

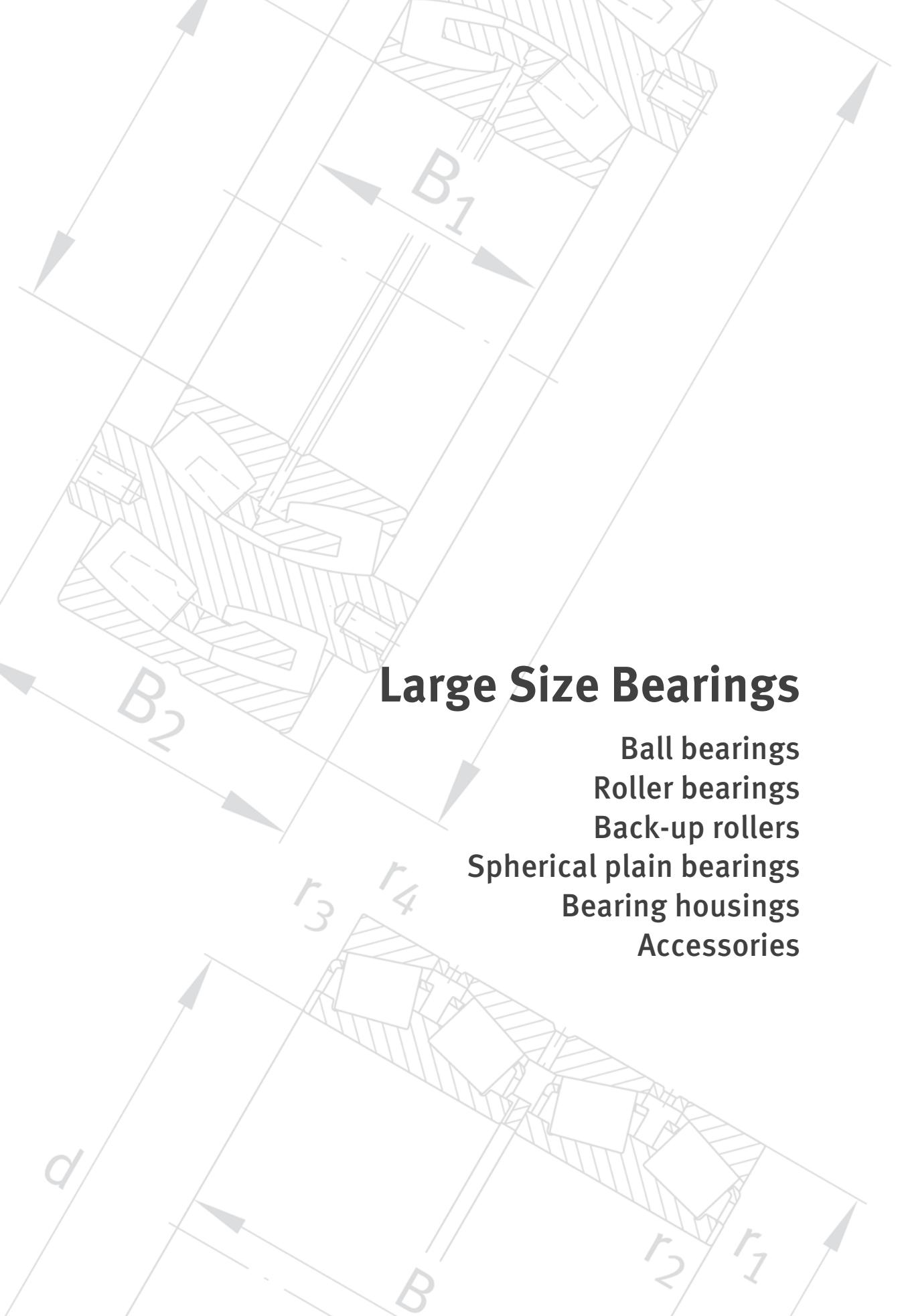


FAG



Large Size Bearings

Ball bearings
Roller bearings
Back-up rollers
Spherical plain bearings
Bearing housings
Accessories



Large Size Bearings

Ball bearings
Roller bearings
Back-up rollers
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Accessories

All data have been prepared with a great deal
of care and checked for their accuracy.

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Foreword

Schaeffler Group Industrial

Schaeffler Group Industrial with its brands INA and FAG 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.

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.

Quality Manufacturing technology Environmental protection

“Zero defects” is our quality objective. We have matched all our processes to this target. In addition, our experience in forming, 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.

The quality of our products and processes is certified; for example, all manufacturing facilities comply with DIN-EN ISO 9001:2000, 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 to ISO 14001 and 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.
Large size bearing catalogue GL 1 An engineering compendium	We take orders from throughout the world and make deliveries worldwide too. 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.
Definition of the Attention symbol	Catalogue GL 1 is based on our proven catalogue HR 1, Rolling Bearings. It gives descriptions of standard rolling bearings with an outside diameter of 320 mm or greater and the appropriate accessories as well as numerous special rolling bearings and large plain bearings. We are thus offering an overview of our product range for large and heavy machinery for the original equipment manufacture, distribution and aftermarket sectors. In order to facilitate the selection of suitable products, reference is made at many points to typical applications. The catalogue shows which products can be considered for a bearing arrangement, the factors that must be taken into consideration in the design, the tolerances required on the adjacent construction and how the bearing arrangement is sealed. It gives detailed information on the calculation of bearing rating life, on temperatures and loads, on the lubricants that are most suitable for the bearing arrangement and, last but not least, on how the products are correctly fitted and maintained. The data represent the state of current technology and manufacture as at April 2009. They take account of the progress in rolling bearing technology as well as the experience gained in numerous applications. Any information in publications that does not concur with the data in this catalogue is therefore invalid.
Follow instructions	This catalogue gives descriptions of standard and special bearings. Since these are used in numerous applications, we cannot make a judgement as to whether any malfunctions will cause harm to persons or property. It is always and fundamentally the responsibility of the designer and user to ensure that all specifications are observed and that all necessary information is communicated to the end user. This applies in particular to applications in which product failure and malfunction may constitute a hazard to human beings. In line with ANSI 535.6-2006, we have replaced the old Attention symbol by this new symbol. In case of non-compliance, damage or malfunctions in the product or the adjacent construction may occur.

X-life® Maximum customer benefit

X-life is the premium brand of Schaeffler Group Industrial. It brings together the strengths of the two brands and gives 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 lubricant concept. In addition, 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.

Foreword

***medias® professional* Electronic information system**

medias® professional, the proven selection and information system, presents the INA and 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® professional 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 integration of 3D models.

medias® professional focusses on the individual bearing. The complete shaft can be simulated and any influences on the bearings as a result of shaft deformation 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 and 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 catalogue contains a large proportion of the core rotary rolling bearing range as well as numerous special rolling bearings of the brands INA and FAG. It also includes large ELGES radial and axial spherical plain bearings.

Furthermore, we develop and manufacture many other products and systems that are of significant 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 technical publications that can be obtained upon request.

INA and FAG

When it comes to motion

Catalogue GL 1 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 bearing arrangements. To this end, this catalogue is an important instrument.

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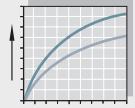
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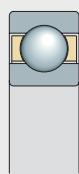
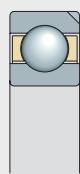
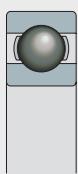
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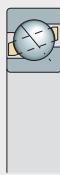
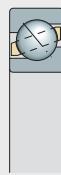
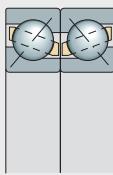


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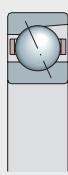
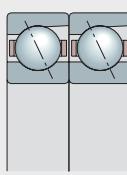
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Deep groove ball bearings



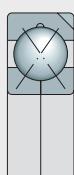
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Angular contact ball bearings



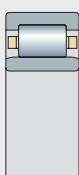
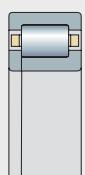
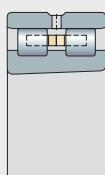
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Spindle bearings



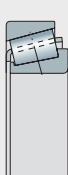
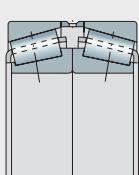
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Four point contact bearings



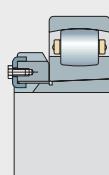
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Cylindrical roller bearings



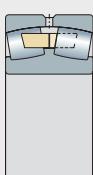
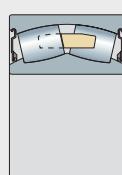
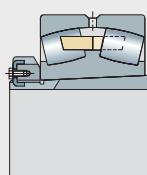
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Tapered roller bearings



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Barrel roller bearings

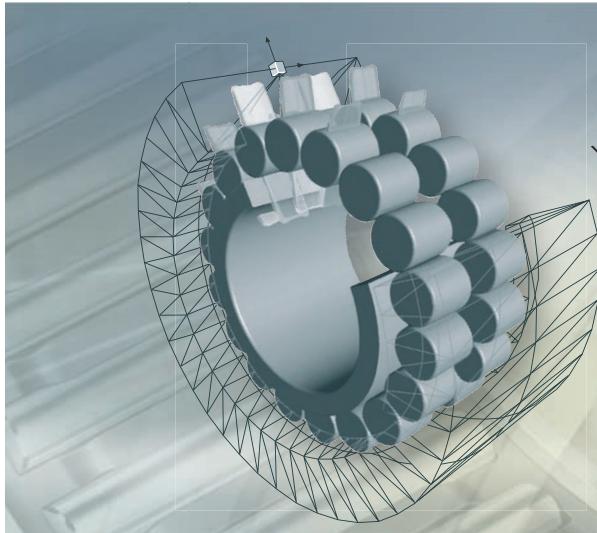


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Spherical roller bearings



FAG



$$L_{10} = \left(\frac{C}{P} \right)^{\beta}$$

$$L_{nm} = a_{ISO} \cdot L_{10}$$

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

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

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

$$P_0 = F_{0a} + 2,7 \cdot F_{0r}$$

Technical principles

Load carrying capacity and life

Rigidity

Friction and increases in temperature

Speeds

Lubrication

Bearing data

Design of bearing arrangements

Fitting and dismantling



Technical principles

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Load carrying capacity and life

Schaeffler KG introduced the “Expanded calculation of the adjusted rating life” in 1997. This method was standardised for the first time in DIN ISO 281 Appendix 1 and has been a constituent part of the international standard ISO 281 since 2007.

As part of the international standardisation work, the life adjustment factor a_{DIN} was renamed as a_{ISO} but without any change to the calculation method.

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 for the basic rating life under favourable operating conditions. Ioannides and Harris have developed a further model of fatigue in rolling contact that expands on the theory by Lundberg and Palmgren 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.



The influencing factors, particularly those relating to contamination, are very complex. A great deal of experience is required in order to arrive at an accurate assessment. Further advice should therefore be sought from the engineering service of Schaeffler Group Industrial.

The tables and diagrams can give only guide values.



Dimensioning of rolling bearings

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

- rating life
- load carrying capacity
- operational reliability.

Dynamic load carrying capacity and life

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 empirically proven performance standards and 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 fatigue life is dependent on:

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

For rotating rolling bearings, the decisive parameter is the basic dynamic load rating C .

This 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.

Calculation of the rating life

The methods for calculating the rating life are:

- the basic rating life L_{10} and L_{10h} to ISO 281,
see section Basic rating life, page 32
- the adjusted rating life L_{na} to DIN ISO 281:1990
(no longer a constituent part of ISO 281),
see section Adjusted rating life, page 33
- the expanded adjusted rating life L_{nm} to ISO 281,
see section Expanded adjusted rating life, page 36.

Load carrying capacity and life

Basic rating life

The basic rating life L_{10} and L_{10h} is determined as follows:

$$L_{10} = \left(\frac{C}{P} \right)^p$$

$$L_{10h} = \frac{16\,666}{n} \cdot \left(\frac{C}{P} \right)^p$$

L_{10} 10^6 revolutions

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

L_{10h} h

The basic rating life in operating hours according to the definition for L_{10}

C N

Basic dynamic load rating

P N

Equivalent dynamic bearing load for radial and axial bearings

p -

Life exponent;

for roller bearings: $p = 10/3$

for ball bearings: $p = 3$

n min^{-1}

Operating speed.

Equivalent dynamic bearing load

The equivalent dynamic load P is a calculated value.

This value is constant in magnitude 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.



This calculation method cannot be applied to axial cylindrical roller bearings. Combined loads are not permissible with these bearings.



Adjusted rating life

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

- special material characteristics
- lubrication
- a requisite reliability other than 90%.

This calculation method was replaced in ISO 281:2007 by calculation of the expanded adjusted rating life L_{nm} , see page 36.

$$L_{na} = a_1 \cdot a_2 \cdot a_3 \cdot L_{10}$$

L_{na} 10^6 revolutions
Adjusted rating life for special material characteristics and operating conditions with a requisite reliability of $(100 - n) \%$

L_{10} 10^6 revolutions
Basic rating life

a_1 —
Life adjustment factor for a requisite reliability other than 90%.
In ISO 281:2007, the values for the life adjustment factor a_1 were redefined, see table Life adjustment factor a_1 for requisite reliability, page 36

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

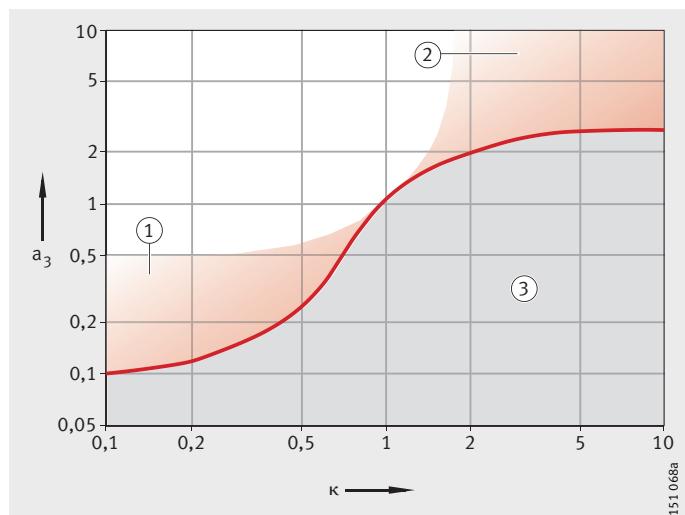
a_3 —
Life adjustment factor for special operating conditions;
in particular lubrication, *Figure 1*.

The viscosity ratio κ is determined according to the formula on page 34.

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.

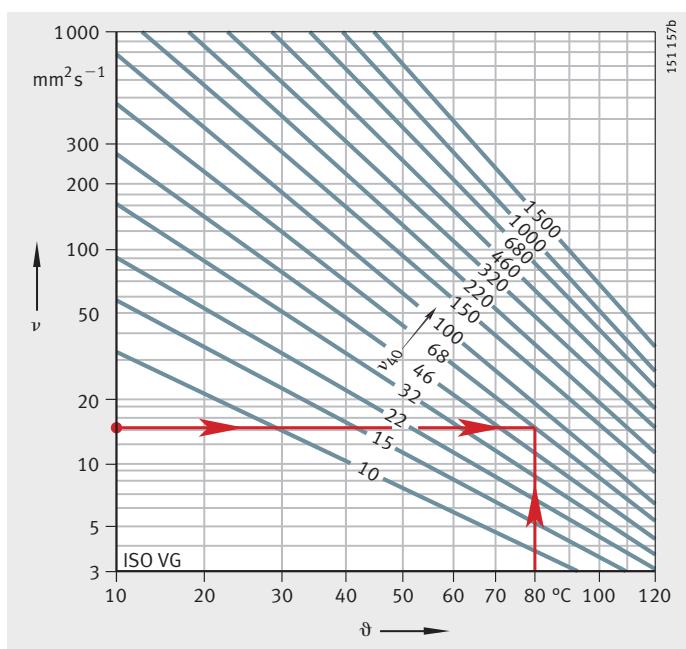
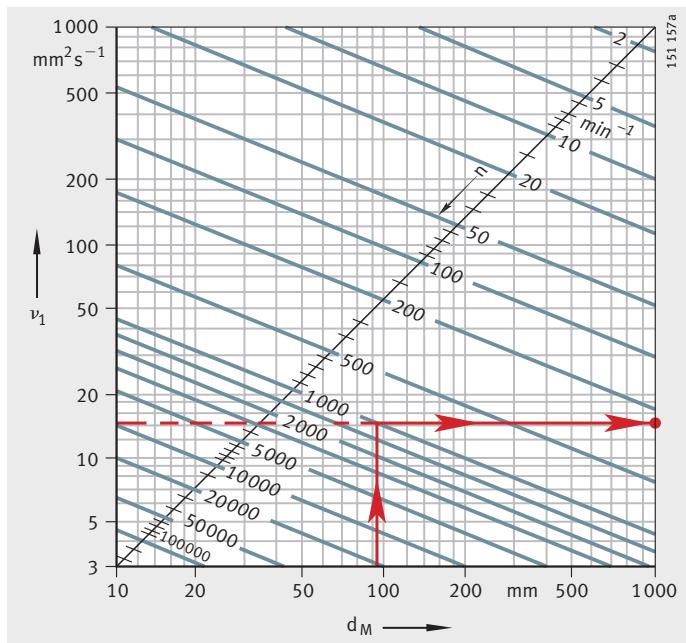
The reference viscosity ν_1 is determined from the mean bearing diameter $d_M = (D + d)/2$ and the operating speed n , *Figure 2*, page 35.

The nominal viscosity of the oil at +40 °C is determined from the required operating viscosity ν and the operating temperature ϑ , *Figure 3*, page 35. 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 sources).



Taking account of EP additives in calculation of the expanded adjusted rating life L_{nm} : see page 36.



Load carrying capacity and life

Expanded adjusted rating life

The calculation of the expanded adjusted rating life L_{nm} was standardised in DIN ISO 281 Appendix 1. Since 2007, it has been standardised in the worldwide standard ISO 281. Computer-aided calculation in accordance with DIN ISO 281 Appendix 4 has been specified in ISO/TS 16 281 since 2008.

L_{nm} is calculated as follows:

$$L_{nm} = a_1 \cdot a_{ISO} \cdot L_{10}$$

L_{nm} 10^6 revolutions

Expanded adjusted rating life in 10^6 revolutions to ISO 281

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

a_{ISO} –
Life adjustment factor for operating conditions

L_{10} 10^6 revolutions
Basic rating life, see page 22

Basic rating life, see page 32.

The values for the life adjustor

ISO 281:2007 and differ

ISO 201.2007 and other

Requisite reliability: Expanded life

Requisite reliability Expanded Life adjustment factors

adjusted rating life

Life adjustment factor a_1 for requisite reliability

Requisite reliability %	Expanded adjusted rating life L_{nm}	Life adjustment factor a_1
90	L_{10m}	1
95	L_{5m}	0,64
96	L_{4m}	0,55
97	L_{3m}	0,47
98	L_{2m}	0,37
99	L_{1m}	0,25
99,2	$L_{0,8m}$	0,22
99,4	$L_{0,6m}$	0,19
99,6	$L_{0,4m}$	0,16
99,8	$L_{0,2m}$	0,12
99,9	$L_{0,1m}$	0,093
99,92	$L_{0,08m}$	0,087
99,94	$L_{0,06m}$	0,08
99,95	$L_{0,05m}$	0,077



Life adjustment factor a_{ISO} for operating conditions

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

- 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.

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

a_{ISO} —
Life adjustment factor for operating conditions,
Figure 4, page 38 to *Figure 7*, page 39

e_C —
Life adjustment factor for contamination, see table, page 40

C_u N
Fatigue limit load

P N
Equivalent dynamic bearing load

κ —
Viscosity ratio, see page 34.
For $\kappa > 4$ a value $\kappa = 4$ should be expected.
This calculation method cannot be used for $\kappa < 0,1$.

Taking account of EP additives in the lubricant

In accordance with ISO 281, EP additives in the lubricant can be taken into consideration as follows:

- At a viscosity ratio $\kappa < 1$ and a contamination factor $e_C \geq 0,2$, a value $\kappa = 1$ can be used in calculation in the case of lubricants with EP additives that have proven effective. Under 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.

Where a value $\kappa = 1$ is used in calculation in the case of EP additives that have proven effective, the life adjustment factor must be restricted to $a_{ISO} \leq 3$. If the value a_{ISO} calculated for the actual κ is greater than 3, this value can be used in calculation.

Load carrying capacity and life

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

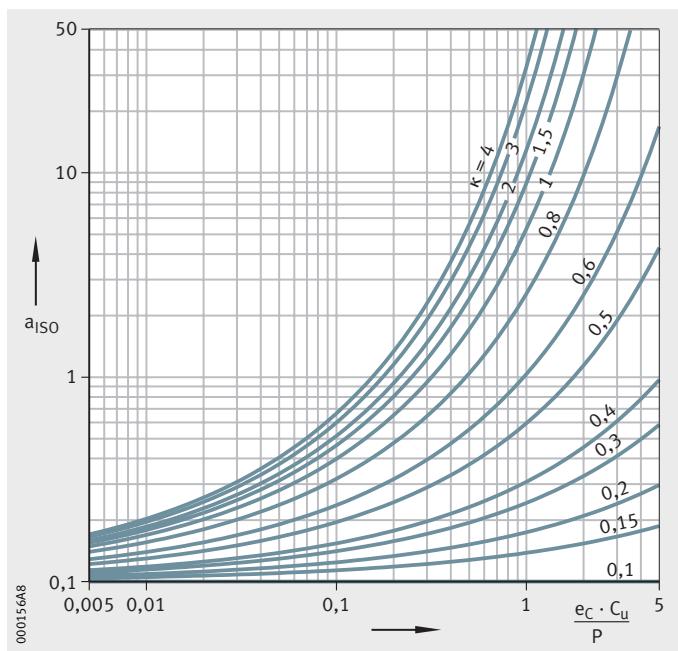
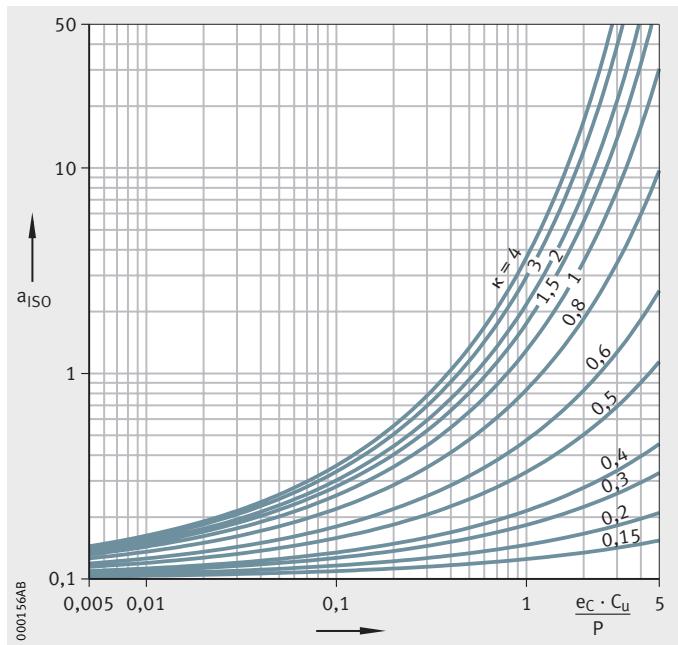


Figure 5
Life adjustment factor a_{ISO}
for axial roller bearings



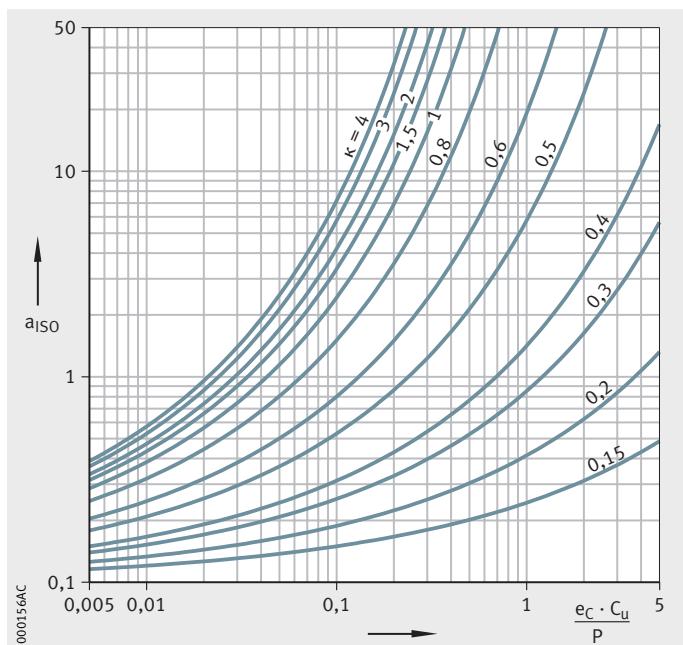


Figure 6
Life adjustment factor also
for radial ball bearings

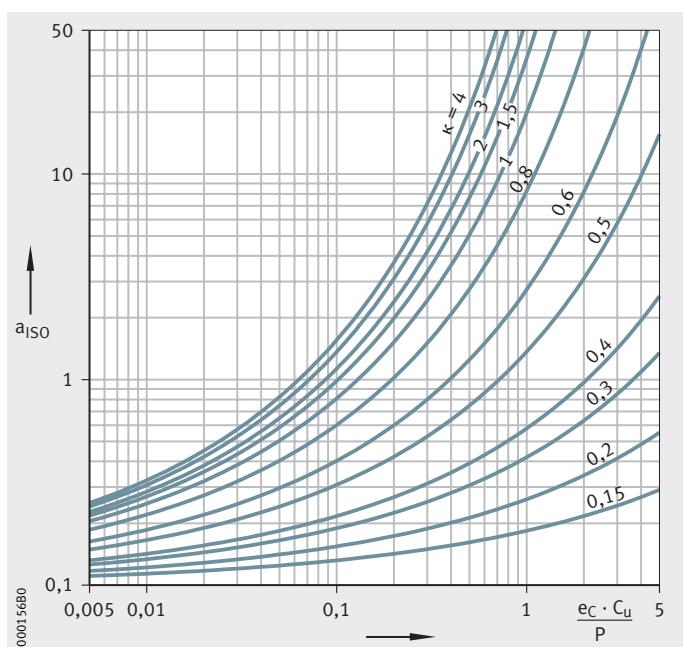


Figure 7
Life adjustment factor also
for axial ball bearings

Load carrying capacity and life

Fatigue limit load

The fatigue limit load C_u in accordance with ISO 281 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 account of the influence of contamination in the lubrication gap on the rating life, see table.

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

- the type, size, hardness and quantity of particles
- the relative lubricant 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 (factor e_C). They do not take account of other contamination such as that caused by water or other fluids.



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 for contamination

Contamination	Factor e_C	
	$d_M < 100 \text{ mm}^1)$	$d_M \geq 100 \text{ mm}^1)$
Extreme cleanliness <ul style="list-style-type: none">■ particle size of the order of magnitude of the lubricant film thickness■ laboratory conditions	1	1
High cleanliness <ul style="list-style-type: none">■ oil filtered through extremely fine filter sealed, greased bearings	0,8 to 0,6	0,9 to 0,8
Standard cleanliness <ul style="list-style-type: none">■ oil filtered through fine filter	0,6 to 0,5	0,8 to 0,6
Slight contamination <ul style="list-style-type: none">■ slight contamination of oil	0,5 to 0,3	0,6 to 0,4
Typical contamination <ul style="list-style-type: none">■ bearing contaminated with wear debris from other machine elements	0,3 to 0,1	0,4 to 0,2
Heavy contamination <ul style="list-style-type: none">■ bearing environment heavily contaminated■ bearing arrangement insufficiently sealed	0,1 to 0	0,1 to 0
Very heavy contamination	0	0

¹⁾ $d_M = \text{mean bearing diameter } (d + D)/2$.



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.

The operating values calculated here already take account of the life adjustment factors a_3 or a_{ISO} . 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 , n and P are calculated as follows:

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

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

Variable load at constant speed

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

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

Constant load at variable speed

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

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

Load carrying capacity and life

Constant load with speed varying in steps

If the speed varies in steps, 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 is calculated as follows:

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

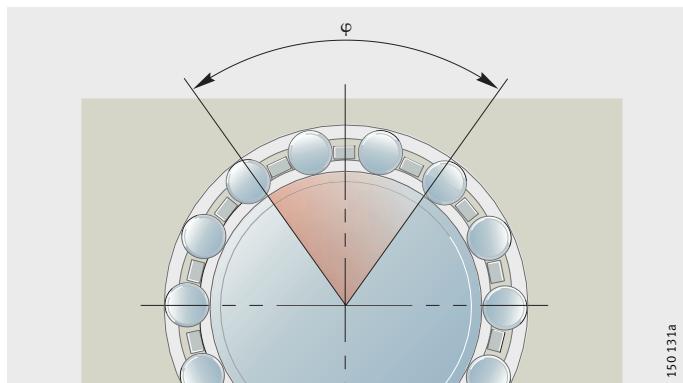


The formula is valid only if the angle of oscillation is greater than twice the angular pitch of the rolling elements.

If the angle of oscillation is smaller, there is a risk of false brinelling.

φ = angle of oscillation

Figure 8
Angle of oscillation



150.131a

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_{ISO} for current operating condition, see page 37	
$n_i, n(t)$	min^{-1}
Bearing speed during current operating condition	
q_i	%
Duration of operating condition as a proportion of the total operating period; $q_i = (\Delta t_i / T) \cdot 100$	
$F_i, F(t)$	N
Bearing load during current operating condition	
n_{osc}	min^{-1}
Frequency of to and fro movement	
φ	°
Angle of oscillation, Figure 8.	



Required rating life



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

Do not overspecify the bearing. If the calculated rating life is > 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.

Rail vehicles

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
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

Electric motors

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Large motors	32 000	63 000	50 000	110 000

Rolling mills, steelworks equipment

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Roll stands	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

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
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
Belt drums	–	–	50 000	75 000
Bucket wheel excavators, travel drive	7 800	21 000	10 000	35 000
Bucket wheel excavators, bucket wheel	–	–	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

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

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, material processing	–	–	80 000	120 000
Paper machinery, wet section	–	–	100 000	150 000
Paper machinery, dry section	–	–	120 000	250 000
Paper machinery, calenders	–	–	80 000	120 000
Printing machinery	32 000	46 000	50 000	75 000

Operating life

The operating life is defined as the life actually achieved by the bearing. It may differ significantly from the calculated value.

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

- deviations in the operating data
- misalignment between the shaft and housing
- insufficient or excessive operating clearance
- contamination
- insufficient lubrication
- excessive operating temperature
- oscillating bearing movement with very small angles of oscillation (false brinelling)
- high vibration loads and false brinelling
- very high shock loads (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
- the tilting of the bearing.



Ribs subjected to load must be supported across their entire height.

The permissible axial load $F_{a\text{per}}$ must not be exceeded, in order to avoid impermissibly high temperatures.

The limiting load $F_{a\text{max}}$ must not be exceeded, in order to avoid unacceptable pressure at the contact surfaces.

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

For bearings of the TB design, the value 0,6 is permissible.

Continuous axial loading without simultaneous radial loading is not permissible.

Bearings of TB design

In the case of these bearings, the axial load carrying capacity has been significantly improved through the use of new calculation and manufacturing methods.

A special curvature on the end faces of the rollers ensures optimum contact conditions between the roller and rib.

As a result, the axial contact pressures on the rib are significantly minimised and a lubricant film capable of supporting higher loads is formed. Under normal operating conditions, wear and fatigue at the rib contact running and roller end faces is completely eliminated.

The axial frictional torque is reduced by up to 50%.

The bearing temperature during operation is therefore significantly lower.



Permissible and maximum axial load

$F_{a\text{ per}}$ and $F_{a\text{ max}}$ are calculated using the following formulae.

Bearings of standard design

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

Bearings of TB design

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

Bearings of standard and TB design

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

$F_{a\text{ per}}$ N
Permissible axial load

$F_{a\text{ max}}$ N
Axial limiting load

k_S –
Factor dependent on the lubrication method,
see table Factor k_S for the lubrication method, page 48

k_B –
Factor dependent on the bearing series,
see table Bearing factor k_B , page 48

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

n min^{-1}
Operating speed.

Load carrying capacity and life

Misalignment of bearings



Misalignment caused by shaft deflection, for example, may lead to alternating stresses on the inner ring ribs. In this case, the axial load must be restricted to F_{as} in accordance with the formula in order to limit bearing tilting to a maximum of 2 angular minutes.

$$F_{as} = 20 \cdot d_M^{1,42}$$

If more severe tilting is present, a separate strength analysis is required.

Factor k_S for the 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
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 a reference viscosity ν_1 in accordance with the section Oil lubrication, page 85. Doped oils should be used such as 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	Factor 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	15
NJ3..-E, NJ23..-E, NUP3..-E, NUP23..-E	20
NJ4	22



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 operation of the bearing.

If a rolling bearing operates with only infrequent rotary motion or completely without 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 concentrically acting, constant 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, $4\,000 \text{ N/mm}^2$
- for ball bearings, $4\,200 \text{ N/mm}^2$
- for self-aligning ball bearings, $4\,600 \text{ N/mm}^2$.

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



In addition to dimensioning on the basis of the fatigue limit life, it is advisable to check the static load safety factor. The guide values and shock loads occurring in operation according to the table must be taken into consideration, see table Guide values for static load safety factor, page 50.

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

P_0 (P_{0r}, P_{0a}) N

Equivalent static load on the radial or axial bearing, see page 50.



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

Load carrying capacity and life

**Guide values
for static load safety factor**

Operating conditions	Static load safety factor 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 higher requirements 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.



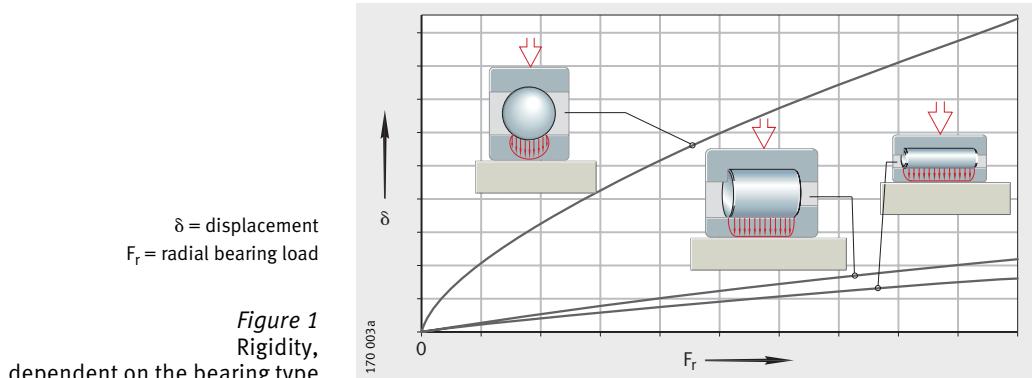
This calculation method cannot be applied to axial cylindrical roller bearings. Combined loads are not permissible with these bearings.

For all radial cylindrical roller bearings, $P_0 = F_{0r}$.



Rigidity

The rigidity is determined by the type, size and operating clearance of the bearing. It 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*.



Deflection

Rolling bearings have a progressive deflection rate.
The displacement values can be determined using approximation formulae.



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}/μm
Rigidity parameter

d mm
Bearing bore diameter

δ_r μm
Radial displacement between shaft axis and bore centre,
Figure 2, page 52

δ_a μm
Axial displacement between shaft locating washer and housing locating washer,
Figure 3, page 52

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, see table, page 52.

Rigidity

Factor K_c

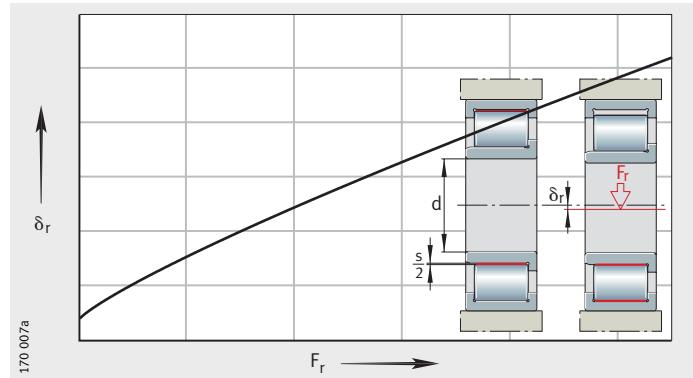
Bearing series	Factor $K_c^{1)}$	Bearing series	Factor $K_c^{1)}$
SL1818	12,8	NJ2..-E	11,1
SL1829, SL1830, SL1923	16	NJ3..-E	11,3
SL1850, SL0148, SL0248, SL0249	29,2	NJ22..-E	15,4
K811, 811, K812, 812	36,7	NJ23..-E	16,9
K893, 893, K894, 894	59,7	NU10	9,5
		NU19	11,3
		NN30..-AS-K	18,6

1) K_c values for other series available by agreement.

Radial cylindrical roller bearing

δ_r = radial displacement
 F_r = radial bearing load

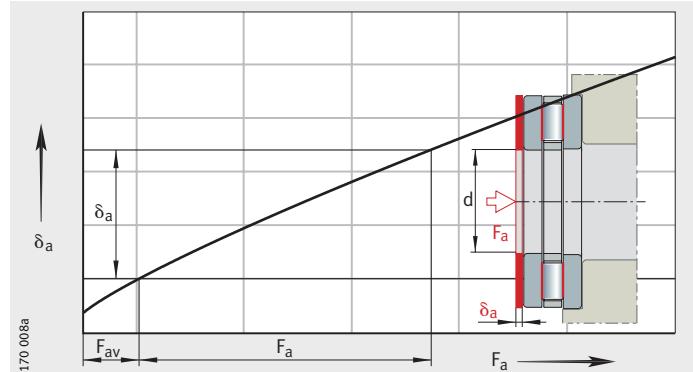
Figure 2
 Radial displacement



Axial cylindrical roller bearing

δ_a = axial displacement
 F_a = axial bearing load
 F_{av} = axial preload force

Figure 3
 Axial displacement





Friction and increases in temperature

Friction

The friction in a rolling bearing is made up of several components, see table. Due to the large number of influencing factors, such as dynamics in speed and load, tilting and skewing resulting from installation, the actual frictional torques and frictional energy may deviate significantly from the calculated values. If the frictional torque is an important design criterion, please consult the Schaeffler Engineering Service.

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

Heat dissipation

Friction is converted into heat. This must be dissipated from the bearing. The equilibrium between the frictional energy and heat dissipation allows calculation of the thermally safe operating speed n_θ , see section Thermally safe operating speed, page 61.

Heat dissipation by the lubricant

Lubricating oil dissipates a portion of the heat. Recirculating oil lubrication with additional cooling is particularly effective. 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*.



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

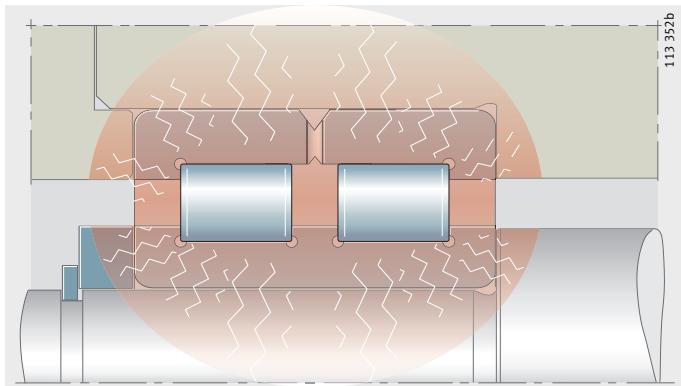


Figure 1
Temperature distribution
between bearing,
shaft and housing

Friction and increases in temperature

Determining the friction values

The speed and load must also 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 58):

$$M_R = M_0 + M_1$$

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 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 torque as a function of speed,
Figure 2, page 55 and tables from page 55 to page 57

f_1 –
Bearing factor for frictional torque as a function of load,
see tables from page 55 to page 57

v $\text{mm}^2 \text{s}^{-1}$
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_r, F_a N
Radial load for radial bearings, axial load for axial bearings

P_1 N
Decisive load for frictional torque.
For ball bearings, tapered roller bearings and spherical roller bearings,
see table, page 57

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



Bearing factors

The bearing factors f_0 and f_1 are mean values derived from series of tests and correspond to the data given in ISO 15 312.

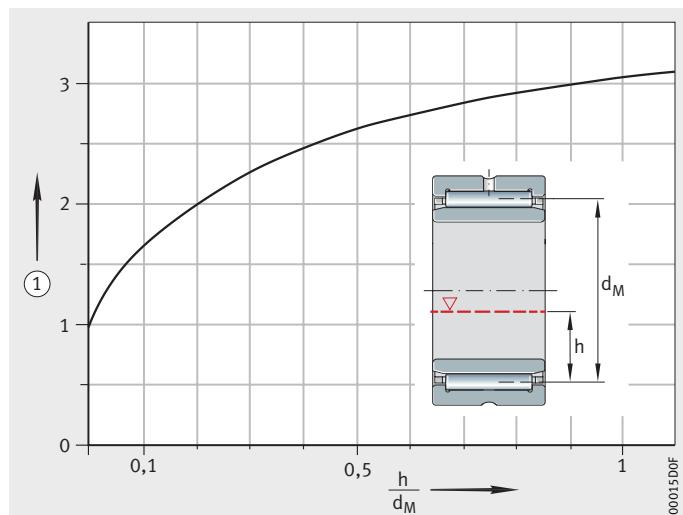
They are valid for bearings that have undergone running-in and have uniform distribution of lubricant. In the freshly greased state, the bearing factor f_0 can be two to five times higher.

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*.

① Increase factor for bearing factor f_0
 h = oil level
 d_M = mean bearing diameter $(d + D)/2$

Figure 2
Increase in the bearing factor f_0 ,
as a function of the oil level

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	

Friction and increases in temperature

**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
2..-E			0,00030
3..-E			0,00035
4	1,3	2	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	
811, K811			
812, K812			
893, K893	2	3	0,0015
894, K894			

**Bearing factors
for tapered roller bearings**

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

**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			$0,0008 \cdot (P_0/C_0)^{0,33}$
230, 239	3	4,5	$0,00075 \cdot (P_0/C_0)^{0,5}$
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	1,1	1,7	$0,0005 \cdot (P_0/C_0)^{0,5}$
160	1,1	1,7	$0,0007 \cdot (P_0/C_0)^{0,5}$
60, 619	1,1	1,7	$0,0007 \cdot (P_0/C_0)^{0,5}$
62	1,3	2	$0,0009 \cdot (P_0/C_0)^{0,5}$
63, 64	1,5	2,3	

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			
72..-B	1,3	2	$0,001 \cdot (P_0/C_0)^{0,33}$
73..-B	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	1	1,5	$0,0012 \cdot (F_a/C_0)^{0,33}$

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	$F_a - 0,1 \cdot F_r$	$1,4 \cdot F_a - 0,1 \cdot F_r$
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 greater value	$1,21 \cdot Y \cdot F_a$ or F_r , use the greater 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 $F_a/F_r \leq e$	

For $P_1 \leq F_r$, $P_1 = F_r$ applies.



Friction and increases in temperature

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 calculated as follows:

$$M_R = M_0 + M_1 + M_2$$

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

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

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, *Figure 3 and Figure 4*, page 59

A –
Bearing parameter according to formula

F_a N
Axial dynamic bearing load

k_B –
Factor as a function of the bearing series, see table, page 59

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



The bearing factors f_2 are subject to wide scatter. They are valid for recirculating oil lubrication with an adequate quantity of oil. The curves must not be extrapolated, *Figure 3 and Figure 4*, page 59.

Bearings of TB design

In the case of bearings of TB design, the axial load carrying capacity has been significantly improved through the use of new calculation and manufacturing methods.

A special curvature on the end faces of the rollers ensures optimum contact conditions between the roller and rib.

As a result, the axial contact pressures on the rib are significantly minimised and a lubricant film capable of supporting higher loads is formed. Under normal operating conditions, wear and fatigue at the rib contact running and roller end faces is completely eliminated.

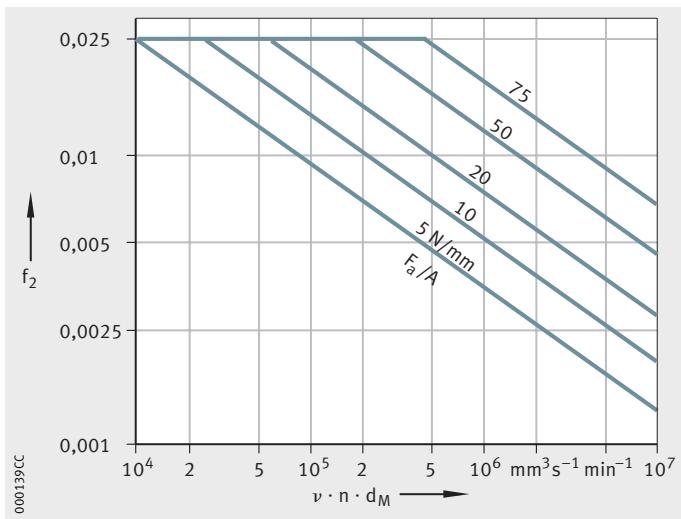
In addition, the axial frictional torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower.



Cylindrical roller bearings of standard design

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

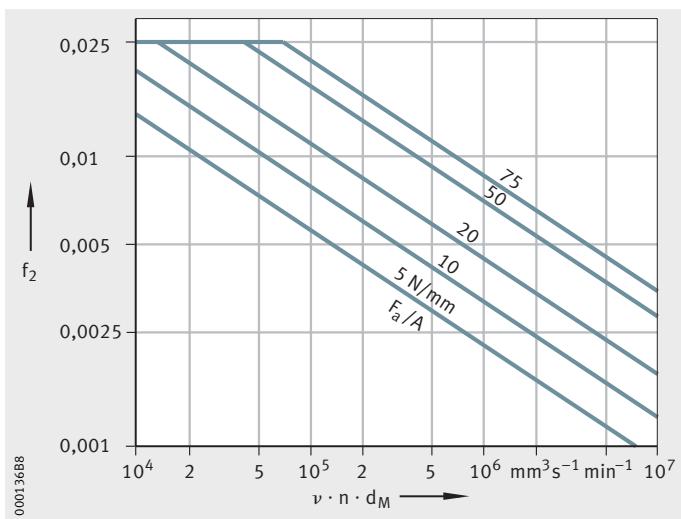
Figure 3
Bearing factor f_2 ,
as a function of operating parameter



Cylindrical roller bearings of TB design

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

Figure 4
Bearing factor f_2 ,
as a function of operating parameter



Bearing factor k_B

Bearing series	Factor k_B
SL1818, SL0148	4,5
SL1829, SL0149	11
SL1830, SL1850	17
SL1822	20
LSL1923	28
SL1923	30
NJ2..-E, NJ22..-E, NUP2..-E, NUP22..-E	15
NJ3..-E, NJ23..-E, NUP3..-E, NUP23..-E	20
NJ4	22

Speeds

On the basis of DIN 732-1, calculation of the thermal reference speed n_B has been standardised in ISO 15 312. The calculation of reference speeds has been matched to this standard. As a result, the values are different from 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 ancillary value when calculating the thermally safe operating speed n_ϑ . It is the speed at which, under defined reference conditions, a bearing 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 in ISO 15 312 as follows:

- mean ambient temperature $\vartheta_{Ar} = +20 \text{ }^\circ\text{C}$
- mean bearing temperature at the outer ring $\vartheta_r = +70 \text{ }^\circ\text{C}$
- load on radial bearings $P_{1r} = 0,05 \cdot C_{0r}$
- load on axial bearings $P_{1a} = 0,02 \cdot C_{0a}$
- the operating viscosities (axial bearings according to DIN 732-1)
For radial bearings, they are such that approximately the same reference speeds are achieved for oil and grease lubrication.
 - radial bearings: $12 \text{ mm}^2\text{s}^{-1}$ (ISO VG class 32)
 - axial spherical roller bearings: $24 \text{ mm}^2\text{s}^{-1}$ (ISO VG class 68)
 - axial cylindrical roller bearings: $48 \text{ mm}^2\text{s}^{-1}$ (ISO VG class 220)
- heat dissipation via the bearing seating surfaces, see 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 $A_r > 50 000 \text{ mm}^2$:

$$q_r = 0,016 \cdot \left(\frac{A_r}{50 000} \right)^{-0,34} \text{ W/mm}^2$$

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 $A_r > 50 000 \text{ mm}^2$:

$$q_r = 0,020 \cdot \left(\frac{A_r}{50 000} \right)^{-0,16} \text{ W/mm}^2$$



Limiting speed



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

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

Thermally safe operating speed



The thermally safe operating speed n_ϑ is calculated according to DIN 732-2 (draft).

The basis for the calculation is the heat balance in the bearing, the equilibrium between the frictional energy as a function of speed and the heat dissipation as a function of temperature.

When conditions are in equilibrium, the bearing temperature is constant.

The permissible operating temperature determines the thermally safe operating speed n_ϑ 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
- back-up rollers
- axial deep groove and axial angular contact ball bearings.

The limiting speed n_G must always be observed.

Speeds

Calculation of the thermally safe operating speed

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

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

The speed ratio is derived from *Figure 1*, page 63:

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

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 63:

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

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 :

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

Load parameter k_P :

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

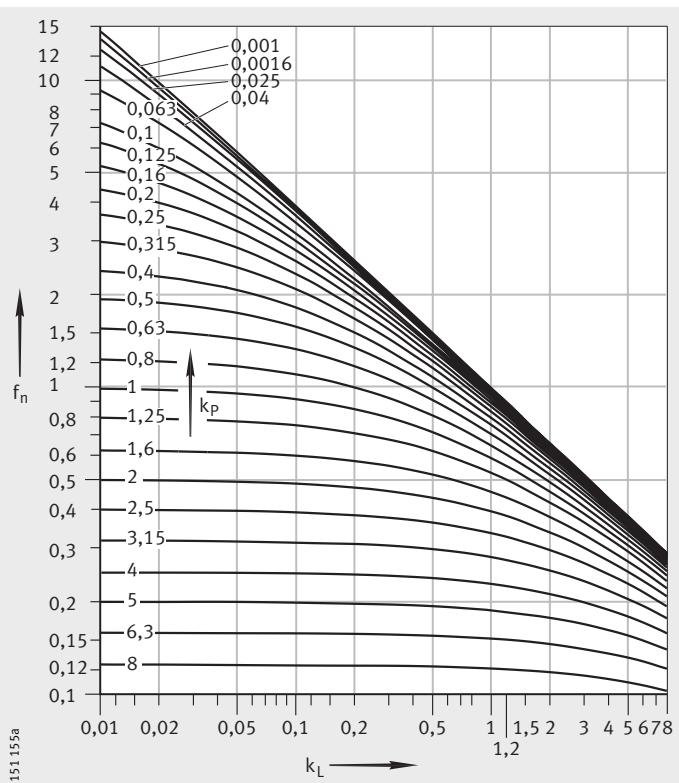


Figure 1
 Speed ratio f_n

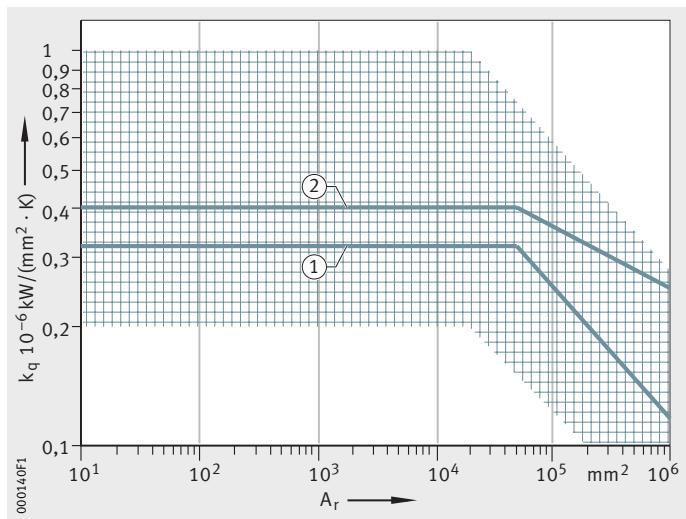


Figure 2
 Heat transfer coefficient k_q
 as a function
 of the bearing seating surface

Symbols, units and definitions

A_r mm^2

Bearing seating surface for
 radial bearings:

axial bearings:

tapered roller bearings:

axial spherical roller bearings:

$$A_r = \pi \times B \times (D + d)$$

$$A_r = \pi / 2 \times (D^2 - d^2)$$

$$A_r = \pi \times T \times (D + d)$$

$$A_r = \pi / 4 \times (D^2 + d_1^2 - D_1^2 - d^2)$$

Speeds

Symbols, units and definitions continued

B	mm
Bearing width	mm
d	mm
Bearing bore diameter	mm
D	mm
Bearing outside diameter	mm
d_1	mm
Outside diameter of shaft locating washer	mm
D_1	mm
Inside diameter of housing locating washer	mm
d_M	mm
Mean bearing diameter $(D + d)/2$	mm
f_0	—
Bearing factor for frictional torque as a function of speed, see section Bearing factors, page 55	—
f_1	—
Bearing factor for frictional torque as a function of load, see section Bearing factors, page 55	—
f_n	—
Speed ratio, <i>Figure 1</i> , page 63	—
k_L	—
Lubricant film parameter	—
k_P	—
Load parameter	—
k_q	$10^{-6} \text{ kW}/(\text{mm}^2 \cdot \text{K})$
Heat transfer coefficient of bearing seating surface, <i>Figure 2</i> , page 63. It is dependent on the housing design and size, the housing material and the mounting position. In normal applications, the heat transfer coefficient for bearing seating surfaces up to 25 000 mm^2 is between 0,2 and $1,0 \cdot 10^{-6} \text{ kW}/(\text{mm}^2 \cdot \text{K})$	—
n_{ϑ}	min^{-1}
Thermally safe operating speed	—
n_B	min^{-1}
Reference speed, see dimension tables	—
P_1	N
Radial load for radial bearings, axial load for axial bearings	—
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 outlet temperature and oil inlet temperature	—
ν	$\text{mm}^2 \text{s}^{-1}$
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

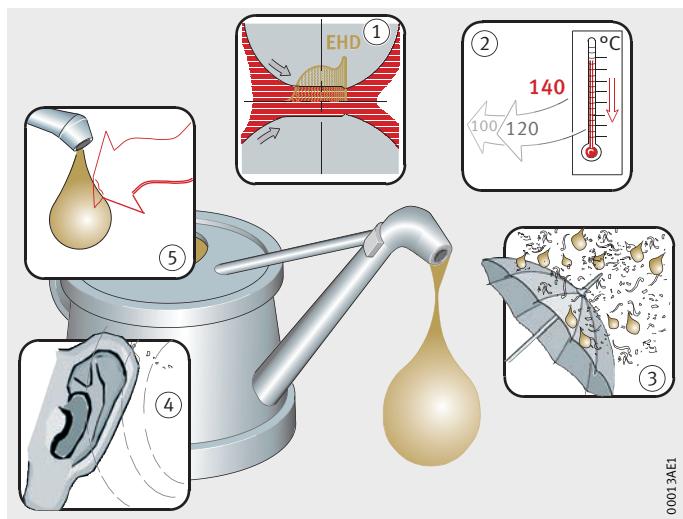


Figure 1
Functions of the lubricant

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Lubrication

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
- the sealing action
- the reservoir effect
- long operating life with little maintenance work
(lifetime 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

The feed lines and lubrication holes in the housings and shafts, *Figure 2* and *Figure 3* must:

- lead directly to the lubrication hole in the rolling bearing
- be as short as possible
- be provided individually for each bearing.



Ensure that the feed lines are filled, *Figure 3*; the feed line should be bled if necessary.

Follow the instructions provided by the lubrication device manufacturer.

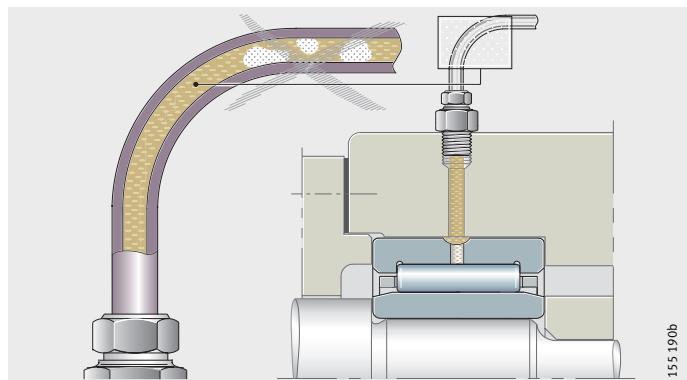


Figure 2
Lubricant feed lines

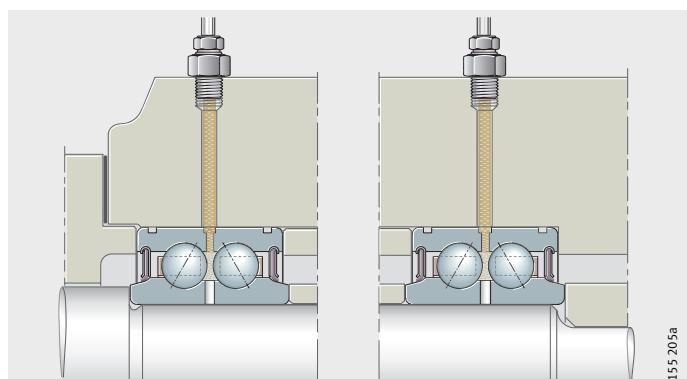


Figure 3
Arrangement of feed to more
than one bearing on a shaft

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 85.

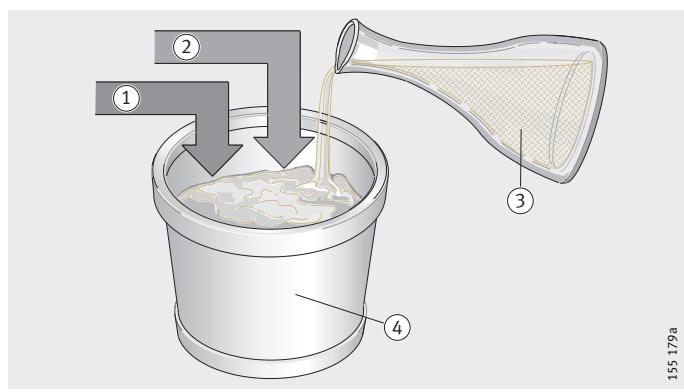
Composition of a grease

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



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Lubricants must always 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 to DIN 51 818).

For rolling bearings, classes 1, 2, 3 should be used in preference, *Figure 5*.

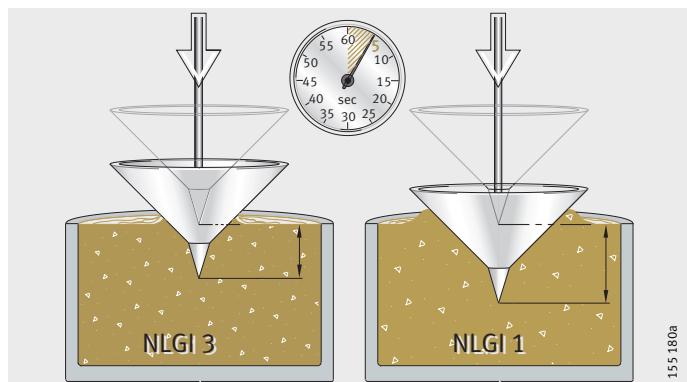


Figure 5
Consistency of greases

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Lubrication

Selection of suitable grease

Rolling bearing greases K to DIN 51 825 are suitable.

Greases should be selected in accordance with the operating conditions of the bearing:

- temperature
- compressive load, see page 72
- speed, see page 72
- the presence of water and moisture, see page 73.

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 on the FAG rolling bearing 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 1 400 mbar.

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 stated by the grease manufacturer.

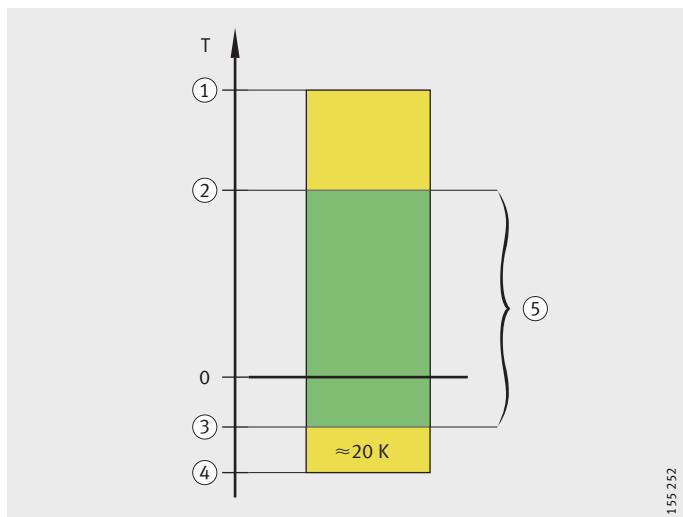
The upper continuous limit temperature $T_{\text{upperlimit}}$ must not be exceeded if a temperature-induced reduction in the grease operating life is to be avoided; see section Grease operating life, page 76.



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.

- T = operating temperature
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



155252

Lubrication

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 (EP = 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 ($P \leq 0,03 \cdot C$).

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 μm .

Speed

Greases should be selected in accordance with the speed parameter $n \cdot d_M$ for grease, see table, page 74:

- 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 accelerations $> 500 \text{ g}$, separation (of the thickener and base oil) may occur. In this case, please consult the lubricant manufacturer.



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



Water and moisture

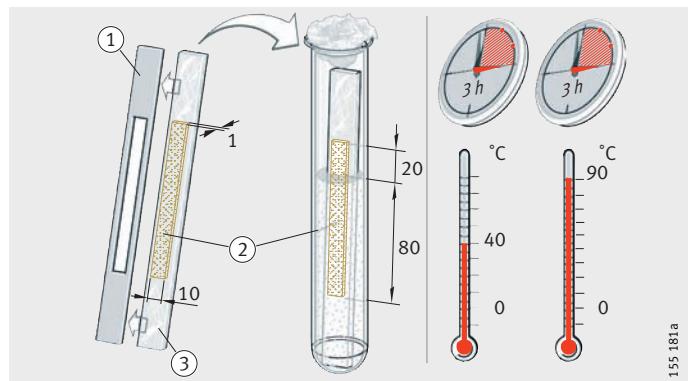
Water in the grease has a highly detrimental effect on the operating life of the bearing:

- The static behaviour of greases in the presence of water is assessed in accordance with DIN 51 807, *Figure 7*.
- The anti-corrosion characteristics can be tested according to DIN 51 802 (Emcor test) (information is given in the datasheets from the grease manufacturers).

- ① Blank
② Grease specimen
③ Glass slide

Figure 7

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



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Lubrication

Greases with special suitability

Many of the rolling bearings supplied by Schaeffler Group Industrial have grease filling. The greases used have proved particularly suitable for the applications in mechanical-dynamic tests, see table.

Greases	Designation ¹⁾	Classification	Type of grease
	GA01	Ball bearing grease for $T < +180 \text{ }^{\circ}\text{C}$	Polycarbamide Ester oil
	GA02	Ball bearing grease for $T < +160 \text{ }^{\circ}\text{C}$	Polycarbamide SHC
	GA13	Standard ball bearing and 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
	GA08	Grease for line contact	Lithium complex soap Mineral oil
	GA11	Rolling bearing grease resistant to media for temperatures up to $+250 \text{ }^{\circ}\text{C}$	PTFE Alkoxyfluoroether
	GA47	Rolling bearing grease resistant to media for temperatures up to $+140 \text{ }^{\circ}\text{C}$	Barium complex soap Mineral oil

1) GA stands for **Grease Application Group**, based on Grease Spec 00.

2) The upper continuous limit temperature $T_{\text{upperlimit}}$ must not be exceeded if a temperature-induced reduction in grease operating life is to be avoided.

3) Dependent on bearing type.



Operating temperature range °C	Upper continuous limit temperature $T_{upperlimit}^2)$ °C	NLGI class	Speed parameter $n \cdot d_M$ $\text{min}^{-1} \cdot \text{mm}$	ISO VG class (base oil) ³⁾	Designation ¹⁾	Recommended Arcanol grease for relubrication
-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	MULTI3
-30 to +140	+75	2	500 000	68 to 150	GA14	MULTI2
-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	–
-30 to +140	+95	2 to 3	500 000	150 to 320	GA08	LOAD150
-40 to +250	+180	2	300 000	460 to 680	GA11	TEMP200
-20 to +140	+70	1 to 2	350 000	150 to 320	GA47	–

Arcanol rolling bearing greases

For users who wish to charge their rolling bearings with grease themselves, there is a range of particularly suitable Arcanol rolling bearing greases.

The greases in the range are graded in terms of their performance capability such that they can be used to cover almost all areas of application, see section Arcanol rolling bearing greases, page 1046.

Lubrication

Grease operating life

The grease operating life t_{fG} applies where this is less than the calculated bearing life and the bearings are not lubricated.

A guide value can be determined in approximate terms as follows:

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

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, see page 78 to page 81.



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

Basic grease operating life

Preconditions for the basic grease operating life

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

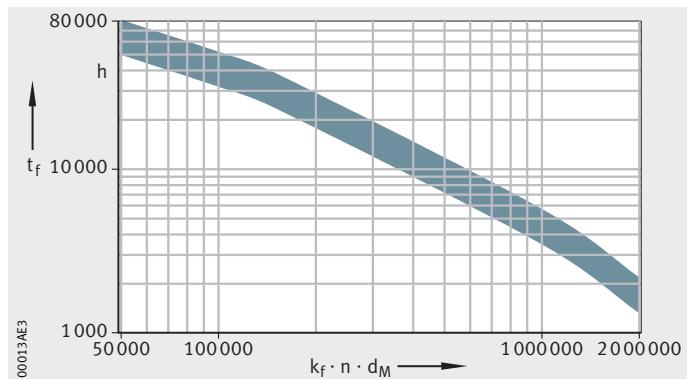
The basic grease operating life t_f is dependent on the bearing-specific speed parameter $k_f \cdot n \cdot d_M$ and is calculated using *Figure 8*.

k_f –
Bearing type factor, see table Factor k_f as a function of bearing type, page 77
 n min^{-1}
Operating speed or equivalent speed
 d_M mm
Mean bearing diameter $(d + D)/2$.

Calculation of basic grease operating life

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

Figure 8
Calculation of basic grease operating life t_f





Factor k_f as a function of bearing type

Bearing type	Factor k_f
Deep groove ball bearings, single row	1
Angular contact ball bearings, single row	1,6
Angular contact ball bearings, double row	2
Four point contact bearings	1,6
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 or without alternating axial load	2
Cylindrical roller bearings, double row ¹⁾	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
Back-up rollers	20
Cylindrical roller bearings LSL	3,1
Axial cylindrical roller bearings	58

¹⁾ Not valid for high precision cylindrical roller bearings NN30 and NNU49.
In this case, please use the calculation scheme in the publication
Super Precision Bearings, AC 41130/7.

Guidelines on calculating the grease operating life Combined rolling bearings



Rotating outer ring

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

If the outer ring is the rotating component, there may be a reduction in the grease operating life.

In the case of back-up rollers:

- the 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 .

Lubrication

Restrictions



The grease operating life cannot be determined using the method described in the following cases:

- if the grease can leave the bearing arrangement
 - if there is excessive evaporation of the base oil
 - in bearing positions 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 high precision bearings for combined loads
- for high precision cylindrical roller bearings.

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

Correction factors for determining the grease operating life

Temperature factor K_T

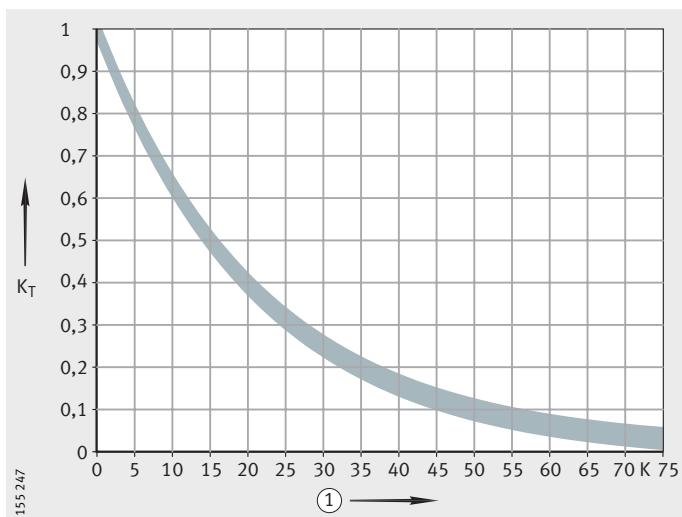


If the bearing temperature is higher than the continuous limit temperature $T_{upperlimit}$, K_T must be determined from the diagram, *Figure 9*.

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 74. If necessary, a different grease should be selected or contact should be made with the Schaeffler engineering service.

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

Figure 9
Temperature factor





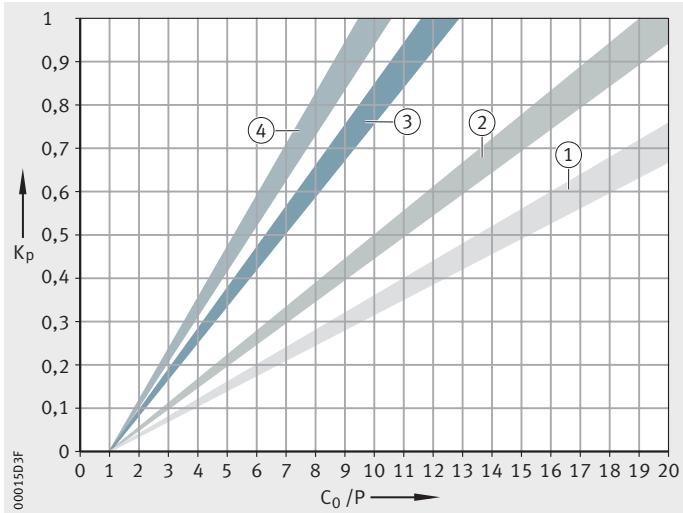
Load factor K_p

The factor K_p is dependent on the bearing and describes the reduction at higher load (this places greater strain on the grease), *Figure 10* and table.

This is based on high-quality lithium soap greases.

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

Figure 10
 K_p factor for bearings



K_p factor

Curve ¹⁾	Bearing type
①	Axial angular contact ball bearings, double row
	Axial deep groove ball bearings
	Axial cylindrical roller bearings
②	Spherical roller bearings with central rib
	Cylindrical roller bearings, double row (excluding NN30)
	Back-up rollers
③	Cylindrical roller bearings LSL
	Tapered roller bearings
	Spherical roller bearings without central rib (E1)
	Barrel roller bearings
	Cylindrical roller bearings, full complement
	Cylindrical roller bearings, single row (constant or alternating load)
	Four point contact bearings
④	Deep groove ball bearings
	Angular contact ball bearings (single or double row)
	Self-aligning ball bearings

¹⁾ Curves: see *Figure 10*.

Lubrication

Oscillation factor K_R



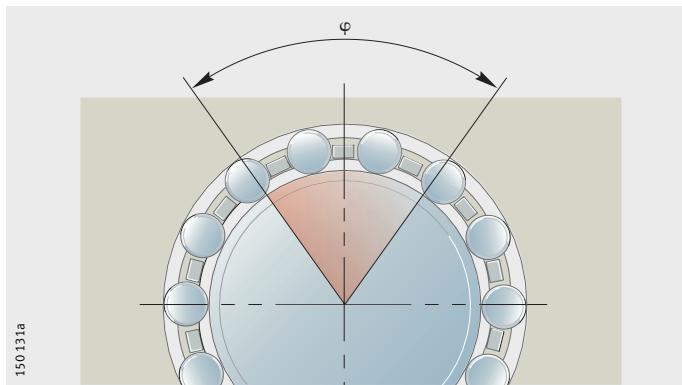
The factor K_R applies for an angle of oscillation $\varphi < 180^\circ$, *Figure 11* and *Figure 12*. Oscillating motion places a greater strain on the grease than does rotating motion.

In order to reduce fretting corrosion, the lubrication interval should be reduced.

If the rolling elements do not undergo complete rotation, please contact the Schaeffler engineering service.

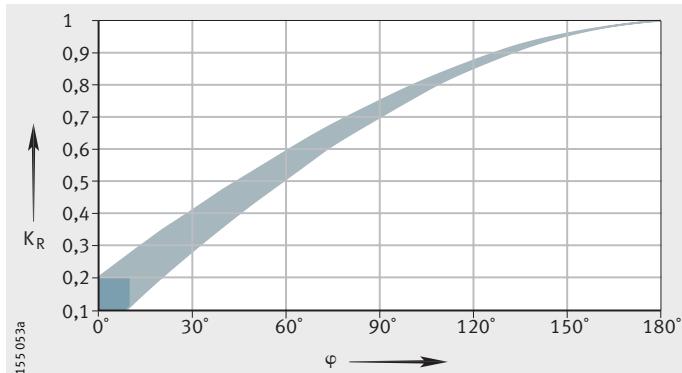
φ = angle of oscillation

Figure 11
Angle of oscillation



K_R = oscillation factor
 φ = angle of oscillation

Figure 12
Oscillation factor





Factor K_U
for environmental influences



The 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 .

It 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, the influence of contamination on rating life calculation must also be noted, see section Load carrying capacity and life, page 30.

Environmental factor K_U

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

Factor K_S
for vertical shafts

If increased escape of grease is expected, for example in the case of radial bearings with a vertical axis of rotation, the factor K_S according to the table must be taken into consideration.

K_S factor

Arrangement of shaft	Factor K_S
Vertical (depending on sealing)	0,5 to 0,7
Other arrangement	1

Lubrication

Relubrication intervals



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

The precise lubrication interval should be determined by tests conducted under application conditions.

This should be carried out as follows:

■ Sufficiently long observation periods must be used.

■ The condition of the grease must be checked at regular intervals.

For reasons of operational reliability, relubrication intervals of > 1 year are not recommended.

Lubrication interval guide value

Experience shows that a guide value for most applications 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, see page 76.

Relubrication conditions

The grease used for relubrication must be the same as that used in initial greasing.

If different greases are used, their miscibility and compatibility must be checked; see section Miscibility, page 84.

Relubrication quantity

Due to the compact construction of the bearings, relubrication should be carried out using 50% to 80% of the initial greasing quantity (recommendation).

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

Relubrication should always be carried out as follows:

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



Grease reservoir

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. Increasing the size of the grease reservoir does not lead to a proportional increase in the grease operating life.

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*.

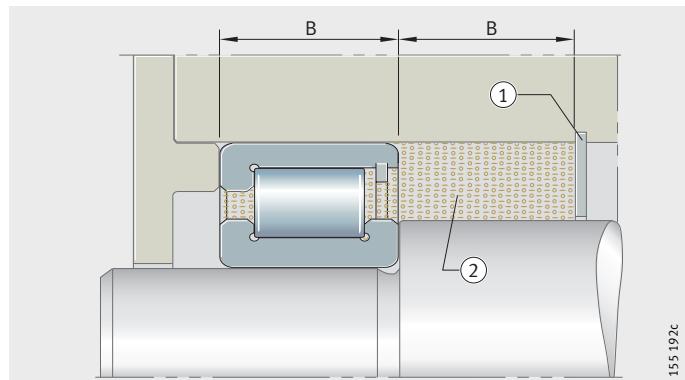


Figure 13
Grease reservoir on one side

① Sealing shield
② Grease reservoir

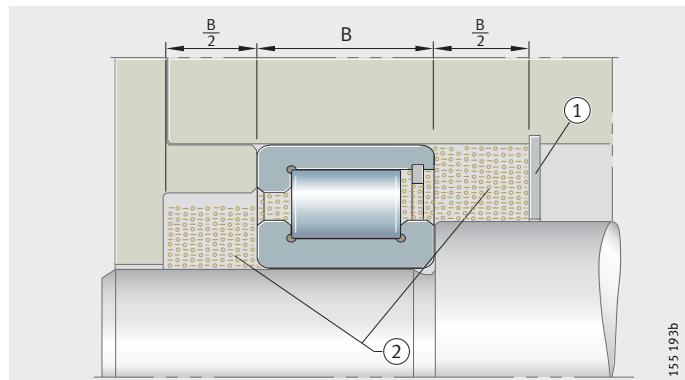


Figure 14
Grease reservoir on both sides

Lubrication

Miscibility	Mixtures of greases should be avoided if at all possible.
Preconditions	If they are unavoidable, the following preconditions must be fulfilled: <ul style="list-style-type: none">■ The base oil must be the same.■ The thickener types must match.■ The base oil viscosities must be similar (they must not differ by more than one ISO VG class).■ The consistency must be identical (NLGI class).
	Miscibility of greases must be always be agreed in consultation with the lubricant manufacturer. Even when these preconditions are fulfilled, impairment of the performance capability of the mixed grease cannot be ruled out. If a decision is taken to change to a different grease grade, the grease should be rinsed out if this is possible. Further relubrication should be carried out after a shortened period. If incompatible greases are mixed, this can lead to considerable structural changes. Substantial softening of the grease mixture may also occur. Definite statements on miscibility can only be obtained by means of suitable tests.
Storage	In general, the greases used can be stored for 3 years.
Preconditions	The preconditions are: <ul style="list-style-type: none">■ a closed room or store■ temperatures between 0 °C and +40 °C■ relative humidity no greater than 65%■ no influence of chemical agents (vapours, gases, fluids)■ the rolling bearings are sealed.  Lubricants age due to environmental influences. The information provided by lubricant manufacturers must always be observed. 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, we cannot offer any guarantees either for the lubricants used by customers for relubrication or for their characteristics.



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.

In these cases, please consult the lubricant manufacturer or the Schaeffler engineering service.

Operating temperatures



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

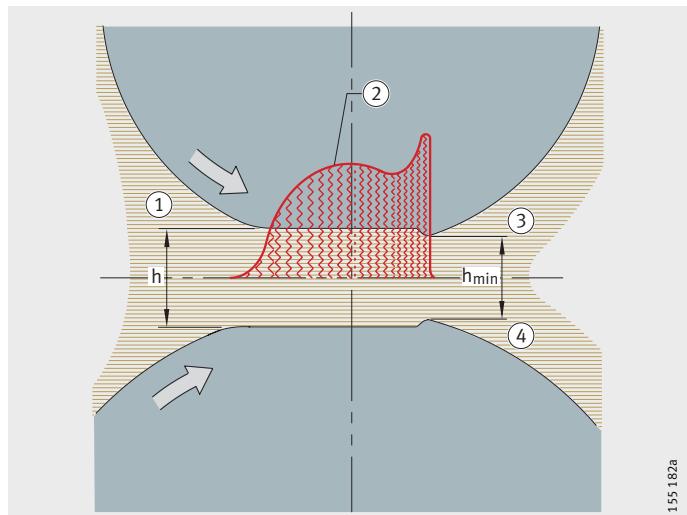
Selection of suitable oil

The achievable bearing 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, page 30.

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

Figure 15

Lubricant film in the contact zones



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Reference viscosity for mineral oils

The guide value for ν_1 is dependent on the mean bearing diameter d_M and the speed n . It takes account of the EHD theory of lubricant film formation and practical experience.

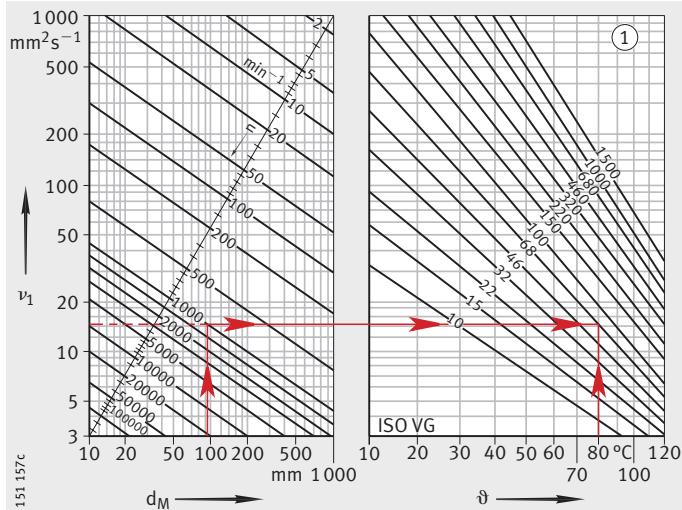
Depending on the operating speed, the oil at operating temperature must have at least the reference viscosity ν_1 , *Figure 16*, page 86.

Lubrication

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

Figure 16
Reference viscosity and
V/T diagram for mineral oils

Calculation of reference viscosity



The reference viscosity ν_1 is determined as follows:

- Assign ν_1 to a nominal viscosity with ISO VG between 10 and 1 500 (centre point viscosity to DIN 51 519).
- Round intermediate values to the nearest ISO VG (due to the steps between groups).

This method cannot be used for synthetic oils, since these have different V/P (viscosity/pressure) and V/T (viscosity/temperature) characteristics.

In these cases, please consult the Schaeffler 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, the VI index should be at least 95.

When selecting the viscosity, the lower operating temperature must be taken into consideration, since the increasing viscosity will reduce the flowability of the lubricant. As a result, the level of power losses may increase.

A 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 power losses arising from lubricant friction, there may be problems with the feed and removal of oil at low or even at normal temperatures.

The oil selected must be sufficiently viscous that it gives the highest possible fatigue life. It must also be ensured that the bearings are always supplied with adequate quantities of oil.



Pressure properties and anti-wear additives

If the bearings are subjected to high loads or if 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 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 points (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 to DIN 51 819).

Silicone oils should only be used for low loads ($P \leq 0,03 \cdot C$).



Compatibility

Before an oil is used, its behaviour must be checked in relation to plastics, seal materials (elastomers) and light and non-ferrous metals.

This must always be checked under dynamic loading and at operating temperature.

Synthetic oils must always be checked for their compatibility. The lubricant manufacturer must be consulted on this at the same time.

Miscibility

The 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 HLP can be mixed with HLP.

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



Synthetic oils must always be checked for their compatibility. The lubricant manufacturer must be consulted on this at the same time.

Miscibility must be checked in advance for each individual case.

Cleanliness

The cleanliness of the oil influences the rating life of bearings, see also section Load carrying capacity and life, page 30.

The Schaeffler Group therefore recommends that an oil filter should be provided; attention must be paid to the filtration rate. The filter mesh should be $< 25 \mu\text{m}$.

Lubrication

Lubrication methods

- The essential lubrication methods are:
- drip feed oil lubrication
 - pneumatic oil lubrication
(to protect the environment, this should be used as a substitute for oil mist lubrication)
 - oil bath lubrication
(immersion or sump lubrication)
 - recirculating oil lubrication.

Drip feed oil lubrication

This is suitable for bearings running at high speeds, *Figure 17*.

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 drops weighs approx. 0,025 g).

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

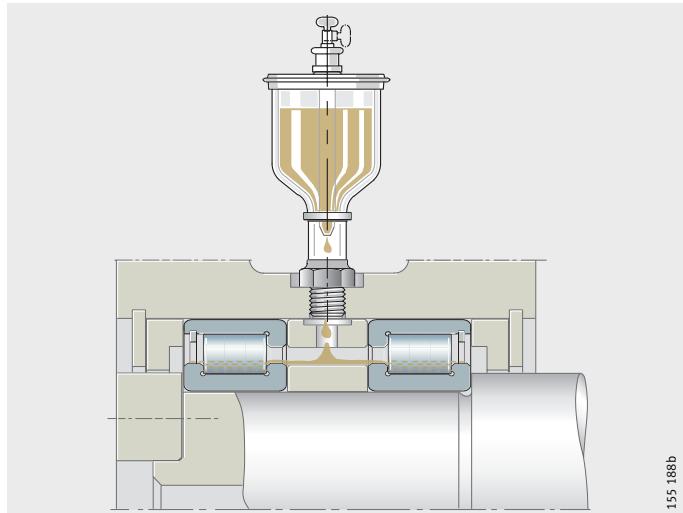


Figure 17
Drip feed oil lubrication
(schematic)



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 $3\,000\,000 \text{ min}^{-1} \cdot \text{mm}$), *Figure 18*.

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

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

Parameters for design of the lubrication system should be requested from the equipment manufacturers.



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

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

Pneumatic oil lubrication has little cooling effect.

Follow the instructions provided by the manufacturers of the lubrication systems.

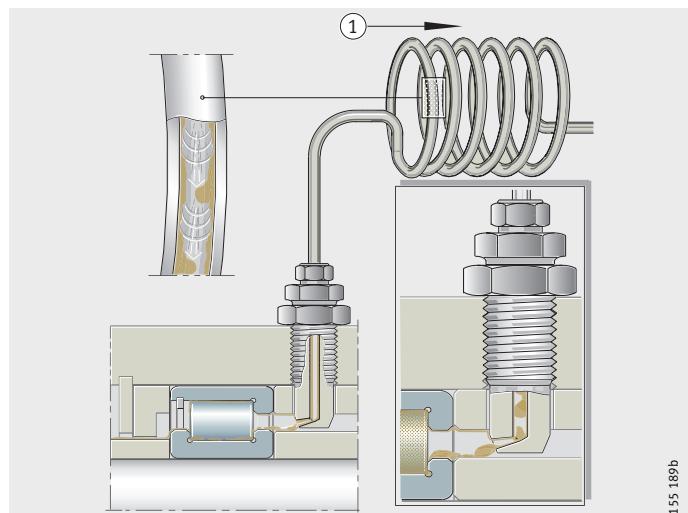


Figure 18
Pneumatic oil lubrication
(schematic)

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 as a result of losses due to splashing. Furthermore, foaming of the oil may occur.

In general, it is suitable for speeds 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 completely 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.

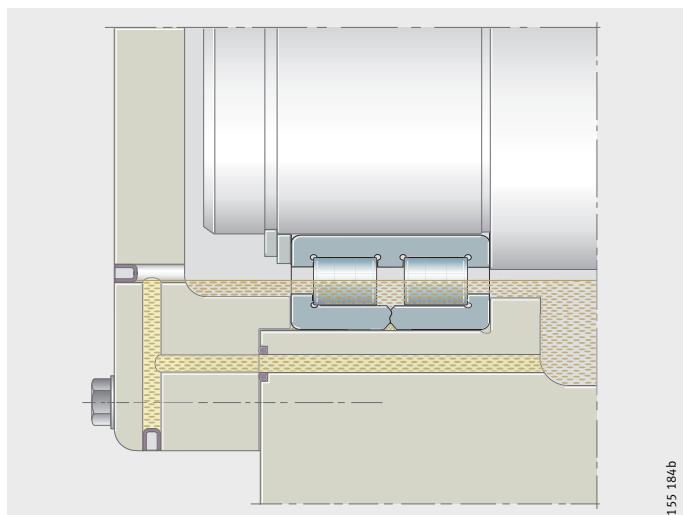


Figure 19
Oil bath lubrication
(schematic)

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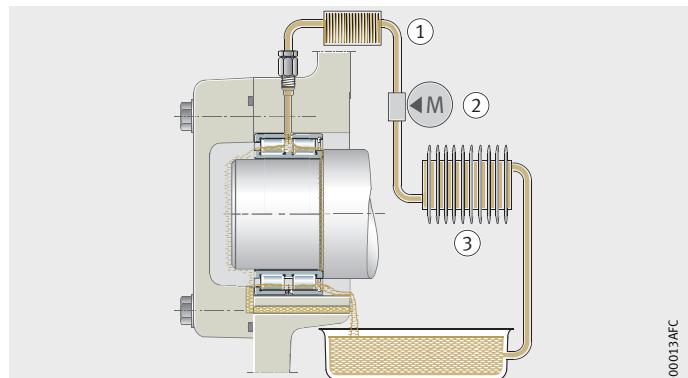


Recirculating oil lubrication

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*, page 60.

- ① Filter
- ② Pump
- ③ Cooling system

Figure 20
Recirculating oil lubrication
(schematic)



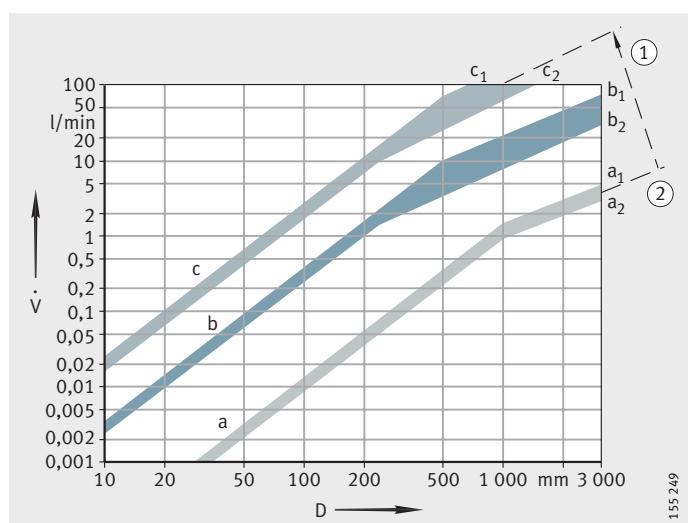
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The oil quantities \dot{V} are matched to the operating conditions, *Figure 21*. The diagram indicates oil quantities that can be fed through the bearing without pressure with a side feed arrangement and banking up to the lower edge of the shaft.

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.

- \dot{V} = oil quantity
 D = outside bearing diameter
 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



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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*.

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

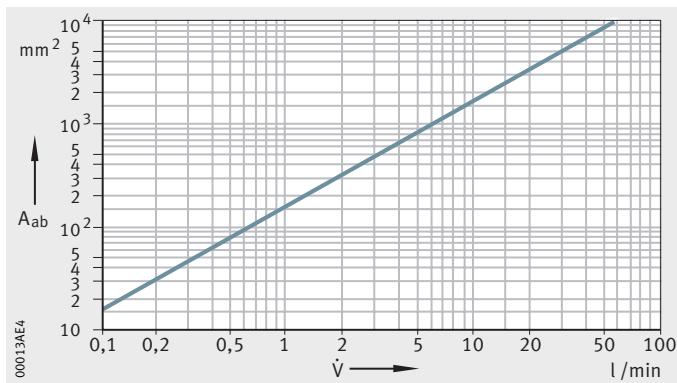
$$A_{rab} = K_{ab} \cdot A_{ab}$$

A_{rab} mm²
Outlet cross-section taking viscosity into consideration

K_{ab} –
Correction factor for viscosity, see table
 A_{ab} mm²
Outlet cross-section, *Figure 22*.

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

Figure 22
Outlet cross-section (guide values)



Correction factor K_{ab}

Viscosity mm ² · s ⁻¹	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, *Figure 23*.

Injection lubrication using large recirculation quantities is associated with high power loss.

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.

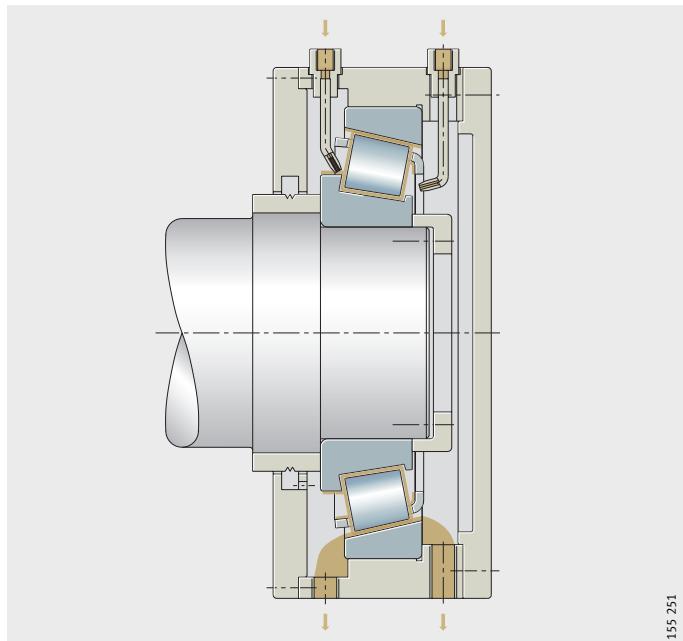


Figure 23
Oil injection lubrication
(oil feed from both sides
for tapered roller bearing running
at high speeds)

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Lubrication

Heat dissipation by the lubricant

Oil can dissipate frictional heat from the bearing. It is possible to calculate the heat flow \dot{Q}_L that is dissipated with the lubricant and the necessary 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

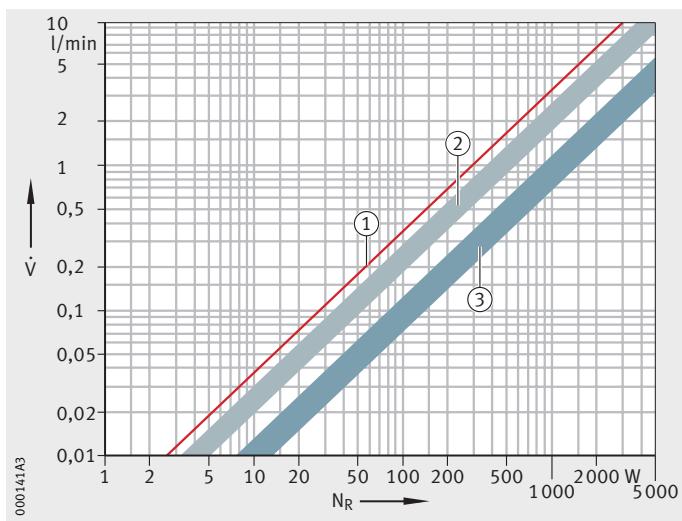
Difference between oil inlet and oil outlet temperature.

Guide values for the oil quantity in cooling and lubrication

If these values cannot be calculated, the guide values according to Figure 24 apply for the temperature difference of $\Delta \vartheta_L = 10$ K.

- \dot{V} = oil quantity
- N_R = frictional power
- 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 cooling and lubrication





Oil changes

At temperatures in the bearing of less than +50 °C and with only slight contamination, an oil change once per year is generally sufficient.

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



The precise oil change intervals should be agreed in consultation with the oil manufacturer.

Severe operating conditions

Under severe conditions, the oil should be changed more often. This applies, for example, in the case of higher temperatures and low oil quantities with a high circulation index.

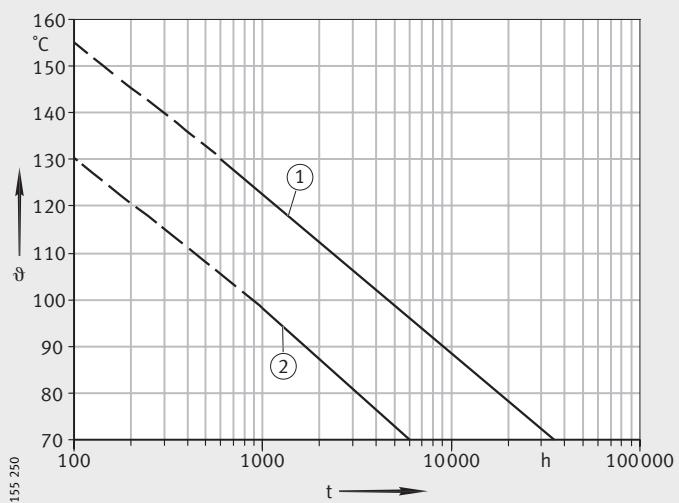
The circulation index indicates how often the entire oil volume available is recirculated and pumped per hour:

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

③ = oil sump temperature
t = oil change interval
① Synthetic gearbox oils
② Mineral gearbox oils

Source: FVA Project No. 171

Figure 25
Oil change intervals

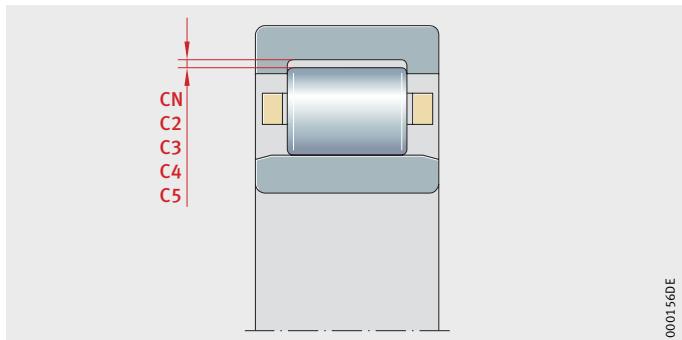


Bearing data

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*.

In accordance with DIN 620-4, ISO 5 753, the radial internal clearance is divided into groups, *Figure 1* and table.



CN, C2, C3, C4, C5 = internal clearance groups

Figure 1
Radial internal clearance

Radial internal clearance groups

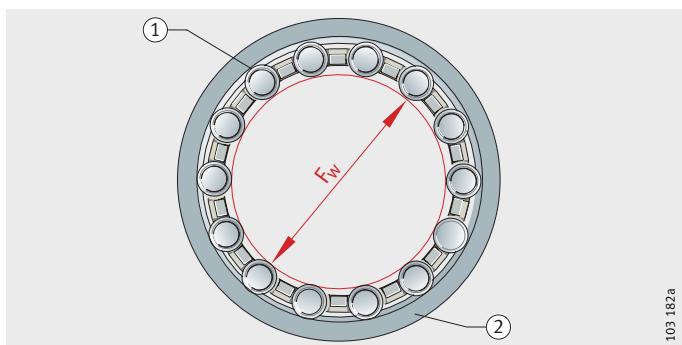
Internal clearance group	Description	Standard	Application
CN	<input type="checkbox"/> Normal radial internal clearance <input type="checkbox"/> CN is not included in bearing designations	DIN 620-4 ISO 5 753	For normal operating conditions with shaft and housing tolerances, see section Operating clearance value, page 97
C2	<input type="checkbox"/> Internal clearance < CN		For heavy alternating loads combined with oscillating motion
C3	<input type="checkbox"/> Internal clearance > CN		For bearing rings with press fits and large temperature differential between the inner and outer ring
C4	<input type="checkbox"/> Internal clearance > C3		
C5	<input type="checkbox"/> Internal clearance > C4	ISO 5 753	

Enveloping circle

For bearings without an inner ring, the enveloping circle F_w is used. This is the inner inscribed circle of the cylindrical rollers in clearance-free contact with the outer raceway, *Figure 2*. Before the bearings are fitted, it is in the tolerance zone F6. Deviations for F6, see table, page 146.

① Cylindrical roller
② Outer raceway
 F_w = enveloping circle diameter

Figure 2
Enveloping circle



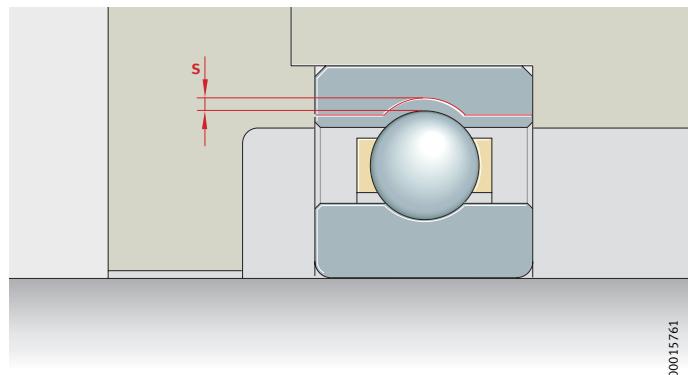
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Operating clearance

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

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Operating clearance value

The operating clearance value is dependent on the operating and installation conditions of the bearing, see also section Design of bearing arrangements, page 120.

A larger operating clearance is, for example, necessary 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 120.

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 oversize of the fitted parts with a firm seating is determined from the mean deviations and the upper and lower deviations of the tolerance zones of the fitted parts reduced by $1/3$ 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.



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 contraction of the outer 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 radial internal clearance due to temperature

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

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

Δs_T μm
Reduction in 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
(usual temperature difference between inner and outer ring: 5 K to 10 K).



Where shafts start up quickly, a larger radial internal clearance should be used 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.

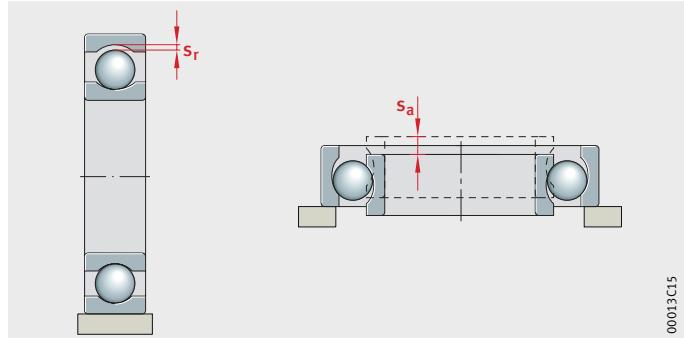
Bearing data

Axial internal clearance

The axial internal clearance s_a is the extent to which one bearing ring can be displaced in relation to the other, without load, along the bearing axis, *Figure 4*.

s_a = axial internal clearance
 s_r = radial internal clearance

Figure 4
Axial internal clearance
in comparison
with radial internal clearance



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In various bearing types, there is a relationship between the radial internal clearance s_r and the axial internal clearance s_a . Guide values for the correlation between the radial and axial internal clearance are shown for some bearing types in table.

Correlation between axial internal clearance and radial internal clearance

Bearing type	Ratio of axial internal clearance to radial internal clearance $\frac{s_a}{s_r}$
Spherical roller bearings	$2,3 \cdot Y_0^{1)}$
Tapered roller bearings	Single row, arranged in pairs $4,6 \cdot Y_0^{1)}$
	Matched pairs (N11CA) $2,3 \cdot Y_0^{1)}$
Angular contact ball bearings	Double row, contact angle 40° 2
	Single row Series 72..-B and 73..-B, arranged in pairs 1,2
Four point contact bearings	1,4

¹⁾ Y_0 factor, see dimension tables.



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

Special bearings made from HNS (High Nitrogen Steel, supplied by agreement) can achieve adequate life values even under the most challenging conditions (high temperatures, moisture, contamination).

High performance steels Cronidur and Cronitect®

For increased performance requirements, highly corrosion-resistant, nitrogen-alloyed martensitic HNS steels are available such as Cronidur and the newly developed steel Cronitect®.

In contrast to Cronidur, the more economical alternative Cronitect® has nitrogen introduced into the structure by means of a surface layer hardening process.

Both steels are considerably superior in terms of corrosion and wear resistance as well as fatigue strength to the conventional corrosion-resistant steels for rolling bearings, see also TPI 64, Corrosion-resistant products.

Ceramic materials

For ceramic hybrid spindle bearings, balls are manufactured 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.

Bearing data

Materials and bearing components

The following table shows suitable materials and their application in bearing technology.

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	For example, outer ring of back-up rollers
Silicon nitride	Ceramic balls
Brass alloy	Cage
Aluminium alloy	Cage
NBR, FPM, PUR	Sealing ring

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 unloaded 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 5*, page 103. 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

Solid section cages made from metal or laminated fabric

These cages are made from metal, laminated fabric or plastic, *Figure 6*. They can be identified from the bearing designation.

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.

Cage designs

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

Figure 5
Sheet metal cages made from steel



- 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 cages

Figure 6
Solid section cages made from brass



Bearing data

Guidance method

A further means of distinguishing between cages is their guidance method, *Figure 7*. 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

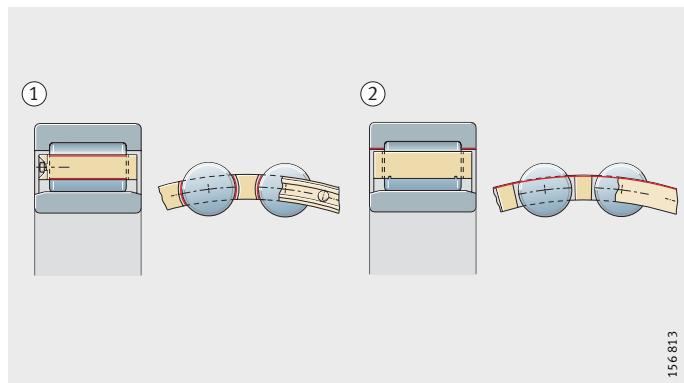


Figure 7
Guidance of cages

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Operating temperature

Rolling bearings are thermally stabilised such that, depending on the bearing type, they are generally dimensionally stable up to +120 °C (certain series up to +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 suffixes S1, S2, S3 and S4 to DIN 623-1, see table.



The temperature data in the product descriptions must be observed.

Suffixes for bearings for high temperatures

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

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.



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 fluoro elastomer (FKM, FPM, for example Viton) or fluoride-containing greases such as the rolling bearing greases 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 such 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. These bearings have the prefix S. For higher requirements, it may be advisable to use the high performance steels Cronidur and Cronitec®, see page 101.

Corrotect® coating

In many applications, the special coating Corrotect® is more cost-effective than corrosion-resistant steel.

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.

Advantages of the coating

The advantages of the special coating Corrotect® are all-round rust protection, including the turned surfaces of chamfers and radii, *Figure 8*. 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 uncoated parts, the operating life is significantly increased by the anti-corrosion protection. Uncoated bearings can be easily replaced by coated bearings of the same dimensions and there is no decrease in load carrying capacity (such as occurs in the use of corrosion-resistant steels). During storage, there is no need to use organic-based preservatives.

- ① With Corrotect® coating
② Uncoated

Figure 8
Bearing rings
after the salt spray test



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Fitting of coated bearings



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

For lower press-in forces, the surface of the parts should be lightly greased; the tolerances are increased by the thickness of the coating.



Dimensional and geometrical tolerances

Unless stated otherwise, the tolerances for radial rolling bearings correspond to DIN 620-2 (ISO 492), while the tolerances for axial rolling bearings correspond to DIN 620-3 (ISO 199), *Figure 9*.

The accuracy corresponds to tolerance class PN. For bearings with increased accuracy, the tolerances are restricted to the values of classes P6, P5, P4 and P2. Tolerance tables for the individual tolerance classes, see page 109 to page 115.

High precision bearings

In addition to the standardised tolerance classes, high precision bearings are also produced in the tolerance classes P4S, SP and UP. These tolerances are listed in the product descriptions for the high precision bearings.

Measurement methods

Measurement methods according to DIN 620-1 (ISO 1132-2) are valid for the acceptance inspection of rolling bearings. Further information on the measurement methods is given in TPI 138, Rolling bearing tolerances, Definitions and measurement principles. This TPI can be ordered via the Internet.

