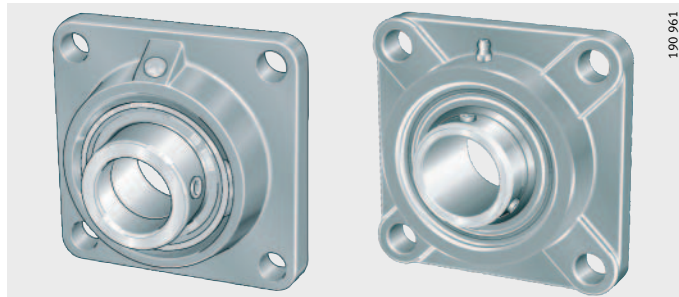
PCFTR



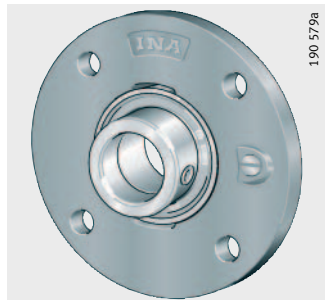
**Four-bolt
flanged housing units**
Cast iron housings

Combinations
of bearings and housings
see page 1090

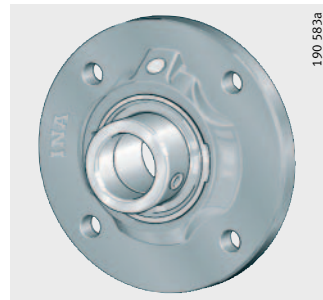
PCJ, PCJY, RCJ, RCJY, RCJL, RCJO, TCJ, PCF, RCJY..-JIS



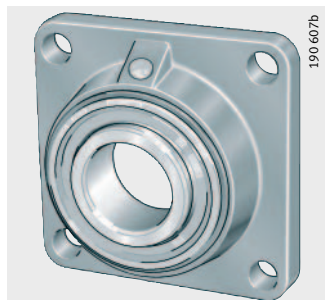
**PME, PMEY, RME, RMEY,
RME0, TME**



RFE, TFE



PCCJ



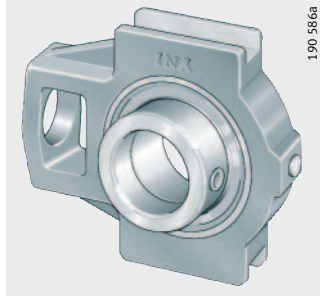
Product overview Housing units

Take-up housing units

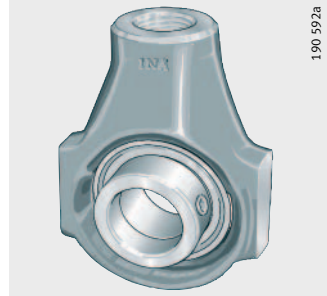
Cast iron housings

Combinations
of bearings and housings
see page 1091

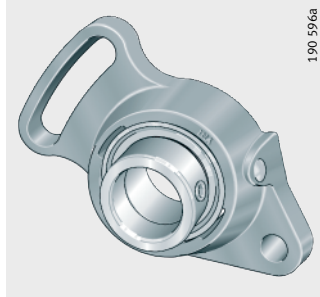
**PTUE, PTUEY, RTUE, RTUEY,
RTUEO, TTUE**



PHE, PHEY, RHE, THE

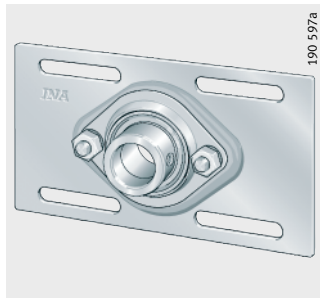


PSFT



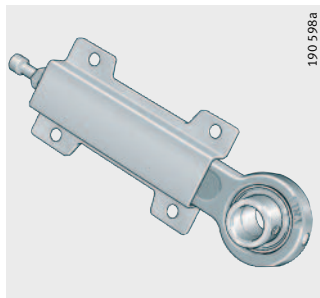
Sheet steel housings

MSTU



Cast iron/sheet steel housings

PHUSE

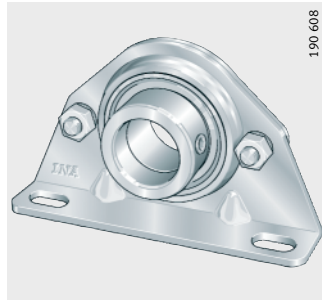


Plummer block housing units

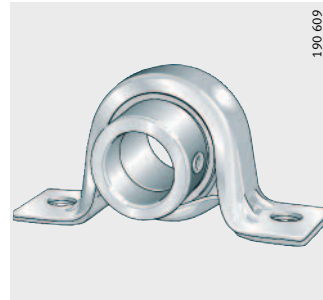
Sheet steel housings

Combinations
of bearings and housings
see page 1092

PBS



PB, PBY, RPB

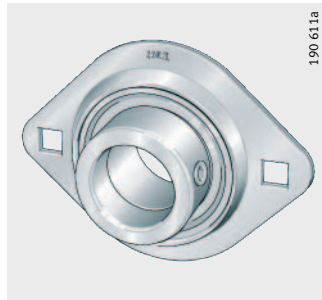


**Two-bolt and three-bolt
flanged housing units**

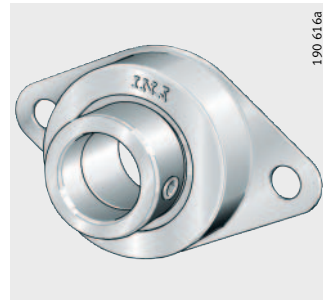
Sheet steel housings

Combinations
of bearings and housings
see page 1092

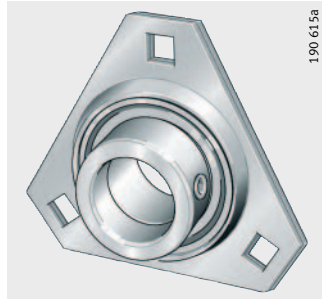
RAT, RATY, RALT, PCSLT



RCSMF



RATR, RALTR, RRTR, RATRY



RA, RAY, RRY, GRA, GRRY



Housing units

Features INA housed bearing units are available as plummer block, flanged and take-up housing units in numerous different designs. The units are ready-to-fit and comprise INA cast iron or sheet steel housings in which INA radial insert ball bearings are fitted. In order to ensure function and reliability under all operating conditions, the bearings and housings are matched to each other.

Due to the spherical outside surface of the bearing outer ring and the concave housing bore, housing units can compensate for static angular misalignment of the shaft; see Compensation of misalignments, page 1094.

The units are used predominantly as locating bearings, but are also suitable as non-locating bearings under low loads and speeds.

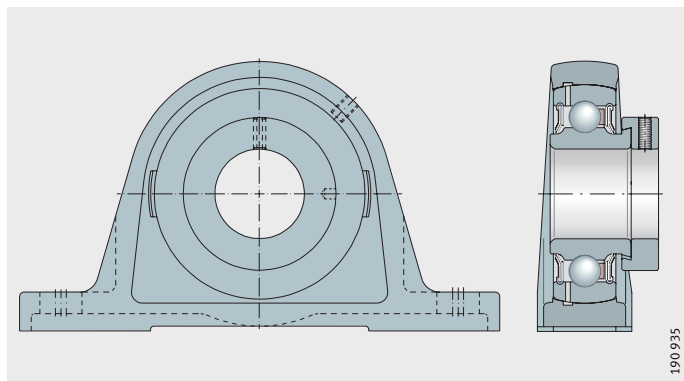
The housings are screw mounted on the adjacent construction. Less stringent tolerances are adequate for the screw mounting surfaces; see Design of adjacent construction, page 1096.

Housing units with cast iron housing

Cast iron housings are single-piece units with high load carrying capacity; see Load carrying capacity of cast iron housings, page 1095. For lubrication of radial insert ball bearings, the housing bore has a radial groove and the housing has a lubrication hole suitable for conventional lubrication nipples to DIN 71 412. In the delivered condition, the hole in the housing is closed off by a plastic plug. Cast iron units are available as plummer block and flanged housing units.

Plummer block housing units

Plummer block housing units have a long or a short base, *Figure 1*. Housings with a long base are screw mounted to the adjacent construction by means of slots, housings with a short base by blind threaded holes.



PASE

Figure 1

Plummer block housing unit – cast iron housing with long base

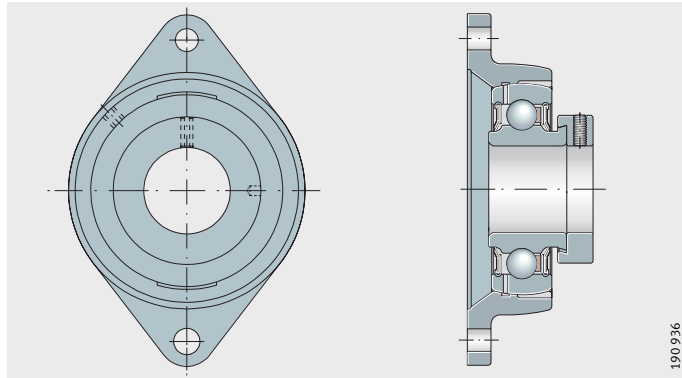
Flanged housing units

Flanged housing units are available as two-bolt, three-bolt and four-bolt units, *Figure 2*. The housings are oval, triangular, square or round in shape. The housings have through holes for locating purposes. Some series also have a centring spigot. The centring spigot is mounted in a turned recess in the machine structure. This gives concentric alignment of the housings and relieves the fixing screws of any radial forces.

PCJT

Figure 2

Flanged housing unit – cast iron housing



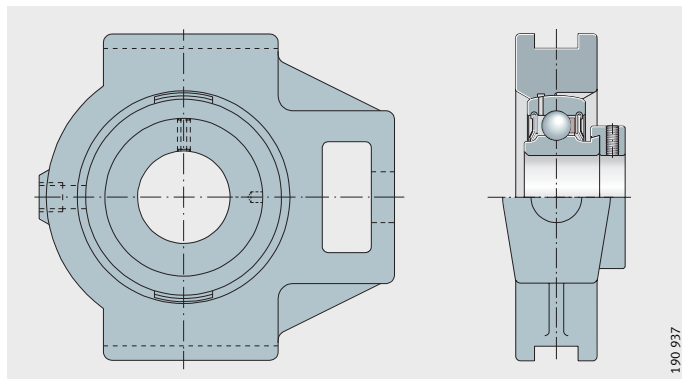
Take-up housing units

Take-up housing units can be moved or swivelled, *Figure 3*. They are used where shafts must carry out long displacement motions.

PTUE

Figure 3

Take-up housing unit – cast iron housing



Housing materials

The material used for the cast iron housings is cast iron to EN-GJL-200/250. Housings are also available by agreement in spheroidal graphite cast iron to EN-GJS-400/450.

Bearing end caps

In order to cover the exposed ends of rotating shafts, cast iron housings with the suffix N can be fitted with bearing end caps.

Housing units

Corrosion-resistant units

Corrosion-resistant units are available as plummer block and flanged housing units. The housings and insert bearings are plated with Corrotect® and have the suffix FA125.

The units are used if moisture, contaminated water, salt spray mist, weakly alkaline or weakly acidic cleaning agents are present.

Units for high and low temperatures

These units are available as plummer block and flanged housing units. The housings correspond to the cast iron housings described above. The high temperature variant FA164 includes a tapered lubrication nipple to DIN 71412 screwed into the housing.

The radial insert ball bearings fitted have the suffix FA164 or FA101 and are designed for high or low temperatures; see Radial insert ball bearings, page 1037.

Housing units with sheet steel housing

Sheet steel housings are two-piece units made from pressed deep drawn sheet steel and are in some cases plated with Corrotect®. Series GRA and GRRY can be relubricated via a lubrication nipple. The units are available as plummer block and flanged housing units, *Figure 4* and *Figure 5*.

Units with sheet steel housings are suitable for moderate loads and lightweight constructions.

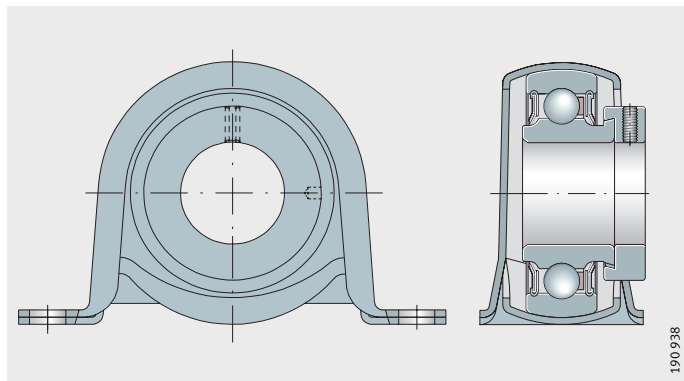
Plummer block and flanged housing units with rubber interliner

In addition to the normal plummer block and flanged housing units, there is also a design with a rubber interliner on the bearing outer ring. This interliner absorbs shocks and vibrations and thus gives damping of running noises.

PB

Figure 4

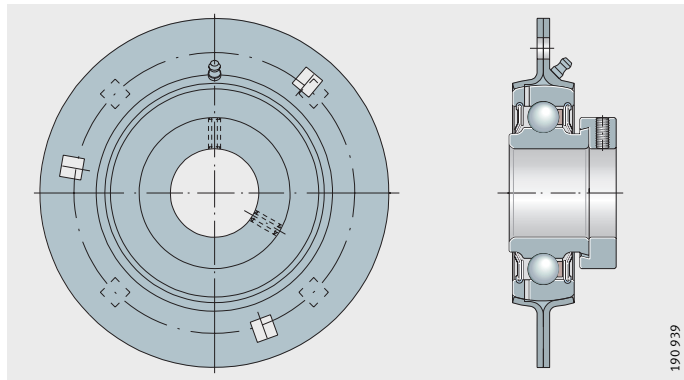
Plummer block housing unit – sheet steel housing



GRA

Figure 5

Flanged housing unit – sheet steel housing



Corrosion-resistant units The two-piece sheet steel flanged units have the suffix VA and are also available with a relubrication facility. They are used if moisture, contaminated water, salt spray mist, weakly alkaline or weakly acidic cleaning agents are present.

Possible combinations of radial insert ball bearings and housings Possible combinations – radial insert ball bearings with sheet steel housings, see page 1090/1092.

Other products In addition to the comprehensive catalogue range, INA also supplies housing units for special applications, including:

- corrosion-resistant flanged housing units with two-piece housings
 - a polypropylene flanged element combined with a corrosion-resistant alloy steel flanged element
- units with plastic housings combined with radial insert ball bearings of type VA
- other designs with special greases, seals etc. Please contact us as necessary.

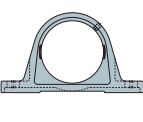
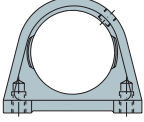
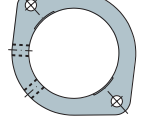
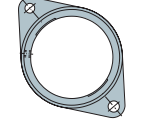
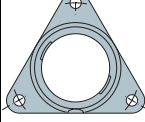
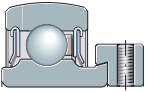
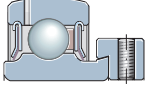
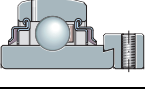
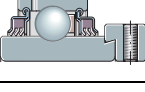
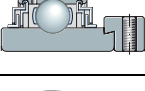
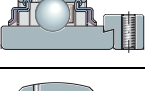
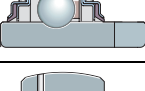
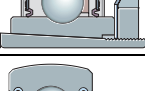
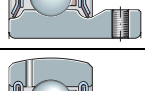
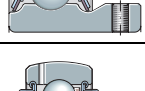
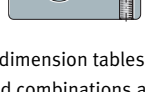
Suffixes Suffixes for available housing unit designs: see table.

Available designs

Suffixes	Description
2C	Radial insert ball bearing with flinger shields on both sides
FA101	High/low temperature design for –40 °C to +150 °C
FA106	Bearing subjected to special noise testing
FA107	Bearing with lubrication holes on the locating side
FA125	With Corrotect® plating
FA164	High temperature design up to +250 °C
N	Cast iron housing with undercut slot for end caps
OSE	Bearing without locating element
JIS	Housing dimensions according to JIS B 1559



Housing units

Possible combinations – radial insert ball bearings with cast iron housings	Housings					
	Plummer block housings		Two-bolt flanged housings		Three-bolt flanged housings	
						
	GG.ASE	GG.SHE	GG.LCTE²⁾	GG.CJT	GG.CFTR	
GG.SAO¹⁾		GG.GLCTE	GG.CFT			
			GG.CJTZ			
RAE..-NPP-B d = 12 to 50 mm				FLCTE²⁾ page 1120		
GRAE..-NPP-B d = 12 to 60 mm		PASE page 1106	PSHE page 1116	GLCTE page 1120	PCJT page 1122 PCFT page 1122	PCFTR page 1132
GE..-KRR-B d = 17 to 120 mm		RASE page 1106	RSHE page 1116		RCJT page 1122 RCJTZ page 1130	Available by agreement only
GE..-KTT-B d = 20 to 80 mm		TASE page 1106	TSHE page 1116		TCJT page 1122	Available by agreement only
GE..-KLL-B d = 20 to 50 mm		LASE page 1106	Available by agreement only		LCJT page 1122	Available by agreement only
GNE..-KRR-B¹⁾ d = 30 to 100 mm		RSAO page 1108				
GLE..-KRR-B d = 20 to 70 mm		RASEL page 1106	Available by agreement only		Available by agreement only	Available by agreement only
GSH..-2RSR-B d = 20 to 50 mm		RASEA page 1106	Available by agreement only		RCJTA page 1122	Available by agreement only
AY..-NPP-B d = 12 to 30 mm				FLCTEY²⁾ page 1120		
GAY..-NPP-B d = 12 to 60 mm		PASEY page 1106	PSHEY page 1116	FLCTEY²⁾ page 1120	PCJTY page 1122	Available by agreement only
GYE..-KRR-B d = 12 to 90 mm		RASEY page 1106	RSHEY page 1116		RCJTY page 1122	Available by agreement only

Catalogue range, for dimension tables see pages indicated.

Other dimensions and combinations available by agreement.

Combinations not possible or not advisable.

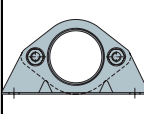
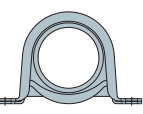
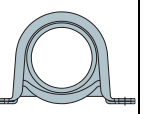

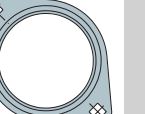
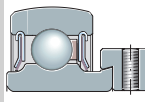
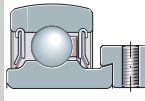
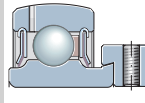
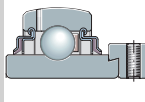
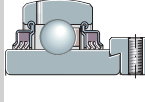
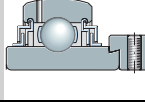
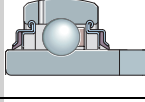
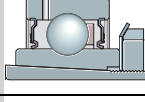
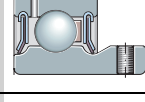
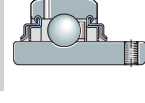
Four-bolt flanged housings		Four-bolt flanged housings		Take-up housings		
						
GG.ME	GG.CJ	GG.TUE	GEH.HUE GEH..-HUSE	GG.HE	GG.SFT	GEH..-MSTU
GG.MEO¹⁾	GG.CJO¹⁾	GG.TUEO¹⁾				
GG.FE	GG.CF					
						MSTU page 1158
PME page 1142	PCJ page 1134 PCF page 1134	PTUE page 1150	PHUSE page 1156	PHE page 1154	PSFT page 1158	
RME page 1142 RFE page 1146	RCJ page 1134	RTUE page 1150	Available by agreement only	RHE page 1154	Available by agreement only	Available by agreement only
TME page 1142 TFE page 1146	TCJ page 1134	TTUE page 1150	Available by agreement only	THE page 1154	Available by agreement only	Available by agreement only
Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only
RMEO page 1142	RCJO page 1136	RTUEO page 1152				
Available by agreement only	RCJL page 1136	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only
Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only
						Available by agreement only
PMEY page 1142	PCJY page 1134	PTUEY page 1150	Available by agreement only	PHEY page 1154	Available by agreement only	
RMEY page 1142	RCJY page 1134	RTUEY page 1150	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only



1) Heavy series.

2) Without lubrication hole.

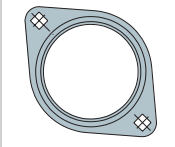
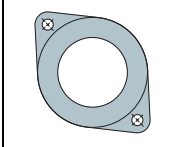
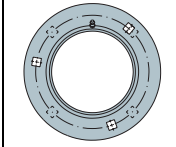
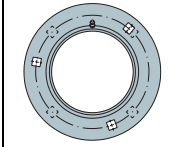
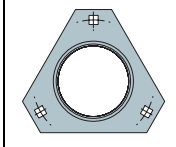
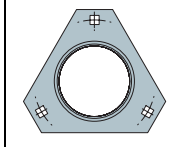
Housing units

Possible combinations – radial insert ball bearings with sheet steel housings		Housings				
		Plummer block housings			Two-bolt flanged housings	
						
GEH...PBS	GEH...BT	GEH...BT GRG...RABR	FLAN...LST (2 pieces)	FLAN...MST (2 pieces)		
RALE...NPP-B d = 20 to 30 mm				RPB page 1160	RALT page 1162	
RAE...NPP-B d = 12 to 40 mm		PBS page 1160	PB page 1160	RPB page 1160		RAT page 1162
GRAE...NPP-B d = 20 to 60 mm						
GE...KRR-B d = 17 to 60 mm		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately	Housing and bearing to be ordered separately		Housing and bearing to be ordered separately
GE...KIT-B d = 20 to 60 mm		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately			Housing and bearing to be ordered separately
GE...KLL-B d = 20 to 50 mm		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately			Housing and bearing to be ordered separately
GLE...KRR-B d = 20 to 60 mm		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately			Housing and bearing to be ordered separately
GSH...2RSR-B d = 20 to 50 mm		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately			Housing and bearing to be ordered separately
(G)AY...NPP-B d = 12 to 60 mm		Housing and bearing to be ordered separately	PBY page 1160			RATY page 1162
GYE...KRR-B d = 12 to 60 mm		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately			Housing and bearing to be ordered separately

Catalogue range, for dimension tables see pages indicated.

Other dimensions and combinations available by agreement.

Combinations not possible or not advisable.

Three-bolt flanged housings					
					
FLAN..-CSLT FLAN..-CST	FLAN..-RCSMF GRG..-RCSM	FLAN..-MSB (2 pieces)	FLAN..-MSA FLAN..-MSB	FLAN..-LSTR (2 pieces)	FLAN..-MSTR (2 pieces)
PCSLT page 1162				RALTR page 1166	
	RCSMF page 1164	RA page 1168			RATR page 1166
		RA page 1168	GRA page 1168		
		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately		RRTR page 1166
		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately		Housing and bearing to be ordered separately
		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately		Housing and bearing to be ordered separately
		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately		Housing and bearing to be ordered separately
		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately		Housing and bearing to be ordered separately
		RAY page 1168			RATRY page 1166
		RRY page 1168	GRRY page 1168		Housing and bearing to be ordered separately



Housing units

Design and safety guidelines

INA radial insert ball bearings and housings are matched to each other and, as a unit, give particularly robust and economical bearing arrangements.

Compensation of misalignments

Units with a spherical outer ring and concave housing bore can compensate for static misalignment of the shaft, *Figure 6*:

- if relubrication is used, up to $\pm 2,5^\circ$
- if relubrication is not used, up to $\pm 5^\circ$.

Caution! The units must not be used to support swivelling or tumbling motion.

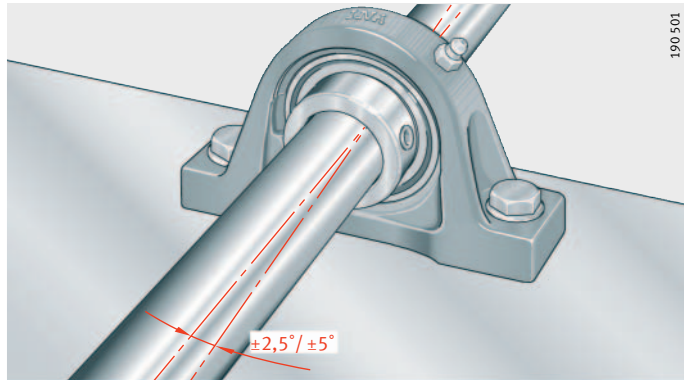


Figure 6
Compensation
of static shaft misalignment

Load carrying capacity of housings

Caution!

Due to their versatile characteristics, INA housed bearing units can be easily used in almost all industrial sectors. If bearing arrangements are planned for equipment in which a malfunction could be hazardous to persons or an unplanned stoppage of the machine could cause major disruption, it is essential that you consult us before proceeding with the design.

Cast iron housings – radial load carrying capacity

Cast iron housings can support the same radial loads as the radial insert ball bearings fitted. The static load carrying capacity of radial insert ball bearings C_{0r} is stated in the dimension tables.

For shock loads, appropriate safety factors must be applied. In this case, please contact us.

Caution!

In the case of TUE and TUEO, the maximum radial tensile loading is only $0,25 \times C_{0r}$ (for higher loads, please contact us).

Axial load carrying capacity

The axial load carrying capacity of cast iron housings is restricted to $0,50 \times C_{0r}$.

Sheet steel housings – radial load carrying capacity

Sheet steel housings are suitable for moderate loads.

The permissible radial load carrying capacity C_{0rG} is given in the dimension tables.

Axial load carrying capacity

The permissible axial load carrying capacity of sheet steel housings is shown in the table.

Permissible axial load carrying capacity

Units with sheet steel housings	Permissible axial load carrying capacity ¹⁾
MSTU	$0,20 \times C_{0rG}$
PHUSE	$0,25 \times C_{0rG}$
PB, PBY, RPB	$0,33 \times C_{0rG}$
PBS	$0,20 \times C_{0rG}$
RALTR, RATR, RATRY, RRTR	$0,50 \times C_{0rG}$
PCSLT, RAT, RATY, RALT	$0,50 \times C_{0rG}$
RCSMF	$0,33 \times C_{0rG}$
RA, RAY, GRA, RRY, GRRY	$0,50 \times C_{0rG}$

¹⁾ C_{0rG} is the permissible radial load carrying capacity of the sheet steel housing according to the dimension table.



Load carrying capacity and speed limits of radial insert ball bearings

Caution!

In the design of housing units, attention must be paid to the load carrying capacity and speed limits of the radial insert ball bearings fitted:

- axial load carrying capacity, see page 1048
- speed limits, see page 1049
- dimension tables.

Housing units

Design of adjacent construction

The permissible shaft tolerance is dependent on the speed, load and the insert bearing fitted. Shafts of tolerance zone h6 to h9 can be used. Conventional drawn shafts will suffice for most applications.

Screw mounting surfaces

Recommendations for the screw mounting surfaces:

- roughness of the screw mounting surface max. $R_a 12,5$ ($R_z 63$)
- geometrical tolerance 0,04/100 concave, spherical not permissible.

Fixing screws

The screw connection should be designed according to VDI 2230; friction value $\mu = 0,14$. Screws of grade 8.8 or better can be used. For fixing, hexagonal socket head screws to DIN EN ISO 4 762 should be used. The screws should be secured by at least a washer to DIN EN ISO 7 089/7 090 or additionally with a lock washer to DIN 128 or a conical spring washer to DIN 6 796.

The screws are not included in the delivery.

Bearing end caps

In order to cover the shaft ends, bearing end caps made from plastic (acrylic ester rubber) are available, table, *Figure 7*. The caps are suitable for temperatures from -20 °C to $+80\text{ °C}$. They protect against injury due to rotating shafts and also protect the bearings against contamination.

For fixing of the caps, housings with the suffix N have an annular groove on the side with the locating slot. Fitting of the caps is described on page 1102.

The series for which end caps are supplied are indicated in the dimension tables. Bearing end caps are accessories and must always be ordered separately.

End caps

Bearing end caps Designation	Dimensions			
	d	D	L	E max.
KASK04	20	48	36	30
KASK05	25	54	38	30
KASK06	30	63	44	35
KASK07	35	73	47	39
KASK08	40	82	51	42
KASK10	50	92	56	46
KASK12	60	112	65	55

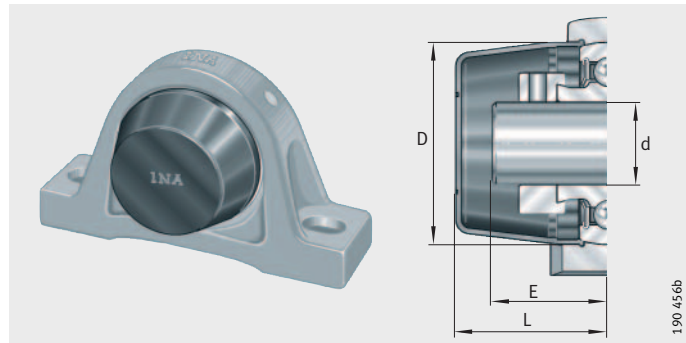


Figure 7

Plummer block housing unit with bearing end cap

Fitting and dismantling Radial insert ball bearings must be handled with care before and during assembly. Their trouble-free operation is also dependent on the care taken in fitting.

Delivered condition The housings have a coating of anthracite grey primer (\approx RAL 7016). The radial insert ball bearings are greased; for information on the grease used, see table Features of radial insert ball bearings – comparison of series, page 1046.

Storage/storage period The units should be stored:

- in dry, clean rooms with the temperature as constant as possible
- at a maximum relative humidity of max. 65%.

The storage period of radial insert ball bearings is limited by the storage life of the grease, see section Lubrication.

Removal from packaging Perspiration causes corrosion. Hands should be kept clean and dry. Bearings should not be removed from their original packaging until immediately before assembly.

Guidelines for fitting

Caution! If cast iron housings and bearings are not supplied by INA as ready-to-fit units but are instead combined by the customer, the following guidelines should be followed:

- if the fit is too loose, grease can escape between the housing and bearing and will not therefore reach the bearing during relubrication
- if the fit is too tight, the bearing outer ring cannot align itself within the housing bore.

The assembly area should be as dry and clean as possible.

First, bolt the housing to the adjacent construction, then locate the inner bearing ring on the shaft – if this sequence is followed, the bearing will align itself to the shaft such that stresses do not occur.

Provide the fitting tools and fixing screws.

Clean the shaft and remove any burrs.

Inspect the bearing seating surfaces on the shaft.

Keep bearing seating surfaces clean, dry and free of grease.

Caution! The specified tolerances must be observed.

Fitting forces must never be directed through the rolling elements.

Blows must never be applied directly to the bearing rings and seals.

Fitting of plated components

Before fitting, the compatibility of products plated with Corrotect® with the media should be checked.

The tolerances are increased by the thickness of the plating.

In order to reduce the forces involved in pressing-in, the surface of the parts should be lightly greased or a mounting paste used.



Housing units

Fitting of cast iron units – plummer block and flanged housing units

Push the housing unit onto the shaft and align it with the fixing holes in the adjacent construction, *Figure 8*.

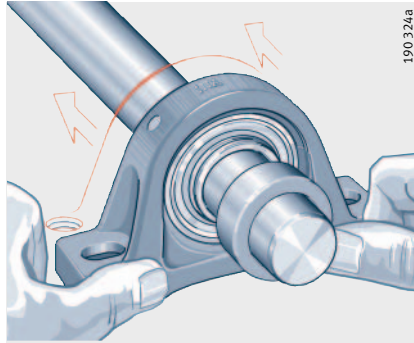


Figure 8
Pushing the unit onto the shaft

Mount the housing on the adjacent construction using the fixing screws, *Figure 9*.

If the shaft is to be supported by several housing units, tighten the screws finger tight at first, align the shaft and then tighten the screws securely.

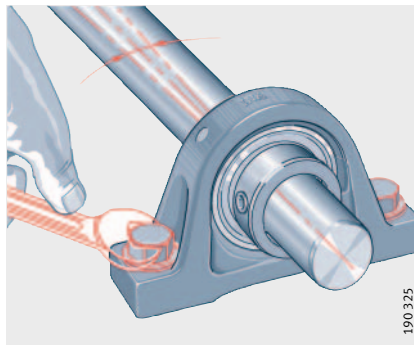


Figure 9
Screw mounting
the housing finger tight

Slide the eccentric locking collar onto the collar seating on the bearing inner ring and rotate by hand, preferably in the direction of shaft rotation, *Figure 10*.

Using a drift and hammer, tension the eccentric locking collar by means of one or two strong blows, *Figure 10*.

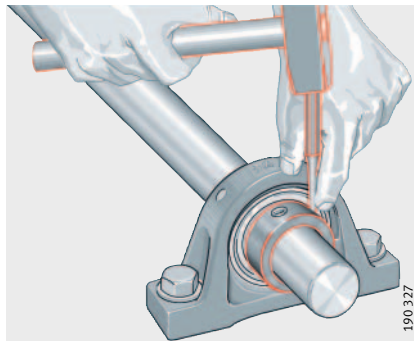


Figure 10
Tensioning
the eccentric locking collar

For location using a locking collar, tighten the grub screw by means of a torque wrench, *Figure 11*.

For location using grub screws in the inner ring, tighten both grub screws by means of a torque wrench.

Caution! Observe the tightening torque M_A according to the table.

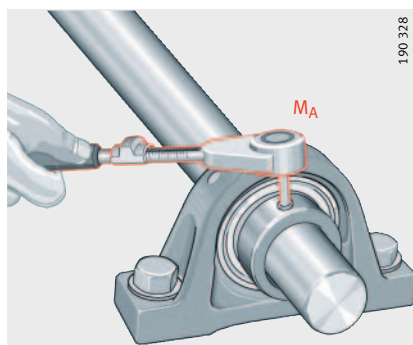


Figure 11
Tightening the grub screw
in the eccentric locking collar or
inner ring

Dismantling

For bearings with an eccentric locking collar, undo the grub screw and rotate the locking collar in the opposite direction to the direction of shaft rotation.

For bearings with grub screws in the inner ring, undo both grub screws.

Unbolt the housing.

Tightening torques for grub screws

Width across flats A/F mm	Thread	Tightening torque ¹⁾ M_A Nm
2,5	M5	3,6
3	M6×0,75	6
4	M8×1	14
5	M10×1,25	26
6	M12, M12×1,25 ²⁾	42

¹⁾ The tightening torques are valid for original INA grub screws only.

²⁾ GYE90-KRR-B.



Housing units

Fitting of cast iron units – radial insert ball bearings with integral adapter sleeve

The bearing seatings on the shaft and outside surface of the adapter must be dry and free of grease.

Push the housing unit onto the shaft and align it with the fixing holes in the adjacent construction, *Figure 12*.

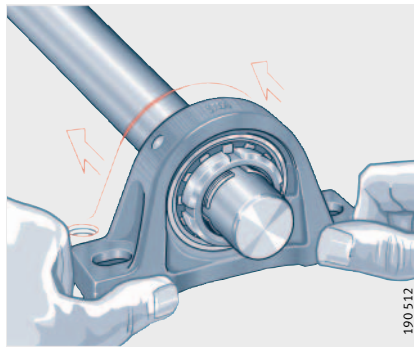


Figure 12

Pushing the unit onto the shaft

Mount the housing on the adjacent construction using the fixing screws, *Figure 13*. If the shaft is to be supported by several housing units, tighten the screws finger tight at first, align the shaft and then tighten the screws securely.

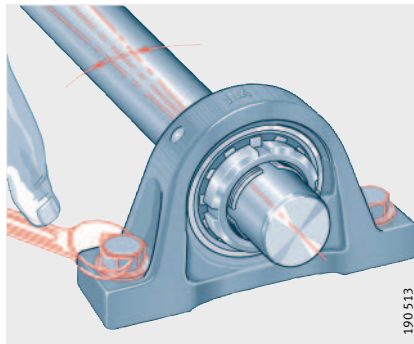


Figure 13

Screw mounting the housing finger tight

Tighten the locknut using 2 hook wrenches of type A to DIN 1810-5; for tightening, the adapter sleeve must be located using a second hook wrench, *Figure 14*. Wrenches for tightening and counter-tensioning: see table.

Caution! Do not exceed the maximum tightening torque M_A given in the table, otherwise the operating clearance in the bearing will become too small. Driving the locknut up will slightly displace the bearing in an axial direction.

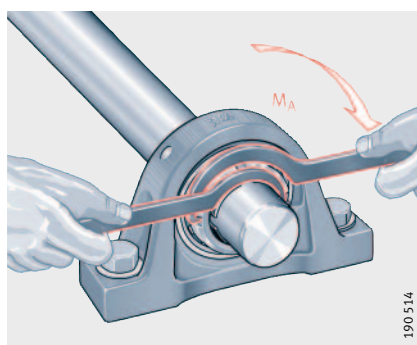


Figure 14
Tightening of locknut

Bend the tab on the tab washer into a groove in the locknut to secure the nut against loosening, *Figure 15*.

Caution! Ensure that the seal in the bearing is not damaged when bending the locking tab over.

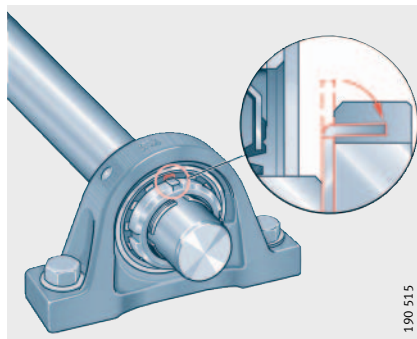


Figure 15
Securing of locknut

Dismantling

Bend back the tab on the tab washer and undo the locknut by a few turns. Place the impact cap in front of the locknut and drive the adapter sleeve off the shaft seat using hammer blows. Unbolt the housing.

Hook wrenches and tightening torques

Shaft diameter d mm	Hook wrench, type A, to DIN 1810 A		Tightening torque Locknut	
	For tightening locknut	For countertensioning adapter sleeve	$M_{A \text{ min}}$ Nm	$M_{A \text{ max}}$ Nm
20	A 30–32 (HN 4)	A 25–28 (HN 2)	13	17
25	A 40–42 (HN 5)	A 30–32 (HN 3)	22	28
30	A 45–50 (HN 6)	A 34–36 (HN 4)	33	40
35	A 52–55 (HN 7)	A 40–42 (HN 5)	47	56
40	A 58–62 (HN 8)	A 45–50 (HN 6)	70	80
50	A 68–75 (HN 10)	A 52–55 (HN 7)	90	105



Housing units

Fitting of bearing end caps

Description of bearing end caps: see page 1096.

Caution! Bearing end caps should only be fitted or dismantled while the shaft is stationary. If the shaft is rotating, there is a high risk of injury.

Position the tabs of the end cap in the locating slots, noting the position of the INA logo, *Figure 16*.

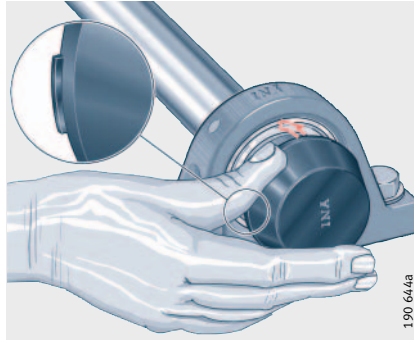


Figure 16
Positioning the cap

Rotate the end cap clockwise by 90°, noting the position of the INA logo, *Figure 17*. Check that the end cap is secured properly in the housing.

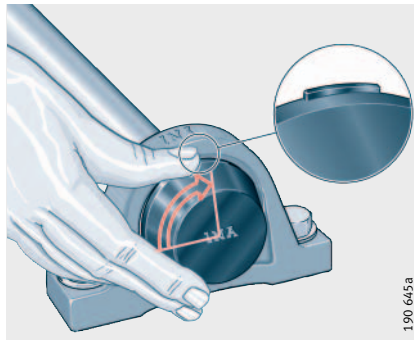


Figure 17
Locking the cap in place

Dismantling

Loosen the end cap by rotating it in the opposite direction (90°), noting the position of the INA logo, *Figure 18*.

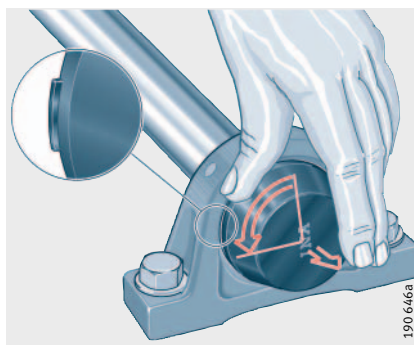


Figure 18
Removing the cap

Fitting of sheet steel units with eccentric locking collar/grub screws in inner ring

Caution!

With two-piece housings, the housing and radial insert ball bearing should be assembled first.

Push the housing unit onto the shaft and align it with the fixing holes in the adjacent construction, *Figure 19*.

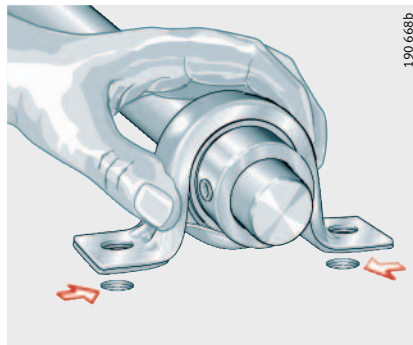


Figure 19

Pushing the unit onto the shaft

Mount the housing on the adjacent construction using the fixing screws, *Figure 20*. If the shaft is to be supported by several housing units, tighten the screws finger tight at first, align the shaft and then tighten the screws securely.

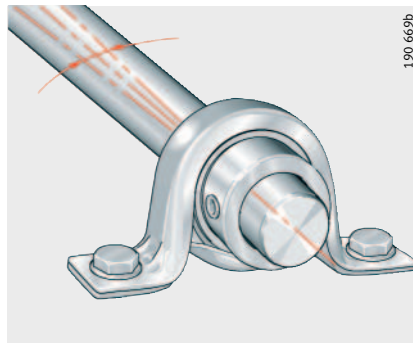


Figure 20

Screw mounting the housing finger tight



Housing units

Slide the eccentric locking collar onto the collar seating on the bearing inner ring and rotate by hand, preferably in the direction of shaft rotation.

Using a drift and hammer, tension the eccentric locking collar by means of one or two strong blows, *Figure 21*.

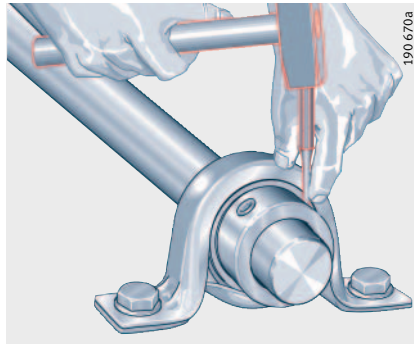


Figure 21
Tensioning
the eccentric locking collar

For location using a locking collar, tighten the grub screw by means of a torque wrench, *Figure 22*.

For location using grub screws in the inner ring, tighten both grub screws by means of a torque wrench.

Caution! Observe the tightening torque M_A according to the table, page 1099.

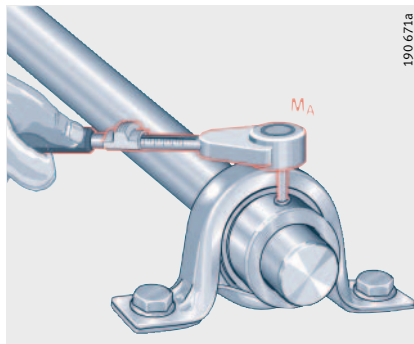


Figure 22
Tightening the grub screw
in the eccentric locking collar or
inner ring

Dismantling

For bearings with an eccentric locking collar, undo the grub screw and rotate the locking collar in the opposite direction to the direction of shaft rotation.

For bearings with grub screws in the inner ring, undo both grub screws.

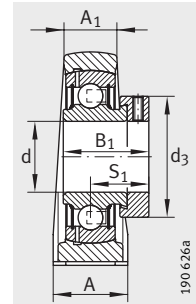
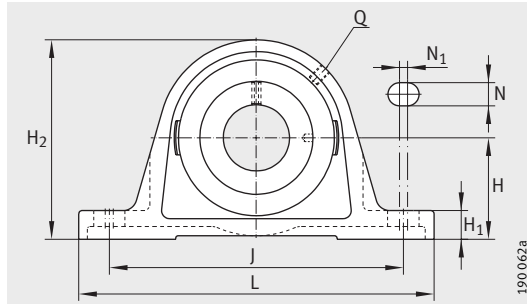
Unbolt the housing.

- Accuracy** The housings correspond predominantly to DIN 626-2 and ISO 3 228, insofar as they are described therein.
Series with the suffix -JIS are designed in accordance with the “Japanese Industry Standard” JIS B 1559.
Accuracy of fitted radial insert ball bearings: see page 1050.
- Cast iron housings** The dimensional tolerances for the machined surfaces of cast iron housings are $\pm 0,25$ mm.
The dimensional tolerances for unmachined as well as machined to unmachined surfaces correspond to GTB 14 DIN 1 680-2.
For the JIS design, the dimensional tolerances correspond to ISO 8 062/CT10.
- Sheet steel housings** The bearing seat of sheet steel housings is designed such that the bearing is securely seated in the housing when the housing parts are bolted together.



Plummer block housing units

Cast iron housings with long base



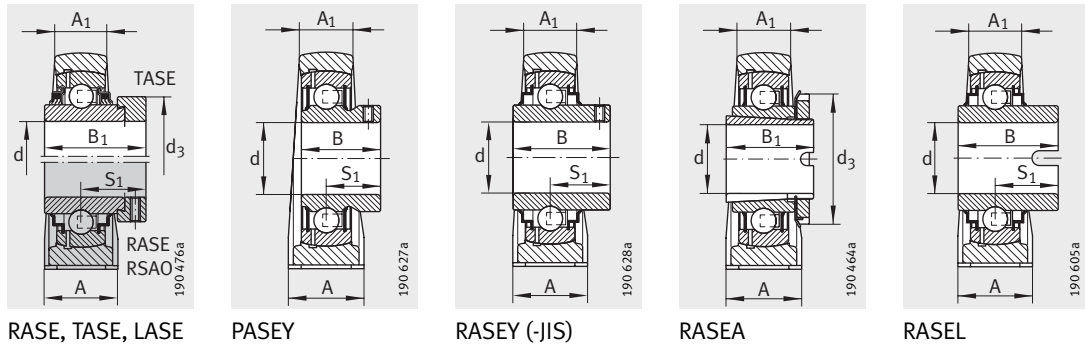
PASE (-FA125), RASE (-FA125, -FA164), TASE, LASE, PASEY, RASEY (-JIS), RASEA, RASEL

PASE

Dimension table · Dimensions in mm									
Designation			Mass m ≈kg	Dimensions					
Unit	Housing	Radial insert ball bearing		d	H	J	L	A	A ₁
PASE12	GG.ASE03	GRAE12-NPP-B	0,46	12	30,2	95	125	30	18
PASEY12	GG.ASE03	GAY12-NPP-B	0,44	12	30,2	95	125	30	18
RASEY12	GG.ASE03	GYE12-KRR-B	0,45	12	30,2	95	125	30	18
PASE15	GG.ASE03	GRAE15-NPP-B	0,46	15	30,2	95	125	30	18
PASEY15	GG.ASE03	GAY15-NPP-B	0,43	15	30,2	95	125	30	18
RASEY15	GG.ASE03	GYE15-KRR-B	0,45	15	30,2	95	125	30	18
RASEY16	GG.ASE03	GYE16-KRR-B	0,45	16	30,2	95	125	30	18
PASE17	GG.ASE03	GRAE17-NPP-B	0,46	17	30,2	95	125	30	18
RASE17	GG.ASE03	GE17-KRR-B	0,5	17	30,2	95	125	30	18
PASEY17	GG.ASE03	GAY17-NPP-B	0,42	17	30,2	95	125	30	18
RASEY17	GG.ASE03	GYE17-KRR-B	0,45	17	30,2	95	125	30	18
PASE20-N	GG.ASE04-E-N	GRAE20-NPP-B	0,55	20	33,3	97	130	32	19
PASE20-N-FA125	GG.ASE04-E-N-FA125.1	GRAE20-NPP-B-FA125.5	0,55	20	33,3	97	130	32	19
RASE20-N	GG.ASE04-E-N	GE20-KRR-B	0,59	20	33,3	97	130	32	19
RASE20-N-FA125	GG.ASE04-E-N-FA125.1	GE20-KRR-B-FA125.5	0,59	20	33,3	97	130	32	19
RASE20-FA164 ¹⁾	GG.ASE04-E-N	GE20-KRR-B-FA164	0,59	20	33,3	97	130	32	19
TASE20-N	GG.ASE04-E-N	GE20-KTT-B	0,59	20	33,3	97	130	32	19
LASE20-N	GG.ASE04-E-N	GE20-KLL-B	0,59	20	33,3	97	130	32	19
PASEY20-N	GG.ASE04-E-N	GAY20-NPP-B	0,52	20	33,3	97	130	32	19
RASEY20-N	GG.ASE04-E-N	GYE20-KRR-B	0,56	20	33,3	97	130	32	19
RASEY20-JIS	GG.P204	GYE20-KRR-B-FA107	0,63	20	33,3	95	127	38	22
RASEA20-N	GG.ASE04-E-N	GSH20-2RSR-B	0,51	20	33,3	97	130	32	19
RASEL20-N	GG.ASE04-E-N	GLE20-KRR-B	0,58	20	33,3	97	130	32	19
PASE25-N	GG.ASE05-N	GRAE25-NPP-B	0,64	25	36,5	103	130	36	21
PASE25-N-FA125	GG.ASE05-N-FA125.1	GRAE25-NPP-B-FA125.5	0,64	25	36,5	103	130	36	21
RASE25-N	GG.ASE05-N	GE25-KRR-B	0,7	25	36,5	103	130	36	21
RASE25-N-FA125	GG.ASE05-N-FA125.1	GE25-KRR-B-FA125.5	0,7	25	36,5	103	130	36	21
RASE25-FA164 ¹⁾	GG.ASE05-N	GE25-KRR-B-FA164	0,7	25	36,5	103	130	36	21
TASE25-N	GG.ASE05-N	GE25-KTT-B	0,7	25	36,5	103	130	36	21
LASE25-N	GG.ASE05-N	GE25-KLL-B	0,7	25	36,5	103	130	36	21
PASEY25-N	GG.ASE05-N	GAY25-NPP-B	0,61	25	36,5	103	130	36	21
RASEY25-N	GG.ASE05-N	GYE25-KRR-B	0,65	25	36,5	103	130	36	21
RASEY25-JIS	GG.P205	GYE25-KRR-B-FA107	0,79	25	36,5	105	140	38	23
RASEA25-N	GG.ASE05-N	GSH25-2RSR-B	0,6	25	36,5	103	130	36	21
RASEL25-N	GG.ASE05-N	GLE25-KRR-B	0,67	25	36,5	103	130	36	21

¹⁾ With lubrication nipple DIN 71412-AR 1/8.

²⁾ To be ordered separately.

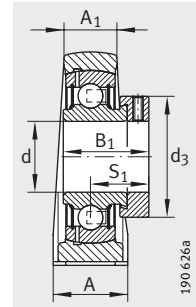
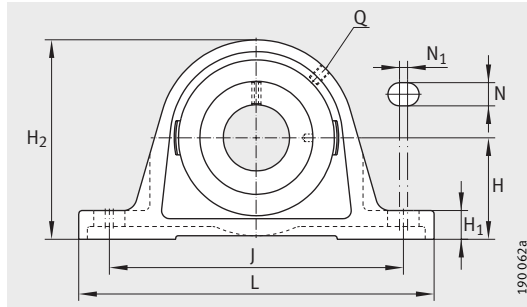


									Basic load ratings		End cap ²⁾
H ₁	H ₂	N	N ₁	B	B ₁	S ₁	Q	d ₃	dyn. C _r N	stat. C _{0r} N	
10	57	11	8	–	28,6	22,1	M6	28	9 800	4 750	–
10	57	11	8	22	–	16	M6	–	9 800	4 750	–
10	57	11	8	27,4	–	15,9	M6	–	9 800	4 750	–
10	57	11	8	–	28,6	22,1	M6	28	9 800	4 750	–
10	57	11	8	22	–	16	M6	–	9 800	4 750	–
10	57	11	8	27,4	–	15,9	M6	–	9 800	4 750	–
10	57	11	8	27,4	–	15,9	M6	–	9 800	4 750	–
10	57	11	8	–	28,6	22,1	M6	28	9 800	4 750	–
10	57	11	8	–	37,4	23,4	M6	28	9 800	4 750	–
10	57	11	8	22	–	16	M6	–	9 800	4 750	–
10	57	11	8	27,4	–	15,9	M6	–	9 800	4 750	–
14,5	64	11	8	–	31	23,5	R _p 1/8	33	12 800	6 600	KASK04
14,5	64	11	8	–	31	23,5	R _p 1/8	33	12 800	6 600	KASK04
14,5	64	11	8	–	43,7	26,6	R _p 1/8	33	12 800	6 600	KASK04
14,5	64	11	8	–	43,7	26,6	R _p 1/8	33	12 800	6 600	KASK04
14,5	64	11	8	–	43,7	26,6	R _p 1/8	33	12 800	6 600	–
14,5	64	11	8	–	43,7	26,6	R _p 1/8	33	12 800	6 600	KASK04
14,5	64	11	8	–	43,7	26,6	R _p 1/8	33	12 800	6 600	KASK04
14,5	64	11	8	25	–	18	R _p 1/8	33	12 800	6 600	KASK04
14,5	64	11	8	31	–	18,3	R _p 1/8	–	12 800	6 600	KASK04
14	65	13	6	31	–	18,3	M6	–	12 800	6 600	–
14,5	64	11	8	–	28	–	R _p 1/8	32	12 700	6 600	KASK04
14,5	64	11	8	34,1	–	18,5	R _p 1/8	–	12 800	6 600	KASK04
14,5	70	11	8	–	31	23,5	R _p 1/8	37,5	14 000	7 800	KASK05
14,5	70	11	8	–	31	23,5	R _p 1/8	37,5	14 000	7 800	KASK05
14,5	70	11	8	–	44,5	26,9	R _p 1/8	37,5	14 000	7 800	KASK05
14,5	70	11	8	–	44,5	26,9	R _p 1/8	37,5	14 000	7 800	KASK05
14,5	70	11	8	–	44,5	26,9	R _p 1/8	37,5	14 000	7 800	–
14,5	70	11	8	–	44,5	26,9	R _p 1/8	37,5	14 000	7 800	KASK05
14,5	70	11	8	–	44,5	26,9	R _p 1/8	37,5	14 000	7 800	KASK05
14,5	70	11	8	27	–	19,5	R _p 1/8	–	14 000	7 800	KASK05
14,5	70	11	8	34,1	–	19,6	R _p 1/8	–	14 000	7 800	KASK05
15	71	13	6	34,1	–	19,8	M6	–	14 000	7 800	–
14,5	70	11	8	–	28	–	R _p 1/8	38	13 600	7 800	KASK05
14,5	70	11	8	34,9	–	20,2	R _p 1/8	–	14 000	7 800	KASK05



Plummer block housing units

Cast iron housings with long base



PASE (-FA125), RASE (-FA125, -FA164), TASE, LASE, RSAO, PASEY, RASEY (-JIS), RASEA, RASEL

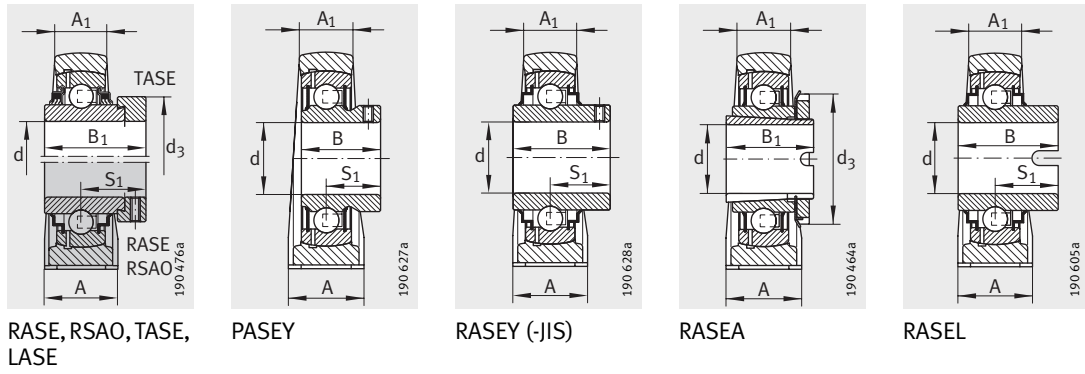
PASE

Dimension table (continued) · Dimensions in mm

Designation			Mass m ≈kg	Dimensions					
Unit	Housing	Radial insert ball bearing		d	H	J	L	A	A ₁
PASE30-N	GG.ASE06-N	GRAE30-NPP-B	1,04	30	42,9	118	158	40	25
PASE30-N-FA125	GG.ASE06-N-FA125.1	GRAE30-NPP-B-FA125.5	1,04	30	42,9	118	158	40	25
RASE30-N	GG.ASE06-N	GE30-KRR-B	1,11	30	42,9	118	158	40	25
RASE30-N-FA125	GG.ASE06-N-FA125.1	GE30-KRR-B-FA125.5	1,11	30	42,9	118	158	40	25
RASE30-FA164¹⁾	GG.ASE06-N	GE30-KRR-B-FA164	1,11	30	42,9	118	158	40	25
TASE30-N	GG.ASE06-N	GE30-KTT-B	1,12	30	42,9	118	158	40	25
LASE30-N	GG.ASE06-N	GE30-KLL-B	1,11	30	42,9	118	158	40	25
RSAO30	GG.SAO06	GNE30-KRR-B	1,8	30	50	140	180	50	28
PASEY30-N	GG.ASE06-N	GAY30-NPP-B	0,98	30	42,9	118	158	40	25
RASEY30-N	GG.ASE06-N	GYE30-KRR-B	1,06	30	42,9	118	158	40	25
RASEY30-JIS	GG.P206	GYE30-KRR-B-FA107	1,3	30	42,9	121	165	48	26
RASEA30-N	GG.ASE06-N	GSH30-2RSR-B	1	30	42,9	118	158	40	25
RASEL30-N	GG.ASE06-N	GLE30-KRR-B	1,03	30	42,9	118	158	40	25
PASE35-N	GG.ASE06-N	GRAE35-NPP-B	1,53	35	47,6	126	163	45	27
PASE35-N-FA125	GG.ASE07-N-FA125.1	GRAE35-NPP-B-FA125.5	1,53	35	47,6	126	163	45	27
RASE35-N	GG.ASE07-N	GE35-KRR-B	1,6	35	47,6	126	163	45	27
RASE35-N-FA125	GG.ASE07-N-FA125.1	GE35-KRR-B-FA125.5	1,6	35	47,6	126	163	45	27
RASE35-FA164¹⁾	GG.ASE07-N	GE35-KRR-B-FA164	1,6	35	47,6	126	163	45	27
TASE35-N	GG.ASE07-N	GE35-KTT-B	1,61	35	47,6	126	163	45	27
LASE35-N	GG.ASE07-N	GE35-KLL-B	1,6	35	47,6	126	163	45	27
RSAO35	GG.SAO07	GNE35-KRR-B	2,75	35	56	160	210	56	30
PASEY35-N	GG.ASE07-N	GAY35-NPP-B	1,44	35	47,6	126	163	45	27
RASEY35-N	GG.ASE07-N	GYE35-KRR-B	1,54	35	47,6	126	163	45	27
RASEY35-JIS	GG.P207	GYE35-KRR-B-FA107	1,41	35	47,6	127	167	48	27
RASEA35-N	GG.ASE07-N	GSH35-2RSR-B	1,48	35	47,6	126	163	45	27

¹⁾ With lubrication nipple DIN 71412-AR 1/8.

²⁾ To be ordered separately.

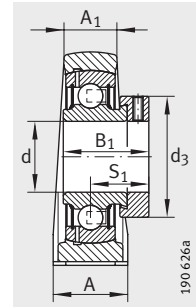
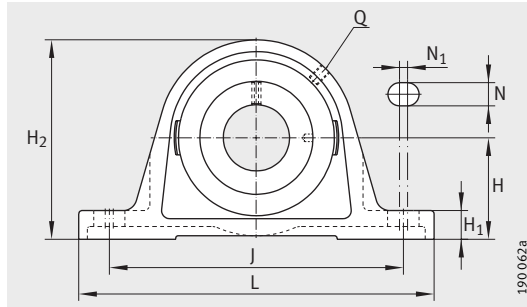


H ₁	H ₂	N	N ₁	B	B ₁	S ₁	Q	d ₃ max.	Basic load ratings		End cap ²⁾
									dyn. C _r N	stat. C _{0r} N	
17	82	14	8	–	35,8	26,7	R _p 1/8	44	19 500	11 300	KASK06
17	82	14	8	–	35,8	26,7	R _p 1/8	44	19 500	11 300	KASK06
17	82	14	8	–	48,5	30,1	R _p 1/8	44	19 500	11 300	KASK06
17	82	14	8	–	48,5	30,1	R _p 1/8	44	19 500	11 300	KASK06
17	82	14	8	–	48,5	30,1	R _p 1/8	44	19 500	11 300	–
17	82	14	8	–	48,5	30,1	R _p 1/8	44	19 500	11 300	KASK06
17	82	14	8	–	48,5	30,1	R _p 1/8	44	19 500	11 300	KASK06
18	95	17,5	3	–	50	32,5	R _p 1/8	51	29 500	16 700	–
17	82	14	8	30	–	21	R _p 1/8	–	19 500	11 300	KASK06
17	82	14	8	38,1	–	22,2	R _p 1/8	–	19 500	11 300	KASK06
17	83	17	4	38,1	–	22,2	M6	–	19 500	11 300	–
17	82	14	8	–	32	–	R _p 1/8	45	18 900	11 300	KASK06
17	82	14	8	36,5	–	22,5	R _p 1/8	–	19 500	11 300	KASK06
19	93	14	7	–	39	29,4	R _p 1/8	51	25 500	15 300	KASK07
19	93	14	7	–	39	29,4	R _p 1/8	51	25 500	15 300	KASK07
19	93	14	7	–	51,3	32,3	R _p 1/8	51	25 500	15 300	KASK07
19	93	14	7	–	51,3	32,3	R _p 1/8	51	25 500	15 300	KASK07
19	93	14	7	–	51,3	32,3	R _p 1/8	51	25 500	15 300	–
19	93	14	7	–	51,3	32,3	R _p 1/8	51	25 500	15 300	KASK07
19	93	14	7	–	51,3	32,3	R _p 1/8	51	25 500	15 300	KASK07
20	106	17,5	8	–	51,6	33,4	R _p 1/8	55	36 500	20 900	–
19	93	14	7	35	–	25,5	R _p 1/8	–	25 500	15 300	KASK07
19	93	14	7	42,9	–	25,4	R _p 1/8	–	25 500	15 300	KASK07
18	93	17	4	42,9	–	25,4	M6	–	25 500	15 300	–
19	93	14	7	–	34	–	R _p 1/8	52	24 900	15 300	KASK07



Plummer block housing units

Cast iron housings with long base



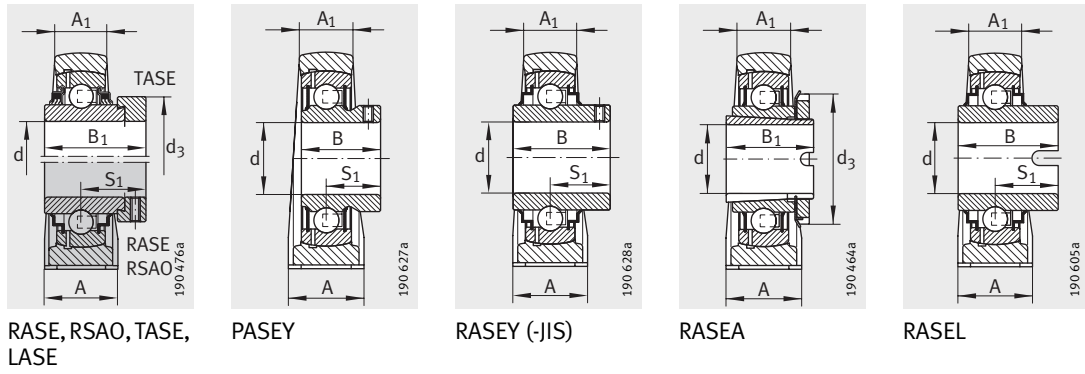
PASE (-FA125), RASE (-FA125, -FA164), TASE, LASE, RSAO, PASEY, RASEY (-JIS), RASEA, RASEL

PASE

Dimension table (continued) · Dimensions in mm									
Designation			Mass m ≈kg	Dimensions					
Unit	Housing	Radial insert ball bearing		d	H	J	L	A	A ₁
PASE40-N	GG.ASE/AK08-N	GRAE40-NPP-B	1,71	40	49,2	138	179	48	30
PASE40-N-FA125	GG.ASE/AK08-N-FA125.1	GRAE40-NPP-B-FA125.5	1,71	40	49,2	138	179	48	30
RASE40-N	GG.ASE/AK08-N	GE40-KRR-B	1,83	40	49,2	138	179	48	30
RASE40-N-FA125	GG.ASE/AK08-N-FA125.1	GE40-KRR-B-FA125.5	1,83	40	49,2	138	179	48	30
RASE40-FA164 ¹⁾	GG.ASE/AK08-N	GE40-KRR-B-FA164	1,83	40	49,2	138	179	48	30
TASE40-N	GG.ASE/AK08-N	GE40-KTT-B	1,86	40	49,2	138	179	48	30
LASE40-N	GG.ASE/AK08-N	GE40-KLL-B	1,83	40	49,2	138	179	48	30
RSAO40	GG.SAO08	GNE40-KRR-B	3,18	40	60	170	220	60	31
PASEY40-N	GG.ASE/AK08-N	GAY40-NPP-B	1,6	40	49,2	138	179	48	30
RASEY40-N	GG.ASE/AK08-N	GYE40-KRR-B	1,74	40	49,2	138	179	48	30
RASEY40-JIS	GG.P208	GYE40-KRR-B-FA107	1,68	40	49,2	137	184	54	30
RASEA40-N	GG.ASE/AK08-N	GSH40-2RSR-B	1,71	40	49,2	138	179	48	30
RASEL40-N	GG.ASE/AK08-N	GLE40-KRR-B	1,7	40	49,2	138	179	48	30
PASE45	GG.ASE09	GRAE45-NPP-B	2,09	45	54	150	192	48	32
PASE45-FA125	GG.ASE09-FA125.1	GRAE45-NPP-B-FA125.5	2,09	45	54	150	192	48	32
RASE45	GG.ASE09	GE45-KRR-B	2,21	45	54	150	192	48	32
RASE45-FA125	GG.ASE09-FA125.1	GE45-KRR-B-FA125.5	2,21	45	54	150	192	48	32
TASE45	GG.ASE09	GE45-KTT-B	2,26	45	54	150	192	48	32
LASE45	GG.ASE09	GE45-KLL-B	2,21	45	54	150	192	48	32
PASEY45	GG.ASE09	GAY45-NPP-B	1,95	45	54	150	192	48	32
RASEY45	GG.ASE09	GYE45-KRR-B	2,1	45	54	150	192	48	32
RASEY45-JIS	GG.P209	GYE45-KRR-B-FA107	2,07	45	54	146	190	54	30
RASEL45	GG.ASE09	GLE45-KRR-B	2,1	45	54	150	192	48	32
PASE50-N	GG.ASE10-N	GRAE50-NPP-B	2,47	50	57,2	158	200	54	34
PASE50-N-FA125	GG.ASE10-N-FA125.1	GRAE50-NPP-B-FA125.5	2,47	50	57,2	158	200	54	34
RASE50-N	GG.ASE10-N	GE50-KRR-B	2,7	50	57,2	158	200	54	34
RASE50-N-FA125	GG.ASE10-N-FA125.1	GE50-KRR-B-FA125.5	2,7	50	57,2	158	200	54	34
RASE50-FA164 ¹⁾	GG.ASE10-N	GE50-KRR-B-FA164	2,7	50	57,2	158	200	54	34
TASE50-N	GG.ASE10-N	GE50-KTT-B	2,76	50	57,2	158	200	54	34
LASE50-N	GG.ASE10-N	GE50-KLL-B	2,7	50	57,2	158	200	54	34

¹⁾ With lubrication nipple DIN 71412-AR 1/8.

²⁾ To be ordered separately.

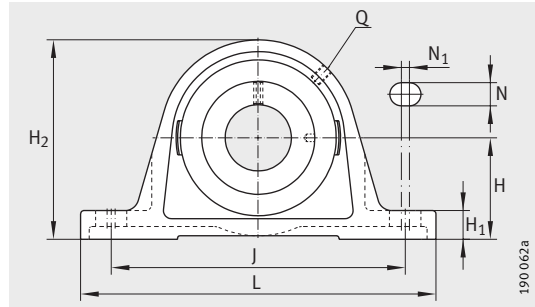


									Basic load ratings		End cap ²⁾
H ₁	H ₂	N	N ₁	B	B ₁	S ₁	Q	d ₃ max.	dyn. C _r N	stat. C _{0r} N	
19	99	14	12	–	43,8	32,7	R _p 1/8	58	32 500	19 800	KASK08
19	99	14	12	–	43,8	32,7	R _p 1/8	58	32 500	19 800	KASK08
19	99	14	12	–	56,5	34,9	R _p 1/8	58	32 500	19 800	KASK08
19	99	14	12	–	56,5	34,9	R _p 1/8	58	32 500	19 800	KASK08
19	99	14	12	–	56,5	34,9	R _p 1/8	58	32 500	19 800	–
19	99	14	12	–	56,5	34,9	R _p 1/8	58	32 500	19 800	KASK08
19	99	14	12	–	56,5	34,9	R _p 1/8	58	32 500	19 800	KASK08
22	116	17,5	10	–	54,6	36,6	R _p 1/8	63	44 500	26 000	–
19	99	14	12	39,5	–	29	R _p 1/8	–	32 500	19 800	KASK08
19	99	14	12	49,2	–	30,2	R _p 1/8	–	32 500	19 800	KASK08
18	98	17	4	49,2	–	30,2	M6	–	32 500	19 800	–
19	99	14	12	–	38	–	R _p 1/8	58	29 500	19 800	KASK08
19	99	14	12	42,9	–	27	R _p 1/8	–	32 500	19 800	KASK08
21,5	107	14	15	–	42,8	32,7	R _p 1/8	63	32 500	20 400	–
21,5	107	14	15	–	43,8	32,7	R _p 1/8	63	32 500	20 400	–
21,5	107	14	15	–	56,5	34,9	R _p 1/8	63	32 500	20 400	–
21,5	107	14	15	–	56,5	34,9	R _p 1/8	63	32 500	20 400	–
21,5	107	14	15	–	56,5	34,9	R _p 1/8	63	32 500	20 400	–
21,5	107	14	15	–	56,5	34,9	R _p 1/8	63	32 500	20 400	–
21,5	107	14	15	41,5	–	30,5	R _p 1/8	–	32 500	20 400	–
21,5	107	14	15	49,2	–	30,2	R _p 1/8	–	32 500	20 400	–
20	106	17	4	49,2	–	30,2	M6	–	32 500	20 400	–
21,5	107	14	15	42,9	–	25,5	R _p 1/8	–	32 500	20 400	–
21,5	115	18	5	–	43,8	32,7	R _p 1/8	69	35 000	23 200	KASK10
21,5	115	18	5	–	43,8	32,7	R _p 1/8	69	35 000	23 200	KASK10
21,5	115	18	5	–	62,8	38,1	R _p 1/8	69	35 000	23 200	KASK10
21,5	115	18	5	–	62,8	38,1	R _p 1/8	69	35 000	23 200	KASK10
21,5	115	18	5	–	62,8	38,1	R _p 1/8	69	35 000	23 200	–
21,5	115	18	5	–	62,8	38,1	R _p 1/8	69	35 000	23 200	KASK10
21,5	115	18	5	–	62,8	38,1	R _p 1/8	69	35 000	23 200	KASK10



Plummer block housing units

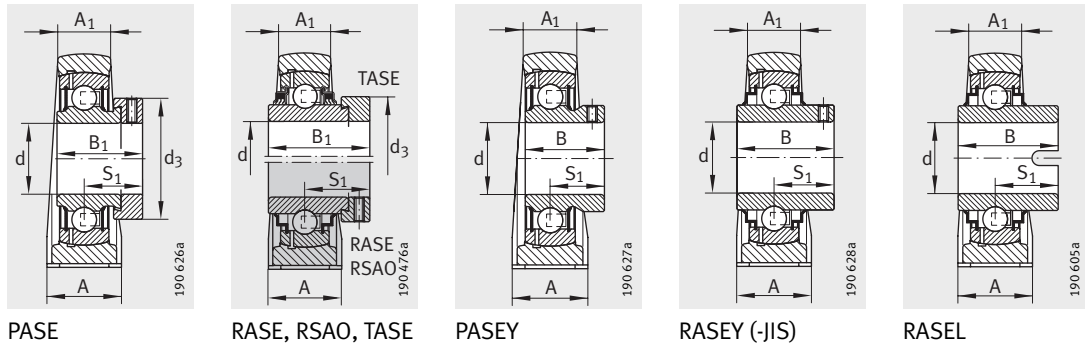
Cast iron housings with long base



PASE (-FA125), RASE (-FA164), TASE, RSAO, PASEY, RASEY (-JIS), RASEA, RASEL

Dimension table (continued) · Dimensions in mm									
Designation			Mass m ≈ kg	Dimensions					
Unit	Housing	Radial insert ball bearing		d	H	J	L	A	A ₁
RSAO50	GG.SAO10	GNE50-KRR-B	6,1	50	75	212	275	75	39
PASEY50-N	GG.ASE10-N	GAY50-NPP-B	2,32	50	57,2	158	200	54	34
RASEY50-N	GG.ASE10-N	GYE50-KRR-B	2,5	50	57,2	158	200	54	34
RASEY50-JIS	GG.P210	GYE50-KRR-B-FA107	2,57	50	57,2	159	206	60	32
RASEA50-N	GG.ASE10-N	GSH50-2RSR-B	2,09	50	57,2	158	200	54	34
RASEL50-N	GG.ASE10-N	GLE50-KRR-B	2,46	50	57,2	158	200	54	34
PASE55	GG.ASE11	GRAE55-NPP-B	2,79	55	63,5	176	222	60	35
RASE55	GG.ASE11	GE55-KRR-B	3,4	55	63,5	176	222	60	35
TASE55	GG.ASE11	GE55-KTT-B	3,47	55	63,5	176	222	60	35
RASEY55-JIS	GG.P211	GYE55-KRR-B-FA107	3,47	55	63,5	171	219	60	34
RASEY55	GG.ASE11	GYE55-KRR-B	3,08	55	63,5	176	222	60	35
PASE60-N	GG.ASE12-N	GRAE60-NPP-B	4,35	60	69,9	190	240	60	42
PASE60-N-FA125	GG.ASE12-N-FA125.1	GRAE60-NPP-B-FA125.5	4,35	60	69,9	190	240	60	42
RASE60-N	GG.ASE12-N	GE60-KRR-B	4,79	60	69,9	190	240	60	42
RASE60-FA164¹⁾	GG.ASE12-N	GE60-KRR-B-FA164	4,79	60	69,9	190	240	60	42
TASE60-N	GG.ASE12-N	GE60-KTT-B	4,79	60	69,9	190	240	60	42
RSAO60	GG.SAO12	GNE60-KRR-B	9	60	85	250	330	85	46
PASEY60-N	GG.ASE12-N	GAY60-NPP-B	4,02	60	69,9	190	240	60	42
RASEY60-N	GG.ASE12-N	GYE60-KRR-B	4,27	60	69,9	190	240	60	42
RASEY60-JIS	GG.P212	GYE60-KRR-B-FA107	4,53	60	69,8	184	241	70	36
RASEL60-N	GG.ASE12-N	GLE60-KRR-B	4,27	60	69,9	190	240	60	42
RASE65	GG.ASE14	GE65-214-KRR-B	6,41	65	79,4	203	260	65	44
TASE65	GG.ASE14	GE65-214-KTT-B	6,41	65	79,4	203	260	65	44
RASEY65	GG.ASE14	GYE65-214-KRR-B	5,95	65	79,4	203	260	65	44
RASE70	GG.ASE14	GE70-KRR-B	6,15	70	79,4	203	260	65	44
RASE70-FA164¹⁾	GG.ASE14	GE70-KRR-B-FA164	6,15	70	79,4	203	260	65	44
TASE70	GG.ASE14	GE70-KTT-B	6,15	70	79,4	203	260	65	44
RSAO70	GG.ASE14	GNE70-KRR-B	11	70	95	282	360	90	54
RASEY70	GG.ASE14	GYE70-KRR-B	5,65	70	79,4	203	260	65	44
RASEL70	GG.ASE14	GLE70-KRR-B	6,5	70	79,4	203	260	65	44
RASE75	GG.ASE15	GE75-KRR-B	7,65	75	82,5	210	265	66	48
RASE75-FA164¹⁾	GG.ASE15	GE75-KRR-B-FA164	7,65	75	82,5	210	265	66	48
TASE75	GG.ASE15	GE75-KTT-B	7,65	75	82,5	210	265	66	48
RASEY75	GG.ASE15	GYE75-KRR-B	7,19	75	82,5	210	265	66	48

¹⁾ With lubrication nipple DIN 71412-AR 1/8.
²⁾ To be ordered separately.

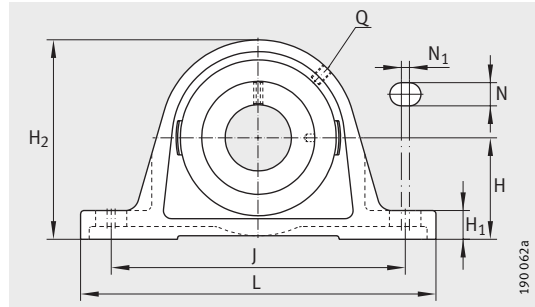


									Basic load ratings		End cap ²⁾
H ₁	H ₂	N	N ₁	B	B ₁	S ₁	Q	d ₃	dyn. C _r	stat. C _{0r}	
								max.	N	N	
27	143	20	15	–	66,8	42,1	R _p 1/8	75,8	62 000	38 000	–
21,5	115	18	5	43	–	32	R _p 1/8	–	35 000	23 200	KASK10
21,5	115	18	5	51,6	–	32,6	R _p 1/8	–	35 000	23 200	KASK10
21	114	20	5	51,6	–	32,6	M6	–	35 000	23 200	–
21,5	115	18	5	–	40	–	R _p 1/8	70	33 000	19 900	KASK10
21,5	115	18	5	49,2	–	30,2	R _p 1/8	–	35 000	23 200	KASK10
22,5	124,5	18	12	–	48,4	36,4	R _p 1/8	76	43 500	29 000	–
22,5	124,5	18	12	–	71,4	43,6	R _p 1/8	76	43 500	29 000	–
22,5	124,5	18	12	–	71,4	43,6	R _p 1/8	76	43 500	29 000	–
23	126	20	5	55,6	–	33,4	M6	–	43 500	29 000	–
22,5	124,5	18	12	55,6	–	33,4	R _p 1/8	–	43 500	29 000	–
25	140	18	10	–	53,1	39,6	R _p 1/8	84	52 000	36 000	KASK12
25	140	18	10	–	53,1	39,6	R _p 1/8	84	52 000	36 000	KASK12
25	140	18	10	–	77,9	46,8	R _p 1/8	84	52 000	36 000	KASK12
25	140	18	10	–	77,9	46,8	R _p 1/8	84	52 000	36 000	–
25	140	18	10	–	77,9	46,8	R _p 1/8	84	52 000	36 000	KASK12
32	165	25	13	–	68,4	45,4	R _p 1/8	89	82 000	52 000	–
25	140	18	10	47	–	34	R _p 1/8	–	52 000	36 000	KASK12
25	140	18	10	65,1	–	39,7	R _p 1/8	–	52 000	36 000	KASK12
25	138	20	5	65,1	–	39,7	M6	–	52 000	36 000	–
25	140	18	10	61,9	–	37,3	R _p 1/8	–	52 000	36 000	KASK12
27,5	156	22	6	–	66	44,6	R _p 1/8	96	62 000	44 000	–
27,5	156	22	6	–	66	44,6	R _p 1/8	96	62 000	44 000	–
27,5	156	22	6	74,6	–	44,4	R _p 1/8	–	62 000	44 000	–
27,5	156	22	6	–	66	44,6	R _p 1/8	96	62 000	44 000	–
27,5	156	22	6	–	66	44,6	R _p 1/8	96	62 000	44 000	–
27,5	156	22	6	–	66	44,6	R _p 1/8	96	62 000	44 000	–
35	187	27	15	–	75,5	49,4	R _p 1/8	102	104 000	68 000	–
27,5	156	22	6	74,6	–	44,4	R _p 1/8	–	62 000	44 000	–
27,5	156	22	6	68,2	–	41,2	R _p 1/8	–	62 000	44 000	–
27,5	164	22	8	–	67	45,6	R _p 1/8	100	62 000	44 500	–
27,5	164	22	8	–	67	45,6	R _p 1/8	100	62 000	44 500	–
27,5	164	22	8	–	67	45,6	R _p 1/8	100	62 000	44 500	–
27,5	164	22	8	77,8	–	44,5	R _p 1/8	–	62 000	44 500	–



Plummer block housing units

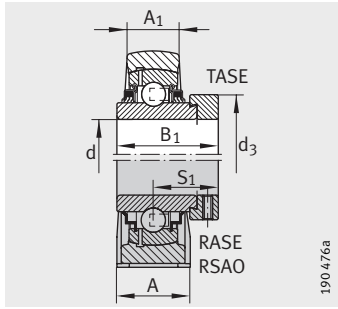
Cast iron housings with long base



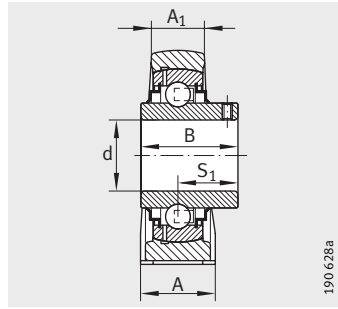
RASE (-FA164), TASE, RSAO, RASEY

Dimension table (continued) - Dimensions in mm							
Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	H	J	L
RASE80	GG.ASE16	GE80-KRR-B	8,65	80	89	232	290
RASE80-AH01-FA164¹⁾	GG.ASE16	GE80-KRR-B-AH01-FA164	8,65	80	89	232	290
TASE80	GG.ASE16	GE80-KTT-B	8,65	80	89	232	290
RSAO80	GG.SAO16	GNE80-KRR-B	22,5	80	116	315	390
RASEY80	GG.ASE16	GYE80-KRR-B	8,63	80	89	232	290
RASE90	GG.ASE18	GE90-KRR-B	12,12	90	101,6	268	330
RASE90-FA164¹⁾	GG.ASE18	GE90-KRR-B-FA164	12,12	90	101,6	268	330
RSAO90	GG.SAO18	GNE90-KRR-B	29,5	90	130	340	410
RASEY90	GG.ASE18	GYE90-KRR-B	12,6	90	101,6	268	330
RASE100	GG.ASE20	GE100-KRR-B	15,85	100	115	308	380
RSAO100	GG.SAO20	GNE100-KRR-B	41	100	145	375	440
RASE120	GG.ASE24	GE120-KRR-B	25,53	120	135	358	440

¹⁾ With lubrication nipple DIN 71412-AR 1/8.



RASE, RSAO, TASE



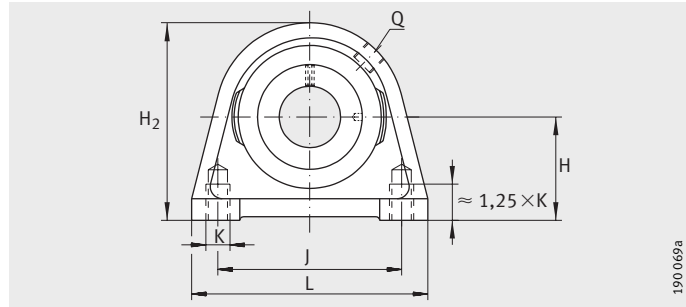
RASEY

											Basic load ratings	
A	A ₁	H ₁	H ₂	N	N ₁	B	B ₁	S ₁	Q	d ₃ max.	dyn. C _r N	stat. C _{0r} N
78	55	30	175	26	8	–	70,7	47,6	R _p 1/8	108	72 000	54 000
78	55	30	175	26	8	–	70,7	47,6	R _p 1/8	108	72 000	54 000
78	55	30	175	26	8	–	71	47,6	R _p 1/8	108	72 000	54 000
110	76	50	226	25,5	19	–	93,6	59,7	R _p 1/8	118	123 000	87 000
78	55	30	175	26	8	82,6	–	49,3	R _p 1/8	–	72 000	54 000
85	55	35	200	27	8	–	69,6	46,6	R _p 1/8	118	96 000	72 000
85	55	35	200	27	8	–	69,6	46,6	R _p 1/8	118	96 000	72 000
120	84	57	250	28	26	–	101	65,5	R _p 1/8	132	143 000	107 000
85	55	35	200	27	8	96	–	56,3	R _p 1/8	–	96 000	72 000
95	62	40	225	30	8	–	75	49,5	R _p 1/8	132	122 000	93 000
130	94	65	280	32	15	–	109,5	70	R _p 1/8	145	174 000	140 000
105	70	45	265	33	8	–	81	52,5	R _p 1/8	152	155 000	131 000



Plummer block housing units

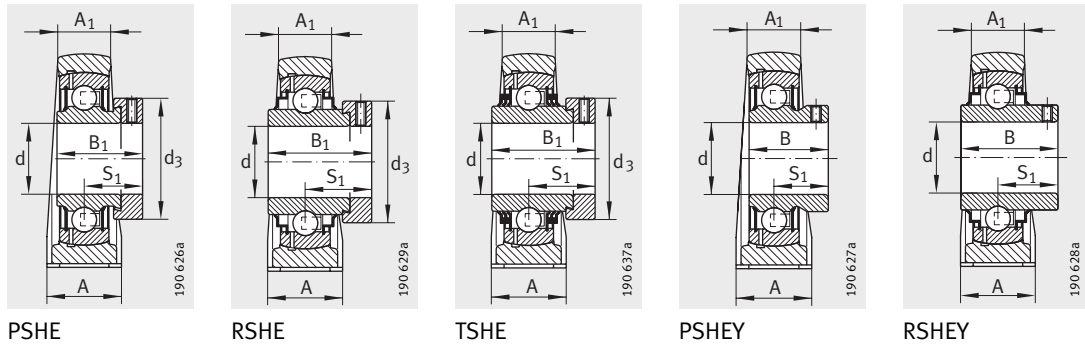
Cast iron housings with short base



PSHE, RSHE, TSHE, PSHEY, RSHEY

Dimension table · Dimensions in mm							
Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	H	A	A ₁
PSHE12	GG.SHE03	GRAE12-NPP-B	0,44	12	30,2	30	18
PSHEY12	GG.SHE03	GAY12-NPP-B	0,42	12	30,2	30	18
PSHE15	GG.SHE03	GRAE15-NPP-B	0,44	15	30,2	30	18
PSHEY15	GG.SHE03	GAY15-NPP-B	0,41	15	30,2	30	18
RSHEY15	GG.SHE03	GYE15-KRR-B	0,42	15	30,2	30	18
PSHE17	GG.SHE03	GRAE17-NPP-B	0,44	17	30,2	30	18
RSHE17	GG.SHE03	GE17-KRR-B	0,48	17	30,2	30	18
PSHEY17	GG.SHE03	GAY17-NPP-B	0,4	17	30,2	30	18
RSHEY17	GG.SHE03	GYE17-KRR-B	0,41	17	30,2	30	18
PSHE20-N	GG.SHE04-N	GRAE20-NPP-B	0,51	20	33,3	32	19
RSHE20-N	GG.SHE04-N	GE20-KRR-B	0,55	20	33,3	32	19
TSHE20-N	GG.SHE04-N	GE20-KTT-B	0,55	20	33,3	32	19
PSHEY20-N	GG.SHE04-N	GAY20-NPP-B	0,48	20	33,3	32	19
RSHEY20-N	GG.SHE04-N	GYE20-KRR-B	0,52	20	33,3	32	19
PSHE25-N	GG.SHE05-E-N	GRAE25-NPP-B	0,6	25	36,5	36	21
RSHE25-N	GG.SHE05-E-N	GE25-KRR-B	0,66	25	36,5	36	21
TSHE25-N	GG.SHE05-E-N	GE25-KTT-B	0,66	25	36,5	36	21
PSHEY25-N	GG.SHE05-E-N	GAY25-NPP-B	0,57	25	36,5	36	21
RSHEY25-N	GG.SHE05-E-N	GYE25-KRR-B	0,61	25	36,5	36	21
PSHE30-N	GG.SHE06-E-N	GRAE30-NPP-B	1,05	30	42,9	40	25
RSHE30-N	GG.SHE06-E-N	GE30-KRR-B	1,12	30	42,9	40	25
TSHE30-N	GG.SHE06-E-N	GE30-KTT-B	1,13	30	42,9	40	25
PSHEY30-N	GG.SHE06-E-N	GAY30-NPP-B	0,99	30	42,9	40	25
RSHEY30-N	GG.SHE06-E-N	GYE30-KRR-B	1,07	30	42,9	40	25
PSHE35-N	GG.SHE07-E-N	GRAE35-NPP-B	1,44	35	47,6	45	27
RSHE35-N	GG.SHE07-E-N	GE35-KRR-B	1,51	35	47,6	45	27
TSHE35-N	GG.SHE07-E-N	GE35-KTT-B	1,51	35	47,6	45	27
PSHEY35-N	GG.SHE07-E-N	GAY35-NPP-B	1,35	35	47,6	45	27
RSHEY35-N	GG.SHE07-E-N	GYE35-KRR-B	1,45	35	47,6	45	27

¹⁾ To be ordered separately.

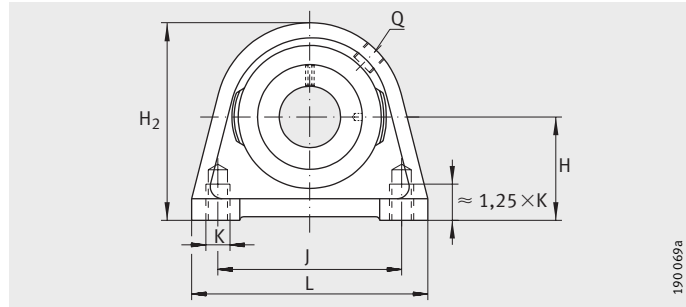


H ₂	K	B	B ₁	J	S ₁	Q	d ₃	L	Basic load ratings		End cap ¹⁾
									dyn. C _r N	stat. C _{0r} N	
							max.				
57	M8	–	28,6	47	22,1	M6	28	63	9 800	4 750	–
57	M8	22	–	47	16	M6	–	63	9 800	4 750	–
57	M8	–	28,6	47	22,1	M6	28	63	9 800	4 750	–
57	M8	22	–	47	16	M6	–	63	9 800	4 750	–
57	M8	27,4	–	47	15,9	M6	–	63	9 800	4 750	–
57	M8	–	28,6	47	22,1	M6	28	63	9 800	4 750	–
57	M8	–	37,4	47	23,4	M6	28	63	9 800	4 750	–
57	M8	22	–	47	16	M6	–	63	9 800	4 750	–
57	M8	27,4	–	47	15,9	M6	–	63	9 800	4 750	–
64	M8	–	31	50,8	23,5	R _p 1/8	33	65	12 800	6 600	KASK04
64	M8	–	43,7	50,8	26,6	R _p 1/8	33	65	12 800	6 600	KASK04
64	M8	–	43,7	50,8	26,6	R _p 1/8	33	65	12 800	6 600	KASK04
64	M8	25	–	50,8	18	R _p 1/8	–	65	12 800	6 600	KASK04
64	M8	31	–	50,8	18,3	R _p 1/8	–	65	12 800	6 600	KASK04
70	M10	–	31	50,8	23,5	R _p 1/8	37,5	70	14 000	7 800	KASK05
70	M10	–	44,5	50,8	26,9	R _p 1/8	37,5	70	14 000	7 800	KASK05
70	M10	–	44,5	50,8	26,9	R _p 1/8	37,5	70	14 000	7 800	KASK05
70	M10	27	–	50,8	19,5	R _p 1/8	–	70	14 000	7 800	KASK05
70	M10	34,1	–	50,8	19,6	R _p 1/8	–	70	14 000	7 800	KASK05
82	M10	–	35,8	76,2	26,7	R _p 1/8	44	98	19 500	11 300	KASK06
82	M10	–	48,5	76,2	30,1	R _p 1/8	44	98	19 500	11 300	KASK06
82	M10	–	48,5	76,2	30,1	R _p 1/8	44	98	19 500	11 300	KASK06
82	M10	30	–	76,2	21	R _p 1/8	–	98	19 500	11 300	KASK06
82	M10	38,1	–	76,2	22,2	R _p 1/8	–	98	19 500	11 300	KASK06
93	M10	–	39	82,6	29,4	R _p 1/8	51	103	25 500	15 300	KASK07
93	M10	–	51,3	82,6	32,3	R _p 1/8	51	103	25 500	15 300	KASK07
93	M10	–	51,3	82,6	32,3	R _p 1/8	51	103	25 500	15 300	KASK07
93	M10	35	–	82,6	25,5	R _p 1/8	–	103	25 500	15 300	KASK07
93	M10	42,9	–	82,6	25,4	R _p 1/8	–	103	25 500	15 300	KASK07



Plummer block housing units

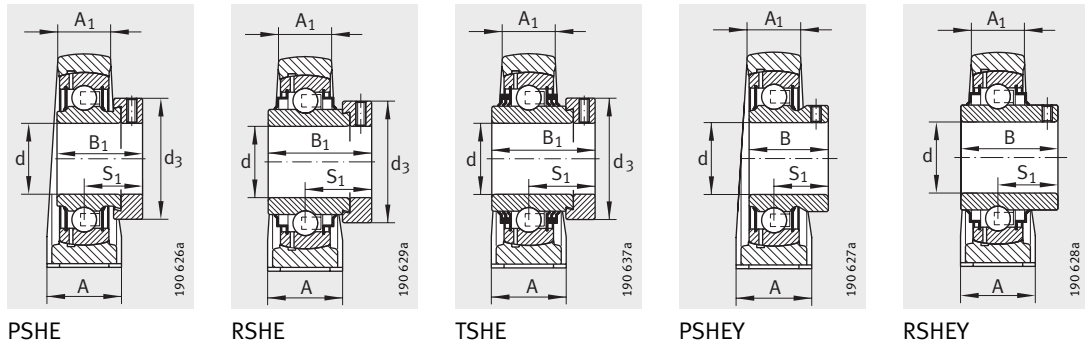
Cast iron housings with short base



PSHE, RSHE, TSHE, PSHEY, RSHEY

Dimension table (continued) · Dimensions in mm							
Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	H	A	A ₁
PSHE40-N	GG.SHE08-E-N	GRAE40-NPP-B	1,84	40	49,2	48	30
RSHE40-N	GG.SHE08-E-N	GE40-KRR-B	1,96	40	49,2	48	30
TSHE40-N	GG.SHE08-E-N	GE40-KTT-B	1,99	40	49,2	48	30
PSHEY40-N	GG.SHE08-E-N	GAY40-NPP-B	1,73	40	49,2	48	30
RSHEY40-N	GG.SHE08-E-N	GYE40-KRR-B	1,87	40	49,2	48	30
PSHE45	GG.SHE09	GRAE405-NPP-B	2,14	45	54	48	32
RSHE45	GG.SHE09	GE45-KRR-B	2,26	45	54	48	32
TSHE45	GG.SHE09	GE45-KTT-B	2,31	45	54	48	32
PSHEY45	GG.SHE09	GAY405-NPP-B	2	45	54	48	32
RSHEY45	GG.SHE09	GYE45-KRR-B	2,15	45	54	48	32
PSHE50-N	GG.SHE10-E-N	GRAE50-NPP-B	2,79	50	57,2	54	34
RSHE50-N	GG.SHE10-E-N	GE50-KRR-B	3,02	50	57,2	54	34
TSHE50-N	GG.SHE10-E-N	GE50-KTT-B	3,08	50	57,2	54	34
PSHEY50-N	GG.SHE10-E-N	GAY50-NPP-B	2,64	50	57,2	54	34
RSHEY50-N	GG.SHE10-E-N	GYE50-KRR-B	2,82	50	57,2	54	34
PSHE55	GG.SHE11	GRAE505-NPP-B	2,91	55	64	60	35
RSHE55	GG.SHE11	GE55-KRR-B	3,52	55	64	60	35
TSHE55	GG.SHE11	GE55-KTT-B	3,59	55	64	60	35
RSHEY55	GG.SHE11	GYE55-KRR-B	3,2	55	64	60	35
PSHE60-N	GG.SHE12-N	GRAE60-NPP-B	4,1	60	69,9	60	42
RSHE60-N	GG.SHE12-N	GE60-KRR-B	4,54	60	69,9	60	42
TSHE60-N	GG.SHE12-N	GE60-KTT-B	4,54	60	69,9	60	42
PSHEY60-N	GG.SHE12-N	GAY60-NPP-B	3,87	60	69,9	60	42
RSHEY60-N	GG.SHE12-N	GYE60-KRR-B	4,02	60	69,9	60	42

¹⁾ To be ordered separately.

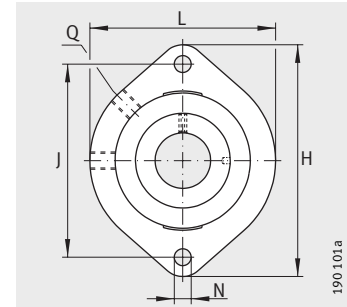


									Basic load ratings		End cap ¹⁾
H ₂	K	B	B ₁	J	S ₁	Q	d ₃ max.	L	dyn. C _r N	stat. C _{0r} N	
99	M12	–	43,8	88,9	32,7	R _p 1/8	58	116	32 500	19 800	KASK08
99	M12	–	56,5	88,9	34,9	R _p 1/8	58	116	32 500	19 800	KASK08
99	M12	–	56,5	88,9	34,9	R _p 1/8	58	116	32 500	19 800	KASK08
99	M12	39,5	–	88,9	29	R _p 1/8	–	116	32 500	19 800	KASK08
99	M12	49,2	–	88,9	30,2	R _p 1/8	–	116	32 500	19 800	KASK08
107	M12	–	43,8	95,3	32,7	R _p 1/8	63	120	32 500	20 400	–
107	M12	–	56,5	95,3	34,9	R _p 1/8	63	120	32 500	20 400	–
107	M12	–	56,5	95,3	34,9	R _p 1/8	63	120	32 500	20 400	–
107	M12	41,5	–	95,3	30,5	R _p 1/8	–	120	32 500	20 400	–
107	M12	49,2	–	95,3	30,5	R _p 1/8	–	120	32 500	20 400	–
115	M16	–	43,8	101,6	32,7	R _p 1/8	69	135	35 000	23 200	KASK10
115	M16	–	62,8	101,6	38,1	R _p 1/8	69	135	35 000	23 200	KASK10
115	M16	–	62,8	101,6	38,1	R _p 1/8	69	135	35 000	23 200	KASK10
115	M16	43	–	101,6	32	R _p 1/8	–	135	35 000	23 200	KASK10
115	M16	51,6	–	101,6	32,6	R _p 1/8	–	135	35 000	23 200	KASK10
125	M16	–	48,4	118	36,4	R _p 1/8	76	150	43 500	29 000	–
125	M16	–	71,4	118	43,6	R _p 1/8	76	150	43 500	29 000	–
125	M16	–	71,4	118	43,6	R _p 1/8	76	150	43 500	29 000	–
125	M16	55,6	–	118	33,4	R _p 1/8	–	150	43 500	29 000	–
140	M16	–	53,1	118	39,6	R _p 1/8	84	150	52 000	36 000	KASK12
140	M16	–	77,9	118	46,8	R _p 1/8	84	150	52 000	36 000	KASK12
140	M16	–	77,9	118	46,8	R _p 1/8	84	150	52 000	36 000	KASK12
140	M16	47	–	118	34	R _p 1/8	–	150	52 000	36 000	KASK12
140	M16	65,1	–	118	39,7	R _p 1/8	–	150	52 000	36 000	KASK12



Two-bolt flanged housing units

Cast iron housings

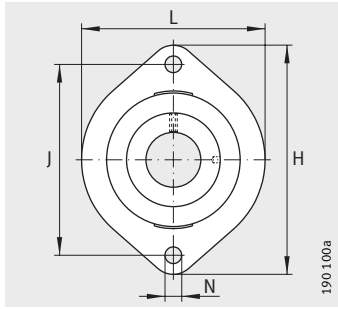


GLCTE

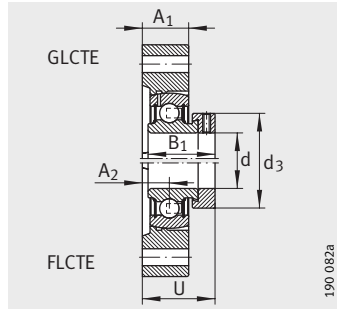
Dimension table · Dimensions in mm							
Designation			Mass m ≈ kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	L	H	A ₁
FLCTE12	GG.LCTE03	RAE12-NPP-B	0,3	12	58,7	81	15
GLCTE12²⁾	GG.GLCTE03	GRAE12-NPP-B	0,3	12	58,7	81	15
FLCTEY12	GG.LCTE03	AY12-NPP-B	0,28	12	58,7	81	15
FLCTE15	GG.LCTE03	RAE15-NPP-B	0,3	15	58,7	81	15
GLCTE15²⁾	GG.GLCTE03	GRAE15-NPP-B	0,3	15	58,7	81	15
FLCTEY15	GG.LCTE03	AY15-NPP-B	0,27	15	58,7	81	15
FLCTE17	GG.LCTE03	RAE17-NPP-B	0,3	17	58,7	81	15
GLCTE17²⁾	GG.GLCTE03	GRAE17-NPP-B	0,3	17	58,7	81	15
FLCTEY17	GG.LCTE03	AY17-NPP-B	0,26	17	58,7	81	15
FLCTE20	GG.LCTE04	RAE20-NPP-B	0,39	20	66,5	90,5	17
GLCTE20¹⁾	GG.GLCTE04-E	GRAE20-NPP-B	0,39	20	66,5	90,5	17
FLCTEY20	GG.LCTE04	AY20-NPP-B	0,36	20	66,5	90,5	17
FLCTE25	GG.LCTE05	RAE25-NPP-B	0,47	25	71	97	17,5
GLCTE25¹⁾	GG.GLCTE05-E	GRAE25-NPP-B	0,47	25	71	97	17,5
FLCTEY25	GG.LCTE05	AY25-NPP-B	0,44	25	71	97	17,5
FLCTE30	GG.LCTE06	RAE30-NPP-B	0,76	30	84	112,5	20,5
GLCTE30¹⁾	GG.GLCTE06-E	GRAE30-NPP-B	0,76	30	84	112,5	20,5
FLCTEY30	GG.LCTE06	AY30-NPP-B	0,7	30	84	112,5	20,5
FLCTE35	GG.LCTE07	RAE35-NPP-B	1,02	35	94	126	22
GLCTE35²⁾	GG.GLCTE07	GRAE35-NPP-B	1,02	35	94	126	22
FLCTEY35	GG.LCTE07	GAY35-NPP-B	0,93	35	94	126	22
FLCTE40	GG.LCTE08	RAE40-NPP-B	1,27	40	100	150	24
GLCTE40²⁾	GG.GLCTE08	GRAE40-NPP-B	1,27	40	100	150	24
FLCTEY40	GG.LCTE08	GAY40-NPP-B	1,18	40	100	150	24

¹⁾ Lubrication hole 45°.

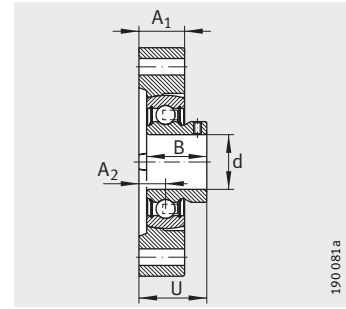
²⁾ Lubrication hole 90°.



FLCTE, FLCTEY



GLCTE, FLCTE



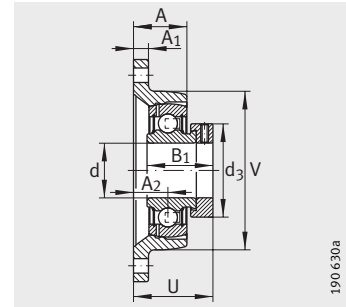
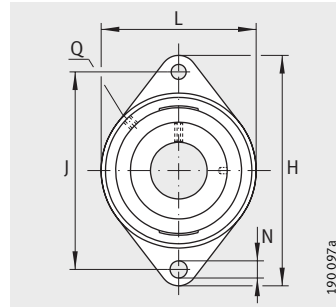
FLCTEY

								Basic load ratings	
N	B	B ₁	J	A ₂	Q	d ₃ max.	U	dyn. C _r N	stat. C _{0r} N
6,6	–	28,6	63,5	8,4	–	28	30,5	9 800	4 750
6,6	–	28,6	63,5	8,4	M6 ²⁾	28	30,5	9 800	4 750
6,6	22	–	63,5	8,4	–	–	24,4	9 800	4 750
6,6	–	28,6	63,5	8,4	–	28	30,5	9 800	4 750
6,6	–	28,6	63,5	8,4	M6 ²⁾	28	30,5	9 800	4 750
6,6	22	–	63,5	8,4	–	–	24,4	9 800	4 750
6,6	–	28,6	63,5	8,4	–	28	30,5	9 800	4 750
6,6	–	28,6	63,5	8,4	M6 ²⁾	28	30,5	9 800	4 750
6,6	22	–	63,5	8,4	–	–	24,4	9 800	4 750
9	–	31	71,4	9,5	–	33	33	12 800	6 600
9	–	31	71,4	9,5	M6 ¹⁾	33	33	12 800	6 600
9	25	–	71,4	9,5	–	–	27	12 800	6 600
9	–	31	76,2	9,9	–	37,5	33,4	14 000	7 800
9	–	31	76,2	9,9	M6 ¹⁾	37,5	33,4	14 000	7 800
9	27	–	76,2	9,9	–	–	29,4	14 000	7 800
11,5	–	35,8	90,5	11,4	–	44	38,1	19 500	11 300
11,5	–	35,8	90,5	11,4	R _p 1/8 ¹⁾	44	38,1	19 500	11 300
11,5	30	–	90,5	11,4	–	–	32,4	19 500	11 300
11,5	–	39	100	12,4	–	51	41,8	25 500	15 300
11,5	–	39	100	12,4	R _p 1/8 ²⁾	51	41,8	25 500	15 300
11,5	35	–	100	12,4	–	–	37,9	25 500	15 300
14	–	43,8	119	13,5	–	58	46,2	32 500	19 800
14	–	43,8	119	13,5	R _p 1/8 ²⁾	58	46,2	32 500	19 800
14	39,5	–	119	13,5	–	–	42,5	32 500	19 800



Two-bolt flanged housing units

Cast iron housings

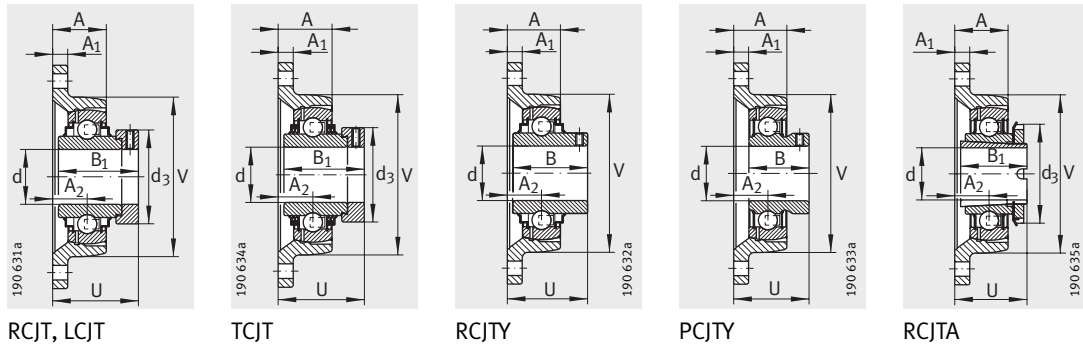


PCFT, PCJT (-N-FA125), PCJTY,
RCJT (-N-FA125), TCJT, LCJT,
RCJTA, RCJTY (-JIS)

PCFT, PCJT

Dimension table · Dimensions in mm								
Designation			Mass m ≈kg	Dimensions				
Unit	Housing	Radial insert ball bearing		d	L	H	A ₁	N
PCFT12	GG.CFT03	GRAE12-NPP-B	0,39	12	57	99	9,5	11,5
PCJT12	GG.CJT03	GRAE12-NPP-B	0,37	12	57	99	9,5	11,5
PCJTY12	GG.CJT03	GAY12-NPP-B	0,35	12	57	99	9,5	11,5
RCJTY12	GG.CJT03	GYE12-KRR-B	0,36	12	57	99	9,5	11,5
PCFT15	GG.CFT03	GRAE15-NPP-B	0,39	15	57	99	9,5	11,5
PCJT15	GG.CFT03	GRAE15-NPP-B	0,37	15	57	99	9,5	11,5
PCJTY15	GG.CFT03	GAY15-NPP-B	0,34	15	57	99	9,5	11,5
RCJTY15	GG.CFT03	GYE15-KRR-B	0,35	15	57	99	9,5	11,5
RCJTY16	GG.CJT03	GYE16-KRR-B	0,34	16	57	99	9,5	11,5
PCFT17	GG.CFT03	GRAE17-NPP-B	0,39	17	57	99	9,5	11,5
PCJT17	GG.CJT03	GRAE17-NPP-B	0,37	17	57	99	9,5	11,5
RCJT17	GG.CJT03	GE17-KRR-B	0,41	17	57	99	9,5	11,5
PCJTY17	GG.CJT03	GAY17-NPP-B	0,33	17	57	99	9,5	11,5
RCJTY17	GG.CJT03	GYE17-KRR-B	0,34	17	57	99	9,5	11,5
PCFT20	GG.CFT04	GRAE20-NPP-B	0,40	20	61	112	10	11,5
PCJT20-N	GG.CJT04-N	GRAE20-NPP-B	0,48	20	61	112	10	11,5
PCJT20-N-FA125	GG.CJT04-N-FA125.1	GRAE20-NPP-B-FA125.5	0,48	20	61	112	10	11,5
RCJT20-N	GG.CJT04-N	GE20-KRR-B	0,52	20	61	112	10	11,5
RCJT20-N-FA125	GG.CJT04-N-FA125.1	GE20-KRR-B-FA125.5	0,52	20	61	112	10	11,5
TCJT20-N	GG.CJT04-N	GE20-KTT-B	0,52	20	61	112	10	11,5
LCJT20-N	GG.CJT04-N	GE20-KLL-B	0,52	20	61	112	10	11,5
RCJTA20-N	GG.CJT04-N	GSH20-2RSR-B	0,52	20	61	112	10	11,5
PCJTY20-N	GG.CJT04-N	GAY20-NPP-B	0,45	20	61	112	10	11,5
RCJTY20-N	GG.CJT04-N	GYE20-KRR-B	0,49	20	61	112	10	11,5
RCJTY20-JIS	GG.FL204	GYE20-KRR-B-FA107	0,42	20	60	113	12	12
PCFT25	GG.CFT05	GRAE25-NPP-B	0,52	25	70	124	11	11,5
PCJT25-N	GG.CJT05-N	GRAE25-NPP-B	0,56	25	70	124	11	11,5
PCJT25-N-FA125	GG.CJT05-N-FA125.1	GRAE25-NPP-B-FA125.5	0,56	25	70	124	11	11,5
RCJT25-N	GG.CJT05-N	GE25-KRR-B	0,62	25	70	124	11	11,5
RCJT25-N-FA125	GG.CJT05-N-FA125.1	GE25-KRR-B-FA125.5	0,62	25	70	124	11	11,5
TCJT25-N	GG.CJT05-N	GE25-KTT-B	0,62	25	70	124	11	11,5
LCJT25-N	GG.CJT05-N	GE25-KLL-B	0,62	25	70	124	11	11,5
RCJTA25-N	GG.CJT05-N	GSH25-2RSR-B	0,54	25	70	124	11	11,5
PCJTY25-N	GG.CJT05-N	GAY25-NPP-B	0,48	25	70	124	11	11,5
RCJTY25-N	GG.CJT05-N	GYE25-KRR-B	0,57	25	70	124	11	11,5
RCJTY25-JIS	GG.FL205	GYE25-KRR-B-FA107	0,61	25	68	130	14	16

¹⁾ To be ordered separately.

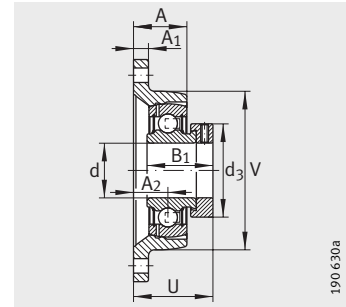
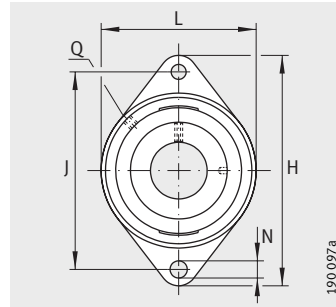


									Basic load ratings		End cap ¹⁾
B	B ₁	J	A ₂	Q	d ₃ max.	A	U	V	dyn. C _r N	stat. C _{0r} N	
-	28,6	76,5	10	M6	28	18	32,1	57	9 800	4 750	-
-	28,6	76,5	17	M6	28	25	39,1	57	9 800	4 750	-
22	-	76,5	17	M6	-	25	33	57	9 800	4 750	-
27,4	-	76,5	17	M6	-	25	32,9	57	9 800	4 750	-
-	28,6	76,5	10	M6	28	18	32,1	57	9 800	4 750	-
-	28,6	76,5	17	M6	28	25	39,1	57	9 800	4 750	-
22	-	76,5	17	M6	-	25	33	57	9 800	4 750	-
27,4	-	76,5	17	M6	-	25	32,9	57	9 800	4 750	-
27,4	-	76,5	17	M6	-	25	32,9	57	9 800	4 750	-
-	28,6	76,5	10	M6	28	18	32,1	57	9 800	4 750	-
-	28,6	76,5	17	M6	28	25	39,1	57	9 800	4 750	-
-	37,4	76,5	17	M6	28	25	40,4	57	9 800	4 750	-
22	-	76,5	17	M6	-	25	33	57	9 800	4 750	-
27,4	-	76,5	17	M6	-	25	32,9	57	9 800	4 750	-
-	31	90	10,5	R _p 1/8	33	17,5	34	61	12 800	6 600	-
-	31	90	19	R _p 1/8	33	28	42,5	61	12 800	6 600	KASK04
-	31	90	19	R _p 1/8	33	28	42,5	61	12 800	6 600	KASK04
-	43,7	90	19	R _p 1/8	33	28	45,6	61	12 800	6 600	KASK04
-	43,7	90	19	R _p 1/8	33	28	45,6	61	12 800	6 600	KASK04
-	43,7	90	19	R _p 1/8	33	28	45,6	61	12 800	6 600	KASK04
-	43,7	90	19	R _p 1/8	33	28	45,6	61	12 800	6 600	KASK04
-	28	90	19	R _p 1/8	32	28	42,5	61	12 700	6 600	KASK04
25	-	90	19	R _p 1/8	-	28	37	61	12 800	6 600	KASK04
31	-	90	19	R _p 1/8	-	28	37,3	61	12 800	6 600	KASK04
31	-	90	15	M6	-	25,5	33,3	-	12 800	6 600	-
-	31	99	12,5	R _p 1/8	37,5	20	36	70	14 000	7 800	-
-	31	99	19	R _p 1/8	37,5	29	42,5	70	14 000	7 800	KASK05
-	31	99	19	R _p 1/8	37,5	29	42,5	70	14 000	7 800	KASK05
-	44,5	99	19	R _p 1/8	37,5	29	46	70	14 000	7 800	KASK05
-	44,5	99	19	R _p 1/8	37,5	29	46	70	14 000	7 800	KASK05
-	44,5	99	19	R _p 1/8	37,5	29	46	70	14 000	7 800	KASK05
-	44,5	99	19	R _p 1/8	37,5	29	46	70	14 000	7 800	KASK05
-	28	99	19	R _p 1/8	38	29	42,5	70	13 600	7 800	KASK05
27	-	99	19	R _p 1/8	-	29	38,5	70	14 000	7 800	KASK05
34,1	-	99	19	R _p 1/8	-	29	38,8	70	14 000	7 800	KASK05
34,1	-	99	16	M6	-	27	35,8	-	14 000	7 800	-



Two-bolt flanged housing units

Cast iron housings



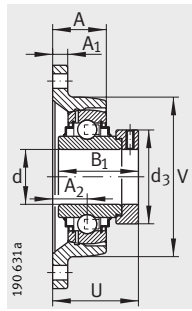
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RCJT (-N-FA125, -FA164), TCJT,
LCJT, RCJTA, RCJTY (-JIS)

PCFT, PCJT

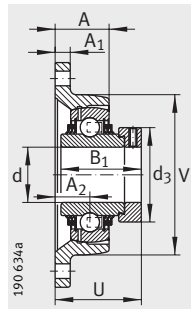
Dimension table (continued) · Dimensions in mm								
Designation			Mass m ≈kg	Dimensions				
Unit	Housing	Radial insert ball bearing		d	L	H	A ₁	N
PCFT30	GG.CFT06	GRAE30-NPP-B	0,77	30	80	142	12	11,5
PCJT30-N	GG.CJT06-N	GRAE30-NPP-B	0,81	30	80	142	12	11,5
PCJT30-N-FA125	GG.CJT06-N-FA125.1	GRAE30-NPP-B-FA125.5	0,81	30	80	142	12	11,5
RCJT30-N	GG.CJT06-N	GE30-KRR-B	0,88	30	80	142	12	11,5
RCJT30-N-FA125	GG.CJT06-N-FA125.1	GE30-KRR-B-FA125.5	0,88	30	80	142	12	11,5
RCJT30-FA164¹⁾	GG.CJT06-N	GE30-KRR-B-FA164	0,88	30	80	142	12	11,5
TCJT30-N	GG.CJT06-N	GE30-KTT-B	0,89	30	80	142	12	11,5
LCJT30-N	GG.CJT06-N	GE30-KLL-B	0,88	30	80	142	12	11,5
RCJTA30-N	GG.CJT06-N	GSH30-2RSR-B	0,77	30	80	142	12	11,5
PCJTY30-N	GG.CJT06-N	GAY30-NPP-B	0,75	30	80	142	12	11,5
RCJTY30-N	GG.CJT06-N	GYE30-KRR-B	0,88	30	80	142	12	11,5
RCJTY30-JIS	GG.FL206	GYE30-KRR-B-FA107	0,91	30	80	148	14	16
PCFT35	GG.CFT07	GRAE35-NPP-B	1,08	35	92	155	12,5	14
PCJT35-N	GG.CJT07-N	GRAE35-NPP-B	1,12	35	92	155	12,5	14
PCJT35-N-FA125	GG.CJT07-N-FA125.1	GRAE35-NPP-B-FA125.5	1,12	35	92	155	12,5	14
RCJT35-N	GG.CJT07-N	GE35-KRR-B	1,19	35	92	155	12,5	14
RCJT35-N-FA125	GG.CJT07-N-FA125.1	GE35-KRR-B-FA125.5	1,19	35	92	155	12,5	14
RCJT35-FA164¹⁾	GG.CJT07-N	GE35-KRR-B-FA164	1,19	35	92	155	12,5	14
TCJT35-N	GG.CJT07-N	GE35-KTT-B	1,2	35	92	155	12,5	14
LCJT35-N	GG.CJT07-N	GE35-KLL-B	1,19	35	92	155	12,5	14
RCJTA35-N	GG.CJT07-N	GSH35-2RSR-B	1,06	35	92	155	12,5	14
PCJTY35-N	GG.CJT07-N	GAY35-NPP-B	1,03	35	92	155	12,5	14
RCJTY35-N	GG.CJT07-N	GYE35-KRR-B	1,13	35	92	155	12,5	14
RCJTY35-JIS	GG.FL207	GYE35-KRR-B-FA107	1,19	35	90	161	16	16
PCFT40	GG.CFT08	GRAE40-NPP-B	1,42	40	105	172	13	14
PCJT40-N	GG.CJT08-N	GRAE40-NPP-B	1,54	40	105	172	13	14
PCJT40-N-FA125	GG.CJT08-N-FA125.1	GRAE40-NPP-B-FA125.5	1,54	40	105	172	13	14
RCJT40-N	GG.CJT08-N	GE40-KRR-B	1,66	40	105	172	13	14
RCJT40-N-FA125	GG.CJT08-N-FA125.1	GE40-KRR-B-FA125.5	1,66	40	105	172	13	14
RCJT40-FA164¹⁾	GG.CJT08-N	GE40-KRR-B-FA164	1,66	40	105	172	13	14

¹⁾ With lubrication nipple DIN 71412-AR 1/8.

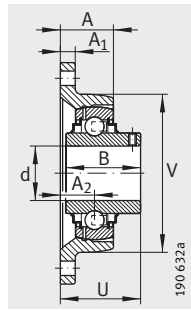
²⁾ To be ordered separately.



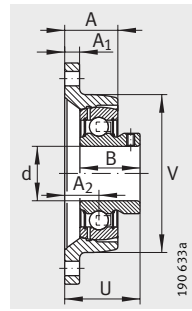
RCJT, LCJT



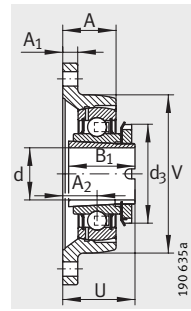
TCJT



RCJTY (-JIS)



PCJTY



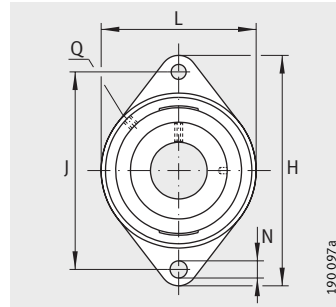
RCJTA

									Basic load ratings		End cap ²⁾
B	B ₁	J	A ₂	Q	d ₃ max.	A	U	V	dyn. C _r N	stat. C _{0r} N	
-	35,8	116,5	13,3	R _p 1/8	44	22,3	40	80	19 500	11 300	-
-	35,8	116,5	20	R _p 1/8	44	29	46,7	80	19 500	11 300	KASK06
-	35,8	116,5	20	R _p 1/8	44	29	46,7	80	19 500	11 300	KASK06
-	48,5	116,5	20	R _p 1/8	44	29	50,1	80	19 500	11 300	KASK06
-	48,5	116,5	20	R _p 1/8	44	29	50,1	80	19 500	11 300	KASK06
-	48,5	116,5	20	R _p 1/8	44	29	50,2	80	19 500	11 300	-
-	48,5	116,5	20	R _p 1/8	44	29	50,1	80	19 500	11 300	KASK06
-	48,5	116,5	20	R _p 1/8	44	29	50,1	80	19 500	11 300	KASK06
-	32	116,5	20	R _p 1/8	45	29	44	80	18 900	11 300	KASK06
30	-	116,5	20	R _p 1/8	-	29	41	80	19 500	11 300	KASK06
38,1	-	116,5	20	R _p 1/8	-	29	42,2	80	19 500	11 300	KASK06
38,1	-	117	18	M6	-	31	40,2	-	19 500	11 300	-
-	39	130	15,5	R _p 1/8	51	25	44,9	92	25 500	15 300	-
-	39	130	21	R _p 1/8	51	30,5	50,4	92	25 500	15 300	KASK07
-	39	130	21	R _p 1/8	51	30,5	50,4	92	25 500	15 300	KASK07
-	51,3	130	21	R _p 1/8	51	30,5	53,3	92	25 500	15 300	KASK07
-	51,3	130	21	R _p 1/8	51	30,5	53,3	92	25 500	15 300	KASK07
-	51,3	130	21	R _p 1/8	51	30,5	53,4	92	25 500	15 300	-
-	51,3	130	21	R _p 1/8	51	30,5	53,3	92	25 500	15 300	KASK07
-	51,3	130	21	R _p 1/8	51	30,5	53,3	92	25 500	15 300	KASK07
-	34	130	21	R _p 1/8	52	30,5	46	92	24 900	15 300	KASK07
35	-	130	21	R _p 1/8	-	30,5	46,5	92	25 500	15 300	KASK07
42,9	-	130	21	R _p 1/8	-	30,5	46,4	92	25 500	15 300	KASK07
42,9	-	130	19	M6	-	34	44,4	-	25 500	15 300	-
-	43,8	143,5	18,3	R _p 1/8	58	28,8	51	105	32 500	19 800	-
-	43,8	143,5	24	R _p 1/8	58	34,5	56,7	105	32 500	19 800	KASK08
-	43,8	143,5	24	R _p 1/8	58	34,5	56,7	105	32 500	19 800	KASK08
-	56,5	143,5	24	R _p 1/8	58	34,5	58,9	105	32 500	19 800	KASK08
-	56,5	143,5	24	R _p 1/8	58	34,5	58,9	105	32 500	19 800	KASK08
-	56,5	143,5	24	R _p 1/8	58	34,5	59,1	105	32 500	19 800	-

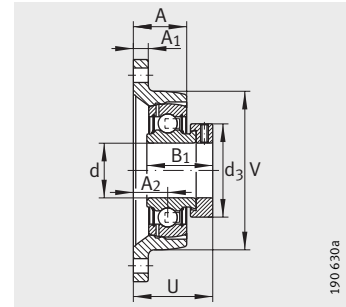


Two-bolt flanged housing units

Cast iron housings



PCFT, PCJT (-N-FA125), PCJTY, RCJT (-N-FA125, -FA164), TCJT, LCJT, RCJTA, RCJTY (-JIS)



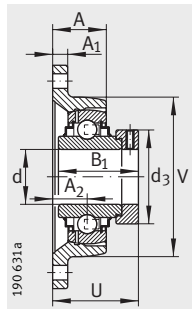
PCFT, PCJT

Dimension table (continued) · Dimensions in mm

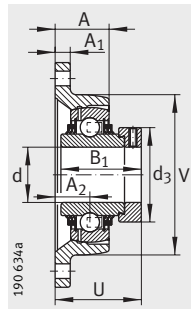
Designation			Mass m ≈kg	Dimensions				
Unit	Housing	Radial insert ball bearing		d	L	H	A ₁	N
TCJT40-N	GG.CJT08-N	GE40-KTT-B	1,69	40	105	172	13	14
LCJT40-N	GG.CJT08-N	GE40-KLL-B	1,66	40	105	172	13	14
PCJTY40-N	GG.CJT08-N	GAY40-NPP-B	1,43	40	105	172	13	14
RCJTA40-N	GG.CJT08-N	GSH40-2RSR-B	1,46	40	105	172	13	14
RCJTY40-N	GG.CJT08-N	GYE40-KRR-B	1,57	40	105	172	13	14
RCJTY40-JIS	GG.FL208	GYE40-KRR-B-FA107	1,51	40	100	175	16	16
PCFT45	GG.CFT09	GRAE45-NPP-B	1,59	45	111	180	13	14
PCJT45	GG.CJT09	GRAE45-NPP-B	1,69	45	111	180	13	14
RCJT45	GG.CJT09	GE45-KRR-B	1,81	45	111	180	13	14
TCJT45	GG.CJT09	GE45-KTT-B	1,81	45	111	180	13	14
LCJT45	GG.CJT09	GE45-KLL-B	1,81	45	111	180	13	14
PCJTY45	GG.CJT09	GAY45-NPP-B	1,55	45	111	180	13	14
RCJTY45	GG.CJT09	GYE45-KRR-B	1,7	45	111	180	13	14
RCJTY45-JIS	GG.FL209	GYE45-KRR-B-FA107	1,94	45	108	188	18	19
PCFT50	GG.CFT10	GRAE50-NPP-B	1,82	50	116	190	13	14
PCJT50-N	GG.CJT10-N	GRAE50-NPP-B	1,97	50	116	190	13	18
PCJT50-N-FA125	GG.CJT10-N-FA125.1	GRAE50-NPP-B-FA125.5	1,97	50	116	190	13	18
RCJT50-N	GG.CJT10-N	GE50-KRR-B	2,2	50	116	190	13	18
RCJT50-N-FA125	GG.CJT10-N-FA125.1	GE50-KRR-B-FA125.5	2,2	50	116	190	13	18
RCJT50-FA164¹⁾	GG.CJT10-N	GE50-KRR-B-FA164	2,2	50	116	190	13	18
TCJT50-N	GG.CJT10-N	GE50-KTT-B	2,26	50	116	190	13	18
LCJT50-N	GG.CJT10-N	GE50-KLL-B	2,2	50	116	190	13	18
PCJTY50-N	GG.CJT10-N	GAY50-NPP-B	1,82	50	116	190	13	18
RCJTY50-N	GG.CJT10-N	GYE50-KRR-B	2	50	116	190	13	18
RCJTY50-JIS	GG.FL210	GYE50-KRR-B-FA107	2,21	50	115	197	18	19
PCJT55	GG.CJT11	GRAE55-NPP-B	2,31	55	134	222	15	18
RCJT55	GG.CJT11	GE55-KRR-B	2,92	55	134	222	15	18
TCJT55	GG.CJT11	GE55-KTT-B	2,98	55	134	222	15	18
RCJTY55	GG.CJT11	GYE55-KRR-B	2,6	55	134	222	15	18
RCJTY55-JIS	GG.FL211	GYE55-KRR-B-FA107	2,83	55	130	224	20	19

¹⁾ With lubrication nipple DIN 71412-AR 1/8.

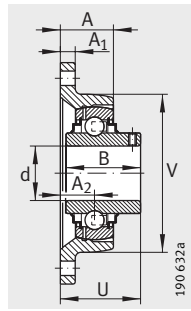
²⁾ To be ordered separately.



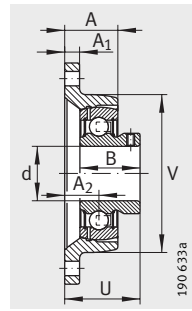
RCJT, LCJT



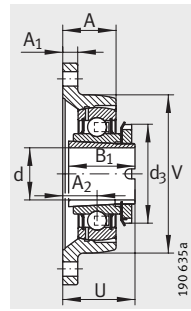
TCJT



RCJTY (-JIS)



PCJTY



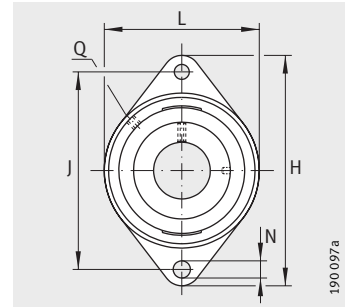
RCJTA

									Basic load ratings		End cap ²⁾
B	B ₁	J	A ₂	Q	d ₃ max.	A	U	V	dyn. C _r N	stat. C _{0r} N	
-	56,5	143,5	24	R _p 1/8	58	34,5	58,9	105	32 500	19 800	KASK08
-	56,5	143,5	24	R _p 1/8	58	34,5	58,9	105	32 500	19 800	KASK08
39,5	-	143,5	24	R _p 1/8	-	34,5	53	105	32 500	19 800	KASK08
-	38	143,5	24	R _p 1/8	58	34,5	51	105	29 500	19 800	KASK08
49,2	-	143,5	24	R _p 1/8	-	34,5	54,2	105	32 500	19 800	KASK08
49,2	-	144	21	M6	-	36	51,2	-	32 500	19 800	-
-	43,8	148,5	19,2	R _p 1/8	63	30,2	51,9	111	32 500	20 400	-
-	43,8	148,5	24	R _p 1/8	63	35	56,7	111	32 500	20 400	-
-	56,5	148,5	24	R _p 1/8	63	35	58,9	111	32 500	20 400	-
-	56,5	148,5	24	R _p 1/8	63	35	58,9	111	32 500	20 400	-
-	56,5	148,5	24	R _p 1/8	63	35	58,9	111	32 500	20 400	-
41,5	-	148,5	24	R _p 1/8	-	35	54,5	111	32 500	20 400	-
49,2	-	148,5	24	R _p 1/8	-	35	54,2	111	32 500	20 400	-
49,2	-	148	22	M6	-	38	52,2	-	32 500	20 400	-
-	43,8	157	19,2	R _p 1/8	69	30,2	51,9	116	35 000	23 200	-
-	43,8	157	28	R _p 1/8	69	39	60,7	116	35 000	23 200	KASK10
-	43,8	157	28	R _p 1/8	69	39	60,7	116	35 000	23 200	KASK10
-	62,8	157	28	R _p 1/8	69	39	66,1	116	35 000	23 200	KASK10
-	62,8	157	28	R _p 1/8	69	39	66,1	116	35 000	23 200	KASK10
-	62,8	157	28	R _p 1/8	69	39	66,1	116	35 000	23 200	-
-	62,8	157	28	R _p 1/8	69	39	66,1	116	35 000	23 200	KASK10
-	62,8	157	28	R _p 1/8	69	39	66,1	116	35 000	23 200	KASK10
43	-	157	28	R _p 1/8	-	39	60	116	35 000	23 200	KASK10
51,6	-	157	28	R _p 1/8	-	39	60,6	116	35 000	23 200	KASK10
51,6	-	157	22	M6	-	40	54,6	-	35 000	23 200	-
-	48,4	184	31	R _p 1/8	76	43,5	67,4	134	43 500	29 000	-
-	71,4	184	31	R _p 1/8	76	43,5	74,6	134	43 500	29 000	-
-	71,4	184	31	R _p 1/8	76	43,5	74,6	134	43 500	29 000	-
55,6	-	184	31	R _p 1/8	-	43,5	64,4	134	43 500	29 000	-
55,6	-	184	25	M6	-	43	58,4	-	43 500	29 000	-



Two-bolt flanged housing units

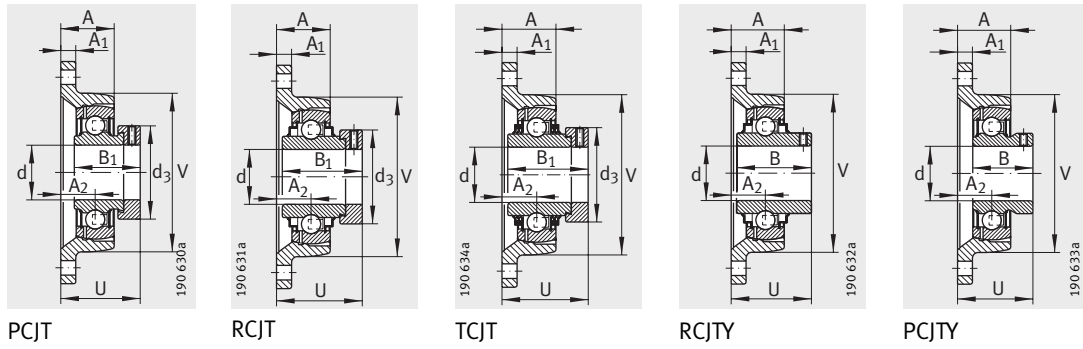
Cast iron housings



PCJT (-N-FA125), PCJTY, RCJT, TCJT, RCJTY (-JIS)

Dimension table (continued) · Dimensions in mm								
Designation			Mass m ≈kg	Dimensions				
Unit	Housing	Radial insert ball bearing		d	L	H	A ₁	N
PCJT60-N	GG.CJT12-N	GRAE60-NPP-B	3,25	60	138	238	16	18
PCJT60-N-FA125	GG.CJT12-N-FA125.1	GRAE60-NPP-B-FA125.5	3,25	60	138	238	16	18
RCJT60-N	GG.CJT12-N	GE60-KRR-B	3,69	60	138	238	16	18
PCJTY60-N	GG.CJT12-N	GAY60-NPP-B	2,92	60	138	238	16	18
RCJTY60-N	GG.CJT12-N	GYE60-KRR-B	3,17	60	138	238	16	18
RCJTY60-JIS	GG.FL212	GYE60-KRR-B-FA107	3,88	60	140	250	20	23
RCJT65	GG.CJT13/14	GE65-214-KRR-B	6,41	65	160	258	18	21
TCJT65	GG.CJT13/14	GE65-214-KTT-B	6,41	65	160	258	18	21
RCJTY65	GG.CJT13/14	GYE65-214-KRR-B	5,95	65	160	258	18	21
RCJT70	GG.CJT13/14	GE70-KRR-B	6,15	70	160	258	18	21
RCJTY70	GG.CJT13/14	GYE70-KRR-B	5,65	70	160	258	18	21
RCJT75	GG.CJT15	GE75-KRR-B	6	75	160	258	18	21
TCJT75	GG.CJT15	GE75-KTT-B	6	75	160	258	18	21
RCJTY75	GG.CJT15	GYE75-KRR-B	5,54	75	160	258	18	21

1) To be ordered separately.

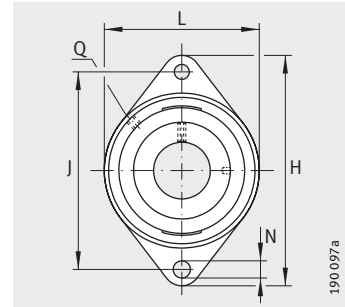


B	B ₁	J	A ₂	Q	d ₃ max.	A	U	V	Basic load ratings		End cap ¹⁾
									dyn. C _r N	stat. C _{0r} N	
-	53,1	202	34	R _p 1/8	84	46	73,6	138	52 000	36 000	KASK12
-	53,1	202	34	R _p 1/8	84	46	73,6	138	52 000	36 000	KASK12
-	77,9	202	34	R _p 1/8	84	46	80,8	138	52 000	36 000	KASK12
47	-	202	34	R _p 1/8	-	46	68	138	52 000	36 000	KASK12
65,1	-	202	34	R _p 1/8	-	46	73,7	138	52 000	36 000	KASK12
65,1	-	202	29	M6	-	48	68,7	-	52 000	36 000	-
-	66	216	38	R _p 1/8	96	57	82,6	160	62 000	44 000	-
-	66	216	38	R _p 1/8	96	57	82,6	160	62 000	44 000	-
74,6	-	216	38	R _p 1/8	-	57	82,4	160	62 000	44 000	-
-	66	216	38	R _p 1/8	96	57	82,6	160	62 000	44 000	-
74,6	-	216	38	R _p 1/8	-	57	82,4	160	62 000	44 000	-
-	67	216	38	R _p 1/8	100	57	83,6	160	62 000	44 500	-
-	67	216	38	R _p 1/8	100	57	83,6	160	62 000	44 500	-
77,8	-	216	38	R _p 1/8	-	57	82,5	160	62 000	44 500	-



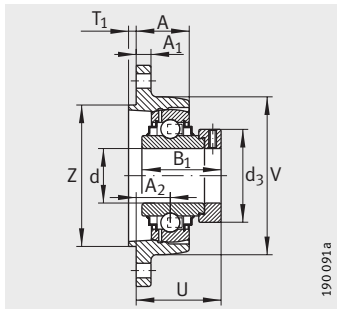
Two-bolt flanged housing units with centring spigot

Cast iron housings



RCJTZ

Dimension table · Dimensions in mm								
Designation			Mass m ≈ kg	Dimensions				
Unit	Housing	Radial insert ball bearing		d	L	H	A ₁	N
RCJTZ20	GG.CJZ04	GE20-KRR-B	0,53	20	60,5	112,5	10	11,5
RCJTZ25	GG.CJZ05	GE25-KRR-B	0,64	25	70	124	12	11,5
RCJTZ30	GG.CJZ06	GE30-KRR-B	0,9	30	83	142	12	11,5
RCJTZ35	GG.CJZ07	GE35-KRR-B	1,22	35	94	155	12,5	14
RCJTZ40	GG.CJZ08	GE40-KRR-B	1,69	40	105	172	13	14
RCJTZ45	GG.CJZ09	GE45-KRR-B	1,86	45	111	180	13	14
RCJTZ50	GG.CJZ10	GE50-KRR-B	2,21	50	116	190	13	14
RCJTZ60	GG.CJZ12	GE60-KRR-B	3,74	60	138	238	16	18



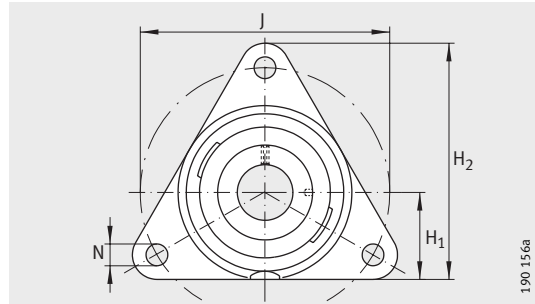
RCJTZ

										Basic load ratings	
B ₁	J	A ₂	Q	d ₃ max.	A	T ₁	U	V	Z h8	dyn. C _r N	stat. C _{0r} N
43,7	90	19	R _p 1/8	33	31,7	3,5	45,6	60,5	55	12 800	6 500
44,5	99	19	R _p 1/8	37,5	26,5	3,5	45,9	70	60	14 000	7 800
48,5	116,5	17	R _p 1/8	44	26	3	47,1	83	80	19 500	11 300
51,3	130	17	R _p 1/8	51	26,5	4	49,3	94	90	25 500	15 300
56,5	143,5	20	R _p 1/8	58	30,5	4	54,9	105	100	32 500	19 800
56,5	148,5	20	R _p 1/8	63	31	4	54,9	111	105	32 500	20 400
62,8	157	24	R _p 1/8	69	35	4	62,1	116	105	35 000	23 200
77,9	202	30	R _p 1/8	84	42	4	76,8	138	130	52 000	36 000



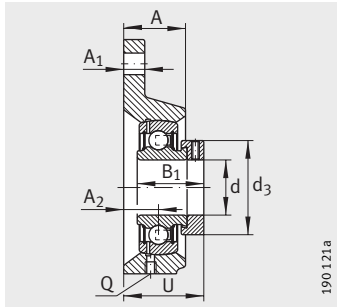
Three-bolt flanged housing units

Cast iron housings



PCFTR

Dimension table · Dimensions in mm							
Designation			Mass m ≈ kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	H ₂	H ₁	A ₁
PCFTR12	GG.CFTR03	GRAE12-NPP-B	0,4	12	81	31	11
PCFTR15	GG.CFTR03	GRAE15-NPP-B	0,4	15	81	31	11
PCFTR17	GG.CFTR03	GRAE17-NPP-B	0,4	17	81	31	11
PCFTR20	GG.CFTR04	GRAE20-NPP-B	0,56	20	92	35	11
PCFTR25	GG.CFTR05	GRAE25-NPP-B	0,71	25	97	36	12
PCFTR30	GG.CFTR06	GRAE30-NPP-B	0,99	30	117	44	12
PCFTR35	GG.CFTR07	GRAE35-NPP-B	1,34	35	128	48	14
PCFTR40	GG.CFTR08	GRAE40-NPP-B	1,83	40	137	51	16
PCFTR45	GG.CFTR09	GRAE45-NPP-B	2	45	150	55	16
PCFTR50	GG.CFTR10	GRAE50-NPP-B	2,15	50	150	55	16



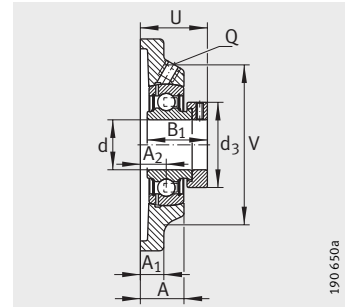
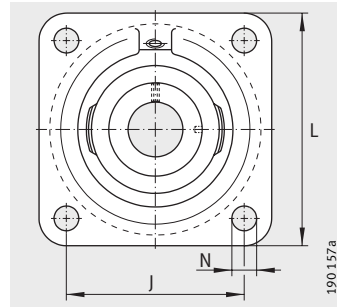
PCFTR

								Basic load ratings	
N	B ₁	J	A ₂	Q	d ₃ max.	A	U	dyn. C _r N	stat. C _{0r} N
11,5	28,6	76,1	10	M6	28	20	32,1	9 800	4 750
11,5	28,6	76,1	10	M6	28	20	32,1	9 800	4 750
11,5	28,6	76,1	10	M6	28	20	32,1	9 800	4 750
11,5	31	89,5	10,5	R _p 1/8	33	20	34	12 800	6 600
11,5	31	96	12,5	R _p 1/8	37,5	22	36	14 000	7 800
11,5	35,8	116	13,3	R _p 1/8	44	24	40	19 500	11 300
14	39	129,7	15,6	R _p 1/8	51	27	45,1	25 500	15 300
14	43,8	140	18,3	R _p 1/8	58	30	51	32 500	19 800
14	43,8	160	19,2	R _p 1/8	63	33	51,9	32 500	20 400
14	43,8	160	19,2	R _p 1/8	69	33	51,9	35 000	23 200



Four-bolt flanged housing units

Cast iron housings



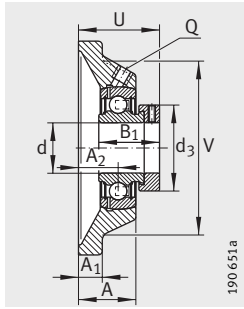
PCF, PCJ (-N-FA125),
RCJ (-N-FA125, -FA164), TCJ,
PCJY, RCJY, RCJY...-JIS

PCF

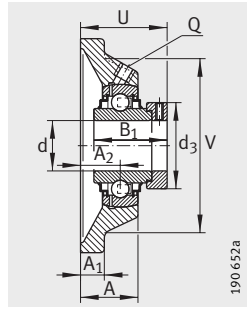
Dimension table · Dimensions in mm							
Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	L	A ₁	N
PCJ12	GG.CJ03	GRAE12-NPP-B	0,52	12	76	9,5	11,5
PCJY12	GG.CJ03	GAY12-NPP-B	0,5	12	76	9,5	11,5
RCJY12	GG.CJ03	GYE12-KRR-B	0,51	12	76	9,5	11,5
PCJ15	GG.CJ03	GRAE15-NPP-B	0,52	15	76	9,5	11,5
PCJY15	GG.CJ03	GAY15-NPP-B	0,49	15	76	9,5	11,5
RCJY15	GG.CJ03	GYE15-KRR-B	0,51	15	76	9,5	11,5
RCJY16	GG.CJ03	GYE16-KRR-B	0,51	16	76	9,5	11,5
PCJ17	GG.CJ03	GRAE17-NPP-B	0,52	17	76	9,5	11,5
RCJ17	GG.CJ03	GE17-KRR-B	0,56	17	76	9,5	11,5
PCJY17	GG.CJ03	GAY17-NPP-B	0,48	17	76	9,5	11,5
RCJY17	GG.CJ03	GYE17-KRR-B	0,51	17	76	9,5	11,5
PCF20	GG.CF04	GRAE20-NPP-B	0,55	20	86	10	11,5
PCJ20-N	GG.CJ04-N	GRAE20-NPP-B	0,61	20	86	10	11,5
PCJ20-N-FA125	GG.CJ04-N-FA125.1	GRAE20-NPP-B-FA125.5	0,61	20	86	10	11,5
RCJ20-N	GG.CJ04-N	GE20-KRR-B	0,65	20	86	10	11,5
RCJ20-N-FA125	GG.CJ04-N-FA125.1	GE20-KRR-B-FA125.5	0,65	20	86	10	11,5
TCJ20-N	GG.CJ04-N	GE20-KTT-B	0,65	20	86	10	11,5
PCJY20-N	GG.CJ04-N	GAY20-NPP-B	0,58	20	86	10	11,5
RCJY20-N	GG.CJ04-N	GYE20-KRR-B	0,62	20	86	10	11,5
RCJY20-JIS	GG.F204	GYE20-KRR-B-FA107	0,6	20	86	12	12
PCF25	GG.CF05	GRAE25-NPP-B	0,71	25	95	11	11,5
PCJ25-N	GG.CJ05-N	GRAE25-NPP-B	0,76	25	95	11	11,5
PCJ25-N-FA125	GG.CJ05-N-FA125.1	GRAE25-NPP-B-FA125.5	0,76	25	95	11	11,5
RCJ25-N	GG.CJ05-N	GE2-KRR-B	0,82	25	95	11	11,5
RCJ25-N-FA125	GG.CJ05-N-FA125.1	GE25-KRR-B-FA125.5	0,82	25	95	11	11,5
RCJ25-FA164 ¹⁾	GG.CJ05-N	GE25-KRR-B-FA164	0,82	25	95	11	11,5
TCJ25-N	GG.CJ05-N	GE25-KTT-B	0,82	25	95	11	11,5
PCJY25-N	GG.CJ05-N	GAY25-NPP-B	0,73	25	95	11	11,5
RCJY25-N	GG.CJ05-N	GYE25-KRR-B	0,77	25	95	11	11,5
RCJY25-JIS	GG.F205	GYE25-KRR-B-FA107	0,76	25	95	14	12

¹⁾ With lubrication nipple DIN 71412-AR 1/8.

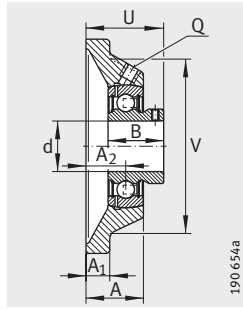
²⁾ To be ordered separately.



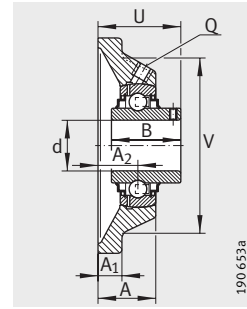
PCJ (-FA125)



RCJ (-FA125, -FA164),
TCJ



PCJY



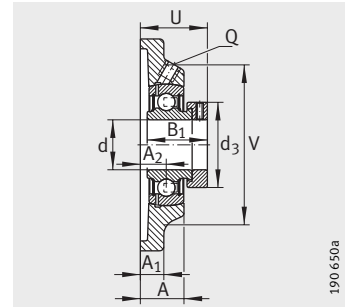
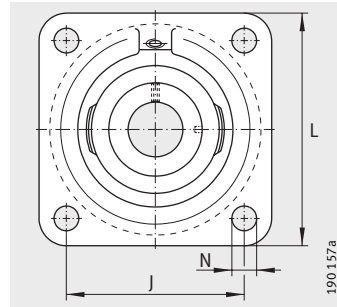
RCJY (-JIS)

B	B ₁	J	A ₂	Q	d ₃ max.	A	U	V	Basic load ratings		End cap ²⁾
									dyn. C _r N	stat. C _{0r} N	
-	28,6	54	17	M6	28	27	39,1	58	9 800	4 750	-
22	-	54	17	M6	-	27	33	58	9 800	4 750	-
27,4	-	54	17	M6	-	27	32,9	58	9 800	4 750	-
-	28,6	54	17	M6	28	27	39,1	58	9 800	4 750	-
22	-	54	17	M6	-	27	33	58	9 800	4 750	-
27,4	-	54	17	M6	-	27	32,9	58	9 800	4 750	-
27,4	-	54	17	M6	-	27	32,9	58	9 800	4 750	-
-	28,6	54	17	M6	28	27	39,1	58	9 800	4 750	-
-	37,4	54	17	M6	28	27	40,4	58	9 800	4 750	-
22	-	54	17	M6	-	27	33	58	9 800	4 750	-
27,4	-	54	17	M6	-	27	32,9	58	9 800	4 750	-
-	31	63,5	10,5	R _p 1/8	33	20	34	68	12 800	6 600	-
-	31	63,5	19	R _p 1/8	33	29	42,5	68	12 800	6 600	KASK04
-	31	63,5	19	R _p 1/8	33	29	42,5	68	12 800	6 600	KASK04
-	43,7	63,5	19	R _p 1/8	33	29	45,6	68	12 800	6 600	KASK04
-	43,7	63,5	19	R _p 1/8	33	29	45,6	68	12 800	6 600	KASK04
-	43,7	63,5	19	R _p 1/8	33	29	45,6	68	12 800	6 600	KASK04
25	-	63,5	19	R _p 1/8	-	29	37	68	12 800	6 600	KASK04
31	-	63,5	19	R _p 1/8	-	29	37,3	68	12 800	6 600	KASK04
31	-	64	15	M6	-	25,5	33,3	-	12 800	6 600	-
-	31	70	12,5	R _p 1/8	37,5	22	36	74	14 000	7 800	-
-	31	70	19	R _p 1/8	37,5	29	42,5	74	14 000	7 800	KASK05
-	31	70	19	R _p 1/8	37,5	29	42,5	74	14 000	7 800	KASK05
-	44,5	70	19	R _p 1/8	37,5	29	45,9	74	14 000	7 800	KASK05
-	44,5	70	19	R _p 1/8	37,5	29	46	74	14 000	7 800	KASK05
-	44,5	70	19	R _p 1/8	37,5	29	46	74	14 000	7 800	-
-	44,5	70	19	R _p 1/8	37,5	29	45,9	74	14 000	7 800	KASK05
27	-	70	19	R _p 1/8	-	29	38,5	74	14 000	7 800	KASK05
34,1	-	70	19	R _p 1/8	-	29	38,8	74	14 000	7 800	KASK05
34,1	-	70	16	M6	-	27	35,8	-	14 000	7 800	-



Four-bolt flanged housing units

Cast iron housings



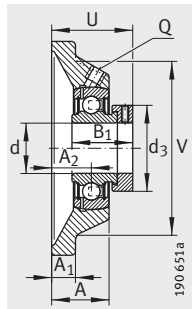
PCF, PCJ (-N-FA125),
RCJ (-N-FA125, -FA164), RCJO,
TCJ, PCJY, RCJY, RCJY (-JIS), RCJL

PCF

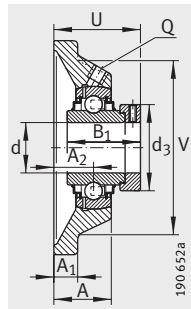
Dimension table (continued) · Dimensions in mm							
Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	L	A ₁	N
PCF30	GG.CF06	GRAE30-NPP-B	1,01	30	108	12	11,5
PCJ30-N	GG.CJ06-N	GRAE30-NPP-B	1,09	30	108	12	11,5
PCJ30-N-FA125	GG.CJ06-N-FA125.1	GRAE30-NPP-B-FA125.5	1,09	30	108	12	11,5
RCJ30-N	GG.CJ06-N	GE30-KRR-B	1,16	30	108	12	11,5
RCJ30-N-FA125	GG.CJ06-N-FA125.1	GE30-KRR-B-FA125.5	1,16	30	108	12	11,5
TCJ30-N	GG.CJ06-N	GE30-KTT-B	1,16	30	108	12	11,5
RCJL30-N	GG.CJ06-N	GLE30-KRR-B	1,08	30	108	12	11,5
RCJO30	GG.CJ006	GNE30-KRR-B	1,75	30	125	15	14,5
PCJY30-N	GG.CJ06-N	GAY30-NPP-B	1,03	30	108	12	11,5
RCJY30-N	GG.CJ06-N	GYE30-KRR-B	1,11	30	108	12	11,5
RCJY30-JIS	GG.F206	GYE30-KRR-B-FA107	1,17	30	108	14	12
PCF35	GG.CF07	GRAE35-NPP-B	1,37	35	118	12,5	14
PCJ35-N	GG.CJ07-N	GRAE35-NPP-B	1,4	35	118	12,5	14
PCJ35-N-FA125	GG.CJ07-N-FA125.1	GRAE35-NPP-B-FA125.5	1,4	35	118	12,5	14
RCJ35-N	GG.CJ07-N	GE35-KRR-B	1,47	35	118	12,5	14
RCJ35-N-FA125	GG.CJ07-N-FA125.1	GE35-KRR-B-FA125.5	1,47	35	118	12,5	14
RCJ35-FA164 ¹⁾	GG.CJ07-N	GE35-KRR-B-FA164	1,47	35	118	12,5	14
TCJ35-N	GG.CJ07-N	GE35-KTT-B	1,47	35	118	12,5	14
RCJL35-N	GG.CJ07-N	GLE35-KRR-B	1,35	35	118	12,5	14
RCJO35	GG.CJ007	GNE35-KRR-B	2,55	35	135	16	19
PCJY35-N	GG.CJ07-N	GAY35-NPP-B	1,31	35	118	12,5	14
RCJY35-N	GG.CJ07-N	GYE35-KRR-B	1,41	35	118	12,5	14
RCJY35-JIS	GG.F207	GYE35-KRR-B-FA107	1,47	35	117	16	14
PCF40	GG.CF08	GRAE40-NPP-B	1,72	40	130	13	14
PCJ40-N	GG.CJ08-N	GRAE40-NPP-B	1,9	40	130	13	14
PCJ40-N-FA125	GG.CJ08-N-FA125.1	GRAE40-NPP-B-FA125.5	1,9	40	130	13	14
RCJ40-N	GG.CJ08-N	GE40-KRR-B	2,02	40	130	13	14
RCJ40-N-FA125	GG.CJ08-N-FA125.1	GE40-KRR-B-FA125.5	2,02	40	130	13	14
RCJ40-FA164 ¹⁾	GG.CJ08-N	GE40-KRR-B-FA164	2,02	40	130	13	14
TCJ40-N	GG.CJ08-N	GE40-KTT-B	2,02	40	130	13	14
RCJL40-N	GG.CJ08-N	GLE40-KRR-B	1,86	40	130	13	14
RCJO40	GG.CJ008	GNE40-KRR-B	3,1	40	150	17	19
PCJY40-N	GG.CJ08-N	GAY40-NPP-B	1,79	40	130	13	14
RCJY40-N	GG.CJ08-N	GYE40-KRR-B	1,93	40	130	13	14
RCJY40-JIS	GG.F208	GYE40-KRR-B-FA107	1,91	40	130	16	16

¹⁾ With lubrication nipple DIN 71412-AR 1/8.

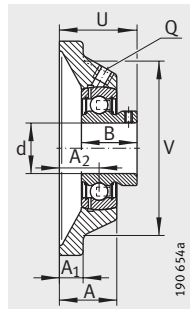
²⁾ To be ordered separately.



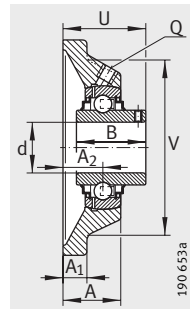
PCJ (-N-FA125)



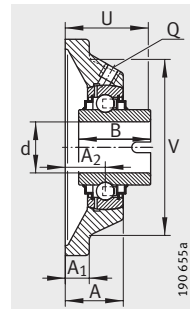
RCJ (-N-FA125, -FA164), RCJO, TCJ



PCJY



RCJY (-JIS)



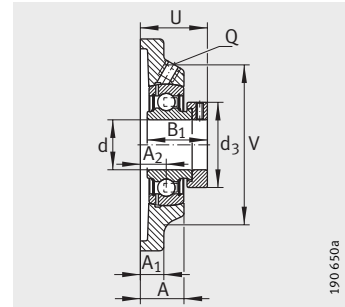
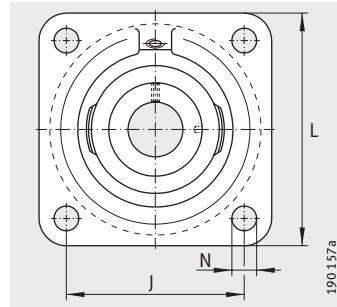
RCJL

B	B ₁	J	A ₂	Q	d ₃ max.	A	U	V	Basic load ratings		End cap ²⁾
									dyn. C _r N	stat. C _{0r} N	
-	35,8	82,5	13,3	R _p 1/8	44	22,3	40	85	19 500	11 300	-
-	35,8	82,5	20	R _p 1/8	44	29	46,7	85	19 500	11 300	KASK06
-	35,8	82,5	20	R _p 1/8	44	29	46,7	85	19 500	11 300	KASK06
-	48,5	82,5	20	R _p 1/8	44	29	50,1	85	19 500	11 300	KASK06
-	48,5	82,5	20	R _p 1/8	44	29	50,1	85	19 500	11 300	KASK06
-	48,5	82,5	20	R _p 1/8	44	29	50,1	85	19 500	11 300	KASK06
36,5	-	82,5	20	R _p 1/8	-	29	42	85	19 500	11 300	KASK06
-	50	95	20,6	R _p 1/8	51	30,6	53,1	98	29 500	16 700	-
30	-	82,5	20	R _p 1/8	-	29	41	85	19 500	11 300	KASK06
38,1	-	82,5	20	R _p 1/8	-	29	42,2	85	19 500	11 300	KASK06
38,1	-	83	18	M6	-	31	40,2	-	19 500	11 300	-
-	39	92	15,5	R _p 1/8	51	25	44,9	100	25 500	15 300	-
-	39	92	21	R _p 1/8	51	30,5	50,4	100	25 500	15 300	KASK07
-	39	92	21	R _p 1/8	51	30,5	50,4	100	25 500	15 300	KASK07
-	51,3	92	21	R _p 1/8	51	30,5	53,3	100	25 500	15 300	KASK07
-	51,3	92	21	R _p 1/8	51	30,5	53,3	100	25 500	15 300	KASK07
-	51,3	92	21	R _p 1/8	51	30,5	53,4	100	25 500	15 300	-
-	51,3	92	21	R _p 1/8	51	30,5	53,3	100	25 500	15 300	KASK07
37,7	-	92	21	R _p 1/8	-	30,5	43	100	25 500	15 300	KASK07
-	51,6	100	20	R _p 1/8	55	31	53,4	104	36 500	20 900	-
35	-	92	21	R _p 1/8	-	30,5	46,5	100	25 500	15 300	KASK07
42,9	-	92	21	R _p 1/8	-	30,5	46,4	100	25 500	15 300	KASK07
42,9	-	92	19	M6	-	34	44,4	-	25 500	15 300	-
-	43,8	101,5	18,3	R _p 1/8	58	28,8	51	110	32 500	19 800	-
-	43,8	101,5	24	R _p 1/8	58	34,5	56,7	110	32 500	19 800	KASK08
-	43,8	101,5	24	R _p 1/8	58	34,5	56,7	110	32 500	19 800	KASK08
-	56,5	101,5	24	R _p 1/8	58	34,5	58,1	110	32 500	19 800	KASK08
-	56,5	101,5	24	R _p 1/8	58	34,5	59,1	110	32 500	19 800	KASK08
-	56,5	101,5	24	R _p 1/8	58	34,5	59,1	110	32 500	19 800	-
-	56,5	101,5	24	R _p 1/8	58	34,5	58,1	110	32 500	19 800	KASK08
42,9	-	101,5	24	R _p 1/8	-	34,5	51	110	32 500	19 800	KASK08
-	54,6	112	23	R _p 1/8	63	34,5	59,6	121	44 500	26 000	-
39,5	-	101,5	24	R _p 1/8	-	34,5	53	110	32 500	19 800	KASK08
49,2	-	101,5	24	R _p 1/8	-	34,5	54,2	110	32 500	19 800	KASK08
49,2	-	102	21	M6	-	36	51,2	-	32 500	19 800	-



Four-bolt flanged housing units

Cast iron housings



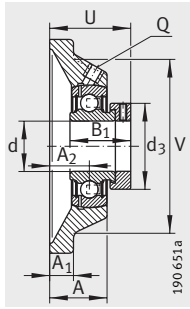
PCF, PCJ (-N-FA125, -FA125),
RCJ (-N-FA125, -FA125, -FA164),
RCJO, TCJ, PCJY, RCJY (-JIS), RCJL

PCF

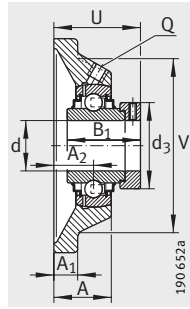
Dimension table (continued) · Dimensions in mm							
Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	L	A ₁	N
PCF45	GG.CF09	GRAE45-NPP-B	1,99	45	137	13	14
PCJ45	GG.CJ09	GRAE45-NPP-B	2,22	45	137	13	14
PCJ45-FA125	GG.CJ09-FA125.1	GRAE45-NPP-B-FA125.5	2,22	45	137	13	14
RCJ45	GG.CJ09	GE45-KRR-B	2,26	45	137	13	14
RCJ45-FA125	GG.CJ09-FA125.1	GE45-KRR-B-FA125.5	2,26	45	137	13	14
TCJ45	GG.CJ09	GE45-KTT-B	2,31	45	137	13	14
PCJY45	GG.CJ09	GAY45-NPP-B	2	45	137	13	14
RCJY45	GG.CJ09	GYE45-KRR-B	2,15	45	137	13	14
RCJY45-JIS	GG.F209	GYE45-KRR-B-FA107	2,28	45	137	18	16
PCF50	GG.CF10	GRAE50-NPP-B	2,2	50	143	13	14
PCJ50-N	GG.CJ10-N	GRAE50-NPP-B	2,3	50	143	13	18
PCJ50-N-FA125	GG.CJ10-N-FA125.1	GRAE50-NPP-B-FA125.5	2,3	50	143	13	18
RCJ50-N	GG.CJ10-N	GE50-KRR-B	2,53	50	143	13	18
RCJ50-N-FA125	GG.CJ10-N-FA125.1	GE50-KRR-B-FA125.5	2,53	50	143	13	18
RCJ50-FA164 ¹⁾	GG.CJ10-N	GE50-KRR-B-FA164	2,53	50	143	13	18
TCJ50-N	GG.CJ10-N	GE50-KTT-B	2,53	50	143	13	18
RCJL50-N	GG.CJ10-N	GLE50-KRR-B	2,29	50	143	13	18
RCJO50	GG.CJO10	GNE50-KRR-B	4,9	50	175	19	23
PCJY50-N	GG.CJ10-N	GAY50-NPP-B	2,15	50	143	13	18
RCJY50-N	GG.CJ10-N	GYE50-KRR-B	2,33	50	143	13	18
RCJY50-JIS	GG.F210	GYE50-KRR-B-FA107	2,54	50	143	18	16
PCJ55	GG.CJ11	GRAE55-NPP-B	2,91	55	162	15	18
RCJ55	GG.CJ11	GE55-KRR-B	3,52	55	162	15	18
TCJ55	GG.CJ11	GE55-KTT-B	3,57	55	162	15	18
RCJY55	GG.CJ11	GYE55-KRR-B	3,2	55	162	15	18
RCJY55-JIS	GG.F211	GYE55-KRR-B-FA107	3,3	55	162	20	19
PCJ60-N	GG.CJ12-N	GRAE60-NPP-B	4,1	60	175	16	18
RCJ60-N	GG.CJ12-N	GE60-KRR-B	4,54	60	175	16	18
RCJ60-FA164 ¹⁾	GG.CJ12-N	GE60-KRR-B-FA164	4,54	60	175	16	18
TCJ60-N	GG.CJ12-N	GE60-KTT-B	4,54	60	175	16	18
RCJL60-N	GG.CJ12-N	GLE60-KRR-B	4,22	60	175	16	18
RCJO60	GG.CJO12	GNE60-KRR-B	6,8	60	195	22	23
PCJY60-N	GG.CJ12-N	GAY60-NPP-B	4,02	60	175	16	18
RCJY60-N	GG.CJ12-N	GYE60-KRR-B	4,22	60	175	16	18
RCJY60-JIS	GG.F212	GYE60-KRR-B-FA107	4,22	60	175	20	19

¹⁾ With lubrication nipple DIN 71412-AR 1/8.

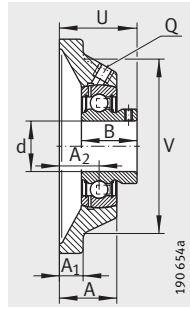
²⁾ To be ordered separately.



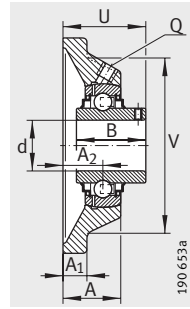
PCJ (-N-FA125,
-FA125)



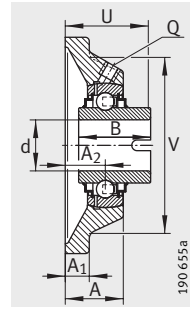
RCJ (-N-FA125,
-FA125, -FA164),
RCJO, TCJ



PCJY



RCJY (-JIS)



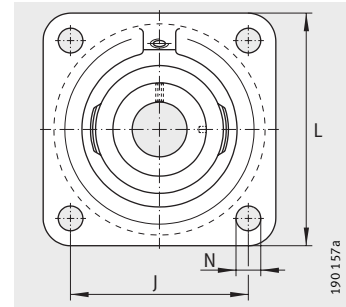
RCJL

									Basic load ratings		End cap ²⁾
B	B ₁	J	A ₂	Q	d ₃ max.	A	U	V	dyn. C _r N	stat. C _{0r} N	
-	43,8	105	19,2	R _p 1/8	63	30,2	51,9	116	32 500	20 400	-
-	43,8	105	24	R _p 1/8	63	35	56,7	116	32 500	20 400	-
-	43,8	105	24	R _p 1/8	63	35	56,7	116	32 500	20 400	-
-	56,5	105	24	R _p 1/8	63	35	58,1	116	32 500	20 400	-
-	56,5	105	24	R _p 1/8	63	35	59,1	116	32 500	20 400	-
-	56,5	105	24	R _p 1/8	63	35	58,1	116	32 500	20 400	-
41,5	-	105	24	R _p 1/8	-	35	54,5	116	32 500	20 400	-
49,2	-	105	24	R _p 1/8	-	35	54,2	116	32 500	20 400	-
49,2	-	105	22	M6	-	38	52,2	-	32 500	20 400	-
-	43,8	111	19,2	R _p 1/8	69	30,2	51,4	125	35 000	23 200	-
-	43,8	111	28	R _p 1/8	69	39	60,7	125	35 000	23 200	KASK10
-	43,8	111	28	R _p 1/8	69	39	60,7	125	35 000	23 200	KASK10
-	62,8	111	28	R _p 1/8	69	39	66,1	125	35 000	23 200	KASK10
-	62,8	111	28	R _p 1/8	69	39	66,1	125	35 000	23 200	KASK10
-	62,8	111	28	R _p 1/8	69	39	66,1	125	35 000	23 200	-
-	62,8	111	28	R _p 1/8	69	39	66,1	125	35 000	23 200	KASK10
49,2	-	111	28	R _p 1/8	-	39	58,2	125	35 000	23 200	KASK10
-	66,8	132	28	R _p 1/8	75,8	42,5	70,1	144	62 000	38 000	-
43	-	111	28	R _p 1/8	-	39	60	125	35 000	23 200	KASK10
51,6	-	111	28	R _p 1/8	-	39	60,6	125	35 000	23 200	KASK10
51,6	-	111	22	M6	-	40	54,6	-	35 000	23 200	-
-	48,4	130	31	R _p 1/8	76	43,5	67,4	140	43 500	29 000	-
-	71,4	130	31	R _p 1/8	76	43,5	74,6	140	43 500	29 000	-
-	71,4	130	31	R _p 1/8	76	43,5	74,6	140	43 500	29 000	-
55,6	-	130	31	R _p 1/8	-	43,5	64,4	140	43 500	29 000	-
55,6	-	130	25	M6	-	43	58,4	-	43 500	29 000	-
-	53,1	143	34	R _p 1/8	84	46	73,6	150	52 000	36 000	KASK12
-	77,9	143	34	R _p 1/8	84	46	80,8	150	52 000	36 000	KASK12
-	77,9	143	34	R _p 1/8	84	46	81	150	52 000	36 000	-
-	77,9	143	34	R _p 1/8	84	46	80,8	150	52 000	36 000	KASK12
61,9	-	143	34	R _p 1/8	-	46	71,3	150	52 000	36 000	KASK12
-	68,4	150	33	R _p 1/8	89	49,5	78,4	170	82 000	52 000	-
47	-	143	34	R _p 1/8	-	46	68	150	52 000	36 000	KASK12
65,1	-	143	34	R _p 1/8	-	46	73,7	150	52 000	36 000	KASK12
65,1	-	143	29	M6	-	48	68,7	-	52 000	36 000	-



Four-bolt flanged housing units

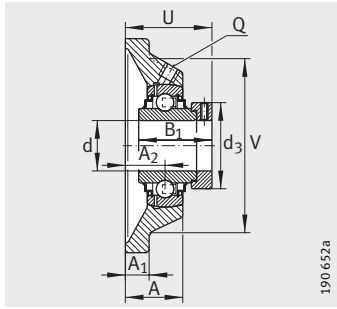
Cast iron housings



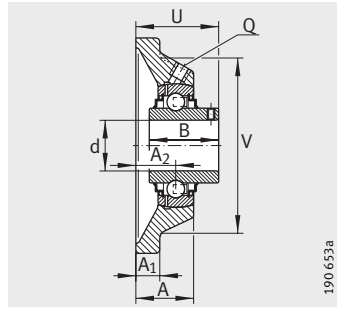
RCJ (-FA164), RCJO, TCJ,
RCJL, RCJY

Dimension table (continued) · Dimensions in mm							
Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	L	A ₁	N
RCJ65	GG.CJ14	GE65-214-KRR-B	6,11	65	188	18	18
RCJ65-FA164 ¹⁾	GG.CJ14	GE65-214-KRR-B-FA164	6,11	65	188	18	18
TCJ65	GG.CJ14	GE65-214-KTT-B	6,11	65	188	18	18
RCJY65	GG.CJ14	GYE65-214-KRR-B	5,65	65	188	18	18
RCJ70	GG.CJ14	GE70-KRR-B	5,85	70	188	18	18
TCJ70	GG.CJ14	GE70-KTT-B	5,85	70	188	18	18
RCJL70	GG.CJ14	GLE70-KRR-B	5,65	70	188	18	18
RCJO70	GG.CJO14	GNE70-KRR-B	10	70	226	25	25
RCJY70	GG.CJ14	GYE70-KRR-B	5,35	70	188	18	18
RCJ75	GG.CJ15	GE75-KRR-B	6,5	75	197	20	23
TCJ75	GG.CJ15	GE75-KTT-B	6,5	75	197	20	23
RCJY75	GG.CJ15	GYE75-KRR-B	6,04	75	197	20	23
RCJ80	GG.CJ16	GE80-KRR-B	6,85	80	197	20	23
TCJ80	GG.CJ16	GE80-KTT-B	6,85	80	197	20	23
RCJO80	GG.CJO16	GNE80-KRR-B	17,15	80	250	25	28
RCJY80	GG.CJ16	GYE80-KRR-B	6,82	80	197	20	23
RCJ90	GG.CJ18	GE90-KRR-B	9	90	235	22	23
RCJO90	GG.CJO18	GNE90-KRR-B	21,6	90	280	28,5	28
RCJY90	GG.CJ18	GYE90-KRR-B	9,48	90	235	22	23
RCJ100	GG.CJ20	GE100-KRR-B	12,25	100	265	25	27
RCJO100	GG.CJO20	GNE100-KRR-B	33,6	100	310	32	32
RCJ120	GG.CJ24	GE120-KRR-B	18	120	305	28	30

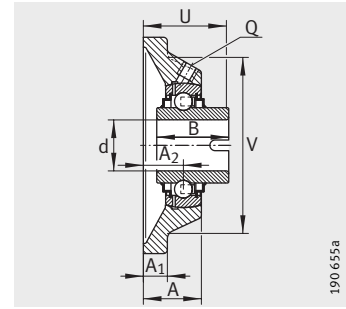
¹⁾ With lubrication nipple DIN 71412-AR 1/8.



RCJ (-FA164), RCJO, TCJ



RCJY



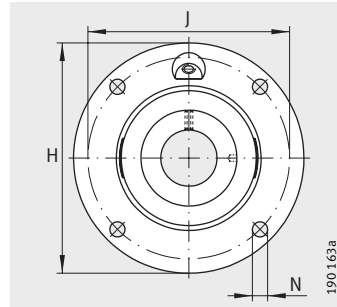
RCJL

									Basic load ratings	
B	B ₁	J	A ₂	Q	d ₃ max.	A	U	V	dyn. C _r N	stat. C _{0r} N
-	66	150	38	R _p 1/8	96	52	82,6	165	62 000	44 000
-	66	150	38	R _p 1/8	96	52	82,6	165	62 000	44 000
-	66	150	38	R _p 1/8	96	52	82,6	165	62 000	44 000
74,6	-	150	38	R _p 1/8	-	52	82,4	165	62 000	44 000
-	66	150	38	R _p 1/8	96	52	82,6	165	62 000	44 000
-	66	150	38	R _p 1/8	96	52	82,6	165	62 000	44 000
68,2	-	150	38	R _p 1/8	-	52	79,2	165	62 000	44 000
-	75,4	178	36	R _p 1/8	102	54,5	85,4	196	104 000	68 000
74,6	-	150	38	R _p 1/8	-	52	82,4	165	62 000	44 000
-	67	153	41,3	R _p 1/8	100	55,8	86,9	170	62 000	44 500
-	67	153	41,3	R _p 1/8	100	55,8	86,9	170	62 000	44 500
77,8	-	153	41,3	R _p 1/8	-	55,8	85,8	170	62 000	44 500
-	70,7	153	41,3	R _p 1/8	108	55,8	88,9	180	72 000	54 000
-	70,7	153	41,3	R _p 1/8	108	55,8	88,9	180	72 000	54 000
-	93,6	196	50	R _p 1/8	118	80	109,7	210	123 000	87 000
82,6	-	153	41,3	R _p 1/8	-	55,8	90,6	180	72 000	54 000
-	69,5	187	23,8	R _p 1/8	118	39,8	70,3	200	96 000	72 000
-	101	216	48,5	R _p 1/8	132	85	114	230	143 000	107 000
96	-	187	23,8	R _p 1/8	-	39,8	80,1	200	96 000	72 000
-	75	210	28	R _p 1/8	132	46	77,5	230	122 000	93 000
-	109,5	242	55	R _p 1/8	145	97	125	268	174 000	140 000
-	81	240	31	R _p 1/8	152	51	83	270	155 000	131 000

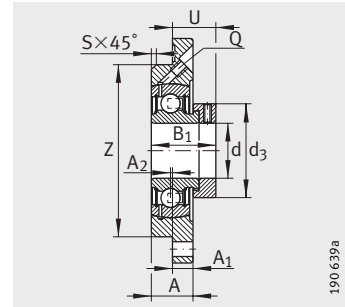


Four-bolt flanged housing units with centring spigot

Cast iron housings



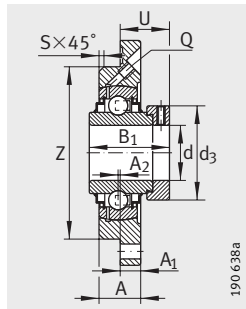
PME, RME, RME0, TME, PMEY, RMEY



PME

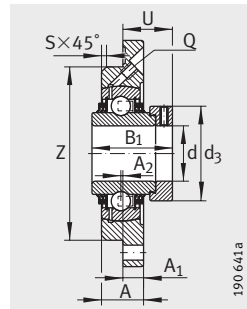
Dimension table · Dimensions in mm							
Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	H	A ₁	N
PME20-N	GG.ME04-N	GRAE20-NPP-B	0,53	20	100	8	9
RME20-N	GG.ME04-N	GE20-KRR-B	0,57	20	100	8	9
TME20-N	GG.ME04-N	GE20-KTT-B	0,57	20	100	8	9
PMEY20-N	GG.ME04-N	GAY20-NPP-B	0,5	20	100	8	9
RMEY20-N	GG.ME04-N	GYE20-KRR-B	0,54	20	100	8	9
PME25-N	GG.ME05-N	GRAE25-NPP-B	0,74	25	115	9	9
RME25-N	GG.ME05-N	GE25-KRR-B	0,8	25	115	9	9
TME25-N	GG.ME05-N	GE25-KTT-B	0,8	25	115	9	9
PMEY25-N	GG.ME05-N	GAY25-NPP-B	0,71	25	115	9	9
RMEY25-N	GG.ME05-N	GYE25-KRR-B	0,75	25	115	9	9
PME30-N	GG.ME06-N	GRAE30-NPP-B	0,97	30	125	9,5	11,5
RME30-N	GG.ME06-N	GE30-KRR-B	1,04	30	125	9,5	11,5
TME30-N	GG.ME06-N	GE30-KTT-B	1,05	30	125	9,5	11,5
PMEY30-N	GG.ME06-N	GAY30-NPP-B	0,91	30	125	9,5	11,5
RMEY30-N	GG.ME06-N	GYE30-KRR-B	0,99	30	125	9,5	11,5
PME35-N	GG.ME07-N	GRAE35-NPP-B	1,27	35	135	10	11,5
RME35-N	GG.ME07-N	GE35-KRR-B	1,34	35	135	10	11,5
TME35-N	GG.ME07-N	GE35-KTT-B	1,35	35	135	10	11,5
RME035	GG.ME007	GNE35-KRR-B	2,4	35	174	16	19
PMEY35-N	GG.ME07-N	GAY35-NPP-B	1,18	35	135	10	11,5
RMEY35-N	GG.ME07-N	GYE35-KRR-B	1,28	35	135	10	11,5
PME40-N	GG.ME08-N	GRAE40-NPP-B	1,62	40	145	11,5	11,5
RME40-N	GG.ME08-N	GE40-KRR-B	1,74	40	145	11,5	11,5
TME40-N	GG.ME08-N	GE40-KTT-B	1,77	40	145	11,5	11,5
RME040	GG.ME008	GNE40-KRR-B	3,4	40	194	17	19
PMEY40-N	GG.ME08-N	GAY40-NPP-B	1,51	40	145	11,5	11,5
RMEY40-N	GG.ME08-N	GYE40-KRR-B	1,65	40	145	11,5	11,5
PME45	GG.ME09	GRAE45-NPP-B	1,93	45	155	12	14
RME45	GG.ME09	GE45-KRR-B	2,05	45	155	12	14
TME45	GG.ME09	GE45-KTT-B	2,1	45	155	12	14
PMEY45	GG.ME09	GAY45-NPP-B	1,79	45	155	12	14
RMEY45	GG.ME09	GYE45-KRR-B	1,94	45	155	12	14

¹⁾ To be ordered separately.



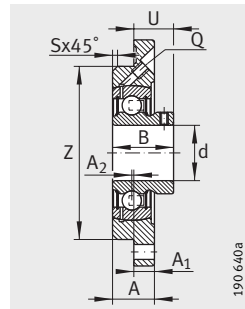
RME, RMEO

190 638a



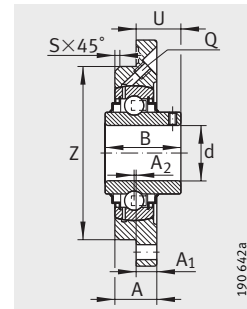
TME

190 641a



PMEY

190 640a



RMEY

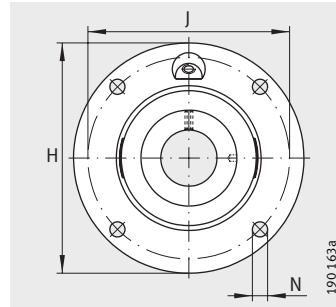
190 642a

										Basic load ratings		End cap ¹⁾
B	B ₁	J	A ₂	Q	d ₃ max.	S	A	U	Z h8	dyn. C _r N	stat. C _{0r} N	
-	31	78	2	M6	33	2	17	21,5	62	12 800	6 600	KASK04
-	43,7	78	2	M6	33	2	17	24,6	62	12 800	6 600	KASK04
-	43,7	78	2	M6	33	2	17	24,6	62	12 800	6 600	KASK04
25	-	78	2	M6	-	2	17	16	62	12 800	6 600	KASK04
31	-	78	2	M6	-	2	17	16,3	62	12 800	6 600	KASK04
-	31	90	2,5	M6	37,5	2	19	21	70	14 000	7 800	KASK05
-	44,5	90	2,5	M6	37,5	2	19	24,4	70	14 000	7 800	KASK05
-	44,5	90	2,5	M6	37,5	2	19	24,4	70	14 000	7 800	KASK05
27	-	90	2,5	M6	-	2	19	17	70	14 000	7 800	KASK05
34,1	-	90	2,5	M6	-	2	19	17,3	70	14 000	7 800	KASK05
-	35,8	100	2	M6	44	2	20,5	24,7	80	19 500	11 300	KASK06
-	48,5	100	2	M6	44	2	20,5	28,1	80	19 500	11 300	KASK06
-	48,5	100	2	M6	44	2	20,5	28,1	80	19 500	11 300	KASK06
30	-	100	2	M6	-	2	20,5	19	80	19 500	11 300	KASK06
38,1	-	100	2	M6	-	2	20,5	20,2	80	19 500	11 300	KASK06
-	39	110	1	M6	51	2	20,5	28,4	90	25 500	15 300	KASK07
-	51,3	110	1	M6	51	2	20,5	31,3	90	25 500	15 300	KASK07
-	51,3	110	1	M6	51	2	20,5	31,3	90	25 500	15 300	KASK07
-	51,6	141	-2	M6	55	2	25	25,4	100	36 500	20 900	-
35	-	110	1	M6	-	2	20,5	24,5	90	25 500	15 300	KASK07
42,9	-	110	1	M6	-	2	20,5	24,4	90	25 500	15 300	KASK07
-	43,8	120	1	M6	58	2	23	31,7	100	32 500	19 800	KASK08
-	56,5	120	1	M6	58	2	23	33,9	100	32 500	19 800	KASK08
-	56,5	120	1	M6	58	2	23	33,9	100	32 500	19 800	KASK08
-	54,6	158	-2,5	M6	63	2	27	39,1	115	44 500	26 000	-
39,5	-	120	1	M6	-	2	23	28	100	32 500	19 800	KASK08
49,2	-	120	1	M6	-	2	23	29,2	100	32 500	19 800	KASK08
-	43,8	130	2	M6	63	2	25	30,7	105	32 500	20 400	-
-	56,5	130	2	M6	63	2	25	32,9	105	32 500	20 400	-
-	56,5	130	2	M6	63	2	25	32,9	105	32 500	20 400	-
41,5	-	130	2	M6	-	2	25	28,5	105	32 500	20 400	-
49,2	-	130	2	M6	-	2	25	28,2	105	32 500	20 400	-

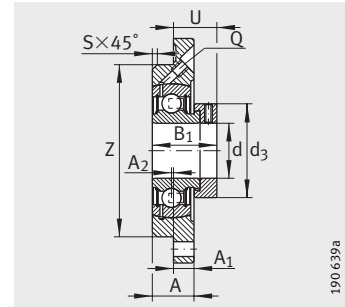


Four-bolt flanged housing units with centring spigot

Cast iron housings



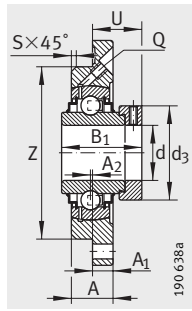
PME, RME, RME0, TME, PMEY, RMEY



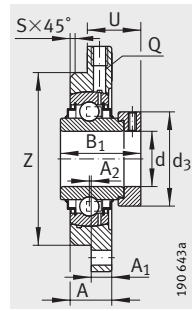
PME

Dimension table (continued) · Dimensions in mm							
Designation			Mass m ≈ kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	H	A ₁	N
PME50-N	GG.ME10-N	GRAE50-NPP-B	2,3	50	165	13	14
RME50-N	GG.ME10-N	GE50-KRR-B	2,53	50	165	13	14
TME50-N	GG.ME10-N	GE50-KTT-B	2,59	50	165	13	14
RME050	GG.MEO10	GNE50-KRR-B	4,6	50	230	19	23
PMEY50-N	GG.ME10-N	GAY50-NPP-B	2,15	50	165	13	14
RMEY50-N	GG.ME10-N	GYE50-KRR-B	2,33	50	165	13	14
PME55	GG.ME11	GRAE55-NPP-B	2,76	55	185	15	18
RME55	GG.ME11	GE55-KRR-B	3,37	55	185	15	18
TME55	GG.ME11	GE55-KTT-B	3,43	55	185	15	18
RMEY55	GG.ME11	GYE55-KRR-B	3,05	55	185	15	18
PME60-N	GG.ME12-N	GRAE60-NPP-B	3,55	60	195	16	18
RME60-N	GG.ME12-N	GE60-KRR-B	3,99	60	195	16	18
TME60-N	GG.ME12-N	GE60-KTT-B	4,1	60	195	16	18
RME060	GG.MEO12	GNE60-KRR-B	6	60	256	22	23
PMEY60-N	GG.ME12-N	GAY60-NPP-B	3,22	60	195	16	18
RMEY60-N	GG.ME12-N	GYE60-KRR-B	3,47	60	195	16	18
RME65	GG.ME14	GE65-214-KRR-B	5,81	65	215	18	18
TME65	GG.ME14	GE65-214-KTT-B	5,81	65	215	18	18
RMEY65	GG.ME14	GYE65-214-KRR-B	5,35	65	215	18	18
RME70	GG.ME14	GE70-KRR-B	5,55	70	215	18	18
TME70	GG.ME14	GE70-KTT-B	5,66	70	215	18	18
RME070	GG.MEO14	GNE70-KRR-B	9	70	300	25	25
RMEY70	GG.ME14	GYE70-KRR-B	5,1	70	215	18	18
RME75	GG.ME15	GE75-2RSR-B	5,65	75	220	18	18
TME75	GG.ME15	GE75-KTT-B	5,76	75	220	18	18
RMEY75	GG.ME15	GYE75-KRR-B	5,19	75	220	18	18
RME80	GG.ME16	GE80-KRR-B	5,75	80	220	18	18
TME80	GG.ME16	GE80-KTT-B	5,86	80	220	18	18
RME080	GG.MEO16	GNE80-KRR-B-FA107	12,7	80	275	22	22
RMEY80	GG.ME16	GYE80-KRR-B	5,73	80	220	18	18
RME90	GG.ME18	GE90-KRR-B	8,82	90	265	20	23
RME090	GG.MEO18	GNE90-KRR-B-FA107	12,7	90	300	22	22
RMEY90	GG.ME18	GYE90-KRR-B	9,3	90	265	20	23
RME100	GG.ME20	GE100-KRR-B	11,45	100	295	22	23
RME0100	GG.MEO20	GNE100-KRR-B-FA107	22,3	100	340	27	26
RME120	GG.ME24	GE120-KRR-B	17,43	120	350	24	27

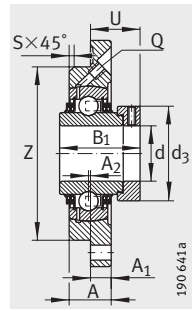
¹⁾ To be ordered separately.



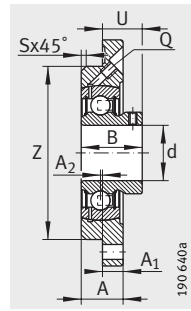
RME, RMEO
(up to d = 70 mm)



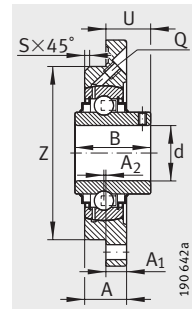
RMEO
(from d = 80 mm)



TME



PMEY



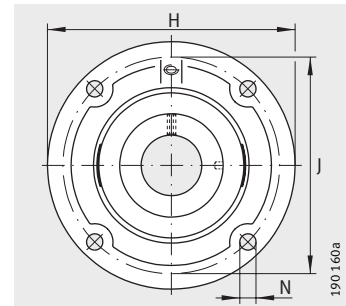
RMEY

										Basic load ratings		End cap ¹⁾
B	B ₁	J	A ₂	Q	d ₃ max.	S	A	U	Z h8	dyn. C _r N	stat. C _{0r} N	
-	43,8	135	1	M8×1	69	3	25	31,7	110	35 000	23 200	KASK10
-	62,8	135	1	M8×1	69	3	25	37,1	110	35 000	23 200	KASK10
-	62,8	135	1	M8×1	69	3	25	37,1	110	35 000	23 200	KASK10
-	66,8	187	-2,5	R _p 1/8	75,8	2	31	44,6	140	62 000	38 000	-
43	-	135	1	M8×1	-	3	25	31	110	35 000	23 200	KASK10
51,6	-	135	1	M8×1	-	3	25	31,6	110	35 000	23 200	KASK10
-	48,4	150	-	M6	76	3	27,5	36,4	125	43 500	29 000	-
-	71,4	150	-	M6	76	3	27,5	43,6	125	43 500	29 000	-
-	71,4	150	-	M6	76	3	27,5	43,6	125	43 500	29 000	-
55,6	-	150	-	M6	-	3	27,5	33,4	125	43 500	29 000	-
-	53,1	160	1	R _p 1/8	84	3	29	38,6	135	52 000	36 000	KASK12
-	77,9	160	1	R _p 1/8	84	3	29	45,8	135	52 000	36 000	KASK12
-	77,9	160	1	R _p 1/8	84	3	29	45,8	135	52 000	36 000	KASK12
-	68,4	212	-2,5	R _p 1/8	89	3	36	47,9	160	82 000	52 000	-
47	-	160	1	R _p 1/8	-	3	29	33	135	52 000	36 000	KASK12
65,1	-	160	1	R _p 1/8	-	3	29	38,7	135	52 000	36 000	KASK12
-	66	177	-	R _p 1/8	96	6	32	44,6	150	62 000	44 000	-
-	66	177	-	R _p 1/8	96	6	32	44,6	150	62 000	44 000	-
74,6	-	177	-	R _p 1/8	-	6	32	44,4	150	62 000	44 000	-
-	66	177	-	R _p 1/8	96	6	32	44,6	150	62 000	44 000	-
-	66	177	-	R _p 1/8	96	6	32	44,6	150	62 000	44 000	-
-	75,5	252	-0,5	R _p 1/8	102	4	43	49,9	185	104 000	68 000	-
74,6	-	177	-	R _p 1/8	-	6	32	44,4	150	62 000	44 000	-
-	67	184	-	R _p 1/8	100	6	32	45,6	160	62 000	44 500	-
-	67	184	-	R _p 1/8	100	6	32	45,6	160	62 000	44 500	-
77,8	-	184	-	R _p 1/8	-	6	32	44,5	160	62 000	44 500	-
-	70,7	184	-2	R _p 1/8	108	6	31	49,6	160	72 000	54 000	-
-	70,7	184	-2	R _p 1/8	108	6	31	49,6	160	72 000	54 000	-
-	93,6	235	3	R _p 1/8	118	6	50	56,7	200	123 000	87 000	-
82,6	-	184	-2	R _p 1/8	-	6	31	51,3	160	72 000	54 000	-
-	69,5	220	-4	R _p 1/8	118	3	32	50,5	190	96 000	72 000	-
-	101	260	3	R _p 1/8	132	6	50	62,5	220	143 000	107 000	-
96	-	220	-4	R _p 1/8	-	3	32	60,3	190	96 000	72 000	-
-	75	245	-4	R _p 1/8	132	3	36	53,4	210	122 000	93 000	-
-	109,4	295	1,5	R _p 1/8	145	8	57	68,5	250	174 000	140 000	-
-	81	295	-4	R _p 1/8	152	3	40	56,5	250	155 000	131 000	-



Four-bolt flanged housing units with centring spigot

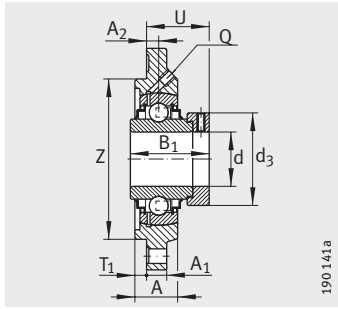
Cast iron housings



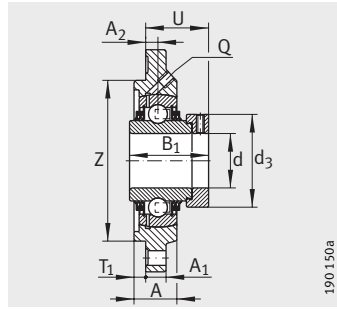
RFE, TFE

Dimension table · Dimensions in mm									
Designation			Mass m ≈ kg	Dimensions					
Unit	Housing	Radial insert ball bearing		d	H	A ₁	N	B ₁	
RFE25	GG.FE05	GE25-KRR-B	0,8	25	115	9	9	44,5	
TFE25	GG.FE05	GE25-KTT-B	0,8	25	115	9	9	44,5	
RFE30	GG.FE06	GE30-KRR-B	1,08	30	127	9,5	9	48,5	
TFE30	GG.FE06	GE30-KTT-B	1,08	30	127	9,5	9	48,5	
RFE35	GG.FE07	GE35-KRR-B	1,3	35	135	10	11,5	51,3	
TFE35	GG.FE07	GE35-KTT-B	1,3	35	135	10	11,5	51,3	
RFE40	GG.FE08	GE40-KRR-B	1,72	40	145	11,5	11,5	56,5	
TFE40	GG.FE08	GE40-KTT-B	1,72	40	145	11,5	11,5	56,5	
RFE45	GG.FE09	GE45-KRR-B	2,06	45	155	12	14	56,5	
RFE50-N¹⁾	GG.FE10-N	GE50-KRR-B	2,48	50	165	13	14	62,8	
TFE50-N¹⁾	GG.FE10-N	GE50-KTT-B	2,48	50	165	13	14	62,8	
RFE60	GG.FE12	GE60-KRR-B	3,99	60	195	16	14	77,9	
TFE60	GG.FE12	GE60-KTT-B	3,99	60	195	16	14	77,9	

¹⁾ Closing plug KASK10 to be ordered separately.



RFE



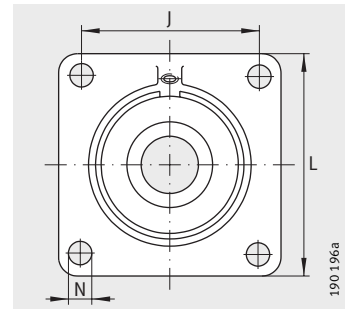
TFE

								Basic load ratings	
J	A ₂	Q	d ₃ max.	A	T ₁	U	Z h8	dyn. C _r N	stat. C _{0r} N
92	9,5	R _p 1/8	37,5	22	3	36,4	75	14 000	7 800
92	9,5	R _p 1/8	37,5	22	3	36,4	75	14 000	7 800
105	10,5	R _p 1/8	44	22,5	3	40,6	85	19 500	11 300
105	10,5	R _p 1/8	44	22,5	3	40,6	85	19 500	11 300
110	9	R _p 1/8	51	22,5	4	41,3	90	25 500	15 300
110	9	R _p 1/8	51	22,5	4	41,3	90	25 500	15 300
120	11,5	R _p 1/8	58	26	4	46,4	100	32 500	19 800
120	11,5	R _p 1/8	58	26	4	46,4	100	32 500	19 800
130	11,5	R _p 1/8	63	26,5	4	46,4	105	32 500	20 400
136	12,5	R _p 1/8	69	27,5	4	50,6	115	35 000	23 200
136	12,5	R _p 1/8	69	27,5	4	50,6	115	35 000	23 200
165	17	R _p 1/8	84	33	4	63,8	140	52 000	36 000
165	17	R _p 1/8	84	33	4	63,8	140	52 000	36 000



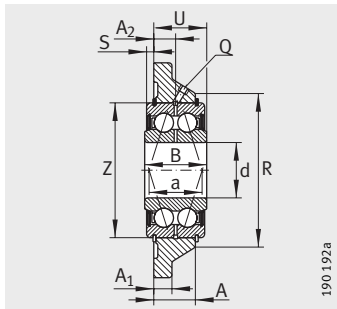
Four-bolt flanged housing units

Cast iron housings with
double row angular contact ball bearing



PCCJ

Dimension table · Dimensions in mm								
Designation			Mass m ≈kg	Dimensions				
Unit	Housing	Double row angular contact ball bearing		L	A ₁	N	B	J
PCCJ25	GG.CCJ05	G5205-2RS-N	0,79	95	12	11,5	30	70
PCCJ30	GG.CCJ06	G5206-2RS-N	1,12	108	12	11,5	34	82,5
PCCJ35	GG.CCJ07	G5207-2RS-N	1,48	118	14	14	36	92
PCCJ40	GG.CCJ08	G5208-2RS-N	1,8	130	14	14	38	101,5



PCCJ

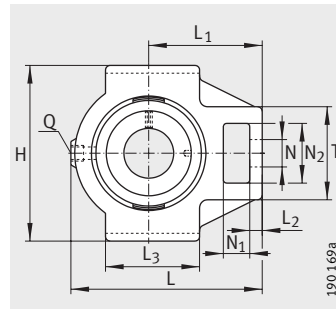
190 192a

								Basic load ratings	
A ₂	Q	R max.	S	A	U	Z h8	a	dyn. C _r N	stat. C _{0r} N
11,7	M6	64	2,4	22,1	26,7	52	24	21 600	14 900
13	M6	76	3,2	24	29,7	62	28,9	30 000	21 400
14	M6	88	3	26	31,7	72	33,8	39 500	29 000
15	M6	98	3,2	28	33,7	80	38,8	50 000	38 000

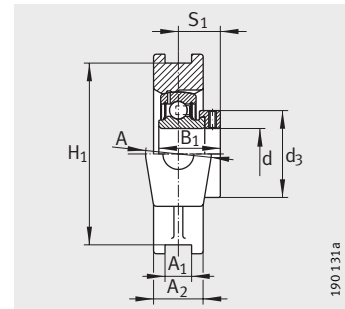


Take-up housing units

Cast iron housings

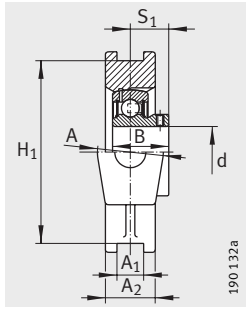


PTUE, RTUE, TTUE, PTUEY, RTUEY

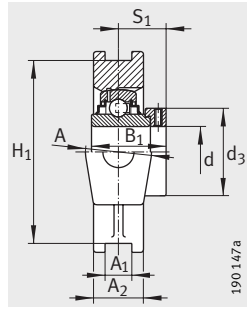


PTUE

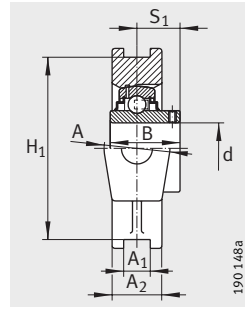
Dimension table · Dimensions in mm										
Designation			Mass m ≈kg	Dimensions						
Unit	Housing	Radial insert ball bearing		d	A	A ₁ H13	A ₂	L	L ₁	L ₂
PTUE20	GG.TUE04	GRAE20-NPP-B	0,83	20	37	12	25	94,5	60	9
RTUE20	GG.TUE04	GE20-KRR-B	0,87	20	37	12	25	94,5	60	9
TTUE20	GG.TUE04	GE20-KTT-B	0,87	20	37	12	25	94,5	60	9
PTUEY20	GG.TUE04	GAY20-NPP-B	0,8	20	37	12	25	94,5	60	9
RTUEY20	GG.TUE04	GYE20-KRR-B	0,84	20	37	12	25	94,5	60	9
PTUE25	GG.TUE05	GRAE25-NPP-B	0,85	25	37	12	25	98,5	62	10
RTUE25	GG.TUE05	GE25-KRR-B	0,91	25	37	12	25	98,5	62	10
TTUE25	GG.TUE05	GE25-KTT-B	0,91	25	37	12	25	98,5	62	10
PTUEY25	GG.TUE05	GAY25-NPP-B	0,82	25	37	12	25	98,5	62	10
RTUEY25	GG.TUE05	GYE25-KRR-B	0,86	25	37	12	25	98,5	62	10
PTUE30	GG.TUE06	GRAE30-NPP-B	1,17	30	37	12	25	114,5	70	10
RTUE30	GG.TUE06	GE30-KRR-B	1,24	30	37	12	25	114,5	70	10
TTUE30	GG.TUE06	GE30-KTT-B	1,25	30	37	12	25	114,5	70	10
PTUEY30	GG.TUE06	GAY30-NPP-B	1,11	30	37	12	25	114,5	70	10
RTUEY30	GG.TUE06	GYE30-KRR-B	1,19	30	37	12	25	114,5	70	10
PTUE35	GG.TUE07	GRAE35-NPP-B	1,73	35	40	12	30	131,5	80	13
RTUE35	GG.TUE07	GE35-KRR-B	1,8	35	40	12	30	131,5	80	13
TTUE35	GG.TUE07	GE35-KTT-B	1,81	35	40	12	30	131,5	80	13
PTUEY35	GG.TUE07	GAY35-NPP-B	1,64	35	40	12	30	131,5	80	13
RTUEY35	GG.TUE07	GYE35-KRR-B	1,74	35	40	12	30	131,5	80	13
PTUE40	GG.TUE08	GRAE40-NPP-B	2,4	40	50	16	35	141	88	16
RTUE40	GG.TUE08	GE40-KRR-B	2,52	40	50	16	35	141	88	16
TTUE40	GG.TUE08	GE40-KTT-B	2,55	40	50	16	35	141	88	16
RTUEY40	GG.TUE08	GYE40-KRR-B	2,43	40	50	16	35	141	88	16
PTUE45	GG.TUE09	GRAE45-NPP-B	2,49	45	50	16	35	141	88	16
RTUE45	GG.TUE09	GE45-KRR-B	2,61	45	50	16	35	141	88	16
TTUE45	GG.TUE09	GE45-KTT-B	2,66	45	50	16	35	141	88	16
PTUE50	GG.TUE10	GRAE50-NPP-B	2,42	50	50	16	35	148	90	16
RTUE50	GG.TUE10	GE50-KRR-B	2,65	50	50	16	35	148	90	16
TTUE50	GG.TUE10	GE50-KTT-B	2,71	50	50	16	35	148	90	16
PTUEY50	GG.TUE10	GAY50-NPP-B	2,27	50	50	16	35	148	90	16
RTUEY50	GG.TUE10	GYE50-KRR-B	2,45	50	50	16	35	148	90	16
PTUE55	GG.TUE11	GRAE55-NPP-B	3,99	55	60	22	42	169	104	17
RTUE55	GG.TUE11	GE55-KRR-B	4,6	55	60	22	42	169	104	17
TTUE55	GG.TUE11	GE55-KTT-B	4,72	55	60	22	42	169	104	17



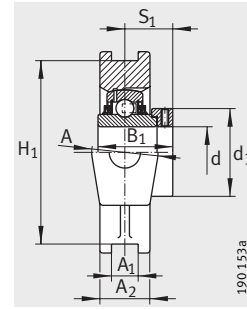
PTUEY



RTUE



RTUEY



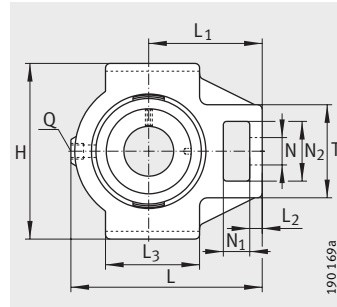
TTUE

													Basic load ratings	
N	N ₁	N ₂	B	B ₁	H	H ₁	S ₁	Q	T	L ₃	d ₃	dyn. C _r	stat. C _{0r}	
						±0,15					max.	N	N	
19	18	32	-	31	90	76	23,5	R _p 1/8	51	50	33	12 800	6 600	
19	18	32	-	43,7	90	76	26,6	R _p 1/8	51	50	33	12 800	6 600	
19	18	32	-	43,7	90	76	26,6	R _p 1/8	51	50	33	12 800	6 600	
19	18	32	25	-	90	76	18	R _p 1/8	51	50	-	12 800	6 600	
19	18	32	31	-	90	76	18,3	R _p 1/8	51	50	-	12 800	6 600	
19	18	32	-	31	90	76	23,5	R _p 1/8	51	50	37,5	14 000	7 800	
19	18	32	-	44,5	90	76	26,9	R _p 1/8	51	50	37,5	14 000	7 800	
19	18	32	-	44,5	90	76	26,9	R _p 1/8	51	50	37,5	14 000	7 800	
19	18	32	27	-	90	76	19,5	R _p 1/8	51	50	-	14 000	7 800	
19	18	32	34,1	-	90	76	19,8	R _p 1/8	51	50	-	14 000	7 800	
22	18	36,5	-	35,8	102	89	26,7	R _p 1/8	56	57	44	19 500	11 300	
22	18	36,5	-	48,5	102	89	30,1	R _p 1/8	56	57	44	19 500	11 300	
22	18	36,5	-	48,5	102	89	30,1	R _p 1/8	56	57	44	19 500	11 300	
22	18	36,5	30	-	102	89	21	R _p 1/8	56	57	-	19 500	11 300	
22	18	36,5	38,1	-	102	89	22,2	R _p 1/8	56	57	-	19 500	11 300	
22	18	36,5	-	39	102	89	29,4	R _p 1/8	64	63	51	25 500	15 300	
22	18	36,5	-	51,3	102	89	32,3	R _p 1/8	64	63	51	25 500	15 300	
22	18	36,5	-	51,3	102	89	32,3	R _p 1/8	64	63	51	25 500	15 300	
22	18	36,5	35	-	102	89	25,5	R _p 1/8	64	63	-	25 500	15 300	
22	18	36,5	42,9	-	102	89	25,4	R _p 1/8	64	63	-	25 500	15 300	
29	20	49	-	43,8	115	102	32,7	R _p 1/8	82	82	58	32 500	19 800	
29	20	49	-	56,5	115	102	34,9	R _p 1/8	82	82	58	32 500	19 800	
29	20	49	-	56,5	115	102	34,9	R _p 1/8	82	82	58	32 500	19 800	
29	20	49	49,2	-	115	102	30,2	R _p 1/8	82	82	-	32 500	19 800	
29	20	49	-	43,8	115	102	32,7	R _p 1/8	82	82	63	32 500	20 400	
29	20	49	-	56,5	115	102	34,9	R _p 1/8	82	82	63	32 500	20 400	
29	20	49	-	56,5	115	102	34,9	R _p 1/8	82	82	63	32 500	20 400	
29	20	49	-	43,8	115	102	32,7	R _p 1/8	83	85	69	35 000	23 200	
29	20	49	-	62,8	115	102	38,1	R _p 1/8	83	85	69	35 000	23 200	
29	20	49	-	62,8	115	102	38,1	R _p 1/8	83	85	69	35 000	23 200	
29	20	49	43	-	115	102	32	R _p 1/8	83	85	-	35 000	23 200	
29	20	49	51,6	-	115	102	32,6	R _p 1/8	83	85	-	35 000	23 200	
35	26	63,5	-	48,4	145	130	36,4	R _p 1/8	102	95	76	43 500	29 000	
35	26	63,5	-	71,4	145	130	43,6	R _p 1/8	102	95	76	43 500	29 000	
35	26	63,5	-	71,4	145	130	43,6	R _p 1/8	102	95	76	43 500	29 000	

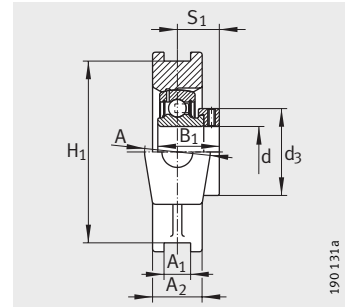


Take-up housing units

Cast iron housings



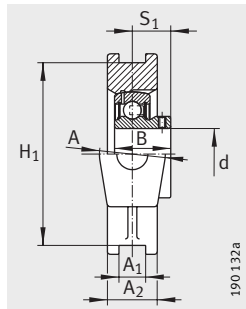
PTUE, RTUE, TTUE, RTUEO, PTUEY, RTUEY



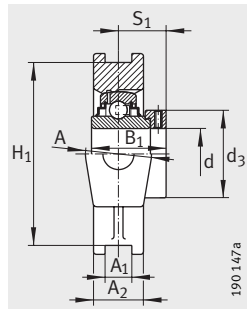
PTUE

Dimension table (continued) · Dimensions in mm										
Designation			Mass m ≈ kg	Dimensions						
Unit	Housing	Radial insert ball bearing		d	A	A ₁ H13	A ₂	L	L ₁	L ₂
PTUE60	GG.TUE12	GRAE60-NPP-B	4,21	60	60	22	44	186	118	19
RTUE60	GG.TUE12	GE60-KRR-B	4,84	60	60	22	44	186	118	19
TTUE60	GG.TUE12	GE60-KTT-B	4,96	60	60	22	44	186	118	19
PTUEY60	GG.TUE12	GAY60-NPP-B	3,97	60	60	22	44	186	118	19
RTUEY60	GG.TUE12	GYE60-KRR-B	4,22	60	60	22	44	186	118	19
RTUE65	GG.TUE13/14	GE65-214-KRR-B	7,46	65	70	25	50	214	135	20
TTUE65	GG.TUE13/14	GE65-214-KTT-B	7,54	65	70	25	50	214	135	20
RTUEY65	GG.TUE13/14	GYE65-214-KRR-B	7	65	70	25	50	214	135	20
RTUE70	GG.TUE13/14	GE70-KRR-B	7,2	70	70	25	50	214	135	20
TTUE70	GG.TUE13/14	GE70-KTT-B	7,28	70	70	25	50	214	135	20
RTUEY70	GG.TUE13/14	GYE70-KRR-B	6,7	70	70	25	50	214	135	20
RTUE75	GG.TUE15	GE75-KRR-B	7,05	75	70	25	50	214	135	20
TTUE75	GG.TUE15	GE75-KTT-B	7,13	75	70	25	50	214	135	20
RTUEY75	GG.TUE15	GYE75-KRR-B	6,59	75	70	25	50	214	135	20
RTUE80	GG.TUE16	GE80-KRR-B	8,4	80	70	28	50	230	140	20
TTUE80	GG.TUE16	GE80-KTT-B	8,46	80	70	28	50	230	140	20
RTUEO80	GG.TUEO16	GNE80-KRR-B	17,25	80	102	30	60	282	174	28
RTUEY80	GG.TUE16	GYE80-KRR-B	8,38	80	70	28	50	230	140	20
RTUE90	GG.TUE18	GE90-KRR-B	11,57	90	80	28	55	275	170	30
RTUEO90	GG.TUEO18	GNE90-KRR-B	22,9	90	110	32	66	312	192	30
RTUE100	GG.TUE20	GE100-KRR-B	14,55	100	90	28	60	295	180	30
RTUE120	GG.TUE24	GE120-KRR-B	22,43	120	100	32	70	345	210	35

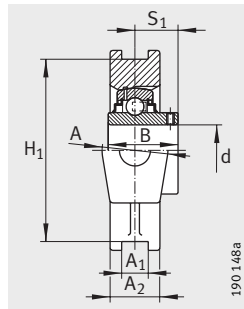
1) Tolerance ${}^0_{-0,6}$.



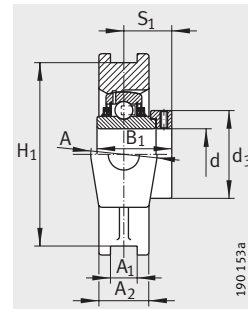
PTUEY



RTUE, RTUEO



RTUEY



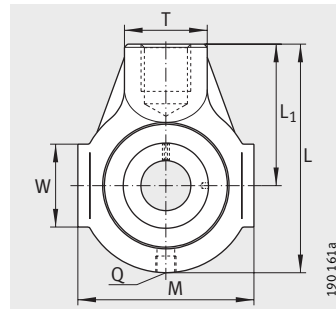
TTUE

												Basic load ratings	
N	N ₁	N ₂	B	B ₁	H	H ₁	S ₁	Q	T	L ₃	d ₃ max.	dyn. C _r N	stat. C _{0r} N
35	32	63,5	-	53,1	146	130±0,15	39,6	R _p 1/8	102	100	84	52 000	36 000
35	32	63,5	-	77,9	146	130±0,15	46,8	R _p 1/8	102	100	84	52 000	36 000
35	32	63,5	-	77,9	146	130±0,15	46,8	R _p 1/8	102	100	84	52 000	36 000
35	32	63,5	47	-	146	130±0,15	34	R _p 1/8	102	100	-	52 000	36 000
35	32	63,5	65,1	-	146	130±0,15	39,7	R _p 1/8	102	100	-	52 000	36 000
41	35	70	-	66	166	151±0,25	44,6	R _p 1/8	110	120	96	62 000	44 000
41	35	70	-	66	166	151±0,25	44,6	R _p 1/8	110	120	96	62 000	44 000
41	35	70	74,6	-	166	151±0,25	44,4	R _p 1/8	110	120	-	62 000	44 000
41	35	70	-	66	166	151±0,25	44,6	R _p 1/8	110	120	96	62 000	44 000
41	35	70	-	66	166	151±0,25	44,6	R _p 1/8	110	120	96	62 000	44 000
41	35	70	74,6	-	166	151±0,25	44,4	R _p 1/8	110	120	-	62 000	44 000
41	35	70	-	67	166	151±0,25	45,6	R _p 1/8	110	120	100	62 000	44 500
41	35	70	-	67	166	151±0,25	45,6	R _p 1/8	110	120	100	62 000	44 500
41	35	70	77,8	-	166	151±0,25	44,5	R _p 1/8	110	120	-	62 000	44 500
41	35	70	-	70,7	184	165±0,25	47,6	R _p 1/8	110	120	108	72 000	54 000
41	35	70	-	70,7	184	165±0,25	47,6	R _p 1/8	110	120	108	72 000	54 000
53	42	98	-	93,7	230	204 ¹⁾	59,7	R _p 1/8	150	150	118	123 000	87 000
41	35	70	82,6	-	184	165±0,25	49,3	R _p 1/8	110	120	-	72 000	54 000
47	40	80	-	69,5	215	190±0,25	46,5	R _p 1/8	130	140	118	96 000	72 000
57	46	106	-	101	255	228 ¹⁾	65,5	R _p 1/8	160	165	132	143 000	107 000
47	40	80	-	75	240	215±0,25	49,5	R _p 1/8	130	160	132	122 000	93 000
55	45	95	-	81	285	255±0,25	52,5	R _p 1/8	150	190	152	155 000	131 000

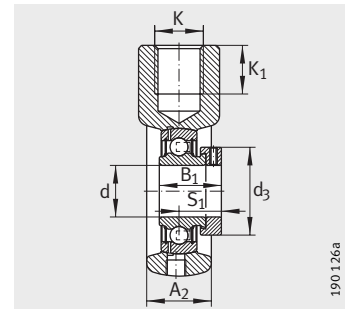


Take-up housing units

Cast iron housings

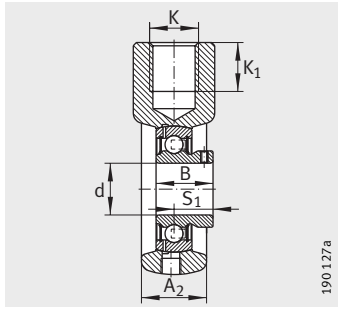


PHE, PHEY, RHE, THE

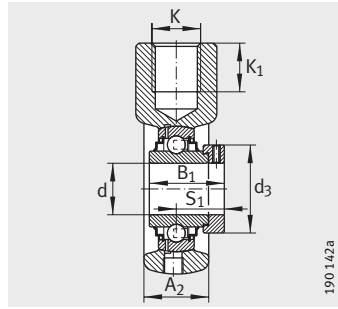


PHE

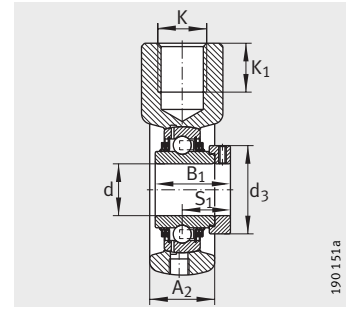
Dimension table · Dimensions in mm									
Designation			Mass m ≈ kg	Dimensions					
Unit	Housing	Radial insert ball bearing		d	L	A ₂	L ₁	K	K ₁
PHE20	GG.HE04	GRAE20-NPP-B	0,54	20	91	25	58	M16	21
PHEY20	GG.HE04	GAY20-NPP-B	0,51	20	91	25	58	M16	21
RHE20	GG.HE04	GE20-KRR-B	0,58	20	91	25	58	M16	21
PHE25	GG.HE05	GRAE25-NPP-B	0,71	25	99	28	64	M20	22
PHEY25	GG.HE05	GAY25-NPP-B	0,68	25	99	28	64	M20	22
RHE20	GG.HE05	GE25-KRR-B	0,77	25	99	28	64	M20	22
THE25	GG.HE05	GE25-KTT-B	0,77	25	99	28	64	M20	22
PHE30	GG.HE06	GRAE30-NPP-B	1,09	30	114	32	72	M24	24
PHEY30	GG.HE06	GAY30-NPP-B	1,03	30	114	32	72	M24	24
RHE30	GG.HE06	GE30-KRR-B	1,16	30	114	32	72	M24	24
THE30	GG.HE06	GE30-KTT-B	1,17	30	114	32	72	M24	24
PHE35	GG.HE07	GRAE35-NPP-B	1,32	35	122	32	76	M24	24
PHEY35	GG.HE07	GAY35-NPP-B	1,23	35	122	32	76	M24	24
RHE35	GG.HE07	GE35-KRR-B	1,39	35	122	32	76	M24	24
THE35	GG.HE07	GE35-KTT-B	1,4	35	122	32	76	M24	24
PHE40	GG.HE08	GRAE40-NPP-B	1,65	40	135	36	85	M24	24
PHEY40	GG.HE08	GAY40-NPP-B	1,54	40	135	36	85	M24	24
RHE40	GG.HE08	GE40-KRR-B	1,77	40	135	36	85	M24	24
THE40	GG.HE08	GE40-KTT-B	1,8	40	135	36	85	M24	24
PHE45	GG.HE09	GRAE45-NPP-B	1,89	45	145	40	90	M24	24
PHEY45	GG.HE09	GAY45-NPP-B	1,75	45	145	40	90	M24	24
RHE45	GG.HE09	GE45-KRR-B	2,01	45	145	40	90	M24	24
THE45	GG.HE09	GE45-KTT-B	2,06	45	145	40	90	M24	24
PHE50	GG.HE10	GRAE50-NPP-B	1,92	50	145	40	90	M24	24
RHE50	GG.HE10	GE50-KRR-B	2,15	50	145	40	90	M24	24
THE50	GG.HE10	GE50-KTT-B	2,21	50	145	40	90	M24	24



PHEY



RHE



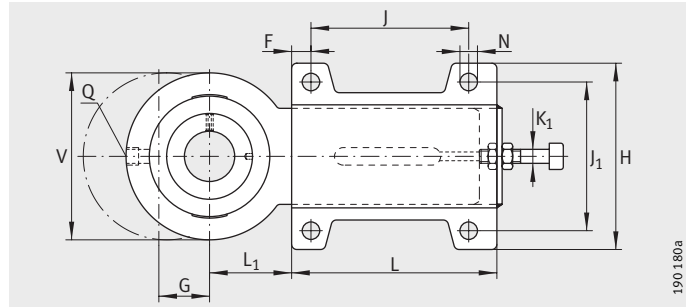
THE

								Basic load ratings	
B	B ₁	M	S ₁	Q	d ₃ max.	T	W	dyn. C _r N	stat. C _{0r} N
-	31	65	23,5	R _p 1/8	33	30	38	12 800	6 600
25	-	65	18	R _p 1/8	-	30	38	12 800	6 600
-	43,7	65	26,6	R _p 1/8	33	30	38	12 800	6 600
-	31	70	23,5	R _p 1/8	37,5	35	38	14 000	7 800
27	-	70	19,5	R _p 1/8	-	35	38	14 000	7 800
-	44,5	70	26,9	R _p 1/8	37,5	35	38	14 000	7 800
-	44,5	70	26,9	R _p 1/8	37,5	35	38	14 000	7 800
-	35,8	85	26,7	R _p 1/8	44	40	40	19 500	11 300
30	-	85	21	R _p 1/8	-	40	40	19 500	11 300
-	48,5	85	30,1	R _p 1/8	44	40	40	19 500	11 300
-	48,5	85	30,1	R _p 1/8	44	40	40	19 500	11 300
-	39	90	29,4	R _p 1/8	51	40	49	25 500	15 300
35	-	90	25,5	R _p 1/8	-	40	49	25 500	15 300
-	51,3	90	32,3	R _p 1/8	51	40	49	25 500	15 300
-	51,3	90	32,3	R _p 1/8	51	40	49	25 500	15 300
-	43,8	100	32,7	R _p 1/8	58	40	45	32 500	19 800
39,5	-	100	29	R _p 1/8	-	40	45	32 500	19 800
-	56,5	100	34,9	R _p 1/8	58	40	45	32 500	19 800
-	56,5	100	34,9	R _p 1/8	58	40	45	32 500	19 800
-	43,7	110	32,7	R _p 1/8	63	40	45	32 500	20 400
41,5	-	110	30,5	R _p 1/8	-	40	45	32 500	20 400
-	56,5	110	34,9	R _p 1/8	63	40	45	32 500	20 400
-	56,5	110	34,9	R _p 1/8	63	40	45	32 500	20 400
-	43,8	110	32,7	R _p 1/8	69	40	46	35 000	23 200
-	62,8	110	38,1	R _p 1/8	69	40	46	35 000	23 200
-	62,8	110	38,1	R _p 1/8	69	40	46	35 000	23 200



Take-up housing units

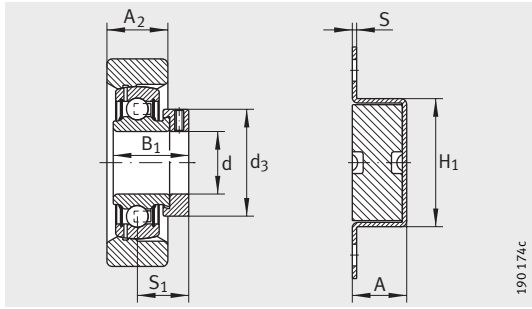
Cast iron/sheet steel housings



PHUSE

Dimension table · Dimensions in mm											
Designation		Mass m ≈kg	Dimensions								
Unit	Radial insert ball bearing		d	L	A ₂	S	F	G	L ₁	N	K ₁
PHUSE25	GRAE25-NPP-B	2,07	25	187	22	4	20	65	50	11,5	M12
PHUSE30	GRAE30-NPP-B	2,22	30	187	22	4	20	65	50	11,5	M12
PHUSE35	GRAE35-NPP-B	2,46	35	187	22	4	20	65	50	11,5	M12
PHUSE40	GRAE40-NPP-B	4,89	40	256	30	4	20	80	60	14	M16
PHUSE50-N ¹⁾	GRAE50-NPP-B	5,25	50	256	30	4	20	80	60	14	M16

¹⁾ End cap KASK10 to be ordered separately.



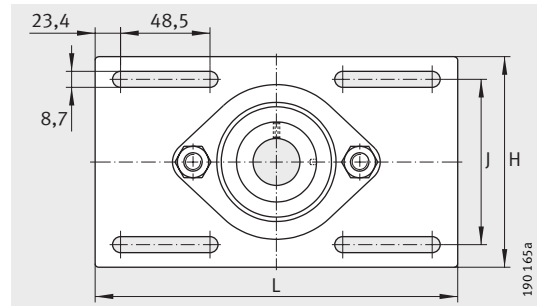
PHUSE

										Load carrying capacity of housing C_{0rG} N	Basic load ratings	
B_1	J	J_1	S_1	Q	d_3 max.	A	V	H	H_1		dyn. C_r N	stat. C_{0r} N
31	140	80	23,5	$R_p 1/8$	37,5	28	78	103	52	7 800	14 000	7 800
35,8	140	80	26,7	$R_p 1/8$	44	28	88	103	52	11 300	19 500	11 300
39	140	80	29,4	$R_p 1/8$	51	28	98	103	52	15 300	25 500	15 300
43,8	180	100	32,7	$R_p 1/8$	58	36	108	130	60	19 800	32 500	19 800
43,8	180	100	32,7	$R_p 1/8$	69	36	120	130	60	23 200	35 000	23 200



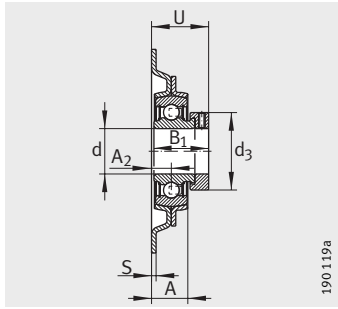
Take-up housing units

Cast iron housings
Sheet steel housings



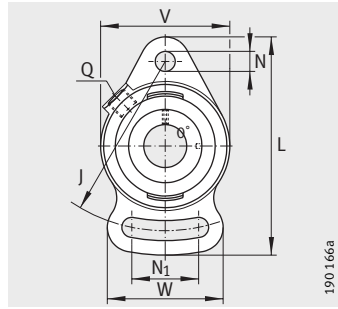
MSTU

Dimension table · Dimensions in mm										
Designation			Mass m ≈kg	Dimensions						
Unit	Housing	Radial insert ball bearing		d	H	A ₁	L	S	B	N ₁
PSFT20	GG.SFT04	GRAE20-NPP-B	0,41	20	–	10	112	–	11,5	30
MSTU25	GEH52-MSTU	RAE25-NPP-B	0,58	25	104,8	–	203,2	2	–	–
PSFT25	GG.SFT05	GRAE25-NPP-B	0,52	25	–	11	124	–	11,5	37,5
MSTU30	GEH62-MSTU	RAE30-NPP-B	0,84	30	114,3	–	203,2	2,5	–	–
PSFT30	GG.SFT06	GRAE30-NPP-B	0,77	30	–	12	142	–	11,5	40
PSFT35	GG.SFT07	GRAE35-NPP-B	1,1	35	–	12,5	155	–	14	45



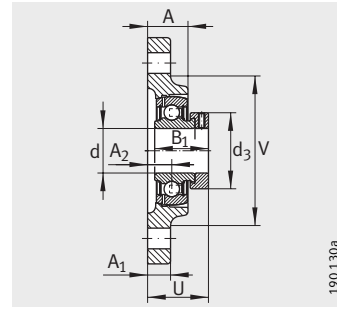
MSTU

190 119a



PSFT

190 166a



PSFT

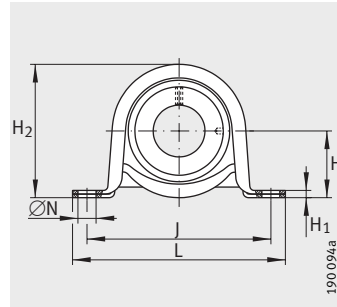
190 130a

									Load carrying capacity of housing C_{0rG} N	Basic load ratings	
B_1	J	A_2	Q	d_3 max.	A	U	V	W		dyn. C_r N	stat. C_{0r} N
31	90	10,5	$R_p 1/8$	33	18	34	61	52	–	12 800	6 600
31	80,2	10,3	–	37,5	19	33,8	–	–	3 900	14 000	7 800
31	99	12,5	$R_p 1/8$	37,5	20	36	70	63	–	14 000	7 800
35,8	89,2	12,1	–	44	21,1	37,8	–	–	3 900	19 500	11 300
35,8	117	13	$R_p 1/8$	44	22	39,7	80	65	–	19 500	11 300
39	128	15	$R_p 1/8$	51	25	44,5	90	75	–	25 500	15 300

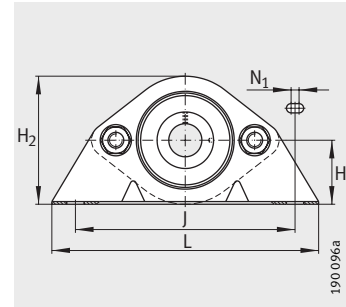


Plummer block housing units

Sheet steel housings

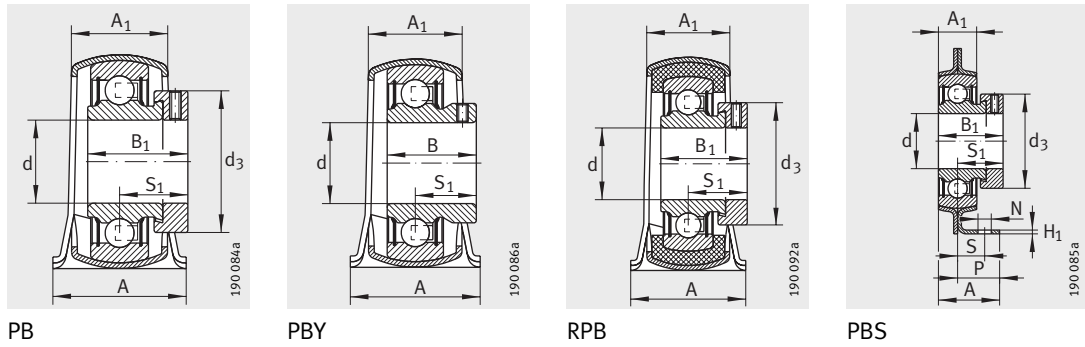


PB, PBY, RPB



PBS

Dimension table · Dimensions in mm										
Unit	Housing	Rubber interliner	Radial insert ball bearing	Mass m ≈kg	Dimensions					
					d	H	A	A ₁	H ₁	H ₂
PB12	GEH40-BT	–	RAE12-NPP-B	0,17	12	22,2	25,4	18,4	2,6	43,2
PBY12	GEH40-BT	–	AY12-NPP-B	0,15	12	22,2	25,4	18,4	2,6	43,2
RPB12	GEH47-BT	RABR40/47	RAE12-NPP-B	0,23	12	25,4	31,8	22,3	3,3	50,1
PBS12	GEH40-PBS	–	RAE12-NPP-B	0,32	12	30,2	32,5	14,2	2,6	59,6
PB15	GEH40-BT	–	RAE15-NPP-B	0,17	15	22,2	25,4	18,4	2,6	43,2
PBY15	GEH40-BT	–	AY15-NPP-B	0,15	15	22,2	25,4	18,4	2,6	43,2
RPB15	GEH47-BT	RABR40/47	RAE15-NPP-B	0,23	15	25,4	31,8	22,3	3,3	50,1
PBS15	GEH40-PBS	–	RAE15-NPP-B	0,32	15	30,2	32,5	14,2	2,6	59,6
PB17	GEH40-BT	–	RAE17-NPP-B	0,17	17	22,2	25,4	18,4	2,6	43,2
PBY17	GEH40-BT	–	AY17-NPP-B	0,15	17	22,2	25,4	18,4	2,6	43,2
RPB17	GEH47-BT	RABR40/47	RAE17-NPP-B	0,23	17	25,4	31,8	22,3	3,3	50,1
PBS17	GEH40-PBS	–	RAE17-NPP-B	0,32	17	30,2	32,5	14,2	2,6	59,6
PB20	GEH47-BT	–	RAE20-NPP-B	0,27	20	25,4	31,8	22,3	3,3	50,1
PBY20	GEH47-BT	–	AY20-NPP-B	0,22	20	25,4	31,8	22,3	3,3	50,1
RPB20	GEH52-BT	RABR47/52	RAE20-NPP-B	0,28	20	28,6	31,8	23,5	4	56,5
PBS20	GEH40-PBS	–	RAE20-NPP-B	0,45	20	33,6	33	15,8	3	66,8
PB25	GEH52-BT	–	RAE25-NPP-B	0,3	25	28,6	31,8	23,5	4	56,5
PBY25	GEH52-BT	–	AY25-NPP-B	0,26	25	28,6	31,8	23,5	4	56,5
RPB25	GEH62-BT	RABR52/62	RAE25-NPP-B	0,38	25	33,3	38	26,5	4	66,1
PBS25	GEH52-BT	–	RAE25-NPP-B	0,49	25	36,5	34,1	17,4	3,4	72
PB30	GEH62-BT	–	RAE30-NPP-B	0,5	30	33,3	38	26,5	4	66,1
PBY30	GEH62-BT	–	AY30-NPP-B	0,4	30	33,3	38	26,5	4	66,1
RPB30	GEH62-BT	RABR55/62	RAE30-NPP-B	0,45	30	33,3	38	26,5	4	66,1
PBS30	GEH62-PBS	–	RAE30-NPP-B	0,79	30	42,9	38,9	17,4	3,4	85
PBS35	GEH72-PBS	–	RAE35-NPP-B	1,05	35	47,6	46,1	22,2	4	94,4
PBS40	GEH80-PBS	–	RAE40-NPP-B	1,33	40	55	53,5	23	4	106

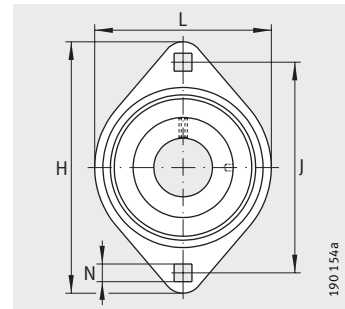


N	N ₁	B	B ₁	J	S ₁	P	S	d ₃ max.	L	Load carrying capacity of housing C _{0rG} N	Basic load ratings	
											dyn. C _r N	stat. C _{0r} N
9,5	-	22	28,6	68	22,1	-	-	28	85,7	1 350	9 800	4 750
9,5	-	-	-	68	16	-	-	-	85,7	1 350	9 800	4 750
9,5	-	-	28,6	76	22,1	-	-	28	98,7	900	9 800	4 750
10,5	5,6	-	28,6	92	22,1	25,4	15	28	123,8	2 700	9 800	4 750
9,5	-	22	28,6	68	22,1	-	-	28	85,7	1 350	9 800	4 750
9,5	-	-	-	68	16	-	-	-	85,7	1 350	9 800	4 750
9,5	-	-	28,6	76	22,1	-	-	28	98,4	900	9 800	4 750
10,5	5,6	-	28,6	92	22,1	25,4	15	28	123,8	2 700	9 800	4 750
9,5	-	22	28,6	68	22,1	-	-	28	85,7	1 350	9 800	4 750
9,5	-	-	-	68	16	-	-	-	85,7	1 350	9 800	4 750
9,5	-	-	28,6	76	22,1	-	-	28	98,4	900	9 800	4 750
10,5	5,6	-	28,6	92	22,1	25,4	15	28	123,8	2 700	9 800	4 750
9,5	-	25	31	76	23,5	-	-	33	98,4	1 600	12 800	6 600
9,5	-	-	-	76	18	-	-	-	98,4	1 600	12 800	6 600
11,5	-	-	31	86	23,5	-	-	33	108	1 100	12 800	6 600
10,5	5,6	-	31	97	23,5	25,4	15	33	127	3 200	12 800	6 600
11,5	-	27	31	86	23,5	-	-	37,5	108	1 800	14 000	7 800
11,5	-	-	-	86	19,5	-	-	-	108	1 800	14 000	7 800
11,5	-	-	31	95	23,5	-	-	37,5	117,5	1 400	14 000	7 800
10,5	9,5	-	31	95,5	23,5	25,4	14,3	37,5	133,5	3 600	14 000	7 800
11,5	-	30	35,8	95	26,7	-	-	44	117,5	2 700	19 500	11 300
11,5	-	-	-	95	21	-	-	-	117,5	2 700	19 500	11 300
11,5	-	-	26,5	95	20	-	-	42,5	117,5	1 400	13 200	8 300
13,5	8	-	35,8	119	26,7	30,2	16	44	159	3 600	19 500	11 300
13,5	8	-	39	127	29,4	35	20,7	51	165	4 100	25 500	15 300
13,5	8	-	43,8	136,5	32,7	40	25	58	180	4 500	32 500	19 800



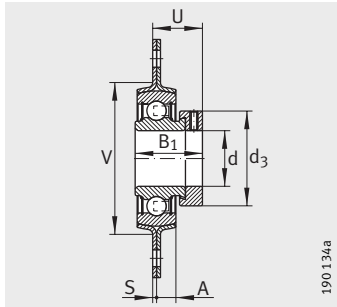
Two-bolt flanged housing units

Sheet steel housings

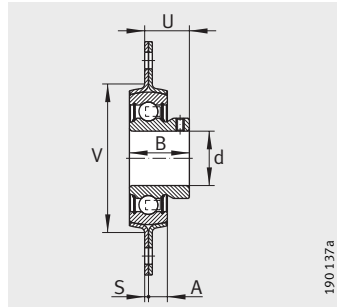


RAT, RATY, RALT, PCSLT

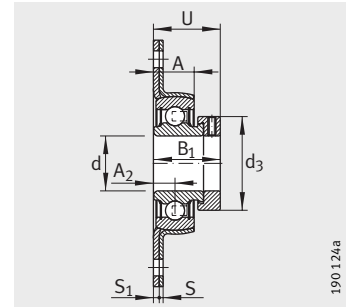
Dimension table · Dimensions in mm						
Designation			Mass m ≈kg	Dimensions		
Unit	Housing	Radial insert ball bearing		d	L	H
RAT12	FLAN40-MST (2 parts)	RAE12-NPP-B	0,19	12	58,7	81
RATY12	FLAN40-MST (2 parts)	AY12-NPP-B	0,14	12	58,7	81
RAT15	FLAN40-MST (2 parts)	RAE15-NPP-B	0,19	15	58,7	81
RATY15	FLAN40-MST (2 parts)	AY15-NPP-B	0,13	15	58,7	81
RAT17	FLAN40-MST (2 parts)	RAE17-NPP-B	0,19	17	58,7	81
RATY17	FLAN40-MST (2 parts)	AY17-NPP-B	0,12	17	58,7	81
RALT20-FA125.8	FLAN42-LST-FA125 (2 parts)	RALE20-NPP-B	0,21	20	58,7	81
PCSLT20	FLAN42-CSLT-FA125/FLAN42-CST-FA125 (1 part each)	RALE20-NPP-B	0,22	20	66	90,5
RAT20	FLAN47-MST (2 parts)	RAE20-NPP-B	0,27	20	66	90,5
RATY20	FLAN47-MST (2 parts)	AY20-NPP-B	0,22	20	66	90,5
RALT25	FLAN47-LST (2 parts)	RALE25-NPP-B	0,22	25	71	95,2
PCSLT25	FLAN47-CSLT-FA125/FLAN47-CST-FA125 (1 part each)	RALE25-NPP-B	0,25	25	71	95,2
RAT25	FLAN52-MST (2 parts)	RAE25-NPP-B	0,34	25	71	95,2
RATY25	FLAN52-MST (2 parts)	AY25-NPP-B	0,26	25	71	95,2
PCSLT30	FLAN55-CSLT-FA125/FLAN55-CST-FA125 (1 part each)	RALE30-NPP-B	0,3	30	84	112,5
RAT30	FLAN62-MST (2 parts)	RAE30-NPP-B	0,49	30	84	112,7
RATY30	FLAN62-MST (2 parts)	AY30-NPP-B	0,41	30	84	112,7
RAT35	FLAN72-MST (2 parts)	RAE35-NPP-B	0,72	35	93,7	123
RATY35	FLAN72-MST (2 parts)	GAY35-NPP-B	0,56	35	93,7	123
RAT40	FLAN80-MST (2 parts)	RAE40-NPP-B	0,98	40	100	151
RATY40	FLAN80-MST (2 parts)	GAY40-NPP-B	0,85	40	100	151



RAT, RALT



RATY



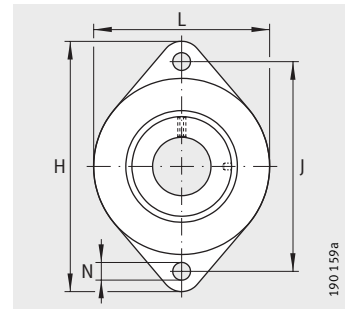
PCSLT

											Load carrying capacity of housing C_{0rG}	Basic load ratings	
S	S_1	N	B	B_1	J	A_2	d_3 max.	A	U	V		N	dyn. C_r N	stat. $C_{0r}$ N
2	-	7,1	-	28,6	63,5	-	28	7	24	48	2700	9800	4750
2	-	7,1	22	-	63,5	-	-	7	18	48	2700	9800	4750
2	-	7,1	-	28,6	63,5	-	28	7	24	48	2700	9800	4750
2	-	7,1	22	-	63,5	-	-	7	18	48	2700	9800	4750
2	-	7,1	-	28,6	63,5	-	28	7	24	48	2700	9800	4750
2	-	7,1	22	-	63,5	-	-	7	18	48	2700	9800	4750
2	-	7,1	-	24,6	63,5	-	30	7	20,6	48	2700	9400	5000
2	3	8,7	-	24,6	71,4	7,5	30	14	26,1	-	4200	9400	5000
2	-	8,7	-	31	71,5	-	33	8	25,5	55	3200	12800	6600
2	-	8,7	25	-	71,5	-	-	8	20	55	3200	12800	6600
2	-	8,7	-	25,4	76	-	36	7,1	21,4	55	3000	10100	5900
2	3	8,7	-	25,4	76,2	8,5	36	16	28	-	4500	10100	5900
2	-	8,7	-	31	76,2	-	37,5	8,7	25,5	60	3650	14000	7800
2	-	8,7	27	-	76,2	-	-	8,7	21,5	60	3650	14000	7800
2,5	3,5	11,5	-	26,5	90,5	9	42,5	16	29	-	6000	13200	8300
2,5	-	10,5	-	35,7	90,5	-	44	8,7	29,2	71	5000	19500	11300
2,5	-	10,5	30	-	90,5	-	-	8,7	23,5	71	5000	19500	11300
2,5	-	10,5	-	38,9	100	-	51	10,5	31,5	81	6300	25500	15300
2,5	-	10,5	35	-	100	-	-	10,5	28	81	6300	25500	15300
3,5	-	13,5	-	43,8	119	-	58	11,5	36,2	90	7000	32500	19800
3,5	-	13,5	39,5	-	119	-	-	11,5	32,5	90	7000	32500	19800



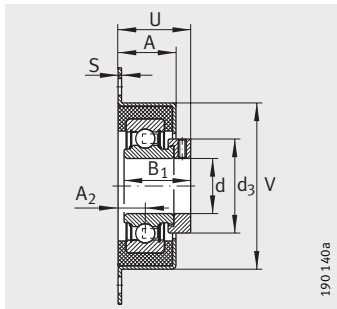
Two-bolt flanged housing units

Sheet steel housings with rubber interliner



RCSMF

Dimension table · Dimensions in mm									
Designation				Mass m ≈kg	Dimensions				
Unit	Housing	Rubber interliner	Radial insert ball bearing		d	L	H	S	N
RCSMF12	FLAN65-RCSMF	RCSM40/65	RAE12-NPP	0,27	12	70	114	1,5	10,5
RCSMF15	FLAN65-RCSMF	RCSM40/65	RAE15-NPP	0,27	15	70	114	1,5	10,5
RCSMF17	FLAN65-RCSMF	RCSM40/65	RAE17-NPP	0,27	17	70	114	1,5	10,5
RCSMF20	FLAN65-RCSMF	RCSM47/65	RAE20-NPP	0,32	20	70	114	1,5	10,5
RCSMF25	FLAN65-RCSMF	RCSM52/65	RAE25-NPP	0,33	25	70	114	1,5	10,5
RCSMF30	FLAN65-RCSMF	RCSM55/65	RAE30-NPP	0,32	30	70	114	1,5	10,5



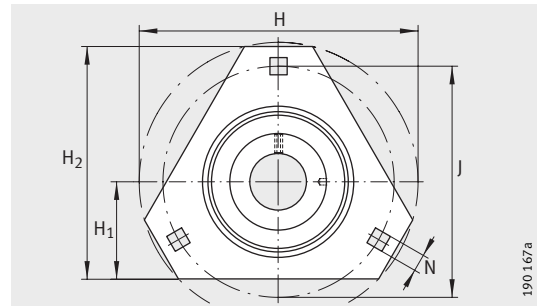
RCSMF

							Load carrying capacity of housing C_{0rG} N	Basic load ratings	
B_1	J	A_2	d_3 max.	A	U	V		dyn. C_r N	stat. C_{0r} N
28,6	92	12,7	28	27	34,8	68	900	9 800	4 750
28,6	92	12,7	28	27	34,8	68	900	9 800	4 750
28,6	92	12,7	28	27	34,8	68	900	9 800	4 750
31	92	12,7	33	27	36,2	68	1 100	12 800	6 600
31	92	12,7	37,5	27	36,2	68	1 400	14 000	7 800
26,5	92	15	42,5	27	35	68	1 400	13 200	8 300



Three-bolt flanged housing units

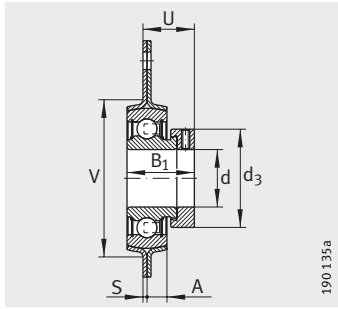
Sheet steel housings



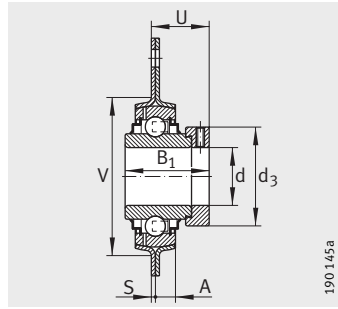
RATR, RALTR, RRTR, RATRY

Dimension table · Dimensions in mm								
Designation			Mass m ≈ kg	Dimensions				
Unit	Housing	Radial insert ball bearing		d	H ₂	H	H ₁	S ₁
RALTR20	FLAN42-LSTR (2 parts)	RAE20-NPP-B	0,21	20	76,2	90,5	33,3	2
RATR20	FLAN47-MSTR (2 parts)	RAE20-NPP-B	0,28	20	76,2	90,5	33,3	2
RRTR20	FLAN47-MSTR (2 parts)	GE20-KRR-B	0,32	20	76,2	90,5	33,3	2
RALTR25 ¹⁾	FLAN47-LSTR (2 parts)	RAE25-NPP-B	0,23	25	80,5	95,3	34,9	2
RATR25	FLAN42-MSTR (2 parts)	RAE25-NPP-B	0,32	25	80,5	95,3	34,9	2
RRTR25 ¹⁾	FLAN52-MSTR (2 parts)	E25-KRR-B	0,37	25	80,5	95,3	34,9	2
RATR30	FLAN62-MSTR (2 parts)	RAE30-NPP-B	0,43	30	93	112,7	38,1	2,5
RATRY30	FLAN62-MSTR (2 parts)	AY30-NPP-B	0,41	30	93	112,7	38,1	2,5
RRTR30 ¹⁾	FLAN62-MSTR (2 parts)	E30-KRR-B	0,5	30	93	112,7	38,1	2,5
RATR35	FLAN72-MSTR (2 parts)	RAE35-NPP-B	0,56	35	105,6	127	44,5	2,5
RATRY35	FLAN72-MSTR (2 parts)	GAY35-NPP-B	0,47	35	105,6	127	44,5	2,5
RRTR35	FLAN72-MSTR (2 parts)	E35-KRR-B	0,63	35	105,6	127	44,5	2,5

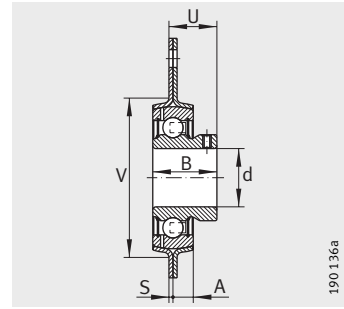
¹⁾ Housing and radial insert ball bearing must be ordered separately.