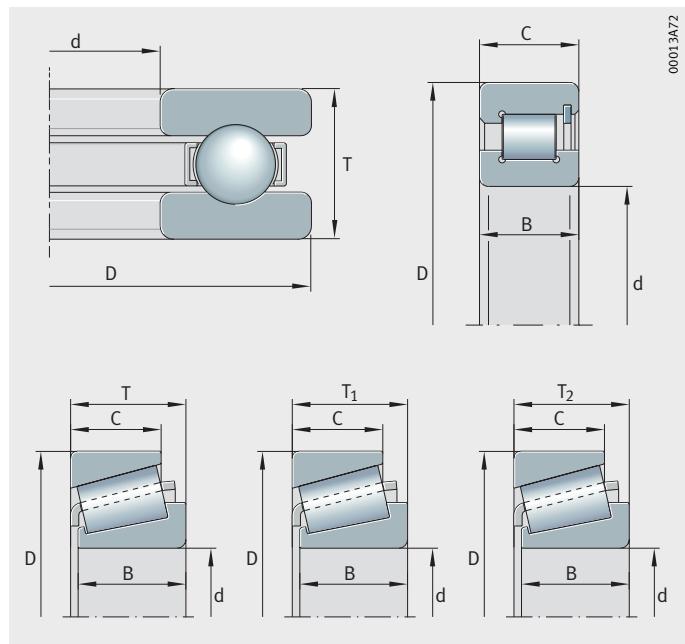


Figure 9

Main dimensions to DIN 620

Bearing data

Dimensional and tolerance symbols

Dimensional and tolerance symbols	Toleranced characteristic to DIN 1132 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	Axial 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_l	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
T	Total width of tapered roller bearing
T_{1s}	Total width of tapered roller bearing over inner ring and normal outer ring measured at one point
T_{2s}	Total width of tapered roller bearing over outer ring and normal inner ring measured at one point
$\Delta_{Ts}, \Delta_{T1s}, \Delta_{T2s}$	Deviation in total width from nominal dimension of tapered roller bearing measured at one point



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.
				9 max.	0, 1 max.	2, 3, 4 max.		
over	incl.	upper	lower					
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.
		Normal deviation		Modified deviation ¹⁾		
over	incl.	upper	lower	upper	lower	
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⁾ Only for bearings manufactured specifically for use as matched pairs.

Bearing data

**Tolerance class PN
Outer ring¹⁾
Tolerances in μm**

D mm		Δ_{Dmp} Deviation		V _{Dsp}				V_{Dmp} ²⁾	K _{ea}
				Open bearings Diameter series		Bearings with sealing shields and sealing washers			
over	incl.	upper	lower	9 max.	0, 1 max.	2, 3, 4 max.	max.	max.	max.
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 (table Tolerance class PN Inner ring, page 109).

²⁾ 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 mm		Δ_{dmp} Deviation		V _{dsp} Diameter series			V _{dmp}	K _{ia}
				9 max.	0, 1 max.	2, 3, 4 max.		
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 mm		Δ_{Bs} Normal deviation		V _{Bs} Modified deviation ¹⁾			V _{Bs}
				upper	lower	upper	
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⁾ Only for bearings manufactured specifically for use as matched pairs.

Tolerance class P6 Outer ring¹⁾ Tolerances in μm

D mm		Δ_{Dmp} Deviation		V _{Dsp}			V _{Dmp} ²⁾	K _{ea}
				Open bearings Diameter series	9 max.	0, 1 max.	2, 3, 4 max.	
315	400	0	-28	35	35	21	-	21
400	500	0	-33	41	41	25	-	25
500	630	0	-38	48	48	29	-	29
630	800	0	-45	56	56	34	-	34
800	1 000	0	-60	75	75	45	-	45

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 (table Tolerance class P6 Inner ring).

²⁾ Applies before assembly of the bearing and after removal of internal and/or external snap rings.

Bearing data

Radial bearings, excluding tapered roller bearings

Tolerance class P5 Inner ring Tolerances in μm

d mm		Δ_{dmp} Deviation		V_{dsp} Diameter series		V_{dmp}	K_{ia}	S_d
over	incl.	upper	lower	9 max.	0, 1, 2, 3, 4 max.	max.	max.	max.
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 mm		$S_{\text{ia}}^{1)}$	Δ_{Bs}				V_{Bs}		
over	incl.		Normal deviation		Modified deviation ²⁾				
			upper	lower	upper	lower			
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⁾ Only for deep groove and angular contact ball bearings.

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

Tolerance class P5 Outer ring¹⁾ Tolerances in μm

D mm		Δ_{Dmp} Deviation		$V_{\text{Dsp}}^{2)}$ Diameter series		$V_{\text{Dmp}}^{3)}$	K_{ea}	S_d	$S_{\text{ea}}^{4)}$	V_{Cs}
over	incl.	upper	lower	9 max.	0, 1, 2, 3, 4 max.	max.	max.	max.	max.	max.
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 (table Tolerance class P5 Inner ring).

²⁾ No values are defined for radial ball bearings with sealing shields or sealing washers.

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

⁴⁾ 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					
		Δ_{dmp} Deviation μm		$V_{dp}^{1)}$	$\Delta_{d1\text{mp}} - \Delta_{\text{dmp}}$ Deviation μm		max.
over	incl.	upper	lower		upper	lower	
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	
1 000	1 250	+105	0	—	+105	0	
1 250	1 600	+125	0	—	+125	0	
1 600	2 000	+150	0	—	+150	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					
		Δ_{dmp} Deviation μm		$V_{dp}^{1)}$	$\Delta_{d1\text{mp}} - \Delta_{\text{dmp}}$ Deviation μm		max.
over	incl.	upper	lower		upper	lower	
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	
1 000	1 250	+125	0	—	+115	0	
1 250	1 600	+160	0	—	+125	0	
1 600	2 000	+200	0	—	+150	0	

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

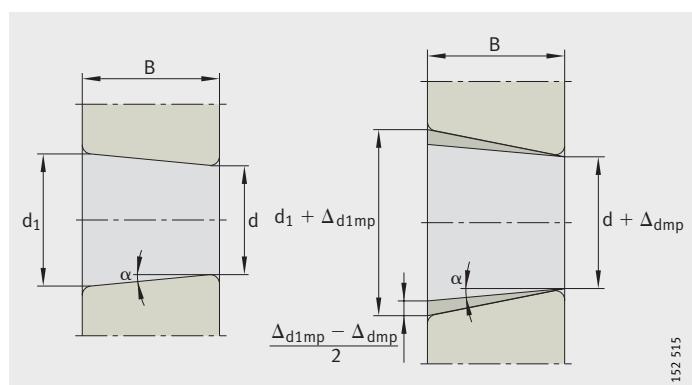
Taper 1:12
Half of taper angle $\alpha = 2^{\circ}23' 9,4''$;
theoretical large end diameter

$$d_1 = d + \frac{1}{12} \times B$$

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 10
Tolerances for tapered bores



152 515

Bearing data

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

d mm		PN (normal tolerance), P6 and P5		V_{dp} max.	P4		V_{dp} max.
		Δ_{dmp} Deviation	upper		upper	lower	
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, DIN 620-3
Tolerances in μm

D mm		PN (normal tolerance), P6 and P5		V_{Dp} max.	P4		V_{Dp} max.
		Δ_{Dmp} Deviation	upper		upper	lower	
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 in 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 toler- ance) max.	P6 max.	P5 max.	P4 max.	
120	180	15	9	5	4	Identical to S_i for the shaft locating washer of the corresponding bearing
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 tables.
The corresponding dimensional symbols are shown in *Figure 11*.

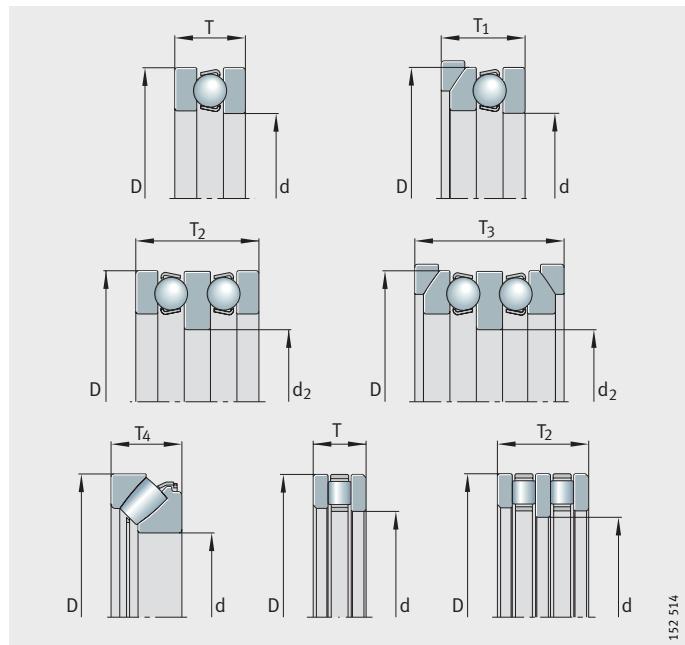


Figure 11
Tolerances
for nominal bearing height

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
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

Tolerance for nominal bearing height continued Tolerances in μm

d mm		T ₃ Deviation		T ₄ Deviation	
over	incl.	upper	lower	upper	lower
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

Bearing data

Chamfer dimensions

Radial bearings, excluding tapered roller bearings

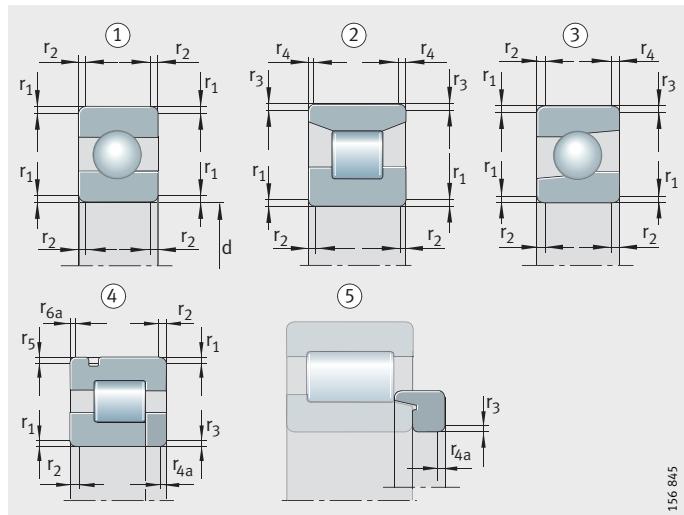
The chamfer dimensions correspond to DIN 620-6.

For minimum and maximum bearing values, *Figure 12* and table Limit values for chamfer dimensions to DIN 620-6 Values in mm, page 117.

For chamfer dimensions of tapered roller bearings see page 118, for axial bearings see page 119.

- 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 12
Chamfer dimensions
for radial bearings
excluding tapered roller bearings



156 845



**Limit values
for chamfer dimensions
to DIN 620-6**
Values in mm

r ¹⁾	d		r ₁ to r _{6a} min.	r ₁ , r ₃ , r ₅ max.	r ₂ , r ₄ , r ₆ ²⁾ max.	r _{4a} , r _{6a} max.
	over	incl.				
1	50	—	1	1,9	3	2,2
1,1	120	—	1,1	2,5	4	2,7
1,5	120	—	1,5	3	5	3,5
2	80	220	2	3,5	5	4
		220	—	3,8	6	4
2,1	—	280	2,1	4	6,5	4,5
		280	—	2,1	7	4,5
2,5	100	280	2,5	4,5	6	5
		280	—	2,5	7	5
3	—	280	3	5	8	5,5
		280	—	3	5,5	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

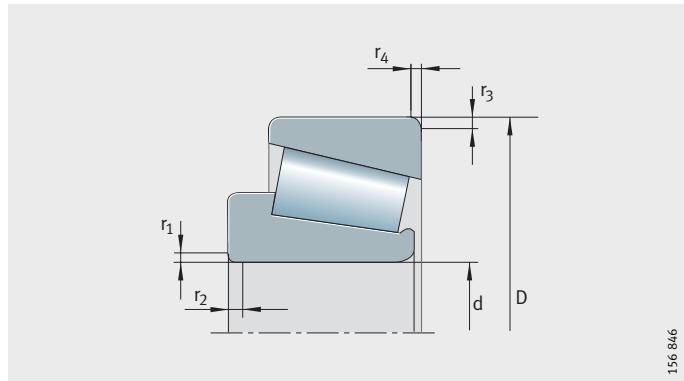
¹⁾ The nominal chamfer dimension r is identical to the smallest permissible chamfer dimension r_{min}.

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

Bearing data

Tapered roller bearings

For minimum and maximum values for metric tapered roller bearings, *Figure 13* and table.



156 846

Figure 13
Chamfer dimensions
for metric tapered roller bearings

Limit values
for chamfer dimensions
Values in mm

r ¹⁾	d, D		r ₁ to r ₄ min.	r ₁ , r ₃ max.	r ₂ , r ₄ max.
	over	incl.			
1	50	-	1	1,9	3
1,5	120	250	1,5	2,8	3,5
	250	-	1,5	3,5	4
2	120	250	2	3,5	4,5
	250	-	2	4	5
2,5	120	250	2,5	4	5,5
	250	-	2,5	4,5	6
3	120	250	3	4,5	6,5
	250	400	3	5	7
	400	-	3	5,5	7,5
4	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}.



Axial bearings

For minimum and maximum bearing values, *Figure 14* and table. The table corresponds to DIN 620-6.

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

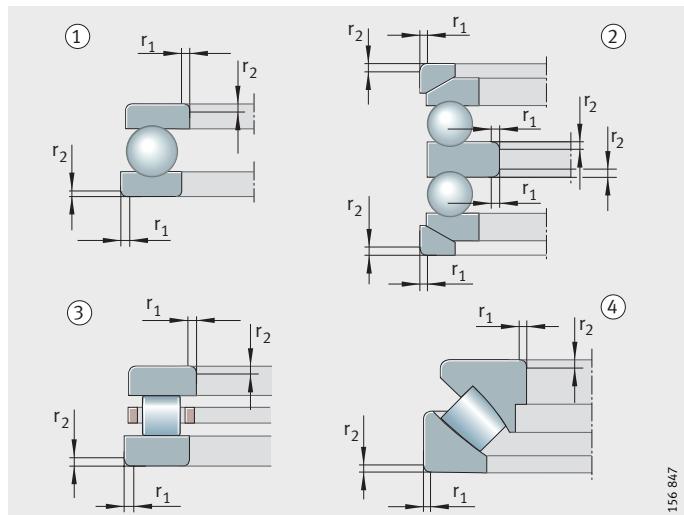


Figure 14
Chamfer dimensions
for axial bearings

**Limit values
for chamfer dimensions
Values in mm**

$r^{(1)}$	r_1, r_2	
	min.	max.
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

Locating/non-locating 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.

Non-locating bearings

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, *Figure 1*, page 122 to *Figure 4*, page 123.

Ideal non-locating bearings are cylindrical roller bearings with cage N and NU, *Figure 1 ②*, page 122. In these bearings, the roller and cage assembly can be displaced on the raceway of the bearing ring without ribs.

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, *Figure 2*, page 122. The bearing ring subjected to point load therefore has a loose fit; this is normally the outer ring, see section Conditions of rotation, page 128.



Locating bearings

The locating bearing guides the shaft in an axial direction and supports external axial forces. In order to prevent axial stresses, shafts with more than two bearings have only one locating bearing. 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.

A double row angular contact ball bearing, *Figure 3 ①*, page 122, 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, *Figure 4*, page 123, used as locating bearings will provide extremely close axial guidance.

There are particular advantages in using angular contact ball bearings of the universal design, *Figure 5*, page 123. 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 such that, when fitted in an X or O arrangement, they have slight axial internal clearance (design UA), are clearance-free (UO) or have slight preload (UL).

Spindle bearings of the universal design UL, *Figure 6*, page 123 have slight preload when fitted in an X or O arrangement (designs with greater preload are available by agreement).

In gearboxes, a four point contact bearing is sometimes fitted directly adjacent to a cylindrical roller bearing to give a locating bearing arrangement, *Figure 3 ③*, page 122.

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.

If a lower axial force is present, a cylindrical roller bearing with cage NUP can also be used as a locating bearing, *Figure 4 ③*, page 123.

No adjustment or setting work with matched pairs of tapered roller bearings

Fitting is also made easier when using matched pairs of tapered roller bearings as locating bearings (N11CA), *Figure 7 ②*, page 123. They are matched with appropriate axial internal clearance such that no adjustment or setting work is required.

Design of bearing arrangements

Examples of locating/non-locating bearing arrangements

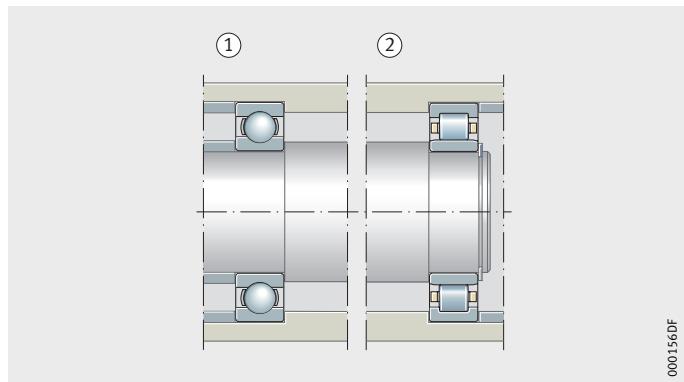
Deep groove ball bearing:

- ① Locating bearing

Cylindrical roller bearing NU:

- ② Non-locating bearing

Figure 1
Locating/non-locating bearing arrangements



0001561F

Deep groove ball bearings:

- ① Locating bearing

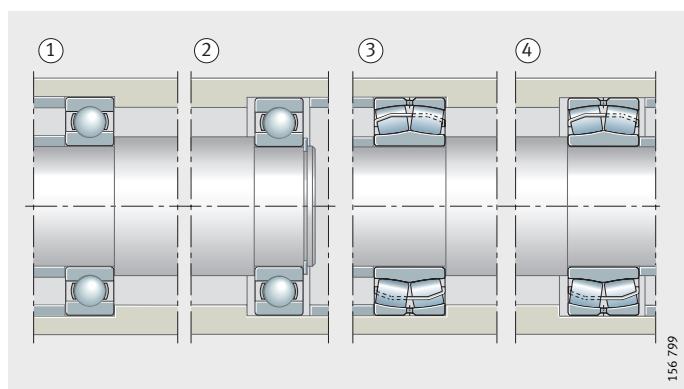
- ② Non-locating bearing

Spherical roller bearings:

- ③ Locating bearing

- ④ Non-locating bearing

Figure 2
Locating/non-locating bearing arrangements



156 799

Double row angular contact ball bearing:

- ① Locating bearing

Cylindrical roller bearing NU:

- ② Non-locating bearing

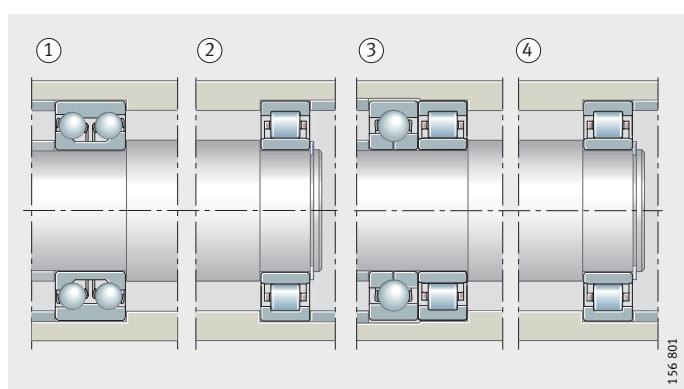
Four point contact bearing and cylindrical roller bearing:

- ③ Locating bearing

Cylindrical roller bearing NU:

- ④ Non-locating bearing

Figure 3
Locating/non-locating bearing arrangements

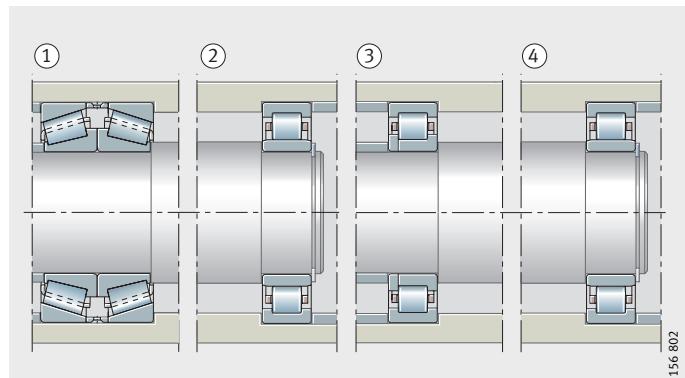


156 801



- 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

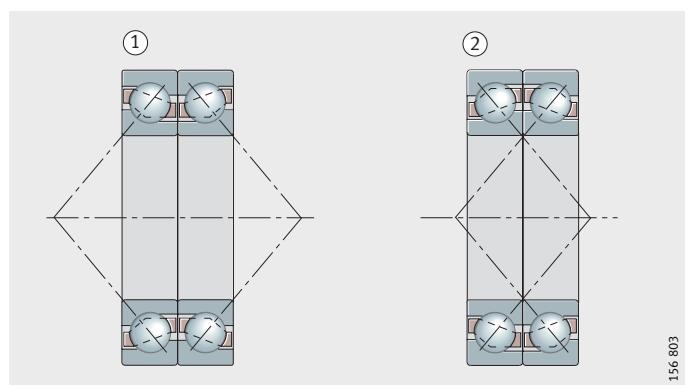
Figure 4
Locating/non-locating
bearing arrangements



156 802

- Pair of angular contact ball bearings
of universal design:
 ① O arrangement
 ② X arrangement

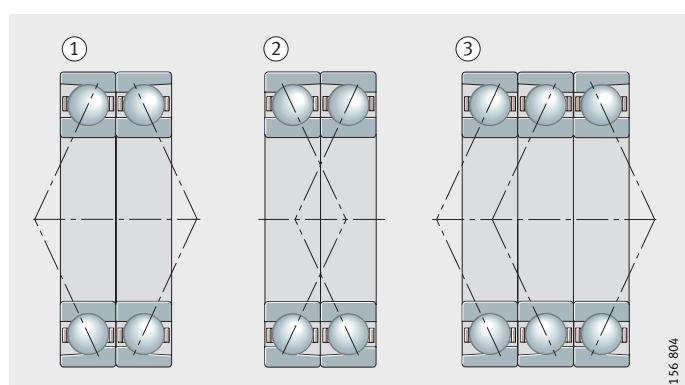
Figure 5
Locating bearing arrangements



156 803

- Spindle bearings of universal design:
 ① O arrangement
 ② X arrangement
 ③ Tandem O arrangement

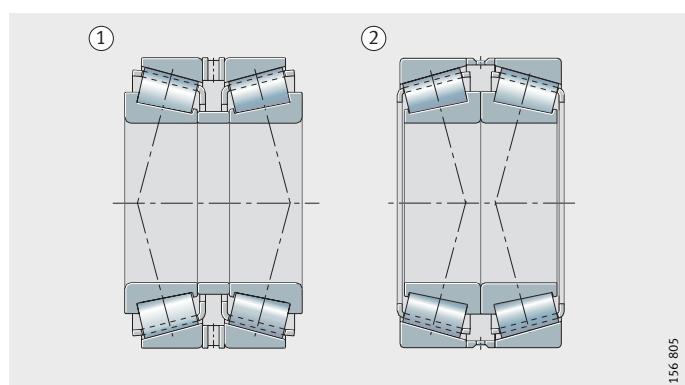
Figure 6
Locating bearing arrangements



156 804

- Pair of tapered roller bearings:
 ① O arrangement
 ② X arrangement

Figure 7
Locating bearing arrangements



156 805

Design of bearing arrangements

Adjusted bearing arrangement

These bearing arrangements normally consist 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.

Area of application

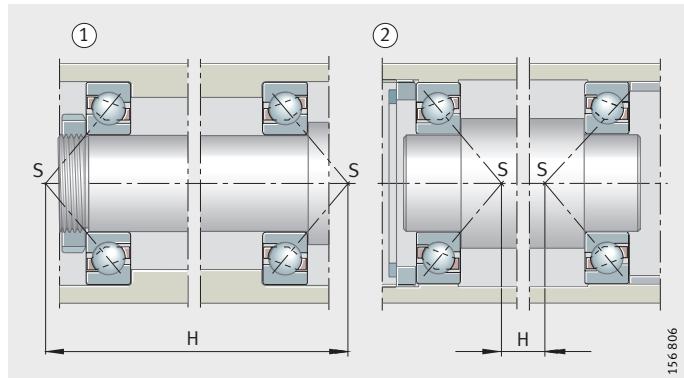
Due to this adjustment facility, the adjusted bearing arrangement is particularly suitable where close guidance is required, for example in pinion bearing arrangements with spiral toothed bevel gears and spindle bearing arrangements in machine tools.

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 they 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.

Angular contact ball bearings
① O arrangement
② X arrangement
S = apexes of the pressure cones
H = support distance

Figure 8
Adjusted bearing arrangement

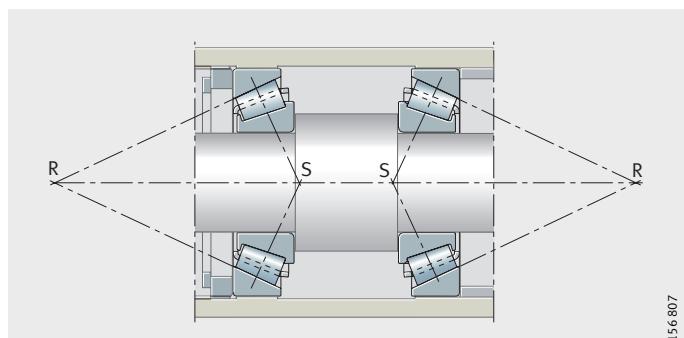


Influence of thermal expansion in an X or O arrangement

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 internal clearance (preconditions: shaft and housing of identical material, inner ring and complete shaft at identical temperature, outer ring and complete housing at identical temperature).

Tapered roller bearings
X arrangement
S = apexes of the pressure cones
R = roller cone apexes

Figure 9
Adjusted bearing arrangement





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

- The roller cone apexes R, 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*.

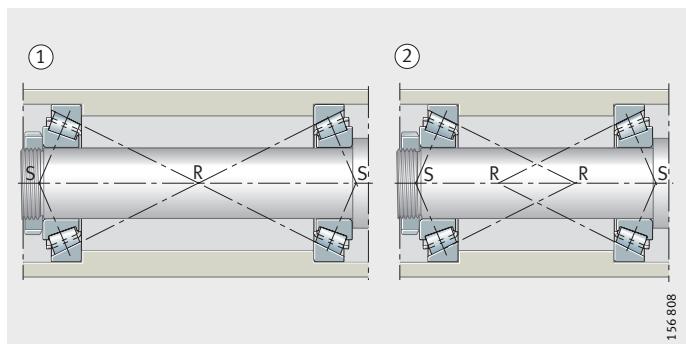
Tapered roller bearings in O arrangement

① Intersection points coincide

② Intersection points overlap

S = apexes of the pressure cones

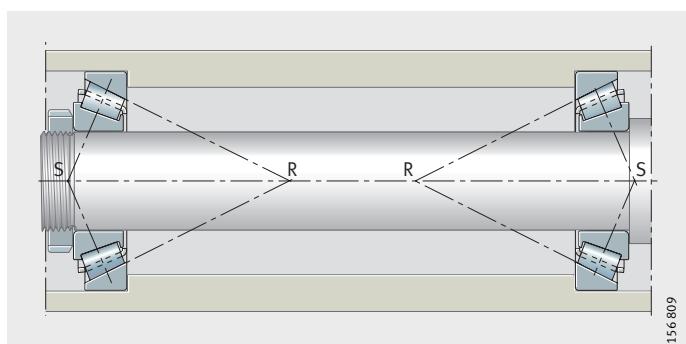
R = roller cone apexes



Tapered roller bearings in O arrangement,
without overlapping of
roller cone apexes

S = apexes of the pressure cones

R = roller cone apexes



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 12*. 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 stressed 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.

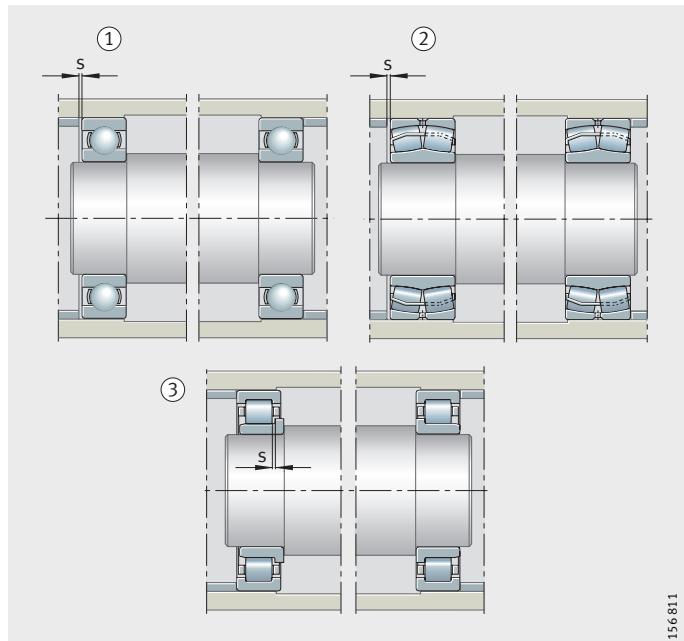
In both bearings, one ring, usually an outer ring, has a fit that allows displacement.

In floating bearing arrangements and cylindrical roller bearings with cage NJ, the length compensation takes place within the bearings. The inner and outer rings can have tight fits, *Figure 12* 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 12
Floating bearing arrangements





Fits	<p>Rolling bearings are located on the shaft and in the housing in a radial, axial and tangential direction in accordance with their function. Radial and tangential location is normally achieved by force locking, i.e. by tight fits on the bearing rings. Axial location of the bearings is normally achieved by geometrical locking.</p>
Criteria for selection of fits	<p>The following must be taken into consideration in the selection of fits:</p> <ul style="list-style-type: none">■ The bearing rings must be well supported on their circumference in order to allow full utilisation of the load carrying capacity of the bearing.■ 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 the length of the shaft and housing and must therefore be capable of axial displacement.■ The bearings must be easy to fit and dismantle. <p>Good support of the bearing rings on their circumference requires rigid seating. The requirement that rings must not creep on their mating parts also requires rigid seating. If non-separable bearings must be fitted and dismantled, a tight fit can only be achieved for one bearing ring.</p> <p>In cylindrical roller bearings N und NU, both rings can have tight fits, since the length compensation takes place within the bearing and since the rings can be fitted separately.</p> <p>! 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 radial internal clearance.</p> <p>If materials other than cast iron or steel are used for the adjacent construction, the modulus of elasticity and the differing coefficients of thermal expansion of the materials must also be taken into consideration to achieve rigid seating.</p> <p>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.</p> <p>Higher loads, especially shocks, require a fit with larger interference and narrower geometrical tolerances.</p>
Seats for axial bearings	<p>Axial bearings, which support axial loads only, must not be guided radially (with the exception of axial cylindrical roller bearings which have a degree of freedom in the radial direction due to flat raceways). In the case of groove-shaped raceways 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.</p> <p>Where axial bearings also support radial forces, such as in axial spherical roller bearings, fits should be selected in the same way as for radial bearings.</p> <p>The contact surfaces of the mating parts must be perpendicular to the axis of rotation (axial runout tolerance to IT5 or better), in order to ensure uniform load distribution over all the rolling elements.</p>

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.

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

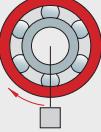
If forces are present that displace the ring relative to its seating surface, every point on the raceway is subjected to load over the course of one revolution of the bearing.

A load with this characteristic is described as a circumferential load.



As damage to the bearing seating surface can occur, a tight fit should be used.

Conditions of rotation

Conditions of motion	Example	Schematic	Load case	Fit
Rotating inner ring	Shaft with weight load		Circumferential load on inner ring and Point load on outer ring	Inner ring: tight fit necessary Outer ring: loose fit permissible
Stationary outer ring				
Non-variable load direction				
Stationary inner ring	Hub bearing arrangement with significant imbalance		Point load on inner ring and Circumferential load on outer ring	Inner ring: loose fit permissible Outer ring: tight fit necessary
Rotating outer ring				
Load direction rotates with outer ring				
Stationary inner ring	Back-up roller (hub bearing arrangement)		Point load on inner ring and Circumferential load on outer ring	Inner ring: loose fit permissible Outer ring: tight fit necessary
Rotating outer ring				
Non-variable load direction				
Rotating inner ring	Centrifuge, vibrating screen		Circumferential load on outer ring	
Stationary outer ring				
Load direction rotates with inner ring				



Shaft and housing tolerances

Tolerance zones

Reference to tables of shaft and housing tolerances

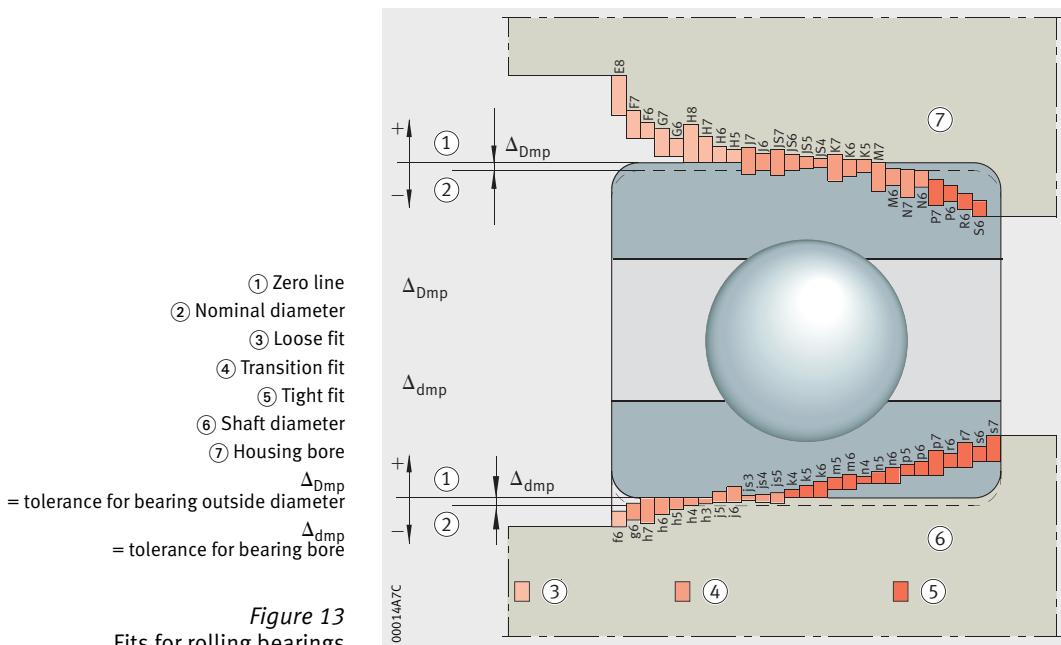
The fit is determined by the ISO tolerances for shafts and housings (ISO 286) together with the tolerances Δ_{dmp} for the bore and Δ_{Dmp} for the outside diameter of the bearings (DIN 620).

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 representation of the most common rolling bearing is shown in *Figure 13*.

The tables on pages 130 and 132 contain recommendations for the selection of shaft and housing tolerances that are valid for normal fitting and operating conditions.

Deviations are possible if particular requirements apply, for example in relation to running accuracy, smooth running or operating temperature. Increased running accuracies thus require closer tolerances such as tolerance grade 5 instead of 6. If the inner ring is warmer than the shaft during operation, the seating may loosen to an impermissible extent. A tighter fit must then be selected, for example m6 instead of k6.

In such cases, the question of fits can only be resolved by a compromise. The individual requirements must be weighed against each other and those fulfilled that give the best overall solution.



Design of bearing arrangements

**Shaft tolerances
for radial bearings
with cylindrical bore**

Conditions of rotation	Bearing type	Shaft diameter mm	Displacement facility Load	Tolerance zone
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	h6 (j6)
	Ball bearings	100 to 200	Low loads ¹⁾	k6 (m6)
			Normal and high loads ²⁾	m6 (m5)
		over 200	Low loads	m6 (m5)
			Normal and high loads	n6 (n5)
	Roller bearings	60 to 200	Low loads	k6 (k5)
			Normal loads	m6 (m5)
			High loads	n6 (n5)
		200 to 500	Normal loads	m6 (n6)
			High loads, shocks	p6
		over 500	Normal loads	n6 (p6)
			High loads	p6

1) $C/P > 10$.

2) $C/P < 10$.

**Shaft tolerances
for axial bearings**

Load	Bearing type	Shaft diameter	Operating conditions	Tolerance zone
Axial load	Axial deep groove ball bearings	All sizes	–	j6
	Axial cylindrical roller bearings with shaft locating washer		–	h6 (j6)
	Axial cylindrical roller and cage assembly		–	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)



Housing tolerances for radial bearings

Conditions of rotation	Displacement facility Load	Operating conditions	Tolerance zone
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, housing split	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 shocks, outer ring cannot be displaced	High running accuracy required 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 housings made from GG if bearing outside diameter $D > 250$ mm and temperature differential between outer ring and housing > 10 K.

²⁾ F7 for housings made from GG if bearing outside diameter $D > 250$ mm and temperature differential between outer ring and housing > 10 K.

Design of bearing arrangements

Housing tolerances
for axial bearings

Load	Bearing type	Operating conditions	Toler- ance zone
Axial load	Axial deep groove ball bearings	Normal running accuracy High running accuracy	E8 H6
	Axial cylindrical roller bearings with housing locating washer	–	H7 (K7)
	Axial cylindrical roller and cage assembly	–	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 of shaft and housing fits

The numerical values for the fits, page 134 to page 145, are valid for solid shafts made from steel and for 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 $\varnothing 200$ m6.

Example: table entry for shaft fit

Shaft deviation μm	Fit interference or fit clearance μm		
Maximum material value	+46	76²⁾	Interference or fit clearance if the maximum material values are combined
		56¹⁽²⁾	Probable interference or fit clearance
	+17	17³⁾	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 page 134 to page 141.

Housing fits

In each cell are five numbers in accordance with the following scheme, for example for housing $\varnothing 360$ H6.

Example: table entry for housing fit

Housing deviation μm	Fit interference or fit clearance μm		
Minimum material value	+36	0²⁾	Interference or fit clearance if the maximum material values are combined
		25¹⁽²⁾	Probable interference or fit clearance
	0	76³⁾	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 page 142 to page 145.

Design of bearing arrangements

Shaft fits

Nominal shaft diameter in mm

over incl.	120 140	140 160	160 180	180 200
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Deviation of bearing bore diameter in μm (normal tolerance)

Δ_{dmp}	0 -25	0 -25	0 -25	0 -30
-----------------------	----------	----------	----------	----------

Shaft deviation, fit interference or fit clearance in μm

g5	-14 -32	11 3 32	-14 -32	11 3 32	-14 -32	11 3 32	-15 -35	15 2 35
g6	-14 -39	11 6 39	-14 -39	11 6 39	-14 -39	11 6 39	-15 -44	15 5 44
h5	0 -18	25 11 18	0 -18	25 11 18	0 -18	25 11 18	0 -20	30 13 20
h6	0 -25	25 8 25	0 -25	25 8 25	0 -25	25 8 25	0 -29	30 10 29
j5	+7 -11	32 18 11	+7 -11	32 18 11	+7 -11	32 18 11	+7 -13	37 20 13
j6	+14 -11	39 22 11	+14 -11	39 22 11	+14 -11	39 22 11	+16 -13	46 26 13
js5	+9 -9	34 20 9	+9 -9	34 20 9	+9 -9	34 20 9	+10 -10	40 23 10
js6	+12,5 -12,5	38 21 13	+12,5 -12,5	38 21 13	+12,5 -12,5	38 21 13	+14,5 -14,5	45 25 15
k5	+21 +3	46 32 3	+21 +3	46 32 3	+21 +3	46 32 3	+24 +4	54 37 4
k6	+28 +3	53 36 3	+28 +3	53 36 3	+28 +3	53 36 3	+33 +4	63 43 4
m5	+33 +15	58 44 15	+33 +15	58 44 15	+33 +15	58 44 15	+37 +17	67 50 17
m6	+40 +15	65 48 15	+40 +15	65 48 15	+40 +15	65 48 15	+46 +17	76 56 17



200 225		225 250		250 280		280 315		315 355		355 400		400 450		450 500	
0 -30	0 -30	0 -35	0 -35	0 -35	0 -40	0 -40	0 -40	0 -45	0 -45	0 -45	0 -45	0 -45	0 -45	0 -45	
-15 -35	15 2 35	-15 -35	15 2 35	-17 -40	18 1 40	-17 -40	18 1 40	-18 -43	22 0 43	-18 -43	22 0 43	-20 -47	25 1 47	-20 -47	25 1 47
-15 -44	15 5 44	-15 -44	15 5 44	-17 -49	18 4 49	-17 -49	18 4 49	-18 -54	22 3 54	-18 -54	22 3 54	-20 -60	25 3 60	-20 -60	25 3 60
0 -20	30 13 20	0 -20	30 13 20	0 -23	35 16 23	0 -23	35 16 23	0 -25	40 18 25	0 -25	40 18 25	0 -27	45 21 27	0 -27	45 21 27
0 -29	30 10 29	0 -29	30 10 29	0 -32	35 13 32	0 -32	35 13 32	0 -36	40 15 36	0 -36	40 15 36	0 -40	45 17 40	0 -40	45 17 40
+7 -13	37 20 13	+7 -13	37 20 13	+7 -16	42 23 16	+7 -16	42 23 16	+7 -18	47 25 18	+7 -18	47 25 18	+7 -20	52 28 20	+7 -20	52 28 20
+16 -13	46 26 13	+16 -13	46 26 13	+16 -16	51 29 16	+16 -16	51 29 16	+18 -18	58 33 18	+18 -18	58 33 18	+20 -20	65 37 20	+20 -20	65 37 20
+10 -10	40 23 10	+10 -10	40 23 10	+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	+13,5 -13,5	59 35 14	+13,5 -13,5	59 35 14
+14,5 -14,5	45 25 15	+14,5 -14,5	45 25 15	+16 -16	51 29 16	+16 -16	51 29 16	+18 -18	58 33 18	+18 -18	58 33 18	+20 -20	65 37 20	+20 -20	65 37 20
+24 +4	54 37 4	+24 +4	54 37 4	+27 +4	62 43 4	+27 +4	62 43 4	+29 +4	69 47 4	+29 +4	69 47 4	+32 +5	77 53 5	+32 +5	77 53 5
+33 +4	63 43 4	+33 +4	63 43 4	+36 +4	71 49 4	+36 +4	71 49 4	+40 +4	80 55 4	+40 +4	80 55 4	+45 +5	90 62 5	+45 +5	90 62 5
+37 +17	67 50 17	+37 +17	67 50 17	+43 +20	78 59 20	+43 +20	78 59 20	+46 +21	86 64 21	+46 +21	86 64 21	+50 +23	95 71 23	+50 +23	95 71 23
+46 +17	76 56 17	+46 +17	76 56 17	+52 +20	87 65 20	+52 +20	87 65 20	+57 +21	97 72 21	+57 +21	97 72 21	+63 +23	108 80 23	+63 +23	108 80 23

Design of bearing arrangements

Shaft fits
continued

Nominal shaft diameter in mm									
	over incl.	500 560	560 630	630 710	710 800				
Deviation of bearing bore diameter in μm (normal tolerance)									
Δ_{dmp}		0 -50		0 -50		0 -75		0 -75	
Shaft deviation, fit interference or fit clearance in μm									
g5	-22 -51	28 1 51	-22 -51	28 1 51	-24 -56	51 15 56	-24 -56	51 15 56	
g6	-22 -66	28 4 66	-22 -66	28 4 66	-24 -74	51 9 74	-24 -74	51 9 74	
h5	0 -29	50 23 29	0 -29	50 23 29	0 -32	75 39 32	0 -32	75 39 32	
h6	0 -44	50 18 44	0 -44	50 18 44	0 -50	75 33 50	0 -50	75 33 50	
j5	-	-	-	-	-	-	-	-	-
j6	+22 -22	72 40 22	+22 -22	72 40 22	+25 -25	100 58 25	+25 -25	100 58 25	
js5	+14,5 -14,5	65 38 15	+14,5 -14,5	65 38 15	+16 -16	91 55 16	+16 -16	91 55 16	
js6	+22 -22	72 40 22	+22 -22	72 40 22	+25 -25	100 58 25	+25 -25	100 58 25	
k5	+29 0	79 53 0	+29 0	79 53 0	+32 0	107 71 0	+32 0	107 71 0	
k6	+44 0	94 62 0	+44 0	94 62 0	+50 0	125 83 0	+50 0	125 83 0	
m5	+55 +26	105 78 26	+55 +26	105 78 26	+62 +30	137 101 30	+62 +30	137 101 30	
m6	+70 +26	120 88 26	+70 +26	120 88 26	+80 +30	155 113 30	+80 +30	155 113 30	



800 900		900 1000		1 000 1 120		1120 1250		1250 1600		1600 2 000		2 000 2 500	
0 -100		0 -100		0 -125		0 -125		0 -160		0 -200		0 -250	
-26 -62	74 29 62	-26 -62	74 29 62	-28 -70	97 41 70	-28 -70	97 41 70	-30 -80	130 60 80	-32 -92	168 81 92	-34 -104	216 109 104
-26 -82	74 24 82	-26 -82	74 24 82	-28 -94	97 33 94	-28 -94	97 33 94	-30 -108	130 41 108	-32 -124	168 71 124	-34 -144	216 96 144
0 -36	100 55 36	0 -36	100 55 36	0 -42	125 69 42	0 -42	125 69 42	0 -50	160 90 50	0 -60	200 119 60	0 -70	250 143 70
0 -56	100 48 56	0 -56	100 48 56	0 -66	125 61 66	0 -66	125 61 66	0 -78	160 81 78	0 -92	200 103 92	0 -110	250 130 110
-	-	-	-	-	-	-	-	-	-	-	-	-	-
+28 -28	128 76 28	+28 -28	128 76 28	+33 -33	158 94 33	+33 -33	158 94 33	+39 -39	199 120 39	+46 -46	246 149 46	+55 -55	305 185 55
+18 -18	118 73 18	+18 -18	118 73 18	+21 -21	146 90 21	+21 -21	146 90 21	+25 -25	185 115 25	+30 -30	230 143 30	+35 -35	285 178 35
+28 -28	128 76 28	+28 -28	128 76 28	+33 -33	158 94 33	+33 -33	158 94 33	+39 -39	199 120 39	+46 -46	246 149 46	+55 -55	305 185 55
+36 0	136 91 0	+36 0	136 91 0	+42 0	167 111 0	+42 0	167 111 0	+50 0	210 140 0	+60 0	260 173 0	+70 0	320 213 0
+56 0	156 104 0	+56 0	156 104 0	+66 0	191 127 0	+66 0	191 127 0	+78 0	238 159 0	+92 0	292 195 0	+110 0	360 240 0
+70 +34	170 125 34	+70 +34	170 125 34	+82 +40	207 151 40	+82 +40	207 151 40	+98 +48	258 188 48	+118 +58	318 193 58	+138 +68	388 236 68
+90 +34	190 138 34	+90 +34	190 138 34	+106 +40	231 167 40	+106 +40	231 167 40	+126 +48	286 207 48	+150 +58	350 214 58	+178 +68	428 263 68

Design of bearing arrangements

Shaft fits

Nominal shaft diameter in mm									
	over incl.	120 140	140 160	160 180	180 200				
Deviation of bearing bore diameter in μm (normal tolerance)									
Δ_{dmp}		0 -25		0 -25		0 -25		0 -30	
Shaft deviation, fit interference or fit clearance in μm									
n5	+45 +27	70 56 27	+45 +27	70 56 27	+45 +27	70 56 27	+51 +31	81 64 31	
n6	+52 +27	77 60 27	+52 +27	77 60 27	+52 +27	77 60 27	+60 +31	90 70 31	
p6	+68 +43	93 76 43	+68 +43	93 76 43	+68 +43	93 76 43	+79 +50	109 89 50	
p7	+83 +43	108 87 43	+83 +43	108 87 43	+83 +43	108 87 43	+96 +50	126 101 50	
r6	+88 +63	113 97 63	+90 +65	115 99 65	+93 +68	118 102 68	+106 +77	136 116 77	
r7	+103 +63	128 107 63	+105 +65	130 109 65	+108 +68	133 112 68	+123 +77	153 128 77	
Shaft tolerances for adapter sleeves and withdrawal sleeves									
h7/ $\frac{\text{IT}5}{2}$	0 -40	9	0 -40	9	0 -40	9	0 -46	10	
h8/ $\frac{\text{IT}5}{2}$	0 -63	9	0 -63	9	0 -63	9	0 -72	10	
h9/ $\frac{\text{IT}6}{2}$	0 -100	12,5	0 -100	12,5	0 -100	12,5	0 -115	14,5	

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



200 225		225 250		250 280		280 315		315 355		355 400		400 450	
0 -30		0 -30		0 -35		0 -35		0 -40		0 -40		0 -45	
+51 +31	81 64 31	+51 +31	81 64 31	+57 +34	92 73 34	+57 +34	92 73 34	+62 +37	102 80 37	+62 +37	102 80 37	+67 +40	112 88 40
+60 +31	90 70 31	+60 +31	90 70 31	+66 +34	101 79 34	+66 +34	101 79 34	+73 +37	113 88 37	+73 +37	113 88 37	+80 +40	125 97 40
+79 +50	109 89 50	+79 +50	109 89 50	+88 +56	123 101 56	+88 +56	123 101 56	+98 +62	138 113 62	+98 +62	138 113 62	+108 +68	153 125 68
+96 +50	126 101 50	+96 +50	126 101 50	+108 +56	143 114 56	+108 +56	143 114 56	+119 +62	159 127 62	+119 +62	159 127 62	+131 +68	176 139 68
+109 +80	139 119 80	+113 +84	143 123 84	+126 +94	161 138 94	+130 +98	165 142 98	+144 +108	184 159 108	+150 +114	190 165 114	+166 +126	211 183 126
+126 +80	156 131 80	+130 +84	160 135 84	+146 +94	181 152 94	+150 +98	185 156 98	+165 +108	205 173 108	+171 +114	211 179 114	+189 +126	234 198 126
0 -46	10	0 -46	10	0 -52	11,5	0 -52	11,5	0 -57	12,5	0 -57	12,5	0 -63	13,5
0 -72	10	0 -72	10	0 -81	11,5	0 -81	11,5	0 -89	12,5	0 -89	12,5	0 -97	13,5
0 -115	14,5	0 -115	14,5	0 -130	16	0 -130	16	0 -140	18	0 -140	18	0 -155	20

Design of bearing arrangements

Shaft fits
continued

Nominal shaft diameter in mm									
	over incl.	450 500	500 560		560 630		630 710		
Deviation of bearing bore diameter in μm (normal tolerance)									
Δ_{dmp}		0 -45	0 -50		0 -50		0 -75		
Shaft deviation, fit interference or fit clearance in μm									
n5	+67 +40	112 88 40	+73 +44	123 96 44	+73 +44	123 96 44	+82 +50	157 121 50	
n6	+80 +40	125 97 40	+88 +44	138 106 44	+88 +44	138 106 44	+100 +50	175 133 50	
p6	+108 +68	153 125 68	+122 +78	172 140 78	+122 +78	172 140 78	+138 +88	213 171 88	
p7	+131 +68	176 139 68	+148 +78	198 158 78	+148 +78	198 158 78	+168 +88	243 199 88	
r6	+172 +132	217 189 132	+194 +150	244 212 150	+199 +155	249 217 155	+225 +175	300 258 175	
r7	+195 +132	240 204 132	+220 +150	270 230 150	+225 +155	275 235 155	+255 +175	330 278 175	
Shaft tolerances for adapter sleeves and withdrawal sleeves									
h7 / $\frac{\text{IT}5}{2}$	0 -63	13,5	0 -70	14,5	0 -70	14,5	0 -80	16	
h8 / $\frac{\text{IT}5}{2}$	0 -97	13,5	0 -110	14,5	0 -110	14,5	0 -125	16	
h9 / $\frac{\text{IT}6}{2}$	0 -155	20	0 -175	22	0 -175	22	0 -200	25	

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



710 800		800 900		900 1000		1000 1120		1120 1250		1250 1600		1600 2000		2000 2500	
0 -75		0 -100		0 -100		0 -125		0 -125		0 -160		0 -200		0 -250	
+82 +50	157 121 50	+92 +56	192 147 56	+92 +56	192 147 56	+108 +66	233 177 66	+108 +66	233 177 66	+128 +78	288 218 78	+152 +92	352 204 92	+180 +110	430 283 110
+100 +50	175 133 50	+112 +56	212 160 56	+112 +56	212 160 56	+132 +66	257 193 66	+132 +66	257 193 66	+156 +78	316 237 78	+184 +92	384 225 92	+220 +110	470 277 110
+138 +88	213 171 88	+156 +100	256 204 100	+156 +100	256 204 100	+186 +120	311 247 120	+186 +120	311 247 120	+218 +140	378 299 140	+262 +170	462 251 170	+305 +195	555 305 195
+168 +88	243 199 88	+190 +100	290 227 100	+190 +100	290 227 100	+225 +120	350 273 120	+225 +120	350 273 120	+265 +140	425 330 140	+320 +170	520 290 170	+370 +195	620 348 195
+235 +185	310 268 185	+266 +210	366 314 210	+276 +220	376 324 220	+316 +250	441 377 250	+326 +260	451 387 260	-	-	-	-	-	-
+265 +185	340 288 185	+300 +210	400 337 210	+310 +220	410 347 220	+355 +250	480 403 250	+365 +260	490 413 260	-	-	-	-	-	-
0 -80	16	0 -90	18	0 -90	18	0 -105	21	0 -105	21	0 -125	25	0 -150	30	0 -175	35
0 -125	16	0 -140	18	0 -140	18	0 -165	21	0 -165	21	0 -195	25	0 -230	30	0 -280	35
0 -200	25	0 -230	28	0 -230	28	0 -260	33	0 -260	33	0 -310	39	0 -370	46	0 -440	55

Design of bearing arrangements

Housing fits

Nominal housing bore diameter in mm

over incl.	315 400	400 500	500 630	630 800
---------------	------------	------------	------------	------------

Deviation of bearing outside diameter in μm (normal tolerance)

$\Delta_{D_{\text{mp}}}$	0 -40	0 -45	0 -50	0 -75
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Housing deviation, fit interference or fit clearance in μm

E8	+214 +125	125 168 254	+232 +135	135 182 277	+255 +145	145 199 305	+285 +160	160 227 360
F7	+119 +62	62 94 159	+131 +68	68 104 176	+146 +76	76 116 196	+160 +80	80 132 235
G6	+54 +18	18 43 94	+60 +20	20 48 105	+66 +22	22 54 116	+74 +24	24 66 149
G7	+75 +18	18 50 115	+83 +20	20 56 128	+92 +22	22 62 142	+104 +24	24 76 179
H6	+36 0	0 25 76	+40 0	0 28 85	+44 0	0 32 94	+50 0	0 42 125
H7	+57 0	0 32 97	+63 0	0 36 108	+70 0	0 40 120	+80 0	0 52 155
H8	+89 0	0 43 129	+97 0	0 47 142	+110 0	0 54 160	+125 0	0 67 200
J6	+29 -7	7 18 69	+33 -7	7 21 78	-	-	-	-
J7	+39 -18	18 14 79	+43 -20	20 16 88	-	-	-	-
JS6	+18 -18	18 6 58	+20 -20	20 8 65	+22 -22	22 10 72	+25 -25	25 17 100
JS7	+28,5 -28,5	28,5 3 68,5	+31,5 -31,5	31,5 4 76,5	+35 -35	35 5 85	+40 -40	40 12 115
K6	+7 -29	29 4 47	+8 -32	32 4 53	0 -44	44 12 50	0 -50	50 8 75
K7	+17 -40	40 8 57	+18 -45	45 9 63	0 -70	70 30 50	0 -80	80 28 75



800 1000		1000 1250		1250 1600		1600 2000		2000 2500		2500 3150	
0 -100		0 -125		0 -160		0 -200		0 -250		0 -300	
+310 +170	170 250 410	+360 +195	195 292 485	+415 +220	220 338 575	+470 +240	240 384 670	+540 +260	260 436 790	+620 +290	290 500 920
+176 +86	86 149 276	+203 +98	98 175 328	+235 +110	110 205 395	+270 +120	120 237 470	+305 +130	130 271 555	+355 +145	145 315 655
+82 +26	26 78 182	+94 +28	28 93 219	+108 +30	30 109 268	+124 +32	32 130 324	+144 +34	34 154 394	+173 +38	38 183 473
+116 +26	26 89 216	+133 +28	28 105 258	+155 +30	30 125 315	+182 +32	32 149 382	+209 +34	34 175 459	+248 +38	38 208 548
+56 0	0 52 156	+66 0	0 64 191	+78 0	0 79 238	+92 0	0 98 292	+110 0	0 120 360	+135 0	0 145 435
+90 0	0 63 190	+105 0	0 77 230	+125 0	0 95 285	+150 0	0 117 350	+175 0	0 142 425	+210 0	0 170 510
+140 0	0 80 240	+165 0	0 97 290	+195 0	0 118 355	+230 0	0 143 430	+280 0	0 177 530	+330 0	0 210 630
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
+28 -28	28 24 128	+33 -33	33 31 158	+39 -39	39 40 199	+46 -46	46 52 246	+55 -55	55 65 305	+67 -67	67 78 367
+45 -45	45 18 145	+52 -52	52 24 177	+62 -62	62 32 222	+75 -75	75 42 275	+87 -87	87 54 337	+105 -105	105 65 405
0 -56	56 4 100	0 -66	66 2 125	0 -78	78 1 160	0 -92	92 6 200	0 -110	110 10 250	0 -135	135 10 300
0 -90	90 27 100	0 -105	105 28 125	0 -125	125 30 160	0 -150	150 33 200	0 -175	175 34 250	0 -210	210 40 300

Design of bearing arrangements

Housing fits

Nominal housing bore diameter in mm

over incl.	315 400	400 500	500 630	630 800
---------------	------------	------------	------------	------------

Deviation of bearing outside diameter in μm (normal tolerance)

$\Delta_{D_{\text{mp}}}$	0 -40	0 -45	0 -50	0 -75
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Housing deviation, fit interference or fit clearance in μm

M6	-10 -46	46 21 30	-10 -50	50 22 35	-26 -70	70 38 24	-30 -80	80 38 45
M7	0 -57	57 25 40	0 -63	63 27 45	-26 -96	96 56 24	-30 -110	110 58 45
N6	-26 -62	62 37 14	-27 -67	67 39 18	-44 -88	88 56 6	-50 -100	100 58 25
N7	-16 -73	73 41 24	-17 -80	80 44 28	-44 -114	114 74 6	-50 -130	130 78 25
P6	-51 -87	87 62 11	-55 -95	95 67 10	-78 -122	122 90 28	-88 -138	138 96 13
P7	-41 -98	98 66 1	-45 -108	108 72 0	-78 -148	148 108 28	-88 -168	168 126 13



800		1000		1250		1600		2000		2500	
1000		1250		1600		2000		2500		3150	
0		0		0		0		0		0	
-100		-125		-160		-200		-250		-300	
-34	90	-40	106	-48	126	-58	150	-68	178	-76	211
-90	38	-106	45	-126	47	-150	52	-178	58	-211	66
	66		85	112	112	142	182		182		224
-34	124	-40	145	-48	173	-58	208	-68	243	-76	286
-124	61	-145	68	-173	78	-208	91	-243	102	-286	116
	66		85	112	112	142	182		182		224
-56	112	-66	132	-78	156	-92	184	-110	220	-135	270
-112	60	-132	67	-156	77	-184	86	-220	100	-270	125
	44		59	82	108		140				165
-56	146	-66	171	-78	203	-92	242	-110	285	-135	345
-146	83	-171	94	-203	108	-242	125	-285	144	-345	175
	44		59	82	108		140				165
-100	156	-120	186	-140	218	-170	262	-195	305	-240	375
-156	104	-186	121	-218	139	-262	164	-305	185	-375	230
	0		5	20	30		30		55		60
-100	190	-120	225	-140	265	-170	320	-195	370	-240	450
-190	127	-225	148	-265	159	-320	203	-370	229	-450	280
	0		5	20	30		30		55		60

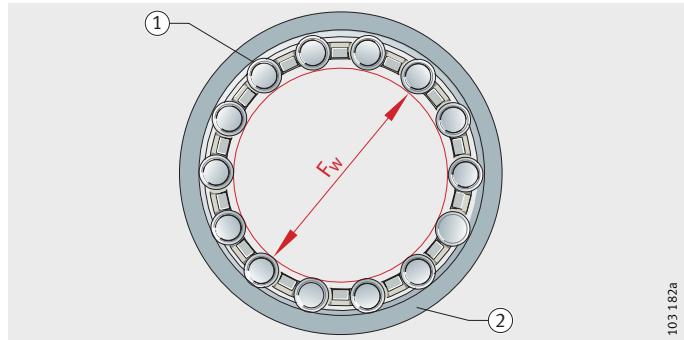
Design of bearing arrangements

Enveloping circle

For bearings without an inner ring, the enveloping circle F_w is used. This is the inner inscribed circle of the cylindrical rollers in clearance-free contact with the outer raceway, *Figure 14*. Before the bearings are fitted, it is in the tolerance zone F6. Deviations for F6, see table.

- ① Cylindrical roller
② Outer raceway
 F_w = enveloping circle diameter

Figure 14
Enveloping circle



103 182a

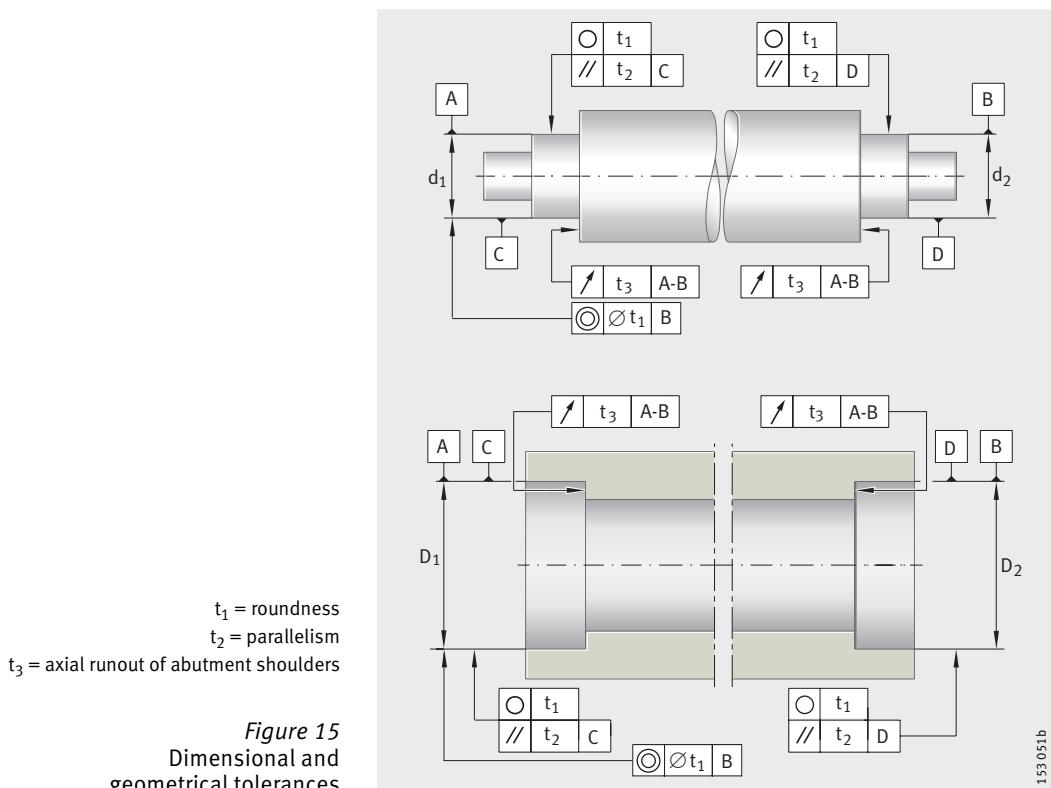
Deviations
for the enveloping circle diameter

Enveloping circle diameter F_w mm		Tolerance zone F6	
over	incl.	Tolerance for enveloping circle diameter F_w	
		Upper deviation μm	Lower deviation μm
250	315	+88	+56
315	400	+98	+62
400	500	+108	+68
500	630	+120	+76
630	800	+130	+80
800	1000	+142	+86
1000	1250	+164	+98
1250	1600	+188	+110
1600	2000	+212	+120



Geometrical tolerances of bearing seating surfaces

In order to achieve the required fit, the bearing seats and fit surfaces of the shaft and housing bore must conform to certain tolerances, *Figure 15* and table, page 148.



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 table, page 148, and by 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 bearing. Misalignments due to elastic deformation of the shaft and housing must be taken into consideration.

Housings

For 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.

Design of bearing arrangements

**Geometrical tolerances
of bearing seating surfaces**

Bearing tolerance class	Bearing seating surface	Diameter tolerance	Roundness tolerance t_1	Parallelism tolerance t_2	Abutment shoulder face runout 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 IT3/2	IT2	IT2
			Point load IT4/2	IT3	
	Housing	IT6	Circumferential load IT4/2	IT3	IT3
			Point load IT5/2	IT4	
P4 SP	Shaft	IT4	Circumferential load IT2/2	IT1	IT1
			Point load IT3/2	IT2	
	Housing	IT5	Circumferential load IT3/2	IT2	IT2
			Point load IT4/2	IT3	
UP P4S	Shaft	IT3	Circumferential load IT1/2	IT0	IT0
			Point load IT2/2	IT1	
	Housing	IT4	Circumferential load IT2/2	IT1	IT1
			Point load IT3/2	IT2	

ISO fundamental tolerances (IT grades) to DIN ISO 286, see page 150.



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. Guide values: see table.

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.

Guide values for roughness of bearing seating surfaces

Diameter of bearing seat d (D) mm		Recommended mean roughness values R_a ²⁾ for ground bearing seats Corresponding diameter tolerance μm			
over	incl.	IT7	IT6	IT5	IT4
80	500	1,6 (N7)	1,6 (N7)	0,8 (N6)	0,4 (N5)
500	1 250	3,2 (N8) ¹⁾	1,6 (N7)	1,6 (N7)	0,8 (N6)

¹⁾ When fitting using the hydraulic method, $R_a = 1,6 \mu\text{m}$ should not be exceeded.

²⁾ The values in brackets are roughness classes to DIN ISO 1302.

Design of bearing arrangements

Values for IT grades

The table shows numerical values for the ISO fundamental tolerances (IT grades) to DIN ISO 286.

IT grades and values

Nominal dimension in mm				
over incl.	120 180	180 250	250 315	315 400
Values in μm				
IT0	2	3	4	5
IT1	3,5	4,5	6	7
IT2	5	7	8	9
IT3	8	10	12	13
IT4	12	14	16	18
IT5	18	20	23	25
IT6	25	29	32	36
IT7	40	46	52	57
IT8	63	72	81	89
IT9	100	115	130	140
IT10	160	185	210	230
IT11	250	290	320	360
IT12	400	460	520	570



400	500	630	800	1 000	1 250	1 600	2 000	2 500
500	630	800	1 000	1 250	1 600	2 000	2 500	3 150
6	—	—	—	—	—	—	—	—
8	—	—	—	—	—	—	—	—
10	—	—	—	—	—	—	—	—
15	—	—	—	—	—	—	—	—
20	—	—	—	—	—	—	—	—
27	29	32	36	42	50	60	70	86
40	44	50	56	66	78	92	110	135
63	70	80	90	105	125	150	175	210
97	110	125	140	165	195	230	280	330
155	175	200	230	260	310	370	440	540
250	280	320	360	420	500	600	700	860
400	440	500	560	660	780	900	1 100	1 350
630	700	800	900	1 050	1 250	1 500	1 750	2 100

Design of bearing arrangements

Raceways for bearings without inner and/or outer ring



In rolling bearings which do not have an inner and/or outer ring to provide a raceway, the rolling elements run directly on the shaft or in the housing bore.

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

The raceways must always be free from undulations and 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 guidelines on shaft design in the product sections must also 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 (such as 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 (such as 17MnCr5, 16CrNiMo6) or EN 10 084 (such as 16MnCr5).

Flame or induction hardening

For flame and induction hardening, steels to ISO 683-17 (such as Cf54, 43CrMo4) or DIN 17 212 (such as Cf53) must be used.



Surface hardness and hardening depth

The values apply to raceways, axial washers and shaft shoulders. Steels hardened by means of case, flame or induction hardening must have a surface hardness of $670 \text{ HV} + 170 \text{ HV}$ and a sufficient hardening depth CHD or SHD.

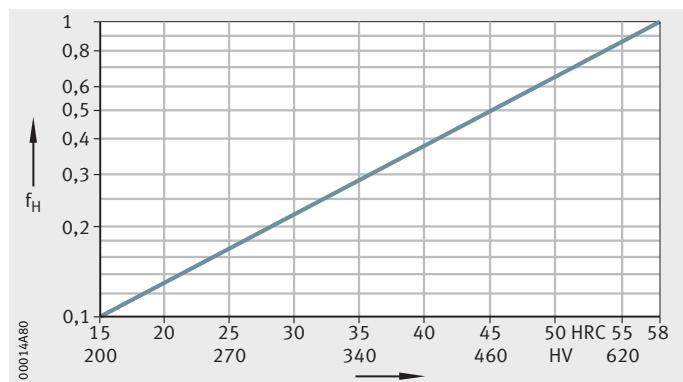
In accordance with DIN 50 190, the hardening depth is the depth of the hardened surface zone at which there is still a hardness of 550 HV. It is measured on the finish ground shaft and must correspond to the stated values, but must in any case be $\geq 0,3 \text{ mm}$.



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

f_H = factor for taking account of raceway hardness
HRC, HV = surface hardness

Figure 16
Taking account of the raceway hardness



Design of bearing arrangements

Hardness curves

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

The formulae are based on hardness curves achieved with normal specialist heat treatment.

Case hardening:

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

Flame or induction hardening:

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

CHD mm
Case hardening depth

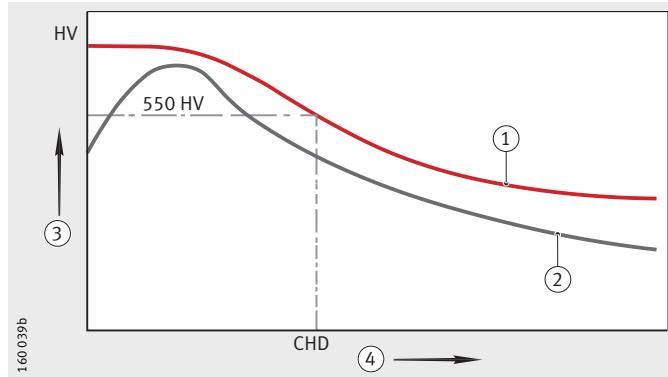
SHD mm
Surface hardening depth

D_w mm
Rolling element diameter

$R_{p0,2}$ N/mm²
Proof stress.

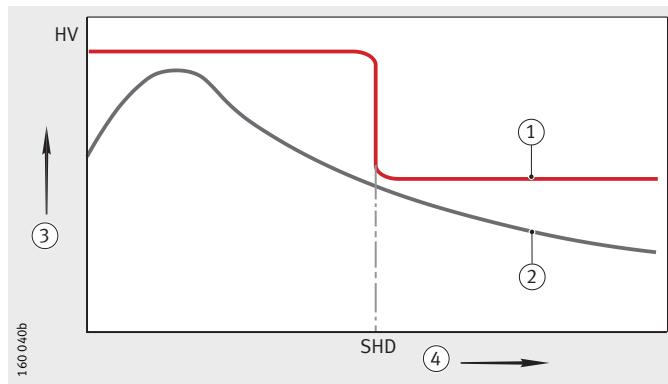
- ① Case hardening
 - ② Required hardness
 - ③ Hardness
 - ④ Distance from surface
- CHD = case hardening depth with hardness 550 HV

Figure 17
Case hardening depth CHD
and hardness curve



- ① Flame or induction hardening
 - ② Required hardness
 - ③ Hardness
 - ④ Distance from surface
- SHD = surface hardening depth

Figure 18
Surface hardening depth SHD
and hardness curve





Axial location of bearings

Axial location of the bearing rings is matched to the specific bearing arrangement (locating bearing, non-locating bearing, adjusted and floating arrangements of bearings).

Examples: see *Figure 19*, page 156 to *Figure 25*, page 158.

Design guidelines



The bearing rings must be located by force or geometrical locking in order to prevent lateral movement. The bearing rings must only be in contact with the shaft or housing shoulder, but not with the fillet.

Every radius of the mating part must be smaller than the smallest chamfer dimension r or r_1 of the bearing.

The radius should have rounding to DIN 5 418 or an undercut to DIN 509.

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).

The bearing tables give the maximum values for the radius r_a or r_{a1} and the diameters of the abutment shoulders (D_a or d_a).

Any special characteristics of the individual bearing types, e.g. for cylindrical roller bearings, tapered roller bearings and axial bearings are indicated in the product sections.

Locating bearings

Locating bearings can support axial forces. The retaining element must be matched to these axial forces. Shoulders on the shaft and housing, snap rings, housing covers, shaft covers, nuts and spacer rings are suitable.

Non-locating bearings

Non-locating bearings only need to support slight axial forces occurring in thermal expansion. The axial location method only needs to prevent creep of the rings. A tight fit is often sufficient.

Self-retaining bearings

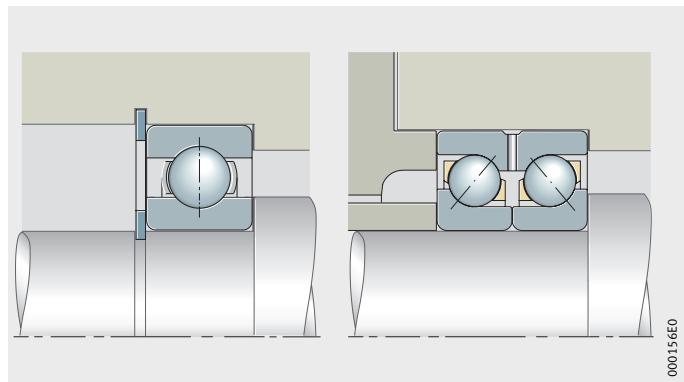
In non-separable bearings, one bearing ring requires a tight fit, while the other ring is retained by the rolling elements.

Design of bearing arrangements

Deep groove ball bearings,
double row angular
contact ball bearings

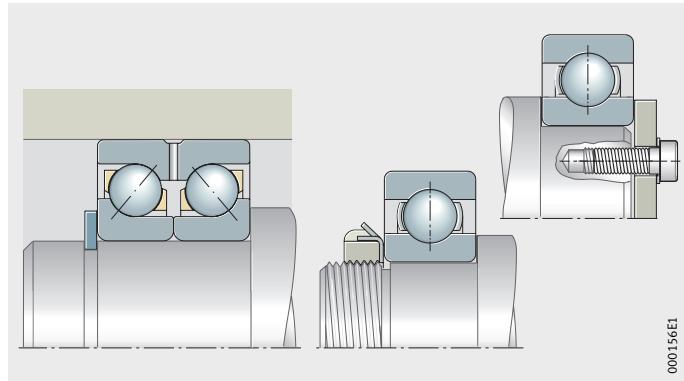
Supported on both sides,
inner and outer rings

Figure 19
Locating bearings



Supported on both sides,
inner ring

Figure 20
Non-locating bearings





Cylindrical roller bearings

The bearings must be supported on both sides on the inner and outer rings, *Figure 21* to *Figure 23*, page 157.

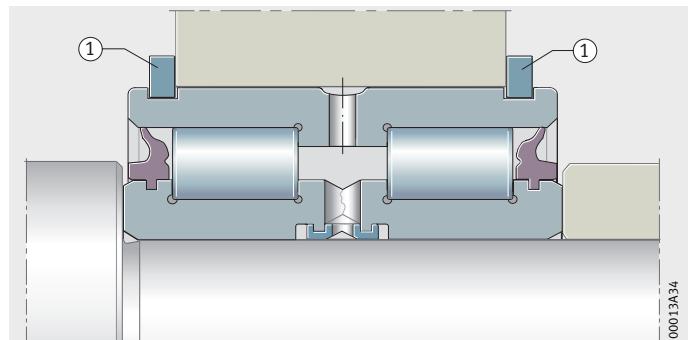
The ribs of axially loaded cylindrical roller bearings must be supported up to dimension d_1 or D_1 .

Dimensions d_1 , D_1 : see dimension tables.

For semi-locating bearings, the bearing rib only requires support on one side, on the rib supporting the axial load.

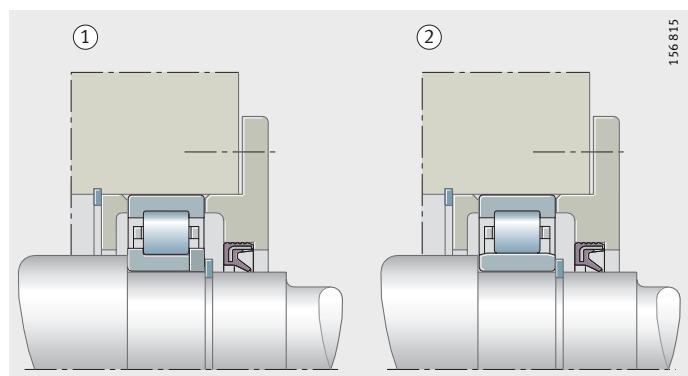
Outer ring axially located by retaining rings
① Retaining rings

Figure 21
Locating bearing



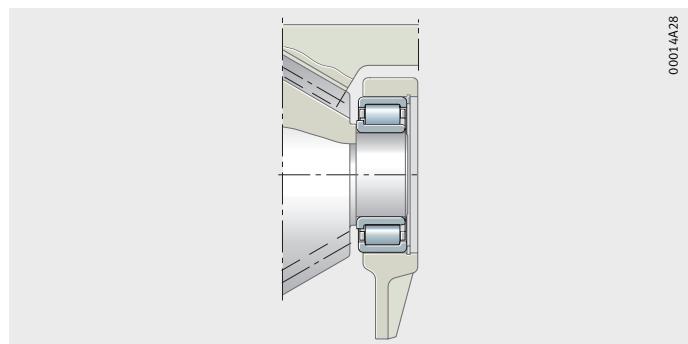
Axial location by geometrical locking
① Locating bearing
② Non-locating bearing

Figure 22
Locating and non-locating bearings



The inner ring rib prevents axial creep to one side

Figure 23
Non-locating bearing



Design of bearing arrangements

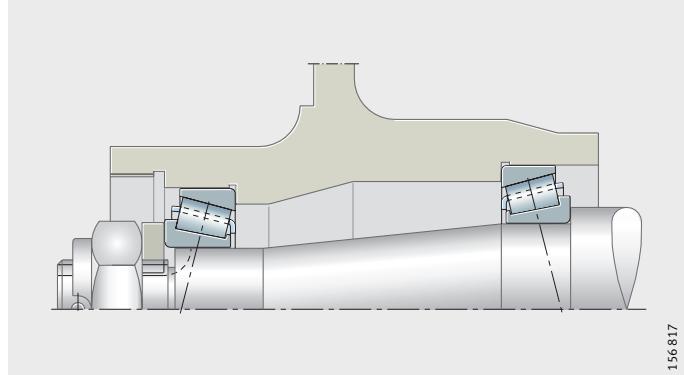
Adjusted and floating bearing arrangements

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 24* and *Figure 25*. Shaft nuts, ring nuts, covers or spacer washers are suitable as adjustment elements.

In floating bearing arrangements, lateral movement of the rings is prevented by shaft or housing shoulders, covers, snap rings, *Figure 25*.

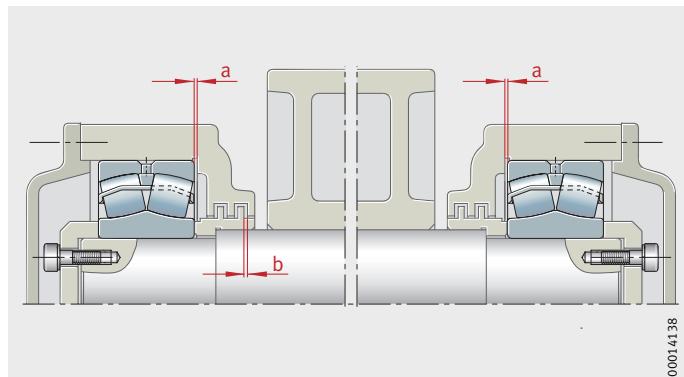
Axial location

Figure 24
Adjusted bearing arrangement



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

Figure 25
Floating bearing arrangement





Seals

The sealing arrangement 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 clearance or noise brings 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, only lubricant friction occurs in the lubrication gap. 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 26*.

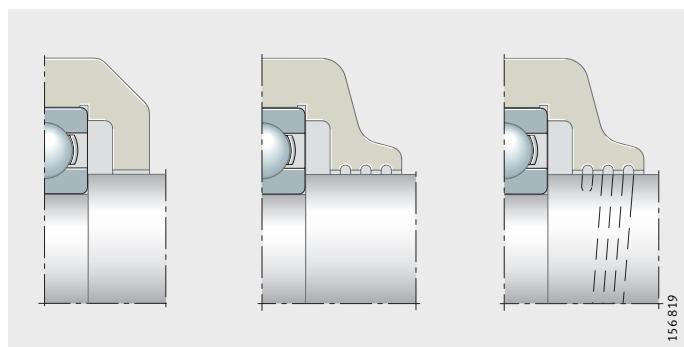


Figure 26
Simple gap seals

Design of bearing arrangements

Labyrinth seals

A considerably greater sealing effect than with gap seals is achieved by labyrinth seals incorporating gaps filled with grease, *Figure 27*. In contaminated environments, grease should be pressed from the interior into the seal gap at short intervals.

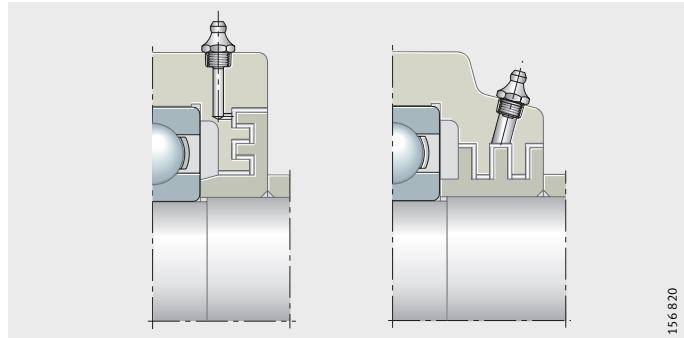


Figure 27
Labyrinth seals

Splash ring

Where oil lubrication is used with a horizontal shaft, splash rings are suitable for preventing the escape of oil, *Figure 28*. The oil outlet hole on the underside of the seal location must be sufficiently large that it cannot be clogged by contamination.

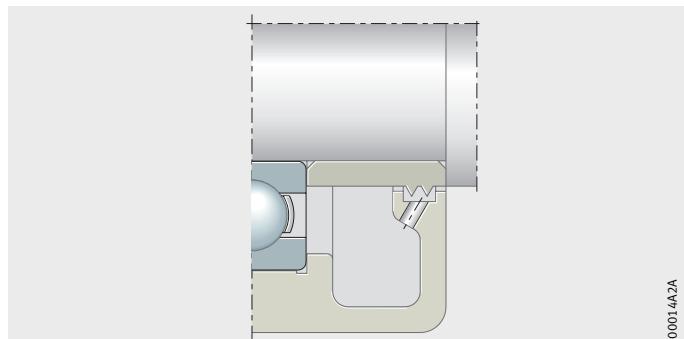


Figure 28
Splash ring

Flinger shields

Co-rotating flinger shields have the effect of shielding the seal gap from heavy contamination, *Figure 29*.

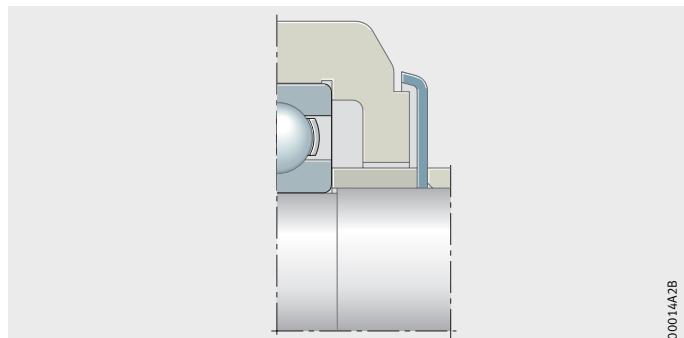


Figure 29
Flinger shield



Baffle plates

Stationary (rigid) baffle plates ensure that grease remains in the area around the bearing, *Figure 30*.

The grease collar that forms at the seal gap protects the bearing against contamination.

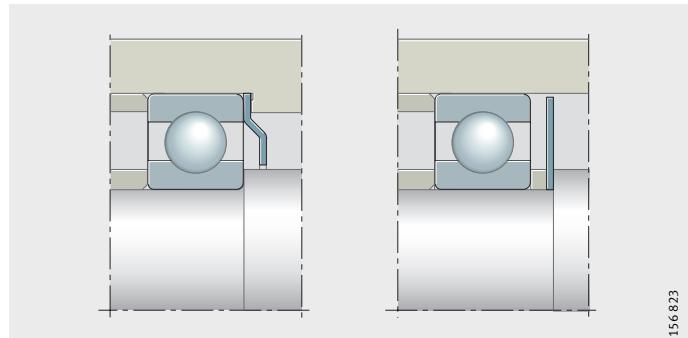


Figure 30
Rigid baffle plates

Lamellar rings

Lamellar rings made from steel and radially sprung either outwards or inwards require little mounting space, *Figure 31*.

They give protection against loss of grease and ingress of dust and are also used as an outer seal against spray water.

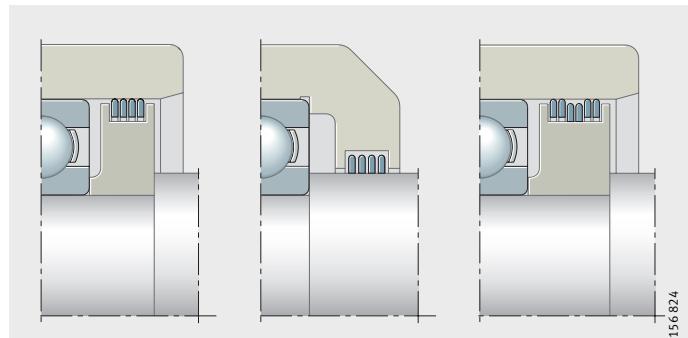


Figure 31
Lamellar rings

Design of bearing arrangements

Non-contact seals in the bearing

Sealing shields in the bearing

Sealing shields are compact sealing elements fitted on one or both sides of the bearing.

Bearings with sealing shields on both sides are supplied with a grease filling.

We supply large bearings fitted with sealing shields by agreement only.

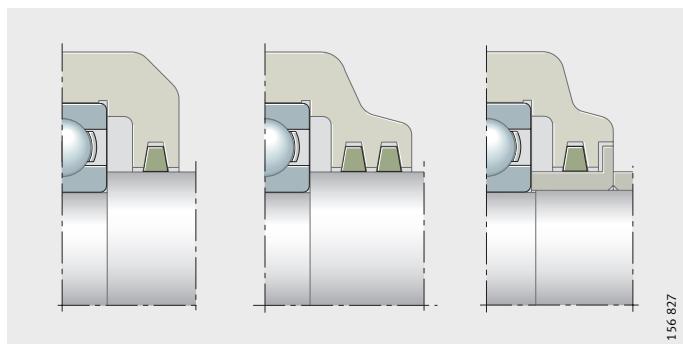
Contact seals in the adjacent construction

Contact seals are normally in contact with the running surface under radial contact force. 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 and felt strips are sealing elements that have proved very effective with grease lubrication, *Figure 32*. 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 32
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 und DIN 3 761, *Figure 33*. The seal collar with one lip is pressed against the shaft running surface by a spring. 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 nitrile butadiene rubber (NBR) are suitable, when used with oil lubrication, for circumferential speeds at the running surface of up to 12 m/s.

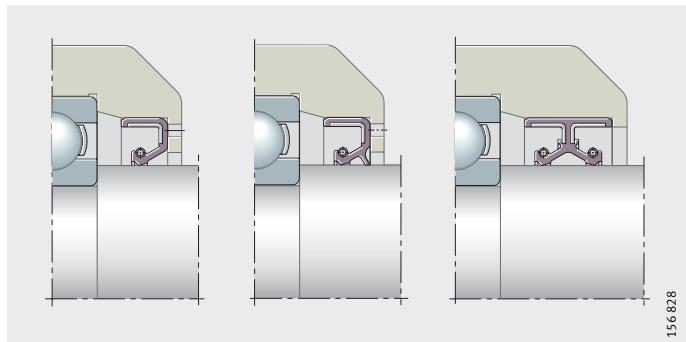


Figure 33
Rotary shaft seals

Lip seal with axial sealing action

The V ring, *Figure 34* is a lip seal with axial sealing action. 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, when used with grease lubrication, for circumferential speeds of up to 12 m/s, while stationary V rings are suitable for up to 20 m/s. At circumferential speeds over 8 m/s, the V ring must be axially supported; at speeds of 12 m/s or more it must also be radially clamped.

V rings are frequently used as outer seals in order to keep contamination away from a rotary shaft seal.

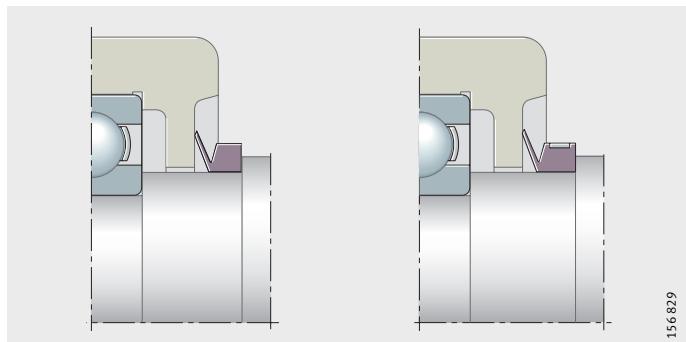


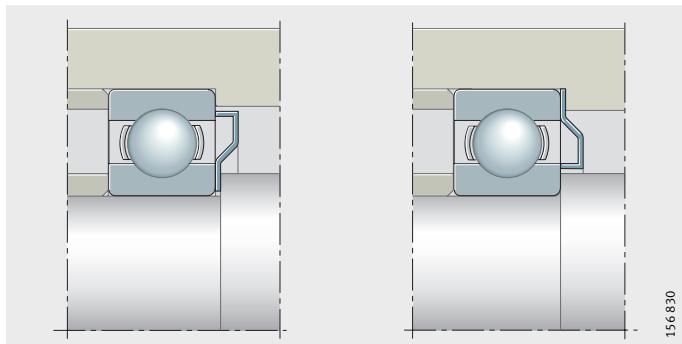
Figure 34
V ring

Design of bearing arrangements

Axial spring seals

When using grease lubrication, effective sealing can also be achieved by means of axial spring seals, *Figure 35*. 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 35
Spring seals





Contact seals in the bearing

Sealing washers

Work roll bearing arrangements in hot or cold rolling lines must be effectively sealed against large quantities of water or roll coolant that are mixed with contaminants. These bearing arrangements are normally lubricated with grease. For cost and environmental reasons, it is desirable to achieve low levels of grease consumption. Four-row tapered roller bearings with integrated seals have therefore been developed, *Figure 36*. These bearings have main dimensions identical to those of the unsealed bearings.

Only small quantities of the high quality rolling bearing grease used are required. Although the basic load ratings of the sealed bearings are lower, they normally have a longer life than the open bearings due to the improved cleanliness in the lubrication gap.



The rotary shaft seals on the sealed bearings are made from fluoro elastomer, which can give off gases and vapours harmful to health at approx. +300 °C or higher. This may occur, for example, if a welding torch is used in the dismantling of the bearings. If high temperatures are unavoidable, attention must be paid to the valid safety data sheet for the material.

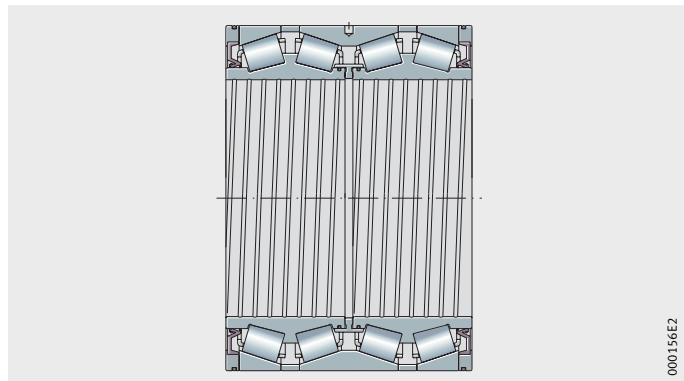


Figure 36
Sealing washers on both sides

Fitting and dismantling

Handling

Rolling bearings, rolling bearing parts and Arcanol rolling bearing greases are high quality goods and must therefore be handled with care.

Storage of rolling bearings

The performance capability of modern rolling bearings lies at the boundaries of what is technically achievable. The materials, dimensional and geometrical tolerances, surface quality and lubrication have been optimised for maximum levels of function, which means that even slight deviations in functional areas, such as those caused by corrosion, can impair the performance capacity. In order to realise the full performance capability of rolling bearings, it is essential to match the anti-corrosion protection, packaging, storage and handling to each other.

Corrosion protection and packaging constitute part of the bearing and are optimised such that they preserve all characteristics of the product at the same time as far as possible.

In addition to protecting the surface against corrosion, this includes emergency running lubrication, friction, lubricant compatibility, noise behaviour, resistance to ageing and compatibility with rolling bearing components (cage and seal material).

Storage conditions for rolling bearings



As a basic prerequisite, parts must be stored in a closed storage area which cannot be affected by any aggressive media, such as exhaust gases from vehicles or gases, mist or aerosols of acids, lyes or salts. Direct sunlight should be avoided since, apart from the harmful effects of UV radiation, it can lead to wide temperature fluctuations in the packaging. The temperature should be constant and air humidity should be as low as possible. Jumps in temperature and increased humidity lead to condensation.

The following conditions must be fulfilled:

- frost-free storage, i.e. a temperature $> +5^{\circ}\text{C}$
(this prevents formation of white frost with a temperature no lower than $+2^{\circ}\text{C}$ permissible up to 12 hours per day)
- maximum temperature $+40^{\circ}\text{C}$
(in order to prevent excessive drainage of anti-corrosion oils)
- relative humidity $< 65\%$
(with temperature changes up to 70% up to a maximum of 12 hours per day).

The temperature and humidity must be continuously monitored. This can be carried out using a datalogger. The measurements must be taken at intervals of no more than 2 hours.

At least 2 measurement points must be selected: the highest point and the lowest point in the vicinity of an external wall at which the goods can be stored.

Larger bearings with rings of relatively small thickness should not be stored standing but lying flat and supported over their whole circumference.



Storage periods for rolling bearings

Rolling bearings should not be stored for longer than 3 years. This applies both to open and to greased bearings with sealing shields or washers. In particular, specifically greased rolling bearings should not be stored for too long, since the chemical-physical behaviour of greases may change during storage. Even if the minimum performance capacity remains, the safety reserves of the grease may have diminished.

In general, rolling bearings can be used even after their permissible storage period has been exceeded if the storage conditions during storage and transport were observed.

If the conditions are not fulfilled, shorter storage periods must be anticipated. If the periods are exceeded, it is recommended that the bearing should be checked for corrosion, the condition of the anti-corrosion oil and the condition of the grease before it is used.

Storage of Arcanol rolling bearing greases

The information on storage of rolling bearings apply as appropriate to Arcanol rolling bearing greases. The precondition is that the grease is stored in closed, completely filled original containers.

Storage periods for Arcanol rolling bearing greases

Rolling bearing greases are mixtures of oil, thickener and additives. Such mixtures of liquid and solid substances do not have unlimited stability. During storage, their chemical-physical characteristics may change and they should therefore be used up as soon as possible.

If the storage conditions are observed, Arcanol lubricating greases can be stored without loss of performance for 3 years. As in the case of rolling bearings, however, the permissible storage period should not be seen as a rigid limit.

If storage is carried out as prescribed, most greases can be used even after 3 years, if allowances are made for small changes.

If there is any doubt when using older greases, random sample checking of chemical-physical characteristics is recommended in order to determine any changes in the grease.

It is therefore not possible to state storage periods for containers that have been opened. If containers are to be stored after opening, the grease surface should always be brushed flat, the container should be sealed airtight and it should be stored such that the empty space is at the top. High temperatures should be avoided in all cases.

Fitting and dismantling

Unpacking of rolling bearings

Perspiration leads to corrosion. Hands should be kept clean and dry and protective 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, since the protective vapour phase is only effective in closed packaging. Bearings should be oiled or greased immediately after unpacking.

Compatibility, miscibility

The anti-corrosion agents in bearings with an oil-based preservative are compatible and miscible with oils and greases having 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 bearings are contaminated.

If in doubt, please contact the relevant lubricant manufacturer.

Cleaning of rolling bearings

The following are suitable for degreasing and washing of rolling bearings:

- aqueous neutral, acid 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.

Cleaning should be carried out using brushes, paint brushes or lint-free cloths. In the case of resinous oil or grease residues, precleaning by mechanical means followed by treatment with an aqueous, strongly alkaline cleaning agent is recommended.



Legal regulations relating to handling, environmental protection and health and safety at work must be complied with. The specifications of the cleaning agent manufacturer must be observed.

Paraffin oil, petroleum ether, spirit and dewatering fluids are flammable, 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).

After cleaning, rolling bearings must be dried and preservative applied immediately (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



The following guidelines must always be taken into account:

- 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.
- Before fitting work is started, 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.
- Check the housing bore and shaft seat for dimensional and geometrical accuracy and cleanliness.
- Check that the shaft and housing bore have a lead chamfer of 10° to 15°.
- Wipe away any anti-corrosion agent from the seating and contact surfaces, wash anti-corrosion agent out of tapered bores.
- Lightly oil or rub solid lubricant into the bearing ring seating surfaces.
- Do not cool the bearings excessively.
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



Non-separable bearings

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, *Figure 1*. The bearing together with the shaft is then pushed into the housing (fit clearance).

Tight fit of the inner ring,
fitting this ring first

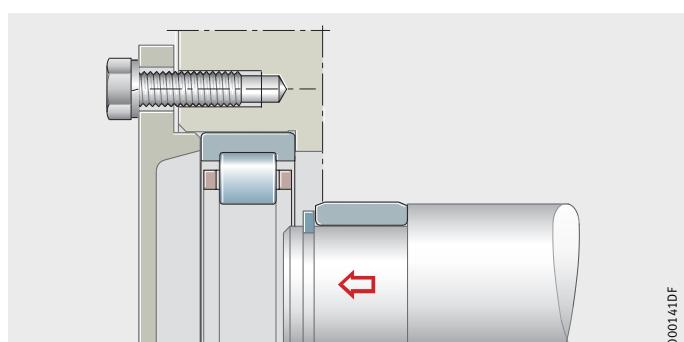
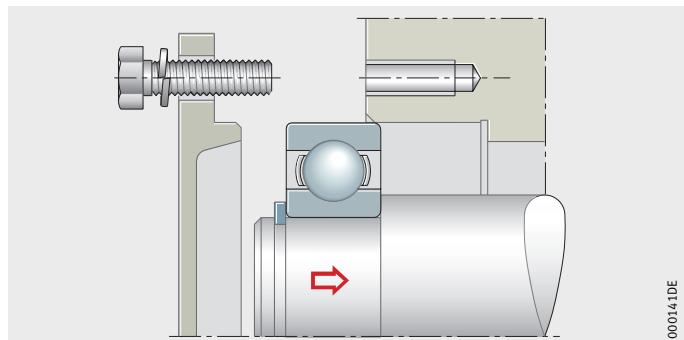
Figure 1
Non-separable bearing

Separable bearings

In separable bearings, fitting is easier; both rings can be fitted individually, *Figure 2*. Rotating the ring while fitting to give a screwdriver effect will help to avoid scraping marks.

Tight fit of the inner ring,
individual fitting of rings

Figure 2
Separable bearing



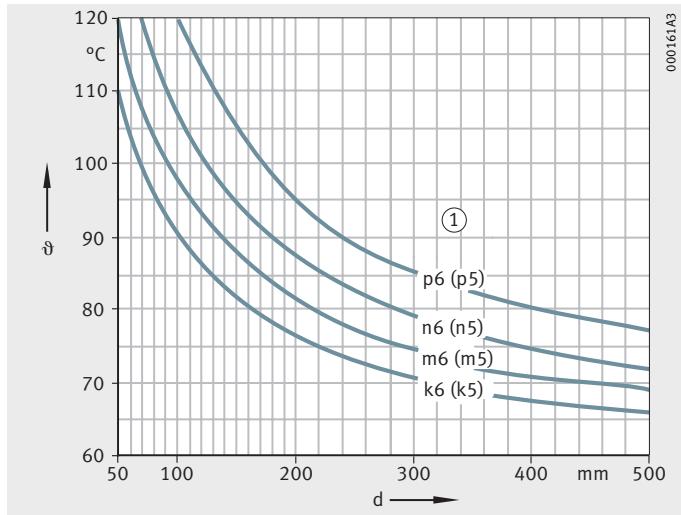


Heating of bearings

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 temperature required for fitting is shown in *Figure 3*. The data are valid for maximum fit interference, a room temperature of +20 °C and an excess temperature safety margin of 30 K.

ϑ = heating temperature
 d = bearing bore diameter
① Shaft tolerance

Figure 3
Heating temperature



Induction heating devices

Induction heating devices give rapid, safe and clean heating. The devices are used mainly in volume fitting work.

Oil bath

With the exception of sealed, greased bearings and high precision bearings, rolling bearings of all sizes and types can be heated in an oil bath. A thermostatic controller is advisable (temperature +80 °C to +100 °C). In order that the bearings are heated uniformly, they should be laid on a grid or suspended in the oil bath.



With this method, please note the risk of accidents, environmental pollution by oil vapour, flammability of hot oil and risk of bearing contamination.

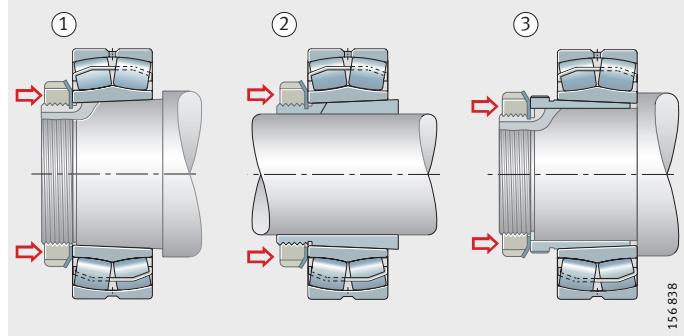
Fitting and dismantling

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 withdrawal sleeve on a cylindrical shaft, *Figure 4* ①, ②, ③.

- ① Fitting using a locknut
- ② Fitting on an adapter sleeve using the adapter sleeve nut
- ③ Fitting on a withdrawal sleeve using a locknut

Figure 4
Mounting of rolling bearings
with a tapered bore



156 838

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.

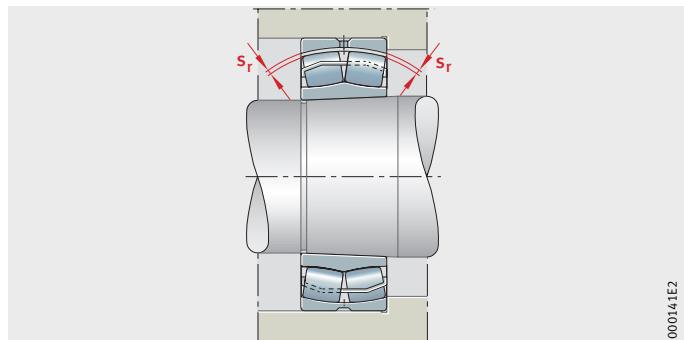
In spherical roller bearings, the radial internal clearance (s_r) must be measured simultaneously over both rows of rollers, *Figure 5*. Alternatively, the axial displacement is measured.

For values for the reduction in radial internal clearance and the displacement in spherical roller bearings, see section Spherical roller bearings, page 624 and page 625.

For the measurement of radial internal clearance, aids such as feeler gauges FEELER-GAUGE-100 and FEELER-GAUGE-300 are suitable.

Spherical roller bearings
 s_r = radial internal clearance

Figure 5
Radial internal clearance



000141E2



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, *Figure 6 ①*. This method is not suitable for spherical roller bearings of E1 design. For the fitting of large bearings, a hydraulic device should be used to drive up the product or press in the sleeve, *Figure 6 ②*. Hydraulic nuts are available for all common threaded sleeves and shafts.

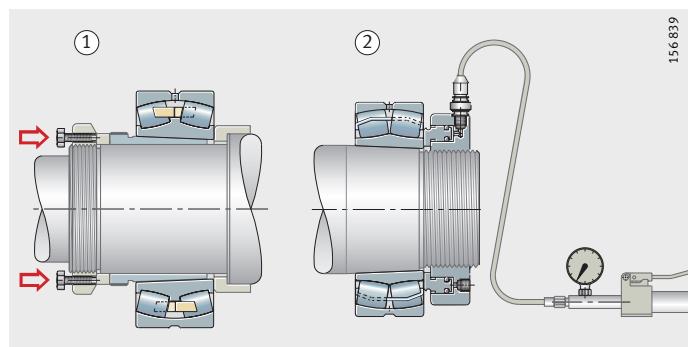
Hydraulic method

The hydraulic method gives considerable assistance in the fitting and particularly in the dismantling of bearings of approx. $d = 160$ mm and above.

For fitting, an oil with a viscosity of $75 \text{ mm}^2/\text{s}$ at $+20^\circ\text{C}$ (nominal viscosity $32 \text{ mm}^2/\text{s}$ at $+40^\circ\text{C}$) is recommended.

- ① Fitting on withdrawal sleeve using locknut and pressure screws
- ② Fitting on tapered shaft using hydraulic nut

Figure 6
Mounting of rolling bearings with a tapered bore



Guidelines for dismantling

Information on fitting and dismantling is given in the publications WL 80 100, Mounting of Rolling Bearings and WL 80 250, FAG Equipment and Services for the Mounting and Maintenance of Rolling Bearings.

Dismantling should be taken into consideration in the original design of the bearing position. If bearing rings are to be mounted with a tight fit, slots should be provided in the shaft or housing bore, for example, to allow removal of the rings.



If the bearing is to be reused, the following guidelines should be taken into consideration:

- Do not use a concentrated or hard flame.
- Avoid direct blows on the bearing rings.
- Do not apply dismantling forces through the rolling elements.
- Clean the bearings carefully after dismantling.

Fitting and dismantling

Dismantling of rolling bearings on cylindrical seats

Removal of inner rings using an induction device

If the bearings and adjacent parts are to be reused, the removal tool should be applied to the ring fitted with a tight fit. In non-separable bearings, the ring fitted with a sliding fit is dismantled first and the ring with a tight fit is then removed.

Induction heating devices are used to remove the shrink-fitted inner rings of cylindrical roller bearings, *Figure 7*.

Heating is achieved quickly and the rings are loosened easily without the transfer of substantial heat to the shaft.



Figure 7
Induction heating device

156797

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 8*. The rings are heated on an electric heating plate to between +200 °C and +300 °C, pushed over the bearing ring to be removed and clamped in place using the grips. Once the press fit on the shaft has been eliminated, both rings are removed together.



The bearing ring must be removed from the heating ring immediately after dismantling in order to prevent overheating.

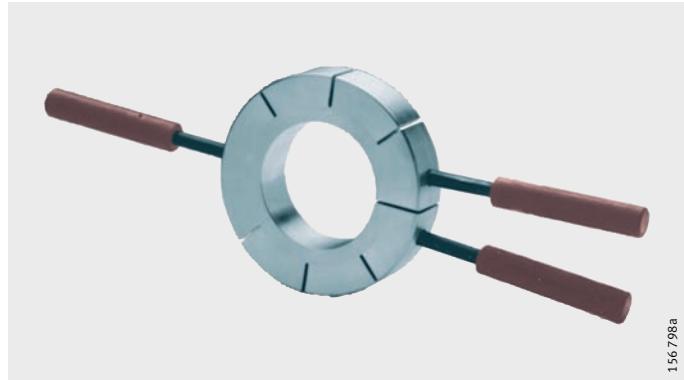


Figure 8
Heating ring

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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 device on the shaft or adapter sleeve nut must be loosened first. The nut is then unscrewed by the amount of the displacement. The inner ring is then driven off the sleeve or shaft.

Dismantling of large bearings located using a withdrawal sleeve requires considerable force. In this case, locknuts with additional pressure screws can be used, *Figure 9 ①*. A disc must be inserted between the inner ring and the pressure screws.

Hydraulic dismantling

An easier and more economical method is the dismantling of withdrawal sleeves using hydraulic nuts, *Figure 9 ②*. The protruding withdrawal sleeve is supported by a heavy-section ring.

The dismantling of large bearings can be made easier by using the hydraulic method, *Figure 9 ③* and *Figure 10*. 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.

The arrangement of oil ducts in the hydraulic method for dismantling of a spherical roller bearing from a tapered shaft seat is shown in *Figure 10*.



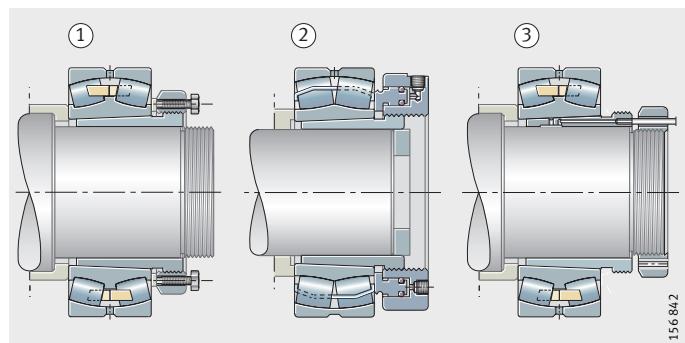
The withdrawal sleeve becomes loose abruptly. Leave the nut on the shaft.

Large adapter and withdrawal sleeves already have the appropriate slots and holes. In this case, a pump must be used to generate the oil pressure required.

Dismantling of a withdrawal sleeve:
① Using a nut and pressure screws
② Using a hydraulic nut

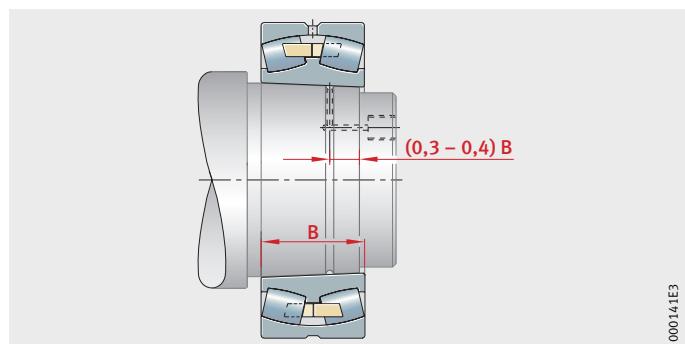
Dismantling of a spherical roller bearing from the withdrawal sleeve:
③ Using the hydraulic method

Figure 9
Dismantling of a withdrawal sleeve and spherical roller bearing



B = bearing width

Figure 10
Oil ducts for dismantling a spherical roller bearing



Fitting and dismantling

Suitable oils	For dismantling, oils with a viscosity of approx. $150 \text{ mm}^2/\text{s}$ at $+20^\circ\text{C}$ (nominal viscosity $46 \text{ mm}^2/\text{s}$ at $+40^\circ\text{C}$) are used. Fretting corrosion can be dissolved by rust-dissolving additives in the oil.
Disposal of bearings after dismantling	If the bearings are not to be reused after dismantling, the products 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 should be sent for recycling.

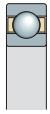


FAG



Deep groove ball bearings

Single row



Deep groove ball bearings

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Product overview	Deep groove ball bearings
Features	Radial and axial load capacity..... 181 Compensation of angular misalignments 181 Bearings with retaining slot 182 Hybrid deep groove ball bearings..... 182 Matched single row deep groove ball bearings 182 Sealing..... 183 Lubrication..... 183 Operating temperature 183 Cages..... 183 Suffixes..... 183
Design and safety guidelines	Equivalent dynamic bearing load 184 Equivalent static bearing load..... 185 Axial load carrying capacity..... 185 Minimum radial load 185 Design of bearing arrangements 185
Accuracy 186 Radial internal clearance of bearings with cylindrical bore..... 187
Dimension tables	Deep groove ball bearings, single row 188

Product overview Deep groove ball bearings

Single row

With and without retaining slot

160, 60, 62, 63, 608, 618,
609, 619, Z-5..KL1, F-8..KL1



Z-5..KL1-N1, F-8..KL1-N1

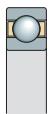


Hybrid deep groove ball bearings

F-HC8..KL1



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.

Single row deep groove ball bearings are of a simple design, robust in operation and easy to maintain.

Due to their low frictional torque, deep groove ball bearings are suitable for high speeds.

Deep groove ball bearings with standardised main dimensions and standardised designations (DIN 625-1) are used, for example, in gearboxes, electric motors, converter drive units and roll stands.

Deep groove ball bearings with non-standardised designations (Z-5..KL, F-8..KL) are used, for example, as axial bearings in roll stands.

Their section height is normally matched to the associated radial bearing.

Hybrid deep groove ball bearings with ceramic balls and steel bearing rings are special bearings for spreader rolls in paper machinery. These are indicated by the designation F-HC8..KL, see section Hybrid deep groove ball bearings, page 182.

Radial and axial load carrying capacity

Due to the raceway geometry and the balls, deep groove ball bearings can support axial loads in both directions as well as radial loads, see section Axial load carrying capacity, page 185.

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 for single row deep groove ball bearings

Series	Adjustment angle	
	Low loads	High loads
62, 622, 63, 623, 64	5' – 10'	8' – 16'
618, 619, 160, 60	2' – 6'	5' – 10'

Deep groove ball bearings

Bearings with retaining slot

Deep groove ball bearings with a retaining slot in the outer ring can be easily secured in a circumferential direction. Special bearings that already have a retaining slot are indicated in the dimension table. By agreement, bearings with standardised main dimensions are also available with a retaining slot in the outer ring. These bearings have the suffix N1.

Hybrid deep groove ball bearings

A special design of deep groove ball bearing is used in high speed spreader rolls in paper machinery. These hybrid bearings with the designation F-HC8..KL have steel bearing rings and ceramic balls. Since the number of balls is reduced in this case, the risk of slippage is significantly lower. Further information on these bearings is given in TPI WL 13-4, Hybrid deep groove ball bearings for spreader rolls.

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 different arrangements as matched pairs of bearings, *Figure 1*.

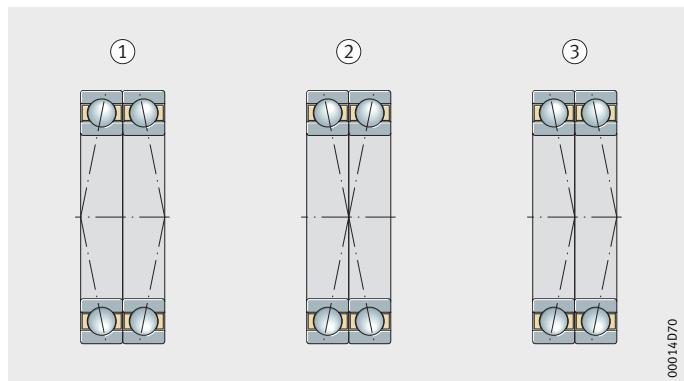
Sets in an O arrangement (suffix DB) can support axial loads in both directions as well as tilting moments.

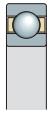
Sets in an X arrangement (suffix DF) can support axial loads in both directions but are not suitable for tilting moments.

For high axial loads in 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





Sealing	Single row deep groove ball bearings are not sealed.																							
Lubrication	The bearings can be lubricated with grease or oil.																							
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.																							
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. The suffix MA indicates bearings with a solid brass cage guided on the outer ring. Cages guided on the inner ring are indicated by the suffix MB.																							
Suffixes	Suffixes for available designs: see table.																							
Available designs	<table border="1"><thead><tr><th>Suffix¹⁾</th><th>Description</th><th>Design</th></tr></thead><tbody><tr><td>C3</td><td>Radial internal clearance larger than normal</td><td rowspan="3">Standard</td></tr><tr><td>M</td><td>Solid brass cage, ball-guided</td></tr><tr><td>MB</td><td>Solid brass cage, guided on inner ring</td></tr><tr><td>DB</td><td>Two deep groove ball bearings in O arrangement, matched clearance-free</td><td rowspan="6">Special design, available by agreement only</td></tr><tr><td>DF</td><td>Two deep groove ball bearings in X arrangement, matched clearance-free</td></tr><tr><td>DT</td><td>Two deep groove ball bearings in tandem arrangement, matched clearance-free</td></tr><tr><td>MA</td><td>Solid brass cage, guided on outer ring</td></tr><tr><td>N1</td><td>One retaining slot in outer ring (for securing in circumferential direction)</td></tr><tr><td>P6</td><td>Tolerance class P6</td></tr></tbody></table>	Suffix ¹⁾	Description	Design	C3	Radial internal clearance larger than normal	Standard	M	Solid brass cage, ball-guided	MB	Solid brass cage, guided on inner ring	DB	Two deep groove ball bearings in O arrangement, matched clearance-free	Special design, available by agreement only	DF	Two deep groove ball bearings in X arrangement, matched clearance-free	DT	Two deep groove ball bearings in tandem arrangement, matched clearance-free	MA	Solid brass cage, guided on outer ring	N1	One retaining slot in outer ring (for securing in circumferential direction)	P6	Tolerance class P6
Suffix ¹⁾	Description	Design																						
C3	Radial internal clearance larger than normal	Standard																						
M	Solid brass cage, ball-guided																							
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DT	Two deep groove ball bearings in tandem arrangement, matched clearance-free																							
MA	Solid brass cage, guided on outer ring																							
N1	One retaining slot in outer ring (for securing in circumferential direction)																							
P6	Tolerance class P6																							

¹⁾ In the case of deep groove ball bearings with non-standardised designations, the design (for example radial internal clearance, cage, accuracy) is specified in the designation (Z-5 or F-8).
In the case of these bearings, additional suffixes are only used for deviations from the original design.

Deep groove ball bearings

Design and safety guidelines

Equivalent dynamic bearing load

Load ratio and equivalent dynamic load

The equivalent dynamic load P is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

For bearings under dynamic loading, the following applies:

Load ratio	Equivalent dynamic bearing 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 kN

Equivalent dynamic bearing load for combined load

F_a kN

Axial dynamic bearing load

F_r kN

Radial dynamic bearing load

e, X, Y –

Factors, see table Factors e, X and Y .

The factors e, X and Y required for determining P are dependent on the ratio $f_0 \cdot F_a / C_{0r}$ and the radial internal clearance.

The values in the table 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} kN

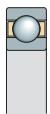
Basic static load rating, see dimension tables

f_0 –

Factor, see dimension tables

F_a kN

Axial dynamic bearing load.



Equivalent static bearing load

The equivalent static load P_0 is valid for bearings that are subjected to radial and axial static loads.

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

For bearings under static loading, the following applies:

Load ratio and equivalent static load

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 kN

Equivalent static bearing load for combined load

F_{0a} kN

Axial static bearing load

F_{0r} kN

Radial static bearing load.

Axial load carrying capacity



Deep groove ball bearings are also suitable for axial loads.

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, ball bearings with cage must be subjected to a minimum radial load of the order of $P/C_r > 0,01$.

Design

of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

Mounting dimensions

The dimension tables give the maximum dimension of the radius r_a and the diameters of the abutment shoulders D_a and d_a .

Deep groove ball bearings

Accuracy

The main dimensions of the standardised single row deep groove ball bearings correspond to DIN 625-1.

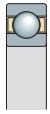
The dimensional and running tolerances of the standardised bearings correspond to tolerance class PN to DIN 620.

Tolerances for special bearings are available by agreement.

The width tolerance of matched bearings deviates from this standard, see table.

Width tolerance of bearing rings in matched bearings

Bore diameter d mm		Width deviation Δ_{Bs} μm	
over	incl.	min.	max.
120	180	0	-750
180	250	0	-950
250	315	0	-1050
315	400	0	-1350
400	500	0	-1650



Radial internal clearance of bearings with cylindrical bore

The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

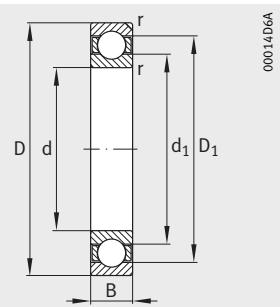
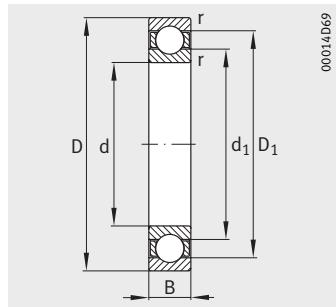
Standardised bearings with increased internal clearance have the suffix C3. Special bearings with radial internal clearance C3 or C4 are indicated in the dimension tables.

Radial internal clearance

Bore d mm		Radial internal clearance							
		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
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	2	35	25	85	75	140	125	195
225	250	2	40	30	95	85	160	145	225
250	280	2	45	35	105	90	170	155	245
280	315	2	55	40	115	100	190	175	270
315	355	3	60	45	125	110	210	195	300
355	400	3	70	55	145	130	240	225	340
400	450	3	80	60	170	150	270	250	380
450	500	3	90	70	190	170	300	280	420
500	560	10	100	80	210	190	330	310	470
560	630	10	110	90	230	210	360	340	520
630	710	20	130	110	260	240	400	380	570
710	800	20	140	120	290	270	450	430	630
800	900	20	160	140	320	300	500	480	700
900	1 000	20	170	150	350	330	550	530	770
1 000	1 120	20	180	160	380	360	600	580	850
1 120	1 250	20	190	170	410	390	650	630	920
1 250	1 400	30	200	190	440	420	700	680	990
1 400	1 600	30	210	210	470	450	750	730	1060

Deep groove ball bearings

Single row

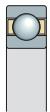
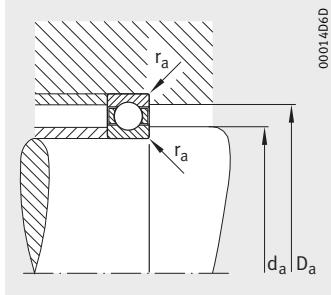


With retaining slot

Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁	d ₁ ≈
6330-M	26,5	150	320	65	4	266,1	205,6
6330-M-C3	26,5	150	320	65	4	266,1	205,6
6332-M	31,6	160	340	68	4	280,9	219,7
6332-M-C3	31,6	160	340	68	4	280,9	219,7
6334-M	37,3	170	360	72	4	298	232,6
6334-M-C3	37,3	170	360	72	4	298	232,6
6236-M	19	180	320	52	4	272	228,7
6236-M-C3	19	180	320	52	4	272	228,7
6336-M	43	180	380	75	4	317	245,2
6336-M-C3	43	180	380	75	4	317	245,2
6238-M	22,6	190	340	55	4	291,5	239,9
6238-M-C3	22,6	190	340	55	4	291,5	239,9
6338-M	50,4	190	400	78	5	330,5	260,2
6338-M-C3	50,4	190	400	78	5	330,5	260,2
6240-M	27	200	360	58	4	306,5	254,9
6240-M-C3	27	200	360	58	4	306,5	254,9
6340-M	56,6	200	420	80	5	345,9	274,7
6340-M-C3	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
6044-M-C3	18,8	220	340	56	3	303,1	258,1
6244-M	37,9	220	400	65	4	337,6	282,2
6244-M-C3	37,9	220	400	65	4	337,6	282,2
6344-M	73,7	220	460	88	5	383	299,4
6344-M-C3	73,7	220	460	88	5	383	299,4
F-801656.KL¹⁾	11,5	230	329,5	40	2,1	298,1	262,8
Z-508729.KL	11,5	230	329,5	40	2,1	298,1	262,8
60948-M	6,19	240	320	25	1,5	292,3	268,3
61948	6,83	240	320	38	2,1	298	262,9
61948-M-C3	8,53	240	320	38	2,1	298	262,9
61948-MA	8,48	240	320	38	2,1	298,9	262,9
Z-578545.KL	10,4	240	329,5	40	2,1	303	268

¹⁾ With retaining slot.

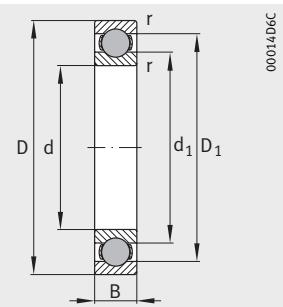
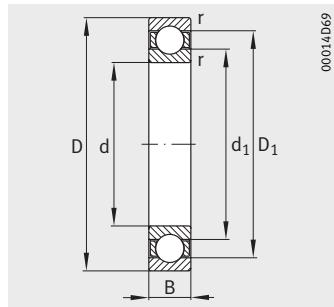


Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur}	Factor f_0	Limiting speed n_G	Reference speed n_B
d_a min.	D_a max.	r_a max.	dyn. C_r kN	stat. C_{0r} kN				
167	303	3	280	290	13,1	13,8	4 800	3 000
167	303	3	280	290	13,1	13,8	4 800	3 000
177	323	3	300	325	14	13,9	4 300	2 800
177	323	3	300	325	14	13,9	4 300	2 800
187	343	3	325	365	14,7	13,9	4 000	2 600
187	343	3	325	365	14,7	13,9	4 000	2 600
197	303	3	224	245	10,3	15,3	4 800	2 750
197	303	3	224	245	10,3	15,3	4 800	2 750
197	363	3	355	405	16,3	13,9	3 800	2 440
197	363	3	355	405	16,3	13,9	3 800	2 440
207	323	3	255	280	11,6	15	4 300	2 600
207	323	3	255	280	11,6	15	4 300	2 600
210	380	4	375	440	17,5	14	3 600	2 300
210	380	4	375	440	17,5	14	3 600	2 300
217	343	3	270	310	12,4	15,3	4 000	2 430
217	343	3	270	310	12,4	15,3	4 000	2 430
220	400	4	380	465	18	14,1	3 400	2 170
220	400	4	380	465	18	14,1	3 400	2 170
230,2	329,8	2,1	200	240	8,4	16,3	4 300	2 310
232,4	327,6	2,5	245	290	11,1	15,6	4 000	2 700
232,4	327,6	2,5	245	290	11,1	15,6	4 000	2 700
237	383	3	300	355	13,5	15,2	3 600	2 200
237	383	3	300	355	13,5	15,2	3 600	2 200
240	440	4	440	560	20	14,1	3 200	1 960
240	440	4	440	560	20	14,1	3 200	1 960
240	319	2,1	200	240	8,4	16,3	4 300	–
240	319	2,1	200	240	8,4	16,3	4 300	–
247	313	1,5	108	146	5,1	16	4 300	2 000
250,2	309,8	2,1	200	240	8,4	16,3	4 300	2 330
250,2	309,8	2,1	200	240	8,4	16,3	4 300	2 330
250,2	309,8	2,1	200	240	8,4	16,3	4 300	2 330
250,2	319,3	2,1	196	240	8,7	16,4	4 000	–

Deep groove ball bearings

Single row



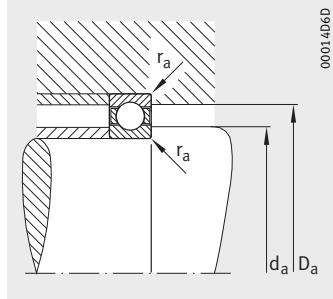
Hybrid deep groove ball bearings
with ceramic balls

Dimension table (continued) · Dimensions in mm

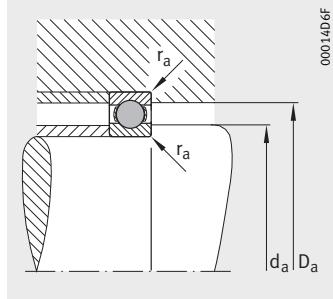
Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁	d ₁
16048	12,7	240	360	37	2,1	317,4	283,1
6048-M	20,5	240	360	56	3	321,9	278,8
6048-M-C3	20,5	240	360	56	3	321,9	278,8
6248-M	51,3	240	440	72	4	369,6	309,9
6248-M-C3	51,3	240	440	72	4	369,6	309,9
6348-M	96,4	240	500	95	5	411,3	328,7
6348-M-C3	96,4	240	500	95	5	411,3	328,7
60852-M	2,17	260	320	19	1	298	282
F-HC808546.KL¹⁾	3,78	260	320	28	2	300,7	279,6
61852	4,23	260	320	28	2	300,7	279,6
61852-M	5,11	260	320	28	2	299,8	280,5
61852-MA	5,26	260	320	28	2	300,7	280,5
60952-M	10,5	260	360	31	2	324,3	296,2
61952-M	14,4	260	360	46	2,1	329,9	291,2
61952-M-C3	14,4	260	360	46	2,1	329,9	291,2
61952-MA	14,4	260	360	46	2,1	329,9	291,2
Z-507338.01.KL	16,4	260	369,5	46	2,1	329,9	291,2
16052	19,1	260	400	44	3	351,2	310
6052-M	29,8	260	400	65	4	357	304,6
6052-M-C3	29,8	260	400	65	4	357	304,6
6252-M	68,4	260	480	80	5	402,4	337,3
6252-M-C3	68,4	260	480	80	5	402,4	337,3
6352-M	118	260	540	102	6	446,1	355
6352-M-C3	118	260	540	102	6	446,1	355
60856-M	5,4	280	350	22	1,1	325,4	305,7
F-HC808547.KL¹⁾	5,63	280	350	33	2	328,1	302,7
F-804993.07.KL²⁾	5,89	280	350	33	2	328,1	302,7
F-808547.KL²⁾	5,89	280	350	33	2	328,1	302,7
61856	6,34	280	350	33	2	328,1	302,7
61856-M	7,56	280	350	33	2	327,3	303,4
61856-MA	7,92	280	350	33	2	328,1	303,4

¹⁾ Hybrid deep groove ball bearing.

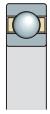
²⁾ With JN cage.



Mounting dimensions



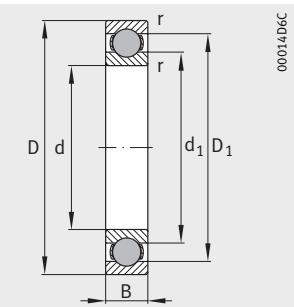
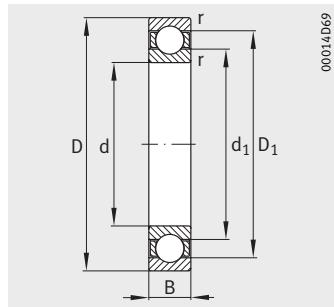
Mounting dimensions



Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur}	Factor f_0	Limiting speed n_G	Reference speed n_B
d_a min.	D_a max.	r_a max.	dyn. C_r	stat. C_{0r}				
kN	kN	kN						
250,2	349,8	2,1	204	255	8,5	16,4	3 800	2 100
252,4	347,6	2,5	255	315	11,4	15,8	3 800	2 450
252,4	347,6	2,5	255	315	11,4	15,8	3 800	2 450
257	423	3	360	475	16,7	15,2	3 400	1 980
257	423	3	360	475	16,7	15,2	3 400	1 980
260	480	4	465	620	21,8	14,2	3 000	1 800
260	480	4	465	620	21,8	14,2	3 000	1 800
264,6	315,4	1	67	104	3,6	15,6	4 300	1 700
268,8	311,2	2	42,5	55	1,61	13,2	4 300	–
268,8	311,2	2	96,5	132	4,55	15,8	4 300	2 070
268,8	311,2	2	96,5	132	4,55	15,8	4 300	2 070
268,8	311,2	2	96,5	132	4,55	15,8	4 300	2 070
268,8	351,2	2	153	200	6,4	16,1	3 800	1 900
270,2	349,8	2,1	220	280	8,6	16,3	3 800	2 180
270,2	349,8	2,1	220	280	8,6	16,3	3 800	2 180
270,2	349,8	2,1	220	280	8,6	16,3	3 800	2 180
270	359,5	2,1	220	280	8,6	16,3	3 800	–
272,4	387,6	2,5	236	310	9,9	16,4	3 600	1 960
274,6	385,4	3	300	390	13,3	15,7	3 400	2 260
274,6	385,4	3	300	390	13,3	15,7	3 400	2 260
280	460	4	405	560	19,2	15,2	3 000	1 820
280	460	4	405	560	19,2	15,2	3 000	1 820
265,6	534,4	5	520	720	24,8	14,3	2 800	1 650
265,6	534,4	5	520	720	24,8	14,3	2 800	1 650
286	344	1	90	134	4,55	15,7	4 000	1 600
288,8	341,2	2	60	68	2,05	12,5	3 800	–
288,8	341,2	2	81,5	88	–	16	3 800	–
288,8	341,2	2	81,5	88	2,9	16	3 800	–
288,8	341,2	2	129	176	5,8	16	3 800	1 950
288,8	341,2	2	129	176	5,8	16	3 800	–
288,8	341,2	2	129	176	5,8	16	3 800	–

Deep groove ball bearings

Single row

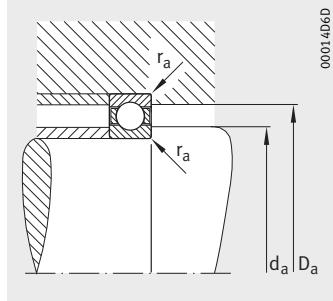


Hybrid deep groove ball bearings
with ceramic balls

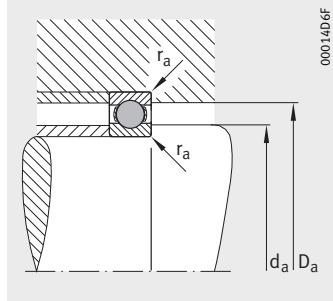
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁	d ₁
60956-M	11,2	280	380	31	2	344,3	316,2
61956	12,4	280	380	46	2,1	351,1	310,1
61956-M-C3	12,4	280	380	46	2,1	351,1	310,1
Z-507341.KL	17,3	280	389,5	46	2,1	350,5	310,1
16056-M	23,2	280	420	44	3	370,6	329,9
6056-M	31,7	280	420	65	4	377,5	324,1
6056-M-C3	31,7	280	420	65	4	377,5	324,1
6256-M	72,9	280	500	80	5	423	356,7
6256-M-C3	72,9	280	500	80	5	423	356,7
6356-M	147	280	580	108	6	481,1	384
6356-M-C3	147	280	580	108	6	481,1	384
Z-578599.KL	26,2	290	409,5	60	3	375	325,6
60860-M	7,55	300	380	25	1,5	351,3	329,3
F-HC808548.KL¹⁾	8,03	300	380	38	2,1	354,7	326,2
61860	8,97	300	380	38	2,1	354,7	326,2
61860-M	10,7	300	380	38	2,1	353,8	327
Z-538205.KL	24,4	300	419,5	56	3	383	337,1
60960-M	17,6	300	420	37	2,1	376,6	344,3
61960-M	24	300	420	56	3	384,2	337,1
61960-M-C3	24	300	420	56	3	384,2	337,1
61960-MA	26,2	300	420	56	3	385,1	337,1
61960-MB	25,9	300	420	56	3	384,2	336,4
16060-M	32,6	300	460	50	4	404	357,3
6060-M	44,5	300	460	74	4	410,8	350,8
6060-M-C3	44,5	300	460	74	4	410,8	350,8
6060-MB-C3	44,5	300	460	74	4	410,8	350,8
6260-M	90,5	300	540	85	5	456,1	383,3
6260-M-C3	90,5	300	540	85	5	456,1	383,3
6360-M	170	300	620	109	7,5	511,8	410,5
6360-M-C3	170	300	620	109	7,5	511,8	410,5

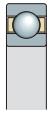
¹⁾ Hybrid deep groove ball bearing.



Mounting dimensions



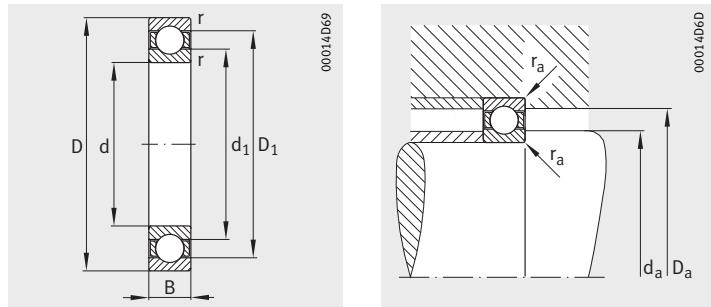
Mounting dimensions



Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur}	Factor f_0	Limiting speed n_G	Reference speed n_B
d_a min.	D_a max.	r_a max.	dyn. C_r kN	stat. C_{0r} kN				
288,8	371,2	2	156	216	6,9	16	3 600	1 700
290,2	369,8	2,1	236	310	9,9	16,4	3 600	1 990
290,2	369,8	2,1	236	310	9,9	16,4	3 600	1 990
290	379,5	2,1	236	310	9,4	16,4	3 600	–
292,4	407,6	2,5	240	325	10,1	16,4	3 400	1 800
294,6	405,4	3	320	440	14,4	15,8	3 400	2 070
294,6	405,4	3	320	440	14,4	15,8	3 400	2 070
291	489	4	425	600	20,3	15,3	3 000	1 690
291	489	4	425	600	20,3	15,3	3 000	1 690
285,6	574,4	5	610	915	26	14,3	2 600	1 470
285,6	574,4	5	610	915	26	14,3	2 600	1 470
302,4	397,1	2,5	310	425	13,8	15,9	3 400	–
307	373	1,5	112	166	5,5	15,7	3 600	1 500
310,2	369,8	2,1	71	80	2,22	12,5	3 600	–
310,2	369,8	2,1	153	204	6,3	16	3 600	1 850
310,2	369,8	2,1	153	204	6,3	16	3 600	–
312,4	407,1	2,5	285	400	11,6	16,2	3 200	–
310,2	409,8	2,1	204	275	8,5	16,2	3 400	1 600
312,4	407,6	2,5	285	400	12,4	16,2	3 200	1 890
312,4	407,6	2,5	285	400	12,4	16,2	3 200	1 890
312,4	407,6	2,5	285	400	12,4	16,2	3 200	1 890
312,4	407,6	2,5	285	400	12,4	16,2	3 200	1 890
314,6	445,4	3	300	430	12,7	16,4	3 200	1 670
314,6	445,4	3	365	510	16,7	15,7	3 000	1 930
314,6	445,4	3	365	510	16,7	15,7	3 000	1 930
314,6	445,4	3	365	510	16,7	15,7	3 000	1 930
320	520	4	455	670	19,7	15,3	2 800	1 550
320	520	4	455	670	19,7	15,3	2 800	1 550
332	588	6	640	980	31	14,4	2 400	1 360
332	588	6	640	980	31	14,4	2 400	1 360

Deep groove ball bearings

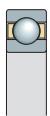
Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

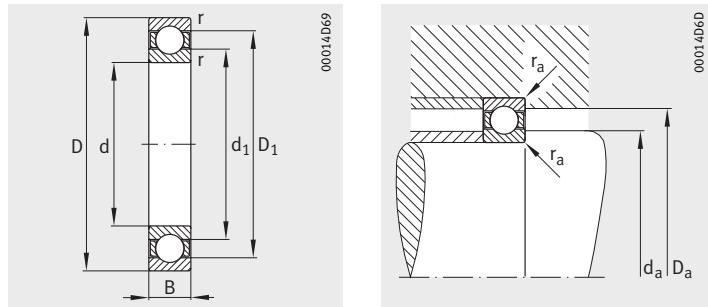
Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁	d ₁ ≈
60864-M	7,98	320	400	25	1,5	371,5	349,2
61864-M	11,3	320	400	38	2,1	373,8	347
60964-M	18,5	320	440	37	2,1	395,7	364
61964-M	25,3	320	440	56	3	403,9	357,3
61964-M-C3	25,3	320	440	56	3	403,9	357,3
61964-MA	25	320	440	56	3	405,1	357,3
F-807088.KL	27,6	320	449,5	56	3	403,9	356,4
16064-M	34,9	320	480	50	4	423,1	377,7
6064-M	47,4	320	480	74	4	430,8	370,9
6064-M-C3	47,4	320	480	74	4	430,8	370,9
6064-MB-C3	47,4	320	480	74	4	430,8	370,9
6264-M	113	320	580	92	5	492,5	410
6264-M-C3	113	320	580	92	5	492,5	410
Z-507360.01.KL	126	320	580	105	5	491,5	410,8
6364-M	205	320	670	112	7,5	546,8	446,3
6364-M-C3	205	320	670	112	7,5	546,8	446,3
Z-509173.KL	29,6	330	460	56	3	423,1	377,9
60868-M	8,22	340	420	25	1,5	391,3	369,3
61868-M	12	340	420	38	2,1	394,2	366,7
61868-MA	12	340	420	38	2,1	394,2	366,7
60968-M	19,8	340	460	37	2,1	417	384
61968-M	27,3	340	460	56	3	423,1	377,8
61968-MA	27	340	460	56	3	424	377,8
61968-MB-C3	27,3	340	460	56	3	423,1	377,8
Z-538204.KL	35,4	340	479,5	60	3	431,1	388
Z-503809.KL	35,5	340	480	60	3	432	388
Z-576368.KL	40,9	340	489,5	65	5	442	388,6
16068-M	47,5	340	520	57	4	457,1	403,6
6068-M	63,2	340	520	82	5	469,6	402,3
6068-M-C3	63,2	340	520	82	5	469,6	402,3
6068-MB-C3	63,2	340	520	82	5	469,6	402,3
6268-M	118	340	620	92	6	530	446,5
6268-M-C3	118	340	620	92	6	530	446,5
6368-M	244	340	710	118	7,5	578	474
6368-M-C3	244	340	710	118	7,5	578	474
Z-532002.KL	44,3	350	500	70	4	457,1	402,7



Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur}	Factor f_0	Limiting speed n_G	Reference speed n_B
d_a min.	D_a max.	r_a max.	dyn. C_r	stat. C_{0r}				
			kN	kN	kN		min ⁻¹	min ⁻¹
327	393	1,5	114	176	5,2	15,7	3 400	1 400
330,2	389,8	2,1	156	220	6,5	15,9	3 400	1 710
330,2	429,8	2,1	204	285	8,6	16,1	3 200	1 500
332,4	427,6	2,5	300	430	12,7	16,4	3 200	1 750
332,4	427,6	2,5	300	430	12,7	16,4	3 200	1 750
332,4	427,6	2,5	300	430	12,7	16,4	3 200	1 750
332,4	437,1	2,5	300	430	12,7	16,4	3 200	–
334,6	465,4	3	305	455	13	16,4	3 000	1 550
334,6	465,4	3	380	560	17,4	15,9	3 000	1 790
334,6	465,4	3	380	560	17,4	15,9	3 000	1 790
334,6	465,4	3	380	560	17,4	15,9	3 000	1 790
340	560	4	530	815	23,5	15,2	2 600	1 430
340	560	4	530	815	23,5	15,2	2 600	1 430
340	560	4	530	815	23,5	15,2	2 600	–
325,6	664,4	6	630	1 000	30,5	14,8	2 200	1 250
325,6	664,4	6	630	1 000	30,5	14,8	2 200	1 250
352,4	447,6	2,5	305	455	13	16,4	3 000	–
347	413	1,5	118	186	5,8	15,6	3 400	1 300
350,2	409,8	2,1	156	220	6,6	15,9	3 200	1 590
350,2	409,8	2,1	156	220	6,6	15,9	3 200	1 590
350,2	449,8	2,1	208	300	8,8	16	3 000	1 400
352,4	447,6	2,5	305	455	13	16,4	3 000	1 630
352,4	447,6	2,5	305	455	13	16,4	3 000	1 630
352,4	447,6	2,5	305	455	13	16,4	3 000	1 630
352,4	467,4	2,5	280	415	11,9	16,5	3 000	–
352,4	467,6	2,5	280	415	11,9	16,5	3 000	–
358	471,5	4	345	510	13,9	16,2	2 800	–
354,6	505,4	3	355	550	17,8	16,3	2 800	1 460
358	502	4	440	695	20,8	15,8	2 800	1 630
358	502	4	440	695	20,8	15,8	2 800	1 630
358	502	4	440	695	20,8	15,8	2 800	1 630
366	594	5	550	900	26	15,5	2 400	1 270
366	594	5	550	900	26	15,5	2 400	1 270
345,6	704,4	6	710	1 180	35	14,9	2 000	1 160
345,6	704,4	6	710	1 180	35	14,9	2 000	1 160
365	485	3	355	550	15,3	16,3	2 800	–

Deep groove ball bearings

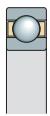
Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

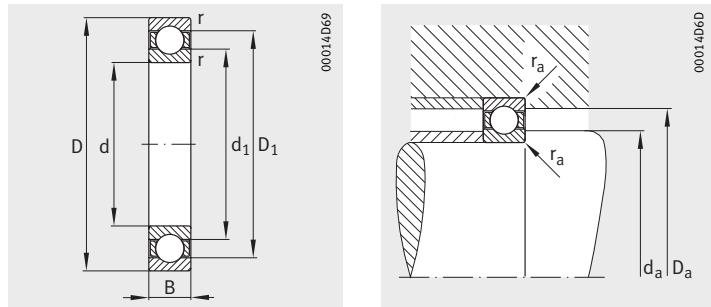
Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁	d ₁
60872-M	8,87	360	440	25	1,5	411,5	389,2
61872-M	12,8	360	440	38	2,1	413	387,7
61872-MA	12,8	360	440	38	2,1	414,2	387,7
61872-MB	12,8	360	440	38	2,1	413	386,7
F-804093.KL	27,9	360	479	56	3	442,8	397
60972-M	20,4	360	480	37	2,1	437	404
61972-M	28,7	360	480	56	3	442,8	398
61972-MA	30,6	360	480	56	3	444	398
61972-MB	28,2	360	480	56	3	442,8	397
61972-MB-C3	28,2	360	480	56	3	442,8	397
16072-M	49,4	360	540	57	4	478,1	423,5
6072-M	66,2	360	540	82	5	489	423,7
6072-M-C3	66,2	360	540	82	5	489	423,7
6072-MB-C3	66,2	360	540	82	5	489	423,7
Z-533303.KL	76,8	360	550	85	5	490,3	423,7
6272-M	148	360	650	95	6	549	462,7
6272-M-C3	148	360	650	95	6	549	462,7
6372-M	293	360	750	125	7,5	611	499
6372-M-C3	293	360	750	125	7,5	611	499
60876-M	14,2	380	480	31	2	444,1	416,7
61876-M	20,6	380	480	46	2,1	445,9	414,1
Z-576367.KL	40,3	380	519,5	65	4	478,2	423,7
60976-M	30,3	380	520	44	3	469,4	431,3
61976-M	40,6	380	520	65	4	478	423,5
61976-MA	41,9	380	520	65	4	479,3	423,5
61976-MB	41,4	380	520	65	4	478	422,5
61976-MB-C3	41,4	380	520	65	4	478	422,5
16076-M	51,7	380	560	57	4	498	443,5
6076-M	69,6	380	560	82	5	504	438,6
6076-M-C3	69,6	380	560	82	5	504	438,6
6076-MB-C3	69,6	380	560	82	5	504	438,6
6276-M	161	380	680	95	6	574	487,7
6276-M-C3	161	380	680	95	6	574	487,7
6376-M	317	380	780	128	7,5	640	523,5
6376-M-C3	317	380	780	128	7,5	640	523,5



Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur}	Factor f_0	Limiting speed n_G	Reference speed n_B
d_a min.	D_a max.	r_a max.	dyn. C_r	stat. C_{0r}				
			kN	kN	kN		min ⁻¹	min ⁻¹
367	433	1,5	120	196	5,5	15,6	3 200	1 200
370,2	429,8	2,1	160	236	6,9	15,8	3 200	1 480
370,2	429,8	2,1	160	236	6,9	15,8	3 200	1 480
370,2	429,8	2,1	160	236	6,9	15,8	3 200	1 480
372,4	467,6	2,5	310	480	13,3	16,5	3 000	1 500
370,2	469,8	2,1	208	305	8,9	15,9	3 000	1 300
372,4	467,6	2,5	310	480	13,2	16,5	3 000	1 520
372,4	467,6	2,5	310	480	13,2	16,5	3 000	1 520
372,4	467,6	2,5	310	480	13,2	16,5	3 000	1 520
372,4	467,6	2,5	310	480	13,2	16,5	3 000	1 520
374,6	525,4	3	365	585	15,7	16,4	2 800	1 370
378	522	4	455	735	21,5	15,9	2 600	1 530
378	522	4	455	735	21,5	15,9	2 600	1 530
378	522	4	455	735	21,5	15,9	2 600	1 530
378	532	4	455	735	21,5	15,9	2 600	–
362,4	647,6	5	560	900	25,5	15,4	2 200	1 240
362,4	647,6	5	560	900	25,5	15,4	2 200	1 240
365,6	744,4	6	735	1 250	35	14,8	1 900	1 100
365,6	744,4	6	735	1 250	35	14,8	1 900	1 100
388,8	471,2	2	166	260	7,2	15,7	3 000	1 200
390,2	469,8	2,1	220	320	8,9	16	3 000	1 430
394,6	505,4	3	365	585	15,1	16,4	2 800	–
392,4	507,6	2,5	250	390	11,2	16	2 800	1 300
394,6	505,4	3	365	585	15,1	16,4	2 800	1 450
394,6	505,4	3	365	585	15,1	16,4	2 800	1 450
394,6	505,4	3	365	585	15,1	16,4	2 800	1 450
394,6	505,4	3	365	585	15,1	16,4	2 800	1 450
394,6	545,4	3	375	620	16,1	16,5	2 600	1 290
398	542	4	455	750	21,1	16	2 600	1 470
398	542	4	455	750	21,1	16	2 600	1 470
398	542	4	455	750	21,1	16	2 600	1 470
406	654	5	585	980	27	15,6	2 000	1 150
406	654	5	585	980	27	15,6	2 000	1 150
412	748	6	830	1 460	42,5	14,8	1 800	1 020
412	748	6	830	1 460	42,5	14,8	1 800	1 020

Deep groove ball bearings

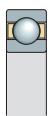
Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

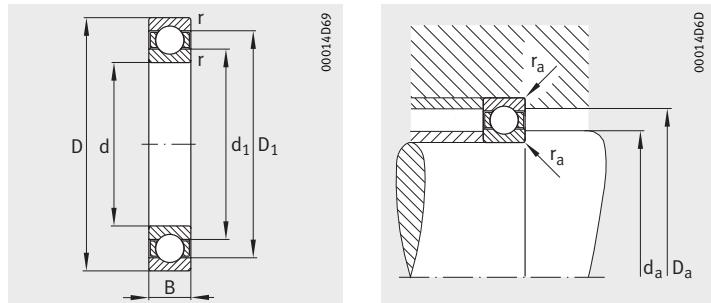
Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁	d ₁ ≈
60880-M	15,3	400	500	31	2	464,1	436,7
61880-M	21,5	400	500	46	2,1	467,3	433,7
60980-M	31,7	400	540	44	3	488,1	452,8
61980-M	42,5	400	540	65	4	498	443,6
61980-MA	42,7	400	540	65	4	499,3	443,6
61980-MB	42,6	400	540	65	4	498	442,5
61980-MB-C3	42,6	400	540	65	4	498	442,5
16080-M	69,3	400	600	63	5	525,8	472
6080-M	90,6	400	600	90	5	536,3	465
6080-M-C3	90,6	400	600	90	5	536,3	465
6080-MB-C3	90,6	400	600	90	5	536,3	465
F-801513.KL	90,6	400	600	90	5	536,3	465
6280-M	203	400	720	103	6	606,2	515,7
6280-M-C3	203	400	720	103	6	606,2	515,7
6380-M	371	400	820	136	7,5	672	551,5
6380-M-C3	371	400	820	136	7,5	672	551,5
60884-M	15,9	420	520	31	2	484,4	456,4
61884-M	22,8	420	520	46	2,1	485,8	454,3
Z-576366.KL	45,4	420	559,5	65	4	517,9	463,5
60984-M	33,3	420	560	44	3	508,1	472,9
61984-M	45,6	420	560	65	4	517,9	463,5
61984-MA	47,2	420	560	65	4	519,3	463,5
61984-MB	44,9	420	560	65	4	517,9	462,4
61984-MB-C3	44,9	420	560	65	4	517,9	462,4
Z-544178.KL	57	420	580	70	4	529	473
Z-508748.KL	60,2	420	580	72	3	528	472
16084-M	72,1	420	620	63	5	547	494
6084-M	99,7	420	620	90	5	556,4	484,9
6084-MB-C3	99,7	420	620	90	5	556,4	484,9



Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur}	Factor f_0	Limiting speed n_G	Reference speed n_B
d_a min.	D_a max.	r_a max.	dyn. C_r	stat. C_{0r}				
			kN	kN	kN		min^{-1}	min^{-1}
408,8	491,2	2	170	275	7,4	15,7	2 800	1 100
410,2	489,8	2,1	220	335	8,8	15,9	2 800	1 340
412,4	527,6	2,5	245	390	10,6	15,9	2 800	1 200
414,6	525,4	3	375	620	15,7	16,5	2 600	1 360
414,6	525,4	3	375	620	15,7	16,5	2 600	1 360
414,6	525,4	3	375	620	15,7	16,5	2 600	1 360
414,6	525,4	3	375	620	15,7	16,5	2 600	1 360
418	582	4	380	630	19,1	16,5	2 400	1 240
418	582	4	520	865	23,5	15,9	2 200	1 390
418	582	4	520	865	23,5	15,9	2 200	1 390
418	582	4	520	865	23,5	15,9	2 200	1 390
418	582	4	520	865	23,5	15,9	2 200	–
402,4	717,6	5	620	1 080	27	15,6	1 900	1 100
402,4	717,6	5	620	1 080	27	15,6	1 900	1 100
432	788	6	865	1 600	44	14,9	1 700	980
432	788	6	865	1 600	44	14,9	1 700	980
428,8	511,2	2	173	285	8	15,6	2 800	1 000
430,2	509,8	2,1	224	345	9,2	15,9	2 800	1 260
434,6	545,4	3	390	655	16,3	16,5	2 600	–
432,4	547,6	2,5	250	400	10,8	15,9	2 600	1 100
434,6	545,4	3	390	655	16,3	16,5	2 600	1 280
434,6	545,4	3	390	655	16,3	16,5	2 600	1 280
434,6	545,4	3	390	655	16,3	16,5	2 600	1 280
434,6	565,4	3	380	640	14,4	16,5	2 400	–
432,4	567,6	2,5	380	630	19,1	16,5	2 400	–
438	602	4	390	670	16,8	16,4	2 200	1 170
438	602	4	530	930	24,4	16	2 200	1 310
438	602	4	530	930	24,4	16	2 200	1 310

Deep groove ball bearings

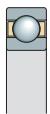
Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

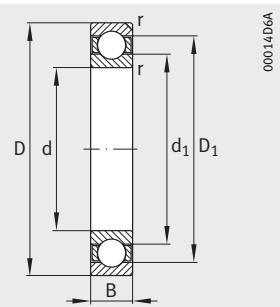
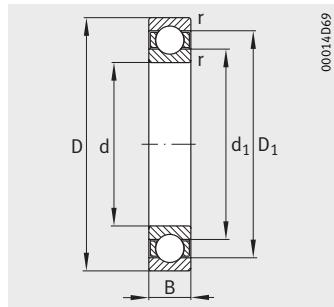
Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁	d ₁
60888-M	16,8	440	540	31	2	504,1	476,7
61888-M	23,8	440	540	46	2,1	505,9	474,2
60988-M	45,5	440	600	50	4	540,9	500,2
61988-M	62,1	440	600	74	4	549,2	492,4
61988-MB-C3	62,1	440	600	74	4	549,2	492,4
16088-M	86,3	440	650	67	5	566,8	514
6088-M	108	440	650	94	6	583,6	507,7
6088-MB-C3	108	440	650	94	6	583,6	507,7
60892-M	26	460	580	37	2,1	535,6	504,4
61892-M	35,8	460	580	56	3	540,9	500,2
61892-MA	36,7	460	580	56	3	542	500,2
60992-M	46,2	460	620	50	4	561	520
61992-M	64,6	460	620	74	4	569,2	512,4
61992-MA	64,6	460	620	74	4	570,4	512,4
61992-MB-C3	64,6	460	620	74	4	569,2	512,4
F-803489.KL	126	460	679	100	6	612,6	528,7
16092-M	95,9	460	680	71	5	595,5	536,1
6092-M	125	460	680	100	6	612,6	529,8
6092-MB-C3	127	460	680	100	6	612,6	528,7
F-804931.KL	18,1	480	580	30	2	543,1	517,7
60896-M	26,6	480	600	37	2,1	555,6	524,4
61896-M	37,3	480	600	56	3	560,9	520,3
61896-MA	38,6	480	600	56	3	562	520,3
60996-M	57	480	650	54	4	587,9	544
61996-M	75,6	480	650	78	5	595,4	536,2
61996-MA	78,7	480	650	78	5	596,9	536,2
61996-MB	74,6	480	650	78	5	595,4	535
61996-MB-C3	74,6	480	650	78	5	595,4	535
F-801512.KL	104	480	680	90	6	618,6	543,8
16096-M	100	480	700	71	5	615,4	556,1
6096-M	129	480	700	100	6	632,8	549,6
6096-MB-C3	129	480	700	100	6	632,8	549,6



Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur}	Factor f_0	Limiting speed n_G	Reference speed n_B
d_a min.	D_a max.	r_a max.	dyn. C_r	stat. C_{0r}				
			kN	kN	kN		min ⁻¹	min ⁻¹
448,8	531,2	2	173	290	7,6	15,6	2 600	1 000
450,2	529,8	2,1	228	355	9,4	15,8	2 600	1 190
454,6	585,4	3	290	480	12	16	2 400	1 100
454,6	585,4	3	400	695	17,6	16,5	2 200	1 250
454,6	585,4	3	400	695	17,6	16,5	2 200	1 250
458	632	4	400	710	17,2	16,4	2 200	1 140
463	627	5	550	965	25,5	16	2 000	1 250
463	627	5	550	965	25,5	16	2 000	1 250
470,2	569,8	2,1	228	375	10,2	15,7	2 400	950
472,4	567,6	2,5	290	480	12	16	2 400	1 170
472,4	567,6	2,5	290	480	12	16	2 400	1 170
474,6	605,4	3	305	520	13,3	16	2 200	1 000
474,6	605,4	3	415	735	18,1	16,4	2 200	1 180
474,6	605,4	3	415	735	18,1	16,4	2 200	1 180
474,6	605,4	3	415	735	18,1	16,4	2 200	1 180
483	656	5	585	1 060	27	16	1 900	–
478	662	4	440	815	19,6	16,4	2 000	1 090
483	657	5	585	1 060	27	16	1 900	1 200
483	657	5	585	1 060	27	16	1 900	1 200
488,8	571,2	2	156	280	6,9	15,5	2 400	–
490,2	589,8	2,1	232	390	10,3	15,6	2 200	900
492,4	587,6	2,5	290	500	12,1	15,9	2 200	1 110
492,4	587,6	2,5	290	500	12,1	15,9	2 200	1 110
494,6	635,4	3	325	570	14,1	16	2 000	1 000
498	632	4	440	815	18,4	16,4	2 000	1 130
498	632	4	440	815	18,4	16,4	2 000	1 130
498	632	4	440	815	18,4	16,4	2 000	1 130
498	632	4	440	815	18,4	16,4	2 000	1 130
503	657	5	520	950	22,8	16,3	1 900	–
498	682	4	440	800	19,2	16,4	1 900	1 040
503	677	5	610	1 140	28,5	16	1 900	1 140
503	677	5	610	1 140	28,5	16	1 900	1 140

Deep groove ball bearings

Single row

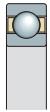
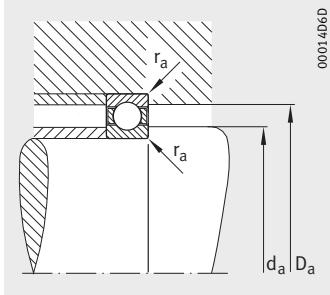


With retaining slot

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁	d ₁
608/500-M	27,9	500	620	37	2,1	575,6	544,4
618/500-M	38,7	500	620	56	3	580,9	540,4
618/500-MA	40,2	500	620	56	3	582	540,4
618/500-MB	40,1	500	620	56	3	580,9	539,3
609/500-M	59	500	670	54	4	607,9	564
619/500-M	79	500	670	78	5	615,4	556,2
619/500-MA	79	500	670	78	5	615,4	556,2
619/500-MB	79	500	670	78	5	615,4	556,2
619/500-MB-C3	79	500	670	78	5	615,4	556,2
F-804943.KL	81,2	500	670	78	5	616,9	555,9
Z-530352.KL	116	500	700	100	6	640	562
160/500-M	105	500	720	71	5	635,9	581,7
60/500-M	133	500	720	100	6	657,4	574,9
60/500-MB-C3	133	500	720	100	6	657,4	574,9
F-800562.KL	132	520	719	100	5	660,5	582
608/530-M	29,4	530	650	37	2,1	605,6	574,4
618/530-M	41,3	530	650	56	3	610,8	570,4
618/530-MA	42,4	530	650	56	3	612	570,4
618/530-MB	42,3	530	650	56	3	610,8	569,3
609/530-M	69,8	530	710	57	4	646	595,3
619/530-M	92	530	710	82	5	652,3	589,7
619/530-MB	92	530	710	82	5	652,3	589,7
619/530-MB-C3	92	530	710	82	5	652,3	589,7
Z-508780.KL¹⁾	157	530	760	100	6	683	606
160/530-M	142	530	780	80	6	688,7	624,7
60/530-M	185	530	780	112	6	701,8	610,3
60/530-MB-C3	185	530	780	112	6	701,8	610,3
Z-529220.KL¹⁾	190	530	780	112	6	701,8	609,3
608/560-M	30,5	560	680	37	2,1	636,7	604,3
618/560-M	35,1	560	680	56	3	640,7	600,4
618/560-MA	34,8	560	680	56	3	642	600,4
618/560-MB	44,5	560	680	56	3	640,7	599,3
609/560-M	81,6	560	750	60	4	681	630,4
619/560-M	107	560	750	85	5	690	623,9

¹⁾ With retaining slot.

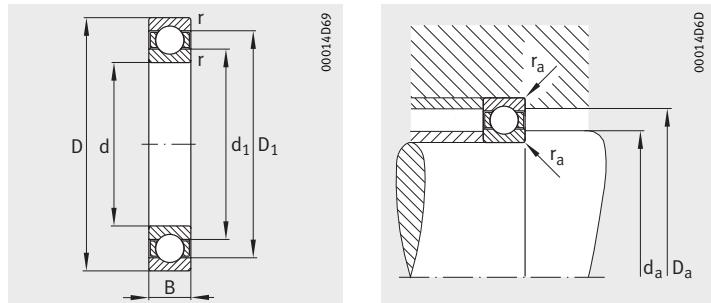


Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load C _{ur}	Factor f ₀	Limiting speed n _G	Reference speed n _B
d _a min.	D _a max.	r _a max.	dyn. C _r	stat. C _{0r}				
			kN	kN				min ⁻¹
510,2	609,8	2,1	232	405	10,3	15,6	2 200	850
512,4	607,6	2,5	300	510	12,3	15,9	2 000	1 060
512,4	607,6	2,5	300	510	12,3	15,9	2 000	1 060
512,4	607,6	2,5	300	510	12,3	15,9	2 000	1 060
514,6	655,4	3	325	585	14,6	15,9	2 000	950
518	652	4	440	800	18,2	16,4	1 900	1 080
518	652	4	440	800	18,2	16,4	1 900	1 080
518	652	4	440	800	18,2	16,4	1 900	1 080
518	652	4	440	800	18,2	16,4	1 900	–
523	677	5	585	1 120	27	16,2	900	–
518	702	4	425	780	22	16,3	1 900	980
523	697	5	610	1 140	27,5	16,1	1 800	1 100
523	697	5	610	1 140	27,5	16,1	1 800	1 100
538	701	4	585	1 120	24,7	16,3	1 800	–
540,2	639,8	2,1	236	425	10,5	15,6	2 000	800
542,4	637,6	2,5	305	550	12,8	15,8	2 000	980
542,4	637,6	2,5	305	550	12,8	15,8	2 000	980
542,4	637,6	2,5	305	550	12,8	15,8	2 000	980
544,6	695,4	3	380	720	17,1	16	1 900	850
548	692	4	465	880	20	16,3	1 800	1 010
548	692	4	465	880	20	16,3	1 800	1 010
548	692	4	465	880	20	16,3	1 800	1 010
553	737	5	600	1 160	26,5	16,3	1 700	–
553	757	5	510	1 000	22,5	16,3	1 700	920
553	757	5	710	1 400	32,5	16	1 700	1 000
553	757	5	710	1 400	32,5	16	1 700	1 000
553	757	5	710	1 400	32,5	16	1 700	–
570,2	669,8	2,1	240	440	9,9	15,5	1 900	750
572,4	667,6	2,5	310	560	12,8	15,8	1 900	920
572,4	667,6	2,5	310	560	12,8	15,8	1 900	920
572,4	667,6	2,5	310	560	12,8	15,8	1 900	920
574,6	735,4	3	390	735	16,5	16	1 800	800
578	732	4	510	1 000	22,5	16,3	1 700	940

Deep groove ball bearings

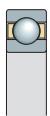
Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

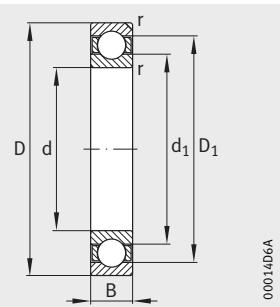
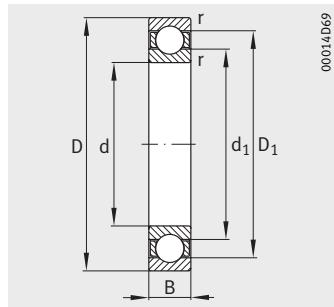
Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁	d ₁ ≈
619/560-MA	107	560	750	85	5	690	623,9
619/560-MB	107	560	750	85	5	690	623,9
619/560-MB-C3	107	560	750	85	5	690	623,9
160/560-M	137	560	820	82	6	732,7	668,3
60/560-M	209	560	820	115	6	740,4	643,2
60/560-MB-C3	209	560	820	115	6	740,4	643,2
608/600-M	40,1	600	730	42	3	683,3	647,8
618/600-M	54,2	600	730	60	3	687,8	643,6
618/600-MA	54,3	600	730	60	3	689	643,6
609/600-M	96,7	600	800	63	5	728,1	673,5
619/600-M	128	600	800	90	5	736	666
619/600-MA	128	600	800	90	5	736	666
619/600-MB	128	600	800	90	5	736	666
619/600-MB-C3	128	600	800	90	5	736	666
160/600-M	180	600	870	85	6	771	700,5
60/600-M	238	600	870	118	6	785,4	688
60/600-MB-C3	238	600	870	118	6	785,4	688
608/630-M	56,1	630	780	48	3	725,9	685,4
618/630-M	75,9	630	780	69	4	730,5	681,1
618/630-MA	77,3	630	780	69	4	732	681,1
609/630-M	126	630	850	71	5	769	711
619/630-M	167	630	850	100	6	780,3	701,7
619/630-MA	167	630	850	100	6	780,3	701,7
619/630-MB	167	630	850	100	6	780,3	701,7
619/630-MB-C3	167	630	850	100	6	780,3	701,7
160/630-M	220	630	920	92	6	813,5	738,5
60/630-M	287	630	920	128	7,5	831,9	721,2
60/630-MB-C3	287	630	920	128	7,5	831,9	721,2
Z-508308.KL	327	640	940	128	7,5	844	740
F-800564.KL	268	650	919	118	6	831,8	738,7
Z-514645.KL	262	650	920	118	6	828,7	738,7



Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur}	Factor f_0	Limiting speed n_G	Reference speed n_B
d_a min.	D_a max.	r_a max.	dyn. C_r	stat. C_{0r}				
			kN	kN	kN		min^{-1}	min^{-1}
578	732	4	510	1 000	22,5	16,3	1 700	940
578	732	4	510	1 000	22,5	16,3	1 700	940
578	732	4	510	1 000	22,5	16,3	1 700	940
583	797	5	550	1 120	24,1	16,3	1 600	840
583	797	5	765	1 530	35,5	16	1 600	950
583	797	5	765	1 530	35,5	16	1 600	950
612,4	717,6	2,5	255	475	10,6	15,5	1 800	700
612,4	717,6	2,5	355	670	15	15,8	1 800	850
612,4	717,6	2,5	355	670	15	15,8	1 800	850
618	782	4	440	880	18,7	16	1 600	750
618	782	4	550	1 120	23,6	16,3	1 600	880
618	782	4	550	1 120	23,6	16,3	1 600	880
618	782	4	550	1 120	23,6	16,3	1 600	880
618	782	4	550	1 120	23,6	16,3	1 600	880
623	847	5	550	1 120	23,4	16,3	1 500	800
623	847	5	780	1 660	36,5	16,1	1 500	850
623	847	5	780	1 660	36,5	16,1	1 500	850
644,6	767,6	2,5	320	630	14,2	15,6	1 700	700
644,6	765,4	3	400	780	17,5	15,9	1 600	830
644,6	765,4	3	400	780	17,5	15,9	1 600	830
648	832	4	480	1 000	21,7	16	1 500	750
653	827	5	630	1 320	28	16,4	1 500	840
653	827	5	630	1 320	28	16,4	1 500	840
653	827	5	630	1 320	28	16,4	1 500	840
653	827	5	630	1 320	28	16,4	1 500	840
653	897	5	585	1 250	25	16,3	1 400	770
658	892	6	880	1 900	41,5	16	1 300	800
658	892	6	880	1 900	41,5	16	1 300	800
668	912	6	815	1 760	36	16,2	1 300	–
673	897	5	750	1 630	33	16,4	1 400	–
673	897	5	750	1 630	33	16,4	1 400	–

Deep groove ball bearings

Single row

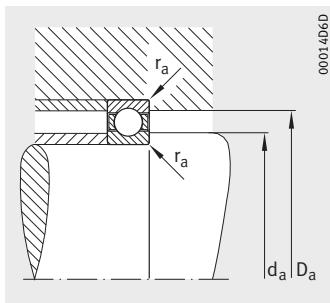


With retaining slot

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁	d ₁
608/670-M	59,6	670	820	48	3	765	726
618/670-M	80,4	670	820	69	4	770,3	721,1
618/670-MA	84,7	670	820	69	4	772	721,1
Z-509029.KL	118	670	850	85	6	792,5	727,5
609/670-M	144	670	900	73	5	816,7	755
619/670-M	192	670	900	103	6	822,2	749,5
619/670-MA	192	670	900	103	6	822,2	749,5
619/670-MB	192	670	900	103	6	822,2	749,5
619/670-MB-C3	192	670	900	103	6	822,2	749,5
160/670-M	272	670	980	100	6	867,5	785
60/670-M	350	670	980	136	7,5	884,2	769,4
60/670-MB-C3	350	670	980	136	7,5	884,2	769,4
608/710-M	69,9	710	870	50	4	812,7	770
618/710-M	96	710	870	74	4	818,9	762,7
618/710-MA	98,6	710	870	74	4	820,4	762,7
609/710-M	165	710	950	78	5	862	800
619/710-M	218	710	950	106	6	869,1	792,5
619/710-MA	218	710	950	106	6	869,1	792,5
619/710-MB	218	710	950	106	6	869,1	792,5
619/710-MB-C3	218	710	950	106	6	869,1	792,5
Z-502954.KL	368	710	1 000	140	7,5	911,5	800
160/710-M	305	710	1 030	103	6	914,5	828
60/710-M	394	710	1 030	140	7,5	931,1	812,6
60/710-MB-C3	394	710	1 030	140	7,5	931,1	812,6
Z-534196.KL¹⁾	394	710	1 030	140	7,5	931,5	812,6
Z-528283.KL¹⁾	534	710	1 080	160	7,5	962	826
608/750-M	84,4	750	920	54	4	859	812,4
618/750-M	114	750	920	78	5	864,9	806,7
618/750-MA	117	750	920	78	5	866,9	806,7
609/750-M	186	750	1 000	80	6	910	843
619/750-M	248	750	1 000	112	6	919,2	833,2
619/750-MA	248	750	1 000	112	6	919,2	833,2
619/750-MB	248	750	1 000	112	6	919,2	833,2
619/750-MB-C3	248	750	1 000	112	6	919,2	833,2

¹⁾ With retaining slot; radial internal clearance C4.

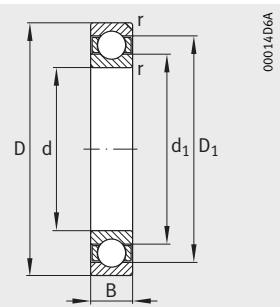
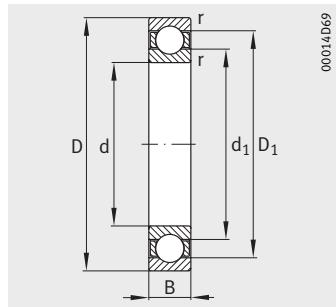


Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur}	Factor f_0	Limiting speed n_G	Reference speed n_B
d_a min.	D_a max.	r_a max.	dyn. C_r kN	stat. C_{0r} kN				
682,4	807,6	2,5	325	655	14,4	15,6	1 600	630
684,6	805,4	3	405	815	17,7	15,8	1 500	770
684,6	805,4	3	405	815	17,7	15,8	1 500	770
693	827	5	550	1 180	24,5	16,1	1 500	–
688	882	4	520	1 120	23,6	16	1 400	670
693	877	5	640	1 370	27,5	16,3	1 400	780
693	877	5	640	1 370	27,5	16,3	1 400	780
693	877	5	640	1 370	27,5	16,3	1 400	780
693	877	5	640	1 370	27,5	16,3	1 400	780
693	957	5	655	1 460	28,5	16,3	1 300	720
698	952	6	965	2 160	46	16	1 300	750
698	952	6	965	2 160	46	16	1 300	750
724,6	855,4	3	355	735	16,1	15,6	1 400	600
724,6	855,4	3	465	980	20	15,9	1 400	720
724,6	855,4	3	465	980	20	15,9	1 400	720
728	932	4	530	1 160	24,1	16	1 300	630
733	927	5	680	1 530	30	16,3	1 300	730
733	927	5	680	1 530	30	16,3	1 300	730
733	927	5	680	1 530	30	16,3	1 300	730
733	927	5	680	1 530	30	16,3	1 300	730
738	972	6	930	2 200	44,5	16,3	1 300	–
733	1 007	5	710	1 600	30,5	16,3	1 300	670
738	1 002	6	1 020	2 320	48	16	1 200	700
738	1 002	6	1 020	2 320	48	16	1 200	700
738	1 002	6	1 020	2 320	48	16	1 200	–
785	1 005	7,5	1 140	2 700	55	15,8	1 200	–
764,6	905,4	3	380	830	17,2	15,6	1 300	560
768	902	4	510	1 120	22,6	15,9	1 300	680
768	902	4	510	1 120	22,6	15,9	1 300	680
773	977	5	585	1 340	26	16	1 300	600
773	977	5	720	1 660	32,5	16,3	1 300	690
773	977	5	720	1 660	32,5	16,3	1 300	690
773	977	5	720	1 660	32,5	16,3	1 300	690

Deep groove ball bearings

Single row



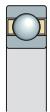
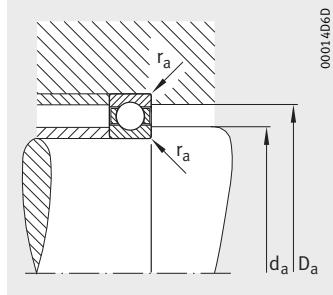
With retaining slot

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁	d ₁
Z-565323.KL¹⁾	312	750	1 016	125	6	933,8	839,3
160/750-M	362	750	1 090	109	7,5	966,5	876
60/750-M	469	750	1 090	150	7,5	985,3	858,4
60/750-MB-C3	469	750	1 090	150	7,5	985,3	858,4
Z-500909.KL¹⁾	451	760	1 080	150	7,5	984,5	858
F-800886.KL	120	769	940	78	5	885,5	827,2
Z-556478.KL	61,4	800	935	50	5	886,5	849,5
608/800-M	101	800	980	57	4	914,1	867,2
618/800-M	136	800	980	82	5	921,8	860
618/800-MA	136	800	980	82	5	923,5	860
609/800-M	212	800	1 060	82	6	965	898
619/800-M	283	800	1 060	115	6	976,7	886,2
619/800-MB	283	800	1 060	115	6	976,7	886,2
619/800-MB-C3	283	800	1 060	115	6	976,7	886,2
Z-526190.KL	313	800	1 080	115	6	989	891
160/800-M	403	800	1 150	112	7,5	1 024	929
60/800-M	532	800	1 150	155	7,5	1 038,2	911,5
60/800-MB-C3	532	800	1 150	155	7,5	1 038,2	911,5
F-801911.KL¹⁾	538	800	1 150	155	7,5	1 038	910
Z-572323.KL	278	830	1 080	115	6	1 003,8	909,3
608/850-M	106	850	1 030	57	4	966,2	915,4
618/850-M	144	850	1 030	82	5	971,9	910
618/850-MA	144	850	1 030	82	5	973,5	910
609/850-M	241	850	1 120	85	6	1 023	950
619/850-M	323	850	1 120	118	6	1 033,6	939,2
619/850-MB	323	850	1 120	118	6	1 033,6	939,2
619/850-MB-C3	323	850	1 120	118	6	1 033,6	939,2
160/850-M	476	850	1 220	118	7,5	1 086,5	987
60/850-M	626	850	1 220	165	7,5	1 105,9	968,1
60/850-MB-C3	626	850	1 220	165	7,5	1 105,9	968,1
Z-501657.KL²⁾	642	850	1 220	165	7,5	1 105,9	966,8
Z-529055.KL¹⁾	337	860	1 130	120	7,5	1 044	945,5

¹⁾ With retaining slot.

²⁾ With retaining slot; radial internal clearance 200...300 µm.

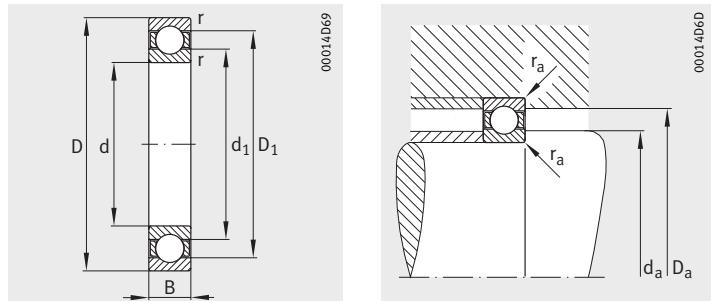


Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur}	Factor f_0	Limiting speed n_G	Reference speed n_B
d_a min.	D_a max.	r_a max.	dyn. C_r kN	stat. C_{0r} kN				
773	993	5	830	2000	38	16,4	1 300	–
778	1 062	6	750	1 730	32	16,3	1 200	640
778	1 062	6	1 100	2 650	52	16	1 100	670
778	1 062	6	1 100	2 650	52	16	1 100	670
788	1 052	6	1 080	2 600	49,5	16,1	1 100	–
787	922	4	510	1 140	23,1	15,8	1 300	–
818	917	4	305	670	14,7	15,4	1 300	–
814,6	965,4	3	430	980	19,7	15,6	1 300	530
818	962	4	550	1 270	23,8	15,8	1 300	630
818	962	4	550	1 270	23,8	15,8	1 300	630
823	1 037	5	610	1 430	27	15,9	1 200	560
823	1 037	5	800	1 900	34,5	16,3	1 200	630
823	1 037	5	800	1 900	34,5	16,3	1 200	630
823	1 037	5	800	1 900	34,5	16,3	1 200	630
823	1 057	5	865	2 080	38,5	16,4	1 100	–
828	1 122	6	815	2 000	35,5	16,3	1 100	590
828	1 122	6	1 140	2 800	55	16,1	1 100	630
828	1 122	6	1 140	2 800	55	16,1	1 100	630
828	1 122	6	1 140	2 800	55	16,1	1 100	–
853	1 057	5	850	2 080	38	16,3	1 100	–
864,6	1 015,4	3	430	1 000	18,4	15,5	1 200	480
868	1 012	4	560	1 290	23,9	15,8	1 200	580
868	1 012	4	560	1 290	23,9	15,8	1 200	580
873	1 097	5	670	1 630	27	15,9	1 100	530
873	1 097	5	850	2 080	37	16,2	1 100	590
873	1 097	5	850	2 080	37	16,2	1 100	590
873	1 097	5	850	2 080	37	16,2	1 100	590
878	1 192	6	865	2 200	38,5	16,2	1 100	550
878	1 192	6	1 220	3 150	57	16,2	1 000	600
878	1 192	6	1 220	3 150	57	16,2	1 000	600
878	1 192	6	1 220	3 150	57	16,2	1 000	–
888	1 102	6	930	2 360	50	16,4	1 100	–

Deep groove ball bearings

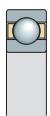
Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

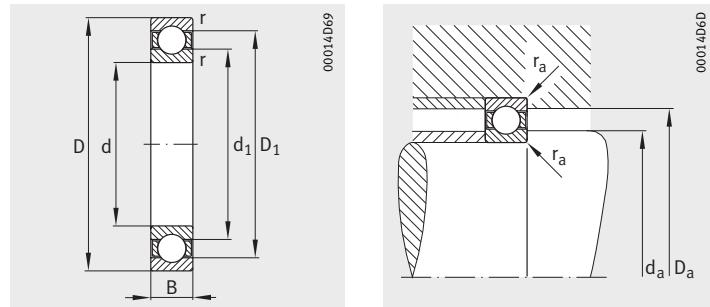
Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁	d ₁ ≈
608/900-M	115	900	1 090	60	5	1 022	970
618/900-M	169	900	1 090	85	5	1 024,8	965,9
609/900-M	280	900	1 180	88	6	1 078,1	1 002
619/900-M	352	900	1 180	122	6	1 090,5	991,5
160/900-M	532	900	1 280	122	7,5	1 143	1 040,5
60/900-M	705	900	1 280	170	7,5	1 161,1	1 022,5
608/950-M	141	950	1 150	63	5	1 079	1 023
618/950-M	198	950	1 150	90	5	1 082,9	1 017,7
F-807431.KL	259	950	1 200	90	5	1 085,6	1 014,6
609/950-M	335	950	1 250	95	6	1 141	1 061
619/950-M	443	950	1 250	132	7,5	1 152,2	1 050,7
Z-532248.KL	722	950	1 320	170	10	1 208	1 066
160/950-M	658	950	1 360	132	7,5	1 212	1 101,5
60/950-M	856	950	1 360	180	7,5	1 236	1 078,5
608/1000-M	192	1 000	1 220	71	5	1 140,5	1 081
618/1000-M	254	1 000	1 220	100	6	1 147,8	1 073,3
618/1000-MA	256	1 000	1 220	100	6	1 150	1 073,3
609/1000-M	407	1 000	1 320	103	6	1 204	1 120
619/1000-M	531	1 000	1 320	140	7,5	1 220,7	1 102,4
F-804593.KL	594	1 000	1 380	122	6	1 240,6	1 142,1
Z-528268.KL	657	1 000	1 380	180	7,5	1 263	1 121,5
160/1000-M	726	1 000	1 420	136	7,5	1 279	1 164,5
60/1000-M	944	1 000	1 420	185	7,5	1 291	1 133,5
Z-529852.KL	263	1 030	1 250	100	5	1 180	1 102
608/1060-M	202	1 060	1 280	71	5	1 200,5	1 141
618/1060-M	269	1 060	1 280	100	6	1 207,5	1 133,7
618/1060-MA	270	1 060	1 280	100	6	1 210	1 133,7
609/1060-M	485	1 060	1 400	109	7,5	1 278	1 186
619/1060-M	640	1 060	1 400	150	7,5	1 289,9	1 172,9
160/1060-M	834	1 060	1 500	140	9,5	1 343,5	1 221
60/1060-M	1 100	1 060	1 500	195	9,5	1 365	1 200



Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur}	Factor f_0	Limiting speed n_G	Reference speed n_B
d_a min.	D_a max.	r_a max.	dyn. C_r	stat. C_{0r}				
			kN	kN	kN		min^{-1}	min^{-1}
918	1 072	4	480	1 180	22,7	15,5	1 100	450
918	1 072	4	570	1 370	27	15,7	1 100	550
923	1 157	5	720	1 800	33	15,9	1 100	480
923	1 157	5	900	2 280	50	16,2	1 000	550
928	1 252	6	900	2 320	40	16,2	1 000	520
928	1 252	6	1 290	3 400	60	16,3	950	560
968	1 132	4	520	1 290	23,8	15,5	1 100	430
968	1 132	4	655	1 660	30,5	15,8	1 100	510
968	1 182	4	655	1 660	29	15,8	1 100	–
973	1 227	5	780	2 040	37	15,9	1 000	450
978	1 222	6	965	2 550	43,5	16,2	950	520
986	1 284	8	1 320	3 650	44	16,4	900	–
978	1 332	6	1 000	2 700	45,5	16,2	950	490
978	1 332	6	1 430	3 900	68	16,1	900	530
1 018	1 202	4	585	1 500	27,5	15,6	1 000	430
1 023	1 197	5	735	1 930	34	15,8	1 000	495
1 023	1 197	5	735	1 930	34	15,8	1 000	495
1 028	1 292	6	830	2 240	40	15,9	950	450
1 028	1 292	6	1 160	3 250	54	16,3	900	485
1 023	1 357	5	950	2 550	42,5	16	900	–
1 028	1 352	6	1 370	3 900	64	16,4	900	–
1 028	1 392	6	1 060	2 900	47	16,2	900	455
1 028	1 392	6	1 500	4 150	70	16,3	850	500
1 048	1 232	4	720	1 860	31,5	15,8	950	–
1 078	1 262	4	585	1 500	27,5	15,6	950	380
1 083	1 257	5	765	2 040	35,5	15,8	950	460
1 083	1 257	5	765	2 040	35,5	15,8	950	460
1 088	1 372	6	930	2 600	44	15,9	900	400
1 088	1 372	6	1 140	3 250	52	16,2	850	465
1 094	1 466	8	1 160	3 350	53	16,2	850	430
1 094	1 466	8	1 600	4 650	76	16,3	800	450

Deep groove ball bearings

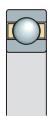
Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

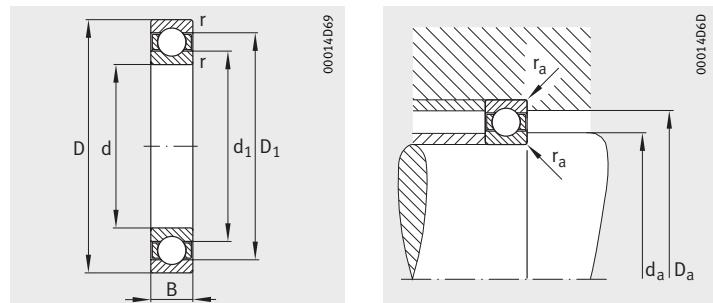
Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁	d ₁
608/1120-M	259	1 120	1 360	78	5	1 274	1 209
618/1120-M	329	1 120	1 360	106	6	1 281,1	1 200,8
618/1120-MA	337	1 120	1 360	106	6	1 284	1 200,8
609/1120-M	509	1 120	1 460	109	7,5	1 338	1 246
619/1120-M	661	1 120	1 460	150	7,5	1 349	1 235
160/1120-M	954	1 120	1 580	145	9,5	1 415	1 289
60/1120-M	1 250	1 120	1 580	200	9,5	1 439	1 266
608/1180-M	259	1 180	1 420	78	5	1 334	1 269
618/1180-M	357	1 180	1 420	106	6	1 341,7	1 258,7
618/1180-MA	377	1 180	1 420	106	6	1 344	1 258,7
609/1180-M	600	1 180	1 540	115	7,5	1 411	1 312
619/1180-M	797	1 180	1 540	160	7,5	1 423	1 301
160/1180-M	1 110	1 180	1 660	155	9,5	1 489,5	1 355
60/1180-M	1 450	1 180	1 660	212	9,5	1 512	1 332
608/1250-M	293	1 250	1 500	80	6	1 409,5	1 343
618/1250-M	401	1 250	1 500	112	6	1 418,8	1 333,9
618/1250-MA	401	1 250	1 500	112	6	1 421,1	1 333,9
609/1250-M	711	1 250	1 630	122	7,5	1 493	1 391
619/1250-M	933	1 250	1 630	170	7,5	1 507	1 377
60/1250-M	1 650	1 250	1 750	218	9,5	1 598	1 408
608/1320-M	399	1 320	1 600	88	6	1 498,5	1 424
618/1320-M	523	1 320	1 600	122	6	1 504,7	1 416,9
618/1320-MA	525	1 320	1 600	122	6	1 508	1 416,9
609/1320-M	830	1 320	1 720	128	7,5	1 576	1 468
619/1320-M	1 070	1 320	1 720	175	7,5	1 590	1 454
60/1320-M	1 950	1 320	1 850	230	12	1 686	1 488
608/1400-M	472	1 400	1 700	95	6	1 591,5	1 511
618/1400-M	640	1 400	1 700	132	7,5	1 602	1 501,1
618/1400-MA	643	1 400	1 700	132	7,5	1 604,5	1 501,1
619/1400-M	1 260	1 400	1 820	185	9,5	1 684	1 540
60/1400-M	2 250	1 400	1 950	243	12	1 784	1 573



Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur}	Factor f_0	Limiting speed n_G	Reference speed n_B
d_a min.	D_a max.	r_a max.	dyn. C_r	stat. C_{0r}				
			kN	kN				min ⁻¹
1 138	1 342	4	670	1 830	31,5	15,5	900	360
1 143	1 337	5	815	2 240	36	15,8	900	430
1 143	1 337	5	815	2 240	36	15,8	900	430
1 148	1 432	6	950	2 650	45	15,9	850	380
1 148	1 432	6	1 160	3 400	53	16,2	800	435
1 154	1 546	8	1 220	3 550	54	16,2	800	405
1 154	1 546	8	1 760	5 400	87	16,3	750	430
1 198	1 402	4	670	1 930	33	15,5	850	340
1 203	1 397	5	830	2 360	37,5	15,7	850	405
1 203	1 397	5	830	2 360	37,5	15,7	850	405
1 208	1 512	6	1 060	3 150	50	15,9	800	360
1 208	1 512	6	1 290	3 800	60	16,2	750	410
1 214	1 626	8	1 320	4 000	61	16,2	750	380
1 214	1 626	8	1 860	5 850	90	16,3	700	400
1 273	1 477	5	710	2 080	34	15,5	800	320
1 273	1 477	5	900	2 600	39,5	15,7	800	380
1 273	1 477	5	900	2 600	39,5	15,7	800	380
1 278	1 602	6	1 100	3 350	53	15,9	750	340
1 278	1 602	6	1 400	4 300	67	16,2	700	385
1 284	1 716	8	2 000	6 400	96	16,4	670	380
1 343	1 577	5	815	2 500	40	15,5	750	300
1 343	1 577	5	950	2 850	45,5	15,7	750	360
1 343	1 577	5	950	2 850	45,5	15,7	750	360
1 348	1 692	6	1 200	3 750	57	15,9	700	320
1 348	1 692	6	1 530	4 900	71	16,2	700	360
1 362	1 808	10	2 120	7 100	104	16,4	670	360
1 423	1 677	5	900	2 800	43	15,5	700	280
1 428	1 672	6	1 040	3 200	46,5	15,8	700	340
1 428	1 672	6	1 040	3 200	46,5	15,8	700	340
1 434	1 786	8	1 630	5 400	80	16,2	670	335
1 442	1 908	10	2 320	8 000	114	16,4	630	340

Deep groove ball bearings

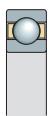
Single row



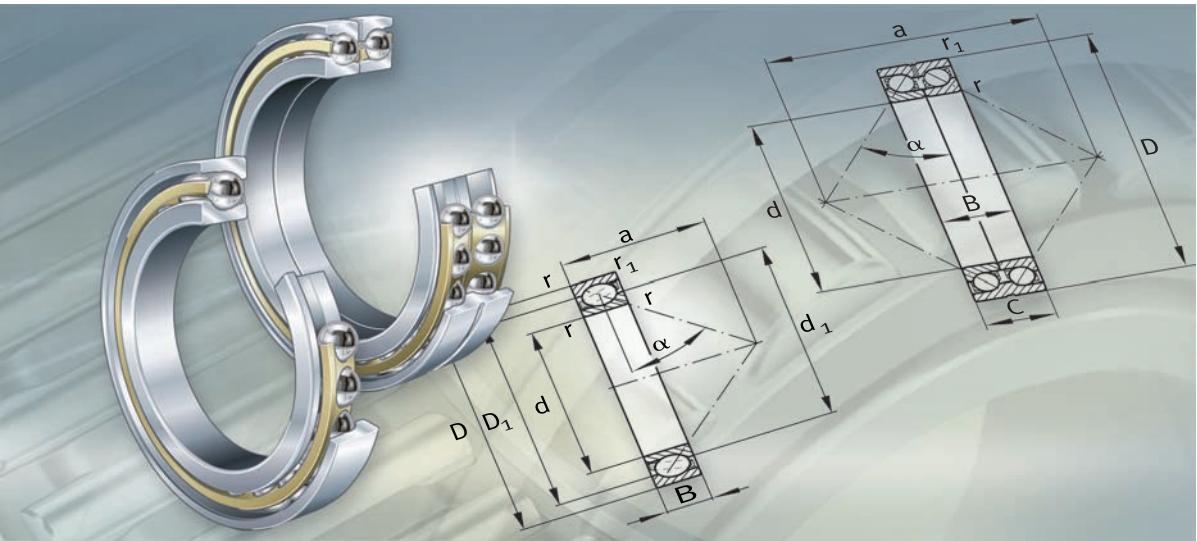
Mounting dimensions

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D ₁	d ₁
Z-563867.KL	419	1 500	1 750	100	6	1 663	1 589
Z-547707.KL	696	1 500	1 820	125	7,5	1 715	1 606,5
618/1500-M	778	1 500	1 820	140	7,5	1 715,1	1 608,1
618/1500-MA	792	1 500	1 820	140	7,5	1 718,7	1 608,1
619/1500-M	1 530	1 500	1 950	195	9,5	1 805	1 650
60/1500-M	3 070	1 500	2 120	272	12	1 932	1 696
619/1600-M	1 690	1 600	2 060	200	9,5	1 914	1 752
60/1600-M	3 460	1 600	2 240	280	12	2 045	1 803
619/1700-M	1 980	1 700	2 180	212	9,5	2 027	1 859
F-809025.KL	1 960	1 700	2 180	212	7,5	2 036	1 847
60/1700-M	3 900	1 700	2 360	290	15	2 158	1 910
619/1800-M	2 250	1 800	2 300	218	9,5	2 144,9	1 960,5
60/1800-M	4 660	1 800	2 500	308	15	2 292	2 018
619/1900-M	2 660	1 900	2 430	230	12	2 265	2 072
Z-541682.KL	1 440	2 000	2 360	190	9,5	2 260	2 120



Mounting dimensions			Basic load ratings		Fatigue limit load C_{ur}	Factor f_0	Limiting speed n_G	Reference speed n_B
d_a min.	D_a max.	r_a max.	dyn. C_r	stat. C_{0r}				
			kN	kN	kN			min^{-1}
1 523	1 727	5	510	1 290	20,6	15,4	670	–
1 528	1 792	6	1 160	3 750	55	15,8	670	–
1 528	1 792	6	1 160	3 750	55	15,8	670	315
1 528	1 792	6	1 160	3 750	55	15,8	670	315
1 534	1 916	8	1 830	6 300	87	16,2	630	310
1 542	2 078	10	2 600	9 300	130	16,3	600	300
1 634	2 026	8	1 900	6 800	95	16,2	600	285
1 642	2 198	10	2 800	10 600	140	16,4	560	280
1 734	2 146	8	2 000	7 350	94	16,1	560	270
1 728	2 152	6	2 160	8 000	104	16,2	560	260
1 750	2 310	12	2 900	11 200	147	16,4	530	260
1 842	2 258	10	2 200	8 300	105	16,2	560	249
1 850	2 450	12	3 350	13 400	167	16,3	530	240
1 942	2 388	10	2 400	9 500	118	16,2	530	233
2 034	2 326	8	1 460	5 600	61	15,6	530	–



Angular contact ball bearings

Single row
Double row

Angular contact ball bearings

Single row angular contact ball bearings

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In single row angular contact ball bearings, the raceways are arranged such that the forces are transmitted from one raceway to the other at a specific contact angle (oblique to the radial plane).

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.

Single row angular contact ball bearings with standardised main dimensions and standardised designations to DIN 628-1 are used, for example, in gearboxes, rolling mills and electrical machinery.

Special bearings with non-standardised designations (Z-5..SKL or F-8..SKL) and main dimensions are also available.

Such bearings with an extended inner ring are used, for example, as axial bearings for oil film bearings.

Double row angular contact ball bearings

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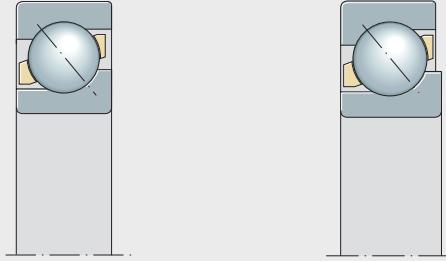
Double row angular contact ball bearings are similar in design to a pair of single row angular contact ball bearings in an O arrangement or an X arrangement. In this case, the apexes of the cones formed by the ball pressure lines point outwards or inwards.

Double row bearings can support radial forces as well as axial forces in both directions and are particularly suitable for rigid axial guidance arrangements.

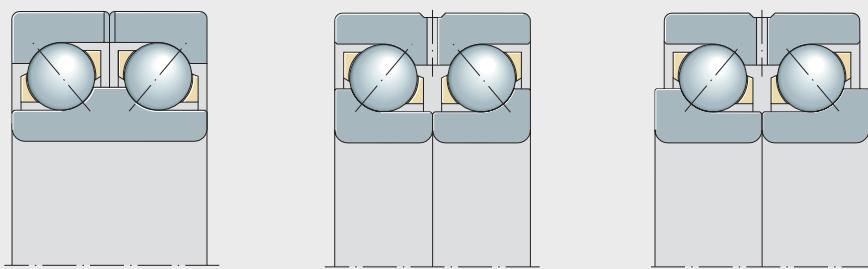
All the double row angular contact ball bearings described here are special bearings with non-standardised main dimensions and designations (Z-5..SKL).

Bearings with a split outer ring (X arrangement) or a split inner ring (O arrangement) are used, for example, as axial bearings in wire rolling mills.

Bearings in an O arrangement with an extended inner ring are frequently used as axial bearings for oil film bearings.

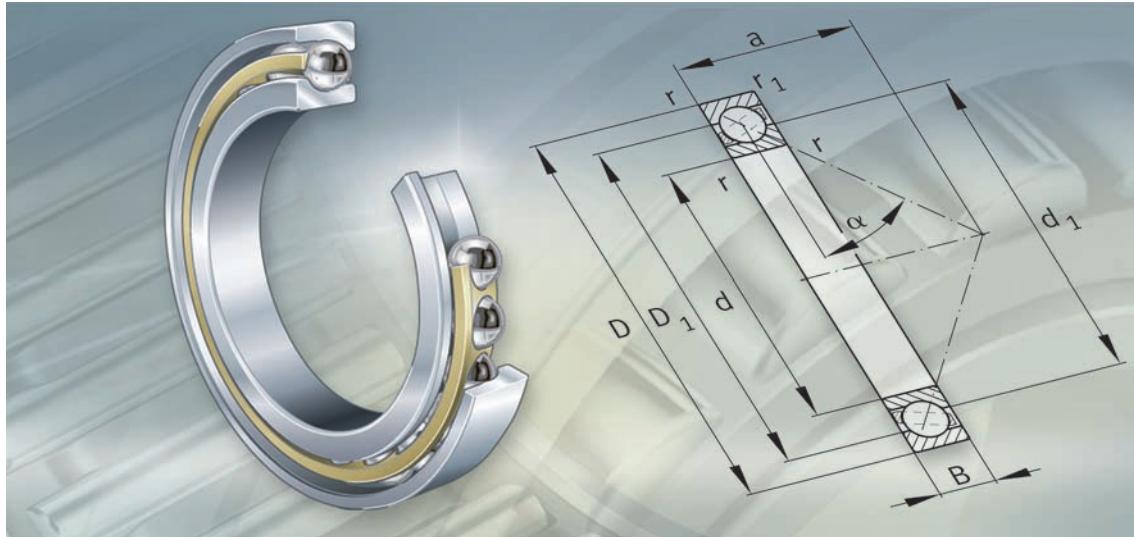


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00014D85

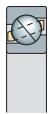
FAG



Single row angular contact ball bearings

Single row angular contact ball bearings

	Page
Product overview	Single row angular contact ball bearings 222
Features	Radial and axial load capacity 223 Universal design 223 Matched bearings 223 Sealing 224 Lubrication 224 Operating temperature 224 Cages 224 Suffixes 224
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Accuracy	Tolerances for universal designs and for matched bearings 229 Axial internal clearance or preload of universal design 230
Dimension tables	Angular contact ball bearings, single row 232



Product overview Single row angular contact ball bearings

Single row

Contact angle $\alpha = 40^\circ$
Contact angle $\alpha = 30^\circ$

70..-B, 72..-B, 73..-B,
Z-5..SKL1-01, F-8..SKL1-01



708, 709, 718, 719, 70,
Z-5..SKL1-02, F-8..SKL1-02



With extended inner ring
Contact angle $\alpha = 40^\circ$

Z-5..SKL1-03



Single row angular contact ball bearings



Features

Single row angular contact ball bearings are, with a few exceptions, self-retaining units with solid inner and outer rings and ball and cage assemblies with cages. The raceways of the inner and outer rings are offset from each other along the bearing axis.

The angular adjustment facility of these bearings is very limited.

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. Bearings with a contact angle 40° have a higher axial load carrying capacity than those with a contact angle 30°.

Universal design

Single row angular contact ball bearings of the 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 slight axial internal clearance, the suffix UL indicates slight preload and the 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.

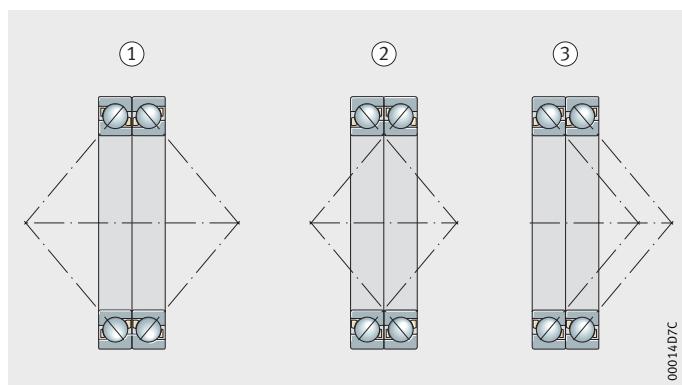
Matched bearings

Sets without an intermediate ring are available in an O arrangement (DB), X arrangement (DF) or tandem arrangement (DT), *Figure 1*.

When ordering bearings, the number of sets must be stated, not the number of individual bearings.

- ① O arrangement, DB
- ② X arrangement, DF
- ③ Tandem arrangement, DT

Figure 1
Matched sets



00014D7C

Single row angular contact ball bearings

Sealing	The bearings are not sealed.
Lubrication	Single row angular contact ball bearings can be lubricated with grease or oil.
Operating temperature	<p>Angular contact ball bearings without seals can be used at operating temperatures from -30°C to $+150^{\circ}\text{C}$.</p> <p>Bearings with a diameter $D > 240\text{ mm}$ are dimensionally stable up to $+200^{\circ}\text{C}$.</p>

Cages	<p>Angular contact ball bearings with ball-guided solid window cages made from brass have, in the case of bearings of standardised series, the suffix MP.</p> <p>The suffixes MPA or MPB(S) indicate bearings with a solid window cage made from brass that is guided on the outer ring or inner ring.</p> <p>In the case of bearings with non-standardised designations (Z-5..SKL or F-8..SKL), an enquiry can be placed with us for the cage design.</p>
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Suffixes	Suffixes for the available designs of standard bearings: see table.
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Available designs

Available designs	Suffix ¹⁾	Description	Design
	B	Modified internal construction	Standard
	DB	Two angular contact ball bearings in O arrangement, matched clearance-free	Special design, available by agreement only
	DF	Two angular contact ball bearings in X arrangement, matched clearance-free	
	DT	Two angular contact ball bearings in tandem arrangement, matched	
	MP	Solid brass cage	Standard
	MPA	Solid brass cage, guided on outer ring	Special design, available by agreement only
	MPB	Solid brass cage, guided on inner ring	
	MPBS	Solid brass cage, guided on inner ring, with lubrication slots	
	P5	Bearings in tolerance class P5	
	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	
	UO	Universal design for fitting in pairs, bearing pair is clearance-free in O and X arrangement	

¹⁾ In the case of angular contact ball bearings with non-standardised designations, the design (for example cage, accuracy) is specified in the designation (Z-5 or F-8). In the case of these bearings, additional suffixes are only used for deviations from the original design.

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, *Figure 2*, *Figure 3* and table Load ratio and axial bearing load, page 226.

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 a load F_{rB} .
- F is an external axial force acting on bearing A.

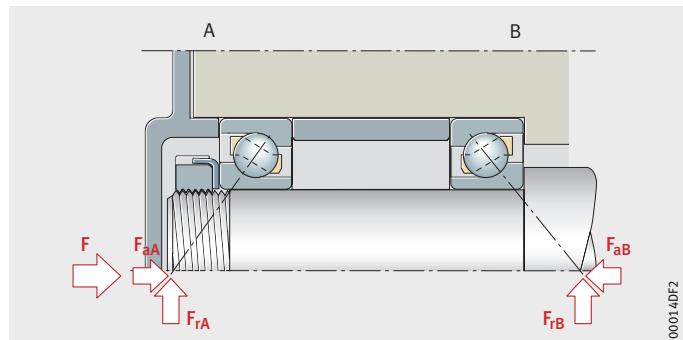


Figure 2
Bearings in O arrangement

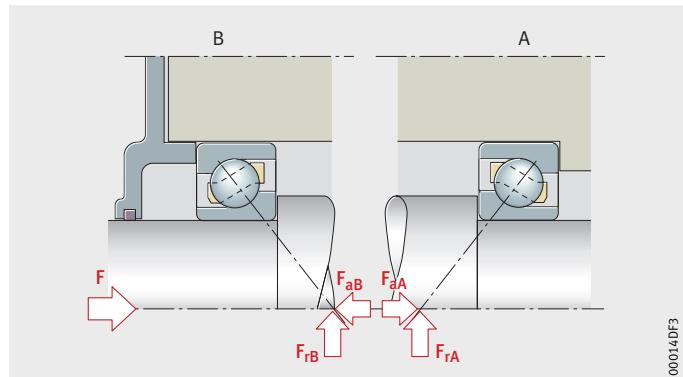


Figure 3
Bearings in X arrangement

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 with a contact angle 40° ($e = 1,14$), $Y = 0,57$ is used in the formulae, for bearings with a contact angle 30° ($e = 0,8$) the value to be used is $Y = 0,76$.

Equivalent dynamic bearing load

Contact angle 40°

The equivalent dynamic load P is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

For bearings under dynamic loading, the following applies:

Arrangement of bearings	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 bearings,
see table Load ratio and axial bearing load.

P kN
Equivalent dynamic bearing load for combined load

F_a kN
Axial dynamic bearing load

F_r kN
Radial dynamic bearing load.

Contact angle 30°

For bearings under dynamic loading, the following applies:

Arrangement of bearings	Load ratio	Equivalent dynamic bearing load
Single bearing ¹⁾	$\frac{F_a}{F_r} \leq 0,8$	$P = F_r$
	$\frac{F_a}{F_r} > 0,8$	$P = 0,39 \cdot F_r + 0,76 \cdot F_a$
Bearing pair in O or X arrangement	$\frac{F_a}{F_r} \leq 0,8$	$P = F_r + 0,78 \cdot F_a$
	$\frac{F_a}{F_r} > 0,8$	$P = 0,63 \cdot F_r + 1,24 \cdot F_a$

¹⁾ Calculation of axial force for single bearings,
see table Load ratio and axial bearing load, page 226.

P kN

Equivalent dynamic bearing load for combined load

F_a kN

Axial dynamic bearing load

F_r kN

Radial dynamic bearing load.



Equivalent static bearing load

The equivalent static load P_0 is valid for bearings that are subjected to radial and axial static loads. It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

For bearings under static loading, the following applies:

Contact angle 40°

Arrangement of bearings	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 kN

Equivalent static bearing load for combined load

F_{0a} kN

Axial static bearing load

F_{0r} kN

Radial static bearing load.

Single row angular contact ball bearings

Contact angle 30°

Arrangement of bearings	Load ratio	Equivalent static load
Single bearing	$\frac{F_{0a}}{F_{0r}} \leq 1,5$	$P_0 = F_{0r}$
	$\frac{F_{0a}}{F_{0r}} > 1,5$	$P_0 = 0,5 \cdot F_{0r} + 0,33 \cdot F_{0a}$
Bearing pair in O or X arrangement	–	$P_0 = F_{0r} + 0,66 \cdot F_{0a}$

P_0 kN

Equivalent static bearing load for combined load

F_{0a} kN

Axial static bearing load

F_{0r} kN

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, ball bearings with cage must therefore be subjected to a minimum radial load of the order of $P/C_r > 0,01$.

Speeds

For standardised bearings, the dimension tables give the limiting speeds n_G and reference speeds n_B , while only the limiting speeds are given for the other bearings.



The limiting speeds n_G in the dimension tables must not be exceeded.

Bearings of universal design

Bearings with the suffix UA, UL or 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.



Design

of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

Mounting dimensions

The bearing tables give the maximum dimensions of the radii r_a and r_{a1} and the diameters of the abutment shoulders D_a , D_b and d_a .

Accuracy

Angular contact ball bearings with standardised main dimensions correspond to DIN 628-1.

The dimensional and geometrical tolerances of the standardised bearings correspond to tolerance class PN to DIN 620-2.

We can provide the tolerances of the non-standardised bearings in response to an enquiry.

Tolerances for universal designs and for matched bearings

In addition to normal tolerance (no tolerance suffix), angular contact ball bearings of the universal design UA, UL or UO are also available by agreement in the tolerance class P5 (suffix P5-UL or P5-UA).

Exceptions: 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:

Tolerance for ring width

Bore d mm		Width deviation Δ_{Bs} μm			
over	incl.	PN		P5	
		min.	max.	min.	max.
120	180	0	-500	0	-380
180	315	0	-500	0	-500
315	400	0	-630	0	-630

Single row angular contact ball bearings

Axial internal clearance or preload of universal design

Axial internal clearance or preload of series 70..-B, 72..-B and 73..-B of universal design, in pairs in an X or O arrangement, see table.

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 and preload

Bore code	Axial internal clearance or preload of bearing pair Nominal dimension μm					Preload $F_{v\ max}$ N	
	UA	UO	UL			UL	
	70..-B, 72..-B, 73..-B		70..-B	72..-B	73..-B	70..-B	72..-B
Tolerance classes							
	PN, P6, P5		P5	P5	P5	P5	P5
30	60	0	-	-13	-18	-	1723 2 500
32	60	0	-	-13	-18	-	1815 2 769
34	70	0	-	-14	-19	-	2038 3 115
36	75	0	-	-14	-19	-	2115 3 192
38	80	0	-	-14	-19	-	2 308 3 308
40	90	0	-	-13	-20	-	2 462 3 577
44	100	0	-	-16	-21	-	2 808 4 077
48	110	0	-	-15	-20	-	3 350 4 650
52	120	0	-	-18	-24	-	3 750 5 100
56	130	0	-	-18	-23	-	3 900 5 600
60	145	0	-	-17	-23	-	4 300 5 850
64	160	0	-	-19	-22	-	4 650 6 000

Tolerances for axial internal clearance or preload

Tolerances for axial internal clearance or preload of unfitted pairs of angular contact ball bearings of universal design in an X or O arrangement, see table.

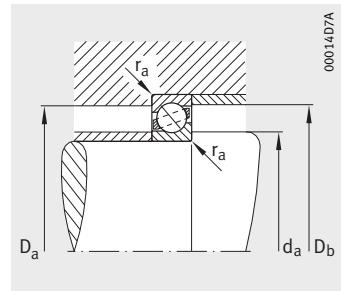
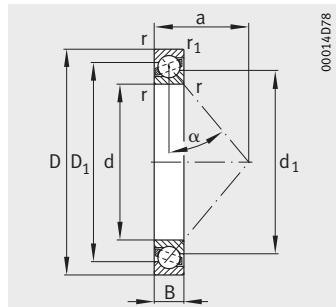
Tolerances in μm

Bore code	70..-B, 72..-B		73..-B	
	Tolerance classes			
	PN, P6	P5	PN, P6	P5
12 to 36	+12	+10	+12	+10
38 to 64	+16	+14	+16	+14



Angular contact ball bearings

Single row



Mounting dimensions

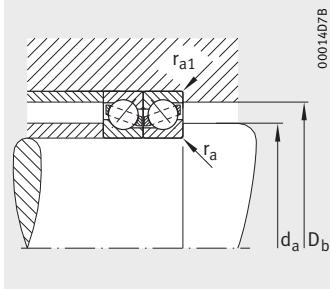
Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions									
		d	D	B	r min.	r ₁ min.	D ₁	d ₁	a	α	
7330-B-MP	24,8	150	320	65	4	1,5	255,8	218,3	131	40	
7332-B-MP	29	160	340	68	4	1,5	270	231	139	40	
7334-B-MP	34,4	170	360	72	4	1,5	290,9	249	147	40	
7236-B-MP	17,5	180	320	52	4	1,5	265,8	237,4	131	40	
7336-B-MP	39,9	180	380	75	4	1,5	303	259	155	40	
7238-B-MP	21,1	190	340	55	4	1,5	281	250	139	40	
7338-B-MP	45,9	190	400	78	5	2	318	273	163	40	
7240-B-MP	25,6	200	360	58	4	1,5	297	264	146	40	
7340-B-MP	52,2	200	420	80	5	2	336,6	288,9	170	40	
7044-B-MP	17,2	220	340	56	3	1,1	293,8	269	109	40	
Z-576434.SKL ¹⁾	18,2	220	340	56	3	1,1	293,7	—	109	40	
7044-MP	17,3	220	340	56	3	1,1	292	268	109	30	
7244-B-MP	35,1	220	400	65	4	1,5	329,5	294,5	163	40	
7344-B-MP	68,3	220	460	88	5	2	365,7	315	187	40	
70948-MP	5,89	240	320	25	1,5	1	287	272,3	93	30	
71948-MP	7,21	240	320	38	2,1	1,1	288	271	100	30	
7048-B-MP	18,6	240	360	56	3	1,1	313,8	289,1	154	40	
7048-MP	18,6	240	360	56	3	1,1	317,2	285,6	115	30	
7248-B-MP	47,5	240	440	72	4	1,5	361	320	179	40	
7348-B-MP	87,1	240	500	95	5	2	397	343	203	40	
Z-507342.01.SKL ²⁾	9,46	250	340	35 / 38 ³⁾	2,1	1,5	304	286	195	40	
70852-MP	3,45	260	320	19	1	0,6	295,7	284,3	93	30	
71852-MP	4,64	260	320	28	2	1	296	284	98	30	
70952-MP	10,1	260	360	31	2	1	320	300,3	105	30	
71952-MP	11,7	260	360	46	2,1	1,1	324,1	298,2	112	30	
7052-MP	27,5	260	400	65	4	1,5	349,3	313,7	128	30	
7252-B-MP	62,5	260	480	80	5	2	393	348	195	40	
7352-B-MP	109	260	540	102	6	3	431	371	219	40	

¹⁾ With MPB cage.