RATR, RALTR



RRTR



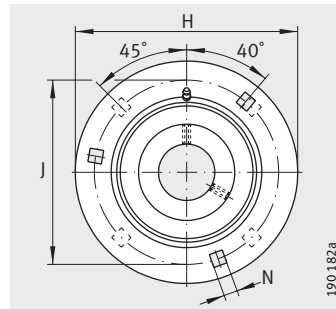
RATRY

N	B	B ₁	J	d ₃ max.	A	U	V	Load carrying capacity of housing C _{0rG} N	Basic load ratings	
									dyn. C _r N	stat. C _{0r} N
8,7	–	24,5	71,5	30	7,2	20,6	49	2 600	9 400	5 000
8,7	–	31	71,5	33	8	25,5	55	3 200	12 800	6 600
8,7	–	43,7	71,5	33	8	28,6	55	3 200	12 800	6 600
8,7	–	25,5	76	36	7,2	21,4	54	3 000	10 100	5 900
8,7	–	31	76	37,5	8,7	25,5	60	3 650	14 000	7 800
8,7	–	44,5	76	37,5	8,7	28,9	60	3 650	14 000	7 800
10,5	–	35,7	90,5	44	8,7	29,2	71	5 000	19 500	11 300
10,5	30	–	90,5	–	8,7	23,5	71	5 000	19 500	11 300
10,5	–	48,5	90,5	44	8,7	32,6	71	5 000	19 500	11 300
10,5	–	39	100	51	9,5	31,9	81	6 400	25 500	15 300
10,5	35	–	100	–	9,5	28	81	6 400	25 500	15 300
10,5	–	51,3	100	51	9,5	34,8	81	6 400	25 500	15 300

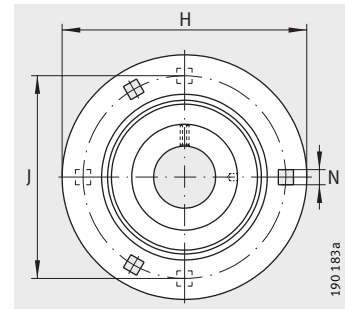


Three-bolt and four-bolt flanged housing units

Sheet steel housings



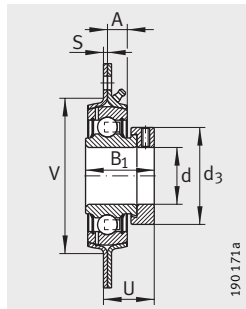
GRA, GRRY..-VA



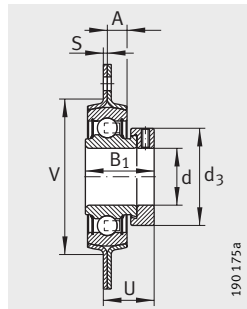
RA, RAY, RRY..-VA

Dimension table · Dimensions in mm			
Designation			Mass
Unit	Housing	Radial insert ball bearing	m ≈kg
RA12 ¹⁾	FLAN40-MSB (2 parts)	RAE12-NPP-B	0,23
RAY12 ¹⁾	FLAN40-MSB (2 parts)	AY12-NPP-B	0,17
RRY12-VA ¹⁾	FLAN40-MSB-VA (2 parts)	GYE12-KRR-B-VA	0,21
RA15	FLAN40-MSB (2 parts)	RAE15-NPP-B	0,23
RAY15	FLAN40-MSB (2 parts)	AY15-NPP-B	0,16
RRY15-VA ¹⁾	FLAN40-MSB-VA (2 parts)	GYE15-KRR-B-VA	0,2
RA17	FLAN40-MSB (2 parts)	RAE17-NPP-B	0,23
RAY17 ¹⁾	FLAN40-MSB (2 parts)	AY17-NPP-B	0,15
RRY17-VA ¹⁾	FLAN40-MSB-VA (2 parts)	GYE17-KRR-B-VA	0,19
RA20	FLAN47-MSB (2 parts)	RAE20-NPP-B	0,32
RAY20	FLAN47-MSB (2 parts)	AY20-NPP-B	0,3
GRA20	FLAN47-MSB/FLAN47-MSA (1 part each)	GRAE20-NPP-B	0,32
GRRY20-VA	FLAN47-MSB-VA/FLAN47-MSA-VA (1 part each)	GYE20-KRR-B-VA	0,34
RRY20-VA	FLAN47-MSB-VA (2 parts)	GYE20-KRR-B-VA	0,34
RA25	FLAN52-MSB (2 parts)	RAE25-NPP-B	0,37
RAY25	FLAN52-MSB (2 parts)	AY25-NPP-B	0,34
GRA25	FLAN52-MSB/FLAN52-MSA (1 part each)	GRAE25-NPP-B	0,37
GRRY25-VA	FLAN52-MSB-VA/FLAN52-MSA-VA (1 part each)	GYE25-KRR-B-VA	0,38
RRY25-VA	FLAN52-MSB-VA (2 parts)	GYE25-KRR-B-VA	0,38
RA30	FLAN62-MSB (2 parts)	RAE30-NPP-B	0,61
RAY30	FLAN62-MSB (2 parts)	AY30-NPP-B	0,45
GRA30	FLAN62-MSB/FLAN62-MSA (1 part each)	GRAE30-NPP-B	0,61
GRRY30-VA	FLAN62-MSB-VA/FLAN62-MSA-VA (1 part each)	GYE30-KRR-B-VA	0,63
RRY30-VA	FLAN62-MSB-VA (2 parts)	GYE30-KRR-B-VA	0,63
RA35	FLAN72-MSB (2 parts)	RAE35-NPP-B	0,82
RAY35	FLAN72-MSB (2 parts)	GAY35-NPP-B	0,78
GRA35	FLAN72-MSB/FLAN72-MSA (1 part each)	GRAE35-NPP-B	0,82

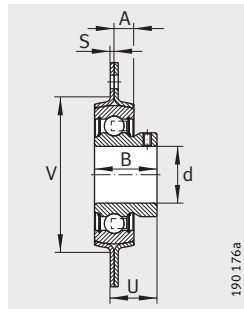
¹⁾ Housing and radial insert ball bearing must be ordered separately.



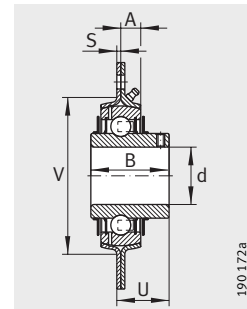
GRA



RA



RAY



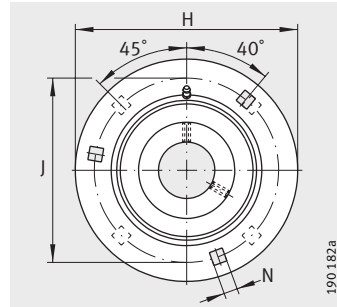
GRRY..-VA, RRY..-VA

Dimensions											Number of screw mounting holes n	Load carrying capacity of housing C _{0rG} N	Basic load ratings	
d	H	S	N	B	B ₁	J	d ₃ max.	A	U	V			dyn. C _r N	stat. C _{0r} N
12	81	2	7,1	-	28,6	63,5	28	7	24	48	3	2 700	9 800	4 750
12	81	2	7,1	22	-	63,5	-	7	18	48	3	2 700	9 800	4 750
12	81	2	7,1	25	-	63,5	-	7	17,4	48	3	2 700	9 800	4 750
15	81	2	7,1	-	28,6	63,5	28	7	24	48	3	2 700	9 800	4 750
15	81	2	7,1	22	-	63,5	-	7	18	48	3	2 700	9 800	4 750
15	81	2	7,1	25	-	63,5	-	7	17,4	48	3	2 700	9 800	4 750
17	81	2	7,1	-	28,6	63,5	28	7	24	48	3	2 700	9 800	4 750
17	81	2	7,1	22	-	63,5	-	7	18	48	3	2 700	9 800	4 750
17	81	2	7,1	25	-	63,5	-	7	17,4	48	3	2 700	9 800	4 750
20	90,5	2	8,7	-	31	71,5	33	8	25,5	55	3	3 200	12 800	6 600
20	90,5	2	8,7	25	-	71,5	-	8	20	55	3	3 200	12 800	6 600
20	90,5	2	8,7	-	31	71,5	33	8	25,5	55	3	3 200	12 800	6 600
20	90,5	2	8,7	31	-	71,5	-	8	20,3	55	3	3 200	12 800	6 600
20	90,5	2	8,7	31	-	71,5	-	8	20,3	55	3	3 200	12 800	6 600
25	95	2	8,7	-	31	76	37,5	8,7	25,5	60	3	3 650	14 000	7 800
25	95	2	8,7	27	-	76	-	8,7	21,5	60	3	3 650	14 000	7 800
25	95	2	8,7	-	31	76	37,5	8,7	25,5	60	3	3 650	14 000	7 800
25	95	2	8,7	34	-	76	-	8,7	21,7	60	3	3 650	14 000	7 800
25	95	2	8,7	34	-	76	-	8,7	21,7	60	3	3 650	14 000	7 800
30	112,7	2,5	10,5	-	35,8	90,5	44	8,7	29,2	71	3	5 000	19 500	11 300
30	112,7	2,5	10,5	30	-	90,5	-	8,7	23,5	71	3	5 000	19 500	11 300
30	112,7	2,5	10,5	-	35,8	90,5	44	8,7	29,2	71	3	5 000	19 500	11 300
30	112,7	2,5	10,5	38,1	-	90,5	-	9	24,7	71	3	5 000	19 500	11 300
30	112,7	2,5	10,5	38,1	-	90,5	-	9	24,7	71	3	5 000	19 500	11 300
35	122	2,5	10,5	-	39	100	51	9,5	31,9	81	3	6 400	25 500	15 300
35	122	2,5	10,5	35	-	100	-	9,5	28	81	3	6 400	25 500	15 300
35	122	2,5	10,5	-	39	100	51	9,5	32	81	3	6 400	25 500	15 300

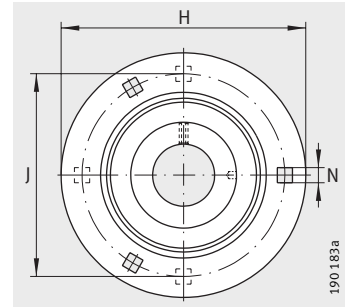


Three-bolt and four-bolt flanged housing units

Sheet steel housings



GRA

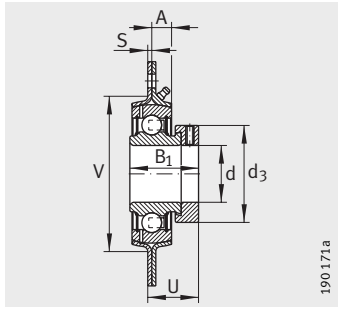


RA, RAY

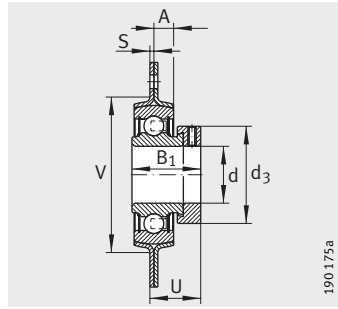
Dimension table (continued) · Dimensions in mm

Designation			Mass m ≈ kg	Dimensions	
Unit	Housing	Radial insert ball bearing		d	H
RA40	FLAN80-MSB (2 parts)	RAE40-NPP-B	1,36	40	147,5
RAY40 ¹⁾	FLAN80-MSB (2 parts)	GAY40-NPP-B	1,25	40	147,5
GRA40	FLAN80-MSB/FLAN80-MSA (1 part each)	GRAE40-NPP-B	1,36	40	147,5
RA45	FLAN85-MSB (2 parts)	GRAE45-NPP-B	1,41	45	149,2
GRA45	FLAN85-MSB/FLAN85-MSA (1 part each)	GRAE45-NPP-B	1,41	45	149,2
RA50	FLAN90-MSB (2 parts)	GRAE50-NPP-B	1,68	50	155,5
RAY50 ¹⁾	FLAN90-MSB (2 parts)	GAY50-NPP-B	1,68	50	155,5
GRA50	FLAN90-MSB/FLAN90-MSA (1 part each)	GRAE50-NPP-B	1,68	50	155,5
RA55 ¹⁾	FLAN100-MSB (2 parts)	GRAE55-NPP-B	1,39	55	167
RA60 ¹⁾	FLAN110-MSB (2 parts)	GRAE60-NPP-B	2,54	60	176
RAY60 ¹⁾	FLAN110-MSB (2 parts)	GAY60-NPP-B	2,13	60	176

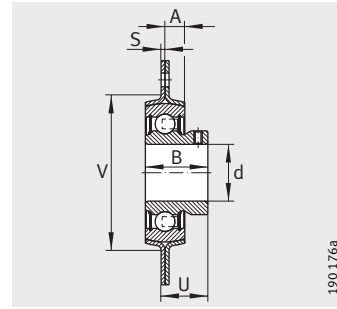
¹⁾ Housing and radial insert ball bearing must be ordered separately.



GRA



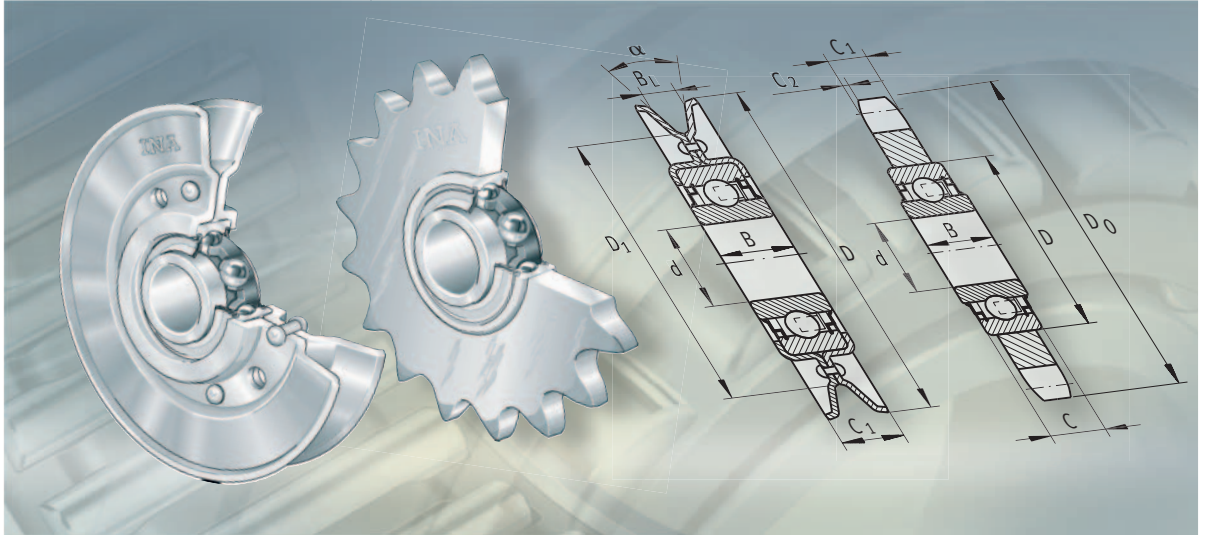
RA



RAY

									Number of mounting holes n	Load carrying capacity of housing C_{0rG} N	Basic load ratings	
S	N	B	B ₁	J	d ₃ max.	A	U	V			dyn. C_r N	stat. C_{0r} N
3,5	13,5	-	43,8	119	58	10,3	36,2	90	4	7 700	32 500	19 800
3,5	13,5	39,5	-	119	-	10,3	32,5	90	4	7 700	32 500	19 800
3,5	13,5	-	43,8	119	58	10,3	36,2	90	4	7 700	32 500	19 800
3,5	13,5	-	43,8	120,5	63	11,1	36,2	95	4	7 700	32 500	20 400
3,5	13,5	-	43,8	120,5	63	11,1	36,2	95	4	7 700	32 500	20 400
4	13,5	-	43,8	127	69	11,1	36,7	100	4	8 600	35 000	23 200
4	13,5	43	-	127	-	11,1	36	100	4	8 600	35 000	23 200
4	13,5	-	43,8	127	69	11,1	36,7	100	4	8 600	35 000	23 200
4	13,5	-	48,4	138	76	12,5	40,4	110	4	9 500	43 500	29 000
4	13,5	-	53,1	148	84	12	43,6	120	4	11 200	52 000	36 000
4	13,5	47	-	148	-	12	38	120	4	11 200	52 000	36 000





Roller chain idler sprocket units
Idler pulley units

Roller chain idler sprocket units Idler pulley units

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	Idler pulley units 1175
	Operating temperature 1175
Design and safety guidelines	Roller chain idler sprocket units 1176
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Accuracy 1177
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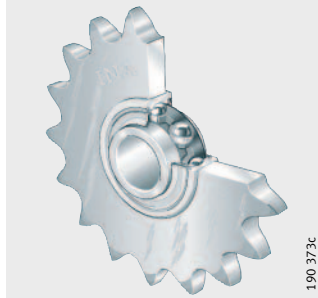
Product overview

Roller chain idler sprocket units Idler pulley units

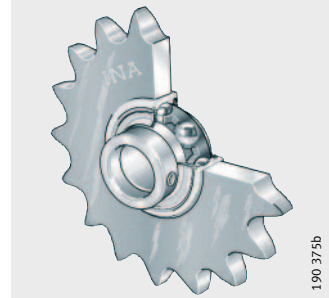
Roller chain idler sprocket units

Sprocket made from steel or sintered iron

KSR..-L0

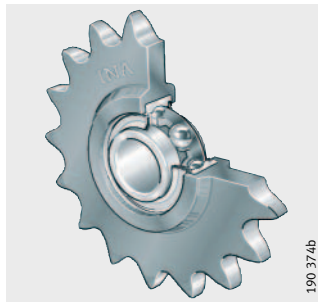


KSR..-B0



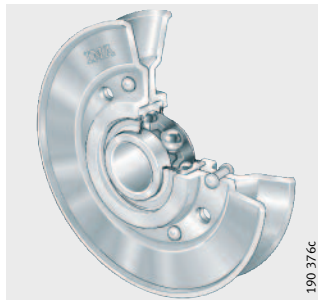
Sprocket made from plastic

KSR..-L0..-22

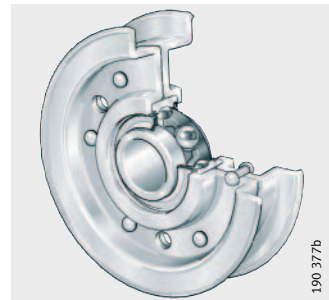


Idler pulley units

RSRA..-L0, RSRA..-K0



RSRB..-L0



RSRD..-L0



Roller chain idler sprocket units

Idler pulley units

Features

Roller chain idler sprocket units

INA roller chain idler sprocket units are guidance and return units for roller bush chains and roller chains. They can compensate for chain stretch resulting from operation and give smoother system running under high loads and speeds.

The ready-to-fit units comprise sprockets and deep groove ball bearings or radial insert ball bearings. The sprockets are made from high strength steel, sintered iron or plastic (polyamide). Sprockets made from plastic give particularly smooth running and generate very little noise. Since the inner ring of the deep groove ball bearing is extended on both sides, no additional spacer rings are required.

In series KSR...-B0, the inner ring is located on the shaft by means of a locking collar. The bearing bore of this series has a plus tolerance. As a result, unmachined shafts up to ISO tolerance h9 can be used under moderate loads and speeds.

Sealing/lubrication

The deep groove ball bearings are sealed on both sides. They are greased using a lithium soap grease to GA13 and are maintenance-free.

Idler pulley units

Idler pulley units are tensioning systems for belt drives and idler units. They

- increase the wrap angle in belt drives and can therefore support higher power levels or allow smaller units to be used
- compensate for belt stretch resulting from operation
- allow shorter centre distances
- reduce the wear on the belt drive.

The ready-to-fit units comprise deep drawn, profiled sheet steel pulley halves riveted together and deep groove ball bearings. Pulleys of larger diameters are additionally welded together. A lead chamfer on the pulley profile prevents damage to the belt. Due to the sheet steel construction, the additional rotating masses and the imbalance masses generated are low.

Type A is suitable for vee belts,
type B for flat, vee and round belts,
type D for round belts, steel cables and hemp ropes.



Sealing/lubrication

The deep groove ball bearings are sealed on both sides. They are greased using a lithium soap grease to GA13 and are maintenance-free.

Operating temperature

Roller chain idler sprocket units with steel or sintered iron sprockets are suitable for operating temperatures from $-20\text{ }^{\circ}\text{C}$ to $+120\text{ }^{\circ}\text{C}$.

Roller chain idler sprocket units with plastic sprockets are suitable for operating temperatures from $-20\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$.

Idler pulley units are suitable for operating temperatures from $-20\text{ }^{\circ}\text{C}$ to $+120\text{ }^{\circ}\text{C}$, limited by the grease and seal material.

Roller chain idler sprocket units Idler pulley units

Design and safety guidelines Roller chain idler sprocket units

Roller chain idler sprocket units should always be mounted on the slack side of the chain, *Figure 1*.

The wrap angle on the idler sprocket unit should be selected such that at least three teeth are engaged simultaneously.

For grease lubrication, a grease with good adhesion characteristics should be used.

Roller chain idler sprocket units of bore $d = 16$ mm are tolerated so that they can be fitted using M16 mounting screws.

Caution! The minimum press-out force of the deep groove ball bearings is 700 N. This value must not be exceeded during operation.
The preload on the slack side should not be less than 1% of the tractive force on the taut side.

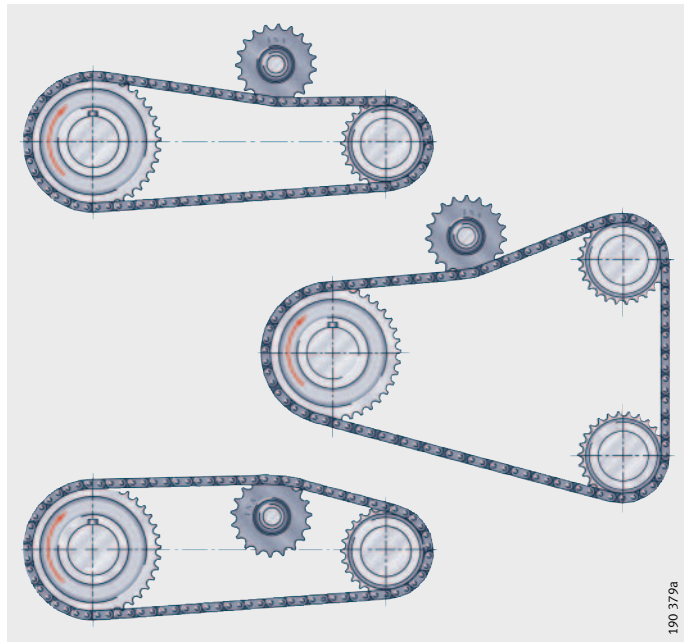


Figure 1
Arrangement on slack side of chain drive

Material codes

The materials used for the sprockets are classified by material codes, see table.

Code/material

Code	Material	Hardness
08	Sintered iron C 10	HB 50±10
09	Sintered iron D 39	HB 105±15
15	Steel St 52	–
16	Steel C 45	HRC 50±5 Tooth flanks hardened
22	Plastic PA	–

Idler pulley units

Idler pulley units should always be positioned on the slack side of the drive, *Figure 2*.

For normal loads, a light fit for the inner ring combined with axial clamping is sufficient.

If idler pulley units with a flat profile are to be used for tensioning via the back of a vee belt, check the suitability of the vee belt for this arrangement.

Caution! The permissible belt speed of 40 m/s must not be exceeded. Check the permissible strand force and life of the ball bearing for every application.

Preload force

The following is an approximate guide value for the preload S_v between the shafts:

- for flat belts
 $S_v = 2 \text{ to } 3 \times F_u$ (circumferential force)
- for vee belts
 $S_v = 1,7 \text{ to } 2,5 \times F_u$ (circumferential force).

Checking belt tension

Measure the speed ratio without load at low speed. Then measure the speed ratio at operating speed and under operating load. If the difference in speed due to slippage is $> 2\%$, retension the belt.

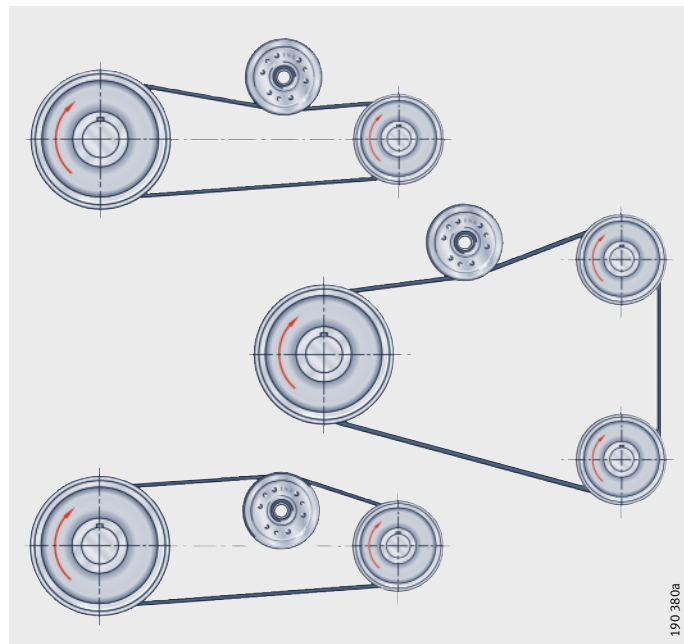
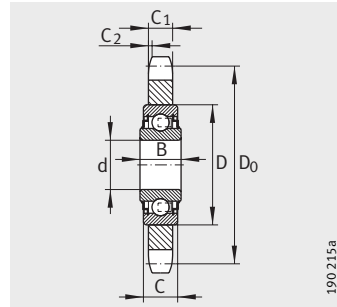


Figure 2
Arrangement
on slack side of belt drive

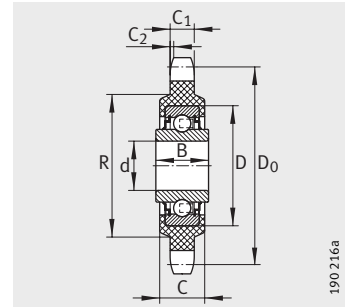
Accuracy

In the case of idler pulley units for vee belts, the groove angles are slightly larger due to the small wrap than recommended according to DIN 2211 and DIN 2217.

Roller chain idler sprocket units



KSR..-L0



KSR..-L0..-22

Dimension table · Dimensions in mm															
Tooth set		Designation ⁴⁾⁵⁾	Mass m ≈kg	Dimensions										For chain to	
p ¹⁾ "	z ²⁾			d ³⁾	C ₁	D ₀	D _k	C _{2 min}	D	B	C	R	DIN 8187	DIN 8188	
3/8	20	KSR16-L0-06-10-20-08	0,14	16,2	5,2	60,9	65	0,8	40	18,3	12	-	*	-	
1/2	16	KSR16-L0-08-10-16-08	0,16	16,2	7	65,1	70,5	1,1	40	18,3	12	-	*	-	
		KSR16-L0-08-10-16-15	0,14	16,2	7	65,1	70,5	1,1	40	18,3	12	-	*	*	
		KSR16-L0-08-10-16-22	0,1	16,2	7	65,1	70,5	1,1	40	18,3	18,1	48	*	*	
	18	KSR16-L0-08-10-18-08	0,21	16,2	7	73,1	78,6	1,1	40	18,3	12	-	*	-	
		KSR16-L0-08-10-18-09	0,21	16,2	7	73,1	78,6	1,1	40	18,3	12	-	*	*	
		KSR16-L0-08-10-18-16	0,21	16,2	7	73,1	78,6	1,1	40	18,3	12	-	*	*	
5/8	14	KSR16-L0-10-10-14-08	0,21	16,2	8,7	71,3	78	1,3	40	18,3	12	-	*	*	
	17	KSR16-L0-10-10-17-08	0,32	16,2	8,7	86,4	93,1	1,3	40	18,3	12	-	*	*	
		KSR16-L0-10-10-17-09	0,32	16,2	8,7	86,4	93,1	1,3	40	18,3	12	-	*	*	
		KSR16-L0-10-10-17-22	0,26	16,2	8,7	86,4	93,1	1,3	40	18,3	18	48	*	*	
3/4	13	KSR16-L0-12-10-13-08	0,33	16,2	10,5	79,6	87	1,5	40	18,3	12	-	*	*	
		KSR16-L0-12-10-13-16	0,33	16,2	10,5	79,6	87	1,5	40	18,3	12	-	*	*	
	15	KSR16-L0-12-10-15-08	0,42	16,2	10,5	91,6	99,2	1,5	40	18,3	12	-	*	*	
		KSR16-L0-12-10-15-09	0,42	16,2	10,5	91,6	99,2	1,5	40	18,3	12	-	*	-	
		KSR16-L0-12-10-15-22	0,36	16,2	10,5	91,6	99,2	1,5	40	18,3	18	48	*	*	
	17	KSR16-L0-12-10-17-15	0,58	16,2	10,5	103,7	111,4	1,5	40	18,3	12	-	*	*	
		KSR16-L0-12-10-17-16	0,58	16,2	10,5	103,7	111,4	1,5	40	18,3	12	-	*	*	
	20	KSR16-L0-12-10-20-15	0,86	16,2	10,5	121,8	130	1,5	40	18,3	12	-	*	*	
	1	12	KSR20-L0-16-10-12-15	0,7	20	15,3	98,1	107,6	2	47	17,7	14	-	*	*
		KSR20-L0-16-10-12-16	0,7	20	15,3	98,1	107,6	2	47	17,7	14	-	*	-	
1 1/4	9	KSR25-L0-20-10-09-16	0,8	25	17,6	92,8	103	2,5	52	21	15	-	*	*	
	13	KSR25-L0-20-10-13-15	1,6	25	17,6	132,7	144	2,5	52	21	15	-	*	*	

1) p = pitch.

2) z = number of teeth.

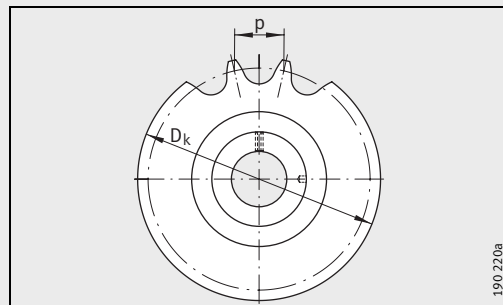
3) Bore tolerance d: see table.

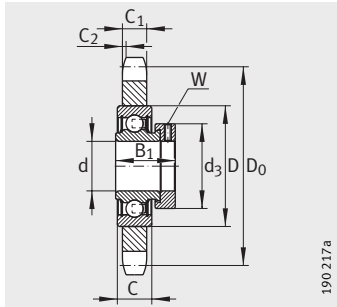
4) Material codes: see page 1176.

5) Composition of designation: see example, page 1179, footnote⁴⁾.

Bore tolerance

Series	Bore d mm	Tolerance mm
KSR..-L0	16,2	0 +0,1
	20 - 25	0 -0,01





KSR..-B0

Dimension table · Dimensions in mm																
Tooth set		Designation ³⁾⁴⁾	Mass m ≈ kg	Dimensions										W	For chain to	
p ¹⁾ "	z ²⁾			d 0 +0,018	C ₁	D ₀	D _k	C _{2 min}	D	B ₁	C	d ₃ max.	DIN 8187		DIN 8188	
³ / ₈	20	KSR15-B0-06-10-20-08	0,18	15	5,2	60,9	65	0,8	40	28,6	12	28	3	*	–	
¹ / ₂	16	KSR15-B0-08-10-16-08	0,21	15	7	65,1	70,5	1,1	40	28,6	12	28	3	*	–	
	18	KSR20-B0-08-10-18-08	0,32	20	7	73,1	78,6	1,1	47	31	14	33	3	*	*	
		KSR20-B0-08-10-18-15	0,32	20	7	73,1	78,6	1,1	47	31	14	33	3	*	*	
	19	KSR25-B0-08-10-19-08	0,29	25	7	77,1	82,5	1,1	52	31	15	37,3	3	*	*	
⁵ / ₈	14	KSR15-B0-10-10-14-08	0,26	15	8,7	71,3	78	1,3	40	28,3	12	28	3	*	*	
	17	KSR20-B0-10-10-17-15	0,41	20	8,7	86,3	93,1	1,3	47	31	14	33	3	*	*	
³ / ₄	13	KSR15-B0-12-10-13-08	0,4	15	10,5	79,6	87	1,5	40	28,6	12	28	3	*	*	
	15	KSR20-B0-12-10-15-16	0,47	20	10,5	91,6	99,2	1,5	47	31	14	33	3	*	*	
1	10	KSR20-B0-16-10-10-15	0,5	20	15,3	82,3	89,4	2	47	31	14	33	3	*	–	
	15	KSR30-B0-16-10-15-15	1,34	30	15,3	122,2	131	2	62	35,7	18	44	4	*	–	

1) p = pitch.

2) z = number of teeth.

3) Material codes: see page 1176.

4) Composition of designation taking example of **roller chain idler sprocket unit KSR15-B0-06-10-20-08**

KSR Roller chain idler sprocket unit

15 Bearing bore diameter

B0 Insert bearing with eccentric locking collar, series RAE..-NPP

06 Sprocket pitch in 1/16", code

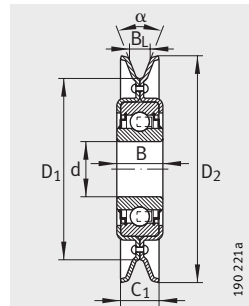
10 Chain code (width index or relevant standard)

20 Number of teeth

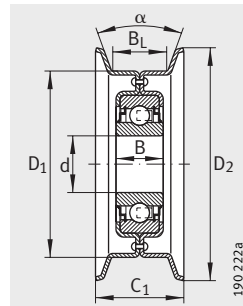
08 Material code (sintered iron).



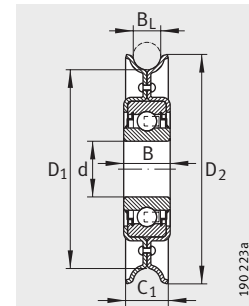
Idler pulley units



RSRA...-L0, RSRA...-K0
Type A



RSRB...-L0
Type B



RSRD...-L0
Type D

Dimension table · Dimensions in mm

Type	Designation	Mass m ≈ kg	Dimensions						Angle α °	Vee belt size to DIN 2 215, ISO/R 434, ISO/R 608, DIN 7 753 (ISO/R 460)	Basic load ratings ²⁾	
			d ¹⁾	D ₁	D ₂	B	C ₁	B _L			dyn. C _r N	stat. C _{0r} N
A	RSRA15-90-L0	0,24	15	61,6	90	14,4	20	12,4	32	8, 10, (12,5)	7 600	3 700
	RSRA17-102-K0-AH01	0,42	17	70,8	102	12	22,2	12,7	34	8, 10, (12,5)	9 600	4 750
	RSRA13-129-L0	0,56	13	73,7	129	18,3	32	22,1	32	13, 17, 20, 22	9 800	4 750
	RSRA16-129-L0	0,54	16	73,7	129	18,3	32	22,1	32	13, 17, 20, 22	9 800	4 750
	RSRA16-186-L0	1,11	16	130,8	186	18,3	32	22,1	32	13, 17, 20, 22	9 800	4 750
B	RSRB15-92-L0	0,31	15	76,2	92	14,4	31	22,2	10	–	7 600	3 700
	RSRB13-117-L0	0,5	13	101	117	18,3	36	25,4	10	–	9 800	4 750
	RSRB16-117-L0	0,48	16	101	117	18,3	36	25,4	10	–	9 800	4 750
	RSRB13-159-L0	0,8	13	139,7	159	18,3	36,5	25,4	10	–	9 800	4 750
	RSRB16-159-L0	0,78	16	139,7	159	18,3	36,5	25,4	10	–	9 800	4 750
	RSRB16-222-L0	1,45	16	203	222	18,3	50	38	10	–	9 800	4 750
D	RSRD25-150-L0	0,83	25	133	154	21	24	17	–	–	14 000	7 800

¹⁾ Bore tolerance d: see table.

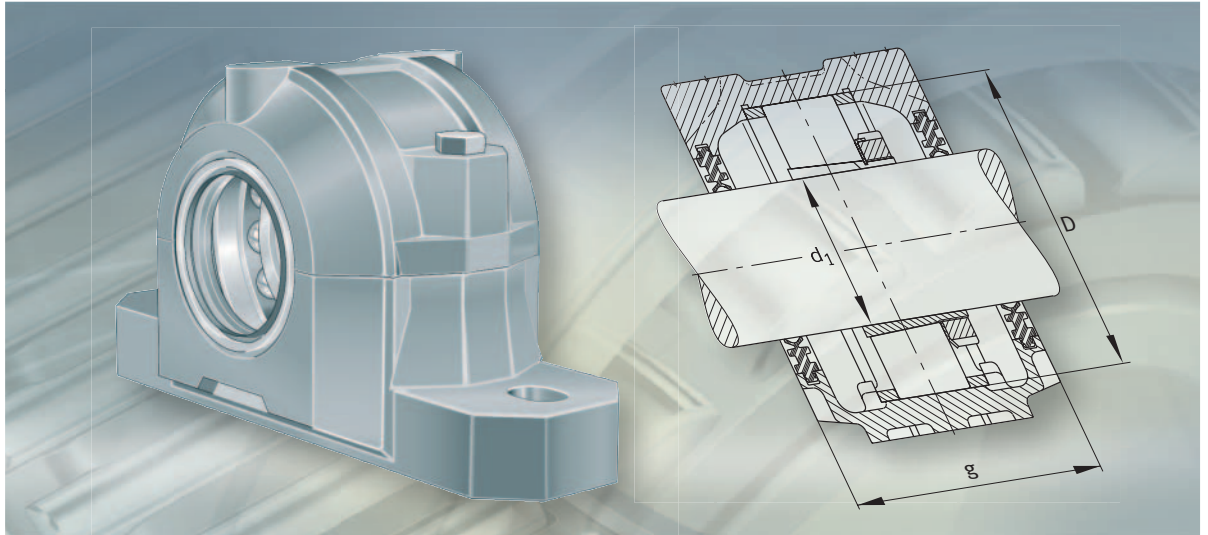
²⁾ Basic load rating of bearing.

Bore tolerance

Bore d mm	Tolerance mm
13	+0,08 –0,05
15	0 –0,08
16	+0,26 +0,13
17	0 –0,008
25	0 –0,01



FAG



Bearing housings

Bearing housings

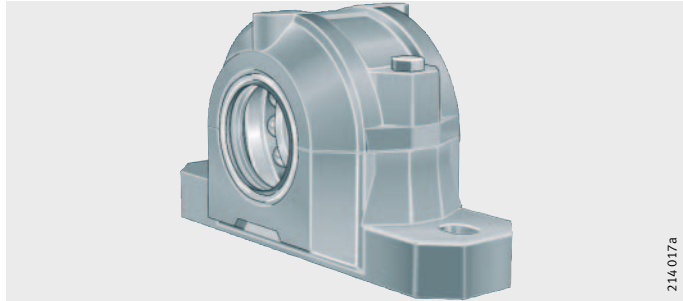
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	Flanged housings, F112, unsplit, for self-aligning ball bearings with extended inner ring.....	1306
	Flanged housings, F5, unsplit, for bearings with tapered bore and adapter sleeve	1308



Product overview Bearing housings

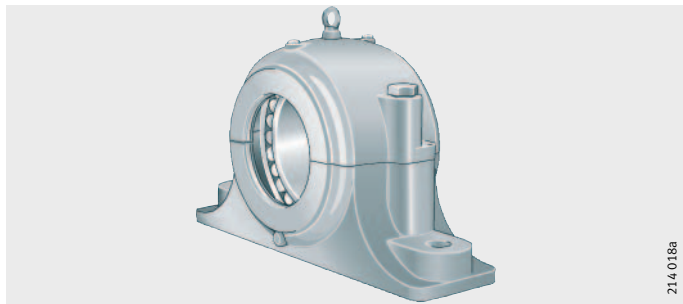
Plummer block housings Split

SNV



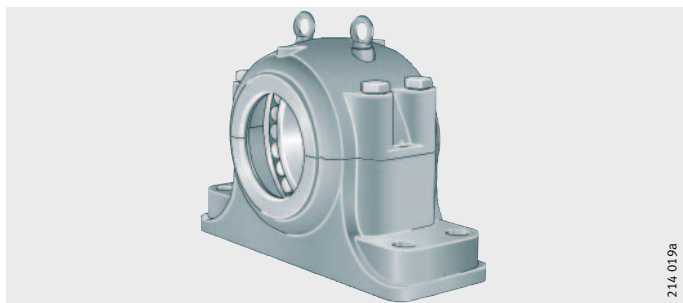
214.017a

S30



214.018a

SD31



214.019a

For oil lubrication

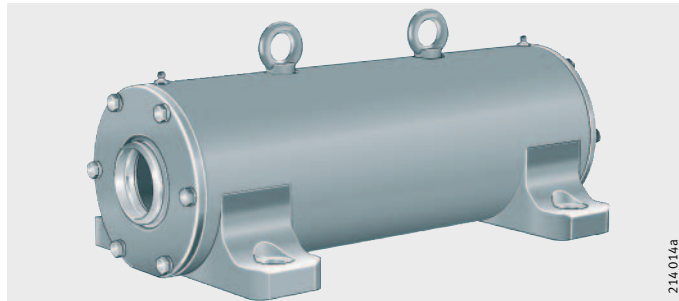
LOE



214.016b

Plummer block housings
Unsplit

VR3



214.014a

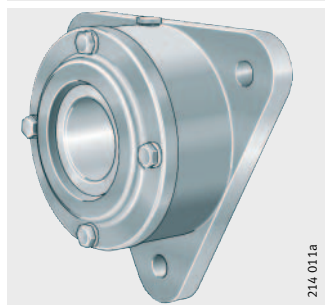
BND



214.015b

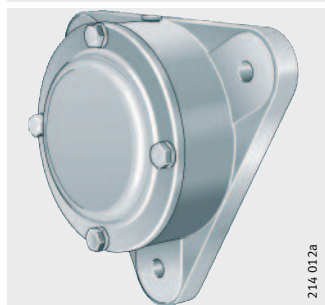
Flanged housings

F112



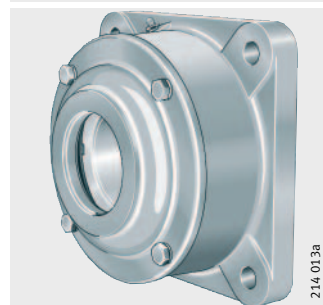
214.011a

F5 (F505 to F513)



214.012a

F5 (F515 to F522)



214.013a



Bearing housings

Features	FAG housings and the associated bearings form bearing units that have proven successful in machinery, plant and equipment. It is only possible to show here a small selection of the numerous sizes and designs (for an overview of the FAG series housings, see publication TI WL 90-30). For other housings or housing designs, please contact Schaeffler Group Industrial.
Housing materials and outer surfaces	<p>The bearing housings are predominantly made from flake graphite cast iron. We can supply housings made from cast steel or spheroidal graphite cast iron by agreement. Since the bearings are generally lubricated with grease and the initial grease filling lasts for a long period, most housings do not have relubrication holes. However, there are cast-on bosses or marks present so that lubrication holes can be made if necessary. If relubrication is carried out, it must be ensured that excess grease is allowed to escape.</p> <p>All outer surfaces of the housings and housing parts not machined by chip-forming methods have a universal paint coating (colour RAL 7031, bluish grey). The coating can be finished using all synthetic resin, polyurethane, acrylic, epoxy resin, chlorinated rubber, nitrocellulose and acid-hardening hammer tone finishes. The anti-corrosion protection on the inner and outer surfaces machined by chip-forming methods can be easily removed.</p>
Locating or non-locating bearings	The bearing seats in the housing are generally machined such that the bearings are movable and can thus function as non-locating bearings. Locating bearing arrangements can be achieved by the insertion of locating rings if these are listed in the tables. Locating rings must be ordered separately. Housings without locating rings are supplied in a non-locating or locating bearing design.
Sealing	For the sealing of bearing housings, contact seals, non-contact seals or combinations thereof are available in order to match the operating conditions, <i>Figure 1 to Figure 3</i> .

- ① Double lip seal
- ② Felt seal
- ③ Felt seal and V ring

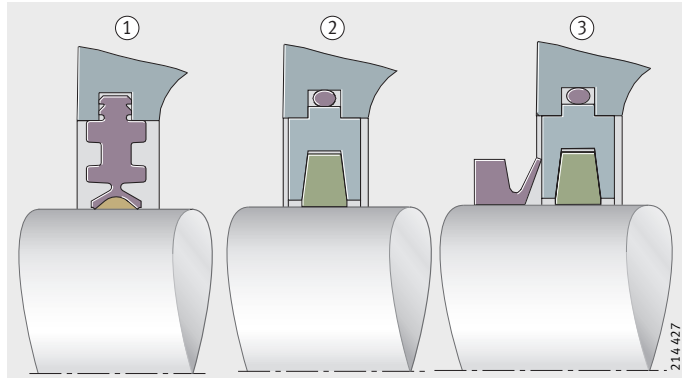


Figure 1
Examples of contact seals

- ① Radial labyrinth
- ② Axial labyrinth

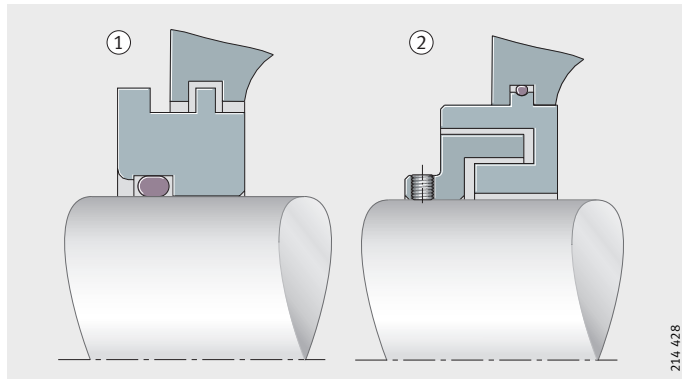


Figure 2
Examples of non-contact seals

- Taconite seal, comprising
- ① Labyrinth and
 - ② V ring

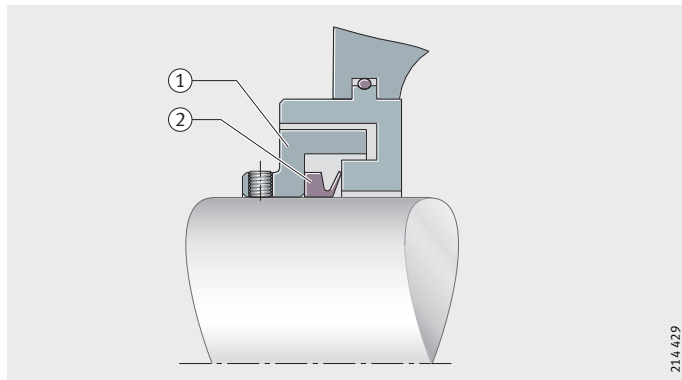


Figure 3
Example of combined seals



Bearing housings

Split and unsplit plummer block housings

Split and unsplit plummer block housings are generally intended for bearing arrangements with self-aligning ball bearings, barrel roller bearings and spherical roller bearings.

In split plummer block housings, the removable upper section of the housing is centred on the lower section by dowel pins, allowing easier fitting and maintenance. The upper sections must not be interchanged with each other.

In the case of split housings, the tolerance data for bearing seats are only valid for the delivered condition, i.e. before the screws connecting the upper and lower sections are loosened.

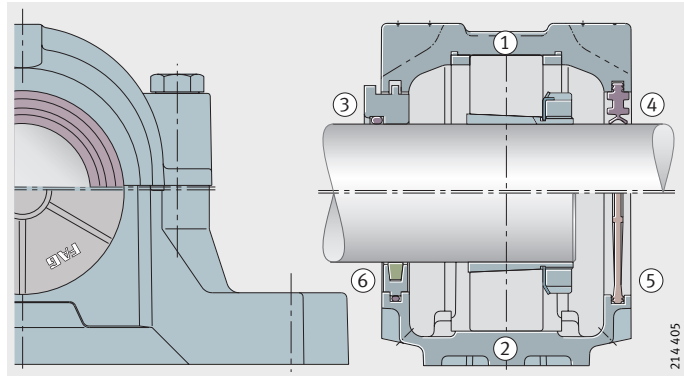
Split plummer block housings SNV

Housings SNV are designed in accordance with a modular concept. This allows the fitting of rolling bearings of various diameter and width series.

- ① Locating bearing
- ② Non-locating bearing
- ③ TSV, ④ DH, ⑤ DKV, ⑥ FSV

Figure 4

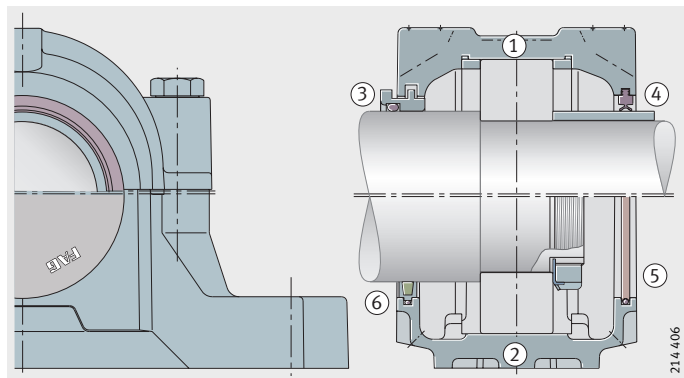
Housing SNV for bearings with tapered bore and adapter sleeve



- ① Locating bearing
- ② Non-locating bearing
- ③ TSV, ④ DH, ⑤ DKVT, ⑥ FSV

Figure 5

Housing SNV for bearings with cylindrical bore



For example, the housing SNV160 can accommodate various bearing types with angular adjustment, namely self-aligning ball bearings, barrel roller bearings and spherical roller bearings, from 20 bearing series; all bearings with the same outside diameter of 160 mm. Housings SNV can also accommodate deep groove ball bearings and split spherical roller bearings.

Bearings from different diameter series with the same outside diameter have different bore diameters.

In addition, the method of locating the bearing on the shaft is also significant:

- direct seating or location using an adapter also results in different shaft diameters.

In housings SNV, this gives different sizes of gap between the shaft and housing bore, depending on the bearing fitted. This gap is taken up by the seal.

The dimension tables indicate the suitable seals and covers for the bearings listed. If the housing bore allows a different bearing to be used, the seals must be selected as appropriate.

From size SNV215, the housings have an eye bolt that must not be loaded to a value greater than the mass of the housing including the bearing.

The essential advantages of housings SNV are:

- Simplified stockholding as a result of the modular concept. One housing size is suitable for various shaft diameters.
- High load carrying capacity, see page 1216.
- Depending on the operating conditions, double lip seals, V ring seals, labyrinth seals, felt seals or combined seals may be used. Special seals are available by agreement.
- Locating bearings centred by means of two locating rings of identical width.
- If high forces do not act on the locating face in a purely vertical direction, the housing can be abutted against stops due to the flat end faces on the housing base.
- Holes can be created at marked points on the housing for: lubrication and monitoring systems, fixing screws, parallel or tapered pins.



Dimensions, material

The dimensions of housings SNV correspond to ISO 113/II and, with the exception of the width, also to DIN 736 to DIN 739. The housings are interchangeable with the existing housings SN(E). The housings SNV listed in the tables are made from flake graphite cast iron (suffix L). Housings made from spheroidal graphite cast iron (suffix D) are available by agreement.

Bearing seat and fitting of bearings

The bearing seat in the housing SNV is machined to H7. The bearings are movable and thus function as non-locating bearings. Locating bearing arrangements are achieved by inserting one locating ring (FRM) on each side of the bearing; the bearing is thus seated in the centre of the housing. Housings SNV can accommodate rolling bearings that are seated directly on a stepped shaft or on an adapter sleeve.

Bearing housings

Seals and covers	<p>Seals and covers are fitted in the rectangular-section annular slots on both sides of housings SNV. The seals must be ordered separately. They are principally suitable for grease lubrication.</p> <p>The standard seal for housings SNV is the double lip seal DH. Other types available upon request are V ring seals DHV, labyrinth seals TSV, felt seals FSV, combined seals TCV and special seals.</p>
Double lip seal DH	<p>The double lip seal DH made from NBR is suitable for circumferential speeds up to 13 m/s. The two-part seal can be easily inserted in the annular slots in the housing (pay attention to the position of the joint). The seal lips slide on the rotating shaft. The outer seal lip prevents ingress of contamination into the bearing arrangement. This effect is supported by the grease held between the seal lips. The inner lip prevents lubricant from escaping from the housing. The double lip seal allows shaft misalignment of up to 0,5° in both directions. It is suitable for temperatures from -40 °C to +100 °C. The contact area on the shaft for the seal lips should have a roughness to class N8 (DIN ISO 1302).</p>
V ring seal DHV	<p>In V ring seals DHV made from NBR, the seal lip is in axial contact with the sliding surface. The seal allows misalignment of up to 0,5° in both directions and is suitable, if grease lubrication is used, for a circumferential speed up to 12 m/s (at > 8 m/s, axial location is necessary).</p>
Labyrinth rings TSV	<p>Labyrinth rings of series TSV are suitable for higher circumferential speeds since they are of a non-contact type. The O ring pressed between the labyrinth ring and the shaft ensures that the labyrinth ring does not slip despite the loose fit. The O ring made from Viton® is suitable for temperatures up to +200 °C. The labyrinth seal allows shaft misalignment of up to 0,5° in both directions. If necessary, the labyrinth can be relubricated.</p>
Felt seals FSV	<p>FAG felt seals FSV are suitable for grease lubrication and temperatures up to +100 °C (by agreement, aramide packing is available for high temperatures). The adapter holding the inserted, oil-impregnated felt strip is secured against rotation by an O ring in the housing slot. Felt seals are suitable for circumferential speeds up to 5 m/s and, after running-in, up to 15 m/s. The permissible shaft misalignment is 0,5° in both directions.</p>
Covers DKV	<p>If housings SNV are to be closed off on one side, covers DKV must be ordered specially. The plastic covers are suitable for long term operating temperatures up to +120 °C. Covers DKVT for higher temperatures are available by agreement.</p>

Grease lubrication

In many applications, bearings can be lubricated for life, i.e. the grease quantity introduced at assembly is sufficient for the entire bearing life when contact seals are used (e.g. DH, FSV). The bearings are filled completely with grease while the housing cavities are filled to 60%. Grease quantity for initial filling: see table Recommended grease quantity for initial filling of housings SNV, page 1192 (housing cavities filled to 60%, bearing filled completely).

For bearing operating temperatures $< +100\text{ }^{\circ}\text{C}$, bearing loads $P/C < 0,3$ and a bearing specific speed parameter $k_a \cdot n \cdot d_M < 700\,000\text{ min}^{-1} \cdot \text{mm}$, the most suitable rolling bearing grease is Arcanol MULTITOP, a lithium soap grease to NLGI class 2 with particularly effective EP additives, see also publication no. WL 81 116.

For a speed parameter $n \cdot d_M < 50\,000\text{ min}^{-1} \cdot \text{mm}$ and a non-contact seal (e.g. TSV), where the grease should also perform a sealing function, the housing and seal cavities should be filled to approx. 100%.

If the achievable fatigue limit life of the bearing is significantly longer than the grease operating life, the existing grease must be removed and replaced by fresh grease.

If the grease change intervals for particular applications are too short, relubrication is recommended. The lubricant can be introduced into the housing from the side or, in the case of bearings with a lubrication slot and lubrication holes, through the centre.

If relubrication is carried out from the side, the housing cavities on the side with the lubrication nipple should be filled to approx. 100% with grease so that the relubrication grease can act immediately on the bearing. Depending on the seal selected and the application, the housing can be fitted at marked locations with devices for the inlet and outlet of lubricant.

Housings ordered using the suffix G944A* have a lubrication nipple and grease outlet hole. Position and dimensions of the holes and lubrication nipple see *Figure 6*, page 1193.

In housings with a grease outlet hole or non-contact seal, the bearing cannot be overlubricated. If the temperature level is higher at relubrication due to the churning energy of the grease, this will return to its original level after a few hours' running time, once the excess grease has escaped. In the interests of the environment, controlled metering of lubricant is recommended.

Due to their favourable flow behaviour, greases of consistency class 2, e.g. Arcanol MULTITOP and MULTI2, are more suitable for relubrication than greases of higher consistency classes.



Bearing housings

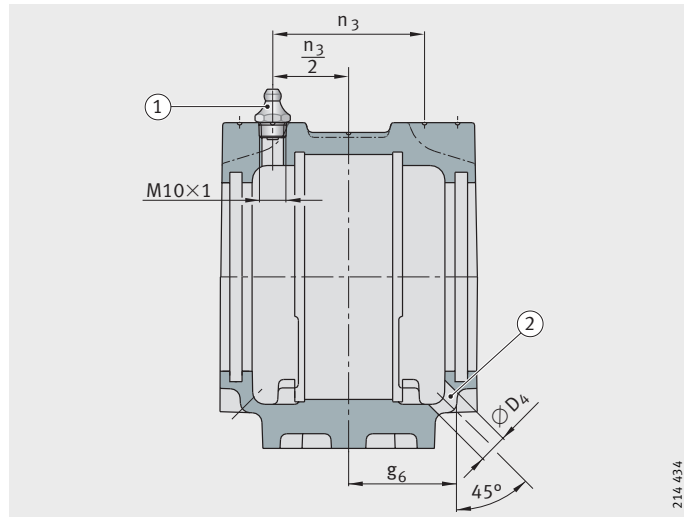
Recommended grease quantity for initial filling of housings SNV (housing cavities filled to 60%, bearing filled completely)

Housing	Grease quantity Initial filling ≈g
SNV052	30
SNV062	45
SNV072	65
SNV080	80
SNV085	105
SNV090	130
SNV100	180
SNV110	210
SNV120	270
SNV125	290
SNV130	330
SNV140	440
SNV150	500
SNV160	650
SNV170	700
SNV180	900
SNV190	950
SNV200	1 200
SNV215	1 400
SNV230	1 600
SNV240	1 700
SNV250	2 000
SNV260	2 000
SNV270	2 500
SNV280	2 600
SNV290	3 000
SNV300	3 100
SNV320	3 700
SNV340	4 500

- ① Lubrication nipple (example)
- ② Outlet hole

Figure 6

Recommended dimensions for lubrication nipple connector hole and grease outlet hole



Recommended dimensions for lubrication nipple connector hole and grease outlet hole

Housing	Connector for lubrication nipple $\frac{n_3}{2}$ mm	Grease outlet hole	
		D_4 mm	g_6 mm
SNV052	19	10	27,5
SNV062	21	10	30
SNV072	23	10	33
SNV080	26	10	36
SNV085	23,5	10	34,5
SNV090	29	10	41,5
SNV100	31	15	44
SNV110	33,5	15	46
SNV120	35,5	15	49
SNV125	28,5	10	41
SNV130	38	15	51,5
SNV140	40,5	15	57,5
SNV150	42,5	15	60
SNV160	45	15	62,5
SNV170	46,5	20	64
SNV180	49,5	20	69
SNV190	49,5	20	68,5
SNV200	55,5	20	77,5
SNV215	58,5	20	80
SNV230	61	20	83
SNV240	60	20	81,5
SNV250	65,5	20	89
SNV260	62,5	20	84
SNV270	71,5	20	96,5
SNV280	68	20	92,5
SNV290	76	20	102,5
SNV300	73	20	99,5
SNV320	77	20	104,5
SNV340	81	20	109,5



Bearing housings

Housings SNV for grease relubrication (suffix G944A*, available by agreement) have a lubrication nipple and an outlet hole of the dimensions given in the table, see table on page 1193. Example: design G944AA with taper type lubrication nipple NIP.DIN 71 412-AM10×1.

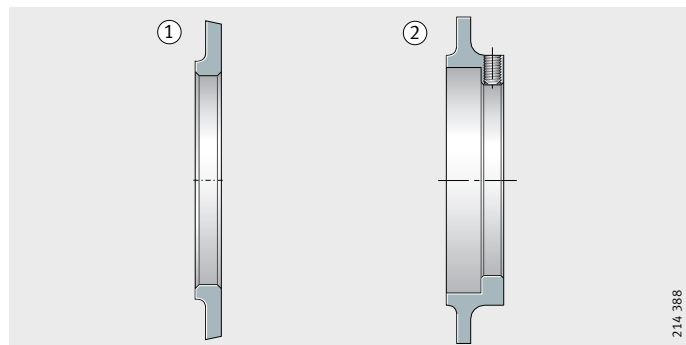
Grease valves RSV

For operation at high speeds, e.g. in fan bearing arrangements, we can by agreement supply grease valves RSV, see *Figure 7* and *Figure 8*.

The grease valves for housings SNV of design G944A* must be ordered separately. For bearings located by means of adapter sleeves, grease valves RSV5 or RSV6 should be used, for bearings with a cylindrical bore RSV2 or RSV3 should be used.

- ① RSV2, RSV3
- ② RSV5, RSV6

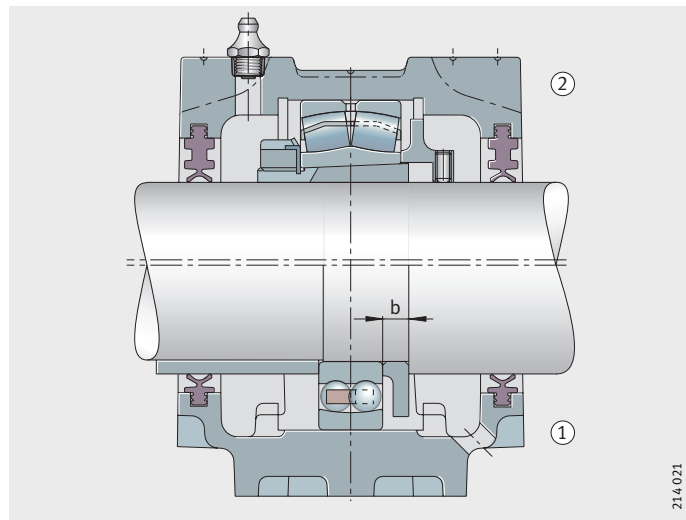
Figure 7
Grease valves RSV



214 368

- ① RSV2, RSV3
 - ② RSV5, RSV6
- b = valve width

Figure 8
Grease valves RSV
Mounting position



214 021

Dimensions of grease valves RSV

Grease valve	Width b mm
RSV205 to RSV211	8
RSV212 to RSV218	10
RSV219 to RSV222	13
RSV224 to RSV232	15
RSV305 to RSV308	8
RSV309 to RSV313	10
RSV314 to RSV316	13
RSV317 to RSV322	15
RSV324 to RSV332	16

Oil lubrication

Housings SNV are designed such that they are suitable for both oil bath and recirculating oil lubrication. The housings have a large internal cavity with oil collector pockets in the lower section as well as connector facilities for oil inlet, oil outlet, oil level sensors and temperature sensors. When using oil bath lubrication, a minimum oil level must be ensured. If the FAG double lip seal is used, a certain amount of oil leakage must be expected, which is unavoidable with seals that are split and not spring-loaded. In order to limit oil leakage to a small quantity, the shaft in the double lip contact areas should be as follows: hardness min. 55 HRC, ground free from spiral marks with $R_a = 0,2 \mu\text{m}$ to max. $0,5 \mu\text{m}$.

The parting line between the upper and lower sections of the housing must be sealed with a thin layer of a commercial sealant (with permanent elasticity).

Caution! Please note that the housing must be ventilated if oil bath lubrication is used (for example, the inlet hole can be closed off using a ventilation plug).



Bearing housings

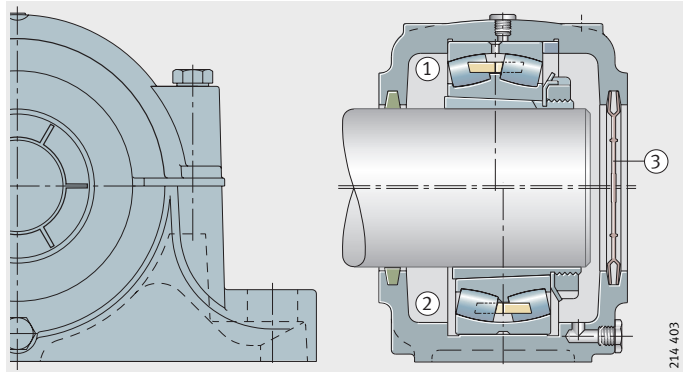
Split plummer block housings S30

Split plummer block housings for spherical roller bearings 230...K with tapered bore and adapter sleeve, *Figure 9 to Figure 12.*

- ① Locating bearing
- ② Non-locating bearing
- ③ Cover DK

Figure 9

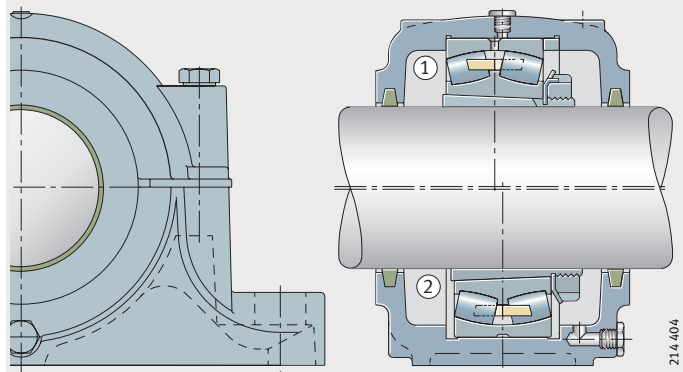
Plummer block housing S30 up to and including size S3040 with cover DK



- ① Locating bearing
- ② Non-locating bearing

Figure 10

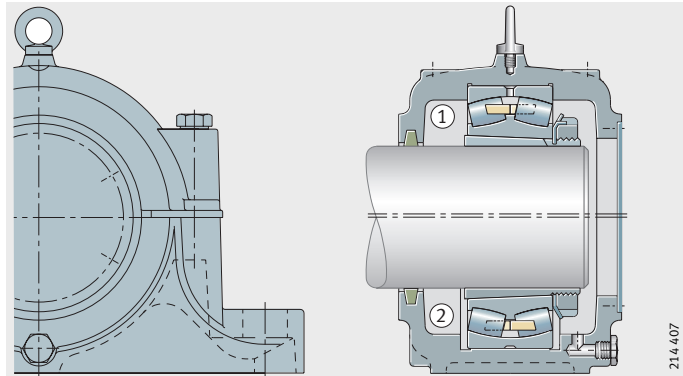
Plummer block housing S30 up to and including size S3040 without cover DK



- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

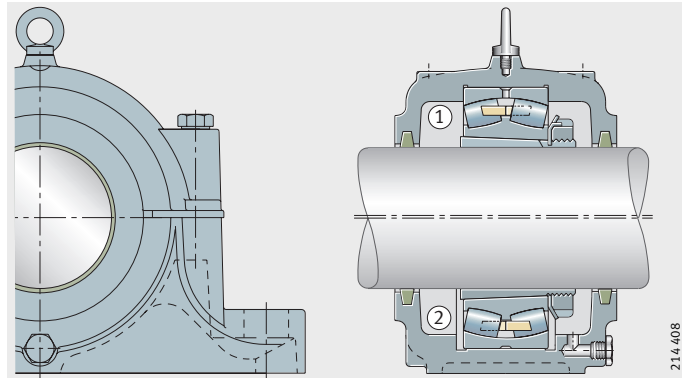
Figure 11

Plummer block housing S30 from size S3044, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

Figure 12
Plummer block housing S30
from size S3044,
design B



Plummer block housings of series S30 for spherical roller bearings of series 230..-K with tapered bore and adapter sleeve

The smaller housings including S3040 are non-locating bearing housings, i.e. locating bearing arrangements can be achieved by inserting a locating ring. Locating rings must be ordered separately. Housings closed on one side up to size S3040 have a polyamide cover inserted in the slot instead of the felt strip. This cover must be ordered separately.

The larger housings from S3044 are produced as non-locating bearing housings or as locating bearing housings. When ordering housings closed on one side, design A must be indicated in the order. The cover is made from steel. Housings of design B are intended for continuous shafts.

The housings are sealed using felt strips. Felt seals allow shaft misalignment of up to 0,5° in both directions.

Housings of series S30 can be relubricated via a lubrication connector in the centre of the housing. From size S3034, the housings have a ring bolt that must not be loaded to a value greater than the mass of the housing including the bearing.

The housing material is flake graphite cast iron (suffix L).

Load carrying capacity: see also Load carrying capacity of split plummer block housings, page 1217.

Caution! The maximum axial load carrying capacity is 35% of F_{180° .



Bearing housings

Recommended grease quantity for
initial filling of housings S30
(housing cavities filled to 60%,
bearing filled completely)

Housing	Grease quantity Initial filling ≈g
S3024	390
S3026	560
S3028	630
S3030	730
S3032	970
S3034	1 100
S3036	1 300
S3038	1 300
S3040	2 000
S3044	2 700
S3048	2 700
S3052	3 700
S3056	4 200
S3060	5 200
S3064	5 500
S3068	6 800
S3072	7 200
S3076	8 600
S3080	10 400
S3084	12 000
S3088	13 200
S3092	14 600
S3096	15 100

Split plummer block housings SD31

Split plummer block housings for spherical roller bearings 231...-K with tapered bore and adapter sleeve, *Figure 13 to Figure 16.*

- ① Locating bearing
- ② Non-locating bearing

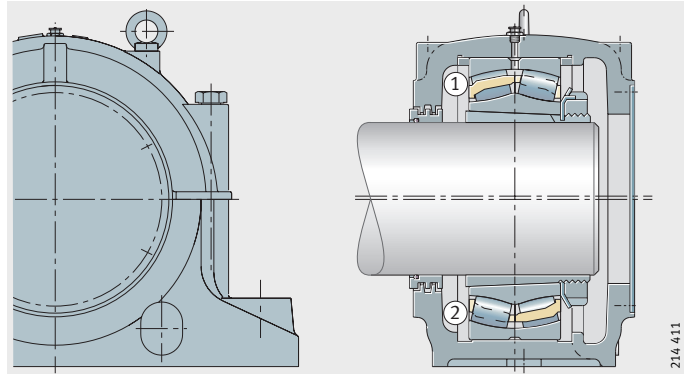


Figure 13

Plummer block housing SD31 up to and including size SD3140, design A

- ① Locating bearing
- ② Non-locating bearing

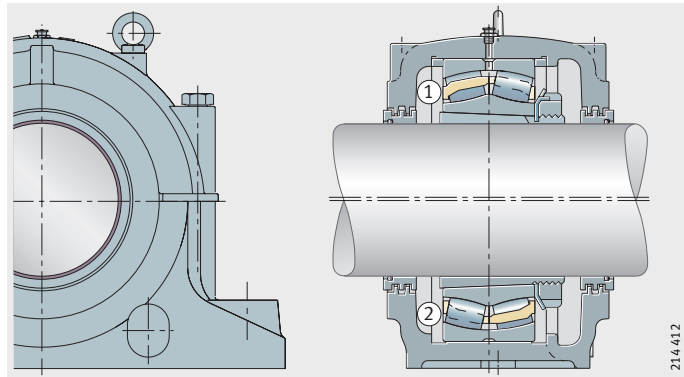


Figure 14

Plummer block housing SD31 up to and including size SD3140, design B

- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

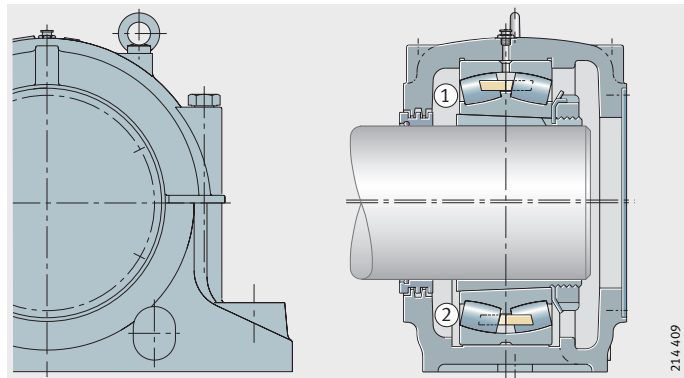


Figure 15

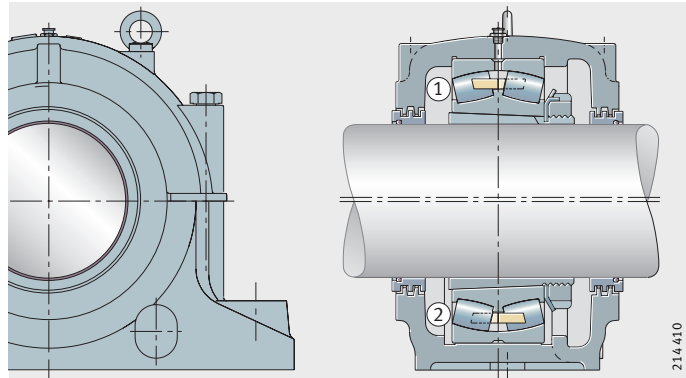
Plummer block housing SD31 from size S3144, design A



Bearing housings

- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

Figure 16
Plummer block housing SD31
from size SD3144,
design B



Plummer block housings of series SD31 for spherical roller bearings of series 231..-K with tapered bore and adapter sleeve

These housings are intended for bearing arrangements subjected to heavy loads. The bearings are located on the shaft by means of adapter sleeves.

From SD3144, the housings are supplied as a locating bearing design or non-locating bearing design. Smaller housings initially give non-locating bearing arrangements. Locating bearing arrangements can be achieved by the insertion of locating rings on both sides of the bearing. Locating rings must be ordered separately.

The housings are intended for grease lubrication and can be relubricated via a lubrication nipple.

For the holes required for oil lubrication, the upper and lower section of the housings have cast-on bosses.

The seal is a three-section labyrinth. Labyrinth seals allow shaft misalignment of up to 0,25° in both directions. Housings closed on one side (design A) are supplied with a steel cover.

The ring bolts in the upper section of the housing must not be loaded to a value greater than the mass of the housing including the bearing.

The housing material is flake graphite cast iron (suffix L).

Load carrying capacity: see also Load carrying capacity of split plummer block housings, page 1218.

Caution! The maximum axial load carrying capacity is $\frac{2}{3}$ of F_{180° .

Recommended grease quantity for initial filling of SD31 housings (housing cavities filled to 60%, bearing filled completely)

Housing	Grease quantity Initial filling ≈g
SD3134	1 700
SD3136	2 100
SD3138	2 800
SD3140	3 600
SD3144	4 200
SD3148	5 200
SD3152	6 700
SD3156	7 000
SD3160	10 000
SD3164	12 000
SD3168	18 000
SD3172	18 000
SD3176	23 000
SD3180	23 000
SD3184	32 000
SD3188	32 000
SD3192	40 000
SD3196	40 000



Bearing housings

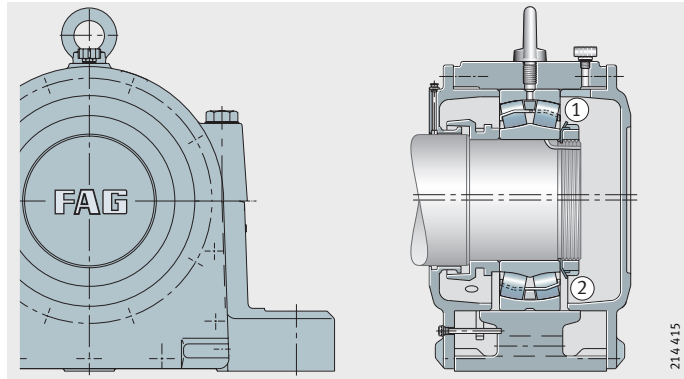
Split plummer block housings LOE for oil lubrication

Split plummer block housings LOE are designed for oil lubrication. Plummer block housings LOE2 and LOE3 are fitted with spherical roller bearings with a cylindrical bore of series 222 and 223, *Figure 17* and *Figure 18*.

The bearings are located on the shaft using an interference fit and axially secured by means of a locknut.

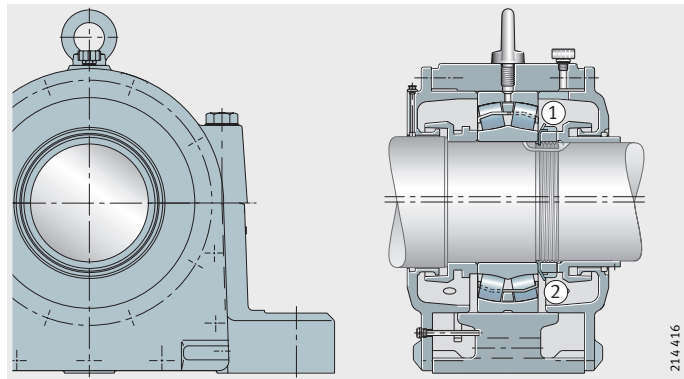
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

Figure 17
Plummer block housings LOE2, LOE3, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

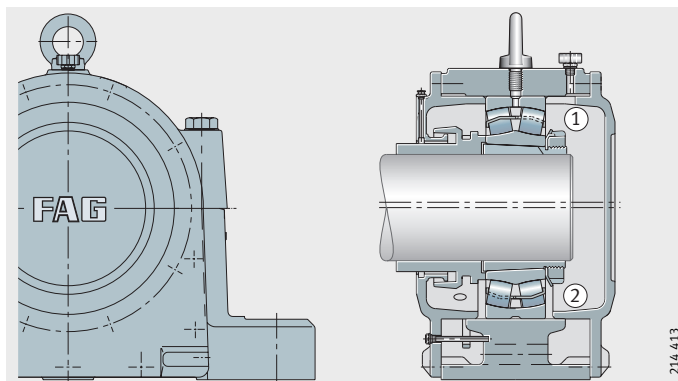
Figure 18
Plummer block housings LOE2, LOE3, design B



LOE plummer block housings LOE5 and LOE6 are intended for spherical roller bearings with tapered bore and adapter sleeve location, *Figure 19* and *Figure 20*.

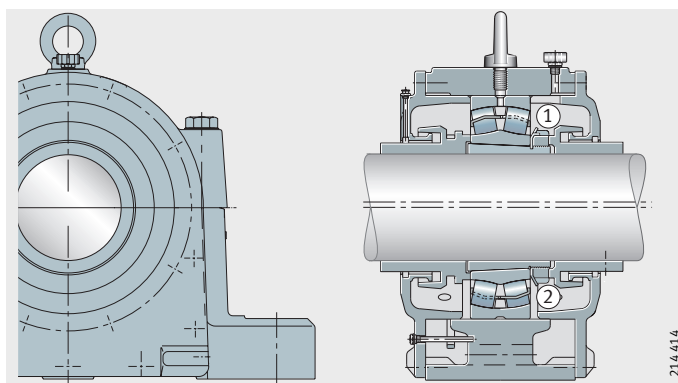
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

Figure 19
Plummer
block housings LOE5, LOE6,
design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

Figure 20
Plummer
block housings LOE5, LOE6,
design B



The housing is split, the labyrinth covers are unsplit. The seal comprises two labyrinth rings. Labyrinth seals allow shaft misalignment of up to $0,25^\circ$ in both directions. The grease chamber in the cover labyrinth can be relubricated. The housing base has four extended slots.

Plummer block housings of series LOE are suitable for high-speed bearing arrangements and are designed for oil lubrication. The oil is supplied to the rolling bearing from the oil sump in the lower section of the housing by a ring oiler. An angled oil level indicator is screwed to one cover.

Housings of series LOU for recirculating oil lubrication are available by agreement.

The ring bolt in the upper section of the housing must not be loaded to a value greater than the mass of the housing including the bearing.

The housing material is flake graphite cast iron (suffix L).



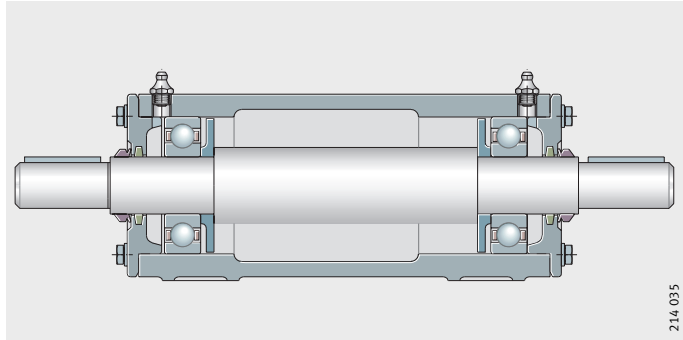
Bearing housings

Unsplit plummer block housings VR3

Plummer block housings VR3 are fitted with rolling bearings with a cylindrical bore, *Figure 21 to Figure 26*. The variants of these housings are available completely assembled and greased as bearing units VRE3.

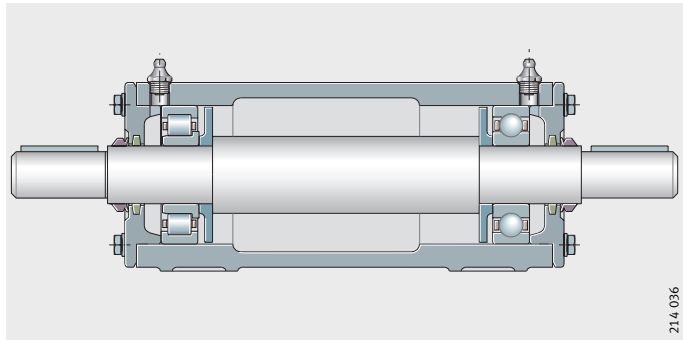
Housing VR3..-A
2 deep groove ball bearings
in floating arrangement
Shaft VRW3..-A

Figure 21
Unit VRE3..-A



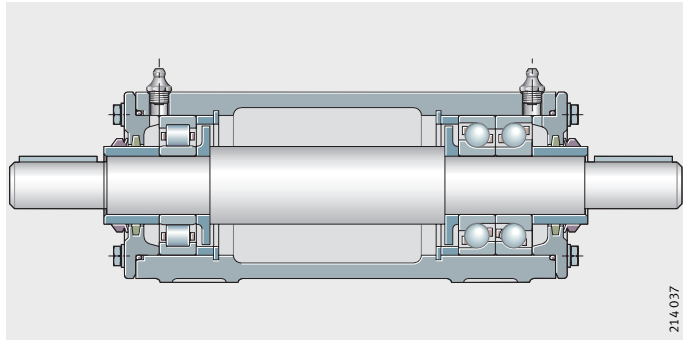
Housing VR3..-A
1 deep groove ball bearing and
1 cylindrical roller bearing NJ
in floating arrangement
Shaft VRW3..-A

Figure 22
Unit VRE3..-B



Housing VR3..-C
Locating/non-locating bearing
arrangement with
1 cylindrical roller bearing NU and
2 angular contact ball bearings
in O arrangement
Shaft VRW3..-C

Figure 23
Unit VRE3..-C



From size VR(E)310, the housings have two ring bolts that must not be loaded to a value greater than the mass of the housing including the bearing and shaft. After mounting, the ring bolts can be replaced by the hexagon head bolts with seals included in the packaging.

Housing VR3..-D
 Locating/non-locating bearing
 arrangement with
 1 cylindrical roller bearing NU and
 1 deep groove ball bearing
 Shaft VRW3..-D

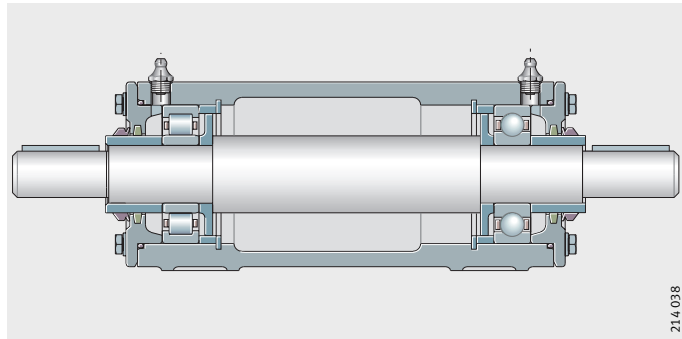


Figure 24
 Unit VRE3..-D

Housing VR3..-E
 Locating/non-locating bearing
 arrangement with
 1 cylindrical roller bearing NU,
 1 cylindrical roller bearing NU and
 1 deep groove ball bearing
 Shaft VRW3..-C

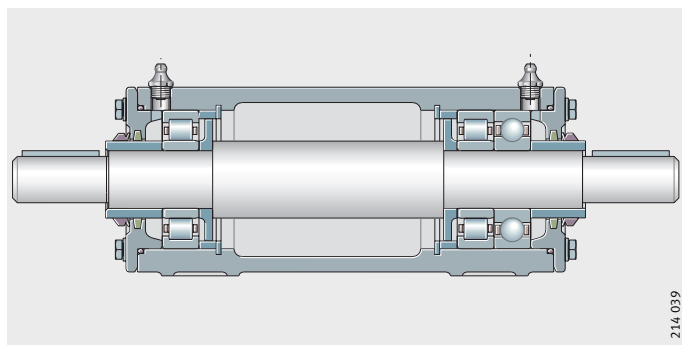


Figure 25
 Unit VRE3..-E

Housing VR3..-F
 2 deep groove ball bearings
 in floating arrangement,
 axially adjusted by spring between
 outer ring and housing cover
 Shaft VRW3..-F

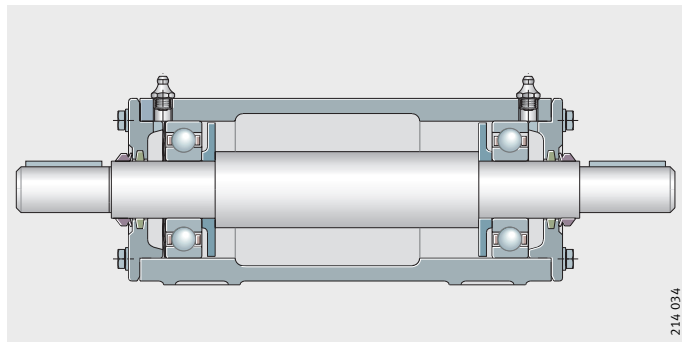


Figure 26
 Unit VRE3..-F



These unsplit housings, developed for fan applications, contain two bearing positions. They are used where a precise and easy-to-fit bearing arrangement is required, for example in:

- conveying equipment
- test rigs
- materials processing machinery
- belt drives
- laboratory equipment
- textile machinery
- feeder mechanisms.

Bearing housings

All variants of housings VR3 are available completely assembled and greased as bearing units VRE3. They can be integrated directly in existing machinery without substantial preparation. The shaft diameter range extends from 25 mm to 120 mm.

Advantages of bearing units VRE3:

- Easy to fit
- Low maintenance requirements
- Effective, low-friction sealing against dust and moisture (permissible operating temperature +100 °C)
- Bearing arrangement contained in single-piece housing, therefore requiring no time-consuming alignment work
- High tilting moments supported by two bearings with optimum spacing
- Six designs allow matching to different load conditions.

In addition to complete bearing units VRE3, the following are also available:

- housings VR3 with covers, grease valves, lubrication nipples, seals, locating elements and, if necessary, a spring washer
- shafts VRW with locating elements
- rolling bearings.

Areas of application of designs

Design A is suitable for predominantly radial load and high speed. It can support axial loads in both directions (not alternating).

Design B is suitable for high radial load on one side. It can only support axial forces in one direction.

Design C is suitable for high radial load on one side. It can support high axial forces in both directions.

Design D is suitable for axial loads in both directions.

Design E is suitable for high radial loads on both sides and axial loads in both directions.

Design F is suitable for predominantly radial load and high speed. It can support axial load in one direction (facing away from the spring).

Marking

A cast-on boss on the housing body indicates:

- the position of the cylindrical roller bearing in design B,
- the position of the non-locating bearing in designs C, D and E,
- the position of the ondular washer in design F.

The position of the ondular washer is also indicated on the shaft VRW3...-F.

The housing is made from flake graphite cast iron, the shaft is made from steel.

Further information

Further information on lubrication and sealing, fitting and maintenance of VRE units is given in publication no. WL 90121, FAG Bearing Units for Fans, Series VRE3.

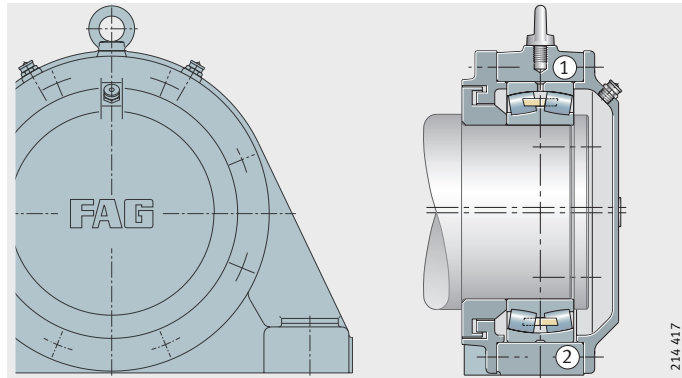
Unsplit plummer block housings BND

Unsplit FAG housings of series BND are combined with FAG spherical roller bearings, seals and grease filling to form bearing units for very demanding operating conditions, *Figure 27 to Figure 38*.

- ① Locating bearing BND...Z-Y-AF-S
- ② Non-locating bearing BND...Z-Y-AL-S

Figure 27

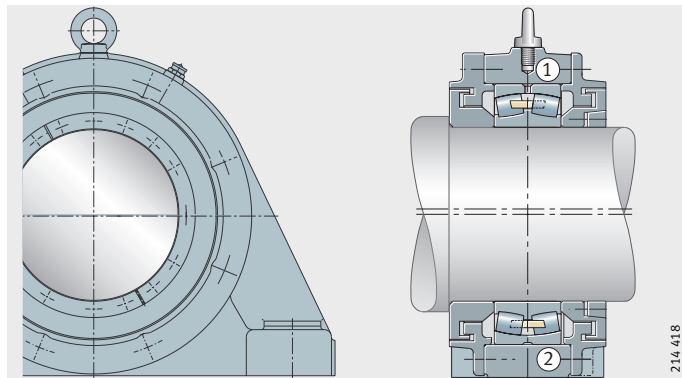
Plummer block housing BND for bearing with cylindrical bore (labyrinth seal), design A



- ① Locating bearing BND...Z-Y-BF-S
- ② Non-locating bearing BND...Z-Y-BL-S

Figure 28

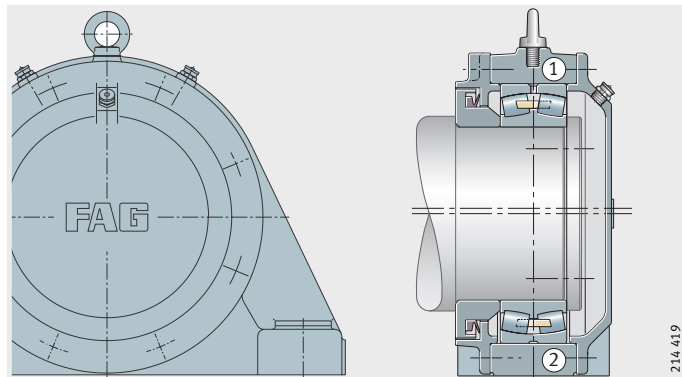
Plummer block housing BND for bearing with cylindrical bore (labyrinth seal), design B



- ① Locating bearing BND...Z-T-AF-S
- ② Non-locating bearing BND...Z-T-AL-S

Figure 29

Plummer block housing BND for bearing with cylindrical bore (Taconite seal), design A

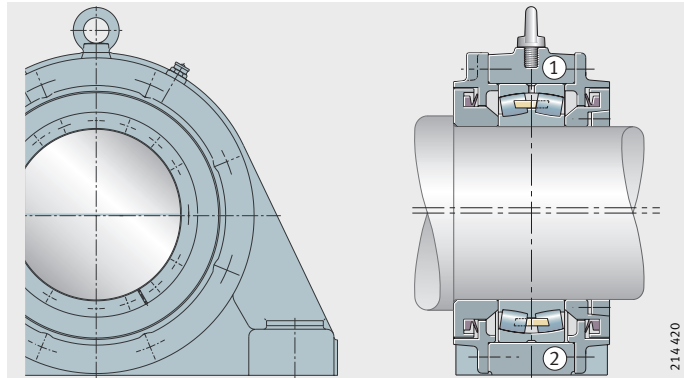


Bearing housings

- ① Locating bearing BND..-Z-T-BF-S
- ② Non-locating bearing BND..-Z-T-BL-S

Figure 30

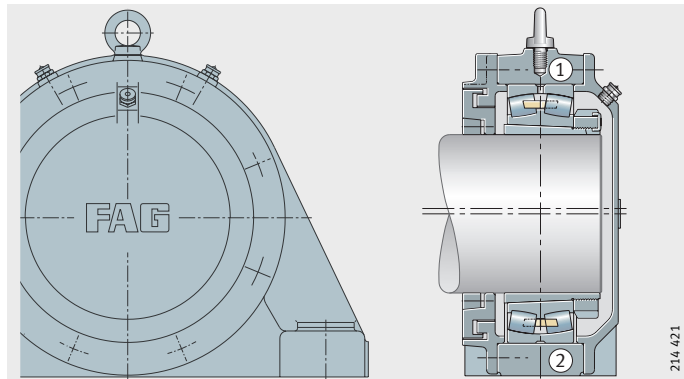
Plummer block housing BND for bearing with cylindrical bore (Taconite seal), design B



- ① Locating bearing BND..-H-W-Y-AF-S
- ② Non-locating bearing BND..-H-W-Y-AL-S

Figure 31

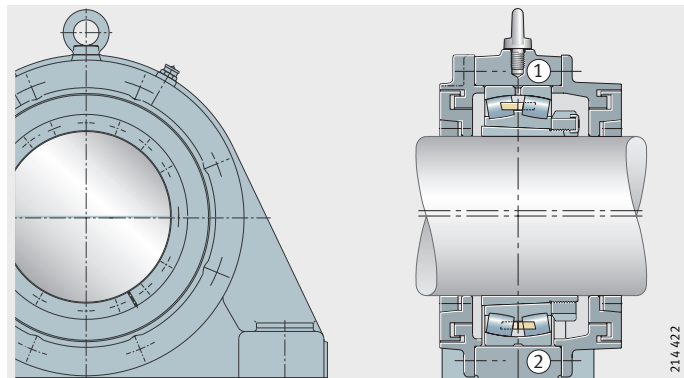
Plummer block housing BND for bearing with tapered bore and adapter sleeve (labyrinth seal), design A



- ① Locating bearing BND..-H-W-Y-BF-S
- ② Non-locating bearing BND..-H-W-Y-BL-S

Figure 32

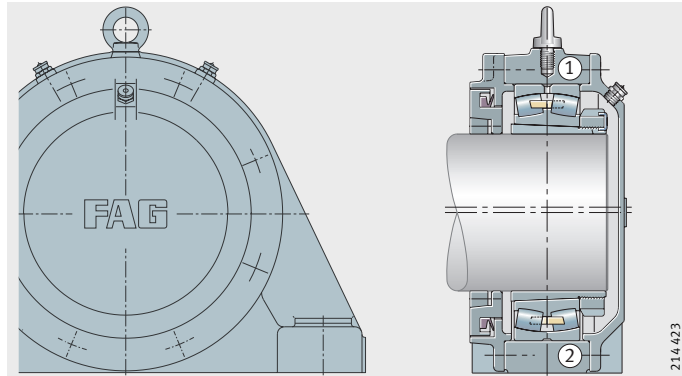
Plummer block housing BND for bearing with tapered bore and adapter sleeve (labyrinth seal), design B



- ① Locating bearing BND..-H-W-T-AF-S
- ② Non-locating bearing BND..-H-W-T-AL-S

Figure 33

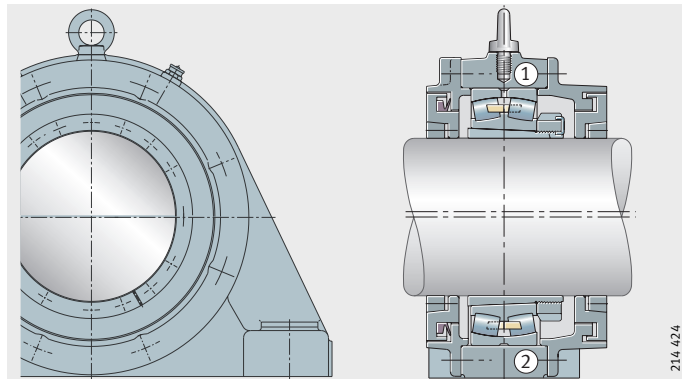
Plummer block housing BND for bearing with tapered bore and adapter sleeve (Taconite seal), design A



- ① Locating bearing BND..-H-W-T-BF-S
- ② Non-locating bearing BND..-H-W-T-BL-S

Figure 34

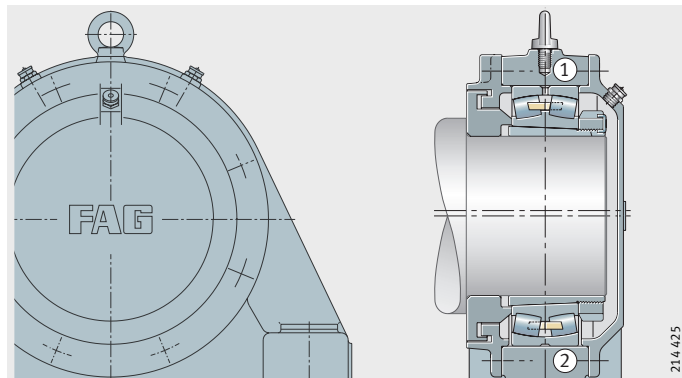
Plummer block housing BND for bearing with tapered bore and adapter sleeve (Taconite seal), design B



- ① Locating bearing BND..-H-C-Y-AF-S
- ② Non-locating bearing BND..-H-C-Y-AL-S

Figure 35

Plummer block housing BND for bearing with tapered bore and adapter sleeve and for shaft with abutment shoulder (labyrinth seal), design A

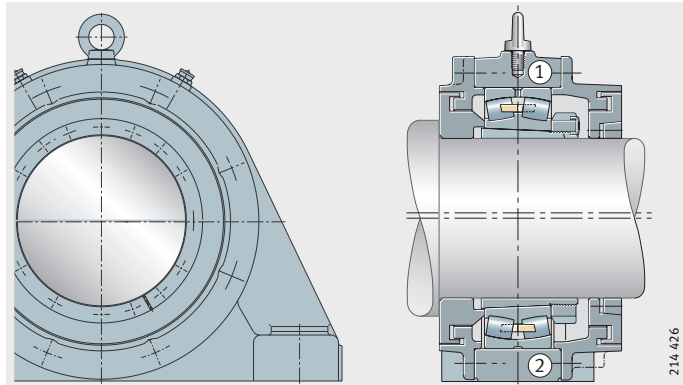


Bearing housings

- ① Locating bearing BND...-H-C-Y-BF-S
- ② Non-locating bearing BND...-H-C-Y-BL-S

Figure 36

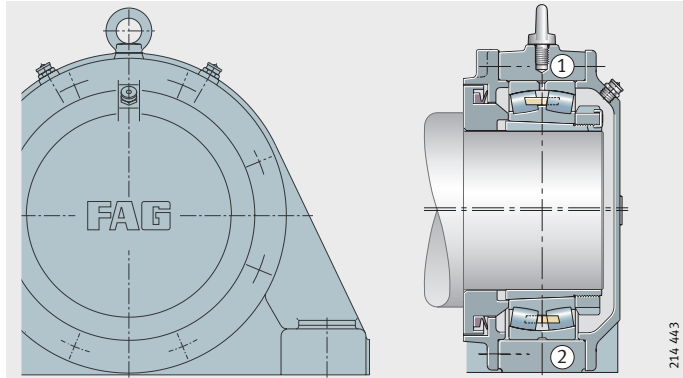
Plummer block housing BND for bearing with tapered bore and adapter sleeve and for shaft with abutment shoulder (labyrinth seal), design B



- ① Locating bearing BND...-H-C-T-AF-S
- ② Non-locating bearing BND...-H-C-T-AL-S

Figure 37

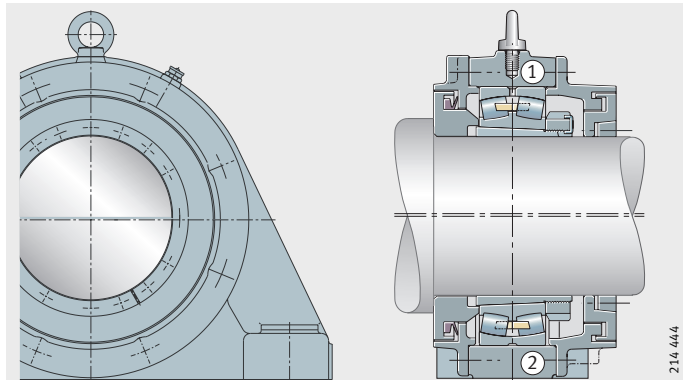
Plummer block housing BND for bearing with tapered bore and adapter sleeve and for shaft with abutment shoulder (Taconite seal), design A



- ① Locating bearing BND...-H-C-T-BF-S
- ② Non-locating bearing BND...-H-C-T-BL-S

Figure 38

Plummer block housing BND for bearing with tapered bore and adapter sleeve and for shaft with abutment shoulder (Taconite seal), design B



Unsplit housings of series BND, originally developed for belt conveyors, can also be beneficially used in materials processing, for example in hard crushers, sugar cane mill drives and rotor shafts in wind turbines.

The dimensions of housings BND are matched to spherical roller bearings of series 222, 230, 231 and 232.

In housings BND of design A for the bearing arrangements of shaft ends, one side is closed by a cover. Design B is intended for continuous shafts.

The housing body, labyrinth rings and cover are unsplit. The labyrinth rings are located by means of split tapered rings made from laminated fabric material. The labyrinth gaps are dimensioned so that the shafts can undergo deflection of approx. 0,5° in both directions without the labyrinths touching the bore.

Material	The standard material for the housing bodies is cast steel (suffix S). If required, housing bodies made from spheroidal graphite cast iron (suffix D) are available.
Bearing seat and fitting of bearings	The bearing seat in the housing is machined to H7. The housings are supplied as a locating bearing design or non-locating bearing design. In the locating bearing, the bearing is clamped between the housing covers. In the non-locating bearing, the bearing can align itself axially, since the covers have shorter centring collars. Housings BND can accommodate rolling bearings with a cylindrical bore that are seated directly on a stepped shaft. We recommend machining the shaft to m6 for these bearings. Shaft seats for bearings with a tapered bore seated on adapter sleeves should be machined to h8.
Seals	Plummer block housings BND are sealed on one side (design A) or on both sides (design B) by labyrinths (suffix Y). If required, Taconite seals (suffix T) are available with a V ring integrated in the labyrinth (these must be relubricated separately).
Load carrying capacity	Guide values for the rupture load of housings BND: see Housings BND, page 1219. When determining the permissible load, a safety factor of 6 should be applied to the housing rupture load.
Caution!	Housings BND should not be subjected to an axial load greater than 20% of the housing rupture load F_{180°. For load directions between 55° and 120° and axial load, we recommend that the housings should be secured in the load direction by means of stops or dowels. The ring bolts in the upper section of the housing must not be loaded to a value greater than the mass of the housing including the bearing.



Bearing housings

Lubrication Housings BND are designed for grease lubrication. Suitable lubricants are lithium soap greases of consistency 2 and 3, for example rolling bearing grease MULTI3 for low loads and MULTITOP and LOAD400 for high and very high loads. The housings have button head lubrication nipples with a head diameter standardised to DIN 3 404 of 22 mm. The grease is fed uniformly to both rows of rollers via the circumferential slot and three lubrication holes in the outer ring of the spherical roller bearings.

In initial lubrication, the cavities in the bearing, the housing and the labyrinths are completely filled with grease. Recommended grease quantities: see table.

The relubrication intervals should be matched to the environmental conditions. The bearings should be relubricated after an interval of no more than four weeks.

For relubrication, we recommend approx. 10% of the grease used for initial filling. For machinery operating in highly contaminated environments, relubrication should be carried out daily with small quantities.

Recommended grease quantity for initial filling of housings BND (housing cavities and bearing completely filled)

Bearing bore mm	Grease quantity for initial filling	
	BND31, BND22, BND32 ≈g	BND30 ≈g
65	700	–
75	800	–
90	900	–
100	950	–
110	1 000	–
120	1 100	500
130	1 250	600
140	1 400	700
150	1 700	800
160	1 900	900
170	2 200	1 000
180	2 500	1 200
190	6 000	1 300
200	3 600	1 600
220	4 200	1 900
240	5 000	2 100
260	6 000	2 500
280	7 000	3 000
300	8 000	3 500
320	9 000	4 100
340	10 500	4 800
360	12 000	5 500
380	13 000	6 200
400	14 500	7 000
420	16 000	8 000

Flanged housings
Flanged housings F112

These housings are fitted with self-aligning ball bearings with an extended inner ring of series 112, *Figure 39* to *Figure 41*.

Figure 39
 Flanged housing for self-aligning ball bearings with extended inner ring F11204 to F11206

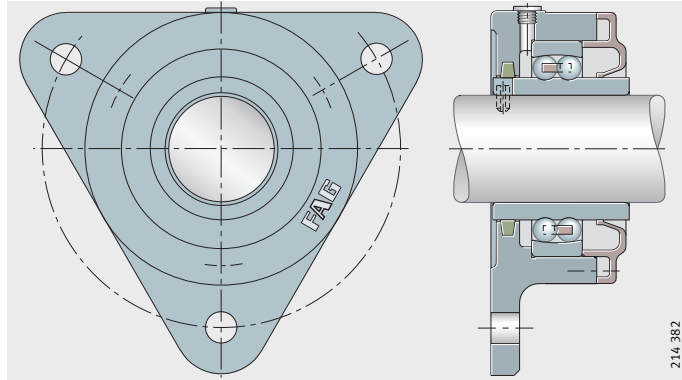


Figure 40
 Flanged housing for self-aligning ball bearings with extended inner ring F11207 to F11208

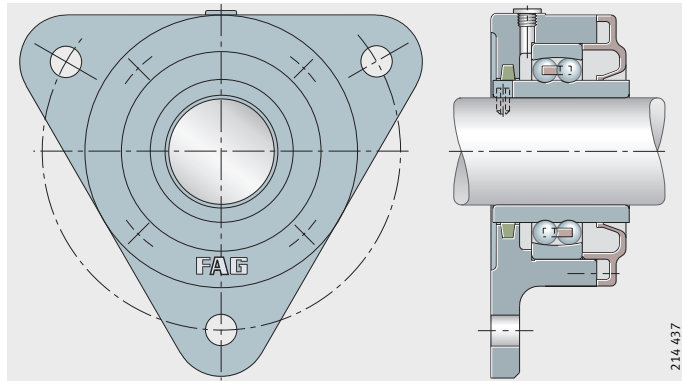
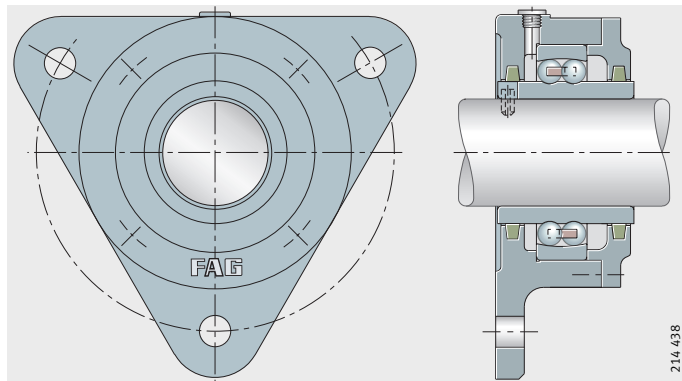


Figure 41
 Flanged housing for self-aligning ball bearings with extended inner ring F11209 and F11210



Flanged housings F11204 to F11208 have, on the side facing away from the housing flange, a polyamide cover designed as a seal. The larger housings have covers made from flake graphite cast iron and felt seals. Felt seals allow shaft misalignment of up to 0,5° in both directions.

All flanged housings have a threaded hole M10×1 that is closed off by a plastic plug until relubrication is to be carried out.

The housing material is flake graphite cast iron.

Bearing housings

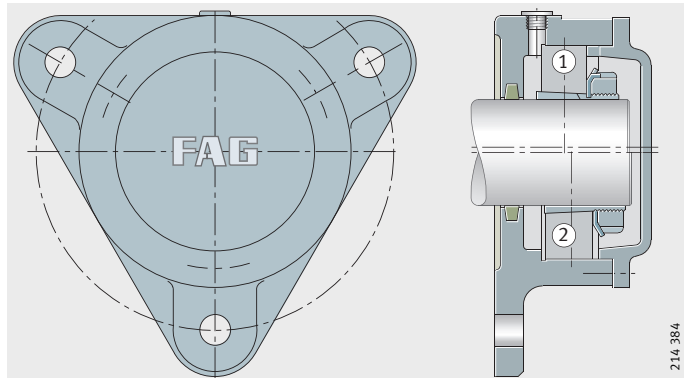
Flanged housings F5

Flanged housings for bearings with a tapered bore and adapter sleeve, *Figure 42 to Figure 45.*

- ① Locating bearing (A, WA)
- ② Non-locating bearing (A, WA)

Figure 42

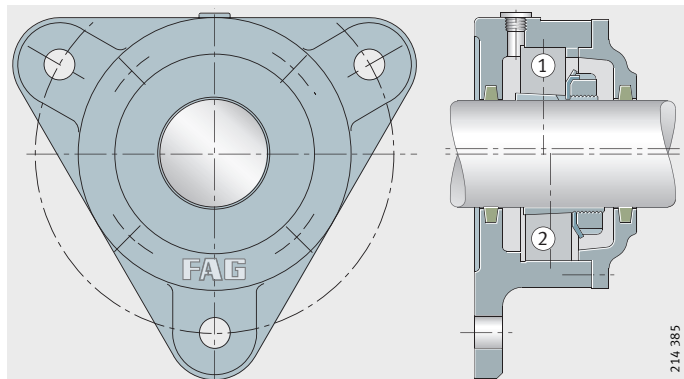
Flanged housing for bearings with tapered bore and adapter sleeve F505, F506, F508, design A



- ① Locating bearing (B, WB)
- ② Non-locating bearing (B, WB)

Figure 43

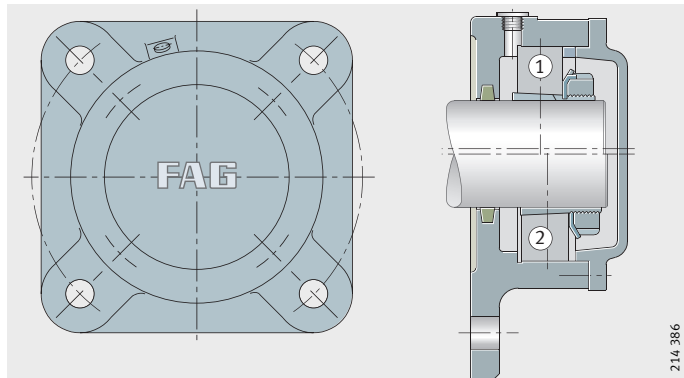
Flanged housing for bearings with tapered bore and adapter sleeve F507, F509 to F513, design B



- ① Locating bearing (A, WA)
- ② Non-locating bearing (A, WA)

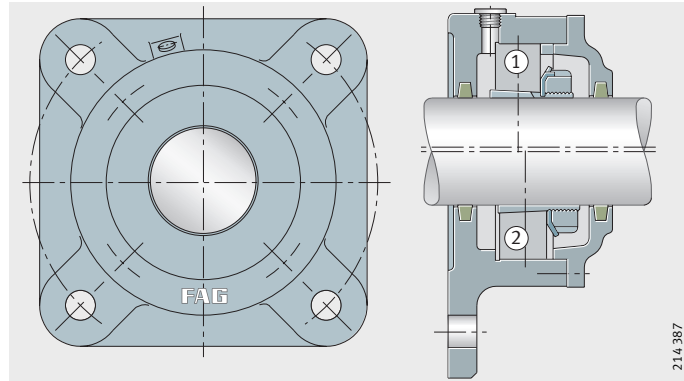
Figure 44

Flanged housing for bearings with tapered bore and adapter sleeve F515 to F522, design A



- ① Locating bearing (B, WB)
- ② Non-locating bearing (B, WB)

Figure 45
 Flanged housing for bearings with tapered bore and adapter sleeve F515 to F522, design B



These flanged housings are suitable for self-aligning ball bearings, barrel roller bearings and spherical roller bearings with a tapered bore that are located on the shaft using adapter sleeves. The housings are available with one side closed off (design A) or – for continuous shafts – open on both sides (design B). Felt strips are used for sealing. Felt seals allow shaft misalignment of up to 0,5° in both directions.

The housings are designed as non-locating bearing housings. Locating bearing arrangements can be achieved by the insertion of locating rings. The number of rings required is indicated in the tables. Two rings are inserted on both sides of the bearing, a single ring is inserted on the side with the adapter sleeve nut. Locating rings must be ordered separately.

The housing material is flake graphite cast iron (suffix L).

Design and safety guidelines

Load carrying capacity of split plummer block housings

The permissible load on the housing is dependent on the strength of the housing and connecting screws, the load carrying capacity of the bearing and on the load direction. Guide values for the rupture load of the housings and the maximum load carrying capacity of the screws connecting the upper and lower sections of the housing are given on the following pages.

When determining the permissible load, safety factors must be applied. For general machine building, a safety factor of 6 relative to the housing rupture load is normally applied.

The values in the tables are valid if the mounting surface of the mating parts is in accordance with DIN ISO 2 768-H.

A precondition for supporting loads is that the housing base surface is completely and rigidly supported.

Caution! Housings SNV and SD31 must not be subjected to axial loads greater than $\frac{2}{3}$ of the housing rupture load F_{180° , housings S30 must not be subjected to axial loads greater than 35% of F_{180° . For load directions between 55° and 120° and axial load, we recommend that the housings should be secured in the load direction by means of stops or dowels.

The ring bolts in the upper section of the housing must not be loaded to a value greater than the mass of the housing including the bearing.



Bearing housings

Housings SNV

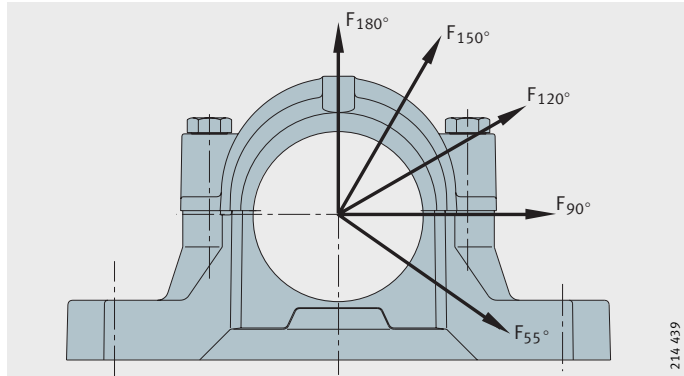


Figure 46
Guide values for the rupture load of housings SNV and the maximum load carrying capacity of the connecting screws (for tightening torques, see also page 1221)

Housing Designation	Housing rupture load in load direction F Housing made from flake graphite cast iron					Connecting screws			
						Thread to DIN 13	Maximum load carrying capacity of both screws with contact between parting surfaces in load direction		
	55°	90°	120°	150°	180°	Material 8.8	120°	150°	180°
kN									
SNV052	160	95	70	60	80	M10	60	35	30
SNV062	170	100	80	65	85	M10	60	35	30
SNV072	190	110	85	80	95	M10	60	35	30
SNV080	210	130	95	85	105	M10	60	35	30
SNV085	225	140	100	90	120	M10	60	35	30
SNV090	265	160	120	105	130	M10	60	35	30
SNV100	280	170	125	120	140	M12	80	45	40
SNV110	300	180	130	125	150	M12	80	45	40
SNV120	335	200	150	130	170	M12	80	45	40
SNV125	335	200	150	130	170	M12	80	45	40
SNV130	400	250	180	150	200	M12	80	45	40
SNV140	425	265	190	170	210	M12	80	45	40
SNV150	475	280	200	180	235	M12	80	45	40
SNV160	530	335	250	210	265	M16	180	100	90
SNV170	560	355	265	225	280	M16	180	100	90
SNV180	630	375	280	250	300	M20	260	150	130
SNV190	630	375	280	250	300	M20	260	150	130
SNV200	670	400	315	280	335	M20	260	150	130
SNV215	800	450	355	315	400	M20	260	150	130
SNV230	900	530	400	355	450	M24	360	210	180
SNV240	1000	600	450	400	500	M24	360	210	180
SNV250	1060	630	475	425	530	M24	360	210	180
SNV260	1180	710	530	475	600	M24	360	210	180
SNV270	1180	710	530	475	600	M24	360	210	180
SNV280	1320	750	600	530	630	M24	360	210	180
SNV290	1400	850	630	560	710	M24	360	210	180
SNV300	1500	900	670	600	750	M24	360	210	180
SNV320	1700	1000	750	670	850	M24	360	210	180
SNV340	1900	1120	850	750	950	M30	640	370	320

Housings S30

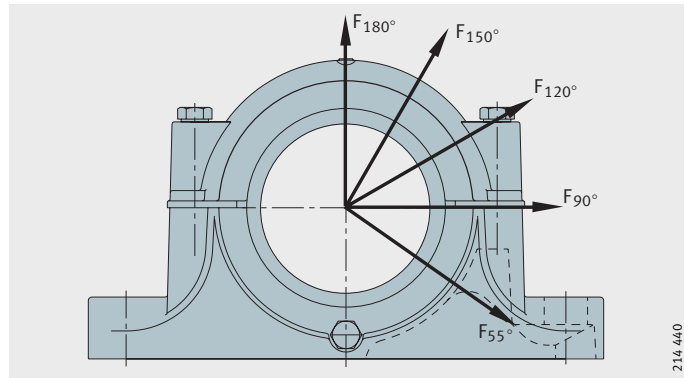


Figure 47
Guide values for the rupture load of housings S30 and the maximum load carrying capacity of the connecting screws (for tightening torques, see also page 1221)

Housing Designation	Housing rupture load in load direction F Housing made from flake graphite cast iron					Connecting screws			
						Thread to DIN 13	Maximum load carrying capacity of both screws with contact between parting surfaces in load direction		
	55° kN	90°	120°	150°	180°	Material 8.8	120° kN	150°	180°
S3024	540	320	245	215	270	M20	260	150	130
S3026	620	370	280	250	310	M20	260	150	130
S3028	700	420	315	280	350	M20	260	150	130
S3030	780	470	350	310	390	M20	260	150	130
S3032	860	520	390	345	430	M20	260	150	130
S3034	1 000	600	450	400	500	M24	360	210	180
S3036	1 160	700	520	465	580	M24	360	210	180
S3038	1 300	780	585	520	650	M24	360	210	180
S3040	1 500	890	665	590	740	M24	360	210	180
S3044	1 700	1 020	765	680	850	M30	640	370	320
S3048	1 900	1 130	845	750	940	M30	640	370	320
S3052	2 200	1 320	990	880	1 100	M36	800	460	400
S3056	2 500	1 500	1 120	1 000	1 300	M36	800	460	400
S3060	2 700	1 620	1 215	1 080	1 350	M36	800	460	400
S3064	2 900	1 740	1 305	1 160	1 450	M36	800	460	400
S3068	3 200	1 920	1 440	1 280	1 600	M36	800	460	400
S3072	3 500	2 100	1 575	1 400	1 750	M36	800	460	400
S3076	3 900	2 340	1 755	1 560	1 950	M36	800	460	400
S3080	4 300	2 580	1 935	1 720	2 150	M36	800	460	400
S3084	4 900	2 940	2 205	1 960	2 450	M36	800	460	400
S3088	5 300	3 180	2 385	2 120	2 650	M36	800	460	400
S3092	6 100	3 660	2 745	2 440	3 050	M48	1 340	770	670
S3096	7 000	4 200	3 150	2 800	3 500	M48	1 340	770	670



Bearing housings

Housings SD31

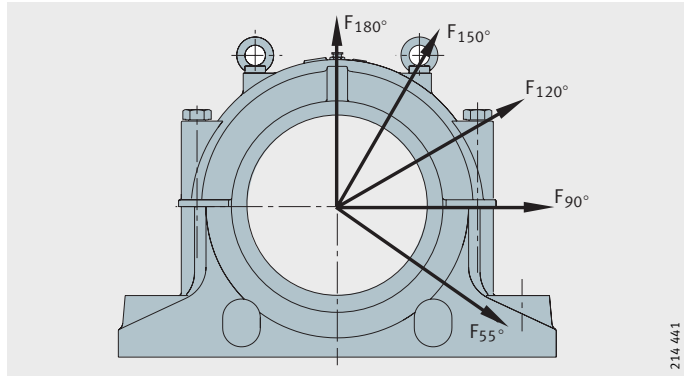


Figure 48
 Guide values for the rupture load of housings SD31 and the maximum load carrying capacity of the connecting screws (for tightening torques, see also page 1221)

Housing Designation	Housing rupture load in load direction F Housing made from flake graphite cast iron					Connecting screws			
						Thread to DIN 13	Maximum load carrying capacity of the four screws with contact between parting surfaces in load direction		
	55° kN	90°	120°	150°	180°	Material 8.8	120° kN	150°	180°
SD3134	2 600	1 100	1 000	940	1 050	M20	520	300	260
SD3136	2 750	1 200	1 050	1 000	1 100	M20	520	300	260
SD3138	3 000	1 350	1 150	1 100	1 200	M20	520	300	260
SD3140	4 000	1 700	1 450	1 400	1 600	M24	720	420	360
SD3144	4 250	1 900	1 600	1 500	1 700	M24	720	420	360
SD3148	4 600	2 300	1 800	1 600	1 850	M24	720	420	360
SD3152	5 500	2 550	2 150	2 050	2 200	M30	1 280	740	640
SD3156	6 600	3 100	2 400	2 250	2 650	M30	1 280	740	640
SD3160	7 750	3 400	2 900	2 800	3 100	M30	1 280	740	640
SD3164	8 100	3 650	3 100	3 000	3 250	M30	1 280	740	640
SD3168	8 850	4 000	3 200	3 100	3 550	M30	1 280	740	640
SD3172	9 750	4 500	3 350	3 250	3 900	M30	1 280	740	640
SD3176	10 300	4 800	3 400	3 300	4 150	M30	1 280	740	640
SD3180	10 700	5 000	3 500	3 400	4 300	M36	1 600	920	800
SD3184	12 000	5 800	4 000	3 750	4 800	M36	1 600	920	800
SD3188	12 400	5 950	4 450	3 950	4 950	M36	1 600	920	800
SD3192	13 300	6 350	4 750	4 250	5 300	M36	1 600	920	800
SD3196	14 300	6 850	5 150	4 550	5 700	M42	2 060	1 180	1 030

Load carrying capacity of unsplit plummer block housings

The permissible load on the housing is dependent on the strength of the housing, the load carrying capacity of the bearing and on the load direction. Guide values for the rupture load of the housings are indicated in the following table.

When determining the permissible load, safety factors must be applied. For general machine building, a safety factor of 6 relative to the housing rupture load is normally applied.

The values in the tables are valid if the mounting surface of the mating parts is in accordance with DIN ISO 2 768-H.

A precondition for supporting loads is that the housing base surface is completely and rigidly supported.

Housings BND

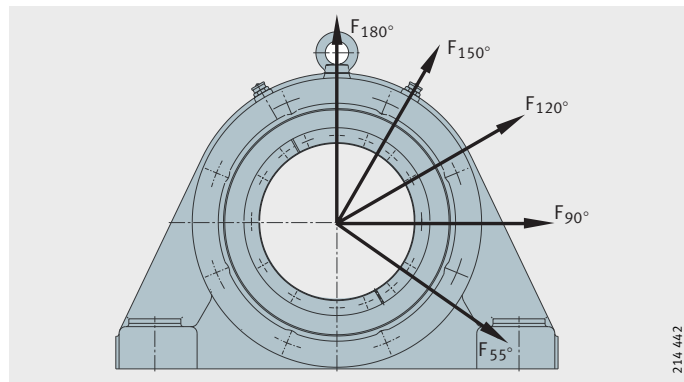


Figure 49
Guide values for the rupture load of housings BND made from cast steel and spheroidal graphite cast iron

Housing Designation				Housing rupture load in load direction F				
				55°	90°	120°	150°	180°
BND2213	–	–	–	665	530	440	350	440
BND2215	–	–	–	880	705	580	465	580
BND2218	–	–	–	1 125	900	745	595	745
BND2220	BND3024	–	–	1 325	1 070	1 020	815	1 020
–	–	BND3122	–	1 900	1 530	1 685	1 345	1 685
BND2222	BND3026	–	–	1 580	1 275	1 120	920	1 120
–	–	BND3124	BND3222	1 875	1 500	1 685	1 345	1 685
BND2224	BND3028	–	–	1 785	1 430	1 225	1 020	1 225
–	–	BND3126	BND3224	2 020	1 610	1 735	1 385	1 735
BND2226	BND3030	–	–	2 040	1 630	2 140	1 735	2 140
–	BND3032	–	–	2 295	1 835	2 245	1 835	2 245
–	–	BND3128	BND3226	2 295	1 835	1 735	1 385	1 735
BND2228	BND3034	–	–	2 755	2 195	2 245	1 835	2 245
–	–	BND3130	BND3228	2 755	2 195	1 785	1 430	1 785
BND2230	BND3036	–	–	3 060	2 450	2 245	1 835	2 245
–	–	BND3132	BND3230	3 110	2 500	1 835	1 470	1 835
BND2232	BND3038	–	–	3 365	2 705	2 450	1 940	2 450
–	–	BND3134	BND3232	3 570	2 855	1 940	1 550	1 940
BND2234	BND3040	–	–	3 925	3 110	3 060	2 450	3 060
–	–	BND3136	BND3234	4 285	3 415	2 040	1 630	2 040
BND2236	–	–	–	4 435	3 570	3 470	2 755	3 470



Bearing housings

Housing Designation				Housing rupture load in load direction F				
				55°	90°	120°	150°	180°
				kN				
BND2238	BND3044	–	–	4 435	3 570	3 470	2 755	3 470
–	–	BND3138	BND3236	4 590	3 725	2 140	1 715	2 140
–	–	BND3140	BND3238	5 610	4 540	2 295	1 835	2 295
BND2240	BND3048	–	–	5 050	4 030	4 895	3 875	4 895
–	–	BND3144	BND3240	6 120	4 935	2 550	2 040	2 550
BND2244	BND3052	–	–	5 660	4 540	5 000	3 980	5 000
–	BND3056	–	–	6 580	5 255	6 120	4 895	6 120
–	–	BND3148	BND3244	6 835	5 510	3 060	2 450	3 060
BND2248	BND3060	–	–	7 295	5 815	6 325	5 100	6 325
–	–	BND3152	BND3248	7 650	6 170	3 570	2 855	3 570
BND2252	BND3064	–	–	8 000	6 425	6 835	5 400	6 835
–	–	BND3156	BND3252	9 385	7 550	4 180	3 365	4 180
BND2256	BND3068	–	–	8 825	7 040	6 835	5 400	6 835
–	–	BND3160	BND3256	10 200	8 260	4 490	3 570	4 490
BND2260	BND3072	–	–	9 640	7 700	8 160	6 530	8 160
–	BND3076	–	–	10 810	8 670	8 365	8 770	8 365
–	–	BND3164	BND3260	11 935	9 535	5 100	4 080	5 100
BND2264	BND3080	–	–	12 035	9 690	9 080	7 240	9 080
–	–	BND3168	BND3264	14 280	11 375	5 815	4 590	5 815
BND2268	BND3084	–	–	13 360	10 760	9 280	7 345	9 280
–	–	BND3172	–	14 485	11 630	6 630	5 300	6 630
BND2272	–	–	–	15 700	12 570	10 370	8 325	10 370
–	–	BND3176	BND3268	16 320	13 055	6 630	5 300	6 630
BND2276	–	–	–	16 600	13 280	10 960	8 800	10 960
–	–	BND3180	BND3272	17 850	14 280	7 345	5 815	7 345
BND2280	–	–	–	19 750	15 800	13 030	10 470	13 030
–	–	–	BND3276	18 870	15 050	8 160	6 530	8 160
–	–	BND3184	–	19 380	15 600	8 160	6 530	8 160
BND2284	–	–	–	21 540	17 240	14 220	11 420	14 220
–	–	–	BND3280	22 440	17 950	9 280	7 445	9 280
–	–	–	BND3284	24 480	19 380	10 710	8 570	10 710

Tightening torques

The tightening torques in the following table are maximum values for metric coarse-pitch threads to DIN 13-13 and head contact dimensions to DIN 912, 931, 933, 934, 6 912, 7 984 and 7 990.