²⁾ With MP cage.

³⁾ The outer ring is 35 mm wide, the inner ring is 38 mm wide.



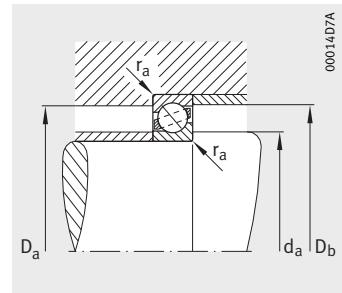
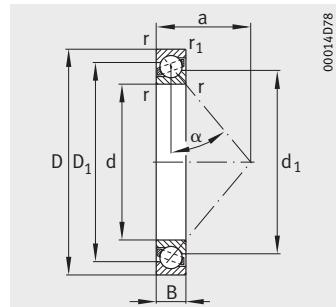
Mounting dimensions



Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	D _b	r _a	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	e	X	Y	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
167	303	311	3	1,5	325	390	1,14	0,35	0,57	0,26	14,2	3 800	2 200
177	323	331	3	1,5	360	450	1,14	0,35	0,57	0,26	15,1	3 600	2 040
187	343	351	3	1,5	405	530	1,14	0,35	0,57	0,26	18,1	3 200	1 840
197	303	311	3	1,5	275	345	1,14	0,35	0,57	0,26	12,1	3 600	2 290
197	363	371	3	1,5	415	560	1,14	0,35	0,57	0,26	18,4	3 000	1 760
207	323	331	3	1,5	300	390	1,14	0,35	0,57	0,26	13,2	3 200	2 140
210	380	389	4	2	430	600	1,14	0,35	0,57	0,26	18,7	2 800	1 680
217	343	351	3	1,5	320	430	1,14	0,35	0,57	0,26	14	3 000	2 010
220	400	409	4	2	465	655	1,14	0,35	0,57	0,26	20,4	2 800	1 560
232,4	327,6	334	2,5	1	255	355	1,14	0,35	0,57	0,26	11,5	3 000	2 080
232,4	327,6	334	2,5	1	255	355	1,14	0,35	0,57	0,26	11,5	3 000	–
232,4	327,6	334	2,5	1	285	390	0,8	0,39	0,76	0,33	12,8	3 000	–
237	383	391	3	1,5	365	530	1,14	0,35	0,57	0,26	16,5	2 800	1 790
240	440	449	4	2	530	780	1,14	0,35	0,57	0,26	23,4	2 800	1 400
247	313	315,4	1,5	1	125	186	0,8	0,39	0,76	0,33	6,5	3 000	–
250,2	309,8	314	2,1	1	190	260	0,8	0,39	0,76	0,33	8,9	3 000	–
252,4	347,6	354	2,5	1	270	390	1,14	0,35	0,57	0,26	12,2	2 800	1 890
252,4	347,6	354	2,5	1	300	430	0,8	0,39	0,76	0,33	13,7	2 800	–
257	423	431	3	1,5	440	670	1,14	0,35	0,57	0,26	22,3	2 800	1 520
260	480	489	4	2	600	950	1,14	0,35	0,57	0,26	29	2 600	1 220
260,2	333	333	2,1	1,5	186	255	1,14	0,35	0,57	0,26	7,9	2 800	–
264,6	315,4	316,8	1	0,6	76,5	125	0,8	0,39	0,76	0,33	3,8	3 000	–
268,8	311,2	315,4	2	1	122	190	0,8	0,39	0,76	0,33	6,3	3 000	–
268,8	351,2	355,4	2	1	186	270	0,8	0,39	0,76	0,33	8,8	2 800	–
270,2	349,8	354	2,1	1	255	375	0,8	0,39	0,76	0,33	11,9	2 800	–
274,6	385,4	393	3	1,5	365	560	0,8	0,39	0,76	0,33	16,7	2 800	–
280	460	469	4	2	490	765	1,14	0,35	0,57	0,26	21,7	2 600	1 460
286	514	526	5	2,5	655	1 060	1,14	0,35	0,57	0,26	30	2 400	1 140

Angular contact ball bearings

Single row



Mounting dimensions

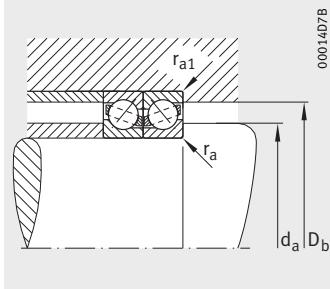
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions								
		d	D	B	r min.	r ₁ min.	D ₁	d ₁	a	α °
70856-MP	5,07	280	350	22	1,1	0,6	321,7	308,3	102	30
71856-MP	6,86	280	350	33	2	1	323,9	307,8	107	30
F-801617.01.SKL¹⁾	9,17	280	370	40	3	1,1	336	316,4	114	30
70956-MP	10,8	280	380	31	2	1	340	320,3	111	30
71956-MP	14,1	280	380	46	2,1	1,1	344	318,3	118	30
7056-MP	29,2	280	420	65	4	1,5	369,2	333,7	133	30
7256-B-MP	58,8	280	500	80	5	2	413	368	204	40
F-804601.SKL²⁾	134	280	579	108	6	3	460,5	400	234	40
7356-B-MP	134	280	580	108	6	3	464,5	402,5	234	40
Z-507343.01.SKL²⁾	13,6	285	380	46	2,1	1	342	323	150	40
F-800060.SKL³⁾	14,7	285	380	46	2,1	2,1	344,9	318,3	118	30
70860-MP	7,11	300	380	25	1,5	1	346,8	334,5	111	30
71860-MP	9,67	300	380	38	2,1	1,1	349,1	331	117	30
70960-MP	16,8	300	420	37	2,1	1	372	348	112	30
71960-MP	22,3	300	420	56	3	1,1	377,1	345,6	132	30
7060-B-MP	41,5	300	460	74	4	1,5	398,4	365,6	196	40
F-804853.SKL²⁾	41,4	300	460	74	4	1,5	398,4	365,6	196	40
7060-MP	41	300	460	74	4	1,5	402,9	360,6	147	30
7260-B-MP	83,8	300	540	85	5	2	444,5	397	219	40
7360-B-MP	157	300	620	109	7,5	4	493,5	428	247	40
70864-MP	7,6	320	400	25	1,5	1	366,7	353,3	116	30
71864-MP	10,3	320	400	38	2,1	1,1	368	351	123	30
70964-MP	17,7	320	440	37	2,1	1	392	368	128	30
71964-MP	23,6	320	440	56	3	1,1	397,1	365,6	138	30
7064-MP	46,9	320	480	74	4	1,5	417	383	152	30
7264-B-MP	104	320	580	92	5	2	476,5	425	235	40
7364-B-MP	193	320	670	112	7,5	4	529,4	467,6	264	40
Z-509091.01.SKL²⁾	23,6	335	450	56	2,1	1,5	402,5	382,5	193	40

¹⁾ With JP sheet steel cage.

²⁾ With MP cage.

³⁾ With MPA cage.



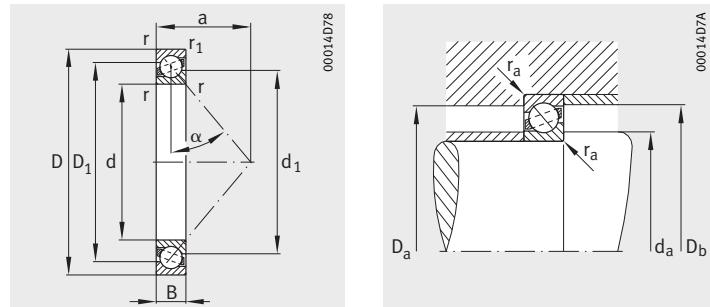
Mounting dimensions



Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	D _b	r _a	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	e	X	Y	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
286	344	346,8	1	0,6	100	163	0,8	0,39	0,76	0,33	5,2	2 800	–
288,8	341,2	345,4	2	1	163	250	0,8	0,39	0,76	0,33	8	2 800	–
292,4	357,6	364	2,5	1	245	365	0,8	0,39	0,76	0,33	11,2	1 700	–
288,8	371,2	375,4	2	1	190	285	0,8	0,39	0,76	0,33	8,9	2 800	–
290,2	369,8	374	2,1	1	260	400	0,8	0,39	0,76	0,33	12,3	2 800	–
294,6	405,4	413	3	1,5	375	600	0,8	0,39	0,76	0,33	17,2	2 600	–
300	480	489	4	2	500	830	1,14	0,35	0,57	0,26	22,7	2 400	1 350
306	554	566	5	2,5	735	1 270	1,14	0,35	0,57	0,26	37,5	2 000	–
306	554	566	5	2,5	735	1 270	1,14	0,35	0,57	0,26	33	2 000	1 040
295	370	290	2,1	1	196	285	1,14	0,35	0,57	0,26	8,9	2 800	–
290,2	369,8	374	2,1	2,1	260	400	0,8	0,39	0,76	0,33	12,3	2 800	–
307	373	375,4	1,5	1	104	176	0,8	0,39	0,76	0,33	5,4	2 800	–
310,2	369,8	374	2,1	1	204	315	0,8	0,39	0,76	0,33	9,6	2 800	–
310,2	409,8	415,4	2,1	1	245	375	0,8	0,39	0,76	0,33	11,1	2 600	–
312,4	407,6	414	2,5	1	325	530	0,8	0,39	0,76	0,33	15,6	2 600	–
314,6	445,4	453	3	1,5	390	655	1,14	0,35	0,57	0,26	17,7	2 400	1 450
314,6	445,4	453	3	1,5	390	655	1,14	0,35	0,57	0,26	17,7	2 400	–
314,6	445,4	453	3	1,5	430	720	0,8	0,39	0,76	0,33	19,6	2 400	–
320	520	529	4	2	560	965	1,14	0,35	0,57	0,26	26	2 200	1 210
332	588	603	6	3	750	1 370	1,14	0,35	0,57	0,26	35	1 900	940
327	393	395,4	1,5	1	106	186	0,8	0,39	0,76	0,33	5,5	2 600	–
330,2	389,8	394	2,1	1	212	335	0,8	0,39	0,76	0,33	10	2 600	–
330,2	429,8	435,4	2,1	1	245	380	0,8	0,39	0,76	0,33	11,1	2 400	–
332,4	427,6	434	2,5	1	340	570	0,8	0,39	0,76	0,33	16,4	2 400	–
334,6	465,4	473	3	1,5	440	765	0,8	0,39	0,76	0,33	20,2	2 400	–
340	560	569	4	2	610	1 100	1,14	0,35	0,57	0,26	28,5	1 900	1 120
352	638	653	6	3	780	1 500	1,14	0,35	0,57	0,26	36,5	1 800	860
345	440	443	2,1	1,5	255	405	1,14	0,35	0,57	0,26	11	2 400	–

Angular contact ball bearings

Single row



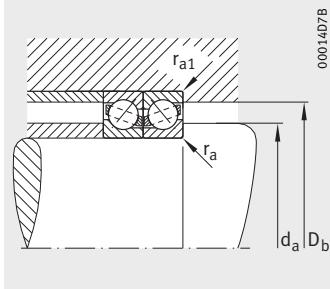
Mounting dimensions

Dimension table (continued) · Dimensions in mm

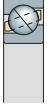
Designation	Mass m ≈kg	Dimensions								
		d	D	B	r min.	r ₁ min.	D ₁	d ₁	a	α °
70868-MP	8,02	340	420	25	1,5	1	386,7	373,3	122	30
71868-MP	10,8	340	420	38	2,1	1,1	390,7	370,9	129	30
70968-MP	18,6	340	460	37	2,1	1	412	388	134	30
71968-MP	22,7	340	460	56	3	1,1	415	385,3	144	30
7068-B-MP	62,8	340	520	82	5	2	450,5	413,9	221	40
7068-MP	63	340	520	82	5	2	448	412	165	30
7268-B-MP	123	340	620	92	6	3	506,5	455	247	40
7368-B-MPB	218	340	710	118	7,5	4	557,5	492,2	279	40
70872-MP	8,45	360	440	25	1,5	1	406,7	393,3	128	30
71872-MP	11,5	360	440	38	2,1	1,1	408	391	134	30
70972-MP	19,6	360	480	37	2,1	1	432	408	140	30
71972-MP	23	360	480	56	3	1,1	437,1	405,7	149	30
7072-B-MP	61,6	360	540	82	5	2	470,5	433,9	230	40
7072-MP	61,1	360	540	82	5	2	475,5	428,4	171	30
7272-B-MP	138	360	650	95	6	3	534,4	481,6	259	40
7372-B-MPB	280	360	750	125	7,5	4	588,5	520,7	295	40
70876-MP	13,8	380	480	31	2	1	438,7	421,3	140	30
71876-MP	18,6	380	480	46	2,1	1,1	443,6	418,7	147	30
F-804862.SKL¹⁾	17	380	480	50	2,1	1,1	446	416,5	147	30
70976-MP	29	380	520	44	3	1,1	464,5	435,6	152	30
Z-509092.01.SKL²⁾	39,8	380	520	65	2,5	2,5	465,4	438	221	40
71976-MP	41,7	380	520	65	4	1,5	468	432	162	30
7076-MP	69,1	380	560	82	5	2	488	452	177	30
7276-B-MP	152	380	680	95	6	3	557,5	504	270	40
7376-B-MP	314	380	780	128	7,5	4	614,8	544,7	307	40
70880-MP	14,7	400	500	31	2	1	458,7	441,3	145	30
71880-MP	20,4	400	500	46	2,1	1,1	462,4	437,6	153	30
70980-MP	30,3	400	540	44	3	1,1	484,5	455,6	158	30
71980-MP	39,4	400	540	65	4	1,5	488	452	168	30
7080-MP	83,3	400	600	90	5	2	520	480	189	30
7280-B-MPB	188	400	720	103	6	3	592,9	533,8	286	40
7380-B-MP	369	400	820	136	7,5	4	647	572,7	324	40
Z-509093.01.SKL²⁾	47,5	410	560	70	3,5	3,5	499,7	470,3	239	40

¹⁾ Full complement.

²⁾ With MP cage.



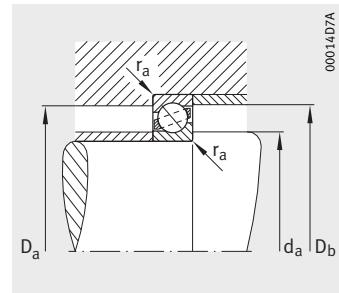
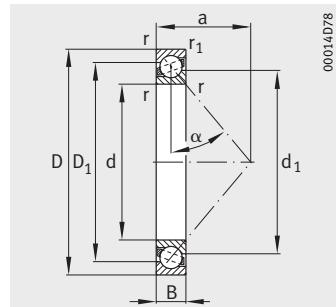
Mounting dimensions



Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	D _b	r _a	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	e	X	Y	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
347	413	415,4	1,5	1	108	196	0,8	0,39	0,76	0,33	5,6	2 400	–
350,2	409,8	414	2,1	1	212	345	0,8	0,39	0,76	0,33	10,2	2 400	–
350,2	449,8	455,4	2,1	1	250	405	0,8	0,39	0,76	0,33	11,3	2 400	–
352,4	447,6	454	2,5	1	340	570	0,8	0,39	0,76	0,33	18,1	2 400	–
358	502	511,2	4	2	465	850	1,14	0,35	0,57	0,26	22,8	2 000	–
358	502	511,2	4	2	520	930	0,8	0,39	0,76	0,33	27,5	2 000	–
366	594	606	5	2,5	630	1 180	1,14	0,35	0,57	0,26	31,5	1 800	1 000
372	678	693	6	3	865	1 700	1,14	0,35	0,57	0,26	40,5	1 600	790
367	433	435,4	1,5	1	110	204	0,8	0,39	0,76	0,33	5,7	2 400	–
370,2	429,8	434	2,1	1	216	365	0,8	0,39	0,76	0,33	10,3	2 400	–
370,2	469,8	475,4	2,1	1	255	425	0,8	0,39	0,76	0,33	11,6	2 200	–
372,4	467,6	474	2,5	1	345	600	0,8	0,39	0,76	0,33	16,8	2 200	–
378	522	531,2	4	2	475	880	1,14	0,35	0,57	0,26	23,4	1 900	1 130
378	522	531,2	4	2	530	980	0,8	0,39	0,76	0,33	26	1 900	–
386	624	636	5	2,5	695	1 340	1,14	0,35	0,57	0,26	34,5	1 600	920
392	718	733	6	3	900	1 830	1,14	0,35	0,57	0,26	43,5	1 500	740
388,8	471,2	475,4	2	1	166	290	0,8	0,39	0,76	0,33	8	2 000	–
390,2	469,8	474	2,1	1	285	490	0,8	0,39	0,76	0,33	13,5	2 000	–
390,2	469,8	474	2,1	1	360	640	0,8	0,39	0,76	0,33	17,5	1 300	–
392,4	507,6	514	2,5	1	320	560	0,8	0,39	0,76	0,33	15	1 900	–
390	510	510	2,5	2,5	355	630	1,14	0,35	0,57	0,26	16,1	1 900	–
394,6	505,4	513	3	1,5	400	720	0,8	0,39	0,76	0,33	19,6	1 900	–
398	542	551,2	4	2	540	1 040	0,8	0,39	0,76	0,33	25,5	1 900	–
406	654	666	5	2,5	710	1 430	1,14	0,35	0,57	0,26	34,5	1 600	870
412	748	763	6	3	950	1 960	1,14	0,35	0,57	0,26	45	1 400	750
408,8	491,2	495,4	2	1	170	310	0,8	0,39	0,76	0,33	8,3	1 900	–
410,2	489,8	494	2,1	1	290	510	0,8	0,39	0,76	0,33	14,5	1 900	–
412,4	527,6	534	2,5	1	325	585	0,8	0,39	0,76	0,33	15,5	1 900	–
414,6	525,4	533	3	1,5	415	765	0,8	0,39	0,76	0,33	20,3	1 900	–
418	582	591,2	4	2	600	1 180	0,8	0,39	0,76	0,33	29,5	1 800	–
426	694	706	5	2,5	765	1 600	1,14	0,35	0,57	0,26	36,5	1 500	830
432	788	803	6	3	1 020	2 200	1,14	0,35	0,57	0,26	50	1 400	700
423	547	547	3,5	3,5	380	695	1,14	0,35	0,57	0,26	21	1 800	–

Angular contact ball bearings

Single row



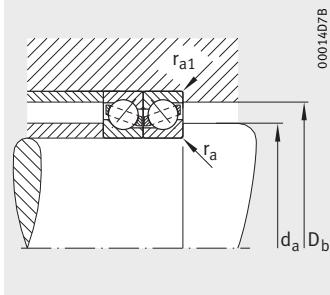
Mounting dimensions

Dimension table (continued) · Dimensions in mm

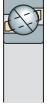
Designation	Mass m ≈kg	Dimensions								
		d	D	B	r min.	r ₁ min.	D ₁	d ₁	a	α °
70884-MP	15,4	420	520	31	2	1	478,7	461,3	151	30
71884-MP	20,3	420	520	46	2,1	1,1	483,7	458,4	159	30
70984-MP	31,6	420	560	44	3	1,1	504,5	475,6	164	30
71984-MP	41,4	420	560	65	4	1,5	508,2	474,6	174	30
7084-MP	86,8	420	620	90	5	2	540	500	195	30
7284-B-MPB	228	420	760	109	7,5	4	619	560,7	302	40
7384-B-MP	395	420	850	136	9,5	5	672	597,7	334	40
70888-MP	16	440	540	31	2	1	498,7	481,3	157	30
71888-MP	21,3	440	540	46	2,1	1,1	502,4	477,6	164	30
F-803794.SKL¹⁾	17,3	440	540	46	2,1	0,6	502	481	164	30
F-808756.SKL²⁾	45,3	440	580	70	4	1,5	530,9	493	184	30
70988-MP	42,2	440	600	50	4	1,5	538,5	503,5	175	30
Z-509094.01.SKL²⁾	56,9	440	600	74	3,5	3,5	540	500	255	40
71988-MP	56,9	440	600	74	4	1,5	540	500	187	30
7088-MP	102	440	650	94	6	3	566,5	523	204	30
7288-B-MP	255	440	790	112	7,5	4	645,5	584,2	314	40
7388-B-MP	477	440	900	145	9,5	5	709	630,7	350	40
70892-MP	24,3	460	580	37	2,1	1,1	531,1	509	169	30
71892-MP	32,2	460	580	56	3	1,1	536,9	506	178	30
F-803705.SKL²⁾	37,2	460	600	50	3	1,1	535,4	507	178	30
70992-MP	44,6	460	620	50	4	1,5	558,5	523,5	181	30
71992-MP	53,9	460	620	74	4	1,5	560	520	193	30
7092-MP	115	460	680	100	6	3	600,1	544,5	214	30
7292-B-MPB	287	460	830	118	7,5	4	677,5	612,3	330	40
7392-B-MP	573	460	950	155	9,5	5	746	663,2	373	40
Z-510289.01.SKL²⁾	68,4	465	635	76	3,5	3,5	565,5	533,5	269	40
70896-MP	25,2	480	600	37	2,1	1,1	551,1	529	174	30
71896-MP	33,9	480	600	56	3	1,1	556,8	526	184	30
70996-MP	54,3	480	650	54	4	1,5	582	548	190	30
71996-MP	73,6	480	650	78	5	2	586	544,7	202	30
7096-MP	129	480	700	100	6	3	613	567	220	30
7296-B-MPB	348	480	870	125	7,5	4	710	640,2	346	40
7396-B-MP	618	480	980	160	9,5	5	773,5	686,2	386	40

¹⁾ With JP sheet steel cage.

²⁾ With MP cage.



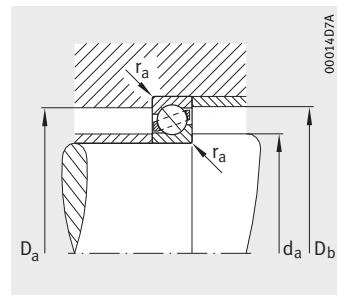
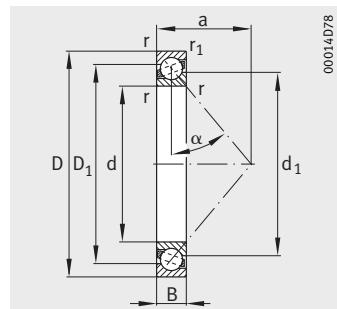
Mounting dimensions



Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	D _b	r _a	r _{a1}	dyn. C _r	stat. C _{0r}	e	X	Y	Y ₀	C _{ur}	n _G	n _B
min.	max.	max.	max.	max.	kN	kN					kN	min ⁻¹	min ⁻¹
428,8	511,2	515,4	2	1	173	320	0,8	0,39	0,76	0,33	8,4	1 900	–
430,2	509,8	514	2,1	1	300	550	0,8	0,39	0,76	0,33	14,2	1 900	–
432,4	547,6	554	2,5	1	335	620	0,8	0,39	0,76	0,33	15,9	1 800	–
434,6	545,4	553	3	1,5	415	780	0,8	0,39	0,76	0,33	20,5	1 800	–
438	602	611,2	4	2	620	1 250	0,8	0,39	0,76	0,33	30	1 600	–
452	728	743	6	3	800	1 730	1,14	0,35	0,57	0,26	38,5	1 400	790
460	810	830	8	4	1 060	2 360	1,14	0,35	0,57	0,26	53	1 300	630
448,8	531,2	535,4	2	1	176	335	0,8	0,39	0,76	0,33	8,6	1 800	–
450,2	529,8	534	2,1	1	300	550	0,8	0,39	0,76	0,33	14,4	1 800	–
450,2	529,8	534	2,1	0,6	345	640	0,8	0,39	0,76	0,33	16,5	1 100	–
454,6	565,4	573	3	1,5	475	930	0,8	0,39	0,76	0,33	23,6	1 600	–
454,6	585,4	593	3	1,5	405	780	0,8	0,39	0,76	0,33	19,4	1 600	–
453	587	587	3,5	3,5	440	865	1,14	0,35	0,57	0,26	23,9	1 600	–
454,6	585,4	593	3	1,5	500	1 000	0,8	0,39	0,76	0,33	24,7	1 600	–
463	627	637,6	5	5	655	1 370	0,8	0,39	0,76	0,33	31,5	1 500	–
472	758	773	6	3	850	1 860	1,14	0,35	0,57	0,26	40,5	1 400	850
480	860	880	8	4	1 160	2 650	1,14	0,35	0,57	0,26	55	1 200	600
470,2	569,8	574	2,1	1	250	465	0,8	0,39	0,76	0,33	11,5	1 600	–
472	568	574	2,5	1	380	735	0,8	0,39	0,76	0,33	18,6	1 600	–
472	568	574	2,5	1	375	720	0,8	0,39	0,76	0,33	17,9	1 600	–
474,6	605,4	613	3	1,5	415	800	0,8	0,39	0,76	0,33	19,5	1 500	–
474,6	605,4	613	3	1,5	500	1 020	0,8	0,39	0,76	0,33	25	1 500	–
483	657	667,6	5	2,5	710	1 500	0,8	0,39	0,76	0,33	37	1 400	–
492	798	813	6	3	930	2 120	1,14	0,35	0,57	0,26	45	1 300	690
500	910	930	8	4	1 250	3 000	1,14	0,35	0,57	0,26	62	1 200	560
478	622	622	3,5	3,5	450	900	1,14	0,35	0,57	0,26	20,9	1 500	–
490,2	589,8	594	2,1	1	255	480	0,8	0,39	0,76	0,33	11,7	1 500	–
492,4	587,6	594	2,5	1	390	765	0,8	0,39	0,76	0,33	19,1	1 500	–
494,6	635,4	643	3	1,5	430	865	0,8	0,39	0,76	0,33	21,1	1 500	–
498	632	641,2	4	2	540	1 100	0,8	0,39	0,76	0,33	26	1 500	–
503	677	687,6	5	2,5	720	1 600	0,8	0,39	0,76	0,33	35	1 400	–
512	838	853	6	3	1 040	2 400	1,14	0,35	0,57	0,26	51	1 200	750
520	940	960	8	4	1 290	3 050	1,14	0,35	0,57	0,26	63	1 100	560

Angular contact ball bearings

Single row



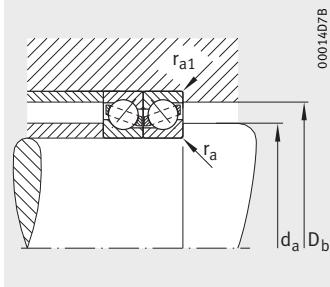
Mounting dimensions

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions								
		d	D	B	r min.	r ₁ min.	D ₁	d ₁	a	α °
708/500-MP	26,2	500	620	37	2,1	1,1	571,1	549	190	30
718/500-MP	35,1	500	620	56	3	1,1	576,8	546	190	30
709/500-MP	56,1	500	670	54	4	1,5	602	568	196	30
719/500-MP	72	500	670	78	5	2	606	564,7	208	30
70/500-MP	133	500	720	100	6	3	633	587	226	30
72/500-B-MPB	431	500	920	136	7,5	4	747	672,7	366	40
73/500-B-MPB	731	500	1 030	170	12	6	810,5	719,2	406	40
Z-556716.SKL¹⁾	14,7	530	600	35	2	1	572,5	557,5	181	30
708/530-MP	27,6	530	650	37	2,1	1,1	601,1	579	189	30
718/530-MP	37,2	530	650	56	3	1,1	606,7	576	198	30
709/530-MP	66,6	530	710	57	4	1,5	639	601	208	30
719/530-MP	84,9	530	710	82	5	2	645,3	598,7	220	30
70/530-MPB	180	530	780	112	6	3	691,3	624,6	245	30
72/530-B-MPB	524	530	980	145	9,5	5	794	715,7	389	40
708/560-MP	25,8	560	680	37	2,1	1,1	631,1	609	198	30
Z-560752.SKL¹⁾	28,9	560	680	42	3,5	2	631,1	609	200	30
718/560-MP	30,1	560	680	56	3	1,1	636,8	606	207	30
709/560-MP	78,1	560	750	60	5	2	675	635	219	30
719/560-MP	98,2	560	750	85	5	2	681	632,2	232	30
70/560-MPB	207	560	820	115	6	3	726,7	658,1	257	30
72/560-B-MPB	595	560	1 030	150	9,5	5	836,5	753,7	409	40
708/600-MP	37,7	600	730	42	3	1,1	676,7	655,3	213	30
Z-560519.SKL²⁾	41,4	600	730	45	2,7	2,7	676,7	655,3	213	30
718/600-MP	49,1	600	730	60	3	1,1	681,5	651,3	222	30
709/600-MP	92,2	600	800	63	5	2	721	679	234	30
719/600-MP	122	600	800	90	5	2	727,5	676	247	30
70/600-MPB	232	600	870	118	6	3	763	706,5	271	30
72/600-B-MPB	686	600	1 090	155	9,5	5	886,5	803,7	432	40

¹⁾ Separable bearing with MP cage.

²⁾ Separable bearing with MPBS cage.



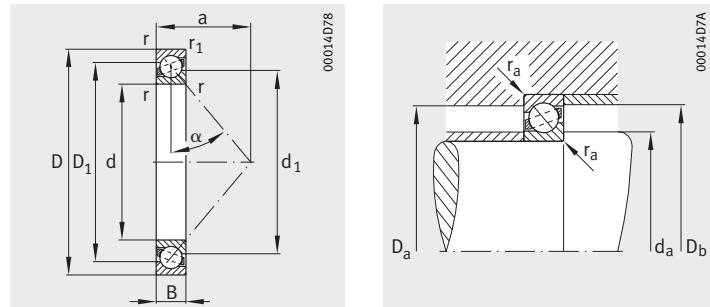
Mounting dimensions



Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	D _b	r _a	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	e	X	Y	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
510,2	609,8	614	2,1	1	260	500	0,8	0,39	0,76	0,33	12	1 500	–
512,4	607,6	614	2,5	1	390	780	0,8	0,39	0,76	0,33	19,1	1 500	–
514,6	655,4	663	3	1,5	440	900	0,8	0,39	0,76	0,33	21,2	1 400	–
518	652	661,2	4	2	550	1 180	0,8	0,39	0,76	0,33	27	1 400	–
523	697	707,6	5	2,5	735	1 660	0,8	0,39	0,76	0,33	35,5	1 400	–
532	888	903	6	3	1 120	2 700	1,14	0,35	0,57	0,26	57	1 200	700
548	982	1 004	10	5	1 370	3 400	1,14	0,35	0,57	0,26	67	1 100	530
538,8	591,2	595,4	2	1	134	280	0,8	0,39	0,76	0,33	6,6	1 500	–
540,2	639,8	644	2,1	1	265	520	0,8	0,39	0,76	0,33	12,3	1 400	–
542,4	637,6	644	2,5	1	405	830	0,8	0,39	0,76	0,33	19,8	1 400	–
544,6	695,4	703	3	1,5	500	1 080	0,8	0,39	0,76	0,33	24,5	1 400	–
548	692	701,2	4	2	610	1 340	0,8	0,39	0,76	0,33	31	1 400	–
553	757	767,6	5	2,5	850	1 960	0,8	0,39	0,76	0,33	42,5	1 300	–
570	940	960	8	4	1 220	3 050	1,14	0,35	0,57	0,26	60	1 100	670
570,2	669,8	674	2,1	1	270	550	0,8	0,39	0,76	0,33	12,6	1 400	–
574,6	665,4	671,2	3	2	270	550	0,8	0,39	0,76	0,33	15,2	1 400	–
572,4	667,6	674	2,5	1	405	865	0,8	0,39	0,76	0,33	20,1	1 400	–
578	732	741,2	4	2	540	1 200	0,8	0,39	0,76	0,33	26,5	1 300	–
578	732	741,2	4	2	655	1 460	0,8	0,39	0,76	0,33	32,5	1 300	–
583	797	807,6	5	2,5	930	2 280	0,8	0,39	0,76	0,33	47,5	600	–
600	990	1 010	8	4	1 320	3 400	1,14	0,35	0,57	0,26	67	1 000	630
612,4	717,6	724	2,5	1	335	735	0,8	0,39	0,76	0,33	16,2	1 300	–
612,4	717,6	724	3	3	315	670	0,8	0,39	0,76	0,33	14,9	1 300	–
612,4	717,6	724	2,5	1	465	1 040	0,8	0,39	0,76	0,33	22,4	1 300	–
618	782	791,2	4	2	560	1 290	0,8	0,39	0,76	0,33	28	1 200	–
618	782	791,2	4	2	710	1 700	0,8	0,39	0,76	0,33	35,5	1 200	–
623	847	857,6	5	2,5	980	2 400	0,8	0,39	0,76	0,33	48,5	1 100	–
640	1 050	1 070	8	4	1 340	3 600	1,14	0,35	0,57	0,26	68	950	600

Angular contact ball bearings

Single row

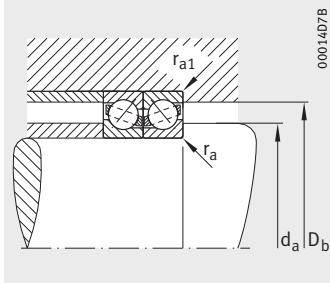


Mounting dimensions

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions								
		d	D	B	r min.	r ₁ min.	D ₁	d ₁	a	α °
708/630-MPB	55	630	780	48	3	1,1	719,8	687,5	228	30
718/630-MPB	71,7	630	780	69	4	1,5	726,4	685,9	238	30
709/630-MP	124	630	850	71	5	2	763,5	712,2	249	30
719/630-MP	168	630	850	100	6	3	768	701,5	264	30
70/630-MPB	297	630	920	128	7,5	4	805,5	742	288	30
72/630-B-MPB	784	630	1 150	165	12	6	938,9	849,7	456	40
708/670-MPB	51,6	670	820	48	3	1,1	759,8	727,5	239	30
718/670-MPB	76,2	670	820	69	4	1,5	766,1	725,9	250	30
709/670-MP	142	670	900	73	5	2	809	756,5	263	30
719/670-MPB	184	670	900	103	6	3	817	757,2	278	30
70/670-MPB	314	670	980	136	7,5	4	869,1	790	306	30
72/670-B-MPB	965	670	1 220	175	12	6	993	896,7	484	40
F-801245.SKL¹⁾	47,6	680	810	50	3	1,1	759,8	727,5	239	30
708/710-MPB	62,1	710	870	50	4	1,5	805,4	772	253	30
718/710-MPB	93,6	710	870	74	4	1,5	811,1	771	265	30
709/710-MP	167	710	950	78	5	2	855,5	800	279	30
719/710-MPB	181	710	950	106	6	3	861	792	293	30
70/710-MPB	403	710	1 030	140	7,5	4	903,5	835	321	30
72/710-B-MPB	1 080	710	1 280	180	12	6	1 045	944,7	507	40
708/750-MPB	80,9	750	920	54	4	1,5	851,1	816	273	30
718/750-MPB	110	750	920	78	5	2	857,5	814,9	280	30
709/750-MP	189	750	1 000	80	6	3	901	844	293	30
719/750-MP	216	750	1 000	112	6	3	907	836	309	30
70/750-MPB	485	750	1 090	150	7,5	4	956	884	341	30
72/750-B-MPB	1 340	750	1 360	195	15	7,5	1 107	1 002,7	540	40
708/800-MPB	99,2	800	980	57	4	1,5	907,4	869,4	285	30
718/800-MPB	131	800	980	82	5	2	914,1	868,5	298	30
709/800-MP	214	800	1 060	82	6	3	957	898,2	310	30
719/800-MP	242	800	1 060	115	6	3	964	885	326	30
70/800-MPB	547	800	1 150	155	7,5	4	1 012	938	339	30

¹⁾ With MPB cage.

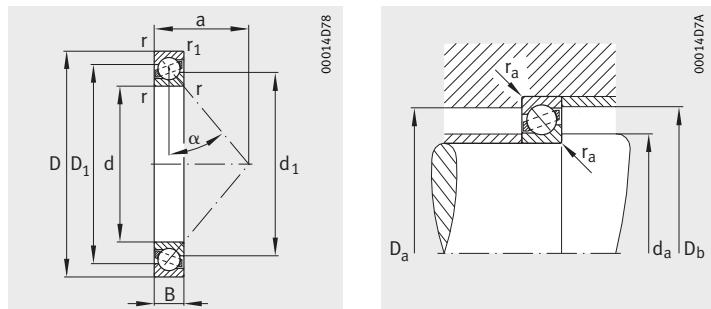


Mounting dimensions

Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a min.	D _a max.	D _b max.	r _a max.	r _{a1} max.	dyn. C _r kN	stat. C _{0r} kN	e	X	Y	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
642,4	767,6	774	2,5	1	390	865	0,8	0,39	0,76	0,33	18,4	1 200	–
644,6	765,4	773	3	1,5	540	1 250	0,8	0,39	0,76	0,33	27	1 200	–
648	832	841,2	4	2	670	1 630	0,8	0,39	0,76	0,33	33,5	1 100	–
653	827	837,6	5	2,5	780	1 860	0,8	0,39	0,76	0,33	39	1 100	–
658	892	905,4	6	3	1 080	2 800	0,8	0,39	0,76	0,33	54	1 100	–
678	1 102	1 124	10	5	1 430	4 000	1,14	0,35	0,57	0,26	74	900	530
682	808	814	2,5	1	400	915	0,8	0,39	0,76	0,33	18,9	1 100	–
684,6	805,4	813	3	1,5	560	1 340	0,8	0,39	0,76	0,33	28	1 100	–
688	882	891,2	4	2	695	1 730	0,8	0,39	0,76	0,33	35	1 100	–
693	877	888	5	2,5	850	2 120	0,8	0,39	0,76	0,33	42,5	1 100	–
698	952	965,4	6	3	1 200	3 200	0,8	0,39	0,76	0,33	61	1 000	–
718	1 172	1 194	10	5	1 600	4 550	1,14	0,35	0,57	0,26	83	850	500
692,4	797,6	804	2,5	1	400	915	0,8	0,39	0,76	0,33	18,9	1 100	–
724,6	855,4	863	3	1,5	430	1 020	0,8	0,39	0,76	0,33	20,9	1 000	–
724,6	855,4	863	3	1,5	585	1 460	0,8	0,39	0,76	0,33	29,5	1 000	–
728	932	941,2	4	2	765	1 960	0,8	0,39	0,76	0,33	38	950	–
733	927	937,6	5	2,5	900	2 320	0,8	0,39	0,76	0,33	44,5	950	–
738	1 002	1 015,4	6	3	1 250	3 450	0,8	0,39	0,76	0,33	62	950	–
758	1 232	1 254	10	5	1 700	5 000	1,14	0,35	0,57	0,26	87	800	480
764,6	905,4	913	3	1,5	455	1 120	0,8	0,39	0,76	0,33	22,2	600	–
768	902	911,2	4	2	640	1 630	0,8	0,39	0,76	0,33	31	950	–
773	977	987,6	5	2,5	800	2 120	0,8	0,39	0,76	0,33	42	900	–
773	977	987,6	5	2,5	965	2 600	0,8	0,39	0,76	0,33	49,5	900	–
778	1 062	1 075,4	6	3	1 370	3 900	0,8	0,39	0,76	0,33	70	900	–
808	1 302	1 328	12	6	1 860	5 700	1,14	0,35	0,57	0,26	97	750	450
814,6	965,4	973	3	1,5	510	1 290	0,8	0,39	0,76	0,33	25	900	–
818	962	971,2	4	2	710	1 860	0,8	0,39	0,76	0,33	36	900	–
823	1 037	1 047,6	5	2,5	830	2 280	0,8	0,39	0,76	0,33	43	850	–
823	1 037	1 047,6	5	2,5	1 040	2 850	0,8	0,39	0,76	0,33	54	850	–
828	1 122	1 135,4	6	3	1 460	4 300	0,8	0,39	0,76	0,33	74	850	–

Angular contact ball bearings

Single row

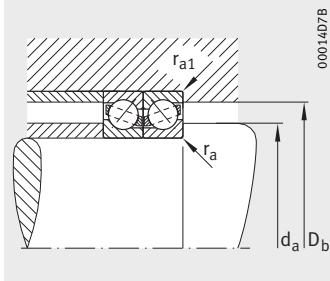


Mounting dimensions

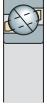
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions							
		d	D	B	r min.	r ₁ min.	D ₁ ≈	a ≈	α °
708/850-MPB	93,1	850	1 030	57	4	1,5	957,4	300	30
718/850-MPB	123	850	1 030	82	5	2	964,3	312	30
709/850-MP	244	850	1 120	85	6	3	1 013	327	30
719/850-MPB	309	850	1 120	118	6	3	1 022	343	30
F-804092.SKL¹⁾	475	850	1 220	118	7,5	7,5	1 072	343	30
70/850-MPB	652	850	1 220	165	7,5	4	1 074	381	30
708/900-MPB	123	900	1 090	60	5	2	1 013	317	30
718/900-MPB	143	900	1 090	85	5	2	1 019,2	330	30
709/900-MP	276	900	1 180	88	6	3	1 069,5	344	30
719/900-MP	311	900	1 180	122	6	3	1 077	361	30
70/900-MPB	646	900	1 280	170	7,5	4	1 129	414	30
708/950-MPB	144	950	1 150	63	5	2	1 069	335	30
718/950-MPB	168	950	1 150	90	5	2	1 075,5	348	30
709/950-MP	338	950	1 250	95	6	3	1 132	365	30
719/950-MP	455	950	1 250	132	7,5	4	1 139	384	30
70/950-MPB	882	950	1 360	180	7,5	4	1 198,5	423	30
708/1000-MPB	190	1 000	1 220	71	5	2	1 135	356	30
718/1000-MPB	255	1 000	1 220	100	6	3	1 142,8	370	30
709/1000-MP	411	1 000	1 320	103	6	3	1 194	386	30
719/1000-MP	544	1 000	1 320	140	7,5	4	1 202	405	30
F-807448.SKL¹⁾	659	1 000	1 420	130	7,5	7,5	1 255,5	414	30
70/1000-MPB	972	1 000	1 420	185	7,5	4	1 254	442	30
708/1060-MPB	175	1 060	1 280	71	5	2	1 195	373	30
718/1060-MPB	267	1 060	1 280	100	6	3	1 198,2	388	30
709/1060-MP	492	1 060	1 400	109	7,5	4	1 266	410	30
719/1060-MP	653	1 060	1 400	150	7,5	4	1 273	430	30
708/1120-MPB	253	1 120	1 360	78	5	2	1 263,5	397	30
718/1120-MPB	312	1 120	1 360	106	6	3	1 273,5	411	30
709/1120-MP	515	1 120	1 460	109	7,5	4	1 326	427	30
719/1120-MP	686	1 120	1 460	150	7,5	4	1 333	447	30

¹⁾ Separable bearing with MPB cage.



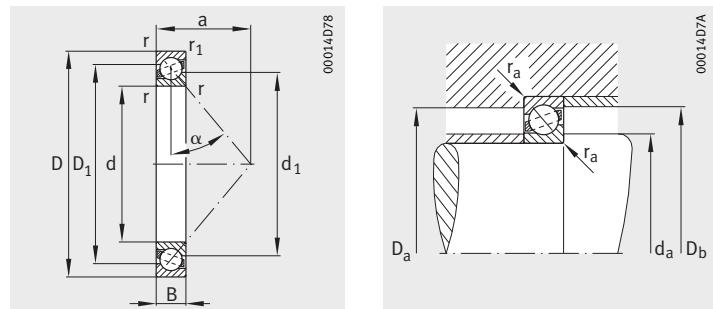
Mounting dimensions



Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed
d _a min.	D _a max.	D _b max.	r _a max.	r _{a1} max.	dyn. C _r kN	stat. C _{0r} kN	e	X	Y	Y ₀	C _{ur} kN	n _G min ⁻¹
864,6	1 015,4	1 023	3	1,5	520	1 370	0,8	0,39	0,76	0,33	25,5	850
868	1 012	1 021,2	4	2	710	1 930	0,8	0,39	0,76	0,33	36,5	850
873	1 097	1 107,6	5	2,5	880	2 500	0,8	0,39	0,76	0,33	45,5	800
873	1 097	1 107,6	5	2,5	1 100	3 150	0,8	0,39	0,76	0,33	47	800
878	1 192	1 192	6	6	1 120	3 350	0,8	0,39	0,76	0,33	48,5	800
878	1 192	1 205,4	6	3	1 560	4 800	0,8	0,39	0,76	0,33	81	800
918	1 072	1 081,2	4	2	550	1 500	0,8	0,39	0,76	0,33	27	800
918	1 072	1 081,2	4	2	765	2 160	0,8	0,39	0,76	0,33	39	800
923	1 157	1 167,6	5	2,5	965	2 800	0,8	0,39	0,76	0,33	49	750
923	1 157	1 167,6	5	2,5	1 160	3 450	0,8	0,39	0,76	0,33	62	750
928	1 252	1 265,4	6	3	1 600	5 000	0,8	0,39	0,76	0,33	83	750
968	1 132	1 141,2	4	2	585	1 660	0,8	0,39	0,76	0,33	29,5	750
968	1 132	1 141,2	4	2	830	2 400	0,8	0,39	0,76	0,33	42	750
973	1 227	1 237,6	5	2,5	1 060	3 250	0,8	0,39	0,76	0,33	57	700
978	1 222	1 235,4	6	3	1 270	3 900	0,8	0,39	0,76	0,33	67	700
978	1 332	1 345,4	6	3	1 830	6 000	0,8	0,39	0,76	0,33	95	700
1 018	1 202	1 211,2	4	2	680	2 000	0,8	0,39	0,76	0,33	34	700
1 023	1 197	1 207,6	5	2,5	950	2 850	0,8	0,39	0,76	0,33	48,5	700
1 023	1 297	1 307,6	5	2,5	1 120	3 450	0,8	0,39	0,76	0,33	57	700
1 028	1 292	1 305,4	6	3	1 370	4 300	0,8	0,39	0,76	0,33	73	700
1 028	1 392	1 392	6	6	1 400	4 550	0,8	0,39	0,76	0,33	77	700
1 028	1 392	1 405,4	6	3	1 860	6 200	0,8	0,39	0,76	0,33	96	700
1 078	1 262	1 271,2	4	2	695	2 120	0,8	0,39	0,76	0,33	34,5	700
1 083	1 257	1 267,6	5	2,5	965	3 000	0,8	0,39	0,76	0,33	50	700
1 088	1 372	1 385,4	6	3	1 270	4 150	0,8	0,39	0,76	0,33	69	630
1 088	1 372	1 385,4	6	3	1 460	4 750	0,8	0,39	0,76	0,33	76	630
1 138	1 342	1 351,2	4	2	780	2 450	0,8	0,39	0,76	0,33	39	630
1 143	1 337	1 347,6	5	2,5	1 080	3 450	0,8	0,39	0,76	0,33	55	630
1 148	1 432	1 445,4	6	3	1 250	4 150	0,8	0,39	0,76	0,33	68	630
1 148	1 432	1 445,4	6	3	1 500	5 000	0,8	0,39	0,76	0,33	79	630

Angular contact ball bearings

Single row

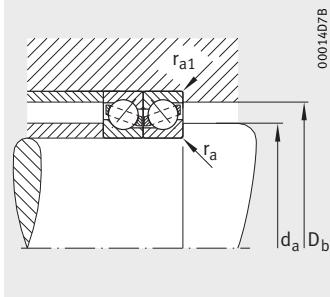


Mounting dimensions

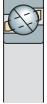
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions							
		d	D	B	r min.	r ₁ min.	D ₁ ≈	a ≈	α °
708/1180-MPB	265	1 180	1 420	78	5	2	1 323,5	414	30
718/1180-MPB	346	1 180	1 420	106	6	3	1 330,9	428	30
709/1180-MP	608	1 180	1 540	115	7,5	4	1 398	450	30
719/1180-MP	816	1 180	1 540	160	7,5	4	1 406	473	30
708/1250-MPB	299	1 250	1 500	80	6	3	1 399,1	437	30
718/1250-MPB	382	1 250	1 500	112	6	3	1 407,2	453	30
709/1250-MP	720	1 250	1 630	122	7,5	4	1 480	477	30
719/1250-MP	967	1 250	1 630	170	7,5	4	1 488	501	30
Z-563415.SKL¹⁾	279	1 300	1 550	80	3	3	1 452	451	30
708/1320-MPB	393	1 320	1 600	88	6	3	1 486,8	465	30
718/1320-MPB	523	1 320	1 600	122	6	3	1 496	482	30
709/1320-MP	842	1 320	1 720	128	7,5	4	1 562	503	30
719/1320-MP	1 110	1 320	1 720	175	7,5	4	1 571	526	30
708/1400-MPB	481	1 400	1 700	95	6	3	1 579,5	495	30
718/1400-MPB	644	1 400	1 700	132	7,5	4	1 589	513	30
719/1400-MPB	1 230	1 400	1 820	185	9,5	5	1 670	557	30
718/1500-MPB	782	1 500	1 820	140	7,5	4	1 701,6	549	30
719/1500-MP	1 590	1 500	1 950	195	9,5	5	1 784	596	30
718/1600-MPB	1 010	1 600	1 950	155	7,5	4	1 820,6	590	30
718/1700-MPB	1 130	1 700	2 060	160	7,5	4	1 926,5	623	30
718/1800-MPB	1 300	1 800	2 180	165	9,5	5	2 040,7	657	30
718/1900-MPB	1 540	1 900	2 300	175	9,5	5	2 152,8	694	30
718/2000-MPB	1 830	2 000	2 430	190	9,5	5	2 277,5	734	30

¹⁾ With MPB cage.

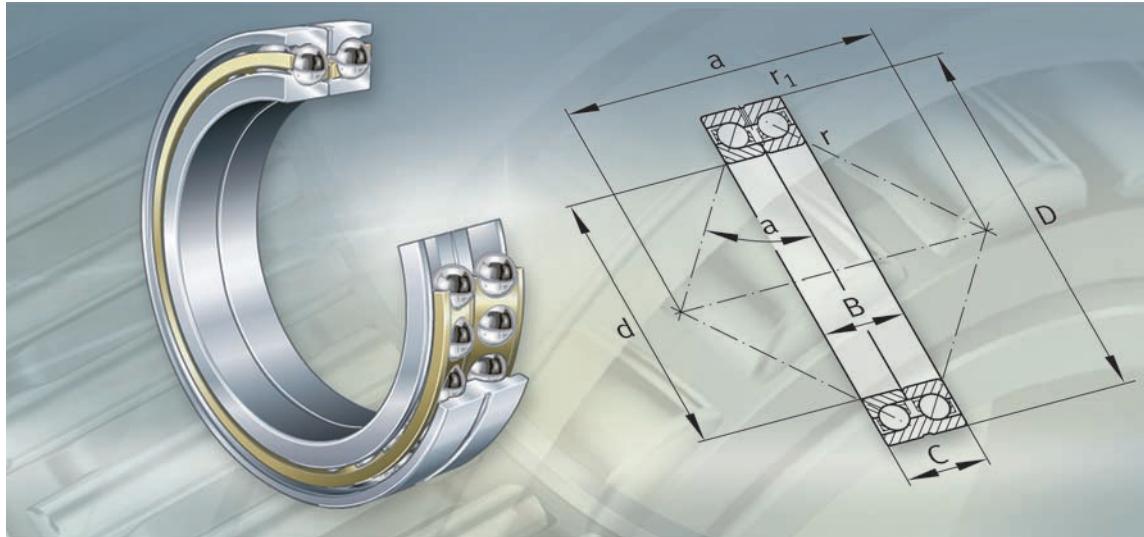


Mounting dimensions



Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed
d _a	D _a	D _b	r _a	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	e	X	Y	Y ₀	C _{ur} kN	n _G min ⁻¹
1 198	1 402	1 411,2	4	2	800	2 550	0,8	0,39	0,76	0,33	40	630
1 203	1 397	1 407,6	5	2,5	1 100	3 600	0,8	0,39	0,76	0,33	56	630
1 208	1 512	1 525,4	6	3	1 340	4 550	0,8	0,39	0,76	0,33	71	600
1 208	1 512	1 525,4	6	3	1 630	5 700	0,8	0,39	0,76	0,33	89	600
1 273	1 477	1 487,6	5	2,5	830	2 750	0,8	0,39	0,76	0,33	42	600
1 273	1 477	1 487,6	5	2,5	1 180	4 000	0,8	0,39	0,76	0,33	61	600
1 278	1 602	1 615,4	6	3	1 500	5 400	0,8	0,39	0,76	0,33	80	560
1 278	1 602	1 615,4	6	3	1 760	6 400	0,8	0,39	0,76	0,33	95	560
1 312,4	1 537,6	1 537,6	2,5	2,5	720	2 320	0,8	0,39	0,76	0,33	35,5	560
1 343	1 577	1 587,6	5	2,5	950	3 250	0,8	0,39	0,76	0,33	49,5	560
1 343	1 577	1 587,6	5	2,5	1 340	4 750	0,8	0,39	0,76	0,33	72	560
1 348	1 692	1 705,4	6	3	1 560	5 700	0,8	0,39	0,76	0,33	84	530
1 348	1 692	1 705,4	6	3	1 900	6 950	0,8	0,39	0,76	0,33	102	530
1 423	1 677	1 687,6	5	2,5	1 100	3 900	0,8	0,39	0,76	0,33	56	530
1 428	1 672	1 685,4	6	3	1 500	5 500	0,8	0,39	0,76	0,33	80	530
1 434	1 786	1 802	8	4	2 040	7 800	0,8	0,39	0,76	0,33	115	530
1 528	1 792	1 805,4	6	3	1 630	6 300	0,8	0,39	0,76	0,33	89	500
1 534	1 916	1 932	8	4	2 320	9 300	0,8	0,39	0,76	0,33	127	500
1 628	1 922	1 935,4	6	3	1 860	7 500	0,8	0,39	0,76	0,33	102	500
1 728	2 032	2 045,4	6	3	1 900	8 000	0,8	0,39	0,76	0,33	102	480
1 834	2 146	2 162	8	4	2 160	9 300	0,8	0,39	0,76	0,33	118	450
1 934	2 266	2 282	8	4	2 280	10 200	0,8	0,39	0,76	0,33	124	430
2 034	2 396	2 412	8	4	2 400	11 000	0,8	0,39	0,76	0,33	131	380

FAG



Double row angular contact ball bearings

Double row angular contact ball bearings

	Page
Product overview	Double row angular contact ball bearings..... 250
Features	Radial and axial load capacity..... 251 Bearings with split outer ring 251 Bearings with split inner ring 251 Bearings with split, extended inner ring 251 Sealing..... 251 Lubrication..... 251 Operating temperature 251 Cages..... 251
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Accuracy	Axial internal clearance 253
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Product overview Double row angular contact ball bearings

Double row
Split outer ring

Z-5..SKL2-01



00014D8E

Split inner ring

Z-5..SKL2-02



00014D8F

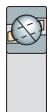
Split, extended inner ring

Z-5..SKL2-03



00014D90

Double row angular contact ball bearings



Features

The double row angular contact ball bearings shown here are self-retaining units with solid inner and outer rings and ball and cage assemblies with cages. Double row angular contact ball bearings are similar in design to a pair of single row angular contact ball bearings in an X arrangement or an O arrangement.

The special bearings with non-standardised main dimensions with the designation Z-5..SKL differ in the design of the bearing rings.

The angular adjustment facility of the double row angular contact ball bearings is very limited.

Radial and axial load capacity

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.

The bearings described here are used as axial bearings.

Bearings with split outer ring

Design 1

- In bearings with a split outer ring and a single-piece inner ring, the rows of balls are in an X arrangement.
- These axial bearings for wire rod roll stands are fitted with radial clearance between the outer ring and chock bore. As a result, the angular contact ball bearings support purely axial forces.
- The contact angle $\alpha = 40^\circ$.

Bearings with split inner ring

Design 2

- These bearings with a split inner ring and single-piece outer ring (O arrangement) are also fitted in wire rod roll stands with radial clearance between the outer ring and chock bore.
- The contact angle $\alpha = 40^\circ$.

Bearings with split, extended inner ring

Design 3

- These double row angular contact ball bearings have the same internal construction as the bearings of Design 2. However, the inner rings are wider than the outer ring. These bearings are used, for example, as axial bearings for oil film bearings.
- The contact angle $\alpha = 40^\circ$.

Sealing

The double row angular contact ball bearings are not sealed.

Lubrication

The bearings can be lubricated with grease or oil.

Operating temperature

Double row angular contact ball bearings without seals are suitable for operating temperatures from -30°C to $+150^\circ\text{C}$.

Cages

The double row angular contact ball bearings have one solid brass cage for each row of balls.

Double row angular contact ball bearings

Design and safety guidelines
Equivalent dynamic bearing load
Contact angle 40°

For bearings under dynamic loading, the following applies in the case of pure axial load:

$$P = 0,93 \cdot F_a$$

P kN
Equivalent dynamic bearing load
 F_a kN
Axial dynamic bearing load.

Equivalent static bearing load
Contact angle 40°

For bearings under static loading, the following applies in the case of pure axial load:

$$P_0 = 0,52 \cdot F_{0a}$$

P_0 kN
Equivalent static load
 F_{0a} kN
Axial 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, ball bearings with cage must therefore be subjected to a minimum load of the order of $P/C_r > 0,01$.

Speeds



For these special bearings, the tables only give limiting speeds n_G .
The limiting speed n_G given in the dimension tables must not be exceeded.

Design of bearing arrangements
Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

Mounting dimensions

The dimension tables give the maximum dimension of the radius r_a and the diameters of the abutment shoulders D_a , d_a .

Accuracy

The main dimensions of the bearings are not standardised. The dimensional and running tolerances correspond to tolerance class PN to DIN 620-2 or better. We can provide the tolerances of the individual bearings in response to an enquiry.

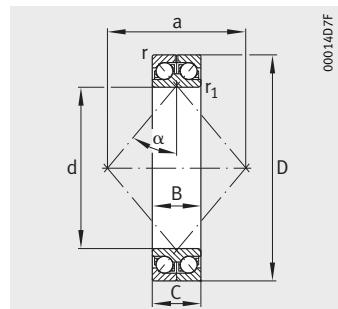
Axial internal clearance

We can provide the axial internal clearance of the double row angular contact ball bearings in response to an enquiry.

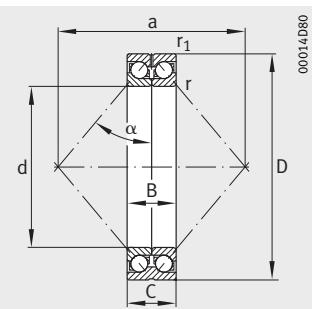


Angular contact ball bearings

Double row



Design 1: $\alpha = 40^\circ$

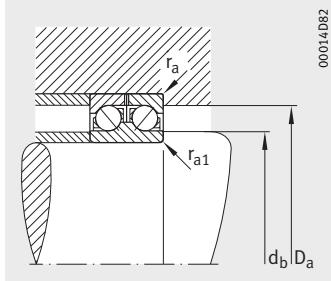


Design 2 and 3: $\alpha = 40^\circ$

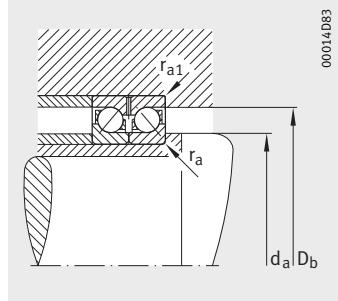
Dimension table · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions							
			d	D	B/C	r min.	r ₁ min.	D ₁	d ₁	a
Z-508732.01.SKL	2	22	230	330	80	2,1	2,1	308,9	271	275
Z-573446.SKL	1	23,9	230	330	80	2,1	1,1	308,9	254	195
Z-514481.SKL ¹⁾	3	18,9	250	340	76 / 70	2,1	1,5	320,5	286	286
Z-508731.01.SKL	2	30,5	260	370	92	2,1	2,1	348,5	305	310
Z-505057.SKL	1	61,5	260	400	130	4	4	373	290	342
Z-508730.01.SKL	2	32,5	280	390	92	2,1	2,1	368,6	324	327

¹⁾ The outer ring is 70 mm wide, the split inner ring is 76 mm wide.



Mounting dimensions
Design 1

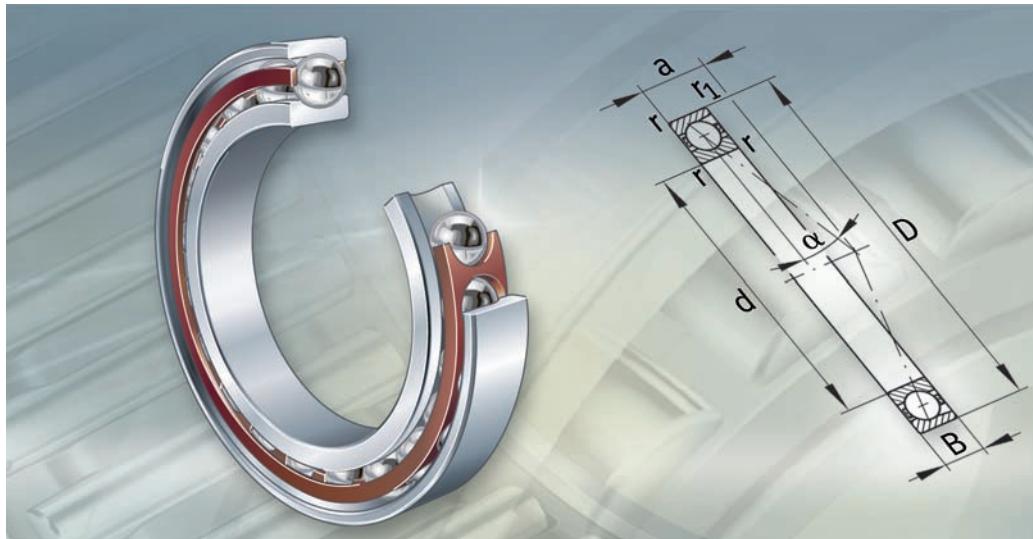


Mounting dimensions
Design 2 and 3



Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed
d _a	D _a	r _a	r _{a1}	dyn. C _r	stat. C _{0r}	C _{ur}	n _G
min.	max.	max.	max.	kN	kN	kN	min ⁻¹
240	319,5	2,1	2,1	320	530	17,3	1 600
236	319,5	2,1	1	320	530	17,8	1 600
260	333	2,1	1,5	300	510	15,8	1 600
270	359,5	2,1	2,1	390	695	22,2	1 500
277	383	3	3	540	1 020	30	1 400
290	379,5	2,1	2,1	405	750	23,2	1 400

FAG



Spindle bearings

Spindle bearings

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Product overview Spindle bearings

Standard spindle bearings

B719, B70, B72



With ceramic balls

HCB719



Spindle bearings

Features

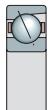
Spindle bearings are single row angular contact ball bearings, comprising solid inner and outer rings and ball and cage assemblies with solid window cages. They are not separable.

Spindle bearings have restricted tolerances. They are particularly suitable for bearing arrangements with very high requirements for guidance accuracy and high speeds. They have proved extremely suitable for main spindle bearing arrangements in machine tools.

A detailed description of spindle bearings (designs, calculation, lubrication, speeds, fits) is given in Catalogue AC 41130, Super Precision Bearings.

Radial and axial load capacity

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. Spindle bearings are available with a contact angle $\alpha = 15^\circ$ (suffix C) or $\alpha = 25^\circ$ (suffix E).



Standard spindle bearings

Standard spindle bearings B70, B719 and B72 have steel balls.

With ceramic balls

Spindle bearings HCB719 have balls in standard sizes made from ceramic (hybrid bearings).

Sealing

Large spindle bearings are of an open design.

Lubrication

The bearings can be lubricated with grease or oil.

Universal design

Spindle bearings of the universal design can be fitted in any arrangement or combined in various sets without any loss of performance. The position of the pressure cone is marked on the cylindrical surface of the outer ring.

Bearings with the suffix UL are designed for slight preload in an X or O arrangement.

The preload is altered by mounting and the operating conditions.



Ordering data

When ordering, the number of individual bearings must be stated.

Spindle bearings

Operating temperature



The bearings are suitable for operating temperatures from -30°C to $+100^{\circ}\text{C}$, restricted by the 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 (suffix T). The cage is guided on the outer ring.

Check the chemical resistance of the 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 at high temperatures.

The oil change intervals must be observed.

Suffixes

Suffixes for available designs: see table.

Available designs

Design		
		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 laminated fabric
		UL Universal design, for example for fitting in pairs, bearing pair has slight preload in O and X arrangement

¹⁾ For preload values, see Catalogue AC 41130, Super Precision Bearings.

Design and safety guidelines

Operating life

High precision bearings must guide machine parts with very high precision and support forces at up to very high speeds.

They are selected predominantly from the perspectives of:

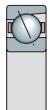
- accuracy
- rigidity
- running behaviour.

In order that they can fulfil these tasks for as long as possible, the bearings must run without wear. The precondition for this is the creation of a load-bearing hydrodynamic lubricant film at the contact points of the rolling contact partners.

Under these conditions, rolling bearings will achieve their fatigue life in a large number of applications. If the design is appropriate to the fatigue life, the operating life of the bearing is normally restricted by the lubricant operating life.

The decisive factors for the operating life from the perspective of load are the Hertzian pressures occurring at the contacts and the bearing kinematics. For high performance assemblies, individual design with the aid of special calculation programs is therefore advisable.

Since failure as a result of fatigue plays no part in practice in the case of high precision bearings, calculation of the rating life L_{10} in accordance with DIN ISO 281 is not suitable as a means of determining the operating life.



Spindle bearings

Equivalent static bearing load

The equivalent static load P_0 is valid for bearings that are subjected to radial and axial static loads. It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

For bearings under static loading, the following applies:

Bearings with contact angle 15°

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
$\frac{F_{0a}}{F_{0r}} \leq 1,3$	$P_0 = F_{0r}$
$\frac{F_{0a}}{F_{0r}} > 1,3$	$P_0 = 0,5 \cdot F_{0r} + 0,38 \cdot F_{0a}$

P_0 kN

Equivalent static bearing load for combined load

F_{0a} kN

Axial static bearing load

F_{0r} kN

Radial static bearing load.

Static load safety factor

In order to maintain the accuracy of the bearings, a static load safety factor $S_0 > 3$ is required.

$$S_0 = \frac{C_{0r}}{P_0}$$

C_{0r} kN

Basic static load rating, see dimension tables

P_0 kN

Equivalent static load.

If several bearings are present, the external load is distributed over the individual bearings.

On this point, see Catalogue AC 41 130, Super Precision Bearings.

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.



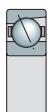
The speeds stated in the dimension tables are guide values for single bearings under elastic preload and low loads.

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.

For a more detailed description, see Catalogue AC 41130, Super Precision Bearings.

Universal bearing sets

Universal bearings of the same sort (same bore and outside diameter) are also available as sets. They can be used as required in an O, X or tandem arrangement, *Figure 1* to *Figure 3*, page 264.



Sets with slight preload have the following designations:

- duplex (2 bearings): suffix DUL
- triplex (3 bearings): suffix TUL
- quadruplex (4 bearings): suffix QUL.

Ordering data

When ordering bearings, the number of sets must be stated, not the number of individual 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.

The bearings must be fitted in the arrangement ordered.

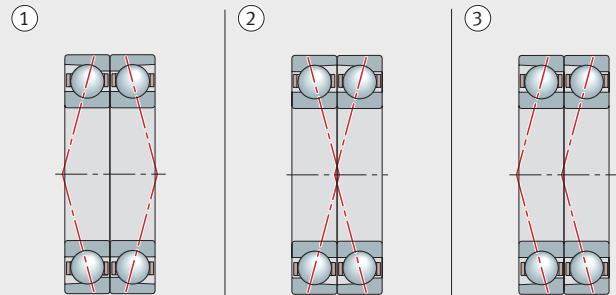


Figure 1
Sets of 2 bearings

0000A296

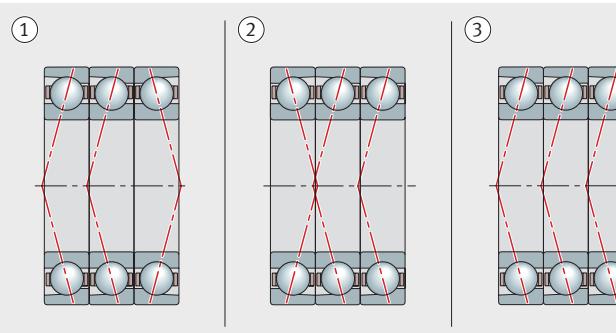


Figure 2
Sets of 3 bearings

0001297

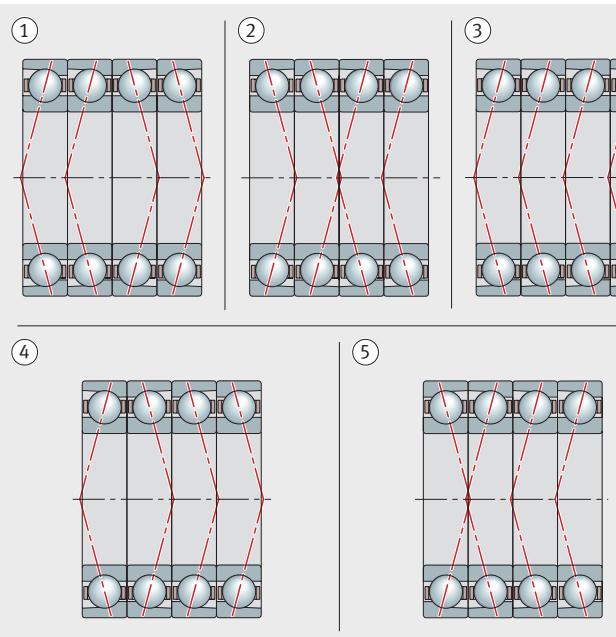


Figure 3
Sets of 4 bearings

00015B15

Ordering example

B7048-C-T-P4S-DBL

Description: two spindle bearings in O arrangement, slight preload.

**Design
of bearing arrangements**
Shaft and housing tolerances

For spindle bearings, fits are recommended as a function of the speeds, see Catalogue AC 41130, Super Precision Bearings.

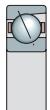
Mounting dimensions

The bearing tables give the maximum dimensions of the radii r_a and r_{a1} and the diameters of the abutment shoulders D_a and d_a .

Accuracy

The main dimensions of the bearings correspond to DIN 628-1. The dimensional tolerances of the bearings correspond to tolerance class P4, while the running tolerances correspond to tolerance class P2 to DIN 620-2.

The actual value codes 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 V_{Bs} μm	Radial runout K_{ia} μm	Axial runout	
d mm	Δ_{dmp} μm	Δ_{Bs} μm	V_{Bs} μm	S_d μm	S_{ia} μm				
over	incl.								
150	180	0	-10	0	-250	4	3	4	5
180	250	0	-12	0	-300	5	4	5	5
250	315	0	-15	0	-350	6	5	6	7
315	400	0	-19	0	-400	7	7	7	9
400	500	0	-23	0	-450	8	8	8	11
500	630	0	-26	0	-500	10	9	10	13

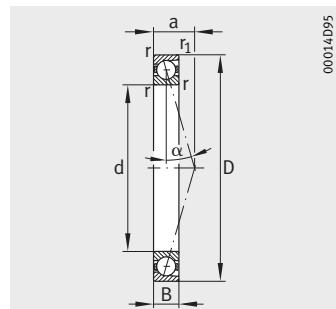
Outer ring tolerances

Outside diameter		Outside diameter deviation		Width variation V_{Cs} μm	Radial runout K_{ea} μm	Axial runout	
D mm	Δ_{Dmp} μm	Δ_{Cs} μm	V_{Cs} μm			S_D μm	S_{ea} μm
over	incl.						
315	400	0	-15	7	8	7	8
400	500	0	-18	7	9	8	10
500	630	0	-22	8	11	9	12
630	800	0	-26	9	13	10	14

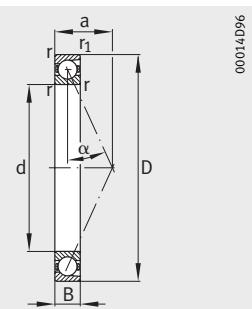
The width deviation Δ_{Cs} is identical to Δ_{Bs} of the corresponding inner ring.

Spindle bearings

With steel balls



B719..-C, B70..-C, B72..-C
α = 15°

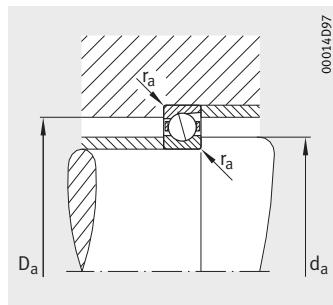


B719..-E, B70..-E, B72..-E
α = 25°

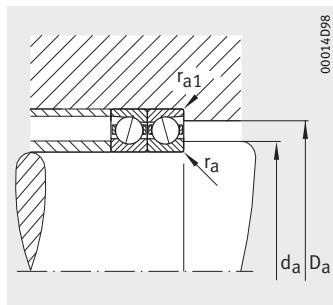
Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	r ₁ min.	a ≈
B7236-C-T-P4S	16,4	180	320	52	4	4	60
B7236-E-T-P4S	16,3	180	320	52	4	4	84
B7238-C-T-P4S	20	190	340	55	4	4	63
B7238-E-T-P4S	20	190	340	55	4	4	89
B7240-C-T-P4S	24,2	200	360	58	4	4	67
B7240-E-T-P4S	24,2	200	360	58	4	4	94
B7044-C-T-P4S	15,7	220	340	56	3	3	66
B7044-E-T-P4S	15,7	220	340	56	3	3	93
B7244-C-T-P4S	33,1	220	400	65	4	4	74
B7244-E-T-P4S	33,1	220	400	65	4	4	105
HCB71948-C-T-P4S¹⁾	5,92	240	320	38	2,1	1,1	57
HCB71948-E-T-P4S¹⁾	5,9	240	320	38	2,1	1,1	84
B71948-C-T-P4S	7,1	240	320	38	2,1	1,1	57
B71948-E-T-P4S	7,08	240	320	38	2,1	1,1	84
B7048-C-T-P4S	16,8	240	360	56	3	3	68
B7048-E-T-P4S	16,7	240	360	56	3	3	98
B71952-C-T-P4S	12	260	360	46	2,1	1,1	65
B71952-E-T-P4S	11,9	260	360	46	2,1	1,1	95
B71956-C-T-P4S	12,8	280	380	46	2,1	1,1	67
B71956-E-T-P4S	12,7	280	380	46	2,1	1,1	100
B71960-C-T-P4S	20,1	300	420	56	3	1,1	76
B71960-E-T-P4S	20	300	420	56	3	1,1	112
B71964-C-T-P4S	21,3	320	440	56	3	1,1	79
B71964-E-T-P4S	21,3	320	440	56	3	1,1	117
B71968-C-T-P4S	22,4	340	460	56	3	1,1	82
B71968-E-T-P4S	22,4	340	460	56	3	1,1	121
B71972-C-T-P4S	23,6	360	480	56	3	1,1	84
B71972-E-T-P4S	23,6	360	480	56	3	1,1	126
B71984-C-T-P4S	36,8	420	560	65	4	1,5	98
B71984-E-T-P4S	36,8	420	560	65	4	1,5	147
B71992-C-T-P4S	55,1	460	620	74	4	1,5	109
B71992-E-T-P4S	55	460	620	74	4	1,5	163
B719/500-C-T-P4S	67,9	500	670	78	5	2	117
B719/500-E-T-P4S	67,9	500	670	78	5	2	175

¹⁾ With ceramic balls.



Mounting dimensions

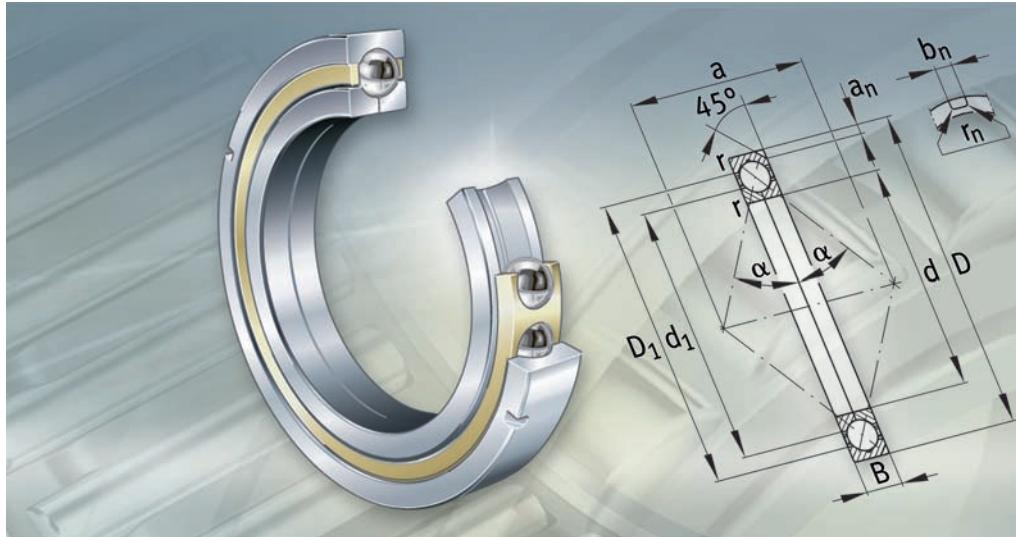


Mounting dimensions



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 kN	stat. C_{0r} kN	C_{ur} kN	n_G grease min^{-1}	n_G oil min^{-1}
213,5	286,5	3	3	305	390	17,6	3 800	5 600
213,5	286,5	3	3	290	365	16,8	3 400	5 000
223,5	306,5	3	3	315	415	18,3	3 400	5 000
223,5	306,5	3	3	300	390	17,4	3 200	4 800
238,5	321,5	3	3	325	440	19	3 200	4 800
238,5	321,5	3	3	310	415	18	3 000	4 500
239	321	2,5	1	325	440	19	3 200	4 800
239	321	2,5	1	310	415	18	3 000	4 500
264	356	3	3	400	560	23,2	2 800	4 300
264	356	3	3	380	540	22,1	2 600	4 000
254	307	1	1	154	215	9,6	4 000	6 000
254	307	1	1	145	200	9	3 600	5 300
254	307	1	1	224	310	13,5	3 200	4 800
254	307	1	1	212	285	12,8	3 000	4 500
260	341	2,5	1	335	465	19,5	3 000	4 500
260	341	2,5	1	315	440	18,5	2 800	4 300
278	342	2,1	1	285	415	17,1	2 800	4 300
278	342	2,1	1	270	390	16,2	2 600	4 000
298	362	2,1	1	300	450	18	2 600	4 000
298	362	2,1	1	280	425	17	2 400	3 800
322	398	1,5	1	360	570	21,8	2 400	3 800
322	398	1,5	1	340	540	20,7	2 200	3 600
342	418	1,5	1	375	620	23,1	2 200	3 600
342	418	1,5	1	355	585	21,9	2 000	3 400
362	438	1,5	1	380	640	23,6	2 200	3 600
362	438	1,5	1	360	610	17,9	1 900	3 200
382	458	1,5	1	390	695	24,8	2 000	3 400
382	458	1,5	1	375	640	23,4	1 800	3 000
444	536	1,5	1	510	980	32,5	1 700	2 800
444	536	1,5	1	475	915	30,5	1 500	2 400
493	587	1,5	1	530	1 080	34,5	1 500	2 400
493	587	1,5	1	500	1 000	32,5	1 400	2 200
538	632	2,5	1	550	1 160	36,5	1 400	2 200
538	632	2,5	1	520	1 080	34,5	1 200	1 900

FAG



Four point contact bearings

Four point contact bearings

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Accuracy	Axial internal clearance 275
Dimension tables	Four point contact bearings 276



Product overview Four point contact bearings

With retaining slots

QJ2..-N2, QJ3..-N2,
QJ10..-N2, QJ19..-N2



00014.DA9

Four point contact bearings

Features

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.

The bearings comprise solid outer rings, split inner rings and ball and cage assemblies with brass 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.

Axial load capacity in both directions

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.

With retaining slots in the outer ring

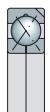
Single row four point contact bearings capable of supporting axial loads in both directions are often combined with a radial bearing and used as an axial bearing with radial clearance in a housing.

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.

Compensation of angular misalignments

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.

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.



Four point contact bearings

Sealing	Four point contact bearings are of an open design.												
Lubrication	They are not greased and can be lubricated with grease or oil.												
Operating temperature	Bearings with solid brass cages can be used at operating temperatures from -30°C to $+150^{\circ}\text{C}$. Bearings with an outside diameter of more than 240 mm are dimensionally stable up to $+200^{\circ}\text{C}$.												
Cages	Four point contact bearings with brass cages have the suffix MPA. These window cages are guided on the outer ring.												
Suffixes	Suffixes for available designs: see table.												
Available designs	<table><thead><tr><th>Suffix</th><th>Description</th><th>Design</th></tr></thead><tbody><tr><td>C3</td><td>Axial internal clearance larger than normal</td><td>Special design, available by agreement only</td></tr><tr><td>MPA</td><td>Solid brass cage</td><td>Standard</td></tr><tr><td>N2</td><td>Two retaining slots in outer ring</td><td></td></tr></tbody></table>	Suffix	Description	Design	C3	Axial internal clearance larger than normal	Special design, available by agreement only	MPA	Solid brass cage	Standard	N2	Two retaining slots in outer ring	
Suffix	Description	Design											
C3	Axial internal clearance larger than normal	Special design, available by agreement only											
MPA	Solid brass cage	Standard											
N2	Two retaining slots in outer ring												

Design and safety guidelines

Equivalent dynamic bearing load

Load ratio and equivalent dynamic load

The equivalent dynamic load P is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

For bearings under dynamic loading, the following applies:

Load ratio	Equivalent dynamic bearing 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 kN

Equivalent dynamic bearing load for combined load

F_a kN

Axial dynamic bearing load

F_r kN

Radial dynamic bearing load.

Equivalent static bearing load

The equivalent static load P_0 is valid for bearings that are subjected to radial and axial static loads.

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

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + 0,58 \cdot F_{0a}$$

P_0 kN

Equivalent static bearing load for combined load

F_{0a} kN

Axial static bearing load

F_{0r} kN

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 elements 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.



Four point contact bearings

Speeds	High speeds can be achieved if four point contact bearings are subjected to purely axial load. ISO 15 312 does not give thermal reference speeds for these bearings.
	The dimension tables therefore only state the limiting speeds n_G . These values are for oil lubrication and must not be exceeded. If higher speeds are required, please contact us.
Design of bearing arrangements	
Shaft and housing tolerances	Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 130. Recommended housing tolerances for radial bearings, see table, page 131.
Mounting dimensions	The dimension tables give the maximum dimension of the radius r_a and the diameters of the abutment shoulders D_a and d_a .

Accuracy

The main dimensions of the bearings correspond to DIN 628-4.
The dimensional and running tolerances correspond to tolerance class PN to DIN 620-2.

Axial internal clearance

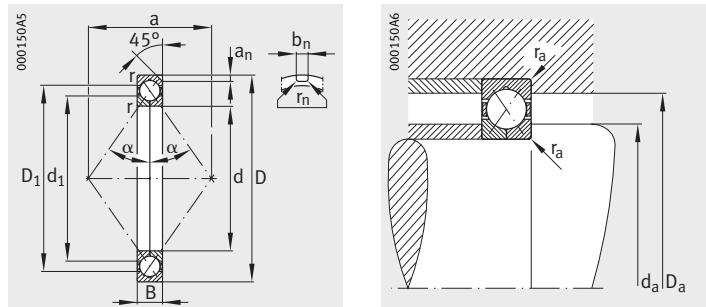
The axial internal clearance corresponds to internal clearance group CN to DIN 628-4.

Axial internal clearance

Bore d mm		Axial internal clearance							
over	incl.	C2 µm		CN µm		C3 µm		C4 µm	
		min.	max.	min.	max.	min.	max.	min.	max.
140	180	90	155	135	200	185	250	235	300
180	220	105	175	155	225	210	280	260	330
220	260	120	195	175	250	230	305	290	360
260	300	140	220	200	280	260	340	320	400
300	355	160	240	220	300	280	360	—	—
355	400	180	270	250	330	310	390	—	—
400	450	200	290	270	360	340	430	—	—
450	500	220	310	290	390	370	470	—	—
500	560	240	330	310	420	400	510	—	—



Four point contact bearings

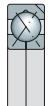


N2, two retaining slots
 $\alpha = 35^\circ$

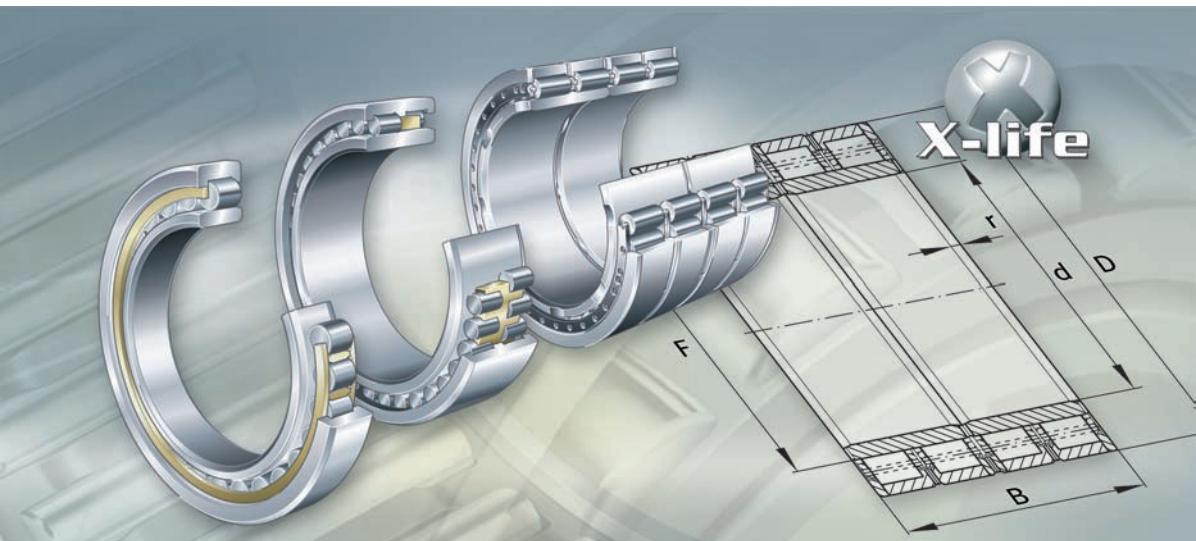
Mounting dimensions

Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions									
		d	D	B	r min.	D ₁ ≈	d ₁ ≈	a ≈	a _n	b _n	r _n
QJ330-N2-MPA	28	150	320	65	4	261	211,3	165	12,7	10,5	2
QJ332-N2-MPA	32,8	160	340	68	4	279,9	222,7	175	12,7	10,5	2
QJ334-N2-MPA	38,4	170	360	72	4	292	238	186	12,7	10,5	2
QJ236-N2-MPA	19,6	180	320	52	4	269	231	175	12,7	10,5	2
QJ336-N2-MPA	44,9	180	380	75	4	311	249,1	196	12,7	10,5	2
QJ238-N2-MPA	23,8	190	340	55	4	286,3	245,8	186	12,7	10,5	2
QJ338-N2-MPA	52,1	190	400	78	5	327	262,5	207	12,7	10,5	2
QJ240-N2-MPA	28	200	360	58	4	302	258,6	196	12,7	10,5	2
QJ340-N2-MPA	58,3	200	420	80	5	343,5	276,5	217	15	12,5	2,5
QJ1044-N2-MPA	19,5	220	340	56	3	298,5	261,4	196	12,7	10,5	2
QJ244-N2-MPA	38,6	220	400	65	4	336	284,6	217	12,7	10,5	2
QJ344-N2-MPA	77,1	220	460	88	5	378	302	238	15	12,5	2,5
QJ1048-N2-MPA	21,7	240	360	56	3	319,6	282,3	210	12,7	10,5	2
QJ248-N2-MPA	53,1	240	440	72	4	367	312,5	238	15	12,5	2,5
QJ348-N2-MPA	98,2	240	500	95	5	410	330,7	259	15	12,5	2,5
QJ1052-N2-MPA	32,3	260	400	65	4	353	309,3	231	12,7	10,5	2
QJ1056-N2-MPA	34,3	280	420	65	4	373	329,3	245	15	12,5	2,5
QJ1060-N2-MPA	48,4	300	460	74	4	406	356,6	266	15	12,5	2,5
QJ260-N2-MPA	92,4	300	540	85	5	455,8	387,3	294	20	15,5	3
QJ1064-N2-MPA	50,7	320	480	74	4	424	375,8	280	15	12,5	2,5
QJ264-N2-MPA	119	320	580	92	5	486,5	413,3	315	20	15,5	3
QJ272-N2-MPA	155	360	650	95	6	543	466,5	354	25	20,5	3
QJ1076-N2-MPA	74,6	380	560	82	5	497	443	329	15	12,5	2,5
QJ1984-N2-MPA	48	420	560	65	4	512,2	469,2	343	15	12,5	2,5
QJ1084-N2-MPA	103	420	620	90	5	550,2	489,8	364	15	12,5	2,5
QJ284-N2-MPA	192	420	760	109	7,5	637,8	546,3	413	25	20,5	3
QJ1988-N2-MPA	66,4	440	600	74	4	545,6	497	364	15	12,5	2,5
QJ1088-N2-MPA	115	440	650	94	6	579,1	514,3	382	20	15,5	3
QJ1992-N2-MPA	68,1	460	620	74	4	565,6	517	378	15	12,5	2,5
QJ1096-N2-MPA	139	480	700	100	6	625,8	557,7	413	20	15,5	3
QJ10/560-N2-MPA	222	560	820	115	6	731	652	483	25	20,5	3



Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
d _a	D _a	r _a	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹
167	303	3	510	735	25,5	3 800
177	323	3	585	865	29,5	3 600
187	343	3	585	915	24,9	3 200
197	303	3	430	670	18,9	3 600
197	363	3	680	1 080	33	3 000
207	323	3	455	735	24,4	3 200
210	380	4	735	1 250	37	2 800
217	343	3	510	850	22,6	3 000
220	400	4	750	1 270	37	2 800
232,4	327,6	2,5	440	750	22,2	3 000
237	383	3	630	1 120	31	2 800
240	440	4	900	1 660	44,5	2 800
252	348	2,5	450	780	25	2 800
257	423	3	680	1 270	30,5	2 800
260	480	4	1 020	1 960	52	2 600
275	385	3	550	1 020	30,5	2 800
294,6	405,4	3	560	1 080	31,5	2 600
314,6	445,4	3	630	1 250	34	2 400
320	520	4	915	1 930	52	2 200
334,6	465,4	3	640	1 320	33	2 400
340	560	4	1 040	2 320	54	1 900
386	624	5	1 140	2 700	60	1 600
398	542	4	780	1 800	42	1 900
434,6	545,4	3	620	1 400	34	1 800
438	602	4	900	2 160	48	1 600
452	728	6	1 430	3 650	82	1 400
454,6	585,4	3	735	1 760	41,5	1 600
463	627	5	965	2 400	55	1 500
474,6	605,4	3	750	1 800	42	1 500
503	677	5	1 060	2 750	60	1 400
583	797	5	1 320	3 750	77	1 200



Cylindrical roller bearings

Single row,
Double row,
Four-row,
Full complement
Self-aligning
Split



Cylindrical roller bearings

X-life Single row cylindrical roller bearings with cage

282

Single row bearings with cage have very high radial load carrying capacity and are suitable for high speeds. The rollers are guided between rigid ribs by one of the two bearing rings. This ring and the removable ring can be fitted separately. In addition to non-locating, semi-locating and locating bearings with a cylindrical bore, high precision bearings with a tapered bore are also available as non-locating bearings for machine tools.

Double row cylindrical roller bearings with cage

388

These bearings have high load carrying capacity and rigidity. The bearing rings can be fitted separately. Bearings with a cylindrical bore are non-locating bearings and are used, for example, in rolling mills, plastics calenders and large gearboxes. High precision bearings with a tapered bore are used for the radial support of main spindles in machine tools.

Four-row cylindrical roller bearings with cage

414

These non-locating bearings can support extremely high radial forces. Special bearings are required for the support of axial forces. The principal areas of application are rolling mills, roll presses and calenders. Bearings with a cylindrical bore are normally designed for a tight fit on the roll journal. Bearings with a tapered bore have a tight fit.

Full complement cylindrical roller bearings

442

Full complement bearings have extremely high load capacity and rigidity but cannot achieve speeds as high as those of bearings with a cage. Single row bearings are semi-locating bearings, while double row bearings are available as non-locating, semi-locating and locating bearings, for example for gearboxes. Double row bearings with annular slots in the outer rings are locating bearings. These sealed bearings are highly suitable for cable sheave arrangements.

Self-aligning cylindrical roller bearings

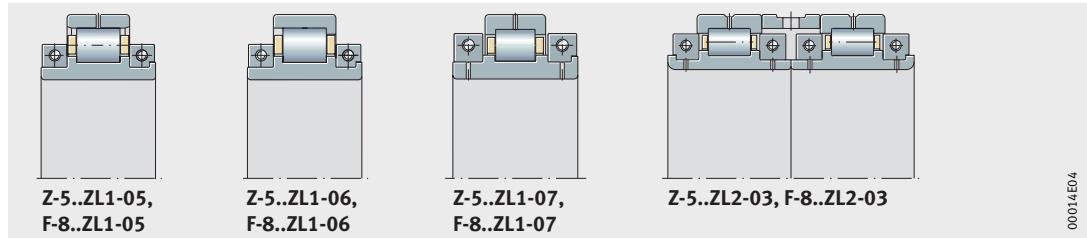
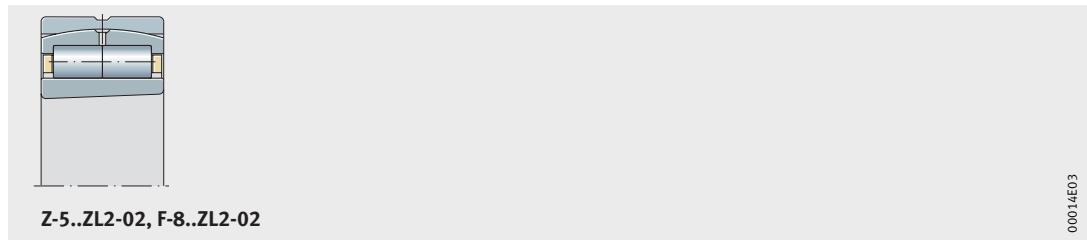
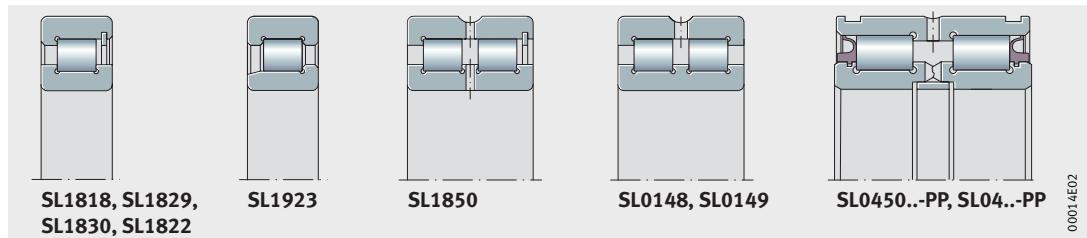
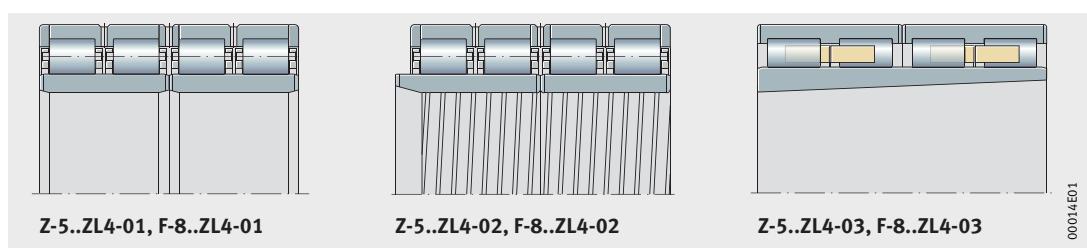
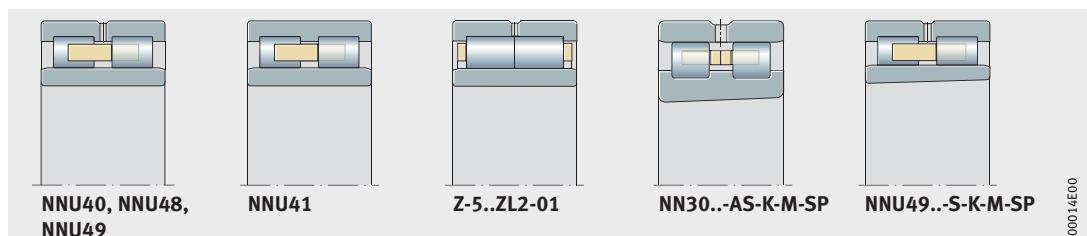
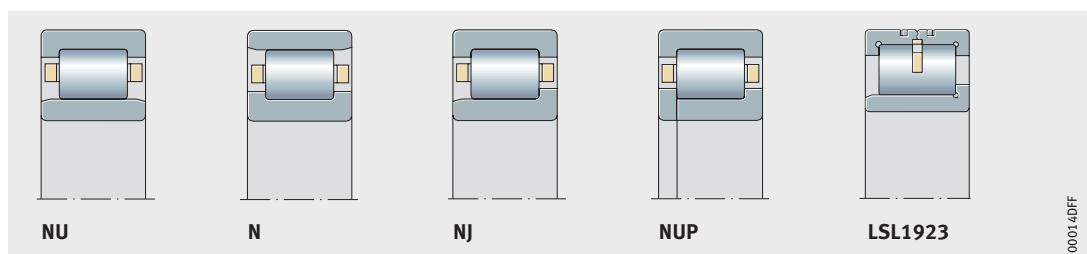
464

These bearings were specially developed for the dry section of paper machinery. They are ideal as non-locating bearings, allow angular adjustment due to the spherical outer ring and the plain bearing pivot ring and are designed for operating temperatures up to +200 °C. In the case of bearings with a tapered bore, the radial internal clearance can be set precisely.

Split cylindrical roller bearings

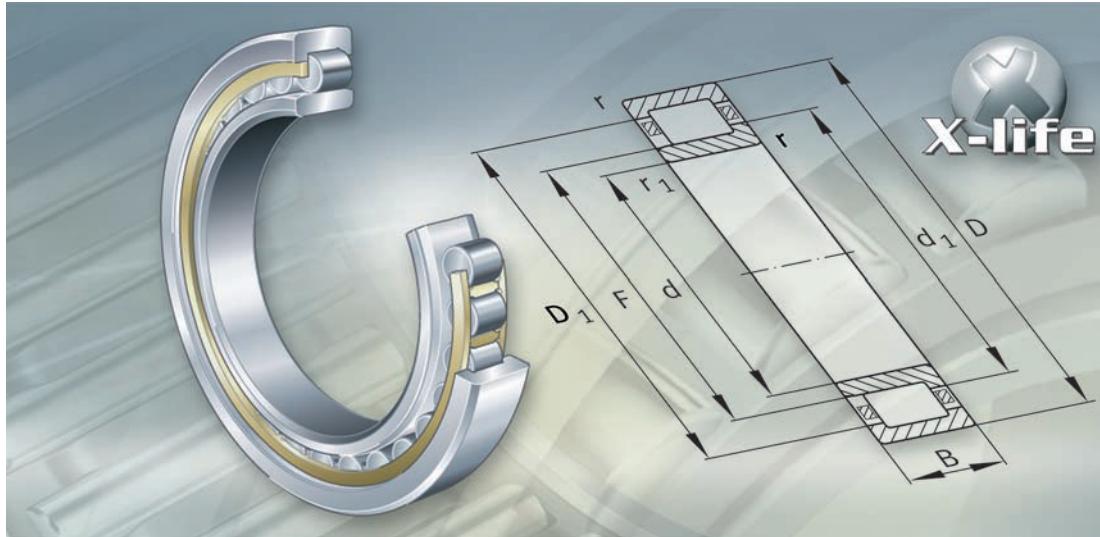
476

Split cylindrical roller bearings are used in bearing positions that can only be accessed with difficulty, for example on cranked and very long shafts. The bearing design is matched to the specific application. Single row bearings are available as non-locating, semi-locating and locating bearings. Double row and four-row bearings were developed as locating or non-locating bearings especially for the drive spindles of roll stands.





FAG



Single row cylindrical roller bearings with cage

Single row cylindrical roller bearings with cage

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Product overview Single row cylindrical roller bearings with cage

Non-locating bearings

With cylindrical bore

NU10, NU12, NU18, NU19, NU28, NU29, NU30, NU31, NU38, NU39..-E, NU4, NU2..-E, NU3..-E, NU20..-E, NU22..-E, NU23..-E, Z-5..ZL1-01, F-8..ZL1-01



00014DF0

N2..-E, N3..-E, N10, N18, N28, N29, N4, Z-5..ZL1-02, F-8..ZL1-02



00014DF5

With tapered bore

NU10..-K, NU30..-K

N10..-K-M1-SP,
N19..-K-M1-SP



00014DF1



00014DF6

Semi-locating bearings
With cage

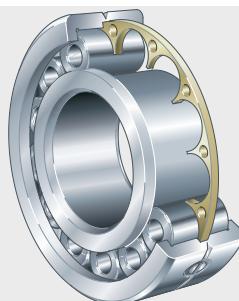
NJ2..-E, NJ3..-E, NJ22..-E, NJ23..-E, NJ4, NJ10, NJ18, NJ19,
NJ28, NJ29, Z-5..ZL1-03, F-8..ZL1-03



00014DF7

With disc cage

LSL1923



00014DFF

Locating bearings
With rib washer

NUP2..-E, NUP3..-E, NUP20..-E, NUP22..-E, NUP23..-E, NUP10,
NUP18, NUP19, NUP28, NUP29, NUP4, Z-5..ZL1-04, F-8..ZL1-04



00014DFA

With L-section ring

NJ2..-E + HJ, NJ3..-E + HJ, NJ22..-E + HJ, NJ23..-E + HJ, NJ4 + HJ,
NJ10 + HJ, NJ18 + HJ, NJ19 + HJ, NJ28 + HJ, NJ29 + HJ

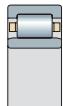


00014DFB

Single row 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 than 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. As a result, both bearing rings can be given a tight fit.</p> <p>Single row cylindrical roller bearings with cage are available as non-locating, semi-locating and locating bearings.</p>
X-life	<p>Some sizes are supplied in the X-life design. These bearings are indicated in the dimension tables. Bearings of X-life quality have, for example, a lower roughness R_a and a better 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 rating life for the same dimensioning. In certain applications, this means that a smaller bearing arrangement can be designed where necessary.</p>
Non-locating bearings	<p>Cylindrical roller bearings NU and N are non-locating bearings and can support radial forces only. 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>
Special bearings with cylindrical bore	<p>In addition to cylindrical roller bearings with standardised designations and main dimensions, we also supply special bearings. Special bearings of the type NU (Z-5..ZL1-01) are used, for example, in drilling rig equipment. They have chamfers on the inner ring bore and, in some cases, inch dimensions.</p> <p>Special bearings for high speed tubular stranding machines are of the type N (Z-5..ZL1-02 or F-8..ZL1-02) and have a lubrication groove and three lubrication holes in the outer ring. The robust solid brass cage is guided on the inner ring. In order to reduce the inertia forces, the bearings contain only half as many rollers as normal bearings of the same size. Their load carrying capacity is, however, sufficient for the application. Large bearings have threaded holes for the location of eye bolts for mounting. The bearings for high speed tubular stranding machines have metric main dimensions.</p>

High precision bearings with tapered bore	Single row cylindrical roller bearings of series N10..-K-M1-SP and N19..-K-M1-SP are high precision bearings for machine tools. In the case of bearings with a tapered bearing bore (taper 1:12), the radial internal clearance or preload can be set to an optimum value. These bearings are characterised by their high load carrying capacity, high rigidity and excellent accuracy.
Axial displacement	The outer and inner ring can be axially displaced relative to each other from the central position by the value “s”.
Semi-locating bearings	Cylindrical roller bearings NJ and bearings with disc cage LSL1923 are semi-locating bearings. Semi-locating bearings can support axial forces in one direction as well as high radial forces and can thus guide shafts axially in one direction. They act as non-locating bearings in the opposite direction. The bearings have two ribs on the outer ring and one rib on the inner ring.
Bearings with disc cage	Since they have a larger number of rolling elements and larger rolling elements, bearings of series LSL 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.
Bearings with L-section ring	Non-locating bearings NU can be combined with an L-section ring HJ to form a semi-locating bearing unit. They must not be installed with two L-section rings (due to the risk of jamming).
Axial displacement	The outer and inner ring can be axially displaced relative to each other in one direction by the value “s”.
Locating bearings	Cylindrical roller bearings NUP and NJ with HJ are locating bearings. Locating bearings can support axial forces in both directions as well as high radial forces and can thus guide shafts axially in both directions.
Bearings with rib washer	The design 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.



Single row cylindrical roller bearings with cage

Bearings with L-section ring	Semi-locating bearings NJ can be combined with an L-section ring HJ to form a locating bearing unit. This design has two ribs on the outer ring, one rib on the inner ring and additionally 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 bearings of series NUP bearings with a loose rib washer is too small to provide a sufficiently high bearing seat. In some applications, they also make it easier to fit and dismantle the bearings.
Sealing	The bearings are supplied without seals.
Lubrication	The bearings can be lubricated from the end faces using grease or oil.
Operating temperature	Single row cylindrical roller bearings with cage can be used at operating temperatures from -30°C to $+150^{\circ}\text{C}$. For continuous operating temperatures above $+120^{\circ}\text{C}$, please contact us.
Cages	The suffix M1 indicates standard bearings with roller-guided brass cages. Further cage suffixes: see table, page 289. Please contact us for information on the cage designs for special bearings.
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 fulfills 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.

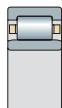
Suffixes

Suffixes for available designs of standard bearings: see table.

Available designs

Suffix ¹⁾	Description	Design
C3	Radial internal clearance larger than normal	Special design, available by agreement only
C4	Radial internal clearance larger than C3	
E	Increased capacity design	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)	
K	Tapered bore, taper 1:12	
M	Solid brass cage, two-piece, roller-guided	Special design, available by agreement only
MA	Solid brass cage, rib-guided on outer ring	
MPA	Solid brass window cage, rib-guided on outer ring	
MP1A	Solid brass cage, single-piece, rib-guided on outer ring	
MP1B	Solid brass cage, single-piece, rib-guided on inner ring	
M1	Solid brass cage, roller-guided	Standard
M1A	Solid brass cage, two-piece, rib-guided on outer ring	Special design, available by agreement only
M1B	Solid brass cage, two-piece, rib-guided on inner ring	
SP	Tolerance class SP	Standard

¹⁾ In the case of non-standardised cylindrical roller bearings, the design (for example radial internal clearance, cage, accuracy) is specified in the designation (Z-5 or F-8). In the case of these bearings, additional suffixes are only used for deviations from the original design.



Single row cylindrical roller bearings with cage

Design and safety guidelines

Permissible skewing

There is no significant reduction in rating life if the misalignment of the inner ring relative to the outer ring does not exceed the following values:

- 4' in bearings of series 10, 12, 18, 19, 2, 3, 4
- 3' in bearings of series 20, 22, 23, 28, 29, 30, 31, 38, 39.

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
- tilting of the bearing.



Ribs subjected to load must be supported across their entire height.

The permissible axial load $F_{a\ per}$ must not be exceeded, in order to avoid an unacceptable increase in temperature.

The axial limiting load $F_{a\ max}$ must not be exceeded, in order to avoid impermissible pressures at the contact surfaces.

The ratio F_a/F_r must not exceed the value 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 as a function of the lubrication method, see table, page 291

k_B –
Factor as a function of the bearing series, see table Bearing factor k_B , page 291

d_M mm
Mean bearing diameter $(d + D)/2$, see dimension table

n min^{-1}
Operating speed.

**Factor k_s
for the 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 oils should be used, e.g. CLP (DIN 51517) and HLP (DIN 51524) of ISO VG classes 32 to 460 and ATF oils (DIN 51502) and gearbox oils (DIN 51512) of SAE viscosity classes 75 W to 140 W.

Bearing factor k_B

Series	Factor k_B
NJ2..-E, NJ22..-E, NUP2..-E, NUP22..-E	15
NJ3..-E, NJ23..-E, NUP3..-E, NUP23..-E	20
NJ4	22

Skewing of the bearing, for example due to shaft deflection, can lead to alternating stresses on the inner ring ribs. In this case, the axial load must be restricted to F_{as} for bearing tilting of up to max. 2 angular minutes.

$$F_{as} = 20 \cdot d_M^{1,42}$$

If even greater tilting is present, special strength analysis is required.

Minimum radial load

In continuous operation, a minimum radial load of the order of $F_{r\ min} = C_{0r}/60$ is necessary.

If $F_{r\ min} < C_{0r}/60$, please contact us.



Single row cylindrical roller bearings with cage

Equivalent dynamic bearing load

Non-locating bearings

For bearings under dynamic loading, the following applies:

$$P = F_r$$

Semi-locating and locating bearings

Load ratio and equivalent dynamic load

Load ratio	Equivalent dynamic bearing load
$\frac{F_a}{F_r} \leq e$	$P = F_r$
$\frac{F_a}{F_r} > e$	$P = 0,92 \cdot F_r + Y \cdot F_a$

P kN

Equivalent dynamic bearing load for combined load

F_a kN

Axial dynamic bearing load

F_r kN

Radial dynamic bearing load

e, Y –

Factors, see table.

Factors e and Y

Series	Calculation factors	
	e	Y
NJ2, NUP2, NJ3, NUP3, NJ4	0,2	0,6
NJ22, NUP22, NJ23, NUP23, LSL1923	0,3	0,4

Operating life of high precision bearings

High precision bearings must guide machine parts with high precision and support forces at up to very high speeds.

They are selected predominantly from the perspectives of:

- accuracy
- rigidity
- running behaviour.

In order that they can fulfil these tasks for as long as possible, the bearings must run without wear. The precondition for this is the creation of a load-bearing hydrodynamic lubricant film at the contact points of the rolling contact partners.

Under these conditions, rolling bearings will achieve their fatigue life in a large number of applications. If the design is appropriate to the fatigue life, the operating life of the bearing is normally restricted by the lubricant operating life.

The decisive factors for the operating life from the perspective of load are the Hertzian pressures occurring at the contacts and the bearing kinematics. For high performance assemblies, individual design with the aid of special calculation programs is therefore advisable.

Since failure as a result of fatigue plays no part in practice in the case of high precision bearings, calculation of the rating life L_{10} in accordance with DIN ISO 281 is not suitable as a means of determining the operating life.

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

P_0 kN
Equivalent static bearing load

F_{0r} kN
Radial static bearing load.

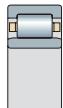
Static load safety factor of high precision bearings

$$S_0 = \frac{C_{0r}}{P_0}$$

S_0 –
Static load safety factor
 C_{0r} kN
Basic static load rating, see dimension tables
 P_0 kN
Equivalent static bearing load.



In order to achieve sufficiently smooth running, the static load safety factor for high precision bearings should be $S_0 > 3$.



Single row cylindrical roller bearings with cage

Speeds of high precision bearings



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



The limiting speeds n_G given in the dimension tables for high precision bearings are valid for lubrication with grease or for minimal quantity lubrication with oil and must not be exceeded.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

Recommendations for machining of the tapered shaft and housing for high precision bearings, see table, page 398.

Axial location

In order to prevent lateral creep of the bearing rings, they must be located by force or physical locking means.

The abutment shoulders (shaft and housing) should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seating point to the abutment shoulder must be designed with rounding to DIN 5418 or an undercut to DIN 509. The minimum values for the chamfer dimensions r in the dimension tables must be observed.

In the case of semi-locating bearings, the bearing rings only require support on one side, on the rib supporting the axial load.



Full support must be provided for ribs transmitting forces in axially loaded bearings.

Accuracy

The dimensional and running tolerances of the bearings with cylindrical bore correspond to tolerance class PN to DIN 620. Special bearings for tubular stranding machines running at high speeds have increased accuracy to tolerance class P6 or P5. High precision bearings with a tapered bore correspond to the more stringent tolerance class SP.

Width tolerances SP

Bore		Width deviation (in relation to bore)		Width variation V_{Bs} μm
d mm	Δ_{Bs} μm	max.	min.	
over	incl.			
180	250	0	-300	5
250	315	0	-350	6
315	400	0	-400	7
400	500	0	-450	8

Inner ring tolerances SP

Bore		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.							
180	250	30	0	9	0	8	8	6
250	315	35	0	11	0	9	9	7
315	400	40	0	12	0	12	10	9
400	500	45	0	14	0	14	12	11

Outer ring tolerances SP

Outside diameter		Outside diameter deviation		Variation V_{Dp} μm	Radial runout K_{ea} μm	Axial runout	
D mm	Δ_{Ds} μm	$\Delta_{D1\ mp} - \Delta_{Ds}$ μm				S_D μm	S_{ea} μm
over	incl.						
250	315	0	-18	9	11	8	10
315	400	0	-20	10	13	10	13
400	500	0	-23	12	15	11	15
500	630	0	-28	14	17	13	18
630	800	0	-35	18	20	15	22



Single row cylindrical roller bearings with cage

Radial internal clearance

The radial internal clearance of bearings with a cylindrical bore normally corresponds to internal clearance group CN to DIN 620-4. This also applies to special cylindrical roller bearings for stranding machines.

Radial internal clearance (cylindrical bore)

Bore d mm	Radial internal clearance						
	CN μm		C3 μm		C4 μm		
over	incl.	min.	max.	min.	max.	min.	max.
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
710	800	310	470	470	630	630	790
800	900	350	520	520	690	690	860
900	1000	390	580	580	770	770	960
1000	1120	430	640	640	850	850	1060
1120	1250	470	710	710	950	950	1190
1250	1400	530	790	790	1050	1050	1310
1400	1600	610	890	890	1170	1170	1450
1600	1800	700	1020	1020	1340	1340	1660
1800	2000	760	1120	1120	1480	1480	1840

Bearings with a tapered bore frequently have a radial internal clearance C3 or C4 to DIN 620-4.

Radial internal clearance (tapered bore)

Bore d mm	Radial internal clearance						
	CN μm		C3 μm		C4 μm		
over	incl.	min.	max.	min.	max.	min.	max.
200	225	155	215	200	260	245	305
225	250	170	235	220	285	270	335
250	280	185	255	240	310	295	365
280	315	205	280	265	340	325	400
315	355	225	305	290	370	355	435
355	400	255	345	330	420	405	495
400	450	285	385	370	470	455	555
450	500	315	425	410	520	505	615
500	560	350	470	455	575	560	680

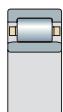
**Radial internal clearance
of high precision bearings**

The radial internal clearance of high precision bearings is smaller than the normal internal clearance and corresponds to internal clearance group C1NA.

The internal clearance is not stated in the designation.
The bearing rings are not interchangeable.

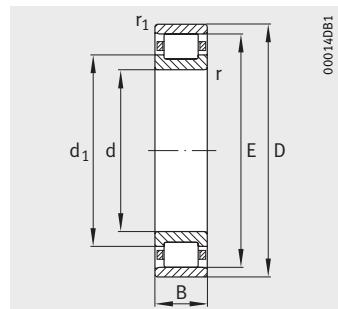
**Radial internal clearance C1NA
(tapered bore)**

Bore d mm		Radial internal clearance C1NA μm	
over	incl.	min.	max.
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

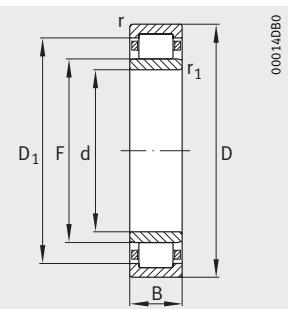


Cylindrical roller bearings with cage

Single row
Non-locating bearings



Design 1
N

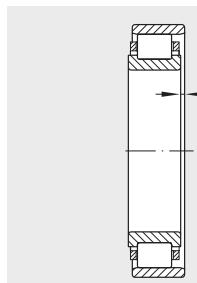


Design 3
NU

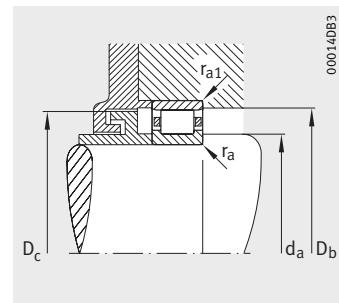
Dimension table · Dimensions in mm

Designation	X-life	Design	Mass m ≈kg	Dimensions									
				d	D	B	r min.	r ₁ min.	s ²⁾	E	F	D ₁	d ₁
N426-M1	—	1	40,1	130	340	78	5	5	6,2	285	—	—	204,2
NU426-M1	—	3	40,6	130	340	78	5	5	6,2	285	185	265,9	—
N428-M1	—	1	46,9	140	360	82	5	5	7,6	302	—	—	218,2
NU428-M1	—	3	47,4	140	360	82	5	5	7,6	302	198	282,9	—
N330-E-M1	XL	1	26,9	150	320	65	4	4	5,5	283	—	—	209,5
NU330-E-M1	XL	3	27	150	320	65	4	4	5,5	283	193	269,8	—
NU330-E-M1A	XL	3	27	150	320	65	4	4	5,5	283	193	269,8	—
NU330-E-MP1A	XL	3	26,5	150	320	65	4	4	5,5	283	193	269,8	—
NU330-E-MPA	XL	3	27,9	150	320	65	4	4	5,5	283	193	269,8	—
NU330-E-N-M1	XL	3 ¹⁾	27	150	320	65	4	4	5,5	283	193	269,8	—
N2330-E-M1	XL	1	43,3	150	320	108	4	4	9,7	283	—	—	209,5
N2330-E-MP1B	XL	1	42,4	150	320	108	4	4	9,7	283	—	—	209,5
NU2330-E-M1	XL	3	43,4	150	320	108	4	4	9,7	283	193	269,8	—
N430-M1	—	1	53,9	150	380	85	5	5	8,1	317	—	—	233,2
NU430-M1	—	3	54,4	150	380	85	5	5	8,1	317	213	297,9	—
N332-E-M1	—	1	32,6	160	340	68	4	4	5,5	300	—	—	221,6
NU332-E-M1	—	3	31,8	160	340	68	4	4	5,6	300	204	286	—
NU332-E-M1A	—	3	31,8	160	340	68	4	4	5,6	300	204	286	—
NU332-E-MP1A	—	3	32	160	340	68	4	4	5,6	300	204	286	—
N2332-E-M1	—	1	51,4	160	340	114	4	4	9,9	300	—	—	221,6
N2332-E-M1B	—	1	51,8	160	340	114	4	4	9,9	300	—	—	221,6
NU2332-E-M1	—	3	51,5	160	340	114	4	4	9,9	300	204	286	—
N432-M1	—	1	61,5	160	400	88	5	5	8,3	334	—	—	247,2
NU432-M1	—	3	61,9	160	400	88	5	5	8,3	334	226	314,9	—
NU334-E-MPA	—	3	38,4	170	360	72	4	4	6	318	218	301,6	—
N334-E-M1	—	1	37,9	170	360	72	4	4	5,9	318	—	—	237
NU334-E-M1	—	3	38	170	360	72	4	4	6	318	218	301,6	—
N2334-EX-M1	—	1	61	170	360	120	4	4	10,2	320	—	—	235,7
N2334-EX-MP1B	—	1	59,9	170	360	120	4	4	10,2	320	—	—	235,7
NU2334-EX-M1	—	3	61,4	170	360	120	4	4	10,2	320	216	303	—
N434-M1	—	1	70,4	170	420	92	5	5	8,7	351	—	—	261,2
NU434-M1	—	3	71,1	170	420	92	5	5	8,7	351	239	329,9	—

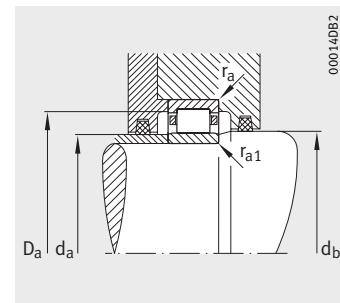
¹⁾ With retaining slot in outer ring.



2) Axial displacement "s"
for N and NU



Mounting dimensions
for N



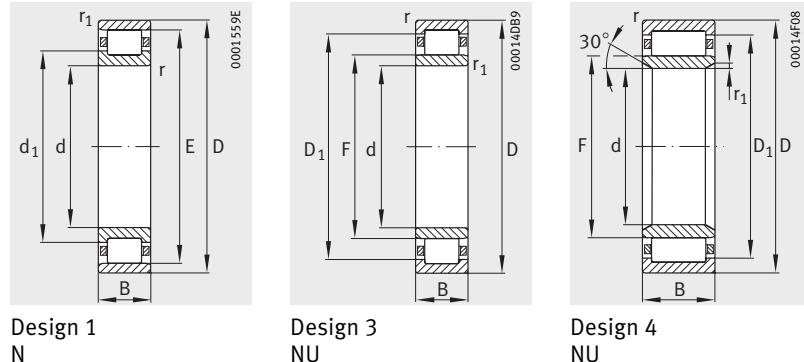
Mounting dimensions
for NU

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
154	—	—	316	287	283	4	4	865	1 020	114	3 200	1 900
154	183	187	316	—	—	4	4	865	1 020	95	3 200	1 900
164	—	—	336	304	300	4	4	930	1 120	123	3 000	1 800
164	195	200	336	—	—	4	4	930	1 120	103	3 000	1 800
167	—	—	303	285	281	3	3	900	930	126	3 600	1 940
167	190	195	303	—	—	3	3	900	930	103	3 600	1 940
167	190	195	303	—	—	3	3	900	930	103	3 600	1 940
167	190	195	303	—	—	3	3	900	930	93	3 600	2 000
167	190	195	303	—	—	3	3	900	930	103	3 600	1 940
167	190	195	303	—	—	3	3	900	930	103	3 600	2 000
167	—	—	303	285	281	3	3	1 380	1 600	226	3 200	1 500
167	—	—	303	285	281	3	3	1 380	1 600	226	3 200	1 500
167	190	195	303	—	—	3	3	1 380	1 600	226	3 200	1 460
174	—	—	356	319	315	4	4	980	1 220	132	2 800	1 600
174	210	216	356	—	—	4	4	980	1 220	111	2 800	1 600
177	—	—	323	302	298	3	3	865	1 060	114	3 000	1 770
177	200	211	323	—	—	3	3	865	1 060	96	3 000	1 770
177	200	211	323	—	—	3	3	865	1 060	96	3 000	1 770
177	200	211	323	—	—	3	3	865	1 060	81	3 000	1 800
177	—	—	323	302	298	3	3	1 320	1 830	204	3 000	1 300
177	—	—	323	302	298	3	3	1 320	1 830	204	3 000	1 300
177	200	211	323	—	—	3	3	1 320	1 830	204	3 000	1 340
184	—	—	376	336	332	4	4	1 060	1 320	142	2 800	1 500
184	223	230	376	—	—	4	4	1 060	1 320	118	2 800	1 500
187	215	221	343	—	—	3	3	915	1 140	98	3 000	1 670
187	—	—	343	320	316	3	3	965	1 220	132	3 000	1 610
187	215	221	343	—	—	3	3	965	1 220	105	3 000	1 610
187	—	—	343	322	318	3	3	1 500	2 080	231	2 800	1 200
187	—	—	343	322	318	3	3	1 500	2 080	231	2 800	1 200
187	214	218	343	—	—	3	3	1 500	2 080	231	2 800	1 210
194	—	—	396	353	349	4	4	1 120	1 400	151	2 800	1 500
194	236	243	396	—	—	4	4	1 120	1 400	126	2 800	1 500



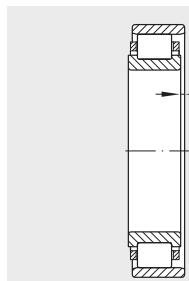
Cylindrical roller bearings with cage

Single row
Non-locating
bearings



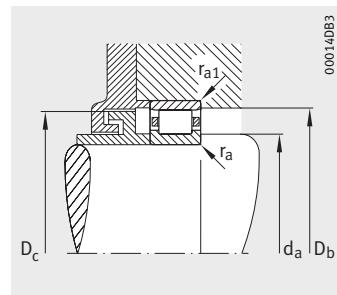
Dimension table (continued) · Dimensions in mm

Designation	X-life	Design	Mass m ≈kg	Dimensions									
				d	D	B	r min.	r ₁ min.	s ¹⁾	E	F	D ₁	d ₁
N236-E-M1	XL	1	18,9	180	320	52	4	4	4,7	289	-	-	230,2
NU236-E-M1	XL	3	18,9	180	320	52	4	4	4,7	289	217	278,6	-
NU236-E-M1A	XL	3	18,9	180	320	52	4	4	4,7	289	217	278,6	-
NU236-E-MP1A	XL	3	18,9	180	320	52	4	4	4,7	289	217	278,6	-
NU1236-M1	-	3	22,2	180	320	62	4	4	4,7	293	213	279,8	-
NU2236-E-M1	XL	3	30,7	180	320	86	4	4	7,2	291	215	280	-
NU2236-E-M1A	XL	3	31,3	180	320	86	4	4	7,2	291	215	280	-
N336-E-MP1B	-	1	42,9	180	380	75	4	4	6,1	335	-	-	250,5
NU336-E-M1	-	3	43,9	180	380	75	4	4	6,1	335	231	319,8	-
NU336-E-M1A	-	3	43,9	180	380	75	4	4	6,1	335	231	319,8	-
NU336-E-MP1A	-	3	43,9	180	380	75	4	4	6,1	335	231	319,8	-
NU336-E-MPA	-	3	43,9	180	380	75	4	4	6,1	335	231	319,8	-
N2336-EX-M1	-	1	71,3	180	380	126	4	4	10,5	339	-	-	248
N2336-EX-MP1B	-	1	69,7	180	380	126	4	4	10,5	339	-	-	248
NU2336-EX-M1	-	3	71,8	180	380	126	4	4	10,5	339	227	320,8	-
NU436-M1	-	3	80,9	180	440	95	6	6	8,9	370	250	346,9	-
NU3138-M1	-	3	34,4	190	320	104	3	3	9,2	294	222	282,1	-
N238-E-M1	-	1	22,8	190	340	55	4	4	4,7	306	-	-	244
N238-E-M1B	-	1	23	190	340	55	4	4	4,7	306	-	-	244
NU238-E-M1	-	3	22,8	190	340	55	4	4	4,7	306	230	295	-
NU238-E-M1-C3	-	3	22,8	190	340	55	4	4	4,7	306	230	295	-
NU238-E-M1A	-	3	22,8	190	340	55	4	4	4,7	306	230	295	-
NU238-E-MP1A	-	3	22,2	190	340	55	4	4	4,7	306	230	295	-
NU238-E-MPA	-	3	22,2	190	340	55	4	4	4,7	306	230	295	-
NU1238-M1	-	3	26,6	190	340	65	4	4	4,8	310	226	296,2	-
NU2238-E-M1	-	3	37,1	190	340	92	4	4	8	308	228	296,4	-
NU2238-E-M1A	-	3	37,9	190	340	92	4	4	8	308	228	296,4	-
Z-549128.ZL	-	4	45,5	190	340	114	3	8	7,6	313,1	229,1	299,2	-
N338-E-M1	-	1	50,5	190	400	78	5	5	6,3	353	-	-	265,4
NU338-E-M1	-	3	50,6	190	400	78	5	5	6,3	353	245	336	-
NU338-E-M1A	-	3	50,6	190	400	78	5	5	6,3	353	245	336	-
N2338-EX-M1	-	1	82,5	190	400	132	5	5	11	360	-	-	262,5
N2338-EX-MP1B	-	1	80,9	190	400	132	5	5	11	360	-	-	262,5
NU2338-EX-M1	-	3	83,1	190	400	132	5	5	11	360	240	340,5	-
NU438-M1	-	3	90,6	190	460	98	6	6	9,4	385	265	361,9	-



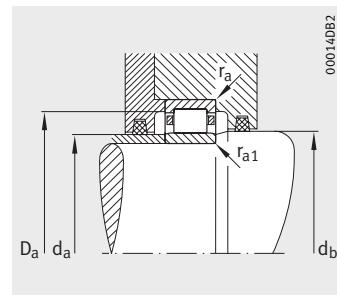
1) Axial displacement "s"
for N and NU

00014DB4



Mounting dimensions
for N

00014DB3



Mounting dimensions
for NU

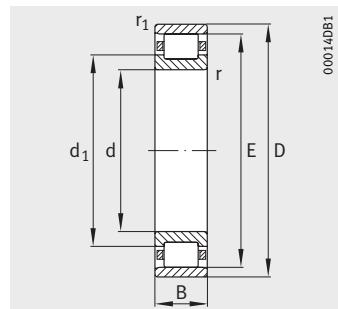
00014DB2

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
197	—	—	303	292	286	3	3	730	830	112	3 600	1 850
197	214	221	303	—	—	3	3	730	830	93	3 600	1 850
197	214	221	303	—	—	3	3	730	830	93	3 600	1 850
197	214	221	303	—	—	3	3	730	830	85	3 600	1 850
197	210	216	303	—	—	3	—	830	910	100	3 200	2 000
197	214	221	303	—	—	3	3	1 180	1 490	209	3 200	1 380
197	214	221	303	—	—	3	3	1 180	1 490	209	3 200	1 380
197	—	—	363	338	332	3	3	1 040	1 320	141	2 800	1 500
197	228	234	363	—	—	3	3	1 040	1 320	112	2 800	1 500
197	228	234	363	—	—	3	3	1 040	1 320	112	2 800	1 500
197	228	234	363	—	—	3	3	1 040	1 320	87	2 800	1 500
197	228	234	363	—	—	3	3	1 040	1 320	87	2 800	1 500
197	—	—	363	342	336	3	3	1 660	2 320	260	2 800	1 100
197	—	—	363	342	336	3	3	1 660	2 320	260	2 800	1 100
197	225	229	363	—	—	3	3	1 660	2 320	260	2 800	1 120
210	247	254	410	—	—	5	5	1 290	1 630	141	2 600	1 300
204	219	225	306	—	—	2,5	2,5	1 060	1 660	181	2 400	—
207	—	—	323	309	303	3	3	680	930	100	3 200	1 720
207	—	—	323	309	303	3	3	680	930	100	3 200	1 700
207	227	234	323	—	—	3	3	680	930	85	3 200	1 720
207	227	234	323	—	—	3	3	680	930	85	3 200	1 720
207	227	234	323	—	—	3	3	680	930	85	3 200	1 720
207	227	234	323	—	—	3	3	680	930	72	3 200	1 700
207	227	234	323	—	—	3	3	680	930	72	3 200	1 700
207	223	230	323	—	—	3	3	765	1 020	109	3 000	1 800
207	225	232	323	—	—	3	3	1 100	1 660	184	3 000	1 290
207	225	232	323	—	—	3	3	1 100	1 660	184	3 000	1 290
218	227	234	326	—	—	3	7	1 320	2 040	218	2 200	—
210	—	—	380	356	350	4	4	1 120	1 430	151	2 800	1 400
210	242	248	380	—	—	4	4	1 120	1 430	120	2 800	1 400
210	242	248	380	—	—	4	4	1 120	1 430	120	2 800	1 400
210	—	—	380	363	357	4	4	1 900	2 650	285	2 600	1 000
210	—	—	380	363	357	4	4	1 900	2 650	285	2 600	1 000
210	237,8	242,2	380	—	—	4	4	1 900	2 650	285	2 600	1 010
220	262	269	430	—	—	5	5	1 340	1 760	152	2 600	1 200

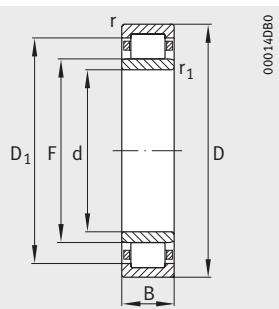


Cylindrical roller bearings with cage

Single row
Non-locating bearings



Design 1
N

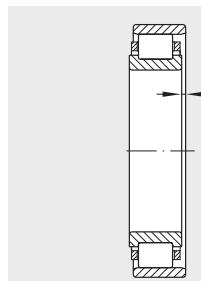


Design 3
NU

Dimension table (continued) · Dimensions in mm

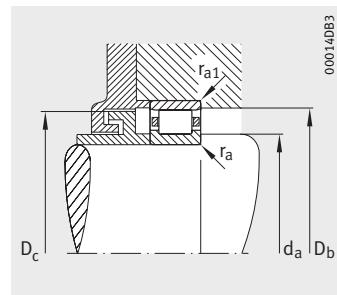
Designation	Design	Mass m ≈kg	Dimensions									
			d	D	B	r min.	r ₁ min.	s ²⁾	E	F	D ₁	d ₁ ≈
NU3140-M1	3	42,4	200	340	112	3	3	10	313	233	300,2	—
N240-E-M1	1	27,2	200	360	58	4	4	4,8	323	—	—	257,6
NU240-E-M1	3	27,2	200	360	58	4	4	4,8	323	243	311,5	—
NU240-E-M1-C3	3	27,2	200	360	58	4	4	4,8	323	243	311,5	—
NU240-E-M1A	3	27,2	200	360	58	4	4	4,8	323	243	311,5	—
NU1240-M1	3	32,3	200	360	70	4	4	5	328	238	313,1	—
N2240-E-M1	1	44,7	200	360	98	4	4	8,2	325	—	—	256,3
N2240-E-MP1B	1	43,9	200	360	98	4	4	8,2	325	—	—	256,3
N2240-E-N-M1	1 ¹⁾	44,7	200	360	98	4	4	8,2	325	—	—	256,3
N2240-E-N-MP1B	1 ¹⁾	43,9	200	360	98	4	4	8,2	325	—	—	256,3
NU2240-E-M1	3	44,7	200	360	98	4	4	8,2	325	241	312,9	—
NU2240-E-M1A	3	45,7	200	360	98	4	4	8,2	325	241	312,9	—
NU2240-E-MPA	3	44,4	200	360	98	4	4	8,2	325	241	312,9	—
N340-E-M1	1	57	200	420	80	5	5	6,3	370	—	—	279
NU340-E-M1	3	57,3	200	420	80	5	5	6,3	370	258	351,8	—
NU340-E-M1A	3	57,3	200	420	80	5	5	6,3	370	258	351,8	—
NU340-E-MP1A	3	57	200	420	80	5	5	6,3	370	258	351,8	—
NU2340-EX-M1	3	95,6	200	420	138	5	5	11,3	377	253	356,9	—
NU440-M1	3	103	200	480	102	6	6	9,4	404	276	378,9	—

¹⁾ With retaining slot in outer ring.



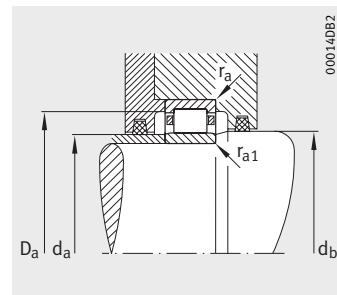
2) Axial displacement "s"
for N and NU

00014DB4



Mounting dimensions
for N

00014DB3



Mounting dimensions
for NU

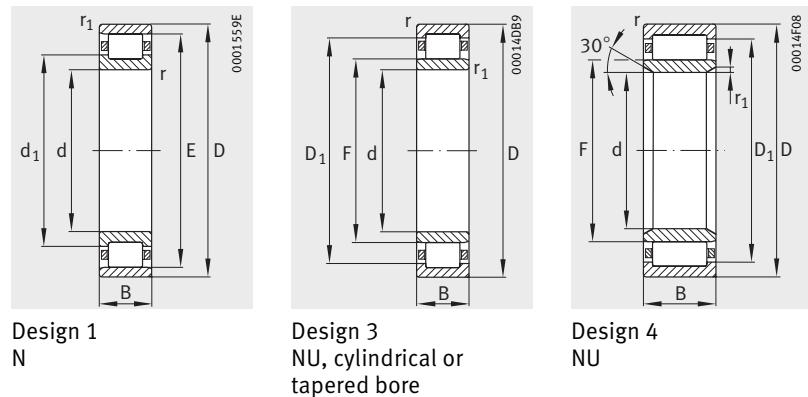
00014DB2

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
214	230	236	326	—	—	2,5	2,5	1 290	2 080	230	2 800	1 500
217	—	—	343	326	320	3	3	750	1 040	110	3 000	1 600
217	240	247	343	—	—	3	3	750	1 040	94	3 000	1 600
217	240	247	343	—	—	3	3	750	1 040	94	3 000	1 600
217	240	247	343	—	—	3	3	750	1 040	94	3 000	1 600
217	235	241	343	—	—	3	3	880	1 160	122	2 800	1 700
217	—	—	343	328	322	3	3	1 220	1 860	205	2 800	1 200
217	—	—	343	328	322	3	3	1 220	1 860	205	2 800	1 200
217	—	—	343	328	322	3	3	1 220	1 860	205	2 800	1 200
217	—	—	343	328	322	3	3	1 220	1 860	205	2 800	1 200
217	240	247	343	—	—	3	3	1 220	1 860	206	2 800	1 180
217	240	247	343	—	—	3	3	1 220	1 860	206	2 800	1 180
217	240	247	343	—	—	3	3	1 220	1 860	206	2 800	1 200
220	—	—	400	373	367	4	4	1 180	1 530	161	2 600	1 320
220	255	261	400	—	—	4	4	1 180	1 530	128	2 600	1 320
220	255	261	400	—	—	4	4	1 180	1 530	128	2 600	1 320
220	255	261	400	—	—	4	4	1 180	1 530	99	2 600	1 300
220	250,7	255,3	400	—	—	4	4	2 040	2 900	310	2 400	940
230	273	280	450	—	—	5	5	1 460	1 860	159	2 400	1 200



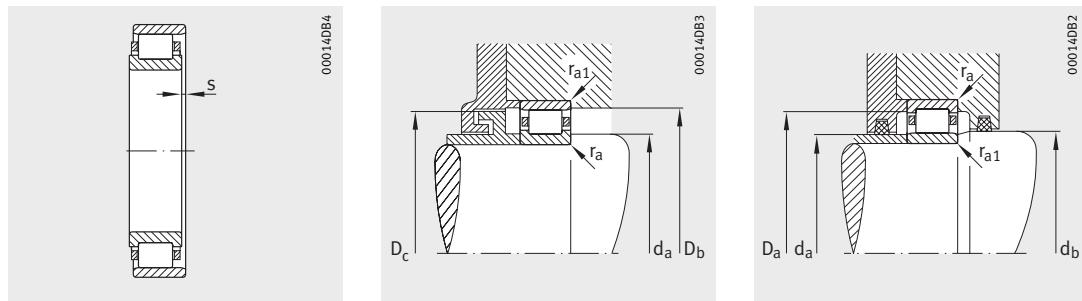
Cylindrical roller bearings with cage

Single row
Non-locating
bearings



Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions									
			d	D	B	r min.	r ₁ min.	s ¹⁾	E	F	D ₁	d ₁ ≈
N1044-M1	1	20,4	220	340	56	3	3	6,2	310	—	—	261,7
N1044-M1B	1	18,8	220	340	56	3	3	6,2	310	—	—	261,7
NU1044-K-M1	3	18,3	220	340	56	3	—	6,2	310	250	298,9	—
NU1044-K-M1A	3	18,7	220	340	56	3	—	6,2	310	250	298,9	—
NU1044-M1	3	20,5	220	340	56	3	3	6,2	310	250	298,9	—
NU1044-M1-C3	3	20,5	220	340	56	3	3	6,2	310	250	298,9	—
NU1044-M1A	3	19	220	340	56	3	3	6,2	310	250	298,9	—
NU1044-MP1A	3	18,2	220	340	56	3	3	6,2	310	250	298,9	—
NU2044-E-M1	3	25,1	220	340	72	3	3	4	314	250	302,8	—
NU3044-M1	3	30,9	220	340	90	3	3	2,5	310	250	298,9	—
Z-546293.ZL	3	37,2	220	350	98	3	3	6,7	323	247	310,4	—
NU3144-M1	3	52,6	220	370	120	4	4	10,2	340	256	326,1	—
N244-E-M1	1	38,2	220	400	65	4	4	5,5	358	—	—	285,2
NU244-E-M1	3	38,1	220	400	65	4	4	5,5	358	268	344,9	—
NU244-E-M1A	3	38,1	220	400	65	4	4	5,5	358	268	344,9	—
NU244-E-MP1A	3	38,3	220	400	65	4	4	5,5	358	268	344,9	—
NU1244-M1	3	45,2	220	400	78	4	4	5,7	365	261	348	—
NU2244-EX-M1	3	61,6	220	400	108	4	4	8,4	367	259	349,4	—
NU2244-EX-M1A	3	62,8	220	400	108	4	4	8,4	367	259	349,4	—
NU2244-EX-MP1A	3	60,4	220	400	108	4	4	8,4	367	259	349,4	—
Z-548409.ZL	4	75,1	220	400	133	3	9,5	—	366,1	266,1	349,6	—
N344-E-M1	1	75,5	220	460	88	5	5	7	406	—	—	305,1
NU344-E-M1	3	75,5	220	460	88	5	5	7	406	282	386	—
NU344-E-M1A	3	75,5	220	460	88	5	5	7	406	282	386	—
NU2344-EX-M1	3	121	220	460	145	5	5	11,9	413	277	391,2	—
NU444-M1	3	150	220	540	115	6	6	10	455	305	426,1	—



1) Axial displacement "s"
for N and NU

Mounting dimensions
for N

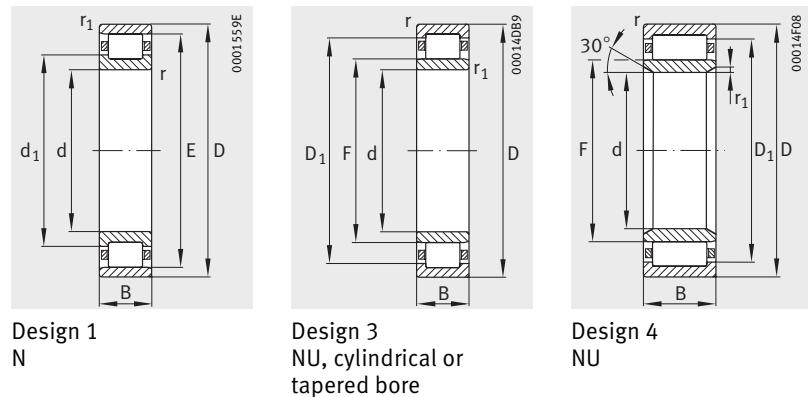
Mounting dimensions
for NU

Mounting dimensions							Basic load ratings		Fatigue limit load	Limiting speed	Reference speed	
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
232	—	—	328	313	307	2,5	2,5	510	765	80	3 200	2 000
232	—	—	328	313	307	2,5	2,5	510	765	80	3 200	2 000
232	248	254	328	—	—	2,5	—	510	765	69	3 200	2 040
232	248	254	328	—	—	2,5	—	510	765	69	3 200	2 000
232	248	254	328	—	—	2,5	2,5	510	765	69	3 200	2 040
232	248	254	328	—	—	2,5	2,5	510	765	69	3 200	2 040
232	248	254	328	—	—	2,5	2,5	510	765	69	3 200	2 040
232	248	254	328	—	—	2,5	2,5	510	765	60	3 200	2 040
232	247	253	328	—	—	2,5	2,5	880	1 460	161	3 000	1 500
232	246	254	328	—	—	2,5	2,5	965	1 730	191	3 000	1 400
232	243	251	338	—	—	2,5	2,5	1 250	2 080	231	2 800	—
237	253	259	353	—	—	3	3	1 460	2 400	265	2 800	1 300
237	—	—	383	361	355	3	3	950	1 320	135	2 800	1 400
237	265	271	383	—	—	3	3	950	1 320	109	2 800	1 380
237	265	271	383	—	—	3	3	950	1 320	109	2 800	1 380
237	265	271	383	—	—	3	3	950	1 320	87	2 800	1 400
237	257	264	383	—	—	3	3	1 080	1 430	150	2 800	1 500
237	256,7	261,3	383	—	—	3	3	1 630	2 360	250	2 600	1 000
237	256,7	261,3	383	—	—	3	3	1 630	2 360	250	2 600	1 000
237	256,7	261,3	383	—	—	3	3	1 630	2 360	250	2 600	1 000
260	263	269	386	—	—	2,5	8	1 900	3 000	320	2 600	1 100
240	—	—	440	409	403	4	4	1 430	1 900	192	2 400	1 100
240	279	285	440	—	—	4	4	1 430	1 900	152	2 400	1 140
240	279	285	440	—	—	4	4	1 430	1 900	152	2 400	1 140
240	274,7	279,3	440	—	—	4	4	2 360	3 350	340	2 200	830
250	302	309	510	—	—	5	5	1 960	2 550	209	2 200	950



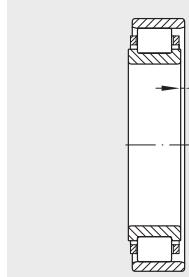
Cylindrical roller bearings with cage

Single row
Non-locating
bearings



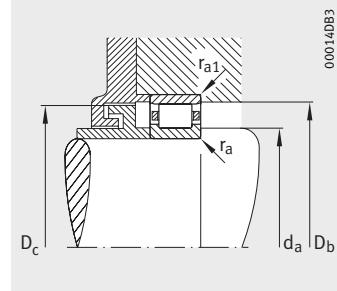
Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions									
			d	D	B	r min.	r ₁ min.	s ¹⁾	E	F	D ₁	d ₁ ≈
NU1948-M1	3	8,37	240	320	38	2,1	1,5	4,6	299	261	292,6	-
NU3948-E-M1	3	13,6	240	320	60	2,1	1,5	3,2	302	260	295	-
NU3948-E-MP1A	3	13,5	240	320	60	2,1	1,5	5,3	302	260	295	-
N1048-M1	1	19,8	240	360	56	3	3	6,4	330	-	-	281,6
N1048-M1B	1	20	240	360	56	3	3	6,4	330	-	-	281,6
NU1048-K-M1	3	20	240	360	56	3	-	6,4	330	270	318,9	-
NU1048-M1	3	19,9	240	360	56	3	3	6,4	330	270	318,9	-
NU1048-M1-C3	3	19,9	240	360	56	3	3	6,4	330	270	318,9	-
NU1048-M1A	3	20,2	240	360	56	3	3	6,4	330	270	318,9	-
NU1048-MP1A	3	19,2	240	360	56	3	3	6,4	330	270	318,9	-
NU2048-E-M1	3	26,6	240	360	72	3	3	1,9	334	270	322,8	-
NU3048-M1	3	33,6	240	360	92	3	3	9,8	330	270	318,9	-
NU3148-M1	3	64,8	240	400	128	4	4	12	368	278	353,2	-
N248-E-M1	1	51,5	240	440	72	4	4	6	393	-	-	312
NU248-E-M1	3	51,8	240	440	72	4	4	6	393	293	376,6	-
NU248-E-M1A	3	51,8	240	440	72	4	4	6	393	293	376,6	-
NU1248-M1	3	60,4	240	440	85	4	4	6,5	399	287	380,8	-
NU2248-EX-M1	3	82,8	240	440	120	4	4	10,2	399	287	380,7	-
NU2248-EX-M1A	3	84,3	240	440	120	4	4	10,2	399	287	380,7	-
NU2248-EX-MPA	3	83,3	240	440	120	4	4	10,2	399	287	380,7	-
Z-548410.ZL	4	102	240	440	146	3	9,5	-	401,4	291,4	383,4	-
NU348-E-M1	3	95,7	240	500	95	5	5	7,4	442	306	421,2	-
NU2348-EX-M1	3	151	240	500	155	5	5	13,3	447	303	424	-
NU448-M1	3	176	240	580	122	6	6	10,9	490	330	459,1	-
Z-544518.ZL	3	54,1	241	375	127	10	4	-	342,5	282,5	332,6	-
Z-549124.ZL	3	59,7	250	410	111	4	4	-	378	282	362,3	-



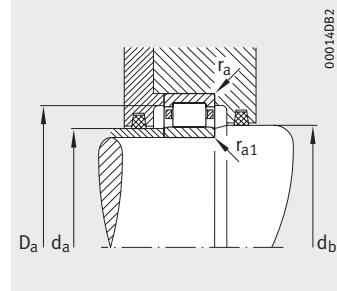
1) Axial displacement "s"
for N and NU

00014DB4



Mounting dimensions
for N

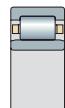
00014DB3



Mounting dimensions
for NU

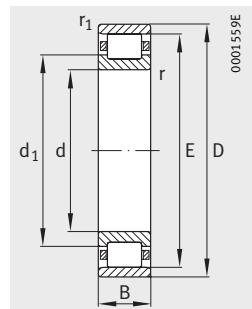
00014DB2

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{or} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
248	258	264	309	—	—	2	1,5	330	490	44	3 800	—
248	257	263	309	—	—	2	1,5	700	1 200	130	3 200	1 400
248	257	263	309	—	—	2	1,5	700	1 200	130	3 200	1 400
252	—	—	348	333	327	2,5	2,5	540	850	86	3 000	1 800
252	—	—	348	333	327	2,5	2,5	540	850	86	3 000	1 800
252	268	275	348	—	—	2,5	—	540	850	64	3 000	1 800
252	268	275	348	—	—	2,5	2,5	540	850	74	3 000	1 850
252	268	275	348	—	—	2,5	2,5	540	850	74	3 000	1 850
252	268	275	348	—	—	2,5	2,5	540	850	74	3 000	1 850
252	268	275	348	—	—	2,5	2,5	540	850	74	3 000	1 850
252	269	275	348	—	—	2,5	2,5	915	1 600	172	2 800	1 400
252	266	274	348	—	—	2,5	2,5	1 000	1 900	205	2 800	1 300
257	275	281	383	—	—	3	3	1 660	2 800	295	2 600	1 100
257	—	—	423	396	390	3	3	1 140	1 600	163	2 600	1 220
257	290	296	423	—	—	3	3	1 140	1 600	132	2 600	1 220
257	290	296	423	—	—	3	3	1 140	1 600	132	2 600	1 220
257	284,5	289,5	423	—	—	3	3	1 290	1 760	183	2 400	1 300
257	284,5	289,5	423	—	—	3	3	1 830	2 800	295	2 400	900
257	284,5	289,5	423	—	—	3	3	1 830	2 800	295	2 400	900
257	284,5	289,5	423	—	—	3	3	1 830	2 800	295	2 400	900
280	288	294	426	—	—	2,5	8	2 240	3 600	380	2 400	1 000
260	303	309	480	—	—	4	4	1 730	2 280	176	2 200	1 000
260	300,5	305,5	480	—	—	4	4	2 600	3 750	375	2 000	750
270	327	334	550	—	—	5	5	2 240	2 900	198	1 900	850
258	279	285	340	—	—	8	3	1 400	2 900	215	1 800	—
267	279	285	393	—	—	3	3	1 630	2 600	270	2 600	1 100

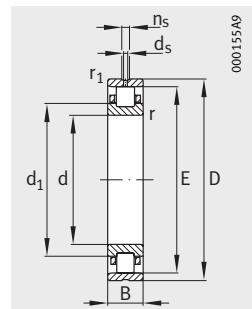


Cylindrical roller bearings with cage

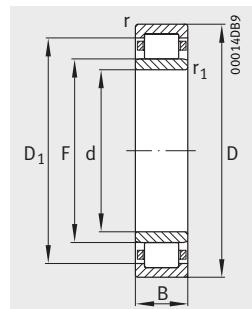
Single row
Non-locating
bearings



Design 1
N



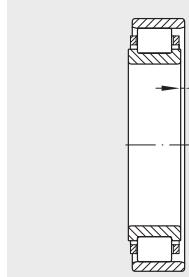
Design 2
N with lubrication
groove and holes



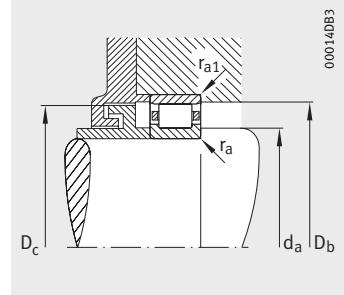
Design 3
NU, cylindrical or
tapered bore

Dimension table (continued) · Dimensions in mm

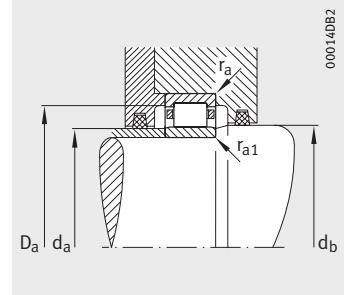
Designation	De-sign	Mass m ≈kg	Dimensions											
			d	D	B	r min.	r ₁ min.	s ¹⁾	E	F	D ₁	d ₁	d _s	n _s
Z-541924.ZL	2	4,62	260	320	28	2	1,1	5	306	—	—	284	2	6,5
NU1852-M1	3	4,83	260	320	28	2	1,1	3,2	307	275	300,6	—	—	—
NU3852-M1	3	7,9	260	320	45	2	1,1	4,6	307	275	300,6	—	—	—
NU1952-M1	3	14,2	260	360	46	2,1	1,5	5,3	334	286	324,4	—	—	—
NU3952-E-M1	3	23,1	260	360	75	2,1	1,5	4,3	338	286	329,3	—	—	—
N1052-M1	1	29,4	260	400	65	4	4	7,2	364	—	—	309,1	—	—
N1052-M1B	1	29,9	260	400	65	4	4	7,2	364	—	—	309,1	—	—
NU1052-K-M1	3	29,2	260	400	65	4	—	7,2	364	296	351,3	—	—	—
NU1052-M1	3	29,7	260	400	65	4	4	7,2	364	296	351,3	—	—	—
NU1052-M1-C3	3	29,7	260	400	65	4	4	7,2	364	296	351,3	—	—	—
NU1052-M1A	3	29,9	260	400	65	4	4	7,2	364	296	351,3	—	—	—
NU1052-MP1A	3	29	260	400	65	4	4	7,2	364	296	351,3	—	—	—
NU2052-E-M1	3	39,5	260	400	82	4	4	6,2	370	294	356,3	—	—	—
NU3052-M1	3	49,3	260	400	104	4	4	9,7	364	296	351,3	—	—	—
NU3152-M1	3	89,7	260	440	144	4	4	13,5	404	304	388,2	—	—	—
NU252-E-M1	3	68,4	260	480	80	5	5	6,2	429	317	410,8	—	—	—
NU252-E-M1A	3	68,4	260	480	80	5	5	6,2	429	317	410,8	—	—	—
NU1252-M1	3	77	260	480	90	5	5	6,7	433	313	413,6	—	—	—
NU2252-E-M1	3	109	260	480	130	5	5	10,5	433	313	413,6	—	—	—
NU2252-E-M1A	3	111	260	480	130	5	5	10,5	433	313	413,6	—	—	—
NU2252-E-MP1A	3	108	260	480	130	5	5	10,5	433	313	413,6	—	—	—
NU352-E-M1	3	121	260	540	102	6	6	10	477	337	454,6	—	—	—
NU2352-EX-M1	3	189	260	540	165	6	6	13,7	484	324	458,4	—	—	—
Z-547407.ZL	1	12,8	279	368	44	4	4	4	348	—	—	306,1	—	—
NU1856-M1	3	7,1	280	350	33	2	1,1	4	333	299	327,1	—	—	—
NU1956-M1	3	15	280	380	46	2,1	1,5	5,2	354	306	345,4	—	—	—
NU3956-E-M1	3	24,8	280	380	75	2,1	1,5	6,6	358	306	349,3	—	—	—
N1056-M1	1	31,3	280	420	65	4	4	7,2	384	—	—	329,1	—	—
N1056-M1B	1	31,3	280	420	65	4	4	7,2	384	—	—	329,1	—	—
NU1056-M1	3	31,4	280	420	65	4	4	7,2	384	316	371,3	—	—	—
NU1056-M1-C3	3	31,4	280	420	65	4	4	7,2	384	316	371,3	—	—	—
NU1056-M1A	3	31,7	280	420	65	4	4	7,2	384	316	371,3	—	—	—
NU1056-MP1A	3	30,9	280	420	65	4	4	7,2	384	316	371,3	—	—	—



00014DB4



00014DB3



00014DB2

1) Axial displacement "s"
for N and NU

Mounting dimensions
for N

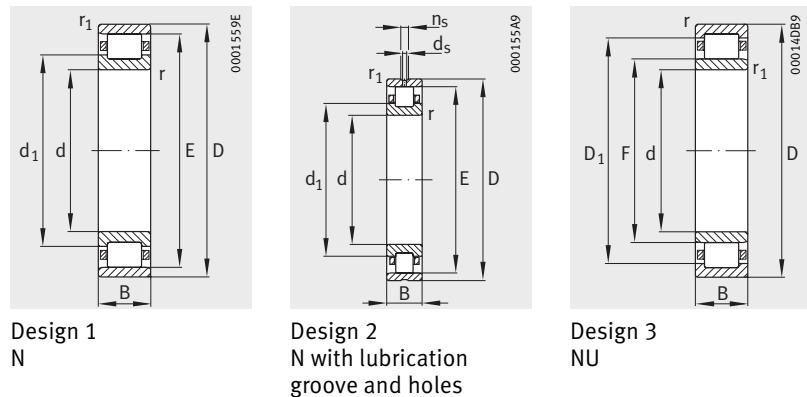
Mounting dimensions
for NU

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{or} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
269	—	—	311	310	302	2	1,1	106	176	13,5	3 800	—
269	272	278	311	—	—	2	1	270	440	39	3 600	—
269	272	278	311	—	—	2	1	485	930	100	3 200	1 300
268	283	289	349	—	—	2	1,5	425	735	64	3 000	—
268	283	289	349	—	—	2	1,5	830	1 660	179	2 800	1 200
275	—	—	385	366,5	361,5	3	3	655	1 020	104	2 800	1 700
275	—	—	385	366,5	361,5	3	3	655	1 020	104	2 800	1 700
275	292	300	385	—	—	3	—	655	1 020	90	2 800	1 690
275	292	300	385	—	—	3	3	655	1 020	90	2 800	1 690
275	292	300	385	—	—	3	3	655	1 020	90	2 800	1 690
275	292	300	385	—	—	3	3	655	1 020	90	2 800	1 690
275	292	300	385	—	—	3	3	655	1 020	77	2 800	1 690
275	291	297	385	—	—	3	3	1 200	2 080	217	2 600	1 200
275	292	300	385	—	—	3	3	1 270	2 400	255	2 800	1 100
277	301	307	423	—	—	3	3	2 040	3 400	355	2 400	1 000
280	314	320	460	—	—	4	4	1 340	1 900	154	2 400	1 110
280	314	320	460	—	—	4	4	1 340	1 900	154	2 400	1 110
280	310	316	460	—	—	4	4	1 460	2 040	204	2 200	1 100
280	310	316	460	—	—	4	4	2 160	3 350	345	2 200	780
280	310	316	460	—	—	4	4	2 160	3 350	345	2 200	780
280	310	316	460	—	—	4	4	2 160	3 350	345	2 200	800
286	334,3	339,7	514	—	—	5	5	1 900	2 600	198	2 000	900
286	321,3	326,7	514	—	—	5	5	3 100	4 500	435	1 800	660
294	—	—	353	351	345	3	3	490	850	87	2 800	—
289	296	302	341	—	—	2	1	255	500	43	3 200	—
288	303	309	369	—	—	2	1,5	440	800	68	2 800	—
288	303	309	369	—	—	2	1,5	865	1 760	188	2 800	1 100
295	—	—	405	386	382	3	3	680	1 100	112	2 800	1 500
295	—	—	405	386	382	3	3	680	1 100	112	2 800	1 500
295	312	321	405	—	—	3	3	680	1 100	96	2 800	1 550
295	312	321	405	—	—	3	3	680	1 100	96	2 800	1 550
295	312	321	405	—	—	3	3	695	1 140	86	2 800	1 530



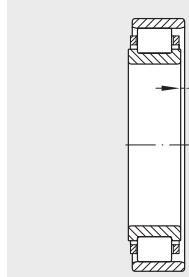
Cylindrical roller bearings with cage

Single row
Non-locating
bearings

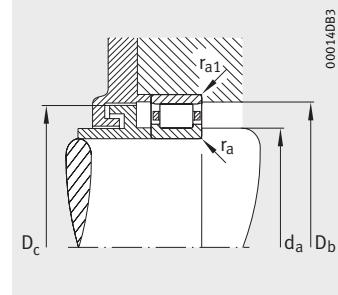


Dimension table (continued) · Dimensions in mm

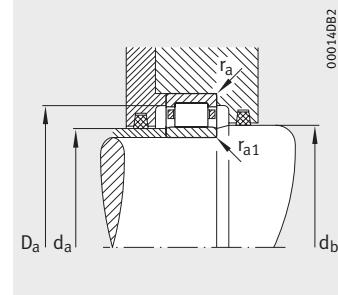
Designation	De-sign	Mass m ≈kg	Dimensions											
			d	D	B	r min.	r ₁ min.	s ¹⁾	E	F	D ₁	d ₁	d _s	n _s
NU2056-E-M1	3	41,8	280	420	82	4	4	6,2	390	314	376,3	—	—	—
NU3056-M1	3	53,2	280	420	106	4	4	9,8	384	316	371,3	—	—	—
NU3156-M1	3	96,6	280	460	146	5	5	14	424	324	407,6	—	—	—
NU256-E-M1	3	72,1	280	500	80	5	5	6,3	449	337	430,8	—	—	—
NU256-E-M1A	3	72,1	280	500	80	5	5	6,3	449	337	430,8	—	—	—
NU1256-M1	3	81,2	280	500	90	5	5	6,7	453	333	434	—	—	—
NU2256-E-M1	3	114	280	500	130	5	5	10,5	453	333	436	—	—	—
NU2256-E-M1A	3	118	280	500	130	5	5	10,5	453	333	436	—	—	—
NU2256-E-MP1A	3	113	280	500	130	5	5	10,5	453	333	436	—	—	—
NU356-E-M1	3	147	280	580	108	6	6	8,7	512	362	488	—	—	—
NU2356-EX-M1	3	234	280	580	175	6	6	13,8	521	351	493,8	—	—	—
Z-527791.ZL	2	9,65	300	380	38	2,1	2,1	7	362	—	—	329,9	3,2	9,5
NU1860-M1	3	9,96	300	380	38	2,1	1,5	4,3	362	322	355,2	—	—	—
N2860-M1	1	12,8	300	380	48	2,1	1,5	5,3	362	—	—	328,7	—	—
NU2860-M1	3	12,9	300	380	48	2,1	1,5	5,3	362	322	355,2	—	—	—
NU3860-M1	3	16,4	300	380	60	2,1	1,5	6	362	322	355,2	—	—	—
NU1960-M1	3	23,7	300	420	56	3	3	6,5	390	330	378	—	—	—
NU3960-E-M1	3	38,6	300	420	90	3	3	7,5	394	330	383,3	—	—	—
NU3960-E-M1A	3	38,6	300	420	90	3	3	7,5	394	330	383,3	—	—	—
N1060-M1	1	44,3	300	460	74	4	4	7,9	420	—	—	355,7	—	—
NU1060-M1	3	44,6	300	460	74	4	4	7,9	420	340	405,2	—	—	—
NU1060-M1-C3	3	44,6	300	460	74	4	4	7,9	420	340	405,2	—	—	—
NU1060-M1A	3	44,6	300	460	74	4	4	7,9	420	340	405,2	—	—	—
NU1060-MP1A	3	43,5	300	460	74	4	4	7,9	420	340	405,2	—	—	—
NU3060-M1	3	74	300	460	118	4	4	10,5	420	340	405,2	—	—	—
NU3160-M1	3	126	300	500	160	5	5	4,2	460	348	442,4	—	—	—
NU260-E-M1	3	90,4	300	540	85	5	5	6,9	484	364	464,6	—	—	—
NU260-E-M1A	3	90,4	300	540	85	5	5	6,9	484	364	464,6	—	—	—
NU1260-M1	3	103	300	540	98	5	5	7,2	487	359	466,4	—	—	—
NU2260-EX-MPA	3	147	300	540	140	5	5	12,2	495	355	472,6	—	—	—
NU2260-EX-M1	3	143	300	540	140	5	5	12,2	495	355	472,6	—	—	—
NU2260-EX-M1A	3	143	300	540	140	5	5	12,2	495	355	472,6	—	—	—
NU360-E-M1	3	171	300	620	109	7,5	7,5	8,9	542	392	518	—	—	—



00014DB4



00014DB3

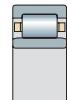


00014DB2

1) Axial displacement "s"
for N and NU

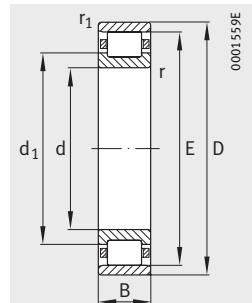
Mounting dimensions
for NMounting dimensions
for NU

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{or} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
295	311	317	405	—	—	3	3	1 220	2 160	224	2 600	1 100
295	312	320	405	—	—	3	3	1 340	2 600	275	2 600	1 000
300	321	327	440	—	—	4	4	2 080	3 650	370	2 200	950
300	334	340	480	—	—	4	4	1 400	2 000	163	2 200	1 020
300	334	340	480	—	—	4	4	1 400	2 000	163	2 200	1 020
300	330	336	480	—	—	4	4	1 530	2 200	215	2 200	1 000
300	330	336	480	—	—	4	4	2 280	3 600	360	2 000	720
300	330	336	480	—	—	4	4	2 280	3 600	360	2 000	720
300	330	336	480	—	—	4	4	2 280	3 600	360	2 000	700
306	359	366	554	—	—	5	5	2 160	3 050	224	1 900	790
306	348	354	554	—	—	5	5	3 550	5 200	495	1 600	590
310	—	—	370	366	358	2,1	2,1	204	325	25	2 800	—
310	319	325	370	—	—	2	1,5	335	640	55	2 800	—
310	—	—	370	366	358	2	1,5	475	1 000	101	2 800	1 200
310	319	325	370	—	—	2	1,5	475	1 000	101	2 800	1 200
310	319	325	370	—	—	2	1,5	610	1 400	143	2 800	1 100
312	327	333	408	—	—	2,5	2,5	600	1 020	87	2 800	—
312	327	333	408	—	—	2,5	2,5	1 180	2 360	242	2 600	950
312	327	333	408	—	—	2,5	2,5	1 180	2 360	242	2 600	950
315	—	—	445	422	418	3	3	900	1 430	139	2 400	1 400
315	336	345	445	—	—	3	3	900	1 430	120	2 400	1 390
315	336	345	445	—	—	3	3	900	1 430	120	2 400	1 390
315	336	345	445	—	—	3	3	900	1 430	120	2 400	1 390
315	336	345	445	—	—	3	3	900	1 430	105	2 400	1 390
315	336	344	445	—	—	3	3	1 700	3 250	335	2 400	900
320	345	351	480	—	—	4	4	2 500	4 300	435	2 000	850
320	359	367	520	—	—	4	4	1 600	2 320	182	2 000	920
320	359	367	520	—	—	4	4	1 600	2 320	182	2 000	920
320	—	—	520	491	483	4	4	1 730	2 500	242	2 000	950
320	352	358	520	—	—	4	4	2 550	3 900	375	1 200	670
320	352	358	520	—	—	4	4	2 700	4 150	395	1 900	650
320	352	358	520	—	—	4	4	2 700	4 150	395	1 900	650
332	389	395	588	—	—	6	6	2 280	3 250	238	1 800	750

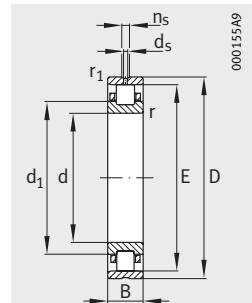


Cylindrical roller bearings with cage

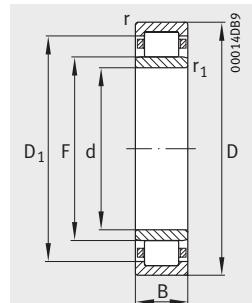
Single row
Non-locating
bearings



Design 1
N



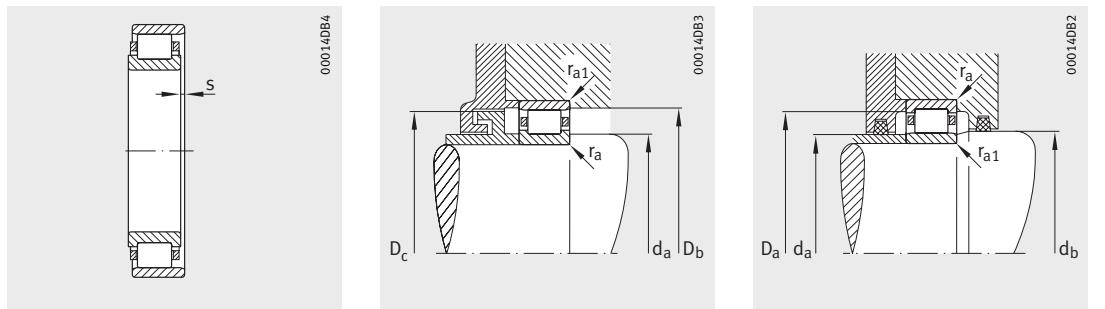
Design 2
N with lubrication
groove and holes



Design 3
NU

Dimension table (continued) · Dimensions in mm

Designation	De-sign	Mass m ≈kg	Dimensions											
			d	D	B	r min.	r ₁ min.	s ¹⁾	E	F	D ₁	d ₁	d _s	n _s
Z-527454.ZL	2	10,2	320	400	38	2	2	7	381	-	-	349	3,2	9,5
NU1864-M1	3	10,8	320	400	38	2,1	1,5	4,3	381	341	373,8	-	-	-
NU3864-M1	3	17,5	320	400	60	2,1	1,5	6	381	341	373,8	-	-	-
NU1964-M1	3	25,1	320	440	56	3	3	6,2	410	350	398	-	-	-
NU2964-M1	3	33,2	320	440	72	3	3	7	410	350	398	-	-	-
NU3964-E-M1	3	41,5	320	440	90	3	3	4,7	414	350	403,3	-	-	-
N1064-M1	1	46,5	320	480	74	4	4	8	440	-	-	375,4	-	-
NU1064-M1	3	46,9	320	480	74	4	4	8	440	360	425,1	-	-	-
NU1064-M1-C3	3	46,9	320	480	74	4	4	8	440	360	425,1	-	-	-
NU1064-M1A	3	46,9	320	480	74	4	4	8	440	360	425,1	-	-	-
NU1064-MP1A	3	45,8	320	480	74	4	4	8	440	360	425,1	-	-	-
NU3064-M1	3	79,3	320	480	121	4	4	11,5	440	360	425,1	-	-	-
NU3164-M1	3	168	320	540	176	5	5	12	496	368	475,4	-	-	-
NU264-EX-M1	3	113	320	580	92	5	5	7,5	520	392	499,4	-	-	-
NU264-EX-M1A	3	113	320	580	92	5	5	7,5	520	392	499,4	-	-	-
NU1264-M1	3	130	320	580	105	5	5	7,3	523	383	500,6	-	-	-
NU2264-EX-M1	3	180	320	580	150	5	5	11,9	530	380	506	-	-	-
NU2264-EX-M1A	3	184	320	580	150	5	5	11,9	530	380	506	-	-	-
NU364-E-M1	3	214	320	670	112	7,5	7,5	8,9	580	420	554	-	-	-
NU2364-E-M1	3	356	320	670	200	7,5	7,5	16	602	402	570	-	-	-
Z-527455.ZL	2	10,6	340	420	38	2,1	2,1	7	401,5	-	-	369,3	3,2	9,5
NU1868-M1	3	11,3	340	420	38	2,1	1,5	4,3	401,5	361,5	394,7	-	-	-
NU3868-M1	3	18,4	340	420	60	2,1	1,5	6	401,5	361,5	394,7	-	-	-
NU1968-M1	3	27,2	340	460	56	3	3	6,5	430	370	418	-	-	-
NU2968-M1	3	34,6	340	460	72	3	3	7	430	370	418	-	-	-
NU3968-E-M1	3	43,8	340	460	90	3	3	4,7	434	370	423,3	-	-	-
NU1068-MPA	3	65,1	340	520	82	5	5	8,9	475	385	458,2	-	-	-
N1068-M1	1	62,8	340	520	82	5	5	8,9	475	-	-	402,2	-	-
NU1068-M1	3	63,2	340	520	82	5	5	8,9	475	385	458,2	-	-	-
NU1068-M1-C3	3	63,2	340	520	82	5	5	8,9	475	385	458,2	-	-	-
NU1068-M1A	3	63,2	340	520	82	5	5	8,9	475	385	458,2	-	-	-
NU3168-M1A	3	209	340	580	190	5	5	17,3	527	399	507,2	-	-	-
NU268-E-M1	3	133	340	620	92	6	6	7,4	547	419	526,4	-	-	-
NU1268-M1	3	165	340	620	118	6	6	8,3	558	408	534	-	-	-
NU2268-E-M1	3	229	340	620	165	6	6	13,3	558	408	534	-	-	-



1) Axial displacement "s"
for N and NU

Mounting dimensions
for N

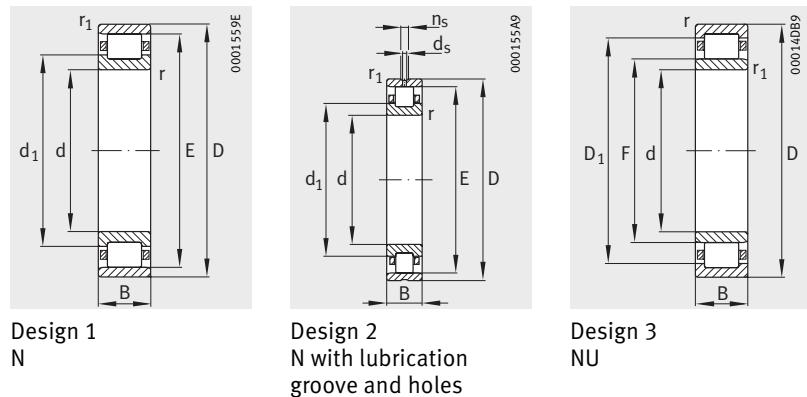
Mounting dimensions
for NU

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{or} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
329	—	—	391	385	377	2	2	212	360	27	2 800	—
330	338	344	390	—	—	2	1,5	345	695	58	2 800	—
330	338	344	390	—	—	2	1,5	630	1 500	151	2 800	1 000
332	346	354	428	—	—	2,5	2,5	620	1 100	91	2 600	—
332	346	354	428	—	—	2,5	2,5	915	1 800	181	2 400	1 100
332	346	354	428	—	—	2,5	2,5	1 220	2 550	255	2 400	900
335	—	—	465	443	437	3	3	915	1 500	144	2 400	1 300
335	356	365	465	—	—	3	3	915	1 500	124	2 400	1 300
335	356	365	465	—	—	3	3	915	1 500	124	2 400	1 300
335	356	365	465	—	—	3	3	915	1 500	124	2 400	1 300
335	356	365	465	—	—	3	3	915	1 500	108	2 400	1 300
335	356	364	465	—	—	3	3	1 760	3 450	345	2 200	850
340	364	372	520	—	—	4	4	3 250	5 600	550	1 900	700
340	388,5	395,5	560	—	—	4	4	1 800	2 700	204	1 900	830
340	388,5	395,5	560	—	—	4	4	1 800	2 700	204	1 900	830
340	380	386	560	—	—	4	4	2 080	3 000	280	1 900	850
340	376,5	383,5	560	—	—	4	4	3 150	4 900	460	1 600	570
340	376,5	383,5	560	—	—	4	4	3 150	4 900	460	1 600	560
352	416	424	638	—	—	6	6	2 550	3 750	265	1 600	650
352	398	405	638	—	—	6	6	4 550	6 800	620	1 400	480
350	—	—	410	405	398	2,1	2,1	212	360	26,5	2 800	—
350	358	365	410	—	—	2,1	1,5	360	735	61	2 800	—
350	358	365	410	—	—	2	1,5	640	1 560	156	2 600	950
352	366	374	448	—	—	2,5	2,5	640	1 160	96	2 600	—
352	366	374	448	—	—	2,5	2,5	950	1 930	190	2 400	950
352	366	374	448	—	—	2,5	2,5	1 250	2 600	260	2 400	850
357	381	390	503	—	—	4	4	1 080	1 760	141	2 200	1 200
357	—	—	503	478,5	471,5	4	4	1 120	1 830	169	2 200	1 200
357	381	390	503	—	—	4	4	1 120	1 830	147	2 200	1 190
357	381	390	503	—	—	4	4	1 120	1 830	147	2 200	1 190
357	381	390	503	—	—	4	4	1 120	1 830	147	2 200	1 190
360	395	403	560	—	—	4	4	3 200	5 600	540	1 800	700
366	415	423	594	—	—	5	5	1 930	3 000	225	1 800	750
366	404	412	594	—	—	5	5	2 360	3 450	315	1 800	800
366	404	412	594	—	—	5	5	3 450	5 700	540	1 500	520



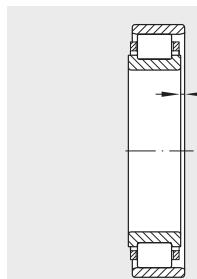
Cylindrical roller bearings with cage

Single row
Non-locating
bearings



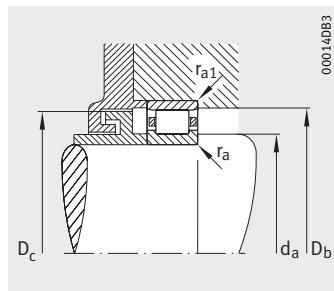
Dimension table (continued) · Dimensions in mm

Designation	De-sign	Mass m ≈kg	Dimensions											
			d	D	B	r min.	r ₁ min.	s ¹⁾	E	F	D ₁	d ₁	d _s	n _s
NU2268-E-M1A	3	233	340	620	165	6	6	13,3	558	408	534	—	—	—
NU368-E-M1	3	247	340	710	118	7,5	7,5	9,7	614,4	450,4	588	—	—	—
NU2368-E-M1	3	419	340	710	212	7,5	7,5	15,5	635	425	601,4	—	—	—
Z-527456.ZL	2	11,2	360	440	38	2,1	2,1	7	421,5	—	—	389,4	3,2	9,5
NU1872-M1	3	12	360	440	38	2,1	1,5	4,3	421,5	381,5	414,7	—	—	—
NU3872-M1	3	19,4	360	440	60	2,1	1,5	6	421,5	381,5	414,7	—	—	—
NU1972-M1	3	27,7	360	480	56	3	3	6,2	450	390	438,5	—	—	—
NU2972-M1	3	37,2	360	480	72	3	3	4	450	390	440	—	—	—
NU3972-E-M1	3	45,6	360	480	90	3	3	4,7	454	390	443,3	—	—	—
N1072-M1	1	65,3	360	540	82	5	5	8,9	495	—	—	421,6	—	—
NU1072-M1	3	65,9	360	540	82	5	5	8,9	495	405	478,1	—	—	—
NU1072-M1-C3	3	65,9	360	540	82	5	5	8,9	495	405	478,1	—	—	—
NU1072-M1A	3	65,9	360	540	82	5	5	8,9	495	405	478,1	—	—	—
NU1072-MP1A	3	64,2	360	540	82	5	5	8,9	495	405	478,1	—	—	—
NU1072-MPA	3	64,2	360	540	82	5	5	8,9	495	405	478,1	—	—	—
NU3072-M1	3	112	360	540	134	5	5	11,5	495	405	478,1	—	—	—
NU3172-M1	3	220	360	600	192	5	5	19	548	420	527	—	—	—
NU272-E-M1	3	149	360	650	95	6	6	9,5	579	451	558,5	—	—	—
NU272-E-M1A	3	151	360	650	95	6	6	9,5	579	451	558,5	—	—	—
NU1272-M1	3	187	360	650	122	6	6	8,2	589	429	563,5	—	—	—
NU2272-E-M1	3	254	360	650	170	6	6	15	588	428	562	—	—	—
NU2272-E-M1A	3	258	360	650	170	6	6	15	588	428	562	—	—	—
NU2372-E-M1	3	498	360	750	224	7,5	7,5	19	665	445	630	—	—	—
NU2372-E-M1A	3	498	360	750	224	7,5	7,5	19	665	445	630	—	—	—
Z-526718.ZL	2	18,8	380	480	46	2,1	2,1	8,5	455,5	—	—	415,5	3,2	9,5
N1876-M1	1	19,1	380	480	46	2,1	2,1	5,3	455,5	—	—	415,5	—	—
NU1876-M1	3	19,2	380	480	46	2,1	2,1	5,3	455,5	407,5	447,4	—	—	—
N2876-M1	1	25,3	380	480	60	2,1	2,1	6,9	455,5	—	—	415,5	—	—
NU2876-M1	3	25,4	380	480	60	2,1	2,1	6,9	455,5	407,5	447,4	—	—	—
NU3876-M1	3	32,5	380	480	75	2,1	2,1	7,8	455,5	407,5	447,4	—	—	—
NU1976-M1	3	40,7	380	520	65	4	4	6	484	416	472,7	—	—	—
N2976-M1	3	52,5	380	520	82	4	4	7,2	486	—	—	425,9	—	—
NU2976-M1	3	52,9	380	520	82	4	4	7,2	486	414	471,6	—	—	—
NU2976-MP1A	3	52,3	380	520	82	4	4	7,2	486	414	471,6	—	—	—
NU3976-E-M1	3	67	380	520	106	4	4	8,7	490	414	474,8	—	—	—



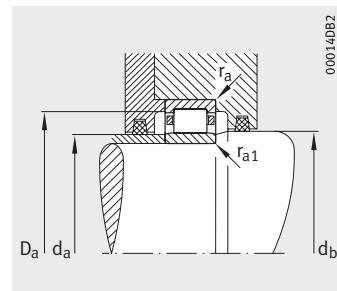
1) Axial displacement "s"
for N and NU

00014DB4



Mounting dimensions
for N

00014DB3



Mounting dimensions
for NU

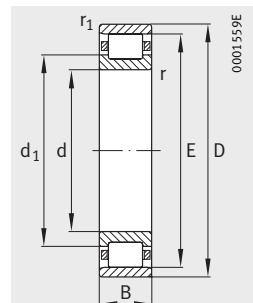
00014DB2

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{or} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
366	404	412	594	—	—	5	5	3 450	5 700	540	1 500	520
372	447	454	678	—	—	6	6	2 750	4 150	290	1 500	600
372	421,5	428,5	678	—	—	6	6	5 000	7 350	660	1 400	450
370	—	—	430	425	418	2,1	2,1	220	390	28	2 600	—
370	378	385	430	—	—	2	1,5	365	765	62	2 600	—
370	378	385	430	—	—	2	1,5	670	1 660	163	2 400	900
372	386	394	468	—	—	2,5	2,5	655	1 220	100	2 400	—
372	386	394	468	—	—	2,5	2,5	980	2 040	199	2 200	900
372	386	394	468	—	—	2,5	2,5	1 290	2 800	275	2 200	800
378	—	—	523	499	491	4	4	1 140	1 900	175	2 400	1 300
377	400	410	523	—	—	4	4	1 140	1 900	151	2 200	1 110
377	400	410	523	—	—	4	4	1 140	1 900	151	2 200	1 110
377	400	410	523	—	—	4	4	1 140	1 900	151	2 200	1 110
377	400	410	523	—	—	4	4	1 140	1 900	133	2 200	1 110
377	400	410	523	—	—	4	4	1 140	1 900	133	2 200	1 110
377	400	410	523	—	—	4	4	2 200	4 400	420	2 000	670
380	416	424	580	—	—	4	4	3 350	6 000	570	1 600	630
386	447	455	624	—	—	5	5	2 000	3 150	234	1 600	700
386	447	455	624	—	—	5	5	2 000	3 150	234	1 600	700
386	425	433	624	—	—	5	5	2 700	4 000	345	1 600	700
386	424	432	624	—	—	5	5	3 600	5 700	520	1 400	510
386	424	432	624	—	—	5	5	3 600	5 700	520	1 400	510
392	441	449	718	—	—	6	6	5 500	8 300	730	1 300	400
392	441	449	718	—	—	6	6	5 500	8 300	730	1 300	400
390	—	—	470	460	451	2,1	2,1	285	480	34,5	2 400	—
390	—	—	470	460	451	2	2	490	1 000	91	2 400	—
390	404	411	470	—	—	2	2	490	1 000	81	2 400	—
390	—	—	470	460	451	2	2	695	1 560	148	2 200	900
390	404	411	470	—	—	2	2	695	1 560	148	2 200	900
390	404	411	470	—	—	2	2	900	2 160	208	2 200	800
395	412	420	505	—	—	3	3	815	1 500	124	2 200	—
395	—	—	505	490	482	3	3	1 320	2 700	255	2 000	800
395	410	418	505	—	—	3	3	1 320	2 700	260	2 000	800
395	410	418	505	—	—	3	3	1 320	2 700	260	2 000	800
395	410	418	505	—	—	3	3	1 700	3 550	340	2 000	700

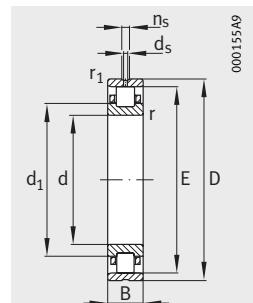


Cylindrical roller bearings with cage

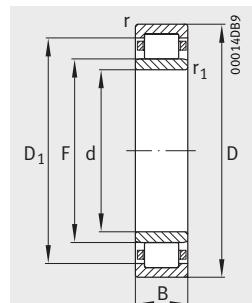
Single row
Non-locating
bearings



Design 1
N



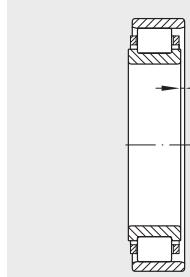
Design 2
N with lubrication
groove and holes



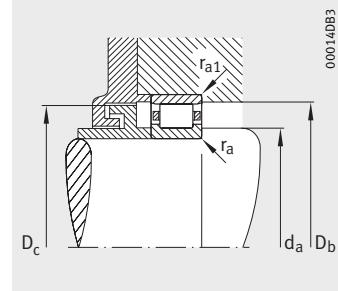
Design 3
NU, cylindrical or
tapered bore

Dimension table (continued) · Dimensions in mm

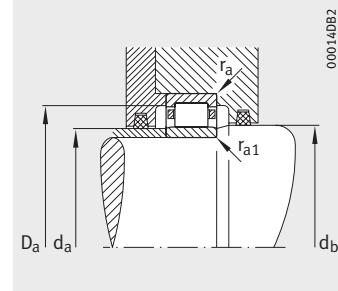
Designation	De-sign	Mass m ≈kg	Dimensions											
			d	D	B	r min.	r ₁ min.	s ¹⁾	E	F	D ₁	d ₁	d _s	n _s
N1076-M1	1	67,2	380	560	82	5	5	9	515	—	—	441,6	—	—
N1076-M1B	1	67,6	380	560	82	5	5	9	515	—	—	441,6	—	—
NU1076-M1	3	69,1	380	560	82	5	5	9	515	425	498,1	—	—	—
NU1076-M1-C3	3	69,1	380	560	82	5	5	9	515	425	498,1	—	—	—
NU1076-M1A	3	69,1	380	560	82	5	5	9	515	425	498,1	—	—	—
NU3076-M1	3	117	380	560	135	5	5	12,5	515	425	498,1	—	—	—
NU3176-M1	3	231	380	620	194	5	5	19,5	568	440	547	—	—	—
NU276-E-M1	3	162	380	680	95	6	6	8	622	494	601	—	—	—
NU1276-M1	3	211	380	680	132	6	6	9,5	619	449	592	—	—	—
NU2276-E-M1	3	288	380	680	175	6	6	13,8	615	451	588,8	—	—	—
NU2276-E-M1A	3	293	380	680	175	6	6	13,8	615	451	588,8	—	—	—
Z-527457.ZL	2	19,4	400	500	46	2,1	2,1	8	476	—	—	437,4	3,2	9,5
NU1880-M1	3	20,3	400	500	46	2,1	2,1	5,3	476	428	468	—	—	—
NU3880-M1	3	34	400	500	75	2,1	2,1	7,8	476	428	468	—	—	—
NU1980-M1	3	41,9	400	540	65	4	4	7,2	504	436	492,7	—	—	—
NU2980-M1	3	55,3	400	540	82	4	4	7,2	506	434	494	—	—	—
NU3980-E-M1	3	70,3	400	540	106	4	4	8,7	510	434	497,5	—	—	—
N1080-M1	1	87,9	400	600	90	5	5	9,5	550	—	—	469	—	—
NU1080-K-M1	3	88,5	400	600	90	5	—	9,5	550	450	531,5	—	—	—
NU1080-M1	3	90,1	400	600	90	5	5	9,5	550	450	531,5	—	—	—
NU1080-M1-C3	3	90,1	400	600	90	5	5	9,5	550	450	531,5	—	—	—
NU1080-M1A	3	90,6	400	600	90	5	5	9,5	550	450	531,5	—	—	—
NU3080-M1	3	153	400	600	148	5	5	12,8	550	450	531,5	—	—	—
NU3180-M1	3	260	400	650	200	6	6	18	600	460	577,5	—	—	—
NU1280-M1	3	258	400	720	140	6	6	9,8	654	474	625	—	—	—
NU2280-E-M1	3	342	400	720	185	6	6	15,4	661	471	630,5	—	—	—
NU2280-E-M1A	3	346	400	720	185	6	6	15,4	661	471	630,5	—	—	—
Z-547075.01.ZL	1	32,2	406	502	76	4	2,5	—	482,7	—	—	437,6	—	—
Z-547459.ZL	1	33,7	406	502	76	4	4	—	482,7	—	—	437,6	—	—
Z-527458.ZL	2	21	420	520	46	2,1	2,1	8,5	496	—	—	457,5	3,2	12,2
NU1884-M1	3	20,9	420	520	46	2,1	2,1	5,3	496	448	488	—	—	—
NU3884-M1	3	35,5	420	520	75	2,1	2,1	7,8	496	448	488	—	—	—
NU1984-M1	3	44,2	420	560	65	4	4	7,2	524	456	510,4	—	—	—



00014DB4



00014DB3



00014DB2

1) Axial displacement "s" for N and NU

Mounting dimensions for N

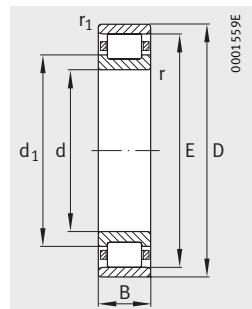
Mounting dimensions for NU

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{or} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
398	—	—	543	519	511	4	4	1 180	2 000	180	2 400	1 250
398	—	—	543	519	511	4	4	1 180	2 000	180	2 400	1 250
397	420	430	543	—	—	4	4	1 180	2 000	156	2 000	1 050
397	420	430	543	—	—	4	4	1 180	2 000	156	2 000	1 050
397	420	430	543	—	—	4	4	1 180	2 000	156	2 000	1 050
397	420	430	543	—	—	4	4	2 240	4 550	435	1 900	670
400	436	444	600	—	—	4	4	3 450	6 300	600	1 600	600
406	556	564	654	—	—	5	5	2 120	3 450	255	1 500	610
406	445	453	654	—	—	5	5	2 850	4 150	370	1 500	700
406	446	456	654	—	—	5	5	4 050	6 700	610	1 400	450
406	446	456	654	—	—	5	5	4 050	6 700	610	1 400	450
410	—	—	490	480	472	2,1	2,1	300	530	37	2 400	—
410	424	431	490	—	—	2,1	2,1	520	1 100	88	2 400	—
410	424	431	490	—	—	2	2	930	2 280	219	2 200	750
415	432	440	525	—	—	3	3	800	1 500	123	2 200	—
415	430	438	525	—	—	3	3	1 340	2 750	265	2 000	750
415	430	438	525	—	—	3	3	1 760	3 750	360	1 900	670
417	—	—	583	554	546	4	4	1 370	2 320	212	1 900	950
417	445	455	583	—	—	4	—	1 370	2 320	177	1 900	980
417	445	455	583	—	—	4	4	1 370	2 320	177	1 900	980
417	445	455	583	—	—	4	4	1 370	2 320	177	1 900	980
417	445	455	583	—	—	4	4	1 370	2 320	177	1 900	980
426	456	464	624	—	—	5	5	4 050	7 500	690	1 400	530
426	470	478	694	—	—	5	5	3 050	4 400	385	1 400	670
426	467	475	694	—	—	5	5	5 600	7 600	670	1 300	850
426	467	475	694	—	—	5	5	5 600	7 600	670	1 300	410
421	—	—	490	486	478	3	2,1	1 160	2 750	231	2 200	670
421	—	—	490	486	478	3	3	1 160	2 750	231	2 200	670
430	—	—	510	500	492	2,1	2,1	315	570	39,5	2 200	—
430	444	451	510	—	—	2	2	530	1 140	90	2 200	—
430	444	451	510	—	—	2	2	950	2 400	226	2 000	700
435	452	460	545	—	—	3	3	830	1 600	129	2 000	—

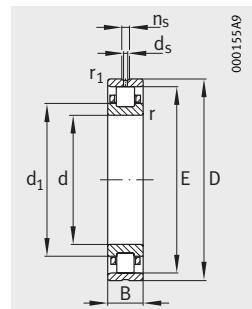


Cylindrical roller bearings with cage

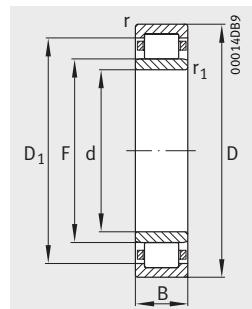
Single row
Non-locating
bearings



Design 1
N



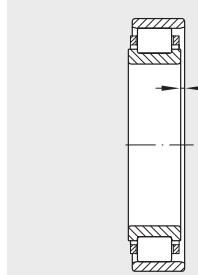
Design 2
N with lubrication
groove and holes



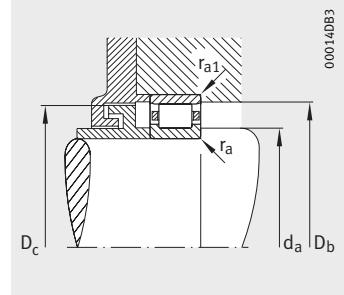
Design 3
NU, cylindrical or
tapered bore

Dimension table (continued) · Dimensions in mm

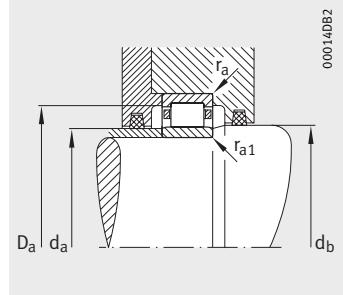
Designation	De-sign	Mass m ≈kg	Dimensions											
			d	D	B	r min.	r ₁ min.	s ¹⁾	E	F	D ₁	d ₁	d _s	n _s
NU2984-M1	3	58,6	420	560	82	4	4	6	526	454	511,6	—	—	—
NU3984-E-M1	3	73	420	560	106	4	4	5,7	530	454	517,5	—	—	—
N1084-M1	1	92,2	420	620	90	5	5	9,6	570	—	—	489	—	—
NU1084-M1	3	92,9	420	620	90	5	5	9,6	570	470	551,5	—	—	—
NU1084-M1A	3	94,2	420	620	90	5	5	9,6	570	470	551,5	—	—	—
NU3084-M1	3	162	420	620	150	5	5	13,5	570	470	551,5	—	—	—
NU3084-M1A	3	162	420	620	150	5	5	13,5	570	470	551,5	—	—	—
NU3184-M1	3	352	420	700	224	6	6	19	645	485	619,5	—	—	—
NU1284-M1	3	314	420	760	150	7,5	7,5	9,8	694	494	662	—	—	—
NU2284-E-M1	3	398	420	760	195	7,5	7,5	16,8	690	494	658	—	—	—
NU2284-E-M1A	3	406	420	760	195	7,5	7,5	16,8	690	494	658	—	—	—
Z-531636.ZL	2	19	440	540	40	2,1	2,1	6,5	514	—	—	478,6	3,2	9,5
Z-527459.ZL	2	22	440	540	46	2,1	2,1	8,5	516	—	—	477,4	3,2	12,2
N1888-M1B	1	22,3	440	540	46	2,1	2,1	5,3	516	—	—	476	—	—
NU1888-M1	3	22,2	440	540	46	2,1	2,1	5,3	516	468	508	—	—	—
NU3888-M1	3	37	440	540	75	2,1	2,1	7,8	516	468	508	—	—	—
NU1988-M1	3	60,5	440	600	74	4	4	8,9	558	482	545,5	—	—	—
N2988-M1B	1	81	440	600	95	4	4	8,7	560	—	—	493,3	—	—
NU2988-M1	3	81	440	600	95	4	4	8,7	560	480	545,6	—	—	—
NU3988-E-M1	3	99,2	440	600	118	4	4	9,7	564	480	550	—	—	—
N1088-M1	1	107	440	650	94	6	6	9,8	597	—	—	513,5	—	—
NU1088-M1	3	107	440	650	94	6	6	9,8	597	493	577,6	—	—	—
NU1088-M1A	3	109	440	650	94	6	6	9,8	597	493	577,6	—	—	—
NU1088-MPA	3	113	440	650	94	6	6	9,8	597	493	577,6	—	—	—
NU3088-K-M1A	3	181	440	650	157	6	—	3,2	597	493	577,6	—	—	—
NU3188-M1	3	367	440	720	226	6	6	19,1	665	505	640	—	—	—
NU1288-M	3	345	440	790	155	7,5	7,5	9,8	724	514	690	—	—	—
NU2288-E-M1	3	438	440	790	200	7,5	7,5	17,5	718	518	686	—	—	—
NU2288-E-M1A	3	449	440	790	200	7,5	7,5	17,5	718	518	686	—	—	—
Z-527460.ZL	2	32,1	460	580	56	3	3	10	550	—	—	505	3,2	12,2
NU1892-M1	3	34,1	460	580	56	3	3	6,6	550	494	540,5	—	—	—
NU3892-M1	3	56,4	460	580	90	3	3	10	550	494	540,5	—	—	—
NU1992-M1	3	63,1	460	620	74	4	4	8,4	578	502	562,8	—	—	—



00014DB4



00014DB3



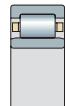
00014DB2

1) Axial displacement "s"
for N and NU

Mounting dimensions
for N

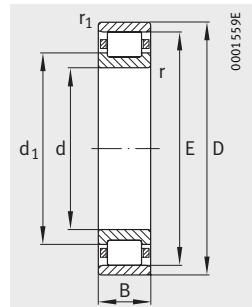
Mounting dimensions
for NU

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{or} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
435	450	458	545	—	—	3	3	1 370	2 900	275	1 900	700
435	450	458	545	—	—	3	3	1 760	3 900	370	1 900	630
437	—	—	603	574	566	4	4	1 400	2 450	219	1 800	900
437	465	475	603	—	—	4	4	1 400	2 450	183	1 800	920
437	465	475	603	—	—	4	4	1 400	2 450	183	1 800	920
437	465	475	603	—	—	4	4	2 700	5 600	530	1 600	560
437	465	475	603	—	—	4	4	2 700	5 600	530	1 600	560
446	480	490	674	—	—	5	5	4 900	8 800	790	1 400	480
452	490	498	728	—	—	6	6	3 900	5 700	490	1 400	560
452	489	499	728	—	—	6	6	5 000	8 150	710	1 200	380
452	489	499	728	—	—	6	6	5 000	8 150	710	1 200	380
450	—	—	530	519	509	2,1	2,1	290	550	37	2 200	—
450	—	—	530	521	511	2,1	2,1	335	620	42	2 200	—
450	—	—	530	521	511	2	2	540	1 200	104	2 200	—
450	464	471	530	—	—	2	2	540	1 200	93	2 200	—
450	464	471	530	—	—	2	2	965	2 500	232	2 000	670
455	478	486	585	—	—	3	3	1 000	1 900	149	1 900	—
455	—	—	585	565	555	3	3	1 630	3 450	320	1 800	670
455	476	484	585	—	—	3	3	1 630	3 450	320	1 800	670
455	476	484	585	—	—	3	3	2 120	4 650	430	1 600	560
463	—	—	627	601	593	5	5	1 560	2 750	244	1 600	850
463	488	498	627	—	—	5	5	1 560	2 750	203	1 600	860
463	488	498	627	—	—	5	5	1 560	2 750	203	1 600	860
463	488	498	627	—	—	5	5	1 560	2 750	203	1 600	860
463	488	498	627	—	—	5	—	3 000	6 400	590	1 500	500
466	500	510	694	—	—	5	5	5 100	9 300	830	1 400	450
472	509	519	758	—	—	6	6	4 050	6 000	500	1 300	530
472	514	523	758	—	—	6	6	5 100	8 300	710	1 200	380
472	514	523	758	—	—	6	6	5 100	8 300	710	1 200	380
472	—	—	568	555	545	2,5	2,5	400	710	48	2 000	—
472	490	497	568	—	—	2,5	2,5	670	1 430	109	2 000	—
472	490	497	568	—	—	2,5	2,5	1 200	3 050	280	1 800	630
475	498	506	605	—	—	3	3	1 020	1 960	135	1 800	—

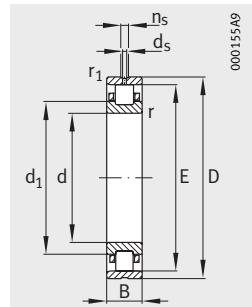


Cylindrical roller bearings with cage

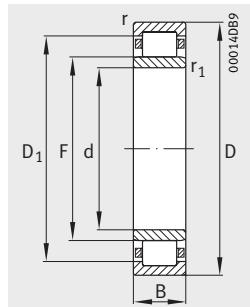
Single row
Non-locating
bearings



Design 1
N



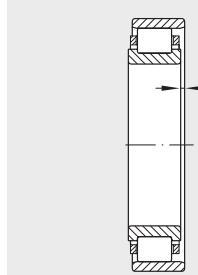
Design 2
N with lubrication
groove and holes



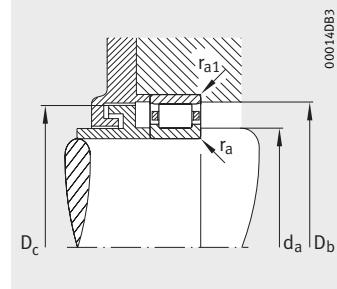
Design 3
NU, cylindrical or
tapered bore

Dimension table (continued) · Dimensions in mm

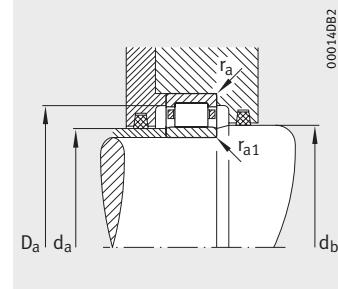
Designation	De-sign	Mass m ≈kg	Dimensions											
			d	D	B	r min.	r ₁ min.	s ¹⁾	E	F	D ₁	d ₁	d _s	n _s
NU2992-M1	3	84	460	620	95	4	4	8,7	580	500	564	—	—	—
NU3992-E-M1	3	104	460	620	118	4	4	6,2	584	500	570	—	—	—
NU1092-K-M1	3	122	460	680	100	6	—	11,2	624	516	603,9	—	—	—
NU1092-K-M1A	3	124	460	680	100	6	—	11,2	624	516	603,9	—	—	—
NU1092-M1	3	125	460	680	100	6	6	11,2	624	516	603,9	—	—	—
NU1092-M1A	3	126	460	680	100	6	6	11,2	624	516	603,9	—	—	—
NU3092-K-M1A	3	206	460	680	163	6	—	14,4	624	516	603,9	—	—	—
NU3192-M1A	3	436	460	760	240	7,5	7,5	20	701	531	674	—	—	—
NU1292-M1	3	401	460	830	165	7,5	7,5	14,1	759	539	724	—	—	—
NU2292-E-M1	3	511	460	830	212	7,5	7,5	20	756	544	722	—	—	—
NU2292-E-M1A	3	521	460	830	212	7,5	7,5	20	756	544	722	—	—	—
NU2292-E-MPA	3	513	460	830	212	7,5	7,5	20	756	544	722	—	—	—
Z-527461.ZL	2	34,6	480	600	56	3	3	10	570	—	—	525	3,2	12,2
NU1896-M1	3	35,2	480	600	56	3	3	6,6	570	514	560,5	—	—	—
NU3896-M1	3	57,8	480	600	90	3	3	10	570	514	560,5	—	—	—
NU1996-M1	3	74,2	480	650	78	5	5	8,8	605	525	589	—	—	—
NU2996-M1	3	98,8	480	650	100	5	5	6,3	607	523	593	—	—	—
NU3996-E-M1	3	125	480	650	128	5	5	6,7	613	523	598	—	—	—
N1096-M1	1	128	480	700	100	6	6	10,7	644	—	—	556,4	—	—
NU1096-M1	3	129	480	700	100	6	6	10,7	644	536	623,9	—	—	—
NU1096-M1A	3	132	480	700	100	6	6	10,7	644	536	623,9	—	—	—
NU3096-M1	3	219	480	700	165	6	6	15	644	536	623,9	—	—	—
NU3196-M1	3	483	480	790	248	7,5	7,5	22	726	556	698,8	—	—	—
NU1296-M1	3	468	480	870	170	7,5	7,5	10,5	794	564	757	—	—	—
Z-537024.ZL	2	29,6	500	620	45	3	3	7	587	—	—	547	3,2	9,5
Z-527462.ZL	2	35	500	620	56	3	3	10	590	—	—	545	3,2	12,2
N18/500-M1	1	36,1	500	620	56	3	3	6,6	590	—	—	543,5	—	—
NU18/500-M1	3	36,9	500	620	56	3	3	6,6	590	534	580	—	—	—
N28/500-M1	1	48,2	500	620	72	3	3	8	590	—	—	543,5	—	—
NU28/500-M1	3	48,5	500	620	72	3	3	8	590	534	580	—	—	—
NU28/500-M1A	3	49,1	500	620	72	3	3	8	590	534	580	—	—	—
NU38/500-M1	3	60,5	500	620	90	3	3	10	590	534	580	—	—	—
NU19/500-M1	3	76,8	500	670	78	5	5	8,8	625	545	609	—	—	—



00014DB4



00014DB3



00014DB2

1) Axial displacement "s"
for N and NU

Mounting dimensions
for N

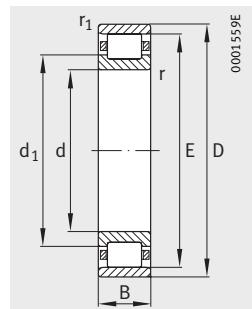
Mounting dimensions
for NU

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{or} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
475	496	504	605	—	—	3	3	1 660	3 600	330	1 600	630
475	496	504	605	—	—	3	3	2 160	4 800	440	1 600	530
483	510	522	657	—	—	5	—	1 660	3 000	218	1 600	800
483	510	522	657	—	—	5	—	1 660	3 000	218	1 600	800
483	510	522	657	—	—	5	5	1 660	3 000	218	1 600	830
483	510	522	657	—	—	5	5	1 660	3 000	218	1 600	830
483	511	521	657	—	—	5	—	3 250	6 950	630	1 400	480
492	526	536	728	—	—	6	6	5 600	10 400	920	1 300	430
492	534	544	798	—	—	6	6	4 650	6 950	580	1 200	500
492	540	549	798	—	—	6	6	5 600	9 150	770	1 100	360
492	540	549	798	—	—	6	6	5 600	9 150	770	1 100	355
492	540	549	798	—	—	6	6	5 600	9 150	770	1 100	360
492	—	—	588	575	565	2,5	2,5	415	765	52	1 900	—
492	510	517	588	—	—	2,5	2,5	680	1 460	113	1 900	—
492	510	517	588	—	—	2,5	2,5	1 220	3 100	285	1 800	600
497	521	529	633	—	—	4	4	1 140	2 240	172	1 800	—
497	519	527	633	—	—	4	4	1 900	4 150	380	1 500	560
497	519	527	633	—	—	4	4	2 450	5 500	495	1 500	500
503	—	—	677	648,5	639,5	5	5	1 700	3 100	270	1 500	800
503	530	542	677	—	—	5	5	1 700	3 100	225	1 500	780
503	530	542	677	—	—	5	5	1 700	3 100	225	1 500	780
503	531	541	677	—	—	5	5	3 350	7 200	650	1 400	450
512	551	561	758	—	—	6	6	5 850	11 000	970	1 200	400
512	559	569	838	—	—	6	6	5 100	7 650	630	1 100	450
512	—	—	608	593	581	2,5	2,5	360	695	47	1 900	—
512	—	—	608	596	584	2,5	2,5	440	830	55	1 800	—
512	—	—	608	596	584	2,5	2,5	695	1 530	130	1 800	—
512	530	538	608	—	—	2,5	2,5	695	1 530	116	1 800	—
512	—	—	608	596	584	2,5	2,5	1 020	2 500	222	1 600	630
512	530	538	608	—	—	2,5	2,5	1 020	2 500	222	1 600	630
512	530	538	608	—	—	2,5	2,5	1 020	2 500	222	1 600	630
512	530	538	608	—	—	2,5	2,5	1 250	3 250	290	1 600	560
517	541	549	653	—	—	4	4	1 160	2 320	176	1 600	—

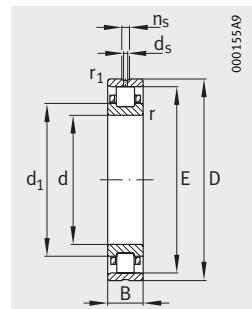


Cylindrical roller bearings with cage

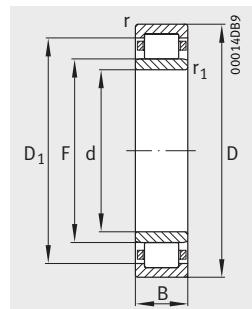
Single row
Non-locating
bearings



Design 1
N



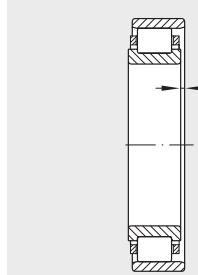
Design 2
N with lubrication
groove and holes



Design 3
NU, cylindrical or
tapered bore

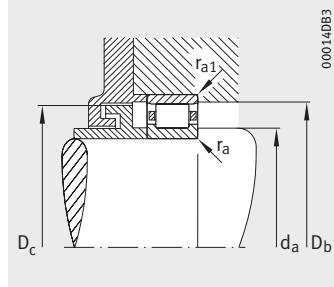
Dimension table (continued) · Dimensions in mm

Designation	De-sign	Mass m ≈kg	Dimensions											
			d	D	B	r min.	r ₁ min.	s ¹⁾	E	F	D ₁	d ₁	d _s	n _s
NU29/500-M1	3	103	500	670	100	5	5	6,3	627	543	613	—	—	—
NU39/500-E-M1	3	128	500	670	128	5	5	11	633	543	618	—	—	—
N10/500-M1	1	132	500	720	100	6	6	10,7	664	—	—	576,4	—	—
NU10/500-M1	3	133	500	720	100	6	6	10,7	664	556	643,9	—	—	—
NU10/500-M1A	3	135	500	720	100	6	6	10,7	664	556	643,9	—	—	—
NU20/500-E-M1	3	177	500	720	128	6	6	7	673	553	655,5	—	—	—
NU30/500-M1	3	230	500	720	167	6	6	10,8	664	556	643,9	—	—	—
NU31/500-M1	3	575	500	830	264	7,5	7,5	23,5	761	581	732	—	—	—
NU12/500-M1	3	568	500	920	185	7,5	7,5	16	839	589	799	—	—	—
NU12/500-M1A	3	568	500	920	185	7,5	7,5	16	839	589	799	—	—	—
NU22/500-E-M1	3	728	500	920	243	7,5	7,5	17	824	604	789	—	—	—
Z-527247.ZL	2	31	530	650	45	3	3	3,2	620	—	—	575	3,2	9,5
Z-527272.ZL	2	36,6	530	650	56	3	3	10	620	—	—	573,5	3,2	12,2
NU18/530-M1	3	38,5	530	650	56	3	3	6,6	620	564	610,5	—	—	—
NU28/530-M1	3	50,7	530	650	72	3	3	8	620	564	610,5	—	—	—
NU38/530-M1	3	64,1	530	650	90	3	3	10	620	564	610,5	—	—	—
NU19/530-M1	3	89,9	530	710	82	5	5	9,3	662	578	645,2	—	—	—
NU29/530-M1	3	123	530	710	106	5	5	8,5	665	575	647	—	—	—
NU10/530-M1	3	190	530	780	112	6	6	10,2	719	591	696	—	—	—
NU10/530-M1A	3	193	530	780	112	6	6	10,2	719	591	696	—	—	—
NU20/530-E-M1	3	250	530	780	145	6	6	8	724	594	703,1	—	—	—
NU30/530-K-M1A	3	311	530	780	185	6	—	16,8	719	591	696	—	—	—
NU30/530-M1A	3	315	530	780	185	6	6	15,5	719	591	696	—	—	—
NU31/530-M1	3	665	530	870	272	7,5	7,5	22	801	611	770,6	—	—	—
NU12/530-M1	3	702	530	980	200	9,5	9,5	11,7	894	624	851	—	—	—
Z-540208.ZL	2	33	560	680	45	3	3	7	647	—	—	606,8	3,2	9,5
Z-526722.ZL	2	40,5	560	680	56	3	3	10	650	—	—	605	3,2	9,5
NU18/560-M1	3	40,5	560	680	56	3	3	6,6	650	594	640	—	—	—
NU38/560-M1	3	67,3	560	680	90	3	3	10	650	594	640	—	—	—
NU19/560-M1	3	105	560	750	85	5	5	9,6	700	610	682	—	—	—
NU29/560-M1	3	143	560	750	112	5	5	6,5	703	607	687,5	—	—	—
NU10/560-K-M1	3	209	560	820	115	6	—	9,8	754	626	731	—	—	—
NU10/560-M1	3	213	560	820	115	6	6	9,8	754	626	731	—	—	—