They are valid with 90% utilisation of the yield stress of the material of 8.8 screws and a friction factor of 0,14. We recommend that the screws should be tightened to 70% of these values. Housings are not supplied together with screws for the housing base.

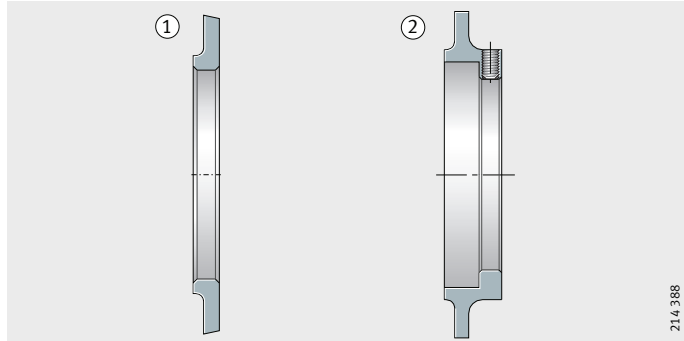
Maximum tightening torques for screws with metric thread to DIN 13-13

Nominal screw size	Tightening torque Nm
M6	10,4
M8	25
M10	51
M12	87
M16	215
M20	430
M24	740
M30	1 450
M36	2 600
M42	4 000
M45	4 950
M48	6 000
M56	9 650
M64	14 400



Bearing housings

Accessories Grease valves



- ① RSV2, RSV3
- ② RSV5, RSV6

Figure 50
Grease valves RSV

Locating rings

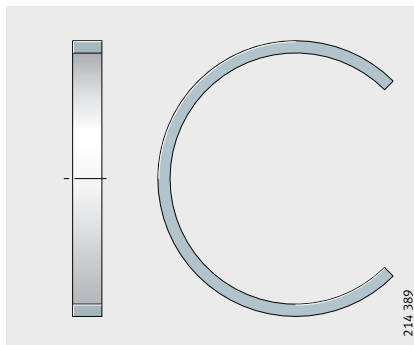


Figure 51
Locating ring FRM

Seals

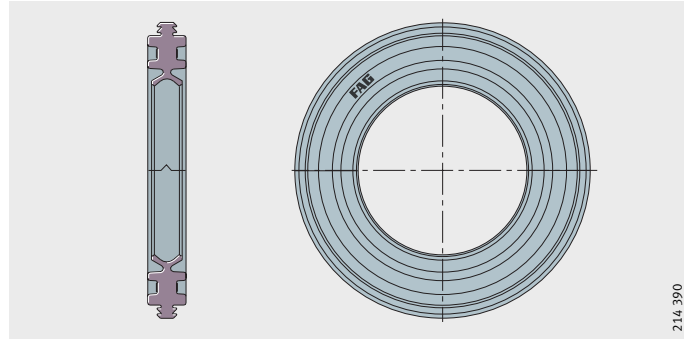


Figure 52
Double lip seal DH

214.390

- ① V ring seal DHV
- ② Felt seal FSV
- ③ Felt strip FJST

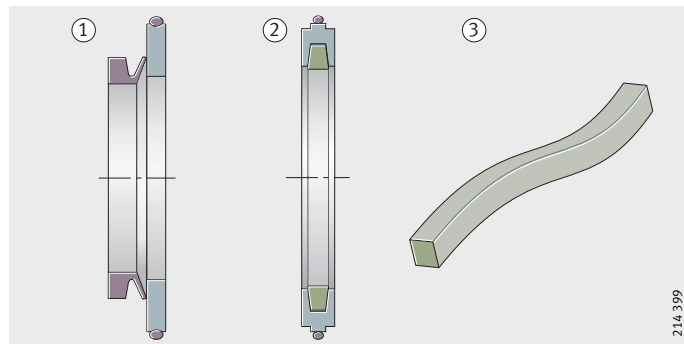


Figure 53
Seals DHV, FSV and FJST

214.399

- ① TSV
- ② TCV

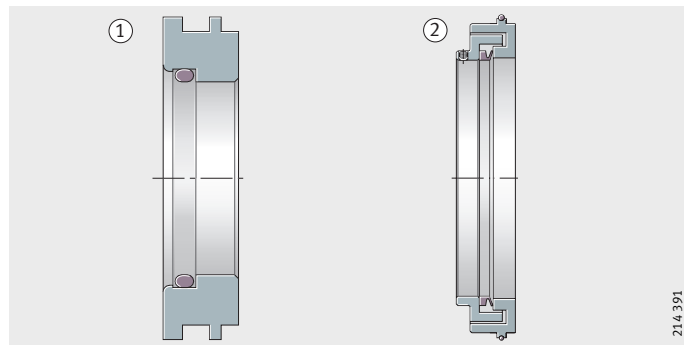


Figure 54
Seals TSV and TCV

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Bearing housings

Covers

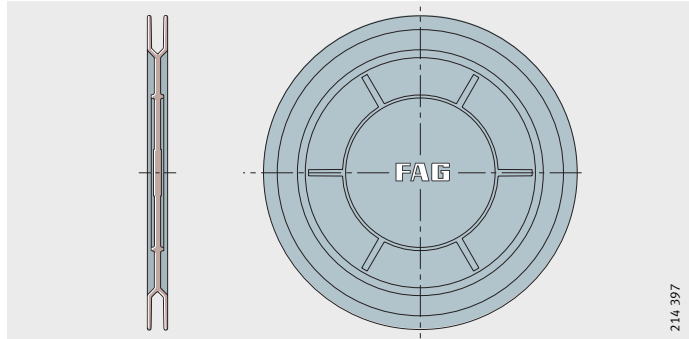
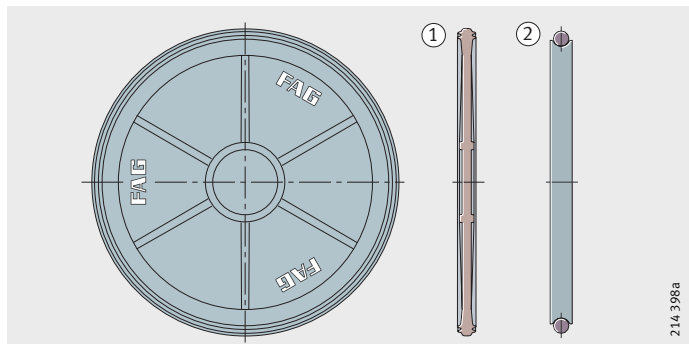


Figure 55
Cover DK



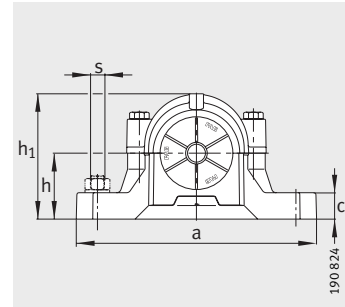
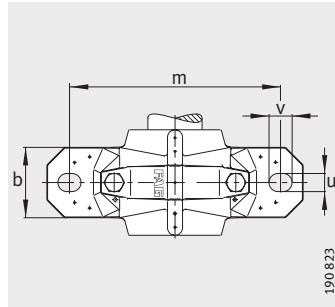
- ① Cover DKV
- ② Cover DKVT

Figure 56
Covers DKV and DKVT



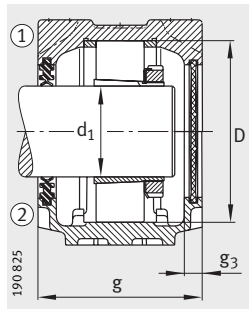
Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve

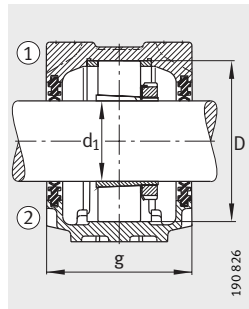


- ① Locating bearing
- ② Non-locating bearing

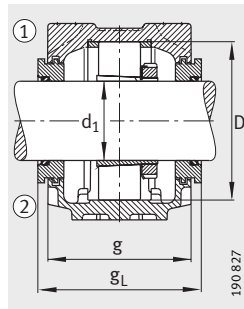
Dimension table · Dimensions in mm								
Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV052-L	1205-K-TVH-C3	H205X012	FRM52/6	DH505X012	TSV505X012	FSV505X012	DHV505X012	-
SNV052-L	20205-K-TVP-C3	H205X012	FRM52/6	DH505X012	TSV505X012	FSV505X012	DHV505X012	-
SNV052-L	2205-K-TVH-C3	H305X012	FRM52/4,5	DH505X012	TSV505X012	FSV505X012	DHV505X012	-
SNV052-L	22205-E1-K	H305X012	FRM52/4,5	DH505X012	TSV505X012	FSV505X012	DHV505X012	-
SNV062-L	1305-K-TVH-C3	H305X012	FRM62/6,5	DH605X012	TSV605X012	FSV605X012	DHV605X012	-
SNV062-L	2305-K-TVH-C3	H2305X012	FRM62/3	DH605X012	TSV605X012	FSV605X012	DHV605X012	-
SNV052-L	1205-K-TVH-C3	H205	FRM52/6	DH505	TSV505	FSV505	DHV505	-
SNV052-L	20205-K-TVP-C3	H205	FRM52/6	DH505	TSV505	FSV505	DHV505	-
SNV052-L	2205-K-TVH-C3	H305	FRM52/4,5	DH505	TSV505	FSV505	DHV505	-
SNV052-L	22205-E1-K	H305	FRM52/4,5	DH505	TSV505	FSV505	DHV505	-
SNV062-L	1305-K-TVH-C3	H305	FRM62/6,5	DH605	TSV605	FSV605	DHV605	-
SNV062-L	2305-K-TVH-C3	H2305	FRM62/3	DH605	TSV605	FSV605	DHV605	-
SNV052-L	1205-K-TVH-C3	H205X013	FRM52/6	DH505	TSV505X013	FSV505	DHV505	-
SNV052-L	20205-K-TVP-C3	H205X013	FRM52/6	DH505	TSV505X013	FSV505	DHV505	-
SNV052-L	2205-K-TVH-C3	H305X013	FRM52/4,5	DH505	TSV505X013	FSV505	DHV505	-
SNV052-L	22205-E1-K	H305X013	FRM52/4,5	DH505	TSV505X013	FSV505	DHV505	-
SNV062-L	1206-K-TVH-C3	H206X014	FRM62/7	DH506X014	TSV506X014	FSV506X014	DHV506X014	-
SNV062-L	20206-K-TVP-C3	H206X014	FRM62/7	DH506X014	TSV506X014	FSV506X014	DHV506X014	-
SNV062-L	2206-K-TVH-C3	H306X014	FRM62/5	DH506X014	TSV506X014	FSV506X014	DHV506X014	-
SNV062-L	22206-E1-K	H306X014	FRM62/5	DH506X014	TSV506X014	FSV506X014	DHV506X014	-
SNV072-L	1306-K-TVH-C3	H306X014	FRM72/7	DH606X014	TSV606X014	FSV606X014	DHV606X014	TCV606X014
SNV072-L	2306-K-TVH-C3	H2306X014	FRM72/3	DH606X014	TSV606X014	FSV606X014	DHV606X014	TCV606X014
SNV062-L	1206-K-TVH-C3	H206X015	FRM62/7	DH506X014	TSV506X015	FSV506X015	DHV506X015	-
SNV062-L	20206-K-TVP-C3	H206X015	FRM62/7	DH506X014	TSV506X015	FSV506X015	DHV506X015	-
SNV062-L	2206-K-TVH-C3	H306X015	FRM62/5	DH506X014	TSV506X015	FSV506X015	DHV506X015	-
SNV062-L	22206-E1-K	H306X015	FRM62/5	DH506X014	TSV506X015	FSV506X015	DHV506X015	-
SNV072-L	1306-K-TVH-C3	H306X015	FRM72/7	DH606X014	TSV606X015	FSV606X015	DHV606X015	TCV606X015
SNV072-L	2306-K-TVH-C3	H2306X015	FRM72/3	DH606X014	TSV606X015	FSV606X015	DHV606X015	TCV606X015



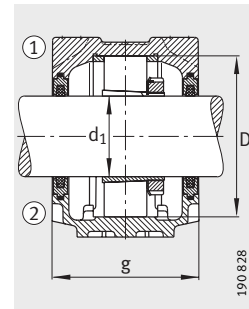
Double lip seal DH
Cover DKV



Double lip seal DH



Labyrinth ring TSV



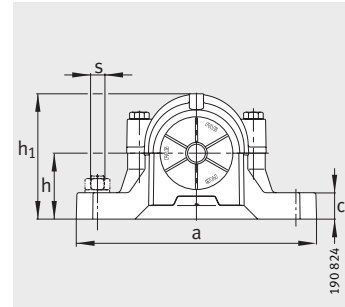
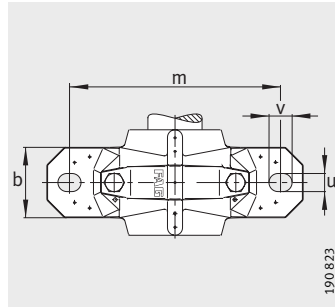
Felt seal FSV

Cover	Mass m Housing ≈kg	Dimensions																	
		d ₁		a	g	h ₁	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s	
		mm	inch															mm	inch
DKV052	1,3	19,05	³ / ₄	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	¹ / ₂
DKV052	1,3	19,05	³ / ₄	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	¹ / ₂
DKV052	1,3	19,05	³ / ₄	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	¹ / ₂
DKV052	1,3	19,05	³ / ₄	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	¹ / ₂
DKV062	1,9	19,05	³ / ₄	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	¹ / ₂
DKV062	1,9	19,05	³ / ₄	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	¹ / ₂
DKV052	1,3	20	-	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	¹ / ₂
DKV052	1,3	20	-	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	¹ / ₂
DKV052	1,3	20	-	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	¹ / ₂
DKV052	1,3	20	-	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	¹ / ₂
DKV062	1,9	20	-	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	¹ / ₂
DKV062	1,9	20	-	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	¹ / ₂
DKV052	1,3	20,638	¹³ / ₁₆	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	¹ / ₂
DKV052	1,3	20,638	¹³ / ₁₆	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	¹ / ₂
DKV052	1,3	20,638	¹³ / ₁₆	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	¹ / ₂
DKV052	1,3	20,638	¹³ / ₁₆	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	¹ / ₂
DKV062	1,9	22,225	⁷ / ₈	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	¹ / ₂
DKV062	1,9	22,225	⁷ / ₈	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	¹ / ₂
DKV062	1,9	22,225	⁷ / ₈	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	¹ / ₂
DKV062	1,9	22,225	⁷ / ₈	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	¹ / ₂
DKV072	2	22,225	⁷ / ₈	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	¹ / ₂
DKV072	2	22,225	⁷ / ₈	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	¹ / ₂
DKV062	1,9	23,813	¹⁵ / ₁₆	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	¹ / ₂
DKV062	1,9	23,813	¹⁵ / ₁₆	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	¹ / ₂
DKV062	1,9	23,813	¹⁵ / ₁₆	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	¹ / ₂
DKV062	1,9	23,813	¹⁵ / ₁₆	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	¹ / ₂
DKV072	2	23,813	¹⁵ / ₁₆	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	¹ / ₂
DKV072	2	23,813	¹⁵ / ₁₆	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	¹ / ₂



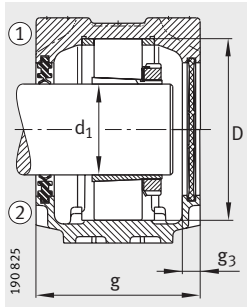
Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve

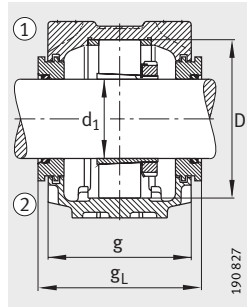


- ① Locating bearing
- ② Non-locating bearing

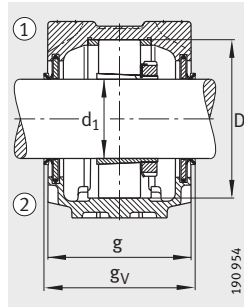
Dimension table (continued) - Dimensions in mm								
Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV062-L	1206-K-TVH-C3	H206	FRM62/7	DH506	TSV506	FSV506	DHV506	-
SNV062-L	20206-K-TVP-C3	H206	FRM62/7	DH506	TSV506	FSV506	DHV506	-
SNV062-L	2206-K-TVH-C3	H306	FRM62/5	DH506	TSV506	FSV506	DHV506	-
SNV062-L	22206-E1-K	H306	FRM62/5	DH506	TSV506	FSV506	DHV506	-
SNV072-L	1306-K-TVH-C3	H306	FRM72/7	DH606	TSV606	FSV606	DHV606	TCV606
SNV072-L	2306-K-TVH-C3	H2306	FRM72/3	DH606	TSV606	FSV606	DHV606	TCV606
SNV062-L	1206-K-TVH-C3	H206X100	FRM62/7	DH506	TSV506X100	FSV506	DHV506	-
SNV062-L	20206-K-TVP-C3	H206X100	FRM62/7	DH506	TSV506X100	FSV506	DHV506	-
SNV062-L	2206-K-TVH-C3	H306X100	FRM62/5	DH506	TSV506X100	FSV506	DHV506	-
SNV062-L	22206-E1-K	H306X100	FRM62/5	DH506	TSV506X100	FSV506	DHV506	-
SNV072-L	1306-K-TVH-C3	H306X100	FRM72/7	DH606	TSV606X100	FSV606	DHV606	TCV606
SNV072-L	2306-K-TVH-C3	H2306X100	FRM72/3	DH606	TSV606X100	FSV606	DHV606	TCV606
SNV072-L	1207-K-TVH-C3	H207X102	FRM72/8	DH507X102	TSV507X102	FSV507X102	DHV507X102	-
SNV072-L	20207-K-TVP-C3	H207X102	FRM72/8	DH507X102	TSV507X102	FSV507X102	DHV507X102	-
SNV072-L	2207-K-TVH-C3	H307X102	FRM72/5	DH507X102	TSV507X102	FSV507X102	DHV507X102	-
SNV072-L	22207-E1-K	H307X102	FRM72/5	DH507X102	TSV507X102	FSV507X102	DHV507X102	-
SNV080-L	1307-K-TVH-C3	H307X102	FRM80/9	DH607X102	TSV607X102	FSV607X102	DHV607X102	TCV607X102
SNV080-L	21307-E1-K-TVPB	H307X102	FRM80/9	DH607X102	TSV607X102	FSV607X102	DHV607X102	TCV607X102
SNV080-L	2307-K-TVH-C3	H2307X102	FRM80/4	DH607X102	TSV607X102	FSV607X102	DHV607X102	TCV607X102
SNV072-L	1207-K-TVH-C3	H207	FRM72/8	DH507	TSV507	FSV507	DHV507	-
SNV072-L	20207-K-TVP-C3	H207	FRM72/8	DH507	TSV507	FSV507	DHV507	-
SNV072-L	2207-K-TVH-C3	H307	FRM72/5	DH507	TSV507	FSV507	DHV507	-
SNV072-L	22207-E1-K	H307	FRM72/5	DH507	TSV507	FSV507	DHV507	-
SNV080-L	1307-K-TVH-C3	H307	FRM80/9	DH607	TSV607	FSV607	DHV607	TCV607
SNV080-L	21307-E1-K-TVPB	H307	FRM80/9	DH607	TSV607	FSV607	DHV607	TCV607
SNV080-L	2307-K-TVH-C3	H2307	FRM80/4	DH607	TSV607	FSV607	DHV607	TCV607
SNV072-L	1207-K-TVH-C3	H207X103	FRM72/8	DH507	TSV507	FSV507	DHV507	-
SNV072-L	20207-K-TVP-C3	H207X103	FRM72/8	DH507	TSV507	FSV507	DHV507	-
SNV072-L	2207-K-TVH-C3	H307X103	FRM72/5	DH507	TSV507	FSV507	DHV507	-
SNV072-L	22207-E1-K	H307X103	FRM72/5	DH507	TSV507	FSV507	DHV507	-
SNV080-L	1307-K-TVH-C3	H307X103	FRM80/9	DH607	TSV607	FSV607	DHV607	TCV607
SNV080-L	21307-E1-K-TVPB	H307X103	FRM80/9	DH607	TSV607	FSV607	DHV607	TCV607
SNV080-L	2307-K-TVH-C3	H2307X103	FRM80/4	DH607	TSV607	FSV607	DHV607	TCV607



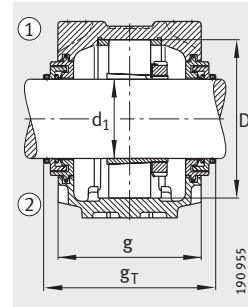
Double lip seal DH
Cover DKV



Labyrinth ring TSV



V ring seal DHV



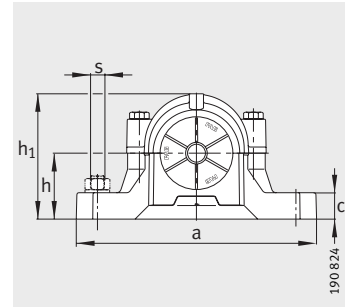
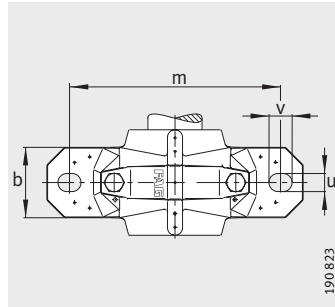
Taconite seal TCV

Cover	Mass m Housing ≈kg	Dimensions																	
		d ₁		a	g	h ₁	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s	
		mm	inch															mm	inch
DKV062	1,9	25	-	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV062	1,9	25	-	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV062	1,9	25	-	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV062	1,9	25	-	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV072	2	25	-	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	1/2
DKV072	2	25	-	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	1/2
DKV062	1,9	25,4	1	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV062	1,9	25,4	1	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV062	1,9	25,4	1	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV062	1,9	25,4	1	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV072	2	25,4	1	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	1/2
DKV072	2	25,4	1	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	1/2
DKV072	2	28,575	1 1/8	185	80	97	52	22	72	93	86	-	10,5	50	150	15	20	M12	1/2
DKV072	2	28,575	1 1/8	185	80	97	52	22	72	93	86	-	10,5	50	150	15	20	M12	1/2
DKV072	2	28,575	1 1/8	185	80	97	52	22	72	93	86	-	10,5	50	150	15	20	M12	1/2
DKV072	2	28,575	1 1/8	185	80	97	52	22	72	93	86	-	10,5	50	150	15	20	M12	1/2
DKV080	2,9	28,575	1 1/8	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2
DKV080	2,9	28,575	1 1/8	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2
DKV080	2,9	28,575	1 1/8	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2
DKV072	2	30	-	185	80	97	52	22	72	93	86	-	10,5	50	150	15	20	M12	1/2
DKV072	2	30	-	185	80	97	52	22	72	93	86	-	10,5	50	150	15	20	M12	1/2
DKV072	2	30	-	185	80	97	52	22	72	93	86	-	10,5	50	150	15	20	M12	1/2
DKV072	2	30	-	185	80	97	52	22	72	93	86	-	10,5	50	150	15	20	M12	1/2
DKV080	2,9	30	-	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2
DKV080	2,9	30	-	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2
DKV080	2,9	30	-	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2
DKV072	2	30,163	1 3/16	185	80	97	52	22	72	93	86	-	10,5	50	150	15	20	M12	1/2
DKV072	2	30,163	1 3/16	185	80	97	52	22	72	93	86	-	10,5	50	150	15	20	M12	1/2
DKV072	2	30,163	1 3/16	185	80	97	52	22	72	93	86	-	10,5	50	150	15	20	M12	1/2
DKV072	2	30,163	1 3/16	185	80	97	52	22	72	93	86	-	10,5	50	150	15	20	M12	1/2
DKV080	2,9	30,163	1 3/16	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2
DKV080	2,9	30,163	1 3/16	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2
DKV080	2,9	30,163	1 3/16	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2



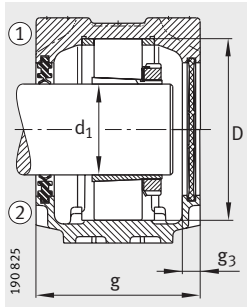
Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve

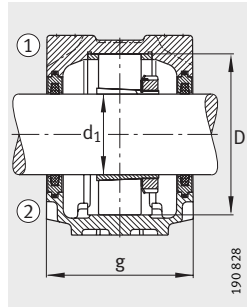


- ① Locating bearing
- ② Non-locating bearing

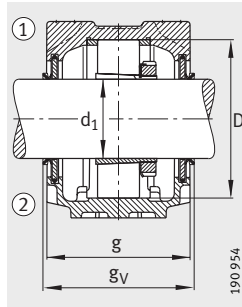
Dimension table (continued) · Dimensions in mm								
Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV080-L	1208-K-TV-C3	H208X104	FRM80/10,5	DH508X104	TSV508X104	FSV508X104	DHV508X104	TCV508X104
SNV080-L	20208-K-TVP-C3	H208X104	FRM80/10,5	DH508X104	TSV508X104	FSV508X104	DHV508X104	TCV508X104
SNV080-L	2208-K-TVH-C3	H308X104	FRM80/8	DH508X104	TSV508X104	FSV508X104	DHV508X104	TCV508X104
SNV080-L	22208-E1-K	H308X104	FRM80/8	DH508X104	TSV508X104	FSV508X104	DHV508X104	TCV508X104
SNV090-L	1308-K-TVH-C3	H308X104	FRM90/9	DH608X104	TSV608X104	FSV608X104	DHV608X104	TCV608X104
SNV090-L	21308-E1-K	H308X104	FRM90/9	DH608X104	TSV608X104	FSV608X104	DHV608X104	TCV608X104
SNV090-L	2308-K-TVH-C3	H2308X104	FRM90/4	DH608X104	TSV608X104	FSV608X104	DHV608X104	TCV608X104
SNV090-L	22308-E1-K	H2308X104	FRM90/4	DH608X104	TSV608X104	FSV608X104	DHV608X104	TCV608X104
SNV080-L	1208-K-TVH-C3	H208X105	FRM80/10,5	DH508X104	TSV508X105	FSV508X105	DHV508X105	TCV508X105
SNV080-L	20208-K-TVP-C3	H208X105	FRM80/10,5	DH508X104	TSV508X105	FSV508X105	DHV508X105	TCV508X105
SNV080-L	2208-K-TVH-C3	H308X105	FRM80/8	DH508X104	TSV508X105	FSV508X105	DHV508X105	TCV508X105
SNV080-L	22208-E1-K	H308X105	FRM80/8	DH508X104	TSV508X105	FSV508X105	DHV508X105	TCV508X105
SNV090-L	1308-K-TVH-C3	H308X105	FRM90/9	DH608X104	TSV608X105	FSV608X105	DHV608X105	TCV608X105
SNV090-L	21308-E1-K	H308X105	FRM90/9	DH608X104	TSV608X105	FSV608X105	DHV608X105	TCV608X105
SNV090-L	2308-K-TVH-C3	H2308X105	FRM90/4	DH608X104	TSV608X105	FSV608X105	DHV608X105	TCV608X105
SNV090-L	22308-E1-K	H2308X105	FRM90/4	DH608X104	TSV608X105	FSV608X105	DHV608X105	TCV608X105
SNV080-L	1208-K-TVH-C3	H208X106	FRM80/10,5	DH508	TSV508	FSV508	DHV508	TCV508
SNV080-L	20208-K-TVP-C3	H208X106	FRM80/10,5	DH508	TSV508	FSV508	DHV508	TCV508
SNV080-L	2208-K-TVH-C3	H308X106	FRM80/8	DH508	TSV508	FSV508	DHV508	TCV508
SNV080-L	22208-E1-K	H308X106	FRM80/8	DH508	TSV508	FSV508	DHV508	TCV508
SNV090-L	1308-K-TVH-C3	H308X106	FRM90/9	DH608	TSV608	FSV608	DHV608	TCV608
SNV090-L	21308-E1-K	H308X106	FRM90/9	DH608	TSV608	FSV608	DHV608	TCV608
SNV090-L	2308-K-TVH-C3	H2308X106	FRM90/4	DH608	TSV608	FSV608	DHV608	TCV608
SNV090-L	22308-E1-K	H2308X106	FRM90/4	DH608	TSV608	FSV608	DHV608	TCV608
SNV080-L	1208-K-TVH-C3	H208	FRM80/10,5	DH508	TSV508	FSV508	DHV508	TCV508
SNV080-L	20208-K-TVP-C3	H208	FRM80/10,5	DH508	TSV508	FSV508	DHV508	TCV508
SNV080-L	2208-K-TVH-C3	H308	FRM80/8	DH508	TSV508	FSV508	DHV508	TCV508
SNV080-L	22208-E1-K	H308	FRM80/8	DH508	TSV508	FSV508	DHV508	TCV508
SNV090-L	1308-K-TVH-C3	H308	FRM90/9	DH608	TSV608	FSV608	DHV608	TCV608
SNV090-L	21308-E1-K	H308	FRM90/9	DH608	TSV608	FSV608	DHV608	TCV608
SNV090-L	2308-K-TVH-C3	H2308	FRM90/4	DH608	TSV608	FSV608	DHV608	TCV608
SNV090-L	22308-E1-K	H2308	FRM90/4	DH608	TSV608	FSV608	DHV608	TCV608



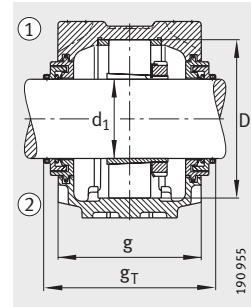
Double lip seal DH
Cover DKV



Felt seal FSV



V ring seal DHV



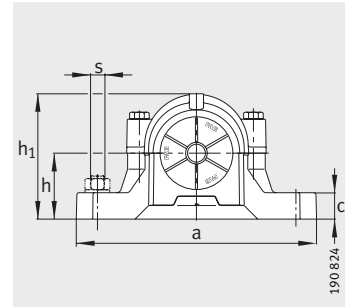
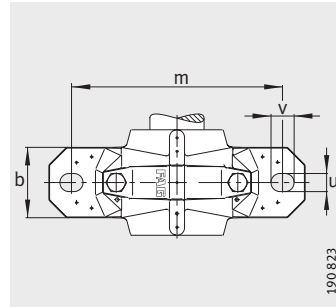
Taconite seal TCV

Cover	Mass m Housing ≈kg	Dimensions																	
		d ₁		a	g	h ₁	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s	
		mm	inch															mm	inch
DKV080	2,9	31,75	1 ¹ / ₄	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1 ¹ / ₂
DKV080	2,9	31,75	1 ¹ / ₄	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1 ¹ / ₂
DKV080	2,9	31,75	1 ¹ / ₄	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1 ¹ / ₂
DKV080	2,9	31,75	1 ¹ / ₄	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1 ¹ / ₂
DKV090	3,1	31,75	1 ¹ / ₄	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	1 ¹ / ₂
DKV090	3,1	31,75	1 ¹ / ₄	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	1 ¹ / ₂
DKV090	3,1	31,75	1 ¹ / ₄	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	1 ¹ / ₂
DKV090	3,1	31,75	1 ¹ / ₄	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	1 ¹ / ₂
DKV080	2,9	33,338	1 ⁵ / ₁₆	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1 ¹ / ₂
DKV080	2,9	33,338	1 ⁵ / ₁₆	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1 ¹ / ₂
DKV080	2,9	33,338	1 ⁵ / ₁₆	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1 ¹ / ₂
DKV080	2,9	33,338	1 ⁵ / ₁₆	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1 ¹ / ₂
DKV090	3,1	33,338	1 ⁵ / ₁₆	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	1 ¹ / ₂
DKV090	3,1	33,338	1 ⁵ / ₁₆	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	1 ¹ / ₂
DKV090	3,1	33,338	1 ⁵ / ₁₆	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	1 ¹ / ₂
DKV090	3,1	33,338	1 ⁵ / ₁₆	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	1 ¹ / ₂
DKV080	2,9	34,925	1 ³ / ₈	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1 ¹ / ₂
DKV080	2,9	34,925	1 ³ / ₈	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1 ¹ / ₂
DKV080	2,9	34,925	1 ³ / ₈	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1 ¹ / ₂
DKV080	2,9	34,925	1 ³ / ₈	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1 ¹ / ₂
DKV090	3,1	34,925	1 ³ / ₈	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	1 ¹ / ₂
DKV090	3,1	34,925	1 ³ / ₈	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	1 ¹ / ₂
DKV090	3,1	34,925	1 ³ / ₈	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	1 ¹ / ₂
DKV090	3,1	34,925	1 ³ / ₈	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	1 ¹ / ₂
DKV080	2,9	35	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1 ¹ / ₂
DKV080	2,9	35	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1 ¹ / ₂
DKV080	2,9	35	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1 ¹ / ₂
DKV080	2,9	35	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1 ¹ / ₂
DKV090	3,1	35	–	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	1 ¹ / ₂
DKV090	3,1	35	–	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	1 ¹ / ₂
DKV090	3,1	35	–	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	1 ¹ / ₂
DKV090	3,1	35	–	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	1 ¹ / ₂



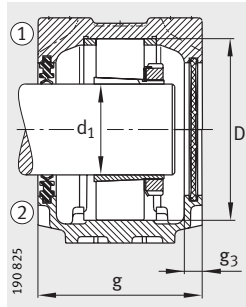
Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve

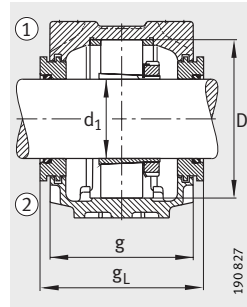


- ① Locating bearing
- ② Non-locating bearing

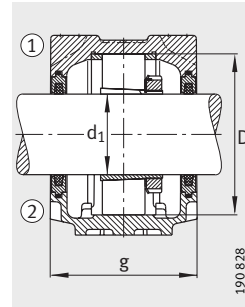
Dimension table (continued) · Dimensions in mm								
Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV085-L	1209-K-TVH-C3	H209X107	FRM85/6	DH509X107	TSV509X107	FSV509X107	DHV509X107	TCV509X107
SNV085-L	20209-K-TVP-C3	H209X107	FRM85/6	DH509X107	TSV509X107	FSV509X107	DHV509X107	TCV509X107
SNV085-L	2209-K-TVH-C3	H309X107	FRM85/4	DH509X107	TSV509X107	FSV509X107	DHV509X107	TCV509X107
SNV085-L	22209-E1-K	H309X107	FRM85/4	DH509X107	TSV509X107	FSV509X107	DHV509X107	TCV509X107
SNV100-L	1309-K-TVH-C3	H309X107	FRM100/9,5	DH609X107	TSV609X107	FSV609X107	DHV609X107	TCV609X107
SNV100-L	21309-E1-K	H309X107	FRM100/9,5	DH609X107	TSV609X107	FSV609X107	DHV609X107	TCV609X107
SNV100-L	2309-K-TVH-C3	H2309X107	FRM100/4	DH609X107	TSV609X107	FSV609X107	DHV609X107	TCV609X107
SNV100-L	22309-E1-K	H2309X107	FRM100/4	DH609X107	TSV609X107	FSV609X107	DHV609X107	TCV609X107
SNV085-L	1209-K-TVH-C3	H209X108	FRM85/6	DH509X107	TSV509X108	FSV509X108	DHV509X108	TCV509X108
SNV085-L	20209-K-TVP-C3	H209X108	FRM85/6	DH509X107	TSV509X108	FSV509X108	DHV509X108	TCV509X108
SNV085-L	2209-K-TVH-C3	H309X108	FRM85/4	DH509X107	TSV509X108	FSV509X108	DHV509X108	TCV509X108
SNV085-L	22209-E1-K	H309X108	FRM85/4	DH509X107	TSV509X108	FSV509X108	DHV509X108	TCV509X108
SNV100-L	1309-K-TVH-C3	H309X108	FRM100/9,5	DH609X107	TSV609X108	FSV609X108	DHV609X108	TCV609X108
SNV100-L	21309-E1-K	H309X108	FRM100/9,5	DH609X107	TSV609X108	FSV609X108	DHV609X108	TCV609X108
SNV100-L	2309-K-TVH-C3	H2309X108	FRM100/4	DH609X107	TSV609X108	FSV609X108	DHV609X108	TCV609X108
SNV100-L	22309-E1-K	H2309X108	FRM100/4	DH609X107	TSV609X108	FSV609X108	DHV609X108	TCV609X108
SNV100-L	1309-K-TVH-C3	H309X109	FRM100/9,5	DH609	TSV609	FSV609	DHV609	TCV609
SNV100-L	21309-E1-K	H309X109	FRM100/9,5	DH609	TSV609	FSV609	DHV609	TCV609
SNV100-L	2309-K-TVH-C3	H2309X109	FRM100/4	DH609	TSV609	FSV609	DHV609	TCV609
SNV100-L	22309-E1-K	H2309X109	FRM100/4	DH609	TSV609	FSV609	DHV609	TCV609
SNV085-L	1209-K-TVH-C3	H209	FRM85/6	DH509	TSV509	FSV509	DHV509	TCV509
SNV085-L	20209-K-TVP-C3	H209	FRM85/6	DH509	TSV509	FSV509	DHV509	TCV509
SNV085-L	2209-K-TVH-C3	H309	FRM85/4	DH509	TSV509	FSV509	DHV509	TCV509
SNV085-L	22209-E1-K	H309	FRM85/4	DH509	TSV509	FSV509	DHV509	TCV509
SNV100-L	1309-K-TVH-C3	H309	FRM100/9,5	DH609	TSV609	FSV609	DHV609	TCV609
SNV100-L	21309-E1-K	H309	FRM100/9,5	DH609	TSV609	FSV609	DHV609	TCV609
SNV100-L	2309-K-TVH-C3	H2309	FRM100/4	DH609	TSV609	FSV609	DHV609	TCV609
SNV100-L	22309-E1-K	H2309	FRM100/4	DH609	TSV609	FSV609	DHV609	TCV609
SNV090-L	1210-K-TVH-C3	H210X110	FRM90/10,5	DH510X110	TSV510X110	FSV510X110	DHV510X110	TCV510X110
SNV090-L	20210-K-TVP-C3	H210X110	FRM90/10,5	DH510X110	TSV510X110	FSV510X110	DHV510X110	TCV510X110
SNV090-L	2210-K-TVH-C3	H310X110	FRM90/9	DH510X110	TSV510X110	FSV510X110	DHV510X110	TCV510X110
SNV090-L	22210-E1-K	H310X110	FRM90/9	DH510X110	TSV510X110	FSV510X110	DHV510X110	TCV510X110
SNV110-L	1310-K-TVH-C3	H310X110	FRM110/10,5	DH610X110	TSV610X110	FSV610X110	DHV610X110	TCV610X110
SNV110-L	21310-E1-K	H310X110	FRM110/10,5	DH610X110	TSV610X110	FSV610X110	DHV610X110	TCV610X110
SNV110-L	2310-K-TVH-C3	H2310X110	FRM110/4	DH610X110	TSV610X110	FSV610X110	DHV610X110	TCV610X110
SNV110-L	22310-E1-K	H2310X110	FRM110/4	DH610X110	TSV610X110	FSV610X110	DHV610X110	TCV610X110



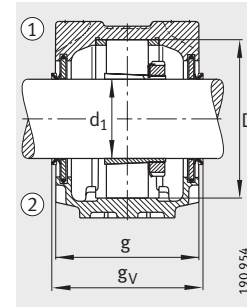
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV



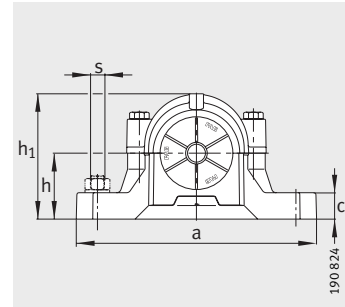
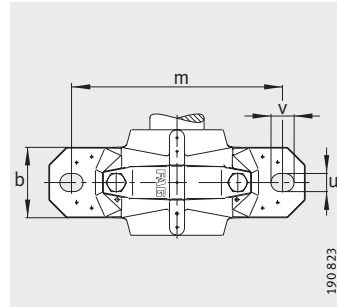
V ring seal DHV

Cover	Mass m ≈kg	Dimensions																		
		Housing		d ₁	a	g	h ₁	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s	
		mm	inch																mm	inch
DKV085	2,8	36,513	1 ⁷ / ₁₆	205	87	114	60	25	85	101	91	123	12,5	60	170	15	20	M12	1 ¹ / ₂	
DKV085	2,8	36,513	1 ⁷ / ₁₆	205	87	114	60	25	85	101	91	123	12,5	60	170	15	20	M12	1 ¹ / ₂	
DKV085	2,8	36,513	1 ⁷ / ₁₆	205	87	114	60	25	85	101	91	123	12,5	60	170	15	20	M12	1 ¹ / ₂	
DKV085	2,8	36,513	1 ⁷ / ₁₆	205	87	114	60	25	85	101	91	123	12,5	60	170	15	20	M12	1 ¹ / ₂	
DKV100	4,3	36,513	1 ⁷ / ₁₆	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV100	4,3	36,513	1 ⁷ / ₁₆	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV100	4,3	36,513	1 ⁷ / ₁₆	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV100	4,3	36,513	1 ⁷ / ₁₆	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV085	2,8	38,1	1 ¹ / ₂	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1 ¹ / ₂	
DKV085	2,8	38,1	1 ¹ / ₂	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1 ¹ / ₂	
DKV085	2,8	38,1	1 ¹ / ₂	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1 ¹ / ₂	
DKV085	2,8	38,1	1 ¹ / ₂	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1 ¹ / ₂	
DKV100	4,3	38,1	1 ¹ / ₂	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV100	4,3	38,1	1 ¹ / ₂	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV100	4,3	38,1	1 ¹ / ₂	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV100	4,3	38,1	1 ¹ / ₂	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV100	4,3	39,688	1 ⁹ / ₁₆	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV100	4,3	39,688	1 ⁹ / ₁₆	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV100	4,3	39,688	1 ⁹ / ₁₆	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV100	4,3	39,688	1 ⁹ / ₁₆	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV085	2,8	40	–	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1 ¹ / ₂	
DKV085	2,8	40	–	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1 ¹ / ₂	
DKV085	2,8	40	–	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1 ¹ / ₂	
DKV085	2,8	40	–	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1 ¹ / ₂	
DKV100	4,3	40	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV100	4,3	40	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV100	4,3	40	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV100	4,3	40	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV090	3,1	41,275	1 ⁵ / ₈	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1 ¹ / ₂	
DKV090	3,1	41,275	1 ⁵ / ₈	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1 ¹ / ₂	
DKV090	3,1	41,275	1 ⁵ / ₈	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1 ¹ / ₂	
DKV090	3,1	41,275	1 ⁵ / ₈	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1 ¹ / ₂	
DKV110	4,9	41,275	1 ⁵ / ₈	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV110	4,9	41,275	1 ⁵ / ₈	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV110	4,9	41,275	1 ⁵ / ₈	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5 ⁵ / ₈	
DKV110	4,9	41,275	1 ⁵ / ₈	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5 ⁵ / ₈	



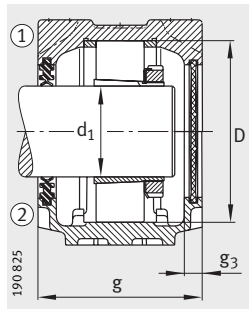
Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve

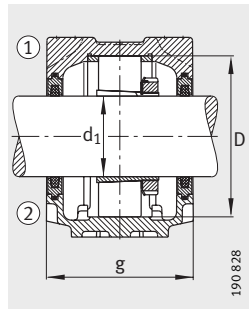


- ① Locating bearing
- ② Non-locating bearing

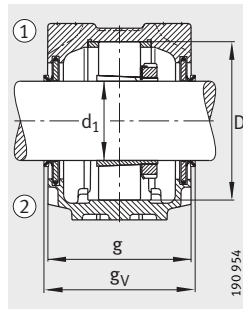
Dimension table (continued) · Dimensions in mm								
Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV090-L	1210-K-TVH-C3	H210X111	FRM90/10,5	DH510X110	TSV510X111	FSV510X111	DHV510X111	TCV510X111
SNV090-L	20210-K-TVP-C3	H210X111	FRM90/10,5	DH510X110	TSV510X111	FSV510X111	DHV510X111	TCV510X111
SNV090-L	2210-K-TVH-C3	H310X111	FRM90/9	DH510X110	TSV510X111	FSV510X111	DHV510X111	TCV510X111
SNV090-L	22210-E1-K	H310X111	FRM90/9	DH510X110	TSV510X111	FSV510X111	DHV510X111	TCV510X111
SNV110-L	1310-K-TVH-C3	H310X111	FRM110/10,5	DH610X110	TSV610X111	FSV610X111	DHV610X111	TCV610X111
SNV110-L	21310-E1-K	H310X111	FRM110/10,5	DH610X110	TSV610X111	FSV610X111	DHV610X111	TCV610X111
SNV110-L	2310-K-TVH-C3	H2310X111	FRM110/4	DH610X110	TSV610X111	FSV610X111	DHV610X111	TCV610X111
SNV110-L	22310-E1-K	H2310X111	FRM110/4	DH610X110	TSV610X111	FSV610X111	DHV610X111	TCV610X111
SNV090-L	1210-K-TVH-C3	H210X112	FRM90/10,5	DH510	TSV510X112	FSV510	DHV510	TCV510
SNV090-L	20210-K-TVP-C3	H210X112	FRM90/10,5	DH510	TSV510X112	FSV510	DHV510	TCV510
SNV090-L	2210-K-TVH-C3	H310X112	FRM90/9	DH510	TSV510X112	FSV510	DHV510	TCV510
SNV090-L	22210-E1-K	H310X112	FRM90/9	DH510	TSV510X112	FSV510	DHV510	TCV510
SNV110-L	1310-K-TVH-C3	H310X112	FRM110/10,5	DH610	TSV610X112	FSV610	DHV610	TCV610
SNV110-L	21310-E1-K	H310X112	FRM110/10,5	DH610	TSV610X112	FSV610	DHV610	TCV610
SNV110-L	2310-K-TVH-C3	H2310X112	FRM110/4	DH610	TSV610X112	FSV610	DHV610	TCV610
SNV110-L	22310-E1-K	H2310X112	FRM110/4	DH610	TSV610X112	FSV610	DHV610	TCV610
SNV090-L	1210-K-TVH-C3	H210	FRM90/10,5	DH510	TSV510	FSV510	DHV510	TCV510
SNV090-L	20210-K-TVP-C3	H210	FRM90/10,5	DH510	TSV510	FSV510	DHV510	TCV510
SNV090-L	2210-K-TVH-C3	H310	FRM90/9	DH510	TSV510	FSV510	DHV510	TCV510
SNV090-L	22210-E1-K	H310	FRM90/9	DH510	TSV510	FSV510	DHV510	TCV510
SNV110-L	1310-K-TVH-C3	H310	FRM110/10,5	DH610	TSV610	FSV610	DHV610	TCV610
SNV110-L	21310-E1-K	H310	FRM110/10,5	DH610	TSV610	FSV610	DHV610	TCV610
SNV110-L	2310-K-TVH-C3	H2310	FRM110/4	DH610	TSV610	FSV610	DHV610	TCV610
SNV110-L	22310-E1-K	H2310	FRM110/4	DH610	TSV610	FSV610	DHV610	TCV610
SNV100-L	1211-K-TVH-C3	H211X114	FRM100/11,5	DH511X114	TSV511X114	FSV511X114	DHV511X114	TCV511X114
SNV100-L	20211-K-TVP-C3	H211X114	FRM100/11,5	DH511X114	TSV511X114	FSV511X114	DHV511X114	TCV511X114
SNV100-L	2211-K-TVH-C3	H311X114	FRM100/9,5	DH511X114	TSV511X114	FSV511X114	DHV511X114	TCV511X114
SNV100-L	22211-E1-K	H311X114	FRM100/9,5	DH511X114	TSV511X114	FSV511X114	DHV511X114	TCV511X114
SNV120-L	1311-K-TVH-C3	H311X114	FRM120/11	DH611X114	TSV611X114	FSV611X114	DHV611X114	TCV611X114
SNV120-L	20311-K-TVP-C3	H311X114	FRM120/11	DH611X114	TSV611X114	FSV611X114	DHV611X114	TCV611X114
SNV120-L	21311-E1-K	H311X114	FRM120/11	DH611X114	TSV611X114	FSV611X114	DHV611X114	TCV611X114
SNV120-L	2311-K-TVH-C3	H2311X114	FRM120/4	DH611X114	TSV611X114	FSV611X114	DHV611X114	TCV611X114
SNV120-L	22311-E1-K	H2311X114	FRM120/4	DH611X114	TSV611X114	FSV611X114	DHV611X114	TCV611X114



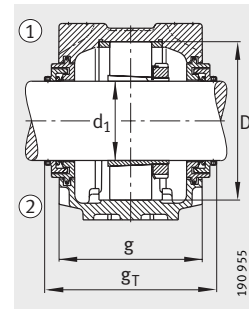
Double lip seal DH
Cover DKV



Felt seal FSV



V ring seal DHV



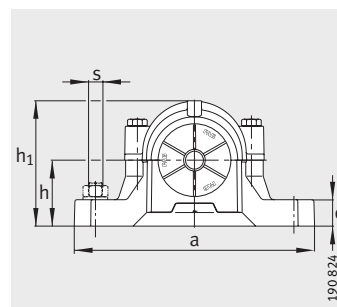
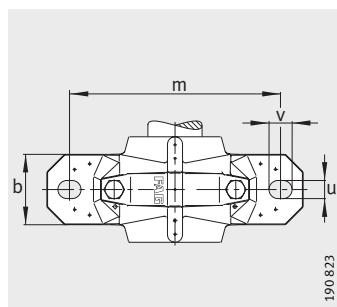
Taconite seal TCV

Cover	Housing	Mass m ≈kg	Dimensions																	
			d ₁		a	g	h ₁	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s	
			mm	inch															mm	inch
DKV090	3,1	42,863	1 ¹¹ / ₁₆	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2	
DKV090	3,1	42,863	1 ¹¹ / ₁₆	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2	
DKV090	3,1	42,863	1 ¹¹ / ₁₆	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2	
DKV090	3,1	42,863	1 ¹¹ / ₁₆	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2	
DKV110	4,9	42,863	1 ¹¹ / ₁₆	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8	
DKV110	4,9	42,863	1 ¹¹ / ₁₆	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8	
DKV110	4,9	42,863	1 ¹¹ / ₁₆	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8	
DKV110	4,9	42,863	1 ¹¹ / ₁₆	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8	
DKV090	3,1	44,45	1 ³ / ₄	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2	
DKV090	3,1	44,45	1 ³ / ₄	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2	
DKV090	3,1	44,45	1 ³ / ₄	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2	
DKV090	3,1	44,45	1 ³ / ₄	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2	
DKV110	4,9	44,45	1 ³ / ₄	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8	
DKV110	4,9	44,45	1 ³ / ₄	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8	
DKV110	4,9	44,45	1 ³ / ₄	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8	
DKV110	4,9	44,45	1 ³ / ₄	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8	
DKV090	3,1	45	-	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2	
DKV090	3,1	45	-	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2	
DKV090	3,1	45	-	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2	
DKV090	3,1	45	-	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2	
DKV110	4,9	45	-	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8	
DKV110	4,9	45	-	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8	
DKV110	4,9	45	-	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8	
DKV110	4,9	45	-	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8	
DKV100	4,3	47,625	1 ⁷ / ₈	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8	
DKV100	4,3	47,625	1 ⁷ / ₈	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8	
DKV100	4,3	47,625	1 ⁷ / ₈	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8	
DKV100	4,3	47,625	1 ⁷ / ₈	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8	
DKV120	6,1	47,625	1 ⁷ / ₈	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8	
DKV120	6,1	47,625	1 ⁷ / ₈	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8	
DKV120	6,1	47,625	1 ⁷ / ₈	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8	
DKV120	6,1	47,625	1 ⁷ / ₈	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8	
DKV120	6,1	47,625	1 ⁷ / ₈	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8	
DKV120	6,1	47,625	1 ⁷ / ₈	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8	



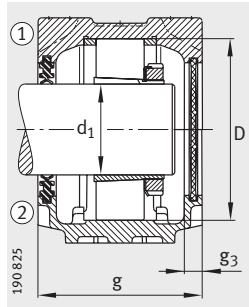
Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve

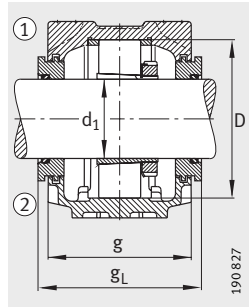


- ① Locating bearing
- ② Non-locating bearing

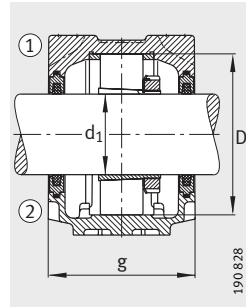
Dimension table (continued) · Dimensions in mm								
Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV100-L	1211-K-TVH-C3	H211X115	FRM100/11,5	DH511	TSV511X115	FSV511X115	DHV511X115	TCV511X115
SNV100-L	20211-K-TVP-C3	H211X115	FRM100/11,5	DH511	TSV511X115	FSV511X115	DHV511X115	TCV511X115
SNV100-L	2211-K-TVH-C3	H311X115	FRM100/9,5	DH511	TSV511X115	FSV511X115	DHV511X115	TCV511X115
SNV100-L	22211-E1-K	H311X115	FRM100/9,5	DH511	TSV511X115	FSV511X115	DHV511X115	TCV511X115
SNV120-L	1311-K-TVH-C3	H311X115	FRM120/11	DH611	TSV611X115	FSV611X115	DHV611X115	TCV611X115
SNV120-L	20311-K-TVP-C3	H311X115	FRM120/11	DH611	TSV611X115	FSV611X115	DHV611X115	TCV611X115
SNV120-L	21311-E1-K	H311X115	FRM120/11	DH611	TSV611X115	FSV611X115	DHV611X115	TCV611X115
SNV120-L	2311-K-TVH-C3	H2311X115	FRM120/4	DH611	TSV611X115	FSV611X115	DHV611X115	TCV611X115
SNV120-L	22311-E1-K	H2311X115	FRM120/4	DH611	TSV611X115	FSV611X115	DHV611X115	TCV611X115
SNV100-L	1211-K-TVH-C3	H211	FRM100/11,5	DH511	TSV511	FSV511	DHV511	TCV511
SNV100-L	20211-K-TVP-C3	H211	FRM100/11,5	DH511	TSV511	FSV511	DHV511	TCV511
SNV100-L	2211-K-TVH-C3	H311	FRM100/9,5	DH511	TSV511	FSV511	DHV511	TCV511
SNV100-L	22211-E1-K	H311	FRM100/9,5	DH511	TSV511	FSV511	DHV511	TCV511
SNV120-L	1311-K-TVH-C3	H311	FRM120/11	DH611	TSV611	FSV611	DHV611	TCV611
SNV120-L	20311-K-TVP-C3	H311	FRM120/11	DH611	TSV611	FSV611	DHV611	TCV611
SNV120-L	21311-E1-K	H311	FRM120/11	DH611	TSV611	FSV611	DHV611	TCV611
SNV120-L	2311-K-TVH-C3	H2311	FRM120/4	DH611	TSV611	FSV611	DHV611	TCV611
SNV120-L	22311-E1-K	H2311	FRM120/4	DH611	TSV611	FSV611	DHV611	TCV611
SNV100-L	1211-K-TVH-C3	H211X200	FRM100/11,5	DH511	TSV511X200	FSV511	DHV511	TCV511X200
SNV100-L	20211-K-TVP-C3	H211X200	FRM100/11,5	DH511	TSV511X200	FSV511	DHV511	TCV511X200
SNV100-L	2211-K-TVH-C3	H311X200	FRM100/9,5	DH511	TSV511X200	FSV511	DHV511	TCV511X200
SNV100-L	22211-E1-K	H311X200	FRM100/9,5	DH511	TSV511X200	FSV511	DHV511	TCV511X200
SNV120-L	1311-K-TVH-C3	H311X200	FRM120/11	DH611	TSV611X200	FSV611	DHV611	TCV611X200
SNV120-L	20311-K-TVP-C3	H311X200	FRM120/11	DH611	TSV611X200	FSV611	DHV611	TCV611X200
SNV120-L	21311-E1-K	H311X200	FRM120/11	DH611	TSV611X200	FSV611	DHV611	TCV611X200
SNV120-L	2311-K-TVH-C3	H2311X200	FRM120/4	DH611	TSV611X200	FSV611	DHV611	TCV611X200
SNV120-L	22311-E1-K	H2311X200	FRM120/4	DH611	TSV611X200	FSV611	DHV611	TCV611X200



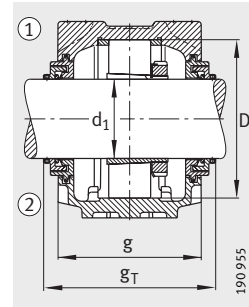
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV



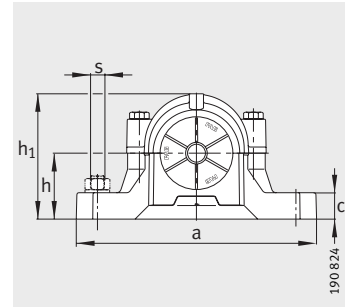
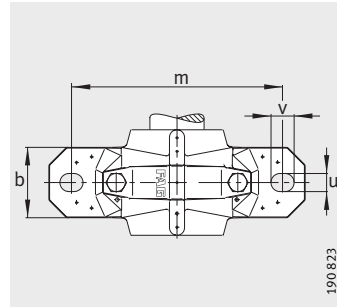
Taconite seal TCV

Cover	Mass m Housing ≈kg	Dimensions																	
		d ₁		a	g	h ₁	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s	
		mm	inch															mm	inch
DKV100	4,3	49,213	1¹⁵/₁₆	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	⁵ / ₈
DKV100	4,3	49,213	1¹⁵/₁₆	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	⁵ / ₈
DKV100	4,3	49,213	1¹⁵/₁₆	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	⁵ / ₈
DKV100	4,3	49,213	1¹⁵/₁₆	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	⁵ / ₈
DKV120	6,1	49,213	1¹⁵/₁₆	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	⁵ / ₈
DKV120	6,1	49,213	1¹⁵/₁₆	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	⁵ / ₈
DKV120	6,1	49,213	1¹⁵/₁₆	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	⁵ / ₈
DKV120	6,1	49,213	1¹⁵/₁₆	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	⁵ / ₈
DKV120	6,1	49,213	1¹⁵/₁₆	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	⁵ / ₈
DKV100	4,3	50	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	⁵ / ₈
DKV100	4,3	50	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	⁵ / ₈
DKV100	4,3	50	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	⁵ / ₈
DKV100	4,3	50	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	⁵ / ₈
DKV120	6,1	50	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	⁵ / ₈
DKV120	6,1	50	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	⁵ / ₈
DKV120	6,1	50	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	⁵ / ₈
DKV120	6,1	50	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	⁵ / ₈
DKV100	4,3	50,8	2	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	⁵ / ₈
DKV100	4,3	50,8	2	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	⁵ / ₈
DKV100	4,3	50,8	2	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	⁵ / ₈
DKV100	4,3	50,8	2	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	⁵ / ₈
DKV120	6,1	50,8	2	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	⁵ / ₈
DKV120	6,1	50,8	2	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	⁵ / ₈
DKV120	6,1	50,8	2	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	⁵ / ₈
DKV120	6,1	50,8	2	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	⁵ / ₈
DKV120	6,1	50,8	2	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	⁵ / ₈



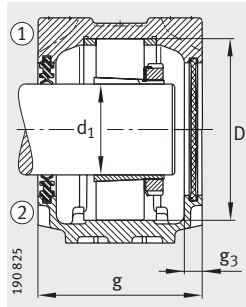
Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve

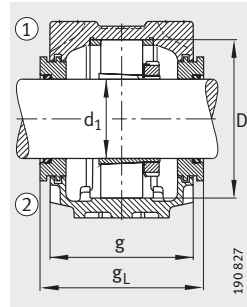


- ① Locating bearing
- ② Non-locating bearing

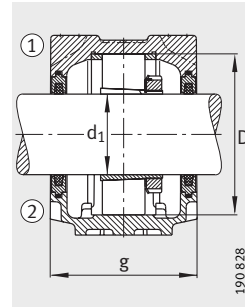
Dimension table (continued) · Dimensions in mm								
Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV110-L	1212-K-TVH-C3	H212X202	FRM110/13	DH512	TSV512X202	FSV512X202	DHV512	TCV512X202
SNV110-L	20212-K-TVP-C3	H212X202	FRM110/13	DH512	TSV512X202	FSV512X202	DHV512	TCV512X202
SNV110-L	2212-K-TVH-C3	H312X202	FRM110/10	DH512	TSV512X202	FSV512X202	DHV512	TCV512X202
SNV110-L	22212-E1-K	H312X202	FRM110/10	DH512	TSV512X202	FSV512X202	DHV512	TCV512X202
SNV130-L	1312-K-TVH-C3	H312X202	FRM130/12,5	DH612	TSV612X202	FSV612X202	DHV612	TCV612X202
SNV130-L	20312-K-TVP-C3	H312X202	FRM130/12,5	DH612	TSV612X202	FSV612X202	DHV612	TCV612X202
SNV130-L	21312-E1-K	H312X202	FRM130/12,5	DH612	TSV612X202	FSV612X202	DHV612	TCV612X202
SNV130-L	2312-K-TVH-C3	H2312X202	FRM130/5	DH612	TSV612X202	FSV612X202	DHV612	TCV612X202
SNV130-L	22312-E1-K	H2312X202	FRM130/5	DH612	TSV612X202	FSV612X202	DHV612	TCV612X202
SNV110-L	1212-K-TVH-C3	H212	FRM110/13	DH512	TSV512	FSV512	DHV512	TCV512
SNV110-L	20212-K-TVP-C3	H212	FRM110/13	DH512	TSV512	FSV512	DHV512	TCV512
SNV110-L	2212-K-TVH-C3	H312	FRM110/10	DH512	TSV512	FSV512	DHV512	TCV512
SNV110-L	22212-E1-K	H312	FRM110/10	DH512	TSV512	FSV512	DHV512	TCV512
SNV130-L	1312-K-TVH-C3	H312	FRM130/12,5	DH612	TSV612	FSV612	DHV612	TCV612
SNV130-L	20312-K-TVP-C3	H312	FRM130/12,5	DH612	TSV612	FSV612	DHV612	TCV612
SNV130-L	21312-E1-K	H312	FRM130/12,5	DH612	TSV612	FSV612	DHV612	TCV612
SNV130-L	2312-K-TVH-C3	H2312	FRM130/5	DH612	TSV612	FSV612	DHV612	TCV612
SNV130-L	22312-E1-K	H2312	FRM130/5	DH612	TSV612	FSV612	DHV612	TCV612
SNV120-L	1213-K-TVH-C3	H213X203	FRM120/14	DH513X203	TSV513X203	FSV513X203	DHV513X203	TCV513X203
SNV120-L	20213-K-TVP-C3	H213X203	FRM120/14	DH513X203	TSV513X203	FSV513X203	DHV513X203	TCV513X203
SNV120-L	2213-K-TVH-C3	H313X203	FRM120/10	DH513X203	TSV513X203	FSV513X203	DHV513X203	TCV513X203
SNV120-L	22213-E1-K	H313X203	FRM120/10	DH513X203	TSV513X203	FSV513X203	DHV513X203	TCV513X203
SNV140-L	1313-K-TVH-C3	H313X203	FRM140/12,5	DH613X203	TSV613X203	FSV613X203	DHV613X203	TCV613X203
SNV140-L	20313-K-MB-C3	H313X203	FRM140/12,5	DH613X203	TSV613X203	FSV613X203	DHV613X203	TCV613X203
SNV140-L	21313-E1-K	H313X203	FRM140/12,5	DH613X203	TSV613X203	FSV613X203	DHV613X203	TCV613X203
SNV140-L	2313-K-TVH-C3	H2313X203	FRM140/5	DH613X203	TSV613X203	FSV613X203	DHV613X203	TCV613X203
SNV140-L	22313-E1-K	H2313X203	FRM140/5	DH613X203	TSV613X203	FSV613X203	DHV613X203	TCV613X203
SNV120-L	1213-K-TVH-C3	H213X204	FRM120/14	DH513X203	TSV513X204	FSV513X204	DHV513X204	TCV513X204
SNV120-L	20213-K-TVP-C3	H213X204	FRM120/14	DH513X203	TSV513X204	FSV513X204	DHV513X204	TCV513X204
SNV120-L	2213-K-TVH-C3	H313X204	FRM120/10	DH513X203	TSV513X204	FSV513X204	DHV513X204	TCV513X204
SNV120-L	22213-E1-K	H313X204	FRM120/10	DH513X203	TSV513X204	FSV513X204	DHV513X204	TCV513X204
SNV140-L	1313-K-TVH-C3	H313X204	FRM140/12,5	DH613X203	TSV613X204	FSV613X204	DHV613X204	TCV613X204
SNV140-L	20313-K-MB-C3	H313X204	FRM140/12,5	DH613X203	TSV613X204	FSV613X204	DHV613X204	TCV613X204
SNV140-L	21313-E1-K	H313X204	FRM140/12,5	DH613X203	TSV613X204	FSV613X204	DHV613X204	TCV613X204
SNV140-L	2313-K-TVH-C3	H2313X204	FRM140/5	DH613X203	TSV613X204	FSV613X204	DHV613X204	TCV613X204
SNV140-L	22313-E1-K	H2313X204	FRM140/5	DH613X203	TSV613X204	FSV613X204	DHV613X204	TCV613X204



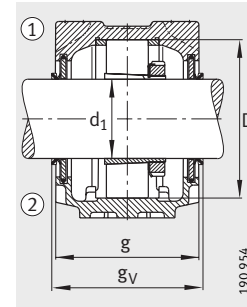
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV



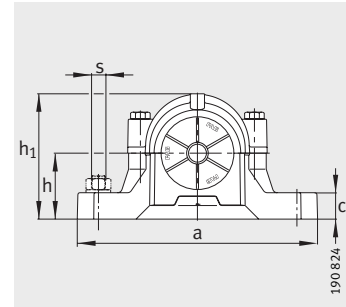
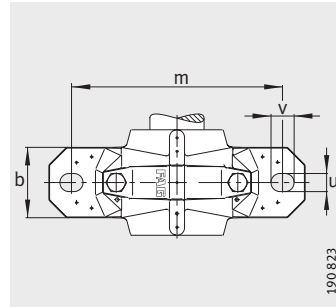
V ring seal DHV

Cover	Mass m Housing ≈kg	Dimensions																	
		d ₁		a	g	h ₁	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s	
		mm	inch															mm	inch
DKV110	4,9	53,975	2 ¹ / ₈	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	53,975	2 ¹ / ₈	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	53,975	2 ¹ / ₈	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	53,975	2 ¹ / ₈	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV130	6,8	53,975	2 ¹ / ₈	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	53,975	2 ¹ / ₈	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	53,975	2 ¹ / ₈	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	53,975	2 ¹ / ₈	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	53,975	2 ¹ / ₈	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV110	4,9	55	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	55	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	55	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	55	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV130	6,8	55	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	55	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	55	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	55	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV120	6,1	55,563	2 ³ / ₁₆	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	55,563	2 ³ / ₁₆	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	55,563	2 ³ / ₁₆	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	55,563	2 ³ / ₁₆	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV140	9,3	55,563	2 ³ / ₁₆	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	55,563	2 ³ / ₁₆	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	55,563	2 ³ / ₁₆	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	55,563	2 ³ / ₁₆	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	55,563	2 ³ / ₁₆	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV120	6,1	57,15	2 ¹ / ₄	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	57,15	2 ¹ / ₄	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	57,15	2 ¹ / ₄	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	57,15	2 ¹ / ₄	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV140	9,3	57,15	2 ¹ / ₄	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	57,15	2 ¹ / ₄	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	57,15	2 ¹ / ₄	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	57,15	2 ¹ / ₄	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	57,15	2 ¹ / ₄	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4



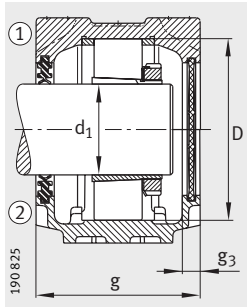
Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve

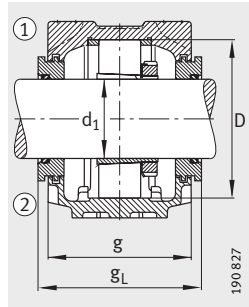


- ① Locating bearing
- ② Non-locating bearing

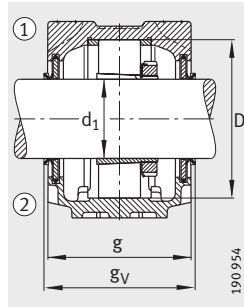
Dimension table (continued) · Dimensions in mm								
Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV120-L	1213-K-TVH-C3	H213	FRM120/14	DH513	TSV513	FSV513	DHV513	TCV513
SNV120-L	20213-K-TVP-C3	H213	FRM120/14	DH513	TSV513	FSV513	DHV513	TCV513
SNV120-L	2213-K-TVH-C3	H313	FRM120/10	DH513	TSV513	FSV513	DHV513	TCV513
SNV120-L	22213-E1-K	H313	FRM120/10	DH513	TSV513	FSV513	DHV513	TCV513
SNV140-L	1313-K-TVH-C3	H313	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
SNV140-L	20313-K-MB-C3	H313	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
SNV140-L	21313-E1-K	H313	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
SNV140-L	2313-K-TVH-C3	H2313	FRM140/5	DH613	TSV613	FSV613	DHV613	TCV613
SNV140-L	22313-E1-K	H2313	FRM140/5	DH613	TSV613	FSV613	DHV613	TCV613
SNV120-L	1213-K-TVH-C3	H213X206	FRM120/14	DH513	TSV513	FSV513	DHV513	TCV513
SNV120-L	20213-K-TVP-C3	H213X206	FRM120/14	DH513	TSV513	FSV513	DHV513	TCV513
SNV120-L	2213-K-TVH-C3	H313X206	FRM120/10	DH513	TSV513	FSV513	DHV513	TCV513
SNV120-L	22213-E1-K	H313X206	FRM120/10	DH513	TSV513	FSV513	DHV513	TCV513
SNV140-L	1313-K-TVH-C3	H313X206	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
SNV140-L	20313-K-MB-C3	H313X206	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
SNV140-L	21313-E1-K	H313X206	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
SNV140-L	2313-K-TVH-C3	H2313X206	FRM140/5	DH613	TSV613	FSV613	DHV613	TCV613
SNV140-L	22313-E1-K	H2313X206	FRM140/5	DH613	TSV613	FSV613	DHV613	TCV613
SNV130-L	1215-K-TVH-C3	H215X207	FRM130/15,5	DH515X207	TSV515X207	FSV515X207	DHV515X207	TCV515X207
SNV130-L	20215-K-TVP-C3	H215X207	FRM130/15,5	DH515X207	TSV515X207	FSV515X207	DHV515X207	TCV515X207
SNV130-L	2215-K-TVH-C3	H315X207	FRM130/12,5	DH515X207	TSV515X207	FSV515X207	DHV515X207	TCV515X207
SNV130-L	22215-E1-K	H315X207	FRM130/12,5	DH515X207	TSV515X207	FSV515X207	DHV515X207	TCV515X207
SNV160-L	1315-K-M-C3	H315X207	FRM160/14	DH615X207	TSV615X207	FSV615X207	DHV615X207	TCV615X207
SNV160-L	21315-E-1K	H315X207	FRM160/14	DH615X207	TSV615X207	FSV615X207	DHV615X207	TCV615X207
SNV160-L	2315-K-M-C3	H2315X207	FRM160/5	DH615X207	TSV615X207	FSV615X207	DHV615X207	TCV615X207
SNV160-L	22315-E1-K	H2315X207	FRM160/5	DH615X207	TSV615X207	FSV615X207	DHV615X207	TCV615X207
SNV130-L	1215-K-TVH-C3	H215X208	FRM130/15,5	DH515X207	TSV515X208	FSV515X208	DHV515X208	TCV515X208
SNV130-L	20215-K-TVP-C3	H215X208	FRM130/15,5	DH515X207	TSV515X208	FSV515X208	DHV515X208	TCV515X208
SNV130-L	2215-K-TVH-C3	H315X208	FRM130/12,5	DH515X207	TSV515X208	FSV515X208	DHV515X208	TCV515X208
SNV130-L	22215-E1-K	H315X208	FRM130/12,5	DH515X207	TSV515X208	FSV515X208	DHV515X208	TCV515X208
SNV160-L	1315-K-M-C3	H315X208	FRM160/14	DH615X207	TSV615X208	FSV615X208	DHV615X208	TCV615X208
SNV160-L	21315-E1-K	H315X208	FRM160/14	DH615X207	TSV615X208	FSV615X208	DHV615X208	TCV615X208
SNV160-L	2315-K-M-C3	H2315X208	FRM160/5	DH615X207	TSV615X208	FSV615X208	DHV615X208	TCV615X208
SNV160-L	22315-E1-K	H2315X208	FRM160/5	DH615X207	TSV615X208	FSV615X208	DHV615X208	TCV615X208



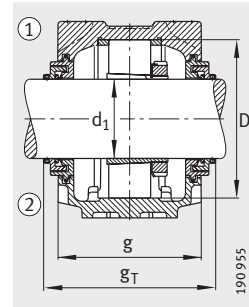
Double lip seal DH
Cover DKV



Labyrinth ring TSV



V ring seal DHV



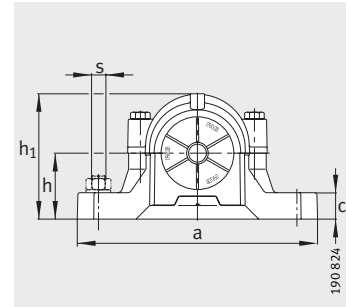
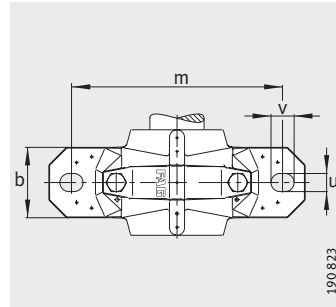
Taconite seal TCV

Cover	Mass m ≈kg	Dimensions																	
		Housing d ₁																s	
			mm	inch	a	g	h ₁	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	mm	inch
DKV120	6,1	60	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	60	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	60	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	60	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV140	9,3	60	–	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	60	–	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	60	–	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	60	–	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	60	–	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV120	6,1	60,325	2 ³ / ₈	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	60,325	2 ³ / ₈	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	60,325	2 ³ / ₈	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	60,325	2 ³ / ₈	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV140	9,3	60,325	2 ³ / ₈	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	60,325	2 ³ / ₈	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	60,325	2 ³ / ₈	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	60,325	2 ³ / ₈	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	60,325	2 ³ / ₈	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV130	6,8	61,913	2 ⁷ / ₁₆	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	61,913	2 ⁷ / ₁₆	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	61,913	2 ⁷ / ₁₆	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	61,913	2 ⁷ / ₁₆	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV160	12,8	61,913	2 ⁷ / ₁₆	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	61,913	2 ⁷ / ₁₆	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	61,913	2 ⁷ / ₁₆	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	61,913	2 ⁷ / ₁₆	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV130	6,8	63,5	2 ¹ / ₂	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	63,5	2 ¹ / ₂	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	63,5	2 ¹ / ₂	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	63,5	2 ¹ / ₂	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV160	12,8	63,5	2 ¹ / ₂	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	63,5	2 ¹ / ₂	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	63,5	2 ¹ / ₂	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	63,5	2 ¹ / ₂	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4



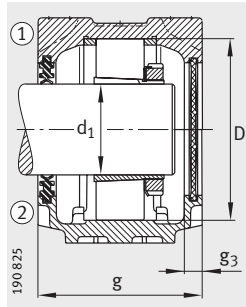
Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve

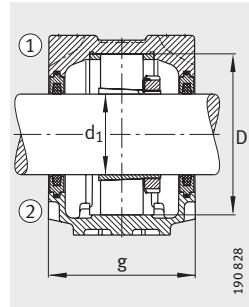


- ① Locating bearing
- ② Non-locating bearing

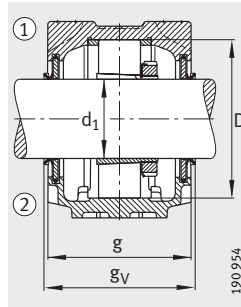
Dimension table (continued) · Dimensions in mm								
Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV130-L	1215-K-TVH-C3	H215	FRM130/15,5	DH515	TSV515	FSV515	DHV515	TCV515
SNV130-L	20215-K-TVP-C3	H215	FRM130/15,5	DH515	TSV515	FSV515	DHV515	TCV515
SNV130-L	2215-K-TVH-C3	H315	FRM130/12,5	DH515	TSV515	FSV515	DHV515	TCV515
SNV130-L	22215-E1-K	H315	FRM130/12,5	DH515	TSV515	FSV515	DHV515	TCV515
SNV160-L	1315-K-M-C3	H315	FRM160/14	DH615	TSV615	FSV615	DHV615	TCV615
SNV160-L	21315-E1-K	H315	FRM160/14	DH615	TSV615	FSV615	DHV615	TCV615
SNV160-L	2315-K-M-C3	H2315	FRM160/5	DH615	TSV615	FSV615	DHV615	TCV615
SNV160-L	22315-E1-K	H2315	FRM160/5	DH615	TSV615	FSV615	DHV615	TCV615
SNV130-L	1215-K-TVH-C3	H215X210	FRM130/15,5	DH515	TSV515X210	FSV515X210	DHV515X210	TCV515X210
SNV130-L	20215-K-TVP-C3	H215X210	FRM130/15,5	DH515	TSV515X210	FSV515X210	DHV515X210	TCV515X210
SNV130-L	2215-K-TVH-C3	H315X210	FRM130/12,5	DH515	TSV515X210	FSV515X210	DHV515X210	TCV515X210
SNV130-L	22215-E1-K	H315X210	FRM130/12,5	DH515	TSV515X210	FSV515X210	DHV515X210	TCV515X210
SNV160-L	1315-K-M-C3	H315X210	FRM160/14	DH615	TSV615X210	FSV615X210	DHV615X210	TCV615X210
SNV160-L	21315-E1-K	H315X210	FRM160/14	DH615	TSV615X210	FSV615X210	DHV615X210	TCV615X210
SNV160-L	2315-K-M-C3	H2315X210	FRM160/5	DH615	TSV615X210	FSV615X210	DHV615X210	TCV615X210
SNV160-L	22315-E1-K	H2315X210	FRM160/5	DH615	TSV615X210	FSV615X210	DHV615X210	TCV615X210
SNV140-L	1216-K-TVH-C3	H216X211	FRM140/16	DH516X211	TSV516X211	FSV516X211	DHV516X211	TCV516X211
SNV140-L	20216-K-TVP-C3	H216X211	FRM140/16	DH516X211	TSV516X211	FSV516X211	DHV516X211	TCV516X211
SNV140-L	2216-K-TVH-C3	H316X211	FRM140/12,5	DH516X211	TSV516X211	FSV516X211	DHV516X211	TCV516X211
SNV140-L	22216-E1-K	H316X211	FRM140/12,5	DH516X211	TSV516X211	FSV516X211	DHV516X211	TCV516X211
SNV170-L	1316-K-M-C3	H316X211	FRM170/14,5	DH616X211	TSV616X211	FSV616X211	DHV616X211	TCV616X211
SNV170-L	21316-E1-K	H316X211	FRM170/14,5	DH616X211	TSV616X211	FSV616X211	DHV616X211	TCV616X211
SNV170-L	2316-K-M-C3	H2316X211	FRM170/5	DH616X211	TSV616X211	FSV616X211	DHV616X211	TCV616X211
SNV170-L	22316-E1-K	H2316X211	FRM170/5	DH616X211	TSV616X211	FSV616X211	DHV616X211	TCV616X211
SNV140-L	1216-K-TVH-C3	H216X212	FRM140/16	DH516	TSV516	FSV516	DHV516	TCV516
SNV140-L	20216-K-TVP-C3	H216X212	FRM140/16	DH516	TSV516	FSV516	DHV516	TCV516
SNV140-L	2216-K-TVH-C3	H316X212	FRM140/12,5	DH516	TSV516	FSV516	DHV516	TCV516
SNV140-L	22216-E1-K	H316X212	FRM140/12,5	DH516	TSV516	FSV516	DHV516	TCV516
SNV170-L	1316-K-M-C3	H316X212	FRM170/14,5	DH616	TSV616	FSV616	DHV616	TCV616
SNV170-L	21316-E1-K	H316X212	FRM170/14,5	DH616	TSV616	FSV616	DHV616	TCV616
SNV170-L	2316-K-M-C3	H2316X212	FRM170/5	DH616	TSV616	FSV616	DHV616	TCV616
SNV170-L	22316-E1-K	H2316X212	FRM170/5	DH616	TSV616	FSV616	DHV616	TCV616



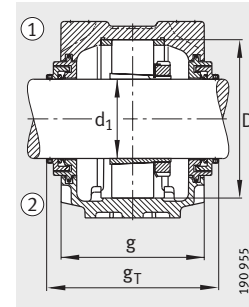
Double lip seal DH
Cover DKV



Felt seal FSV



V ring seal DHV



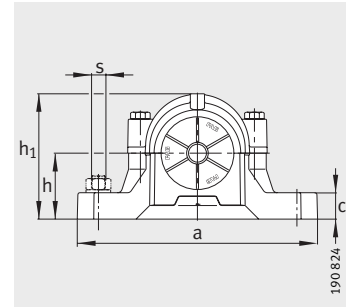
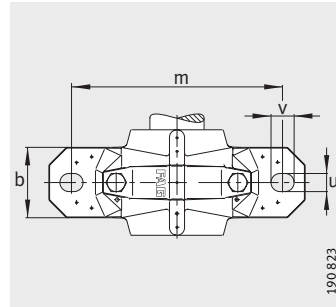
Taconite seal TCV

Cover	Mass m ≈kg	Dimensions																	
		Housing d ₁	a	g	h ₁	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s		
																		mm	inch
DKV130	6,8	65	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	65	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	65	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	65	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV160	12,8	65	–	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	65	–	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	65	–	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	65	–	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV130	6,8	66,675	2 ⁵ / ₈	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	66,675	2 ⁵ / ₈	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	66,675	2 ⁵ / ₈	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	66,675	2 ⁵ / ₈	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV160	12,8	66,675	2 ⁵ / ₈	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	66,675	2 ⁵ / ₈	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	66,675	2 ⁵ / ₈	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	66,675	2 ⁵ / ₈	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV140	9,3	68,263	2 ¹¹ / ₁₆	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	68,263	2 ¹¹ / ₁₆	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	68,263	2 ¹¹ / ₁₆	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	68,263	2 ¹¹ / ₁₆	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV170	14,4	68,263	2 ¹¹ / ₁₆	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	68,263	2 ¹¹ / ₁₆	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	68,263	2 ¹¹ / ₁₆	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	68,263	2 ¹¹ / ₁₆	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV140	9,3	69,85	2 ³ / ₄	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	69,85	2 ³ / ₄	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	69,85	2 ³ / ₄	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	69,85	2 ³ / ₄	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV170	14,4	69,85	2 ³ / ₄	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	69,85	2 ³ / ₄	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	69,85	2 ³ / ₄	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	69,85	2 ³ / ₄	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4



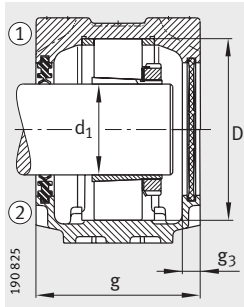
Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve

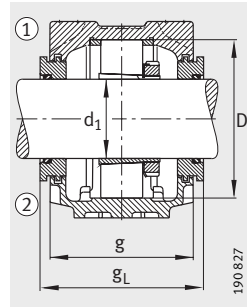


- ① Locating bearing
- ② Non-locating bearing

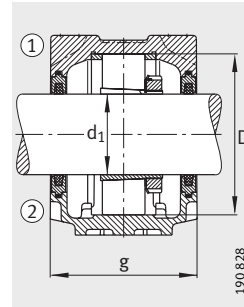
Dimension table (continued) · Dimensions in mm								
Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV140-L	1216-K-TVH-C3	H216	FRM140/16	DH516	TSV516	FSV516	DHV516	TCV516
SNV140-L	20216-K-TVP-C3	H216	FRM140/16	DH516	TSV516	FSV516	DHV516	TCV516
SNV140-L	2216-K-TVH-C3	H316	FRM140/12,5	DH516	TSV516	FSV516	DHV516	TCV516
SNV140-L	22216-E1-K	H316	FRM140/12,5	DH516	TSV516	FSV516	DHV516	TCV516
SNV170-L	1316-K-M-C3	H316	FRM170/14,5	DH616	TSV616	FSV616	DHV616	TCV616
SNV170-L	21316-E1-K	H316	FRM170/14,5	DH616	TSV616	FSV616	DHV616	TCV616
SNV170-L	2316-K-M-C3	H2316	FRM170/5	DH616	TSV616	FSV616	DHV616	TCV616
SNV170-L	22316-E1-K	H2316	FRM170/5	DH616	TSV616	FSV616	DHV616	TCV616
SNV140-L	1216-K-TVH-C3	H216X214	FRM140/16	DH516X214	TSV516X214	FSV516X214	DHV516X214	TCV516X214
SNV140-L	20216-K-TVP-C3	H216X214	FRM140/16	DH516X214	TSV516X214	FSV516X214	DHV516X214	TCV516X214
SNV140-L	2216-K-TVH-C3	H316X214	FRM140/12,5	DH516X214	TSV516X214	FSV516X214	DHV516X214	TCV516X214
SNV140-L	22216-E1-K	H316X214	FRM140/12,5	DH516X214	TSV516X214	FSV516X214	DHV516X214	TCV516X214
SNV170-L	1316-K-M-C3	H316X214	FRM170/14,5	DH616X214	TSV616X214	FSV616X214	DHV616X214	TCV616X214
SNV170-L	21316-E1-K	H316X214	FRM170/14,5	DH616X214	TSV616X214	FSV616X214	DHV616X214	TCV616X214
SNV170-L	2316-K-M-C3	H2316X214	FRM170/5	DH616X214	TSV616X214	FSV616X214	DHV616X214	TCV616X214
SNV170-L	22316-E1-K	H2316X214	FRM170/5	DH616X214	TSV616X214	FSV616X214	DHV616X214	TCV616X214
SNV150-L	1217-K-TVH-C3	H217X215	FRM150/16,5	DH517	TSV517	FSV517	DHV517	TCV517
SNV150-L	20217-K-MB-C3	H217X215	FRM150/16,5	DH517	TSV517	FSV517	DHV517	TCV517
SNV150-L	2217-K-M-C3	H317X215	FRM150/12,5	DH517	TSV517	FSV517	DHV517	TCV517
SNV150-L	22217-E1-K	H317X215	FRM150/12,5	DH517	TSV517	FSV517	DHV517	TCV517
SNV180-L	1317-K-M-C3	H317X215	FRM180/14,5	DH617	TSV617	FSV617	DHV617	TCV617
SNV180-L	21317-E1-K	H317X215	FRM180/14,5	DH617	TSV617	FSV617	DHV617	TCV617
SNV180-L	2317-K-M-C3	H2317X215	FRM180/5	DH617	TSV617	FSV617	DHV617	TCV617
SNV180-L	22317-E1-K	H2317X215	FRM180/5	DH617	TSV617	FSV617	DHV617	TCV617



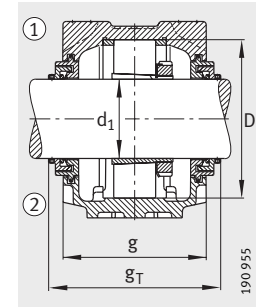
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV



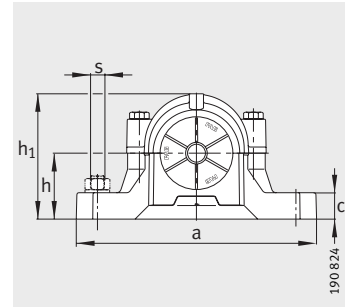
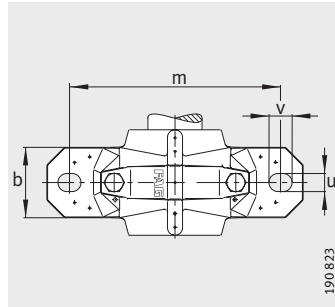
Taconite seal TCV

Cover	Mass m Housing ≈kg	Dimensions																	
		d ₁		a	g	h ₁	b	c	D	g _L	g _v	g _T	g ₃	h	m	u	v	s	
		mm	inch															mm	inch
DKV140	9,3	70	—	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	70	—	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	70	—	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	70	—	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV170	14,4	70	—	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	70	—	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	70	—	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	70	—	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV140	9,3	73,025	2 ⁷ / ₈	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	73,025	2 ⁷ / ₈	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	73,025	2 ⁷ / ₈	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	73,025	2 ⁷ / ₈	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV170	14,4	73,025	2 ⁷ / ₈	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	73,025	2 ⁷ / ₈	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	73,025	2 ⁷ / ₈	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	73,025	2 ⁷ / ₈	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV150	9,9	74,613	2 ¹⁵ / ₁₆	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	74,613	2 ¹⁵ / ₁₆	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	74,613	2 ¹⁵ / ₁₆	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	74,613	2 ¹⁵ / ₁₆	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV180	17	74,613	2 ¹⁵ / ₁₆	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	74,613	2 ¹⁵ / ₁₆	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	74,613	2 ¹⁵ / ₁₆	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	74,613	2 ¹⁵ / ₁₆	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8



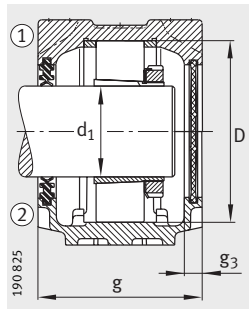
Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve

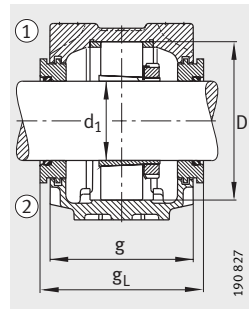


- ① Locating bearing
- ② Non-locating bearing

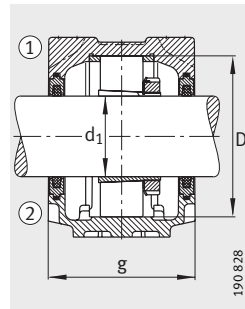
Dimension table (continued) - Dimensions in mm								
Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV150-L	1217-K-TVH-C3	H217	FRM150/16,5	DH517	TSV517	FSV517	DHV517	TCV517
SNV150-L	20217-K-MB-C3	H217	FRM150/16,5	DH517	TSV517	FSV517	DHV517	TCV517
SNV150-L	2217-K-M-C3	H317	FRM150/12,5	DH517	TSV517	FSV517	DHV517	TCV517
SNV150-L	22217-E1-K	H317	FRM150/12,5	DH517	TSV517	FSV517	DHV517	TCV517
SNV180-L	1317-K-M-C3	H317	FRM180/14,5	DH617	TSV617	FSV617	DHV617	TCV617
SNV180-L	21317-E1-K	H317	FRM180/14,5	DH617	TSV617	FSV617	DHV617	TCV617
SNV180-L	2317-K-M-C3	H2317	FRM180/5	DH617	TSV617	FSV617	DHV617	TCV617
SNV180-L	22317-E1-K	H2317	FRM180/5	DH617	TSV617	FSV617	DHV617	TCV617
SNV150-L	1217-K-TVH-C3	H217X300	FRM150/16,5	DH517	TSV517X300	FSV517X300	DHV517X300	TCV517X300
SNV150-L	20217-K-MB-C3	H217X300	FRM150/16,5	DH517	TSV517X300	FSV517X300	DHV517X300	TCV517X300
SNV150-L	2217-K-M-C3	H317X300	FRM150/12,5	DH517	TSV517X300	FSV517X300	DHV517X300	TCV517X300
SNV150-L	22217-E1-K	H317X300	FRM150/12,5	DH517	TSV517X300	FSV517X300	DHV517X300	TCV517X300
SNV180-L	1317-K-M-C3	H317X300	FRM180/14,5	DH617	TSV617X300	FSV617X300	DHV617X300	TCV617X300
SNV180-L	21317-E1-K	H317X300	FRM180/14,5	DH617	TSV617X300	FSV617X300	DHV617X300	TCV617X300
SNV180-L	2317-K-M-C3	H2317X300	FRM180/5	DH617	TSV617X300	FSV617X300	DHV617X300	TCV617X300
SNV180-L	22317-E1-K	H2317X300	FRM180/5	DH617	TSV617X300	FSV617X300	DHV617X300	TCV617X300
SNV160-L	1218-K-TVH-C3	H218X302	FRM160/17,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV160-L	20218-K-MB-C3	H218X302	FRM160/17,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV160-L	2218-K-TVH-C3	H318X302	FRM160/12,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV160-L	22218-E1-K	H318X302	FRM160/12,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV160-L	23218-E1-K-TVPB	H2318X302	FRM160/6,3	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV190-L	1318-K-M-C3	H318X302	FRM190/15,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV190-L	20318-K-MB-C3	H318X302	FRM190/15,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV190-L	21318-E1-K	H318X302	FRM190/15,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV190-L	2318-K-M-C3	H2318X302	FRM190/5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
SNV190-L	22318-E1-K	H2318X302	FRM190/5	DH518	TSV518X302	FSV518	DHV518	TCV518X302



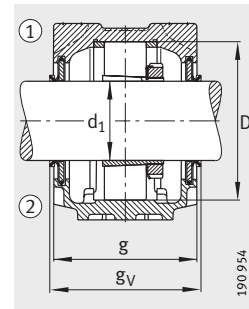
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV



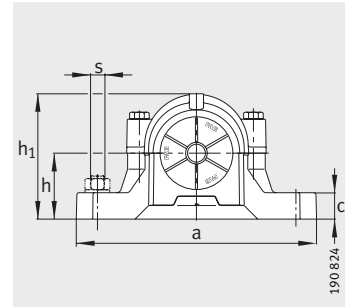
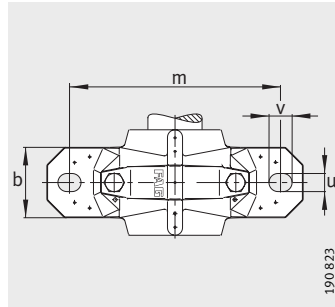
V ring seal DHV

Cover	Mass m Housing ≈kg	Dimensions																	
		d ₁		a	g	h ₁	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s	
		mm	inch															mm	inch
DKV150	9,9	75	–	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	75	–	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	75	–	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	75	–	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV180	17	75	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	75	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	75	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	75	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV150	9,9	76,2	3	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	76,2	3	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	76,2	3	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	76,2	3	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV180	17	76,2	3	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	76,2	3	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	76,2	3	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	76,2	3	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV160	12,8	79,375	3¹/₈	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	79,375	3¹/₈	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	79,375	3¹/₈	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	79,375	3¹/₈	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	22	79,375	3¹/₈	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	79,375	3¹/₈	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	79,375	3¹/₈	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	79,375	3¹/₈	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	79,375	3¹/₈	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8



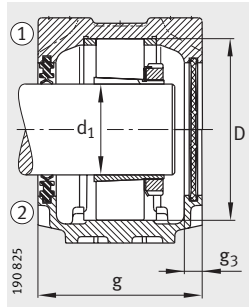
Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve

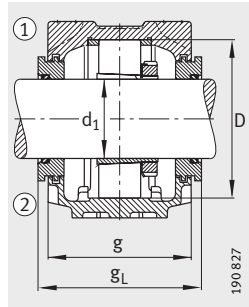


- ① Locating bearing
- ② Non-locating bearing

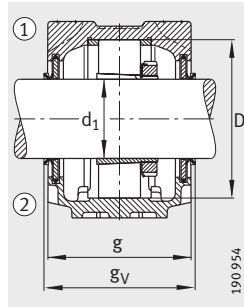
Dimension table (continued) · Dimensions in mm								
Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV160-L	1218-K-TVH-C3	H218	FRM160/17,5	DH518	TSV518	FSV518	DHV518	TCV518
SNV160-L	20218-K-MB-C3	H218	FRM160/17,5	DH518	TSV518	FSV518	DHV518	TCV518
SNV160-L	2218-K-TVH-C3	H318	FRM160/12,5	DH518	TSV518	FSV518	DHV518	TCV518
SNV160-L	22218-E1-K	H318	FRM160/12,5	DH518	TSV518	FSV518	DHV518	TCV518
SNV160-L	23218-E1-K-TVPB	H2318	FRM160/6,3	DH518	TSV518	FSV518	DHV518	TCV518
SNV190-L	1318-K-M-C3	H318	FRM190/15,5	DH518	TSV518	FSV518	DHV518	TCV518
SNV190-L	20318K-MB-C3	H318	FRM190/15,5	DH518	TSV518	FSV518	DHV518	TCV518
SNV190-L	21318-E1-K	H318	FRM190/15,5	DH518	TSV518	FSV518	DHV518	TCV518
SNV190-L	2318-K-M-C3	H2318	FRM190/5	DH518	TSV518	FSV518	DHV518	TCV518
SNV190-L	22318-E1-K	H2318	FRM190/5	DH518	TSV518	FSV518	DHV518	TCV518
SNV160-L	1218-K-TVH-C3	H218X303	FRM160/17,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV160-L	20218-K-MB-C3	H218X303	FRM160/17,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV160-L	2218-K-TVH-C3	H318X303	FRM160/12,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV160-L	22218-E1-K	H318X303	FRM160/12,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV160-L	23218-E1-K-TVPB	H2318X303	FRM160/6,3	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV190-L	1318-K-M-C3	H318X303	FRM190/15,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV190-L	20318-K-MB-C3	H318X303	FRM190/15,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV190-L	21318-E1-K	H318X303	FRM190/15,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV190-L	2318-K-M-C3	H2318X303	FRM190/5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV190-L	22318-E1-K	H2318X303	FRM190/5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
SNV160-L	1218-K-TVH-C3	H218X304	FRM160/17,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV160-L	20218-K-MB-C3	H218X304	FRM160/17,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV160-L	2218-K-TVH-C3	H318X304	FRM160/12,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV160-L	22218-E1-K	H318X304	FRM160/12,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV160-L	23218-E1-K-TVPB	H2318X304	FRM160/6,3	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV190-L	1318-K-M-C3	H318X304	FRM190/15,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV190-L	20318-K-MB-C3	H318X304	FRM190/15,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV190-L	21318-E1-K	H318X304	FRM190/15,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV190-L	2318-K-M-C3	H2318X304	FRM190/5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
SNV190-L	22318-E1-K	H2318X304	FRM190/5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304



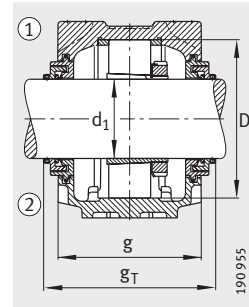
Double lip seal DH
Cover DKV



Labyrinth ring TSV



V ring seal DHV



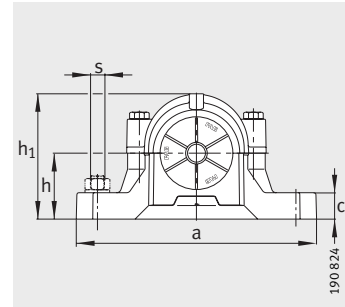
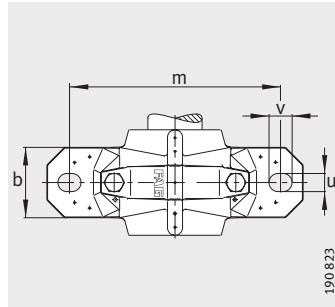
Taconite seal TCV

Cover	Mass m ≈kg	Dimensions																	
		Housing d ₁	a	g	h ₁	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s		
																		mm	inch
DKV160	12,8	80	–	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	80	–	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	80	–	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	80	–	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	80	–	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	22	80	–	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	80	–	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	80	–	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	80	–	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	80	–	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	12,8	80,963	3 ³ / ₁₆	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	80,963	3 ³ / ₁₆	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	80,963	3 ³ / ₁₆	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	80,963	3 ³ / ₁₆	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	80,963	3 ³ / ₁₆	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	22	80,963	3 ³ / ₁₆	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	80,963	3 ³ / ₁₆	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	80,963	3 ³ / ₁₆	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	80,963	3 ³ / ₁₆	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	80,963	3 ³ / ₁₆	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	12,8	82,55	3 ¹ / ₄	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	82,55	3 ¹ / ₄	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	82,55	3 ¹ / ₄	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	82,55	3 ¹ / ₄	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	82,55	3 ¹ / ₄	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	22	82,55	3 ¹ / ₄	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	82,55	3 ¹ / ₄	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	82,55	3 ¹ / ₄	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	82,55	3 ¹ / ₄	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	82,55	3 ¹ / ₄	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8



Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve

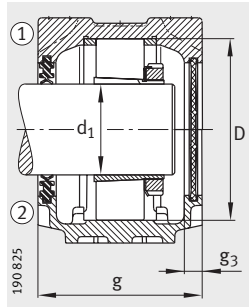


- ① Locating bearing
- ② Non-locating bearing

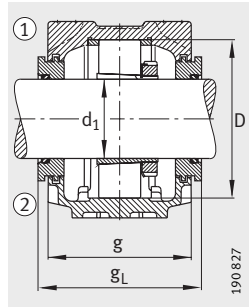
Dimension table (continued) - Dimensions in mm

Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV170-L	1219-K-M-C3	H219	FRM170/18	DH519	TSV519	FSV519	DHV519	TCV519
SNV170-L	2219-K-M-C3	H319	FRM170/12,5	DH519	TSV519	FSV519	DHV519	TCV519
SNV170-L	22219-E1-K	H319	FRM170/12,5	DH519	TSV519	FSV519	DHV519	TCV519
SNV200-L	1319-K-M-C3	H319	FRM200/17,5	DH619	TSV619	FSV619	DHV619	TCV619
SNV200-L	21319-E1-K-TVPB	H319	FRM200/17,5	DH619	TSV619	FSV619	DHV619	TCV619
SNV200-L	2319-K-M-C3	H2319	FRM200/6,5	DH619	TSV619	FSV619	DHV619	TCV619
SNV200-L	22319-E1-K	H2319	FRM200/6,5	DH619	TSV619	FSV619	DHV619	TCV619
SNV170-L	1219-K-M-C3	H219X306	FRM170/18	DH519	TSV519X306	FSV519	DHV519	TCV519X306
SNV170-L	2219-K-M-C3	H319X306	FRM170/12,5	DH519	TSV519X306	FSV519	DHV519	TCV519X306
SNV170-L	22219-E1-K	H319X306	FRM170/12,5	DH519	TSV519X306	FSV519	DHV519	TCV519X306
SNV200-L	1319-K-M-C3	H319X306	FRM200/17,5	DH619	TSV619X306	FSV619	DHV619	TCV619X306
SNV200-L	21319-E1-K-TVPB	H319X306	FRM200/17,5	DH619	TSV619X306	FSV619	DHV619	TCV619X306
SNV200-L	2319-K-M-C3	H2319X306	FRM200/6,5	DH619	TSV619X306	FSV619	DHV619	TCV619X306
SNV200-L	22319-E1-K	H2319X306	FRM200/6,5	DH619	TSV619X306	FSV619	DHV619	TCV619X306
SNV180-L	1220-K-M-C3	H220X307	FRM180/18	DH520X307	TSV520X307	FSV520X307	DHV520X307	TCV520X307
SNV180-L	20220-K-MB-C3	H220X307	FRM180/18	DH520X307	TSV520X307	FSV520X307	DHV520X307	TCV520X307
SNV180-L	2220-K-M-C3	H320X307	FRM180/12	DH520X307	TSV520X307	FSV520X307	DHV520X307	TCV520X307
SNV180-L	22220-E1-K	H320X307	FRM180/12	DH520X307	TSV520X307	FSV520X307	DHV520X307	TCV520X307
SNV180-L	23220-E1-K-TVPB	H2320X307	FRM180/4,85	DH520X307	TSV520X307	FSV520X307	DHV520X307	TCV520X307
SNV215-L¹⁾	1320-K-M-C3	H320X307	FRM215/19,5	DH620X307	TSV620X307	FSV620X307	DHV620X307	TCV620X307
SNV215-L¹⁾	20320-K-MB-C3	H320X307	FRM215/19,5	DH620X307	TSV620X307	FSV620X307	DHV620X307	TCV620X307
SNV215-L¹⁾	21320-E1-K-TVPB	H320X307	FRM215/19,5	DH620X307	TSV620X307	FSV620X307	DHV620X307	TCV620X307
SNV215-L¹⁾	2320-K-M-C3	H2320X307	FRM215/6,5	DH620X307	TSV620X307	FSV620X307	DHV620X307	TCV620X307
SNV215-L¹⁾	22320-E1-K	H2320X307	FRM215/6,5	DH620X307	TSV620X307	FSV620X307	DHV620X307	TCV620X307
SNV180-L	1220-K-M-C3	H220X308	FRM180/18	DH520X308	TSV520X308	FSV520X308	DHV520X308	TCV520X308
SNV180-L	20220-K-MB-C3	H220X308	FRM180/18	DH520X308	TSV520X308	FSV520X308	DHV520X308	TCV520X308
SNV180-L	2220-K-M-C3	H320X308	FRM180/12	DH520X308	TSV520X308	FSV520X308	DHV520X308	TCV520X308
SNV180-L	22220-E1-K	H320X308	FRM180/12	DH520X308	TSV520X308	FSV520X308	DHV520X308	TCV520X308
SNV180-L	23220-E1-K-TVPB	H2320X308	FRM180/4,85	DH520X308	TSV520X308	FSV520X308	DHV520X308	TCV520X308
SNV215-L¹⁾	1320-K-M-C3	H320X308	FRM215/19,5	DH620	TSV620X308	FSV620X308	DHV620	TCV620X308
SNV215-L¹⁾	20320-K-MB-C3	H320X308	FRM215/19,5	DH620	TSV620X308	FSV620X308	DHV620	TCV620X308
SNV215-L¹⁾	21320-E1-K-TVPB	H320X308	FRM215/19,5	DH620	TSV620X308	FSV620X308	DHV620	TCV620X308
SNV215-L¹⁾	2320-K-M-C3	H2320X308	FRM215/6,5	DH620	TSV620X308	FSV620X308	DHV620	TCV620X308
SNV215-L¹⁾	22320-E1-K	H2320X308	FRM215/6,5	DH620	TSV620X308	FSV620X308	DHV620	TCV620X308

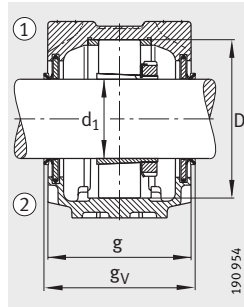
¹⁾ Housing with ring bolt.



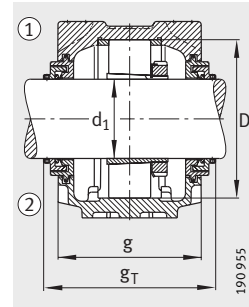
Double lip seal DH
Cover DKV



Labyrinth ring TSV



V ring seal DHV



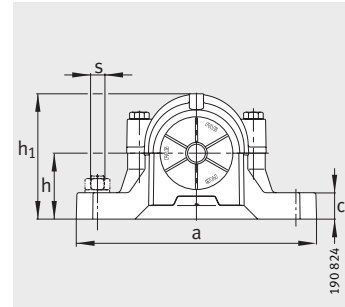
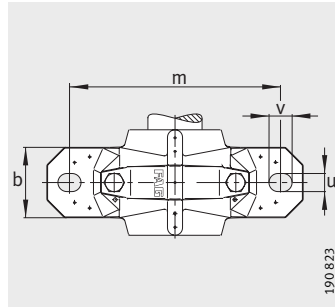
Taconite seal TCV

Cover	Mass m Housing ≈kg	Dimensions																	
		d ₁		a	g	h ₁	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s	
		mm	inch															mm	inch
DKV170	14,4	85	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	85	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	85	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV200	21	85	–	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	85	–	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	85	–	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	85	–	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8
DKV170	14,4	85,725	3 ³ / ₈	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	85,725	3 ³ / ₈	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	85,725	3 ³ / ₈	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV200	21	85,725	3 ³ / ₈	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	85,725	3 ³ / ₈	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	85,725	3 ³ / ₈	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	85,725	3 ³ / ₈	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8
DKV180	17	87,313	3 ⁷ / ₁₆	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	87,313	3 ⁷ / ₁₆	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	87,313	3 ⁷ / ₁₆	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	87,313	3 ⁷ / ₁₆	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	87,313	3 ⁷ / ₁₆	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV215	24,5	87,313	3 ⁷ / ₁₆	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	87,313	3 ⁷ / ₁₆	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	87,313	3 ⁷ / ₁₆	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	87,313	3 ⁷ / ₁₆	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	87,313	3 ⁷ / ₁₆	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV180	17	88,9	3 ¹ / ₂	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	88,9	3 ¹ / ₂	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	88,9	3 ¹ / ₂	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	88,9	3 ¹ / ₂	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	88,9	3 ¹ / ₂	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV215	24,5	88,9	3 ¹ / ₂	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	88,9	3 ¹ / ₂	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	88,9	3 ¹ / ₂	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	88,9	3 ¹ / ₂	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	88,9	3 ¹ / ₂	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8



Plummer block housings

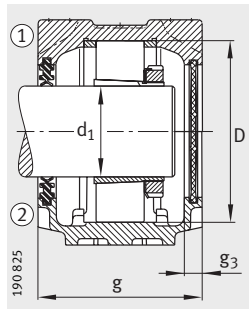
SNV, split
For bearings with tapered bore and adapter sleeve



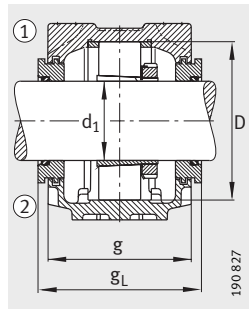
- ① Locating bearing
- ② Non-locating bearing

Dimension table (continued) · Dimensions in mm								
Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV180-L	1220-K-M-C3	H220	FRM180/18	DH520	TSV520	FSV520	DHV520	TCV520
SNV180-L	20220-K-MB-C3	H220	FRM180/18	DH520	TSV520	FSV520	DHV520	TCV520
SNV180-L	2220-K-M-C3	H320	FRM180/12	DH520	TSV520	FSV520	DHV520	TCV520
SNV180-L	22220-E1-K	H320	FRM180/12	DH520	TSV520	FSV520	DHV520	TCV520
SNV180-L	23220-E1-K-TVPB	H2320	FRM180/4,85	DH520	TSV520	FSV520	DHV520	TCV520
SNV215-L ¹⁾	1320-K-M-C3	H320	FRM215/19,5	DH620	TSV620	FSV620	DHV620	TCV620
SNV215-L ¹⁾	20320-K-MB-C3	H320	FRM215/19,5	DH620	TSV620	FSV620	DHV620	TCV620
SNV215-L ¹⁾	21320-E1-K-TVPB	H320	FRM215/19,5	DH620	TSV620	FSV620	DHV620	TCV620
SNV215-L ¹⁾	2320-K-M-C3	H2320	FRM215/6,5	DH620	TSV620	FSV620	DHV620	TCV620
SNV215-L ¹⁾	22320-E1-K	H2320	FRM215/6,5	DH620	TSV620	FSV620	DHV620	TCV620
SNV180-L	1220-K-M-C3	H220X310	FRM180/18	DH520X310	TSV520X310	FSV520X310	DHV520X310	TCV520X310
SNV180-L	20220-K-MB-C3	H220X310	FRM180/18	DH520X310	TSV520X310	FSV520X310	DHV520X310	TCV520X310
SNV180-L	2220-K-M-C3	H320X310	FRM180/12	DH520X310	TSV520X310	FSV520X310	DHV520X310	TCV520X310
SNV180-L	22220-E1-K	H320X310	FRM180/12	DH520X310	TSV520X310	FSV520X310	DHV520X310	TCV520X310
SNV180-L	23220-E1-K-TVPB	H2320X310	FRM180/4,85	DH520X310	TSV520X310	FSV520X310	DHV520X310	TCV520X310
SNV215-L ¹⁾	1320-K-M-C3	H320X310	FRM215/19,5	DH620X310	TSV620X310	FSV620X310	DHV620X310	TCV620X310
SNV215-L ¹⁾	20320-K-MB-C3	H320X310	FRM215/19,5	DH620X310	TSV620X310	FSV620X310	DHV620X310	TCV620X310
SNV215-L ¹⁾	21320-E1-K-TVPB	H320X310	FRM215/19,5	DH620X310	TSV620X310	FSV620X310	DHV620X310	TCV620X310
SNV215-L ¹⁾	2320-K-M-C3	H2320X310	FRM215/6,5	DH620X310	TSV620X310	FSV620X310	DHV620X310	TCV620X310
SNV215-L ¹⁾	22320-E1-K	H2320X310	FRM215/6,5	DH620X310	TSV620X310	FSV620X310	DHV620X310	TCV620X310
SNV180-L	1220-K-M-C3	H220X311	FRM180/18	DH520X310	TSV520X311	FSV520X311	DHV520X311	TCV520X311
SNV180-L	20220-K-MB-C3	H220X311	FRM180/18	DH520X310	TSV520X311	FSV520X311	DHV520X311	TCV520X311
SNV180-L	2220-K-M-C3	H320X311	FRM180/12	DH520X310	TSV520X311	FSV520X311	DHV520X311	TCV520X311
SNV180-L	22220-E1-K	H320X311	FRM180/12	DH520X310	TSV520X311	FSV520X311	DHV520X311	TCV520X311
SNV180-L	23220-E1-K-TVPB	H2320X311	FRM180/4,85	DH520X310	TSV520X311	FSV520X311	DHV520X311	TCV520X311
SNV215-L ¹⁾	1320-K-M-C3	H320X311	FRM215/19,5	DH620X310	TSV620X311	FSV620X311	DHV620X311	TCV620X311
SNV215-L ¹⁾	20320-K-MB-C3	H320X311	FRM215/19,5	DH620X310	TSV620X311	FSV620X311	DHV620X311	TCV620X311
SNV215-L ¹⁾	21320-E1-K-TVPB	H320X311	FRM215/19,5	DH620X310	TSV620X311	FSV620X311	DHV620X311	TCV620X311
SNV215-L ¹⁾	2320-K-M-C3	H2320X311	FRM215/6,5	DH620X310	TSV620X311	FSV620X311	DHV620X311	TCV620X311
SNV215-L ¹⁾	22320-E1-K	H2320X311	FRM215/6,5	DH620X310	TSV620X311	FSV620X311	DHV620X311	TCV620X311

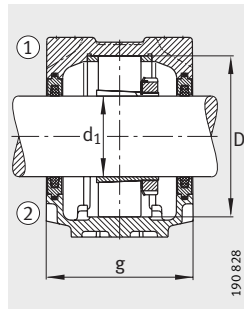
¹⁾ Housing with ring bolt.



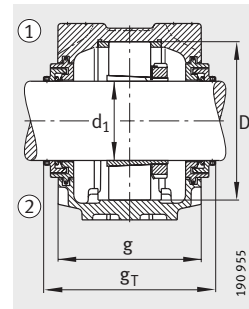
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV



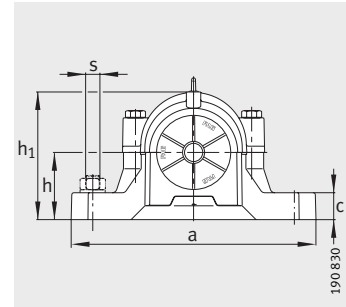
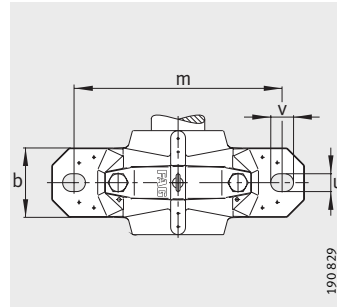
Taconite seal TCV

Cover	Mass m ≈kg	Dimensions																	
		Housing d ₁	a	g	h ₁	b	c	D	g _L	g _v	g _T	g ₃	h	m	u	v	s		
																	mm	inch	mm	inch
DKV180	17	90	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	90	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	90	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	90	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	90	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV215	24,5	90	–	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	90	–	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	90	–	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	90	–	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	90	–	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV180	17	92,075	3 ⁵ / ₈	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	92,075	3 ⁵ / ₈	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	92,075	3 ⁵ / ₈	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	92,075	3 ⁵ / ₈	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	92,075	3 ⁵ / ₈	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV215	24,5	92,075	3 ⁵ / ₈	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	92,075	3 ⁵ / ₈	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	92,075	3 ⁵ / ₈	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	92,075	3 ⁵ / ₈	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	92,075	3 ⁵ / ₈	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV180	17	93,663	3 ¹¹ / ₁₆	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	93,663	3 ¹¹ / ₁₆	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	93,663	3 ¹¹ / ₁₆	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	93,663	3 ¹¹ / ₁₆	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	93,663	3 ¹¹ / ₁₆	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV215	24,5	93,663	3 ¹¹ / ₁₆	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	93,663	3 ¹¹ / ₁₆	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	93,663	3 ¹¹ / ₁₆	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	93,663	3 ¹¹ / ₁₆	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	93,663	3 ¹¹ / ₁₆	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8
DKV215	24,5	93,663	3 ¹¹ / ₁₆	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8



Plummer block housings

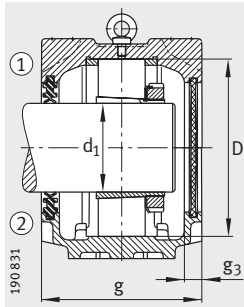
SNV, split
For bearings with tapered bore and adapter sleeve



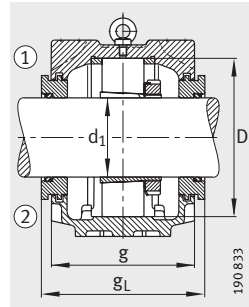
- ① Locating bearing
- ② Non-locating bearing

Dimension table (continued) · Dimensions in mm								
Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV200-L ¹⁾	1222-K-M-C3	H222X312	FRM200/21	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV200-L ¹⁾	20222-K-MB-C3	H222X312	FRM200/21	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV200-L ¹⁾	22222-E1-K	H322X312	FRM200/13,5	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV200-L ¹⁾	23222-E1-K-TVPB	H2322X312	FRM200/5,1	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV240-L	1322-K-M-C3	H322X312	FRM240/20	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV240-L	21322-E1-K-TVPB	H322X312	FRM240/20	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV240-L	2322-K-M-C3	H2322X312	FRM240/5	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV240-L	22322-E1-K	H2322X312	FRM240/5	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV200-L ¹⁾	1222-K-M-C3	H222X314	FRM200/21	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV200-L ¹⁾	20222-K-MB-C3	H222X314	FRM200/21	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV200-L ¹⁾	2222-K-M-C3	H322X314	FRM200/13,5	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV200-L ¹⁾	22222-E1-K	H322X314	FRM200/13,5	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV200-L ¹⁾	23222-E1-K-TVPB	H2322X314	FRM200/5,1	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV240-L	1322-K-M-C3	H322X314	FRM240/20	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV240-L	21322-E1-K-TVPB	H322X314	FRM240/20	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV240-L	2322-K-M-C3	H2322X314	FRM240/5	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV240-L	22322-E1-K	H2322X314	FRM240/5	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV200-L ¹⁾	1222-K-M-C3	H222	FRM200/21	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L ¹⁾	20222-K-MB-C3	H222	FRM200/21	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L ¹⁾	2222-K-M-C3	H322	FRM200/13,5	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L ¹⁾	22222-E1-K	H322	FRM200/13,5	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L ¹⁾	23222-E1-K-TVPB	H2322	FRM200/5,1	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	1322-K-M-C3	H322	FRM240/20	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	21322-E1-K-TVPB	H322	FRM240/20	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	2322-K-M-C3	H2322	FRM240/5	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	22322-E1-K	H2322	FRM240/5	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L ¹⁾	1222-K-M-C3	H222X315	FRM200/21	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L ¹⁾	20222-K-MB-C3	H222X315	FRM200/21	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L ¹⁾	2222-K-M-C3	H322X315	FRM200/13,5	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L ¹⁾	22222-E1-K	H322X315	FRM200/13,5	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L ¹⁾	23222-E1-K-TVPB	H2322X315	FRM200/5,1	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	1322-K-M-C3	H322X315	FRM240/20	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	21322-E1-K-TVPB	H322X315	FRM240/20	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	2322-K-M-C3	H2322X315	FRM240/5	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	22322-E1-K	H2322X315	FRM240/5	DH522	TSV522	FSV522	DHV522	TCV522

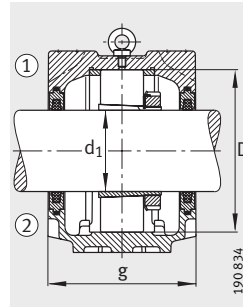
¹⁾ Housing without ring bolt.



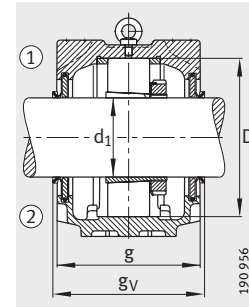
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV



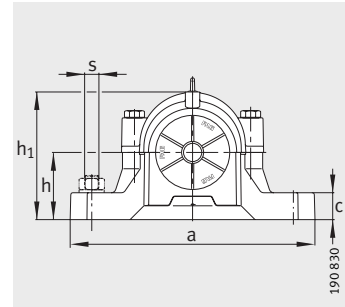
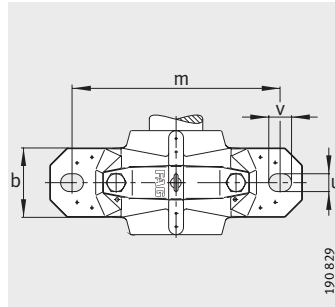
V ring seal DHV

Cover	Housing	Mass m ≈kg	Dimensions																	
			d ₁		a	g	h ₁	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s	
			mm	inch															mm	inch
DKV200	21	95,25	3 ³ / ₄	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	95,25	3 ³ / ₄	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	95,25	3 ³ / ₄	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	95,25	3 ³ / ₄	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	32	95,25	3 ³ / ₄	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1	
DKV200	32	95,25	3 ³ / ₄	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1	
DKV200	32	95,25	3 ³ / ₄	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1	
DKV200	32	95,25	3 ³ / ₄	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1	
DKV200	21	98,425	3 ⁷ / ₈	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	98,425	3 ⁷ / ₈	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	98,425	3 ⁷ / ₈	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	98,425	3 ⁷ / ₈	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	98,425	3 ⁷ / ₈	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	32	98,425	3 ⁷ / ₈	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1	
DKV200	32	98,425	3 ⁷ / ₈	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1	
DKV200	32	98,425	3 ⁷ / ₈	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1	
DKV200	32	98,425	3 ⁷ / ₈	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1	
DKV200	21	100	–	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	100	–	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	100	–	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	100	–	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	100	–	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	32	100	–	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1	
DKV200	32	100	–	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1	
DKV200	32	100	–	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1	
DKV200	32	100	–	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1	
DKV200	21	100,013	3 ¹⁵ / ₁₆	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	100,013	3 ¹⁵ / ₁₆	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	100,013	3 ¹⁵ / ₁₆	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	100,013	3 ¹⁵ / ₁₆	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	100,013	3 ¹⁵ / ₁₆	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	32	100,013	3 ¹⁵ / ₁₆	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1	
DKV200	32	100,013	3 ¹⁵ / ₁₆	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1	
DKV200	32	100,013	3 ¹⁵ / ₁₆	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1	
DKV200	32	100,013	3 ¹⁵ / ₁₆	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1	



Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve

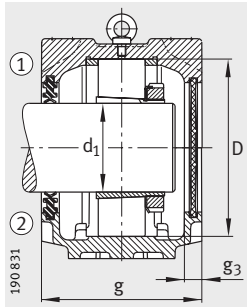


- ① Locating bearing
- ② Non-locating bearing

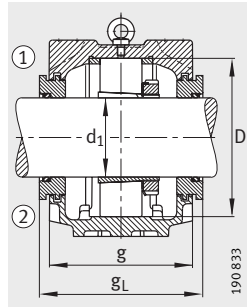
Dimension table (continued) - Dimensions in mm

Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV200-L ¹⁾	1222-K-M-C3	H222X400	FRM200/21	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV200-L ¹⁾	20222-K-MB-C3	H222X400	FRM200/21	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV200-L ¹⁾	2222-K-M-C3	H322X400	FRM200/13,5	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV200-L ¹⁾	22222-E1-K	H322X400	FRM200/13,5	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV200-L ¹⁾	23222-E1-K-TVPB	H2322X400	FRM200/5,1	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV240-L	1322-K-M-C3	H322X400	FRM240/20	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV240-L	21322-E1-K-TVPB	H322X400	FRM240/20	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV240-L	2322-K-M-C3	H2322X400	FRM240/5	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV240-L	22322-E1-K	H2322X400	FRM240/5	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
SNV215-L	20224-K-MB-C3	H3024X403	FRM215/23	DH524X403	TSV524X403	FSV524X403	DHV524X403	TCV524X403
SNV215-L	22224-E1-K	H3124X403	FRM215/14	DH524X403	TSV524X403	FSV524X403	DHV524X403	TCV524X403
SNV215-L	23224-E1-K-TVPB	H2324X403	FRM215/5	DH524X403	TSV524X403	FSV524X403	DHV524X403	TCV524X403
SNV260-L	22324-E1-K	H2324X403	FRM260/5	DH524X403	TSV524X403	FSV524X403	DHV524X403	TCV524X403
SNV215-L	20224-K-MB-C3	H3024X404	FRM215/23	DH524X404	TSV524X404	FSV524X404	DHV524X404	TCV524X404
SNV215-L	22224-E1-K	H3124X404	FRM215/14	DH524X404	TSV524X404	FSV524X404	DHV524X404	TCV524X404
SNV215-L	23224-E1-K-TVPB	H2324X404	FRM215/5	DH524X404	TSV524X404	FSV524X404	DHV524X404	TCV524X404
SNV260-L	22324-E1-K	H2324X404	FRM260/5	DH524X404	TSV524X404	FSV524X404	DHV524X404	TCV524X404
SNV215-L	20224-K-MB-C3	H3024	FRM215/23	DH524	TSV524	FSV524	DHV524	TCV524
SNV215-L	22224-E1-K	H3124	FRM215/14	DH524	TSV524	FSV524	DHV524	TCV524
SNV215-L	23224-E1-K-TVPB	H2324	FRM215/5	DH524	TSV524	FSV524	DHV524	TCV524
SNV260-L	22324-E1-K	H2324	FRM260/5	DH524	TSV524	FSV524	DHV524	TCV524
SNV230-L	20226-K-MB-C3	H3026X407	FRM230/25	DH526X407	TSV526X407	FSV526X407	DHV526X407	TCV526X407
SNV230-L	22226-E1-K	H3126X407	FRM230/13	DH526X407	TSV526X407	FSV526X407	DHV526X407	TCV526X407
SNV230-L	23226-E1-K-TVPB	H2326X407	FRM230/5	DH526X407	TSV526X407	FSV526X407	DHV526X407	TCV526X407
SNV280-L	22326-E1-K	H2326X407	FRM280/5	DH526X407	TSV526X407	FSV526X407	DHV526X407	TCV526X407
SNV230-L	20226-K-MB-C3	H3026X408	FRM230/25	DH526	TSV526X408	FSV526	DHV526	TCV526
SNV230-L	22226-E1-K	H3126X408	FRM230/13	DH526	TSV526X408	FSV526	DHV526	TCV526
SNV230-L	23226-E1-K-TVPB	H2326X408	FRM230/5	DH526	TSV526X408	FSV526	DHV526	TCV526
SNV280-L	22326-E1-K	H2326X408	FRM280/5	DH526	TSV526X408	FSV526	DHV526	TCV526

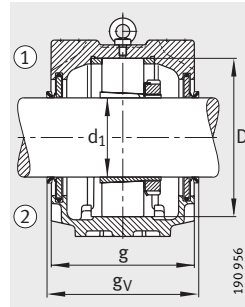
¹⁾ Housing without ring bolt.



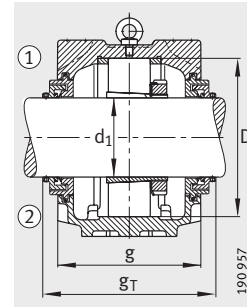
Double lip seal DH
Cover DKV



Labyrinth ring TSV



V ring seal DHV



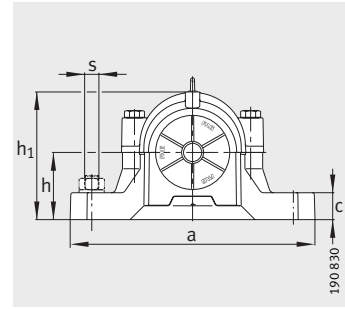
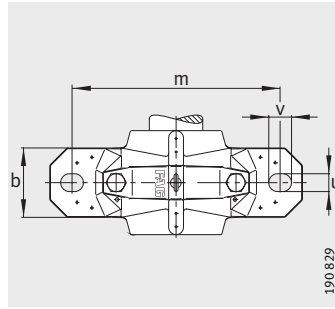
Taconite seal TCV

Cover	Mass m ≈kg	Dimensions																	
		Housing		d ₁	a	g	h ₁	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s
		mm	inch	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	inch
DKV200	21	101,6	4	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	101,6	4	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	101,6	4	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	101,6	4	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	101,6	4	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	32	101,6	4	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	101,6	4	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	101,6	4	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	101,6	4	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV215	24,5	106,363	4^{3/16}	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	24,5	106,363	4^{3/16}	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	24,5	106,363	4^{3/16}	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	48	106,363	4^{3/16}	530	190	321	160	60	260	208,3	199	235	18	160	450	35	42	M30	1 ^{1/4}
DKV215	24,5	107,95	4^{1/4}	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	24,5	107,95	4^{1/4}	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	24,5	107,95	4^{1/4}	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	48	107,95	4^{1/4}	530	190	321	160	60	260	208,3	199	235	18	160	450	35	42	M30	1 ^{1/4}
DKV215	24,5	110	–	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	24,5	110	–	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	24,5	110	–	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	48	110	–	530	190	321	160	60	260	208,3	199	235	18	160	450	35	42	M30	1 ^{1/4}
DKV230	30	112,713	4^{7/16}	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	112,713	4^{7/16}	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	112,713	4^{7/16}	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	55	112,713	4^{7/16}	550	205	344	160	60	280	223,3	214	250	18	170	470	35	42	M30	1 ^{1/4}
DKV230	30	114,3	4^{1/2}	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	114,3	4^{1/2}	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	114,3	4^{1/2}	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	55	114,3	4^{1/2}	550	205	344	160	60	280	223,3	214	250	18	170	470	35	42	M30	1 ^{1/4}



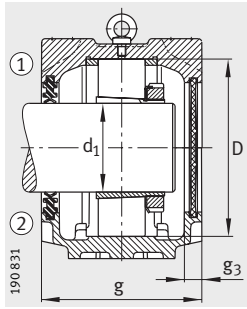
Plummer block housings

SNV, split
For bearings with tapered bore and adapter sleeve

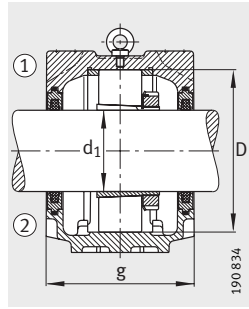


- ① Locating bearing
- ② Non-locating bearing

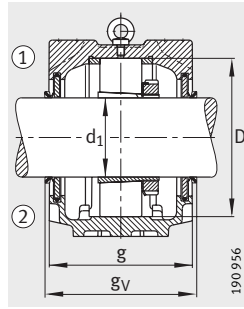
Dimension table (continued) · Dimensions in mm								
Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV230-L	20226-K-MB-C3	H3026	FRM230/25	DH526	TSV526	FSV526	DHV526	TCV526
SNV230-L	22226-E1-K	H3126	FRM230/13	DH526	TSV526	FSV526	DHV526	TCV526
SNV230-L	23226-E1-K-TVPB	H2326	FRM230/5	DH526	TSV526	FSV526	DHV526	TCV526
SNV280-L	22326-E1-K	H2326	FRM280/5	DH526	TSV526	FSV526	DHV526	TCV526
SNV230-L	20226-K-MB-C3	H3026X412	FRM230/25	DH526X412	TSV526X412	FSV526X412	DHV526X412	TCV526X412
SNV230-L	22226-E1-K	H3126X412	FRM230/13	DH526X412	TSV526X412	FSV526X412	DHV526X412	TCV526X412
SNV230-L	23226-E1-K-TVPB	H2326X412	FRM230/5	DH526X412	TSV526X412	FSV526X412	DHV526X412	TCV526X412
SNV280-L	22326-E1-K	H2326X412	FRM280/5	DH526X412	TSV526X412	FSV526X412	DHV526X412	TCV526X412
SNV250-L	20228-K-MB-C3	H3028	FRM250/28	DH528	TSV528	FSV528	DHV528	TCV528
SNV250-L	22228-E1-K	H3128	FRM250/15	DH528	TSV528	FSV528	DHV528	TCV528
SNV250-L	23228-E1-K-TVPB	H2328	FRM250/5	DH528	TSV528	FSV528	DHV528	TCV528
SNV300-L	22328-E1-K	H2328	FRM300/5	DH528	TSV528	FSV528	DHV528	TCV528
SNV250-L	20228-K-MB-C3	H3028X415	FRM250/28	DH528	TSV528X415	FSV528	DHV528	TCV528X415
SNV250-L	22228-E1-K	H3128X415	FRM250/15	DH528	TSV528X415	FSV528	DHV528	TCV528X415
SNV250-L	23228-E1-K-TVPB	H2328X415	FRM250/5	DH528	TSV528X415	FSV528	DHV528	TCV528X415
SNV300-L	22328-E1-K	H2328X415	FRM300/5	DH528	TSV528X415	FSV528	DHV528	TCV528X415
SNV250-L	20228-K-MB-C3	H3028X500	FRM250/28	DH528	TSV528X500	FSV528X500	DHV528X500	TCV528X500
SNV250-L	22228-E1-K	H3128X500	FRM250/15	DH528	TSV528X500	FSV528X500	DHV528X500	TCV528X500
SNV250-L	23228-E1-K-TVPB	H2328X500	FRM250/5	DH528	TSV528X500	FSV528X500	DHV528X500	TCV528X500
SNV300-L	22328-E1-K	H2328X500	FRM300/5	DH528	TSV528X500	FSV528X500	DHV528X500	TCV528X500
SNV270-L	20230-K-MB-C3	H3030X503	FRM270/30,5	DH530X503	TSV530X503	FSV530X503	DHV530X503	TCV530X503
SNV270-L	22230-E1-K	H3130X503	FRM270/16,5	DH530X503	TSV530X503	FSV530X503	DHV530X503	TCV530X503
SNV270-L	23230-E1-K-TVPB	H2330X503	FRM270/5	DH530X503	TSV530X503	FSV530X503	DHV530X503	TCV530X503
SNV320-L	22330-E1-K	H2330X503	FRM320/5	DH530X503	TSV530X503	FSV530X503	DHV530X503	TCV530X503
SNV270-L	20230-K-MB-C3	H3030X504	FRM270/30,5	DH530X504	TSV530X504	FSV530X504	DHV530X504	TCV530X504
SNV270-L	22230-E1-K	H3130X504	FRM270/16,5	DH530X504	TSV530X504	FSV530X504	DHV530X504	TCV530X504
SNV270-L	23230-E1-K-TVPB	H2330X504	FRM270/5	DH530X504	TSV530X504	FSV530X504	DHV530X504	TCV530X504
SNV320-L	22330-E1-K	H2330X504	FRM320/5	DH530X504	TSV530X504	FSV530X504	DHV530X504	TCV530X504



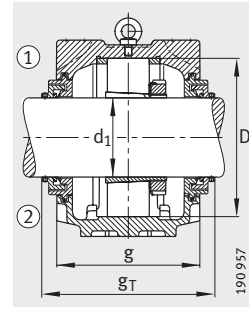
Double lip seal DH
Cover DKV



Felt seal FSV



V ring seal DHV



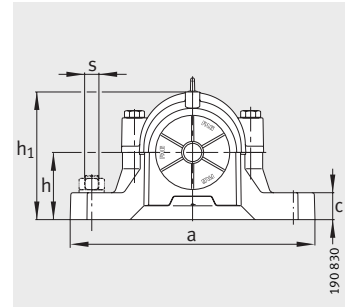
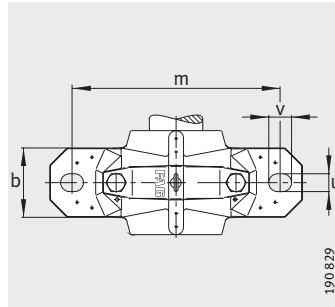
Taconite seal TCV

Cover	Mass m Housing ≈kg	Dimensions																	
		d ₁		a	g	h ₁	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s	
		mm	inch															mm	inch
DKV230	30	115	-	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	115	-	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	115	-	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	55	115	-	550	205	344	160	60	280	223,3	214	250	18	170	470	35	42	M30	1 ^{1/4}
DKV230	30	120,65	4 ^{3/4}	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	120,65	4 ^{3/4}	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	120,65	4 ^{3/4}	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	55	120,65	4 ^{3/4}	550	205	344	160	60	280	223,3	214	250	18	170	470	35	42	M30	1 ^{1/4}
DKV250	38	125	-	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 ^{1/4}
DKV250	38	125	-	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 ^{1/4}
DKV250	38	125	-	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 ^{1/4}
DKV250	70	125	-	620	215	366	170	65	300	233,3	224	260	18	180	520	35	42	M30	1 ^{1/4}
DKV250	38	125,413	4 ^{15/16}	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 ^{1/4}
DKV250	38	125,413	4 ^{15/16}	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 ^{1/4}
DKV250	38	125,413	4 ^{15/16}	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 ^{1/4}
DKV250	70	125,413	4 ^{15/16}	620	215	366	170	65	300	233,3	224	260	18	180	520	35	42	M30	1 ^{1/4}
DKV250	38	127	5	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 ^{1/4}
DKV250	38	127	5	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 ^{1/4}
DKV250	38	127	5	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 ^{1/4}
DKV250	70	127	5	620	215	366	170	65	300	233,3	224	260	18	180	520	35	42	M30	1 ^{1/4}
DKV270	45,5	131,763	5 ^{3/16}	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 ^{1/4}
DKV270	45,5	131,763	5 ^{3/16}	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 ^{1/4}
DKV270	45,5	131,763	5 ^{3/16}	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 ^{1/4}
DKV270	95	131,763	5 ^{3/16}	650	225	386	180	65	320	243,3	234	270	18	190	560	35	42	M30	1 ^{1/4}
DKV270	45,5	133,35	5 ^{1/4}	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 ^{1/4}
DKV270	45,5	133,35	5 ^{1/4}	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 ^{1/4}
DKV270	45,5	133,35	5 ^{1/4}	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 ^{1/4}
DKV270	95	133,35	5 ^{1/4}	650	225	386	180	65	320	243,3	234	270	18	190	560	35	42	M30	1 ^{1/4}



Plummer block housings

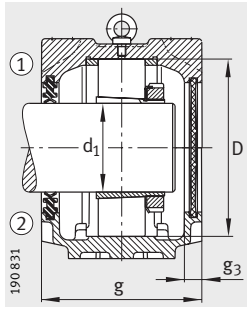
SNV, split
For bearings with tapered bore and adapter sleeve



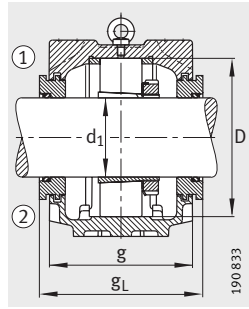
- ① Locating bearing
- ② Non-locating bearing

Dimension table (continued) - Dimensions in mm

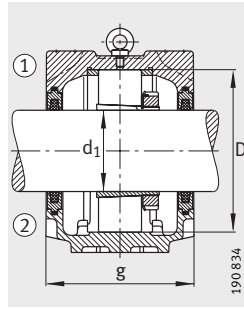
Designation								
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV270-L	20230-K-MB-C3	H3030	FRM270/30,5	DH530	TSV530	FSV530	DHV530	TCV530
SNV270-L	22230-E1-K	H3130	FRM270/16,5	DH530	TSV530	FSV530	DHV530	TCV530
SNV270-L	23230-E1-K-TVPB	H2330	FRM270/5	DH530	TSV530	FSV530	DHV530	TCV530
SNV320-L	22330-E1-K	H2330	FRM320/5	DH530	TSV530	FSV530	DHV530	TCV530
SNV290-L	20232-K-MB-C3	H3032X507	FRM290/33	DH532X507	TSV532X507	FSV532X507	DHV532X507	TCV532X507
SNV290-L	22232-E1-K	H3132X507	FRM290/17	DH532X507	TSV532X507	FSV532X507	DHV532X507	TCV532X507
SNV290-L	23232-E1-K-TVPB	H2332X507	FRM290/5	DH532X507	TSV532X507	FSV532X507	DHV532X507	TCV532X507
SNV340-L	22332-K-MB	H2332X507	FRM340/5	DH532X507	TSV532X507	FSV532X507	DHV532X507	TCV532X507
SNV290-L	20232-K-MB-C3	H3032X508	FRM290/33	DH532	TSV532	FSV532	DHV532	TCV532
SNV290-L	22232-E1-K	H3132X508	FRM290/17	DH532	TSV532	FSV532	DHV532	TCV532
SNV290-L	23232-E1-K-TVPB	H2332X508	FRM290/5	DH532	TSV532	FSV532	DHV532	TCV532
SNV340-L	22332-K-MB	H2332X508	FRM340/5	DH532	TSV532	FSV532	DHV532	TCV532
SNV290-L	20232-K-MB-C3	H3032	FRM290/33	DH532	TSV532	FSV532	DHV532	TCV532
SNV290-L	22232-E1-K	H3132	FRM290/17	DH532	TSV532	FSV532	DHV532	TCV532
SNV290-L	23232-E1-K-TVPB	H2332	FRM290/5	DH532	TSV532	FSV532	DHV532	TCV532
SNV340-L	22332-K-MB	H2332	FRM340/5	DH532	TSV532	FSV532	DHV532	TCV532



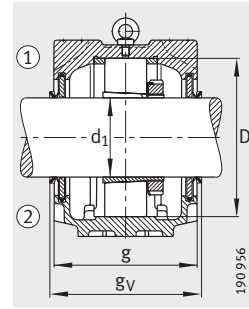
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV



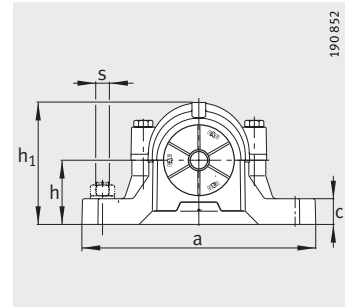
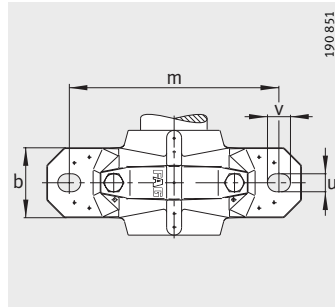
V ring seal DHV

Cover	Mass m Housing ≈kg	Dimensions																	
		d ₁		a	g	h ₁	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s	
		mm	inch															mm	inch
DKV270	45,5	135	–	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 ¹ / ₄
DKV270	45,5	135	–	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 ¹ / ₄
DKV270	45,5	135	–	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 ¹ / ₄
DKV270	95	135	–	650	225	386	180	65	320	243,3	234	270	18	190	560	35	42	M30	1 ¹ / ₄
DKV290	53,8	138,113	5 ⁷ / ₁₆	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 ¹ / ₄
DKV290	53,8	138,113	5 ⁷ / ₁₆	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 ¹ / ₄
DKV290	53,8	138,113	5 ⁷ / ₁₆	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 ¹ / ₄
DKV290	115	138,113	5 ⁷ / ₁₆	680	235	406	190	70	340	253,3	244	298	18	200	580	42	50	M36	1 ¹ / ₂
DKV290	53,8	139,7	5 ¹ / ₂	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 ¹ / ₄
DKV290	53,8	139,7	5 ¹ / ₂	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 ¹ / ₄
DKV290	53,8	139,7	5 ¹ / ₂	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 ¹ / ₄
DKV290	115	139,7	5 ¹ / ₂	680	235	406	190	70	340	253,3	244	298	18	200	580	42	50	M36	1 ¹ / ₂
DKV290	53,8	140	–	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 ¹ / ₄
DKV290	53,8	140	–	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 ¹ / ₄
DKV290	53,8	140	–	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 ¹ / ₄
DKV290	115	140	–	680	235	406	190	70	340	253,3	244	298	18	200	580	42	50	M36	1 ¹ / ₂



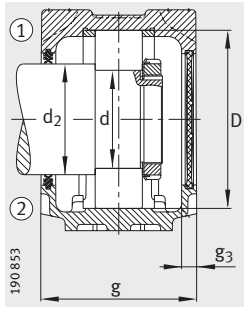
Plummer block housings

SNV, split
For bearings with cylindrical bore

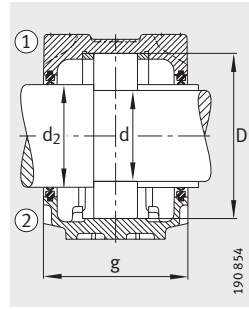


- ① Locating bearing
- ② Non-locating bearing

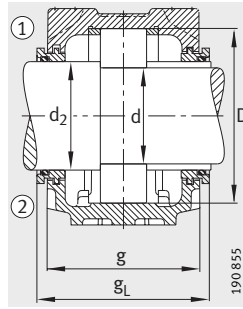
Dimension table · Dimensions in mm										Mass m Housing ≈kg
Designation										
Housing	Bearing	Lock-nut	Retain- ing plate	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Cover	
SNV052-L	1304-TVH	KM4	MB4	FRM52/6	DH304	TSV304	–	DHV304	DKV052	1,3
SNV052-L	20304-TVP	KM4	MB4	FRM52/6	DH304	TSV304	–	DHV304	DKV052	1,3
SNV052-L	21304-E1-TVPB	KM4	MB4	FRM52/6	DH304	TSV304	–	DHV304	DKV052	1,3
SNV052-L	2304-TVH	KM4	MB4	FRM52/3	DH304	TSV304	–	DHV304	DKV052	1,3
SNV052-L	1205-TVH	KM5	MB5	FRM52/6	DH205	TSV205	–	–	DKV052	1,3
SNV052-L	20205-TVP	KM5	MB5	FRM52/6	DH205	TSV205	–	–	DKV052	1,3
SNV052-L	2205-TVH	KM5	MB5	FRM52/4,5	DH205	TSV205	–	–	DKV052	1,3
SNV052-L	22205-E1	KM5	MB5	FRM52/4,5	DH205	TSV205	–	–	DKV052	1,3
SNV062-L	1305-TVH	KM5	MB5	FRM62/6,5	DH305	TSV305	FSV305	DHV305	DKV062	1,9
SNV062-L	20305-TVP	KM5	MB5	FRM62/6,5	DH305	TSV305	FSV305	DHV305	DKV062	1,9
SNV062-L	21305-E1-TVPB	KM5	MB5	FRM62/6,5	DH305	TSV305	FSV305	DHV305	DKV062	1,9
SNV062-L	2305-TVH	KM5	MB5	FRM62/3	DH305	TSV305	FSV305	DHV305	DKV062	1,9
SNV062-L	1206-TVH	KM6	MB6	FRM62/7	DH206	TSV206	–	–	DKV062	1,9
SNV062-L	20206-TVP	KM6	MB6	FRM62/7	DH206	TSV206	–	–	DKV062	1,9
SNV062-L	2206-TVH	KM6	MB6	FRM62/5	DH206	TSV206	–	–	DKV062	1,9
SNV062-L	22206-E1	KM6	MB6	FRM62/5	DH206	TSV206	–	–	DKV062	1,9
SNV072-L	1306-TVH	KM6	MB6	FRM72/7	DH306	TSV306	FSV306	DHV306	DKV072	2
SNV072-L	20306-TVP	KM6	MB6	FRM72/7	DH306	TSV306	FSV306	DHV306	DKV072	2
SNV072-L	21306-E1-TVPB	KM6	MB6	FRM72/7	DH306	TSV306	FSV306	DHV306	DKV072	2
SNV072-L	2306-TVH	KM6	MB6	FRM72/3	DH306	TSV306	FSV306	DHV306	DKV072	2
SNV072-L	1207-TVH	KM7	MB7	FRM72/8	DH207	TSV207	–	–	DKV072	2
SNV072-L	20207-TVP	KM7	MB7	FRM72/8	DH207	TSV207	–	–	DKV072	2
SNV072-L	2207-TVH	KM7	MB7	FRM72/5	DH207	TSV207	–	–	DKV072	2
SNV072-L	22207-E1	KM7	MB7	FRM72/5	DH207	TSV207	–	–	DKV072	2
SNV080-L	1307-TVH	KM7	MB7	FRM80/9	DH307	TSV307	FSV307	DHV307	DKV080	2,9
SNV080-L	20307-TVP	KM7	MB7	FRM80/9	DH307	TSV307	FSV307	DHV307	DKV080	2,9
SNV080-L	21307-E1-TVPB	KM7	MB7	FRM80/9	DH307	TSV307	FSV307	DHV307	DKV080	2,9
SNV080-L	2307-TVH	KM7	MB7	FRM80/4	DH307	TSV307	FSV307	DHV307	DKV080	2,9



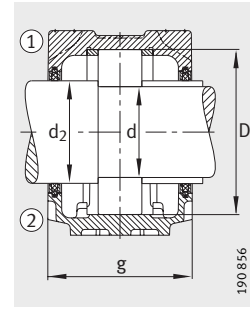
Double lip seal DH
Cover DKV



Double lip seal DH



Labyrinth ring TSV



Felt seal FSV

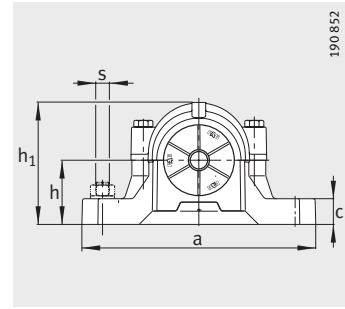
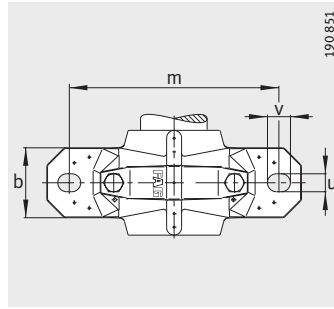
Dimensions

d	a	g	h ₁	d ₂	b	c	D	g _L	g _V	g ₃	h	m	u	v	s	
															mm	inch
20	165	70	75	25	46	19	52	95	76	10,5	40	130	15	20	M12	1/2
20	165	70	75	25	46	19	52	95	76	10,5	40	130	15	20	M12	1/2
20	165	70	75	25	46	19	52	95	76	10,5	40	130	15	20	M12	1/2
20	165	70	75	25	46	19	52	95	76	10,5	40	130	15	20	M12	1/2
25	165	70	75	30	46	19	52	95	-	10,5	40	130	15	20	M12	1/2
25	165	70	75	30	46	19	52	95	-	10,5	40	130	15	20	M12	1/2
25	165	70	75	30	46	19	52	95	-	10,5	40	130	15	20	M12	1/2
25	165	70	75	30	46	19	52	95	-	10,5	40	130	15	20	M12	1/2
25	185	75	91	30	52	22	62	100	81	10,5	50	150	15	20	M12	1/2
25	185	75	91	30	52	22	62	100	81	10,5	50	150	15	20	M12	1/2
25	185	75	91	30	52	22	62	100	81	10,5	50	150	15	20	M12	1/2
25	185	75	91	30	52	22	62	100	81	10,5	50	150	15	20	M12	1/2
30	185	75	91	35	52	22	62	100	-	10,5	50	150	15	20	M12	1/2
30	185	75	91	35	52	22	62	100	-	10,5	50	150	15	20	M12	1/2
30	185	75	91	35	52	22	62	100	-	10,5	50	150	15	20	M12	1/2
30	185	75	91	35	52	22	62	100	-	10,5	50	150	15	20	M12	1/2
30	185	80	97	35	52	22	72	93	86	10,5	50	150	15	20	M12	1/2
30	185	80	97	35	52	22	72	93	86	10,5	50	150	15	20	M12	1/2
30	185	80	97	35	52	22	72	93	86	10,5	50	150	15	20	M12	1/2
30	185	80	97	35	52	22	72	93	86	10,5	50	150	15	20	M12	1/2
35	185	80	97	45	52	22	72	107	-	10,5	50	150	15	20	M12	1/2
35	185	80	97	45	52	22	72	107	-	10,5	50	150	15	20	M12	1/2
35	185	80	97	45	52	22	72	107	-	10,5	50	150	15	20	M12	1/2
35	185	80	97	45	52	22	72	107	-	10,5	50	150	15	20	M12	1/2
35	205	85	112	45	60	25	80	98	93	10,5	60	170	15	20	M12	1/2
35	205	85	112	45	60	25	80	98	93	10,5	60	170	15	20	M12	1/2
35	205	85	112	45	60	25	80	98	93	10,5	60	170	15	20	M12	1/2
35	205	85	112	45	60	25	80	98	93	10,5	60	170	15	20	M12	1/2



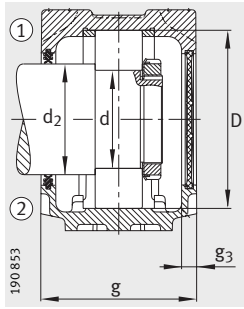
Plummer block housings

SNV, split
For bearings with cylindrical bore

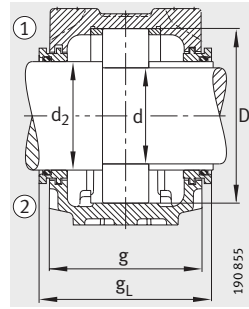


- ① Locating bearing
- ② Non-locating bearing

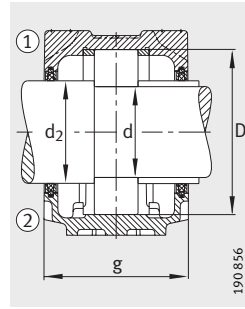
Dimension table (continued) · Dimensions in mm										
Designation										Mass m
Housing	Bearing	Lock- nut	Retain- ing plate	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Cover	Housing ≈kg
SNV080-L	1208-TVH	KM8	MB8	FRM80/10,5	DH208	TSV208	FSV208	DHV208	DKV080	2,9
SNV080-L	20208-TVP	KM8	MB8	FRM80/10,5	DH208	TSV208	FSV208	DHV208	DKV080	2,9
SNV080-L	2208-TVH	KM8	MB8	FRM80/8	DH208	TSV208	FSV208	DHV208	DKV080	2,9
SNV080-L	22208-E1	KM8	MB8	FRM80/8	DH208	TSV208	FSV208	DHV208	DKV080	2,9
SNV090-L	1308-TVH	KM8	MB8	FRM90/9	DH308	TSV308	FSV308	DHV308	DKV090	3,1
SNV090-L	20308-TVP	KM8	MB8	FRM90/9	DH308	TSV308	FSV308	DHV308	DKV090	3,1
SNV090-L	21308-E1	KM8	MB8	FRM90/9	DH308	TSV308	FSV308	DHV308	DKV090	3,1
SNV090-L	2308-TVH	KM8	MB8	FRM90/4	DH308	TSV308	FSV308	DHV308	DKV090	3,1
SNV090-L	22308-E1	KM8	MB8	FRM90/4	DH308	TSV308	FSV308	DHV308	DKV090	3,1
SNV085-L	1209-TVH	KM9	MB9	FRM85/6	DH209	TSV209	FSV209	DHV209	DKV085	2,8
SNV085-L	20209-TVP	KM9	MB9	FRM85/6	DH209	TSV209	FSV209	DHV209	DKV085	2,8
SNV085-L	2209-TVH	KM9	MB9	FRM85/4	DH209	TSV209	FSV209	DHV209	DKV085	2,8
SNV085-L	22209-E1	KM9	MB9	FRM85/4	DH209	TSV209	FSV209	DHV209	DKV085	2,8
SNV100-L	1309-TVH	KM9	MB9	FRM100/9,5	DH309	TSV309	FSV309	DHV309	DKV100	4,3
SNV100-L	20309-TVP	KM9	MB9	FRM100/9,5	DH309	TSV309	FSV309	DHV309	DKV100	4,3
SNV100-L	21309-E1	KM9	MB9	FRM100/9,5	DH309	TSV309	FSV309	DHV309	DKV100	4,3
SNV100-L	2309-TVH	KM9	MB9	FRM100/4	DH309	TSV309	FSV309	DHV309	DKV100	4,3
SNV100-L	22309-E1	KM9	MB9	FRM100/4	DH309	TSV309	FSV309	DHV309	DKV100	4,3
SNV090-L	1210-TVH	KM10	MB10	FRM90/10,5	DH210	TSV210	FSV210	DHV210	DKV090	3,1
SNV090-L	20210-TVP	KM10	MB10	FRM90/10,5	DH210	TSV210	FSV210	DHV210	DKV090	3,1
SNV090-L	2210-TVH	KM10	MB10	FRM90/9	DH210	TSV210	FSV210	DHV210	DKV090	3,1
SNV090-L	22210-E1	KM10	MB10	FRM90/9	DH210	TSV210	FSV210	DHV210	DKV090	3,1
SNV110-L	1310-TVH	KM10	MB10	FRM110/10,5	DH310	TSV310	FSV310	DHV310	DKV110	4,9
SNV110-L	20310-TVP	KM10	MB10	FRM110/10,5	DH310	TSV310	FSV310	DHV310	DKV110	4,9
SNV110-L	21310-E1	KM10	MB10	FRM110/10,5	DH310	TSV310	FSV310	DHV310	DKV110	4,9
SNV110-L	2310-TVH	KM10	MB10	FRM110/4	DH310	TSV310	FSV310	DHV310	DKV110	4,9
SNV110-L	22310-E1	KM10	MB10	FRM110/4	DH310	TSV310	FSV310	DHV310	DKV110	4,9
SNV100-L	1211-TVH	KM11	MB11	FRM100/11,5	DH211	TSV211	FSV211	DHV211	DKV100	4,3
SNV100-L	20211-TVP	KM11	MB11	FRM100/11,5	DH211	TSV211	FSV211	DHV211	DKV100	4,3
SNV100-L	2211-TVH	KM11	MB11	FRM100/9,5	DH211	TSV211	FSV211	DHV211	DKV100	4,3
SNV100-L	22211-E1	KM11	MB11	FRM100/9,5	DH211	TSV211	FSV211	DHV211	DKV100	4,3
SNV120-L	1311-TVH	KM11	MB11	FRM120/11	DH311	TSV311	FSV311	DHV311	DKV120	6,1
SNV120-L	20311-TVP	KM11	MB11	FRM120/11	DH311	TSV311	FSV311	DHV311	DKV120	6,1
SNV120-L	21311-E1	KM11	MB11	FRM120/11	DH311	TSV311	FSV311	DHV311	DKV120	6,1
SNV120-L	2311-TVH	KM11	MB11	FRM120/4	DH311	TSV311	FSV311	DHV311	DKV120	6,1
SNV120-L	22311-E1	KM11	MB11	FRM120/4	DH311	TSV311	FSV311	DHV311	DKV120	6,1



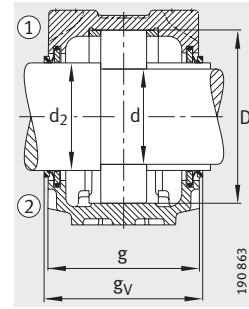
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV



V ring seal DHV

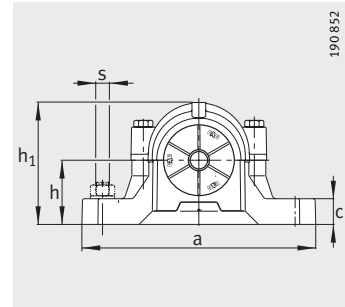
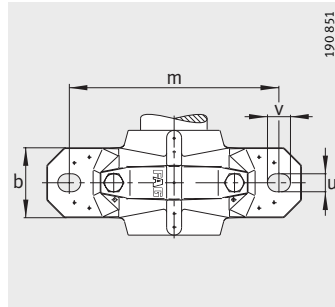
Dimensions

d	a	g	h ₁	d ₂	b	c	D	g _L	g _V	g ₃	h	m	u	v	s	
															mm	inch
40	205	85	112	50	60	25	80	98	93	10,5	60	170	15	20	M12	1/2
40	205	85	112	50	60	25	80	98	93	10,5	60	170	15	20	M12	1/2
40	205	85	112	50	60	25	80	98	93	10,5	60	170	15	20	M12	1/2
40	205	85	112	50	60	25	80	98	93	10,5	60	170	15	20	M12	1/2
40	205	100	117	50	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
40	205	100	117	50	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
40	205	100	117	50	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
40	205	100	117	50	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
40	205	100	117	50	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
45	205	87	114	55	60	25	85	101	93	12,5	60	170	15	20	M12	1/2
45	205	87	114	55	60	25	85	101	93	12,5	60	170	15	20	M12	1/2
45	205	87	114	55	60	25	85	101	93	12,5	60	170	15	20	M12	1/2
45	205	87	114	55	60	25	85	101	93	12,5	60	170	15	20	M12	1/2
45	255	105	133	55	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
45	255	105	133	55	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
45	255	105	133	55	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
45	255	105	133	55	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
45	255	105	133	55	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
50	205	100	117	60	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
50	205	100	117	60	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
50	205	100	117	60	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
50	205	100	117	60	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
50	255	110	139	60	70	30	110	124	116	12,5	70	210	18	23	M16	5/8
50	255	110	139	60	70	30	110	124	116	12,5	70	210	18	23	M16	5/8
50	255	110	139	60	70	30	110	124	116	12,5	70	210	18	23	M16	5/8
50	255	110	139	60	70	30	110	124	116	12,5	70	210	18	23	M16	5/8
50	255	110	139	60	70	30	110	124	116	12,5	70	210	18	23	M16	5/8
55	255	105	133	65	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
55	255	105	133	65	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
55	255	105	133	65	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
55	255	105	133	65	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
55	275	115	155	65	80	30	120	129	121	12,5	80	230	18	23	M16	5/8
55	275	115	155	65	80	30	120	129	121	12,5	80	230	18	23	M16	5/8
55	275	115	155	65	80	30	120	129	121	12,5	80	230	18	23	M16	5/8
55	275	115	155	65	80	30	120	129	121	12,5	80	230	18	23	M16	5/8



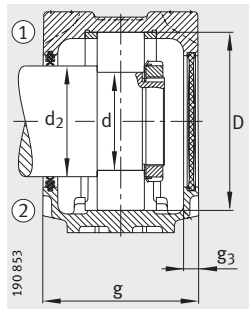
Plummer block housings

SNV, split
For bearings with cylindrical bore

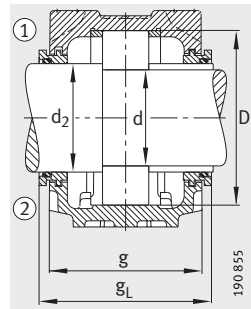


- ① Locating bearing
- ② Non-locating bearing

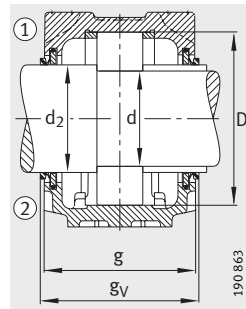
Dimension table (continued) · Dimensions in mm											
Designation											Mass m Housing ≈kg
Housing	Bearing	Lock- nut	Retain- ing plate	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal	Cover	
SNV110-L	1212-TVH	KM12	MB12	FRM110/13	DH212	TSV212	FSV212	DHV212	–	DKV110	4,9
SNV110-L	20212-TVP	KM12	MB12	FRM110/13	DH212	TSV212	FSV212	DHV212	–	DKV110	4,9
SNV110-L	2212-TVH	KM12	MB12	FRM110/10	DH212	TSV212	FSV212	DHV212	–	DKV110	4,9
SNV110-L	22212-E1	KM12	MB12	FRM110/10	DH212	TSV212	FSV212	DHV212	–	DKV110	4,9
SNV130-L	1312-TVH	KM12	MB12	FRM130/12,5	DH312	TSV312	FSV312	DHV312	TCV312	DKV130	6,8
SNV130-L	20312-TVP	KM12	MB12	FRM130/12,5	DH312	TSV312	FSV312	DHV312	TCV312	DKV130	6,8
SNV130-L	21312-E1	KM12	MB12	FRM130/12,5	DH312	TSV312	FSV312	DHV312	TCV312	DKV130	6,8
SNV130-L	2312-TVH	KM12	MB12	FRM130/5	DH312	TSV312	FSV312	DHV312	TCV312	DKV130	6,8
SNV130-L	22312-E1	KM12	MB12	FRM130/5	DH312	TSV312	FSV312	DHV312	TCV312	DKV130	6,8
SNV120-L	1213-TVH	KM13	MB13	FRM120/14	DH213	TSV213	FSV213	DHV213	–	DKV120	6,1
SNV120-L	20213-TVP	KM13	MB13	FRM120/14	DH213	TSV213	FSV213	DHV213	–	DKV120	6,1
SNV120-L	2213-TVH	KM13	MB13	FRM120/10	DH213	TSV213	FSV213	DHV213	–	DKV120	6,1
SNV120-L	22213-E1	KM13	MB13	FRM120/10	DH213	TSV213	FSV213	DHV213	–	DKV120	6,1
SNV140-L	1313-TVH	KM13	MB13	FRM140/12,5	DH313	TSV313	FSV313	DHV313	TCV313	DKV140	9,3
SNV140-L	20313-MB	KM13	MB13	FRM140/12,5	DH313	TSV313	FSV313	DHV313	TCV313	DKV140	9,3
SNV140-L	21313-E1	KM13	MB13	FRM140/12,5	DH313	TSV313	FSV313	DHV313	TCV313	DKV140	9,3
SNV140-L	2313-TVH	KM13	MB13	FRM140/5	DH313	TSV313	FSV313	DHV313	TCV313	DKV140	9,3
SNV140-L	22313-E1	KM13	MB13	FRM140/5	DH313	TSV313	FSV313	DHV313	TCV313	DKV140	9,3
SNV125-L	1214-TVH	KM14	MB14	FRM125/7,5	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	6,5
SNV125-L	20214-TVP	KM14	MB14	FRM125/7,5	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	6,5
SNV125-L	2214-M	KM14	MB14	FRM125/4	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	6,5
SNV125-L	22214-E1	KM14	MB14	FRM125/4	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	6,5
SNV150-L	1314-M	KM14	MB14	FRM150/13	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	9,9
SNV150-L	20314-MB	KM14	MB14	FRM150/13	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	9,9
SNV150-L	21314-E1	KM14	MB14	FRM150/13	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	9,9
SNV150-L	2314-M	KM14	MB14	FRM150/5	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	9,9
SNV150-L	22314-E1	KM14	MB14	FRM150/5	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	9,9
SNV130-L	1215-TVH	KM15	MB15	FRM130/15,5	DH215	TSV215	FSV215	DHV215	–	DKV130	6,8
SNV130-L	20215-TVP	KM15	MB15	FRM130/15,5	DH215	TSV215	FSV215	DHV215	–	DKV130	6,8
SNV130-L	2215-TVH	KM15	MB15	FRM130/12,5	DH215	TSV215	FSV215	DHV215	–	DKV130	6,8
SNV130-L	22215-E1	KM15	MB15	FRM130/12,5	DH215	TSV215	FSV215	DHV215	–	DKV130	6,8
SNV160-L	1315-M	KM15	MB15	FRM160/14	DH315	TSV315	FSV315	DHV315	TCV315	DKV160	12,8
SNV160-L	20315-MB	KM15	MB15	FRM160/14	DH315	TSV315	FSV315	DHV315	TCV315	DKV160	12,8
SNV160-L	21315-E1	KM15	MB15	FRM160/14	DH315	TSV315	FSV315	DHV315	TCV315	DKV160	12,8
SNV160-L	2315-M	KM15	MB15	FRM160/5	DH315	TSV315	FSV315	DHV315	TCV315	DKV160	12,8
SNV160-L	22315-E1	KM15	MB15	FRM160/5	DH315	TSV315	FSV315	DHV315	TCV315	DKV160	12,8



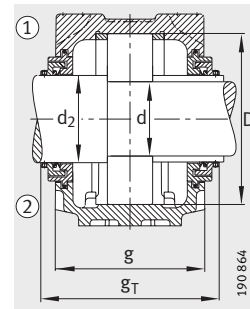
Double lip seal DH
Cover DKV



Labyrinth ring TSV



V ring seal DHV



Taconite seal TCV

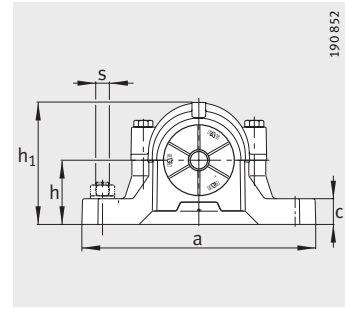
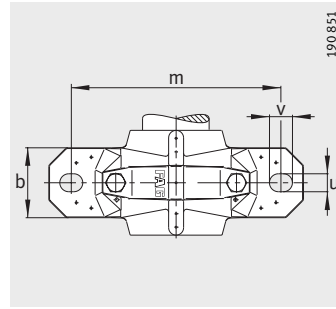
Dimensions

d	a	g	h ₁	d ₂	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s	
																mm	inch
60	255	110	139	70	70	30	110	124	120	–	12,5	70	210	18	23	M16	5/8
60	255	110	139	70	70	30	110	124	120	–	12,5	70	210	18	23	M16	5/8
60	255	110	139	70	70	30	110	124	120	–	12,5	70	210	18	23	M16	5/8
60	255	110	139	70	70	30	110	124	120	–	12,5	70	210	18	23	M16	5/8
60	280	120	161	70	80	30	130	134	130	158	12,5	80	230	18	23	M16	5/8
60	280	120	161	70	80	30	130	134	130	158	12,5	80	230	18	23	M16	5/8
60	280	120	161	70	80	30	130	134	130	158	12,5	80	230	18	23	M16	5/8
60	280	120	161	70	80	30	130	134	130	158	12,5	80	230	18	23	M16	5/8
60	280	120	161	70	80	30	130	134	130	158	12,5	80	230	18	23	M16	5/8
65	275	115	155	75	80	30	120	129	125	–	12,5	80	230	18	23	M16	5/8
65	275	115	155	75	80	30	120	129	125	–	12,5	80	230	18	23	M16	5/8
65	275	115	155	75	80	30	120	129	125	–	12,5	80	230	18	23	M16	5/8
65	275	115	155	75	80	30	120	129	125	–	12,5	80	230	18	23	M16	5/8
65	315	135	183	75	90	32	140	150,3	142,5	175,5	15	95	260	22	27	M20	3/4
65	315	135	183	75	90	32	140	150,3	142,5	175,5	15	95	260	22	27	M20	3/4
65	315	135	183	75	90	32	140	150,3	142,5	175,5	15	95	260	22	27	M20	3/4
65	315	135	183	75	90	32	140	150,3	142,5	175,5	15	95	260	22	27	M20	3/4
65	315	135	183	75	90	32	140	150,3	142,5	175,5	15	95	260	22	27	M20	3/4
70	275	105	158	80	80	30	125	120,3	110	143	15	80	230	18	23	M16	5/8
70	275	105	158	80	80	30	125	120,3	110	143	15	80	230	18	23	M16	5/8
70	275	105	158	80	80	30	125	120,3	110	143	15	80	230	18	23	M16	5/8
70	275	105	158	80	80	30	125	120,3	110	143	15	80	230	18	23	M16	5/8
70	320	140	189	80	90	32	150	155,3	147,5	180,5	15	95	260	22	27	M20	3/4
70	320	140	189	80	90	32	150	155,3	147,5	180,5	15	95	260	22	27	M20	3/4
70	320	140	189	80	90	32	150	155,3	147,5	180,5	15	95	260	22	27	M20	3/4
70	320	140	189	80	90	32	150	155,3	147,5	180,5	15	95	260	22	27	M20	3/4
70	320	140	189	80	90	32	150	155,3	147,5	180,5	15	95	260	22	27	M20	3/4
75	280	120	161	85	80	30	130	134	130	–	12,5	80	230	18	23	M16	5/8
75	280	120	161	85	80	30	130	134	130	–	12,5	80	230	18	23	M16	5/8
75	280	120	161	85	80	30	130	134	130	–	12,5	80	230	18	23	M16	5/8
75	280	120	161	85	80	30	130	134	130	–	12,5	80	230	18	23	M16	5/8
75	345	145	201	85	100	35	160	160,3	152,5	185,5	15	100	290	22	27	M20	3/4
75	345	145	201	85	100	35	160	160,3	152,5	185,5	15	100	290	22	27	M20	3/4
75	345	145	201	85	100	35	160	160,3	152,5	185,5	15	100	290	22	27	M20	3/4
75	345	145	201	85	100	35	160	160,3	152,5	185,5	15	100	290	22	27	M20	3/4
75	345	145	201	85	100	35	160	160,3	152,5	185,5	15	100	290	22	27	M20	3/4



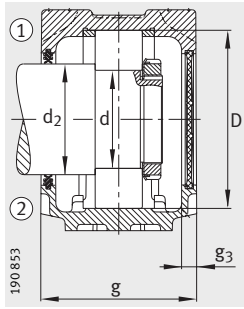
Plummer block housings

SNV, split
For bearings with cylindrical bore

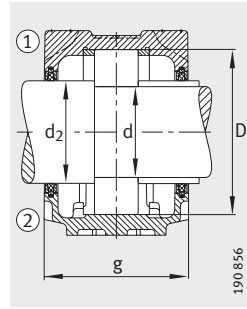


- ① Locating bearing
- ② Non-locating bearing

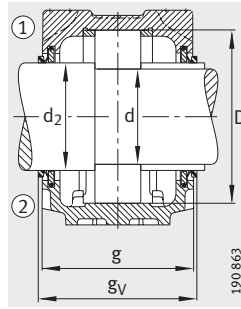
Dimension table (continued) · Dimensions in mm											
Designation											Mass m Housing ≈kg
Housing	Bearing	Lock- nut	Retain- ing plate	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal	Cover	
SNV140-L	1216-TVH	KM16	MB16	FRM140/16	DH216	TSV216	FSV216	DHV216	-	DKV140	9,3
SNV140-L	20216-TVP	KM16	MB16	FRM140/16	DH216	TSV216	FSV216	DHV216	-	DKV140	9,3
SNV140-L	2216-TVH	KM16	MB16	FRM140/12,5	DH216	TSV216	FSV216	DHV216	-	DKV140	9,3
SNV140-L	22216-E1	KM16	MB16	FRM140/12,5	DH216	TSV216	FSV216	DHV216	-	DKV140	9,3
SNV170-L	1316-M	KM16	MB16	FRM170/14,5	DH316	TSV316	FSV316	DHV316	TCV316	DKV170	14,4
SNV170-L	20316-MB	KM16	MB16	FRM170/14,5	DH316	TSV316	FSV316	DHV316	TCV316	DKV170	14,4
SNV170-L	21316-E1	KM16	MB16	FRM170/14,5	DH316	TSV316	FSV316	DHV316	TCV316	DKV170	14,4
SNV170-L	2316-M	KM16	MB16	FRM170/5	DH316	TSV316	FSV316	DHV316	TCV316	DKV170	14,4
SNV170-L	22316-E1	KM16	MB16	FRM170/5	DH316	TSV316	FSV316	DHV316	TCV316	DKV170	14,4
SNV150-L	1217-TVH	KM17	MB17	FRM150/16,5	DH217	TSV217	FSV217	DHV217	-	DKV150	9,9
SNV150-L	20217-MB	KM17	MB17	FRM150/16,5	DH217	TSV217	FSV217	DHV217	-	DKV150	9,9
SNV150-L	2217-M	KM17	MB17	FRM150/12,5	DH217	TSV217	FSV217	DHV217	-	DKV150	9,9
SNV150-L	22217-E1	KM17	MB17	FRM150/12,5	DH217	TSV217	FSV217	DHV217	-	DKV150	9,9
SNV180-L	1317-M	KM17	MB17	FRM180/14,5	DH317	TSV317	FSV317	DHV317	TCV317	DKV180	17
SNV180-L	20317-MB	KM17	MB17	FRM180/14,5	DH317	TSV317	FSV317	DHV317	TCV317	DKV180	17
SNV180-L	21317-E1	KM17	MB17	FRM180/14,5	DH317	TSV317	FSV317	DHV317	TCV317	DKV180	17
SNV180-L	2317-M	KM17	MB17	FRM180/5	DH317	TSV317	FSV317	DHV317	TCV317	DKV180	17
SNV180-L	22317-E1	KM17	MB17	FRM180/5	DH317	TSV317	FSV317	DHV317	TCV317	DKV180	17
SNV160-L	1218-TVH	KM18	MB18	FRM160/17,5	DH218	TSV218	FSV218	DHV218	-	DKV160	12,8
SNV160-L	20218-MB	KM18	MB18	FRM160/17,5	DH218	TSV218	FSV218	DHV218	-	DKV160	12,8
SNV160-L	2218-TVH	KM18	MB18	FRM160/12,5	DH218	TSV218	FSV218	DHV218	-	DKV160	12,8
SNV160-L	22218-E1	KM18	MB18	FRM160/12,5	DH218	TSV218	FSV218	DHV218	-	DKV160	12,8
SNV160-L	23218-E1	KM18	MB18	FRM160/6,3	DH218	TSV218	FSV218	DHV218	-	DKV160	12,8
SNV190-L	1318-M	KM18	MB18	FRM190/15,5	DH318	TSV318	FSV318	DHV318	-	DKV160	22
SNV190-L	20318-MB	KM18	MB18	FRM190/15,5	DH318	TSV318	FSV318	DHV318	-	DKV160	22
SNV190-L	21318-E1	KM18	MB18	FRM190/15,5	DH318	TSV318	FSV318	DHV318	-	DKV160	22
SNV190-L	2318-M	KM18	MB18	FRM190/5	DH318	TSV318	FSV318	DHV318	-	DKV160	22
SNV190-L	22318-E1	KM18	MB18	FRM190/5	DH318	TSV318	FSV318	DHV318	-	DKV160	22



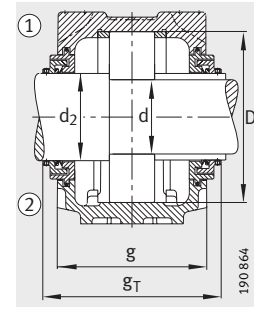
Double lip seal DH
Cover DKV



Felt seal FSV



V ring seal DHV



Taconite seal TCV

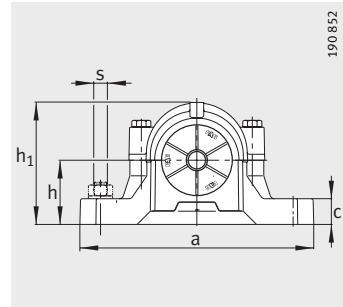
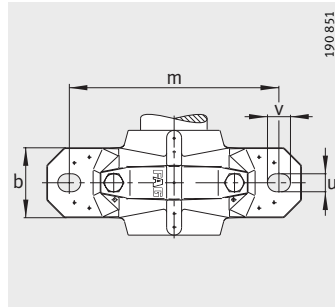
Dimensions

d	a	g	h ₁	d ₂	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s	
																mm	inch
80	315	135	183	90	90	32	140	150,3	142,5	-	15	95	260	22	27	M20	3/4
80	315	135	183	90	90	32	140	150,3	142,5	-	15	95	260	22	27	M20	3/4
80	315	135	183	90	90	32	140	150,3	142,5	-	15	95	260	22	27	M20	3/4
80	315	135	183	90	90	32	140	150,3	142,5	-	15	95	260	22	27	M20	3/4
80	345	150	219	90	100	35	170	167,3	157,5	192,5	16	112	290	22	27	M20	3/4
80	345	150	219	90	100	35	170	167,3	157,5	192,5	16	112	290	22	27	M20	3/4
80	345	150	219	90	100	35	170	167,3	157,5	192,5	16	112	290	22	27	M20	3/4
80	345	150	219	90	100	35	170	167,3	157,5	192,5	16	112	290	22	27	M20	3/4
80	345	150	219	90	100	35	170	167,3	157,5	192,5	16	112	290	22	27	M20	3/4
85	320	140	189	95	90	32	150	155,3	137,5	-	15	95	260	22	27	M20	3/4
85	320	140	189	95	90	32	150	155,3	137,5	-	15	95	260	22	27	M20	3/4
85	320	140	189	95	90	32	150	155,3	137,5	-	15	95	260	22	27	M20	3/4
85	320	140	189	95	90	32	150	155,3	137,5	-	15	95	260	22	27	M20	3/4
85	380	160	223	95	110	40	180	177,3	167,5	202,5	16	112	320	26	32	M24	7/8
85	380	160	223	95	110	40	180	177,3	167,5	202,5	16	112	320	26	32	M24	7/8
85	380	160	223	95	110	40	180	177,3	167,5	202,5	16	112	320	26	32	M24	7/8
85	380	160	223	95	110	40	180	177,3	167,5	202,5	16	112	320	26	32	M24	7/8
90	345	145	201	100	100	35	160	160,3	152,5	-	15	100	290	22	27	M20	3/4
90	345	145	201	100	100	35	160	160,3	152,5	-	15	100	290	22	27	M20	3/4
90	345	145	201	100	100	35	160	160,3	152,5	-	15	100	290	22	27	M20	3/4
90	345	145	201	100	100	35	160	160,3	152,5	-	15	100	290	22	27	M20	3/4
90	345	145	201	100	100	35	160	160,3	152,5	-	15	100	290	22	27	M20	3/4
90	380	155	229	105	110	40	190	170,3	162,5	-	15	112	320	26	32	M24	7/8
90	380	155	229	105	110	40	190	170,3	162,5	-	15	112	320	26	32	M24	7/8
90	380	155	229	105	110	40	190	170,3	162,5	-	15	112	320	26	32	M24	7/8
90	380	155	229	105	110	40	190	170,3	162,5	-	15	112	320	26	32	M24	7/8
90	380	155	229	105	110	40	190	170,3	162,5	-	15	112	320	26	32	M24	7/8



Plummer block housings

SNV, split
For bearings with cylindrical bore

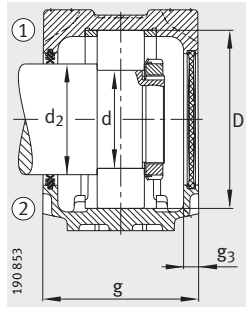


- ① Locating bearing
- ② Non-locating bearing

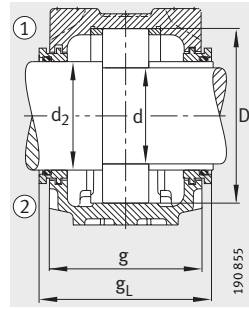
Dimension table (continued) - Dimensions in mm

Designation											Mass m Housing ≈kg
Housing	Bearing	Lock- nut	Retain- ing plate	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal	Cover	
SNV170-L	1219-M	KM19	MB19	FRM170/18	DH219	TSV219	FSV219	DHV219	-	DKV170	14,4
SNV170-L	20219-MB	KM19	MB19	FRM170/18	DH219	TSV219	FSV219	DHV219	-	DKV170	14,4
SNV170-L	2219-M	KM19	MB19	FRM170/12,5	DH219	TSV219	FSV219	DHV219	-	DKV170	14,4
SNV170-L	22219-E1	KM19	MB19	FRM170/12,5	DH219	TSV219	FSV219	DHV219	-	DKV170	14,4
SNV200-L	1319-M	KM19	MB19	FRM200/17,5	DH319	TSV319	FSV319	DHV319	TCV319	DKV200	21
SNV200-L	20319-MB	KM19	MB19	FRM200/17,5	DH319	TSV319	FSV319	DHV319	TCV319	DKV200	21
SNV200-L	21319-E1-TVPB	KM19	MB19	FRM200/17,5	DH319	TSV319	FSV319	DHV319	TCV319	DKV200	21
SNV200-L	2319-M	KM19	MB19	FRM200/6,5	DH319	TSV319	FSV319	DHV319	TCV319	DKV200	21
SNV200-L	22319-E1	KM19	MB19	FRM200/6,5	DH319	TSV319	FSV319	DHV319	TCV319	DKV200	21
SNV180-L	1220-M	KM20	MB20	FRM180/18	DH220	TSV220	FSV220	DHV220	-	DKV180	17
SNV180-L	20220-MB	KM20	MB20	FRM180/18	DH220	TSV220	FSV220	DHV220	-	DKV180	17
SNV180-L	2220-M	KM20	MB20	FRM180/12	DH220	TSV220	FSV220	DHV220	-	DKV180	17
SNV180-L	22220-E1	KM20	MB20	FRM180/12	DH220	TSV220	FSV220	DHV220	-	DKV180	17
SNV180-L	23220-E1-TVPB	KM20	MB20	FRM180/4,85	DH220	TSV220	FSV220	DHV220	-	DKV180	17
SNV215-L ¹⁾	1320-M	KM20	MB20	FRM215/19,5	DH320	TSV320	FSV320	DHV320	TCV320	DKV215	24,5
SNV215-L ¹⁾	20320-MB	KM20	MB20	FRM215/19,5	DH320	TSV320	FSV320	DHV320	TCV320	DKV215	24,5
SNV215-L ¹⁾	21320-E1-TVPB	KM20	MB20	FRM215/19,5	DH320	TSV320	FSV320	DHV320	TCV320	DKV215	24,5
SNV215-L ¹⁾	2320-M	KM20	MB20	FRM215/6,5	DH320	TSV320	FSV320	DHV320	TCV320	DKV215	24,5
SNV215-L ¹⁾	22320-E1	KM20	MB20	FRM215/6,5	DH320	TSV320	FSV320	DHV320	TCV320	DKV215	24,5
SNV200-L	1222-M	KM22	MB22	FRM200/21	DH222	TSV222	FSV222	DHV222	-	DKV200	21
SNV200-L	20222-MB	KM22	MB22	FRM200/21	DH222	TSV222	FSV222	DHV222	-	DKV200	21
SNV200-L	2222-M	KM22	MB22	FRM200/13,5	DH222	TSV222	FSV222	DHV222	-	DKV200	21
SNV200-L	22222-E1	KM22	MB22	FRM200/13,5	DH222	TSV222	FSV222	DHV222	-	DKV200	21
SNV200-L	23222-E1-TVPB	KM22	MB22	FRM200/5,1	DH222	TSV222	FSV222	DHV222	-	DKV200	21
SNV240-L ¹⁾	1322-M	KM22	MB22	FRM240/20	DH222	TSV222	FSV222	DHV222	-	DKV200	32
SNV240-L ¹⁾	20322-MB	KM22	MB22	FRM240/20	DH222	TSV222	FSV222	DHV222	-	DKV200	32
SNV240-L ¹⁾	21322-E1-TVPB	KM22	MB22	FRM240/20	DH222	TSV222	FSV222	DHV222	-	DKV200	32
SNV240-L ¹⁾	2322-M	KM22	MB22	FRM240/5	DH222	TSV222	FSV222	DHV222	-	DKV200	32
SNV240-L ¹⁾	22322-E1	KM22	MB22	FRM240/5	DH222	TSV222	FSV222	DHV222	-	DKV200	32

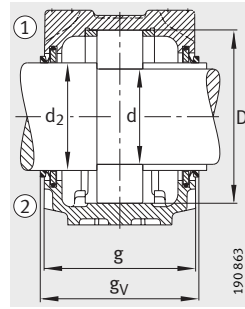
¹⁾ Housing with ring bolt.



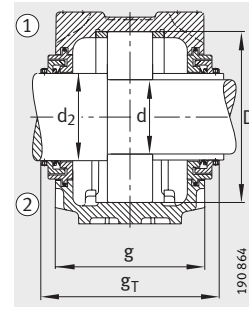
Double lip seal DH
Cover DKV



Labyrinth ring TSV



V ring seal DHV



Taconite seal TCV

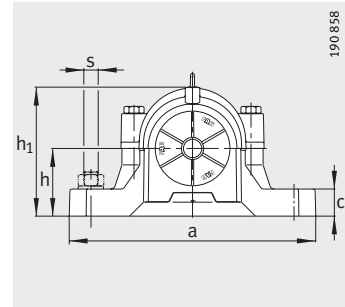
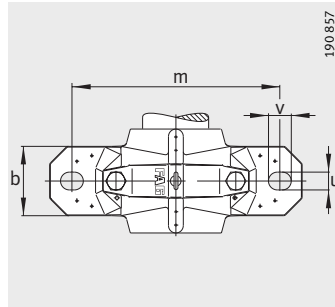
Dimensions

d	a	g	h ₁	d ₂	b	c	D	g _L	g _V	g _T	g ₃	h	m	u	v	s		
																	mm	inch
95	345	150	219	110	100	35	170	167,3	160,5	–	16	112	290	22	27	M20	3/4	
95	345	150	219	110	100	35	170	167,3	160,5	–	16	112	290	22	27	M20	3/4	
95	345	150	219	110	100	35	170	167,3	160,5	–	16	112	290	22	27	M20	3/4	
95	345	150	219	110	100	35	170	167,3	160,5	–	16	112	290	22	27	M20	3/4	
95	410	175	248	110	120	45	200	192,3	185,5	217,5	16	125	350	26	32	M24	7/8	
95	410	175	248	110	120	45	200	192,3	185,5	217,5	16	125	350	26	32	M24	7/8	
95	410	175	248	110	120	45	200	192,3	185,5	217,5	16	125	350	26	32	M24	7/8	
95	410	175	248	110	120	45	200	192,3	185,5	217,5	16	125	350	26	32	M24	7/8	
95	410	175	248	110	120	45	200	192,3	185,5	217,5	16	125	350	26	32	M24	7/8	
100	380	160	223	115	110	40	180	177,3	170,5	–	16	112	320	26	32	M24	7/8	
100	380	160	223	115	110	40	180	177,3	170,5	–	16	112	320	26	32	M24	7/8	
100	380	160	223	115	110	40	180	177,3	170,5	–	16	112	320	26	32	M24	7/8	
100	380	160	223	115	110	40	180	177,3	170,5	–	16	112	320	26	32	M24	7/8	
100	380	160	223	115	110	40	180	177,3	170,5	–	16	112	320	26	32	M24	7/8	
100	410	180	271	115	120	45	215	197,3	190,5	226,5	16	140	350	26	32	M24	7/8	
100	410	180	271	115	120	45	215	197,3	190,5	226,5	16	140	350	26	32	M24	7/8	
100	410	180	271	115	120	45	215	197,3	190,5	226,5	16	140	350	26	32	M24	7/8	
100	410	180	271	115	120	45	215	197,3	190,5	226,5	16	140	350	26	32	M24	7/8	
100	410	180	271	115	120	45	215	197,3	190,5	226,5	16	140	350	26	32	M24	7/8	
110	410	175	248	125	120	45	200	195,3	185,5	–	16	125	350	26	32	M24	7/8	
110	410	175	248	125	120	45	200	195,3	185,5	–	16	125	350	26	32	M24	7/8	
110	410	175	248	125	120	45	200	195,3	185,5	–	16	125	350	26	32	M24	7/8	
110	410	175	248	125	120	45	200	195,3	185,5	–	16	125	350	26	32	M24	7/8	
110	410	175	248	125	120	45	200	195,3	185,5	–	16	125	350	26	32	M24	7/8	
110	450	185	298	125	130	50	240	203,3	193,5	–	18	150	390	28	35	M24	1	
110	450	185	298	125	130	50	240	203,3	193,5	–	18	150	390	28	35	M24	1	
110	450	185	298	125	130	50	240	203,3	193,5	–	18	150	390	28	35	M24	1	
110	450	185	298	125	130	50	240	203,3	193,5	–	18	150	390	28	35	M24	1	
110	450	185	298	125	130	50	240	203,3	193,5	–	18	150	390	28	35	M24	1	



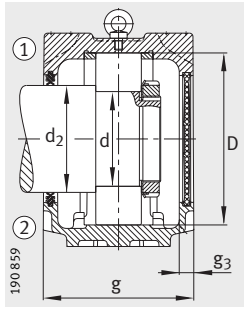
Plummer block housings

SNV, split
For bearings with cylindrical bore

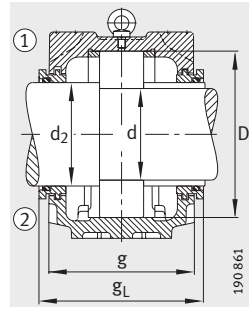


- ① Locating bearing
- ② Non-locating bearing

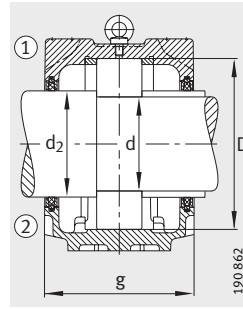
Dimension table (continued) · Dimensions in mm										
Designation										Mass m Housing ≈kg
Housing	Bearing	Lock- nut	Retain- ing plate	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Cover	
SNV215-L	20224-MB	KM24	MB24	FRM215/23	DH224	TSV224	FSV224	DHV224	DKV215	24,5
SNV215-L	22224-E1	KM24	MB24	FRM215/14	DH224	TSV224	FSV224	DHV224	DKV215	24,5
SNV215-L	23224-E1-TVPB	KM24	MB24	FRM215/5	DH224	TSV224	FSV224	DHV224	DKV215	24,5
SNV260-L	20324-MB	KM24	MB24	FRM260/20,5	DH224	TSV224	FSV224	DHV224	DKV215	48
SNV260-L	22324-E1	KM24	MB24	FRM260/5	DH224	TSV224	FSV224	DHV224	DKV215	48
SNV230-L	20226-MB	KM26	MB26	FRM230/25	DH226	TSV226	FSV226	DHV226	DKV230	30
SNV230-L	22226-E1	KM26	MB26	FRM230/13	DH226	TSV226	FSV226	DHV226	DKV230	30
SNV230-L	23226-E1-TVPB	KM26	MB26	FRM230/5	DH226	TSV226	FSV226	DHV226	DKV230	30
SNV280-L	20326-MB	KM26	MB26	FRM280/22,5	DH326	TSV326	FSV326	DHV326	DKV230	55
SNV280-L	22326-E1	KM26	MB26	FRM280/5	DH326	TSV326	FSV326	DHV326	DKV230	55
SNV250-L	20228-MB	KM28	MB28	FRM250/28	DH228	TSV228	FSV228	DHV228	DKV250	38
SNV250-L	22228-E1	KM28	MB28	FRM250/15	DH228	TSV228	FSV228	DHV228	DKV250	38
SNV250-L	23228-E1-TVPB	KM28	MB28	FRM250/5	DH228	TSV228	FSV228	DHV228	DKV250	38
SNV300-L	20328-MB	KM28	MB28	FRM300/25	DH328	TSV328	FSV328	DHV328	DKV250	70
SNV300-L	22328-E1	KM28	MB28	FRM300/5	DH328	TSV328	FSV328	DHV328	DKV250	70
SNV270-L	20230-MB	KM30	MB30	FRM270/30,5	DH230	TSV230	FSV230	DHV230	DKV270	45,5
SNV270-L	22230-E1	KM30	MB30	FRM270/16,5	DH230	TSV230	FSV230	DHV230	DKV270	45,5
SNV270-L	23230-E1-TVPB	KM30	MB30	FRM270/5	DH230	TSV230	FSV230	DHV230	DKV270	45,5
SNV320-L	20330-MB	KM30	MB30	FRM320/26,5	DH330	TSV330	FSV330	DHV330	DKV270	95
SNV320-L	22330-E1	KM30	MB30	FRM320/5	DH330	TSV330	FSV330	DHV330	DKV270	95
SNV290-L	20232-MB	KM32	MB32	FRM290/33	DH232	TSV232	FSV232	DHV232	DKV290	53,8
SNV290-L	22232-E1	KM32	MB32	FRM290/17	DH232	TSV232	FSV232	DHV232	DKV290	53,8
SNV290-L	23232-E1-TVPB	KM32	MB32	FRM290/5	DH232	TSV232	FSV232	DHV232	DKV290	53,8
SNV340-L	22332-MB	KM32	MB32	FRM340/5	DH332	TSV332	FSV332	DHV332	DKV290	115



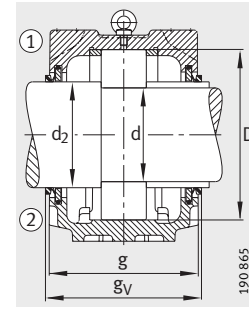
Double lip seal DH
Cover DKV



Labyrinth ring TSV



Felt seal FSV



V ring seal DHV

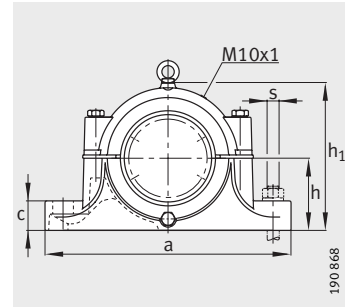
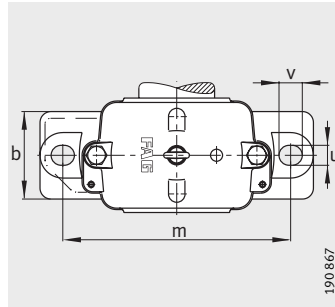
Dimensions

d	a	g	h ₁	d ₂	b	c	D	g _L	g _V	g ₃	h	m	u	v	s		
																mm	inch
120	410	180	271	135	120	45	215	200,3	190,5	16	140	350	26	32	M24	7/8	
120	410	180	271	135	120	45	215	200,3	190,5	16	140	350	26	32	M24	7/8	
120	410	180	271	135	120	45	215	200,3	190,5	16	140	350	26	32	M24	7/8	
120	530	190	321	135	160	60	260	208,3	198,5	18	160	450	35	42	M30	1 1/4	
120	530	190	321	135	160	60	260	208,3	198,5	18	160	450	35	42	M30	1 1/4	
130	445	190	291	145	130	50	230	208,3	198,5	18	150	380	28	35	M24	1	
130	445	190	291	145	130	50	230	208,3	198,5	18	150	380	28	35	M24	1	
130	445	190	291	145	130	50	230	208,3	198,5	18	150	380	28	35	M24	1	
130	550	205	344	150	160	60	280	223,3	213,5	18	170	470	35	42	M30	1 1/4	
130	550	205	344	150	160	60	280	223,3	213,5	18	170	470	35	42	M30	1 1/4	
140	500	200	304	155	150	50	250	218,3	211,5	18	150	420	35	42	M30	1 1/4	
140	500	200	304	155	150	50	250	218,3	211,5	18	150	420	35	42	M30	1 1/4	
140	500	200	304	155	150	50	250	218,3	211,5	18	150	420	35	42	M30	1 1/4	
140	620	215	366	160	170	65	300	233,3	226,5	18	180	520	35	42	M30	1 1/4	
140	620	215	366	160	170	65	300	233,3	226,5	18	180	520	35	42	M30	1 1/4	
150	530	215	328	165	160	60	270	233,3	228,5	18	160	450	35	42	M30	1 1/4	
150	530	215	328	165	160	60	270	233,3	228,5	18	160	450	35	42	M30	1 1/4	
150	530	215	328	165	160	60	270	233,3	228,5	18	160	450	35	42	M30	1 1/4	
150	650	225	386	170	180	65	320	243,3	236,5	18	190	560	35	42	M30	1 1/4	
150	650	225	386	170	180	65	320	243,3	236,5	18	190	560	35	42	M30	1 1/4	
160	550	225	351	175	160	60	290	243,3	236,5	18	170	470	35	42	M30	1 1/4	
160	550	225	351	175	160	60	290	243,3	236,5	18	170	470	35	42	M30	1 1/4	
160	550	225	351	175	160	60	290	243,3	236,5	18	170	470	35	42	M30	1 1/4	
160	680	235	406	180	190	70	340	253,3	246,5	18	200	580	42	50	M36	1 1/2	



Plummer block housings

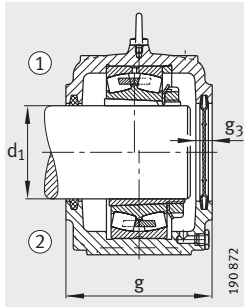
S30, split
For spherical roller bearings with tapered bore and adapter sleeve



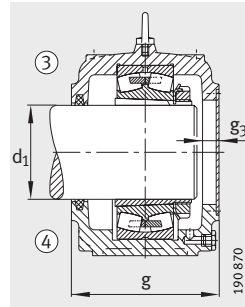
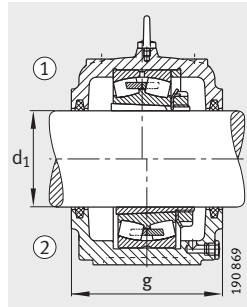
- ① Locating bearing
- ② Non-locating bearing

Dimension table · Dimensions in mm							
Designation					Felt strips		Mass m Housing ≈ kg
Housing	Bearing	Adapter sleeve	Locating ring	Cover	aXbXl mm	Quantity	
S3024-H-N-FZ-AB-L ¹⁾	23024-E1-K-TVPB	H3024	FRM180/10	DK127..135	10X8,5X195	2/4	16,5
S3026-H-N-FZ-AB-L ¹⁾	23026-E1-K-TVPB	H3026	FRM200/10	DK127..135	10X8,5X200	2/4	19,3
S3028-H-N-FZ-AB-L ¹⁾	23028-E1-K-TVPB	H3028	FRM210/10	DK147..155	14X11X225	2/4	24,6
S3030-H-N-FZ-AB-L ¹⁾	23030-E1-K-TVPB	H3030	FRM225/10	DK156..163	14X11X240	2/4	29
S3032-H-N-FZ-AB-L ¹⁾	23032-E1-K-TVPB	H3032	FRM240/10	DK166..182	14X11X250	2/4	37
S3034-H-N-FZ-AB-L	23034-E1-K-TVPB	H3034	FRM260/10	DK166..182	16X12X270	2/4	45
S3036-H-N-FZ-AB-L	23036-E1-K-TVPB	H3036	FRM280/10	DK185..197	16X12X285	2/4	65
S3038-H-N-FZ-AB-L	23038-E1-K-TVPB	H3038	FRM290/10	DK200..212	16X12X300	2/4	67
S3040-H-N-FZ-AB-L	23040-E1-K-TVPB	H3040	FRM310/10	DK200..212	16X12X315	2/4	72
S3044-H-N-FZ-AF-L	23044-K-MB	H3044X	–	–	16X12X350	2	98
S3044-H-N-FZ-AL-L	23044-K-MB	H3044X	–	–	16X12X350	2	98
S3044-H-N-FZ-BF-L	23044-K-MB	H3044X	–	–	16X12X350	4	98
S3044-H-N-FZ-BL-L	23044-K-MB	H3044X	–	–	16X12X350	4	98
S3048-H-N-FZ-AF-L	23048-K-MB	H3048	–	–	16X12X380	2	110
S3048-H-N-FZ-AL-L	23048-K-MB	H3048	–	–	16X12X380	2	110
S3048-H-N-FZ-BF-L	23048-K-MB	H3048	–	–	16X12X380	4	110
S3048-H-N-FZ-BL-L	23048-K-MB	H3048	–	–	16X12X380	4	110
S3052-H-N-FZ-AF-L	23052-K-MB	H3052X	–	–	16X12X410	2	148
S3052-H-N-FZ-AL-L	23052-K-MB	H3052X	–	–	16X12X410	2	148
S3052-H-N-FZ-BF-L	23052-K-MB	H3052X	–	–	16X12X410	4	148
S3052-H-N-FZ-BL-L	23052-K-MB	H3052X	–	–	16X12X410	4	148
S3056-H-N-FZ-AF-L	23056-B-K-MB	H3056	–	–	16X12X445	2	165
S3056-H-N-FZ-AL-L	23056-B-K-MB	H3056	–	–	16X12X445	2	165
S3056-H-N-FZ-BF-L	23056-B-K-MB	H3056	–	–	16X12X445	4	165
S3056-H-N-FZ-BL-L	23056-B-K-MB	H3056	–	–	16X12X445	4	165

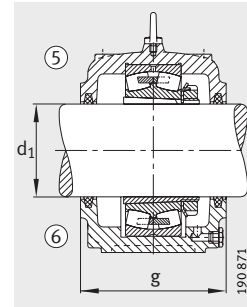
¹⁾ Housing without ring bolt.



Cover DK,
locating bearings up to and including size S3040
with locating ring



Design A
③ Locating bearing AF
④ Non-loc. bearing AL



Design B
⑤ Locating bearing BF
⑥ Non-loc. bearing BL

Dimensions

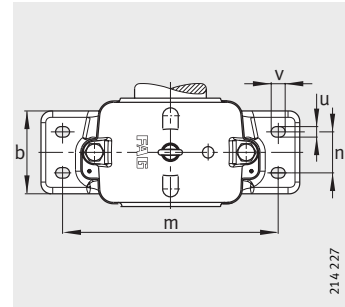
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											mm	inch
110	390	150	215	110	40	18	112	320	30	36	M24	1
115	420	160	239	120	45	18	125	350	30	36	M24	1
125	420	170	259	120	45	21	140	350	30	36	M24	1
135	460	175	278	130	45	21	150	380	30	36	M24	1
140	470	190	288	130	50	21	150	390	30	36	M24	1
150	540	200	320	160	55	25	160	450	36	48	M30	1 ¹ / ₈
160	560	210	340	160	55	25	170	470	36	48	M30	1 ¹ / ₈
170	560	210	353	160	55	25	170	470	36	48	M30	1 ¹ / ₈
180	615	235	373	170	60	25	180	515	36	48	M30	1 ¹ / ₈
200	690	255	408	190	70	25	200	580	42	50	M36	1 ³ / ₈
200	690	255	408	190	70	25	200	580	42	50	M36	1 ³ / ₈
200	690	255	408	190	70	–	200	580	42	50	M36	1 ³ / ₈
200	690	255	408	190	70	–	200	580	42	50	M36	1 ³ / ₈
220	720	265	433	200	75	30	210	610	42	50	M36	1 ³ / ₈
220	720	265	433	200	75	30	210	610	42	50	M36	1 ³ / ₈
220	720	265	433	200	75	–	210	610	42	50	M36	1 ³ / ₈
220	720	265	433	200	75	–	210	610	42	50	M36	1 ³ / ₈
240	820	285	485	220	80	30	240	680	52	70	M45	1 ³ / ₄
240	820	285	485	220	80	30	240	680	52	70	M45	1 ³ / ₄
240	820	285	485	220	80	–	240	680	52	70	M45	1 ³ / ₄
240	820	285	485	220	80	–	240	680	52	70	M45	1 ³ / ₄
260	860	295	505	230	80	30	250	720	52	70	M45	1 ³ / ₄
260	860	295	505	230	80	30	250	720	52	70	M45	1 ³ / ₄
260	860	295	505	230	80	–	250	720	52	70	M45	1 ³ / ₄
260	860	295	505	230	80	–	250	720	52	70	M45	1 ³ / ₄



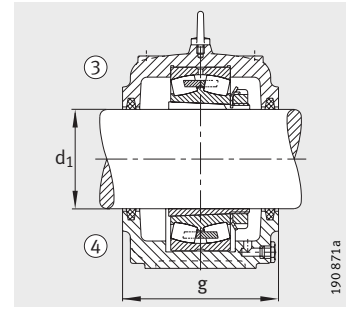
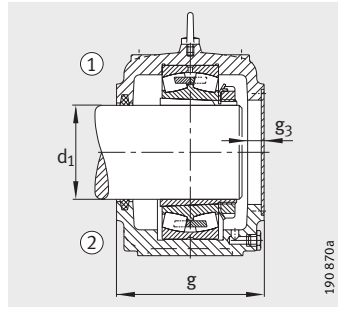
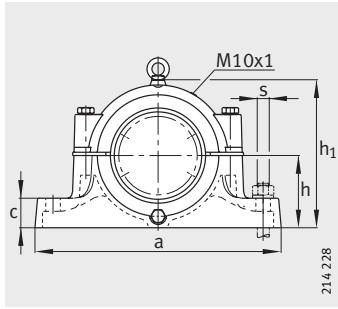
Plummer block housings

S30, split

For spherical roller bearings
with tapered bore and adapter sleeve



Dimension table (continued) · Dimensions in mm					
Designation			Felt strips		Mass m Housing ≈kg
Housing	Bearing	Adapter sleeve	aXbXl mm	Quantity	
S3060-H-N-FZ-AF-L	23060-K-MB	H3060	16X12X470	2	205
S3060-H-N-FZ-AL-L	23060-K-MB	H3060	16X12X470	2	205
S3060-H-N-FZ-BF-L	23060-K-MB	H3060	16X12X470	4	205
S3060-H-N-FZ-BL-L	23060-K-MB	H3060	16X12X470	4	205
S3064-H-N-FZ-AF-L	23064-K-MB	H3064-HG	16X12X505	2	235
S3064-H-N-FZ-AL-L	23064-K-MB	H3064-HG	16X12X505	2	235
S3064-H-N-FZ-BF-L	23064-K-MB	H3064-HG	16X12X505	4	235
S3064-H-N-FZ-BL-L	23064-K-MB	H3064-HG	16X12X505	4	235
S3068-H-N-FZ-AF-L	23068-K-MB	H3068-HG	16X12X535	2	280
S3068-H-N-FZ-AL-L	23068-K-MB	H3068-HG	16X12X535	2	280
S3068-H-N-FZ-BF-L	23068-K-MB	H3068-HG	16X12X535	4	280
S3068-H-N-FZ-BL-L	23068-K-MB	H3068-HG	16X12X535	4	280
S3072-H-N-FZ-AF-L	23072-K-MB	H3072-HG	16X12X565	2	340
S3072-H-N-FZ-AL-L	23072-K-MB	H3072-HG	16X12X565	2	340
S3072-H-N-FZ-BF-L	23072-K-MB	H3072-HG	16X12X565	4	340
S3072-H-N-FZ-BL-L	23072-K-MB	H3072-HG	16X12X565	4	340
S3076-H-N-FZ-AF-L	23076-B-K-MB	H3076-HG	16X12X600	2	400
S3076-H-N-FZ-AL-L	23076-B-K-MB	H3076-HG	16X12X600	2	400
S3076-H-N-FZ-BF-L	23076-B-K-MB	H3076-HG	16X12X600	4	400
S3076-H-N-FZ-BL-L	23076-B-K-MB	H3076-HG	16X12X600	4	400
S3080-H-N-FZ-AF-L	23080-K-MB	H3080-HG	16X12X630	2	460
S3080-H-N-FZ-AL-L	23080-K-MB	H3080-HG	16X12X630	2	460
S3080-H-N-FZ-BF-L	23080-K-MB	H3080-HG	16X12X630	4	460
S3080-H-N-FZ-BL-L	23080-K-MB	H3080-HG	16X12X630	4	460
S3084-H-N-FZ-AF-L	23084-B-K-MB	H3084X-HG	16X12X660	2	500
S3084-H-N-FZ-AL-L	23084-B-K-MB	H3084X-HG	16X12X660	2	500
S3084-H-N-FZ-BF-L	23084-B-K-MB	H3084X-HG	16X12X660	4	500
S3084-H-N-FZ-BL-L	23084-B-K-MB	H3084X-HG	16X12X660	4	500



Design A
 ① Locating bearing AF
 ② Non-locating bearing AL

Design B
 ③ Locating bearing BF
 ④ Non-locating bearing BL

Dimensions

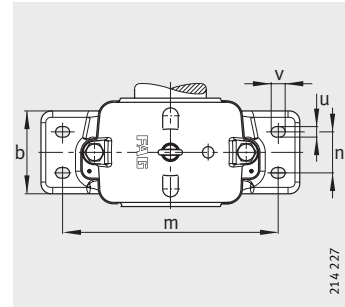
d ₁	a	g	h ₁	b	c	g ₃	h	m	n	u	v	s	
												mm	inch
280	920	320	565	260	90	30	280	780	130	42	50	M36	1 ³ / ₈
280	920	320	565	260	90	30	280	780	130	42	50	M36	1 ³ / ₈
280	920	320	565	260	90	-	280	780	130	42	50	M36	1 ³ / ₈
280	920	320	565	260	90	-	280	780	130	42	50	M36	1 ³ / ₈
300	940	320	570	260	90	30	280	800	130	42	50	M36	1 ³ / ₈
300	940	320	570	260	90	30	280	800	130	42	50	M36	1 ³ / ₈
300	940	320	570	260	90	-	280	800	130	42	50	M36	1 ³ / ₈
300	940	320	570	260	90	-	280	800	130	42	50	M36	1 ³ / ₈
320	1000	340	615	280	95	30	300	860	140	42	50	M36	1 ³ / ₈
320	1000	340	615	280	95	30	300	860	140	42	50	M36	1 ³ / ₈
320	1000	340	615	280	95	-	300	860	140	42	50	M36	1 ³ / ₈
320	1000	340	615	280	95	-	300	860	140	42	50	M36	1 ³ / ₈
340	1060	345	655	280	95	30	320	900	140	42	50	M36	1 ³ / ₈
340	1060	345	655	280	95	30	320	900	140	42	50	M36	1 ³ / ₈
340	1060	345	655	280	95	-	320	900	140	42	50	M36	1 ³ / ₈
340	1060	345	655	280	95	-	320	900	140	42	50	M36	1 ³ / ₈
360	1060	380	675	280	100	30	330	900	140	42	50	M36	1 ³ / ₈
360	1060	380	675	280	100	30	330	900	140	42	50	M36	1 ³ / ₈
360	1060	380	675	280	100	-	330	900	140	42	50	M36	1 ³ / ₈
360	1060	380	675	280	100	-	330	900	140	42	50	M36	1 ³ / ₈
380	1100	400	715	325	120	30	350	950	160	42	50	M36	1 ³ / ₈
380	1100	400	715	325	120	30	350	950	160	42	50	M36	1 ³ / ₈
380	1100	400	715	325	120	-	350	950	160	42	50	M36	1 ³ / ₈
380	1100	400	715	325	120	-	350	950	160	42	50	M36	1 ³ / ₈
400	1160	430	750	340	120	30	375	980	170	42	50	M36	1 ³ / ₈
400	1160	430	750	340	120	30	375	980	170	42	50	M36	1 ³ / ₈
400	1160	430	750	340	120	-	375	980	170	42	50	M36	1 ³ / ₈
400	1160	430	750	340	120	-	375	980	170	42	50	M36	1 ³ / ₈



Plummer block housings

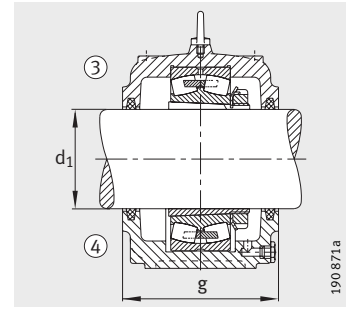
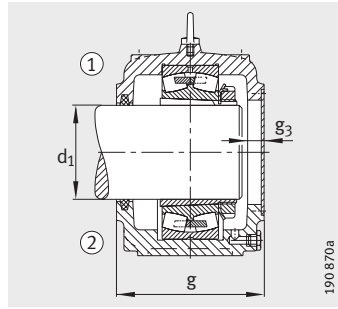
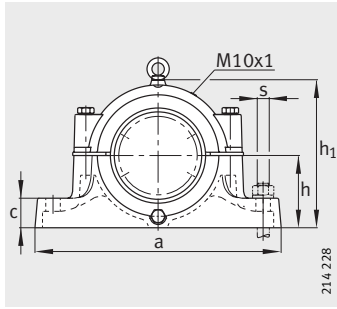
S30, split

For spherical roller bearings
with tapered bore and adapter sleeve



Dimension table (continued) · Dimensions in mm

Designation			Felt strips		Mass m Housing ≈kg
Housing	Bearing	Adapter sleeve	aXbXl mm	Quantity	
S3088-H-N-FZ-AF-L	23088-K-MB	H3088-HG	16X12X675	2	600
S3088-H-N-FZ-AL-L	23088-K-MB	H3088-HG	16X12X675	2	600
S3088-H-N-FZ-BF-L	23088-K-MB	H3088-HG	16X12X675	4	600
S3088-H-N-FZ-BL-L	23088-K-MB	H3088-HG	16X12X675	4	600
S3092-H-N-FZ-AF-L	23092-B-K-MB	H3092-HG	16X12X710	2	700
S3092-H-N-FZ-AL-L	23092-B-K-MB	H3092-HG	16X12X710	2	700
S3092-H-N-FZ-BF-L	23092-B-K-MB	H3092-HG	16X12X710	4	700
S3092-H-N-FZ-BL-L	23092-B-K-MB	H3092-HG	16X12X710	4	700
S3096-H-N-FZ-AF-L	23096-K-MB	H3096-HG	16X12X740	2	800
S3096-H-N-FZ-AL-L	23096-K-MB	H3096-HG	16X12X740	2	800
S3096-H-N-FZ-BF-L	23096-K-MB	H3096-HG	16X12X740	4	800
S3096-H-N-FZ-BL-L	23096-K-MB	H3096-HG	16X12X740	4	800



Design A
 ③ Locating bearing AF
 ④ Non-locating bearing AL

Design B
 ⑤ Locating bearing BF
 ⑥ Non-locating bearing BL

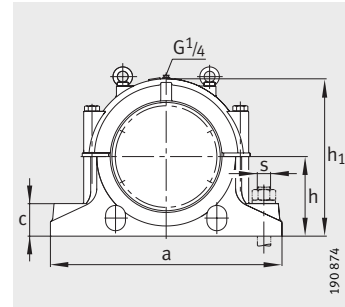
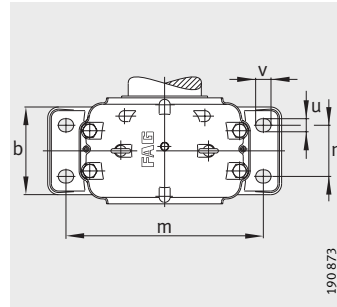
Dimensions

d ₁	a	g	h ₁	b	c	g ₃	h	m	n	u	v	s	
												mm	inch
410	1200	430	780	340	125	30	390	1020	170	42	50	M36	1 ³ / ₈
410	1200	430	780	340	125	30	390	1020	170	42	50	M36	1 ³ / ₈
410	1200	430	780	340	125	–	390	1020	170	42	50	M36	1 ³ / ₈
410	1200	430	780	340	125	–	390	1020	170	42	50	M36	1 ³ / ₈
430	1260	440	805	360	130	30	400	1080	180	56	75	M48	1 ⁷ / ₈
430	1260	440	805	360	130	30	400	1080	180	56	75	M48	1 ⁷ / ₈
430	1260	440	805	360	130	–	400	1080	180	56	75	M48	1 ⁷ / ₈
430	1260	440	805	360	130	–	400	1080	180	56	75	M48	1 ⁷ / ₈
450	1380	440	825	380	190	30	410	1180	190	56	75	M48	1 ⁷ / ₈
450	1380	440	825	380	190	30	410	1180	190	56	75	M48	1 ⁷ / ₈
450	1380	440	825	380	190	–	410	1180	190	56	75	M48	1 ⁷ / ₈
450	1380	440	825	380	190	–	410	1180	190	56	75	M48	1 ⁷ / ₈



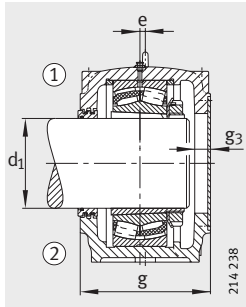
Plummer block housings

SD31, split
For spherical roller bearings with tapered bore and adapter sleeve

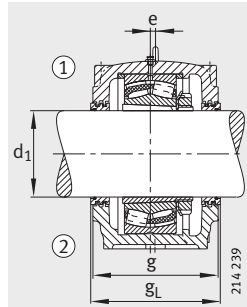


- ① Locating bearing
- ② Non-locating bearing

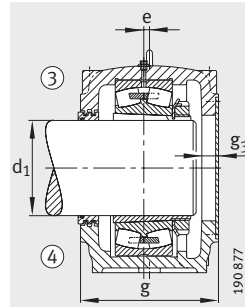
Dimension table · Dimensions in mm							
Designation							Mass m Housing ≈kg
Housing	Bearing	Adapter sleeve	Locating ring		Labyrinth ring with round cord		
				Quantity		Quantity	
SD3134-H-TS-A-L	23134-E1-K-TVPB	H3134	FRM280/10	2	TS34	1	70
SD3134-H-TS-B-L	23134-E1-K-TVPB	H3134	FRM280/10	2	TS34	2	70
SD3136-H-TS-A-L	23136-E1-K-TVPB	H3136	FRM300/10	2	TS36	1	78
SD3136-H-TS-B-L	23136-E1-K-TVPB	H3136	FRM300/10	2	TS36	2	78
SD3138-H-TS-A-L	23138-E1-K-TVPB	H3138	FRM320/10	2	TS38	1	95
SD3138-H-TS-B-L	23138-E1-K-TVPB	H3138	FRM320/10	2	TS38	2	95
SD3140-H-TS-A-L	23140-B-K-MB	H3140	FRM340/10	2	TS40	1	120
SD3140-H-TS-B-L	23140-B-K-MB	H3140	FRM340/10	2	TS40	2	120
SD3144-H-TS-AF-L	23144-B-K-MB	H3144X	–	–	TS44	1	135
SD3144-H-TS-AL-L	23144-B-K-MB	H3144X	–	–	TS44	1	135
SD3144-H-TS-BF-L	23144-B-K-MB	H3144X	–	–	TS44	2	135
SD3144-H-TS-BL-L	23144-B-K-MB	H3144X	–	–	TS44	2	135
SD3148-H-TS-AF-L	23148-B-K-MB	H3148X	–	–	TS48	1	175
SD3148-H-TS-AL-L	23148-B-K-MB	H3148X	–	–	TS48	1	175
SD3148-H-TS-BF-L	23148-B-K-MB	H3148X	–	–	TS48	2	175
SD3148-H-TS-BL-L	23148-B-K-MB	H3148X	–	–	TS48	2	175
SD3152-H-TS-AF-L	23152-K-MB	H3152X	–	–	TS52	1	210
SD3152-H-TS-AL-L	23152-K-MB	H3152X	–	–	TS52	1	210
SD3152-H-TS-BF-L	23152-K-MB	H3152X	–	–	TS52	2	210
SD3152-H-TS-BL-L	23152-K-MB	H3152X	–	–	TS52	2	210
SD3156-H-TS-AF-L	23156-B-K-MB	H3156X	–	–	TS56	1	240
SD3156-H-TS-AL-L	23156-B-K-MB	H3156X	–	–	TS56	1	240
SD3156-H-TS-BF-L	23156-B-K-MB	H3156X	–	–	TS56	2	240
SD3156-H-TS-BL-L	23156-B-K-MB	H3156X	–	–	TS56	2	240
SD3160-H-TS-AF-L	23160-B-K-MB	H3160-HG	–	–	TS60	1	290
SD3160-H-TS-AL-L	23160-B-K-MB	H3160-HG	–	–	TS60	1	290
SD3160-H-TS-BF-L	23160-B-K-MB	H3160-HG	–	–	TS60	2	290
SD3160-H-TS-BL-L	23160-B-K-MB	H3160-HG	–	–	TS60	2	290
SD3164-H-TS-AF-L	23164-K-MB	H3164-HG	–	–	TS64	1	330
SD3164-H-TS-AL-L	23164-K-MB	H3164-HG	–	–	TS64	1	330
SD3164-H-TS-BF-L	23164-K-MB	H3164-HG	–	–	TS64	2	330
SD3164-H-TS-BL-L	23164-K-MB	H3164-HG	–	–	TS64	2	330



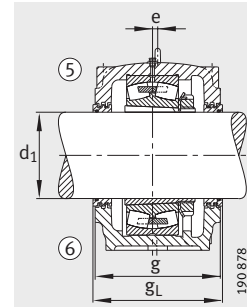
Design A (TS-A)



Design B (TS-B)



Design A
 ③ Locating bear. TS-AF
 ④ Non-loc. bear. TS-AL



Design B
 ⑤ Locating bear. TS-BF
 ⑥ Non-loc. bear. TS-BL

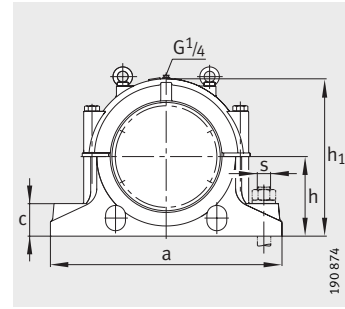
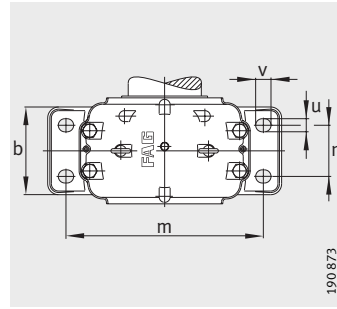
Dimensions

d ₁	a	g	h ₁	b	c	e	g _L	g ₃	h	m	n	u	v	s	
														mm	inch
150	510	230	335	180	70	14	—	35	170	430	100	30	36	M24	1
150	510	230	335	180	70	14	240	—	170	430	100	30	36	M24	1
160	530	240	355	190	75	15	—	35	180	450	110	30	36	M24	1
160	530	240	355	190	75	15	250	—	180	450	110	30	36	M24	1
170	560	260	375	210	80	10	—	35	190	480	120	30	36	M24	1
170	560	260	375	210	80	10	270	—	190	480	120	30	36	M24	1
180	610	280	410	230	85	10	—	35	210	510	130	36	42	M30	1 ¹ / ₈
180	610	280	410	230	85	10	290	—	210	510	130	36	42	M30	1 ¹ / ₈
200	640	290	435	240	90	12	—	35	220	540	140	36	42	M30	1 ¹ / ₈
200	640	290	435	240	90	12	—	35	220	540	140	36	42	M30	1 ¹ / ₈
200	640	290	435	240	90	12	300	—	220	540	140	36	42	M30	1 ¹ / ₈
200	640	290	435	240	90	12	300	—	220	540	140	36	42	M30	1 ¹ / ₈
220	700	310	475	260	95	12	—	35	240	600	150	36	42	M30	1 ¹ / ₈
220	700	310	475	260	95	12	—	35	240	600	150	36	42	M30	1 ¹ / ₈
220	700	310	475	260	95	12	320	—	240	600	150	36	42	M30	1 ¹ / ₈
220	700	310	475	260	95	12	320	—	240	600	150	36	42	M30	1 ¹ / ₈
240	770	320	515	280	100	13	—	35	260	650	160	42	52	M36	1 ³ / ₈
240	770	320	515	280	100	13	—	35	260	650	160	42	52	M36	1 ³ / ₈
240	770	320	515	280	100	13	330	—	260	650	160	42	52	M36	1 ³ / ₈
240	770	320	515	280	100	13	330	—	260	650	160	42	52	M36	1 ³ / ₈
260	790	320	550	280	105	16	—	35	280	670	160	42	52	M36	1 ³ / ₈
260	790	320	550	280	105	16	—	35	280	670	160	42	52	M36	1 ³ / ₈
260	790	320	550	280	105	16	330	—	280	670	160	42	52	M36	1 ³ / ₈
260	790	320	550	280	105	16	330	—	280	670	160	42	52	M36	1 ³ / ₈
280	830	350	590	310	110	22	—	35	300	710	190	42	52	M36	1 ³ / ₈
280	830	350	590	310	110	22	—	35	300	710	190	42	52	M36	1 ³ / ₈
280	830	350	590	310	110	22	360	—	300	710	190	42	52	M36	1 ³ / ₈
280	830	350	590	310	110	22	360	—	300	710	190	42	52	M36	1 ³ / ₈
300	880	370	630	330	115	23	—	35	320	750	200	42	52	M36	1 ³ / ₈
300	880	370	630	330	115	23	—	35	320	750	200	42	52	M36	1 ³ / ₈
300	880	370	630	330	115	23	380	—	320	750	200	42	52	M36	1 ³ / ₈
300	880	370	630	330	115	23	380	—	320	750	200	42	52	M36	1 ³ / ₈

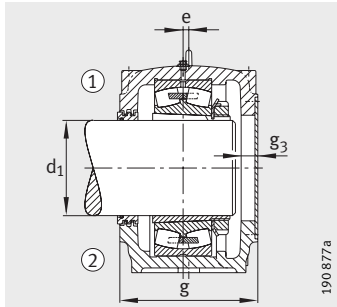


Plummer block housings

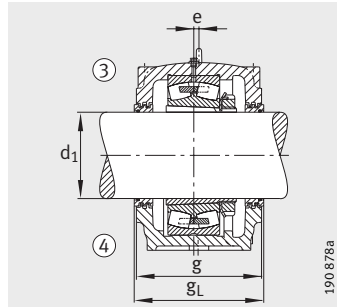
SD31, split
For spherical roller bearings with tapered bore and adapter sleeve



Dimension table (continued) · Dimensions in mm					
Designation					Mass m Housing ≈ kg
Housing	Bearing	Adapter sleeve	Labyrinth ring with round cord		
				Quantity	
SD3168-H-TS-AF-L	23168-B-K-MB	H3168-HG	TS68	1	380
SD3168-H-TS-AL-L	23168-B-K-MB	H3168-HG	TS68	1	380
SD3168-H-TS-BF-L	23168-B-K-MB	H3168-HG	TS68	2	380
SD3168-H-TS-BL-L	23168-B-K-MB	H3168-HG	TS68	2	380
SD3172-H-TS-AF-L	23172-K-MB	H3172-HG	TS72	1	420
SD3172-H-TS-AL-L	23172-K-MB	H3172-HG	TS72	1	420
SD3172-H-TS-BF-L	23172-K-MB	H3172-HG	TS72	2	420
SD3172-H-TS-BL-L	23172-K-MB	H3172-HG	TS72	2	420
SD3176-H-TS-AF-L	23176-K-MB	H3176-HG	TS76	1	490
SD3176-H-TS-AL-L	23176-K-MB	H3176-HG	TS76	1	490
SD3176-H-TS-BF-L	23176-K-MB	H3176-HG	TS76	2	490
SD3176-H-TS-BL-L	23176-K-MB	H3176-HG	TS76	2	490
SD3180-H-TS-AF-L	23180-B-K-MB	H3180-HG	TS80	1	570
SD3180-H-TS-AL-L	23180-B-K-MB	H3180-HG	TS80	1	570
SD3180-H-TS-BF-L	23180-B-K-MB	H3180-HG	TS80	2	570
SD3180-H-TS-BL-L	23180-B-K-MB	H3180-HG	TS80	2	570
SD3184-H-TS-AF-L	23184-K-MB	H3184-HG	TS84	1	610
SD3184-H-TS-AL-L	23184-K-MB	H3184-HG	TS84	1	610
SD3184-H-TS-BF-L	23184-K-MB	H3184-HG	TS84	2	610
SD3184-H-TS-BL-L	23184-K-MB	H3184-HG	TS84	2	610
SD3188-H-TS-AF-L	23188-K-MB	H3188-HG	TS88	1	770
SD3188-H-TS-AL-L	23188-K-MB	H3188-HG	TS88	1	770
SD3188-H-TS-BF-L	23188-K-MB	H3188-HG	TS88	2	770
SD3188-H-TS-BL-L	23188-K-MB	H3188-HG	TS88	2	770
SD3192-H-TS-AF-L	23192-K-MB	H3192-HG	TS92	1	830
SD3192-H-TS-AL-L	23192-K-MB	H3192-HG	TS92	1	830
SD3192-H-TS-BF-L	23192-K-MB	H3192-HG	TS92	2	830
SD3192-H-TS-BL-L	23192-K-MB	H3192-HG	TS92	2	830
SD3196-H-TS-AF-L	23196-K-MB	H3196-HG	TS96	1	930
SD3196-H-TS-AL-L	23196-K-MB	H3196-HG	TS96	1	930
SD3196-H-TS-BF-L	23196-K-MB	H3196-HG	TS96	2	930
SD3196-H-TS-BL-L	23196-K-MB	H3196-HG	TS96	2	930



Design A
 ① Locating bearing TS-AF
 ② Non-locating bearing TS-AL



Design B
 ③ Locating bearing TS-BF
 ④ Non-locating bearing TS-BL

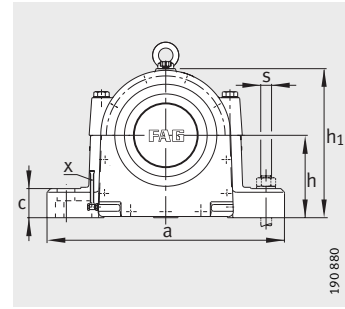
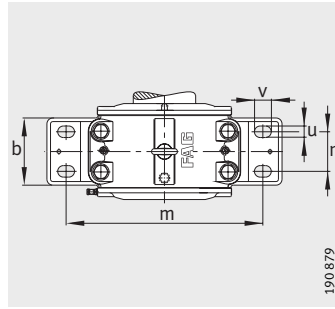
Dimensions

d ₁	a	g	h ₁	b	c	e	g _L	g ₃	h	m	n	u	v	s	
														mm	inch
320	950	400	675	360	120	24	-	35	340	810	220	42	52	M36	1 ³ / ₈
320	950	400	675	360	120	24	-	35	340	810	220	42	52	M36	1 ³ / ₈
320	950	400	675	360	120	24	410	-	340	810	220	42	52	M36	1 ³ / ₈
320	950	400	675	360	120	24	410	-	340	810	220	42	52	M36	1 ³ / ₈
340	1000	400	695	360	120	30	-	35	350	840	220	42	52	M36	1 ³ / ₈
340	1000	400	695	360	120	30	-	35	350	840	220	42	52	M36	1 ³ / ₈
340	1000	400	695	360	120	30	410	-	350	840	220	42	52	M36	1 ³ / ₈
340	1000	400	695	360	120	30	410	-	350	840	220	42	52	M36	1 ³ / ₈
360	1040	400	715	360	120	30	-	35	360	870	220	42	52	M36	1 ³ / ₈
360	1040	400	715	360	120	30	-	35	360	870	220	42	52	M36	1 ³ / ₈
360	1040	400	715	360	120	30	410	-	360	870	220	42	52	M36	1 ³ / ₈
360	1040	400	715	360	120	30	410	-	360	870	220	42	52	M36	1 ³ / ₈
380	1120	430	755	390	125	30	-	35	380	950	240	48	60	M42	1 ⁵ / ₈
380	1120	430	755	390	125	30	-	35	380	950	240	48	60	M42	1 ⁵ / ₈
380	1120	430	755	390	125	30	440	-	380	950	240	48	60	M42	1 ⁵ / ₈
380	1120	430	755	390	125	30	440	-	380	950	240	48	60	M42	1 ⁵ / ₈
400	1170	460	810	420	130	35	-	35	410	1000	260	48	60	M42	1 ⁵ / ₈
400	1170	460	810	420	130	35	-	35	410	1000	260	48	60	M42	1 ⁵ / ₈
400	1170	460	810	420	130	35	470	-	410	1000	260	48	60	M42	1 ⁵ / ₈
400	1170	460	810	420	130	35	470	-	410	1000	260	48	60	M42	1 ⁵ / ₈
410	1220	460	835	430	135	35	-	35	420	1030	260	48	60	M42	1 ⁵ / ₈
410	1220	460	835	430	135	35	-	35	420	1030	260	48	60	M42	1 ⁵ / ₈
410	1220	460	835	430	135	35	470	-	420	1030	260	48	60	M42	1 ⁵ / ₈
410	1220	460	835	430	135	35	470	-	420	1030	260	48	60	M42	1 ⁵ / ₈
430	1280	470	875	440	145	35	-	35	440	1070	260	48	60	M42	1 ⁵ / ₈
430	1280	470	875	440	145	35	-	35	440	1070	260	48	60	M42	1 ⁵ / ₈
430	1280	470	875	440	145	35	480	-	440	1070	260	48	60	M42	1 ⁵ / ₈
430	1280	470	875	440	145	35	480	-	440	1070	260	48	60	M42	1 ⁵ / ₈
450	1330	470	920	440	155	45	-	35	460	1110	260	66	80	M56	2 ¹ / ₄
450	1330	470	920	440	155	45	-	35	460	1110	260	66	80	M56	2 ¹ / ₄
450	1330	470	920	440	155	45	480	-	460	1110	260	66	80	M56	2 ¹ / ₄
450	1330	470	920	440	155	45	480	-	460	1110	260	66	80	M56	2 ¹ / ₄

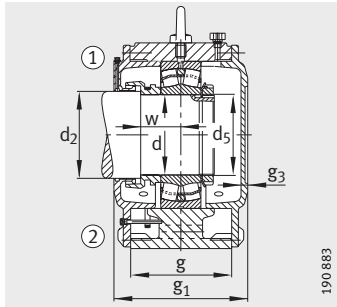


Plummer block housings

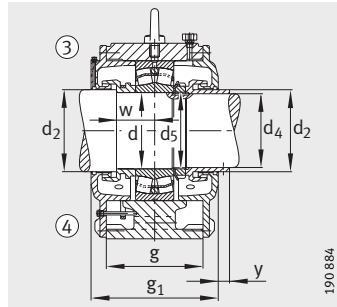
LOE, split
For spherical roller bearings with cylindrical bore



Dimension table · Dimensions in mm					Oil quantity	Oil level	Mass
Designation					Initial filling	Height	m
Housing		Bearing	Shaft nut	Retaining plate	l	x mm	Housing ≈kg
Locating bearings	Non-locating bearings						
LOE310-N-AF-L	LOE310-N-AL-L	22310-E1	KM10	MB10	0,9	50– 65	30
LOE310-N-BF-L	LOE310-N-BL-L	22310-E1	KM10	MB10	0,9	50– 65	30
LOE312-N-AF-L	LOE312-N-AL-L	22312-E1	KM12	MB12	1	50– 65	35
LOE312-N-BF-L	LOE312-N-BL-L	22312-E1	KM12	MB12	1	50– 65	35
LOE314-N-AF-L	LOE314-N-AL-L	22314-E1	KM14	MB14	1,4	50– 65	45
LOE314-N-BF-L	LOE314-N-BL-L	22314-E1	KM14	MB14	1,4	50– 65	45
LOE316-N-AF-L	LOE316-N-AL-L	22316-E1	KM16	MB16	1,6	55– 70	60
LOE316-N-BF-L	LOE316-N-BL-L	22316-E1	KM16	MB16	1,6	55– 70	60
LOE217-N-AF-L	LOE217-N-AL-L	22217-E1	KM17	MB17	1,4	50– 65	45
LOE217-N-BF-L	LOE217-N-BL-L	22217-E1	KM17	MB17	1,4	50– 65	45
LOE218-N-AF-L	LOE218-N-AL-L	22218-E1	KM18	MB18	1,5	45– 60	47
LOE218-N-BF-L	LOE218-N-BL-L	22218-E1	KM18	MB18	1,5	45– 60	47
LOE318-N-AF-L	LOE318-N-AL-L	22318-E1	KM18	MB18	2,3	65– 85	73
LOE318-N-BF-L	LOE318-N-BL-L	22318-E1	KM18	MB18	2,3	65– 85	73
LOE219-N-AF-L	LOE219-N-AL-L	22219-E1	KM19	MB19	1,6	55– 70	60
LOE219-N-BF-L	LOE219-N-BL-L	22219-E1	KM19	MB19	1,6	55– 70	60
LOE220-N-AF-L	LOE220-N-AL-L	22220-E1	KM20	MB20	1,7	50– 65	67
LOE220-N-BF-L	LOE220-N-BL-L	22220-E1	KM20	MB20	1,7	50– 65	67
LOE320-N-AF-L	LOE320-N-AL-L	22320-E1	KM20	MB20	2,4	55– 75	81
LOE320-N-BF-L	LOE320-N-BL-L	22320-E1	KM20	MB20	2,4	55– 75	81
LOE222-N-AF-L	LOE222-N-AL-L	22222-E1	KM22	MB22	2,1	50– 70	74
LOE222-N-BF-L	LOE222-N-BL-L	22222-E1	KM22	MB22	2,1	50– 70	74
LOE322-N-AF-L	LOE322-N-AL-L	22322-E1	KM22	MB22	2,4	45– 65	100
LOE322-N-BF-L	LOE322-N-BL-L	22322-E1	KM22	MB22	2,4	45– 65	100
LOE224-N-AF-L	LOE224-N-AL-L	22224-E1	KM24	MB24	2,3	50– 70	80
LOE224-N-BF-L	LOE224-N-BL-L	22224-E1	KM24	MB24	2,3	50– 70	80
LOE324-N-AF-L	LOE324-N-AL-L	22324-E1	KM24	MB24	4,2	65– 90	130
LOE324-N-BF-L	LOE324-N-BL-L	22324-E1	KM24	MB24	4,2	65– 90	130
LOE226-N-AF-L	LOE226-N-AL-L	22226-E1	KM26	MB26	2,3	55– 75	93
LOE226-N-BF-L	LOE226-N-BL-L	22226-E1	KM26	MB26	2,3	55– 75	93
LOE326-N-AF-L	LOE326-N-AL-L	22326-E1	KM26	MB26	3,7	75–105	142
LOE326-N-BF-L	LOE326-N-BL-L	22326-E1	KM26	MB26	3,7	75–105	142



Design A
 ① Locating bearing AF
 ② Non-locating bearing AL



Design B
 ③ Locating bearing BF
 ④ Non-locating bearing BL

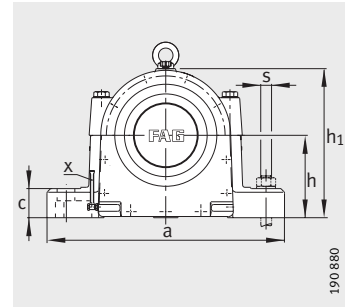
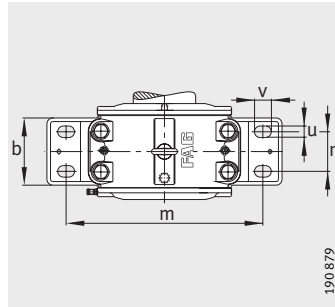
Dimensions

d	a	g ₁	h ₁	d ₂	d ₄	d ₅	w	b	c	g	g ₃	h	m	n	u	v	s	y
50	350	210	205	55	-	M50X2	52	125	40	135	18	115	290	75	20	30	M16	-
50	350	210	205	55	47	M50X2	52	125	40	135	-	115	290	75	20	30	M16	15
60	370	220	220	65	-	M60X2	55	130	45	140	18	125	310	80	20	30	M16	-
60	370	220	220	65	57	M60X2	55	130	45	140	-	125	310	80	20	30	M16	15
70	410	225	240	75	-	M70X2	62	150	48	160	18	135	340	80	25	35	M20	-
70	410	225	240	75	67	M70X2	62	150	48	160	-	135	340	80	25	35	M20	15
80	490	250	270	85	-	M80X2	67	160	50	170	18	150	400	80	30	45	M24	-
80	490	250	270	85	77	M80X2	67	160	50	170	-	150	400	80	30	45	M24	15
85	410	225	240	90	-	M85X2	62	150	48	160	18	135	340	80	25	35	M20	-
85	410	225	240	90	82	M85X2	62	150	48	160	-	135	340	80	25	35	M20	15
90	410	225	245	95	-	M90X2	61	150	48	160	17,5	135	340	80	25	35	M20	-
90	410	225	245	95	87	M90X2	61	150	48	160	-	135	340	80	25	35	M20	15
90	500	250	305	95	-	M90X2	72	165	55	175	18	175	420	80	30	45	M24	-
90	500	250	305	95	87	M90X2	72	165	55	175	-	175	420	80	30	45	M24	15
95	490	250	270	100	-	M95X2	67	160	50	170	18	150	400	80	30	45	M24	-
95	490	250	270	100	92	M95X2	67	160	50	170	-	150	400	80	30	45	M24	15
100	490	250	270	110	-	M100X2	60	160	50	170	20	150	400	80	30	45	M24	-
100	490	250	270	110	97	M100X2	60	160	50	170	-	150	400	80	30	45	M24	15
100	550	250	320	106	-	M100X2	72	165	55	175	18	175	440	80	36	50	M30	-
100	550	250	320	106	97	M100X2	72	165	55	175	-	175	440	80	36	50	M30	15
110	510	250	300	116	-	M110X2	70	165	50	175	18	165	420	80	30	45	M24	-
110	510	250	300	116	107	M110X2	70	165	50	175	-	165	420	80	30	45	M24	15
110	570	270	335	120	-	M110X2	77	180	65	190	20	180	460	95	36	50	M30	-
110	570	270	335	120	107	M110X2	77	180	65	190	-	180	460	95	36	50	M30	15
120	550	250	320	126	-	M120X2	72	165	55	175	18	175	440	80	36	50	M30	-
120	550	250	320	126	117	M120X2	72	165	55	175	-	175	440	80	36	50	M30	15
120	660	300	390	126	-	M120X2	90	200	75	210	18	220	530	110	42	60	M36	-
120	660	300	390	126	117	M120X2	90	200	75	210	-	220	530	110	42	60	M36	15
130	570	260	345	136	-	M130X2	77	175	65	185	18	190	460	90	36	50	M30	-
130	570	260	345	136	127	M130X2	77	175	65	185	-	190	460	90	36	50	M30	15
130	660	315	420	140	-	M130X2	86	200	80	220	18	235	530	110	42	60	M36	-
130	660	315	420	140	127	M130X2	86	200	80	220	-	235	530	110	42	60	M36	15

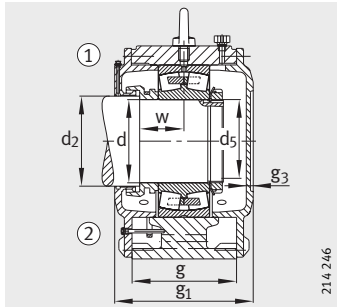


Plummer block housings

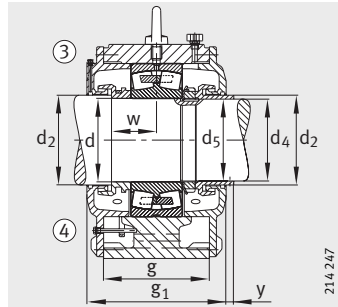
LOE, split
For spherical roller bearings with cylindrical bore



Dimension table (continued) · Dimensions in mm					Oil quantity	Oil level	Mass
Designation					Initial filling	Height	m
Housing		Bearing	Shaft nut	Retaining plate	l	x mm	Housing ≈kg
Locating bearings	Non-locating bearings						
LOE228-N-AF-L	LOE228-N-AL-L	22228-E1	KM28	MB28	3,7	55– 70	100
LOE228-N-BF-L	LOE228-N-BL-L	22228-E1	KM28	MB28	3,7	55– 70	100
LOE328-N-AF-L	LOE328-N-AL-L	22328-E1	KM28	MB28	6,7	80–110	170
LOE328-N-BF-L	LOE328-N-BL-L	22328-E1	KM28	MB28	6,7	80–110	170
LOE230-N-AF-L	LOE230-N-AL-L	22230-E1	KM30	MB30	4,2	65– 90	125
LOE230-N-BF-L	LOE230-N-BL-L	22230-E1	KM30	MB30	4,2	65– 90	125
LOE330-N-AF-L	LOE330-N-AL-L	22330-E1	KM30	MB30	6,2	75–110	200
LOE330-N-BF-L	LOE330-N-BL-L	22330-E1	KM30	MB30	6,2	75–110	200
LOE232-N-AF-L	LOE232-N-AL-L	22232-E1	KM32	MB32	4,7	60– 80	136
LOE232-N-BF-L	LOE232-N-BL-L	22232-E1	KM32	MB32	4,7	60– 80	136
LOE332-N-AF-L	LOE332-N-AL-L	22332-MB	KM32	MB32	7	80–105	240
LOE332-N-BF-L	LOE332-N-BL-L	22332-MB	KM32	MB32	7	80–105	240
LOE234-N-AF-L	LOE234-N-AL-L	22234-E1	KM34	MB34	6	90–105	160
LOE234-N-BF-L	LOE234-N-BL-L	22234-E1	KM34	MB34	6	90–105	160
LOE334-N-AF-L	LOE334-N-AL-L	22334-MB	KM34	MB34	7,2	80–105	270
LOE334-N-BF-L	LOE334-N-BL-L	22334-MB	KM34	MB34	7,2	80–105	270
LOE236-N-AF-L	LOE236-N-AL-L	22236-E1	KM36	MB36	6	75–110	200
LOE236-N-BF-L	LOE236-N-BL-L	22236-E1	KM36	MB36	6	75–110	200
LOE336-N-AF-L	LOE336-N-AL-L	22336-MB	KM36	MB36	7,4	80–105	330
LOE336-N-BF-L	LOE336-N-BL-L	22336-MB	KM36	MB36	7,4	80–105	330
LOE238-N-AF-L	LOE238-N-AL-L	22238-MB	KM38	MB38	7,2	70–100	230
LOE238-N-BF-L	LOE238-N-BL-L	22238-MB	KM38	MB38	7,2	70–100	230
LOE240-N-AF-L	LOE240-N-AL-L	22240-B-MB	KM40	MB40	7,2	75–100	250
LOE240-N-BF-L	LOE240-N-BL-L	22240-B-MB	KM40	MB40	7,2	75–100	250
LOE244-N-AF-L	LOE244-N-AL-L	22244-B-MB	HM44T	MB44	8,2	80–110	310
LOE244-N-BF-L	LOE244-N-BL-L	22244-B-MB	HM44T	MB44	8,2	80–110	310
LOE248-N-AF-L	LOE248-N-AL-L	22248-B-MB	HM48T	MB48	8,4	100–125	385
LOE248-N-BF-L	LOE248-N-BL-L	22248-B-MB	HM48T	MB48	8,4	100–125	385