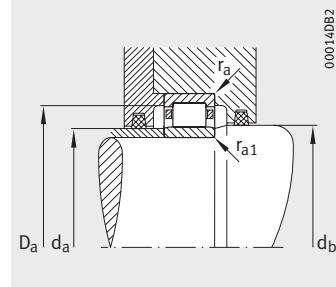
1) Axial displacement "s"
for N and NU

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Mounting dimensions
for N

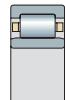
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Mounting dimensions
for NU

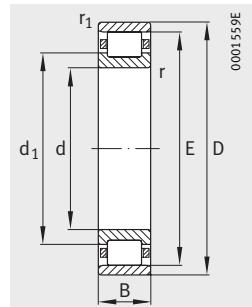
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Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{or} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
517	539	547	653	—	—	4	4	1 930	4 300	385	1 500	560
517	539	547	653	—	—	4	4	2 500	5 700	510	1 400	480
523	—	—	697	669	659	5	5	1 760	3 200	275	1 500	750
523	550	562	697	—	—	5	5	1 760	3 200	232	1 500	750
523	550	562	697	—	—	5	5	1 760	3 200	232	1 500	750
523	548	558	697	—	—	5	5	3 000	6 000	530	1 400	480
523	551	561	697	—	—	5	5	3 400	7 500	670	1 400	430
532	576	586	798	—	—	6	6	6 550	12 500	1 070	1 100	360
532	584	594	888	—	—	6	6	5 700	8 500	680	1 100	430
532	584	594	888	—	—	6	6	5 700	8 500	680	1 100	430
532	600	608	888	—	—	6	6	7 100	12 500	1 030	1 000	290
542	—	—	638	626	614	2,5	2,5	455	880	58	1 800	—
542	—	—	638	626	614	2,5	2,5	455	880	58	1 800	—
542	560	568	638	—	—	2,5	2,5	720	1 660	123	1 800	—
542	560	568	638	—	—	2,5	2,5	1 060	2 700	236	1 500	600
542	560	568	638	—	—	2,5	2,5	1 290	3 450	310	1 500	530
547	574	582	693	—	—	4	4	1 290	2 650	197	1 500	—
547	571	579	693	—	—	4	4	2 200	4 900	425	1 400	500
553	585	597	757	—	—	5	5	2 500	4 550	320	1 300	640
553	585	597	757	—	—	5	5	2 500	4 550	320	1 300	640
553	589	599	757	—	—	5	5	3 550	7 200	610	1 300	450
553	586	596	757	—	—	5	—	4 300	9 150	810	1 300	380
553	586	596	757	—	—	5	5	4 300	9 150	810	1 300	380
562	605	616	838	—	—	6	6	7 200	14 000	1 180	1 100	320
570	619	629	940	—	—	8	8	6 300	9 300	730	1 000	400
572	—	—	668	653	641	2,5	2,5	375	750	48,5	1 600	—
572	—	—	668	656	644	2,5	2,5	475	950	61	1 600	—
572	590	598	668	—	—	2,5	2,5	735	1 700	124	1 600	—
572	590	598	668	—	—	2,5	2,5	1 290	3 550	310	1 500	500
577	606	614	733	—	—	4	4	1 460	3 000	215	1 400	—
577	603	611	733	—	—	4	4	2 450	5 500	475	1 400	450
583	620	632	797	—	—	5	—	2 700	5 100	355	1 200	590
583	620	632	797	—	—	5	5	2 700	5 100	355	1 200	590

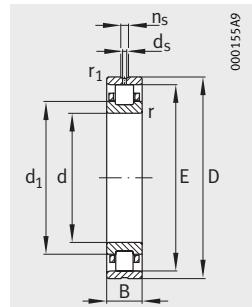


Cylindrical roller bearings with cage

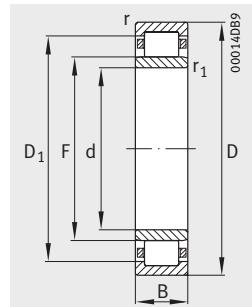
Single row
Non-locating
bearings



Design 1
N



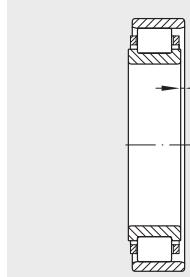
Design 2
N with lubrication
groove and holes



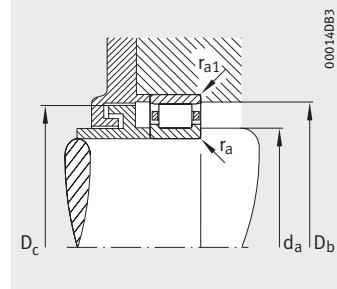
Design 3
NU

Dimension table (continued) · Dimensions in mm

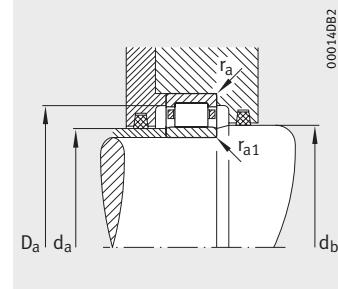
Designation	De-sign	Mass m ≈kg	Dimensions												
			d	D	B	r	r ₁	s ¹⁾	E	F	D ₁	d ₁	d _s	n _s	
NU10/560-M1A	3	222	560	820	115	6	6	9,8	754	626	731	—	—	—	
NU20/560-E-M1	3	281	560	820	150	6	6	12	762	626	741	—	—	—	
NU30/560-M1	3	362	560	820	195	6	6	16,8	754	626	731	—	—	—	
NU31/560-M1	3	756	560	920	280	7,5	7,5	22,5	846	646	814	—	—	—	
NU12/560-M1	3	778	560	1 030	206	9,5	9,5	11,9	939	659	894	—	—	—	
NU12/560-M1A	3	778	560	1 030	206	9,5	9,5	11,9	939	659	894	—	—	—	
NU22/560-E-M	3	1 040	560	1 030	272	9,5	9,5	21,9	939	659	894	—	—	—	
NU22/560-E-M1A	3	1 070	560	1 030	272	9,5	9,5	21,9	939	659	894	—	—	—	
Z-503867.ZL	3	64,6	585	750	60	3	3	—	693	637	682,4	—	—	—	
Z-527273.ZL	2	52,3	600	730	60	3	3	12,2	697	—	—	658,4	3,2	12,2	
N18/600-M1	1	50,4	600	730	60	3	3	7	697	—	—	647	—	—	
NU18/600-M1	3	50,6	600	730	60	3	3	7	697	637	687	—	—	—	
NU28/600-M1	3	67,4	600	730	78	3	3	9,5	697	637	687	—	—	—	
NU38/600-M1	3	85,1	600	730	98	3	3	11	697	637	687	—	—	—	
NU19/600-M1	3	125	600	800	90	5	5	9,9	748	652	730,7	—	—	—	
NU29/600-E-M1	3	172	600	800	118	5	5	8,4	757	649	739	—	—	—	
NU29/600-E-M1A	3	172	600	800	118	5	5	8,4	757	649	739	—	—	—	
NU29/600-E-MP1A	3	169	600	800	118	5	5	8,4	757	649	739	—	—	—	
N10/600-M1	1	240	600	870	118	6	6	10,6	803	—	—	693,5	—	—	
N10/600-M1B	1	241	600	870	118	6	6	10,6	803	—	—	693,5	—	—	
NU10/600-M1	3	241	600	870	118	6	6	10,6	803	667	776	—	—	—	
NU10/600-M1A	3	243	600	870	118	6	6	10,6	803	667	776	—	—	—	
NU30/600-MP1A	3	400	600	870	200	6	6	16	803	667	776	—	—	—	
NU31/600-M1	3	898	600	980	300	7,5	7,5	25,5	902	692	868,5	—	—	—	
NU12/600-M1	3	918	600	1 090	212	9,5	9,5	12	994	704	947,5	—	—	—	
Z-547406.ZL	1	116	622	775	108	5	5	—	743,5	—	—	670,5	—	—	
Z-537025.ZL	2	58,1	630	780	56	4	4	9	737	—	—	688,5	3,2	12,2	
Z-527274.ZL	2	68,6	630	780	69	4	4	12,5	744	—	—	686	3,2	12,2	
NU18/630-M1	3	71,8	630	780	69	4	4	8,4	744	672	732	—	—	—	
N28/630-M1	1	94,5	630	780	88	4	4	8,7	744	—	—	684	—	—	
NU28/630-M1	3	94,8	630	780	88	4	4	8,7	744	672	732	—	—	—	
NU28/630-M1A	3	96,5	630	780	88	4	4	8,7	744	672	732	—	—	—	
NU38/630-M1	3	118	630	780	112	4	4	11,2	744	672	732	—	—	—	
NU19/630-M1	3	163	630	850	100	6	6	8,5	792	688	771	—	—	—	
NU29/630-E-M1	3	211	630	850	128	6	6	10,3	803	683	784	—	—	—	



00014DB4



00014DB3



00014DB2

1) Axial displacement "s"
for N and NU

Mounting dimensions
for N

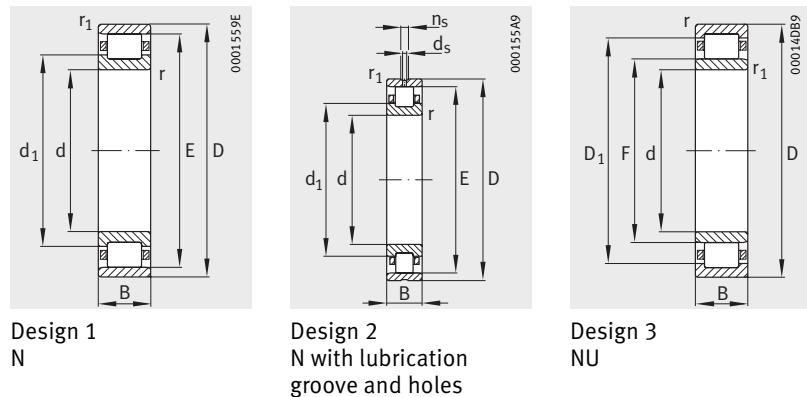
Mounting dimensions
for NU

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{or} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
583	620	632	797	—	—	5	5	2 700	5 100	355	1 200	590
583	620,5	631,5	797	—	—	5	5	3 900	7 800	660	1 200	400
583	621	631	797	—	—	5	5	4 500	10 000	860	1 200	360
592	641	646	888	—	—	6	6	8 000	15 300	1 280	1 000	300
600	654	664	990	—	—	8	8	7 100	10 800	830	950	360
600	654	664	990	—	—	8	8	7 100	10 800	830	950	360
600	654	664	990	—	—	8	8	9 500	15 600	1 240	850	240
600	654	664	990	—	—	8	8	9 500	15 600	1 240	850	240
597	632	642	738	—	—	2,5	2,5	750	1 800	135	1 500	530
612	—	—	718	703	691	2,5	2,5	405	900	55	1 500	670
612	—	—	718	703	691	2,5	2,5	850	2 000	162	1 500	—
612	632	642	718	—	—	2,5	2,5	850	2 000	144	1 500	—
612	632	642	718	—	—	2,5	2,5	1 250	3 350	280	1 400	500
612	632	642	718	—	—	2,5	2,5	1 530	4 250	365	1 400	450
617	647	657	783	—	—	4	4	1 700	3 450	249	1 400	—
617	645	655	783	—	—	4	4	3 000	6 700	570	1 200	400
617	645	655	783	—	—	4	4	3 000	6 700	570	1 200	400
617	645	655	783	—	—	4	4	3 000	6 700	570	1 200	400
623	—	—	847	809	797	5	5	2 850	5 400	440	1 100	530
623	—	—	847	809	797	5	5	2 850	5 400	440	1 100	530
623	661	673	847	—	—	5	5	2 850	5 400	365	1 100	550
623	661	673	847	—	—	5	5	2 850	5 400	365	1 100	550
623	642	672	847	—	—	5	5	4 900	11 000	920	1 100	320
632	687	697	948	—	—	6	6	8 650	17 000	1 390	950	280
640	704	714	1 050	—	—	8	8	7 800	12 500	940	900	320
637	—	—	760	750	738	4	4	2 400	5 700	425	1 300	380
645	—	—	765	743	730	3	3	530	1 100	68	1 400	—
645	—	—	765	750	738	3	3	655	1 250	80	1 400	—
645	667	677	765	—	—	3	3	1 140	2 600	189	1 400	—
645	—	—	765	751	737	3	3	1 700	4 400	370	1 300	430
645	667	677	765	—	—	3	3	1 700	4 400	370	1 300	430
645	667	677	765	—	—	3	3	1 700	4 400	370	1 300	430
645	667	677	765	—	—	3	3	2 040	5 500	470	1 300	400
653	683	693	827	—	—	5	5	1 900	3 900	280	1 300	—
653	678	688	827	—	—	5	5	3 350	7 350	505	1 100	360



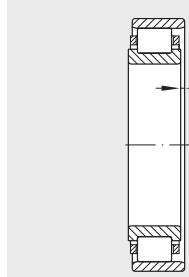
Cylindrical roller bearings with cage

Single row
Non-locating
bearings



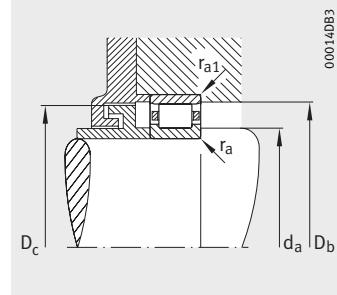
Dimension table (continued) · Dimensions in mm

Designation	De-sign	Mass m ≈kg	Dimensions											
			d	D	B	r min.	r ₁ min.	s ¹⁾	E	F	D ₁	d ₁	d _s	n _s
N10/630-M1	1	292	630	920	128	7,5	7,5	11,7	850	—	—	728	—	—
NU30/630-M1	3	486	630	920	212	7,5	7,5	17,4	850	700	826,2	—	—	—
NU31/630-M	3	1 050	630	1 030	315	7,5	7,5	27,3	947	727	911,8	—	—	—
NU12/630-M1	3	1 100	630	1 150	230	15	15	20	1 020	760	978	—	—	—
Z-527249.ZL	2	60,1	640	790	56	4	4	8,5	750	—	—	698,3	3,2	12,2
Z-537238.ZL	2	60,7	670	820	56	4	4	9	778	—	—	729,5	6,3	12,2
Z-527463.ZL	2	70,3	670	820	69	4	4	12,5	784	—	—	725,9	3,2	12,2
NU18/670-M1	3	75,9	670	820	69	4	4	7,8	784	712	772	—	—	—
N28/670-M1	1	100	670	820	88	4	4	8,7	784	—	—	724	—	—
NU28/670-M1	3	100	670	820	88	4	4	8,7	784	712	772	—	—	—
NU28/670-M1A	3	101	670	820	88	4	4	8,7	784	712	772	—	—	—
NU38/670-M1	3	123	670	820	112	4	4	11,2	784	712	772	—	—	—
NU19/670-M1	3	186	670	900	103	6	6	11,3	839	731	817	—	—	—
NU29/670-M1	3	257	670	900	136	6	6	7,5	841	729	819	—	—	—
N10/670-M1	1	348	670	980	136	7,5	7,5	12,7	905	—	—	774,5	—	—
NU30/670-M1	3	620	670	980	230	7,5	7,5	20,6	905	745	876,2	—	—	—
NU12/670-M	3	1 300	670	1 220	243	12	12	13,4	1 115	785	1 062	—	—	—
Z-527275.ZL	2	86,8	710	870	74	4	4	12	833	—	—	768,4	3,2	12,2
N18/710-M1	1	91,5	710	870	74	4	4	7,9	833	—	—	766,5	—	—
NU18/710-M1	3	91,7	710	870	74	4	4	7,9	833	753	820	—	—	—
NU19/710-M1	3	213	710	950	106	6	6	9,3	886	774	867,7	—	—	—
NU29/710-M1	3	289	710	950	140	6	6	11,7	890	770	866	—	—	—
NU29/710-M1A	3	289	710	950	140	6	6	11,7	890	770	866	—	—	—
N10/710-M1	1	401	710	1 030	140	7,5	7,5	12,6	950	—	—	819,5	—	—
NU10/710-M1	3	400	710	1 030	140	7,5	7,5	12,6	950	790	924,5	—	—	—
NU10/710-M1A	3	406	710	1 030	140	7,5	7,5	12,6	950	790	924,5	—	—	—
NU30/710-M1	3	673	710	1 030	236	7,5	7,5	22,3	950	790	924,5	—	—	—
Z-527250.ZL	2	79	720	880	62	4	4	9	839	—	—	780,9	3,2	12,2
Z-536020.ZL	2	95	750	920	68	5	5	12	875	—	—	817	3,2	12,2
Z-526719.ZL	2	106	750	920	78	5	5	15	879	—	—	812,2	3,2	12,2
NU18/750-M1	3	108	750	920	78	5	5	8,8	879	799	866	—	—	—
NU38/750-M1	3	182	750	920	128	5	5	14	879	799	866	—	—	—
NU19/750-M1	3	245	750	1 000	112	6	6	12,1	935	815	911	—	—	—
NU29/750-M1	3	329	750	1 000	145	6	6	8	940	810	919	—	—	—
N10/750-M1	1	481	750	1 090	150	7,5	7,5	13,6	1 005	—	—	866	—	—



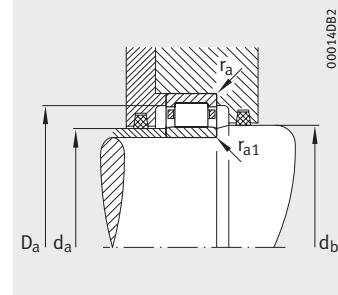
1) Axial displacement "s"
for N and NU

00014DB4



Mounting dimensions
for N

00014DB3



Mounting dimensions
for NU

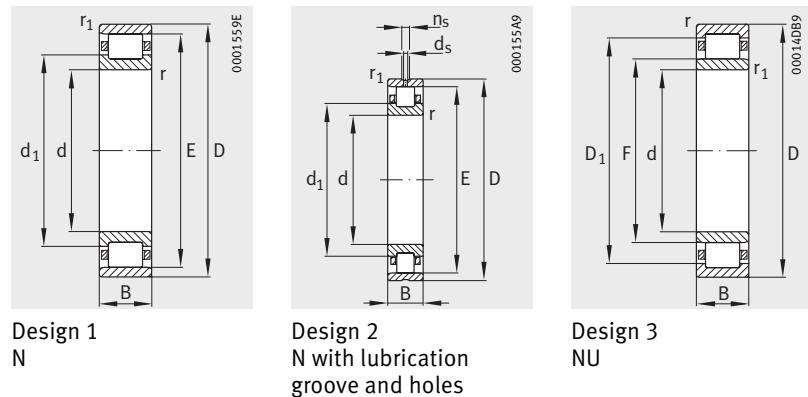
00014DB2

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{or} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
658	—	—	892	856	844	6	6	3 250	6 200	495	1 100	500
658	695	705	892	—	—	6	6	5 700	12 500	1 030	1 100	300
662	722	732	998	—	—	6	6	9 150	18 000	1 430	900	260
684	740	745	1 096	—	—	12	12	7 800	13 200	1 000	800	300
655	—	—	775	756	744	3	3	610	1 250	78	1 400	—
685	—	—	805	784	772	3	3	530	1 100	67	1 400	—
685	—	—	805	790	778	3	3	680	1 370	85	1 400	—
685	707	717	805	—	—	3	3	1 180	2 750	197	1 400	—
685	—	—	805	791	777	3	3	1 760	4 650	385	1 200	400
685	707	717	805	—	—	3	3	1 760	4 650	385	1 200	400
685	707	717	805	—	—	3	3	1 760	4 650	385	1 200	400
685	707	717	805	—	—	3	3	2 120	5 850	320	1 200	360
693	726	736	877	—	—	5	5	2 040	4 250	300	1 200	—
693	724	734	877	—	—	5	5	3 450	8 150	690	1 100	340
698	—	—	952	911	899	6	6	3 750	7 100	540	950	450
698	740	750	952	—	—	6	6	6 550	14 600	1 180	950	260
718	780	790	1 172	—	—	10	10	9 150	14 300	1 050	800	280
725	—	—	855	840	826	3	3	800	1 560	124	1 200	—
725	—	—	855	840	826	3	3	1 400	3 250	260	1 200	—
725	748	758	855	—	—	3	3	1 400	3 250	230	1 200	—
733	769	779	927	—	—	5	5	2 240	4 750	300	1 100	—
733	765	775	927	—	—	5	5	3 750	8 800	710	1 000	320
733	765	775	927	—	—	5	5	3 750	8 800	710	1 000	320
738	—	—	1 002	957	943	6	6	4 050	8 000	620	950	430
738	784	796	1 002	—	—	6	6	4 050	8 000	510	950	425
738	784	796	1 002	—	—	6	6	4 050	8 000	510	950	425
738	785	795	1 002	—	—	6	6	6 800	15 600	1 250	950	240
735	—	—	865	846	832	3	3	800	1 700	104	1 200	—
767	—	—	903	882	868	4	4	735	1 560	94	1 100	—
767	—	—	903	886	872	4	4	850	1 700	102	1 100	—
767	794	804	903	—	—	4	4	1 430	3 450	213	1 100	—
767	794	804	903	—	—	4	4	2 550	7 350	590	1 100	320
773	810	820	977	—	—	5	5	2 500	5 300	365	1 100	—
773	805	815	977	—	—	5	5	4 150	9 650	770	950	300
778	—	—	1 062	1 012	998	6	6	4 500	9 000	680	850	400



Cylindrical roller bearings with cage

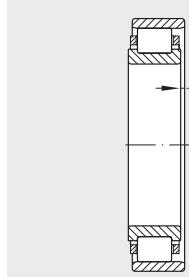
Single row
Non-locating
bearings



Dimension table (continued) · Dimensions in mm

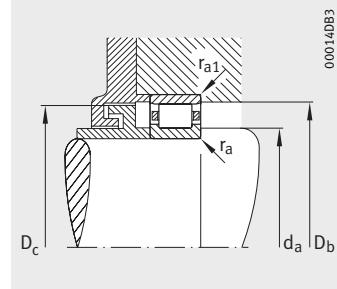
Designation	De-sign	Mass m ≈kg	Dimensions												
			d	D	B	r min.	r ₁ min.	s ²⁾	E	F	D ₁	d ₁	d _s	n _s	
NU10/750-M1	3	480	750	1 090	150	7,5	7,5	13,6	1 005	835	978	—	—	—	—
NU10/750-M1A	3	495	750	1 090	150	7,5	7,5	13,6	1 005	835	978	—	—	—	—
NU30/750-M1	3	808	750	1 090	250	7,5	7,5	20,5	1 005	835	978	—	—	—	—
Z-527276.ZL	2 ¹⁾	113	800	980	82	5	5	15	939	—	—	866,2	3,2	12,2	
NU18/800-M1	3	129	800	980	82	5	5	8,9	939	849	923	—	—	—	—
NU38/800-M1	3	220	800	980	136	5	5	14	939	849	923	—	—	—	—
NU19/800-M1	3	276	800	1 060	115	6	6	12,8	990	870	968,4	—	—	—	—
NU29/800-M1	3	378	800	1 060	150	6	6	13,3	995	865	969	—	—	—	—
N10/800-M1	1	556	800	1 150	155	7,5	7,5	13,6	1 065	—	—	918	—	—	—
NU10/800-M1	3	557	800	1 150	155	7,5	7,5	13,6	1 065	885	1 036	—	—	—	—
NU10/800-M1A	3	557	800	1 150	155	7,5	7,5	13,6	1 065	885	1 036	—	—	—	—
NU30/800-M1	3	912	800	1 150	258	7,5	7,5	22,5	1 065	885	1 036	—	—	—	—
Z-527251.ZL	2	101	820	990	72	5	5	7,3	951	—	—	883,2	3,2	12,2	
Z-526720.ZL	2 ¹⁾	130	850	1 030	82	5	5	15	989	—	—	916,2	3,2	15	
NU18/850-M1	3	137	850	1 030	82	5	5	9	985	895	970	—	—	—	—
NU28/650-M1	3	185	850	1 030	106	5	5	9,3	985	895	970	—	—	—	—
NU28/650-M1A	3	186	850	1 030	106	5	5	9,3	985	895	970	—	—	—	—
NU38/850-M1	3	232	850	1 030	136	5	5	14	985	895	970	—	—	—	—
NU19/850-M1	3	315	850	1 120	118	6	6	12,6	1 049	921	1 024,1	—	—	—	—
NU29/850-M1	3	427	850	1 120	155	6	6	8,6	1 053	917	1 031,5	—	—	—	—
N10/850-M1	1	658	850	1 220	165	7,5	7,5	13,5	1 125	—	—	978	—	—	—
NU10/850-M1	3	659	850	1 220	165	7,5	7,5	13,5	1 125	945	1 096,2	—	—	—	—
NU30/850-M	3	1 080	850	1 220	272	7,5	7,5	26	1 125	945	1 096,2	—	—	—	—
Z-527464.ZL	2 ¹⁾	146	900	1 090	85	5	5	15	1 047	—	—	969,3	3,2	15	
NU18/900-M1	3	159	900	1 090	85	5	5	11,8	1 047	951	1 031	—	—	—	—
NU38/900-M1	3	269	900	1 090	140	5	5	13,5	1 047	951	1 031	—	—	—	—
NU19/900-M1	3	354	900	1 180	122	6	6	9,8	1 108	972	1 086,2	—	—	—	—
NU29/900-M1	3	499	900	1 180	165	6	6	13,3	1 110	970	1 088	—	—	—	—
N10/900-M1	1	720	900	1 280	170	7,5	7,5	13,5	1 190	—	—	1 026	—	—	—
NU10/900-M1	3	728	900	1 280	170	7,5	7,5	13,5	1 190	990	1 158	—	—	—	—
NU30/900-M1	3	1 190	900	1 280	280	7,5	7,5	23	1 190	990	1 158	—	—	—	—

¹⁾ With thread M8 for eye bolts on the end faces.



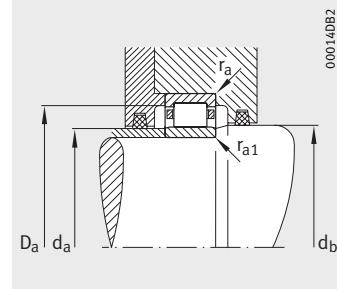
2) Axial displacement "s"
for N and NU

00014DB4



Mounting dimensions
for N

00014DB3



Mounting dimensions
for NU

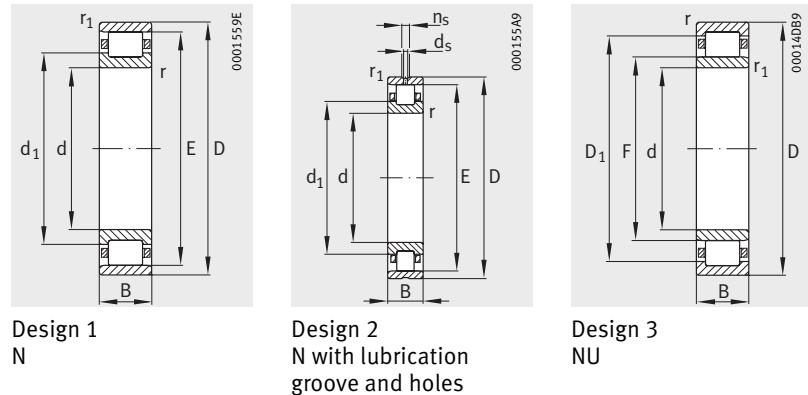
00014DB2

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{or} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
778	829	841	1 062	—	—	6	6	4 500	9 000	570	850	400
778	829	841	1 062	—	—	6	6	4 500	9 000	570	850	400
778	830	840	1 062	—	—	6	6	7 650	17 600	1 380	850	220
817	—	—	963	946	932	4	4	1 020	2 000	118	1 100	450
817	844	854	963	—	—	4	4	1 760	4 150	280	1 100	—
817	844	854	963	—	—	4	4	3 100	8 800	690	1 000	280
823	865	875	1 037	—	—	5	5	2 600	5 700	390	1 000	—
823	860	870	1 037	—	—	5	5	4 250	10 000	780	900	280
828	—	—	1 122	1 072	1 058	6	6	5 000	10 000	750	800	360
828	879	891	1 122	—	—	6	6	5 000	10 000	630	800	365
828	879	891	1 122	—	—	6	6	5 000	10 000	630	800	365
828	880	890	1 122	—	—	6	6	8 500	19 600	1 530	800	200
837	—	—	973	858	844	4	4	915	1 900	111	1 100	—
867	—	—	1 013	896	882	4	4	1 060	2 160	126	1 000	—
867	894	904	1 013	—	—	4	4	1 800	4 400	295	1 000	—
867	890	900	1 013	—	—	4	4	2 750	7 650	590	950	280
867	890	900	1 013	—	—	4	4	2 750	7 650	590	950	280
867	894	904	1 013	—	—	4	4	3 200	9 300	720	950	260
873	916	926	1 097	—	—	5	5	2 900	6 400	430	950	—
873	912	922	1 097	—	—	5	5	4 750	11 600	890	850	260
878	—	—	1 192	1 132	1 118	6	6	5 600	11 800	880	750	320
878	938	952	1 192	—	—	6	6	5 600	11 800	730	750	325
878	940	950	1 192	—	—	6	6	8 500	20 400	1 540	750	190
917	—	—	1 073	1 054	1 040	4	4	1 140	2 320	132	950	—
917	946	956	1 073	—	—	4	4	2 040	5 100	330	950	—
917	946	956	1 073	—	—	4	4	3 600	10 600	810	850	220
923	967	977	1 157	—	—	5	5	3 250	7 350	470	900	—
923	965	975	1 157	—	—	5	5	5 400	13 400	1 010	800	220
928	—	—	1 252	1 198	1 182	6	6	6 400	13 400	960	700	300
928	983	997	1 252	—	—	6	6	6 400	13 400	800	700	295
928	985	995	1 252	—	—	6	6	10 200	24 000	1 770	700	170



Cylindrical roller bearings with cage

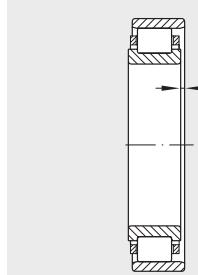
Single row
Non-locating
bearings



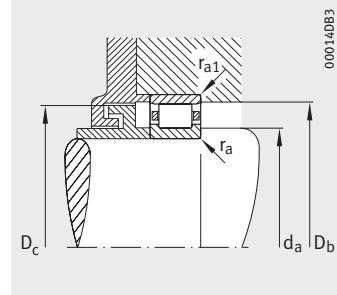
Dimension table (continued) · Dimensions in mm

Designation	De-sign	Mass m ≈kg	Dimensions												
			d	D	B	r min.	r ₁ min.	s ⁽²⁾	E	F	D ₁	d ₁	d _s	n _s	
F-803618.ZL	2 ¹⁾	185	950	1 150	90	5	5	20,5	1 094	-	-	1 029,4	3,2	15	
Z-527465.ZL	2 ¹⁾	171	950	1 150	90	5	5	15,5	1 104	-	-	1 024	3,2	15	
NU18/950-M1	3	187	950	1 150	90	5	5	9,5	1 104	1 004	1 088	-	-	-	
NU38/950-M1	3	318	950	1 150	150	5	5	15	1 104	1 004	1 088	-	-	-	
NU19/950-M1	3	435	950	1 250	132	7,5	7,5	13,9	1 175	1 025	1 151	-	-	-	
NU29/950-M1	3	596	950	1 250	175	7,5	7,5	14,5	1 175	1 025	1 151	-	-	-	
N10/950-M1	1	898	950	1 360	180	7,5	7,5	13,5	1 255	-	-	1 091	-	-	
NU10/950-M1	3	899	950	1 360	180	7,5	7,5	13,5	1 255	1 055	1 223	-	-	-	
NU30/950-M	3	1 490	950	1 360	300	7,5	7,5	28	1 255	1 055	1 223	-	-	-	
NU31/950-M	3	3 080	950	1 500	438	12	12	-	1 361	1 089	1 317	-	-	-	
Z-527466.ZL	2 ¹⁾	198	1 000	1 210	92	6	6	16	1 155	-	-	1 075	4,8	15	
NU18/1000-M1	3	242	1 000	1 220	100	6	6	10,3	1 170	1 058	1 150	-	-	-	
NU28/1000-M	3	324	1 000	1 220	128	6	6	11	1 170	1 058	1 150	-	-	-	
NU28/1000-MA	3	326	1 000	1 220	128	6	6	11	1 170	1 058	1 150	-	-	-	
NU38/1000-M	3	411	1 000	1 220	165	6	6	16,3	1 170	1 058	1 150	-	-	-	
Z-507276.ZL	3	423	1 000	1 290	130	7,5	7,5	11,3	1 215	1 075	1 187	-	-	-	
NU19/1000-M1	3	527	1 000	1 320	140	7,5	7,5	10,5	1 240	1 080	1 214,4	-	-	-	
NU29/1000-M1	3	708	1 000	1 320	185	7,5	7,5	16,3	1 240	1 080	1 215	-	-	-	
N10/1000-M1	1	1 010	1 000	1 420	185	7,5	7,5	14,5	1 315	-	-	1 143	-	-	
NU10/1000-M1	3	1 010	1 000	1 420	185	7,5	7,5	14,5	1 315	1 105	1 281	-	-	-	
NU20/1000-E-M1	3	1 300	1 000	1 420	243	7,5	7,5	11,5	1 330	1 100	1 293	-	-	-	
NU30/1000-M1	3	1 640	1 000	1 420	308	7,5	7,5	28	1 315	1 105	1 281	-	-	-	
Z-539392.ZL	2	203	1 030	1 240	92	6	6	15	1 185	-	-	1 104	4,8	15	
Z-539393.ZL	2	257	1 030	1 250	100	6	6	-	1 190	-	-	1 109	-	-	
Z-526747.ZL	2 ¹⁾	211	1 060	1 270	92	6	6	16	1 215	-	-	1 134	4,8	9,5	
Z-535549.ZL	2	240	1 060	1 280	100	6	6	12,5	1 220	-	-	1 139	4,8	9,5	
NU18/1060-M1	3	259	1 060	1 280	100	6	6	10,3	1 230	1 118	1 210	-	-	-	
NU28/1060-M	3	341	1 060	1 280	128	6	6	11	1 230	1 118	1 210	-	-	-	
NU38/1060-M	3	431	1 060	1 280	165	6	6	16,3	1 230	1 118	1 210	-	-	-	
NU19/1060-M1	3	630	1 060	1 400	150	7,5	7,5	11,5	1 312	1 148	1 285,8	-	-	-	
NU29/1060-M1	3	830	1 060	1 400	195	7,5	7,5	16,2	1 315	1 145	1 288	-	-	-	
N10/1060-M1	1	1 150	1 060	1 500	195	9,5	9,5	14,5	1 390	-	-	1 210	-	-	
NU10/1060-M1	3	1 150	1 060	1 500	195	9,5	9,5	14,5	1 390	1 170	1 355	-	-	-	

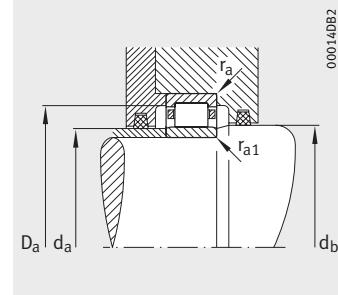
¹⁾ With thread M8 for eye bolts on the end faces.



00014DB4



00014DB3



00014DB2

2) Axial displacement "s"
for N and NU

Mounting dimensions
for N

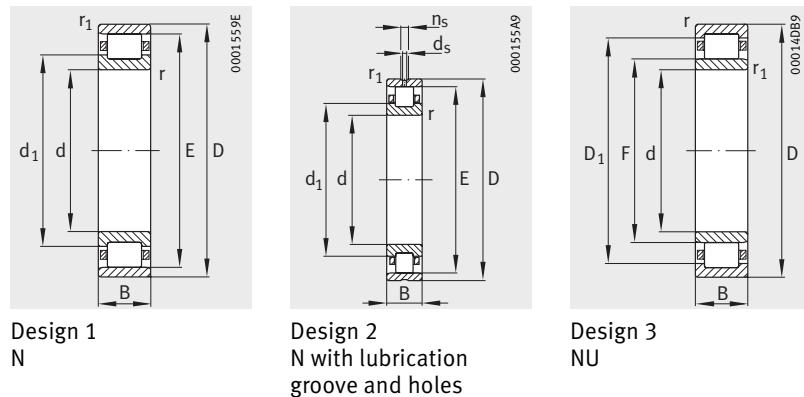
Mounting dimensions
for NU

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{or} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
967	—	—	1 133	1 102	1 086	4	4	880	1 960	118	900	—
967	—	—	1 133	1 112	1 096	4	4	1 200	2 450	141	900	—
967	999	1 009	1 133	—	—	4	4	2 200	5 500	340	900	—
967	999	1 009	1 133	—	—	4	4	3 900	11 600	880	800	220
978	1 020	1 030	1 222	—	—	6	6	3 800	8 500	540	800	—
978	1 020	1 030	1 222	—	—	6	6	5 850	14 600	1 090	750	220
978	—	—	1 332	1 263	1 247	6	6	7 200	15 600	1 110	700	260
978	1 048	1 062	1 332	—	—	6	6	7 200	15 600	920	700	265
978	1 050	1 060	1 332	—	—	6	6	11 400	28 000	2 070	700	150
992	1 083	1 095	1 458	—	—	10	10	16 300	36 500	2 500	430	—
1 023	—	—	1 187	1 163	1 147	5	5	1 250	2 650	151	850	—
1 023	1 053	1 063	1 197	—	—	5	5	2 450	5 850	390	850	—
1 023	1 053	1 063	1 197	—	—	5	5	3 650	10 000	760	750	220
1 023	1 053	1 063	1 197	—	—	5	5	3 650	10 000	760	750	220
1 023	1 053	1 063	1 197	—	—	5	5	4 400	12 700	960	750	200
1 028	1 070	1 080	1 262	—	—	6	6	3 550	8 150	520	800	—
1 028	1 075	1 085	1 292	—	—	6	6	4 400	9 800	600	750	—
1 028	1 075	1 085	1 292	—	—	6	6	6 550	16 300	1 170	700	200
1 028	—	—	1 392	1 323	1 307	6	6	7 500	16 300	1 150	630	260
1 028	1 098	1 112	1 392	—	—	6	6	7 500	16 300	960	630	255
1 028	1 095	1 105	1 392	—	—	6	6	10 600	23 600	1 700	630	170
1 028	1 100	1 110	1 392	—	—	6	6	12 500	31 000	2 250	630	140
1 053	—	—	1 217	1 193	1 177	5	5	1 250	2 650	149	850	—
1 053	—	—	1 227	1 198	1 182	5	5	2 080	5 300	380	850	260
1 083	—	—	1 247	1 223	1 207	5	5	1 320	2 850	159	800	—
1 083	—	—	1 257	1 228	1 212	5	5	1 320	2 850	159	800	—
1 083	1 113	1 123	1 257	—	—	5	5	2 550	6 400	415	800	—
1 083	1 113	1 123	1 257	—	—	5	5	3 800	10 600	790	700	220
1 083	1 113	1 123	1 257	—	—	5	5	4 550	13 400	1 000	700	190
1 088	1 143	1 153	1 372	—	—	6	6	4 650	10 600	650	700	—
1 088	1 140	1 150	1 372	—	—	6	6	7 350	18 600	1 330	700	180
1 094	—	—	1 466	1 398	1 382	8	8	8 500	18 600	1 300	600	220
1 094	1 163	1 177	1 466	—	—	8	8	8 500	18 600	1 080	600	231



Cylindrical roller bearings with cage

Single row
Non-locating
bearings

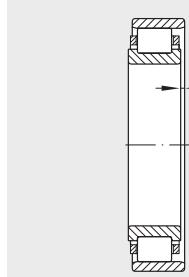


Dimension table (continued) · Dimensions in mm

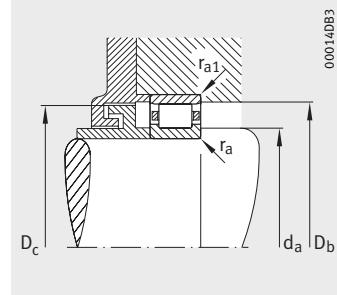
Designation	De-sign	Mass m ≈kg	Dimensions												
			d	D	B	r min.	r ₁ min.	s ³⁾	E	F	D ₁	d ₁	d _s	n _s	
NU20/1060-E-M1	3	1 480	1 060	1 500	250	9,5	9,5	11,5	1 405	1 165	1 367	—	—	—	—
NU30/1060-M1	3	1 920	1 060	1 500	325	9,5	9,5	29,8	1 390	1 170	1 355	—	—	—	—
F-808288.ZL	3	118	1 110	1 240	85	6	2	5	1 205	1 145	1 195	—	—	—	—
Z-527467.ZL	2 ¹⁾	239	1 120	1 340	94	6	6	17	1 280	—	—	1 199	4,8	9,5	—
Z-535550.ZL	2	284	1 120	1 360	104	6	6	20	1 290	—	—	1 209	4,8	9,5	—
NU18/1120-M1	3	312	1 120	1 360	106	6	6	11	1 305	1 185	1 286	—	—	—	—
NU38/1120-M	3	547	1 120	1 360	180	6	6	18	1 305	1 185	1 286	—	—	—	—
NU19/1120-M1	3	665	1 120	1 460	150	7,5	7,5	11,5	1 372	1 208	1 346	—	—	—	—
NU29/1120-M1	3	887	1 120	1 460	195	7,5	7,5	13,8	1 375	1 205	1 347,8	—	—	—	—
N10/1120-M1	1	1 300	1 120	1 580	200	9,5	9,5	16	1 465	—	—	1 276	—	—	—
NU10/1120-M1	3	1 300	1 120	1 580	200	9,5	9,5	16	1 465	1 235	1 428	—	—	—	—
NU20/1120-E-M1	3	1 710	1 120	1 580	265	9,5	9,5	13	1 480	1 230	1 440	—	—	—	—
NU30/1120-M1	3	2 260	1 120	1 580	345	9,5	9,5	32,3	1 465	1 235	1 428	—	—	—	—
Z-527468.ZL	2 ¹⁾	245	1 180	1 400	94	6	6	17	1 342	—	—	1 257,8	4,8	9,5	—
NU18/1180-M1	3	329	1 180	1 420	106	6	6	11	1 365	1 245	1 346	—	—	—	—
NU38/1180-M	3	569	1 180	1 420	180	6	6	18	1 365	1 245	1 346	—	—	—	—
NU19/1180-M1	3	789	1 180	1 540	160	7,5	7,5	12,5	1 445	1 275	1 418	—	—	—	—
NU29/1180-M1	3	1 060	1 180	1 540	206	7,5	7,5	16,5	1 450	1 270	1 421	—	—	—	—
NU39/1180-E-M1	3	1 350	1 180	1 540	272	7,5	7,5	13,9	1 460	1 270	1 432	—	—	—	—
N10/1180-M1	1	1 520	1 180	1 660	212	9,5	9,5	17	1 540	—	—	1 343	—	—	—
NU10/1180-M1	3	1 520	1 180	1 660	212	9,5	9,5	17	1 540	1 300	1 502	—	—	—	—
NU20/1180-E-M1	3	1 940	1 180	1 660	272	9,5	9,5	13	1 555	1 295	1 513	—	—	—	—
NU30/1180-M	3	2 520	1 180	1 660	355	9,5	9,5	32,3	1 540	1 300	1 502	—	—	—	—
Z-527469.ZL	2 ²⁾	278	1 250	1 480	95	6	6	17	1 417	—	—	1 333	4,8	15	—
Z-566705.ZL	2	337	1 250	1 500	106	6	6	15	1 444	—	—	1 340	4,8	15	—
NU18/1250-M1	3	390	1 250	1 500	112	6	6	11,4	1 444	1 316	1 423,3	—	—	—	—
NU38/1250-M	3	654	1 250	1 500	185	6	6	17,3	1 444	1 316	1 423,3	—	—	—	—
NU19/1250-M1	3	938	1 250	1 630	170	7,5	7,5	13	1 530	1 350	1 501,2	—	—	—	—
NU29/1250-M1	3	1 260	1 250	1 630	218	7,5	7,5	10,3	1 535	1 345	1 505	—	—	—	—
NU39/1250-E-M1	3	1 570	1 250	1 630	280	7,5	7,5	13,6	1 545	1 345	1 516	—	—	—	—
N10/1250-M1	1	1 710	1 250	1 750	218	9,5	9,5	18,5	1 625	—	—	1 419	—	—	—
NU10/1250-M1	3	1 710	1 250	1 750	218	9,5	9,5	18,5	1 625	1 375	1 585	—	—	—	—

¹⁾ With thread M8 for eye bolts on the end faces.

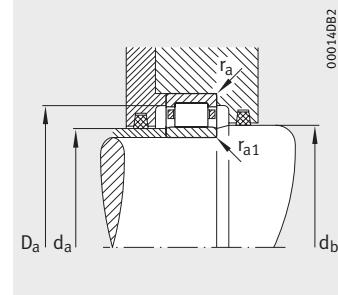
²⁾ With thread M10 for eye bolts on the end faces.



00014DB4



00014DB3



00014DB2

3) Axial displacement "s"
for N and NU

Mounting dimensions
for N

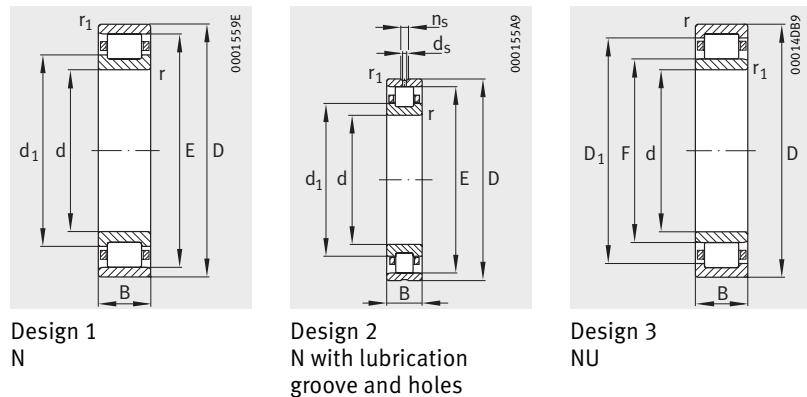
Mounting dimensions
for NU

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{or} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
1 094	1 160	1 170	1 466	—	—	8	8	11 600	26 500	1 830	600	150
1 094	1 165	1 175	1 466	—	—	8	8	13 200	32 500	2 280	430	—
1 119	1 140	1 150	1 217	—	—	5	2	1 120	3 450	241	850	—
1 143	—	—	1 317	1 288	1 272	5	5	1 370	3 050	168	750	—
1 143	—	—	1 337	1 298	1 282	5	5	1 370	3 050	167	750	—
1 143	1 180	1 190	1 337	—	—	5	5	2 850	7 100	450	750	—
1 143	1 180	1 190	1 337	—	—	5	5	5 100	15 000	1 090	700	180
1 148	1 203	1 213	1 432	—	—	6	6	4 750	11 200	680	700	—
1 148	1 200	1 210	1 432	—	—	6	6	7 500	19 600	1 380	630	170
1 154	—	—	1 546	1 474	1 456	8	8	9 000	20 000	1 380	560	220
1 154	1 228	1 242	1 546	—	—	8	8	9 000	20 000	1 150	560	215
1 154	1 225	1 235	1 546	—	—	8	8	12 000	27 500	1 870	560	150
1 154	1 230	1 240	1 546	—	—	8	8	14 600	37 500	2 550	400	—
1 203	—	—	1 377	1 351	1 333	5	5	1 460	3 350	180	750	—
1 203	1 240	1 250	1 397	—	—	5	5	3 000	7 800	485	700	—
1 203	1 240	1 250	1 397	—	—	5	5	5 400	16 300	1 180	630	160
1 208	1 270	1 280	1 512	—	—	6	6	5 100	12 000	720	700	—
1 208	1 265	1 275	1 512	—	—	6	6	8 500	22 000	1 550	600	150
1 208	1 265	1 275	1 512	—	—	6	6	10 600	28 500	1 790	600	130
1 214	—	—	1 626	1 549	1 531	8	8	10 000	22 800	1 500	560	200
1 214	1 293	1 307	1 626	—	—	8	8	10 000	22 800	1 260	560	199
1 214	1 290	1 300	1 626	—	—	8	8	13 400	31 000	2 100	530	130
1 214	1 295	1 305	1 626	—	—	8	8	14 600	36 500	2 420	380	—
1 273	—	—	1 457	1 426	1 408	5	5	1 500	3 550	189	700	—
1 273	—	—	1 477	1 453	1 435	5	5	2 120	4 650	255	700	—
1 273	1 311	1 321	1 477	—	—	5	5	3 350	8 650	530	700	—
1 273	1 311	1 321	1 477	—	—	5	5	6 100	18 600	1 320	600	140
1 278	1 345	1 355	1 602	—	—	6	6	5 700	13 700	820	630	—
1 278	1 340	1 350	1 602	—	—	6	6	9 650	25 500	1 760	560	140
1 278	1 340	1 350	1 602	—	—	6	6	11 800	32 500	2 220	560	110
1 284	—	—	1 716	1 634	1 616	8	8	10 600	24 500	1 590	530	180
1 284	1 368	1 382	1 716	—	—	8	8	10 600	24 500	1 340	530	186



Cylindrical roller bearings with cage

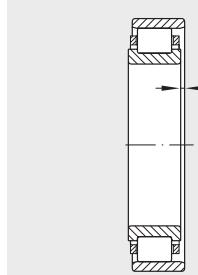
Single row
Non-locating
bearings



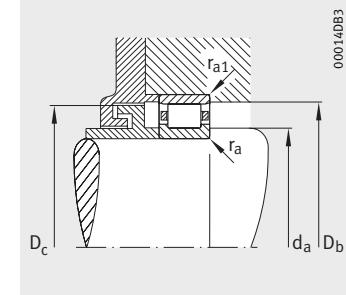
Dimension table (continued) · Dimensions in mm

Designation	De-sign	Mass m ≈kg	Dimensions											
			d	D	B	r min.	r ₁ min.	s ²⁾	E	F	D ₁	d ₁	d _s	n _s
NU20/1250-E-M1	3	2 270	1 250	1 750	290	9,5	9,5	13,5	1 635	1 375	1 593	—	—	—
NU30/1250-M	3	2 940	1 250	1 750	375	9,5	9,5	35,3	1 625	1 375	1 585	—	—	—
Z-529599.ZL	2 ¹⁾	301	1 320	1 550	95	6	6	17	1 487	—	—	1 403	4,8	15
Z-526748.ZL	2	478	1 320	1 600	122	6	6	10	1 533	—	—	1 422	9,5	17,7
NU18/1320-M1	3	497	1 320	1 600	122	6	6	12,8	1 533	1 397	1 511	—	—	—
NU38/1320-M	3	854	1 320	1 600	206	6	6	20,5	1 533	1 397	1 511	—	—	—
NU19/1320-M1	3	1 080	1 320	1 720	175	7,5	7,5	13	1 615	1 425	1 584,6	—	—	—
NU29/1320-M1	3	1 470	1 320	1 720	230	7,5	7,5	17,6	1 620	1 420	1 588	—	—	—
NU39/1320-E-M1	3	1 850	1 320	1 720	300	7,5	7,5	14,9	1 630	1 420	1 600	—	—	—
N10/1320-M1	1	2 040	1 320	1 850	230	12	12	19	1 715	—	—	1 501	—	—
NU10/1320-M1	3	2 030	1 320	1 850	230	12	12	19	1 715	1 455	1 673	—	—	—
NU20/1320-E-M1	3	2 650	1 320	1 850	300	12	12	14	1 725	1 455	1 682	—	—	—
NU30/1320-M	3	3 520	1 320	1 850	400	12	12	39	1 715	1 455	1 673	—	—	—
Z-527470.ZL	2 ¹⁾	362	1 400	1 650	100	7,5	7,5	18	1 577	—	—	1 493	4,8	15
NU18/1400-M1	3	625	1 400	1 700	132	7,5	7,5	13,4	1 630	1 480	1 606	—	—	—
NU38/1400-M	3	1 050	1 400	1 700	224	7,5	7,5	21,5	1 630	1 480	1 606	—	—	—
NU19/1400-M1	3	1 270	1 400	1 820	185	9,5	9,5	14	1 710	1 510	1 678	—	—	—
NU29/1400-M	3	1 710	1 400	1 820	243	9,5	9,5	18,8	1 715	1 505	1 681	—	—	—
NU39/1400-E-M1	3	2 170	1 400	1 820	315	9,5	9,5	15,5	1 726	1 506	1 694	—	—	—
N10/1400-M1	1	2 350	1 400	1 950	243	12	12	19,5	1 810	—	—	1 587	—	—
NU10/1400-M1	3	2 350	1 400	1 950	243	12	12	19,5	1 810	1 540	1 767	—	—	—
NU20/1400-E-M1	3	3 010	1 400	1 950	315	12	12	26,4	1 820	1 540	1 775	—	—	—
NU30/1400-M	3	3 970	1 400	1 950	412	12	12	39,5	1 810	1 540	1 767	—	—	—
Z-529600.ZL	2 ¹⁾	433	1 500	1 760	105	7,5	7,5	20	1 682	—	—	1 598	8	15
NU18/1500-M1	3	750	1 500	1 820	140	7,5	7,5	14,5	1 745	1 585	1 719	—	—	—
NU38/1500-M	3	1 300	1 500	1 820	243	7,5	7,5	23,8	1 745	1 585	1 719	—	—	—
NU29/1500-M	3	2 110	1 500	1 950	258	9,5	9,5	12	1 835	1 615	1 800	—	—	—
NU39/1500-E-M	3	2 640	1 500	1 950	335	9,5	9,5	15,5	1 851	1 611	1 817	—	—	—

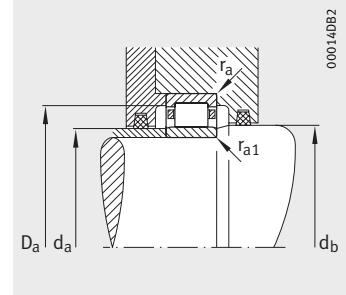
¹⁾ With thread M10 for eye bolts on the end faces.



2) Axial displacement "s"
for N and NU



Mounting dimensions
for N



Mounting dimensions
for NU

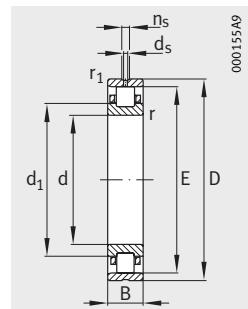
Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{or} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
1 284	1 370	1 380	1 716	—	—	8	8	13 700	32 500	2 190	530	130
1 284	1 370	1 380	1 716	—	—	8	8	16 300	41 500	2 700	360	—
1 243	—	—	1 527	1 496	1 478	5	5	1 560	3 750	197	700	—
1 243	—	—	1 577	1 542	1 524	5	5	2 600	6 000	315	630	—
1 243	1 392	1 402	1 577	—	—	5	5	3 800	10 200	600	630	—
1 243	1 392	1 402	1 577	—	—	5	5	6 800	21 200	1 450	560	130
1 348	1 420	1 430	1 692	—	—	6	6	6 400	15 600	910	600	—
1 348	1 415	1 425	1 692	—	—	6	6	10 600	29 000	1 930	530	120
1 348	1 415	1 425	1 692	—	—	6	6	12 900	36 000	2 420	530	110
1 362	—	—	1 808	1 724	1 706	10	10	11 800	27 000	1 750	500	170
1 362	1 448	1 462	1 808	—	—	10	10	11 800	27 000	1 480	500	171
1 362	1 450	1 460	1 808	—	—	10	10	15 600	38 000	2 500	500	110
1 362	1 450	1 460	1 808	—	—	10	10	18 300	48 000	3 100	340	—
1 428	—	—	1 622	1 586	1 568	6	6	1 600	4 000	206	630	—
1 428	1 475	1 485	1 672	—	—	6	6	4 550	12 000	700	600	—
1 428	1 475	1 485	1 672	—	—	6	6	8 150	25 500	1 710	530	120
1 434	1 505	1 515	1 786	—	—	8	8	7 200	17 600	1 000	560	—
1 434	1 500	1 510	1 786	—	—	8	8	11 400	30 500	2 020	500	120
1 434	1 501	1 511	1 786	—	—	8	8	14 300	40 500	2 700	500	95
1 442	—	—	1 908	1 819	1 801	10	10	13 200	31 000	1 980	480	150
1 442	1 533	1 547	1 908	—	—	10	10	13 200	31 000	1 670	480	155
1 442	1 535	1 545	1 908	—	—	10	10	16 600	40 500	2 600	480	110
1 442	1 535	1 545	1 908	—	—	10	10	19 300	51 000	3 250	340	—
1 528	—	—	1 732	1 691	1 673	6	6	1 630	4 150	214	600	—
1 528	1 580	1 590	1 792	—	—	6	6	5 200	14 000	780	560	—
1 528	1 580	1 590	1 792	—	—	6	6	9 150	29 000	1 890	500	110
1 534	1 610	1 620	1 916	—	—	8	8	12 700	34 500	2 250	480	110
1 534	1 606	1 616	1 916	—	—	8	8	16 000	45 000	2 850	480	90



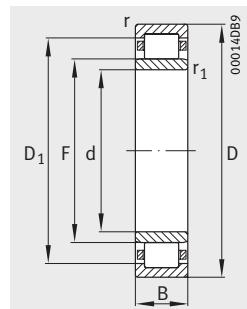
Cylindrical roller bearings with cage

Single row

Non-locating bearings



Design 2
N with lubrication
groove and holes



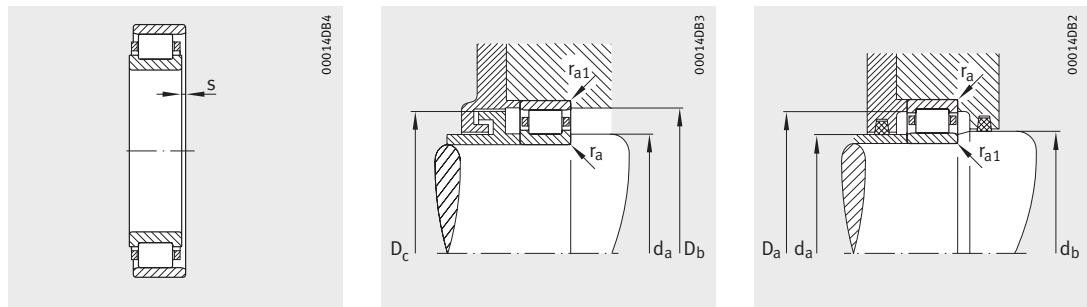
Design 3
NU

Dimension table (continued) · Dimensions in mm

Designation	De-sign	Mass m ≈kg	Dimensions											
			d	D	B	r min.	r ₁ min.	s ³⁾	E	F	D ₁ ≈	d ₁ ≈	d _s	n _s
Z-529601.ZL	2 ¹⁾	553	1 600	1 890	110	7,5	7,5	21	1 799	—	—	1 711	4,8	15
NU28/1600-MA	3	1 270	1 600	1 950	200	7,5	7,5	20	1 870	1 690	1 841	—	—	—
NU38/1600-M	3	1 670	1 600	1 950	265	7,5	7,5	24,3	1 870	1 690	1 841	—	—	—
NU29/1600-M	3	2 310	1 600	2 060	265	9,5	9,5	12,3	1 945	1 715	1 908	—	—	—
Z-529602.ZL	2 ¹⁾	631	1 700	2 000	115	7,5	7,5	22	1 906	—	—	1 815	4,8	15
NU38/1700-M	3	1 860	1 700	2 060	272	7,5	7,5	23,5	1 980	1 790	1 950	—	—	—
NU29/1700-M	3	2 730	1 700	2 180	280	9,5	9,5	12,9	2 060	1 820	2 022	—	—	—
Z-529603.ZL	2 ¹⁾	717	1 800	2 110	120	9,5	9,5	23	2 015	—	—	1 918	8	15
NU38/1800-M	3	2 210	1 800	2 180	290	9,5	9,5	25,5	2 095	1 895	2 063	—	—	—
NU29/1800-M	3	3 110	1 800	2 300	290	12	12	14	2 175	1 925	2 135	—	—	—
Z-529604.ZL	2 ²⁾	829	1 900	2 230	125	9,5	9,5	23	2 129	—	—	2 025	8	15
NU38/1900-M	3	2 560	1 900	2 300	300	9,5	9,5	26	2 210	2 000	2 176	—	—	—
NU29/1900-M	3	3 700	1 900	2 430	308	12	12	14,4	2 300	2 030	2 257	—	—	—
Z-529605.ZL	2 ²⁾	977	2 000	2 350	130	9,5	9,5	24	2 243	—	—	2 132	8	15
NU38/2000-M	3	3 130	2 000	2 430	325	9,5	9,5	29,8	2 330	2 110	2 295	—	—	—
Z-540513.ZL	3	627	2 550	2 780	100	4	4	14,5	2 710	2 626	2 696	—	—	—

¹⁾ With thread M12 for eye bolts on the end faces.

²⁾ With thread M16 for eye bolts on the end faces.

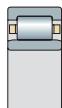


3) Axial displacement "s"
for N and NU

Mounting dimensions
for N

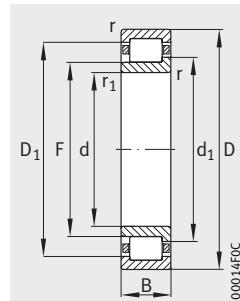
Mounting dimensions
for NU

Mounting dimensions								Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a		d _b	D _a	D _b	D _c	r _a	r _{a1}	dyn. C _r kN	stat. C _{or} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
min.	max.	min.	max.	min.	max.	max.	max.					
1 628	–	–	1 862	1 808	1 790	6	6	1 830	4 750	239	560	–
1 628	1 685	1 695	1 922	–	–	6	6	8 300	24 000	1 540	480	120
1 628	1 685	1 695	1 922	–	–	6	6	11 000	34 000	2 200	480	95
1 634	1 710	1 720	2 026	–	–	8	8	13 400	37 500	2 380	480	100
1 728	–	–	1 972	1 916	1 896	6	6	1 930	5 000	255	530	–
1 728	1 785	1 795	2 032	–	–	6	6	12 200	38 000	2 460	480	85
1 734	1 815	1 825	2 146	–	–	8	8	15 000	42 500	2 600	450	90
1 834	–	–	2 076	2 025	2 005	8	8	2 200	5 850	290	500	–
1 834	1 890	1 900	2 146	–	–	8	8	13 400	42 500	2 650	450	80
1 842	1 920	1 930	2 258	–	–	10	10	16 000	46 500	2 800	430	80
1 934	–	–	2 196	2 139	2 119	8	8	2 500	6 700	325	480	–
1 934	1 995	2 005	2 266	–	–	8	8	15 000	48 000	2 950	430	70
1 942	2 025	2 035	2 388	–	–	10	10	18 300	52 000	3 150	430	75
2 034	–	–	2 316	2 253	2 233	8	8	2 800	7 500	360	480	–
2 034	2 105	2 115	2 396	–	–	8	8	16 600	54 000	3 250	430	67
2 565	–	–	2 765	–	–	3	3	2 750	11 600	470	380	–

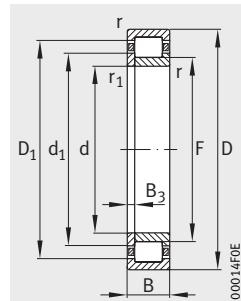


Cylindrical roller bearings with cage

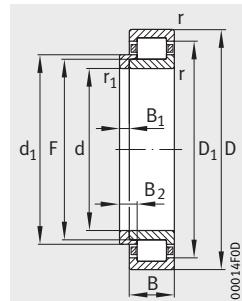
Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing



Design 1
NUP
Locating bearing

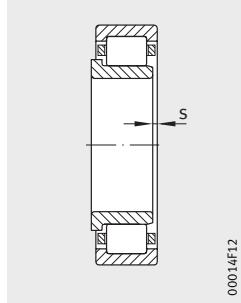


Design 1
NJ and HJ
Locating bearing

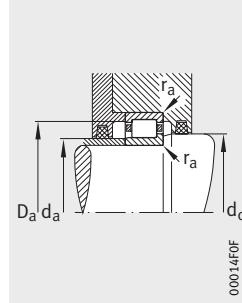
Dimension table · Dimensions in mm

Designation			De-sign	Mass m		Dimensions									
Bearing	X-life	L-section ring		Bearing	L-section ring	d	D	B	r	r ₁	s ²⁾	F	D ₁	d ₁	
				≈kg	≈kg				min.	min.			≈	≈	
NJ426-M1	-	-	1	41,2	-	130	340	78	5	5	6,2	185	265,9	204,2	
NJ426-M1	-	HJ426	1	41,2	12,2	130	340	78	5	5	-	185	265,9	204,2	
NUP426-M1	-	-	1	41,9	-	130	340	78	5	5	-	185	265,9	204,2	
NJ428-M1	-	-	1	48,2	-	140	360	82	5	5	7,6	198	282,9	218,2	
NJ428-M1	-	HJ428	1	48,2	3,79	140	360	82	5	5	-	198	282,9	218,2	
NUP428-M1	-	-	1	49	-	140	360	82	5	5	-	198	282,9	218,2	
NJ330-E-M1	XL	-	1	27,4	-	150	320	65	4	4	5,5	193	269,8	209,5	
NJ330-E-M1	XL	HJ330-E	1	27,4	2,33	150	320	65	4	4	-	193	269,8	209,5	
NJ330-E-M1A	XL	-	1	27,4	-	150	320	65	4	4	5,5	193	269,8	209,5	
NJ330-E-M1A	XL	HJ330-E	1	27,4	2,33	150	320	65	4	4	-	193	269,8	209,5	
NJ330-E-MP1A	XL	-	1	26,9	-	150	320	65	4	4	5,5	193	269,8	209,5	
NJ330-E-MP1A	XL	HJ330-E	1	26,9	2,33	150	320	65	4	4	-	193	269,8	209,5	
NJ330-E-MPA	XL	-	1	28,3	-	150	320	65	4	4	5,5	193	269,8	209,5	
NJ330-E-MPA	XL	HJ330-E	1	28,3	2,33	150	320	65	4	4	-	193	269,8	209,5	
NUP330-E-M1	XL	-	1	27,8	-	150	320	65	4	4	-	193	269,8	209,5	
NUP330-E-M1A	XL	-	1	27,8	-	150	320	65	4	4	-	193	269,8	209,5	
NUP330-E-MP1A	XL	-	1	27,3	-	150	320	65	4	4	-	193	269,8	209,5	
NUP330-E-MPA	XL	-	1	28,7	-	150	320	65	4	4	-	193	269,8	209,5	
NJ2330-E-M1	XL	-	1	44,1	-	150	320	108	4	4	9,7	193	269,8	209,5	
NJ2330-E-M1	XL	HJ2330-E	1	44,1	2,55	150	320	108	4	4	-	193	269,8	209,5	
NJ2330-E-M1A	XL	-	1	44,1	-	150	320	108	4	4	9,7	193	269,8	209,5	
NJ2330-E-M1A	XL	HJ2330-E	1	44,1	2,55	150	320	108	4	4	-	193	269,8	209,5	
NJ2330-E-MP1A	XL	-	1	43,9	-	150	320	108	4	4	9,7	193	269,8	209,5	
NJ2330-E-MP1A	XL	HJ2330-E	1	43,9	2,55	150	320	108	4	4	-	193	269,8	209,5	
NUP2330-E-M1	XL	-	1	44,8	-	150	320	108	4	4	-	193	269,8	209,5	
NUP2330-E-M1A	XL	-	1	44,8	-	150	320	108	4	4	-	193	269,8	209,5	
NJ430-M1	-	-	1	55,3	-	150	380	85	5	5	8,1	213	297,9	233,2	
NJ430-M1	-	HJ430	1	55,3	4,76	150	380	85	5	5	-	213	297,9	233,2	
NUP430-M1	-	-	1	56,3	-	150	380	85	5	5	-	213	297,9	233,2	
NJ332-E-M1	-	-	1	32,3	-	160	340	68	4	4	5,6	204	286	221,6	
NJ332-E-M1	-	HJ332-E	1	32,3	2,58	160	340	68	4	4	-	204	286	221,6	
NJ332-E-M1A	-	-	1	32,3	-	160	340	68	4	4	5,6	204	286	221,6	

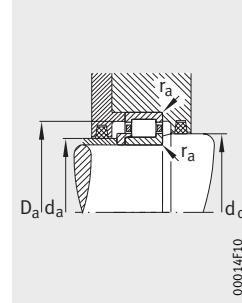
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



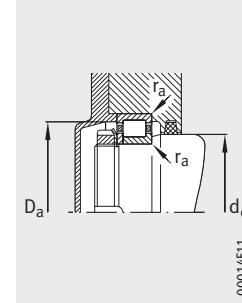
2) Axial displace-
ment "s" for NJ



Mounting dimensions
for NJ



Mounting dimensions
for NJ and HJ



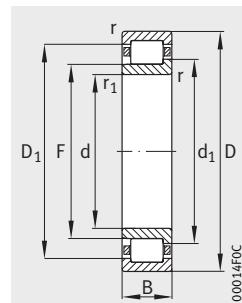
Mounting dimensions
for NUP

			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	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
			min. ¹⁾	max.	min.	max. ¹⁾	max.	max.	max.	max.			
-	-	-	154	183	208	316	4	4	865	1 020	114	3 200	1 900
18	32	-	154	183	208	316	4	4	865	1 020	114	3 200	1 900
-	-	14	154	183	208	316	4	4	865	1 020	114	3 200	1 900
-	-	-	164	195	222	336	4	4	930	1 120	123	3 000	1 800
18	33	-	164	195	222	336	4	4	930	1 120	123	3 000	1 800
-	-	15	164	195	222	336	4	4	930	1 120	123	3 000	1 800
-	-	-	167	190	213	303	3	3	900	930	126	3 600	1 940
15	25	-	167	190	213	303	3	3	900	930	126	3 600	1 940
-	-	-	167	190	213	303	3	3	900	930	126	3 600	1 940
15	25	-	167	190	213	303	3	3	900	930	126	3 600	1 940
-	-	-	167	190	213	303	3	3	900	930	126	3 600	2 000
15	25	-	167	190	213	303	3	3	900	930	126	3 600	2 000
-	-	-	167	190	213	303	3	3	900	930	126	3 600	2 000
15	25	-	167	190	213	303	3	3	900	930	126	3 600	2 000
-	-	10	167	190	213	303	3	3	900	930	126	3 600	1 940
-	-	10	167	190	213	303	3	3	900	930	126	3 600	1 940
-	-	10	167	190	213	303	3	3	900	930	126	3 600	2 000
-	-	10	167	190	213	303	3	3	900	930	126	3 600	2 000
-	-	-	167	190	213	303	3	3	1 380	1 600	226	3 200	1 460
15	31,5	-	167	190	213	303	3	3	1 380	1 600	226	3 200	1 460
-	-	-	167	190	213	303	3	3	1 380	1 600	226	3 200	1 460
15	31,5	-	167	190	213	303	3	3	1 380	1 600	226	3 200	1 460
-	-	-	167	190	213	303	3	3	1 380	1 600	226	3 200	1 460
15	31,5	-	167	190	213	303	3	3	1 380	1 600	226	3 200	1 460
-	-	16,5	167	190	213	303	3	3	1 380	1 600	226	3 200	1 460
-	-	16,5	167	190	213	303	3	3	1 380	1 600	226	3 200	1 460
-	-	-	174	210	237	356	4	4	980	1 220	132	2 800	1 600
20	36,5	-	174	210	237	356	4	4	980	1 220	132	2 800	1 600
-	-	16,5	174	210	237	356	4	4	980	1 220	132	2 800	1 600
-	-	-	177	200	228	323	3	3	865	1 060	114	3 000	1 770
15	25	-	177	200	228	323	3	3	865	1 060	114	3 000	1 770
-	-	-	177	200	228	323	3	3	865	1 060	114	3 000	1 770

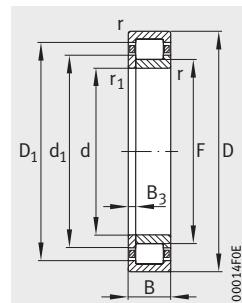


Cylindrical roller bearings with cage

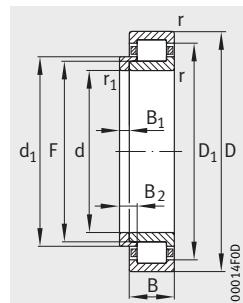
Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing



Design 1
NUP
Locating bearing

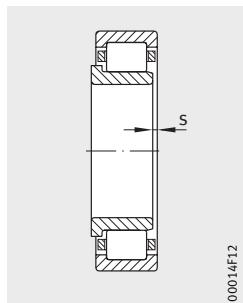


Design 1
NJ and HJ
Locating bearing

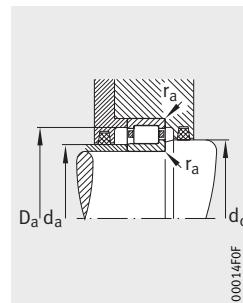
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions									
Bearing	X-life		Bearing	L-section ring ≈kg	d	D	B	r	r ₁	s ²⁾	F	D ₁	d ₁	
NJ332-E-M1A	-	HJ332-E	1	32,3	2,58	160	340	68	4	4	-	204	286	221,6
NUP332-E-M1	-	-	1	32,7	-	160	340	68	4	4	-	204	286	221,6
NUP332-E-M1A	-	-	1	32,7	-	160	340	68	4	4	-	204	286	221,6
NUP332-E-MP1A	-	-	1	33	-	160	340	68	4	4	-	204	286	221,6
NJ2332-E-M1	-	-	1	52,3	-	160	340	114	4	4	9,9	204	286	221,6
NJ2332-E-M1	-	HJ2332-E	1	52,3	2,85	160	340	114	4	4	-	204	286	221,6
NJ2332-E-M1A	-	-	1	52,3	-	160	340	114	4	4	9,9	204	286	221,6
NJ2332-E-M1A	-	HJ2332-E	1	52,3	2,85	160	340	114	4	4	-	204	286	221,6
NJ2332-E-MP1A	-	-	1	54,1	-	160	340	114	4	4	9,9	204	286	221,6
NJ2332-E-MP1A	-	HJ2332-E	1	54,1	2,85	160	340	114	4	4	-	204	286	221,6
NJ2332-E-MPA	-	-	1	54,9	-	160	340	114	4	4	9,9	204	286	221,6
NJ2332-E-MPA	-	HJ2332-E	1	54,9	2,85	160	340	114	4	4	-	204	286	221,6
NUP2332-E-M1	-	-	1	53,2	-	160	340	114	4	4	-	204	286	221,6
NUP2332-E-M1A	-	-	1	53,2	-	160	340	114	4	4	-	204	286	221,6
NUP2332-E-MPA	-	-	1	55,7	-	160	340	114	4	4	-	204	286	221,6
NJ432-M1	-	-	1	63	-	160	400	88	5	5	8,3	226	314,9	247,2
NJ432-M1	-	HJ432	1	63	5,33	160	400	88	5	5	-	226	314,9	247,2
NUP432-M1	-	-	1	64,1	-	160	400	88	5	5	-	226	314,9	247,2
NJ334-E-MPA	-	-	1	39	-	170	360	72	4	4	6	218	301,6	237
NJ334-E-MPA	-	HJ334-E	1	39	3,21	170	360	72	4	4	-	218	301,6	237
NUP334-E-MPA	-	-	1	39,6	-	170	360	72	4	4	-	218	301,6	237
NJ334-E-M1	-	-	1	38,6	-	170	360	72	4	4	6	218	301,6	237
NJ334-E-M1	-	HJ334-E	1	38,6	3,21	170	360	72	4	4	-	218	301,6	237
NUP334-E-M1	-	-	1	39,2	-	170	360	72	4	4	-	218	301,6	237
NJ2334-EX-M1	-	-	1	62,3	-	170	360	120	4	4	10,2	216	303	235,7
NJ2334-EX-M1	-	HJ2334-EX	1	62,3	3,5	170	360	120	4	4	-	216	303	235,7
NJ2334-EX-M1A	-	-	1	62,3	-	170	360	120	4	4	10,2	216	303	235,7
NJ2334-EX-M1A	-	HJ2334-EX	1	62,3	3,5	170	360	120	4	4	-	216	303	235,7
NJ2334-EX-MP1A	-	-	1	61,4	-	170	360	120	4	4	10,2	216	303	235,7
NJ2334-EX-MP1A	-	HJ2334-EX	1	61,4	3,5	170	360	120	4	4	-	216	303	235,7
NUP2334-EX-M1	-	-	1	62,9	-	170	360	120	4	4	-	216	303	235,7
NUP2334-EX-MP1A	-	-	1	62,3	-	170	360	120	4	4	-	216	303	235,7
NJ434-M1	-	-	1	72,3	-	170	420	92	5	5	8,7	239	329,9	261,2
NJ434-M1	-	HJ434	1	72,3	5,97	170	420	92	5	5	-	239	329,9	261,2
NUP434-M1	-	-	1	73,7	-	170	420	92	5	5	-	239	329,9	261,2

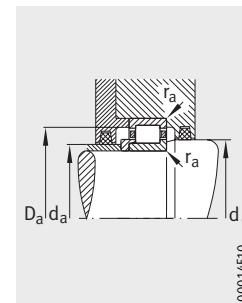
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



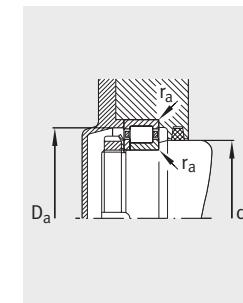
2) Axial displace-
ment "s" for NJ



Mounting dimensions
for NJ



Mounting dimensions
for NJ and HJ



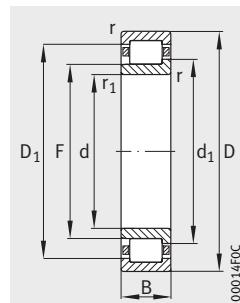
Mounting dimensions
for NUP

			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	r _{a1}	dyn. C _r	stat. C _{0r}	C _{ur}	n _G	n _B
			min. ¹⁾	max.					max. ¹⁾	max.			
15	25	-	177	200	228	323	3	3	865	1 060	114	3 000	1 770
-	-	10	177	200	228	323	3	3	865	1 060	114	3 000	1 770
-	-	10	177	200	228	323	3	3	865	1 060	114	3 000	1 770
-	-	10	177	200	228	323	3	3	865	1 060	114	3 000	1 800
-	-	-	177	200	228	323	3	3	1 320	1 830	204	3 000	1 340
15	32	-	177	200	228	323	3	3	1 320	1 830	204	3 000	1 340
-	-	-	177	200	228	323	3	3	1 320	1 830	204	3 000	1 340
15	32	-	177	200	228	323	3	3	1 320	1 830	204	3 000	1 340
-	-	-	177	200	228	323	3	3	1 320	1 830	204	3 000	1 300
15	32	-	177	200	228	323	3	3	1 320	1 830	204	3 000	1 300
-	-	17	177	200	228	323	3	3	1 320	1 830	204	3 000	1 300
-	-	17	177	200	228	323	3	3	1 320	1 830	204	3 000	1 300
-	-	-	184	223	252	376	4	4	1 060	1 320	142	2 800	1 500
20	37	-	184	223	252	376	4	4	1 060	1 320	142	2 800	1 500
-	-	17	184	223	252	376	4	4	1 060	1 320	142	2 800	1 500
-	-	-	187	215	240	343	3	3	915	1 140	123	3 000	1 700
16	27	-	187	215	240	343	3	3	915	1 140	123	3 000	1 700
-	-	11	187	215	240	343	3	3	915	1 140	123	3 000	1 700
-	-	-	187	215	240	343	3	3	965	1 220	132	3 000	1 610
16	27	-	187	215	240	343	3	3	965	1 220	132	3 000	1 610
16	33,5	-	187	214	238,3	343	3	3	1 500	2 080	230	2 800	1 210
-	-	-	187	214	238,3	343	3	3	1 500	2 080	230	2 800	1 210
16	33,5	-	187	214	238,3	343	3	3	1 500	2 080	230	2 800	1 210
-	-	-	187	214	238,3	343	3	3	1 500	2 080	230	2 800	1 210
16	33,5	-	187	214	238,3	343	3	3	1 500	2 080	230	2 800	1 210
-	-	17,5	187	214	238,3	343	3	3	1 500	2 080	231	2 800	1 200
16	33,5	-	187	214	238,3	343	3	3	1 500	2 080	230	2 800	1 210
-	-	17,5	187	214	238,3	343	3	3	1 500	2 080	231	2 800	1 200
-	-	17,5	187	214	238,3	343	3	3	1 500	2 080	231	2 800	1 200
-	-	-	194	236	266	396	4	4	1 120	1 400	151	2 800	1 500
20	38	-	194	236	266	396	4	4	1 120	1 400	151	2 800	1 500
-	-	18	194	236	266	396	4	4	1 120	1 400	151	2 800	1 500

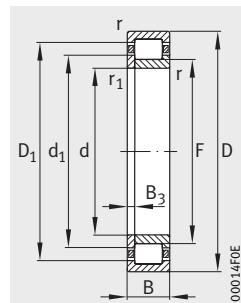


Cylindrical roller bearings with cage

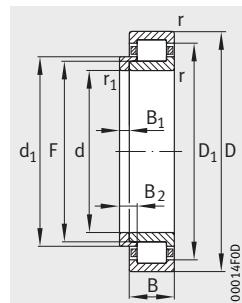
Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing



Design 1
NUP
Locating bearing

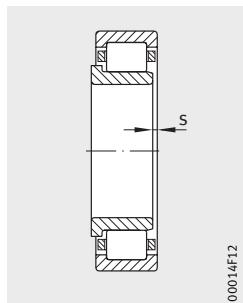


Design 1
NJ and HJ
Locating bearing

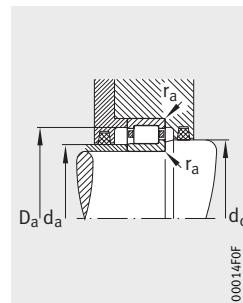
Dimension table (continued) · Dimensions in mm

Designation			Design	Mass		Dimensions								
Bearing	X-life	L-section ring		Bearing ≈kg	L-section ring ≈kg	d	D	B	r	r ₁	s ²⁾	F	D ₁	d ₁
NJ236-E-M1	XL	-	1	19,2	-	180	320	52	4	4	4,7	217	278,6	230,2
NJ236-E-M1	XL	HJ236-E	1	19,2	1,76	180	320	52	4	4	-	217	278,6	230,2
NJ236-E-M1A	XL	-	1	19,2	-	180	320	52	4	4	4,7	217	278,6	230,2
NJ236-E-M1A	XL	HJ236-E	1	19,2	1,76	180	320	52	4	4	-	217	278,6	230,2
NJ236-E-MP1A	XL	-	1	19,1	-	180	320	52	4	4	4,7	217	278,6	230,2
NJ236-E-MP1A	XL	HJ236-E	1	19,1	1,76	180	320	52	4	4	-	217	278,6	230,2
NUP236-E-M1	XL	-	1	17,3	-	180	320	52	4	4	-	217	278,6	230,2
NUP236-E-M1A	XL	-	1	17,3	-	180	320	52	4	4	-	217	278,6	230,2
NUP236-E-MP1A	XL	-	1	19,4	-	180	320	52	4	4	-	217	278,6	230,2
NUP236-E-MPA	XL	-	1	19,4	-	180	320	52	4	4	-	217	278,6	230,2
NJ2236-E-M1	XL	-	1	31,1	-	180	320	86	4	4	7,2	215	280	229
NJ2236-E-M1	XL	HJ2236-E	1	31,1	1,87	180	320	86	4	4	-	215	280	229
NUP2236-E-M1	XL	-	1	31,6	-	180	320	86	4	4	-	215	280	229
NUP2236-E-M1A	XL	-	1	31,6	-	180	320	86	4	4	-	215	280	229
NUP2236-E-MP1A	XL	-	1	31,6	-	180	320	86	4	4	-	215	280	229
NUP2236-E-MPA	XL	-	1	31,3	-	180	320	86	4	4	-	215	280	229
NJ336-E-M1	-	-	1	44,6	-	180	380	75	4	4	6,1	231	319,8	250,5
NJ336-E-M1	-	HJ336-E	1	44,6	3,77	180	380	75	4	4	-	231	319,8	250,5
NJ336-E-M1A	-	-	1	44,6	-	180	380	75	4	4	6,1	231	319,8	250,5
NJ336-E-M1A	-	HJ336-E	1	44,6	3,77	180	380	75	4	4	-	231	319,8	250,5
NJ336-E-MP1A	-	-	1	44,6	-	180	380	75	4	4	6,1	231	319,8	250,5
NJ336-E-MP1A	-	HJ336-E	1	44,6	3,77	180	380	75	4	4	-	231	319,8	250,5
NUP336-E-M1	-	-	1	45,3	-	180	380	75	4	4	-	231	319,8	250,5
NUP336-E-M1A	-	-	1	45,3	-	180	380	75	4	4	-	231	319,8	250,5
NUP336-E-MPA	-	-	1	45,3	-	180	380	75	4	4	-	231	319,8	250,5
NJ2336-EX-M1	-	-	1	72,9	-	180	380	126	4	4	10,5	227	320,8	248
NJ2336-EX-M1	-	HJ2336-EX	1	72,9	4,05	180	380	126	4	4	-	227	320,8	248
NJ2336-EX-M1A	-	-	1	72,9	-	180	380	126	4	4	10,5	227	320,8	248
NJ2336-EX-M1A	-	HJ2336-EX	1	72,9	4,05	180	380	126	4	4	-	227	320,8	248
NJ2336-EX-MP1A	-	-	1	72	-	180	380	126	4	4	10,5	227	320,8	248
NJ2336-EX-MP1A	-	HJ2336-EX	1	72	4,05	180	380	126	4	4	-	227	320,8	248
NUP2336-EX-M1	-	-	1	74	-	180	380	126	4	4	-	227	320,8	248
NUP2336-EX-M1A	-	-	1	74	-	180	380	126	4	4	-	227	320,8	248
NUP2336-EX-MP1A	-	-	1	73,1	-	180	380	126	4	4	-	227	320,8	248
NUP2336-EX-MPA	-	-	1	73,1	-	180	380	126	4	4	-	227	320,8	248

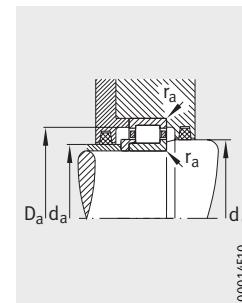
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



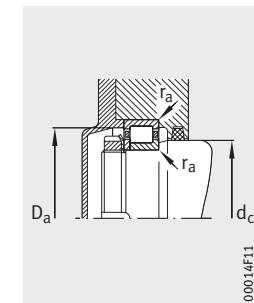
2) Axial displace-
ment "s" for NJ



Mounting dimensions
for NJ



Mounting dimensions
for NJ and HJ



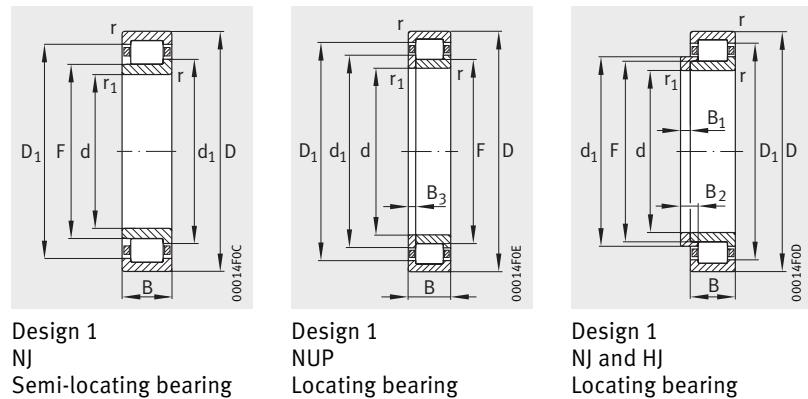
Mounting dimensions
for NUP

			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	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
			min. ¹⁾	max.	min.	max. ¹⁾	max.	max.	max.	max.			
-	-	-	197	214	233	303	3	3	730	830	112	3 600	1 850
12	20	-	197	214	233	303	3	3	730	830	112	3 600	1 850
-	-	-	197	214	233	303	3	3	730	830	112	3 600	1 850
12	20	-	197	214	233	303	3	3	730	830	112	3 600	1 850
-	-	-	197	214	233	303	3	3	730	830	112	3 600	1 900
12	20	-	197	214	233	303	3	3	730	830	112	3 600	1 900
-	-	8	197	214	233	303	3	3	730	830	112	3 600	1 850
-	-	8	197	214	233	303	3	3	730	830	112	3 600	1 850
-	-	8	197	214	233	303	3	3	730	830	112	3 600	1 900
-	-	8	197	214	233	303	3	3	730	830	112	3 600	1 900
-	-	-	197	214	233	303	3	3	1 180	1 490	208	3 200	1 380
12	24	-	197	214	233	303	3	3	1 180	1 490	208	3 200	1 380
-	-	12	197	214	233	303	3	3	1 180	1 490	208	3 200	1 380
-	-	12	197	214	233	303	3	3	1 180	1 490	208	3 200	1 380
-	-	12	197	214	233	303	3	3	1 180	1 490	208	3 200	1 400
-	-	12	197	214	233	303	3	3	1 180	1 490	208	3 200	1 400
-	-	-	197	228	254	363	3	3	1 040	1 320	141	2 800	1 500
17	28,5	-	197	228	254	363	3	3	1 040	1 320	141	2 800	1 500
-	-	-	197	228	254	363	3	3	1 040	1 320	141	2 800	1 500
17	28,5	-	197	228	254	363	3	3	1 040	1 320	141	2 800	1 500
-	-	-	197	228	254	363	3	3	1 040	1 320	141	2 800	1 500
17	28,5	-	197	228	254	363	3	3	1 040	1 320	141	2 800	1 500
-	-	11,5	197	228	254	363	3	3	1 040	1 320	141	2 800	1 500
-	-	11,5	197	228	254	363	3	3	1 040	1 320	141	2 800	1 500
-	-	11,5	197	228	254	363	3	3	1 040	1 320	141	2 800	1 500
-	-	-	197	225	250,6	363	3	3	1 660	2 320	260	2 800	1 120
17	35	-	197	225	250,6	363	3	3	1 660	2 320	260	2 800	1 120
-	-	-	197	225	250,6	363	3	3	1 660	2 320	260	2 800	1 120
17	35	-	197	225	250,6	363	3	3	1 660	2 320	260	2 800	1 120
-	-	-	197	225	250,6	363	3	3	1 660	2 320	260	2 800	1 100
17	35	-	197	225	250,6	363	3	3	1 660	2 320	260	2 800	1 100
-	-	18	197	225	250,6	363	3	3	1 660	2 320	260	2 800	1 100
-	-	18	197	225	250,6	363	3	3	1 660	2 320	260	2 800	1 100
-	-	18	197	225	250,6	363	3	3	1 660	2 320	260	2 800	1 100
-	-	18	197	225	250,6	363	3	3	1 660	2 320	260	2 800	1 100



Cylindrical roller bearings with cage

Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing

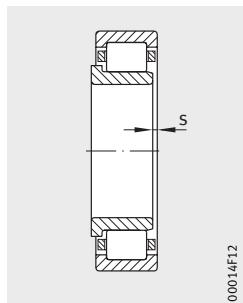
Design 1
NUP
Locating bearing

Design 1
NJ and HJ
Locating bearing

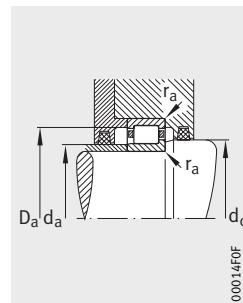
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions								
Bearing	L-section ring		Bearing	L-section ring ≈kg	d	D	B	r	r ₁	s ²⁾	F	D ₁	d ₁
NJ238-E-M1	-	1	23,2	-	190	340	55	4	4	4,7	230	295	244
NJ238-E-M1	HJ238-E	1	23,2	2,17	190	340	55	4	4	-	230	295	244
NJ238-E-M1A	-	1	23,2	-	190	340	55	4	4	4,7	230	295	244
NJ238-E-M1A	HJ238-E	1	23,2	2,17	190	340	55	4	4	-	230	295	244
NUP238-E-M1	-	1	23,5	-	190	340	55	4	4	-	230	295	244
NJ2238-E-M1	-	1	37,7	-	190	340	92	4	4	8	228	296,4	242,7
NJ2238-E-M1	HJ2238-E	1	37,7	2,31	190	340	92	4	4	-	228	296,4	242,7
NUP2238-E-M1	-	1	38,3	-	190	340	92	4	4	-	228	296,4	242,7
NUP2238-E-M1A	-	1	38,3	-	190	340	92	4	4	-	228	296,4	242,7
NJ338-E-M1	-	1	51,4	-	190	400	78	5	5	6,3	245	336	265,4
NJ338-E-M1A	-	1	51,4	-	190	400	78	5	5	6,3	245	336	265,4
NUP338-E-M1	-	1	52,2	-	190	400	78	5	5	-	245	336	265,4
NUP338-E-M1A	-	1	52,2	-	190	400	78	5	5	-	245	336	265,4
NJ2338-EX-M1	-	1	84,4	-	190	400	132	5	5	11	240	340,5	262,5
NJ2338-EX-M1	HJ2338-EX	1	84,4	4,8	190	400	132	5	5	-	240	340,5	262,5
NJ2338-EX-MP1A	-	1	86,3	-	190	400	132	5	5	11	240	340,5	262,5
NJ2338-EX-MP1A	HJ2338-EX	1	86,3	4,8	190	400	132	5	5	-	240	340,5	262,5
NUP2338-EX-M1	-	1	85,7	-	190	400	132	5	5	-	240	340,5	262,5
NJ438-M1	-	1	71,2	-	190	460	98	6	6	9,4	165	361,9	289,2
NJ438-M1	HJ438	1	71,2	8,14	190	460	98	6	6	-	165	361,9	289,2
NJ240-E-M1	-	1	27,5	-	200	360	58	4	4	4,8	243	311,5	257,6
NJ240-E-M1	HJ240-E	1	27,5	2,62	200	360	58	4	4	-	243	311,5	257,6
NJ240-E-M1A	-	1	27,5	-	200	360	58	4	4	4,8	243	311,5	257,6
NJ240-E-M1A	HJ240-E	1	27,5	2,62	200	360	58	4	4	-	243	311,5	257,6
NJ240-E-MP1A	-	1	27,5	-	200	360	58	4	4	4,8	243	311,5	257,6
NJ240-E-MP1A	HJ240-E	1	27,5	2,62	200	360	58	4	4	-	243	311,5	257,6
NUP240-E-M1	-	1	28	-	200	360	58	4	4	-	243	311,5	257,6
NUP240-E-M1A	-	1	28	-	200	360	58	4	4	-	243	311,5	257,6
NUP240-E-MPA	-	1	27,9	-	200	360	58	4	4	-	243	311,5	257,6
NJ2240-E-M1	-	1	45,3	-	200	360	98	4	4	8,2	241	312,9	256,3
NJ2240-E-M1	HJ2240-E	1	45,3	2,78	200	360	98	4	4	-	241	312,9	256,3
NJ2240-E-M1A	-	1	45,3	-	200	360	98	4	4	8,2	241	312,9	256,3
NJ2240-E-M1A	HJ2240-E	1	45,3	2,78	200	360	98	4	4	-	241	312,9	256,3
NUP2240-E-M1	-	1	46	-	200	360	98	4	4	-	241	312,9	256,3
NUP2240-E-M1A	-	1	46	-	200	360	98	4	4	-	241	312,9	256,3

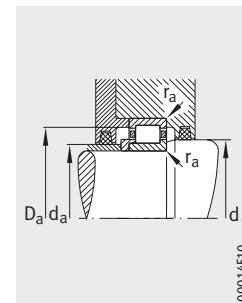
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



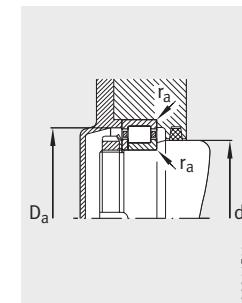
2) Axial displacement "s" for NJ



Mounting dimensions for NJ

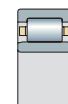


Mounting dimensions for NJ and HJ



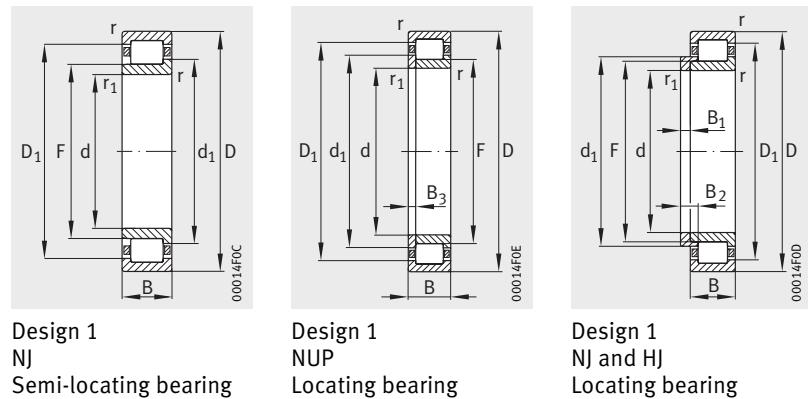
Mounting dimensions for NUP

			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	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
			min. ¹⁾	max.	min.	max. ¹⁾	max.	max.	max.	max.			
-	-	-	207	227	247	323	3	3	680	930	100	3 200	1 720
13	21,5	-	207	227	247	323	3	3	680	930	100	3 200	1 720
-	-	-	207	227	247	323	3	3	680	930	100	3 200	1 720
13	21,5	-	207	227	247	323	3	3	680	930	100	3 200	1 720
-	-	8,5	207	227	247	323	3	3	680	930	100	3 200	1 720
-	-	-	207	227	247	323	3	3	1 100	1 660	184	3 000	1 290
13	26,5	-	207	227	247	323	3	3	1 100	1 660	184	3 000	1 290
-	-	13,5	207	227	247	323	3	3	1 100	1 660	183	3 000	1 290
-	-	13,5	207	227	247	323	3	3	1 100	1 660	183	3 000	1 290
-	-	-	210	242	269	380	4	4	1 120	1 430	151	2 800	1 400
-	-	-	210	242	269	380	4	4	1 120	1 430	151	2 800	1 400
-	-	12	210	242	269	380	4	4	1 120	1 430	151	2 800	1 400
-	-	12	210	242	269	380	4	4	1 120	1 430	151	2 800	1 400
-	-	-	210	237,8	265,3	380	4	4	1 900	2 650	285	2 600	1 010
18	36,5	-	210	237,8	265,3	380	4	4	1 900	2 650	285	2 600	1 010
-	-	-	210	237,8	265,3	380	4	4	1 900	2 650	285	2 600	1 000
18	36,5	-	210	237,8	265,3	380	4	4	1 900	2 650	285	2 600	1 000
-	-	18,8	210	237,8	265,3	380	4	4	1 900	2 650	285	2 600	1 000
-	-	-	220	262	294	430	5	5	1 340	1 760	181	2 600	1 200
23	42	-	220	262	294	430	5	5	1 340	1 760	181	2 600	1 200
-	-	-	217	240	261	343	3	3	750	1 040	110	3 000	1 600
14	23	-	217	240	261	343	3	3	750	1 040	110	3 000	1 600
-	-	-	217	240	261	343	3	3	750	1 040	110	3 000	1 600
14	23	-	217	240	261	343	3	3	750	1 040	110	3 000	1 600
-	-	-	217	240	261	343	3	3	750	1 040	110	3 000	1 600
14	23	-	217	240	261	343	3	3	750	1 040	110	3 000	1 600
-	-	9	217	240	261	343	3	3	750	1 040	110	3 000	1 600
-	-	9	217	240	261	343	3	3	750	1 040	110	3 000	1 600
-	-	9	217	240	261	343	3	3	750	1 040	110	3 000	1 600
-	-	-	217	240	261	343	3	3	1 220	1 860	206	2 800	1 180
14	28	-	217	240	261	343	3	3	1 220	1 860	206	2 800	1 180
-	-	-	217	240	261	343	3	3	1 220	1 860	206	2 800	1 180
14	28	-	217	240	261	343	3	3	1 220	1 860	206	2 800	1 180
-	-	14	217	240	261	343	3	3	1 220	1 860	205	2 800	1 200
-	-	14	217	240	261	343	3	3	1 220	1 860	205	2 800	1 200



Cylindrical roller bearings with cage

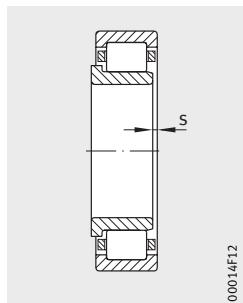
Single row
Semi-locating and
locating bearings



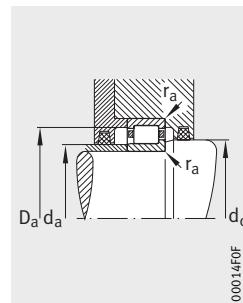
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions									
Bearing	L-section ring		Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r ₁ min.	s ²⁾	F	D ₁	d ₁	
NUP2240-E-MP1A	-	1	45,6	-	200	360	98	4	4	-	241	312,9	256,3	
NUP2240-E-MPA	-	1	45,6	-	200	360	98	4	4	-	241	312,9	256,3	
NJ340-E-M1	-	1	58,1	-	200	420	80	5	5	6,3	258	351,8	279	
NJ340-E-M1	HJ340-E	1	58,1	4,94	200	420	80	5	5	-	258	351,8	279	
NJ340-E-M1A	-	1	58,1	-	200	420	80	5	5	6,3	258	351,8	279	
NJ340-E-M1A	HJ340-E	1	58,1	4,94	200	420	80	5	5	-	258	351,8	279	
NUP340-E-M1	-	1	59	-	200	420	80	5	5	-	258	351,8	279	
NUP340-E-M1A	-	1	59	-	200	420	80	5	5	-	258	351,8	279	
NJ2340-EX-M1	-	1	97,2	-	200	420	138	5	5	11,3	253	356,9	276,1	
NJ2340-EX-M1	HJ2340-EX	1	97,2	5,28	200	420	138	5	5	-	253	356,9	276,1	
NJ2340-EX-M1A	-	1	97,2	-	200	420	138	5	5	11,3	253	356,9	276,1	
NJ2340-EX-M1A	HJ2340-EX	1	97,2	5,28	200	420	138	5	5	-	253	356,9	276,1	
NUP2340-EX-M1	-	1	98,7	-	200	420	138	5	5	-	253	356,9	276,1	
NUP2340-EX-M1A	-	1	98,7	-	200	420	138	5	5	-	253	356,9	276,1	
NUP2340-EX-MP1A	-	1	97	-	200	420	138	5	5	-	253	356,9	276,1	
NJ440-M1	-	1	104	-	200	480	102	6	6	9,4	276	378,9	301,1	
NJ440-M1	HJ440	1	104	9,02	200	480	102	6	6	-	276	378,9	301,1	
NJ1044-M1	-	1	20,9	-	220	340	56	3	3	6,2	250	298,9	261,7	
NJ1044-M1	HJ1044	1	20,9	2,13	220	340	56	3	3	-	250	298,9	261,7	
NJ1044-M1A	-	1	20,9	-	220	340	56	3	3	6,2	250	298,9	261,7	
NJ1044-M1A	HJ1044	1	20,9	2,13	220	340	56	3	3	-	250	298,9	261,7	
NJ244-E-M1	-	1	38,7	-	220	400	65	4	4	5,5	268	344,9	285,2	
NJ244-E-M1	HJ244-E	1	38,7	3,55	220	400	65	4	4	-	268	344,9	285,2	
NUP244-E-M1	-	1	39,3	-	220	400	65	4	4	-	268	344,9	285,2	
NUP244-E-M1A	-	1	39,3	-	220	400	65	4	4	-	268	344,9	285,2	
NJ2244-EX-M1	-	1	62,5	-	220	400	108	4	4	8,4	259	349,4	279,4	
NJ2244-EX-M1	HJ2244-EX	1	62,5	3,58	220	400	108	4	4	-	259	349,4	279,4	
NJ2244-EX-M1A	-	1	62,5	-	220	400	108	4	4	8,4	259	349,4	279,4	
NJ2244-EX-M1A	HJ2244-EX	1	62,5	3,58	220	400	108	4	4	-	259	349,4	279,4	
NJ2244-EX-MP1A	-	1	61,3	-	220	400	108	4	4	8,4	259	349,4	279,4	
NJ2244-EX-MP1A	HJ2244-EX	1	61,3	3,58	220	400	108	4	4	-	259	349,4	279,4	
NUP2244-EX-M1	-	1	63,4	-	220	400	108	4	4	-	259	349,4	279,4	
NUP2244-EX-M1A	-	1	63,4	-	220	400	108	4	4	-	259	349,4	279,4	
NUP2244-EX-MP1A	-	1	62,2	-	220	400	108	4	4	-	259	349,4	279,4	
NJ344-E-M1	-	1	76,6	-	220	460	88	5	5	7	282	386	305,1	

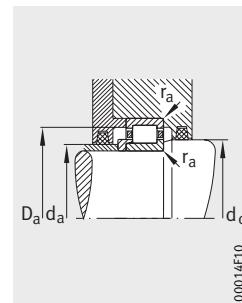
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



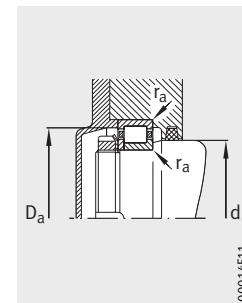
2) Axial displace-
ment "s" for NJ



Mounting dimensions
for NJ



Mounting dimensions
for NJ and HJ



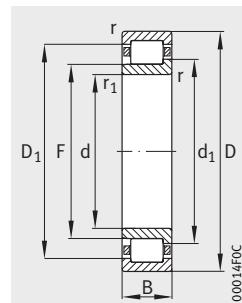
Mounting dimensions
for NUP

			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	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
			min. ¹⁾	max.	min.	max. ¹⁾	max.	max.	max.	max.			
-	-	14	217	240	261	343	3	3	1 220	1 860	205	2 800	1 200
-	-	14	217	240	261	343	3	3	1 220	1 860	205	2 800	1 200
-	-	-	220	255	282	400	4	4	1 180	1 530	161	2 600	1 320
18	30	-	220	255	282	400	4	4	1 180	1 530	161	2 600	1 320
-	-	-	220	255	282	400	4	4	1 180	1 530	161	2 600	1 320
18	30	-	220	255	282	400	4	4	1 180	1 530	161	2 600	1 320
-	-	12	220	255	282	400	4	4	1 180	1 530	161	2 600	1 300
-	-	12	220	255	282	400	4	4	1 180	1 530	161	2 600	1 300
-	-	-	220	250,7	279	400	4	4	2 040	2 900	310	2 400	940
18	37	-	220	250,7	279	400	4	4	2 040	2 900	310	2 400	940
-	-	-	220	250,7	279	400	4	4	2 040	2 900	310	2 400	940
18	37	-	220	250,7	279	400	4	4	2 040	2 900	310	2 400	940
-	-	19	220	250,7	279	400	4	4	2 040	2 900	310	2 400	950
-	-	19	220	250,7	279	400	4	4	2 040	2 900	310	2 400	950
-	-	19	220	250,7	279	400	4	4	2 040	2 900	310	2 400	950
-	-	-	230	273	306	450	5	5	1 460	1 860	190	2 400	1 200
24	43	-	230	273	306	450	5	5	1 460	1 860	190	2 400	1 200
-	-	-	232	248	265	328	2,5	2,5	510	765	80	3 200	2 000
14	27	-	232	248	265	328	2,5	2,5	510	765	80	3 200	2 000
-	-	-	232	248	265	328	2,5	2,5	510	765	80	3 200	2 000
14	27	-	232	248	265	328	2,5	2,5	510	765	80	3 200	2 000
-	-	-	237	265	288	383	3	3	950	1 320	134	2 800	1 380
15	25	-	237	265	288	383	3	3	950	1 320	134	2 800	1 380
-	-	10	237	265	288	383	3	3	950	1 320	135	2 800	1 380
-	-	10	237	265	288	383	3	3	950	1 320	135	2 800	1 380
-	-	-	237	256,7	282,3	383	3	3	1 630	2 360	250	2 600	1 000
15	29	-	237	256,7	282,3	383	3	3	1 630	2 360	250	2 600	1 000
-	-	-	237	256,7	282,3	383	3	3	1 630	2 360	250	2 600	1 000
15	29	-	237	256,7	282,3	383	3	3	1 630	2 360	250	2 600	1 000
-	-	-	237	256,7	282,3	383	3	3	1 630	2 360	250	2 600	1 000
15	29	-	237	256,7	282,3	383	3	3	1 630	2 360	250	2 600	1 000
-	-	14	237	256,7	282,3	383	3	3	1 630	2 360	250	2 600	1 000
-	-	14	237	256,7	282,3	383	3	3	1 630	2 360	250	2 600	1 000
-	-	14	237	256,7	282,3	383	3	3	1 630	2 360	250	2 600	1 000
-	-	-	240	279	308	440	4	4	1 430	1 900	192	2 400	1 140

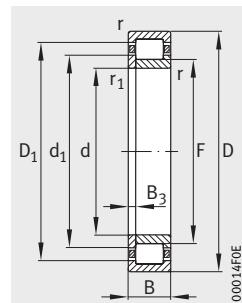


Cylindrical roller bearings with cage

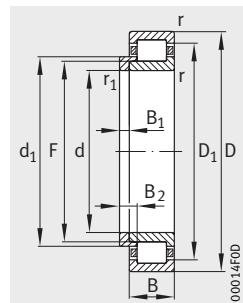
Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing



Design 1
NUP
Locating bearing

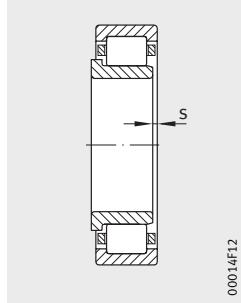


Design 1
NJ and HJ
Locating bearing

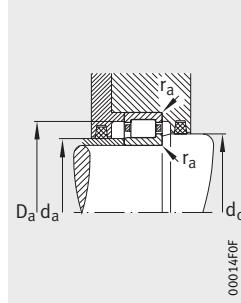
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions									
Bearing	L-section ring		Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r ₁ min.	s ²⁾	F	D ₁	d ₁ ≈	
NUP344-E-M1	–	1	77,7	–	220	460	88	5	5	–	282	386	305,1	
NJ2344-EX-M1	–	1	122	–	220	460	145	5	5	11,9	277	391,2	302,2	
NJ2344-EX-M1	HJ2344-EX	1	122	6,93	220	460	145	5	5	–	277	391,2	302,2	
NUP2344-EX-M1	–	1	124	–	220	460	145	5	5	–	277	391,2	302,2	
NUP2344-EX-M1A	–	1	124	–	220	460	145	5	5	–	277	391,2	302,2	
NJ444-M1	–	1	153	–	220	540	115	6	6	10	305	426,1	335,1	
NJ444-M1	HJ444	1	153	12,4	220	540	115	6	6	–	305	426,1	335,1	
NJ1948-MP1A	–	1	8,9	–	240	320	38	2,1	1,5	4,6	261	292,6	267,4	
NJ1948-MP1A	HJ1948	1	8,9	1,2	240	320	38	2,1	1,5	–	261	292,6	267,4	
NJ1048-M1	–	1	20,4	–	240	360	56	3	3	6,4	270	318,9	281,6	
NJ1048-M1	HJ1048	1	20,4	2,29	240	360	56	3	3	–	270	318,9	281,6	
NJ1048-M1A	–	1	20,4	–	240	360	56	3	3	6,4	270	318,9	281,6	
NJ1048-M1A	HJ1048	1	20,4	2,29	240	360	56	3	3	–	270	318,9	281,6	
NJ248-E-M1	–	1	52,5	–	240	440	72	4	4	6	293	376,6	312	
NJ248-E-M1	HJ248-E	1	52,5	4,6	240	440	72	4	4	–	293	376,6	312	
NUP248-E-M1	–	1	53,3	–	240	440	72	4	4	–	293	376,6	312	
NUP248-E-M1A	–	1	53,3	–	240	440	72	4	4	–	293	376,6	312	
NJ2248-EX-M1	–	1	84,2	–	240	440	120	4	4	10,2	287	380,7	308	
NJ2248-EX-M1	HJ2248-EX	1	84,2	4,9	240	440	120	4	4	–	287	380,7	308	
NJ2248-EX-M1A	–	1	84,2	–	240	440	120	4	4	10,2	287	380,7	308	
NJ2248-EX-M1A	HJ2248-EX	1	84,2	4,9	240	440	120	4	4	–	287	380,7	308	
NUP2248-EX-M1	–	1	85,6	–	240	440	120	4	4	–	287	380,7	308	
NUP2248-EX-M1A	–	1	85,6	–	240	440	120	4	4	–	287	380,7	308	
NJ348-E-M1	–	1	97	–	240	500	95	5	5	7,4	306	421,2	331,3	
NJ348-E-M1	HJ348-E	1	97	8,3	240	500	95	5	5	–	306	421,2	331,3	
NJ2348-EX-M1	–	1	154	–	240	500	155	5	5	13,3	303	424	329,6	
NJ2348-EX-M1	HJ2348-EX	1	154	9,04	240	500	155	5	5	–	303	424	329,6	
NUP2348-EX-M1	–	1	154	–	240	500	155	5	5	–	303	424	329,6	
NJ448-M1	–	1	176	–	240	580	122	6	6	10,9	330	459,1	363,1	
NJ448-M1	HJ448	1	176	15,6	240	580	122	6	6	–	330	459,1	363,1	
NJ2852-M1	–	1	6,42	–	260	320	36	2	1,1	3,8	275	300,6	281,5	
NUP2852-M1	–	1	6,51	–	260	320	36	2	1,1	–	275	300,6	280,6	

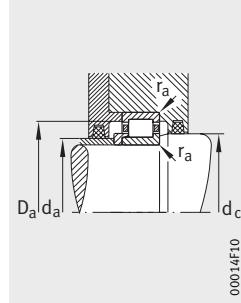
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



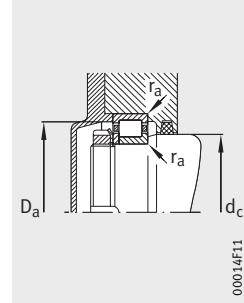
2) Axial displacement "s" for NJ



Mounting dimensions for NJ



Mounting dimensions for NJ and HJ



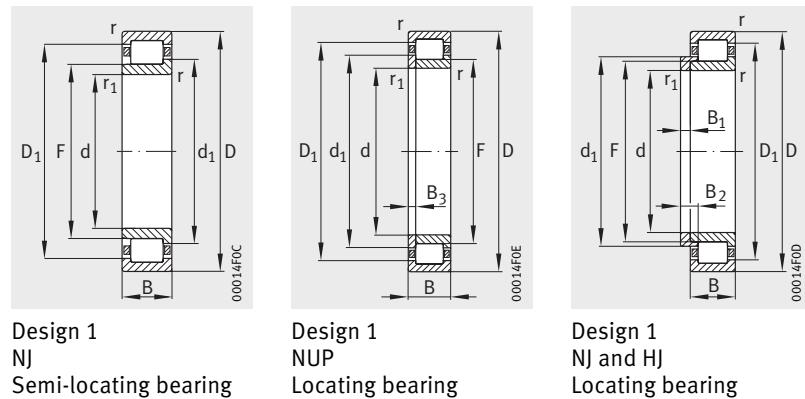
Mounting dimensions for NUP

			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	r_{a1}	dyn. C_r kN	stat. C_{0r} kN	C_{ur} kN	n_G min ⁻¹	n_B min ⁻¹
			min. ¹⁾	max.									
–	–	13	240	279	308	440	4	4	1 430	1 900	192	2 400	1 100
–	–	–	240	276	306	440	4	4	2 360	3 350	340	2 200	830
20	40	–	240	276	306	440	4	4	2 360	3 350	340	2 200	830
–	–	20	240	274,7	305,1	440	4	4	2 360	3 350	340	2 200	830
–	–	20	240	274,7	305,1	440	4	4	2 360	3 350	340	2 200	830
–	–	–	250	302	340	510	5	5	1 960	2 550	249	2 200	950
26	46	–	250	302	340	510	5	5	1 960	2 550	249	2 200	950
–	–	–	248	258	272	309	2	1,5	330	490	50	3 800	–
12	21,5	–	248	258	272	309	2	1,5	330	490	50	3 800	–
–	–	–	252	268	285	348	2,5	2,5	540	850	74	3 000	1 800
14	27	–	252	268	285	348	2,5	2,5	540	850	74	3 000	1 800
–	–	–	252	268	285	348	2,5	2,5	540	850	64	3 000	1 800
14	27	–	252	268	285	348	2,5	2,5	540	850	64	3 000	1 800
–	–	–	257	290	315	423	3	3	1 140	1 600	163	2 600	1 220
16	27	–	257	290	315	423	3	3	1 140	1 600	163	2 600	1 220
–	–	11	257	290	315	423	3	3	1 140	1 600	163	2 600	1 200
–	–	11	257	290	315	423	3	3	1 140	1 600	163	2 600	1 200
–	–	–	257	284,5	311,1	423	3	3	1 830	2 800	290	2 400	900
16	33,5	–	257	284,5	311,1	423	3	3	1 830	2 800	290	2 400	900
–	–	–	257	284,5	311,1	423	3	3	1 830	2 800	290	2 400	900
16	33,5	–	257	284,5	311,1	423	3	3	1 830	2 800	290	2 400	900
–	–	17,5	257	284,5	311,1	423	3	3	1 830	2 800	290	2 400	900
–	–	17,5	257	284,5	311,1	423	3	3	1 830	2 800	290	2 400	900
–	–	–	260	303	335	480	4	4	1 730	2 280	221	2 200	1 000
22	35,5	–	260	303	335	480	4	4	1 730	2 280	221	2 200	1 000
–	–	–	260	300,5	332,7	480	4	4	2 600	3 750	375	2 000	750
22	44,5	–	260	300,5	332,7	480	4	4	2 600	3 750	375	2 000	750
–	–	22,5	260	300,5	332,7	480	4	4	2 600	3 750	375	2 000	750
–	–	–	270	327	368	550	5	5	2 240	2 900	275	1 900	850
28	49	–	270	327	368	550	5	5	2 240	2 900	275	1 900	850
–	–	–	269	272	284	311	2	1	380	690	72	3 200	1 400
–	–	6	269	272	284	311	2	1	380	690	72	3 200	1 400



Cylindrical roller bearings with cage

Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing

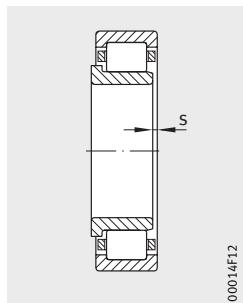
Design 1
NUP
Locating bearing

Design 1
NJ and HJ
Locating bearing

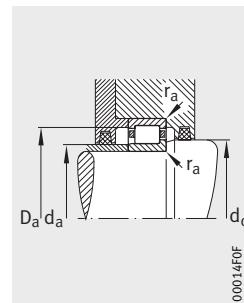
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions									
Bearing	L-section ring		Bearing ≈kg	L-section ring ≈kg	d	D	B	r	r ₁	s ²⁾	F	D ₁	d ₁	
NJ1952-M1	-	1	14,2	-	260	360	46	2,1	1,5	5,3	286	324,4	-	
NJ1952-M1	HJ1952	1	14,2	1,9	260	360	46	2,1	1,5	-	286	324,4	-	
NJ1952-M1A	-	1	14,2	-	260	360	46	2,1	1,5	5,3	286	324,4	-	
NJ1952-M1A	HJ1952	1	14,2	1,9	260	360	46	2,1	1,5	-	286	324,4	-	
NJ1952-MPA	-	1	14,5	-	260	360	46	2,1	1,5	5,3	286	324,4	294	
NJ1952-MPA	HJ1952	1	14,5	1,9	260	360	46	2,1	1,5	-	286	324,4	294	
NJ1052-M1	-	1	30,4	-	260	400	65	4	4	7,2	296	351,3	309,1	
NJ1052-M1	HJ1052	1	30,4	3,36	260	400	65	4	4	-	296	351,3	309,1	
NJ1052-M1A	-	1	30,4	-	260	400	65	4	4	7,2	296	351,3	309,1	
NJ1052-M1A	HJ1052	1	30,4	3,36	260	400	65	4	4	-	296	351,3	309,1	
NJ1052-MP1A	-	1	29	-	260	400	65	4	4	7,2	296	351,3	309,1	
NJ1052-MP1A	HJ1052	1	29	3,36	260	400	65	4	4	-	296	351,3	309,1	
NUP1052-M1	-	1	31,2	-	260	400	65	4	4	-	296	351,3	309,1	
NUP1052-M1A	-	1	31,5	-	260	400	65	4	4	-	296	351,3	309,1	
NUP2052-E-M1	-	1	40,5	-	260	400	82	4	4	-	294	356,3	308	
NUP2052-E-M1A	-	1	40,5	-	260	400	82	4	4	-	294	356,3	308	
NJ252-E-M1	-	1	69,4	-	260	480	80	5	5	6,2	317	410,8	336,9	
NJ252-E-M1	HJ252-E	1	69,4	5,92	260	480	80	5	5	-	317	410,8	336,9	
NJ252-E-M1A	-	1	69,4	-	260	480	80	5	5	6,2	317	410,8	336,9	
NJ252-E-M1A	HJ252-E	1	69,4	5,92	260	480	80	5	5	-	317	410,8	336,9	
NJ2252-E-M1	-	1	110	-	260	480	130	5	5	10,5	313	413,6	335,6	
NJ2252-E-M1	HJ2252-E	1	110	6,44	260	480	130	5	5	-	313	413,6	335,6	
NJ2252-E-M1A	-	1	110	-	260	480	130	5	5	10,5	313	413,6	335,6	
NJ2252-E-M1A	HJ2252-E	1	110	6,44	260	480	130	5	5	-	313	413,6	335,6	
NUP2252-E-M1	-	1	112	-	260	480	130	5	5	-	313	413,6	335,6	
NUP2252-E-M1A	-	1	112	-	260	480	130	5	5	-	313	413,6	335,6	
NJ352-E-M1	-	1	122	-	260	540	102	6	6	10	337	454,6	362,9	
NJ2352-EX-M1	-	1	192	-	260	540	165	6	6	13,7	324	458,4	353,5	
NJ2352-EX-M1	HJ2352-EX	1	192	11	260	540	165	6	6	-	324	458,4	353,5	
NJ2352-EX-M1A	-	1	192	-	260	540	165	6	6	13,7	324	458,4	353,5	
NJ2352-EX-M1A	HJ2352-EX	1	192	11	260	540	165	6	6	-	324	458,4	353,5	
NJ2352-EX-MPA	-	1	194	-	260	540	165	6	6	13,7	324	458,4	353,5	
NJ2352-EX-MPA	HJ2352-EX	1	194	11	260	540	165	6	6	-	324	458,4	353,5	
NUP2352-EX-M1	-	1	206	-	260	540	165	6	6	-	324	458,4	353,5	
NUP2352-EX-M1A	-	1	206	-	260	540	165	6	6	-	324	458,4	353,5	

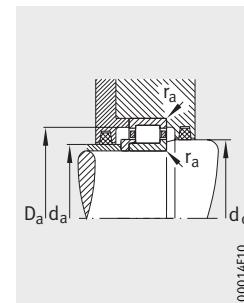
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



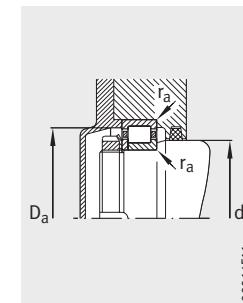
2) Axial displace-
ment "s" for NJ



Mounting dimensions
for NJ



Mounting dimensions
for NJ and HJ

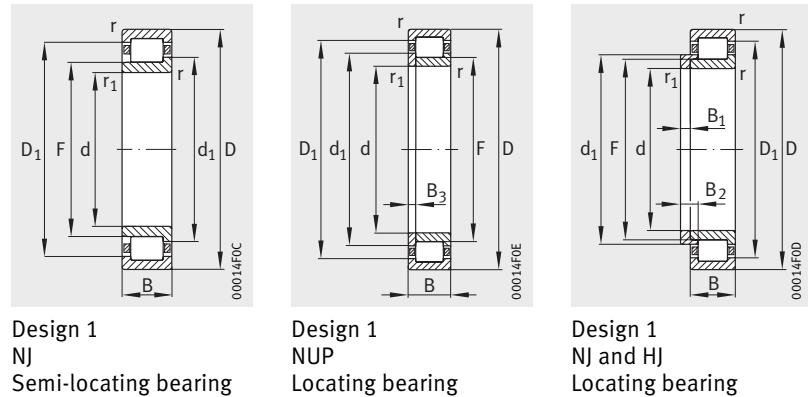


Mounting dimensions
for NUP

			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	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{cur} kn	n _G min ⁻¹	n _B min ⁻¹
			min. ¹⁾	max.									
-	-	-	268	283	299	349	2	2	425	735	56	3 000	-
14	25	-	268	283	299	349	2	2	425	735	56	3 000	-
-	-	-	268	283	299	349	2	2	425	735	56	3 000	-
14	25	-	268	283	299	349	2	2	425	735	56	3 000	-
-	-	-	268	283	299	349	2	2	425	735	73	3 000	-
14	25	-	268	283	299	349	2	2	425	735	73	3 000	-
-	-	-	275	292	312	385	3	3	655	1 020	105	2 800	1 700
16	31,5	-	275	292	312	385	3	3	655	1 020	105	2 800	1 700
-	-	-	275	292	312	385	3	3	655	1 020	105	2 800	1 700
16	31,5	-	275	292	312	385	3	3	655	1 020	105	2 800	1 700
-	-	-	275	292	312	385	3	3	655	1 020	105	2 800	1 700
16	31,5	-	275	292	312	385	3	3	655	1 020	105	2 800	1 700
-	-	15,5	275	292	312	385	3	3	655	1 020	104	2 800	1 700
-	-	15,5	275	292	312	385	3	3	655	1 020	104	2 800	1 700
-	-	10	275	291	314	385	3	3	1 200	2 080	216	2 600	1 200
-	-	10	275	291	314	385	3	3	1 200	2 080	216	2 600	1 200
-	-	-	280	314	341	460	4	4	1 340	1 900	191	2 400	1 110
18	30	-	280	314	341	460	4	4	1 340	1 900	191	2 400	1 110
-	-	-	280	314	341	460	4	4	1 340	1 900	191	2 400	1 110
18	30	-	280	314	341	460	4	4	1 340	1 900	191	2 400	1 110
-	-	-	280	310	339	460	4	4	2 160	3 350	340	2 200	780
18	35,5	-	280	310	339	460	4	4	2 160	3 350	340	2 200	780
-	-	-	280	310	339	460	4	4	2 160	3 350	340	2 200	780
18	35,5	-	280	310	339	460	4	4	2 160	3 350	340	2 200	780
-	-	17,5	280	310	339	460	4	4	2 160	3 350	340	2 200	800
-	-	17,5	280	310	339	460	4	4	2 160	3 350	340	2 200	800
-	-	-	286	334,3	366,2	514	5	5	1 900	2 600	249	2 000	900
-	-	-	286	321,3	356,8	514	5	5	3 100	4 500	435	1 800	670
24	46,5	-	286	321,3	356,8	514	5	5	3 100	4 500	435	1 800	670
-	-	-	286	321,3	356,8	514	5	5	3 100	4 500	435	1 800	670
24	46,5	-	286	321,3	356,8	514	5	5	3 100	4 500	435	1 800	670
-	-	-	286	321,3	356,8	514	5	5	3 100	4 500	435	1 800	670
24	46,5	-	286	321,3	356,8	514	5	5	3 100	4 500	435	1 800	670
-	-	22,5	286	321,3	356,8	514	5	5	3 100	4 500	435	1 800	670
-	-	22,5	286	321,3	356,8	514	5	5	3 100	4 500	435	1 800	670

Cylindrical roller bearings with cage

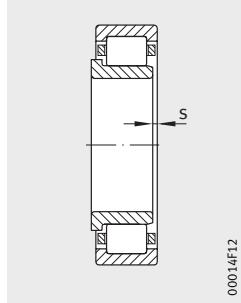
Single row
Semi-locating and
locating bearings



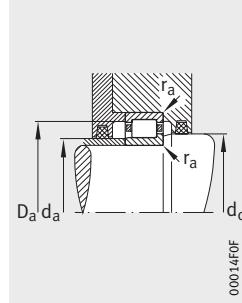
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions									
Bearing	L-section ring		Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r ₁ min.	s ²⁾	F	D ₁	d ₁	
NJ1856-M1	-	1	7,26	-	280	350	33	2	1,1	4	299	327,1	304,8	
NJ1856-M1	HJ1856	1	7,26	1,04	280	350	33	2	1,1	-	299	327,1	304,8	
NJ2856-M1	-	1	9,22	-	280	350	42	2	2	5,3	299	327,1	304,8	
NUP2856-M1	-	1	9,43	-	280	350	42	2	2	-	299	327,1	304,8	
NJ1956-M1	-	1	15,3	-	280	380	46	2,1	1,5	5,2	306	345,4	314	
NJ1956-M1	HJ1956	1	15,3	2,16	280	380	46	2,1	1,5	-	306	345,4	314	
NJ1956-M1A	-	1	15,3	-	280	380	46	2,1	1,5	5,2	306	345,4	314	
NJ1956-M1A	HJ1956	1	15,3	2,16	280	380	46	2,1	1,5	-	306	345,4	314	
NJ2956-M1	-	1	20,5	-	280	380	60	2,1	1,5	6,9	306	346	314	
NJ1056-M1	-	1	32,2	-	280	420	65	4	4	7,2	316	371,3	329,1	
NJ1056-M1	HJ1056	1	32,2	3,59	280	420	65	4	4	-	316	371,3	329,1	
NJ1056-M1A	-	1	32,2	-	280	420	65	4	4	7,2	316	371,3	329,1	
NJ1056-M1A	HJ1056	1	32,2	3,59	280	420	65	4	4	-	316	371,3	329,1	
NJ1056-MP1A	-	1	31,7	-	280	420	65	4	4	7,2	316	371,3	329,1	
NJ1056-MP1A	HJ1056	1	32,2	3,59	280	420	65	4	4	-	316	371,3	329,1	
NUP2056-E-M1	-	1	42,9	-	280	420	82	4	4	-	314	376,3	328	
NUP2056-E-M1A	-	1	42,9	-	280	420	82	4	4	-	314	376,3	328	
NJ256-E-M1	-	1	73,2	-	280	500	80	5	5	6,3	337	430,8	358,2	
NJ256-E-M1	HJ256-E	1	73,2	6,51	280	500	80	5	5	-	337	430,8	358,2	
NJ256-E-M1A	-	1	73,2	-	280	500	80	5	5	6,3	337	430,8	358,2	
NJ256-E-M1A	HJ256-E	1	73,2	6,51	280	500	80	5	5	-	337	430,8	358,2	
NUP256-E-M1	-	1	74,3	-	280	500	80	5	5	-	337	430,8	358,2	
NUP256-E-M1A	-	1	74,3	-	280	500	80	5	5	-	337	430,8	358,2	
NJ2256-E-M1	-	1	116	-	280	500	130	5	5	10,5	333	436	355,6	
NJ2256-E-M1	HJ2256-E	1	116	6,85	280	500	130	5	5	-	333	436	355,6	
NJ2256-E-M1A	-	1	116	-	280	500	130	5	5	10,5	333	436	355,6	
NJ2256-E-M1A	HJ2256-E	1	116	6,85	280	500	130	5	5	-	333	436	355,6	
NUP2256-E-M1	-	1	117	-	280	500	130	5	5	-	333	436	355,6	
NUP2256-E-M1A	-	1	117	-	280	500	130	5	5	-	333	436	355,6	
NJ356-E-M1	-	1	149	-	280	580	108	6	6	8,7	362	488	389,8	
NJ356-E-M1	HJ356-E	1	149	13,7	280	580	108	6	6	-	362	488	389,8	
NJ2356-EX-M1	-	1	237	-	280	580	175	6	6	13	351	493,8	382,3	
NJ2356-EX-M1	HJ2356-EX	1	237	13,8	280	580	175	6	6	-	351	493,8	382,3	

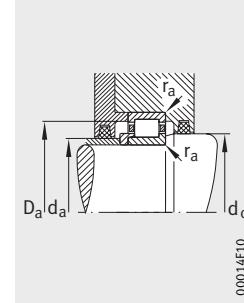
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



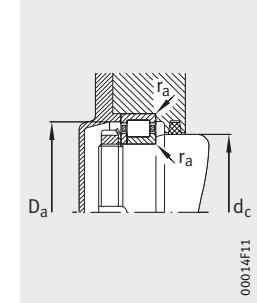
2) Axial displace-
ment "s" for NJ



Mounting dimensions
for NJ



Mounting dimensions
for NJ and HJ



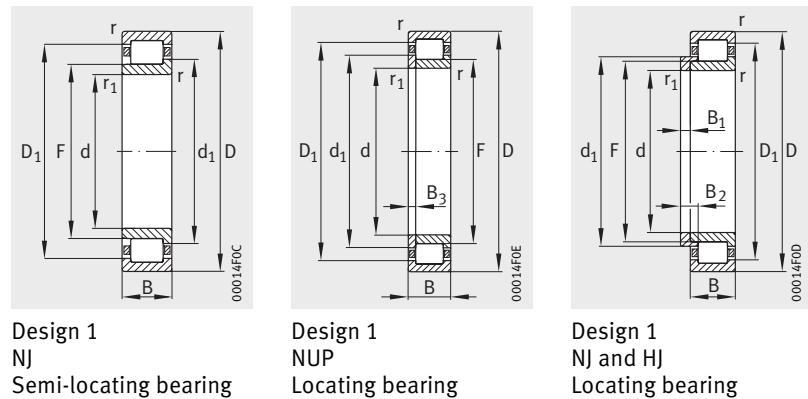
Mounting dimensions
for NUP

			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	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
			min. ¹⁾	max.	min.	max. ¹⁾	max.	max.	max.	max.			
-	-	-	289	296	308	341	2	1	255	500	48,5	3 200	-
10	18	-	289	296	308	341	2	1	255	500	48,5	3 200	-
-	-	-	289	296	308	341	2	1	345	735	74	3 000	1 400
-	-	9	289	296	308	341	2	1	345	735	75	3 000	1 400
-	-	-	288	303	319	369	2	1,5	440	800	78	2 800	-
15	26	-	288	303	319	369	2	1,5	440	800	78	2 800	-
-	-	-	288	303	319	369	2	1,5	440	800	78	2 800	-
15	26	-	288	303	319	369	2	1,5	440	800	78	2 800	-
-	-	-	288	303	319	370	2	1,5	620	1 220	126	2 800	1 300
-	-	-	295	312	333	405	3	3	680	1 100	112	2 800	1 500
16	31,5	-	295	312	333	405	3	3	680	1 100	112	2 800	1 500
-	-	-	295	312	333	405	3	3	680	1 100	112	2 800	1 500
16	31,5	-	295	312	333	405	3	3	680	1 100	112	2 800	1 500
-	-	-	295	312	333	405	3	3	695	1 140	116	2 800	1 500
16	31,5	-	295	312	333	405	3	3	680	1 100	112	2 800	1 500
-	-	10	295	311	334	405	3	3	1 220	2 160	223	2 600	1 100
-	-	10	295	311	334	405	3	3	1 220	2 160	223	2 600	1 100
-	-	-	300	334	362	480	4	4	1 400	2 000	201	2 200	1 020
18	30	-	300	334	362	480	4	4	1 400	2 000	201	2 200	1 020
-	-	-	300	334	362	480	4	4	1 400	2 000	201	2 200	1 020
18	30	-	300	334	362	480	4	4	1 400	2 000	201	2 200	1 020
-	-	12	300	334	362	480	4	4	1 400	2 000	200	2 200	1 000
-	-	12	300	334	362	480	4	4	1 400	2 000	200	2 200	1 000
-	-	-	300	330	359	480	4	4	2 280	3 600	360	2 000	720
18	35,5	-	300	330	359	480	4	4	2 280	3 600	360	2 000	720
-	-	-	300	330	359	480	4	4	2 280	3 600	360	2 000	720
18	35,5	-	300	330	359	480	4	4	2 280	3 600	360	2 000	720
-	-	17,5	300	330	359	480	4	4	2 280	3 600	360	2 000	700
-	-	17,5	300	330	359	480	4	4	2 280	3 600	360	2 000	700
-	-	-	306	359	393,4	554	5	5	2 160	3 050	285	1 900	790
26	42,5	-	306	359	393,4	554	5	5	2 160	3 050	285	1 900	790
-	-	-	306	348	385,9	554	5	5	3 550	5 200	495	1 600	600
26	48,5	-	306	348	385,9	554	5	5	3 550	5 200	495	1 600	600



Cylindrical roller bearings with cage

Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing

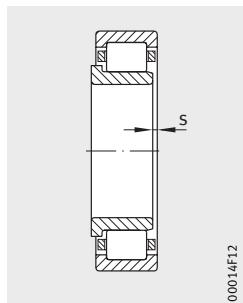
Design 1
NUP
Locating bearing

Design 1
NJ and HJ
Locating bearing

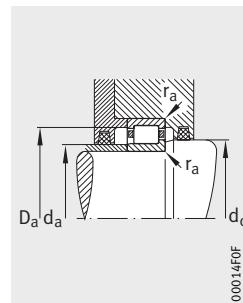
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions									
Bearing	L-section ring		Bearing	L-section ring	d	D	B	r	r ₁	s ²⁾	F	D ₁	d ₁	
			≈kg	≈kg	min.	min.	min.	min.	≈	≈	≈	≈	≈	
NJ1860-M1	-	1	10,2	-	300	380	38	2,1	1,5	4,3	322	355,2	328,7	
NJ1860-M1	HJ1860	1	10,2	1,54	300	380	38	2,1	1,5	-	322	355,2	328,7	
NJ1860-MPA	-	1	10	-	300	380	38	2,1	1,5	4,3	322	355,2	328,7	
NJ1860-MPA	HJ1860	1	10	1,54	300	380	38	2,1	1,5	-	322	355,2	328,7	
NJ2860-M1	-	1	13,1	-	300	380	48	2,1	1,5	5,3	322	355,2	328,7	
NUP2860-M1	-	1	13,4	-	300	380	48	2,1	1,5	-	322	355,2	328,7	
NJ1960-M1	-	1	24,2	-	300	420	56	3	3	6,5	330	378	340	
NJ1960-M1	HJ1960	1	24,2	3,29	300	420	56	3	3	-	330	378	340	
NJ1960-M1A	-	1	24,2	-	300	420	56	3	3	6,5	330	378	340	
NJ1960-M1A	HJ1960	1	24,2	3,29	300	420	56	3	3	-	330	378	340	
NJ1060-M1	-	1	45,7	-	300	460	74	4	4	11,9	340	405,2	355,7	
NJ1060-M1	HJ1060	1	45,7	5,17	300	460	74	4	4	-	340	405,2	355,7	
NJ1060-M1A	-	1	45,7	-	300	460	74	4	4	11,9	340	405,2	355,7	
NJ1060-M1A	HJ1060	1	45,7	5,17	300	460	74	4	4	-	340	405,2	355,7	
NJ1060-MP1A	-	1	44,6	-	300	460	74	4	4	11,9	340	405,2	355,7	
NJ1060-MP1A	HJ1060	1	44,6	5,17	300	460	74	4	4	-	340	405,2	355,7	
NUP2060-E-M1	-	1	61,5	-	300	460	95	4	4	-	341	409,9	356,3	
NUP2060-E-M1A	-	1	61,5	-	300	460	95	4	4	-	341	409,9	356,3	
NJ260-E-M1	-	1	91,6	-	300	540	85	5	5	6,9	364	464,6	385,6	
NJ260-E-M1	HJ260-E	1	91,6	8,31	300	540	85	5	5	-	364	464,6	385,6	
NJ260-E-M1A	-	1	91,6	-	300	540	85	5	5	6,9	364	464,6	385,6	
NJ260-E-M1A	HJ260-E	1	91,6	8,31	300	540	85	5	5	-	364	464,6	385,6	
NUP260-E-M1	-	1	92,8	-	300	540	85	5	5	-	364	464,6	385,6	
NUP260-E-M1A	-	1	92,8	-	300	540	85	5	5	-	364	464,6	385,6	
NJ2260-EX-M1	-	1	146	-	300	540	140	5	5	12,2	355	472,6	380,9	
NJ2260-EX-M1	HJ2260-E	1	146	9,8	300	540	140	5	5	-	355	472,6	380,9	
NUP2260-EX-M1	-	1	148	-	300	540	140	5	5	-	355	472,6	380,9	
NJ1864-M1	-	1	11	-	320	400	38	2,1	1,5	4,3	341	373,8	347,7	
NJ1864-M1	HJ1864	1	11	1,59	320	400	38	2,1	1,5	-	341	373,8	347,7	
NJ1864-MP1A	-	1	10,8	-	320	400	38	2,1	1,5	4,3	341	373,8	347,7	
NJ1864-MP1A	HJ1864	1	10,8	1,59	320	400	38	2,1	1,5	-	341	373,8	347,7	
NUP1864-M1	-	1	11,3	-	320	400	38	2,1	1,5	-	341	373,8	347,7	
NJ2864-M1	-	1	14,3	-	320	400	48	2,1	1,5	5,3	341	373,8	347,7	
NUP2864-M1	-	1	14,6	-	320	400	48	2,1	1,5	-	341	373,8	347,7	
NJ1964-M1	-	1	25,6	-	320	440	56	3	3	6,2	350	398	360	

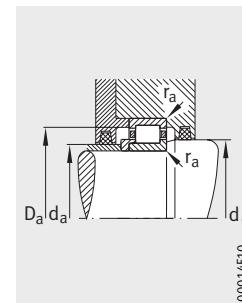
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



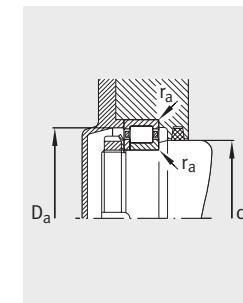
2) Axial displacement "s" for NJ



Mounting dimensions for NJ



Mounting dimensions for NJ and HJ



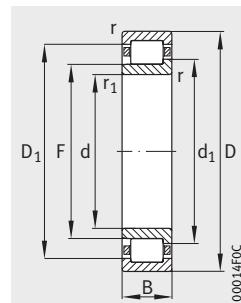
Mounting dimensions for NUP

			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	r _{a1}	dyn. C _r	stat. C _{0r}	C _{ur}	n _G	n _B
			min. ¹⁾	max.	min.	max. ¹⁾	max.	max.	max.	kN	kn	min ⁻¹	min ⁻¹
-	-	-	310	319	332	370	2	1,5	335	640	62	2 800	-
12	21	-	310	319	332	370	2	1,5	335	640	62	2 800	-
-	-	-	310	319	332	370	2	1,5	335	640	62	2 800	-
12	21	-	310	319	332	370	2	1,5	335	640	62	2 800	-
-	-	-	310	319	332	370	2	1,5	475	1 000	101	2 800	1 200
-	-	9	310	319	332	370	2	1,5	475	1 000	101	2 800	1 200
-	-	-	312	327	345	408	2,5	2,5	600	1 020	99	2 800	-
18	31	-	312	327	345	408	2,5	2,5	600	1 020	99	2 800	-
-	-	-	312	327	345	408	2,5	2,5	600	1 020	99	2 800	-
18	31	-	312	327	345	408	2,5	2,5	600	1 020	99	2 800	-
-	-	-	315	336	359	445	3	3	900	1 430	139	2 400	1 400
19	36	-	315	336	359	445	3	3	900	1 430	139	2 400	1 400
-	-	-	315	336	359	445	3	3	900	1 430	139	2 400	1 400
19	36	-	315	336	359	445	3	3	900	1 430	139	2 400	1 400
-	-	-	315	336	359	445	3	3	900	1 430	139	2 400	1 400
19	36	-	315	336	359	445	3	3	900	1 430	139	2 400	1 400
-	-	12,5	315	338	363	445	3	3	1 500	2 700	275	2 200	950
-	-	12,5	315	338	363	445	3	3	1 500	2 700	275	2 200	950
-	-	-	320	359	390	520	4	4	1 600	2 320	225	2 000	920
20	32,5	-	320	359	390	520	4	4	1 600	2 320	225	2 000	920
-	-	-	320	359	390	520	4	4	1 600	2 320	225	2 000	920
20	32,5	-	320	359	390	520	4	4	1 600	2 320	225	2 000	920
-	-	12,5	320	359	390	520	4	4	1 600	2 320	224	2 000	950
-	-	12,5	320	359	390	520	4	4	1 600	2 320	224	2 000	950
-	-	-	320	352	384,7	520	4	4	2 700	4 150	395	1 900	630
20	40	-	320	352	384,7	520	4	4	2 700	4 150	395	1 900	630
-	-	20	320	352	384,7	520	4	4	2 700	4 150	395	1 900	630
-	-	-	330	338	352	390	2	1,5	345	695	66	2 800	-
12	21	-	330	338	352	390	2	1,5	345	695	66	2 800	-
-	-	-	330	338	352	390	2	1,5	345	695	66	2 800	-
12	21	-	330	338	352	390	2	1,5	345	695	66	2 800	-
-	-	9	330	338	352	390	2	1,5	345	695	66	2 800	-
-	-	-	330	338	352	390	2	1,5	490	1 080	107	2 800	1 100
-	-	9	330	338	352	390	2	1,5	490	1 080	107	2 800	1 100
-	-	-	332	346	365	428	2,5	2,5	620	1 100	104	2 600	-

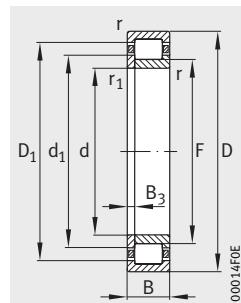


Cylindrical roller bearings with cage

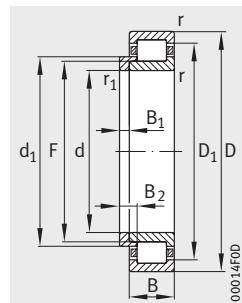
Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing



Design 1
NUP
Locating bearing

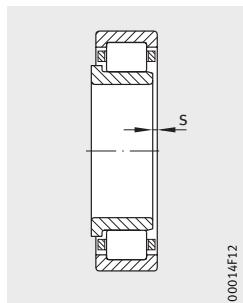


Design 1
NJ and HJ
Locating bearing

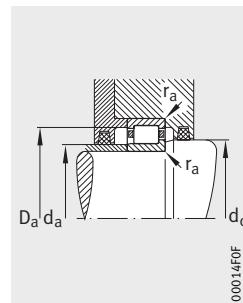
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions									
Bearing	L-section ring		Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r1 min.	s ²⁾	F	D ₁	d ₁	
NJ1964-M1	HJ1964	1	25,6	3,5	320	440	56	3	3	-	350	398	360	
NJ1964-M1A	-	1	25,6	-	320	440	56	3	3	6,2	350	398	360	
NJ1964-M1A	HJ1964	1	25,6	3,5	320	440	56	3	3	-	350	398	360	
NJ1064-M1	-	1	48,1	-	320	480	74	4	4	8	360	425,1	375,4	
NJ1064-M1	HJ1064	1	48,1	5,48	320	480	74	4	4	-	360	425,1	375,4	
NJ1064-M1A	-	1	48,1	-	320	480	74	4	4	8	360	425,1	375,4	
NJ1064-M1A	HJ1064	1	48,1	5,48	320	480	74	4	4	-	360	425,1	375,4	
NJ1064-MP1A	-	1	47	-	320	480	74	4	4	8	360	425,1	375,4	
NJ1064-MP1A	HJ1064	1	47	5,48	320	480	74	4	4	-	360	425,1	375,4	
NUP1064-M1	-	1	49,3	-	320	480	74	4	4	-	360	425,1	375,4	
NJ264-EX-M1	-	1	115	-	320	580	92	5	5	7,5	392	499,4	415,8	
NJ264-EX-M1	HJ264-E	1	115	10,1	320	580	92	5	5	-	392	499,4	415,8	
NJ264-EX-M1A	-	1	115	-	320	580	92	5	5	7,5	392	499,4	415,8	
NJ264-EX-M1A	HJ264-E	1	115	10,1	320	580	92	5	5	-	392	499,4	415,8	
NUP264-EX-M1	-	1	117	-	320	580	92	5	5	-	392	499,4	415,8	
NUP264-EX-M1A	-	1	117	-	320	580	92	5	5	-	392	499,4	415,8	
NJ2264-EX-M1	-	1	183	-	320	580	150	5	5	11,9	380	506	407,8	
NJ2264-EX-M1	HJ2264-EX	1	183	10,8	320	580	150	5	5	-	380	506	407,8	
NUP2264-EX-M1	-	1	237	-	320	580	150	5	5	-	380	506	407,8	
NJ364-E-M1	-	1	216	-	320	670	112	7,5	7,5	8,9	420	554	450	
NJ1868-M1	-	1	11,6	-	340	420	38	2,1	1,5	4,3	361,5	394,7	368,2	
NJ1868-M1	HJ1868	1	11,6	1,71	340	420	38	2,1	1,5	-	361,5	394,7	368,2	
NJ1868-M1A	-	1	11,6	-	340	420	38	2,1	1,5	4,3	361,5	394,7	368,2	
NJ1868-M1A	HJ1868	1	11,6	1,71	340	420	38	2,1	1,5	-	361,5	394,7	368,2	
NJ2868-M1	-	1	15,3	-	340	420	48	2,1	1,5	5,3	361,5	394,7	368,2	
NUP2868-M1	-	1	15,6	-	340	420	48	2,1	1,5	-	361,5	394,7	368,2	
NJ1968-E-M1	-	1	26,9	-	340	460	56	3	3	5,7	370	423,3	380,7	
NJ1968-E-M1	HJ1968-E	1	26,9	4,09	340	460	56	3	3	-	370	423,3	380,7	
NJ1968-E-M1A	-	1	26,9	-	340	460	56	3	3	5,7	370	423,3	380,7	
NJ1968-E-M1A	HJ1968-E	1	26,9	4,09	340	460	56	3	3	-	370	423,3	380,7	
NUP1968-E-MP1A	-	1	27,1	-	340	460	56	3	3	-	370	423,3	380,7	
NJ2968-M1	-	1	35,1	-	340	460	72	3	3	7	370	418	380	
NJ2968-M1	HJ2968	1	35,1	4,02	340	460	72	3	3	-	370	418	380	
NJ2968-M1A	-	1	35,1	-	340	460	72	3	3	7	370	418	380	
NJ2968-M1A	HJ2968	1	35,1	4,02	340	460	72	3	3	-	370	418	380	

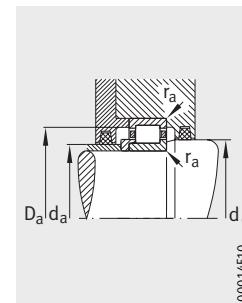
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



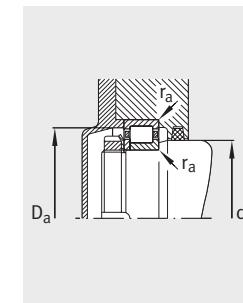
2) Axial displacement "s" for NJ



Mounting dimensions for NJ



Mounting dimensions for NJ and HJ



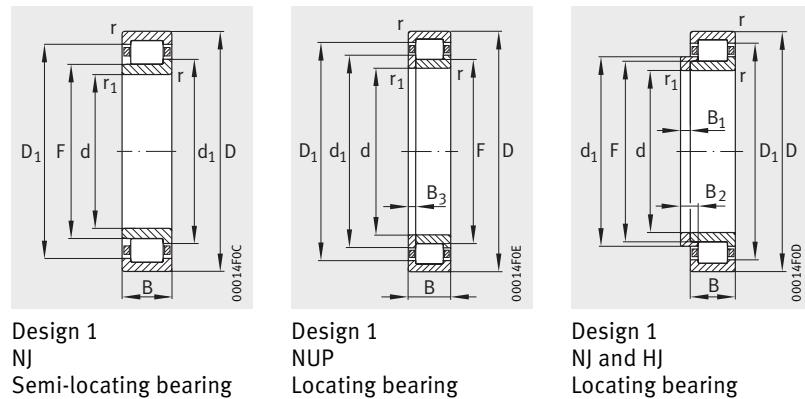
Mounting dimensions for NUP

			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	r _{a1}	dyn. C _r	stat. C _{0r}	C _{cur}	n _G	n _B
			min. ¹⁾	max.	min.	max. ¹⁾	max.	max.	max.	max.	kn	min ⁻¹	min ⁻¹
18	31	–	332	346	365	428	2,5	2,5	620	1 100	104	2 600	–
–	–	–	332	346	365	428	2,5	2,5	620	1 100	104	2 600	–
18	31	–	332	346	365	428	2,5	2,5	620	1 100	104	2 600	–
–	–	–	335	356	380	465	3	3	915	1 500	143	2 400	1 300
19	36	–	335	356	380	465	3	3	915	1 500	143	2 400	1 300
–	–	–	335	356	380	465	3	3	915	1 500	143	2 400	1 300
19	36	–	335	356	380	465	3	3	915	1 500	143	2 400	1 300
–	–	–	335	356	380	465	3	3	915	1 500	143	2 400	1 300
19	36	–	335	356	380	465	3	3	915	1 500	143	2 400	1 300
–	–	–	335	356	380	465	3	3	915	1 500	143	2 400	1 300
19	36	–	335	356	380	465	3	3	915	1 500	143	2 400	1 300
–	–	–	335	356	380	465	3	3	915	1 500	143	2 400	1 300
19	36	–	335	356	380	465	3	3	915	1 500	143	2 400	1 300
–	–	17	335	356	380	465	3	3	915	1 500	143	2 400	1 300
–	–	–	340	388,5	419,6	560	4	4	1 800	2 700	255	1 900	850
21	35	–	340	388,5	419,6	560	4	4	1 800	2 700	255	1 900	850
–	–	–	340	388,5	419,6	560	4	4	1 800	2 700	255	1 900	850
21	35	–	340	388,5	419,6	560	4	4	1 800	2 700	255	1 900	850
–	–	14	340	388,5	419,6	560	4	4	1 800	2 700	255	1 900	850
–	–	14	340	388,5	419,6	560	4	4	1 800	2 700	255	1 900	850
–	–	–	340	376,5	411,7	560	4	4	3 150	4 900	460	1 600	570
21	41	–	340	376,5	411,7	560	4	4	3 150	4 900	460	1 600	570
–	–	20	340	376,5	411,7	560	4	4	3 150	4 900	460	1 600	560
–	–	–	352	415	455	638	6	6	2 550	3 750	330	1 600	650
–	–	–	350	358	373	410	2,1	2,1	360	735	69	2 800	–
12	21	–	350	358	373	410	2,1	2,1	360	735	69	2 800	–
–	–	–	350	358	373	410	2,1	2,1	360	735	69	2 800	–
12	21	–	350	358	373	410	2,1	2,1	360	735	69	2 800	–
–	–	–	350	358	372	410	2	1,5	510	1 140	112	2 600	1 100
–	–	9	350	358	372	410	2	1,5	510	1 140	112	2 600	1 100
–	–	–	352	366	385,4	446	2,5	2,5	695	1 250	118	2 400	–
20	32	–	352	366	385,4	446	2,5	2,5	695	1 250	118	2 400	–
–	–	–	352	366	385,4	446	2,5	2,5	695	1 250	118	2 400	–
20	32	–	352	366	385,4	446	2,5	2,5	695	1 250	118	2 400	–
–	–	12	352	366	385,4	446	2,5	2,5	695	1 250	118	2 400	–
–	–	–	352	366	385	448	2,5	2,5	950	1 930	190	2 400	950
20	32	–	352	366	385	448	2,5	2,5	950	1 930	190	2 400	950
–	–	–	352	366	385	448	2,5	2,5	950	1 930	190	2 400	950
20	32	–	352	366	385	448	2,5	2,5	950	1 930	190	2 400	950



Cylindrical roller bearings with cage

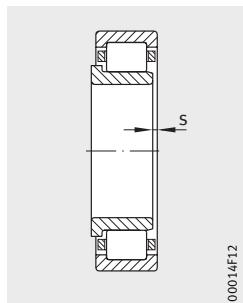
Single row
Semi-locating and
locating bearings



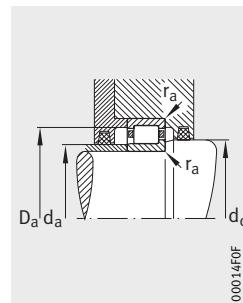
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions								
Bearing	L-section ring		Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r ₁ min.	s ²⁾	F	D ₁ ≈	d ₁ ≈
NJ1068-MPA	-	1	66,6	-	340	520	82	5	5	8,9	385	458,2	402,2
NJ1068-MPA	HJ1068	1	66,6	7,22	340	520	82	5	5	-	385	458,2	402,2
NJ1068-M1	-	1	64,7	-	340	520	82	5	5	8,9	385	458,2	402,2
NJ1068-M1	HJ1068	1	64,7	7,22	340	520	82	5	5	-	385	458,2	402,2
NJ1068-M1A	-	1	64,7	-	340	520	82	5	5	8,9	385	458,2	402,2
NJ1068-M1A	HJ1068	1	64,7	7,22	340	520	82	5	5	-	385	458,2	402,2
NJ268-E-M1	-	1	135	-	340	620	92	6	6	7,4	419	526,4	442,9
NJ268-E-M1	HJ268-E	1	135	12,5	340	620	92	6	6	-	419	526,4	442,9
NJ1872-M1	-	1	17,9	-	360	440	38	2,1	1,5	4,3	421	414,7	388,2
NJ1872-M1	HJ1872	1	17,9	1,8	360	440	38	2,1	1,5	-	421	414,7	388,2
NJ2872-M1	-	1	15,7	-	360	440	48	2,1	1,5	5,4	381,5	414,7	388,2
NUP2872-M1	-	1	16	-	360	440	48	2,1	1,5	-	381,5	414,7	388,2
NJ1972-M1	-	1	28,3	-	360	480	56	3	3	6,2	390	438,5	400
NJ1972-M1	HJ1972	1	28,3	4,28	360	480	56	3	3	-	390	438,5	400
NJ1972-M1A	-	1	28,3	-	360	480	56	3	3	6,2	390	438,5	400
NJ1972-M1A	HJ1972	1	28,3	4,28	360	480	56	3	3	-	390	438,5	400
NUP1972-M1A	-	1	29	-	360	480	56	3	3	-	390	438,5	400
NJ1072-M1	-	1	67,5	-	360	540	82	5	5	8,9	405	478,1	421,6
NJ1072-M1	HJ1072	1	67,5	7,38	360	540	82	5	5	-	405	478,1	421,6
NJ1072-M1A	-	1	67,5	-	360	540	82	5	5	8,9	405	478,1	421,6
NJ1072-M1A	HJ1072	1	67,5	7,38	360	540	82	5	5	-	405	478,1	421,6
NJ1072-MP1A	-	1	65,8	-	360	540	82	5	5	8,9	405	478,1	421,6
NJ1072-MP1A	HJ1072	1	65,8	7,38	360	540	82	5	5	-	405	478,1	421,6
NUP1072-M1	-	1	69,1	-	360	540	82	5	5	-	405	478,1	421,6
NUP2072-E-M1	-	1	91,5	-	360	540	106	5	5	-	405	483,8	422,7
NUP2072-E-M1A	-	1	91,5	-	360	540	106	5	5	-	405	483,8	422,7
NUP2072-E-MP1A	-	1	90	-	360	540	106	5	5	-	405	483,8	422,7
NUP2072-E-MPA	-	1	90	-	360	540	106	5	5	-	405	483,8	422,7
NJ272-E-M1	-	1	151	-	360	650	95	6	6	9,5	451	558,5	475
NJ272-E-M1	HJ272-E	1	151	14,9	360	650	95	6	6	-	451	558,5	475
NJ2272-E-M1	-	1	258	-	360	650	170	6	6	15	428	562	457,5

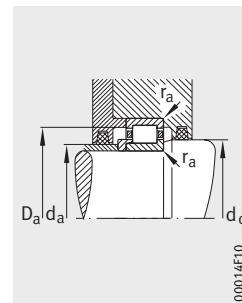
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



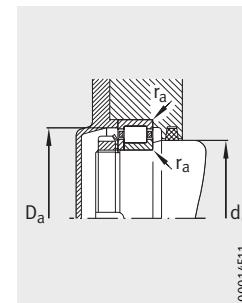
2) Axial displace-
ment "s" for NJ



Mounting dimensions
for NJ



Mounting dimensions
for NJ and HJ



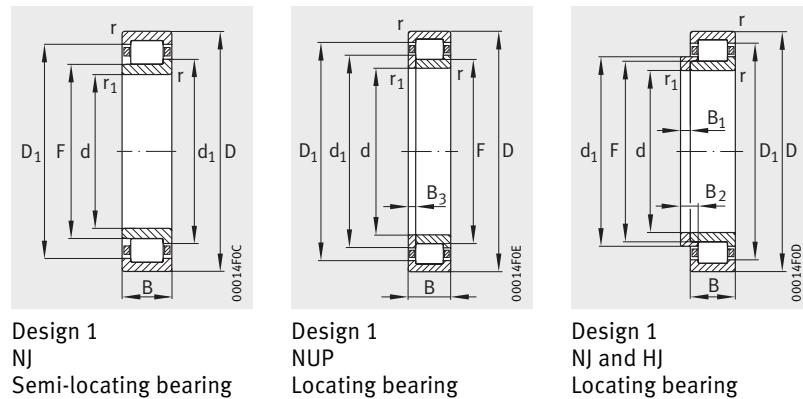
Mounting dimensions
for NUP

			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	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
			min. ¹⁾	max.	min.	max. ¹⁾	max.	max.	min.	min.	min.	min.	min.
-	-	-	357	381	407	503	4	4	1 080	1 760	163	2 200	1 200
21	39,5	-	357	381	407	503	4	4	1 080	1 760	163	2 200	1 200
-	-	-	357	381	407	503	4	4	1 120	1 830	169	2 200	1 200
21	39,5	-	357	381	407	503	4	4	1 120	1 830	169	2 200	1 200
-	-	-	357	381	407	503	4	4	1 120	1 830	169	2 200	1 200
21	39,5	-	357	381	407	503	4	4	1 120	1 830	169	2 200	1 200
-	-	-	366	415	447	594	5	5	1 930	3 000	280	1 800	750
22	36	-	366	415	447	594	5	5	1 930	3 000	280	1 800	750
-	-	-	370	378	393	430	2	1,5	365	765	71	2 600	-
12	21	-	370	378	393	430	2	1,5	365	765	71	2 600	-
-	-	-	370	378	392	430	2	1,5	530	1 220	118	2 400	950
-	-	9	370	378	392	430	2	1,5	530	1 220	118	2 400	950
-	-	-	372	386	405	468	2,5	2,5	655	1 220	114	2 400	-
20	33	-	372	386	405	468	2,5	2,5	655	1 220	114	2 400	-
-	-	-	372	386	405	468	2,5	2,5	655	1 220	114	2 400	-
20	33	-	372	386	405	468	2,5	2,5	655	1 220	114	2 400	-
-	-	13	372	386	405	468	2,5	2,5	655	1 220	115	2 400	-
-	-	-	377	400	427	523	4	4	1 140	1 900	175	2 200	1 100
21	39,5	-	377	400	427	523	4	4	1 140	1 900	175	2 200	1 100
-	-	-	377	400	427	523	4	4	1 140	1 900	175	2 200	1 100
21	39,5	-	377	400	427	523	4	4	1 140	1 900	175	2 200	1 100
-	-	-	377	400	427	523	4	4	1 140	1 900	175	2 200	1 100
21	39,5	-	377	400	427	523	4	4	1 140	1 900	175	2 200	1 100
-	-	18,5	377	400	427	523	4	4	1 140	1 900	175	2 200	1 100
-	-	13	377	401	427	523	4	4	2 000	3 750	355	1 900	750
-	-	13	377	401	427	523	4	4	2 000	3 750	355	1 900	750
-	-	13	377	401	427	523	4	4	2 000	3 750	355	1 900	750
-	-	13	377	401	427	523	4	4	2 000	3 750	355	1 900	750
-	-	-	386	447	479	624	5	5	2 000	3 150	290	1 600	700
22	37,5	-	386	447	479	624	5	5	2 000	3 150	290	1 600	700
-	-	-	386	424	462	624	5	5	3 600	5 700	520	1 400	500



Cylindrical roller bearings with cage

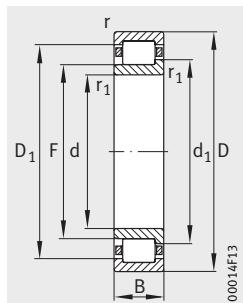
Single row
Semi-locating and
locating bearings



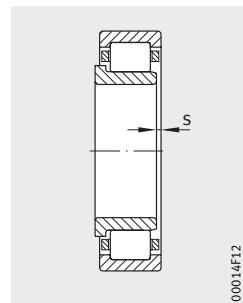
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions									
Bearing	L-section ring		Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r ₁ min.	s ²⁾	F	D ₁	d ₁	
NJ1876-M1	-	1	19,6	-	380	480	46	2,1	2,1	5,3	407,5	447,4	415,5	
NJ1876-M1	HJ1876	1	19,6	2,82	380	480	46	2,1	2,1	-	407,5	447,4	415,5	
NJ1876-MP1A	-	1	19,6	-	380	480	46	2,1	2,1	5,3	407,5	447,4	415,5	
NJ1876-MP1A	HJ1876	1	19,6	2,82	380	480	46	2,1	2,1	-	407,5	447,4	415,5	
NUP1876-M1	-	1	20,1	-	380	480	46	2,1	2,1	-	407,5	447,4	415,5	
NJ2876-M1	-	1	25,9	-	380	480	60	2,1	2,1	6,9	407,5	447,4	415,5	
NJ2876-M1A	-	1	25,9	-	380	480	60	2,1	2,1	6,9	407,5	447,4	415,5	
NUP2876-M1	-	1	26,4	-	380	480	60	2,1	2,1	-	407,5	447,4	415,5	
NUP2876-M1A	-	1	26,4	-	380	480	60	2,1	2,1	-	407,5	447,4	415,5	
NJ2976-M1	-	1	53,8	-	380	520	82	4	4	7,2	414	471,6	425,9	
NUP2976-M1	-	1	54,5	-	380	520	82	4	4	-	414	471,6	425,9	
NJ1076-M1	-	1	70,7	-	380	560	82	5	5	9	425	498,1	441,6	
NJ1076-M1	HJ1076	1	70,7	7,86	380	560	82	5	5	-	425	498,1	441,6	
NJ1076-M1A	-	1	70,7	-	380	560	82	5	5	9	425	498,1	441,6	
NJ1076-M1A	HJ1076	1	70,7	7,86	380	560	82	5	5	-	425	498,1	441,6	
NJ1076-MP1A	-	1	68,7	-	380	560	82	5	5	9	425	498,1	441,6	
NJ1076-MP1A	HJ1076	1	68,7	7,86	380	560	82	5	5	-	425	498,1	441,6	
NJ2276-E-M1	-	1	292	-	380	680	175	6	6	13,8	451	588,8	481	
NJ2276-E-M1	HJ2276-E	1	292	17,3	380	680	175	6	6	-	451	588,8	481	
Z-544425.ZL	-	2 NJ	37,4	-	381	508	63,5	5	3	-	407	469,3	421,8	
NJ1880-M1	-	1	20,8	-	400	500	46	2,1	2,1	5,3	428	468	436	
NJ1880-M1	HJ1880	1	20,8	3,18	400	500	46	2,1	2,1	-	428	468	436	
NUP2880-M1	-	1	28,4	-	400	500	60	2,1	2,1	-	428	468	436	
NJ1980-M1	-	1	42,9	-	400	540	65	4	4	7,2	436	492,7	447,3	
NJ1980-M1	HJ1980	1	42,9	6,22	400	540	65	4	4	-	436	492,7	447,3	
NJ1980-M1A	-	1	42,9	-	400	540	65	4	4	7,2	436	492,7	447,3	
NJ1980-M1A	HJ1980	1	42,9	6,22	400	540	65	4	4	-	436	492,7	447,3	
NJ2980-M1	-	1	56,1	-	400	540	82	4	4	7,2	434	494	445,9	
NJ2980-MP1A	-	1	54,9	-	400	540	82	4	4	7,2	434	494	445,9	
NJ1080-M1	-	1	92,2	-	400	600	90	5	5	9,5	450	531,5	469	
NJ1080-M1	HJ1080	1	92,2	10,3	400	600	90	5	5	-	450	531,5	469	
NJ1080-M1A	-	1	92,2	-	400	600	90	5	5	9,5	450	531,5	469	
NJ1080-M1A	HJ1080	1	92,2	10,3	400	600	90	5	5	-	450	531,5	469	
NUP1080-M1	-	1	94,4	-	400	600	90	5	5	-	450	531,5	469	
NUP2080-E-M1	-	1	126	-	400	600	118	5	5	-	450	533,6	469,7	

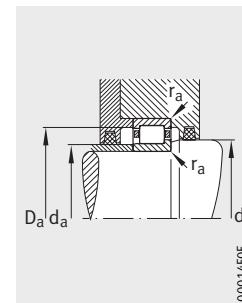
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



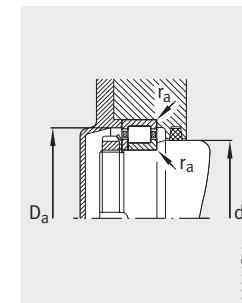
Design 2
NJ
Semi-locating bearing



2) Axial displace-
ment "s" for NJ



Mounting dimensions
for NJ
for NJ and HJ, page 363



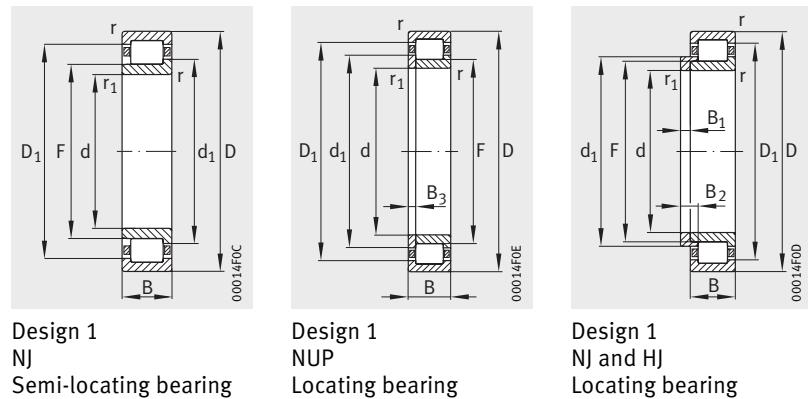
Mounting dimensions
for NUP

			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	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
			min. ¹⁾	max.	min.	max. ¹⁾	max.	max.	max.	max.	max.	max.	max.
-	-	-	390	404	420	470	2	2	490	1 000	91	2 400	-
14	25	-	390	404	420	470	2	2	490	1 000	91	2 400	-
-	-	-	390	404	420	470	2	2	490	1 000	91	2 400	-
14	25	-	390	404	420	470	2	2	490	1 000	91	2 400	-
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-	-	-	390	404	420	470	2	2	695	1 560	148	2 200	900
-	-	-	390	404	420	470	2	2	695	1 560	148	2 200	900
-	-	12	390	404	420	470	2	2	695	1 560	148	2 200	900
-	-	12	390	404	420	470	2	2	695	1 560	148	2 200	900
-	-	-	395	410	432	505	3	3	1 320	2 700	255	2 000	800
-	-	12	395	410	432	505	3	3	1 320	2 700	255	2 000	800
-	-	-	397	420	447	543	4	4	1 180	2 000	180	2 000	1 000
21	39,5	-	397	420	447	543	4	4	1 180	2 000	180	2 000	1 000
-	-	-	397	420	447	543	4	4	1 180	2 000	180	2 000	1 000
21	39,5	-	397	420	447	543	4	4	1 180	2 000	180	2 000	1 000
-	-	-	397	420	447	543	4	4	1 180	2 000	180	2 000	1 000
21	39,5	-	397	420	447	543	4	4	1 180	2 000	180	2 000	1 000
-	-	-	406	446	484	654	5	5	4 050	6 700	610	1 400	450
25	50	-	406	446	484	654	5	5	4 050	6 700	610	1 400	450
-	-	-	393	403	427	491	4	2,5	1 020	1 860	150	2 000	800
-	-	-	410	424	441	490	2,1	2,1	520	1 100	98	2 400	-
15	26	-	410	424	441	490	2,1	2,1	520	1 100	98	2 400	-
-	-	12	410	424	441	490	2	2	735	1 700	159	2 200	850
-	-	-	415	432	453	525	3	3	800	1 500	141	2 200	-
22	37,5	-	415	432	453	525	3	3	800	1 500	141	2 200	-
-	-	-	415	432	453	525	3	3	800	1 500	141	2 200	-
22	37,5	-	415	432	453	525	3	3	800	1 500	141	2 200	-
-	-	-	415	430	452	525	3	3	1 340	2 750	265	2 000	750
-	-	-	415	430	452	525	3	3	1 340	2 750	265	2 000	750
-	-	-	417	445	474	583	4	4	1 370	2 320	212	1 900	950
23	43	-	417	445	474	583	4	4	1 370	2 320	212	1 900	950
-	-	-	417	445	474	583	4	4	1 370	2 320	212	1 900	950
23	43	-	417	445	474	583	4	4	1 370	2 320	212	1 900	950
-	-	20	417	445	474	583	4	4	1 370	2 320	212	1 900	950
-	-	16,5	417	446	476	583	4	4	2 280	4 400	415	1 800	670



Cylindrical roller bearings with cage

Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing

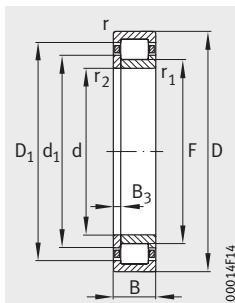
Design 1
NUP
Locating bearing

Design 1
NJ and HJ
Locating bearing

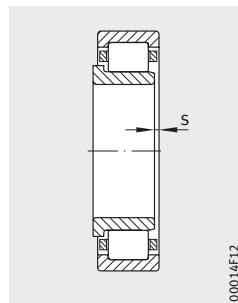
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions								
Bearing	L-section ring		Bearing ≈kg	L-section ring ≈kg	d	D	B	r	r ₁ /r ₂	s ²⁾	F	D ₁	
NUP2080-E-M1A	–	1	126	–	400	600	118	5	5	–	450	533,6	
NJ2280-E-M1	–	1	342	–	400	720	105	6	6	15	471	630,5	
Z-545999.ZL	–	2 NUP	29,6	–	404,6	508	60,325	5	5	–	427,2	477,2	
NJ1884-MPA	–	1	22,5	–	420	520	46	2,1	2,1	5,3	448	488	
NJ1884-MPA	HJ1884	1	22,5	3,33	420	520	46	2,1	2,1	–	448	488	
NJ1884-M1	–	1	21,4	–	420	520	46	2,1	2,1	5,3	448	488	
NJ1884-M1	HJ1884	1	21,4	3,33	420	520	46	2,1	2,1	–	448	488	
NJ1884-M1A	–	1	21,4	–	420	520	46	2,1	2,1	5,3	448	488	
NJ1884-M1A	HJ1884	1	21,4	3,33	420	520	46	2,1	2,1	–	448	488	
NJ2884-M1	–	1	25,1	–	420	520	60	2,1	2,1	6,9	448	488	
NUP2884-M1	–	1	27,8	–	420	520	60	2,1	2,1	–	448	488	
NJ1984-M1	–	1	45,2	–	420	560	65	4	4	7,2	456	510,4	
NJ1984-M1	HJ1984	1	45,2	6,51	420	560	65	4	4	–	456	510,4	
NJ1984-M1A	–	1	45,2	–	420	560	65	4	4	7,2	456	510,4	
NJ1984-M1A	HJ1984	1	45,2	6,51	420	560	65	4	4	–	456	510,4	
NJ2984-M1	–	1	59,4	–	420	560	82	4	4	6	454	511,6	
NJ2984-M1A	–	1	59,4	–	420	560	82	4	4	6	454	511,6	
NUP2984-M1	–	1	60,6	–	420	560	82	4	4	–	454	511,6	
NJ1084-M1	–	1	95,1	–	420	620	90	5	5	15	470	551,5	
NJ1084-M1	HJ1084	1	95,1	10,7	420	620	90	5	5	–	470	551,5	
NJ1084-M1A	–	1	95,1	–	420	620	90	5	5	15	470	551,5	
NJ1084-M1A	HJ1084	1	95,1	10,7	420	620	90	5	5	–	470	551,5	
Z-544003.ZL	–	2 NUP	49,9	–	431,762	558,825	73,025	4	7,5/4	–	456,7	510	
NJ1888-M1	–	1	22,7	–	440	540	46	2,1	2,1	5,3	468	508	
NJ1888-M1	HJ1888	1	22,7	3,48	440	540	46	2,1	2,1	–	468	508	
NJ1888-M1A	–	1	22,7	–	440	540	46	2,1	2,1	5,3	468	508	
NJ1888-M1A	HJ1888	1	22,7	3,48	440	540	46	2,1	2,1	–	468	508	
NJ2888-M1	–	1	30	–	440	540	60	2,1	2,1	6,9	468	508	
NJ2888-M1A	–	1	30	–	440	540	60	2,1	2,1	6,9	468	508	
NUP2888-M1	–	1	30,6	–	440	540	60	2,1	2,1	–	468	508	
NUP2888-M1A	–	1	30,6	–	440	540	60	2,1	2,1	–	468	508	
NUP2888-MP1A	–	1	29,8	–	440	540	60	2,1	2,1	–	468	508	
NJ2988-M1	–	1	82,2	–	440	600	95	4	4	8,7	480	545,6	
NJ2988-M1	HJ2988	1	82,2	8,38	440	600	95	4	4	–	480	545,6	
NJ2988-M1A	–	1	82,2	–	440	600	95	4	4	8,7	480	545,6	

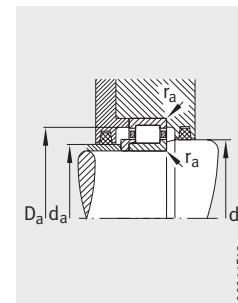
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



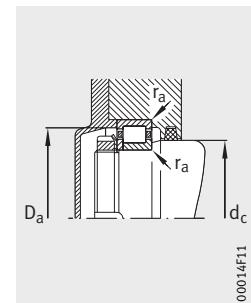
Design 2
NUP
Locating bearing



2) Axial displace-
ment "s" for NJ



Mounting dimensions
for NJ and HJ
for NJ, page 361



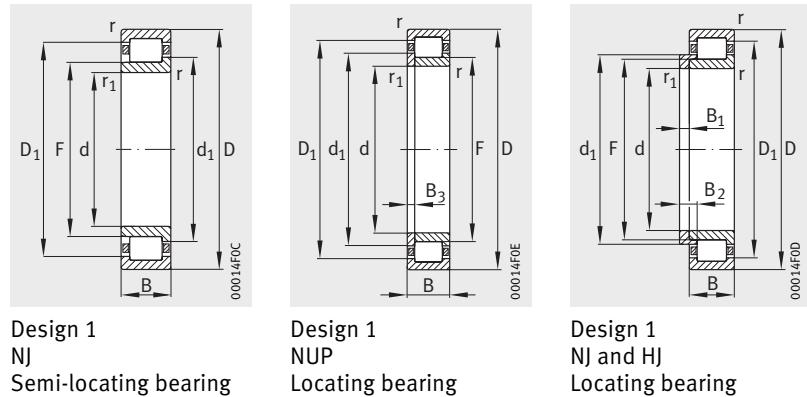
Mounting dimensions
for NUP

				Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed	
d ₁ ≈	B ₁	B ₂	B ₃	d _a		d _c	D _a	r _a	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
				min. ¹⁾	max.	min.	max. ¹⁾	max.	max.	max.	max.	max.	min ⁻¹	min ⁻¹
469,7	–	–	16,5	417	446	476	583	4	4	2 280	4 400	415	1 800	670
–	–	–	–	426	467	508	694	5	5	5 600	7 600	670	1 300	850
438,8	–	–	9,2	–	–	–	–	4	4	915	1 930	157	2 000	750
456	–	–	–	430	444	461	510	2	2	520	1 100	97	2 200	–
456	15	26	–	430	444	461	510	2	2	520	1 100	97	2 200	–
456	–	–	–	430	444	461	510	2	2	530	1 140	101	2 200	–
456	15	26	–	430	444	461	510	2	2	530	1 140	101	2 200	–
456	–	–	–	430	444	461	510	2	2	530	1 140	101	2 200	–
456	15	26	–	430	444	461	510	2	2	530	1 140	101	2 200	–
456	–	–	–	430	444	461	510	2	2	750	1 760	164	2 000	800
456	–	–	12	430	444	461	510	2	2	750	1 760	164	2 000	800
467,3	–	–	–	435	452	473	545	3	3	830	1 600	148	2 000	–
467,3	22	37,5	–	435	452	473	545	3	3	830	1 600	148	2 000	–
467,3	–	–	–	435	452	473	545	3	3	830	1 600	148	2 000	–
467,3	22	37,5	–	435	452	473	545	3	3	830	1 600	148	2 000	–
465,9	–	–	–	435	450	472	545	3	3	1 370	2 900	275	1 900	700
465,9	–	–	–	435	450	472	545	3	3	1 370	2 900	275	1 900	700
465,9	–	–	12	435	450	472	545	3	3	1 370	2 900	275	1 900	700
489	–	–	–	437	465	494	603	4	4	1 400	2 450	219	1 800	900
489	23	43	–	437	465	494	603	4	4	1 400	2 450	219	1 800	900
489	–	–	–	437	465	494	603	4	4	1 400	2 450	219	1 800	900
489	23	43	–	437	465	494	603	4	4	1 400	2 450	219	1 800	900
469,1	–	–	10,5	–	–	–	–	3	6/3	1 180	2 600	241	1 900	630
476	–	–	–	450	464	481	530	2	2	540	1 200	104	2 200	–
476	15	26	–	450	464	481	530	2	2	540	1 200	104	2 200	–
476	–	–	–	450	464	481	530	2	2	540	1 200	104	2 200	–
476	15	26	–	450	464	481	530	2	2	540	1 200	104	2 200	–
476	–	–	–	450	464	481	530	2	2	765	1 830	168	2 000	750
476	–	–	–	450	464	481	530	2	2	765	1 830	168	2 000	750
476	–	–	12	450	464	481	530	2	2	765	1 830	168	2 000	750
476	–	–	12	450	464	481	530	2	2	765	1 830	168	2 000	750
476	–	–	12	450	464	481	530	2	2	765	1 830	168	2 000	750
493,3	–	–	–	455	476	500	585	3	3	1 630	3 450	320	1 800	670
493,3	24	39	–	455	476	500	585	3	3	1 630	3 450	320	1 800	670
493,3	–	–	–	455	476	500	585	3	3	1 630	3 450	320	1 800	670



Cylindrical roller bearings with cage

Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing

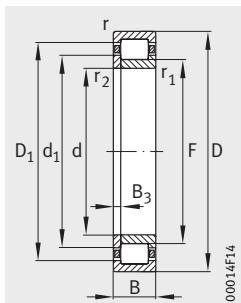
Design 1
NUP
Locating bearing

Design 1
NJ and HJ
Locating bearing

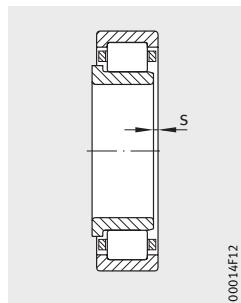
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions							
Bearing	L-section ring		Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r ₁ /r ₂ min.	s ²⁾	F	D ₁ ≈
NJ2988-M1A	HJ2988	1	82,2	8,38	440	600	95	4	4	-	480	545,6
NUP2988-M1	-	1	83,4	-	440	600	95	4	4	-	480	545,6
NJ1088-M1	-	1	110	-	440	650	94	6	6	9,8	493	577,6
NJ1088-M1	HJ1088	1	110	12,6	440	650	94	6	6	-	493	577,6
NJ1088-M1A	-	1	110	-	440	650	94	6	6	9,8	493	577,6
NJ1088-M1A	HJ1088	1	110	12,6	440	650	94	6	6	-	493	577,6
NJ1892-M1	-	1	34,9	-	460	580	56	3	3	6,6	494	540,5
NJ1892-M1	HJ1892	1	34,9	5,33	460	580	56	3	3	-	494	540,5
NJ1892-M1A	-	1	34,9	-	460	580	56	3	3	6,6	494	540,5
NJ1892-M1A	HJ1892	1	34,9	5,33	460	580	56	3	3	-	494	540,5
NJ2892-M1	-	1	46,6	-	460	580	72	3	3	8	494	540,5
NJ2892-M1A	-	1	46,6	-	460	580	72	3	3	8	494	540,5
NUP2892-M1	-	1	47,4	-	460	580	72	3	3	-	494	540,5
NUP2892-M1A	-	1	47,4	-	460	580	72	3	3	-	494	540,5
NJ1992-M1	-	1	64,4	-	460	620	74	4	4	8,4	502	562,8
NJ1992-M1	HJ1992	1	64,4	9,03	460	620	74	4	4	-	502	562,8
NJ1992-M1A	HJ1992	1	64,4	9,03	460	620	74	4	4	8,4	502	562,8
NUP1992-M1	-	1	66	-	460	620	74	4	4	-	502	562,8
NJ2992-M1	-	1	85,2	-	460	620	95	4	4	8,7	500	564
NJ2992-M1	HJ2992	1	85,2	8,73	460	620	95	4	4	-	500	564
NUP2992-M1	-	1	86,5	-	460	620	95	4	4	-	500	564
NJ1092-M1	-	1	128	-	460	680	100	6	6	11,2	516	603,9
NJ1092-M1	HJ1092	1	128	14,2	460	680	100	6	6	-	516	603,9
NJ1092-M1A	-	1	128	-	460	680	100	6	6	11,2	516	603,9
NJ1092-M1A	HJ1092	1	128	14,2	460	680	100	6	6	-	516	603,9
NUP1092-M1	-	1	131	-	460	680	100	6	6	-	516	603,9
Z-539186.ZL	-	2 NUP	46,8	-	469,9	571,5	82,55	4	4	-	494,5	536

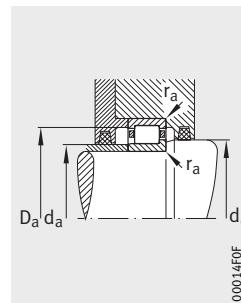
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



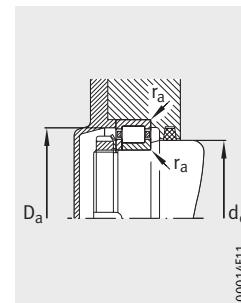
Design 2
NUP
Locating bearing



2) Axial displace-
ment "s" for NJ



Mounting dimensions
for NJ
for NJ and HJ, page 367



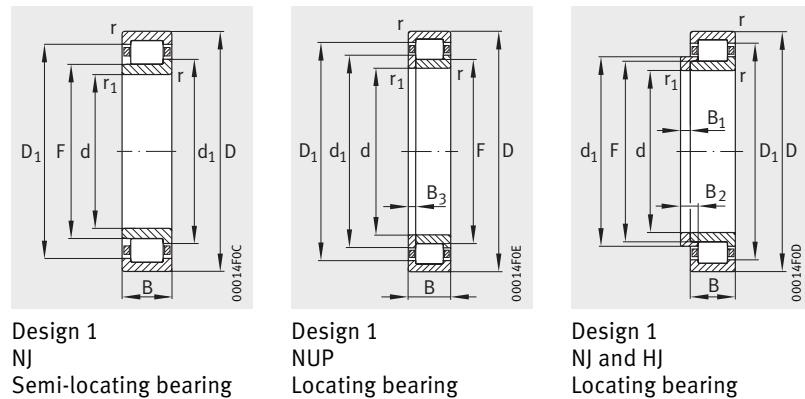
Mounting dimensions
for NUP

				Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed	
d ₁ ≈	B ₁	B ₂	B ₃	d _a		d _c	D _a	r _a	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
				min. ¹⁾	max.	min.	max. ¹⁾	max.	max.	max.	max.	max.	min ⁻¹	min ⁻¹
493,3	24	39	—	455	476	500	585	3	3	1 630	3 450	320	1 800	670
493,3	—	—	15	455	476	500	585	3	3	1 630	3 450	320	1 800	670
513,5	—	—	—	463	488	518	627	5	5	1 560	2 750	244	1 600	850
513,5	24	45	—	463	488	518	627	5	5	1 560	2 750	244	1 600	850
513,5	—	—	—	463	488	518	627	5	5	1 560	2 750	244	1 600	850
513,5	24	45	—	463	488	518	627	5	5	1 560	2 750	244	1 600	850
503,5	—	—	—	472	490	508	568	2,5	2,5	670	1 430	125	2 000	—
503,5	18	32	—	472	490	508	568	2,5	2,5	670	1 430	125	2 000	—
503,5	—	—	—	472	490	508	568	2,5	2,5	670	1 430	125	2 000	—
503,5	18	32	—	472	490	508	568	2,5	2,5	670	1 430	125	2 000	—
503,5	—	—	—	472	490	508	568	2,5	2,5	980	2 360	213	1 800	700
503,5	—	—	—	472	490	508	568	2,5	2,5	980	2 360	213	1 800	700
503,5	—	—	14	472	490	508	568	2,5	2,5	980	2 360	213	1 800	700
503,5	—	—	14	472	490	508	568	2,5	2,5	980	2 360	213	1 800	700
514,5	—	—	—	475	498	520	605	3	3	1 020	1 960	173	1 800	—
514,5	24	42	—	475	498	520	605	3	3	1 020	1 960	173	1 800	—
514,5	—	—	—	475	498	520	605	3	3	1 020	1 960	173	1 800	—
514,5	24	42	—	475	498	520	605	3	3	1 020	1 960	173	1 800	—
514,5	—	—	18	475	498	520	605	3	3	1 020	1 960	173	1 800	—
513,3	—	—	—	475	496	520	605	3	3	1 660	3 600	325	1 600	630
513,3	24	39	—	475	496	520	605	3	3	1 660	3 600	325	1 600	630
513,3	—	—	15	475	496	520	605	3	3	1 660	3 600	325	1 600	630
536,4	—	—	—	483	510	541	657	5	5	1 660	3 000	260	1 600	800
536,4	25	48	—	483	510	541	657	5	5	1 660	3 000	260	1 600	800
536,4	—	—	—	483	510	541	657	5	5	1 660	3 000	260	1 600	800
536,4	25	48	—	483	510	541	657	5	5	1 660	3 000	260	1 600	800
536,4	—	—	23	483	510	541	657	5	5	1 660	3 000	260	1 600	800
505	—	—	10,3	—	—	—	3	3	3	1 250	3 350	275	1 900	560



Cylindrical roller bearings with cage

Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing

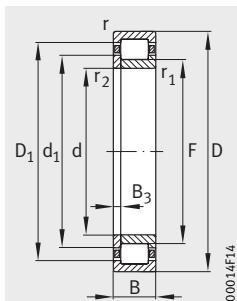
Design 1
NUP
Locating bearing

Design 1
NJ and HJ
Locating bearing

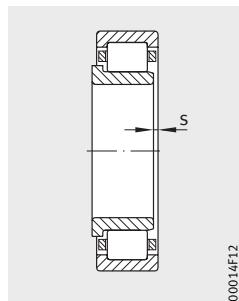
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions							
Bearing	L-section ring		Bearing ≈kg	L-section ring ≈kg	d	D	B	r	r ₁ /r ₂	s ²⁾	F	D ₁
NJ1896-M1	–	1	36	–	480	600	56	3	3	6,6	514	560,5
NJ1896-M1	HJ1896	1	36	5,43	480	600	56	3	3	–	514	560,5
NJ1896-M1A	–	1	36	–	480	600	56	3	3	6,6	514	560,5
NJ1896-M1A	HJ1896	1	36	5,43	480	600	56	3	3	–	514	560,5
NJ2896-M1	–	1	47,2	–	480	600	72	3	3	7,9	514	560,5
NJ2896-M1	HJ2896	1	47,2	5,55	480	600	72	3	3	–	514	560,5
NUP2896-M1	–	1	48,1	–	480	600	72	3	3	–	514	560,5
NJ1996-M1	–	1	76	–	480	650	78	5	5	6,8	525	589
NJ1996-M1	HJ1996	1	76	9,96	480	650	78	5	5	–	525	589
NJ2996-M1	–	1	98,8	–	480	650	100	5	5	6,3	523	593
NJ2996-M1A	–	1	98,8	–	480	650	100	5	5	6,3	523	593
NJ1096-M1	–	1	132	–	480	700	100	6	6	10,7	536	623,9
NJ1096-M1	HJ1096	1	132	14,8	480	700	100	6	6	–	536	623,9
NJ1096-M1A	–	1	132	–	480	700	100	6	6	10,7	536	623,9
NJ1096-M1A	HJ1096	1	132	14,8	480	700	100	6	6	–	536	623,9
NJ18/500-M1	–	1	37,8	–	500	620	56	3	3	6,6	534	580
NJ18/500-M1	HJ18/500	1	37,8	5,78	500	620	56	3	3	–	534	580
NJ18/500-M1A	–	1	37,8	–	500	620	56	3	3	6,6	534	580
NJ18/500-M1A	HJ18/500	1	37,8	5,78	500	620	56	3	3	–	534	580
NJ28/500-M1	–	1	49,3	–	500	620	72	3	3	8	534	580
NUP28/500-M1	–	1	50,3	–	500	620	72	3	3	–	534	580
NJ19/500-M1	–	1	78,4	–	500	670	78	5	5	8,8	545	609
NJ19/500-M1	HJ19/500	1	78,4	10,5	500	670	78	5	5	–	545	609
NUP19/500-M1	–	1	80,2	–	500	670	78	5	5	–	545	609
NUP19/500-M1A	–	1	80,2	–	500	670	78	5	5	–	545	609
NJ10/500-M1	–	1	137	–	500	720	100	6	6	10,7	556	643,9
NJ10/500-M1	HJ10/500	1	137	15,6	500	720	100	6	6	–	556	643,9
NJ10/500-M1A	–	1	137	–	500	720	100	6	6	10,7	556	643,9
NJ10/500-M1A	HJ10/500	1	137	15,6	500	720	100	6	6	–	556	643,9
Z-539187.ZL	–	2 NUP	48,2	–	508	609,6	82,55	4	4	–	529	579
Z-544258.ZL	–	2 NUP	48,6	–	508	609,6	82,55	5,1	5,1	–	528,8	579
Z-544514.ZL	–	2 NUP	53,7	–	508	622,3	79,575	6	6/4	–	532	588,7
Z-544760.ZL	–	2 NUP	59,7	–	508	635	76,2	4	7,5/4	–	544,9	587,6
Z-544002.ZL	–	2 NUP	63,7	–	508,1	622,3	95,25	6	6	–	529	589

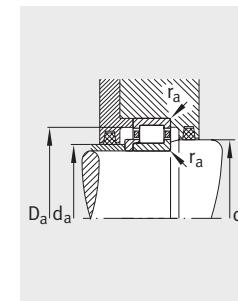
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



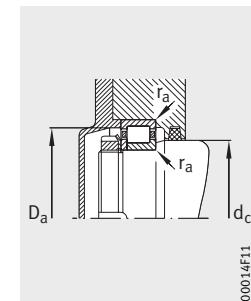
Design 2
NUP
Locating bearing



2) Axial displace-
ment "s" for NJ

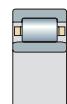


Mounting dimensions
for NJ and HJ
for NJ, page 369



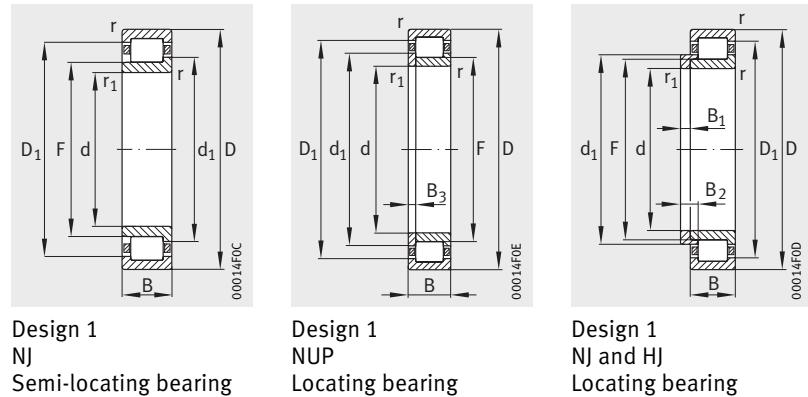
Mounting dimensions
for NUP

				Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed	
d ₁	B ₁	B ₂	B ₃	d _a		d _c	D _a	r _a	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
				min. ¹⁾	max.	min.	max. ¹⁾	max.	max.	max.	max.	max.	min ⁻¹	min ⁻¹
523,5	–	–	–	492	510	528	588	2,5	2,5	680	1 460	126	1 900	–
523,5	18	32	–	492	510	528	588	2,5	2,5	680	1 460	126	1 900	–
523,5	–	–	–	492	510	528	588	2,5	2,5	680	1 460	126	1 900	–
523,5	18	32	–	492	510	528	588	2,5	2,5	680	1 460	126	1 900	–
523,5	–	–	–	492	510	528	588	2,5	2,5	1 000	2 400	215	1 800	670
523,5	18	32	–	492	510	528	588	2,5	2,5	1 000	2 400	215	1 800	670
523,5	–	–	14	492	510	528	588	2,5	2,5	1 000	2 400	216	1 800	670
540	–	–	–	497	521	545	633	4	4	1 140	2 240	196	1 800	–
540	24	43	–	497	521	545	633	4	4	1 140	2 240	196	1 800	–
539	–	–	–	497	519	544	633	4	4	1 900	4 150	380	1 500	560
539	–	–	–	497	519	544	633	4	4	1 900	4 150	380	1 500	560
556,4	–	–	–	503	530	562	677	5	5	1 700	3 100	270	1 500	800
556,4	25	48	–	503	530	562	677	5	5	1 700	3 100	270	1 500	800
556,4	–	–	–	503	530	562	677	5	5	1 700	3 100	270	1 500	800
556,4	25	48	–	503	530	562	677	5	5	1 700	3 100	270	1 500	800
543,5	–	–	–	512	530	549	608	2,5	2,5	695	1 530	130	1 800	–
543,5	18	32	–	512	530	549	608	2,5	2,5	695	1 530	130	1 800	–
543,5	–	–	–	512	530	549	608	2,5	2,5	695	1 530	130	1 800	–
543,5	18	32	–	512	530	549	608	2,5	2,5	695	1 530	130	1 800	–
543,5	–	–	–	512	530	549	608	2,5	2,5	1 020	2 500	222	1 600	630
543,5	–	–	14	512	530	549	608	2,5	2,5	1 020	2 500	222	1 600	630
558,2	–	–	–	517	541	565	653	4	4	1 160	2 320	200	1 600	–
558,2	24	43	–	517	541	565	653	4	4	1 160	2 320	200	1 600	–
558,2	–	–	19	517	541	565	653	4	4	1 160	2 320	200	1 600	–
558,2	–	–	19	517	541	565	653	4	4	1 160	2 320	200	1 600	–
558,2	–	–	19	517	541	565	653	4	4	1 160	2 320	200	1 600	–
576,4	–	–	–	523	550	582	697	5	5	1 760	3 200	275	1 500	750
576,4	25	48	–	523	550	582	697	5	5	1 760	3 200	275	1 500	750
576,4	–	–	–	523	550	582	697	5	5	1 760	3 200	275	1 500	750
576,4	25	48	–	523	550	582	697	5	5	1 760	3 200	275	1 500	750
540,5	–	–	11,3	–	–	–	–	3	3	1 290	3 250	255	1 000	–
540,8	–	–	11,3	–	–	–	–	4	4	1 340	3 450	270	1 600	530
545,1	–	–	12,2	–	–	–	–	5	5/3	1 370	3 150	250	1 600	530
555	–	–	12,1	–	–	–	–	3	6/3	1 140	3 050	244	1 600	530
542,8	–	–	11,6	–	–	–	–	5	5	1 760	4 250	275	1 600	–



Cylindrical roller bearings with cage

Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing

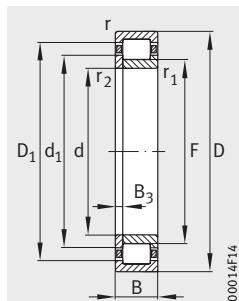
Design 1
NUP
Locating bearing

Design 1
NJ and HJ
Locating bearing

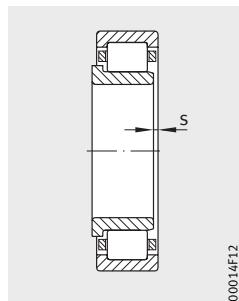
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions							
Bearing	L-section ring		Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r ₁ /r ₂ min.	s ²⁾	F	D ₁ ≈
NJ18/530-M1	-	1	39,3	-	530	650	56	3	3	8,5	564	610,5
NJ18/530-M1	HJ18/530	1	39,3	6,11	530	650	56	3	3	-	564	610,5
NJ18/530-M1A	-	1	39,3	-	530	650	56	3	3	8,5	564	610,5
NJ18/530-M1A	HJ18/530	1	39,3	6,11	530	650	56	3	3	-	564	610,5
NJ28/530-M1	-	1	51,6	-	530	650	72	3	3	8	564	610,5
NJ28/530-M1A	-	1	51,6	-	530	650	72	3	3	8	564	610,5
NUP28/530-M1	-	1	52,6	-	530	650	72	3	3	-	564	610,5
NUP28/530-M1A	-	1	52,6	-	530	650	72	3	3	-	564	610,5
NJ19/530-M1	-	1	91,9	-	530	710	82	5	5	9,3	578	645,2
NJ19/530-M1	HJ19/530	1	91,9	12,4	530	710	82	5	5	-	578	645,2
NJ10/530-M1	-	1	193	-	530	780	112	6	6	10,2	591	696
NJ10/530-M1	HJ10/530	1	193	19,1	530	780	112	6	6	-	591	696
NJ10/530-M1A	-	1	193	-	530	780	112	6	6	10,2	591	696
NJ10/530-M1A	HJ10/530	1	193	19,1	530	780	112	6	6	-	591	696
Z-544001.ZL	-	2 NUP	101	-	533,4	685,8	101,6	3	6/3	-	570	636,5
Z-544515.ZL	-	2 NUP	66,5	-	546,1	660,4	92,08	5	5	-	571	627,6
Z-544759.ZL	-	2 NUP	81,4	-	558,8	685,8	100,013	5,5	5,5	-	584,3	648
Z-545998.ZL	-	2 NUP	114	-	558,8	711,2	111,125	3	6/3	-	595	661,8
NJ18/560-M1	-	1	41,5	-	560	680	56	3	3	6,6	594	640
NJ18/560-M1	HJ18/560	1	41,5	6,44	560	680	56	3	3	-	594	640
NJ18/560-M1A	-	1	41,5	-	560	680	56	3	3	6,6	594	640
NJ18/560-M1A	HJ18/560	1	41,5	6,44	560	680	56	3	3	-	594	640
NJ28/560-M1A	-	1	54,4	-	560	680	72	3	3	8	594	640
NUP28/560-M1	-	1	55,5	-	560	680	72	3	3	-	594	640
NJ19/560-M1	-	1	107	-	560	750	85	5	5	9,6	610	682
NJ19/560-M1	HJ19/560	1	107	14,3	560	750	85	5	5	-	610	682
NJ19/560-M1A	-	1	107	-	560	750	85	5	5	9,6	610	682
NJ19/560-M1A	HJ19/560	1	107	14,3	560	750	85	5	5	-	610	682
NJ29/560-M1	-	1	143	-	560	750	112	5	5	6,5	607	687,5
NJ10/560-M1	-	1	216	-	560	820	115	6	6	9,8	626	731
NJ10/560-M1	HJ10/560	1	216	23,5	560	820	115	6	6	-	626	731
NJ10/560-M1A	-	1	216	-	560	820	115	6	6	9,8	626	731
NJ10/560-M1A	HJ10/560	1	216	23,5	560	820	115	6	6	-	626	731
Z-544513.ZL	-	2 NUP	108	-	569,9	723,9	101,6	6	6	-	622	685,5

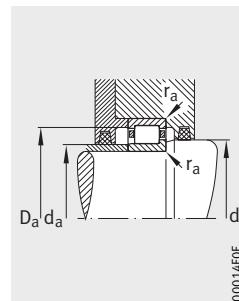
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



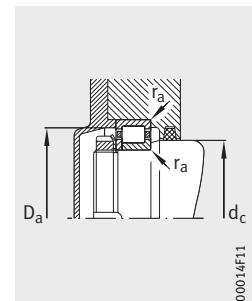
Design 2
NUP
Locating bearing



2) Axial displace-
ment "s" for NJ

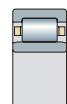


Mounting dimensions
for NJ
for NJ and HJ, page 371



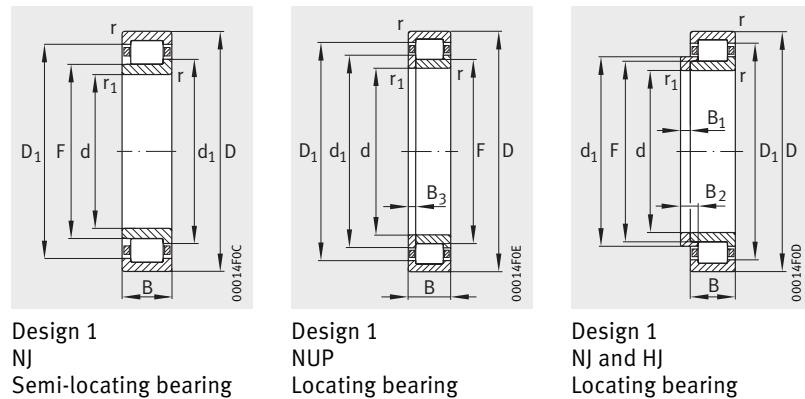
Mounting dimensions
for NUP

d ₁ ≈	B ₁	B ₂	B ₃	Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed	
				d _a min. ¹⁾	d _a max.	d _c min.	d _c max. ¹⁾	D _a max.	r _a max.	r _{a1} max.	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹
573,5	—	—	—	542	560	579	638	2,5	2,5	720	1 660	138	1 800	—
573,5	18	32	—	542	560	579	638	2,5	2,5	720	1 660	138	1 800	—
573,5	—	—	—	542	560	579	638	2,5	2,5	720	1 660	138	1 800	—
573,5	18	32	—	542	560	579	638	2,5	2,5	720	1 660	138	1 800	—
573,5	—	—	—	542	560	579	638	2,5	2,5	1 060	2 700	237	1 500	600
573,5	—	—	—	542	560	579	638	2,5	2,5	1 060	2 700	237	1 500	600
573,5	—	—	14	542	560	579	638	2,5	2,5	1 060	2 700	236	1 500	600
573,5	—	—	14	542	560	579	638	2,5	2,5	1 060	2 700	236	1 500	600
592	—	—	—	547	574	599	693	4	4	1 290	2 650	224	1 500	—
592	25	45	—	547	574	599	693	4	4	1 290	2 650	224	1 500	—
615	—	—	—	553	585	621	757	5	5	2 500	4 550	390	1 300	630
615	26	48	—	553	585	621	757	5	5	2 500	4 550	390	1 300	630
615	—	—	—	553	585	621	757	5	5	2 500	4 550	390	1 300	630
615	26	48	—	553	585	621	757	5	5	2 500	4 550	390	1 300	630
585,4	—	—	13,3	—	—	—	2,5	5/2,5	2,5	2 040	4 800	375	1 400	450
584,5	—	—	12	—	—	—	—	4	4	1 700	4 400	345	1 500	450
599	—	—	14	—	—	—	—	4	4	1 930	4 750	415	1 400	—
610,3	—	—	15,6	—	—	—	—	2,5	5/2,5	2 200	5 400	415	1 400	430
603,5	—	—	—	572	590	609	668	2,5	2,5	735	1 700	139	1 600	—
603,5	18	32	—	572	590	609	668	2,5	2,5	735	1 700	139	1 600	—
603,5	—	—	—	572	590	609	668	2,5	2,5	735	1 700	139	1 600	—
603,5	18	32	—	572	590	609	668	2,5	2,5	735	1 700	139	1 600	—
603,5	—	—	—	572	590	609	668	2,5	2,5	1 060	2 750	238	1 500	560
603,5	—	—	14	572	590	609	668	2,5	2,5	1 060	2 750	238	1 500	560
625	—	—	—	577	606	632	733	4	4	1 460	3 000	244	1 400	—
625	26	46	—	577	606	632	733	4	4	1 460	3 000	244	1 400	—
625	—	—	—	577	606	632	733	4	4	1 460	3 000	244	1 400	—
625	26	46	—	577	606	632	733	4	4	1 460	3 000	244	1 400	—
625	—	—	—	577	603	630	733	4	4	2 450	5 500	475	1 400	450
650	—	—	—	583	620	657	797	5	5	2 700	5 100	435	1 200	600
650	30	50	—	583	620	657	797	5	5	2 700	5 100	435	1 200	600
650	—	—	—	583	620	657	797	5	5	2 700	5 100	435	1 200	600
636,7	—	—	14,8	—	—	—	5	5	5	2 000	5 100	385	1 400	400



Cylindrical roller bearings with cage

Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing

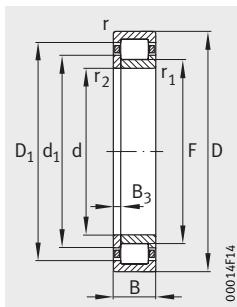
Design 1
NUP
Locating bearing

Design 1
NJ and HJ
Locating bearing

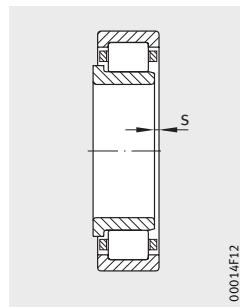
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions							
Bearing	L-section ring		Bearing	L-section ring ≈kg	d	D	B	r	r ₁ /r ₂	s ²⁾	F	D ₁
Z-548036.ZL	-	2 NUP	97,3	-	570	720	95	3	3	-	608	671,5
Z-544257.ZL	-	2 NUP	75	-	571,5	685,1	101,6	6	6	-	594,5	651
Z-547424.ZL	-	2 NUP	115	-	571,5	711,2	120,65	5	5	-	601,5	668,3
Z-544427.ZL	-	2 NUP	107	-	571,5	723,9	101,6	6	6	-	609,5	675,9
Z-543431.ZL	-	2 NUP	91,1	-	588,724	711,2	88,9	6	6	-	589	669
Z-545612.ZL	-	2 NUP	98,4	-	596,9	736,6	101,6	6	6	-	624,5	694,5
NJ18/600-M1	-	1	51,7	-	600	730	60	3	3	7	637	687
NJ18/600-M1	HJ18/600	1	51,7	8,22	600	730	60	3	3	-	637	687
NJ18/600-M1A	-	1	51,7	-	600	730	60	3	3	7	637	687
NJ18/600-M1A	HJ18/600	1	51,7	8,22	600	730	60	3	3	-	637	687
NJ28/600-M1	-	1	63,4	-	600	730	78	3	3	8,5	637	687
NUP28/600-M1	-	1	69,8	-	600	730	78	3	3	-	637	687
NJ19/600-M1	-	1	128	-	600	800	90	5	5	9,9	652	730,7
NJ19/600-M1	HJ19/600	1	128	15,9	600	800	90	5	5	-	652	730,7
NJ19/600-M1A	-	1	128	-	600	800	90	5	5	9,9	652	730,7
NJ19/600-M1A	HJ19/600	1	128	15,9	600	800	90	5	5	-	652	730,7
NJ29/600-E-M1	-	1	174	-	600	800	118	5	5	8,4	649	739
NJ10/600-M1	-	1	246	-	600	870	118	6	6	10,6	667	776
NJ10/600-M1	HJ10/600	1	246	26,4	600	870	118	6	6	-	667	776
NJ10/600-M1A	-	1	246	-	600	870	118	6	6	10,6	667	776
NJ10/600-M1A	HJ10/600	1	246	26,4	600	870	118	6	6	-	667	776
NJ18/630-M1	-	1	73,4	-	630	780	69	4	4	8,4	672	732
NJ18/630-M1	HJ18/630	1	73,4	10,4	630	780	69	4	4	-	672	732
NJ18/630-M1A	-	1	73,4	-	630	780	69	4	4	8,4	672	732
NJ18/630-M1A	HJ18/630	1	73,4	10,4	630	780	69	4	4	-	672	732
NJ28/630-M1	-	1	96,2	-	630	780	88	4	4	8,7	672	732
NJ28/630-M1A	-	1	96,2	-	630	780	88	4	4	8,7	672	732
NUP28/630-M1	-	1	97,7	-	630	780	88	4	4	-	672	732
NUP28/630-M1A	-	1	97,7	-	630	780	88	4	4	-	672	732
NJ19/630-M1	-	1	166	-	630	850	100	6	6	8,5	688	771
NJ19/630-M1	HJ19/630	1	166	18,9	630	850	100	6	6	-	688	771
NUP19/630-M1	-	1	172	-	630	850	100	6	6	-	688	771
NJ29/630-E-M1	-	1	213	-	630	850	128	6	6	10,3	683	784
NJ29/630-E-M1A	-	1	213	-	630	850	128	6	6	10,3	683	784
NJ10/630-M1	-	1	294	-	630	920	128	7,5	7,5	11,7	700	826,2