Design A
 ① Locating bearing AF
 ② Non-locating bearing AL



Design B
 ③ Locating bearing BF
 ④ Non-locating bearing BL

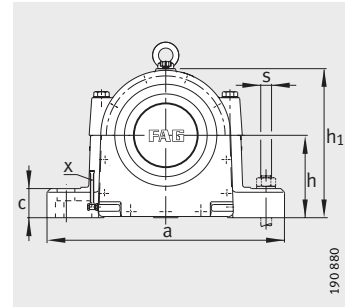
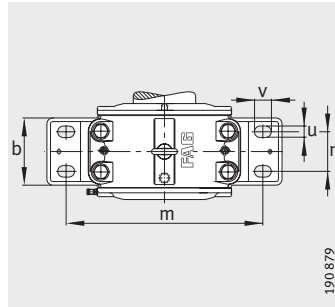
Dimensions

d	a	g ₁	h ₁	d ₂	d ₄	d ₅	w	b	c	g	g ₃	h	m	n	u	v	s	y
140	570	260	355	150	–	M140X2	73	175	65	180	18	190	460	100	36	50	M30	–
140	570	260	355	150	137	M140X2	73	175	65	180	–	190	460	100	36	50	M30	22
140	710	325	450	146	–	M140X2	95	220	85	230	19,5	260	580	125	42	60	M36	–
140	710	325	450	146	137	M140X2	95	220	85	230	–	260	580	125	42	60	M36	15
150	660	275	395	156	–	M150X2	82	190	70	200	18	220	530	100	42	60	M36	–
150	660	275	395	156	147	M150X2	82	190	70	200	–	220	530	100	42	60	M36	15
150	760	335	465	160	–	M150X2	95	200	85	240	18	265	630	125	42	60	M36	–
150	760	335	465	160	147	M150X2	95	200	85	240	–	265	630	125	42	60	M36	15
160	660	290	400	170	–	M160X3	80	200	70	210	20	220	530	110	42	60	M36	–
160	660	290	400	170	155	M160X3	80	200	70	210	–	220	530	110	42	60	M36	22
160	820	350	485	166	–	M160X3	100	240	90	250	20	270	670	130	48	70	M42	–
160	820	350	485	166	155	M160X3	100	240	90	250	–	270	670	130	48	70	M42	15
170	710	300	460	176	–	M170X3	90	200	85	210	18	260	580	110	42	60	M36	–
170	710	300	460	176	165	M170X3	90	200	85	210	–	260	580	110	42	60	M36	15
170	830	350	510	180	–	M170X3	105	240	90	255	18	280	670	130	48	70	M42	–
170	830	350	510	180	165	M170X3	105	240	90	255	–	280	670	130	48	70	M42	15
180	710	300	465	190	–	M180X3	90	200	85	210	20	260	580	110	42	60	M36	–
180	710	300	465	190	175	M180X3	90	200	85	210	–	260	580	110	42	60	M36	22
180	840	360	530	190	–	M180X3	108	240	90	260	20	290	680	130	48	70	M42	–
180	840	360	530	190	175	M180X3	108	240	90	260	–	290	680	130	48	70	M42	15
190	820	350	485	196	–	M190X3	95	240	90	250	20	270	670	130	48	70	M42	–
190	820	350	485	196	185	M190X3	95	240	90	250	–	270	670	130	48	70	M42	15
200	830	344	510	210	–	M200X3	100	240	90	260	20	280	670	130	48	70	M42	–
200	830	344	510	210	195	M200X3	100	240	90	260	–	280	670	130	48	70	M42	15
220	880	380	565	230	–	Tr220X4	108	240	105	280	20	310	720	130	48	70	M42	–
220	880	380	565	230	212	Tr220X4	108	240	105	280	–	310	720	130	48	70	M42	15
240	980	400	615	260	–	Tr240X4	120	280	120	300	20	340	820	165	48	70	M42	–
240	980	400	615	260	235	Tr240X4	120	280	120	300	–	340	820	165	48	70	M42	22

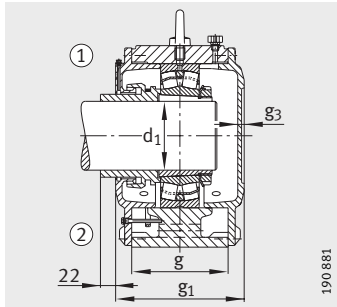


Plummer block housings

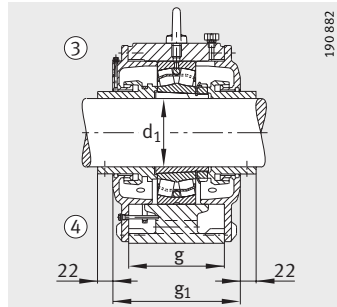
LOE, split
For spherical roller bearings with tapered bore and adapter sleeve



Dimension table · Dimensions in mm				Oil quantity	Oil level	Mass
Designation				Initial filling l	Height x mm	m Housing ≈kg
Housing	Bearing	Adapter sleeve				
Locating bearings	Non-locating bearings					
LOE614-N-AF-L	LOE614-N-AL-L	22314-E1-K	H2314	1,4	50– 65	45
LOE614-N-BF-L	LOE614-N-BL-L	22314-E1-K	H2314	1,4	50– 65	45
LOE616-N-AF-L	LOE616-N-AL-L	22316-E1-K	H2316	1,6	55– 70	60
LOE616-N-BF-L	LOE616-N-BL-L	22316-E1-K	H2316	1,6	55– 70	60
LOE517-N-AF-L	LOE517-N-AL-L	22217-E1-K	H317	1,4	50– 65	45
LOE517-N-BF-L	LOE517-N-BL-L	22217-E1-K	H317	1,4	50– 65	45
LOE518-N-AF-L	LOE518-N-AL-L	22218-E1-K	H318	1,5	45– 60	47
LOE518-N-BF-L	LOE518-N-BL-L	22218-E1-K	H318	1,5	45– 60	47
LOE618-N-AF-L	LOE618-N-AL-L	22318-E1-K	H2318	2,3	65– 85	73
LOE618-N-BF-L	LOE618-N-BL-L	22318-E1-K	H2318	2,3	65– 85	73
LOE519-N-AF-L	LOE519-N-AL-L	22219-E1-K	H319	1,6	55– 70	60
LOE519-N-BF-L	LOE519-N-BL-L	22219-E1-K	H319	1,6	55– 70	60
LOE520-N-AF-L	LOE520-N-AL-L	22220-E1-K	H320	1,7	50– 65	67
LOE520-N-BF-L	LOE520-N-BL-L	22220-E1-K	H320	1,7	50– 65	67
LOE620-N-AF-L	LOE620-N-AL-L	22320-E1-K	H2320	2,4	55– 75	81
LOE620-N-BF-L	LOE620-N-BL-L	22320-E1-K	H2320	2,4	55– 75	81
LOE522-N-AF-L	LOE522-N-AL-L	22222-E1-K	H322	2,1	50– 70	74
LOE522-N-BF-L	LOE522-N-BL-L	22222-E1-K	H322	2,1	50– 70	74
LOE622-N-AF-L	LOE622-N-AL-L	22322-E1-K	H2322	2,4	45– 65	100
LOE622-N-BF-L	LOE622-N-BL-L	22322-E1-K	H2322	2,4	45– 65	100
LOE524-N-AF-L	LOE524-N-AL-L	22224-E1-K	H3124	2,3	50– 70	80
LOE524-N-BF-L	LOE524-N-BL-L	22224-E1-K	H3124	2,3	50– 70	80
LOE624-N-AF-L	LOE624-N-AL-L	22324-E1-K	H2324	4,2	65– 90	130
LOE624-N-BF-L	LOE624-N-BL-L	22324-E1-K	H2324	4,2	65– 90	130
LOE526-N-AF-L	LOE526-N-AL-L	22226-E1-K	H3126	2,3	55– 75	93
LOE526-N-BF-L	LOE526-N-BL-L	22226-E1-K	H3126	2,3	55– 75	93
LOE626-N-AF-L	LOE626-N-AL-L	22326-E1-K	H2326	3,7	75–105	142
LOE626-N-BF-L	LOE626-N-BL-L	22326-E1-K	H2326	3,7	75–105	142
LOE528-N-AF-L	LOE528-N-AL-L	22228-E1-K	H3128	3,7	55– 75	100
LOE528-N-BF-L	LOE528-N-BL-L	22228-E1-K	H3128	3,7	55– 75	100
LOE628-N-AF-L	LOE628-N-AL-L	22328-E1-K	H2328	6,7	80–110	170
LOE628-N-BF-L	LOE628-N-BL-L	22328-E1-K	H2328	6,7	80–110	170



Design A
 ① Locating bearing AF
 ② Non-locating bearing AL



Design B
 ③ Locating bearing BF
 ④ Non-locating bearing BL

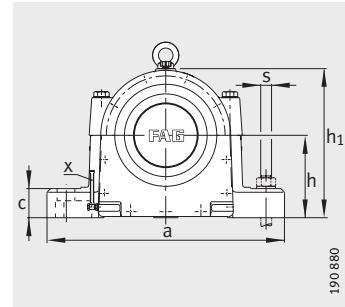
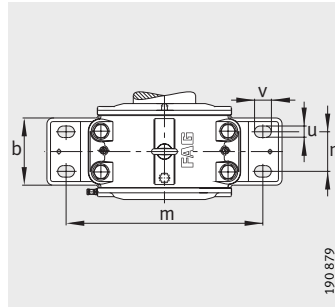
Dimensions

d_1	a	g_1	h_1	b	c	g	g_3	h	m	n	u	v	s
60	410	225	240	150	48	160	18	135	340	80	25	35	M20
60	410	225	240	150	48	160	-	135	340	80	25	35	M20
70	490	250	270	160	50	170	18	150	400	80	30	45	M24
70	490	250	270	160	50	170	-	150	400	80	30	45	M24
75	410	225	240	150	48	160	18	135	340	80	25	35	M20
75	410	225	240	150	48	160	-	135	340	80	25	35	M20
80	410	225	245	150	48	160	17,5	135	340	80	25	35	M20
80	410	225	245	150	48	160	-	135	340	80	25	35	M20
80	500	250	305	165	55	175	18	175	420	80	30	45	M24
80	500	250	305	165	55	175	-	175	420	80	30	45	M24
85	490	250	270	160	50	170	18	150	400	80	30	45	M24
85	490	250	270	160	50	170	-	150	400	80	30	45	M24
90	490	250	270	160	50	170	20	150	400	80	30	45	M24
90	490	250	270	160	50	170	-	150	400	80	30	45	M24
90	550	250	320	165	55	175	18	175	440	80	36	50	M30
90	550	250	320	165	55	175	-	175	440	80	36	50	M30
100	510	250	300	165	50	175	18	165	420	80	30	45	M24
100	510	250	300	165	50	175	-	165	420	80	30	45	M24
100	570	270	335	180	65	190	20	180	460	95	36	50	M30
100	570	270	335	180	65	190	-	180	460	95	36	50	M30
110	550	250	320	165	55	175	18	175	440	80	36	50	M30
110	550	250	320	165	55	175	-	175	440	80	36	50	M30
110	660	300	390	200	75	210	18	220	530	110	42	60	M36
110	660	300	390	200	75	210	-	220	530	110	42	60	M36
115	570	260	345	175	65	185	18	190	460	90	36	50	M30
115	570	260	345	175	65	185	-	190	460	90	36	50	M30
115	660	315	420	200	80	220	18	235	530	110	42	60	M36
115	660	315	420	200	80	220	-	235	530	110	42	60	M36
125	570	260	355	175	65	180	18	190	460	100	36	50	M30
125	570	260	355	175	65	180	-	190	460	100	36	50	M30
125	710	325	450	220	85	230	19,5	260	580	125	42	60	M36
125	710	325	450	220	85	230	-	260	580	125	42	60	M36

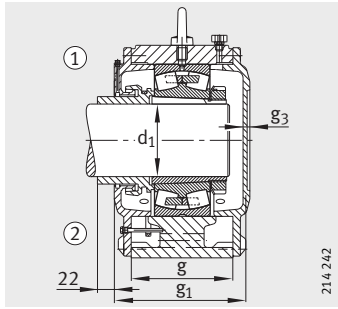


Plummer block housings

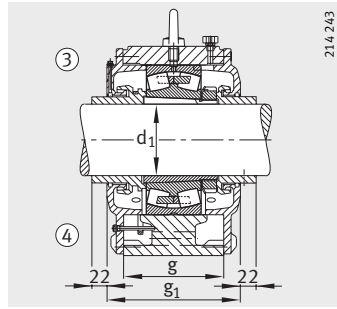
LOE, split
For spherical roller bearings with tapered bore and adapter sleeve



Dimension table (continued) · Dimensions in mm				Oil quantity	Oil level	Mass
Designation				Initial filling	Height x mm	m Housing ≈kg
Housing	Bearing	Adapter sleeve				
Locating bearings	Non-locating bearings			l		
LOE530-N-AF-L	LOE530-N-AL-L	22230-E1-K	H3130	4,2	65– 90	125
LOE530-N-BF-L	LOE530-N-BL-L	22230-E1-K	H3130	4,2	65– 90	125
LOE630-N-AF-L	LOE630-N-AL-L	22330-E1-K	H2330	6,2	75–110	200
LOE630-N-BF-L	LOE630-N-BL-L	22330-E1-K	H2330	6,2	75–110	200
LOE532-N-AF-L	LOE532-N-AL-L	22232-E1-K	H3132	4,7	60– 80	135
LOE532-N-BF-L	LOE532-N-BL-L	22232-E1-K	H3132	4,7	60– 80	135
LOE632-N-AF-L	LOE632-N-AL-L	22332-K-MB	H2332	7	80–105	240
LOE632-N-BF-L	LOE632-N-BL-L	22332-K-MB	H2332	7	80–105	240
LOE534-N-AF-L	LOE534-N-AL-L	22234-E1-K	H3134	6	90–105	160
LOE534-N-BF-L	LOE534-N-BL-L	22234-E1-K	H3134	6	80–105	160
LOE634-N-AF-L	LOE634-N-AL-L	22334-K-MB	H2334	7,2	80–105	270
LOE634-N-BF-L	LOE634-N-BL-L	22334-K-MB	H2334	7,2	80–105	270
LOE536-N-AF-L	LOE536-N-AL-L	22236-E1-K	H3136	6	75–110	200
LOE536-N-BF-L	LOE536-N-BL-L	22236-E1-K	H3136	6	75–110	200
LOE636-N-AF-L	LOE636-N-AL-L	22336-K-MB	H2336	7,4	80–105	330
LOE636-N-BF-L	LOE636-N-BL-L	22336-K-MB	H2336	7,4	80–105	330
LOE538-N-AF-L	LOE538-N-AL-L	22238-K-MB	H3138	7,2	70–100	230
LOE538-N-BF-L	LOE538-N-BL-L	22238-K-MB	H3138	7,2	70–100	230
LOE540-N-AF-L	LOE540-N-AL-L	22240-B-K-MB	H3140	7,2	75–100	250
LOE540-N-BF-L	LOE540-N-BL-L	22240-B-K-MB	H3140	7,2	75–100	250
LOE544-N-AF-L	LOE544-N-AL-L	22244-B-K-MB	H3144X	8,2	80–110	310
LOE544-N-BF-L	LOE544-N-BL-L	22244-B-K-MB	H3144X	8,2	80–110	310
LOE548-N-AF-L	LOE548-N-AL-L	22248-B-K-MB	H3148X	8,4	100–120	385
LOE548-N-BF-L	LOE548-N-BL-L	22248-B-K-MB	H3148X	8,4	100–120	385



Design A
 ① Locating bearing AF
 ② Non-locating bearing AL



Design B
 ③ Locating bearing BF
 ④ Non-locating bearing BL

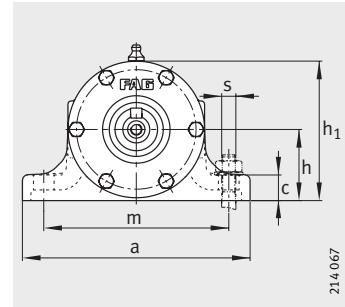
Dimensions

d_1	a	g_1	h_1	b	c	g	g_3	h	m	n	u	v	s
135	660	275	395	190	70	200	18	220	530	100	42	60	M36
135	660	275	395	190	70	200	–	220	530	100	42	60	M36
135	760	335	465	200	85	240	18	265	630	125	42	60	M36
135	760	335	465	200	85	240	–	265	630	125	42	60	M36
140	660	290	400	200	70	210	20	220	530	110	42	60	M36
140	660	290	400	200	70	210	–	220	530	110	42	60	M36
140	820	350	485	240	90	250	20	270	670	130	48	70	M42
140	820	350	485	240	90	250	–	270	670	130	48	70	M42
150	710	300	460	200	85	210	18	260	580	110	42	60	M36
150	710	300	460	200	85	210	–	260	580	110	42	60	M36
150	830	350	510	240	90	255	18	280	670	130	48	70	M42
150	830	350	510	240	90	255	–	280	670	130	48	70	M42
160	710	300	465	200	85	210	20	260	580	110	42	60	M36
160	710	300	465	200	85	210	–	260	580	110	42	60	M36
160	840	360	530	240	90	260	20	290	680	130	48	70	M42
160	840	360	530	240	90	260	–	290	680	130	48	70	M42
170	820	350	485	240	90	250	20	270	670	130	48	70	M42
170	820	350	485	240	90	250	–	270	670	130	48	70	M42
180	830	344	510	240	90	260	20	280	670	130	48	70	M42
180	830	344	510	240	90	260	–	280	670	130	48	70	M42
200	880	380	565	240	105	280	20	310	720	130	48	70	M42
200	880	380	565	240	105	280	–	310	720	130	48	70	M42
220	980	400	625	280	120	300	20	340	820	165	48	70	M42
220	980	400	625	280	120	300	–	340	820	165	48	70	M42



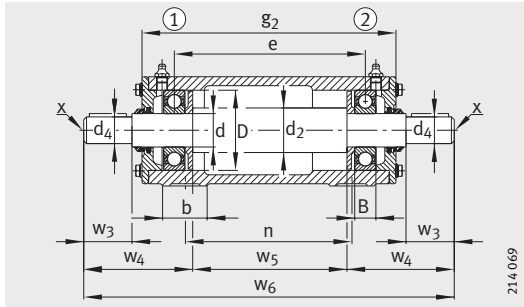
Plummer block housing units

VRE3, unsplit
With bearings and shaft

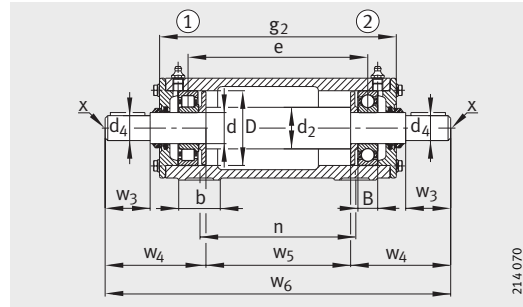


Cross-sections of designs C, D, page 1295, designs E, F, page 1297

Dimension table · Dimensions in mm									
Designation					Mass m		Dimensions		
Bearing unit	Bearing ①	Bearing ②	Housing	Shaft Complete	Housing ≈kg	Unit ≈kg	d	D	B
VRE305-A	6305-C3	6305-C3	VR305-A	VRW305-A	5	7	25	62	17
VRE305-B	NJ305-E-TVP2	6305-C3	VR305-A	VRW305-A	5	7	25	62	17
VRE305-C	NU305-E-TVP2-C3	2X7305-B-TVP-UA	VR305-C	VRW305-C	5,2	7,4	25	62	17
VRE305-D	NU305-E-TVP2-C3	6305-C3	VR305-D	VRW305-D	5,2	7,2	25	62	17
VRE305-E	NU305-E-TVP2-C3	NU305-E-TVP2-C3 + 6305-C3	VR305-E	VRW305-C	5,2	7,5	25	62	17
VRE305-F	6305-C3	6305-C3	VR305-F	VRW305-F	5	7	25	62	17
VRE306-A	6306-C3	6306-C3	VR306-A	VRW306-A	5,8	9	30	72	19
VRE306-B	NJ306-E-TVP2	6306-C3	VR306-A	VRW306-A	5,8	9	30	72	19
VRE306-C	NU306-E-TVP2-C3	2X7306-B-TVP-UA	VR306-C	VRW306-C	6	9,4	30	72	19
VRE306-D	NU306-E-TVP2-C3	6306-C3	VR306-D	VRW306-D	6	9,2	30	72	19
VRE306-E	NU306-E-TVP2-C3	NU306-E-TVP2-C3 + 6306-C3	VR306-E	VRW306-C	6	9,4	30	72	19
VRE306-F	6306-C3	6306-C3	VR306-F	VRW306-F	5,8	9	30	72	19
VRE307-A	6307-C3	6307-C3	VR307-A	VRW307-A	8,5	13	35	80	21
VRE307-B	NJ307-E-TVP2	6307-C3	VR307-A	VRW307-A	8,5	13	35	80	21
VRE307-C	NU307-E-TVP2-C3	2X7307-B-TVP-UA	VR307-C	VRW307-C	8,8	13,6	35	80	21
VRE307-D	NU307-E-TVP2-C3	6307-C3	VR307-D	VRW307-D	8,8	13,3	35	80	21
VRE307-E	NU307-E-TVP2-C3	NU307-E-TVP2-C3 + 6307-C3	VR307-E	VRW307-C	8,8	13,6	35	80	21
VRE307-F	6307-C3	6307-C3	VR307-F	VRW307-F	8,5	13	35	80	21
VRE308-A	6308-C3	6308-C3	VR308-A	VRW308-A	10,9	18	40	90	23
VRE308-B	NJ308-E-TVP2	6308-C3	VR308-A	VRW308-A	10,9	18	40	90	23
VRE308-C	NU308-E-TVP2-C3	2X7308-B-TVP-UA	VR308-C	VRW308-C	11,7	19,1	40	90	23
VRE308-D	NU308-E-TVP2-C3	6308-C3	VR308-D	VRW308-D	11,7	18,8	40	90	23
VRE308-E	NU308-E-TVP2-C3	NU308-E-TVP2-C3 + 6308-C3	VR308-E	VRW308-C	11,7	19,2	40	90	23
VRE308-F	6308-C3	6308-C3	VR308-F	VRW308-F	10,9	18	40	90	23
VRE309-A	6309-C3	6309-C3	VR309-A	VRW309-A	14,9	24,3	45	100	25
VRE309-B	NJ309-E-TVP2	6309-C3	VR309-A	VRW309-A	14,9	24,4	45	100	25
VRE309-C	NU309-E-TVP2-C3	2X7309-B-TVP-UA	VR309-C	VRW309-C	15,3	25,3	45	100	25
VRE309-D	NU309-E-TVP2-C3	6309-C3	VR309-D	VRW309-D	15,3	24,8	45	100	25
VRE309-E	NU309-E-TVP2-C3	NU309-E-TVP2-C3 + 6309-C3	VR309-E	VRW309-C	15,3	25,3	45	100	25
VRE309-F	6309-C3	6309-C3	VR309-F	VRW309-F	14,9	24,2	45	100	25



VRE3..-A



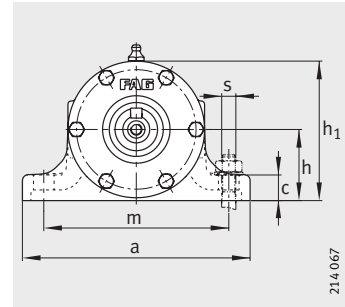
VRE..-B

a	g ₂	h ₁	d ₂	d ₄	w ₂	w ₃	w ₄	w ₅	w ₆	w ₇	e	b	n	m	c	h	s
155	198	87	35	19	-	40	90,5	117	298	-	148	35	135	120	16	45	M12
155	198	87	35	19	-	40	90,5	117	298	-	149	35	135	120	16	45	M12
155	198	87	35	19	40	42	90	101	298	107	140,5	35	135	120	16	45	M12
155	198	87	35	19	40	42	90	118	298	-	149	35	135	120	16	45	M12
155	198	87	35	19	40	42	90	101	298	107	132	35	135	120	16	45	M12
155	198	87	35	19	-	40	91,25	116,25	298	90,5	147,25	35	135	120	16	45	M12
160	225	98	40	24	-	50	102,5	140	345	-	173	40	150	130	18	50	M12
160	225	98	40	24	-	50	102,5	140	345	-	174	40	150	130	18	50	M12
160	225	98	40	24	50	52	104	122	349	123	164,5	40	150	130	18	50	M12
160	225	98	40	24	50	52	104	141	349	-	174	40	150	130	18	50	M12
160	225	98	40	24	50	52	104	122	349	123	155	40	150	130	18	50	M12
160	225	98	40	24	-	50	103,25	139,25	345	102,5	172,25	40	150	130	18	50	M12
190	255	113	45	28	-	60	117,5	160	395	-	197	45	175	150	18	60	M12
190	255	113	45	28	-	60	117,5	160	395	-	198	45	175	150	18	60	M12
190	255	113	45	28	60	62	119	140	399	140	187,5	45	175	150	18	60	M12
190	255	113	45	28	60	62	119	161	399	-	198	45	175	150	18	60	M12
190	255	113	45	28	60	62	119	140	399	140	177	45	175	150	18	60	M12
190	255	113	45	28	-	60	118,5	159	395	117,5	196	45	175	150	18	60	M12
190	317	118	50	32	-	80	143,5	214	501	-	257	52	225	150	20	60	M12
190	317	118	50	32	-	80	143,5	214	501	-	258	52	225	150	20	60	M12
190	317	118	50	32	80	82	143	192	501	166	246,5	52	225	150	20	60	M12
190	317	118	50	32	80	82	143	215	501	-	258	52	225	150	20	60	M12
190	317	118	50	32	80	82	143	192	501	166	235	52	225	150	20	60	M12
190	317	118	50	32	-	80	144,5	213	501	143,5	256	52	225	150	20	60	M12
210	343	135	55	38	-	80	145,5	236	527	-	281	52	250	170	22	70	M12
210	343	135	55	38	-	80	145,5	236	527	-	282	52	250	170	22	70	M12
210	343	135	55	38	80	82	145	212	527	170	269,5	52	250	170	22	70	M12
210	343	135	55	38	80	82	145	237	527	-	282	52	250	170	22	70	M12
210	343	135	55	38	80	82	145	212	527	170	257	52	250	170	22	70	M12
210	343	135	55	38	-	80	146,5	235	527	145,5	280	52	250	170	22	70	M12



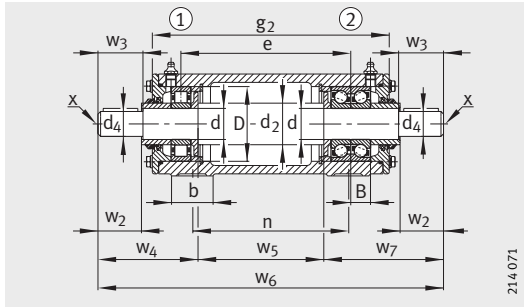
Plummer block housing units

VRE3, unsplit
With bearings and shaft

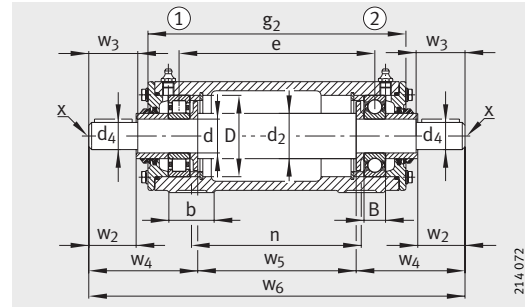


Cross-sections of
designs A, B, page 1293,
designs E, F, page 1297

Dimension table (continued) · Dimensions in mm									
Designation					Mass m		Dimensions		
Bearing unit	Bearing ①	Bearing ②	Housing	Shaft Complete	Housing ≈kg	Unit ≈kg	d	D	B
VRE310-A	6310-C3	6310-C3	VR310-A	VRW310-A	17,3	30,3	50	110	27
VRE310-B	NJ310-E-TVP2	6310-C3	VR310-A	VRW310-A	17,3	30,3	50	110	27
VRE310-C	NU310-E-TVP2-C3	2X7310-B-TVP-UA	VR310-C	VRW310-C	17,9	31,7	50	110	27
VRE310-D	NU310E-TVP2-C3	6310-C3	VR310-D	VRW310-D	17,9	30,9	50	110	27
VRE310-E	NU310-E-TVP2-C3	NU310-E-TVP2-C3 + 6310-C3	VR310-E	VRW310-C	17,9	31,8	50	110	27
VRE310-F	6310-C3	6310-C3	VR310-F	VRW310-F	17,3	30,3	50	110	27
VRE311-A	6311-C3	6311-C3	VR311-A	VRW311-A	22	38,6	55	120	29
VRE311-B	NJ311-E-TVP2	6311-C3	VR311-A	VRW311-A	22	38,7	55	120	29
VRE311-C	NU311-E-TVP2-C3	2X7311-B-TVP-UA	VR311-C	VRW311-C	22,5	40,2	55	120	29
VRE311-D	NU311-E-TVP2-C3	6311-C3	VR311-D	VRW311-D	22,5	39,2	55	120	29
VRE311-E	NU311-E-TVP2-C3	NU311-E-TVP2-C3 + 6311-C3	VR311-E	VRW311-C	22,5	40,2	55	120	29
VRE311-F	6311-C3	6311-C3	VR311-F	VRW311-F	22	38,6	55	120	29
VRE312-A	6312-C3	6312-C3	VR312-A	VRW312-A	30,7	51,2	60	130	31
VRE312-B	NJ312-E-TVP2	6312-C3	VR312-A	VRW312-A	30,7	51,4	60	130	31
VRE312-C	NU312-E-TVP2-C3	2X7312-B-TVP-UA	VR312-C	VRW312-C	31,7	53,8	60	130	31
VRE312-D	NU312-E-TVP2-C3	6312-C3	VR312-D	VRW312-D	31,7	52,4	60	130	31
VRE312-E	NU312-E-TVP2-C3	NU312-E-TVP2-C3 + 6312-C3	VR312-E	VRW312-C	31,7	53,7	60	130	31
VRE312-F	6312-C3	6312-C3	VR312-F	VRW312-F	30,7	51,1	60	130	31
VRE313-A	6313-C3	6313-C3	VR313-A	VRW313-A	32,8	58	65	140	33
VRE313-B	NJ313-E-TVP2	6313-C3	VR313-A	VRW313-A	32,8	58,2	65	140	33
VRE313-C	NU313-E-TVP2-C3	2X7313-B-TVP-UA	VR313-C	VRW313-C	33,8	60,8	65	140	33
VRE313-D	NU313-E-TVP2-C3	6313-C3	VR313-D	VRW313-D	33,8	59,3	65	140	33
VRE313-E	NU313-E-TVP2-C3	NU313-E-TVP2-C3 + 6313-C3	VR313-E	VRW313-C	33,8	60,8	65	140	33
VRE313-F	6313-C3	6313-C3	VR313-F	VRW313-F	32,8	58	65	140	33
VRE314-A	6314-C3	6314-C3	VR314-A	VRW314-A	35	66,9	70	150	35
VRE314-B	NJ314-E-TVP2	6314-C3	VR314-A	VRW314-A	35	67,1	70	150	35
VRE314-C	NU314-E-TVP2-C3	2X7314-B-TVP-UA	VR314-C	VRW314-C	36	70,4	70	150	35
VRE314-D	NU314-E-TVP2-C3	6314-C3	VR314-D	VRW314-D	36	68	70	150	35
VRE314-E	NU314-E-TVP2-C3	NU314-E-TVP2-C3 + 6314-C3	VR314-E	VRW314-C	36	70,6	70	150	35
VRE314-F	6314-C3	6314-C3	VR314-F	VRW314-F	35	66,8	70	150	35



VRE3..-C



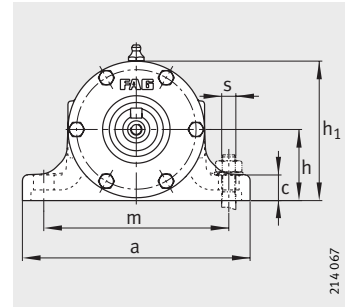
VRE3..-D

a	g ₂	h ₁	d ₂	d ₄	w ₂	w ₃	w ₄	w ₅	w ₆	w ₇	e	b	n	m	c	h	s
210	381	138	60	42	-	110	179,5	266	625	-	313	60	275	170	25	70	M12
210	381	138	60	42	-	110	179,5	266	625	-	314	60	275	170	25	70	M12
210	381	138	60	42	110	112	179	240	625	206	300,5	60	275	170	25	70	M12
210	381	138	60	42	110	112	179	267	625	-	314	60	275	170	25	70	M12
210	381	138	60	42	110	112	179	240	625	206	287	60	275	170	25	70	M12
210	381	138	60	42	-	110	180,5	265	625	179,5	312	60	275	170	25	70	M12
260	407	158	65	48	-	110	181,5	288	651	-	337	60	300	210	25	80	M16
260	407	158	65	48	-	110	181,5	288	651	-	338	60	300	210	25	80	M16
260	407	158	65	48	110	112	181	260	651	210	323,5	60	300	210	25	80	M16
260	407	158	65	48	110	112	181	289	651	-	338	60	300	210	25	80	M16
260	407	158	65	48	110	112	181	260	651	210	309	60	300	210	25	80	M16
260	407	158	65	48	-	110	182,5	287	651	181,5	336	60	300	210	25	80	M16
260	457	162	70	48	-	110	183,5	334	701	-	385	70	340	210	25	80	M16
260	457	162	70	48	-	110	183,5	334	701	-	386	70	340	210	25	80	M16
260	457	162	70	48	110	112	185,5	304	706	216,5	370,5	70	340	210	25	80	M16
260	457	162	70	48	110	112	185,5	335	706	-	386	70	340	210	25	80	M16
260	457	162	70	48	110	112	185,5	304	706	216,5	355	70	340	210	25	80	M16
260	457	162	70	48	-	110	184,5	333	701	183,5	384	70	340	210	25	80	M16
290	480	183	75	55	-	110	187,5	349	724	-	404	70	360	230	25	95	M16
290	480	183	75	55	-	110	187,5	349	724	-	405	70	360	230	25	95	M16
290	480	183	75	55	110	112	189,5	317	729	222,5	388,5	70	360	230	25	95	M16
290	480	183	75	55	110	112	189,5	350	729	-	405	70	360	230	25	95	M16
290	480	183	75	55	110	112	189,5	317	729	222,5	372	70	360	230	25	95	M16
290	480	183	75	55	-	110	189	347,5	724	187,5	402,5	70	360	230	25	95	M16
290	500	188	80	60	-	140	223	365	811	-	422	70	380	230	25	95	M16
290	500	188	80	60	-	140	223	365	811	-	423	70	380	230	25	95	M16
290	500	188	80	60	140	143	222,5	331	811	257,5	405,5	70	380	230	25	95	M16
290	500	188	80	60	140	143	222,5	366	811	-	423	70	380	230	25	95	M16
290	500	188	80	60	140	143	222,5	331	811	257,5	388	70	380	230	25	95	M16
290	500	188	80	60	-	140	224,5	363,5	811	223	420,5	70	380	230	25	95	M16



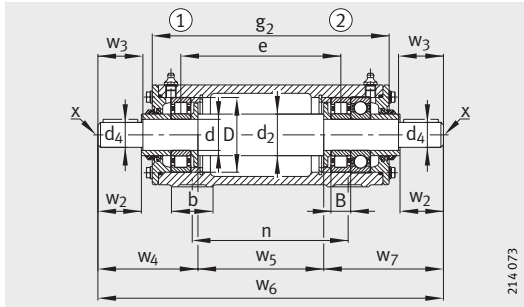
Plummer block housing units

VRE3, unsplit
With bearings and shaft

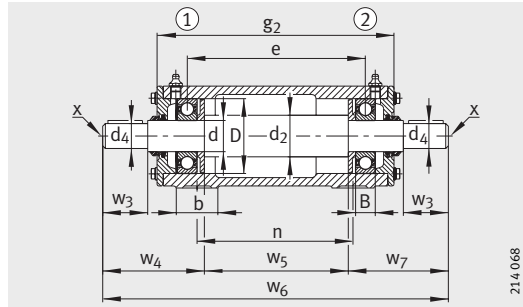


Cross-sections of designs A, B, page 1293, designs C, D, page 1295

Dimension table (continued) · Dimensions in mm									
Designation					Mass m		Dimensions		
Bearing unit	Bearing ①	Bearing ②	Housing	Shaft Complete	Housing ≈kg	Unit ≈kg	d	D	B
VRE315-A	6315-C3	6315-C3	VR315-A	VRW315-A	44,8	84,8	75	160	37
VRE315-B	NJ315-E-TVP2	6315-C3	VR315-A	VRW315-A	44,8	85	75	160	37
VRE315-C	NU315-E-TVP2-C3	2X7315-B-TVP-UA	VR315-C	VRW315-C	46,4	89,3	75	160	37
VRE315-D	NU315-E-TVP2-C3	6315-C3	VR315-D	VRW315-D	46,4	86,4	75	160	37
VRE315-E	NU315-E-TVP2-C3	NU315-E-TVP2-C3 + 6315-C3	VR315-E	VRW315-C	46,4	89,4	75	160	37
VRE315-F	6315-C3	6315-C3	VR315-F	VRW315-F	44,8	84,8	75	160	37
VRE316-A	6316-C3	6316-C3	VR316-A	VRW316-A	44	90,8	80	170	39
VRE316-B	NJ316-E-TVP2	6316-C3	VR316-A	VRW316-A	44	91	80	170	39
VRE316-C	NU316-E-TVP2-C3	2X7316-B-TVP-UA	VR316-C	VRW316-C	45	96,2	80	170	39
VRE316-D	NU316-E-TVP2-C3	6316-C3	VR316-D	VRW316-D	45	91,9	80	170	39
VRE316-E	NU316-E-TVP2-C3	NU316-E-TVP2-C3 + 6316-C3	VR316-E	VRW316-C	45	95,3	80	170	39
VRE316-F	6316-C3	6316-C3	VR316-F	VRW316-F	44	90,8	80	170	39
VRE317-A	6317-C3	6317-C3	VR317-A	VRW317-A	59,2	114	85	180	41
VRE317-B	NJ317-E-TVP2	6317-C3	VR317-A	VRW317-A	59,2	115	85	180	41
VRE317-C	NU317-E-TVP2-C3	2X7317-B-TVP-UA	VR317-C	VRW317-C	60	120	85	180	41
VRE317-D	NU317-E-TVP2-C3	6317-C3	VR317-D	VRW317-D	60	115	85	180	41
VRE317-E	NU317-E-TVP2-C3	NU317-E-TVP2-C3 + 6317-C3	VR317-E	VRW317-C	60	120	85	180	41
VRE318-A	6318-C3	6318-C3	VR318-A	VRW318-A	62	128	90	190	43
VRE318-B	NJ318-E-TVP2	6318-C3	VR318-A	VRW318-A	62	128	90	190	43
VRE318-C	NU318-E-TVP2-C3	2X7318-B-TVP-UA	VR318-C	VRW318-C	63	134	90	190	43
VRE318-D	NU318-E-TVP2-C3	6318-C3	VR318-D	VRW318-D	63	129	90	190	43
VRE318-E	NU318-E-TVP2-C3	NU318-E-TVP2-C3 + 6318-C3	VR318-E	VRW318-C	63	134	90	190	43
VRE319-A	6319-C3	6319-C3	VR319-A	VRW319-A	84,1	156	95	200	45
VRE319-B	NJ319-E-TVP2	6319-C3	VR319-A	VRW319-A	84,1	157	95	200	45
VRE319-C	NU319-E-TVP2-C3	2X7319-B-TVP-UA	VR319-C	VRW319-C	86	164	95	200	45
VRE319-D	NU319-E-TVP2-C3	6319-C3	VR319-D	VRW319-D	86	158	95	200	45
VRE319-E	NU319-E-TVP2-C3	NU319-E-TVP2-C3 + 6319-C3	VR319-E	VRW319-C	86	164	95	200	45
VRE320-A	6320-C3	6320-C3	VR320-A	VRW320-A	90	177	100	215	47
VRE320-B	NJ320-E-TVP2	6320-C3	VR320-A	VRW320-A	90	177	100	215	47
VRE320-C	NU320-E-TVP2-C3	2X7320-B-TVP-UA	VR320-C	VRW320-C	92	186	100	215	47
VRE320-D	NU320-E-TVP2-C3	6320-C3	VR320-D	VRW320-D	92	179	100	215	47
VRE320-E	NU320-E-TVP2-C3	NU320-E-TVP2-C3 + 6320-C3	VR320-E	VRW320-C	92	186	100	215	47



VRE3..-E



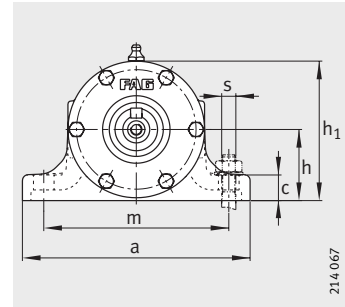
VRE3..-F

a	g ₂	h ₁	d ₂	d ₄	w ₂	w ₃	w ₄	w ₅	w ₆	w ₇	e	b	n	m	c	h	s
320	530	198	90	65	-	140	226	389	841	-	450	80	400	260	30	100	M16
320	530	198	90	65	-	140	226	389	841	-	451	80	400	260	30	100	M16
320	530	198	90	65	140	143	225,5	353	841	262,5	432,5	80	400	260	30	100	M16
320	530	198	90	65	140	143	225,5	390	841	-	451	80	400	260	30	100	M16
320	530	198	90	65	140	143	225,5	353	841	262,5	414	80	400	260	30	100	M16
320	530	198	90	65	-	140	227,5	387,5	841	226	448,5	80	400	260	30	100	M16
320	550	217	95	70	-	140	228	405	861	-	468	80	420	260	30	112	M16
320	550	217	95	70	-	140	228	405	861	-	469	80	420	260	30	112	M16
320	550	217	95	70	140	143	227,5	367	861	266,5	449,5	80	420	260	30	112	M16
320	550	217	95	70	140	143	227,5	406	861	-	469	80	420	260	30	112	M16
320	550	217	95	70	140	143	227,5	367	861	266,5	430	80	420	260	30	112	M16
320	550	217	95	70	-	140	229,5	403,5	861	228	466,5	80	420	260	30	112	M16
350	570	222	100	75	-	140	230	421	881	-	486	80	440	290	30	112	M16
350	570	222	100	75	-	140	230	421	881	-	487	80	440	290	30	112	M16
350	570	222	100	75	140	143	229,5	381	881	270,5	466,5	80	440	290	30	112	M16
350	570	222	100	75	140	143	229,5	422	881	-	487	80	440	290	30	112	M16
350	570	222	100	75	140	143	229,5	381	881	270,5	446	80	440	290	30	112	M16
350	600	227	105	80	-	170	263	445	971	-	510	85	460	290	30	112	M16
350	600	227	105	80	-	170	263	445	971	-	511	85	460	290	30	112	M16
350	600	227	105	80	170	173	264,5	403	975	307,5	489,5	85	460	290	30	112	M16
350	600	227	105	80	170	173	264,5	446	975	-	511	85	460	290	30	112	M16
350	600	227	105	80	170	173	264,5	403	975	307,5	468	85	460	290	30	112	M16
400	633	248	110	85	-	170	267,5	469	1004	-	540	90	480	320	35	125	M20
400	633	248	110	85	-	170	267,5	469	1004	-	541	90	480	320	35	125	M20
400	633	248	110	85	170	173	269	425	1008	314	518,5	90	480	320	35	125	M20
400	633	248	110	85	170	173	269	470	1008	-	541	90	480	320	35	125	M20
400	633	248	110	85	170	173	269	425	1008	314	496	90	480	320	35	125	M20
400	665	260	120	90	-	170	268	500	1036	-	570	95	500	320	40	130	M20
400	665	260	120	90	-	170	268	500	1036	-	571	95	500	320	40	130	M20
400	665	260	120	90	170	173	269,5	454	1040	316,5	547,5	95	500	320	40	130	M20
400	665	260	120	90	170	173	269,5	501	1040	-	571	95	500	320	40	130	M20
400	665	260	120	90	170	173	269,5	454	1040	316,5	524	95	500	320	40	130	M20



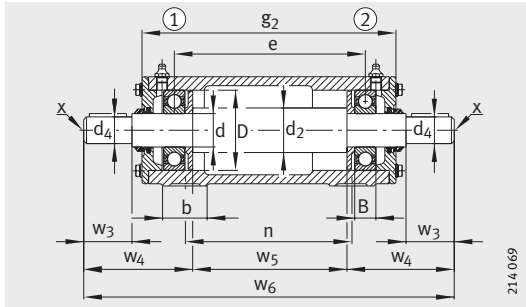
Plummer block housing units

VRE3, unsplit
With bearings and shaft

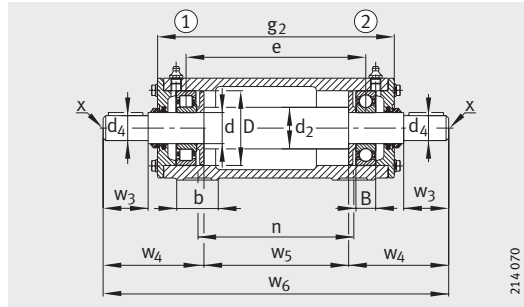


Cross-sections of designs C, D, page 1295, design E, page 1297

Dimension table (continued) · Dimensions in mm									
Designation					Mass m		Dimensions		
Bearing unit	Bearing ①	Bearing ②	Housing	Shaft Complete	Housing ≈kg	Unit ≈kg	d	D	B
VRE322-A	6322-C3	6322-C3	VR322-A	VRW322-A	130	226	110	240	50
VRE322-B	NJ322-E-TVP2	6322-C3	VR322-A	VRW322-A	130	226	110	240	50
VRE322-C	NU322-E-TVP2-C3	2X7322-B-TVP-UA	VR322-C	VRW322-C	132	238	110	240	50
VRE322-D	NU322-E-TVP2-C3	6322-C3	VR322-D	VRW322-D	132	228	110	240	50
VRE322-E	NU322-E-TVP2-C3	NU322-E-TVP2-C3 + 6322-C3	VR322-E	VRW322-C	132	238	110	240	50
VRE324-A	6324-C3	6324-C3	VR324-A	VRW324-A	170	276	120	260	55
VRE324-B	NJ324-E-TVP2	6324-C3	VR324-A	VRW324-A	170	277	120	260	55
VRE324-C	NU324-E-TVP2-C3	2X7324-B-TVP-UA	VR324-C	VRW324-C	172	294	120	260	55
VRE324-D	NU324-E-TVP2-C3	6324-C3	VR324-D	VRW324-D	172	278	120	260	55
VRE324-E	NU324-E-TVP2-C3	NU324-E-TVP2-C3 + 6324-C3	VR324-E	VRW324-C	172	291	120	260	55



VRE3..-A



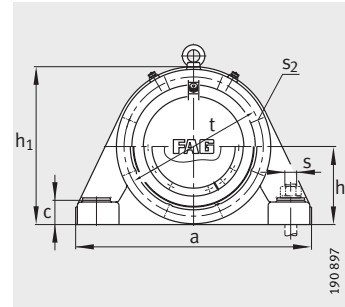
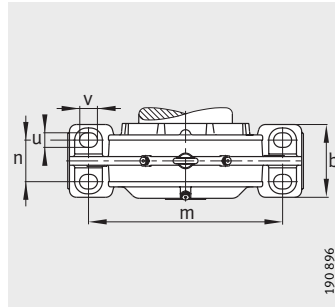
VRE3..-B

a	g ₂	h ₁	d ₂	d ₄	w ₂	w ₃	w ₄	w ₅	w ₆	w ₇	e	b	n	m	c	h	s
450	678	295	130	100	–	210	313	507	1 133	–	580	95	520	380	40	150	M24
450	678	295	130	100	–	210	313	507	1 133	–	581	95	520	380	40	150	M24
450	678	295	130	100	210	213	312,5	458	1 133	362,5	556	95	520	380	40	150	M24
450	678	295	130	100	210	213	312,5	508	1 133	–	581	95	520	380	40	150	M24
450	678	295	130	100	210	213	312,5	458	1 133	362,5	531	95	520	380	40	150	M24
500	705	320	140	110	–	210	318	524	1 160	–	602	100	540	410	40	160	M24
500	705	320	140	110	–	210	318	524	1 160	–	603	100	540	410	40	160	M24
500	705	320	140	110	210	213	317,5	470	1 160	372,5	575,5	100	540	410	40	160	M24
500	705	320	140	110	210	213	317,5	525	1 160	–	603	100	540	410	40	160	M24
500	705	320	140	110	210	213	317,5	470	1 160	372,5	548	100	540	410	40	160	M24



Plummer block housings

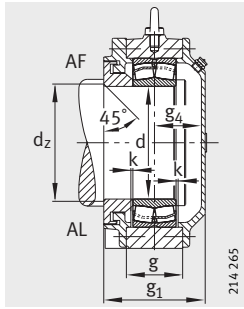
BND, unsplit
For spherical roller bearings



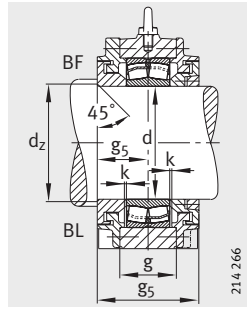
Cross-section of BND housings for bearings with tapered bore: see page 1303 to page 1305

Dimension table · Dimensions in mm												
Designation ¹⁾			Mass m Housing ≈ kg	Dimensions								
Housing	Bearing	Adapter sleeve		d	d ₁	a	g ₁	h ₁	b	c	d _c min.	d _z min.
BND2213	22213-	H313	23	65	60	235	100	155	70	22	66	71
BND2215	22215-	H315	15	75	65	285	105	180	85	35	71	81
BND2218	22218-	H318	28	90	80	370	104	220	110	38	88	98
BND2220	22220-	H320	30	100	90	400	141	255	120	40	98	108
BND2222	22222-	H322	50	110	100	440	149,2	280	130	42	108	118
BND3122	23122-	H3122	40	110	100	400	146	263	140	40	108	118
BND3222	23222-	H2322	35	110	100	440	166	280	130	42	108	118
BND2224	22224-	H3124	58	120	110	470	143	300	140	42	118	128
BND3024	23024-	H3024	20	120	110	370	126	230	110	35	118	128
BND3124	23124-	H3124	50	120	110	410	160	280	150	40	118	128
BND3224	23224-	H2324	40	120	110	470	161	300	140	42	118	128
BND2226	22226-	H3126	65	130	115	500	172	315	150	45	127	142
BND3026	23026-	H3026	30	130	115	410	133	260	120	38	123	138
BND3126	23126-	H3126	55	130	115	430	165	295	150	40	123	138
BND3226	23226-	H2326	50	130	115	500	188	315	150	45	127	142
BND2228	22228-	H3128	70	140	125	530	166	345	160	50	137	152
BND3028	23028-	H3028	35	140	125	430	136	275	130	40	133	148
BND3128	23128-	H3128	60	140	125	470	170	315	160	45	133	148
BND3228	23228-	H2328	65	140	125	530	186	345	160	50	137	152
BND2230	22230-	H3130	85	150	135	550	177	365	170	54	147	162
BND3030	23030-	H3030	40	150	135	455	149	290	140	42	143	158
BND3130	23130-	H3130	70	150	135	580	186	345	200	60	143	158
BND3230	23230-	H2330	75	150	135	550	200	365	170	54	147	162
BND2232	22232-	H3132	100	160	140	600	189	385	180	58	152	172
BND3032	23032-	H3032	45	160	140	480	156	310	150	45	148	168
BND3132	23132-	H3132	80	160	140	540	200	360	200	55	148	168
BND3232	23232-	H2332	90	160	140	600	213	385	180	58	152	172
BND2234	22234-	H3134	105	170	150	640	216	405	200	62	166	186
BND3034	23034-	H3034	70	170	150	510	166	330	160	50	158	178
BND3134	23134-	H3134	100	170	150	570	215	380	200	55	158	178
BND3234	23234-	H2334	120	170	150	640	240	405	200	62	166	186

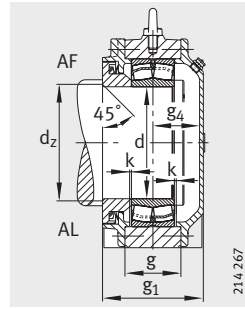
¹⁾ Ordering example:
Housing BND3030-Z-Y-BL-S (see also page 1207), bearing 23030-E1-TVPB (see bearing tables).



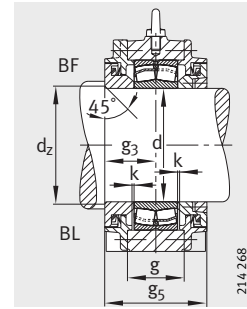
Design A
Housing with labyrinth seal
for bearings with cylindrical bore



Design B



Design A
Housing with Taconite seal
for bearings with cylindrical bore



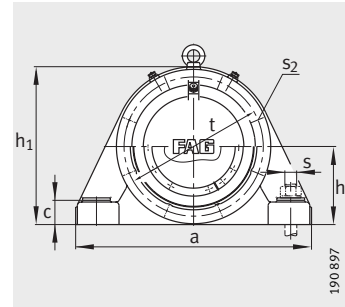
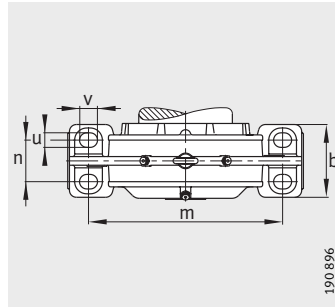
Design B

g	g ₂	g ₃	g ₄ min.	g ₅	h	k	m	n	u	v	s	t	s ₂	S ₂ Quantity
44	120	55	39	110	80	2	185	40	15	20	M10	135	M 6	6
45	125	55	44	110	90	2	225	45	20	28	M16	155	M 6	6
55	123	53	45	106	110	2	290	60	23	32	M20	185	M 8	6
65	168	78	57	156	130	2,5	320	65	30	35	M24	205	M 8	6
73	172	82,6	60	165,2	140	2,5	350	70	30	35	M24	230	M12	6
80	171	78	62	156	130	2,5	300	80	25	35	M20	215	M12	8
89,8	194	91	68	182	140	2,5	350	70	30	35	M24	230	M12	6
77	168	74	61	148	150	2,5	370	75	30	35	M24	245	M12	6
60	146	63	57	126	115	2,5	300	60	25	35	M20	205	M 8	8
85	180	80	74	160	140	2,5	330	80	25	35	M20	235	M12	8
95	186	83	70	166	150	2,5	370	75	30	35	M24	245	M12	6
84	202	95	69	190	160	3	400	85	30	35	M24	260	M12	6
70	156	68	59	136	130	2	340	60	25	35	M20	225	M10	8
90	190	85	72	170	145	3	350	80	25	35	M20	245	M12	8
100	218	103	77	206	160	3	400	85	30	35	M24	260	M12	6
88	196	88	70	176	170	3	430	85	30	35	M24	285	M16	6
70	156	68	61	136	140	3	360	70	30	35	M24	240	M10	8
95	190	85	77	170	155	3	380	85	25	35	M20	270	M12	8
108	216	98	80	196	170	3	430	85	30	35	M24	285	M16	6
97	202	93,5	76	187	180	3	450	90	36	45	M30	305	M16	6
80	176	78	64	156	145	2	370	80	30	35	M24	250	M12	8
102	206	93	85	186	170	2	450	110	30	35	M24	285	M12	8
120	225	105	87	210	180	3	450	90	36	45	M30	305	M16	6
106	226	103	78	206	190	3	490	105	36	45	M30	330	M16	6
85	181	78	71	156	155	3	390	90	30	35	M24	265	M12	8
110	230	105	87	210	180	3	430	110	30	35	M24	310	M16	6
130	250	115	90	230	190	3	490	105	36	45	M30	330	M16	6
111	256	118	88	236	200	3	525	110	36	45	M30	350	M16	8
90	191	83	75	166	165	2	420	95	36	45	M30	285	M12	8
120	250	115	90	230	190	3	470	110	36	45	M30	330	M12	8
135	280	130	100	260	200	3	525	110	36	45	M30	350	M16	8



Plummer block housings

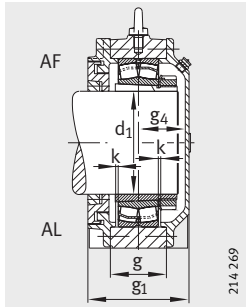
BND, unsplit
For spherical roller bearings



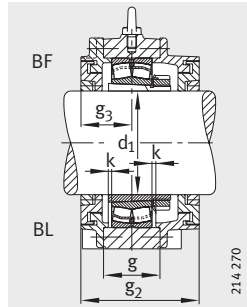
Cross-section of BND housings for bearings with cylindrical bore: see page 1301

Dimension table (continued) · Dimensions in mm												
Designation ¹⁾			Mass m Housing ≈ kg	Dimensions								
Housing	Bearing	Adapter sleeve		d	d ₁	a	g ₁	h ₁	b	c	d _c min.	d _z min.
BND2236	22236-	H3136	130	180	160	680	214	425	210	65	176	196
BND3036	23036-	H3036	70	180	160	540	176	360	170	52	168	188
BND3136	23136-	H3136	110	180	160	600	220	395	200	58	172	192
BND3236	23236-	H2336	140	180	160	680	240	425	210	65	176	196
BND2238	22238-	H3138	170	190	170	710	222	455	220	85	186	206
BND3038	23038-	H3038	80	190	170	570	181	370	180	55	178	198
BND3138	23138-	H3138	125	190	170	680	232	425	210	65	182	202
BND3238	23228-	H2338	170	190	170	710	250	455	220	85	186	206
BND2240	22240-	H3140	185	200	180	780	230	475	240	75	196	216
BND3040	23040-	H3040	95	200	180	600	196	400	190	60	188	208
BND3140	23140-	H3140	170	200	180	710	242	455	220	85	192	212
BND3240	23240-	H2340	205	200	180	780	260	475	240	75	196	216
BND2244	22244-	H3144X	290	220	200	890	264	550	250	80	216	236
BND3044	23044-	H3044X	100	220	200	640	206	430	200	65	212	232
BND3144	23144-	H3144X	190	220	200	780	252	475	240	75	216	236
BND3244	23244-	H2344X	240	220	200	850	279	525	250	80	216	236
BND2248	22248-	H3148X	315	240	220	900	268	585	250	90	236	256
BND3048	23048-	H3048	130	240	220	680	216	455	210	70	232	252
BND3148	23148-	H3148X	280	240	220	890	284	550	250	80	236	256
BND3248	23248-	H2348X	330	240	220	900	308	585	250	90	236	256
BND2252	22252-	H3152X	370	260	240	960	286	625	290	95	260	280
BND3052	23052-	H3052X	160	260	240	720	226	500	220	75	256	276
BND3152	23152-	H3152X	310	260	240	900	292	585	250	90	256	276
BND3252	23252-	H2352X	380	260	240	960	330	625	290	95	260	280
BND2256	22256-	H3156X	420	280	260	1 000	297	645	300	100	280	300
BND3056	23056-	H3056	180	280	260	760	236	520	240	80	276	296
BND3156	23156-	H3156X	335	280	260	900	294	585	250	90	280	300
BND3256	23256-	H2356X	490	280	260	1 000	343	645	300	100	280	300

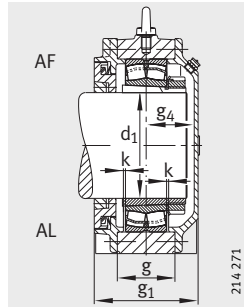
¹⁾ Ordering example:
Housing BND3040-H-W-T-BL-S (see also page 1209), bearing 23040-E1-K-TVPB (see bearing tables), adapter sleeve H3040-HG (see dimension tables).



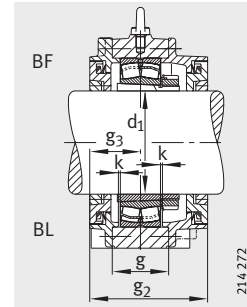
Design A
Housing with labyrinth seal
for bearings with tapered bore



Design B



Design A
Housing with Taconite seal
for bearings with tapered bore



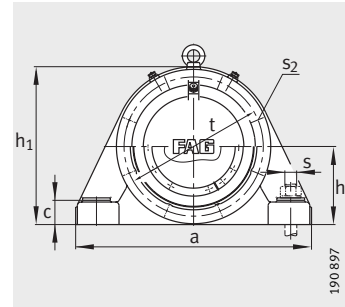
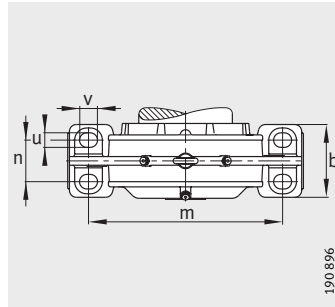
Design B

g	g ₂	g ₃	g ₄ min.	g ₅	h	k	m	n	u	v	s	t	s ₂	s ₂ Quantity
112	248	114	92	228	210	3	550	120	36	45	M30	370	M16	8
100	201	88	80	176	180	3	450	100	36	45	M30	310	M12	8
125	250	115	95	230	200	3	490	105	36	45	M30	350	M16	8
138	274	127	105	254	210	3	550	120	36	45	M30	370	M16	8
115	258	114	98	228	220	3	560	120	42	52	M36	380	M16	8
105	211	93	80	186	185	3	480	105	36	45	M30	325	M12	8
130	266	123	98	246	210	3	550	120	36	45	M30	370	M16	8
143	286	128	112	256	220	3	560	120	42	52	M36	380	M16	8
128	269	123	99	246	235	4	640	140	42	52	M36	420	M16	8
110	226	98	90	196	200	3	510	110	36	45	M30	340	M16	8
135	278	124	108	248	220	3	560	120	42	52	M36	380	M16	8
158	299	138	114	276	235	4	640	140	42	52	M36	420	M16	8
140	314	142	112	284	270	4	720	140	42	52	M36	455	M20	8
115	241	103	95	206	215	3	540	115	42	52	M36	375	M16	8
150	291	134	110	268	235	4	640	140	42	52	M36	420	M16	8
175	329	147	122	294	260	4	700	140	42	52	M36	445	M20	8
150	311	138	120	276	290	4	750	140	42	52	M36	510	M20	8
120	251	108	100	216	225	4	560	120	42	52	M36	400	M16	8
160	334	152	122	304	270	4	720	140	42	52	M36	455	M20	8
190	351	158	140	316	290	4	750	140	42	52	M36	510	M20	8
161	326	148	126	296	310	3	800	160	42	52	M36	535	M20	8
130	261	113	103	226	250	4	600	130	42	52	M36	440	M16	8
174	335	150	132	300	290	4	750	140	42	52	M36	510	M20	8
205	370	170	148	340	310	3	800	160	42	52	M36	535	M20	8
160	354	157	128	314	320	4	840	170	42	52	M36	555	M24	8
135	281	118	108	236	260	4	630	140	42	52	M36	460	M16	8
176	337	151	133	302	290	4	750	140	42	52	M36	510	M20	8
206	400	180	151	360	320	4	840	170	42	52	M36	555	M24	8



Plummer block housings

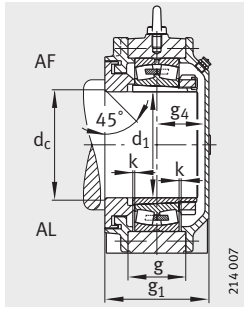
BND, unsplit
For spherical roller bearings



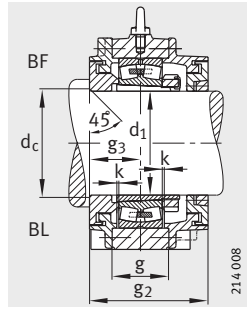
Cross-section of BND housings for bearings with cylindrical bore: see page 1301

Dimension table (continued) · Dimensions in mm												
Designation ¹⁾			Mass m Housing ≈ kg	Dimensions								
Housing	Bearing	Adapter sleeve		d	d ₁	a	g ₁	h ₁	b	c	d _c min.	d _z min.
BND2260	22260-	H3160	485	300	280	1 100	317	695	330	105	300	320
BND3060	23060-	H3060	220	300	280	820	261	570	250	85	296	316
BND3160	23160-	H3160	400	300	280	1 000	327	645	300	100	300	320
BND3260	23260-	H3260	570	300	280	1 100	369	705	330	105	300	320
BND2264	22264-	H3164	600	320	300	1 150	333	745	360	115	320	340
BND3064	23064-	H3064	250	320	300	860	266	590	260	90	316	336
BND3164	23164-	H3164	500	320	300	1 150	359	700	300	100	320	340
BND3264	23264-	H3264	665	320	300	1 150	391	745	360	115	320	340
BND2268	22268-	H3168	635	340	320	1 200	375	790	380	125	344	364
BND3068	23068-	H3068	300	340	320	900	276	630	270	95	340	360
BND3168	23168-	H3168	520	340	320	1 150	373	745	360	115	340	360
BND3268	23268-	H3268	755	340	320	1 200	434	790	380	125	344	364
BND2272	22272-	H3172	690	360	340	1 280	375	820	400	130	364	384
BND3072	23072-	H3072	330	360	340	960	290	660	280	100	360	380
BND3172	23172-	H3172	600	360	340	1 200	400	760	370	115	360	380
BND3272	23272-	H3272	950	360	340	1 280	437	820	400	130	364	384
BND2276	22276-	H3176	900	380	360	1 350	433	865	405	135	384	404
BND3076	23076-	H3076	360	380	360	1 000	294	680	300	105	380	400
BND3176	23176-	H3176	720	380	360	1 200	404	790	380	125	380	400
BND3276	23276-	H3276	1 100	380	360	1 350	489	860	405	135	384	404
BND2280	22280-	H3180	940	400	380	1 430	433	900	450	145	404	424
BND3080	23080-	H3080	400	400	380	1 060	310	720	320	110	400	420
BND3180	23180-	H3180	750	400	380	1 280	405	820	400	130	404	424
BND3280	23280-	H3280	1 205	400	380	1 430	504	900	450	145	404	424
BND2284	22284-	H3184	1 055	420	400	1 500	433	950	470	150	430	450
BND3084	23084-	H3084	435	420	400	1 100	310	755	340	115	420	440
BND3184	23184-	H3184	950	420	400	1 350	440	900	420	135	424	444
BND3284	23284-	H3284	1 310	420	400	1 500	510	950	470	150	430	450

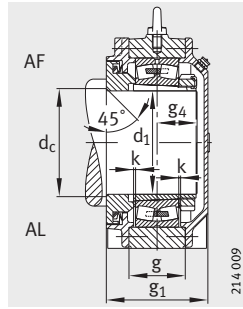
¹⁾ Ordering example:
Housing BND3276-H-C-T-BL-S (see also page 1210), bearing 23276-B-K-MB (see bearing tables),
adapter sleeve H3276-HG (see dimensions tables).



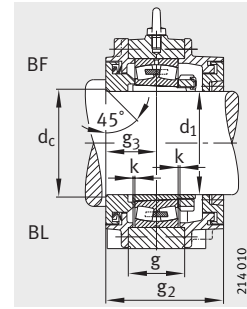
Design A
Housing with labyrinth seal for bearings
with tapered bore, shaft with abutment shoulder



Design B
Housing with labyrinth seal for bearings
with tapered bore, shaft with abutment shoulder



Design A
Housing with Taconite seal for bearings
with tapered bore, shaft with abutment shoulder



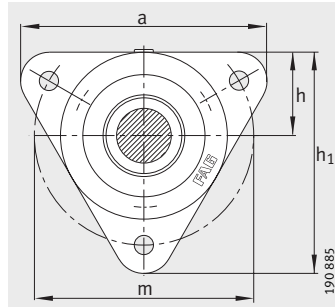
Design B
Housing with Taconite seal for bearings
with tapered bore, shaft with abutment shoulder

g	g ₃	g ₂	g ₄ min.	g ₅	h	k	m	n	u	v	s	t	s ₂	s ₂ Quantity
178	156	352	149	312	350	4	920	180	56	75	M48	600	M24	8
140	128	296	121	256	285	4	690	150	42	52	M36	510	M16	8
190	172	384	143	344	320	4	840	170	42	52	M36	555	M24	8
230	182	404	175	364	350	4	920	180	56	75	M48	600	M24	8
180	163	381	158	326	370	5	960	200	56	75	M48	640	M24	8
150	133	311	123	266	295	4	730	160	42	52	M36	530	M16	8
210	186	412	161	372	350	4	940	160	42	52	M36	590	M24	8
238	192	439	187	384	370	5	960	200	56	75	M48	640	M24	8
201	187,5	430	176	375	390	5	990	200	64	85	M56	680	M30	8
160	133	311	132	266	315	5	770	170	42	52	M36	565	M20	8
220	183	421	178	366	370	5	960	200	56	75	M48	640	M24	8
260	217	489	205	434	390	5	990	200	64	85	M56	680	M30	8
205	185	435	178	370	410	5	1040	210	72	90	M64	710	M30	8
170	140	325	138	280	330	5	820	180	42	52	M36	590	M20	8
225	200	450	188	400	380	4	1000	200	56	75	M48	650	M24	8
267	216	497	209	432	410	5	1040	210	72	90	M64	710	M30	8
230	203	470	218	406	425	5	1100	225	72	90	M64	745	M30	8
160	142	329	141	284	340	7	840	190	56	75	M48	610	M20	8
230	202	459	190	404	390	5	1000	200	64	85	M56	680	M30	8
295	232	529	244	464	425	5	1100	225	72	90	M64	745	M30	8
229	216,5	498	202	433	450	5	1160	240	72	90	M64	790	M30	8
175	150	355	145	300	360	7	900	200	56	75	M48	650	M20	8
235	200	465	193	400	410	5	1040	210	72	90	M64	710	M30	8
300	252	569	237	504	450	5	1160	240	72	90	M64	790	M30	8
238	216,5	498	202	433	470	5	1220	255	72	90	M64	835	M30	8
180	150	350	149	300	375	7	940	210	56	75	M48	670	M20	8
260	210	510	215	420	450	7	1100	210	64	85	M56	760	M30	8
315	255	575	240	510	470	5	1220	255	72	90	M64	835	M30	8

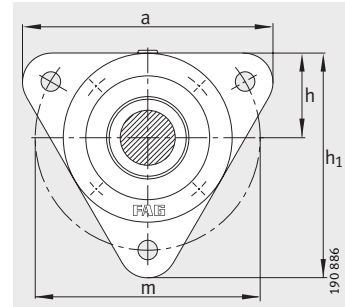


Flanged housings

F112, unsplit
For self-aligning
ball bearings with
extended inner ring



Design
F11204 to F11206

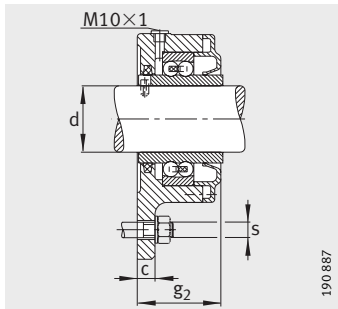


Design
F11207 to F11210

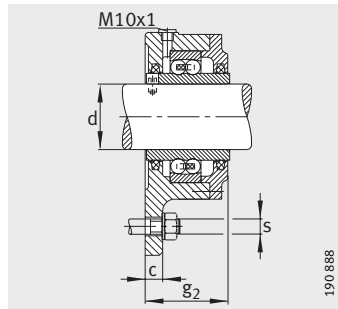
Dimension table · Dimensions in mm

Designation						Mass m Housing ≈kg
Housing	Bearing	Cover ¹⁾		Felt strips		
			Quantity	aXbXl	Quantity	
F11204	11204-TVH	DK.F11204	1	5X4X108	1	0,9
F11205	11205-TVH	DK.F11205	1	5X4X120	1	1,1
F11206	11206-TVH	DK.F11206	1	5X4X145	1	1,5
F11207	11207-TVH	DK.F11207	1	5X4X165	1	1,9
F11208	11208-TVH	DK.F11208	1	5X4X185	1	2,3
F11209	11209-TVH	–	–	5X4X197	2	3,3
F11210	11210-TVH	–	–	5X4X213	2	3,6

¹⁾ The cover is included in the housing designation.



Design
F11204 to F11208



Design
F11209 to F11210

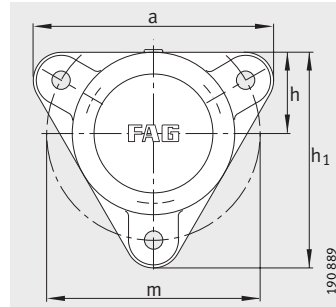
Dimensions

d	a	g ₂	h ₁	c	h	m	s	
							mm	inch
20	105	42	92	10	35	90	M10	3/8
25	110	46	100	10	38	96	M10	3/8
30	130	49	117	12	44	116	M10	3/8
35	145	54	129,5	12	48,5	130	M12	1/2
40	160	60	143	12	54	140	M12	1/2
45	180	62,5	160	15	60	160	M12	1/2
50	180	62,5	160	15	60	160	M12	1/2

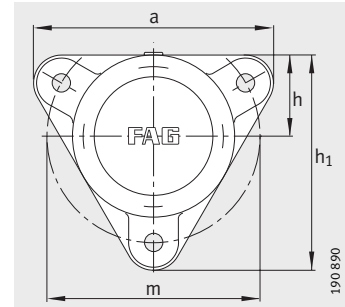


Flanged housings

F5, unsplit
For bearings with tapered bore and adapter sleeve

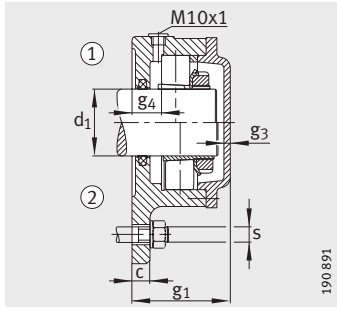


F505, F506, F508

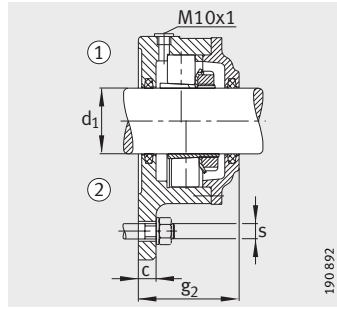


F507, F509 to F513

Dimension table · Dimensions in mm								
Designation								Mass m Housing ≈kg
Housing	Bearing		Adapter sleeve	Locating ring		Felt strips		
					Quantity	aXbXl	Quantity	
F505-A-L	1205-K-TVH-C3	20205-K-TVP-C3	H205	FE52/2	1	5X4X90	1	1,2
F505-B-L	1205-K-TVH-C3	20205-K-TVP-C3	H205	FE52/2	1	5X4X90	2	1,2
F505-WA-L	2205-K-TVH-C3	22205-E1-K	H305	FE52/2	1	5X4X90	1	1,2
F505-WB-L	2205-K-TVH-C3	22205-E1-K	H305	FE52/2	1	5X4X90	2	1,2
F506-A-L	1206-K-TVH-C3	20206-K-TVP-C3	H206	FE62/2	1	6X5X115	1	1,6
F506-B-L	1206-K-TVH-C3	20206-K-TVP-C3	H206	FE62/2	1	6X5X115	2	1,6
F506-WA-L	2206-K-TVH-C3	22206-E1-K	H306	FE62/2	1	6X5X115	1	1,6
F506-WB-L	2206-K-TVH-C3	22206-E1-K	H306	FE62/2	1	6X5X115	2	1,6
F507-A-L	1207-K-TVH-C3	20207-K-TVP-C3	H207	FE72/2	1	6X5X130	1	2
F507-B-L	1207-K-TVH-C3	20207-K-TVP-C3	H207	FE72/2	1	6X5X130	2	2
F507-WA-L	2207-K-TVH-C3	22207-E1-K	H307	FE72/2	1	6X5X130	1	2
F507-WB-L	2207-K-TVH-C3	22207-E1-K	H307	FE72/2	1	6X5X130	2	2
F508-A-L	1208-K-TVH-C3	20208-K-TVP-C3	H208	FE80/2	1	6X5X145	1	2,5
F508-B-L	1208-K-TVH-C3	20208-K-TVP-C3	H208	FE80/2	1	6X5X145	2	2,5
F508-WA-L	2208-K-TVH-C3	22208-E1-K	H308	FE80/2	1	6X5X145	1	2,5
F508-WB-L	2208-K-TVH-C3	22208-E1-K	H308	FE80/2	1	6X5X145	2	2,5
F509-A-L	1209-K-TVH-C3	20209-K-TVP-C3	H209	FE85/2	1	6X5X160	1	3,6
F509-B-L	1209-K-TVH-C3	20209-K-T-VPC3	H209	FE85/2	1	6X5X160	2	3,6
F509-WA-L	2209-K-TVH-C3	22209-E1-K	H309	FE85/2	1	6X5X160	1	3,6
F509-WB-L	2209-K-TVH-C3	22209-E1-K	H309	FE85/2	1	6X5X160	2	3,6
F510-A-L	1210-K-TVH-C3	20210-K-TVP-C3	H210	FE90/2	1	6X5X175	1	3,8
F510-B-L	1210-K-TVH-C3	20210-K-TVP-C3	H210	FE90/2	1	6X5X175	2	3,8
F510-WA-L	2210-K-TVH-C3	22210-E1-K	H310	FE90/2	1	6X5X175	1	3,8
F510-WB-L	2210-K-TVH-C3	22210-E1-K	H310	FE90/2	1	6X5X175	2	3,8
F511-A-L	1211-K-TVH-C3	20211-K-TVP-C3	H211	FE100/2	1	8X6,5X200	1	4,1
F511-B-L	1211-K-TVH-C3	20211-K-TVP-C3	H211	FE100/2	1	8X6,5X200	2	4,1
F511-WA-L	2211-K-TVH-C3	22211-E1-K	H311	FE100/2	1	8X6,5X200	1	4,1
F511-WB-L	2211-K-TVH-C3	22211-E1-K	H311	FE100/2	1	8X6,5X200	2	4,1
F512-A-L	1212-K-TVH-C3	20212-K-TVP-C3	H212	FE110/2	1	8X6,5X215	1	4,6
F512-B-L	1212-K-TVH-C3	20212-K-TVP-C3	H212	FE110/2	1	8X6,5X215	2	4,6
F512-WA-L	2212-K-TVH-C3	22212-E1-K	H312	FE110/2	1	8X6,5X215	1	4,6
F512-WB-L	2212-K-TVH-C3	22212-E1-K	H312	FE110/2	1	8X6,5X215	2	4,6
F513-A-L	1213-K-TVH-C3	20213-K-TVP-C3	H213	FE120/2	1	8X6,5X230	1	5,4
F513-B-L	1213-K-TVH-C3	20213-K-TVP-C3	H213	FE120/2	1	8X6,5X230	2	5,4
F513-WA-L	2213-K-TVH-C3	22213-E1-K	H313	FE120/2	1	8X6,5X230	1	5,4
F513-WB-L	2213-K-TVH-C3	22213-E1-K	H313	FE120/2	1	8X6,5X230	2	5,4



Design A
 ① Locating bearing
 ② Non-locating bearing



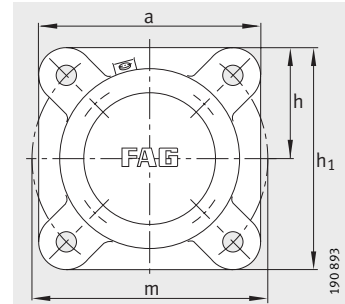
Design B
 ① Locating bearing
 ② Non-locating bearing

Dimensions												
d ₁	a	g ₂	h ₁	c	g ₁	g ₃	g ₄	h	m	s		
										mm	inch	
20	110	–	100	10	50	4	16	38	96	M10	³ / ₈	
20	110	55	100	10	–	–	16	38	96	M10	³ / ₈	
20	110	–	100	10	50	4	14,5	38	96	M10	³ / ₈	
20	110	55	100	10	–	–	14,5	38	96	M10	³ / ₈	
25	130	–	117	12	55	4	18	44	116	M10	³ / ₈	
25	130	57	117	12	–	–	18	44	116	M10	³ / ₈	
25	130	–	117	12	55	4	16	44	116	M10	³ / ₈	
25	130	57	117	12	–	–	16	44	116	M10	³ / ₈	
30	145	–	130	12	57	5	17	48,5	130	M12	¹ / ₂	
30	145	60	130	12	–	–	17	48,5	130	M12	¹ / ₂	
30	145	–	130	12	63	5	17	48,5	130	M12	¹ / ₂	
30	145	66	130	12	–	–	17	48,5	130	M12	¹ / ₂	
35	160	–	143	12	65	5	22	54	140	M12	¹ / ₂	
35	160	66	143	12	–	–	22	54	140	M12	¹ / ₂	
35	160	–	143	12	70	5	22	54	140	M12	¹ / ₂	
35	160	71	143	12	–	–	22	54	140	M12	¹ / ₂	
40	180	–	160	15	65	5	22	60	160	M12	¹ / ₂	
40	180	70	160	15	–	–	22	60	160	M12	¹ / ₂	
40	180	–	160	15	69	5	22	60	160	M12	¹ / ₂	
40	180	74	160	15	–	–	22	60	160	M12	¹ / ₂	
45	180	–	160	15	65	5	20	60	160	M12	¹ / ₂	
45	180	70	160	15	–	–	20	60	160	M12	¹ / ₂	
45	180	–	160	15	71	5	23	60	160	M12	¹ / ₂	
45	180	76	160	15	–	–	23	60	160	M12	¹ / ₂	
50	190	–	170	16	71	6	23	65	170	M12	¹ / ₂	
50	190	76	170	16	–	–	23	65	170	M12	¹ / ₂	
50	190	–	170	16	77	6	25	65	170	M12	¹ / ₂	
50	190	82	170	16	–	–	25	65	170	M12	¹ / ₂	
55	206	–	185	16	73	6	24	70	180	M12	¹ / ₂	
55	206	78	185	16	–	–	24	70	180	M12	¹ / ₂	
55	206	–	185	16	79	6	24	70	180	M12	¹ / ₂	
55	206	84	185	16	–	–	24	70	180	M12	¹ / ₂	
60	219	–	198	16	75	6	24	75	190	M12	¹ / ₂	
60	219	79	198	16	–	–	24	75	190	M12	¹ / ₂	
60	219	–	198	16	83	6	24	75	190	M12	¹ / ₂	
60	219	87	198	16	–	–	24	75	190	M12	¹ / ₂	



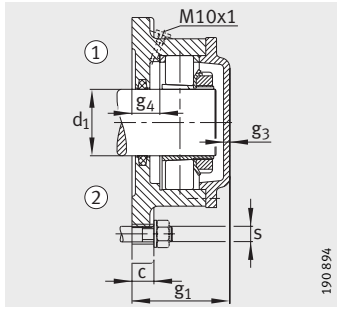
Flanged housings

F5, unsplit
For bearings with
tapered bore and adapter sleeve

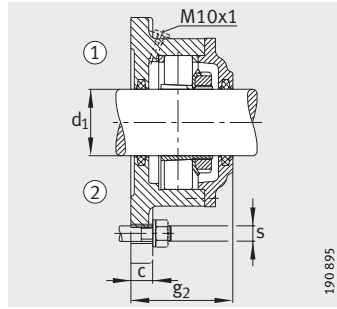


F515 to F522

Dimension table (continued) · Dimensions in mm								
Designation								Mass m Housing ≈ kg
Housing	Bearing		Adapter sleeve	Locating ring		Felt strips		
					Quantity	aXbXl	Quantity	
F515-A-L	1215-K-TVH-C3	20215-K-TVP-C3	H215	FRM130/8	2	8X6,5X245	1	9,5
F515-A-L	2215-K-TVH-C3	22215-E1-K	H315	FRM130/10	1	8X6,5X245	1	9,5
F515-B-L	1215-K-TVH-C3	20215-K-TVP-C3	H215	FRM130/8	2	8X6,5X245	2	9,5
F515-B-L	2215-K-TVH-C3	22215-E1-K	H315	FRM130/10	1	8X6,5X245	2	9,5
F516-A-L	1216-K-TVH-C3	20216-K-TVP-C3	H216	FRM140/8,5	2	9X7,5X270	1	10
F516-A-L	2216-K-TVH-C3	22216-E1-K	H316	FRM140/10	1	9X7,5X270	1	10
F516-B-L	1216-K-TVH-C3	20216-K-TVP-C3	H216	FRM140/8,5	2	9X7,5X270	2	10
F516-B-L	2216-K-TVH-C3	22216-E1-K	H316	FRM140/10	1	9X7,5X270	2	10
F517-A-L	1217-K-TVH-C3	20217-K-MB-C3	H217	FRM150/9	2	9X7,5X285	1	12
F517-A-L	2217-K-TVH-C3	22217-E1-K	H317	FRM150/10	1	9X7,5X285	1	12
F517-B-L	1217-K-TVH-C3	20217-K-MB-C3	H217	FRM150/9	2	9X7,5X285	2	12
F517-B-L	2217-K-TVH-C3	22217-E1-K	H317	FRM150/10	1	9X7,5X285	2	12
F518-A-L	1218-K-TVH-C3	20218-K-MB-C3	H218	FRM160/10	2	9X7,5X300	1	13
F518-A-L	2218-K-TVH-C3	22218-E1-K	H318	FRM160/10	1	9X7,5X300	1	13
F518-B-L	1218-K-TVH-C3	20218-K-MB-C3	H218	FRM160/10	2	9X7,5X300	2	13
F518-B-L	2218-K-TVH-C3	22218-E1-K	H318	FRM160/10	1	9X7,5X300	2	13
F520-A-L	1220-K-M-C3	20220-K-MB-C3	H220	FRM180/10 + FRM180/12	1 1	10X8,5X335	1	18
F520-A-L	2220-K-M-C3	22220-E1-K	H320	FRM180/10	1	10X8,5X335	1	18
F520-B-L	1220-K-M-C3	20220-K-MB-C3	H220	FRM180/10 + FRM180/12	1 1	10X8,5X335	2	18
F520-B-L	2220-K-M-C3	22220-E1-K	H320	FRM180/10	1	10X8,5X335	2	18
F522-A-L	1222-K-M-C3	20222-K-MB-C3	H222	FRM200/13,5	2	12X10X375	1	22
F522-B-L	1222-K-M-C3	20222-K-MB-C3	H222	FRM200/13,5	2	12X10X375	2	22
F522-WA-L	2222-K-M-C3	22222-E1-K	H322	FRM200/10	1	12X10X375	1	22
F522-WB-L	2222-K-M-C3	22222-E1-K	H322	FRM200/10	1	12X10X375	2	22



Design A
 ① Locating bearing
 ② Non-locating bearing

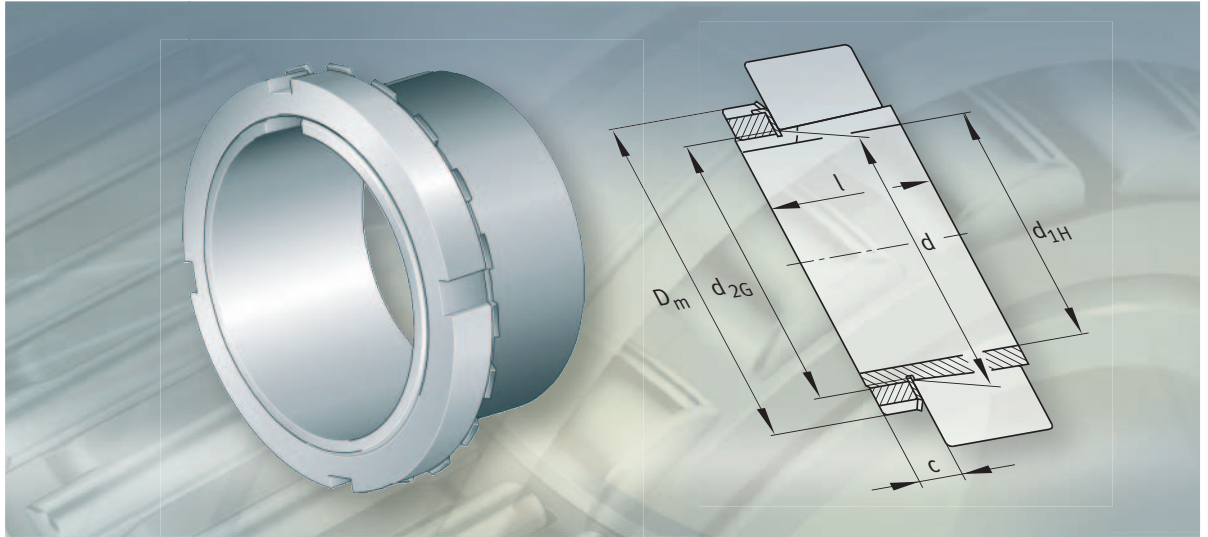


Design B
 ① Locating bearing
 ② Non-locating bearing

Dimensions

d ₁	a	g ₂	h ₁	c	g ₁	g ₃	g ₄	h	m	s	
										mm	inch
65	190	-	190	25	97	6	30	95	215	M16	5/8
65	190	-	190	25	97	6	30	95	215	M16	5/8
65	190	104	190	25	-	-	30	95	215	M16	5/8
65	190	104	190	25	-	-	30	95	215	M16	5/8
70	196	-	196	25	101	6	32	98	215	M16	5/8
70	196	-	196	25	101	6	32	98	215	M16	5/8
70	196	110	196	25	-	-	32	98	215	M16	5/8
70	196	110	196	25	-	-	32	98	215	M16	5/8
75	210	-	210	25	106	7	31	105	240	M16	5/8
75	210	-	210	25	106	7	31	105	240	M16	5/8
75	210	114	210	25	-	-	31	105	240	M16	5/8
75	210	114	210	25	-	-	31	105	240	M16	5/8
80	210	-	210	25	110	7	29	105	240	M16	5/8
80	210	-	210	25	110	7	29	105	240	M16	5/8
80	210	118	210	25	-	-	29	105	240	M16	5/8
80	210	118	210	25	-	-	29	105	240	M16	5/8
90	250	-	250	30	119	8	29	125	280	M20	3/4
90	250	-	250	30	119	8	29	125	280	M20	3/4
90	250	127	250	30	-	-	29	125	280	M20	3/4
90	250	127	250	30	-	-	29	125	280	M20	3/4
100	270	-	270	30	128	8	30	135	310	M20	3/4
100	270	137	270	30	-	-	30	135	310	M20	3/4
100	270	-	270	30	128	8	30	135	310	M20	3/4
100	270	137	270	30	-	-	30	135	310	M20	3/4





Fasteners and retainers

- Adapter sleeves
- Extraction sleeves
- Locknuts
- Retaining plates
- Retaining brackets

Fasteners and retainers

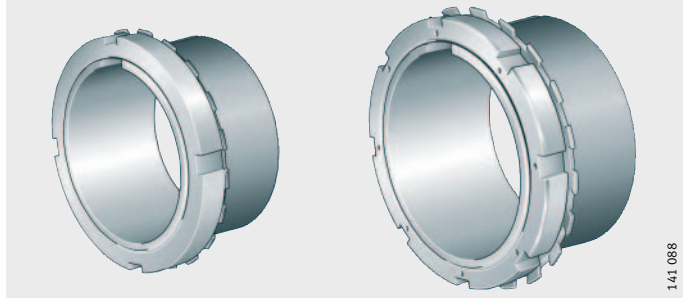
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Features	Adapter sleeves..... 1315
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	Locknuts 1316
	Retaining plates 1316
	Retaining brackets 1316
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Product overview Fasteners and retainers

Adapter sleeves
With nut and retainer,
taper 1:12 or 1:30

H2, H3, H23, H30, H31, H32, H33, H39, H240, H241



Extraction sleeves
Taper 1:12 or 1:30

AH2, AH(X)3, AH(X)23, AH(X)30, AH(X)31, AH(X)32,
AH33, AH39, AH240, AH241

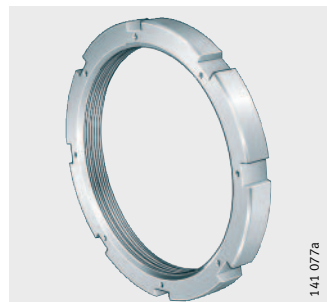


Locknuts

KM, KML, HM

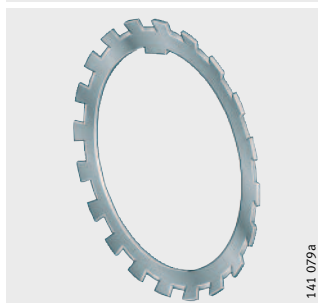


HM30, HM31

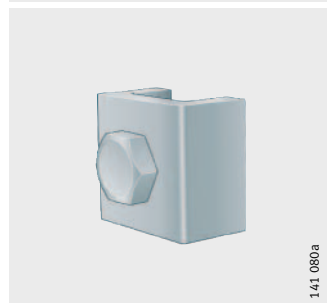


Retaining plates
Retaining brackets
with screw

MB, MBL



MS30, MS31



Fasteners and retainers

Features The location of bearings with a tapered bore on cylindrical shaft studs can be carried out using easy-to-fit, reliable adapter and extraction sleeves.
Locknuts can be used to fix bearings on shafts or adapter sleeves. Gradual loosening of nuts can be prevented using retaining plates or retaining brackets.

Adapter sleeves **For smooth and stepped shafts**

Adapter sleeves are suitable where bearings with a tapered bore are to be located on cylindrical shafts. They require no additional means of securing of the shaft. The bearings can be positioned at any point on smooth shafts.

If adapter sleeves are used with a support ring on stepped shafts, the bearings can be axially located to high accuracy. This also simplifies dismantling of the bearings.

Adapter sleeves comprise slotted adapter sleeves, locknuts and retaining plates. For larger sizes, retaining brackets are used instead of retaining plates.

The tensile strength of the material is at least 430 N/mm^2 . The outside surface of the sleeves has a taper of 1:12, in series H240 and H241 the taper is 1:30.

The dimension tables describe adapter sleeves for metric shafts. Sleeves for inch size shafts are available by agreement.

For hydraulic method

Fitting and dismantling of large bearings requires high mounting forces and is made easier by using the hydraulic method. There are adapter sleeves with oil slots on the tapered outside surface and a pump connector on the thread side. These adapter sleeves have the suffix HG. The dimension tables describe the thread for the pump connector.

Extraction sleeves

Extraction sleeves are suitable where bearings with a tapered bore are to be located on cylindrical shafts. The tapered sleeve is pressed into the bearing bore until the required reduction in radial internal clearance is achieved. The bearing is abutted, for example against a shoulder on the shaft.

Retainers are not included in the delivery.

The tensile strength of the material is at least 430 N/mm^2 .

The outside surface of the slotted steel sleeves has a taper of 1:12, in series AH240 and AH241 the taper is 1:30.

For hydraulic method

Fitting and dismantling of large bearings requires high mounting forces and is made easier by using the hydraulic method. There are extraction sleeves with oil slots on the tapered outside surface and two pump connectors offset to each other by 90° . These extraction sleeves have the suffix H. The dimension tables give the mounting dimensions for the pump connector.



Fasteners and retainers

Locknuts Locknuts can be used to fix bearings on shafts or adapter sleeves. They also give easier mounting of bearings with a tapered shaft seat and the fitting and dismantling of bearings on extraction sleeves. The locknuts are made from steel and the tensile strength of the material is at least 350 N/mm². They have four or eight evenly spaced slots on the circumference, into which hook wrenches or striking-face wrenches can be fitted. By agreement, locknuts of series HM30..-H, HM31..-H with threaded holes for mounting screws are available. Precision locknuts are described in the section Bearings for screw drives and in the publication AC 41161.

Retaining plates Retaining plates MB and MBL are simple, reliable elements for securing smaller locknuts (nuts of series KM and KML). They have an inner tab and several outer tabs evenly spaced around the circumference. The inner tab grips in the slot on the adapter sleeve or shaft, one of the outer tabs is bent to give location in the slot in the nut. The plates are made from steel and the tensile strength of the material is at least 300 N/mm².

Retaining brackets Retaining brackets of series MS are fixed to the locknut using a hexagonal screw. They grip in a slot in the nut and in the adapter sleeve or shaft. The fixing screw has a self-locking thread up to M16, from M20 a standardised hexagonal screw with a retainer is used. Retaining brackets are used with locknuts of series HM30 and HM31.

Suffixes Suffixes for the available designs: see table.

Available designs

Suffix	Description
H	Hydraulic extraction sleeve
HG	Hydraulic adapter sleeve

**Design and
safety guidelines**
Shaft tolerances

Adapter and extraction sleeves adapt themselves to the shaft. Larger diameter tolerances are therefore permissible for shafts than in the case of a direct cylindrical seat for a bearing on the shaft.

For general applications, bearing seats toleranced to h9 are sufficient.

The geometrical tolerances must be tighter than the diameter tolerances since the geometrical accuracy affects the running accuracy of the bearing arrangement. The cylindricity tolerance of the bearing seat should be within IT5/2 or IT6/2.

Accuracy
Adapter sleeves

The dimensions and material conform to DIN 5 415/ISO 2 982-1.

The bore tolerance of adapter sleeves, before slitting, is in the tolerance zone JS9 for the 1:12 taper and JS7 for the 1:30 taper.

Up to M200, the thread is a metric precision thread with tolerance grade 6g to DIN/ISO 965-3, trapezoidal threads are used over M200.

Extraction sleeves

The dimensions and material conform to DIN 5 416/ISO 2 982-1.

The bore tolerance of adapter sleeves, before slitting, is in the tolerance zone JS9 for the 1:12 taper and JS7 for the 1:30 taper.

Up to M200, the thread is a metric precision thread with tolerance grade 6g to DIN/ISO 965-3, trapezoidal threads are used over M200.

Variants with a modified thread d_{2G} have the suffix G.

Locknuts

The dimensions and material conform to DIN 981/ISO 2 982-2. Deviations are indicated in the dimension tables.

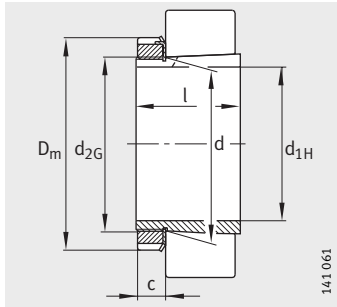
Up to a thread diameter 200 mm, the thread is a metric precision thread, larger locknuts have trapezoidal threads.



Adapter sleeves

With nut and retainer

Dimension table · Dimensions in mm									
Designation			Mass m ≈kg	Dimensions					
Adapter sleeve Complete	Nut	Retainer		d _{1H}	d	D _m ≈	l	c ≈	d _{2G}
H203	KM3	MB3	0,03	14	17	28	21	6	M17X1
H204	KM4	MB4	0,04	17	20	32	24	7	M20X1
H304	KM4	MB4	0,04	17	20	32	28	7	M20X1
H2304	KM4	MB4	0,05	17	20	32	31	7	M20X1
H205	KM5	MB5	0,07	20	25	38	26	9	M25X1,5
H305	KM5	MB5	0,07	20	25	38	29	9	M25X1,5
H2305	KM5	MB5	0,09	20	25	38	35	9	M25X1,5
H206	KM6	MB6	0,1	25	30	45	27	9	M30X1,5
H306	KM6	MB6	0,11	25	30	45	31	9	M30X1,5
H2306	KM6	MB6	0,13	25	30	45	38	9	M30X1,5
H207	KM7	MB7	0,12	30	35	52	29	10	M35X1,5
H307	KM7	MB7	0,14	30	35	52	35	10	M35X1,5
H2307	KM7	MB7	0,16	30	35	52	43	10	M35X1,5
H208	KM8	MB8	0,18	35	40	58	31	11	M40X1,5
H308	KM8	MB8	0,19	35	40	58	36	11	M40X1,5
H2308	KM8	MB8	0,23	35	40	58	46	11	M40X1,5
H3308	KM8	MB8	0,24	35	40	58	50	11	M40X1,5
H209	KM9	MB9	0,22	40	45	65	33	12	M45X1,5
H309	KM9	MB9	0,25	40	45	65	39	12	M45X1,5
H2309	KM9	MB9	0,29	40	45	65	50	12	M45X1,5
H3309	KM9	MB9	0,31	40	45	65	54	12	M45X1,5
H210	KM10	MB10	0,27	45	50	70	35	13	M50X1,5
H310	KM10	MB10	0,3	45	50	70	42	13	M50X1,5
H2310	KM10	MB10	0,36	45	50	70	55	13	M50X1,5
H3310	KM10	MB10	0,39	45	50	70	60	13	M50X1,5
H211	KM11	MB11	0,31	50	55	75	37	13	M55X2
H311	KM11	MB11	0,35	50	55	75	45	13	M55X2
H2311	KM11	MB11	0,42	50	55	75	59	13	M55X2
H3311	KM11	MB11	0,46	50	55	75	65	13	M55X2
H212	KM12	MB12	0,35	55	60	80	38	13	M60X2
H312	KM12	MB12	0,4	55	60	80	47	13	M60X2
H2312	KM12	MB12	0,49	55	60	80	62	13	M60X2
H3312	KM12	MB12	0,54	55	60	80	70	13	M60X2



Taper 1:12
(taper 1:30 for H240, H241)
Retaining plate MB

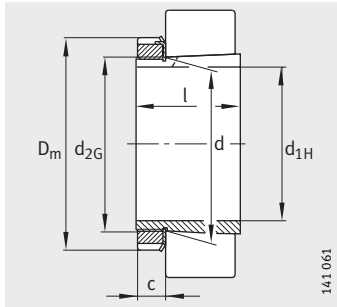
Dimension table (continued) · Dimensions in mm									
Designation			Mass m ≈ kg	Dimensions					
Adapter sleeve Complete	Nut	Retainer		d _{1H}	d	D _m ≈	l	c ≈	d _{2G}
H213	KM13	MB13	0,4	60	65	85	40	14	M65X2
H313	KM13	MB13	0,46	60	65	85	50	14	M65X2
H2313	KM13	MB13	0,56	60	65	85	65	14	M65X2
H3313	KM13	MB13	0,63	60	65	85	75	14	M65X2
H214	KM14	MB14	0,63	60	70	92	41	14	M70X2
H314	KM14	MB14	0,74	60	70	92	52	14	M70X2
H2314	KM14	MB14	0,92	60	70	92	68	14	M70X2
H3314	KM14	MB14	1,08	60	70	92	81	14	M70X2
H215	KM15	MB15	0,71	65	75	98	43	15	M75X2
H315	KM15	MB15	0,84	65	75	98	55	15	M75X2
H2315	KM15	MB15	1,06	65	75	98	73	15	M75X2
H3315	KM15	MB15	1,25	65	75	98	87	15	M75X2
H216	KM16	MB16	0,89	70	80	105	46	17	M80X2
H316	KM16	MB16	1,04	70	80	105	59	17	M80X2
H2316	KM16	MB16	1,3	70	80	105	78	17	M80X2
H3316	KM16	MB16	1,46	70	80	105	89	17	M80X2
H217	KM17	MB17	1,03	75	85	110	50	18	M85X2
H317	KM17	MB17	1,19	75	85	110	63	18	M85X2
H2317	KM17	MB17	1,47	75	85	110	82	18	M85X2
H3317	KM17	MB17	1,68	75	85	110	95	18	M85X2
H218	KM18	MB18	1,21	80	90	120	52	18	M90X2
H318	KM18	MB18	1,39	80	90	120	65	18	M90X2
H2318	KM18	MB18	1,71	80	90	120	86	18	M90X2
H3318	KM18	MB18	1,87	80	90	120	95	18	M90X2
H219	KM19	MB19	1,39	85	95	125	55	19	M95X2
H319	KM19	MB19	1,58	85	95	125	68	19	M95X2
H2319	KM19	MB19	1,95	85	95	125	90	19	M95X2
H3319	KM19	MB19	2,16	85	95	125	101	19	M95X2
H220	KM20	MB20	1,52	90	100	130	58	20	M100X2
H320	KM20	MB20	1,73	90	100	130	71	20	M100X2
H3120	KM20	MB20	1,81	90	100	130	76	20	M100X2
H24020	KM20	MB20	1,77	90	100	130	80	20	M100X2
H24120	KM20	MB20	1,97	90	100	130	94	20	M100X2
H2320	KM20	MB20	2,2	90	100	130	97	20	M100X2
H3320	KM20	MB20	2,38	90	100	130	106	20	M100X2



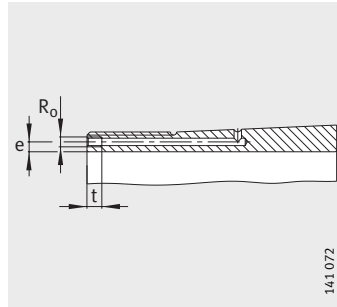
Adapter sleeves

With nut and retainer

Dimension table (continued) - Dimensions in mm									
Designation			Mass	Dimensions					
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d _{1H}	d	D _m ≈	l	c ≈	d _{2G}
H221	KM21	MB21	1,74	95	105	140	60	20	M105X2
H321	KM21	MB21	1,97	95	105	140	74	20	M105X2
H3121	KM21	MB21	2,09	95	105	140	80	20	M105X2
H2321	KM21	MB21	2,5	95	105	140	101	20	M105X2
H3321	KM21	MB21	2,71	95	105	140	111	20	M105X2
H222	KM22	MB22	1,95	100	110	145	63	21	M110X2
H322	KM22	MB22	2,21	100	110	145	77	21	M110X2
H3122	KM22	MB22	2,28	100	110	145	81	21	M110X2
H24022	KM22	MB22	2,3	100	110	145	90	21	M110X2
H24122	KM22	MB22	2,45	100	110	145	99	21	M110X2
H2322	KM22	MB22	2,78	100	110	145	105	21	M110X2
H3322	KM22	MB22	3,06	100	110	145	117	21	M110X2
H3924	KML24	MBL24	1,78	110	120	145	60	22	M120X2
H3024	KML24	MBL24	2,01	110	120	145	72	22	M120X2
H24024	KML24	MBL24	2,24	110	120	145	91	22	M120X2
H3124	KM24	MB24	2,67	110	120	155	88	22	M120X2
H24124	KM24	MB24	2,92	110	120	155	111	22	M120X2
H2324	KM24	MB24	3,24	110	120	155	112	22	M120X2
H3324	KM24	MB24	3,77	110	120	155	132	22	M120X2
H3926	KML26	MBL26	2,53	115	130	155	65	23	M130X2
H3026	KML26	MBL26	2,96	115	130	155	80	23	M130X2
H24026	KML26	MBL26	3,4	115	130	155	102	23	M130X2
H3126	KM26	MB26	3,72	115	130	165	92	23	M130X2
H24126	KM26	MB26	4,08	115	130	165	113	23	M130X2
H2326	KM26	MB26	4,69	115	130	165	121	23	M130X2
H3326	KM26	MB26	5,35	115	130	165	139	23	M130X2
H3928	KML28	MBL28	2,81	125	140	165	66	24	M140X2
H3028	KML28	MBL28	3,3	125	140	165	82	24	M140X2
H24028	KML28	MBL28	3,75	125	140	165	103	24	M140X2
H3128	KM28	MB28	4,4	125	140	180	97	24	M140X2
H24128	KM28	MB28	4,81	125	140	180	119	24	M140X2
H2328	KM28	MB28	5,66	125	140	180	131	24	M140X2
H3328	KM28	MB28	6,32	125	140	180	147	24	M140X2



Taper 1:12
(taper 1:30 for H240, H241)
Retaining plate MB, MBL



Hydraulic adapter sleeve
(suffix HG)
Mounting dimensions

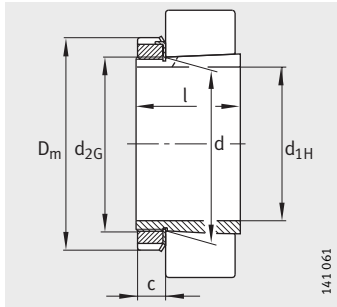
Dimension table (continued) · Dimensions in mm												
Designation			Mass m ≈ kg	Dimensions						Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d _{1H}	d	D _m ≈	l	c ≈	d _{2G}	R ₀	e	t
H3930	KML30	MBL30	3,64	135	150	180	76	26	M150X2	–	–	–
H3030	KML30	MBL30	4,02	135	150	180	87	26	M150X2	–	–	–
H24030	KML30	MBL30	4,61	135	150	180	112	26	M150X2	–	–	–
H3130	KM30	MB30	5,6	135	150	195	111	26	M150X2	–	–	–
H24130	KM30	MB30	6,1	135	150	195	137	26	M150X2	–	–	–
H2330	KM30	MB30	6,76	135	150	195	139	26	M150X2	–	–	–
H3330	KM30	MB30	7,66	135	150	195	159	26	M150X2	–	–	–
H3932	KML32	MBL32	4,75	140	160	190	78	28	M160X3	–	–	–
H3932-HG	KML32	MBL32	4,75	140	160	190	78	28	M160X3	M6	4,2	7
H3032	KML32	MBL32	5,44	140	160	190	93	28	M160X3	–	–	–
H3032-HG	KML32	MBL32	5,44	140	160	190	93	28	M160X3	M6	4,2	7
H24032	KML32	MBL32	6,27	140	160	190	118	28	M160X3	–	–	–
H24032-HG	KML32	MBL32	6,27	140	160	190	118	28	M160X3	M6	4,2	7
H3132	KM32	MB32	7,81	140	160	210	119	28	M160X3	–	–	–
H3132-HG	KM32	MB32	7,81	140	160	210	119	28	M160X3	M6	4,2	7
H2332	KM32	MB32	9,32	140	160	210	147	28	M160X3	–	–	–
H2332-HG	KM32	MB32	9,32	140	160	210	147	28	M160X3	M6	4,2	7
H24132	KM32	MB32	8,66	140	160	210	148	28	M160X3	–	–	–
H24132-HG	KM32	MB32	8,66	140	160	210	148	28	M160X3	M6	4,2	7
H3332	KM32	MB32	10,7	140	160	210	170	28	M160X3	–	–	–
H3332-HG	KM32	MB32	10,7	140	160	210	170	28	M160X3	M6	4,2	7
H3934	KML34	MBL34	5,16	150	170	200	79	29	M170X3	–	–	–
H3934-HG	KML34	MBL34	5,16	150	170	200	79	29	M170X3	M6	4,2	7
H3034	KML34	MBL34	6,25	150	170	200	101	29	M170X3	–	–	–
H3034-HG	KML34	MBL34	6,25	150	170	200	101	29	M170X3	M6	4,2	7
H24034	KML34	MBL34	7,28	150	170	200	130	29	M170X3	–	–	–
H24034-HG	KML34	MBL34	7,28	150	170	200	130	29	M170X3	M6	4,2	7
H3134	KM34	MB34	8,52	150	170	220	122	29	M170X3	–	–	–
H3134-HG	KM34	MB34	8,52	150	170	220	122	29	M170X3	M6	4,2	7
H24134	KM34	MB34	9,32	150	170	220	149	29	M170X3	–	–	–
H24134-HG	KM34	MB34	9,32	150	170	220	149	29	M170X3	M6	4,2	7
H2334	KM34	MB34	10,4	150	170	220	154	29	M170X3	–	–	–
H2334-HG	KM34	MB34	10,4	150	170	220	154	29	M170X3	M6	4,2	7
H3334	KM34	MB34	11,7	150	170	220	175	29	M170X3	–	–	–
H3334-HG	KM34	MB34	11,7	150	170	220	175	29	M170X3	M6	4,2	7



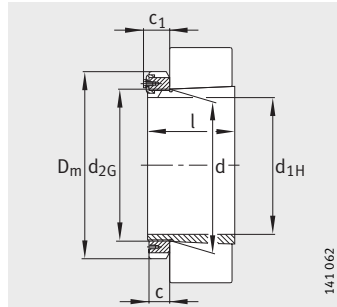
Adapter sleeves

With nut and retainer

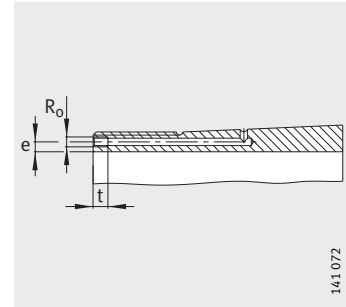
Dimension table (continued) - Dimensions in mm												
Designation			Mass	Dimensions						Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer	m	d _{1H}	d	D _m	l	c	d _{2G}	R ₀	e	t
			≈ kg				≈		≈			
H3936	KML36	MBL36	6,01	160	180	210	87	30	M180X3	–	–	–
H3936-HG	KML36	MBL36	6,01	160	180	210	87	30	M180X3	M6	4,2	7
H3036	KML36	MBL36	7,18	160	180	210	109	30	M180X3	–	–	–
H3036-HG	KML36	MBL36	7,18	160	180	210	109	30	M180X3	M6	4,2	7
H24036	KML36	MBL36	8,33	160	180	210	140	30	M180X3	–	–	–
H24036-HG	KML36	MBL36	8,33	160	180	210	140	30	M180X3	M6	4,2	7
H3136	KM36	MB36	9,67	160	180	230	131	30	M180X3	–	–	–
H3136-HG	KM36	MB36	9,67	160	180	230	131	30	M180X3	M6	4,2	7
H24136	KM36	MB36	10,5	160	180	230	159	30	M180X3	–	–	–
H24136-HG	KM36	MB36	10,5	160	180	230	159	30	M180X3	M6	4,2	7
H2336	KM36	MB36	11,6	160	180	230	161	30	M180X3	–	–	–
H2336-HG	KM36	MB36	11,6	160	180	230	161	30	M180X3	M6	4,2	7
H3336	KM36	MB36	13,3	160	180	230	186	30	M180X3	–	–	–
H3336-HG	KM36	MB36	13,3	160	180	230	186	30	M180X3	M6	4,2	7
H3938	KML38	MBL38	6,49	170	190	220	89	31	M190X3	–	–	–
H3938-HG	KML38	MBL38	6,49	170	190	220	89	31	M190X3	M6	4,2	7
H3038	KML38	MBL38	7,8	170	190	220	112	31	M190X3	–	–	–
H3038-HG	KML38	MBL38	7,8	170	190	220	112	31	M190X3	M6	4,2	7
H24038	KML38	MBL38	9	170	190	220	143	31	M190X3	–	–	–
H24038-HG	KML38	MBL38	9	170	190	220	143	31	M190X3	M6	4,2	7
H3138	KM38	MB38	11	170	190	240	141	31	M190X3	–	–	–
H3138-HG	KM38	MB38	11	170	190	240	141	31	M190X3	M6	4,2	7
H2338	KM38	MB38	12,9	170	190	240	169	31	M190X3	–	–	–
H2338-HG	KM38	MB38	12,9	170	190	240	169	31	M190X3	M6	4,2	7
H24138	KM38	MB38	11,9	170	190	240	172	31	M190X3	–	–	–
H24138-HG	KM38	MB38	11,9	170	190	240	172	31	M190X3	M6	4,2	7
H3338	KM38	MB38	14,7	170	190	240	193	31	M190X3	–	–	–
H3338-HG	KM38	MB38	14,7	170	190	240	193	31	M190X3	M6	4,2	7



Taper 1:12
(taper 1:30 for H240, H241)
Retaining plate MB, MBL



Taper 1:12
(taper 1:30 for H240)
Retaining bracket MS30



Hydraulic adapter sleeve
(suffix HG)
Mounting dimensions

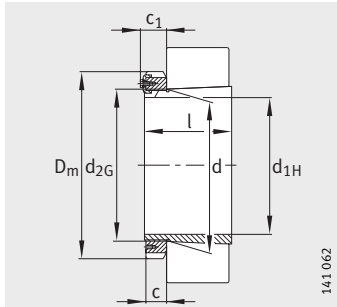
Dimension table (continued) · Dimensions in mm													
Designation			Mass m ≈ kg	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d _{1H}	d	D _m	l	c ≈	c ₁ ≈	d _{2G}	R ₀	e	t
H3940	KML40	MBL40	8,14	180	200	240	98	32	–	M200X3	–	–	–
H3940-HG	KML40	MBL40	8,14	180	200	240	98	32	–	M200X3	M6	4,2	7
H3040	KML40	MBL40	9,5	180	200	240	120	32	–	M200X3	–	–	–
H3040-HG	KML40	MBL40	9,5	180	200	240	120	32	–	M200X3	M6	4,2	7
H24040	KML40	MBL40	10,8	180	200	240	153	32	–	M200X3	–	–	–
H24040-HG	KML40	MBL40	10,8	180	200	240	153	32	–	M200X3	M6	4,2	7
H3140	KM40	MB40	12,3	180	200	250	150	32	–	M200X3	–	–	–
H3140-HG	KM40	MB40	12,3	180	200	250	150	32	–	M200X3	M6	4,2	7
H2340	KM40	MB40	14,2	180	200	250	176	32	–	M200X3	–	–	–
H2340-HG	KM40	MB40	14,2	180	200	250	176	32	–	M200X3	M6	4,2	7
H24140	KM40	MB40	13,4	180	200	250	185	32	–	M200X3	–	–	–
H24140-HG	KM40	MB40	13,4	180	200	250	185	32	–	M200X3	M6	4,2	7
H3340	KM40	MB40	16,4	180	200	250	204	32	–	M200X3	–	–	–
H3340-HG	KM40	MB40	16,4	180	200	250	204	32	–	M200X3	M6	4,2	7
H3944	HM3044	MS3044	8,45	200	220	260	96	30	40	Tr220X4	–	–	–
H3944-HG	HM3044	MS3044	8,45	200	220	260	96	30	40	Tr220X4	M6	4,2	7
H3044X	HM3044	MS3044	10,5	200	220	260	126	30	40	Tr220X4	–	–	–
H3044X-HG	HM3044	MS3044	10,5	200	220	260	126	30	40	Tr220X4	M6	4,2	7
H24044	HM3044	MS3044	12,1	200	220	260	162	30	40	Tr220X4	–	–	–
H24044-HG	HM3044	MS3044	12,1	200	220	260	162	30	40	Tr220X4	M6	4,2	7
H3144X	HM44T	MB44	15,7	200	220	280	161	35	–	Tr220X4	–	–	–
H3144X-HG	HM44T	MB44	15,7	200	220	280	161	35	–	Tr220X4	M6	4,2	7
H2344X	HM44T	MB44	17,8	200	220	280	186	35	–	Tr220X4	–	–	–
H2344X-HG	HM44T	MB44	17,8	200	220	280	186	35	–	Tr220X4	M6	4,2	7
H24144	HM44T	MB44	17,1	200	220	280	199	35	–	Tr220X4	–	–	–
H24144-HG	HM44T	MB44	17,1	200	220	280	199	35	–	Tr220X4	M6	4,2	7
H3344	HM44T	MB44	21,1	200	220	280	223	35	–	Tr220X4	–	–	–
H3344-HG	HM44T	MB44	21,1	200	220	280	223	35	–	Tr220X4	M6	4,2	7



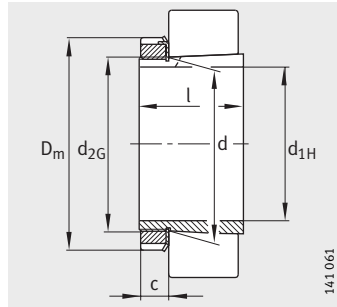
Adapter sleeves

With nut and retainer

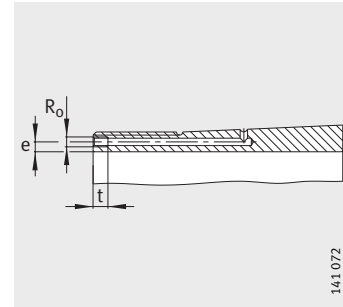
Dimension table (continued) · Dimensions in mm													
Designation			Mass m ≈kg	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d _{1H}	d	D _m	l	c	c ₁	d _{2G}	R ₀	e	t
H3948	HM3048	MS3048	11,3	220	240	290	101	34	45	Tr240X4	–	–	–
H3948-HG	HM3048	MS3048	11,3	220	240	290	101	34	45	Tr240X4	M6	4,2	7
H3048	HM3048	MS3048	13,8	220	240	290	133	34	45	Tr240X4	–	–	–
H3048-HG	HM3048	MS3048	13,8	220	240	290	133	34	45	Tr240X4	M6	4,2	7
H24048	HM3048	MS3048	15,3	220	240	290	167	34	45	Tr240X4	–	–	–
H24048-HG	HM3048	MS3048	15,3	220	240	290	167	34	45	Tr240X4	M6	4,2	7
H3148X	HM48T	MB48	18,4	220	240	300	172	37	–	Tr240X4	–	–	–
H3148X-HG	HM48T	MB48	18,4	220	240	300	172	37	–	Tr240X4	M6	4,2	7
H2348X	HM48T	MB48	20,9	220	240	300	199	37	–	Tr240X4	–	–	–
H2348X-HG	HM48T	MB48	20,9	220	240	300	199	37	–	Tr240X4	M6	4,2	7
H24148	HM48T	MB48	19,9	220	240	300	212	37	–	Tr240X4	–	–	–
H24148-HG	HM48T	MB48	19,9	220	240	300	212	37	–	Tr240X4	M6	4,2	7
H3348	HM48T	MB48	25,1	220	240	300	240	37	–	Tr240X4	–	–	–
H3348-HG	HM48T	MB48	25,1	220	240	300	240	37	–	Tr240X4	M6	4,2	7
H3952	HM3052	MS3048	13,6	240	260	310	116	34	45	Tr260X4	–	–	–
H3952-HG	HM3052	MS3048	13,6	240	260	310	116	34	45	Tr260X4	M6	4,2	7
H3052X	HM3052	MS3048	16	240	260	310	145	34	45	Tr260X4	–	–	–
H3052X-HG	HM3052	MS3048	16	240	260	310	145	34	45	Tr260X4	M6	4,2	7
H24052	HM3052	MS3048	18,4	240	260	310	190	34	45	Tr260X4	–	–	–
H24052-HG	HM3052	MS3048	18,4	240	260	310	190	34	45	Tr260X4	M6	4,2	7
H3152X	HM52T	MB52	23,5	240	260	330	190	38	–	Tr260X4	–	–	–
H3152X-HG	HM52T	MB52	23,5	240	260	330	190	38	–	Tr260X4	M6	4,2	7
H2352X	HM52T	MB52	25,7	240	260	330	211	38	–	Tr260X4	–	–	–
H2352X-HG	HM52T	MB52	25,7	240	260	330	211	38	–	Tr260X4	M6	4,2	7
H24152	HM52T	MB52	25,2	240	260	330	235	38	–	Tr260X4	–	–	–
H24152-HG	HM52T	MB52	25,2	240	260	330	235	38	–	Tr260X4	M6	4,2	7
H3352	HM52T	MB52	30,5	240	260	330	253	38	–	Tr260X4	–	–	–
H3352-HG	HM52T	MB52	30,5	240	260	330	253	38	–	Tr260X4	M6	4,2	7



Taper 1:12
(taper 1:30 for H240, H241)
Retaining bracket MS30, MS31



Taper 1:12
(taper 1:30 for H241)
Retaining plate MB



Hydraulic adapter sleeve
(suffix HG)
Mounting dimensions

Dimension table (continued) · Dimensions in mm

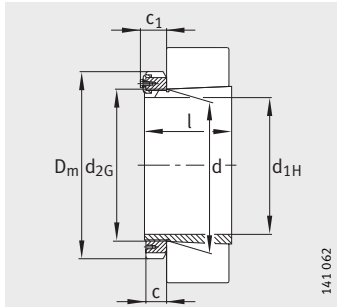
Designation			Mass m ≈kg	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d _{1H}	d	D _m	l	c	c ₁	d _{2G}	R ₀	e	t
H3956	HM3056	MS3056	15,6	260	280	330	121	38	49	Tr280X4	–	–	–
H3956-HG	HM3056	MS3056	15,6	260	280	330	121	38	49	Tr280X4	M6	4,2	7
H3056	HM3056	MS3056	18,5	260	280	330	152	38	49	Tr280X4	–	–	–
H3056-HG	HM3056	MS3056	18,5	260	280	330	152	38	49	Tr280X4	M6	4,2	7
H24056	HM3056	MS3056	20,9	260	280	330	195	38	49	Tr280X4	–	–	–
H24056-HG	HM3056	MS3056	20,9	260	280	330	195	38	49	Tr280X4	M6	4,2	7
H3156X	HM56T	MB56	26,4	260	280	350	195	39	–	Tr280X4	–	–	–
H3156X-HG	HM56T	MB56	26,4	260	280	350	195	39	–	Tr280X4	M6	4,2	7
H2356X	HM56T	MB56	29,8	260	280	350	224	39	–	Tr280X4	–	–	–
H2356X-HG	HM56T	MB56	29,8	260	280	350	224	39	–	Tr280X4	M6	4,2	7
H24156	HM56T	MB56	28	260	280	350	238	39	–	Tr280X4	–	–	–
H24156-HG	HM56T	MB56	28	260	280	350	238	39	–	Tr280X4	M6	4,2	7
H3356	HM56T	MB56	36	260	280	350	273	39	–	Tr280X4	–	–	–
H3356-HG	HM56T	MB56	36	260	280	350	273	39	–	Tr280X4	M6	4,2	7
H3960	HM3060	MS3060	20,9	280	300	360	140	42	53	Tr300X4	–	–	–
H3960-HG	HM3060	MS3060	20,9	280	300	360	140	42	53	Tr300X4	M6	4,2	7
H3060	HM3060	MS3060	23,8	280	300	360	168	42	53	Tr300X4	–	–	–
H3060-HG	HM3060	MS3060	23,8	280	300	360	168	42	53	Tr300X4	M6	4,2	7
H24060	HM3060	MS3060	26,9	280	300	360	220	42	53	Tr300X4	–	–	–
H24060-HG	HM3060	MS3060	26,9	280	300	360	220	42	53	Tr300X4	M6	4,2	7
H3160	HM3160	MS3160	30,6	280	300	380	208	40	53	Tr300X4	–	–	–
H3160-HG	HM3160	MS3160	30,6	280	300	380	208	40	53	Tr300X4	M6	4,2	7
H3260	HM3160	MS3160	34,7	280	300	380	240	40	53	Tr300X4	–	–	–
H3260-HG	HM3160	MS3160	34,7	280	300	380	240	40	53	Tr300X4	M6	4,2	7
H24160	HM3160	MS3160	32,7	280	300	380	258	40	53	Tr300X4	–	–	–
H24160-HG	HM3160	MS3160	32,7	280	300	380	258	40	53	Tr300X4	M6	4,2	7
H3360	HM3160	MS3160	40,8	280	300	380	284	40	53	Tr300X4	–	–	–
H3360-HG	HM3160	MS3160	40,8	280	300	380	284	40	53	Tr300X4	M6	4,2	7
H3964-HG	HM3064	MS3064	22	300	320	380	140	42	56	Tr320X5	M6	3,5	7
H3064-HG	HM3064	MS3064	25,4	300	320	380	171	42	56	Tr320X5	M6	3,5	7
H24064-HG	HM3064	MS3064	28,4	300	320	380	220	42	56	Tr320X5	M6	3,5	7
H3164-HG	HM3164	MS3164	35,4	300	320	400	226	42	56	Tr320X5	M6	3,5	7
H3264-HG	HM3164	MS3164	40	300	320	400	258	42	56	Tr320X5	M6	3,5	7
H24164-HG	HM3164	MS3164	37,4	300	320	400	278	42	56	Tr320X5	M6	3,5	7
H3364-HG	HM3164	MS3164	47,8	300	320	400	308	42	56	Tr320X5	M6	3,5	7



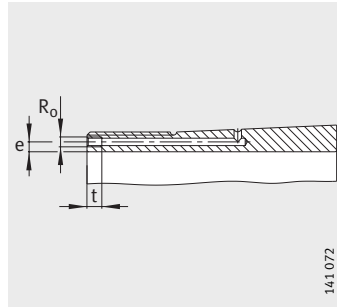
Adapter sleeves

With nut and retainer

Dimension table (continued) · Dimensions in mm													
Designation			Mass m ≈kg	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d _{1H}	d	D _m	l	c	c ₁	d _{2G}	R ₀	e	t
H3968-HG	HM3068	MS3064	24,8	320	340	400	144	45	57	Tr340X5	M6	3,5	7
H3068-HG	HM3068	MS3064	30	320	340	400	187	45	57	Tr340X5	M6	3,5	7
H24068-HG	HM3068	MS3064	33,8	320	340	400	244	45	57	Tr340X5	M6	3,5	7
H3168-HG	HM3168	MS3168	50,1	320	340	440	254	55	70	Tr340X5	M6	3,5	7
H3268-HG	HM3168	MS3168	55,4	320	340	440	288	55	70	Tr340X5	M6	3,5	7
H24168-HG	HM3168	MS3168	53	320	340	440	317	55	70	Tr340X5	M6	3,5	7
H3368-HG	HM3168	MS3168	63,6	320	340	440	336	55	70	Tr340X5	M6	3,5	7
H3972-HG	HM3072	MS3072	25,9	340	360	420	144	45	57	Tr360X5	M6	3,5	7
H3072-HG	HM3072	MS3072	31,6	340	360	420	188	45	57	Tr360X5	M6	3,5	7
H24072-HG	HM3072	MS3072	35,5	340	360	420	244	45	57	Tr360X5	M6	3,5	7
H3172-HG	HM3172	MS3168	54,3	340	360	460	259	58	73	Tr360X5	M6	3,5	7
H3272-HG	HM3172	MS3168	61	340	360	460	299	58	73	Tr360X5	M6	3,5	7
H24172-HG	HM3172	MS3168	57,1	340	360	460	321	58	73	Tr360X5	M6	3,5	7
H3372-HG	HM3172	MS3168	71,8	340	360	460	357	58	73	Tr360X5	M6	3,5	7
H3976-HG	HM3076	MS3076	32,1	360	380	450	164	48	62	Tr380X5	M6	3,5	7
H3076-HG	HM3076	MS3076	36,2	360	380	450	193	48	62	Tr380X5	M6	3,5	7
H24076-HG	HM3076	MS3076	40,1	360	380	450	248	48	62	Tr380X5	M6	3,5	7
H3176-HG	HM3176	MS3176	62,4	360	380	490	264	60	75	Tr380X5	M6	3,5	7
H3276-HG	HM3176	MS3176	70,7	360	380	490	310	60	75	Tr380X5	M6	3,5	7
H24176-HG	HM3176	MS3176	64,9	360	380	490	323	60	75	Tr380X5	M6	3,5	7
H3376-HG	HM3176	MS3176	82,8	360	380	490	370	60	75	Tr380X5	M6	3,5	7
H3980-HG	HM3080	MS3076	35,4	380	400	470	168	52	66	Tr400X5	M6	3,5	7
H3080-HG	HM3080	MS3076	41,7	380	400	470	210	52	66	Tr400X5	M6	3,5	7
H24080-HG	HM3080	MS3076	46,4	380	400	470	272	52	66	Tr400X5	M6	3,5	7
H3180-HG	HM3180	MS3180	71,3	380	400	520	272	62	81	Tr400X5	M6	3,5	7
H3280-HG	HM3180	MS3180	82,1	380	400	520	328	62	81	Tr400X5	M6	3,5	7
H24180-HG	HM3180	MS3180	73,8	380	400	520	332	62	81	Tr400X5	M6	3,5	7
H3380-HG	HM3180	MS3180	93,4	380	400	520	380	62	81	Tr400X5	M6	3,5	7
H3984-HG	HM3084	MS3084	36,9	400	420	490	168	52	66	Tr420X5	M6	3,5	7
H3084X-HG	HM3084	MS3084	43,8	400	420	490	212	52	66	Tr420X5	M6	3,5	7
H24084-HG	HM3084	MS3084	48,6	400	420	490	274	52	66	Tr420X5	M6	3,5	7
H3184-HG	HM3184	MS3180	85,1	400	420	540	304	70	89	Tr420X5	M6	3,5	7
H3284-HG	HM3184	MS3180	95,3	400	420	540	352	70	89	Tr420X5	M6	3,5	7
H24184-HG	HM3184	MS3180	87,8	400	420	540	372	70	89	Tr420X5	M6	3,5	7
H3384-HG	HM3184	MS3180	105	400	420	540	395	70	89	Tr420X5	M6	3,5	7



Taper 1:12
(taper 1:30 for H240, H241)



Hydraulic adapter sleeve
Mounting dimensions

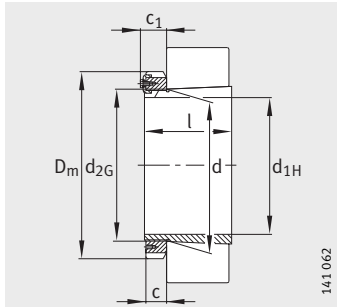
Dimension table (continued) · Dimensions in mm													
Designation			Mass m ≈kg	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d _{1H}	d	D _m	l	c ≈	c ₁ ≈	d _{2G}	R ₀	e	t
H3988-HG	HM3088	MS3088	59	410	440	520	189	60	75	Tr440X5	M8	6,5	12
H3088-HG	HM3088	MS3088	67,7	410	440	520	228	60	75	Tr440X5	M8	6,5	12
H24088-HG	HM3088	MS3088	76,4	410	440	520	294	60	75	Tr440X5	M8	6,5	12
H3188-HG	HM3188	MS3188	105	410	440	560	307	70	89	Tr440X5	M8	6,5	12
H3288-HG	HM3188	MS3188	120	410	440	560	361	70	89	Tr440X5	M8	6,5	12
H24188-HG	HM3188	MS3188	111	410	440	560	372	70	89	Tr440X5	M8	6,5	12
H3388-HG	HM3188	MS3188	140	410	440	560	426	70	89	Tr440X5	M8	6,5	12
H3992-HG	HM3092	MS3088	61,4	430	460	540	189	60	75	Tr460X5	M8	6,5	12
H3092-HG	HM3092	MS3088	71,8	430	460	540	234	60	75	Tr460X5	M8	6,5	12
H24092-HG	HM3092	MS3088	80,8	430	460	540	300	60	75	Tr460X5	M8	6,5	12
H3192-HG	HM3192	MS3188	118	430	460	580	326	75	94	Tr460X5	M8	6,5	12
H3292-HG	HM3192	MS3188	134	430	460	580	382	75	94	Tr460X5	M8	6,5	12
H24192-HG	HM3192	MS3188	124	430	460	580	398	75	94	Tr460X5	M8	6,5	12
H3392-HG	HM3192	MS3188	157	430	460	580	451	75	94	Tr460X5	M8	6,5	12
H3996-HG	HM3096	MS3096	66,8	450	480	560	200	60	75	Tr480X5	M8	6,5	12
H3096-HG	HM3096	MS3096	75,9	450	480	560	237	60	75	Tr480X5	M8	6,5	12
H24096-HG	HM3096	MS3096	84,7	450	480	560	301	60	75	Tr480X5	M8	6,5	12
H3196-HG	HM3196	MS3196	135	450	480	620	335	75	94	Tr480X5	M8	6,5	12
H3296-HG	HM3196	MS3196	155	450	480	620	397	75	94	Tr480X5	M8	6,5	12
H24196-HG	HM3196	MS3196	142	450	480	620	408	75	94	Tr480X5	M8	6,5	12
H3396-HG	HM3196	MS3196	177	450	480	620	462	75	94	Tr480X5	M8	6,5	12
H39/500-HG	HM30/500	MS3096	75,2	470	500	580	208	68	83	Tr500X5	M8	6,5	12
H30/500-HG	HM30/500	MS3096	85,2	470	500	580	247	68	83	Tr500X5	M8	6,5	12
H240/500-HG	HM30/500	MS3096	93,8	470	500	580	309	68	83	Tr500X5	M8	6,5	12
H31/500-HG	HM31/500	MS31/500	145	470	500	630	356	80	99	Tr500X5	M8	6,5	12
H32/500-HG	HM31/500	MS31/500	170	470	500	630	428	80	99	Tr500X5	M8	6,5	12
H241/500-HG	HM31/500	MS31/500	151	470	500	630	430	80	99	Tr500X5	M8	6,5	12
H33/500-HG	HM31/500	MS31/500	189	470	500	630	480	80	99	Tr500X5	M8	6,5	12
H39/530-HG	HM30/530	MS30/530	89	500	530	630	216	68	89	Tr530X6	M8	6	12
H30/530-HG	HM30/530	MS30/530	103	500	530	630	265	68	89	Tr530X6	M8	6	12
H240/530-HG	HM30/530	MS30/530	115	500	530	630	343	68	89	Tr530X6	M8	6	12
H31/530-HG	HM31/530	MS31/530	161	500	530	670	364	80	102	Tr530X6	M8	6	12
H241/530-HG	HM31/530	MS31/530	167	500	530	670	440	80	102	Tr530X6	M8	6	12
H32/530-HG	HM31/530	MS31/530	192	500	530	670	447	80	102	Tr530X6	M8	6	12
H33/530-HG	HM31/530	MS31/530	215	500	530	670	504	80	102	Tr530X5	M8	6	12



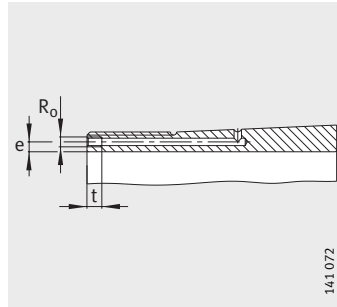
Adapter sleeves

With nut and retainer

Dimension table (continued) · Dimensions in mm														
Designation			Mass m ≈kg	Dimensions								Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d _{1H}	d	D _m	l	c ≈	c ₁ ≈	d _{2G}	R ₀	e	t	
H39/560-HG	HM30/560	MS30/560	95,6	530	560	650	227	75	96	Tr560X6	M8	6	12	
H30/560-HG	HM30/560	MS30/560	112	530	560	650	282	75	96	Tr560X6	M8	6	12	
H240/560-HG	HM30/560	MS30/560	124	530	560	650	358	75	96	Tr560X6	M8	6	12	
H31/560-HG	HM31/560	MS31/560	184	530	560	710	377	85	107	Tr560X6	M8	6	12	
H32/560-HG	HM31/560	MS31/560	218	530	560	710	462	85	107	Tr560X6	M8	6	12	
H241/560-HG	HM31/560	MS31/560	195	530	560	710	468	85	107	Tr560X6	M8	6	12	
H33/560-HG	HM31/560	MS31/560	250	530	560	710	535	85	107	Tr560X6	M8	6	12	
H39/600-HG	HM30/600	MS30/530	129	560	600	700	239	75	96	Tr600X6	G1/8	8	12	
H30/600-HG	HM30/600	MS30/530	149	560	600	700	289	75	96	Tr600X6	G1/8	8	12	
H240/600-HG	HM30/600	MS30/530	171	560	600	700	377	75	96	Tr600X6	G1/8	8	12	
H31/600-HG	HM31/600	MS31/560	234	560	600	750	399	85	107	Tr600X6	G1/8	8	12	
H32/600-HG	HM31/600	MS31/560	279	560	600	750	487	85	107	Tr600X6	G1/8	8	12	
H241/600-HG	HM31/600	MS31/560	249	560	600	750	490	85	107	Tr600X6	G1/8	8	12	
H33/600-HG	HM31/600	MS31/560	320	560	600	750	561	85	107	Tr600X6	G1/8	8	12	
H39/630-HG	HM30/630	MS30/630	123	600	630	730	254	75	96	Tr630X6	M8	6	12	
H30/630-HG	HM30/630	MS30/630	139	600	630	730	301	75	96	Tr630X6	M8	6	12	
H240/630-HG	HM30/630	MS30/630	157	600	630	730	395	75	96	Tr630X6	M8	6	12	
H31/630-HG	HM31/630	MS31/630	251	600	630	800	424	95	117	Tr630X6	M8	6	12	
H32/630-HG	HM31/630	MS31/630	297	600	630	800	521	95	117	Tr630X6	M8	6	12	
H241/630-HG	HM31/630	MS31/630	263	600	630	800	525	95	117	Tr630X6	M8	6	12	
H33/630-HG	HM31/630	MS31/630	338	600	630	800	597	95	117	Tr630X6	M8	6	12	
H39/670-HG	HM30/670	MS30/670	166	630	670	780	264	80	101	Tr670X6	G1/8	8	12	
H30/670-HG	HM30/670	MS30/670	194	630	670	780	324	80	101	Tr670X6	G1/8	8	12	
H240/670-HG	HM30/670	MS30/670	218	630	670	780	418	80	101	Tr670X6	G1/8	8	12	
H31/670-HG	HM31/670	MS31/670	341	630	670	850	456	106	128	Tr670X6	G1/8	8	12	
H241/670-HG	HM31/670	MS31/670	355	630	670	850	548	106	128	Tr670X6	G1/8	8	12	
H32/670-HG	HM31/670	MS31/670	402	630	670	850	558	106	128	Tr670X6	G1/8	8	12	
H33/670-HG	HM31/670	MS31/670	453	630	670	850	635	106	128	Tr670X6	G1/8	8	12	
H39/710-HG	HM30/710	MS30/710	200	670	710	830	286	90	111	Tr710X7	G1/8	8	12	
H30/710-HG	HM30/710	MS30/710	228	670	710	830	342	90	111	Tr710X7	G1/8	8	12	
H240/710-HG	HM30/710	MS30/710	254	670	710	830	438	90	111	Tr710X7	G1/8	8	12	
H31/710-HG	HM31/710	MS31/710	376	670	710	900	467	106	131	Tr710X7	G1/8	8	12	
H32/710-HG	HM31/710	MS31/710	444	670	710	900	572	106	131	Tr710X7	G1/8	8	12	
H241/710-HG	HM31/710	MS31/710	397	670	710	900	577	106	131	Tr710X7	G1/8	8	12	
H33/710-HG	HM31/710	MS31/710	501	670	710	900	652	106	131	Tr710X7	G1/8	8	12	



Taper 1:12
(taper 1:30 for H240, H241)



Hydraulic adapter sleeve
Mounting dimensions

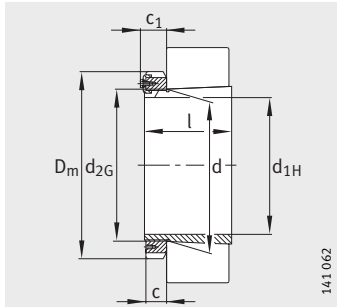
Dimension table (continued) · Dimensions in mm													
Designation			Mass m ≈kg	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d _{1H}	d	D _m	l	c	c ₁	d _{2G}	R ₀	e	t
H39/750-HG	HM30/750	MS30/750	213	710	750	870	291	90	111	Tr750X7	G1/8	8	12
H30/750-HG	HM30/750	MS30/750	248	710	750	870	356	90	111	Tr750X7	G1/8	8	12
H240/750-HG	HM30/750	MS30/750	278	710	750	870	460	90	111	Tr750X7	G1/8	8	12
H31/750-HG	HM31/750	MS31/750	432	710	750	950	493	112	137	Tr750X7	G1/8	8	12
H32/750-HG	HM31/750	MS31/750	508	710	750	950	603	112	137	Tr750X7	G1/8	8	12
H241/750-HG	HM31/750	MS31/750	461	710	750	950	622	112	137	Tr750X7	G1/8	8	12
H33/750-HG	HM31/750	MS31/750	574	710	750	950	688	112	137	Tr750X7	G1/8	8	12
H39/800-HG	HM30/800	MS30/750	263	750	800	920	303	90	111	Tr800X7	G1/8	10	12
H30/800-HG	HM30/800	MS30/750	305	750	800	920	366	90	111	Tr800X7	G1/8	10	12
H240/800-HG	HM30/800	MS30/750	349	750	800	920	475	90	111	Tr800X7	G1/8	10	12
H31/800-HG	HM31/800	MS31/750	515	750	800	1000	505	112	137	Tr800X7	G1/8	10	12
H32/800-HG	HM31/800	MS31/750	611	750	800	1000	618	112	137	Tr800X7	G1/8	10	12
H241/800-HG	HM31/800	MS31/750	552	750	800	1000	627	112	137	Tr800X7	G1/8	10	12
H33/800-HG	HM31/800	MS31/750	716	750	800	1000	730	112	137	Tr800X7	G1/8	10	12
H39/850-HG	HM30/850	MS30/850	292	800	850	980	308	90	115	Tr850X7	G1/8	10	12
H30/850-HG	HM30/850	MS30/850	344	800	850	980	380	90	115	Tr850X7	G1/8	10	12
H240/850-HG	HM30/850	MS30/850	393	800	850	980	495	90	115	Tr850X7	G1/8	10	12
H31/850-HG	HM31/850	MS31/850	590	800	850	1060	536	118	143	Tr850X7	G1/8	10	12
H32/850-HG	HM31/850	MS31/850	696	800	850	1060	651	118	143	Tr850X7	G1/8	10	12
H241/850-HG	HM31/850	MS31/850	624	800	850	1060	658	118	143	Tr850X7	G1/8	10	12
H33/850-HG	HM31/850	MS31/850	814	800	850	1060	766	118	143	Tr850X7	G1/8	10	12
H39/900-HG	HM30/900	MS30/850	335	850	900	1030	326	100	112	Tr900X7	G1/8	10	12
H30/900-HG	HM30/900	MS30/850	392	850	900	1030	400	100	112	Tr900X7	G1/8	10	12
H240/900-HG	HM30/900	MS30/850	446	850	900	1030	520	100	112	Tr900X7	G1/8	10	12
H31/900-HG	HM31/900	MS31/900	674	850	900	1120	557	125	150	Tr900X7	G1/8	10	12
H32/900-HG	HM31/900	MS31/900	775	850	900	1120	660	125	150	Tr900X7	G1/8	10	12
H241/900-HG	HM31/900	MS31/900	712	850	900	1120	685	125	150	Tr900X7	G1/8	10	12
H33/900-HG	HM31/900	MS31/900	923	850	900	1120	795	125	150	Tr900X7	G1/8	10	12
H39/950-HG	HM30/950	MS30/950	369	900	950	1080	344	100	122	Tr950X8	G1/8	10	12
H30/950-HG	HM30/950	MS30/950	432	900	950	1080	420	100	122	Tr950X8	G1/8	10	12
H240/950-HG	HM30/950	MS30/950	499	900	950	1080	557	100	122	Tr950X8	G1/8	10	12
H31/950-HG	HM31/950	MS31/950	738	900	950	1170	583	125	150	Tr950X8	G1/8	10	12
H32/950-HG	HM31/950	MS31/950	835	900	950	1170	675	125	150	Tr950X8	G1/8	10	12
H241/950-HG	HM31/950	MS31/950	776	900	950	1170	715	125	150	Tr950X8	G1/8	10	12
H33/950-HG	HM31/950	MS31/950	1000	900	950	1170	815	125	150	Tr950X8	G1/8	10	12



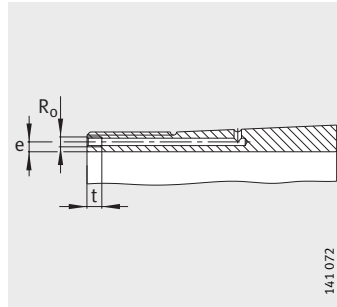
Adapter sleeves

With nut and retainer

Dimension table (continued) - Dimensions in mm														
Designation			Mass m ≈kg	Dimensions								Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d _{1H}	d	D _m	l	c ≈	c ₁ ≈	d _{2G}	R ₀	e	t	
H39/1000-HG	HM30/1000	MS30/1000	410	950	1 000	1 140	358	100	122	Tr1000X8	G1/8	10	12	
H30/1000-HG	HM30/1000	MS30/1000	474	950	1 000	1 140	430	100	122	Tr1000X8	G1/8	10	12	
H240/1000-HG	HM30/1000	MS30/1000	539	950	1 000	1 140	562	100	122	Tr1000X8	G1/8	10	12	
H31/1000-HG	HM31/1000	MS31/1000	840	950	1 000	1 240	609	125	150	Tr1000X8	G1/8	10	12	
H32/1000-HG	HM31/1000	MS31/1000	952	950	1 000	1 240	707	125	150	Tr1000X8	G1/8	10	12	
H241/1000-HG	HM31/1000	MS31/1000	886	950	1 000	1 240	755	125	150	Tr1000X8	G1/8	10	12	
H33/1000-HG	HM31/1000	MS31/1000	1 144	950	1 000	1 240	857	125	150	Tr1000X8	G1/8	10	12	
H39/1060-HG	HM30/1060	MS30/1000	493	1 000	1 060	1 200	372	100	122	Tr1060X8	G1/4	12	15	
H30/1060-HG	HM30/1060	MS30/1000	574	1 000	1 060	1 200	447	100	122	Tr1060X8	G1/4	12	15	
H240/1060-HG	HM30/1060	MS30/1000	665	1 000	1 060	1 200	588	100	122	Tr1060X8	G1/4	12	15	
H31/1060-HG	HM31/1060	MS31/1000	985	1 000	1 060	1 300	622	125	150	Tr1060X8	G1/4	12	15	
H241/1060-HG	HM31/1060	MS31/1000	1 056	1 000	1 060	1 300	775	125	150	Tr1060X8	G1/4	12	15	
H39/1120-HG	HM30/1120	MS30/1000	521	1 060	1 120	1 260	372	100	122	Tr1120X8	G1/4	12	15	
H30/1120-HG	HM30/1120	MS30/1000	631	1 060	1 120	1 260	467	100	122	Tr1120X8	G1/4	12	15	
H240/1120-HG	HM30/1120	MS30/1000	728	1 060	1 120	1 260	612	100	122	Tr1120X8	G1/4	12	15	
H31/1120-HG	HM31/1120	MS31/1000	1 060	1 060	1 120	1 360	622	125	150	Tr1120X8	G1/4	12	15	
H241/1120-HG	HM31/1120	MS31/1000	1 168	1 060	1 120	1 360	805	125	150	Tr1120X8	G1/4	13	15	
H39/1180-HG	HM30/1180	MS30/1000	576	1 120	1 180	1 320	394	100	122	Tr1180X8	G1/4	12	15	
H30/1180-HG	HM30/1180	MS30/1000	682	1 120	1 180	1 320	479	100	122	Tr1180X8	G1/4	12	15	
H240/1180-HG	HM30/1180	MS30/1000	782	1 120	1 180	1 320	625	100	122	Tr1180X8	G1/4	12	15	
H31/1180-HG	HM31/1180	MS31/1000	1 163	1 120	1 180	1 420	647	125	150	Tr1180X8	G1/4	12	15	
H241/1180-HG	HM31/1180	MS31/1000	1 287	1 120	1 180	1 420	845	125	150	Tr1180X8	G1/4	13	15	
H39/1250-HG	HM30/1250	MS30/1000	708	1 180	1 250	1 390	407	110	132	Tr1250X8	G1/4	14	15	
H30/1250-HG	HM30/1250	MS30/1000	858	1 180	1 250	1 390	509	110	132	Tr1250X8	G1/4	15	15	
H240/1250-HG	HM30/1250	MS30/1000	988	1 180	1 250	1 390	660	110	132	Tr1250X8	G1/4	14	15	
H31/1250-HG	HM31/1250	MS31/1000	1 377	1 180	1 250	1 490	677	125	150	Tr1250X8	G1/4	14	15	
H241/1250-HG	HM31/1250	MS31/1000	1 542	1 180	1 250	1 490	885	125	150	Tr1250X8	G1/4	14	15	
H39/1320-HG	HM30/1320	MS30/1000	781	1 250	1 320	1 460	430	110	132	Tr1320X8	G1/4	14	15	
H30/1320-HG	HM30/1320	MS30/1000	946	1 250	1 320	1 460	534	110	132	Tr1320X8	G1/4	15	15	
H240/1320-HG	HM30/1320	MS30/1000	1 085	1 250	1 320	1 460	690	110	132	Tr1320X8	G1/4	14	15	
H31/1320-HG	HM31/1320	MS31/1000	1 515	1 250	1 320	1 560	710	125	150	Tr1320X8	G1/4	14	15	
H241/1320-HG	HM31/1320	MS31/1000	1 703	1 250	1 320	1 560	935	125	150	Tr1320X8	G1/4	14	15	



Taper 1:12
(taper 1:30 for H240, H241)



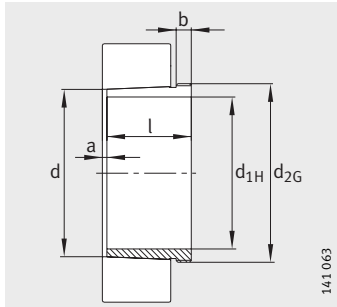
Hydraulic adapter sleeve
Mounting dimensions

Dimension table (continued) · Dimensions in mm														
Designation			Mass m ≈ kg	Dimensions								Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d _{1H}	d	D _m	l	c	c ₁	d _{2G}	R ₀	e	t	
H39/1400-HG	HM30/1400	MS30/1000	924	1 320	1 400	1 540	445	110	132	Tr1400X8	G1/4	15	15	
H30/1400-HG	HM30/1400	MS30/1000	1 113	1 320	1 400	1 540	546	110	132	Tr1400X8	G1/4	15	15	
H240/1400-HG	HM30/1400	MS30/1000	1 287	1 320	1 400	1 540	705	110	132	Tr1400X8	G1/4	14	15	
H31/1400-HG	HM31/1400	MS31/1000	1 792	1 320	1 400	1 640	735	130	155	Tr1400X8	G1/4	15	15	
H241/1400-HG	HM31/1400	MS31/1000	2 030	1 320	1 400	1 640	965	130	155	Tr1400X8	G1/4	15	15	
H39/1500-HG	HM30/1500	MS30/1500	1 210	1 400	1 500	1 650	465	110	132	Tr1500X8	G1/4	15	15	
H30/1500-HG	HM30/1500	MS30/1500	1 534	1 400	1 500	1 650	600	110	132	Tr1500X8	G1/4	15	15	
H240/1500-HG	HM30/1500	MS30/1500	1 791	1 400	1 500	1 650	775	110	132	Tr1500X8	G1/4	14	15	
H31/1500-HG	HM31/1500	MS31/1000	2 227	1 400	1 500	1 740	755	130	155	Tr1500X8	G1/4	15	15	
H241/1500-HG	HM31/1500	MS31/1000	2 564	1 400	1 500	1 740	990	130	155	Tr1500X8	G1/4	15	15	
H39/1600-HG	MU-195077A	MS30/850	2 481	1 500	1 600	1 730	465	100	112	Tr1600X8	G1/4	15	15	
H39/1700-HG	MU-195,078A	MS30/850	2 619	1 600	1 700	1 830	475	100	112	Tr1700X8	G1/4	15	15	

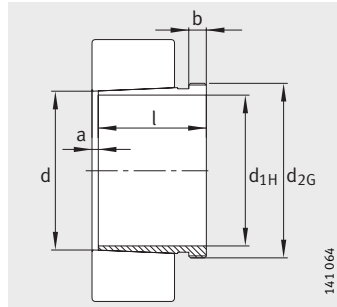


Extraction sleeves

Dimension table · Dimensions in mm							
Designation	Mass m ≈kg	Dimensions					
		d _{1H}	d	l	a ≈	b	d _{2G}
AH208	0,08	35	40	25	2	6	M45X1,5
AH308	0,09	35	40	29	3	6	M45X1,5
AH2308	0,13	35	40	40	3	7	M45X1,5
AH3308	0,15	35	40	44	3	7	M45X1,5
AH209	0,09	40	45	26	3	6	M50X1,5
AH309	0,11	40	45	31	3	6	M50X1,5
AH2309	0,17	40	45	44	3	7	M50X1,5
AH3309	0,18	40	45	47	3	7	M50X1,5
AH210	0,12	45	50	28	3	7	M55X2
AHX310	0,14	45	50	35	3	7	M55X2
AHX2310	0,22	45	50	50	3	9	M55X2
AH3310	0,24	45	50	54	3	9	M55X2
AH211	0,13	50	55	29	3	7	M60X2
AHX311	0,17	50	55	37	3	7	M60X2
AHX2311	0,26	50	55	54	3	10	M60X2
AH3311	0,3	50	55	60	3	10	M60X2
AH212	0,16	55	60	32	3	8	M65X2
AHX312	0,2	55	60	40	3	8	M65X2
AHX2312	0,32	55	60	58	3	11	M65X2
AH3312	0,41	55	60	65	3	11	M70X2
AH213	0,21	60	65	32,5	3,5	8	M75X2
AH213G	0,18	60	65	32,5	3,5	8	M70X2
AH313	0,27	60	65	42	3	8	M75X2
AH313G	0,23	60	65	42	3	8	M70X2
AH2313	0,42	60	65	61	3	12	M75X2
AH2313G	0,36	60	65	61	3	12	M70X2
AH3313	0,49	60	65	71	3	12	M75X2
AH214	0,23	65	70	33,5	3,5	8	M80X2
AH214G	0,2	65	70	33,5	3,5	8	M75X2
AH314	0,29	65	70	43	4	8	M80X2
AH314G	0,26	65	70	43	4	8	M75X2
AHX2314	0,47	65	70	64	4	12	M80X2
AHX2314G	0,42	65	70	64	4	12	M75X2
AH3314	0,57	65	70	76	4	12	M80X2
AH215	0,26	70	75	34,5	3,5	8	M85X2
AH215G	0,22	70	75	34,5	3,5	8	M80X2
AH315	0,33	70	75	45	4	8	M85X2
AH315G	0,29	70	75	45	4	8	M80X2



Taper 1:12

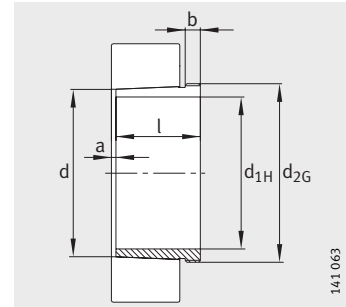


AH240, AH241
Taper 1:30

Dimension table (continued) · Dimensions in mm							
Designation	Mass m ≈kg	Dimensions					
		d _{1H}	d	l	a ≈	b	d _{2G}
AHX2315	0,54	70	75	68	4	12	M85X2
AHX2315G	0,48	70	75	68	4	12	M80X2
AH3315	0,66	70	75	81	4	12	M85X2
AH216	0,28	75	80	35,5	3,5	8	M90X2
AH316	0,38	75	80	48	4	8	M90X2
AHX2316	0,61	75	80	71	4	12	M90X2
AH3316	0,71	75	80	81	4	12	M90X2
AH217	0,33	80	85	38,5	3,5	9	M95X2
AHX317	0,44	80	85	52	4	9	M95X2
AH3217	0,52	80	85	60	4	10	M95X2
AHX2317	0,68	80	85	74	4	13	M95X2
AH3317	0,81	80	85	86	4	13	M95X2
AH218	0,36	85	90	40	4	9	M100X2
AHX318	0,48	85	90	53	4	9	M100X2
AHX3218	0,58	85	90	63	4	10	M100X2
AHX2318	0,78	85	90	79	4	14	M100X2
AH3318	0,88	85	90	87	4	14	M100X2
AH219	0,42	90	95	43	4	10	M105X2
AHX319	0,55	90	95	57	4	10	M105X2
AHX3219	0,67	90	95	67	4	11	M105X2
AHX2319	0,91	90	95	85	4	16	M105X2
AH3319	1,03	90	95	94	4	16	M105X2
AH220	0,46	95	100	45	4	10	M110X2
AHX320	0,6	95	100	59	4	10	M110X2
AH24020	0,5	95	100	62	9	12	M105X2
AHX3120	0,67	95	100	64	4	11	M110X2
AHX3220	0,78	95	100	73	4	11	M110X2
AH24120	0,63	95	100	78	9	13	M105X2
AHX2320	1,03	95	100	90	4	16	M110X2
AH3320	1,16	95	100	99	4	16	M110X2
AH222	0,57	105	110	50	4	11	M120X2
AHX322	0,73	105	110	63	4	12	M120X2
AHX3122	0,79	105	110	68	4	11	M120X2
AH24022	0,65	105	110	73	9	13	M115X2
AH24122	0,73	105	110	82	9	13	M115X2
AHX3222A	0,98	105	110	82	4	11	M120X2
AHX2322	1,38	105	110	98	4	16	M125X2
AHX2322G	1,26	105	110	98	4	16	M120X2

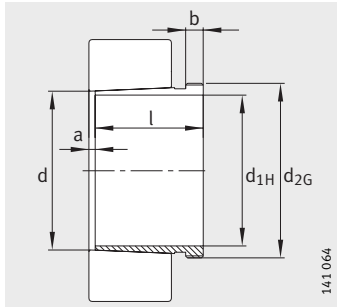


Extraction sleeves

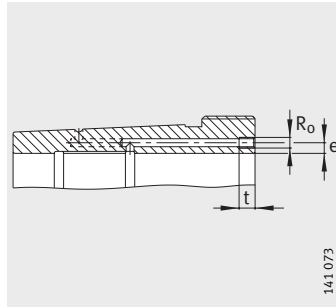


Taper 1:12

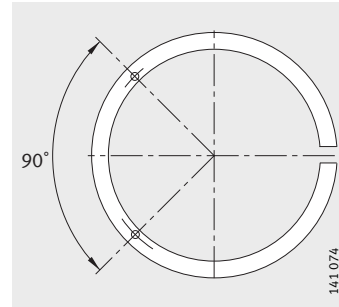
Dimension table (continued) · Dimensions in mm							
Designation	Mass m ≈kg	Dimensions					
		d _{1H}	d	l	a ≈	b	d _{2G}
AH3322	1,54	105	110	108	4	16	M125X2
AH224	0,67	115	120	53	4	12	M130X2
AHX3024	0,77	115	120	60	4	13	M130X2
AHX324	0,89	115	120	69	4	13	M130X2
AH24024	0,71	115	120	73	9	13	M125X2
AHX3124	0,97	115	120	75	4	12	M130X2
AHX3224A	1,22	115	120	90	4	13	M130X2
AH24124	1,02	115	120	93	9	13	M130X2
AHX2324	1,64	115	120	105	4	17	M135X2
AHX2324G	1,5	115	120	105	4	17	M130X2
AH3324	1,99	115	120	123	4	17	M135X2
AH226	0,72	125	130	53	4	12	M140X2
AHX3026	0,94	125	130	67	4	14	M140X2
AHX326	1,05	125	130	74	4	14	M140X2
AHX3126	1,1	125	130	78	4	12	M140X2
AH24026	0,89	125	130	83	10	14	M135X2
AH24126	1,13	125	130	94	10	14	M140X2
AHX3226	1,61	125	130	98	4	15	M145X2
AHX3226G	1,48	125	130	98	4	15	M140X2
AHX2326	2	125	130	115	4	19	M145X2
AHX2326G	1,84	125	130	115	4	19	M140X2
AH3326	2,36	125	130	131	4	19	M145X2
AH228	0,83	135	140	56	5	13	M150X2
AHX3028	1,03	135	140	68	5	14	M150X2
AHX328	1,18	135	140	77	5	14	M150X2
AH24028	0,96	135	140	83	10	14	M145X2
AHX3128	1,29	135	140	83	5	14	M150X2
AH24128	1,29	135	140	99	10	14	M150X2
AHX3228	1,86	135	140	104	5	15	M155X3
AHX3228G	1,72	135	140	104	5	15	M150X2
AHX2328	2,4	135	140	125	5	20	M155X3
AHX2328G	2,21	135	140	125	5	20	M150X2
AH3328	2,72	135	140	138	5	20	M155X3
AH230	0,97	145	150	60	5	14	M160X3
AHX3030	1,18	145	150	72	5	15	M160X3
AHX330	1,54	145	150	83	5	15	M165X3
AHX330G	1,39	145	150	83	5	15	M160X3
AH24030	1,12	145	150	90	11	15	M155X3



AH240, AH241
Taper 1:30



Hydraulic extraction sleeve
(suffix H)
Mounting dimensions

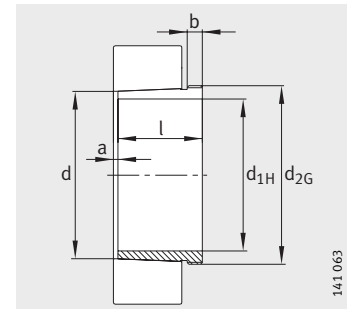


Pump connectors for
hydraulic extraction sleeve

Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AHX3130	1,81	145	150	96	5	15	M165X3	-	-	-
AHX3130G	1,66	145	150	96	5	15	M160X3	-	-	-
AHX3230	2,25	145	150	114	5	17	M165X3	-	-	-
AHX3230G	2,09	145	150	114	5	17	M160X3	-	-	-
AH24130	1,63	145	150	115	11	15	M160X3	-	-	-
AHX2330	2,88	145	150	135	5	24	M165X3	-	-	-
AHX2330G	2,64	145	150	135	5	24	M160X3	-	-	-
AH3330	3,36	145	150	152	5	24	M165X3	-	-	-
AH232	1,71	150	160	64	5	15	M170X3	-	-	-
AH3032	2,09	150	160	77	5	16	M170X3	-	-	-
AH3032-H	2,09	150	160	77	5	16	M170X3	M6	4,2	7
AH332	2,76	150	160	88	5	16	M180X3	-	-	-
AH332G	2,42	150	160	88	5	16	M170X3	-	-	-
AH24032	2,31	150	160	95	11	15	M170X3	-	-	-
AH3132A	2,9	150	160	103	5	16	M170X3	-	-	-
AH3132A-H	2,9	150	160	103	5	16	M170X3	M6	4,5	7
AH24132	3,04	150	160	124	11	15	M170X3	-	-	-
AH3232	4,08	150	160	124	6	20	M180X3	-	-	-
AH3232G	3,65	150	160	124	6	20	M170X3	-	-	-
AH3232G-H	3,65	150	160	124	6	20	M170X3	M6	4,5	7
AH3232-H	4,08	150	160	124	6	20	M180X3	M6	4,5	7
AH2332	4,77	150	160	140	6	24	M180X3	-	-	-
AH2332G	4,26	150	160	140	6	24	M170X3	-	-	-
AH2332G-H	4,26	150	160	140	6	24	M170X3	M6	4,5	7
AH2332-H	4,77	150	160	140	6	24	M180X3	M6	4,5	7
AH3332	5,58	150	160	160	6	24	M180X3	-	-	-
AH3332-H	5,58	150	160	160	6	24	M180X3	M6	4,5	7
AH3934A	1,65	160	170	59	5	13	M180X3	-	-	-
AH234	1,98	160	170	69	5	16	M180X3	-	-	-
AH3034	2,48	160	170	85	5	17	M180X3	-	-	-
AH3034-H	2,48	160	170	85	5	17	M180X3	M6	4,2	7
AH334	3,13	160	170	93	5	17	M190X3	-	-	-
AH334G	2,75	160	170	93	5	17	M180X3	-	-	-
AH3134A	3,12	160	170	104	5	16	M180X3	-	-	-
AH3134A-H	3,12	160	170	104	5	16	M180X3	M6	4,5	7
AH24034	2,76	160	170	106	11	16	M180X3	-	-	-
AH24134	3,27	160	170	125	11	16	M180X3	-	-	-
AH3234	4,83	160	170	134	6	24	M190X3	-	-	-

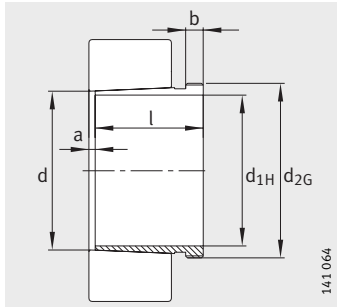


Extraction sleeves

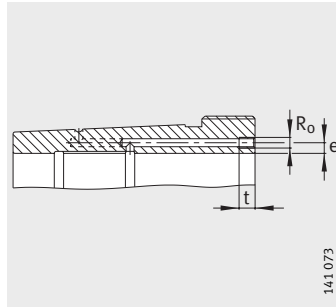


Taper 1:12

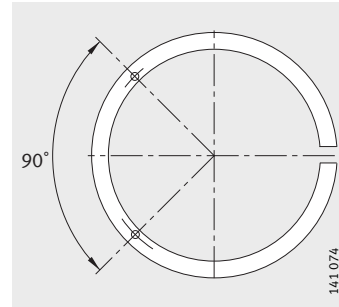
Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AH3234G	4,29	160	170	134	6	24	M180X3	–	–	–
AH3234G-H	4,29	160	170	134	6	24	M180X3	M6	4,5	7
AH3234-H	4,83	160	170	134	6	24	M190X3	M6	4,5	7
AH2334	5,32	160	170	146	6	24	M190X3	–	–	–
AH2334G	4,78	160	170	146	6	24	M180X3	–	–	–
AH2334G-H	4,78	160	170	146	6	24	M180X3	M6	4,5	7
AH2334-H	5,32	160	170	146	6	24	M190X3	M6	4,5	7
AH3334	6,11	160	170	164	6	24	M190X3	–	–	–
AH3334-H	6,11	160	170	164	6	24	M190X3	M6	4,5	7
AH3936	1,96	170	180	66	5	13	M190X3	–	–	–
AH236	2,1	170	180	69	5	16	M190X3	–	–	–
AH3036	2,87	170	180	92	6	17	M190X3	–	–	–
AH3036-H	2,87	170	180	92	6	17	M190X3	M6	4,2	7
AH24036	3,21	170	180	116	11	16	M190X3	–	–	–
AH3136A	3,79	170	180	116	6	19	M190X3	–	–	–
AH3136A-H	3,79	170	180	116	6	19	M190X3	M6	4,5	7
AH24136	3,74	170	180	134	11	16	M190X3	–	–	–
AH3236	5,39	170	180	140	6	25	M200X3	–	–	–
AH3236G	4,8	170	180	140	6	25	M190X3	–	–	–
AH3236G-H	4,8	170	180	140	6	25	M190X3	M6	4,5	7
AH3236-H	5,39	170	180	140	6	25	M200X3	M6	4,5	7
AH2336	6,04	170	180	154	6	26	M200X3	–	–	–
AH2336G	5,42	170	180	154	6	26	M190X3	–	–	–
AH2336G-H	5,42	170	180	154	6	26	M190X3	M6	4,5	7
AH2336-H	6,04	170	180	154	6	26	M200X3	M6	4,5	7
AH3336	7,1	170	180	176	6	26	M200X3	–	–	–
AH3336-H	7,1	170	180	176	6	26	M200X3	M6	4,5	7
AH3938	2,07	180	190	66	5	13	M200X3	–	–	–
AH238	2,57	180	190	73	5	17	Tr205X4	–	–	–
AH238G	2,36	180	190	73	5	17	M200X3	–	–	–
AH3038	3,42	180	190	96	6	18	Tr205X4	–	–	–
AH3038G	3,19	180	190	96	6	18	M200X3	–	–	–
AH3038G-H	3,19	180	190	96	6	18	M200X3	M6	4,2	7
AH3038-H	3,42	180	190	96	6	18	Tr205X4	M6	4,2	7
AH24038	3,48	180	190	118	13	18	M200X3	–	–	–
AH3138	4,89	180	190	125	6	20	Tr210X4	–	–	–
AH3138G	4,39	180	190	125	6	20	M200X3	–	–	–
AH3138G-H	4,39	180	190	125	6	20	M200X3	M6	4,5	7



AH240, AH241
Taper 1:30



Hydraulic extraction sleeve
(suffix H)
Mounting dimensions

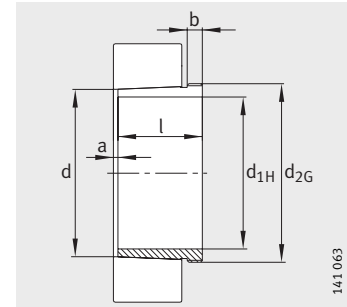


Pump connectors for
hydraulic extraction sleeve

Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AH3138-H	4,89	180	190	125	6	20	Tr210X4	M6	4,5	7
AH3238	5,92	180	190	145	7	25	Tr210X4	–	–	–
AH3238G	5,3	180	190	145	7	25	M200X3	–	–	–
AH3238G-H	5,3	180	190	145	7	25	M200X3	M6	4,5	7
AH3238-H	5,92	180	190	145	7	25	Tr210X4	M6	4,5	7
AH24138	4,37	180	190	146	13	18	M200X3	–	–	–
AH2338	6,67	180	190	160	7	26	Tr210X4	–	–	–
AH2338G	6,02	180	190	160	7	26	M200X3	–	–	–
AH2338G-H	6,02	180	190	160	7	26	M200X3	M6	4,5	7
AH2338-H	6,67	180	190	160	7	26	Tr210X4	M6	4,5	7
AH3338	7,76	180	190	181	7	26	Tr210X4	–	–	–
AH3338-H	7,76	180	190	181	7	26	Tr210X4	M6	4,5	7
AH240	2,88	190	200	77	5	18	Tr215X4	–	–	–
AH240G	2,43	190	200	77	5	18	Tr210X4	–	–	–
AH3940	2,62	190	200	77	6	16	Tr210X4	–	–	–
AH3040	3,86	190	200	102	6	19	Tr215X4	–	–	–
AH3040G	3,62	190	200	102	6	19	Tr210X4	–	–	–
AH3040G-H	3,62	190	200	102	6	19	Tr210X4	M6	4,2	7
AH3040-H	3,86	190	200	102	6	19	Tr215X4	M6	4,2	7
AH24040	3,96	190	200	127	13	18	Tr210X4	–	–	–
AH3140	5,6	190	200	134	6	21	Tr220X4	–	–	–
AH3140-H	5,6	190	200	134	6	21	Tr220X4	M6	4,5	7
AH3240	6,61	190	200	153	7	24	Tr220X4	–	–	–
AH3240-H	6,61	190	200	153	7	24	Tr220X4	M6	4,5	7
AH24140	5,02	190	200	158	13	18	Tr210X4	–	–	–
AH2340	7,64	190	200	170	7	30	Tr220X4	–	–	–
AH2340-H	7,64	190	200	170	7	30	Tr220X4	M6	4,5	7
AH3340	9,04	190	200	195	7	30	Tr220X4	–	–	–
AH3340-H	9,04	190	200	195	7	30	Tr220X4	M6	4,5	7
AH3944	4,81	200	220	77	6	16	Tr230X4	–	–	–
AH3944-H	4,81	200	220	77	6	16	Tr230X4	M8	7,5	12
AH244	5,62	200	220	85	6	18	Tr235X4	–	–	–
AH244G	5,36	200	220	85	6	18	Tr230X4	–	–	–
AH3044	7,47	200	220	111	6	20	Tr235X4	–	–	–
AH3044G	7,18	200	220	111	6	20	Tr230X4	–	–	–
AH3044G-H	7,18	200	220	111	6	20	Tr230X4	G1/8	6,5	12
AH3044-H	7,47	200	220	111	6	20	Tr235X4	G1/8	8,5	12
AH24044	8,22	200	220	138	14	18	Tr230X4	–	–	–

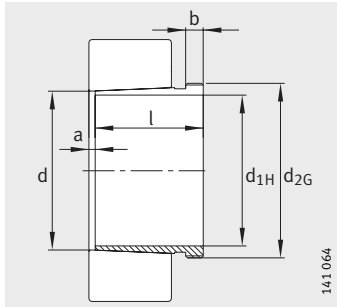


Extraction sleeves

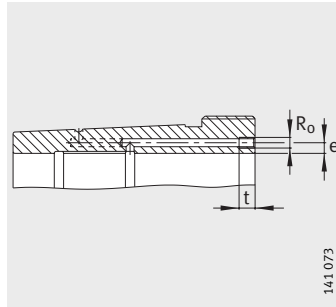


Taper 1:12

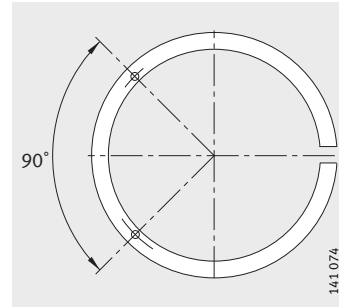
Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AH24044-H	8,22	200	220	138	14	18	Tr230X4	M6	8	7
AH3144	10,4	200	220	145	6	23	Tr240X4	–	–	–
AH3144-H	10,4	200	220	145	6	23	Tr240X4	G1/8	8,5	12
AH24144	10,3	200	220	170	14	20	Tr230X4	–	–	–
AH24144-H	10,3	200	220	170	14	20	Tr230X4	M6	8	7
AH2344	13,6	200	220	181	8	30	Tr240X4	–	–	–
AH2344-H	13,6	200	220	181	8	30	Tr240X4	G1/8	8,5	12
AH3344	16,2	200	220	210	8	30	Tr240X4	–	–	–
AH3344-H	16,2	200	220	210	8	30	Tr240X4	G1/8	8,5	12
AH3948	5,26	220	240	77	6	16	Tr250X4	–	–	–
AH3948-H	5,26	220	240	77	6	16	Tr250X4	M8	7,5	12
AH248	7,41	220	240	96	6	22	Tr260X4	–	–	–
AH3048	8,92	220	240	116	7	21	Tr260X4	–	–	–
AH3048-H	8,92	220	240	116	7	21	Tr260X4	G1/8	8,5	12
AH24048	9,03	220	240	138	15	20	Tr250X4	–	–	–
AH24048-H	9,03	220	240	138	15	20	Tr250X4	M6	8	7
AH3148	12,3	220	240	154	7	25	Tr260X4	–	–	–
AH3148-H	12,3	220	240	154	7	25	Tr260X4	G1/8	8,5	12
AH24148	12,6	220	240	180	15	20	Tr260X4	–	–	–
AH24148-H	12,6	220	240	180	15	20	Tr260X4	G1/8	8,5	12
AH2348	15,6	220	240	189	8	30	Tr260X4	–	–	–
AH2348-H	15,6	220	240	189	8	30	Tr260X4	G1/8	8,5	12
AH3348	19,3	220	240	225	8	30	Tr260X4	–	–	–
AH3348-H	19,3	220	240	225	8	30	Tr260X4	G1/8	8,5	12
AH3952	7,39	240	260	94	6	18	Tr275X4	–	–	–
AH3952G	7,7	240	260	94	6	18	Tr280X4	–	–	–
AH3952G-H	7,7	240	260	94	6	18	Tr280X4	M8	7,5	12
AH3952-H	7,39	240	260	94	6	18	Tr275X4	M8	7,5	12
AH252	8,83	240	260	105	6	23	Tr280X4	–	–	–
AH3052	10,8	240	260	128	7	23	Tr280X4	–	–	–
AH3052-H	10,8	240	260	128	7	23	Tr280X4	G1/8	8,5	12
AH24052	11,6	240	260	162	16	20	Tr270X4	–	–	–
AH24052G	12,3	240	260	162	16	20	Tr280X4	–	–	–
AH24052G-H	12,3	240	260	162	16	20	Tr280X4	M6	8	7
AH24052-H	11,6	240	260	162	16	20	Tr270X4	M6	8	7
AH3152	16	240	260	172	7	26	Tr290X4	–	–	–
AH3152G	15,1	240	260	172	7	26	Tr280X4	–	–	–
AH3152G-H	15,1	240	260	172	7	26	Tr280X4	G1/8	7	12



AH240, AH241
Taper 1:30



Hydraulic extraction sleeve
(suffix H)
Mounting dimensions

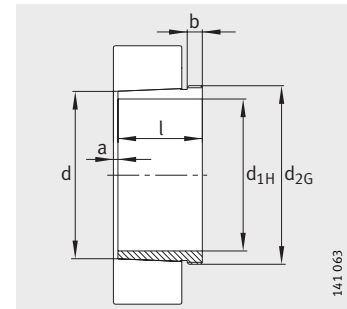


Pump connectors for
hydraulic extraction sleeve

Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AH3152-H	16	240	260	172	7	26	Tr290X4	G1/8	7	12
AH24152	15,5	240	260	202	16	22	Tr280X4	–	–	–
AH24152-H	15,5	240	260	202	16	22	Tr280X4	G1/8	8,5	12
AH2352	19,7	240	260	205	8	30	Tr290X4	–	–	–
AH2352G	18,7	240	260	205	8	30	Tr280X4	–	–	–
AH2352G-H	18,7	240	260	205	8	30	Tr280X4	G1/8	8,5	12
AH2352-H	19,7	240	260	205	8	30	Tr290X4	G1/8	8,5	12
AH3352	23,2	240	260	236	8	30	Tr290X4	–	–	–
AH3352-H	23,2	240	260	236	8	30	Tr290X4	G1/8	8,5	12
AH3956	7,98	260	280	94	6	18	Tr295X4	–	–	–
AH3956G	8,3	260	280	94	6	18	Tr300X4	–	–	–
AH3956G-H	8,3	260	280	94	6	18	Tr300X4	M8	7,5	12
AH3956-H	7,98	260	280	94	6	18	Tr295X4	M8	7,5	12
AH256	9,52	260	280	105	8	23	Tr300X4	–	–	–
AH3056	12	260	280	131	8	24	Tr300X4	–	–	–
AH3056-H	12	260	280	131	8	24	Tr300X4	G1/8	8,5	12
AH24056	12,6	260	280	162	17	22	Tr290X4	–	–	–
AH24056G	13,4	260	280	162	17	22	Tr300X4	–	–	–
AH24056G-H	13,4	260	280	162	17	22	Tr300X4	M6	8	7
AH24056-H	12,6	260	280	162	17	22	Tr290X4	M6	8	7
AH3156	17,7	260	280	175	8	28	Tr310X4	–	–	–
AH3156G	16,7	260	280	175	8	28	Tr300X4	–	–	–
AH3156G-H	16,7	260	280	175	8	28	Tr300X4	G1/8	8,5	12
AH3156-H	17,7	260	280	175	8	28	Tr310X4	G1/8	8,5	12
AH24156	16,7	260	280	202	17	22	Tr300X4	–	–	–
AH24156-H	16,7	260	280	202	17	22	Tr300X4	G1/8	8,5	12
AH2356	22,1	260	280	212	8	30	Tr310X4	–	–	–
AH2356G	20,9	260	280	212	8	30	Tr300X4	–	–	–
AH2356G-H	20,9	260	280	212	8	30	Tr300X4	G1/8	8,5	12
AH2356-H	22,1	260	280	212	8	30	Tr310X4	G1/8	8,5	12
AH3356	27,4	260	280	254	8	30	Tr310X4	–	–	–
AH3356-H	27,4	260	280	254	8	30	Tr310X4	G1/8	8,5	12
AH3960	10,4	280	300	112	7	21	Tr315X5	–	–	–
AH3960G	10,8	280	300	112	7	21	Tr320X5	–	–	–
AH3960G-H	10,8	280	300	112	7	21	Tr320X5	M8	7,5	12
AH3960-H	10,4	280	300	112	7	21	Tr315X5	M8	7,5	12
AH3060	14,4	280	300	145	8	26	Tr320X5	–	–	–
AH3060-H	14,4	280	300	145	8	26	Tr320X5	G1/8	8,5	12

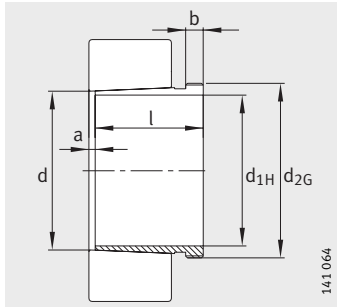


Extraction sleeves

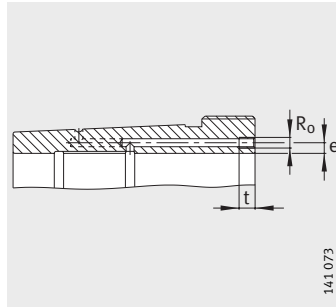


Taper 1:12

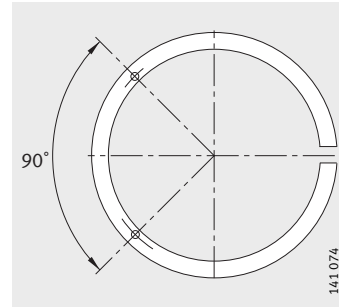
Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AH24060	15,5	280	300	184	18	24	Tr310X4	–	–	–
AH24060G	16,4	280	300	184	18	24	Tr320X5	–	–	–
AH24060G-H	16,4	280	300	184	18	24	Tr320X5	M6	8	7
AH24060-H	15,5	280	300	184	18	24	Tr310X4	M6	8	7
AH3160	21,2	280	300	192	8	30	Tr330X5	–	–	–
AH3160G	20	280	300	192	8	30	Tr320X5	–	–	–
AH3160G-H	20	280	300	192	8	30	Tr320X5	G1/8	8,5	12
AH3160-H	21,2	280	300	192	8	30	Tr330X5	G1/8	8,5	12
AH24160	20,1	280	300	224	18	24	Tr320X5	–	–	–
AH24160-H	20,1	280	300	224	18	24	Tr320X5	G1/8	8,5	12
AH3260	26	280	300	228	8	34	Tr330X5	–	–	–
AH3260G	24,6	280	300	228	8	34	Tr320X5	–	–	–
AH3260G-H	24,6	280	300	228	8	34	Tr320X5	G1/8	8,5	12
AH3260-H	26	280	300	228	8	34	Tr330X5	G1/8	8,5	12
AH3360	31,8	280	300	270	8	34	Tr330X5	–	–	–
AH3360-H	31,8	280	300	270	8	34	Tr330X5	G1/8	8,5	12
AH3964G-H	11,5	300	320	112	7	21	Tr340X5	M8	7,5	12
AH3964-H	11,1	300	320	112	7	21	Tr335X5	M8	7,5	12
AH3064G-H	15,9	300	320	149	8	27	Tr340X5	G1/8	8,5	12
AH3064-H	16,5	300	320	149	8	27	Tr345X5	G1/8	8,5	12
AH24064G-H	17,5	300	320	184	18	24	Tr340X5	M6	8	7
AH24064-H	16,6	300	320	184	18	24	Tr330X5	M6	8	7
AH3164G-H	23,6	300	320	209	8	31	Tr340X5	G1/8	8,5	12
AH3164-H	24,9	300	320	209	8	31	Tr350X5	G1/8	8,5	12
AH24164-H	23,4	300	320	242	18	24	Tr340X5	G1/8	8,5	12
AH3264G-H	28,9	300	320	246	8	36	Tr340X5	G1/8	8,5	12
AH3264-H	30,4	300	320	246	8	36	Tr350X5	G1/8	8,5	12
AH3364-H	37,9	300	320	294	8	36	Tr350X5	G1/8	8,5	12
AH3968G-H	12,3	320	340	112	7	21	Tr360X5	M8	7,5	12
AH3968-H	11,8	320	340	112	7	21	Tr355X5	M8	7,5	12
AH3068G-H	18,6	320	340	162	9	28	Tr360X5	G1/8	8,5	12
AH3068-H	19,2	320	340	162	9	28	Tr365X5	G1/8	8,5	12
AH24068-H	21,1	320	340	206	19	26	Tr360X5	G1/8	8,5	12
AH3168G-H	27,5	320	340	225	9	33	Tr360X5	G1/8	8,5	12
AH3168-H	28,9	320	340	225	9	33	Tr370X5	G1/8	8,5	12
AH3268G-H	33,6	320	340	264	9	38	Tr360X5	G1/8	8,5	12
AH3268-H	35,3	320	340	264	9	38	Tr370X5	G1/8	8,5	12
AH24168-H	28	320	340	269	19	26	Tr360X5	G1/8	8,5	12



AH240, AH241
Taper 1:30



Hydraulic extraction sleeve
(suffix H)
Mounting dimensions

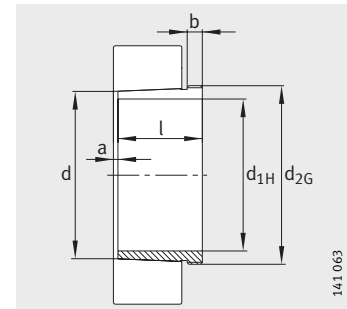


Pump connectors for
hydraulic extraction sleeve

Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AH3368-H	43,1	320	340	310	9	38	Tr370X5	G1/8	8,5	12
AH3972G-H	13	340	360	112	7	21	Tr380X5	M8	7,5	12
AH3972-H	12,5	340	360	112	7	21	Tr375X5	M8	7,5	12
AH3072G-H	20,5	340	360	167	9	30	Tr380X5	G1/8	8,5	12
AH3072-H	21,2	340	360	167	9	30	Tr385X5	G1/8	8,5	12
AH24072-H	22,3	340	360	206	20	26	Tr380X5	G1/8	8,5	12
AH3172G-H	29,8	340	360	229	9	35	Tr380X5	G1/8	8,5	12
AH3172-H	33,1	340	360	229	9	35	Tr400X5	G1/8	8,5	12
AH24172-H	29,7	340	360	269	20	26	Tr380X5	G1/8	8,5	12
AH3272G-H	37,3	340	360	274	9	40	Tr380X5	G1/8	8,5	12
AH3272-H	41,1	340	360	274	9	40	Tr400X5	G1/8	8,5	12
AH3372-H	51,5	340	360	330	9	40	Tr400X5	G1/8	8,5	12
AH3976G-H	16,1	360	380	130	8	22	Tr400X5	M8	7,5	12
AH3976-H	15,6	360	380	130	8	22	Tr395X5	M8	7,5	12
AH3076G-H	22,1	360	380	170	10	31	Tr400X5	G1/8	8,5	12
AH3076-H	23,6	360	380	170	10	31	Tr410X5	G1/8	8,5	12
AH24076-H	24	360	380	208	20	28	Tr400X5	G1/8	8,5	12
AH3176G-H	32	360	380	232	10	36	Tr400X5	G1/8	8,5	12
AH3176-H	35,6	360	380	232	10	36	Tr420X5	G1/8	8,5	12
AH24176-H	31,8	360	380	271	20	28	Tr400X5	G1/8	8,5	12
AH3276G-H	41,3	360	380	284	10	42	Tr400X5	G1/8	8,5	12
AH3276-H	45,5	360	380	284	10	42	Tr420X5	G1/8	8,5	12
AH3376-H	57,1	360	380	342	10	42	Tr420X5	G1/8	8,5	12
AH3980G-H	17	380	400	130	8	22	Tr420X5	M8	7,5	12
AH3980-H	16,4	380	400	130	8	22	Tr415X5	M8	7,5	12
AH3080G-H	25,4	380	400	183	10	33	Tr420X5	G1/8	8,5	12
AH3080-H	27,1	380	400	183	10	33	Tr430X5	G1/8	8,5	12
AH24080-H	27,8	380	400	228	20	28	Tr420X5	G1/8	8,5	12
AH3180G-H	35,1	380	400	240	10	38	Tr420X5	G1/8	8,5	12
AH3180-H	39,1	380	400	240	10	38	Tr440X5	G1/8	8,5	12
AH24180-H	34,4	380	400	278	20	28	Tr420X5	G1/8	8,5	12
AH3280G-H	47,1	380	400	302	10	44	Tr420X5	G1/8	8,5	12
AH3280-H	51,7	380	400	302	10	44	Tr440X5	G1/8	8,5	12
AH3380-H	62,5	380	400	352	10	44	Tr440X5	G1/8	8,5	12
AH3984G-H	17,8	400	420	130	8	22	Tr440X5	M8	7,5	12
AH3984-H	17,3	400	420	130	8	22	Tr435X5	M8	7,5	12
AH3084G-H	27,2	400	420	186	10	34	Tr440X5	G1/8	8,5	12
AH3084-H	29,1	400	420	186	10	34	Tr450X5	G1/8	8,5	12

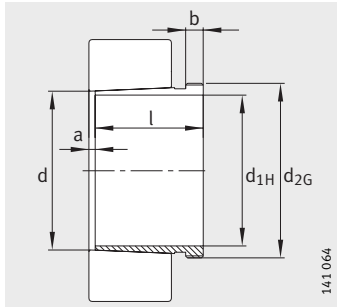


Extraction sleeves

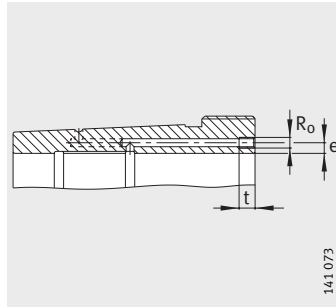


Taper 1:12

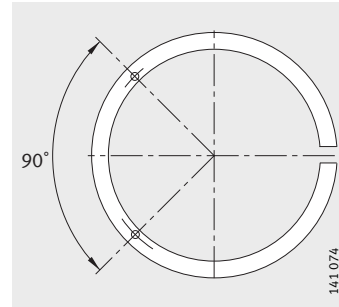
Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AH24084-H	29,6	400	420	230	22	30	Tr440X5	G1/8	8,5	12
AH3184G-H	42	400	420	266	10	40	Tr440X5	G1/8	8,5	12
AH3184-H	46,4	400	420	266	10	40	Tr460X5	G1/8	8,5	12
AH24184-H	41	400	420	310	22	30	Tr440X5	G1/8	8,5	12
AH3284G-H	53,6	400	420	321	10	46	Tr440X5	G1/8	8,5	12
AH3284-H	58,6	400	420	321	10	46	Tr460X5	G1/8	8,5	12
AH3384-H	67,9	400	420	361	10	46	Tr460X5	G1/8	8,5	12
AH3988-H	21,2	420	440	145	8	25	Tr460X5	G1/8	8,5	12
AHX3088G-H	30	420	440	194	11	35	Tr460X5	G1/8	8,5	12
AHX3088-H	31,9	420	440	194	11	35	Tr470X5	G1/8	8,5	12
AH24088-H	32,8	420	440	242	22	30	Tr460X5	G1/8	8,5	12
AHX3188G-H	44,9	420	440	270	11	42	Tr460X5	G1/8	8,5	12
AHX3188-H	49,7	420	440	270	11	42	Tr480X5	G1/8	8,5	12
AH24188-H	42,9	420	440	310	22	30	Tr460X5	G1/8	8,5	12
AHX3288G-H	58,2	420	440	330	11	48	Tr460X5	G1/8	8,5	12
AHX3288-H	63,7	420	440	330	11	48	Tr480X5	G1/8	8,5	12
AH3388-H	79,6	420	440	393	11	48	Tr480X5	G1/8	8,5	12
AH3992-H	22,2	440	460	145	8	25	Tr480X5	G1/8	8,5	12
AHX3092G-H	32,9	440	460	202	11	37	Tr480X5	G1/8	8,5	12
AHX3092G-H	35,1	440	460	202	11	37	Tr490X5	G1/8	8,5	12
AH24092-H	35,6	440	460	250	23	32	Tr480X5	G1/8	8,5	12
AHX3192G-H	50,3	440	460	285	11	43	Tr480X5	G1/8	8,5	12
AHX3192-H	58	440	460	285	11	43	Tr510X6	G1/8	8,5	12
AH24192-H	48,7	440	460	332	23	32	Tr480X5	G1/8	8,5	12
AHX3292G-H	65,6	440	460	349	11	50	Tr480X5	G1/8	8,5	12
AHX3292-H	74,6	440	460	349	11	50	Tr510X6	G1/8	8,5	12
AH3392-H	92,6	440	460	415	11	50	Tr510X6	G1/8	8,5	12
AH3996-H	25,7	460	480	158	9	28	Tr500X5	G1/8	8,5	12
AHX3096G-H	35	460	480	205	12	38	Tr500X5	G1/8	8,5	12
AHX3096-H	39,7	460	480	205	12	38	Tr520X6	G1/8	8,5	12
AH24096-H	37,2	460	480	250	23	32	Tr500X5	G1/8	8,5	12
AHX3192G-H	54,8	460	480	295	12	45	Tr500X5	G1/8	8,5	12
AHX3196-H	63,3	460	480	295	12	45	Tr530X6	G1/8	8,5	12
AH24196G-H	52,2	460	480	340	23	32	Tr500X5	G1/8	8,5	12
AH24196-H	52,9	460	480	343	25	35	Tr500X5	G1/8	8,5	12
AHX3296G-H	72,4	460	480	364	12	52	Tr500X5	G1/8	8,5	12
AHX3296-H	82,2	460	480	364	12	52	Tr530X6	G1/8	8,5	12
AH3396-H	100	460	480	427	12	52	Tr530X6	G1/8	8,5	12



AH240, AH241
Taper 1:30



Hydraulic extraction sleeve
Mounting dimensions

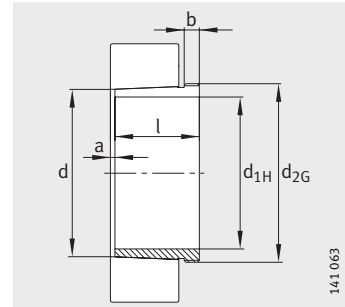


Pump connectors for
hydraulic extraction sleeve

Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AH39/500G-H	29,8	480	500	162	10	32	Tr530X6	G1/8	8,5	12
AH39/500-H	27,7	480	500	162	10	32	Tr520X6	G1/8	8,5	12
AHX30/500G-H	39,9	480	500	209	12	40	Tr530X6	G1/8	8,5	12
AHX30/500-H	42,5	480	500	209	12	40	Tr540X6	G1/8	8,5	12
AH240/500G-H	41,7	480	500	253	23	35	Tr530X6	G1/8	8,5	12
AH240/500-H	39,5	480	500	253	23	35	Tr520X6	G1/8	8,5	12
AHX31/500G-H	64,7	480	500	313	12	47	Tr530X6	G1/8	8,5	12
AHX31/500-H	70,9	480	500	313	12	47	Tr550X6	G1/8	8,5	12
AH241/500G-H	60,5	480	500	360	23	35	Tr530X6	G1/8	8,5	12
AH241/500-H	58,8	480	500	362	25	37	Tr520X6	G1/8	8,5	12
AHX32/500G-H	87,3	480	500	393	12	54	Tr530X6	G1/8	8,5	12
AHX32/500-H	94,4	480	500	393	12	54	Tr550X6	G1/8	8,5	12
AH33/500-H	110	480	500	442	12	54	Tr550X6	G1/8	8,5	12
AH39/530G-H	45,6	500	530	175	10	37	Tr560X6	G1/4	10	15
AH39/530-H	43,1	500	530	175	10	37	Tr550X6	G1/4	10	15
AH30/530A-H	61,7	500	530	230	12	45	Tr560X6	G1/4	10	15
AH240/530G-H	67,5	500	530	285	24	35	Tr560X6	G1/4	8,5	15
AH240/530-H	66,8	500	530	290	25	40	Tr550X6	G1/4	8,5	15
AH31/530A-H	92,3	500	530	325	12	53	Tr560X6	G1/4	10	15
AH241/530G-H	89	500	530	370	24	35	Tr560X6	G1/4	10	15
AH241/530-H	88,2	500	530	375	25	40	Tr550X6	G1/4	10	15
AH32/530AG-H	124	500	530	412	12	57	Tr560X6	G1/4	10	15
AH32/530-A-H	132	500	530	412	12	57	Tr580X6	G1/4	10	15
AH33/530-H	155	500	530	469	12	57	Tr580X6	G1/4	10	15
AH39/560G-H	52,3	530	560	180	10	37	Tr600X6	G1/4	12	15
AH39/560-H	47	530	560	180	10	37	Tr580X6	G1/4	12	15
AH30/560AG-H	71,6	530	560	240	12	45	Tr600X6	G1/4	12	15
AH30/560A-H	68,4	530	560	240	12	45	Tr590X6	G1/4	12	15
AH240/560G-H	77,5	530	560	296	24	38	Tr600X6	G1/4	8,5	15
AH240/560-H	72,7	530	560	298	25	40	Tr580X6	G1/4	8,5	15
AH31/560AG-H	105	530	560	335	12	55	Tr600X6	G1/4	12	15
AH31/560A-H	101	530	560	335	12	55	Tr590X6	G1/4	12	15
AH241/560G-H	104	530	560	393	24	38	Tr600X6	G1/4	12	15
AH241/560-H	101	530	560	400	28	45	Tr580X6	G1/4	12	15
AH32/560AG-H	139	530	560	422	12	57	Tr600X6	G1/4	12	15
AH32/560A-H	144	530	560	422	12	57	Tr610X6	G1/4	12	15
AH33/560-H	166	530	560	475	12	57	Tr610X6	G1/4	12	15
AH39/600G-H	57	570	600	192	10	38	Tr630X6	G1/4	12	15

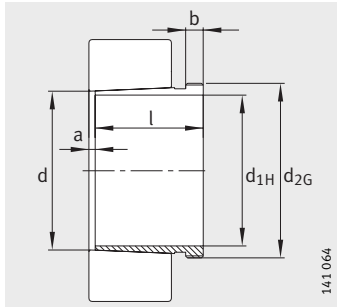


Extraction sleeves

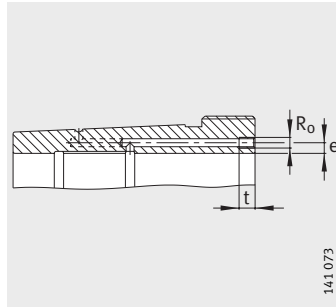


Taper 1:12

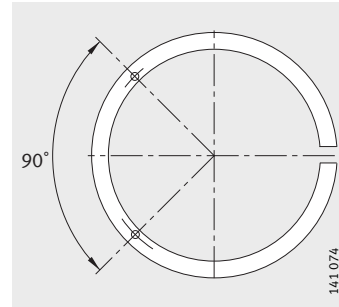
Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AH39/600-H	55,6	570	600	192	10	38	Tr625X6	G1/4	12	15
AH30/600A-H	75	570	600	245	14	45	Tr630X6	G1/4	12	15
AH240/600G-H	84,1	570	600	310	26	38	Tr630X6	G1/4	8,5	15
AH240/600-H	85,4	570	600	317	30	45	Tr625X6	G1/4	8,5	15
AH31/600A-H	116	570	600	355	14	55	Tr630X6	G1/4	12	15
AH241/600G-H	114	570	600	413	26	38	Tr630X6	G1/4	12	15
AH241/600-H	118	570	600	425	30	50	Tr625X6	G1/4	12	15
AH32/600AG-H	155	570	600	445	14	57	Tr630X6	G1/4	12	15
AH32/600A-H	164	570	600	445	14	57	Tr650X6	G1/4	12	15
AH33/600-H	200	570	600	519	14	57	Tr650X6	G1/4	12	15
AH39/630G-H	69,4	600	630	210	12	40	Tr670X6	G1/4	12	15
AH39/630-H	64,5	600	630	210	12	40	Tr655X6	G1/4	12	15
AH30/630A-H	87,3	600	630	258	14	46	Tr670X6	G1/4	12	15
AH240/630G-H	97,9	600	630	330	26	40	Tr670X6	G1/4	8,5	15
AH240/630-H	95,1	600	630	335	30	45	Tr655X6	G1/4	8,5	15
AH31/630A-H	136	600	630	375	14	60	Tr670X6	G1/4	12	15
AH241/630G-H	133	600	630	440	26	40	Tr670X6	G1/4	12	15
AH241/630-H	132	600	630	450	30	50	Tr655X6	G1/4	12	15
AH32/630AG-H	183	600	630	475	14	63	Tr670X6	G1/4	12	15
AH32/630A-H	188	600	630	475	14	63	Tr680X6	G1/4	12	15
AH33/630-H	227	600	630	550	14	62	Tr680X6	G1/4	12	15
AH39/670G-H	92,9	630	670	216	12	41	Tr710X7	G1/4	12	15
AH39/670-H	87,7	630	670	216	12	41	Tr695X6	G1/4	12	15
AH30/670A-H	124	630	670	280	14	50	Tr710X7	G1/4	12	15
AH240/670G-H	137	630	670	348	26	40	Tr710X7	G1/4	8,5	15
AH240/670-H	137	630	670	358	30	50	Tr695X6	G1/4	8,5	15
AH31/670A-H	185	630	670	395	14	60	Tr710X7	G1/4	12	15
AH241/670G-H	180	630	670	452	26	40	Tr710X7	G1/4	12	15
AH241/670-H	183	630	670	467	30	55	Tr695X6	G1/4	12	15
AH32/670AG-H	247	630	670	500	14	63	Tr710X7	G1/4	12	15
AH32/670A-H	252	630	670	500	14	63	Tr720X7	G1/4	12	15
AH33/670-H	303	630	670	577	14	62	Tr720X7	G1/4	12	15
AH39/710G-H	105	670	710	228	12	43	Tr750X7	G1/4	15	15
AH39/710-H	101	670	710	228	12	43	Tr740X7	G1/4	15	15
AH30/710A-H	135	670	710	286	16	50	Tr750X7	G1/4	15	15
AH240/710G-H	152	670	710	360	26	45	Tr750X7	G1/4	8,5	15
AH240/710-H	151	670	710	365	33	50	Tr740X7	G1/4	8,5	15
AH31/710A-H	202	670	710	405	16	60	Tr750X7	G1/4	15	15



AH240, AH241
Taper 1:30



Hydraulic extraction sleeve
Mounting dimensions

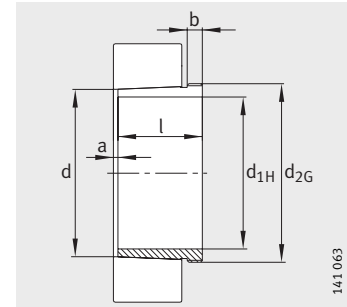


Pump connectors for
hydraulic extraction sleeve

Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AH241/710G-H	207	670	710	483	26	45	Tr750X7	G1/4	15	15
AH241/710-H	209	670	710	493	33	55	Tr740X7	G1/4	15	15
AH32/710AG-H	272	670	710	515	16	65	Tr750X7	G1/4	15	15
AH32/710A-H	278	670	710	515	16	65	Tr760X7	G1/4	15	15
AH33/710-H	334	670	710	595	16	65	Tr760X7	G1/4	15	15
AH39/750G-H	118	710	750	234	12	44	Tr800X7	G1/4	15	15
AH39/750-H	110	710	750	234	12	44	Tr780X7	G1/4	15	15
AH30/750A-H	155	710	750	300	16	50	Tr800X7	G1/4	15	15
AH240/750G-H	174	710	750	380	28	45	Tr800X7	G1/4	8,5	15
AH240/750-H	169	710	750	385	35	50	Tr780X7	G1/4	8,5	15
AH31/750A-H	232	710	750	425	16	60	Tr800X7	G1/4	15	15
AH241/750G-H	241	710	750	520	28	45	Tr800X7	G1/4	15	15
AH241/750-H	239	710	750	530	35	55	Tr780X7	G1/4	15	15
AH32/750A-H	312	710	750	540	16	65	Tr800X7	G1/4	15	15
AH33/750-H	377	710	750	625	16	65	Tr800X7	G1/4	15	15
AH39/800G-H	155	750	800	245	12	45	Tr850X7	G1/4	15	15
AH39/800-H	146	750	800	245	12	45	Tr830X7	G1/4	15	15
AH30/800A-H	198	750	800	308	18	50	Tr850X7	G1/4	15	15
AH240/800G-H	232	750	800	395	28	50	Tr850X7	G1/4	15	15
AH240/800-H	221	750	800	395	40	50	Tr830X7	G1/4	15	15
AH31/800A-H	297	750	800	438	18	63	Tr850X7	G1/4	15	15
AH241/800G-H	311	750	800	525	28	50	Tr850X7	G1/4	15	15
AH241/800-H	304	750	800	530	40	55	Tr830X7	G1/4	15	15
AH32/800AG-H	391	750	800	550	18	62	Tr850X7	G1/4	15	15
AH32/800A-H	396	750	800	555	18	67	Tr850X7	G1/4	15	15
AH33/800-H	500	750	800	667	18	67	Tr850X7	G1/4	15	15
AH39/850G-H	176	800	850	258	12	50	Tr900X7	G1/4	15	15
AH39/850-H	165	800	850	258	12	50	Tr880X7	G1/4	15	15
AH30/850A-H	224	800	850	325	18	53	Tr900X7	G1/4	15	15
AH240/850G-H	259	800	850	415	30	50	Tr900X7	G1/4	15	15
AH240/850-H	250	800	850	418	40	53	Tr880X7	G1/4	15	15
AH31/850A-H	336	800	850	462	18	63	Tr900X7	G1/4	15	15
AH241/850G-H	358	800	850	560	40	60	Tr900X7	G1/4	15	15
AH241/850-H	345	800	850	560	40	60	Tr880X7	G1/4	15	15
AH32/850A-H	450	800	850	585	18	70	Tr900X7	G1/4	15	15
AH33/850-H	567	800	850	700	18	70	Tr900X7	G1/4	15	15

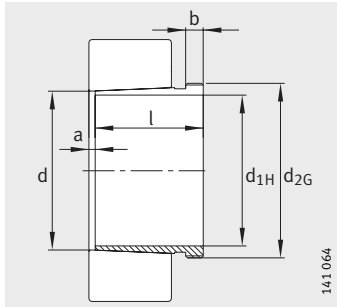


Extraction sleeves

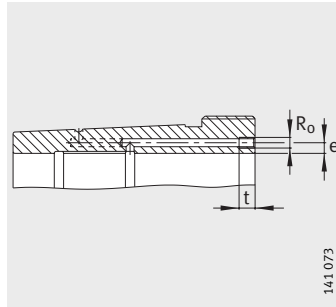


Taper 1:12

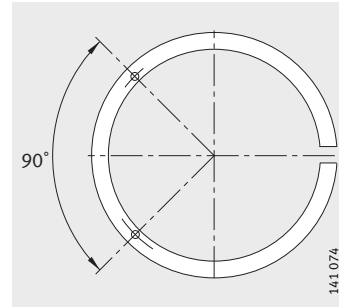
Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AH39/900G-H	192	850	900	265	12	51	Tr950X8	G1/4	15	15
AH39/900-H	180	850	900	265	12	51	Tr930X8	G1/4	15	15
AH30/900A-H	246	850	900	335	20	55	Tr950X8	G1/4	15	15
AH240/900G-H	287	850	900	430	45	55	Tr950X8	G1/4	15	15
AH240/900-H	274	850	900	430	45	55	Tr930X8	G1/4	15	15
AH31/900A-H	368	850	900	475	20	63	Tr950X8	G1/4	15	15
AH241/900G-H	390	850	900	575	45	60	Tr950X8	G1/4	15	15
AH241/900-H	376	850	900	575	45	60	Tr930X8	G1/4	15	15
AH32/900A-H	476	850	900	585	20	70	Tr950X8	G1/4	15	15
AH33/900-H	623	850	900	720	20	70	Tr950X8	G1/4	15	15
AH39/950G-H	216	900	950	282	15	51	Tr1000X8	G1/4	15	15
AH39/950-H	203	900	950	282	15	51	Tr980X8	G1/4	15	15
AH30/950A-H	277	900	950	355	20	55	Tr1000X8	G1/4	15	15
AH240/950G-H	329	900	950	467	45	55	Tr1000X8	G1/4	15	15
AH240/950-H	316	900	950	467	45	55	Tr980X8	G1/4	15	15
AH31/950A-H	414	900	950	500	20	63	Tr1000X8	G1/4	15	15
AH32/950A-H	519	900	950	600	20	70	Tr1000X8	G1/4	15	15
AH241/950G-H	435	900	950	605	45	60	Tr1000X8	G1/4	15	15
AH241/950-H	421	900	950	605	45	60	Tr980X8	G1/4	15	15
AH33/950-H	683	900	950	740	20	70	Tr1000X8	G1/4	15	15
AH39/1000G-H	246	950	1000	296	15	52	Tr1060X8	G1/4	15	15
AH39/1000-H	229	950	1000	296	15	52	Tr1035X8	G1/4	15	15
AH30/1,000A-H	309	950	1000	365	22	57	Tr1060X8	G1/4	15	15
AH240/1000G-H	357	950	1000	469	50	57	Tr1060X8	G1/4	15	15
AH240/1000-H	339	950	1000	469	50	57	Tr1035X8	G1/4	15	15
AH31/1,000A-H	471	950	1000	525	22	63	Tr1060X8	G1/4	15	15
AH32/1,000A-H	591	950	1000	630	22	70	Tr1060X8	G1/4	15	15
AH241/1000-H	502	950	1000	645	50	65	Tr1060X8	G1/4	15	15
AH33/1000-H	781	950	1000	780	22	70	Tr1060X8	G1/4	15	15
AH39/1060G-H	312	1000	1060	310	15	52	Tr1120X8	G1/4	15	15
AH39/1060-H	294	1000	1060	310	15	52	Tr1095X8	G1/4	15	15
AH30/1,060A-H	396	1000	1060	385	22	60	Tr1120X8	G1/4	15	15
AH240/1060G-H	465	1000	1060	498	50	60	Tr1120X8	G1/4	15	15
AH240/1060-H	445	1000	1060	498	50	60	Tr1095X8	G1/4	15	15
AH31/1,060A-H	583	1000	1060	540	22	65	Tr1120X8	G1/4	15	15
AH241/1060-H	632	1000	1060	665	50	65	Tr1120X8	G1/4	15	15
AH30/1,120A-H	451	1060	1120	410	22	65	Tr1180X8	G1/4	15	15
AH240/1120G-H	524	1060	1120	527	50	65	Tr1180X8	G1/4	15	15



AH240, AH241
Taper 1:30



Hydraulic extraction sleeve
Mounting dimensions



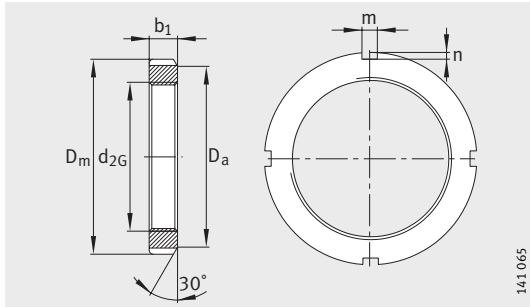
Pump connectors for
hydraulic extraction sleeve

Dimension table (continued) · Dimensions in mm										
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AH240/1120-H	501	1 060	1 120	527	50	65	Tr1155X8	G1/4	15	15
AH241/1120-H	717	1 060	1 120	705	50	75	Tr1180X8	G1/4	15	15
AH39/1120G-H	289	1 070	1 120	310	15	52	Tr1180X8	G1/4	15	15
AH39/1120-H	271	1 070	1 120	310	15	52	Tr1155X8	G1/4	15	15
AH30/1,180A-H	498	1 120	1 180	420	22	65	Tr1250X8	G1/4	15	15
AH240/1180G-H	577	1 120	1 180	540	50	65	Tr1250X8	G1/4	15	15
AH240/1180-H	543	1 120	1 180	540	50	65	Tr1215X8	G1/4	15	15
AH241/1180-H	824	1 120	1 180	750	50	80	Tr1250X8	G1/4	15	15
AH39/1180G-H	336	1 130	1 180	330	15	55	Tr1250X8	G1/4	15	15
AH39/1180-H	307	1 130	1 180	330	15	55	Tr1215X8	G1/4	15	15
AH30/1,250A-H	629	1 180	1 250	445	22	70	Tr1320X8	G1/4	15	15
AH240/1250G-H	733	1 180	1 250	570	50	70	Tr1320X8	G1/4	15	15
AH240/1250-H	694	1 180	1 250	570	50	70	Tr1285X8	G1/4	15	15
AH241/1250-H	1 048	1 180	1 250	795	50	85	Tr1320X8	G1/4	15	15
AH39/1250G-H	367	1 200	1 250	340	18	55	Tr1320X8	G1/4	15	15
AH39/1250-H	336	1 200	1 250	340	18	55	Tr1285X8	G1/4	15	15
AH30/1,320A-H	718	1 250	1 320	470	22	70	Tr1400X8	G1/4	15	15
AH240/1320G-H	828	1 250	1 320	600	50	70	Tr1400X8	G1/4	15	15
AH240/1320-H	775	1 250	1 320	600	50	70	Tr1355X8	G1/4	15	15
AH241/1320-H	1 194	1 250	1 320	840	50	90	Tr1400X8	G1/4	15	15
AH39/1320G-H	421	1 270	1 320	360	18	55	Tr1400X8	G1/4	15	15
AH39/1320-H	379	1 270	1 320	360	18	55	Tr1355X8	G1/4	15	15
AH30/1,400A-H	902	1 320	1 400	487	22	75	Tr1500X8	G1/4	15	15
AH240/1400G-H	1 026	1 320	1 400	615	50	70	Tr1500X8	G1/4	15	15
AH240/1400-H	944	1 320	1 400	615	50	70	Tr1435X8	G1/4	15	15
AH241/1400-H	1 496	1 320	1 400	870	50	95	Tr1500X8	G1/4	15	15
AH39/1400G-H	499	1 350	1 400	380	20	60	Tr1500X8	G1/4	15	15
AH39/1400-H	429	1 350	1 400	380	20	60	Tr1435X8	G1/4	15	15
AH30/1,500A-H	1 257	1 400	1 500	537	22	75	Tr1600X8	G1/4	15	15
AH241/1500-H	1 961	1 400	1 500	895	50	95	Tr1600X8	G1/4	15	15
AH39/1500G-H	563	1 450	1 500	400	20	60	Tr1600X8	G1/4	15	15
AH39/1500-H	494	1 450	1 500	400	20	60	Tr1540X8	G1/4	15	15

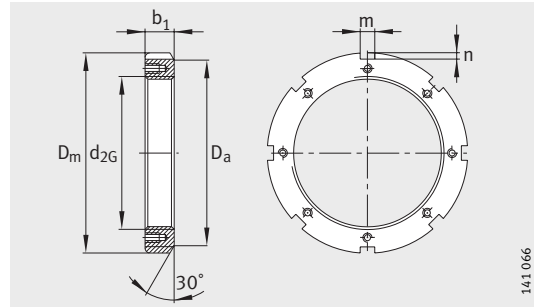


Locknuts

Dimension table · Dimensions in mm								
Designation		Mass m ≈kg	Dimensions			Mounting dimensions		
Nut	Suitable retainer		d _{2G}	D _m	b ₁	D _a	m	n
KM0	MB0	0,005	M10X0,75	18	4	13,5	3	2
KM1	MB1	0,007	M12X1	22	4	17	3	2
KM2	MB2	0,01	M15X1	25	5	21	4	2
KM3	MB3	0,02	M17X1	28	5	24	4	2
KM4	MB4	0,019	M20X1	32	6	26	4	2
KM5	MB5	0,025	M25X1,5	38	7	32	5	2
KM6	MB6	0,043	M30X1,5	45	7	38	5	2
KM7	MB7	0,07	M35X1,5	52	8	44	5	2
KM8	MB8	0,085	M40X1,5	58	9	50	6	2,5
KM9	MB9	0,119	M45X1,5	65	10	56	6	2,5
KM10	MB10	0,148	M50X1,5	70	11	61	6	2,5
KM11	MB11	0,158	M55X2	75	11	67	7	3
KM12	MB12	0,18	M60X2	80	11	73	7	3
KM13	MB13	0,22	M65X2	85	12	79	7	3
KM14	MB14	0,26	M70X2	92	12	85	8	3,5
KM15	MB15	0,3	M75X2	98	13	90	8	3,5
KM16	MB16	0,4	M80X2	105	15	95	8	3,5
KM17	MB17	0,46	M85X2	110	16	102	8	3,5
KM18	MB18	0,6	M90X2	120	16	108	10	4
KM19	MB19	0,658	M95X2	125	17	113	10	4
KM20	MB20	0,73	M100X2	130	18	120	10	4
KM21	MB21	0,87	M105X2	140	18	126	12	5
KM22	MB22	0,965	M110X2	145	19	133	12	5
KM23	MB23	1,01	M115X2	150	19	137	12	5
KML24	MBL24	0,79	M120X2	145	20	135	12	5
KM24	MB24	1,08	M120X2	155	20	138	12	5
KM25	MB25	1,22	M125X2	160	21	148	12	5
KML26	MBL26	0,9	M130X2	155	21	145	12	5
KM26	MB26	1,24	M130X2	165	21	149	12	5
KM27	MB27	1,55	M135X2	175	22	160	14	6
KML28	MBL28	1,01	M140X2	165	22	155	12	5
KM28	MB28	1,56	M140X2	180	22	160	14	6
KM29	MB29	2,05	M145X2	190	24	171	14	6



KM, KML, HM..T



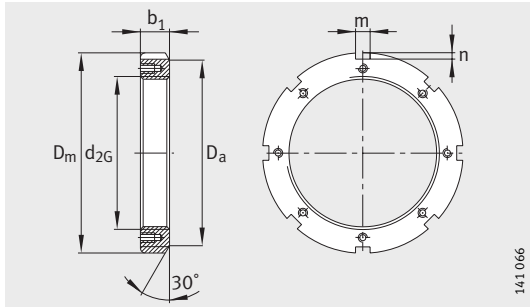
HM30, HM31

Dimension table (continued) · Dimensions in mm								
Designation		Mass m ≈ kg	Dimensions			Mounting dimensions		
Nut	Suitable retainer		d _{2G}	D _m	b ₁	D _a	m	n
KML30	MBL30	1,44	M150X2	180	24	170	14	5
KM30	MB30	2,06	M150X2	195	24	171	14	6
KM31	MB31	2,27	M155X3	200	25	182	16	7
KML32	MBL32	1,62	M160X3	190	25	180	14	5
KM32	MB32	2,52	M160X3	210	25	182	16	7
KM33	MB33	2,7	M165X3	210	26	193	16	7
KML34	MBL34	1,72	M170X3	200	26	190	16	5
KM34	MB34	2,8	M170X3	220	26	193	16	7
KML36	MBL36	1,96	M180X3	210	27	200	16	5
KM36	MB36	3,04	M180X3	230	27	203	18	8
KML38	MBL38	2,13	M190X3	220	28	210	16	5
KM38	MB38	3,34	M190X3	240	28	214	18	8
KML40	MBL40	2,9	M200X3	240	29	220	18	8
KM40	MB40	3,69	M200X3	250	29	226	18	8
HM3044	MS3044	3,21	Tr220X4	260	30	242	20	9
HM44T	MB44	5,3	Tr220X4	280	32	250	20	10
HM3144	MS3144	4,93	Tr220X4	280	32	250	20	10
HM3048	MS3048	5,12	Tr240X4	290	34	270	20	10
HM48T	MB48	6,15	Tr240X4	300	34	270	20	10
HM3148	MS3144	5,75	Tr240X4	300	34	270	20	10
HM3052	MS3048	5,54	Tr260X4	310	34	290	20	10
HM52T	MB52	8,05	Tr260X4	330	35	300	24	12
HM3152	MS3152	7,43	Tr260X4	330	36	300	24	12
HM3056	MS3056	6,61	Tr280X4	330	38	310	24	10
HM56T	MB56	8,9	Tr280X4	350	36	320	24	12
HM3156	MS3152	8,26	Tr280X4	350	38	320	24	12
HM3060	MS3060	9,48	Tr300X4	360	42	336	24	12
HM3160	MS3160	11,4	Tr300X4	380	40	340	24	12
HM3064	MS3064	10,1	Tr320X5	380	42	356	24	12
HM3164	MS3164	12,8	Tr320X5	400	42	360	24	12
HM3068	MS3064	11,5	Tr340X5	400	45	376	24	12
HM3168	MS3168	23	Tr340X5	440	55	400	28	15
HM3072	MS3072	11,9	Tr360X5	420	45	394	28	13
HM3172	MS3168	25,7	Tr360X5	460	58	420	28	15
HM3076	MS3076	15,9	Tr380X5	450	48	422	28	14
HM3176	MS3176	30	Tr380X5	490	60	440	32	18



Locknuts

Dimension table (continued) - Dimensions in mm								
Designation		Mass m ≈kg	Dimensions			Mounting dimensions		
Nut	Suitable retainer		d _{2G}	D _m	b ₁	D _a	m	n
HM3080	MS3076	18,2	Tr400X5	470	52	442	28	14
HM3180	MS3180	35,7	Tr400X5	520	62	460	32	18
HM3084	MS3084	18,9	Tr420X5	490	52	462	32	14
HM3184	MS3180	43,4	Tr420X5	540	70	490	32	18
HM3088	MS3088	26,5	Tr440X5	520	60	490	32	15
HM3188	MS3188	44,3	Tr440X5	560	70	510	36	20
HM3092	MS3088	27,7	Tr460X5	540	60	510	32	15
HM3192	MS3188	53,8	Tr460X5	580	75	540	36	20
HM3096	MS3096	28,7	Tr480X5	560	60	530	36	15
HM3196	MS3196	62,2	Tr480X5	620	75	560	36	20
HM30/500	MS3096	34	Tr500X5	580	68	550	36	15
HM31/500	MS31/500	62,1	Tr500X5	630	80	580	40	23
HM30/530	MS30/530	44,7	Tr530X6	630	68	590	40	20
HM31/530	MS31/530	71,2	Tr530X6	670	80	610	40	23
HM30/560	MS30/560	46,2	Tr560X6	650	75	610	40	20
HM31/560	MS31/560	85,6	Tr560X6	710	85	650	45	25
HM30/600	MS30/530	55,9	Tr600X6	700	75	660	40	20
HM31/600	MS31/560	91,7	Tr600X6	750	85	690	45	25
HM30/630	MS30/630	58,3	Tr630X6	730	75	690	45	20
HM31/630	MS31/630	122	Tr630X6	800	95	730	50	28
HM30/670	MS30/670	73,8	Tr670X6	780	80	740	45	20
HM31/670	MS31/670	156	Tr670X6	850	106	775	50	28
HM30/710	MS30/710	94,8	Tr710X7	830	90	780	50	25
HM31/710	MS31/710	173	Tr710X7	900	106	825	55	30
HM30/750	MS30/750	99,5	Tr750X7	870	90	820	55	25
HM31/750	MS31/750	202	Tr750X7	950	112	875	60	34
HM30/800	MS30/750	106	Tr800X7	920	90	870	55	25
HM31/800	MS31/750	215	Tr800X7	1000	112	925	60	34
HM30/850	MS30/850	113	Tr850X7	980	90	925	60	25
HM31/850	MS31/850	246	Tr850X7	1060	118	975	70	38
HM30/900	MS30/850	135	Tr900X7	1030	100	975	60	25
HM31/900	MS31/900	293	Tr900X7	1120	125	1030	70	38
HM30/950	MS30/950	143	Tr950X8	1080	100	1025	60	25
HM31/950	MS31/950	310	Tr950X8	1170	125	1080	70	38



HM30, HM31

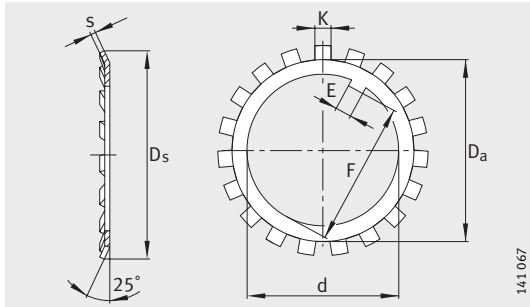
Dimension table (continued) · Dimensions in mm								
Designation		Mass m ≈ kg	Dimensions			Mounting dimensions		
Nut	Suitable retainer		d _{2G}	D _m	b ₁	D _a	m	n
HM30/1000	MS30/1000	165	Tr1000X8	1 140	100	1 085	60	25
HM31/1000	MS31/1000	361	Tr1000X8	1 240	125	1 140	70	38
HM30/1060	MS30/1000	175	Tr1060X8	1 200	100	1 145	60	25
HM31/1060	MS31/1000	386	Tr1060X8	1 300	125	1 210	70	38
HM30/1120	MS30/1000	185	Tr1120X8	1 260	100	1 205	60	25
HM31/1120	MS31/1000	427	Tr1120X8	1 360	125	1 270	70	38
HM30/1180	MS30/1000	196	Tr1180X8	1 320	100	1 265	60	25
HM31/1180	MS31/1000	459	Tr1180X8	1 420	125	1 330	70	38
HM30/1250	MS30/1000	233	Tr1250X8	1 390	110	1 335	60	25
HM31/1250	MS31/1000	485	Tr1250X8	1 490	125	1 400	70	38
HM30/1320	MS30/1000	245	Tr1320X8	1 460	110	1 405	60	25
HM31/1320	MS31/1000	511	Tr1320X8	1 560	125	1 470	70	38
HM30/1400	MS30/1000	259	Tr1400X8	1 540	110	1 485	60	25
HM31/1400	MS31/1000	562	Tr1400X8	1 640	130	1 550	70	38
HM30/1500	MS30/1500	297	Tr1500X8	1 650	110	1 595	60	25
HM31/1500	MS31/1000	601	Tr1500X8	1 740	130	1 650	70	38



Retaining plates

Dimension table · Dimensions in mm								
Designation	Mass m 100 pieces ≈kg	Dimensions			Mounting dimensions			
		d	D _s ≈	s	D _a	E ¹⁾	F	K
MB0	0,13	10	21	1	13,5	3	8,5	3
MB1	0,192	12	25	1	17	3	10,5	3
MB2	0,253	15	28	1	21	4	13,5	4
MB3	0,313	17	32	1	24	4	15,5	4
MB4	0,35	20	36	1	26	4	18,5	4
MB5	0,64	25	42	1,25	32	5	23	5
MB6	0,78	30	49	1,25	38	5	27,5	5
MB7	1,04	35	57	1,04	44	6	32,5	5
MB8	1,23	40	62	1,25	50	6	37,5	6
MB9	1,52	45	69	1,25	56	6	42,5	6
MB10	1,6	50	74	1,25	61	6	47,5	6
MB11	1,96	55	81	1	67	8	52,5	7
MB12	2,53	60	86	1	73	8	57,5	7
MB13	2,9	65	92	1	79	8	62,5	7
MB14	3,34	70	98	1	85	8	66,5	8
MB15	3,6	75	104	1	90	8	71,5	8
MB16	4,64	80	112	1,8	95	10	76,5	8
MB17	5,24	85	119	1,8	102	10	81,5	8
MB18	6,23	90	126	1,8	108	10	86,5	10
MB19	6,7	95	133	1,8	113	10	91,5	10
MB20	7,65	100	142	1,8	120	12	96,5	10
MB21	8,26	105	145	1,75	126	12	100,5	12
MB22	9,4	110	154	1,75	133	12	105,5	12
MB23	10,8	115	159	2	137	12	110,5	12
MBL24	7,7	120	151	2	135	14	115	12
MB24	10,5	120	164	2	138	14	115	12
MB25	11,8	125	170	2	148	14	120	12
MBL26	8,7	130	161	2	145	14	125	12
MB26	11,3	130	175	2	149	14	125	12
MB27	14,4	135	185	2	160	14	130	14

1) The dimension E can be used as a minimum dimension for the slot width in shafts.



MB, MBL

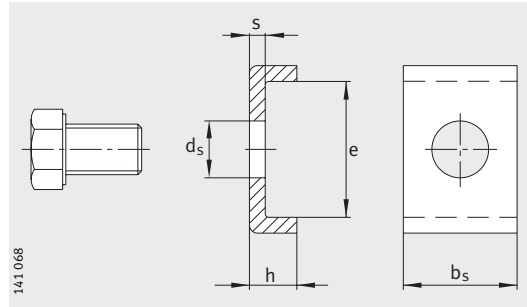
Dimension table (continued) · Dimensions in mm								
Designation	Mass m 100 pieces ≈ kg	Dimensions			Mounting dimensions			
		d	D _s ≈	s	D _a	E ¹⁾	F	K
MBL28	10,9	140	171	2	155	16	135	12
MB28	14,2	140	192	2	160	16	135	14
MB29	16,8	145	202	2	171	16	140	14
MBL30	11,3	150	188	2	170	16	145	14
MB30	15,5	150	205	2	171	16	145	14
MB31	20,9	155	212	2,5	182	16	147,5	16
MBL32	16,2	160	199	2,5	180	18	154	14
MB32	22,2	160	217	2,5	182	18	154	16
MB33	24,1	165	222	2,5	193	18	157,5	16
MBL34	17	170	211	2,5	190	18	164	16
MB34	24,7	170	232	2,5	193	18	164	16
MBL36	18	180	221	2,5	200	20	174	16
MB36	26,8	180	242	2,5	203	20	174	18
MBL38	20,5	190	231	2,5	210	20	184	16
MB38	27,8	190	252	2,5	214	20	184	18
MBL40	21,4	200	248	2,5	222	20	194	18
MB40	29,3	200	262	2,5	226	20	194	18
MB44	40	220	292	3	250	24	213	20
MB48	40	240	312	3	270	24	233	20
MB52	60	260	342	3	300	28	253	24
MB56	62	280	362	3	320	28	273	24

¹⁾ The dimension E can be used as a minimum dimension for the slot width in shafts.



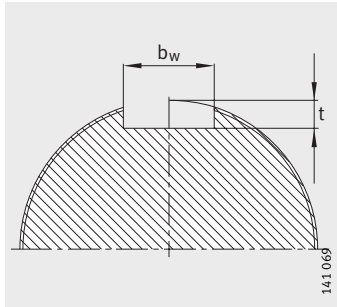
Retaining brackets

With hexagon head cap screw



Dimension table · Dimensions in mm											
Designation		Tightening torque Nm	Mass m ≈kg	Dimensions					Mounting dimensions Shaft slot		
Retaining bracket Complete	Hexagon head cap screw ¹⁾			s	b _s	h	d _s	e	b _w	t	
MS3044	M6X10	10	0,026	4	20	12	7	13,5	22	9	
MS3144	M8X16	25	0,038	4	20	12	9	22,5	22	9	
MS3048	M8X16	25	0,035	4	20	12	9	17,5	22	9	
MS3152	M10X20	51	0,056	4	24	12	11	25,5	26	9	
MS3056	M8X16	25	0,04	4	24	12	9	17,5	26	9	
MS3060	M8X16	25	0,043	4	24	12	9	20,5	26	9	
MS3160	M10X20	51	0,059	4	24	12	12	30,5	26	9	
MS3064	M8X16	25	0,057	5	24	15	9	21	26	10	
MS3164	M10X20	51	0,074	5	24	15	12	31	26	10	
MS3168	M12X22	87	0,115	5	28	15	14	38	30	10	
MS3072	M8X16	25	0,064	5	28	15	9	20	30	10	
MS3076	M10X20	51	0,076	5	28	15	12	24	30	10	
MS3176	M12X22	87	0,115	5	32	15	14	40	34	10	
MS3180	M16X25	215	0,154	5	32	15	18	45	34	10	
MS3084	M10X20	51	0,085	5	32	15	12	24	34	10	
MS3088	M12X22	87	0,1	5	32	15	14	28	34	10	
MS3188	M16X25	215	0,163	5	36	15	18	43	38	10	
MS3096	M12X22	87	0,109	5	36	15	14	28	38	12	
MS3196	M16X25	215	0,177	5	36	15	18	53	38	12	
MS31/500	M16X25	215	0,178	5	40	15	18	45	42	12	

¹⁾ Up to M16 thread: self-retaining screw.



Shaft

Dimension table (continued) · Dimensions in mm										
Designation		Tightening torque	Mass m ≈ kg	Dimensions					Mounting dimensions Shaft slot	
Retaining bracket Complete	Hexagon head cap screw ¹⁾			s	b _s	h	d _s	e	b _w	t
MS30/530	M16X25	215	0,223	7	40	21	18	34	42	14
MS31/530	M20X40	430	0,347	7	40	21	22	51	42	14
MS30/560	M16X25	215	0,212	7	40	21	18	29	42	14
MS31/560	M20X40	430	0,38	7	45	21	22	54	47	14
MS30/630	M16X25	215	0,244	7	45	21	18	34	47	14
MS31/630	M20X40	430	0,426	7	50	21	22	61	52	14
MS30/670	M16X25	215	0,257	7	45	21	18	39	47	14
MS31/670	M20X40	430	0,439	7	50	21	22	66	52	15
MS30/710	M16X25	215	0,279	7	50	21	18	39	52	15
MS31/710	M24X45	740	0,58	7	55	21	26	69	57	15
MS30/750	M16X25	215	0,301	7	55	21	18	39	57	15
MS31/750	M24X45	740	0,614	7	60	21	26	70	62	15
MS30/850	M20X40	430	0,426	7	60	21	22	44	62	15
MS31/850	M24X45	740	0,679	7	70	21	26	71	72	16
MS31/900	M24X45	740	0,698	7	70	21	26	76	72	16
MS30/950	M20X40	430	0,433	7	60	21	22	46	62	16
MS31/950	M24X45	740	0,706	7	70	21	26	78	72	16
MS30/1000	M20X40	430	0,449	7	60	21	22	51	62	16
MS31/1000	M24X45	740	0,744	7	70	21	26	88	72	16
MS30/1500	M20X40	430	0,466	7	60	21	22	56	62	16

¹⁾ Up to M16 thread: self-retaining screw.
From M20 thread: standardised hexagon head cap screw with retainer.



FAG



Arcanol rolling bearing greases

Arcanol rolling bearing greases

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Product overview Arcanol rolling bearing greases

Arcanol
rolling bearing greases



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Arcanol rolling bearing greases

Features FAG developed the range of Arcanol rolling bearing greases from a large number of lubricants. These greases offer very good preconditions for favourable running behaviour of bearings and a long life and high operational reliability of the bearing arrangement.

The areas of application of Arcanol greases were determined under widely differing operating conditions and with rolling bearings of all types by means of modern testing methods and testing systems.

Finely graduated range The range is graduated such that almost all areas of application can be covered to an optimum extent using fourteen rolling bearing greases.

The table on page 1360 shows the physical data for these greases and information on the areas of application.

Variants for automatic or manual grease lubrication For grease lubrication, we supply automatic lubricators of the variants COMPACT, CHAMPION und CONCEPT6, filled with Arcanol greases from FAG.

For manual lubrication, we supply a grease gun, comprising a manual grease gun ARCA.GREASE-GUN and the matching armoured tube ARCA.GREASE-GUN.HOSE.

Containers Arcanol rolling bearing greases are available in tubes, cartridges, cans, buckets, hobbocks and drums. The following table shows which grease grades are supplied in which containers.

Grease container sizes

Arcanol grease	Tube			Cart-ridge 400 g	Can 1 kg	Bucket		Hob- bock 25 kg	Drum 180 kg
	20 g	70 g	250 g			5 kg	10 kg		
MULTITOP	–	–	●	●	●	●	●	●	●
MULTI2	●	–	●	●	●	●	●	●	●
MULTI3	–	–	●	●	●	●	●	●	●
LOAD220	–	–	–	–	●	–	●	●	●
LOAD400	–	–	–	●	●	●	●	●	●
LOAD1 000	–	–	–	–	–	●	–	●	●
TEMP90	●	–	–	●	●	●	–	●	●
TEMP110	–	–	–	●	●	–	–	–	–
TEMP120	–	–	–	–	●	●	–	●	–
TEMP200	–	●	–	–	●	–	–	–	–
SPEED2,6	–	–	●	–	●	–	–	●	–
VIB3	–	–	–	–	●	●	–	●	–
BIO2	–	–	–	●	●	–	●	●	●
FOOD2	–	–	–	●	●	–	●	●	●

Other container sizes by agreement.



Arcanol rolling bearing greases

Arcanol greases

The chemical/physical characteristics of the greases, their principal characteristic and application examples are shown in the table. Ordering examples for the greases are listed below.

Arcanol rolling bearing greases

Designation	Thickener	Base oil viscosity at +40 °C mm ² /s	Consistency NLGI class
MULTITOP	Lithium soap with EP additives	85	2
MULTI2	Lithium soap	ISO VG 100	2
MULTI3	Lithium soap	80	3
LOAD220	Lithium/calcium soap with EP additives	ISO VG 220	2
LOAD400	Lithium/calcium soap with EP additives	400	2
LOAD1000	Lithium/calcium soap with EP additives	ISO VG 1000	2
TEMP90	Calcium polycarbamide with EP additives	130	2
TEMP110	Lithium complex soap	ISO VG 150	2
TEMP120	Polycarbamide with EP additives	ISO VG 460	2
TEMP200	PTFE	400	2
SPEED2,6	Polycarbamide	ISO VG 22	2 to 3
VIB3	Lithium complex soap with EP additives	170	3
BIO2	Lithium/calcium soap	58	2
FOOD2	Aluminium complex soap	192	2

Ordering examples

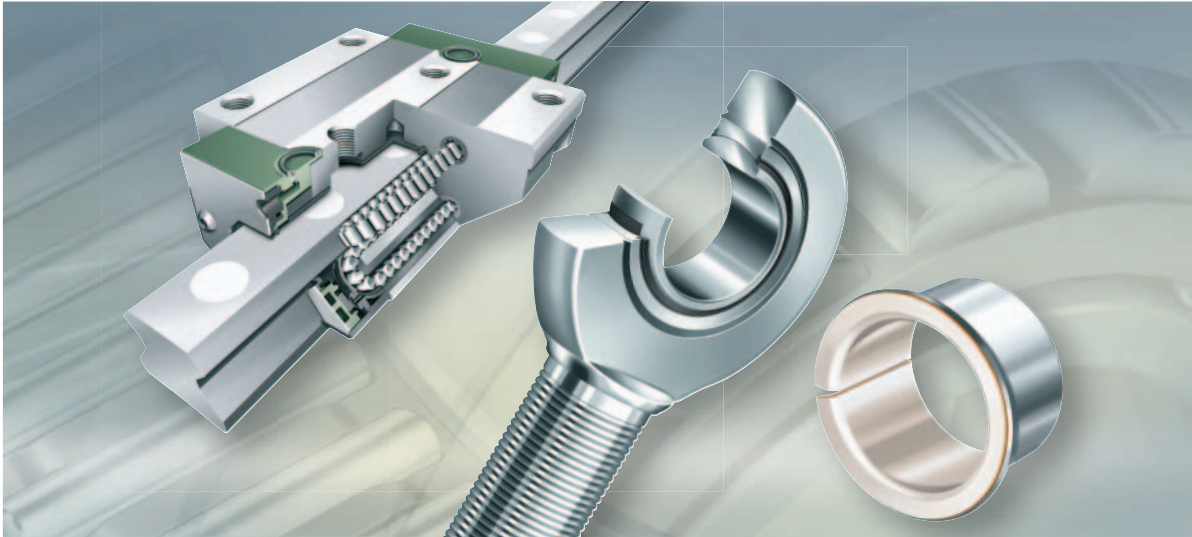
- ARCANOL-MULTITOP-5KG
- ARCANOL-MULTI2-20G
- ARCANOL-MULTI3-25KG
- ARCANOL-LOAD220-1KG
- ARCANOL-LOAD400-400G
- ARCANOL-LOAD1000-5KG
- ARCANOL-TEMP90-180KG
- ARCANOL-TEMP110-400G

Operating temperature °C	Continuous limit temperature °C	Principal characteristic	Application examples
-40 +150	+80	Universal grease for ball and roller bearings at increased speeds, high load, low and high temperatures	Rolling mills, construction machinery, automotive, spinning and grinding spindles
-30 +140	+75	Universal grease for ball bearings D ≤ 62 mm	Small electric motors, agricultural and construction machinery, household appliances
-30 +140	+75	Universal grease for ball bearings D > 62 mm	Large electric motors, agricultural and construction machinery, fans
-20 +140	+80	Special grease for ball and roller bearings at high loads, wide speed range, high humidity	Rolling mill equipment, rail vehicles
-25 +140	+80	Special grease for ball and roller bearings at very high loads, moderate temperature, low speed	Mining machinery, construction machinery
-20 +140	+80	Special grease for ball and roller bearings at very high loads, moderate temperature, low speed	Mining machinery, construction machinery preferably under shock load and in large bearings
-40 +160	+90	Special grease for ball and roller bearings at high temperature, high loads	Couplings, electric motors, automotive
-40 +160	+110	Special grease for ball and roller bearings at high temperature, high speeds	Electric motors, automotive
-35 +180	+120	Special grease for ball and roller bearings at high temperature, high loads	Continuous casting machines
-40 +260	+200	Special grease for ball and roller bearings at very high temperature, for chemically aggressive environments	Track rollers in baking machinery, piston pins in compressors, kiln trucks, chemical plant
-50 +120	+80	Special grease for ball bearings at very high speed, low temperature	Machine tools, instruments
-30 +150	+90	Special grease for ball and roller bearings at high temperature, high loads, oscillating motion	Blade adjusters in rotors in wind turbines, packaging machinery
-30 +120	+80	Special grease for ball and roller bearings	In environmentally hazardous applications
-30 +120	+70	Special grease for ball and roller bearings	In applications with food contact; H1 to USDA

Ordering examples – continued

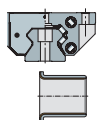
- ARCANOL-TEMP120-25KG
- ARCANOL-TEMP200-70G
- ARCANOL-SPEED2,6-250G
- ARCANOL-VIB3-25KG
- ARCANOL-BIO2-1KG
- ARCANOL-FOOD2-10KG





Other products

Slewing rings
Thin section bearings
Permaglide[®] plain bearings
ELGES spherical plain bearings, plain bushes, rod ends
Linear guidance systems
Equipment and services for
the mounting and maintenance of rolling bearings



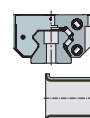


Slewing rings

Four point contact bearings
Crossed roller bearings

Slewing rings

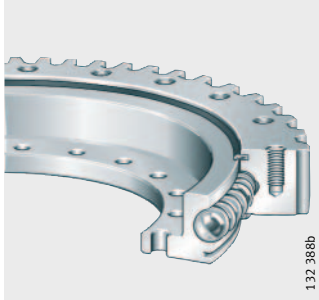
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Features Four point contact bearings	1367
Crossed roller bearings.....	1367



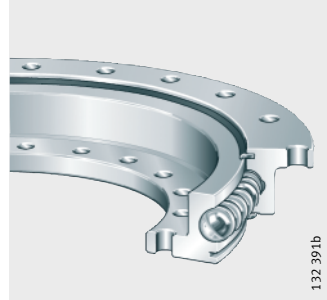
Product overview Slewing rings

Four point contact bearings Light series 20

VLA20

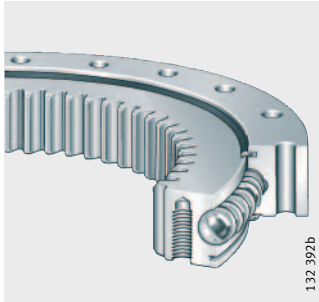


VLU20

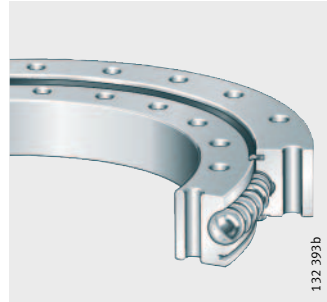


Standard series 20, 25

VSI20
VSI25

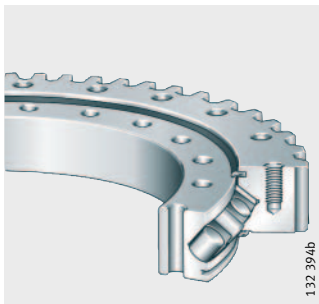


VSU20
VSU25

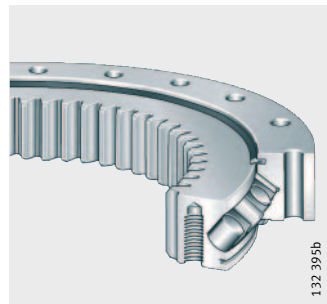


Crossed roller bearings Standard series 14

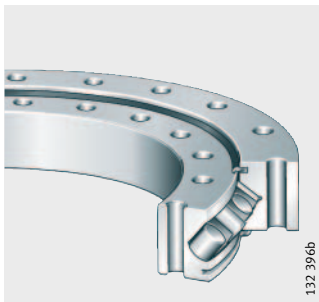
XSA14



XSI14



XSU14



Slewing rings

Features INA slewing rings are known worldwide as premium products in the field of rolling bearing technology. These machine elements have proved themselves many times over; they have high load carrying capacity, a versatile range of applications and are highly cost-effective. Due to their design, a single bearing can reliably support radial, axial and tilting moment loads. It is therefore possible in many cases to replace bearing arrangements comprising a combination of radial and axial bearings by a single bearing. This reduces, in some cases considerably, the costs and work required in the design of the adjacent construction and the fitting of bearings.

Slewing rings are sealed on both sides, lubricated with a high quality grease, can be relubricated via lubrication nipples and are particularly easy to fit. The bearing rings are supplied without gear teeth or, in order to achieve simple drive solutions, are available with external or internal gear teeth.

INA slewing rings are designed as four point contact bearings and crossed roller bearings.

Four point contact bearings

Four point contact bearings are available with external teeth, internal teeth or without teeth as well as in the light series 20 and the standard series 20 and 25.

These slewing rings without preload are robust and proven under very demanding operation; they place only slight demands on the flatness and perpendicularity of the adjacent construction.

They are suitable for applications with low requirements for accuracy and rigidity of the bearing arrangement, for example in simple metalworking machines, wind power equipment and construction machinery.

Crossed roller bearings

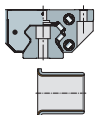
Crossed roller bearings are available with external teeth, internal teeth and without teeth in the standard series 14 as well as in the series XA, XI, XU.

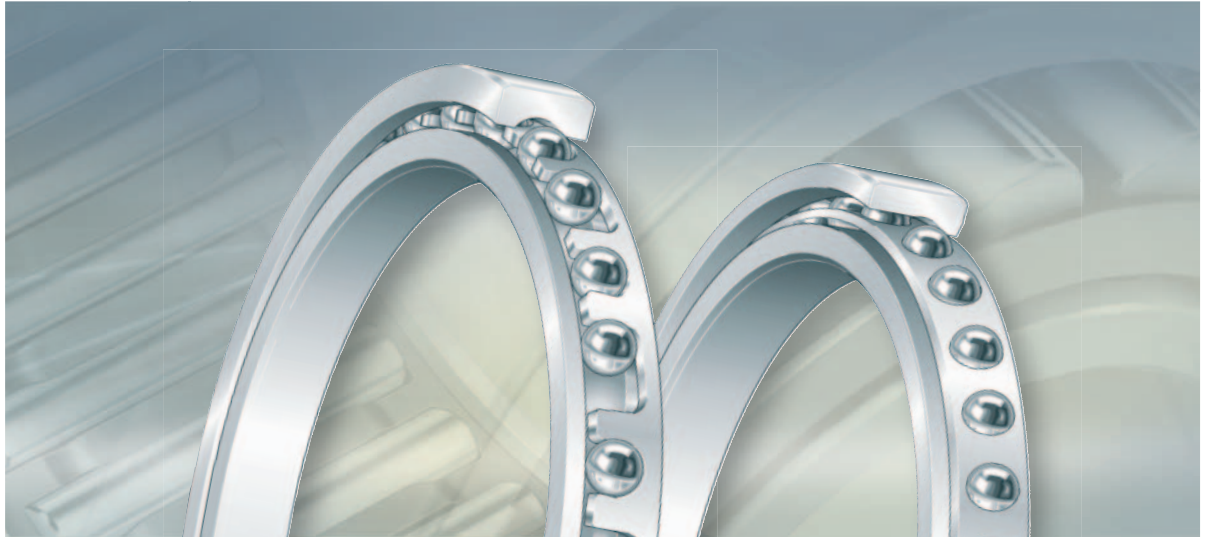
These preloaded slewing rings can support higher loads than four point contact bearings. They have proved themselves particularly where bearings are subjected to high radial forces and moderate axial and tilting moment loads.

They are suitable for applications with uniform running free from stick-slip, low rotational resistance and high requirements for axial and radial runout accuracy and rigidity, for example in robots, handling systems and machine tools.

Catalogue: Slewing rings

The standard range is described comprehensively in Catalogue 404 and the CD and online versions of *medias*[®] *professional*.

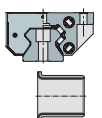




Thin section bearings

Thin section bearings

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Features Deep groove ball bearings, four point contact bearings, angular contact ball bearings	1371



Product overview Thin section bearings

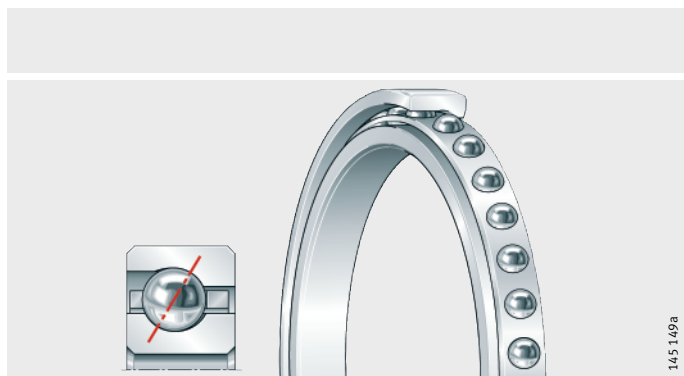
Deep groove ball bearings
Type C



Four point contact bearings
Type X



Angular contact ball bearings
Type E



Thin section bearings

Features Thin section bearings are high precision products with very little running noise and high load carrying capacity. These bearings are available in three different designs with extremely small, predominantly square cross-sections. Within each series, the cross-section remains constant even at higher shaft and housing bore diameters. The bearings are therefore also described as Constant Section (CS) bearings. This feature distinguishes thin section bearings from the conventional bearings that are described in standardised ISO series.

In this way, a larger cross-section can be selected in a graduated way and thus a bearing with high load carrying capacity can be used without the need to increase the shaft diameter. Thin section bearings can thus be used to achieve extremely light and compact designs.

Deep groove ball bearings, four point contact bearings, angular contact ball bearings

Thin section bearings are available as deep groove ball bearings (C), four point contact bearings (X) and as angular contact ball bearings (E). Each of these designs is available in various series. The series correspond to the cross-section sizes. The balls are matched to the series.

Deep groove ball bearings can support axial loads in both directions as well as radial loads; under axial load, a contact angle $\alpha > 0^\circ$ is adopted.

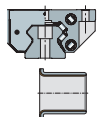
Four point contact bearings can support axial loads in both directions as well as radial loads; they thus act as double row angular contact ball bearings.

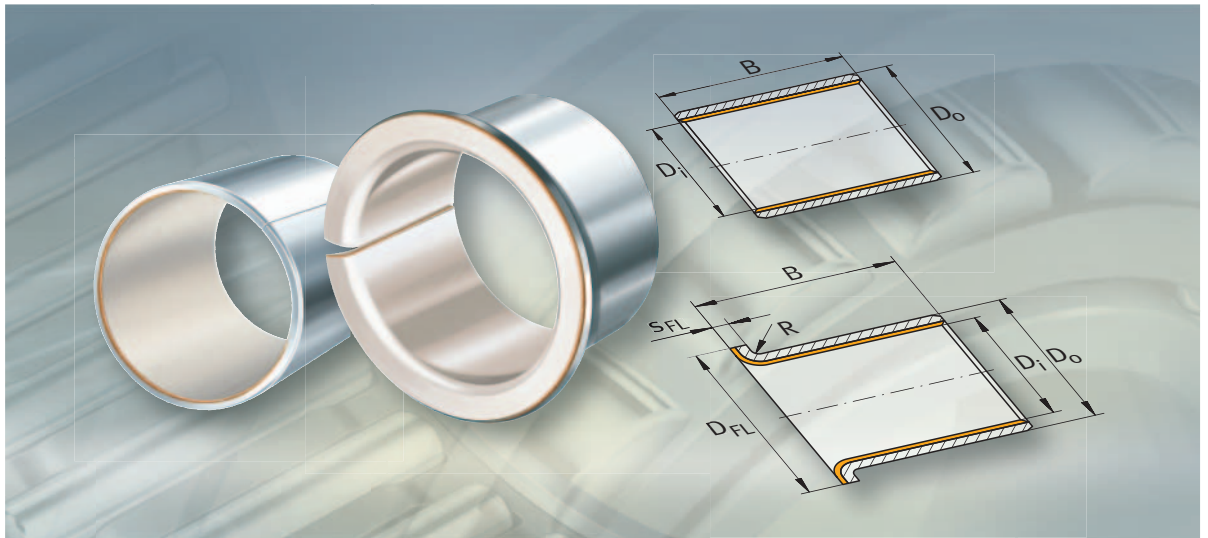
Angular contact ball bearings can be filled with an optimised number of balls and have a contact angle of 30° . They can support considerably higher radial loads than deep groove ball bearings or four point contact bearings and can support axial loads in one direction. For particular requirements, angular contact ball bearings are also available as matched pairs of bearings. These combinations then have significantly higher rigidity and load carrying capacity than individual bearing solutions.

Thin section bearings are available in open and sealed designs. The seals are made from synthetic rubber (NBR) with a steel insert. Sealed bearings are greased. For extreme operating conditions, special lubricants are available. Cages are made from brass or plastic.

In addition to the standard tolerance class PL1, classes PL3 and PL6 are also available (with increasingly tighter tolerances).

Catalogue: Thin section bearings The standard range is described comprehensively in Catalogue 575.





Permaglide[®] plain bearings

Maintenance-free plain bearing material P1

Low-maintenance plain bearing material P2

Bushes

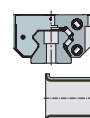
Flanged bushes

Thrust washers

Strips

Permaglide® plain bearings

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Product overview Permaglide® plain bearings	1374
Features Maintenance-free Permaglide® plain bearing material P1.....	1375
Low-maintenance Permaglide® plain bearing material P2	1378
Special designs, linear plain bearings	1381

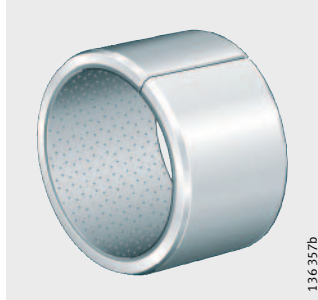


Permaglide® is a registered trademark
and product of KS Gleitlager GmbH, St. Leon-Rot

Product overview Permaglide® plain bearings

Bushes
P1 maintenance-free
P2 low-maintenance

PAP..-P10, PAP..-P11
PAP..-P14, PAPZ...-P10

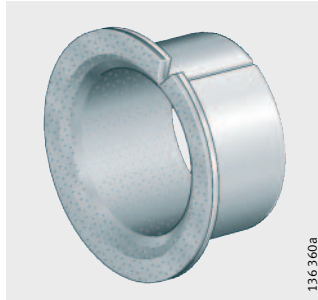


PAP..-P20



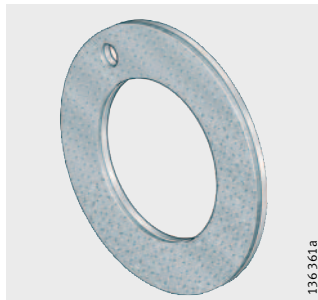
Flanged bushes
P1 maintenance-free

PAF..-P10, PAF..-P11
PAF..-P14

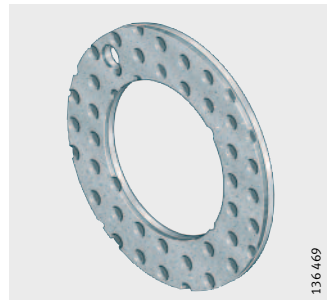


Thrust washers
P1 maintenance-free
P2 low-maintenance

PAW..-P10
PAW..-P14

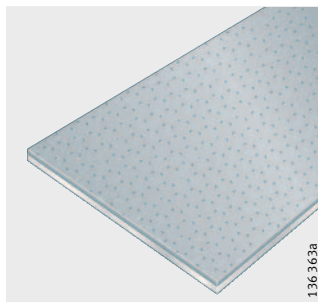


PAW..-P20

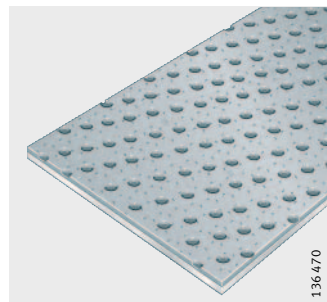


Strips
P1 maintenance-free
P2 low-maintenance

PAS..-P10, PAS..-P11
PAS..-P14



PAS..-P20



Permaglide® plain bearings

Features Permaglide® plain bearings are bearings for very small radial or axial design envelopes. These products are available as bushes, flanged bushes, thrust washers and strips and in two material groups. The bushes are available in metric sizes and in inch sizes. Bushes, washers and strips are made from the maintenance-free Permaglide® P1 or the low-maintenance P2.

Flanged bushes are made from maintenance-free Permaglide® P1.

Caution! Some P1 and P2 materials contain lead (Pb).
Materials containing lead should not be allowed to come into contact with foodstuffs or pharmaceutical products.

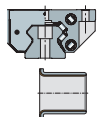
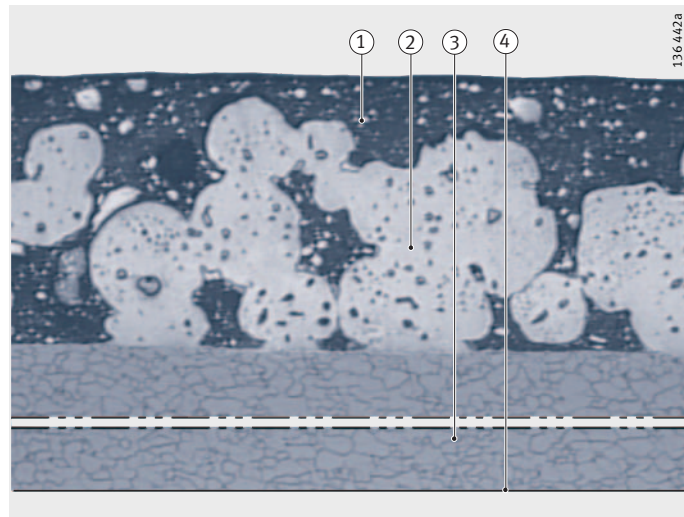
Catalogue: The complete Permaglide® standard range is described comprehensively in Catalogue 706 and the CD and online version of *medias*® professional.

Maintenance-free Permaglide® plain bearing material P1 Permaglide® P1 is maintenance-free and suitable for dry running. It can be used for rotary and oscillating motion as well as for short stroke linear motion. The low-wear material has good sliding characteristics, a low coefficient of friction and high resistance to chemicals. It does not absorb water (highly resistant to swelling), does not tend to weld to metal and is also suitable for hydrodynamic operation. The maintenance-free Permaglide® materials are available in the variants P10, P11 and P14. P141 is available by agreement, page 1376.

Permaglide® P10 The variant P10 has a steel backing, *Figure 1*.

- ① Running-in layer: polytetrafluorethylene (PTFE) and lead (Pb), 0,01 mm to 0,03 mm thick
- ② Sliding layer: porous bronze layer, filled with PTFE/Pb, 0,2 mm to 0,35 mm thick
- ③ Steel backing
- ④ Surface protection for steel backing, end faces and butt joint faces: tin, approx. 0,002 mm thick

Figure 1
Permaglide® P10



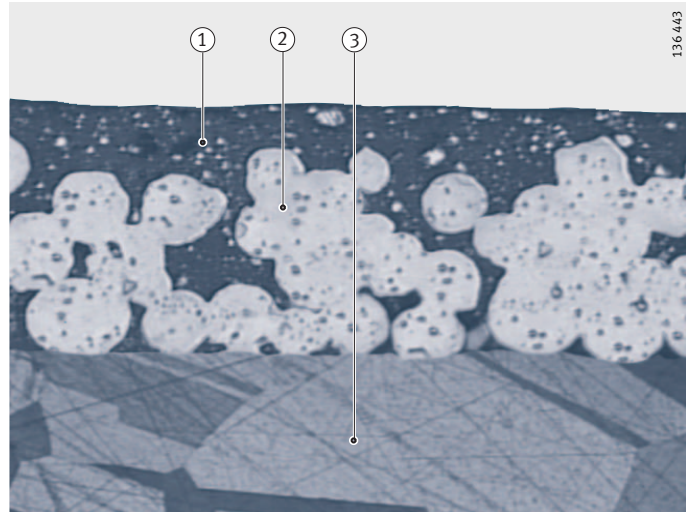
Permaglide® plain bearings

Permaglide® P11

In P11, the backing is made from bronze, *Figure 2*. Plain bearings made from this material have high corrosion resistance and thermal conductivity and are antimagnetic.

- ① Running-in layer: polytetrafluorethylene (PTFE) and lead (Pb), 0,01 mm to 0,03 mm thick
- ② Sliding layer: porous bronze layer, filled with PTFE/Pb, 0,2 mm to 0,35 mm thick
- ③ Bronze backing

Figure 2
Permaglide® P11

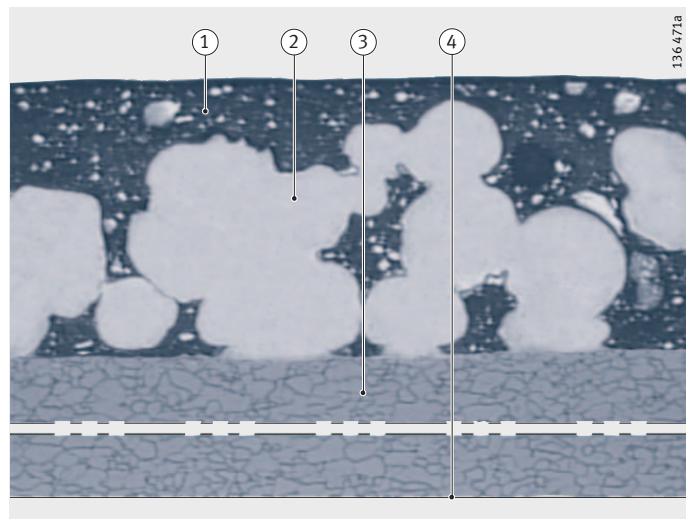


Permaglide® P14

P14 has a steel backing but is free from lead, *Figure 3*.

- ① Running-in layer: polytetrafluorethylene (PTFE) and zinc sulphide (ZnS), 0,01 mm to 0,03 mm thick
- ② Sliding layer: porous bronze layer, filled with PTFE/ZnS, 0,2 mm to 0,35 mm thick
- ③ Steel backing
- ④ Surface protection for steel backing, end faces and butt joint faces: tin, approx. 0,002 mm thick

Figure 3
Permaglide® P14



Special design

Available by agreement and as a special design is the lead-free Permaglide® P141. This material is similar in structure to P14 but has wear-inhibiting additives.

The running-in layer and sliding layer are resistant to swelling and the temperature range extends from -60 °C to $+260\text{ °C}$.

All maintenance-free P1 materials (except for P11) can also be supplied with increased anti-corrosion protection.

Technical data The important mechanical and physical characteristics of the maintenance-free P1 plain bearing materials are shown in the table.

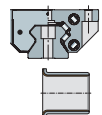
Data

Characteristics				
Maximum pv value for dry running	Continuous operation	pv	1,8	N/mm ² · m/s
	For short periods		3,6	N/mm ² · m/s
Permissible specific bearing load	Static	p _{max}	250	N/mm ²
	Very low sliding speed		140	N/mm ²
	Rotating, oscillating		56	N/mm ²
Permissible sliding speed	Dry running	v _{max}	2	m/s
	Hydrodynamic operation		>2	m/s
Permissible operating temperature	–	ϑ	–200 to +280	°C
Coefficient of thermal expansion	Steel backing	α _{St}	11 · 10 ^{–6}	K ^{–1}
	Bronze backing	α _{Bz}	17 · 10 ^{–6}	K ^{–1}
Coefficient of thermal conductivity	Steel backing	λ _{St}	>42	W (m · K) ^{–1}
	Bronze backing	λ _{Bz}	>70	W (m · K) ^{–1}
Relative electrical resistance after running-in		R _{rel min}	> 1	Ω · cm ²

Product overview/dimensions The available standard dimension ranges for bushes, washers and strips made from P1 material are given in the table.

Product and size range

Plain bearings made from P1 material	Designation	For shafts to/from and dimensions
Bushes	PAP...P10	2 mm to 300 mm
	PAPZ...P10	³ / ₁₆ " to 2"
	PAP...P11	4 mm to 100 mm
	PAP...P14	2 mm to 300 mm
Flanged bushes	PAF...P10	6 mm to 40 mm
	PAF...P11	6 mm to 40 mm
	PAF...P14	6 mm to 40 mm
Thrust washers	PAW...P10	10 mm to 62 mm
	PAW...P11	Available by agreement
	PAW...P14	10 mm to 62 mm
Strips	PAS...P10	Length 500 mm, widths from 180 mm to 250 mm, thicknesses from 0,5 mm to 3,06 mm
	PAS...P11	Length 500 mm, widths from 160 mm to 180 mm, thicknesses from 1 mm to 2,5 mm
	PAS...P14	Length 500 mm, widths from 180 mm to 250 mm, thicknesses from 0,5 mm to 3,06 mm



Permaglide® plain bearings

Low-maintenance Permaglide® plain bearing material P2

Permaglide® P2 is a low-maintenance, low-wear material with good damping characteristics and long relubrication intervals. It can be used for rotary and oscillating motion, has good resistance to edge loading and is highly resistant to shock loads.

Low-maintenance Permaglide® materials are available in the variants P20, P21, P22, P23 and P25.

P21, P22, P23 and P25 are available by agreement.

Permaglide® P20

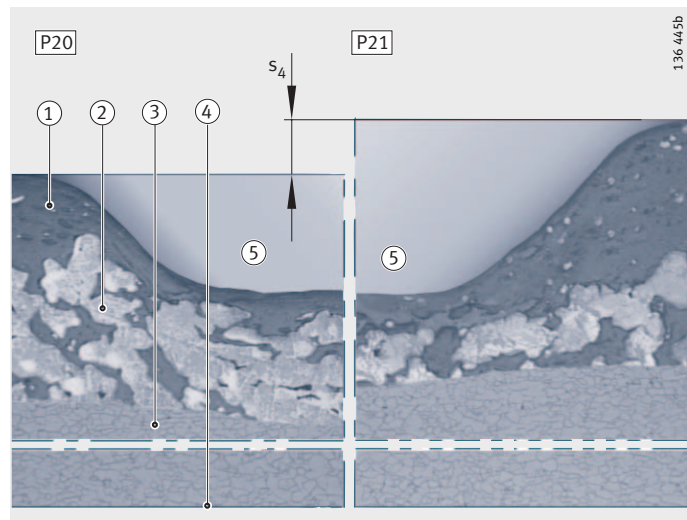
The variant P20 is ready-to-fit and has lubrication pockets, *Figure 4*.

Permaglide® P21

This material has lubrication pockets and a machining allowance, *Figure 4*. The sliding layer is approximately 0,15 mm thicker than in P20 and can therefore be machined subsequently by swarf-forming methods. Misalignment inaccuracies can therefore be compensated or internal clearances with tighter tolerances can be achieved.

- ① Sliding layer: polyvinylidene fluoride (PVDF), polytetrafluorethylene (PTFE) and lead (Pb), 0,05 mm to 0,1 mm thick
- ② Bronze intermediate layer: 0,2 mm to 0,35 mm thick
- ③ Steel backing
- ④ Surface protection: tin, approx. 0,002 mm thick
- ⑤ P20 and P21 with lubrication pockets
P21 with machining allowance s_4 of approx. 0,15 mm

Figure 4
Permaglide® P20, P21



Permaglide® P22

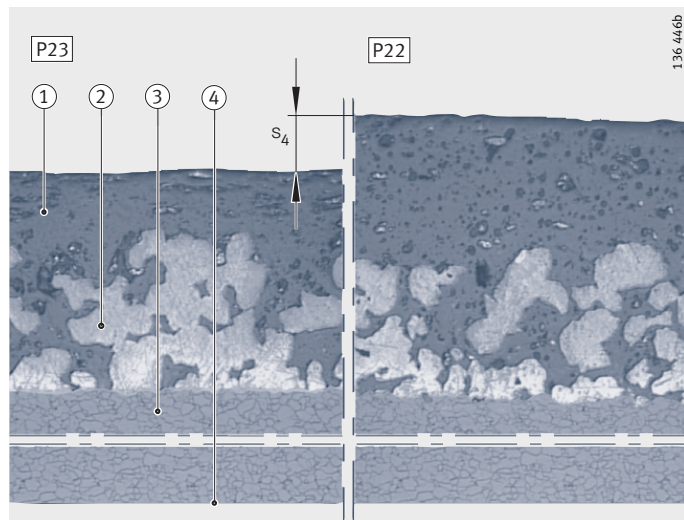
P22 does not have lubrication pockets but does have a machining allowance, *Figure 5*. The sliding layer is approximately 0,15 mm thicker than in P20 and can therefore be machined subsequently by swarf-forming methods. Misalignment inaccuracies can therefore be compensated or internal clearances with tighter tolerances can be achieved.

Permaglide® P23

The variant P23 is ready-to-fit and does not have lubrication pockets, *Figure 5*.

- ① Sliding layer: polyvinylidene fluoride (PVDF), polytetrafluorethylene (PTFE) and lead (Pb), 0,05 mm to 0,1 mm thick
 - ② Bronze intermediate layer: 0,2 mm to 0,35 mm thick
 - ③ Steel backing
 - ④ Surface protection: tin, approx. 0,002 mm thick
- P22 and P23 without lubrication pockets
P22 with machining allowance s_4 of approx. 0,15 mm

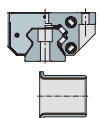
Figure 5
Permaglide® P23, P22



Special design

Available by agreement and as a special design is Permaglide® P25. This material is ready-to-fit, has lubrication pockets and is highly resistant to corrosion due to the bronze backing.

All low-maintenance P2 materials (except for P25) can also be supplied with increased anti-corrosion protection.



Permaglide® plain bearings

Technical data The important mechanical and physical characteristics of the low-maintenance P2 plain bearing materials are shown in the table.

Data

Characteristics				
Maximum pv value		pv	3	N/mm ² · m/s
Permissible specific bearing load	Static	p _{max}	250	N/mm ²
	Very low sliding speed		140	N/mm ²
	Rotating, oscillating		70	N/mm ²
Permissible sliding speed	–	v _{max}	3	m/s
	Hydrodynamic operation		>3	m/s
Permissible operating temperature	Continuous operation	ϑ	–40 to +110 °C	
	For short periods	ϑ _{max}	+140	°C
Coefficient of thermal expansion	Steel backing	α _{St}	11 · 10 ^{–6}	K ^{–1}
Coefficient of thermal conductivity	Steel backing	λ _{St}	<4	W (m · K) ^{–1}
Coefficient of friction		μ	0,02 to 0,2	

Product overview/dimensions The available standard dimension ranges for bushes, washers and strips made from P2 material are given in the table.

Product and size range

Plain bearings made from P2 material	Designation	For shafts to/from and dimensions
Bushes	PAP..-P20	8 mm to 100 mm
Thrust washers	PAW..-P20	12 mm to 52 mm
Strips	PAS..-P20	Length to 500 mm, widths from 180 mm to 250 mm, thicknesses from 0,99 mm to 2,46 mm

Special designs, linear plain bearings

In addition to the catalogue range, there are numerous special designs, *Figure 7*, page 1382:

- made from any Permaglide® plain bearing material
- with different dimensions from the catalogue products
- as combined components ①, ②
 - pressed into rings
 - with plastic moulded parts
- in different shapes ⑦, ⑭
 - bushes with windows and holes ③, ⑤
 - bushes with stamped oil grooves ④, ⑤
 - stamped components ⑬, ⑮, ⑯
 - ball cups ⑩, ⑪, ⑫
 - bearing shells ⑰, ⑱
- with the sliding layer on the outside ⑧, ⑨
- with different butt joint geometries ⑨.

The picture shows a small selection of special components already produced.

Special designs can be made in the following sizes:

- outside diameters of the bush between 3 mm and 305 mm (in special cases up to 800 mm)
- strip widths up to 205 mm
- thicknesses from 0,5 mm to 3,06 mm.

Caution! The feasibility of special designs should be checked as early as possible. This applies to the geometry and also to the costs.

Permaglide® linear plain bearings

Permaglide® linear plain bearings PAB comprise an outer ring with pressed-in Permaglide® bushes PAP..-P20, *Figure 6*, ①. The variant PABO has a segment cut out for supported shafts.

Permaglide® linear plain bearing units PAGH and PAGBA comprise a housing and a pressed-in Permaglide® linear plain bearing PAB or PABO, *Figure 6*, ②.

Catalogue: Track roller and shaft guidance systems

Comprehensive information on Permaglide® linear plain bearings is given in Catalogue 801 and in *medias*® professional.



Figure 6
① Permaglide®
linear plain bearing PAB..-PP-AS
② Permaglide®
linear plain bearing unit
PAGBAO..-PP-AS

Permaglide® plain bearings – special designs

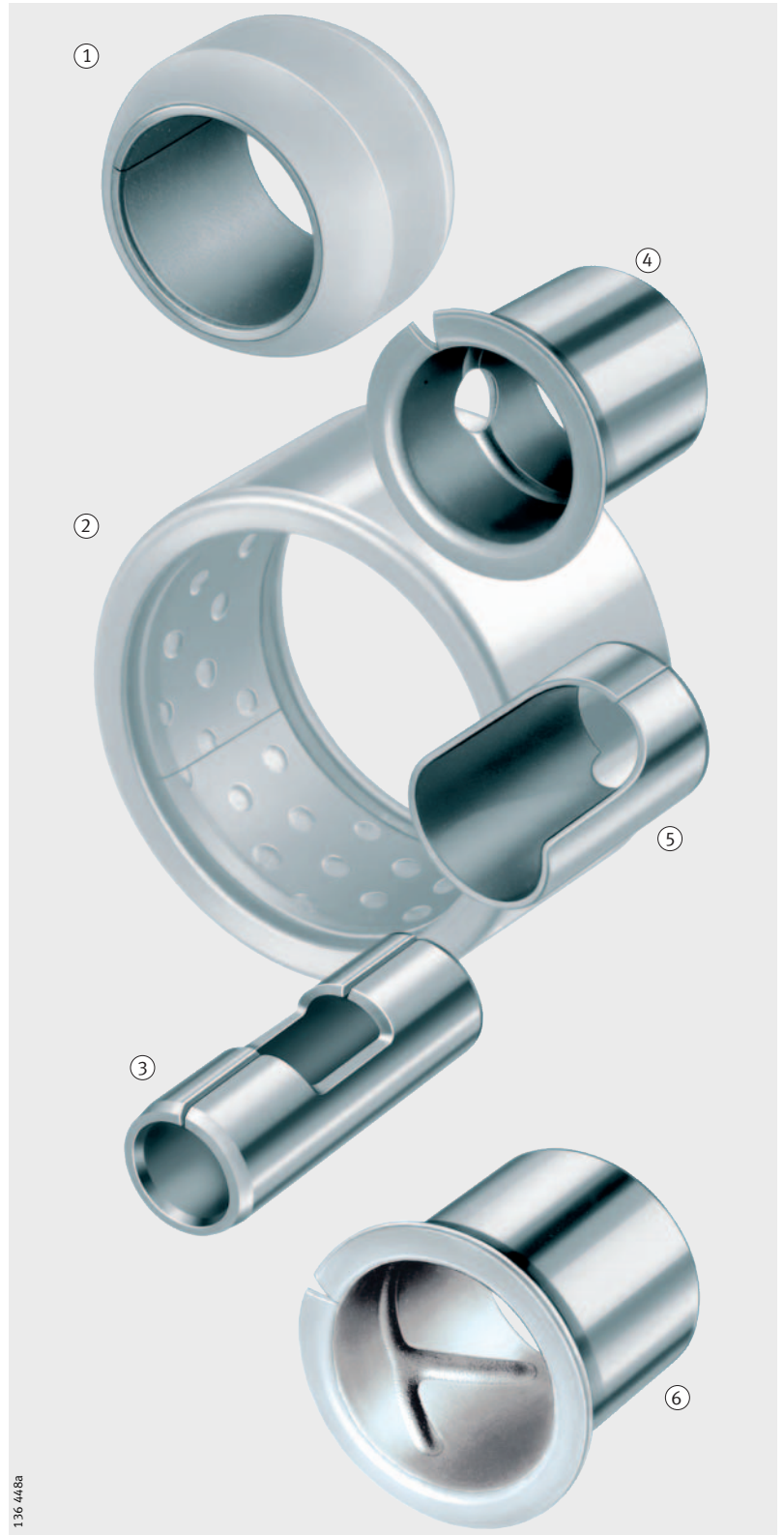
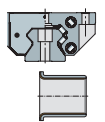
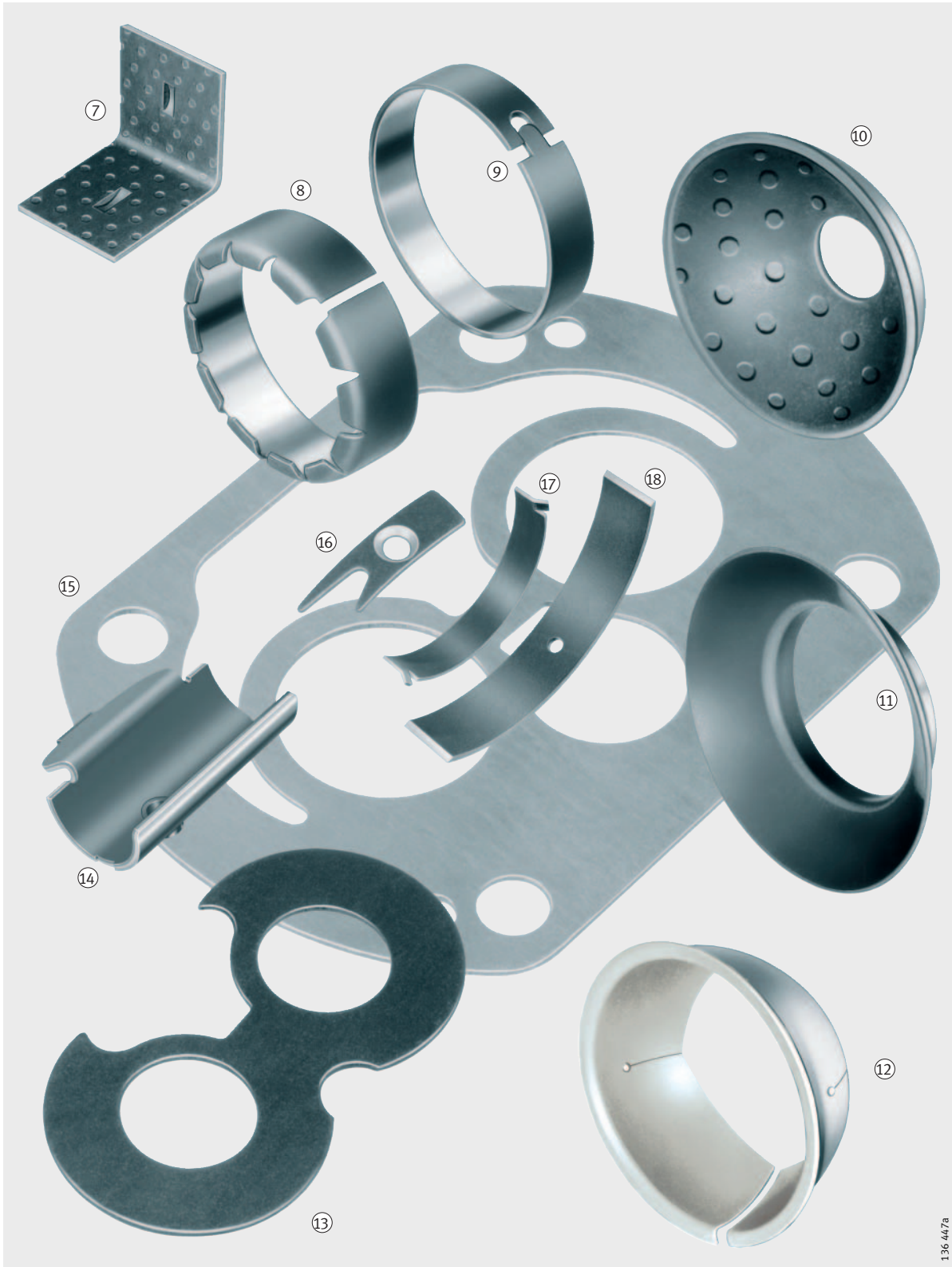
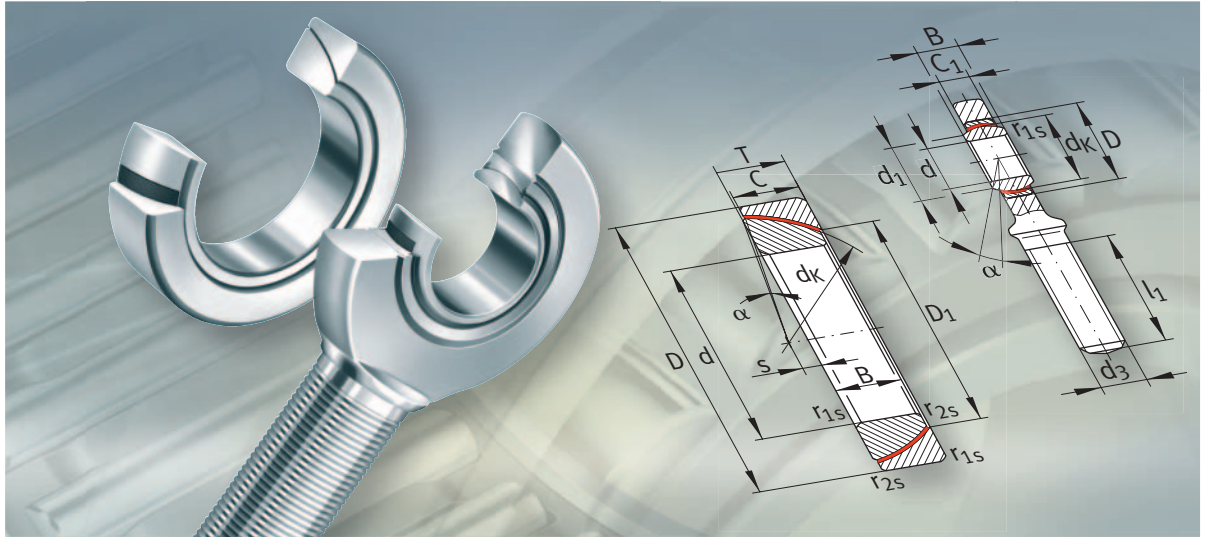


Figure 7
Special designs
Permaglide® plain bearings

136 448a





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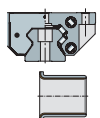


ELGES

Spherical plain bearings,
plain bushes, rod ends

ELGES Spherical plain bearings, plain bushes, rod ends

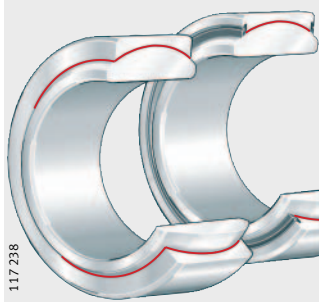
		Page
Product overview	Maintenance-free spherical plain bearings, cylindrical plain bushes	1386
Features	Sliding layers	1387
	Radial spherical plain bearings	
	 Radial large spherical plain bearings	1389
	Angular contact spherical plain bearings	1389
	Axial spherical plain bearings	
	 Axial large spherical plain bearings	1389
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Features	Hydraulic rod ends with thread clamping	1397
	Hydraulic rod ends with welding face	1397



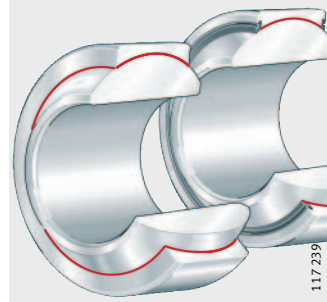
Product overview Maintenance-free spherical plain bearings, cylindrical plain bushes

Radial spherical plain bearings
Unsealed or lip seals on both sides

GE..-UK, GE..-UK-2RS

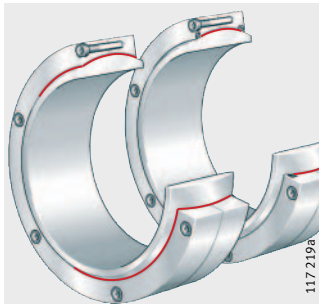


GE..-FW, GE..-FW-2RS

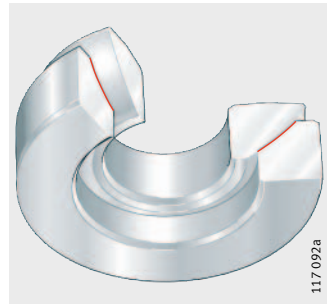


X-life
Radial and axial large spherical plain bearings
Unsealed or lip seals on both sides

GE..-DW, GE..-DW-2RS2

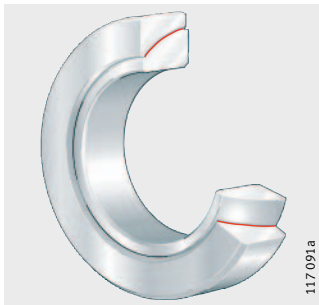


GE..-AW

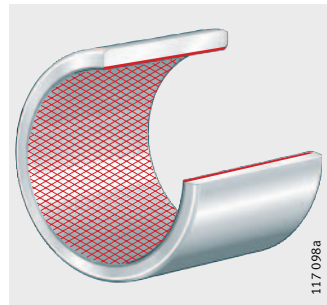


Angular contact spherical plain bearings, cylindrical plain bushes
Unsealed

GE..-SW

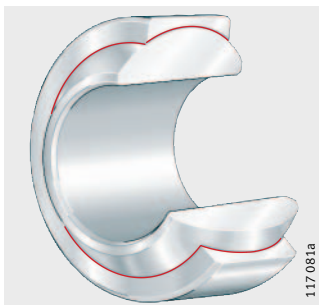


ZGB



Radial spherical plain bearings
Dimension series K, unsealed

GE..-PW



Maintenance-free spherical plain bearings, cylindrical plain bushes

Features

Maintenance-free spherical plain bearings are used where:

- there are particular requirements on bearing life under maintenance-free operation
- for reasons of lubrication, bearings with a metallic sliding contact surface are not suitable, for example under unilateral load.

Spherical plain bearings allow spatial adjustment movements and, depending on the bearing type, are preferably used to support radial, combined or axial loads.

Spherical plain bearings, plain bushes, rod ends: catalogue

The standard range is described comprehensively in Catalogue 238 and the CD and online version of *medias*[®] professional.

Sliding layers

Maintenance-free spherical plain bearings have special sliding layers based on PTFE (polytetrafluoroethylene).

In descending order of performance, these are:

- ELGOGLIDE[®] – the highest performance sliding layer, *Figure 1*
- PTFE composite material, *Figure 2*, page 1388
- PTFE-bronze film, *Figure 3*, page 1388.

These materials form the slideway of the outer ring or the shaft locating washer. They transmit the forces occurring and provide lubrication – the bearings must not be lubricated in any other way.

ELGOGLIDE[®]

The sliding layer comprises 0,5 mm thick ELGOGLIDE[®], is embedded in synthetic resin and attached by a high strength bond to the support body, *Figure 1*.

The flow behaviour of the sliding layer is – in combination with the support body – almost negligible even under very high load.

The adhesive bond is resistant to moisture and does not undergo swelling.

- ① PTFE fabric, comprising Teflon[®] and supporting fibres
- ② Resin matrix
- ③ Supporting fibres
- ④ Steel substrate
- ⑤ Adhesive bond

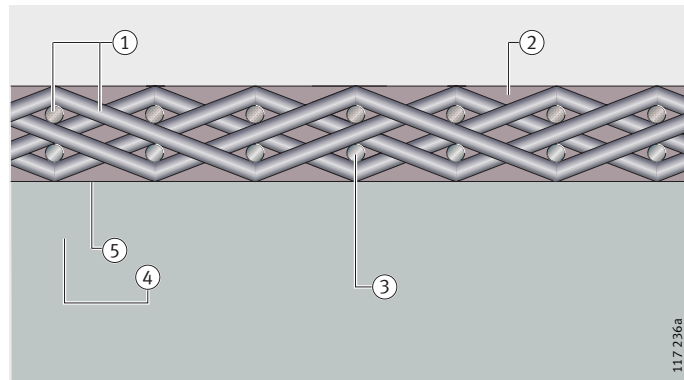
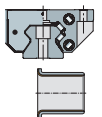


Figure 1
ELGOGLIDE[®] – cross-section



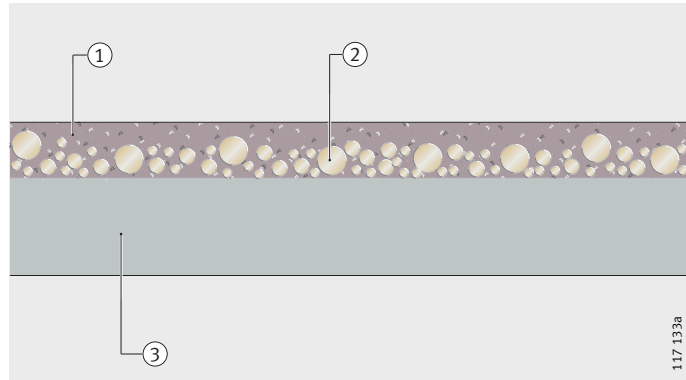
Maintenance-free spherical plain bearings, cylindrical plain bushes

PTFE composite material

PTFE composite material comprises sheet steel with bronze attached by sintering and embedded PTFE compound, *Figure 2*.

- ① PTFE compound
- ② Sintered bronze
- ③ Sheet steel

Figure 2
PTFE composite material – cross-section

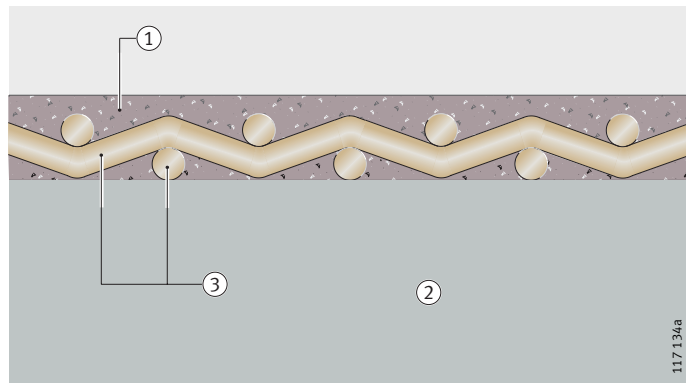



PTFE-bronze film

PTFE-bronze film (metal lattice material) is made from high strength bronze and acts as a stabiliser for the sintered PTFE compound, *Figure 3*.

- ① PTFE compound
- ② Substrate
- ③ Bronze

Figure 3
PTFE-bronze film – cross-section



Radial spherical plain bearings
 **Radial large spherical plain bearings**

Radial spherical plain bearings comprise inner and outer rings with maintenance-free sliding layers made from ELGOGLIDE[®], PTFE composite material or PTFE-bronze film.
 Sealed spherical plain bearings are protected by lip seals against contamination and water spray.
 These bearings have the suffix 2RS or 2RS2.
 Radial large spherical plain bearings from d = 320 mm are X-life bearings.

Series, sliding layer, standard


Series	Sliding layer	Standard to DIN ISO	Shaft diameter	
			from mm	to mm
GE..-UK	Composite	12 240-1, dimension series E	6	30
GE..-FW	Composite	12 240-1, dimension series E	6	25
GE..-UK-2RS	ELGOGLIDE [®]	12 240-1, dimension series E	17	300
GE..-FW-2RS	ELGOGLIDE [®]	12 240-1, dimension series G	30	280
GE..-DW	ELGOGLIDE [®]	12 240-1, dimension series C	320	1000
GE..-DW-2RS2	ELGOGLIDE [®]	12 240-1, dimension series C	320	1000
GE..-PW	PTFE-bronze film	12 240-1, dimension series K	5	30

Angular contact spherical plain bearings

Angular contact spherical plain bearings comprise inner and outer rings with ELGOGLIDE[®]. In addition to radial forces, they can also support axial forces and are suitable for alternating dynamic loads.

Series, sliding layer, standard

Series	Sliding layer	Standard to DIN ISO	Shaft diameter	
			from mm	to mm
GE..-SW	ELGOGLIDE [®]	12 240-2	25	200

Axial spherical plain bearings
 **Axial large spherical plain bearings**

Axial spherical plain bearings comprise shaft locating and housing locating washers with ELGOGLIDE[®]. They are preferably used to support axial forces and are suitable as support or base bearings.
 Axial large spherical plain bearings from d = 220 mm are X-life bearings.

Series, sliding layer, standard

Series	Sliding layer	Standard to DIN ISO	Shaft diameter	
			from mm	to mm
GE..-AW	ELGOGLIDE [®]	12 240-3	10	360

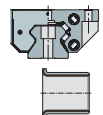
Cylindrical plain bushes

Cylindrical plain bushes comprise a steel support body with ELGOGLIDE[®]. They allow not only swivel movements but also axial movements and can support higher forces than conventional plain bearings.

Series, sliding layer, standard

Series	Sliding layer	Standard to DIN ISO	Shaft diameter	
			from mm	to mm
ZGB	ELGOGLIDE [®]	4 379 ¹⁾	30	200

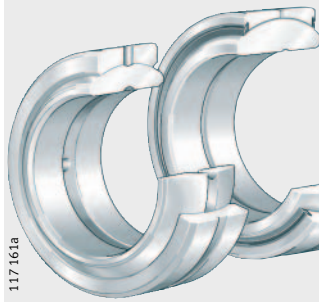
¹⁾ Main dimensions only.



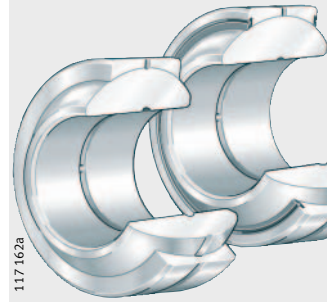
Product overview Spherical plain bearings requiring maintenance

Radial spherical plain bearings
Unsealed or lip seals on both sides

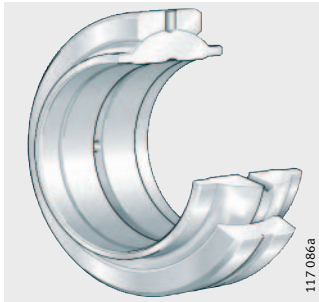
GE..-DO, GE..-DO-2RS



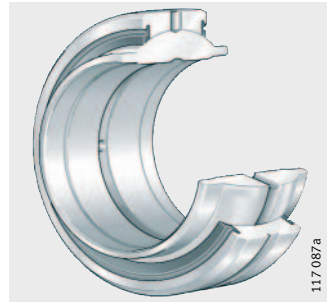
GE..-FO, GE..-FO-2RS



GE..-LO

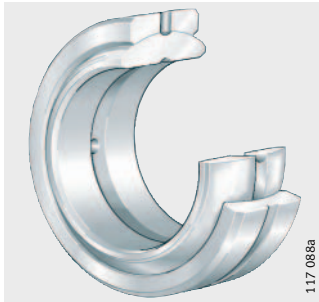


GE..-HO-2RS

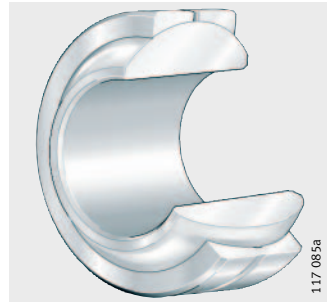


Unsealed, inch dimensions or dimension series K

GE..-ZO



GE..-PB

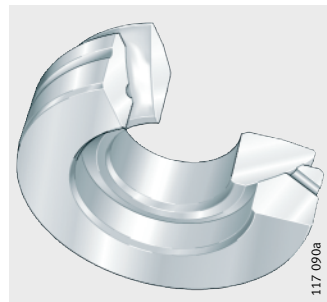


Angular contact spherical plain bearings, axial spherical plain bearings
Unsealed

GE..-SX



GE..-AX



Spherical plain bearings requiring maintenance

Features Radial spherical plain bearings

Radial spherical plain bearings comprise inner and outer rings with steel/steel or steel/bronze sliding contact surfaces and are lubricated via the inner and outer ring. They can support radial forces, transmit motion and loads with low moment levels and thus keep bending stresses away from the adjacent structure.

The bearings are particularly suitable for alternating loads with impact and shock type stresses and support axial loads in both directions.

Sealed spherical plain bearings are protected against contamination and water spray by lip seals and have the suffix 2RS.

Series, sliding contact surface, standard

Series	Sliding contact surface	Standard to DIN ISO	Shaft diameter	
			from mm	to mm
GE..-DO	Steel/steel	12 240-1, dimension series E	6	200
GE..-DO-2RS	Steel/steel	12 240-1, dimension series E	17	300
GE..-DO	Steel/steel	12 240-1, dimension series C	320	1000
GE..-FO	Steel/steel	12 240-1, dimension series G	6	12
GE..-FO-2RS	Steel/steel	12 240-1, dimension series G	15	280
GE..-LO	Steel/steel	12 240-1, dimension series W	12	320
GE..-HO-2RS	Steel/steel	–	20	80
GE..-ZO	Steel/steel	–	19,05	76,2
GE..-PB	Steel/brass	12 240-1, dimension series K	5	30

Angular contact spherical plain bearings

Angular contact spherical plain bearings comprise inner and outer rings with steel/steel sliding contact surfaces. In addition to radial forces, they can also support axial forces, are suitable for alternating dynamic loads and used, for example, as a plain bearing alternative to tapered roller bearings of series 320X to DIN 720 where loads in conjunction with small swivel angles would damage rolling bearings.

Angular contact spherical plain bearings transmit motion and loads with low moment levels and thus keep bending stresses away from the adjacent structure. They are intended for grease lubrication and are lubricated via the outer ring.

Series, sliding contact surface, standard

Series	Sliding contact surface	Standard to DIN ISO	Shaft diameter	
			from mm	to mm
GE..-SX	Steel/steel	12 240-2	25	200

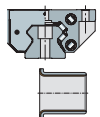
Axial spherical plain bearings

Axial spherical plain bearings comprise shaft locating and housing locating washers with steel/steel sliding contact surfaces, can support axial forces and transmit support forces with low moment levels into the adjacent construction. In order to support radial forces, they can be combined with radial spherical plain bearings of dimension series E to DIN ISO 12 240-1.

The bearings are lubricated via the housing locating washer.

Series, sliding contact surface, standard

Series	Sliding contact surface	Standard to DIN ISO	Shaft diameter	
			from mm	to mm
GE..-AX	Steel/steel	12 240-3	10	200

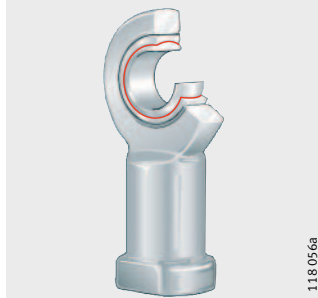


Product overview Maintenance-free rod ends

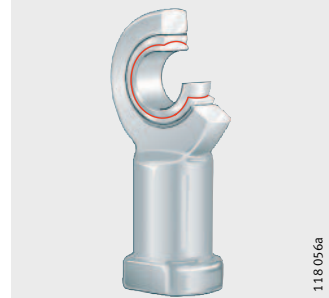
With internal thread

Unsealed or
lip seals on both sides

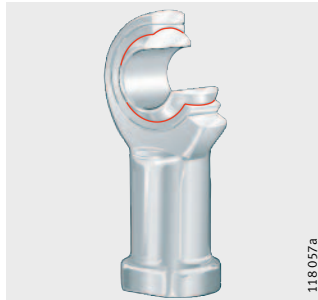
GIR..-UK, GIR..-UK-2RS



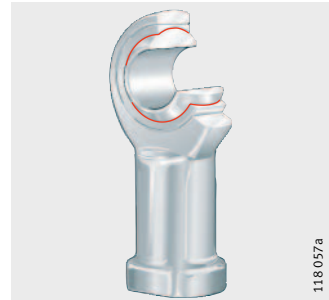
GIL..-UK, GIL..-UK-2RS



GIKR..-PW, GIKPR..-PW



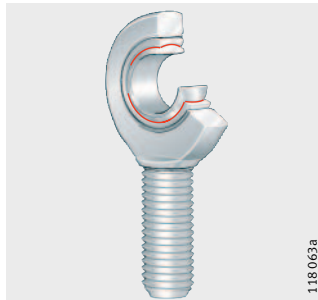
GIKL..-PW



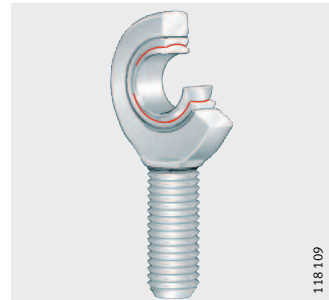
With external thread

Unsealed or
lip seals on both sides

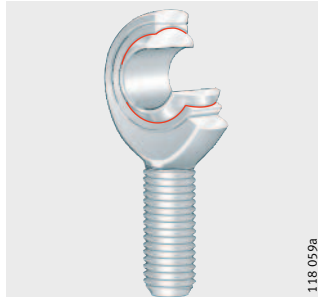
GAR..-UK, GAR..-UK-2RS



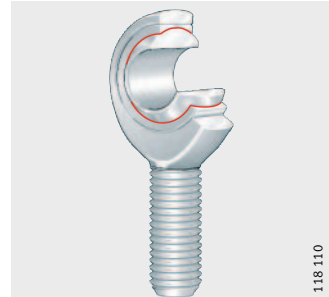
GAL..-UK, GAL..-UK-2RS



GAKR..-PW



GAKL..-PW



Maintenance-free rod ends

Features Maintenance-free rod ends comprise a housing with integral shank and a maintenance-free spherical plain bearing. The integral shank has an internal or external thread. The spherical plain bearing is firmly seated and located in the housing. The housings and shanks are protected against corrosion by zinc plating.

The rod ends can support radial loads in a tensile or compressive direction. They are suitable for slow movements with small to moderate swivel angles, for unilateral load and under certain conditions for alternating loads (suitable for alternating loads with GE..-UK-2RS).

Sealed rod ends have lip seals on both sides and are thus protected against contamination and water spray. This variant has the suffix 2RS.

Rod ends to DIN ISO 12 240-4, dimension series E have radial spherical plain bearings GE..-UK or GE..-UK-2RS with sliding contact surfaces comprising hard chromium/PTFE composite material or hard chromium/ELGOGLIDE® and a right or left hand internal or external thread. The thin-walled design of the eye housing allows compact adjacent constructions.

Rod ends to DIN ISO 12 240-4, dimension series K have radial spherical plain bearings GE..-PW with sliding contact surfaces comprising steel/PTFE-bronze film and a right or left hand internal or external thread.

Rod ends with internal thread

Series, thread type, standard

The table shows rod ends with an internal thread.

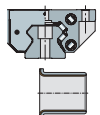
Series	Thread type	Standard to DIN ISO, type F	Shaft diameter	
			from mm	to mm
GIR..-UK	Right hand thread	12 240-4, dimension series E	6	30
GIL..-UK	Left hand thread	12 240-4, dimension series E	6	30
GIR..-UK-2RS	Right hand thread	12 240-4, dimension series E	35	80
GIL..-UK-2RS	Left hand thread	12 240-4, dimension series E	35	80
GIKR..-PW	Right hand thread	12 240-4, dimension series K	5	30
GIKL..-PW	Left hand thread	12 240-4, dimension series K	5	30
GIKPR..-PW	Right hand thread	12 240-4, dimension series K	5	30

Rod ends with external thread

Series, thread type, standard

The table shows rod ends with an external thread.

Series	Thread type	Standard to DIN ISO, type M	Shaft diameter	
			from mm	to mm
GAR..-UK	Right hand thread	12 240-4, dimension series E	6	30
GAL..-UK	Left hand thread	12 240-4, dimension series E	6	30
GAR..-UK-2RS	Right hand thread	12 240-4, dimension series E	35	80
GAL..-UK-2RS	Left hand thread	12 240-4, dimension series E	35	80
GAKR..-PW	Right hand thread	12 240-4, dimension series K	5	30
GAKL..-PW	Left hand thread	12 240-4, dimension series K	5	30

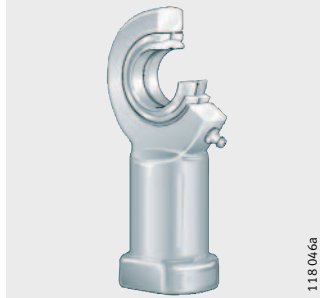


Product overview Rod ends requiring maintenance

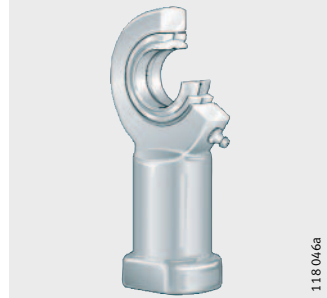
With internal thread

Unsealed or lip seals on both sides

GIR..-DO, GIR..-DO-2RS



GIL..-DO, GIL..-DO-2RS



GIKR..-PB



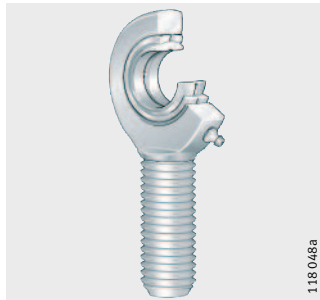
GIKL..-PB



With external thread

Unsealed or lip seals on both sides

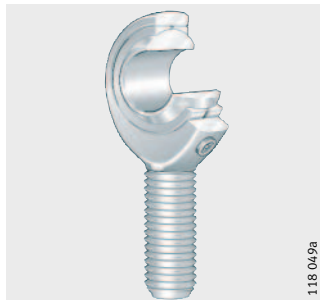
GAR..-DO, GAR..-DO-2RS



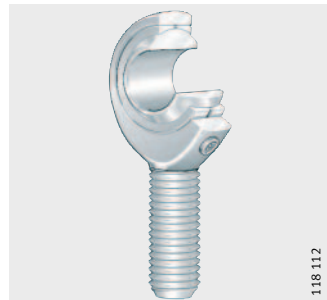
GAL..-DO, GAL..-DO-2RS



GAKR..-PB



GAKL..-PB



Rod ends requiring maintenance

Features These rod ends comprise a housing with integral shank and a spherical plain bearing requiring maintenance. The shank has an internal or external thread, the spherical plain bearing is firmly seated and located in the housing.

The rod ends can support radial forces in a tensile or compressive direction, transmit movements and forces at low moment levels and are suitable for alternating loads and, under certain conditions, unilateral loads.

Protection against corrosion is provided by zinc plating, the thin-walled design of the eye housing allows compact adjacent constructions.

Sealed rod ends are protected against contamination and water spray by lip seals. These bearings have the suffix 2RS.

Rod ends to DIN ISO 12 240-4, dimension series E have radial spherical plain bearings GE..-DO or GE..-DO-2RS with steel/steel sliding contact surfaces, a right or left hand internal or external thread and tapered lubrication nipples to DIN 71 412. They can be relubricated via the lubrication nipple or the housing bore.

Rod ends to DIN ISO 12 240-4, dimension series K have a right or left hand internal or external thread and funnel type lubrication nipple to DIN 3 405 on the rod end eye housing.

Rod ends with internal thread

Dimension series E, type F has a steel/steel sliding contact surface, while dimension series K, type F has a steel/bronze sliding contact surface.

Series, thread type, standard

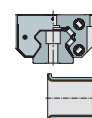
Series	Thread type	Standard to DIN ISO, type F	Shaft diameter	
			from mm	to mm
GIR..-DO	Right hand thread	12 240-4, dimension series E	6	30
GIL..-DO	Left hand thread	12 240-4, dimension series E	6	30
GIR..-DO-2RS	Right hand thread	12 240-4, dimension series E	35	80
GIL..-DO-2RS	Left hand thread	12 240-4, dimension series E	35	80
GIKR..-PB	Right hand thread	12 240-4, dimension series K	5	30
GIKL..-PB	Left hand thread	12 240-4, dimension series K	5	30

Rod ends with external thread

Dimension series E, type M has a steel/steel sliding contact surface, while dimension series K, type M has a steel/bronze sliding contact surface.

Series, thread type, standard

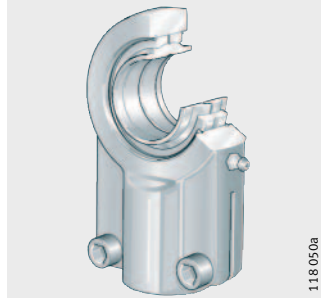
Series	Thread type	Standard to DIN ISO, type M	Shaft diameter	
			from mm	to mm
GAR..-DO	Right hand thread	12 240-4, dimension series E	6	30
GAL..-DO	Left hand thread	12 240-4, dimension series E	6	30
GAR..-DO-2RS	Right hand thread	12 240-4, dimension series E	35	80
GAL..-DO-2RS	Left hand thread	12 240-4, dimension series E	35	80
GAKR..-PB	Right hand thread	12 240-4, dimension series K	5	30
GAKL..-PB	Left hand thread	12 240-4, dimension series K	5	30



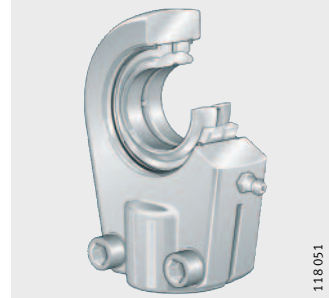
Product overview Hydraulic rod ends

Hydraulic rod ends

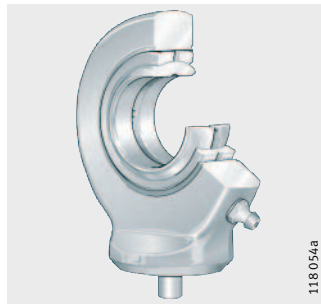
GIHNRK..-LO



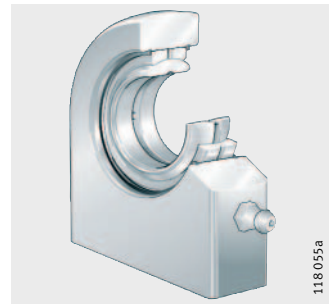
GIHRK..-DO



GK..-DO



GF..-DO



Hydraulic rod ends

Features Hydraulic rod ends are fitted with radial spherical plain bearings GE...LO or GE...DO. They have steel/steel sliding contact surfaces, can support radial forces in a tensile or compressive direction, transmit movements and forces at low moment levels and are suitable for alternating loads.

The shanks can be screw mounted using a thread in the shank or welded in place by means of circular or rectangular welding faces.

Rod ends with a circular welding face have a 45° weld chamfer and a centring facility by means of a concentric locating pin. They are particularly suitable for piston rods. Hydraulic rod ends with a rectangular cross-section are particularly suitable for cylinder bases.

The rod ends are slotted on both sides up to $d \leq 50$ mm, and on one side from $d > 50$ mm; they can be relubricated via tapered lubrication nipples.

Hydraulic rod ends with thread clamping

GIHNRK...LO is designed in accordance with DIN 24 338, ISO 6 982 for standard hydraulic cylinders to Cetop recommendation RP 58 H, DIN 24 333, DIN 24 336, ISO/DIS 6 020 I and ISO/DIS 6 022.

The spherical plain bearings are located in the housing by retaining rings. The thread clamping facility comprises two hexagonal socket head screws to DIN EN ISO 4 762.

GIHRK...DO is particularly suitable for hydraulic cylinders. It has very small linkage distances with maximum stroke utilisation. These rod ends are also available with maintenance-free spherical plain bearings GE...UK-2RS, GE...FW-2RS.

Series, thread type, standard

Series	Thread type	Standard to DIN ISO	Shaft diameter	
			from mm	to mm
GIHNRK...LO	Right hand thread	6 982	12	200
GIHRK...DO	Right hand thread	–	20	120
GIHLK...DO	Left hand thread	–	20	120

Hydraulic rod ends with welding face

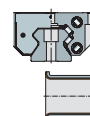
GK...DO is designed in accordance with DIN ISO 12 240-4, dimension series E, type S with a circular welding face, a centring pin on the shank base and 45° welding chamfer. They are suitable for fixing to piston rod ends and cylinder bases.

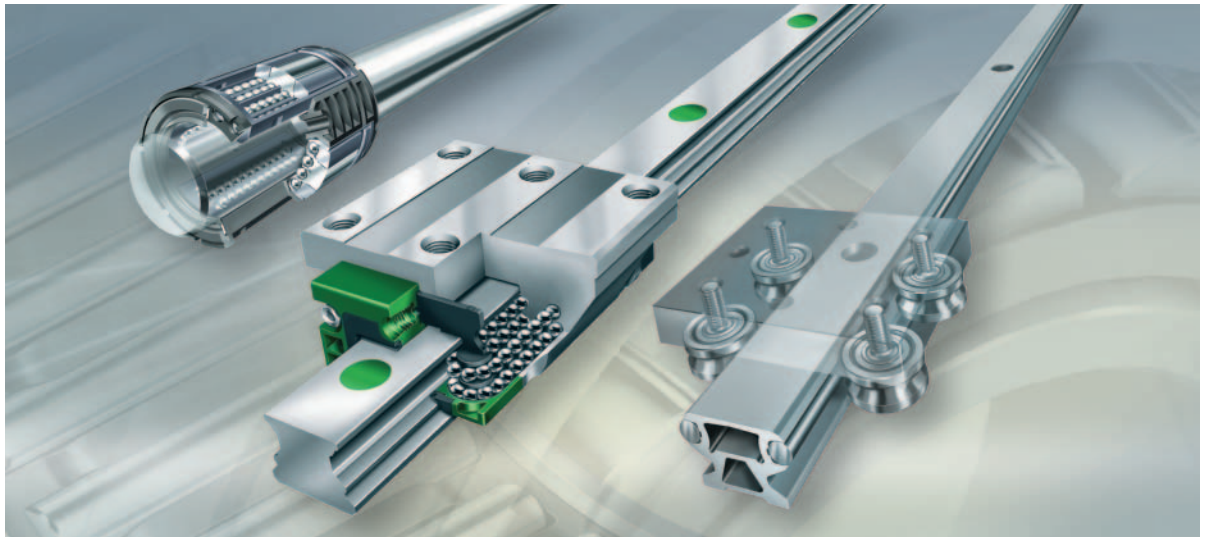
The spherical plain bearings are located in the housing by staking on both sides.

GF...DO is available in a heavy-duty design with a rectangular welding face. The spherical plain bearings are located in the housing by retaining rings and can be dismantled. These rod ends are suitable for fixing to hydraulic cylinder bases.

Series, welding face, standard

Series	Welding face	Standard to DIN ISO	Shaft diameter	
			from mm	to mm
GK...DO	Circular	12 240-4, dimension series E, type S	10	80
GF...DO	Rectangular	–	20	120





Linear guidance systems

Monorail guidance systems

Shaft and track roller guidance systems

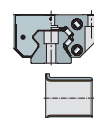
Flat cage and recirculating roller guidance systems

Miniature guidance systems

Driven linear units

Linear guidance systems

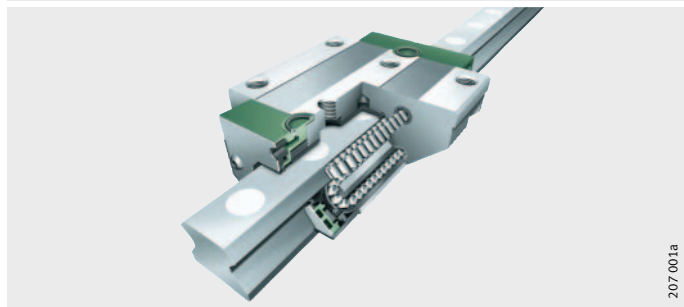
		Page
Product overview	Monorail guidance systems	1400
Features	Linear recirculating roller bearing and guideway assemblies	1401
	Six-row linear recirculating ball bearing and guideway assemblies	1402
	Four-row linear recirculating ball bearing and guideway assemblies	1402
	Two-row linear recirculating ball bearing and guideway assemblies	1402
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Features	Shaft guidance systems	1405
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Product overview	Flat cage and recirculating roller guidance systems	1406
Features	Flat cage guidance systems	1407
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	Miniature carriage units.....	1409
	Miniature linear guidance sets	1409
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	Linear tables	1411



Product overview **Monorail guidance systems**

Linear recirculating roller bearing and guideway assemblies

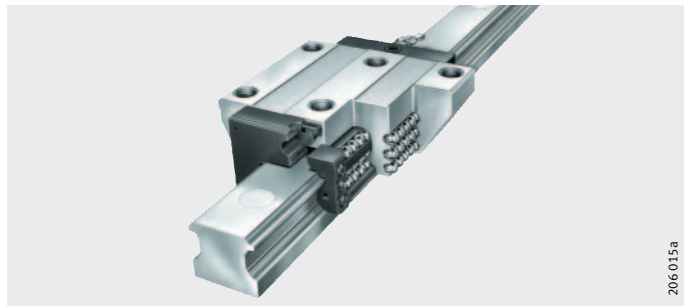
RUE



207.001a

Six-row linear recirculating ball bearing and guideway assemblies

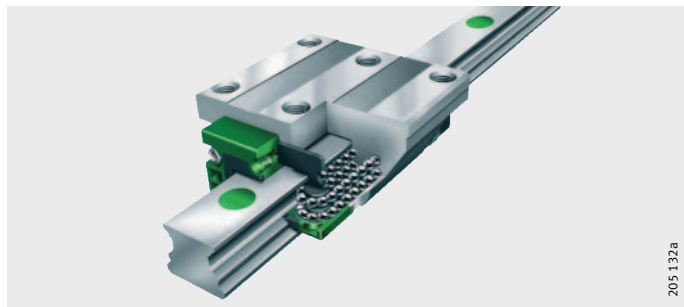
KUSE



206.015a

Four-row linear recirculating ball bearing and guideway assemblies

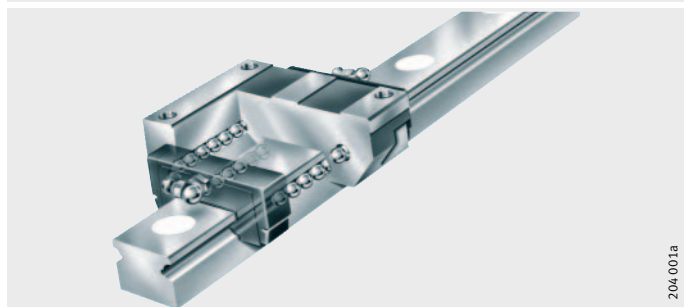
KUVE



205.132a

Two-row linear recirculating ball bearing and guideway assemblies

KUE



204.001a

Monorail guidance systems

Features INA monorail guidance systems are compact linear guidance systems based on roller or balls with high rigidity and load carrying capacity. These guidance systems can support loads from all directions – apart from the direction of motion – and moments about all axes.

They are available in various accuracy and preload classes and are therefore suitable for applications with high guidance and positioning requirements.

Monorail guidance systems are based on a modular concept, i. e. guideways can be combined with all carriage types within each size. This gives more economical stockholding, simpler fitting and more rapid spare parts purchasing.

In order to reduce maintenance intervals and maintenance costs, monorail guidance systems have a lubricant reservoir. The carriages are sealed on all sides, protecting the rolling element systems against contamination even under critical operating conditions.

Catalogue: The complete standard range of monorail guidance systems is described comprehensively in Catalogue 605 and the CD and online versions of *medias*[®] *professional*.

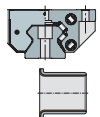
Linear recirculating roller bearing and guideway assemblies

Linear recirculating roller bearing and guideway assemblies RUE are, due to the cylindrical rollers, the INA monorail guidance systems with the highest load carrying capacity and rigidity. They comprise at least one carriage with a full complement roller system, a guideway, integral elastic wipers on the end faces of the carriage, sealing strips on the upper side and underside of the carriage and closing plugs to close off the fixing holes in the guideway.

The carriage and guideway of a linear recirculating roller bearing and guideway assembly are matched to each other due to their closely toleranced preload. It may be possible, after consultation, to use carriages and guideways in different combinations.

Linear recirculating roller bearing and guideway assemblies are suitable for accelerations up to 100 m/s^2 , speeds up to 180 m/min and operating temperatures from -10 °C to $+100 \text{ °C}$. They are used in applications with long unrestricted strokes, high and very high loads and high to very high rigidity.

The units are also available in a variant with optimised noise characteristics and in X-life quality.



Monorail guidance systems

Six-row linear recirculating ball bearing and guideway assemblies

Six-row linear recirculating ball bearing and guideway assemblies KUSE are the guidance systems based on balls with the highest load carrying capacity and rigidity. They comprise at least one carriage with a full complement ball system, a guideway, integral elastic wipers on the end faces of the carriage, sealing strips on the underside of the carriage and plastic closing plugs.

Linear recirculating ball bearing and guideway assemblies KUSE are suitable for accelerations up to 150 m/s^2 , speeds up to 300 m/min and operating temperatures from $-10 \text{ }^\circ\text{C}$ to $+100 \text{ }^\circ\text{C}$. They are used in applications with long unrestricted strokes, high and very high loads and high to very high rigidity.

Four-row linear recirculating ball bearing and guideway assemblies

Four-row linear recirculating ball bearing and guideway assemblies KUVF are the most versatile and most extensively developed range of monorail guidance systems from INA. These units comprise at least one carriage with a full complement ball system, a guideway, integral elastic wipers on the end faces of the carriage, sealing strips on the upper side and underside of the carriage and plastic closing plugs.

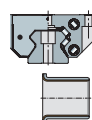
Linear recirculating ball bearing and guideway assemblies KUVF are suitable for accelerations up to 150 m/s^2 , speeds up to 300 m/min and operating temperatures from $-10 \text{ }^\circ\text{C}$ to $+100 \text{ }^\circ\text{C}$. They are used in applications with long unrestricted strokes, high loads, high rigidity and low friction.

The units are also available in a variant with optimised noise characteristics and in X-life quality.

Two-row linear recirculating ball bearing and guideway assemblies

Two-row linear recirculating ball bearing and guideway assemblies KUE are the economical alternative where guidance systems with moderate load capacity are required. The units comprise at least one carriage with a full complement ball system, a guideway, integral elastic wipers on the end faces of the carriage, sealing strips on the underside of the carriage and plastic closing plugs.

Linear recirculating ball bearing and guideway assemblies KUE are suitable for accelerations up to 150 m/s^2 , speeds up to 180 m/min and operating temperatures from $-10 \text{ }^\circ\text{C}$ to $+100 \text{ }^\circ\text{C}$. They are used for long unrestricted strokes, moderate loads, moderate rigidity and low friction.



Product overview Shaft and track roller guidance systems

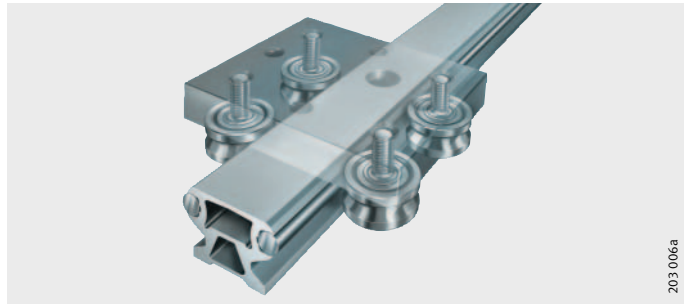
Shaft guidance systems

WF



Track roller guidance systems

LF



Shaft and track roller guidance systems

Features

Shaft guidance systems

INA shaft guidance systems are linear guidance systems based on ball bearings or plain bearings for various areas of use and applications. Linear ball bearings are available as a light range, compact range and heavy range. The mating tracks may be in the form of solid shafts, hollow shafts or supported shaft and support rail units.

The range is rounded out by a large selection of linear ball bearing and housing units and linear plain bearing units. In this case, the linear ball bearings or linear plain bearings are already mounted in ready-to-fit housings.

A large number of shafts (with and without machined features), shaft and support rail units and a versatile range of accessories allow a wide spectrum of applications.

Track roller guidance systems

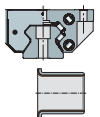
INA track roller guidance systems are linear guidance systems that can be configured on a modular basis for an extremely wide variety of applications. Due to their lightweight construction, they are highly suitable for use in handling systems. They are characterised in particular by quiet running, high traverse speeds, long travel distances and the modular concept.

Track roller guidance systems comprise one or more carriages made from aluminium, profiled track rollers and a straight or curved guideway. The carriages are available as hollow section carriages, open carriages, compact carriages and bogie carriages for curved, oval and circular guidance systems.

The guideways are made from aluminium with rolled-in raceway shafts made from rolling bearing steel. The guideways are available in numerous different designs, e.g. solid profile guideway, hollow section guideway, flat guideway, guideway with slot etc. Their selection is based on the intended purpose of the track roller guidance system.

Catalogue: Shaft and track roller guidance systems

The standard range is described comprehensively in Catalogue 801 and the CD and online versions of *medias*[®] *professional*.



Product overview Flat cage and recirculating roller guidance systems

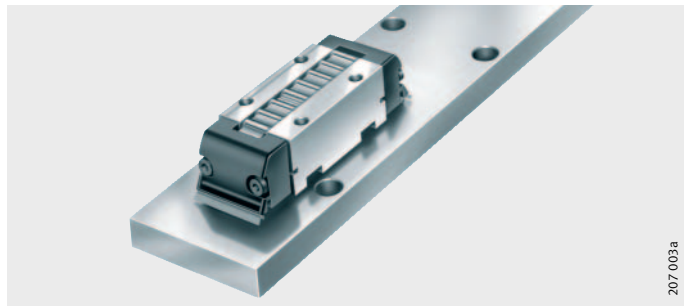
Flat cage guidance systems

M/V, ML/V, MVZ, J/S



Linear recirculating roller guidance systems

RUS, RUS..-KS, PR, RUSW



Flat cage guidance systems and linear recirculating roller guidance systems

Features

Flat cage guidance systems

Where linear locating or non-locating bearings with extremely high load carrying capacity, very smooth running and low, uniform friction are required for limited stroke lengths, flat cage guidance systems are used. These guidance systems comprise a guideway arrangement separated by needle or cylindrical roller flat cages. The guidance systems have particularly high rigidity, high accuracy and low friction and require significantly less space than other linear guidance systems.

Linear recirculating roller guidance systems

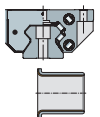
Linear recirculating roller guidance systems comprise a bearing arrangement system for linear motion with unlimited stroke. Since the guidance elements have a versatile range of possible arrangements, linear recirculating roller guidance systems are suitable for numerous applications in general machine building, especially for linear guidance systems in machine tools where high guidance and positioning accuracies are required over long traverse distances.

The range of recirculating guidance systems is complemented by:

- INA adjusting gibs for precise setting of preload
- INA setting devices for measuring the deformation of the adjacent construction where preload forces must be supported
- INA adapters for easy fitting of linear recirculating roller bearings in 45° arrangements.

Catalogue: Flat cage and recirculating roller guidance systems

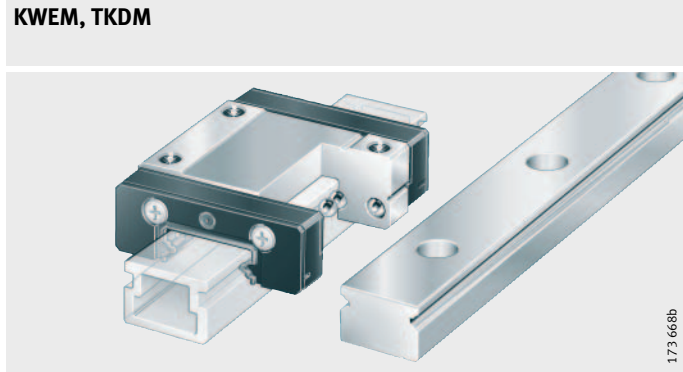
The standard range is described comprehensively in Publication FRF and the CD and online versions of *medias*[®] *professional*.



Product overview **Miniature guidance systems**

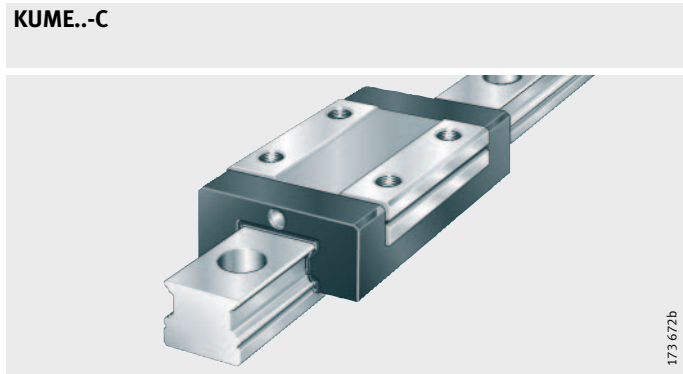
Two-row miniature linear recirculating ball bearing and guideway assemblies

KWEM, TKDM



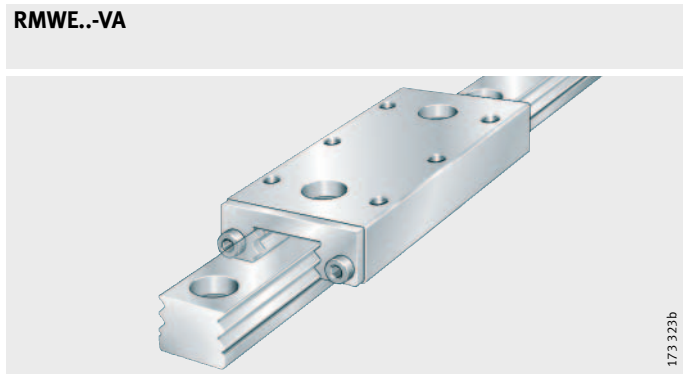
Four-row miniature linear recirculating ball bearing and guideway assemblies

KUME..-C



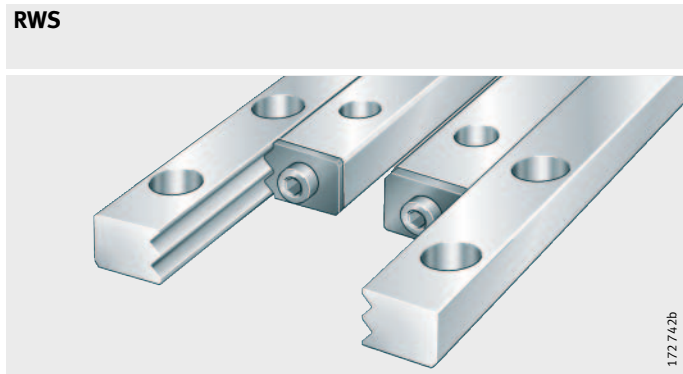
Miniature carriage units

RMWE..-VA



Miniature linear guidance sets

RWS



Miniature guidance systems

Features

INA miniature guidance systems are not standard linear guidance systems that have simply been reduced in size but were specially developed for very small design envelopes. Due to their compact design, they can often be used to replace bearing arrangements that require significantly more space. The guidance systems are preloaded linear locating bearings for limited and unlimited stroke lengths.

Two-row miniature linear recirculating ball bearing and guideway assemblies

These units have moderate load carrying capacity and moderate to high moment load carrying capacity. Due to their modular concept, guideways and carriages can be interchanged within each interchangeability and accuracy class. This simplifies the fitting of guidance systems, gives easier spare parts purchasing and allows very economical stockholding. The saddle plates and guideways are corrosion-resistant. Seals on the end faces of the carriages protect the rolling element system against contamination. The carriages are greased and can be relubricated. The guideways and carriages are also available in a wide version. Information on the units is given in Market Information MAI 81.

Four-row miniature linear recirculating ball bearing and guideway assemblies

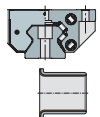
Four-row miniature linear recirculating ball bearing and guideway assemblies are ready-to-fit guidance systems for unlimited stroke lengths. They have high to very high load carrying capacity and rigidity. Due to the lubricant reservoir, the relubrication intervals can be extended. The saddle plates and guideways are corrosion-resistant. Seals on the end faces of the carriages protect the rolling element system against contamination. The carriages are greased and can be relubricated. Information on the units is given in Market Information MAI 81.

Miniature carriage units

Miniature carriage units with cylindrical roller flat cages are corrosion-resistant, ready-to-fit cage guidance systems for limited stroke lengths. They have a high load carrying capacity, high rigidity and high accuracy whilst requiring very little space. Information on the units is given in Market Information MAI 77.

Miniature linear guidance sets

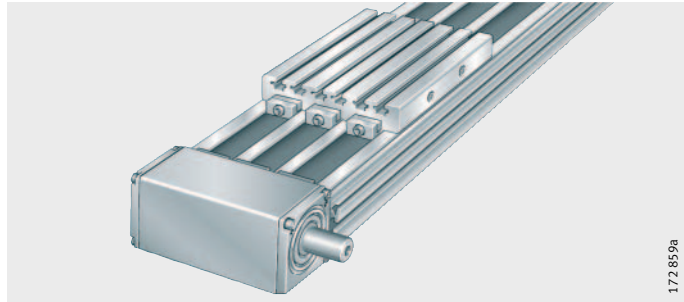
Miniature linear guidance sets with cylindrical roller flat cages are corrosion-resistant, ready-to-fit locating bearings for limited stroke lengths and are preloaded during fitting. These linear guidance systems have high load carrying capacity, high rigidity and high accuracy whilst requiring very little space. Since the layout of the guidance system can be varied, the elements can be easily matched to predetermined adjacent constructions. The sets are particularly suitable for short stroke lengths, low-friction and oscillating motion and high loads with very high rigidity. Information on the units is given in Market Information MAI 79.



Product overview **Driven linear units**

Linear actuators with linear recirculating ball bearing and guideway assemblies and toothed belt drive

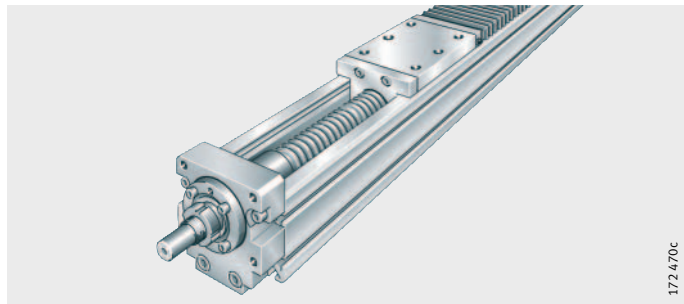
MKU..-ZR



172.859a

Linear actuators with linear recirculating ball bearing and guideway assemblies and ball screw drive

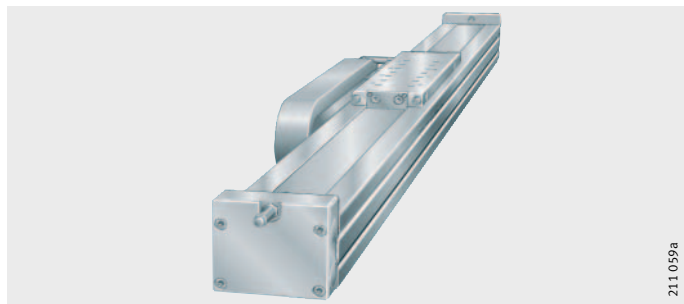
MKU..-KGT



172.470c

Linear actuators with linear recirculating ball bearing and guideway assemblies and direct drive

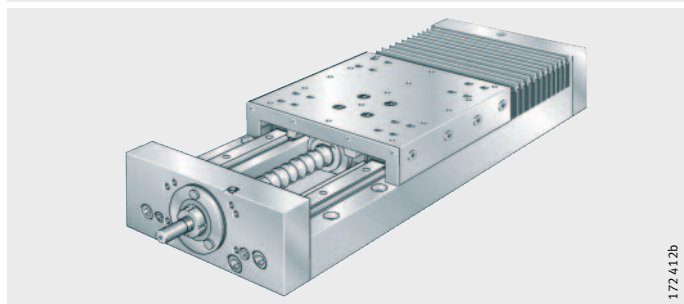
MKUVS42LM



211.059a

Linear tables with and without drive

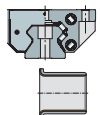
LT



172.412b

Driven linear units

Features	Rapid progress in the automation of production and assembly processes has pushed forward the development of complete, driven assemblies. These comprise a high precision guidance system, a rigid support rail, a wear-free drive unit and a user-friendly controller.
Linear actuators	INA linear actuators are integrated modular systems containing all the components required for operation. The linear actuators are guided by linear ball bearing and guideway assemblies of series KUE, KUVE or KUSE, by track roller guidance systems LF or plain guidance systems. The drive function is carried out by a ball screw drive, toothed belt or direct drive.
Linear tables	<p>INA linear tables are used where larger masses are moved in one or more axes. Due to the large distances between support points, linear tables are also capable of supporting high torques. The guidance systems used are linear ball bearings or linear ball bearing and guideway assemblies.</p> <p>Linear tables are available without a drive mechanism, with a ball screw drive, with a trapezoidal lead screw drive or a direct drive.</p> <p>The INA range of driven linear units is complemented by suitable controllers, motors and gearboxes that are matched to each other for optimum performance.</p>
Publication: Driven linear units	Comprehensive information on these units is given in Publication ALE, information on units with direct drive is given in Market Information MAI 105.



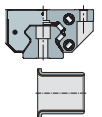
FAG



Equipment and services for the mounting and maintenance of rolling bearings

Equipment and services for the mounting and maintenance of rolling bearings

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Industrial Services – Expertise in maintenance.....	1414
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Equipment and services for the mounting and maintenance of rolling bearings

Equipment and services Industrial Services – Expertise in maintenance

Since the integration of FAG into the Schaeffler Group, F'IS has undertaken service tasks for the whole Group. F'IS is the specialist contact for the maintenance of rotating components. The aim is to help customers save on maintenance costs, optimise plant availability and avoid unforeseen machine downtime. The services are provided irrespective of the brand of the machine components used.

In order to provide a rapid, competent supply of F'IS products, services and training to customers worldwide, F'IS has specialist centres around the world. These work together with local partners that are certified and regularly audited by F'IS. Since each customer has a different set of requirements, F'IS offers concepts individually tailored to the customer.

The F'IS range

F'IS has implemented continuous expansion of its range over the years and offers products, services and training in the following five areas:

- Mounting/repair
- Lubrication
- Alignment
- Condition Monitoring
- Maintenance management.

For a detailed overview, see publication WL 80250.

Products for mounting and repair

Products for mechanical mounting and dismounting

For the mechanical mounting and dismounting of small and medium sized rolling bearings, F'IS offers mounting tool sets, various wrenches and mechanical extractors. Hydraulic extractors are used where higher extraction forces are required.

- Mounting tool sets
- Socket wrenches
- Hook and pin wrenches
- Mechanical extractors
- Hydraulic extractors, *Figure 1*
- Three-section extraction plates.

Products for hydraulic mounting and dismounting

In order to give easier mounting and dismounting of bearings with a tapered bore, hydraulic nuts are often used. Pressure generation devices available include oil injectors, hand pump sets and high pressure pumps. Selection is aided by the computer program MOUNTING MANAGER.

There is a comprehensive range of accessories, such as manometers, adapters and reduction nipples, high pressure hoses and sleeve connectors.

- Hydraulic nuts
- Oil injectors
- Hand pump sets
- High pressure pump
- Hydraulic systems and units
- Connectors, accessories.

Products for thermal mounting and dismounting

Rapid and energy-efficient heating of rolling bearings can be achieved with induction heating devices. FIS has table top equipment – including equipment for mobile use – and particularly effective standalone equipment.

- Electric heating plate
- Induction heating devices
- Heating rings, heat conducting paste
- Electric induction heating devices.



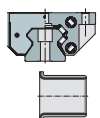
Figure 1
Dismounting of a bearing using a hydraulic extractor

Products for measurement and inspection

- Feeler gauges
- Taper gauges
- Snap gauge
- Enveloping circle gauges.

Accessories for mounting and dismounting

- Transport and mounting tools
- Gloves
- Mounting paste
- Anti-corrosion oil.



Equipment and services for the mounting and maintenance of rolling bearings

Products for lubrication

Lubricants

- Arcanol rolling bearing greases, *Figure 2*.

Lubrication systems

- Motion Guard SELECT Manager (software for selection of greases and lubrication systems)
- Motion Guard COMPACT
- Motion Guard CHAMPION
- Motion Guard CONCEPT6
- Dosing devices
- Grease gun.



Figure 2

Lubricants and lubrication systems

Products for alignment

Belt and chain drives

- Belt pulley alignment device Top-Laser SMARTY
- Belt tension measuring device Top-Laser TRUMMY.

Shaft couplings and alignment accessories

- Shaft alignment device Top-Laser INLINE, *Figure 3*
- Shims Top-Laser SHIMS.



Figure 3

Shaft alignment device
Top-Laser INLINE

**Products for
condition monitoring**
Operating condition monitoring

- Temperature measuring devices
- Digital hand tachometer
- Sonar device.

Vibration diagnosis

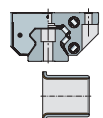
- Detector
- Bearing Analyser, *Figure 4*
- EasyCheck
- EasyCheck Online
- DTECT X1
- WiPro
- Screen Saver
- VibroCheck.



Figure 4
Condition monitoring

**Products for
maintenance management**

- CMMS* Interface.



Equipment and services for the mounting and maintenance of rolling bearings

Mounting service

The F'IS Mounting Team offers mounting services for rolling bearings across market sectors, *Figure 5*. We have extensive experience, for example in railways, mining, steel and aluminium, wind power, paper etc.



Figure 5
Mounting of a large rolling bearing

Repair service for large rolling bearings

During the maintenance of machinery and plant, many rolling bearings are taken out of service and replaced by new ones as a precaution. This exaggerated safety-consciousness blocks any appreciation of the potential cost savings.

The fact is: reconditioned bearings generally give the same performance as new ones. The F'IS experts repair all types of rolling bearings such as cylindrical roller bearings, spherical roller bearings, tapered roller bearings etc.

Railway wheelset bearing maintenance

Wheelset bearings for railway vehicles are among the most heavily loaded vehicle parts. Their life can be increased significantly by appropriate and regular maintenance. F'IS therefore offers operators of all railway vehicles the opportunity to have their wheelset bearings professionally dismantled, cleaned and reconditioned.

Lubrication as a service

In more than half of all cases, inadequate lubrication is the cause of unplanned machine downtime. The use of suitable greases makes it possible to significantly extend the life of rotating machine parts. FIS services include the selection and installation of lubricants and lubrication systems, the lubrication of bearing positions, the preparation of lubrication and maintenance plans, lubrication point management, lubrication consultancy and lubricant investigations and tests.

Alignment service

Incorrect alignment of belts and shafts are among the most common causes of unplanned machine downtime.

In addition to detailed analysis of causes, the FIS service includes alignment of belts and shafts on pumps, ventilators, compressors, electrical machinery etc. as well as the detection and correction of positional deviations in belts and shafts using FIS vibration and laser measurement devices.

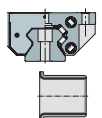
Condition Monitoring

The malfunction-free and optimised operation of complex machinery and plant can only be achieved by means of condition-based maintenance. The key method used by FIS in condition-based maintenance is vibration diagnosis, *Figure 6*. This method makes it possible to detect incipient damage in machinery at a very early stage.

Above all, vibration diagnosis helps to avoid unplanned downtime and expensive secondary damage, increase productivity and improve plant availability.



Figure 6
Condition monitoring as a service



Equipment and services for the mounting and maintenance of rolling bearings

Maintenance management

Maintenance consultancy

Maintenance consultancy by F'IS helps to achieve better cost transparency and more effective design of maintenance arrangements, *Figure 7*. The F'IS team moves beyond classical consultancy and places the emphasis on technical perspectives.

IPS systems

In the field of maintenance planning and control systems (IPS systems), F'IS experts apply their sound technical knowledge to offer analysis of customer-specific requirements independent of the manufacturer. On this basis, the F'IS team achieves an IPS system optimised and tailor-made for the customer. The F'IS service covers both complete solutions in the form of IPS implementation as well as individual modules.



Figure 7
Maintenance consultancy

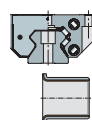
Training

F'IS offers, in relation to the product and service range, both standard training and customer-specific training, *Figure 8*. The individual training units are based on a modular concept with the result that customers can compile their own customised training course on the basis of these training components.

The training courses are offered both at Schaeffler Group locations and also on site at our customers. The current training offer including dates for the standard training courses can be found at www.fis-services.de in the section Training.



Figure 8
Training





FAG



Market sectors

Production Machinery
Power Transmission and Railway
Heavy Industry
Consumer Products

Market sectors

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Market sectors

Schaeffler Group Industrial develops, manufactures and supplies ball bearings, roller bearings, bearing units, housings and accessories worldwide for almost all machinery, plant, vehicles and equipment. We also provide a comprehensive range of services for advice, maintenance and fitting.

Our customers are found in the Business Units Production Machinery, Power Transmission and Railway, Heavy Industry and Consumer Products.

Production Machinery

High performance production machinery is a precondition and a driving force of technical progress.

High precision bearings set standards both in their main application sector in machine tools and also in equipment for the textile industry, in printing machinery, woodworking machinery and machines for the food industry. They fulfil very high requirements for reliability, high running accuracy and/or high speeds.

Comprehensive information is given in Publication AC 41130, Super Precision Bearings.

Bearings for machine tools

Hybrid spindle bearings with steel rings and ceramic balls are finding increasing usage due to their particular speed capacity, robust characteristics and reliability as well as their significantly longer operating life. For very high requirements in terms of load carrying capacity and speed capacity, special X-life ultra bearings with rings made from high performance steel and ceramic balls have been developed.

Single and double row cylindrical roller bearings of high precision design are ideal for use as non-locating bearings, since they allow length compensation without constraining forces between the rollers and raceways. They give bearing arrangements with high radial rigidity, high load carrying capacity and high accuracy.

Double direction axial angular contact ball bearings of series 2344 are used as particularly rigid axial bearings when cylindrical roller bearings of series NN30 support the radial forces.

Bearings for printing machinery

Printing machinery bearings are used in the bearing arrangements of the main cylinders in sheetfed and webfed printing machines, *Figure 1*. Due to their load carrying capacity, rigidity, accuracy and precise adjustability, they provide excellent support for the central requirement in printing machinery, namely the highest possible print quality.

The bearings are specially designed in close partnership between printing machinery manufacturers and our Application Engineering functions. As a result, the bearings are precisely matched to the requirements of the customer. This matching of design to the specific machine concept is particularly important, since exceeding requirements is a drain on resources and failing to meet requirements impairs performance. Finding the optimum solution, however, is not always easy. Due to its considerable experience in the development, design and manufacture of bearings, Schaeffler Group Industrial has the know-how necessary to always offer the best solution for an application in this complex bearing sector. Furthermore, it is able to do so in both technical and economic terms.

Due to the wide range of requirements, standardisation of printing machinery bearings is only possible to a limited extent. The range therefore comprises a large number of types and sizes.

In addition to the classic multi-row, high precision cylindrical roller bearings NN, NNU, N4N, N4U, use is also made of non-locating bearing units without and with eccentric geometries, locating bearing units, polygon bearings, combined linear and rotary bearing units and tapered roller bearing units. Bearings are available with and without seals. The bearing seat for the cylinder journal can be of a cylindrical or tapered design.

INA printing machinery bearings are cost-effective bearing arrangement systems that can be used to achieve the demands of the print industry for high productivity, low maintenance costs and excellent print quality.

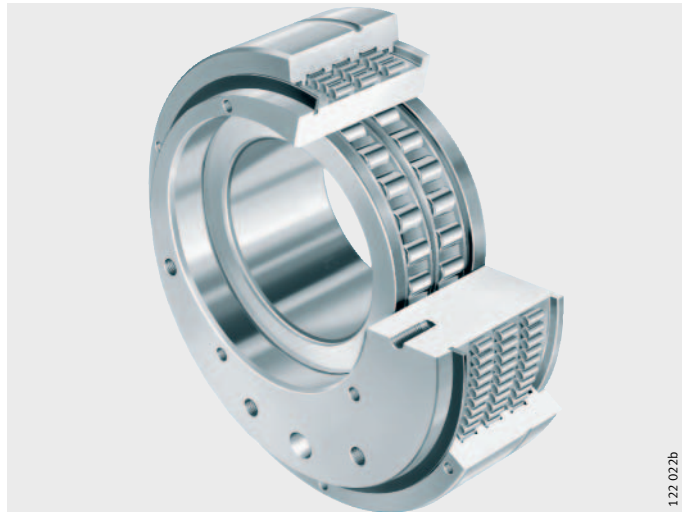


Figure 1
Printing machine bearing unit with eccentric outer ring – non-locating bearing

Special publications

Publication LFD High precision bearings for printing machinery.



Market sectors

Bearings for textile machinery

Whether it is spinning or weaving, finishing or processing, modern textile machines are highly automated and must run with high material throughput and without malfunctions – around the clock. There is no question that the right bearing components play a crucial role here. “Right” in this context means low friction, high accuracy, clearance-free, easy to fit, low maintenance, long service life, low noise and reliable.

In order to fulfil these requirements, Schaeffler Group Industrial has a comprehensive range of precision products for the reliable and cost-effective support of rotary and linear motion in textile machinery. We also have a range of system components that are precisely matched as complete systems to the specific application. Behind every one of these solutions lies years of experience in product development and the design of bearing arrangements.

Tape tension pulleys for gripper drives in weaving machines are renowned for their long life, *Figure 2*. These pulleys can be easily lubricated and have a very low moment of inertia. As a result, they run up to operating speed very quickly. In addition, the pulleys carry out up to 600 alternating rotary movements per minute in continuous operation with very low energy consumption. This gives a considerable increase in the productivity and cost-efficiency of the machine while achieving a uniformly high fabric quality.

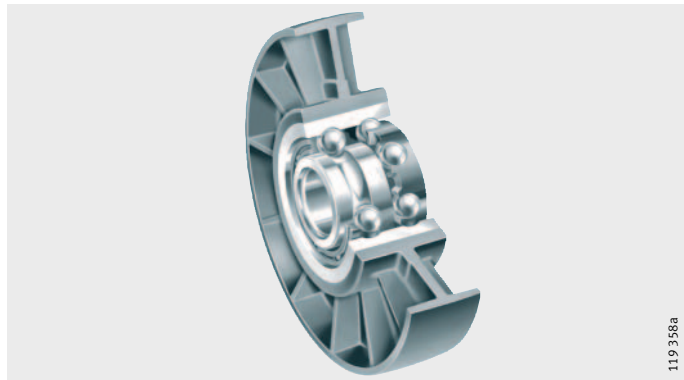


Figure 2
Energy-saving tape tension pulley
for the gripper drive

We also have ready-to-fit tension pulleys with reduced running noise, *Figure 3*. Due to design measures, for example, the imbalance of these components has been reduced by 50%. As a result, it is no longer necessary to balance the pulleys separately.

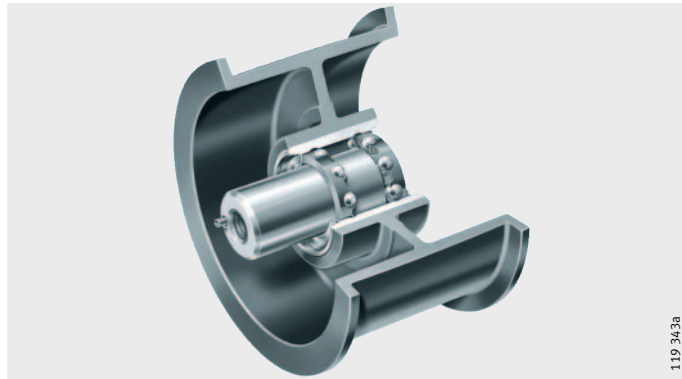


Figure 3
Tape tension pulley with optimised noise characteristics for twisting machines

Such ready-to-fit units are used in single and multi-head embroidery machines and are simply screw mounted on the adjacent construction. This eliminates the matching of individual components to each other and reduces mounting errors. This solution also gives a simplified adjacent construction since it completely replaces the gearbox previously required.

The system comprises a lever, eccentric, connecting rod and the corresponding bearing units. The assembly converts the rotary motion of the drive shaft into the stroke motion for the embroidery operation. Due to the smooth-running, high accuracy running of the bearings, the unit can achieve more than 1000 strokes per minute. Highly effective seals ensure long life and low maintenance requirements.

Special publications

Publication TMB Rolling bearings for textile machinery.

Bearings for the food industry

In plansifters that are used to separate different materials in the mill plant, large centrifugal forces must be supported in the eccentric shaft of the sifter frame. Spherical roller bearings of the special design T41A for oscillating load are particularly suitable for this task.

Bearings for woodworking machinery

In many cases, deep groove ball bearings are adequate for the high speeds and relatively low loads in bearing arrangements for wood shapers. Very high speeds, however, normally require the use of spindle bearings.



Market sectors

Power Transmission and Railway

People and goods are being moved with increasing speed and over increasing distances from one place to another. Motors and transmissions must operate with increasing efficiency. In power transmission, construction machinery and railway engineering, therefore, high demands are being placed on the quality and life of rolling bearings.

Bearings for rail vehicles

In mainline and local trains, the dominant requirements are for higher speeds and smoother running. Bearings and housings for wheelsets, transmissions and motors are selected by the Application Engineering specialists so that they are ideally matched to the customer requirements, *Figure 4*.

Wheelset bearings are subjected to extreme loads and must fulfil very high safety requirements.

For wheelsets, cylindrical roller bearings with smooth running, low friction and high speed suitability are frequently used in specially developed wheelset bearing housings.

Wheelset bearings with spherical roller bearings are available for rigid housings connected to the vehicle or bogie.

Tapered roller bearing units TAROL are suitable for high running speeds and high axial loads. The ready-to-fit units can be mounted in a single operation, are sealed, lubricated and have a specially adjusted axial internal clearance. They are supplied in metric sizes (UIC range) or to the AAR specification in inch sizes.

Increasingly, wheelset bearing units with integrated sensors (for speed, temperature, direction of rotation etc.) are being used.



Figure 4
Tapered roller bearing unit
for passenger train carriages

In hydrodynamic and mechanical railway transmissions with oil lubrication, radial bearings of practically all types are used to guide the pinion shafts, intermediate shafts and ring gear shafts.

In the axle suspension drive, cylindrical roller bearings, tapered roller bearings or spherical roller bearings are used.

For large gear bearing arrangements (gear hub), tapered roller bearings in an O arrangement matched by means of intermediate rings are predominantly used.

In the bearing positions of the traction motors, cylindrical roller bearings and deep groove ball bearings have proved successful.

For rail vehicles, there are also support and guide rollers, bearings in ancillary equipment, wheelset bearings with adapters, electrically insulated deep groove ball bearings and cylindrical roller bearings to ISO dimensions, special Arcanol rolling bearing greases and mounting tools.

Special publications

WL 07170 Rolling bearings for rail vehicles, a complete range.

Bearings for power transmission

Modern gearboxes transmit high power levels within a small space. This requires careful selection of rolling bearings with high performance capacity. In addition to load carrying capacity, appropriate design of the adjacent parts, lubrication and sealing is a precondition for reliable and cost-effective bearing arrangements. In order to take account of these influences, it is particularly advantageous to use the expanded life calculation method.

Depending on the gearbox design and tooth set type, almost all types of rolling bearings are used in power transmission.

The input shafts of cylindrical gear units are often supported by spherical roller bearings or tapered roller bearings, *Figure 5*. For particularly high speeds, combinations of cylindrical roller bearings supporting radial loads and four point contact bearings under axial load are suitable. For intermediate and output shafts, spherical roller bearings in a floating arrangement are often selected.

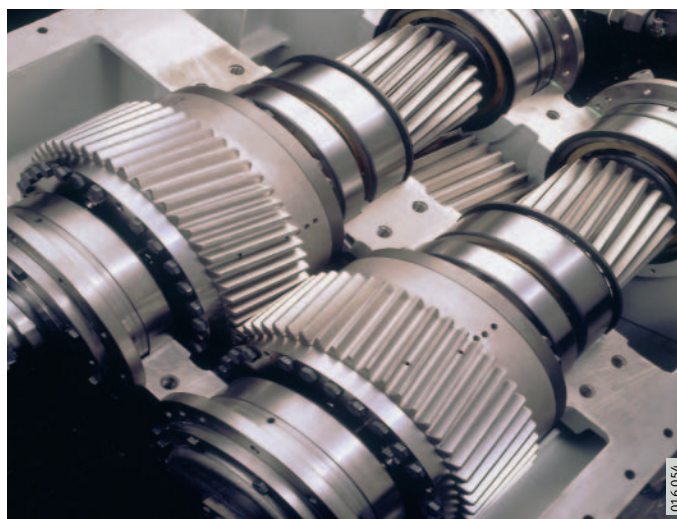


Figure 5
Rolling bearings
in a cylindrical gear unit



Market sectors

In bevel gear pairs, a narrow axial guidance is often required in order to ensure tooth mesh. A solution here is to use axially adjusted or matched tapered roller bearings or angular contact ball bearings.

The high axial forces in the worm shaft of worm gear units can be transmitted using matched or adjusted tapered roller bearings. For worm gear shafts, adjustability and narrow axial guidance of the tooth set are required. Deep groove ball bearings or adjusted tapered roller bearings are often used.

In order to support planet gears in planetary gearboxes, single or multiple row cylindrical roller bearings are used, with spherical roller bearings being fitted in special cases. Thicker planet gear studs can be achieved with direct bearing arrangements. The rolling elements then run directly on the planet gear stud. The hardness curve and surface quality of the raceway must be produced to particular specifications in order to ensure the load carrying capacity and operating life of the planet gear bearing arrangement.

Bearing arrangements in construction machinery

Among the wide range of rolling bearing arrangements in construction machinery, the excitation shaft bearing arrangement in vibratory equipment deserves particular mention.

Road rollers, plate compactors, vibratory motors, vibratory piledrivers or vibrator frames work with mechanical vibrations. The exciter shafts and their eccentrically mounted weights run at high speeds. Deep groove ball bearings (for small vibratory equipment), spherical roller bearings and cylindrical roller bearings (N, NU design) have proved successful here.

In order to compensate for misalignments and shaft deflections, the rollers and inner ring raceways of the cylindrical roller bearings have a logarithmic transverse profile. This allows tilting of up to 4 angular minutes without impairing the life. For greater tilting, the transverse profile can be adapted.

Bearing arrangements in industrial conveying trucks

Examples of special bearing designs can be found in fork lift trucks. Sensor bearings combine proven rolling bearing technology and modern sensor technology for drive, control and monitoring. This ready-to-fit system solution offers numerous cost and performance advantages.

Bearing arrangements in wind turbines

Wind turbines can now generate power levels of more than 3 MW. The bearings must be able to support moderate to high loads, oscillation and vibration. Low friction standard rolling bearings are normally suitable here. The bearings are mounted in standard or special housings. For particular cases, special rolling bearings can also be used.

Rolling bearings for wind turbines are often subject to high quality requirements with corresponding documentary evidence (German Lloyd certification guidelines).

The rotor bearing arrangement can be in the form of a shaft or hub bearing arrangement, *Figure 6*. Locating/non-locating bearing arrangements with spherical, cylindrical or tapered roller bearings have proved successful.

In the hub bearing arrangement, two tapered roller bearings are adjusted against each other. An alternative solution comprises a matched pair of tapered roller bearings as a locating bearing and a cylindrical roller bearing as a non-locating bearing.

For single bearing designs, support of forces and moments is combined in a multiple-row rolling bearing.



Figure 6
Self-aligning
FAG spherical roller bearing
for rotor bearing arrangement

Small swivel movements in the adjustment of the rotor blade as well as high loads and tilting moments are normally supported by four point contact bearings.

As tower bearings, four point contact bearings support the high weights and wind forces.

In wind turbine gearboxes, all types of rolling bearings normally found in gearbox construction are used.

Special publications

WL 01206 Expertise in bearing technology and service for wind energy installations.



Market sectors

Heavy Industry

The difficult operating and environmental conditions in all areas of heavy industry require rolling bearings that are proven even in critical applications. This applies to mining, crude oil and natural gas gathering, materials processing, the steel industry, the paper industry and conveying equipment.

Bearing arrangements for the steel industry

The bearing arrangements in steelworks and rolling mills are generally subjected to very high loads and in many cases also to high temperatures and heavy contamination. In addition to standard rolling bearings, bearings specially for these conditions are required.

The rolling bearings for converters must support not only heavy weights but also severe shocks. Large spherical roller bearings of split or unsplit design fulfil these requirements.

The swivel arms of the turret in continuous casting plants are supported in large rolling bearings. Axial spherical roller bearings are often used to support the weights involved, with cylindrical roller bearings to support the tilting moment.

At the inner support point of driven guide rollers, split roller bearings are used. In order to protect the bearings from the high slab temperatures as well as scale and coolant water, the housings are cooled using water. The seals comprise lamellar sealing rings and labyrinth seals.

For the support of non-driven guide rollers and the outer support of driven guide rollers, unsplit bearings are used.

Sealed spherical roller bearings reduce the consumption of lubricant and thus the environmental impact, *Figure 7*.



Figure 7

Sealed spherical roller bearing for strand guide rollers

In order to support the high radial forces in rolling mills, cylindrical roller bearings with two or four rows are often selected, together with axial bearings in the form of deep groove ball bearings, angular contact ball bearings, double row tapered roller bearings, axial tapered roller bearings or axial spherical roller bearings. If tapered roller bearings with two or four rows are used as radial bearings, an additional axial bearing is not normally necessary.

Spherical roller bearings are common as roll bearings where high axial guidance accuracy is not required and speeds are low.

Sealed multi-row tapered roller bearings for work rolls reduce the consumption of lubricant and thus the environmental impact, *Figure 8*.

Axial tapered roller bearings for pressure spindles ensure low adjustment forces due to their low friction.



Figure 8
Sealed four row tapered
roller bearing for work rolls



Market sectors

Single row cylindrical roller bearings as well as single and double row angular contact ball bearings are found predominantly in high speed rolling mills for wire and fine iron production lines.

The drive shafts in heavy duty rolling mills have a considerable mass. They were previously normally supported in plain bearings. Now, wear and lubricant requirements are considerably reduced due to the use of special cylindrical roller bearings of split design.

Spherical roller bearings are frequently used in gearboxes for rolling mills. In newer designs, the shafts are supported in double row cylindrical roller bearings as non-locating bearings and in double row tapered roller bearings as locating bearings. This bearing arrangement gives particularly accurate radial and axial guidance of the shafts.

Split cylindrical roller bearings are frequently used in the crankshafts of cold pilger machines.

For the bearing arrangement of work rolls in cold pilger machines, spherical roller bearings with a tapered bore and a special internal construction are used that are matched to the particular load conditions in these machines.

The roll bearing arrangement of cluster type cold rolling mills must ensure high surface quality and uniform thickness of the rolled strips. Multi-row cylindrical roller bearings or tapered roller bearings fulfil these requirements as back-up rollers.

Special publications	WL 17104	Rolling bearing arrangements for converters
	WL 17114	Sealed FAG spherical roller bearings
	WL 17115	Bearings and Service – Productivity and Reliability for Metal Production
	WL 17200	FAG rolling bearings in rolling mills
	WL 41140	FAG rolling bearings for rolling mills.

Bearing arrangements for the paper industry

Modern large paper machines contain a large number of rolling bearings of various types and sizes. Very high operational reliability is demanded of all bearings in order to prevent expensive downtime. In many cases, monitoring is carried out using the FAG Diagnostic Service, *Figure 9*.

Attention must also be paid to ensuring ease of mounting. There are also special requirements depending on the type of paper machinery and the subassembly therein. In the wet end section, the emphasis is on preventing corrosion, while the bearings in the dry section must also be designed for high temperatures.

For suction box rolls in the wet end section, spherical roller bearings with a conical or cylindrical bore and increased running accuracy are normally used.

Spherical roller bearings with lubrication holes in the inner ring are used if the outer ring rotates.

For very high speeds, spherical roller bearings with increased running accuracy and increased internal clearance are installed.



Figure 9
Condition-based
rolling bearing monitoring
using Bearing Analyser



Market sectors

An angular adjustment facility and high load carrying capacity are required in central press rolls, so spherical roller bearings are used, *Figure 10*. Sophisticated labyrinth seals are required in the wet section in order to avoid ingress of water spray.

In anti-deflection rolls, the roll sleeve rotates about the stationary roll axis. The roll sleeve is guided by spherical roller bearings, which may have special features including increased running accuracy, increased internal clearance and lubrication holes in the inner ring.

For driven rolls, three-ring bearings are sometimes used. The axis is supported in the bearing inner ring. The rotating intermediate ring connects the drive to the roll sleeve.



Figure 10
Spherical roller bearings E1
of X-life quality.
With superior
load carrying capacity,
reduced operating temperature
and very long operating life

The operating conditions in the dry section are characterised by high temperature and thermal expansion of the dryer roll. Spherical roller bearings are normally used as locating bearings. Up to a working width of approx. 5 m, spherical roller bearings are also used as non-locating bearings; these can be displaced axially in the housing in response to changes in the length of the dryer roll. For larger working widths, preference is given to double row cylindrical roller bearings with angular adjustment facility in normal plummer block housings, *Figure 11*. The spherical roller bearings have an increased internal clearance to C4, the cylindrical roller bearings have a radial internal clearance to C5.

For guide rollers in the dry section too, significant changes in length due to high ambient temperatures must be taken into consideration. The normal spherical roller bearings have an increased radial internal clearance. The bearings are connected to the oil loop of the dryer rolls. In large, high speed machines, the bearing inner rings with a conical bore are mounted directly on the tapered roll journals.

Calender thermo rolls in the end section are normally fitted with spherical roller bearings. Due to the high temperature, they have increased internal clearance and in some cases a conical bore. Heat is dissipated by means of high oil flow quantities.

In spreader rolls running at high speeds, the use of hybrid deep groove ball bearings with steel rings and ceramic balls has proved effective. Since this bearing has only half the usual number of balls, the risk of slippage is reduced.



Figure 11
Self-aligning
double row cylindrical roller bearing

Special publications

- WL 13103 Rolling bearing arrangements for the paper industry
- WL 13111 FAG cylindrical roller bearings with angular adjustment facility for dryer/smoothing rolls and guide rolls in paper machinery
- WL 13115 Optimum paper production/ bearing technology with complete service.



Market sectors

Bearing arrangements in deep and surface mining

The machines used in deep and surface mining perform extremely arduous work.

The high load carrying capacity of the drill head bearing arrangement in tunnel-driving machines is ensured by cylindrical roller bearings and spherical roller bearings. The mass and tilting forces resulting from the offset drilling pressure are supported by single or double row radial cylindrical roller bearings or spherical roller bearings. The drilling pressure is supported by axial roller bearings.

In larger, compact machines, the drill head bearing arrangement is a ready-to-fit unit. It comprises either a double row tapered roller bearing or a three-ring axial/radial cylindrical roller bearing in which the crown gear can be integrated, *Figure 12*. The bearing unit can withstand all load combinations of axial force, radial force and tilting moment.

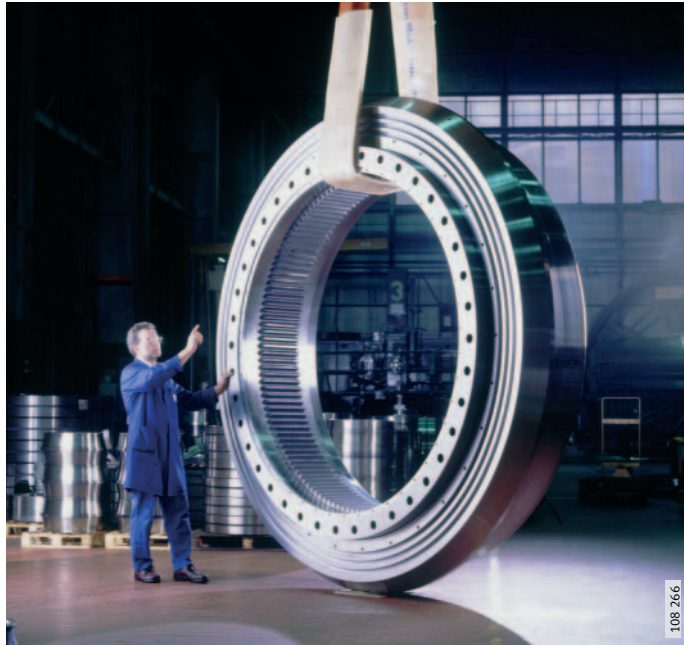


Figure 12
Axial/radial
cylindrical roller bearing
with integrated crown gear

The forces acting on the drive pinions of tunnel-driving machines are securely supported by one spherical roller bearing and one cylindrical roller bearing.

In conveying and lifting equipment, the main requirement is for standardised rolling bearings of all types, sizes and variants. Some applications require large or split bearings.

The bucket wheel in bucket wheel excavators is supported by large spherical roller bearings (unsplit in the original equipment version, split in the replacement bearing version), *Figure 13*. These bearings support high loads and compensate, without constraining forces, the substantial misalignments that result from the large spacing between the locating and non-locating bearings.

Other demands placed on the bearing arrangement include:

- handling large fluctuations in operating temperature
- long life
- sealing against slurry, moisture, contamination and sand
- simple maintenance as well as low time and cost outlay in mounting and dismantling.



Figure 13
Split spherical roller bearing

For gearbox bearing arrangements and for the bearing arrangement between the main gear and the hollow shaft flange, split cylindrical roller bearings are best suited due to the difficulty of access for bearing replacement.

One of many different drums in a belt installation is the drive drum. Spherical roller bearings allow compensation without constraining forces of the misalignments resulting from shaft deflections and deformation of the channels; these can fulfil the requirement for high operational reliability with low maintenance outlay. Specially developed housings are available for all bearing sizes.

The support rollers, connected either rigidly or in a jointed arrangement with each other, are normally fitted with deep groove ball bearings that are standardised, sealed and lubricated for life. Externally mounted seals prevent contamination entering the bearing arrangement.

Special publications

- WL 21107 Heavy-Duty Rolling and Plain Bearings for Mining, Processing, On- and Offshore Technology
- WL 43165 Split FAG spherical roller bearings
- WL 90118 Split FAG plummer block housings of series SNV.



Market sectors

Bearings for materials processing

Extreme operating and environmental conditions require robust bearing arrangements in crushers and mills, sieving and sorting machines as well as cylindrical rotary kilns, pelletising and sintering plants. Substantial shaft deflections and misalignments of the bearing positions must be compensated. High demands are made on the lubrication and sealing of the bearings.

Due to the high forces and harsh operation in crushers, spherical and cylindrical roller bearings are normally used.

In jaw crushers – also known as crosshead or double toggle crushers – spherical roller bearings support the crushing forces, the mass of the flywheels and the peripheral force of the drive via an eccentric shaft.

In gyratory or cone type crushers, the high radial forces are transmitted by two cylindrical roller bearings (outer bearings) and a spherical roller bearing (central bearing). The axial weight is normally supported by an axial cylindrical roller bearing. Crusher cone and crusher shaft bearing arrangements with single and double row radial and axial cylindrical roller bearings or with large special tapered roller bearings are also in use.



Figure 14
Large spherical roller bearings
for tube mills

For the rotating striking trains of single and twin shaft hammer crushers, spherical roller bearings are suitable due to the harsh operation and shaft deflection.

Heavy weights and shock type loads are characteristic of tube mills and also of hammer mills, impact crushers, rigid hammer crushers and impact wheel mills. Spherical roller bearings in specially developed housings are suitable for these requirements, *Figure 14*. In roller grinding mills, the pressing, tilting and axial forces acting on the mill roller induce high radial and axial loads. These can be supported by a cylindrical roller bearing in combination with a spherical roller bearing or a tapered roller bearing unit in an X arrangement. In other roller grinding mills, each mill roller is supported by two tapered roller bearings mounted in an O arrangement.

Preferred bearing types for roller presses are spherical roller bearings and multi-row cylindrical roller bearings.

In order to support the particularly high shock type loads and radial accelerations of the exciter shaft in linear and free vibrators as well as eccentric screens, spherical roller bearings of series 223..-E1 and 223..-A of special designs are used, *Figure 15*. These bearings are characterised by cages guided on the outer ring, restricted tolerances and increased radial internal clearance. For special cases, spherical roller bearings of series 223..-E1A and 233..-A are also used.



Figure 15
Spherical roller bearings
for oscillating stresses

The high combined loads at low speeds are supported in the radial track rollers of cylindrical rotary kilns by spherical roller bearings of series 241; they are located in split RLE or RLZ plummer block housings. In axial track rollers, tapered roller bearings in an O arrangement have proven successful.

For the bearing arrangement of the pinion drive shaft, spherical roller bearings in specially developed RA plummer block housings have proven successful.

The particular operating conditions in sintering and pelletising plant are best met by spherical roller bearings with a tapered bore on extraction sleeves. The bearings are mounted in split RA or SGB plummer block housings. Sealed double row cylindrical roller bearings can be considered for the bearing arrangements of pressure rollers, tapered roller bearings can be considered for the track wheels.

Special publications	WL 21100	FAG special spherical roller bearings for vibratory machinery
	WL 21105	Rolling Bearings in Grinding Mills
	WL 21106	Secure handling of severe vibration · Special spherical roller bearings in vibrating screens
	WL 21107	Heavy-Duty Rolling and Plain Bearings for Mining, Processing, On- and Offshore Technology.



Market sectors

Bearing arrangements in the air handling sector

Bearing arrangements for compressors, fans and centrifuges must fulfil high requirements in relation to functional reliability and cost-efficiency. In many cases standard bearings are suitable, in some cases special bearings are required.

In order to minimise gap losses in compressors, the rolling bearing arrangement must have narrow guidance clearance.

Some compressors run at very high speeds, so particular attention must be paid to the speed capacity of the bearings. Predominantly, four point contact bearings, cylindrical roller bearings and angular contact ball bearings are used.

For bearing arrangements in smaller fans, we offer special bearing units VRE3, *Figure 16*. Depending on the load conditions, six bearing arrangement variants are available. The tubular form, unsplit plummer block housings are fitted with deep groove ball bearings, matched angular contact ball bearings and cylindrical roller bearings.



Figure 16
Plummer block housing unit VRE3
for fans

In large fans and blowers, bearings with proven success include spherical roller bearings or self-aligning ball bearings in plummer block housings SNV, LOE or LOU. Grease or oil lubrication is used according to the operating conditions.

Separators and decanters are centrifuges that can be used to separate solid materials from liquids or mixtures of liquids with simultaneous centrifuging of solids. Separation methods are used, for example, in the food and drinks industry, in chemical engineering and in environmental protection. The design of the bearing arrangement must often take account of vibrations, external temperatures and special lubrication requirements. Selection of suitable bearings is made considerably easier by use of the calculation software BEARINX®.

In many cases, cost-effective standard bearings can be used such as angular contact ball bearings and cylindrical roller bearings with sheet steel cages. By means of design using BEARINX®, a high level of functional reliability – taking account even of extreme operating conditions – is achieved.

Special publications WL 22101 Bearing technology for compressors, fans and centrifuges.

Consumer Products

Rolling bearings are present almost everywhere in our environment: at home, at work and in leisure. In most cases, however, the bearings are simply not noticed.

Rolling bearings in electrical devices are found in household appliances, in communications equipment and in DIY tools as well as in sports equipment and medical technology.

In household appliances, the requirement is normally for operation with little noise and little vibration. In order that the bearings achieve high cost-efficiency and reliability, there is a focus on long operating life and low maintenance requirements. For small devices, simple, sealed deep groove ball bearings lubricated for life are generally preferred in order to meet these requirements.

In order to avoid damage through passage of current, bearings are available with electrical insulation, *Figure 17*. In such deep groove ball bearings, cylindrical roller bearings and tapered roller bearings of variant J20., an oxide ceramic coating is applied to the outside surface and end faces of the outer ring.

Alternatively, hybrid bearings with ceramic rolling elements can be used. Hybrid deep groove ball bearings (prefix HC) with silicon nitride balls are available by agreement.

In order to detect the speed and direction of rotation in electrical devices, deep groove ball bearings with an integral sensor are available.

INA/FAG rolling bearings have also proven themselves in modern sports equipment. In motorcycles, waterjets and bob skis, their speed capacity and quiet running are particularly significant.

Low bearing friction is important where the sportsman works using muscle power, for example in bicycles and inline skates.

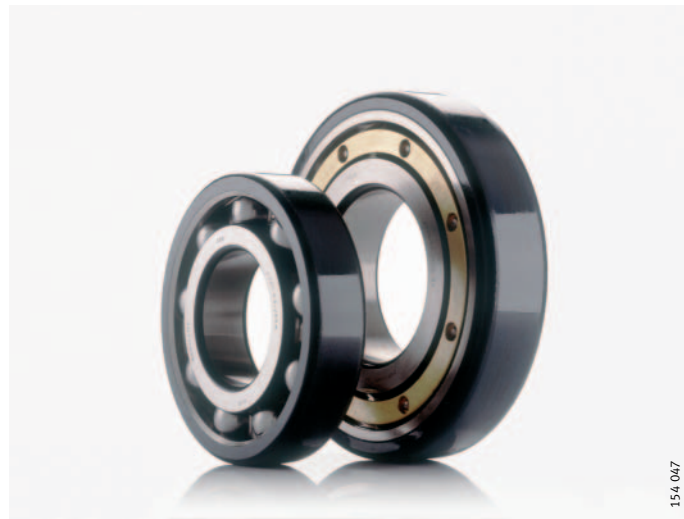


Figure 17
Rolling bearings with
electrical insulation

Special publications

- TI WL 43-1189 Electrically insulated rolling bearings prevent current passage damage
- TI WL 43-1206 FAG deep groove ball bearings with integral sensor
- TI WL 43-1210 FAG hybrid deep groove ball bearings.



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