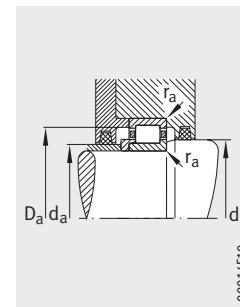
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



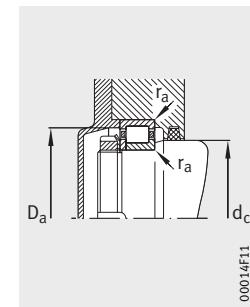
Design 2
NUP
Locating bearing



2) Axial displace-
ment "s" for NJ



Mounting dimensions
for NJ and HJ
for NJ, page 373



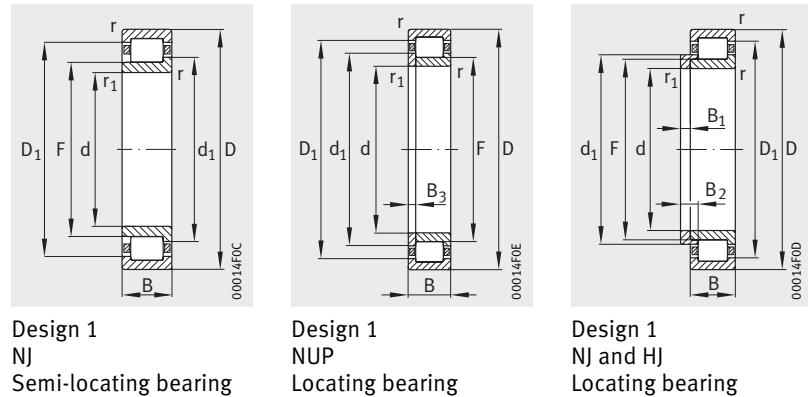
Mounting dimensions
for NUP

				Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed	
d ₁	B ₁	B ₂	B ₃	d _a		d _c	D _a	r _a	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
				min. ¹⁾	max.	min.	max. ¹⁾	max.	max.	max.	max.	max.	min ⁻¹	min ⁻¹
622,5	–	–	15	–	–	–	–	2	2	1 800	4 300	375	1 400	–
608	–	–	13,3	–	–	–	–	5	5	1 860	4 900	385	1 400	430
616,9	–	–	12,8	–	–	–	–	4	4	2 500	6 400	570	1 400	–
624,8	–	–	13,3	–	–	–	–	5	5	2 120	5 200	395	1 400	400
607	–	–	12	–	–	–	–	5	5	2 080	4 400	380	1 400	430
640,5	–	–	13,3	–	–	–	–	5	5	2 200	5 300	455	1 400	–
647	–	–	–	612	632	654	718	2,5	2,5	850	2 000	161	1 500	–
647	20	35	–	612	632	654	718	2,5	2,5	850	2 000	161	1 500	–
647	–	–	–	612	632	654	718	2,5	2,5	850	2 000	161	1 500	–
647	20	35	–	612	632	654	718	2,5	2,5	850	2 000	161	1 500	–
647	–	–	–	612	632	654	718	2,5	2,5	1 250	3 350	280	1 400	500
647	–	–	15	612	632	654	718	2,5	2,5	1 250	3 350	280	1 400	500
667,5	–	–	–	617	647	675	783	4	4	1 700	3 450	280	1 400	–
667,5	26	47	–	617	647	675	783	4	4	1 700	3 450	280	1 400	–
667,5	–	–	–	617	647	675	783	4	4	1 700	3 450	280	1 400	–
667,5	26	47	–	617	647	675	783	4	4	1 700	3 450	280	1 400	–
666	–	–	–	617	645	674	783	4	4	3 000	6 700	570	1 200	400
693,5	–	–	–	623	661	699	847	5	5	2 850	5 400	440	1 100	530
693,5	30	51,5	–	623	661	699	847	5	5	2 850	5 400	440	1 100	530
693,5	–	–	–	623	661	699	847	5	5	2 850	5 400	440	1 100	530
693,5	30	51,5	–	623	661	699	847	5	5	2 850	5 400	440	1 100	530
684	–	–	–	645	667	691	765	3	3	1 140	2 600	212	1 400	–
684	20,5	37	–	645	667	691	765	3	3	1 140	2 600	212	1 400	–
684	–	–	–	645	667	691	765	3	3	1 140	2 600	212	1 400	–
684	20,5	37	–	645	667	691	765	3	3	1 140	2 600	212	1 400	–
684	–	–	–	645	667	691	765	3	3	1 700	4 400	370	1 300	430
684	–	–	–	645	667	691	765	3	3	1 700	4 400	370	1 300	430
684	–	–	15	645	667	691	765	3	3	1 700	4 400	370	1 300	430
684	–	–	15	645	667	691	765	3	3	1 700	4 400	370	1 300	430
705	–	–	–	653	683	713	827	5	5	1 900	3 900	320	1 300	–
705	26	50	–	653	683	713	827	5	5	1 900	3 900	320	1 300	–
705	–	–	24	653	683	713	827	5	5	1 900	3 900	320	1 300	–
702,5	–	–	–	653	678	710,4	827	5	5	3 350	7 350	540	1 100	380
702,5	–	–	–	653	678	710,4	827	5	5	3 350	7 350	540	1 100	380
728	–	–	–	658	694	734	892	6	6	3 250	6 200	495	1 100	500



Cylindrical roller bearings with cage

Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing

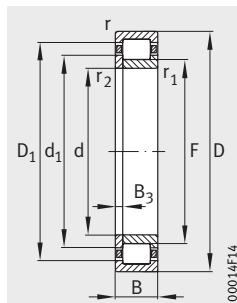
Design 1
NUP
Locating bearing

Design 1
NJ and HJ
Locating bearing

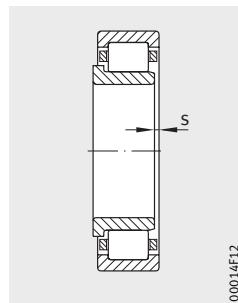
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions							
Bearing	L-section ring		Bearing	L-section ring ≈kg	d	D	B	r	r ₁ /r ₂	s ²⁾	F	D ₁
NJ10/630-M1	HJ10/630	1	294	30,7	630	920	128	7,5	7,5	—	700	826,2
NJ10/630-M1A	—	1	294	—	630	920	128	7,5	7,5	11,7	700	826,2
NJ10/630-M1A	HJ10/630	1	294	30,7	630	920	128	7,5	7,5	—	700	826,2
Z-546151.ZL	—	2 NUP	142	—	647,7	825,5	101,6	6	6	—	686,6	770,2
Z-544979.ZL	—	2 NUP	130	—	660,4	812,8	107,95	6	6	—	698,5	765,3
Z-544000.ZL	—	2 NUP	180	—	660,4	863,6	107,95	6	6	—	698,5	805,9
Z-544428.ZL	—	2 NUP	195	—	660,4	866,775	114,3	6	6	—	705	805,5
Z-544426.ZL	—	2 NUP	122	—	660,406	812,8	101,6	6	6	—	698,5	765,3
Z-543432.ZL	—	2 NUP	134	—	666,75	812,8	120,65	5	5	—	696	769,5
NJ18/670-M1	—	1	77,6	—	670	820	69	4	4	7,8	712	772
NJ18/670-M1	HJ18/670	1	77,6	10,9	670	820	69	4	4	—	712	772
NJ18/670-M1A	—	1	77,6	—	670	820	69	4	4	7,8	712	772
NJ18/670-M1A	HJ18/670	1	77,6	10,9	670	820	69	4	4	—	712	772
NJ28/670-M1	—	1	102	—	670	820	88	4	4	8,7	712	772
NJ28/670-M1A	—	1	102	—	670	820	88	4	4	8,7	712	772
NUP28/670-M1	—	1	103	—	670	820	88	4	4	—	712	772
NUP28/670-M1A	—	1	103	—	670	820	88	4	4	—	712	772
NUP19/670-M1	—	1	194	—	670	900	103	6	6	—	731	817
NJ10/670-M1	—	1	356	—	670	980	136	7,5	7,5	12,7	745	876,2
NJ10/670-M1	HJ10/670	1	356	35,1	670	980	136	7,5	7,5	—	745	876,2
NJ10/670-M1A	—	1	356	—	670	980	136	7,5	7,5	12,7	745	876,2
NJ10/670-M1A	HJ10/670	1	356	35,1	670	980	136	7,5	7,5	—	745	876,2
Z-546109.ZL	—	2 NUP	161	—	673,1	838,2	117,475	5	5	—	712	787,2
NJ18/710-M1	—	1	93,7	—	710	870	74	4	4	7,9	753	820
NJ18/710-M1	HJ18/710	1	93,7	12,6	710	870	74	4	4	—	753	820
NJ18/710-M1A	—	1	93,7	—	710	870	74	4	4	7,9	753	820
NJ18/710-M1A	HJ18/710	1	93,7	12,6	710	870	74	4	4	—	753	820
NJ28/710-M1	—	1	124	—	710	870	95	4	4	8,7	753	820
NJ28/710-M1A	—	1	124	—	710	870	95	4	4	8,7	753	820
NUP28/710-M1	—	1	126	—	710	870	95	4	4	—	753	820
NUP28/710-M1A	—	1	126	—	710	870	95	4	4	—	753	820
NJ19/710-M1	—	1	218	—	710	950	106	6	6	9,3	774	867,7
NJ19/710-M1	HJ19/710	1	218	26,4	710	950	106	6	6	—	774	867,7
NJ19/710-M1A	—	1	218	—	710	950	106	6	6	9,3	774	867,7
NJ19/710-M1A	HJ19/710	1	218	26,4	710	950	106	6	6	—	774	867,7

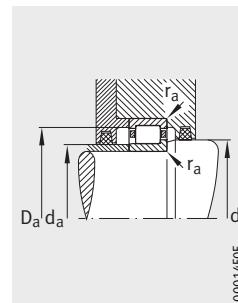
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



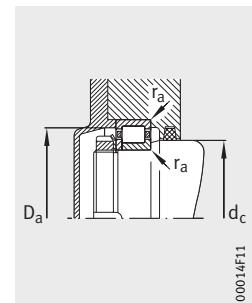
Design 2
NUP
Locating bearing



2) Axial displace-
ment "s" for NJ



Mounting dimensions
for NJ
for NJ and HJ, page 375



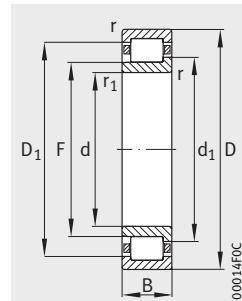
Mounting dimensions
for NUP

d ₁ ≈	B ₁	B ₂	B ₃	Mounting dimensions					Basic load ratings		Fatigue limit load C _{ur} kN	Limiting speed n _G min ⁻¹	Reference speed n _B min ⁻¹	
				d _a min. ¹⁾	d _a max.	d _c min.	d _c max. ¹⁾	D _a max.	r _a max.	r _{a1} max.	dyn. C _r kN	stat. C _{0r} kN		
728	31	55	–	658	694	734	892	6	6	3 250	6 200	495	1 100	500
728	–	–	–	658	694	734	892	6	6	3 250	6 200	495	1 100	500
728	31	55	–	658	694	734	892	6	6	3 250	6 200	495	1 100	500
705,6	–	–	16,8	–	–	–	–	5	5	2 360	5 300	385	1 200	360
714,3	–	–	14	–	–	–	–	5	5	2 400	6 300	470	1 200	340
722,9	–	–	16,5	–	–	–	–	5	5	2 850	5 700	405	1 100	360
727,5	–	–	14,7	–	–	–	–	5	5	3 100	6 700	485	1 100	320
713,8	–	–	13,3	–	–	–	–	5	5	2 240	6 000	435	1 200	340
713	–	–	10,3	–	–	–	–	4	4	3 050	8 000	670	1 200	–
724	–	–	–	685	707	731	805	3	3	1 180	2 750	220	1 400	–
724	20,5	37	–	685	707	731	805	3	3	1 180	2 750	220	1 400	–
724	–	–	–	685	707	731	805	3	3	1 180	2 750	220	1 400	–
724	20,5	37	–	685	707	731	805	3	3	1 180	2 750	220	1 400	–
724	–	–	–	685	707	731	805	3	3	1 760	4 650	385	1 200	400
724	–	–	–	685	707	731	805	3	3	1 760	4 650	385	1 200	400
724	–	–	15	685	707	731	805	3	3	1 760	4 650	385	1 200	400
724	–	–	15	685	707	731	805	3	3	1 760	4 650	385	1 200	400
748,5	–	–	24,5	693	726	757	877	5	5	2 040	4 250	340	1 200	–
774,5	–	–	–	698	739	780	952	6	6	3 750	7 100	540	950	450
774,5	31	56,5	–	698	739	780	952	6	6	3 750	7 100	540	950	450
774,5	–	–	–	698	739	780	952	6	6	3 750	7 100	540	950	450
774,5	31	56,5	–	698	739	780	952	6	6	3 750	7 100	540	950	450
729,2	–	–	13,7	–	–	–	–	4	4	2 750	7 100	–	700	–
766,5	–	–	–	725	748	774	855	3	3	1 400	3 250	260	1 200	–
766,5	21	38	–	725	748	774	855	3	3	1 400	3 250	260	1 200	–
766,5	–	–	–	725	748	774	855	3	3	1 400	3 250	260	1 200	–
766,5	21	38	–	725	748	774	855	3	3	1 400	3 250	260	1 200	–
766,5	–	–	–	725	748	774	855	3	3	2 080	5 500	450	1 100	360
766,5	–	–	–	725	748	774	855	3	3	2 080	5 500	450	1 100	360
766,5	–	–	15	725	748	774	855	3	3	2 080	5 500	450	1 100	360
766,5	–	–	15	725	748	774	855	3	3	2 080	5 500	450	1 100	360
795,1	–	–	–	733	769	800	927	5	5	2 240	4 750	380	1 100	–
795,1	30	55	–	733	769	800	927	5	5	2 240	4 750	380	1 100	–
795,1	–	–	–	733	769	800	927	5	5	2 240	4 750	380	1 100	–
795,1	30	55	–	733	769	800	927	5	5	2 240	4 750	380	1 100	–

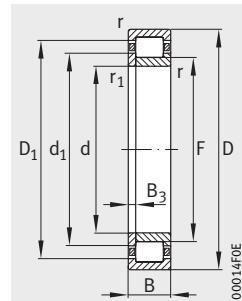


Cylindrical roller bearings with cage

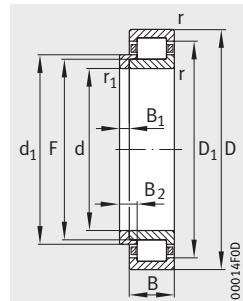
Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing



Design 1
NUP
Locating bearing

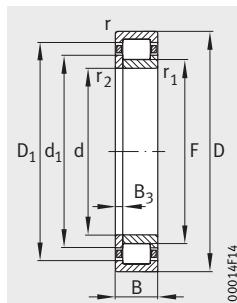


Design 1
NJ and HJ
Locating bearing

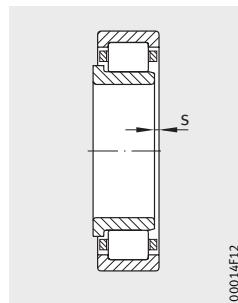
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions							
Bearing	L-section ring		Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r ₁ /r ₂ min.	s ²⁾	F	D ₁ ≈
NUP19/710-M1	–	1	223	–	710	950	106	6	6	–	774	867,7
NUP29/710-M1A	–	1	297	–	710	950	140	6	6	–	770	866
NJ10/710-M1	–	1	407	–	710	1030	140	7,5	7,5	12,6	790	924,5
NJ10/710-M1	HJ10/710	1	407	42,1	710	1030	140	7,5	7,5	–	790	924,5
NJ10/710-M1A	–	1	407	–	710	1030	140	7,5	7,5	12,6	790	924,5
NJ10/710-M1A	HJ10/710	1	407	42,1	710	1030	140	7,5	7,5	–	790	924,5
Z-544519.ZL	–	2 NUP	139	–	711,2	863,6	107,95	6	6	–	739,4	819,5
Z-545611.ZL	–	2 NUP	194	–	711,2	914,4	107,95	6	3,5	–	752,5	853
Z-549125.ZL	–	2 NUP	172	–	723,646	900,113	114,3	6	6	–	760	846,9
Z-545997.ZL	–	2 NUP	183	–	723,9	901,7	120,65	7,5	7,5	–	760,8	847,6
NJ18/750-M1	–	1	111	–	750	920	78	5	5	8,8	799	866
NJ18/750-M1	HJ18/750	1	111	16,5	750	920	78	5	5	–	799	866
NJ18/750-M1A	–	1	112	–	750	920	78	5	5	8,8	799	866
NJ18/750-M1A	HJ18/750	1	112	16,5	750	920	78	5	5	–	799	866
NJ28/750-M1	–	1	146	–	750	920	100	5	5	10	799	866
NJ28/750-M1A	–	1	146	–	750	920	100	5	5	10	799	866
NUP28/750-M1	–	1	149	–	750	920	100	5	5	–	799	866
NUP28/750-M1A	–	1	149	–	750	920	100	5	5	–	799	866
NUP19/750-M1	–	1	256	–	750	1000	112	6	6	–	815	911
NUP19/750-M1A	–	1	256	–	750	1000	112	6	6	–	815	911
NJ10/750-M1	–	1	489	–	750	1090	150	7,5	7,5	13,6	835	978
NJ10/750-M1	HJ10/750	1	489	49,6	750	1090	150	7,5	7,5	–	835	978
NJ10/750-M1A	–	1	489	–	750	1090	150	7,5	7,5	13,6	835	978
NJ10/750-M1A	HJ10/750	1	489	49,6	750	1090	150	7,5	7,5	–	835	978
NJ18/800-M1	–	1	132	–	800	980	82	5	5	8,9	849	923
NJ18/800-M1	HJ18/800	1	134	18,5	800	980	82	5	5	–	849	923
NJ18/800-M1A	–	1	132	–	800	980	82	5	5	8,9	849	923
NJ18/800-M1A	HJ18/800	1	132	18,5	800	980	82	5	5	–	849	923
NJ28/800-M1	–	1	177	–	800	980	106	5	5	9,3	849	923
NUP28/800-M1	–	1	179	–	800	980	106	5	5	–	849	923
NJ19/800-M1	–	1	282	–	800	1060	115	6	6	12,8	870	968,4
NJ19/800-M1	HJ19/800	1	282	34,2	800	1060	115	6	6	–	870	968,4
NJ19/800-M1A	–	1	282	–	800	1060	115	6	6	12,8	870	968,4
NJ19/800-M1A	HJ19/800	1	282	34,2	800	1060	115	6	6	–	870	968,4
NUP19/800-M1	–	1	288	–	800	1060	115	6	6	–	870	968,4

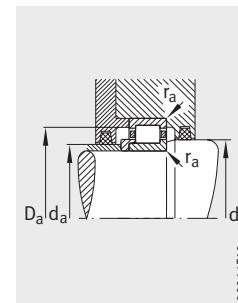
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



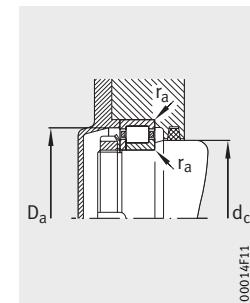
Design 2
NUP
Locating bearing



2) Axial displace-
ment "s" for NJ



Mounting dimensions
for NJ and HJ
for NJ, page 377



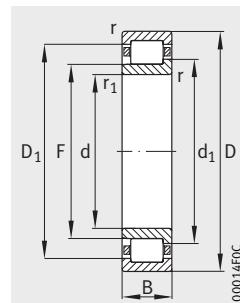
Mounting dimensions
for NUP

d ₁ ≈	B ₁	B ₂	B ₃	Mounting dimensions					Basic load ratings		Fatigue limit load C _{ur} kN	Limiting speed n _G min ⁻¹	Reference speed n _B min ⁻¹	
				d _a min. ¹⁾	d _a max.	d _c min.	d _c max. ¹⁾	D _a max.	r _a max.	r _{a1} max.	dyn. C _r kN	stat. C _{0r} kN		
795,1	–	–	25	733	769	800	927	5	5	2 240	4 750	380	1 100	–
789,5	–	–	20	733	765	798	927	5	5	3 750	8 800	710	1 000	320
819,5	–	–	–	738	784	824	1 002	6	6	4 050	8 000	620	950	430
819,5	35	58	–	738	784	824	1 002	6	6	4 050	8 000	620	950	430
819,5	–	–	–	738	784	824	1 002	6	6	4 050	8 000	620	950	430
819,5	35	58	–	738	784	824	1 002	6	6	4 050	8 000	620	950	430
757,6	–	–	14	–	–	–	–	5	5	2 750	6 800	550	1 100	–
776,4	–	–	14	–	–	–	–	5	3	3 050	6 700	475	1 100	300
779,7	–	–	18,2	–	–	–	–	5	5	2 800	6 700	480	1 100	320
780,5	–	–	15,3	–	–	–	–	6	6	3 200	7 800	560	1 100	300
812,5	–	–	–	767	794	820	903	4	4	1 430	3 450	270	1 100	–
812,5	24	43	–	767	794	820	903	4	4	1 430	3 450	270	1 100	–
812,5	–	–	–	767	794	820	903	4	4	1 430	3 450	270	1 100	–
812,5	24	43	–	767	794	820	903	4	4	1 430	3 450	270	1 100	–
812,5	–	–	–	767	790	816	903	4	4	2 160	5 850	470	1 100	340
812,5	–	–	–	767	790	816	903	4	4	2 160	5 850	470	1 100	340
812,5	–	–	17,5	767	790	816	903	4	4	2 160	5 850	470	1 100	340
812,5	–	–	17,5	767	790	816	903	4	4	2 160	5 850	470	1 100	340
834,5	–	–	26	773	810	843	977	5	5	2 500	5 300	415	1 100	–
834,5	–	–	26	773	810	843	977	5	5	2 500	5 300	415	1 100	–
866	–	–	–	778	829	872	1 062	6	6	4 500	9 000	680	850	400
866	36	63,5	–	778	829	872	1 062	6	6	4 500	9 000	680	850	400
866	–	–	–	778	829	872	1 062	6	6	4 500	9 000	680	850	400
866	36	63,5	–	778	829	872	1 062	6	6	4 500	9 000	680	850	400
864	–	–	–	817	844	872	963	4	4	1 760	4 150	315	1 100	–
864	24,5	43	–	817	844	872	963	4	4	1 760	4 150	315	1 100	–
864	–	–	–	817	844	872	963	4	4	1 760	4 150	315	1 100	–
864	24,5	43	–	817	844	872	963	4	4	1 760	4 150	315	1 100	–
864	–	–	–	817	844	872	963	4	4	2 700	7 200	570	1 000	300
864	–	–	15,5	817	844	872	963	4	4	2 700	7 200	560	1 000	300
889,5	–	–	–	823	865	898	1 037	5	5	2 600	5 700	445	1 000	–
889,5	31,5	59	–	823	865	898	1 037	5	5	2 600	5 700	445	1 000	–
889,5	–	–	–	823	865	898	1 037	5	5	2 600	5 700	445	1 000	–
889,5	31,5	59	–	823	865	898	1 037	5	5	2 600	5 700	440	1 000	–
889,5	–	–	27,5	823	865	898	1 037	5	5	2 600	5 700	440	1 000	–

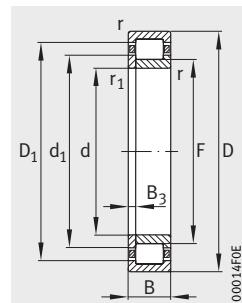


Cylindrical roller bearings with cage

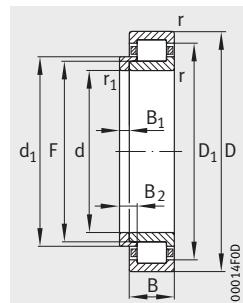
Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing



Design 1
NUP
Locating bearing

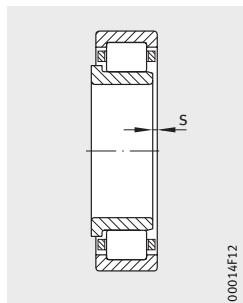


Design 1
NJ and HJ
Locating bearing

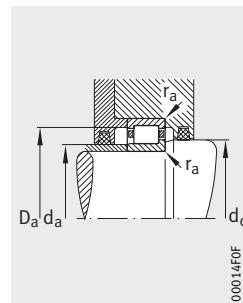
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions							
Bearing	L-section ring		Bearing ≈kg	L-section ring ≈kg	d	D	B	r	r ₁	s ²⁾	F	D ₁ ≈
NUP19/800-M1A	–	1	288	–	800	1 060	115	6	6	–	870	968,4
NJ29/800-M1	–	1	383	–	800	1 060	150	6	6	13,3	865	969
NJ29/800-M1A	–	1	383	–	800	1 060	150	6	6	13,3	865	969
NUP29/800-M1	–	1	383	–	800	1 060	150	6	6	13,3	865	969
NJ10/800-M1	–	1	567	–	800	1 150	155	7,5	7,5	13,6	885	1 036
NJ10/800-M1	HJ10/800	1	567	56,5	800	1 150	155	7,5	7,5	–	885	1 036
NJ10/800-M1A	–	1	567	–	800	1 150	155	7,5	7,5	13,6	885	1 036
NJ10/800-M1A	HJ10/800	1	567	56,5	800	1 150	155	7,5	7,5	–	885	1 036
NJ18/850-M1	–	1	140	–	850	1 030	82	5	5	9	895	970
NJ18/850-M1	HJ18/850	1	140	18,5	850	1 030	82	5	5	–	895	970
NJ18/850-M1A	–	1	140	–	850	1 030	82	5	5	9	895	970
NJ18/850-M1A	HJ18/850	1	140	18,5	850	1 030	82	5	5	–	895	970
NJ28/850-M1	–	1	187	–	850	1 030	106	5	5	9,3	895	970
NJ28/850-M1	HJ28/850	1	187	18,4	850	1 030	106	5	5	–	895	970
NJ28/850-M1A	–	1	187	–	850	1 030	106	5	5	9,3	895	970
NJ28/850-M1A	HJ28/850	1	187	18,4	850	1 030	106	5	5	–	895	970
NUP28/850-M1	–	1	190	–	850	1 030	106	5	5	–	895	970
NUP28/850-M1A	–	1	190	–	850	1 030	106	5	5	–	895	970
NJ19/850-M1	–	1	321	–	850	1 120	118	6	6	12,6	921	1 024,1
NJ19/850-M1	HJ19/850	1	321	39,7	850	1 120	118	6	6	–	921	1 024,1
NJ29/850-M1	–	1	432	–	850	1 120	155	6	6	8,6	917	1 031,5
NJ29/850-M1A	–	1	432	–	850	1 120	155	6	6	8,6	917	1 031,5
NJ10/850-M1	–	1	669	–	850	1 220	165	7,5	7,5	13,5	945	1 096,2
NJ10/850-M1	HJ10/850	1	669	67,3	850	1 220	165	7,5	7,5	–	945	1 096,2
NJ18/900-M1	–	1	163	–	900	1 090	85	5	5	9	951	1 031
NJ18/900-M1	HJ18/900	1	163	21,8	900	1 090	85	5	5	–	951	1 031
NJ28/900-M1	–	1	220	–	900	1 090	112	5	5	9,5	951	1 031
NJ28/900-M1A	–	1	220	–	900	1 090	112	5	5	9,5	951	1 031
NUP28/900-M1	–	1	223	–	900	1 090	112	5	5	–	951	1 031
NUP28/900-M1A	–	1	223	–	900	1 090	112	5	5	–	951	1 031
NJ29/900-M1	–	1	504	–	900	1 180	165	6	6	13,3	970	1 088
NJ29/900-M1A	–	1	504	–	900	1 180	165	6	6	13,3	970	1 088

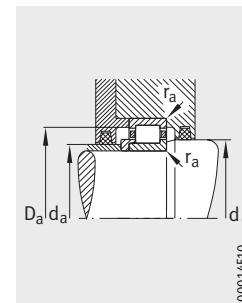
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



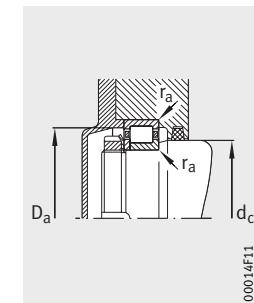
2) Axial displace-
ment "s" for NJ



Mounting dimensions
for NJ



Mounting dimensions
for NJ and HJ



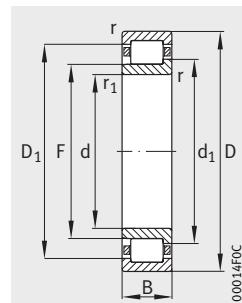
Mounting dimensions
for NUP

d ₁ ≈	B ₁	B ₂	B ₃	Mounting dimensions					Basic load ratings		Fatigue limit load C _{ur} kN	Limiting speed n _G min ⁻¹	Reference speed n _B min ⁻¹	
				d _a min. ¹⁾	d _a max.	d _c min.	d _a max. ¹⁾	r _a max.	r _{a1} max.	dyn. C _r kN	stat. C _{0r} kN			
889,5	–	–	27,5	823	865	898	1 037	5	5	2 600	5 700	440	1 000	–
886	–	–	–	823	860	895	1 037	5	5	4 250	10 000	780	900	280
886	–	–	–	823	860	895	1 037	5	5	4 250	10 000	780	900	280
886	–	–	22,5	823	860	895	1 037	5	5	4 250	10 000	780	900	280
918	–	–	–	828	879	924	1 122	6	6	5 000	10 000	750	800	360
918	38	65,5	–	828	879	924	1 122	6	6	5 000	10 000	750	800	360
918	–	–	–	828	879	924	1 122	6	6	5 000	10 000	750	800	360
918	38	65,5	–	828	879	924	1 122	6	6	5 000	10 000	750	800	360
910	–	–	–	867	894	922	1 013	4	4	1 800	4 400	330	1 000	–
910	24,5	43	–	867	894	922	1 013	4	4	1 800	4 400	330	1 000	–
910	–	–	–	867	894	922	1 013	4	4	1 800	4 400	330	1 000	–
910	24,5	43	–	867	894	922	1 013	4	4	1 800	4 400	330	1 000	–
910	–	–	–	867	890	918	1 013	4	4	2 750	7 650	590	950	280
910	25	40,5	–	867	890	918	1 013	4	4	2 750	7 650	590	950	280
910	–	–	–	867	890	918	1 013	4	4	2 750	7 650	590	950	280
910	25	40,5	–	867	890	918	1 013	4	4	2 750	7 650	590	950	280
910	–	–	15,5	867	890	918	1 013	4	4	2 750	7 650	590	950	280
910	–	–	15,5	867	890	918	1 013	4	4	2 750	7 650	590	950	280
941,5	–	–	–	873	916	950	1 097	5	5	2 900	6 400	490	950	–
941,5	34	61	–	873	916	950	1 097	5	5	2 900	6 400	490	950	–
939	–	–	–	873	912	948	1 097	5	5	4 750	11 600	890	850	260
939	–	–	–	873	912	948	1 097	5	5	4 750	11 600	890	850	260
978	–	–	–	878	938	984	1 192	6	6	5 600	11 800	890	750	320
978	40	67,5	–	878	938	984	1 192	6	6	5 600	11 800	890	750	320
967	–	–	–	917	946	975	1 073	4	4	2 040	5 100	370	950	–
967	24,5	43	–	917	946	975	1 073	4	4	2 040	5 100	370	950	–
967	–	–	–	917	946	975	1 073	4	4	3 100	8 800	660	850	260
967	–	–	–	917	946	975	1 073	4	4	3 100	8 800	660	850	260
967	–	–	15,5	917	946	975	1 073	4	4	3 100	8 800	660	850	260
967	–	–	15,5	917	946	975	1 073	4	4	3 100	8 800	660	850	260
992	–	–	–	923	965	1 003	1 157	5	5	5 400	13 400	1 010	800	220
992	–	–	–	923	965	1 003	1 157	5	5	5 400	13 400	1 010	800	220

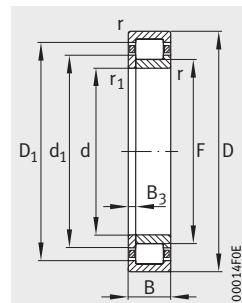


Cylindrical roller bearings with cage

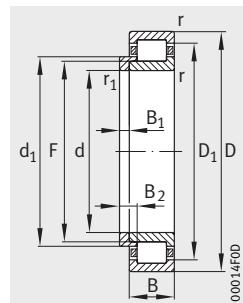
Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing



Design 1
NUP
Locating bearing

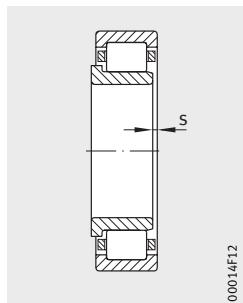


Design 1
NJ and HJ
Locating bearing

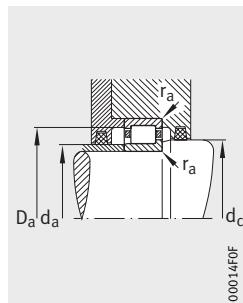
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions							
Bearing	L-section ring		Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r ₁ min.	s ²⁾	F	D ₁ ≈
NJ10/900-M1	-	1	740	-	900	1 280	170	7,5	7,5	13,5	990	1 158
NJ10/900-M1	HJ10/900	1	740	75,5	900	1 280	170	7,5	7,5	-	990	1 158
NJ18/950-M1	-	1	192	-	950	1 150	90	5	5	9,5	1 004	1 088
NJ18/950-M1	HJ18/950	1	192	26,3	950	1 150	90	5	5	-	1 004	1 088
NJ28/950-M1	-	1	261	-	950	1 150	118	5	5	9,8	1 004	1 088
NUP28/950-M1	-	1	265	-	950	1 150	118	5	5	-	1 004	1 088
NJ29/950-M1	-	1	603	-	950	1 250	175	7,5	7,5	14,5	1 025	1 151
NJ10/950-M1	-	1	911	-	950	1 360	180	7,5	7,5	13,5	1 055	1 223
NJ10/950-M1	HJ10/950	1	911	91,7	950	1 360	180	7,5	7,5	-	1 055	1 223
NJ18/1000-M	-	1	247	-	1 000	1 220	100	6	6	10,3	1 058	1 150
NJ18/1000-M	HJ18/1000	1	247	33,6	1 000	1 220	100	6	6	-	1 058	1 150
NUP18/1000-M	-	1	252	-	1 000	1 220	100	6	6	-	1 058	1 150
NJ28/1000-M	-	1	328	-	1 000	1 220	128	6	6	11	1 058	1 150
NUP28/1000-M	-	1	332	-	1 000	1 220	128	6	6	-	1 058	1 150
NUP28/1000-MA	-	1	332	-	1 000	1 220	128	6	6	-	1 058	1 150
NJ10/1000-M1	-	1	1 030	-	1 000	1 420	185	7,5	7,5	14,5	1 105	1 281
NJ10/1000-M1	HJ10/1000	1	1 030	103	1 000	1 420	185	7,5	7,5	-	1 105	1 281
NJ18/1060-M	-	1	264	-	1 060	1 280	100	6	6	10,3	1 118	1 210
NJ18/1060-M	HJ18/1060	1	264	37,6	1 060	1 280	100	6	6	-	1 118	1 210
NJ28/1060-M	-	1	346	-	1 060	1 280	128	6	6	11	1 118	1 210
NUP28/1060-M	-	1	350	-	1 060	1 280	128	6	6	-	1 118	1 210
NJ10/1060-M1	-	1	1 160	-	1 060	1 500	195	9,5	9,5	14,5	1 170	1 355
NJ10/1060-M1	HJ10/1060	1	1 160	121	1 060	1 500	195	9,5	9,5	-	1 170	1 355
F-801007.ZL	-	1	324	-	1 120	1 360	106	6	6	11	1 185	1 286
NJ18/1120-M	-	1	318	-	1 120	1 360	106	6	6	11	1 185	1 286
NJ18/1120-M	HJ18/1120	1	318	46,4	1 120	1 360	106	6	6	-	1 185	1 286
NJ18/1120-MA	-	1	318	-	1 120	1 360	106	6	6	11	1 185	1 286
NJ18/1120-MA	HJ18/1120	1	318	46,4	1 120	1 360	106	6	6	-	1 185	1 286
NJ28/1120-M	-	1	434	-	1 120	1 360	140	6	6	13,1	1 185	1 286
NUP28/1120-M	-	1	441	-	1 120	1 360	140	6	6	-	1 185	1 286
NJ10/1120-M1	-	1	1 320	-	1 120	1 580	200	9,5	9,5	16	1 235	1 428
NJ10/1120-M1	HJ10/1120	1	1 320	138	1 120	1 580	200	9,5	9,5	-	1 235	1 428

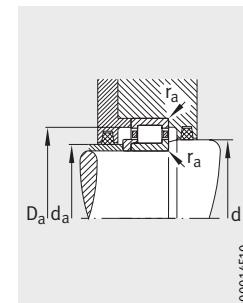
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



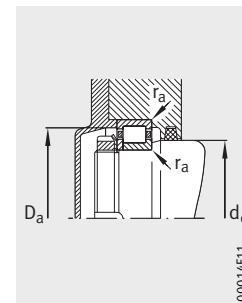
2) Axial displace-
ment "s" for NJ



Mounting dimensions
for NJ



Mounting dimensions
for NJ and HJ



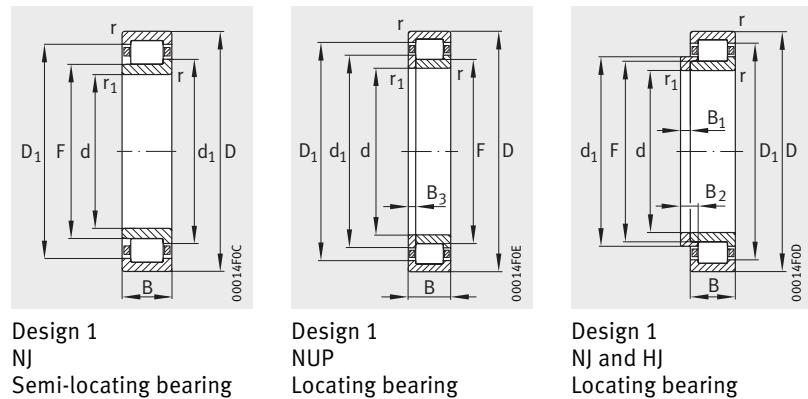
Mounting dimensions
for NUP

d ₁ ≈	B ₁	B ₂	B ₃	Mounting dimensions					Basic load ratings		Fatigue limit load C _{ur} kN	Limiting speed n _G min ⁻¹	Reference speed n _B min ⁻¹	
				d _a		d _c	D _a	r _a	r _{a1}	dyn. C _r kN	stat. C _{0r} kN			
				min. ¹⁾	max.	min.	max. ¹⁾	max.	max.					
1 026	—	—	—	928	983	1 033	1 252	6	6	6 400	13 400	970	700	300
1 026	43	70,5	—	928	983	1 033	1 252	6	6	6 400	13 400	970	700	300
1 020	—	—	—	967	999	1 029	1 133	4	4	2 200	5 500	405	900	—
1 020	27	47	—	967	999	1 029	1 133	4	4	2 200	5 500	405	900	—
1 020	—	—	—	967	999	1 029	1 133	4	4	3 400	9 800	740	800	240
1 020	—	—	16,5	967	999	1 029	1 133	4	4	3 400	9 800	740	800	240
1 049	—	—	—	978	1 020	1 060	1 222	6	6	5 850	14 600	1 090	750	220
1 091	—	—	—	978	1 048	1 098	1 332	6	6	7 200	15 600	1 120	700	260
1 091	45	72,5	—	978	1 048	1 098	1 332	6	6	7 200	15 600	1 120	700	260
1 076	—	—	—	1 023	1 053	1 085	1 197	5	5	2 450	5 850	435	850	—
1 076	30	52	—	1 023	1 053	1 085	1 197	5	5	2 450	5 850	435	850	—
1 076	—	—	22	1 023	1 053	1 085	1 197	5	5	2 450	5 850	430	850	—
1 076	—	—	—	1 023	1 053	1 085	1 197	5	5	3 650	10 000	750	750	220
1 076	—	—	19	1 023	1 053	1 085	1 197	5	5	3 650	10 000	750	750	220
1 076	—	—	19	1 023	1 053	1 085	1 197	5	5	3 650	10 000	750	750	220
1 143	—	—	—	1 028	1 098	1 150	1 392	6	6	7 500	16 300	1 150	630	260
1 143	47	77	—	1 028	1 098	1 150	1 392	6	6	7 500	16 300	1 150	630	260
1 136	—	—	—	1 083	1 113	1 145	1 257	5	5	2 550	6 400	465	800	—
1 136	32	54	—	1 083	1 113	1 145	1 257	5	5	2 550	6 400	465	800	—
1 136	—	—	—	1 083	1 113	1 145	1 257	5	5	3 800	10 600	790	700	220
1 136	—	—	19	1 083	1 113	1 145	1 257	5	5	3 800	10 600	780	700	220
1 210	—	—	—	1 094	1 163	1 217	1 466	8	8	8 500	18 600	1 300	600	220
1 210	50	80	—	1 094	1 163	1 217	1 466	8	8	8 500	18 600	1 300	600	220
1 204	—	—	—	1 143	1 180	1 214	1 337	5	5	2 850	7 100	500	750	—
1 204	—	—	—	1 143	1 180	1 214	1 337	5	5	2 850	7 100	500	750	—
1 204	34	57	—	1 143	1 180	1 214	1 337	5	5	2 850	7 100	500	750	—
1 204	—	—	—	1 143	1 180	1 214	1 337	5	5	2 850	7 100	500	750	—
1 204	34	57	—	1 143	1 180	1 214	1 337	5	5	2 850	7 100	500	750	—
1 204	—	—	—	1 143	1 180	1 214	1 337	5	5	4 150	11 600	840	700	200
1 204	—	—	22,5	1 143	1 180	1 214	1 337	5	5	4 150	11 600	840	700	200
1 276	—	—	—	1 154	1 228	1 283	1 546	8	8	9 000	20 000	1 380	560	220
1 276	52	84,5	—	1 154	1 228	1 283	1 546	8	8	9 000	20 000	1 380	560	220



Cylindrical roller bearings with cage

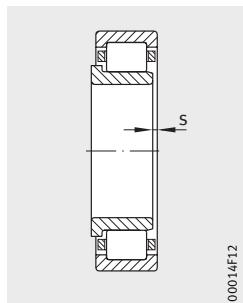
Single row
Semi-locating and
locating bearings



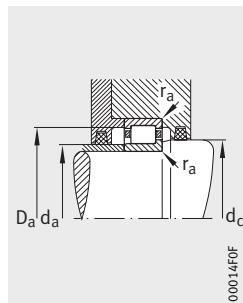
Dimension table (continued) · Dimensions in mm

Designation		De-sign	Mass m		Dimensions							
Bearing	L-section ring		Bearing ≈kg	L-section ring ≈kg	d	D	B	r min.	r ₁ min.	s ²⁾	F	D ₁ ≈
NJ18/1180-M	-	1	339	-	1180	1420	106	6	6	11	1245	1346
NJ18/1180-M	HJ18/1180	1	339	48,8	1180	1420	106	6	6	-	1245	1346
NJ18/1180-MA	-	1	339	-	1180	1420	106	6	6	11	1245	1346
NJ18/1180-MA	HJ18/1180	1	339	48,8	1180	1420	106	6	6	-	1245	1346
NJ28/1180-M	-	1	460	-	1180	1420	140	6	6	13,1	1245	1346
NUP28/1180-M	-	1	467	-	1180	1420	140	6	6	-	1245	1346
NJ10/1180-M1	-	1	1540	-	1180	1660	212	9,5	9,5	17	1300	1502
NJ10/1180-M1	HJ10/1180	1	1540	158	1180	1660	212	9,5	9,5	-	1300	1502
NJ18/1250-M	-	1	398	-	1250	1500	112	6	6	11,4	1316	1423,3
NJ18/1250-M	HJ18/1250	1	398	57,1	1250	1500	112	6	6	-	1316	1423,3
NJ18/1250-MA	-	1	398	-	1250	1500	112	6	6	11,4	1316	1423,3
NJ18/1250-MA	HJ18/1250	1	398	57,1	1250	1500	112	6	6	-	1316	1423,3
NJ28/1250-M	-	1	523	-	1250	1500	145	6	6	13,1	1316	1423,3
NUP28/1250-M	-	1	531	-	1250	1500	145	6	6	-	1316	1423,3
NJ10/1250-M1	-	1	1730	-	1250	1750	218	9,5	9,5	18,5	1375	1585
NJ10/1250-M1	HJ10/1250	1	1730	183	1250	1750	218	9,5	9,5	-	1375	1585
NJ18/1320-M	-	1	506	-	1320	1600	122	6	6	12,8	1397	1511
NJ18/1320-M	HJ18/1320	1	506	75,8	1320	1600	122	6	6	-	1397	1511
NJ18/1320-MA	-	1	506	-	1320	1600	122	6	6	12,8	1397	1511
NJ18/1320-MA	HJ18/1320	1	506	75,8	1320	1600	122	6	6	-	1397	1511
NJ28/1320-M	-	1	713	-	1320	1600	165	6	6	15,8	1397	1511
NUP28/1320-M	-	1	724	-	1320	1600	165	6	6	-	1397	1511
NJ10/1320-M1	-	1	2070	-	1320	1850	230	12	12	19	1455	1673
NJ10/1320-M1	HJ10/1320	1	2070	217	1320	1850	230	12	12	-	1455	1673
NJ18/1400-M	-	1	636	-	1400	1700	132	7,5	7,5	13,4	1480	1606
NJ18/1400-MA	-	1	636	-	1400	1700	132	7,5	7,5	13,4	1480	1606
NJ28/1400-M	-	1	861	-	1400	1700	175	7,5	7,5	17	1480	1606
NUP28/1400-M	-	1	874	-	1400	1700	175	7,5	7,5	-	1480	1606
NJ10/1400-M1	-	1	2390	-	1400	1950	243	12	12	19,5	1540	1767
NJ10/1400-M1	HJ10/1400	1	2390	252	1400	1950	243	12	12	-	1540	1767

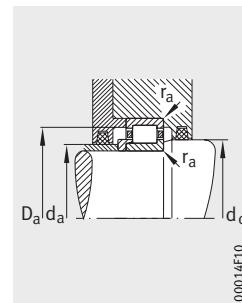
¹⁾ Under axial load, observe the dimensions D₁ and d₁.



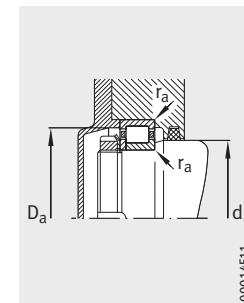
2) Axial displacement "s" for NJ



Mounting dimensions for NJ



Mounting dimensions for NJ and HJ



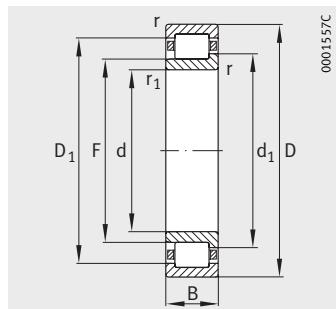
Mounting dimensions for NUP

				Mounting dimensions						Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d ₁	B ₁	B ₂	B ₃	d _a		d _c	D _a	r _a	r _{a1}	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
				min. ¹⁾	max.									
1 264	—	—	—	1 203	1 240	1 274	1 397	5	5	3 000	7 800	540	700	—
1 264	34	57	—	1 203	1 240	1 274	1 397	5	5	3 000	7 800	540	700	—
1 264	—	—	—	1 203	1 240	1 274	1 397	5	5	3 000	7 800	540	700	—
1 264	34	57	—	1 203	1 240	1 274	1 397	5	5	3 000	7 800	540	700	—
1 264	—	—	—	1 203	1 240	1 274	1 397	5	5	4 400	12 900	910	630	180
1 264	—	—	22,5	1 203	1 240	1 274	1 397	5	5	4 400	12 900	910	630	180
1 343	—	—	—	1 214	1 293	1 350	1 626	8	8	10 000	22 800	1 500	560	200
1 343	54	87,5	—	1 214	1 293	1 350	1 626	8	8	10 000	22 800	1 500	560	200
1 337	—	—	—	1 273	1 311	1 347	1 477	5	5	3 350	8 650	590	700	—
1 337	36	60	—	1 273	1 311	1 347	1 477	5	5	3 350	8 650	590	700	—
1 337	—	—	—	1 273	1 311	1 347	1 477	5	5	3 350	8 650	590	700	—
1 337	36	60	—	1 273	1 311	1 347	1 477	5	5	3 350	8 650	590	700	—
1 337	—	—	—	1 273	1 311	1 347	1 477	5	5	5 000	14 300	1 010	600	170
1 337	—	—	22,5	1 273	1 311	1 347	1 477	5	5	5 000	14 300	1 010	600	170
1 419	—	—	—	1 284	1 368	1 427	1 716	8	8	10 600	24 500	1 590	530	180
1 419	57	93,5	—	1 284	1 368	1 427	1 716	8	8	10 600	24 500	1 590	530	180
1 419	—	—	—	1 243	1 392	1 429	1 577	5	5	3 800	10 200	670	630	—
1 419	40	67	—	1 243	1 392	1 429	1 577	5	5	3 800	10 200	670	630	—
1 419	—	—	—	1 243	1 392	1 429	1 577	5	5	3 800	10 200	670	630	—
1 419	40	67	—	1 243	1 392	1 429	1 577	5	5	3 800	10 200	670	630	—
1 419	—	—	—	1 343	1 392	1 429	1 577	5	5	5 700	17 000	1 150	560	150
1 419	—	—	27,5	1 343	1 392	1 429	1 577	5	5	5 700	17 000	1 150	560	150
1 501	—	—	—	1 362	1 448	1 509	1 808	10	10	11 800	27 000	1 750	500	170
1 501	60	97,5	—	1 362	1 448	1 509	1 808	10	10	11 800	27 000	1 750	500	170
1 504	—	—	—	1 428	1 475	1 515	1 672	6	6	4 550	12 000	780	600	—
1 504	—	—	—	1 428	1 475	1 515	1 672	6	6	4 550	12 000	780	600	—
1 504	—	—	—	1 428	1 475	1 515	1 672	6	6	6 550	19 300	1 280	530	140
1 504	—	—	30	1 428	1 475	1 515	1 672	6	6	6 550	19 300	1 280	530	140
1 587	—	—	—	1 442	1 533	1 595	1 908	10	10	13 200	31 000	1 980	480	150
1 587	63	102	—	1 442	1 533	1 595	1 908	10	10	13 200	31 000	1 980	480	150

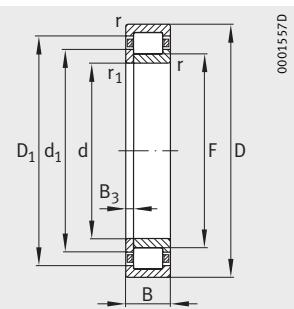


Cylindrical roller bearings with cage

Single row
Semi-locating and
locating bearings



Design 1
NJ
Semi-locating bearing

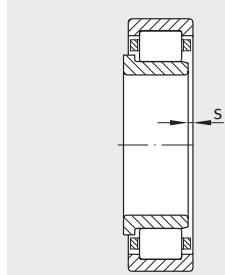


Design 1
NUP
Locating bearing

Dimension table (continued) · Dimensions in mm

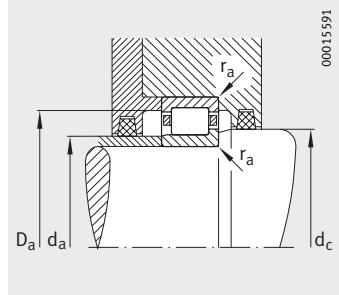
Designation Bearing	Design Bearing	Mass m ≈kg	Dimensions									
			d	D	B	r min.	r1 min.	s ²⁾	F	D ₁	d ₁	B ₃
NJ18/1500-M	1	765	1 500	1 820	140	7,5	7,5	14,5	1 585	1 719	1 611	–
NJ28/1500-M	1	1 030	1 500	1 820	185	7,5	7,5	19,3	1 585	1 719	1 611	–
NUP28/1500-M	1	1 040	1 500	1 820	185	7,5	7,5	–	1 585	1 719	1 611	32,5
NJ18/1600-M	1	1 000	1 600	1 950	155	7,5	7,5	15,5	1 690	1 841	1 719	–
NJ28/1600-M	1	1 300	1 600	1 950	200	7,5	7,5	20	1 690	1 841	1 719	–
NJ28/1600-MA	1	1 300	1 600	1 950	200	7,5	7,5	20	1 690	1 841	1 719	–
NUP28/1600-M	1	1 320	1 600	1 950	200	7,5	7,5	–	1 690	1 841	1 719	35
NUP28/1600-MA	1	1 320	1 600	1 950	200	7,5	7,5	–	1 690	1 841	1 719	35
NJ18/1700-M	1	1 100	1 700	2 060	160	7,5	7,5	15,5	1 790	1 950	1 820	–
NJ18/1700-MA	1	1 100	1 700	2 060	160	7,5	7,5	15,5	1 790	1 950	1 820	–
NUP18/1700-MA	1	1 130	1 700	2 060	160	7,5	7,5	–	1 790	1 950	1 820	32,5
NJ18/1800-M	1	1 270	1 800	2 180	165	9,5	9,5	13	1 895	2 063	1 927	–
NJ18/1800-MA	1	1 270	1 800	2 180	165	9,5	9,5	13	1 895	2 063	1 927	–
NJ28/1800-M	1	1 720	1 800	2 180	218	9,5	9,5	17	1 895	2 063	1 927	–
NJ28/1800-MA	1	1 720	1 800	2 180	218	9,5	9,5	17	1 895	2 063	1 927	–
NJ18/1900-M	1	1 500	1 900	2 300	175	9,5	9,5	17	2 000	2 176	2 034	–
NJ18/2000-M	1	1 890	2 000	2 430	190	9,5	9,5	19	2 110	2 295	2 147	–

¹⁾ Under axial load, observe the dimensions D₁ and d₁.



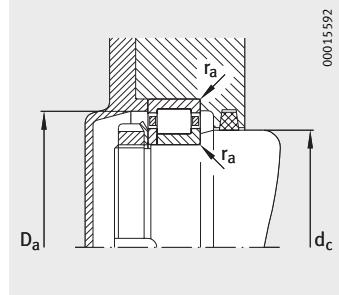
00015562

2) Axial displacement "s" for NJ



00015591

Mounting dimensions for NJ



00015592

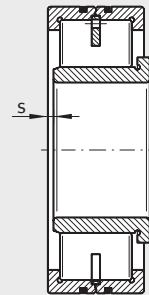
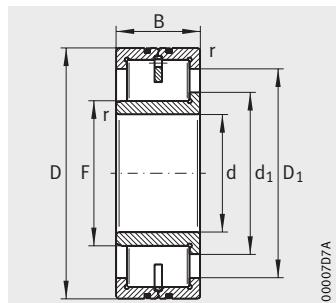
Mounting dimensions for NUP

Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed	
d_a		d_c	D_a	r_a	r_{a1}	dyn. C_r	stat. C_{Or}	C_{ur}	n_G	n_B
min. ¹⁾	max.	min.	max. ¹⁾	max.	max.	kN	kN	kN	min ⁻¹	min ⁻¹
1 528	1 580	1 619	1 792	6	6	5 200	14 000	870	560	–
1 528	1 580	1 619	1 792	6	6	7 350	21 600	1 390	500	130
1 528	1 580	1 619	1 792	6	6	7 350	21 600	1 380	500	130
1 628	1 685	1 727	1 922	6	6	6 200	16 300	1 020	530	–
1 628	1 685	1 727	1 922	6	6	8 300	24 000	1 540	480	120
1 628	1 685	1 727	1 922	6	6	8 300	24 000	1 540	480	120
1 628	1 685	1 727	1 922	6	6	8 300	24 000	1 540	480	120
1 628	1 685	1 727	1 922	6	6	8 300	24 000	1 540	480	120
1 728	1 785	1 829	2 032	6	6	6 950	18 600	1 150	500	–
1 728	1 785	1 829	2 032	6	6	6 950	18 600	1 150	500	–
1 728	1 785	1 829	2 032	6	6	6 950	18 600	1 140	500	–
1 834	1 890	1 936	2 146	8	8	7 800	20 800	1 260	480	–
1 834	1 890	1 936	2 146	8	8	7 800	20 800	1 260	480	–
1 834	1 890	1 936	2 146	8	8	11 400	34 500	2 130	450	90
1 834	1 890	1 936	2 146	8	8	11 400	34 500	2 130	450	90
1 934	1 995	2 042	2 266	8	8	8 500	23 200	1 370	450	–
2 034	2 105	2 154	2 396	8	8	9 300	26 000	1 520	450	–



Cylindrical roller bearings with disc cage

Single row
Semi-locating bearings



¹⁾ Axial displacement "s"

00007DBA

Dimension table · Dimensions in mm

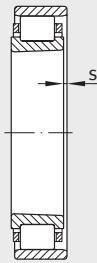
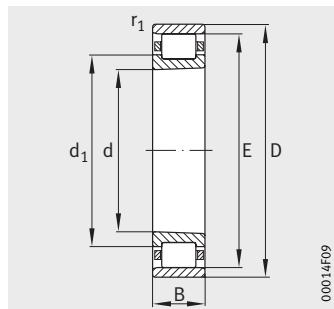
Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	s ¹⁾	F
LSL192330-TB	40,7	150	320	108	4	7	182,49
LSL192332-TB	48,1	160	340	114	4	7	196,38
LSL192334-TB	57,5	170	360	120	4	7	230,55
LSL192336-TB	67,4	180	380	126	4	7	221,56
LSL192338-TB	78,1	190	400	132	5	7	224,43
LSL192340-TB	89,3	200	420	138	5	7	238,45
LSL192344-TB	108	220	460	145	5	7	266,71
LSL192348-TB	138,6	240	500	155	5	10	280,55
LSL192352-TB	168	260	540	165	6	10	315,6
LSL192356-TB	206,6	280	580	175	6	12	333,1
LSL192360-TB	253	300	620	185	7,5	12	350,93

		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d ₁	D ₁	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
≈	≈					
203,3	263,9	1 410	1 760	199	4 250	2 020
219	284,8	1 600	2 010	224	3 950	1 820
226,6	295,4	1 740	2 210	241	3 800	1 760
245	313,3	1 840	2 430	260	3 600	1 620
250	325,5	2 100	2 750	295	3 450	1 540
265,7	345,9	2 340	3 050	315	3 250	1 420
297	385,9	2 500	3 200	320	2 900	1 270
312,5	406,1	2 750	3 550	350	2 750	1 220
351,6	457,2	3 350	4 350	425	2 470	1 010
371	485	3 700	4 850	460	2 330	950
390,9	508,5	4 150	5 500	510	2 220	890



High precision cylindrical roller bearings

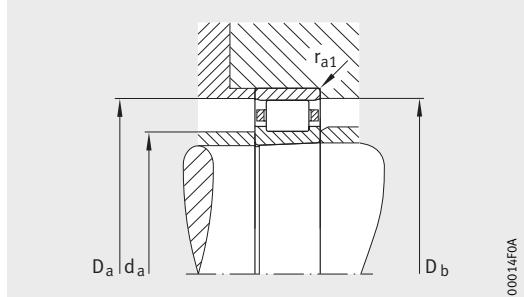
Single row,
with tapered bore
(taper 1:12)
Non-locating bearings



¹⁾ Axial displacement “s”

Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r ₁ min.	s ¹⁾	E	d ₁
N1044-K-M1-SP	21,8	220	340	56	3	8	310	261,7
N1948-K-M1-SP	8,18	240	320	38	2,1	3,5	299	268,5
N1048-K-M1-SP	19,3	240	360	56	3	8	330	281,7
N1952-K-M1-SP	13,8	260	360	46	2,1	3,8	334	295,4
N1052-K-M1-SP	28,8	260	400	65	4	10	364	309,3
N1956-K-M1-SP	14,6	280	380	46	2,1	5,4	354	315,4
N1056-K-M1-SP	30,5	280	420	65	4	10	384	329,3
N1960-K-M1-SP	23,6	300	420	56	3	4,8	390	341,6
N1060-K-M1-SP	43,3	300	460	74	4	10	420	355,7
N1964-K-M1-SP	24,9	320	440	56	3	4,8	410	361,7
N1064-K-M1-SP	45,7	320	480	74	4	10	440	375,7
N1968-K-M1-SP	26,3	340	460	56	3	4,8	430	381,6
N1068-K-M1-SP	60,7	340	520	82	5	12	475	402,7
N1972-K-M1-SP	26,9	360	480	56	3	4,8	450	401,6
N1072-K-M1-SP	64,4	360	540	82	5	8,9	495	421,6
N1976-K-M1-SP	40	380	520	65	4	6	484	429,1
N1076-K-M1-SP	66,6	380	560	82	5	12	515	441,6
N1980-K-M1-SP	41	400	540	65	4	6	504	449,1
N1080-K-M1-SP	88,1	400	600	90	5	9,5	550	469,7
N1984-K-M1-SP	42,9	420	560	65	4	6	524	469,1
N1084-K-M1-SP	90,7	420	620	90	5	12,5	570	489,7
N1988-K-M1-SP	60,2	440	600	74	4	6,5	558	496,6
N1088-K-M1-SP	106	440	650	94	6	13	597	513,5
N1992-K-M1-SP	61,1	460	620	74	4	6,5	578	516,6
N1092-K-M1-SP	120	460	680	100	6	14	624	536,5
N1996-K-M1-SP	73,1	480	650	78	5	6,8	605	540
N1096-K-M1-SP	125	480	700	100	6	14	644	556,4
N19/500-K-M1-SP	74,5	500	670	78	5	6,8	625	560
N10/500-K-M1-SP	130	500	720	100	6	14	664	576,5

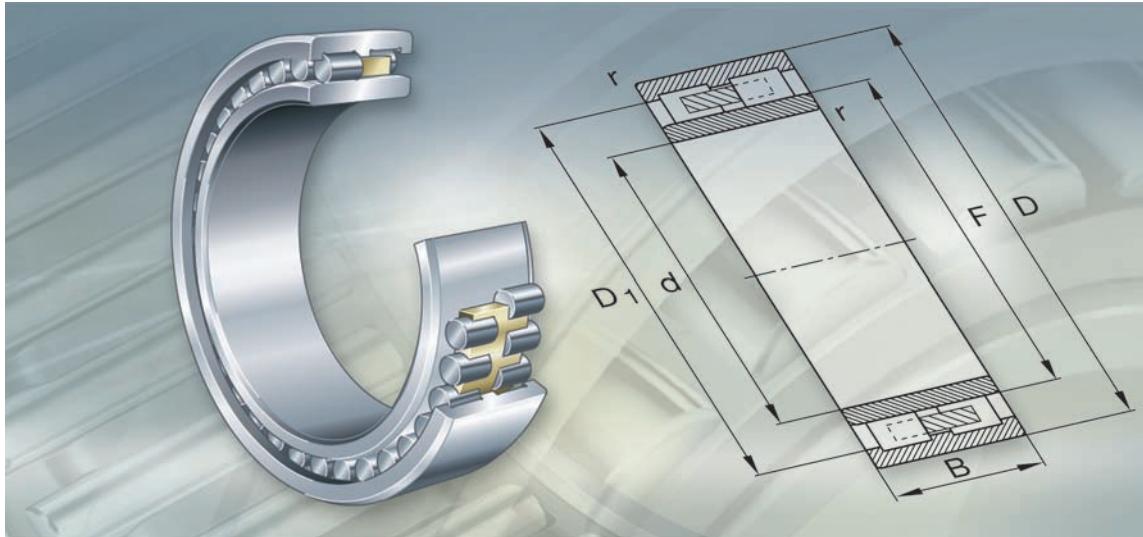


Mounting dimensions

Mounting dimensions				Basic load ratings		Fatigue limit load C_{ur} kN	Limiting speeds	
d_a h12	D_a H12	D_b	r_{a1} min.	dyn. C_r kN	stat. C_{or} kN		n_G grease min ⁻¹	n_G oil min ⁻¹
232,4	328	313	2,5	510	765	100	2 400	2 800
250,5	309	302	2	280	490	62	2 400	2 800
252,5	348	333	2,5	540	850	107	2 200	2 600
270,5	349	337	2	425	735	73	2 000	2 400
275	385	367	3	655	1 020	104	1 900	2 200
290,5	369	357	2	440	800	78	1 900	2 200
295	405	387	3	430	980	225	1 800	2 000
312,5	408	394	2,5	600	1 020	123	1 700	1 900
315	445	424	3	900	1 430	173	1 600	1 800
332,5	428	414	2,5	620	1 100	130	1 600	1 800
335	465	444	3	915	1 500	178	1 500	1 700
352,5	448	434	2,5	655	1 200	140	1 500	1 700
358	503	479	4	1 120	1 830	211	1 400	1 600
372,5	468	454	2,5	655	1 220	142	1 400	1 600
378	523	499	4	1 140	1 900	217	1 300	1 500
395	505	488	3	815	1 500	175	1 300	1 500
398	543	519	4	1 180	2 000	224	1 300	1 500
415	525	509	3	800	1 500	140	1 300	1 500
418	583	555	4	1 370	2 320	260	1 200	1 400
435	545	529	3	830	1 600	182	1 200	1 400
438	603	575	4	1 400	2 450	270	1 100	1 300
455	585	563	3	1 020	1 960	216	1 100	1 300
463	627	602	5	1 560	2 750	300	1 100	1 300
475	605	583	3	1 020	1 960	214	1 100	1 300
483	657	629	5	1 660	3 000	325	1 000	1 200
498	633	610	4	1 140	2 240	243	1 000	1 200
503	677	649	5	1 700	3 100	330	950	1 100
518	653	631	4	1 160	2 320	247	1 000	1 200
523	697	670	5	1 760	3 200	340	950	1 100



FAG



Double row cylindrical roller bearings with cage

Double row cylindrical roller bearings with cage

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Product overview Double row cylindrical roller bearings with cage

Non-locating bearings With cylindrical bore

NNU40, NNU48, NNU49,
Z-5..ZL2-01

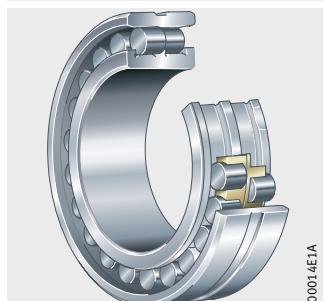


NNU41, Z-5..ZL2-01



With tapered bore

NN30..-AS-K-M-SP



NNU49..-S-K-M-SP



Double row cylindrical roller bearings with cage

Features

These double row cylindrical roller bearings comprise solid bearing rings and cylindrical roller and cage assemblies with solid cages. The bearings are suitable for very high radial loads and high speeds. They are separable and are therefore easier to fit and dismantle. As a result, both bearing rings can be given a tight fit. All the designs described are non-locating bearings, since one of the bearing rings in each case is without ribs.

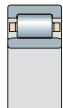
Double row cylindrical roller bearings with cylindrical bore

Design 1

- Outer ring with three rigid ribs, inner ring without ribs, lubrication groove and lubrication holes in the outer ring, brass double comb cage
- Bearings of dimension series 49 with standardised main dimensions and designations, in some cases in tolerance class P5, for high speed work rolls in rolling mills
- Non-standardised bearings (Z-5..ZL) with normal accuracy
- Application:
 - for example in rolling mills and plastics calenders.

Design 2

- Outer ring with three rigid ribs, inner ring without ribs, no lubrication groove and lubrication holes in the outer ring, brass double comb cage
- Bearings of series NNU41 or special bearings (Z-5..ZL)
- Application:
 - for example in grinding track mills.



Double row cylindrical roller bearings with cage

Design 3

Special bearings (Z-5..ZL):

- outer ring with two rigid ribs, inner ring without ribs, lubrication groove and lubrication holes in the outer ring
- brass or steel window cage.

Design 4

Special bearings (Z-5..ZL):

- outer ring with two rigid ribs, inner ring without ribs, lubrication grooves on the end faces of the outer ring
- brass or steel window cage.

Bearings with cylindrical bore of Design 1 to 4, *Figure 1*.

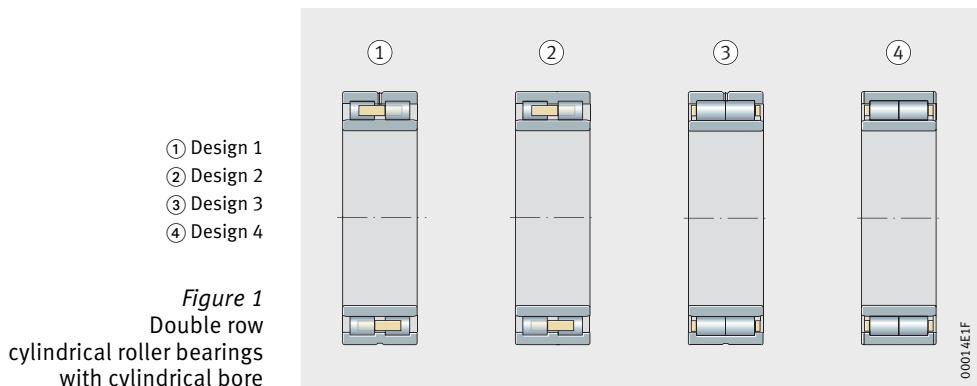


Figure 1
Double row
cylindrical roller bearings
with cylindrical bore

Design 5

■ Special bearings:

- outer ring with two rigid ribs, inner ring without ribs, lubrication groove and lubrication holes in the outer ring
- steel pin cage and through-drilled rollers

■ Application:

- for example in rolling mills and plastics calenders.

Design 6

■ Special bearings:

- outer ring with two rigid ribs, inner ring without ribs, lubrication grooves on the end faces of the outer ring
- steel pin cage and through-drilled rollers

■ Application:

- for example in rolling mills and plastics calenders.

Design 7

■ Special bearings:

- outer ring with three rigid ribs, inner ring without ribs, lubrication groove and lubrication holes in the outer ring
- steel pin cage

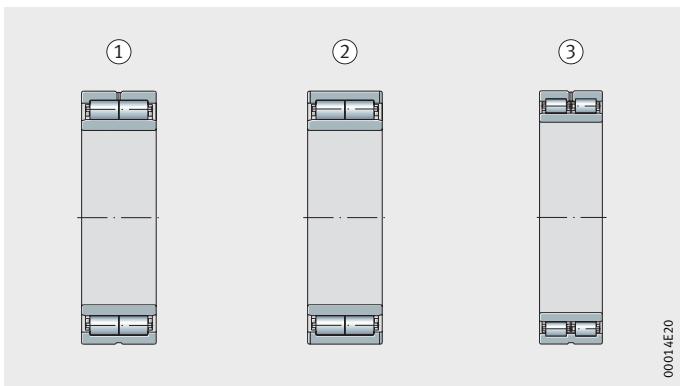
■ Application:

- for example in rolling mills and plastics calenders.

Bearings with cylindrical bore of Design 5 to 7, *Figure 2*.

- ① Design 5
② Design 6
③ Design 7

Figure 2
Double row
cylindrical roller bearings
with cylindrical bore
(continued)



Double row cylindrical roller bearings with cage

Double row cylindrical roller bearings with tapered bore

Double row cylindrical roller bearings with tapered bore (taper 1:12) are high precision bearings for machine tools. The radial internal clearance can be set to an optimum value during fitting. The bearings are suitable for particularly high speeds. They have a lubrication groove and lubrication holes in the outer ring.

Design 8

- Bearings of series NN30..-AS-K-M-SP have a ribless outer ring and an inner ring with three rigid ribs.
- Each row of rollers has a separate solid brass cage.

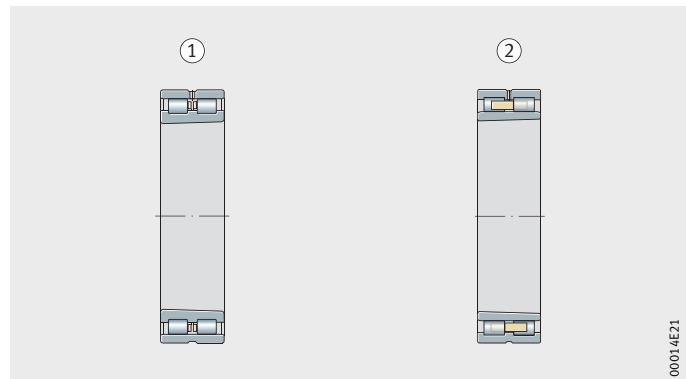
Design 9

- In bearings of series NNU49..-S-K-M-SP, the outer ring has three rigid ribs, while the inner ring is without ribs.
- The bearings have a brass double comb cage.

Bearings with tapered bore of Design 8 and 9, *Figure 3*.

- ① Series NN30..-AS-K-M-SP
(Design 8)
② Series NNU49..-S-K-M-SP
(Design 9)

Figure 3
Double row
cylindrical roller bearings
with tapered bore



Non-locating bearings

All the double row cylindrical roller bearings described here are non-locating bearings and can support radial forces only. Axial forces are supported by additional axial bearings, for example in the case of high precision bearings by double direction axial angular contact ball bearings.

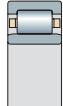
Axial displacement

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	The bearings are supplied without seals.
Lubrication	The bearings can be lubricated from the end faces using grease or oil. Some designs have a lubrication groove and lubrication holes in the outer ring. In the case of standardised bearings, this is indicated by the suffix S. Some special bearings have lubrication grooves in the outer ring end faces.
Operating temperature	The double row cylindrical roller bearings can be used at operating temperatures from -30°C to $+150^{\circ}\text{C}$.  For continuous operation above $+120^{\circ}\text{C}$, please contact us.
Cages	Many double row cylindrical roller bearings have roller-guided solid cages made from brass, while some special bearings have cages made from steel. Special bearings of Designs 5 to 7 have solid pin cages made from steel and through-drilled rollers. These bearings are designed for extremely high load carrying capacity and strong acceleration or deceleration, which occur for example in reversing roll stands.
Suffixes	Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
A	Modified internal construction	Standard
C2	Radial internal clearance smaller than normal	Special design, available by agreement only
C3	Radial internal clearance larger than normal	
K	Tapered bore, taper 1:12	Standard
M	Solid brass cage, guided by rollers	
P5	Tolerance class P5	Special design, available by agreement only
S	Lubrication groove and lubrication holes in outer ring	Standard
SP	Tolerance class SP	



Double row cylindrical roller bearings with cage

Design and safety guidelines Permissible skewing

Minimum radial load



The permissible misalignment of the inner ring relative to the outer ring in double row cylindrical roller bearings is very limited.

In continuous operation, a minimum radial load of the order of $F_{r\ min} = C_{0r}/60$ is necessary.

If $F_{r\ min} < C_{0r}/60$, please contact us.

Equivalent dynamic bearing load

For bearings under dynamic loading used as non-locating bearings, the following applies:

$$P = F_r$$

P kN

Equivalent dynamic bearing load

F_r kN

Radial dynamic bearing load.

Operating life of high precision bearings

High precision bearings must guide machine parts with high precision and support forces at up to very high speeds.

They are selected predominantly from the perspectives of:

- accuracy
- rigidity
- running behaviour.

In order that they can fulfil these tasks for as long as possible, the bearings must run without wear. The precondition for this is the creation of a load-bearing hydrodynamic lubricant film at the contact points of the rolling contact partners.

Under these conditions, rolling bearings will achieve their fatigue life in a large number of applications. If the design is appropriate to the fatigue life, the operating life of the bearing is normally restricted by the lubricant operating life.

The decisive factors for the operating life from the perspective of load are the Hertzian pressures occurring at the contacts and the bearing kinematics. For high performance assemblies, individual design with the aid of special calculation programs is therefore advisable.

Since failure as a result of fatigue plays no part in practice in the case of high precision bearings, calculation of the rating life L_{10} in accordance with DIN ISO 281 is not suitable as a means of determining the operating life.

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

P_0 kN
Equivalent static bearing load

F_{0r} kN
Radial static bearing load.

Static load safety factor of high precision bearings

$$S_0 = \frac{C_{0r}}{P_0}$$

S_0 –
Static load safety factor
 C_{0r} kN
Basic static load rating, see dimension tables
 P_0 kN
Equivalent static bearing load.



In order to achieve sufficiently smooth running, the static load safety factor for high precision bearings should be $S_0 > 3$.

Speeds of high precision bearings



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, see 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



The limiting speeds n_G given in the dimension tables for high precision bearings are valid for lubrication with grease or for minimal quantity lubrication with oil and must not be exceeded.



Design of bearing arrangements Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

Mounting dimensions

The dimension tables give the maximum dimensions of the radii r_a and r_{a1} and the diameters of the abutment shoulders.

Double row cylindrical roller bearings with cage

Tapered shafts for high precision bearings

Tapered shaft

Recommendations for machining of the tapered shaft:
see table and *Figure 4*.

Shaft diameter		Deviation of small taper diameter μm		Roundness t_2 μm	Flatness t_3 μm	Axial runout t_4 μm	Mean roughness R_a μm
d mm	over	incl.	max.	min.			
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

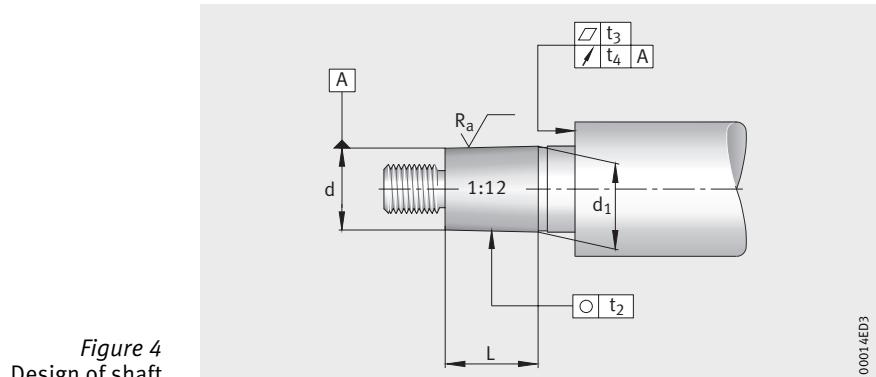


Figure 4
Design of shaft

00014ED3

The deviation of the taper angle of the shaft seat for bearings of tolerance class SP is shown in table:

Deviation of taper angle

Taper length L mm		Taper angle tolerance AT _D μm			
L _U over	L ₀ incl.	AT _{DU}		AT _{DO}	
		max.	min.	max.	min.
40	63	+3,2	0	+5	0
63	100	+4	0	+6,3	0
100	160	+5	0	+8	0
160	250	+3,2	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 values for the tolerance AT_D 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 interpolation.

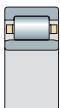
Calculation example

Taper length of shaft seat 50 mm, tolerance class SP.

$$AT_D = AT_{DU} + \frac{AT_{DO} - AT_{DU}}{L_0 - L_u} \cdot (L - L_u)$$

$$AT_D = 3,2 + \frac{5 - 3,2}{63 - 40} \cdot (50 - 40) = 3,98 \mu\text{m}$$

Taper angle tolerance AT_D = +4 μm.



Double row cylindrical roller bearings with cage

Housings for high precision bearings



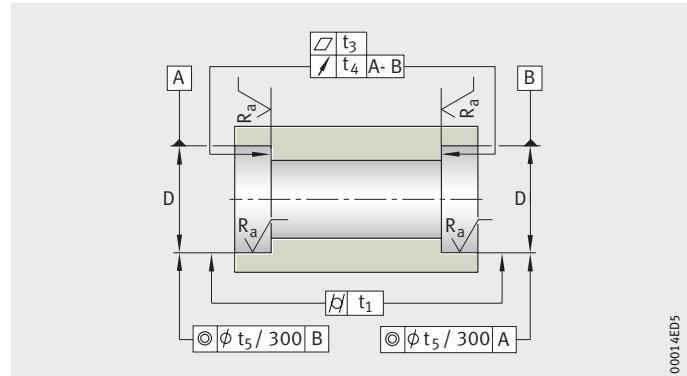
In order to allow fitting and dismantling of the bearings, the dimension $D_b \text{ min}$ in the dimension tables must be observed.

Recommendations for machining of the housings:
see table and Figure 5.

Housing bores for high precision bearings

Housing bore		Cylindricity		Flatness	Axial runout	Coaxiality	Mean roughness
Housing bore		t ₁ µm		t ₃ µm	t ₄ µm	t ₅ µm	R _a µm
over	incl.	max.	min.				
250	315	+3	-20	6	6	8	12
315	400	+3	-22	7	7	9	13
400	500	+2	-25	8	8	10	15
500	630	0	-29	9	9	11	16
630	800	0	-32	10	10	12	18

Figure 5
Design of housing



Accuracy

The dimensional and running tolerances of the bearings with cylindrical bore correspond to tolerance class PN and in some cases also to P5 to DIN 620.

High precision bearings correspond to the more stringent tolerance class SP. Bearings of tolerance class UP are available by agreement.

Width tolerances SP

Bore		Width deviation (in relation to bore)			Width variation V_{Bs} μm
d mm		Δ_{Bs} μm	max.	min.	
over	incl.				
180	250	0	-300	-300	6
250	315	0	-350	-350	8
315	400	0	-400	-400	10
400	500	0	-450	-450	12

Inner ring tolerances SP

Bore		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.							
180	250	30	0	9	8	8	7	8
250	315	35	0	11	9	8	8	10
315	400	40	0	12	12	10	10	12
400	500	45	0	14	14	10	12	15

Outer ring tolerances SP

Outside diameter		Outside diameter deviation			Variation V_{Dp} μm	Radial runout K_{ea} μm	Axial runout	
D mm		Δ_{Ds} μm	$\Delta_{D1\ mp}$ μm				S_D μm	S_{ea} μm
over	incl.							
250	315	0	-18	9	11	8	8	10
315	400	0	-20	10	13	10	10	13
400	500	0	-23	12	15	11	11	15
500	630	0	-28	14	17	13	13	18
630	800	0	-35	18	20	15	15	22



Double row cylindrical roller bearings with cage

Radial internal clearance

The radial internal clearance of bearings with a cylindrical bore normally corresponds to internal clearance group CN to DIN 620-4.

Radial internal clearance (cylindrical bore)

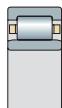
Bore d mm	incl.	Radial internal clearance					
		CN μm	C3 μm	C4 μm	min.	max.	min.
180	200	90	145	140	195	195	250
200	225	105	165	160	220	220	280
225	250	110	175	170	235	235	300
250	280	125	195	190	260	260	330
280	315	130	205	200	275	275	350
315	355	145	225	225	305	305	385
355	400	190	280	280	370	370	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
710	800	310	470	470	630	630	790
800	900	350	520	520	690	690	860
900	1000	390	580	580	770	770	960
1000	1120	430	640	640	850	850	1060
1120	1250	470	710	710	950	950	1190
1250	1400	530	790	790	1050	1050	1310
1400	1600	610	890	890	1170	1170	1450

Radial internal clearance of high precision bearings

The radial internal clearance of high precision bearings is smaller than the normal internal clearance and corresponds to internal clearance group C1NA for the accuracy SP and UP.
The internal clearance is not stated in the designation.
The bearing rings are not interchangeable.

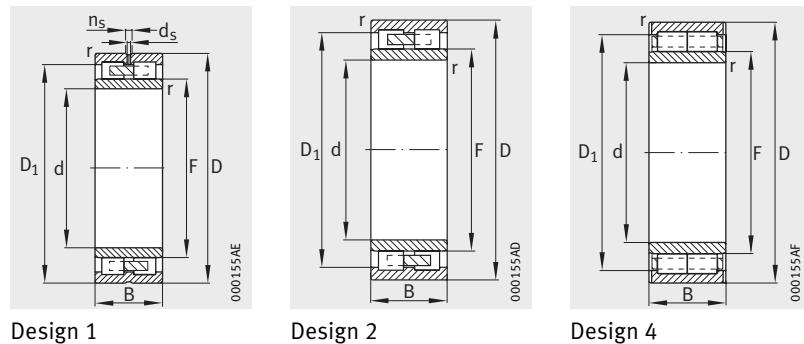
Radial internal clearance C1NA (tapered bore)

Bore d mm		Radial internal clearance C1NA μm	
over	incl.	min.	max.
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
500	560	130	210
560	630	140	230
630	710	160	260
710	800	170	290
800	900	190	330
900	1000	210	360
1000	1120	230	400
1120	1250	250	440
1250	1400	270	460
1400	1600	300	500
1600	1800	320	530



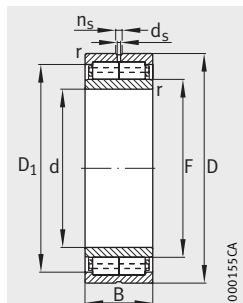
Cylindrical roller bearings with cage

Double row,
with cylindrical bore

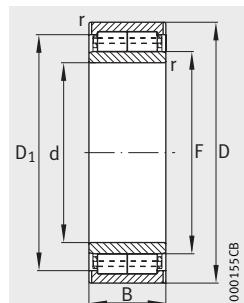


Dimension table · Dimensions in mm

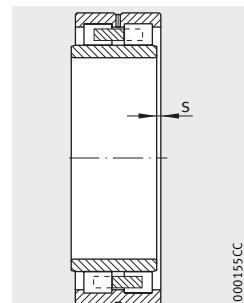
Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r	s ¹⁾ min.	F	D ₁ ≈
NNU4138-M	2	42,3	190	320	128	3	4	222	275,3
NNU4140-M	2	52,2	200	340	140	3	4,3	235	295
NNU4144-M	2	65,9	220	370	150	4	4,9	258	321,5
NNU4948-S-M-P5-C3	1	18,2	240	320	80	2,1	4,7	265	292,2
NNU4148-M	2	80,9	240	400	160	4	5,1	282	352,1
NNU4852-S-M	1	10,6	260	320	60	2	2,5	279,5	299
NNU4952-S-M-P5-C3	1	31,9	260	360	100	2,1	4	292	325,6
NNU4052-S-M	1	65,5	260	400	140	4	4,5	298	354,9
NNU4152-M	2	115	260	440	180	4	7,7	306	381,2
NNU4856-S-M	1	15,4	280	350	69	2	2,5	302	326,6
NNU4956-S-M-P5-C3	1	33,7	280	380	100	2,1	4	312	345,6
NNU4156-M	2	121	280	460	180	5	5	326	401,2
NNU4860-S-M	1	22	300	380	80	2,1	3,4	325	353,2
NNU4960-S-M-P5-C3	1	52,3	300	420	118	3	5	339	379
NNU4160-M	2	161	300	500	200	5	9,2	351	434,6
NNU4864-S-M	1	23,2	320	400	80	2,1	3,4	346	373,2
NNU4964-S-M-P5-C3	1	55,2	320	440	118	3	8,1	359	399
Z-525271.ZL	4	68,6	320	460	120	4	7	364	413,9
NNU4164-M	2	208	320	540	218	5	9,5	375	465,1
NNU4868-S-M	1	25	340	420	80	2,1	5,5	366	393,2
NNU4968-S-M-P5-C3	1	58	340	460	118	3	6,4	379	419
NNU4068-S-M	1	140	340	520	180	5	8,4	385	460
NNU4168-M	2	268	340	580	243	5	10,3	402	502,5
NNU4872-S-M	1	25,8	360	440	80	2,1	3,4	386	414,1
Z-527930.ZL	6	41,9	360	460	100	3	8,8	384,7	426,6
NNU4972-S-M-C3	1	60,8	360	480	118	3	5	399	439
Z-529482.ZL	6	78,7	360	500	125	5	—	394	454
NNU4172-M	2	281	360	600	243	5	10,2	422	523
NNU4876-S-M	1	44	380	480	100	2,1	6,8	412	445,6
NNU4976-S-M-C3	1	91,5	380	520	140	4	7,5	426	470
Z-556618.ZL	5	114	380	540	150	3	8,7	422	485,4
Z-507768.ZL	4	135	380	540	180	4	8	420	490,4
NNU4176-M	2	293	380	620	243	5	10,3	442	542,5



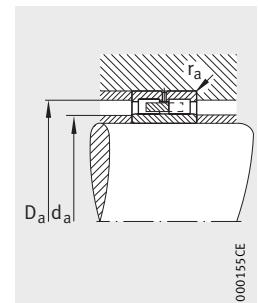
Design 5
With pin cage



Design 6
With pin cage



1) Axial displacement "s"



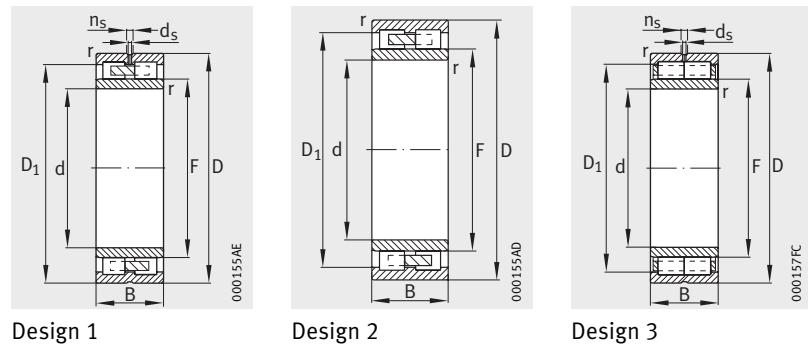
Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
ds	ns		dyn. Cr kN	stat. C0r kN	Cur kN	nG min ⁻¹
—	—	204	1 200	2 120	237	2 400
—	—	214	1 430	2 500	275	2 200
—	—	237	1 630	2 900	315	1 900
6,3	12,2	250	530	1 200	127	2 000
—	—	257	1 960	3 600	380	1 800
4,8	9,5	269	375	1 020	107	1 900
8	15	270	750	1 700	173	1 800
6,3	12,2	275	1 660	3 450	365	1 700
—	—	277	2 360	4 400	450	1 700
4,8	9,5	289	520	1 370	138	1 800
8	15	290	765	1 800	181	1 700
—	—	300	2 400	4 650	470	1 600
4,8	9,5	310	630	1 630	162	1 700
9,5	17,7	312	1 040	2 400	243	1 600
—	—	320	2 900	5 700	570	1 500
4,8	9,5	330	640	1 700	166	1 600
9,5	17,7	332	1 060	2 550	255	1 600
—	—	—	1 530	3 550	350	1 500
—	—	340	3 350	6 550	640	1 400
4,8	9,5	350	655	1 800	173	1 600
9,5	17,7	352	1 100	2 650	265	1 500
8	19	357	2 600	5 400	520	1 400
—	—	360	4 000	7 800	740	1 300
—	—	370	670	1 900	180	1 500
—	—	—	1 290	3 350	330	1 500
9,5	17,7	372	1 140	2 800	275	1 400
—	—	—	2 040	4 650	440	1 400
—	—	380	4 050	8 150	780	1 200
6,3	12,2	390	965	2 600	244	1 400
9,5	17,7	395	1 430	3 600	340	1 300
—	—	—	2 550	6 000	580	1 300
—	—	—	2 800	6 400	620	1 300
—	—	400	4 250	8 650	810	1 200



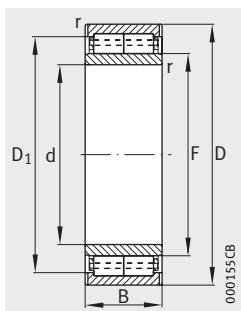
Cylindrical roller bearings with cage

Double row,
with cylindrical bore

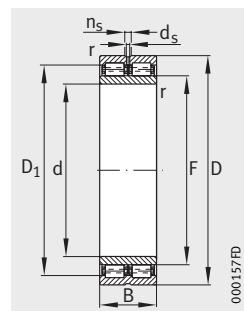


Dimension table (continued) · Dimensions in mm

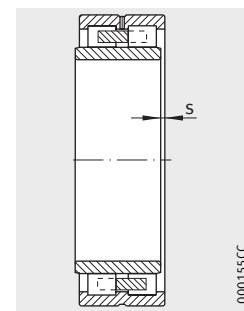
Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r	s ¹⁾ min.	F	D ₁ ≈
NNU4980-S-M-C3	1	95,2	400	540	140	4	5,5	446	490,8
NNU4080-S-M	1	199	400	600	200	5	9,5	450	534
Z-526089.ZL	7	343	400	640	260	5	—	461	568
NNU4180-M	2	324	400	650	250	6	11,4	463	577
NNU4884-S-M	1	48,4	420	520	100	2,1	6,2	453	486,6
NNU4984-S-M-C3	1	99,2	420	560	140	4	8,3	466	510,8
Z-539553.ZL	6	108	420	580	130	4	7	460	526,8
Z-533053.ZL	1	128	420	580	160	4	5,9	463	530
NNU4184-M	2	434	420	700	280	6	8,7	491	612
NNU4888-S-M	1	50,2	440	540	100	2,1	3,8	473	506,6
Z-528620.ZL	6	81,4	440	570	120	3	9	473	526,4
NNU4988-S-M-C3	1	137	440	600	160	4	5,8	490	544,4
NNU4088-S-M	1	243	440	650	212	6	8	491	581
NNU4188-M	2	453	440	720	280	6	12,9	511	632
Z-524628.ZL	6	58,3	460	570	105	3	6,3	486,7	533,6
NNU4892-S-M	1	75,1	460	580	118	3	4,9	499	539
NNU4992-S-M-C3	1	141	460	620	160	4	5,8	510	564,4
NNU4092-S-M	1	275	460	680	218	6	9,5	516	606
NNU4192-M	2	550	460	760	300	7,5	8,7	537	663
NNU4896-S-M	1	77,7	480	600	118	3	4,9	519	559
NNU4996-S-M-C3	1	154	480	650	170	5	6	534	593
NNU4096-S-M	1	282	480	700	218	6	9,5	538	631,5
NNU4196-M	2	602	480	790	308	7,5	13	557	691,5
NNU48/500-S-M	1	75,7	500	620	118	3	4,7	539	580,5
Z-523745.ZL	6	81,7	500	620	120	4	10	532	582
NNU49/500-S-M-C3	1	159	500	670	170	5	6	554	613
NNU40/500-S-M	1	295	500	720	218	6	9,5	558	651,5
Z-509393.ZL	3	312	500	720	218	6	9,5	558	647,6
NNU41/500-M	2	706	500	830	325	7,5	11,7	582	725
NNU49/530-S-M-C3	1	206	530	710	180	5	7,2	588	655
NNU40/530-S-M	1	407	530	780	250	6	11,8	591	698
NNU41/530-M	2	796	530	870	335	7,5	16,2	618	761
Z-549875.ZL	1	452	550	800	260	6	—	612	721
Z-522739.ZL	6	91	560	680	120	5	8,5	592	642
NNU49/560-S-M-C3	1	246	560	750	190	5	5,8	617	684
NNU40/560-S-M	1	461	560	820	258	6	13,8	630	737
NNU41/560-M	2	952	560	920	355	7,5	15,8	653	804



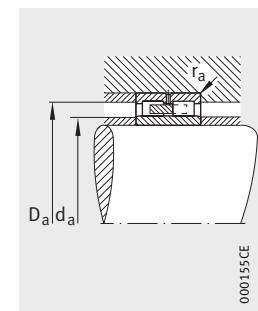
Design 6
With pin cage



Design 7
With pin cage



1) Axial displacement "s"



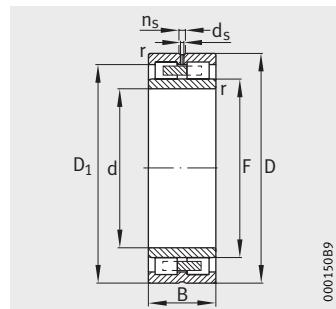
Mounting dimensions

d _s	n _s	Mounting dimensions			Basic load ratings		Fatigue limit load C _{ur} kN	Limiting speed n _G min ⁻¹
		d _a min.	D _a max.	r _a max.	dyn. C _r kN	stat. C _{0r} kN		
9,5	17,7	415	525	3	1 500	3 800	355	1 300
9,5	17,7	417	583	4	3 200	6 950	650	1 200
9,5	17,7	—	—	4	5 300	11 200	1 040	1 100
—	—	426	624	5	4 800	9 500	860	1 100
8	15	430	510	2	1 000	2 850	260	1 300
9,5	17,7	435	545	3	1 530	4 000	370	1 200
—	—	—	—	3	2 400	5 600	520	1 200
6,3	12,2	—	—	3	2 280	5 200	485	1 100
—	—	446	674	5	5 500	11 000	970	1 000
8	15	450	530	2	1 040	3 000	270	1 200
—	—	—	—	2,5	1 960	5 100	470	1 100
9,5	17,7	455	585	3	2 040	5 200	480	1 100
9,5	21,7	463	627	5	3 800	8 300	770	1 000
—	—	466	694	5	5 600	11 600	1 010	950
—	—	—	—	2,5	1 630	4 400	400	1 100
8	15	472	568	2,5	1 320	3 650	340	1 100
9,5	17,7	475	605	3	2 120	5 500	500	1 000
9,5	21,7	—	—	5	3 900	8 800	790	950
—	—	492	728	6	6 400	13 200	1 160	900
8	15	492	588	2,5	1 340	3 800	345	1 000
9,5	17,7	497	633	4	2 360	6 100	550	950
9,5	21,7	503	677	5	4 150	9 300	840	950
—	—	512	758	6	6 550	13 400	1 140	850
8	15	512	608	2,5	1 400	4 150	370	1 000
—	—	—	—	3	1 960	5 600	495	1 000
9,5	17,7	517	653	4	2 320	6 100	540	950
9,5	21,7	523	697	5	4 250	9 650	860	900
8	15	—	—	5	4 650	11 000	980	900
—	—	532	798	6	7 200	14 600	1 250	850
9,5	17,7	547	693	4	2 900	7 650	670	900
9,5	21,7	553	757	5	5 100	11 600	1 000	850
—	—	562	838	6	7 650	16 300	1 370	800
12,5	23,5	—	—	5	6 100	14 600	1 220	800
—	—	—	—	4	2 080	6 300	540	900
9,5	17,7	577	733	4	3 150	8 800	760	850
9,5	21,7	583	797	5	5 200	12 000	1 030	800
—	—	592	888	6	8 800	19 000	1 550	750

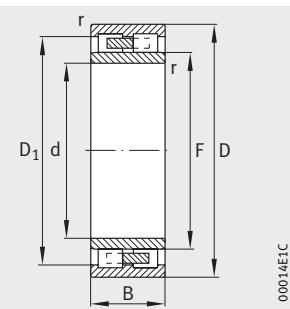


Cylindrical roller bearings with cage

Double row,
with cylindrical bore



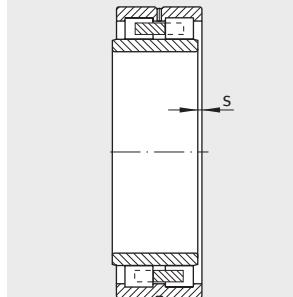
Design 1



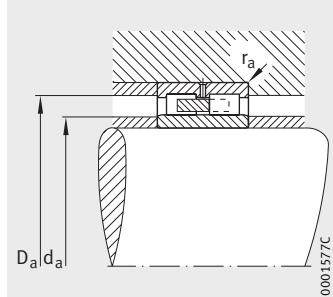
Design 2

Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r	s ¹⁾	F	D ₁
NNU49/600-S-M-C3	1	287	600	800	200	5	6,3	666	741
NNU40/600-S-M	1	533	600	870	272	6	12	668	787,5
NNU41/600-M	2	1 120	600	980	375	7,5	18	699	858,5
NNU48/630-S-M	1	164	630	780	150	4	8,8	678	726
NNU49/630-S-M-C3	1	362	630	850	218	6	8,6	704	784,5
NNU41/630-M	2	1 320	630	1 030	400	7,5	11,7	734	902
Z-509944.ZL	2	388	660	880	225	6	10	727	807,3
NNU49/670-S-M-C3	1	421	670	900	230	6	7	738	828,5
NNU41/670-M	2	1 530	670	1 090	412	7,5	18,2	774	950,5
NNU49/710-S-M-C3	1	488	710	950	243	6	7,9	782	875,5
NNU41/710-M	2	1 790	710	1 150	438	9,5	20	820	1 005
NNU49/750-S-M-C3	1	563	750	1 000	250	6	7,5	825	918,8
NNU41/750-M	2	2 190	750	1 220	475	9,5	21,3	871	1 073
NNU48/800-S-M	1	279	800	980	180	5	5,9	856	919,5
NNU49/800-S-M-C3	1	635	800	1 060	258	6	10,2	880	980,8
NNU41/800-M	2	2 390	800	1 280	475	9,5	12,5	921	1 123
NNU48/850-S-M	1	292	850	1 030	180	5	5,9	910	971
NNU49/850-S-M-C3	1	722	850	1 120	272	6	9,5	931	1 031,8
NNU41/850-M	2	2 810	850	1 360	500	12	12,9	976	1 194
NNU49/900-S-M-C3	1	824	900	1 180	280	6	11,8	986	1 093
NNU41/900-M	2	3 100	900	1 420	515	12	23	1 032	1 250
NNU48/950-S-M	1	430	950	1 150	200	5	6,3	1 016	1 086
NNU49/950-S-M-C3	1	938	950	1 250	300	7,5	9,3	1 046	1 160
NNU41/950-M	2	3 660	950	1 500	545	12	14	1 092	1 327
NNU49/1000-S-M-C3	1	1 200	1 000	1 320	315	7,5	12,8	1 103	1 224
NNU41/1000-M	2	4 340	1 000	1 580	580	12	14,1	1 154	1 406
NNU49/1060-S-M-C3	1	1 410	1 060	1 400	335	7,5	17,5	1 160	1 294
NNU41/1060-M	2	4 930	1 060	1 660	600	15	15	1 214	1 466
NNU49/1120-S-M-C3	1	1 460	1 120	1 460	335	7,5	10,5	1 220	1 354
NNU41/1120-M	2	5 750	1 120	1 750	630	15	15,9	1 279	1 548
NNU48/1180-S-M	1	783	1 180	1 420	243	6	14,8	1 264	1 341
NNU49/1180-S-M-C3	1	1 750	1 180	1 540	355	7,5	10	1 285	1 427,5
NNU41/1180-M	2	6 880	1 180	1 850	670	15	16,5	1 350	1 636
NNU49/1250-S-M-C3	1	2 070	1 250	1 630	375	9,5	9,5	1 360	1 511
NNU41/1250-M	2	8 000	1 250	1 950	710	15	17,4	1 426	1 720
NNU49/1320-S-M-C3	1	2 520	1 320	1 720	400	7,5	10	1 430	1 581
NNU49/1600-S-M-C3	1	3 950	1 600	2 060	462	9,5	12	1 740	1 908



1) Axial displacement "s"



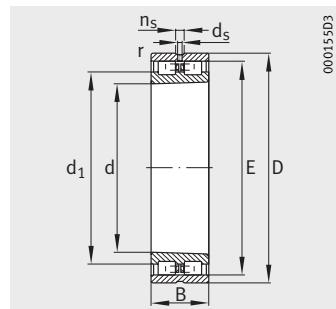
Mounting dimensions

d _s	n _s	Mounting dimensions			Basic load ratings		Fatigue limit load C _{ur} kN	Limiting speed n _G min ⁻¹
		d _a min.	D _a max.	r _a max.	dyn. C _r kN	stat. C _{0r} kN		
9,5	17,7	617	783	4	3 750	10 400	860	750
12,5	27,5	623	847	5	6 300	14 600	1 200	750
-	-	632	948	6	9 650	20 800	1 680	670
9,5	17,7	645	765	3	2 240	7 100	590	750
12,5	23,5	653	827	5	4 150	11 400	940	700
-	-	692	998	6	10 800	23 600	1 860	670
-	-	-	-	5	4 250	11 800	960	700
12,5	23,5	693	877	5	5 000	13 400	1 110	700
-	-	702	1 058	6	11 600	25 500	1 990	600
12,5	23,5	733	927	5	5 500	15 000	1 240	630
-	-	750	1 110	8	12 900	28 500	2 210	560
12,5	23,5	773	977	5	5 850	16 600	1 330	600
-	-	790	1 180	8	15 300	34 500	2 550	530
9,5	17,7	817	963	4	3 450	11 400	900	600
12,5	23,5	823	1 037	5	6 100	17 300	1 350	560
-	-	840	1 240	8	15 600	36 000	2 650	500
9,5	17,7	867	1 013	4	3 550	12 000	930	560
12,5	23,5	873	1 097	5	6 300	18 000	1 400	530
-	-	898	1 312	10	17 300	39 000	2 850	480
12,5	23,5	923	1 157	5	7 100	20 400	1 550	500
-	-	948	1 372	10	18 000	42 500	3 050	450
9,5	17,7	967	1 133	4	4 500	15 600	1 170	500
12,5	23,5	978	1 222	6	8 150	24 000	1 770	480
-	-	998	1 452	10	20 400	48 000	3 400	430
12,5	23,5	1 028	1 292	6	9 000	26 500	1 930	450
-	-	1 048	1 532	10	23 600	56 000	3 850	400
12,5	23,5	1 088	1 372	6	10 400	30 000	2 120	430
-	-	1 118	1 602	12	24 500	60 000	4 100	400
12,5	23,5	1 148	1 432	6	10 400	31 000	2 150	400
-	-	1 178	1 692	12	27 500	67 000	4 500	380
12,5	23,5	1 203	1 397	5	6 000	22 000	1 540	400
12,5	23,5	1 208	1 512	6	12 200	37 500	2 550	380
-	-	1 238	1 792	12	30 500	76 500	5 000	360
12,5	23,5	1 284	1 596	8	13 700	41 500	2 850	380
-	-	1 308	1 892	12	33 500	83 000	5 500	340
12,5	23,5	1 348	1 692	6	14 600	46 500	3 150	360
12,5	23,5	1 634	2 026	8	18 300	61 000	3 850	300

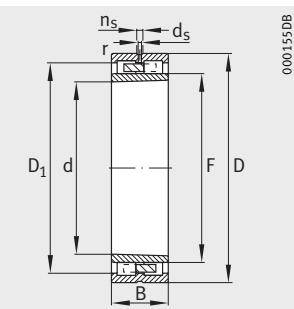


High precision cylindrical roller bearings

Double row,
with tapered bore
(taper 1:12)



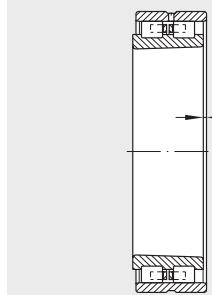
NN30..-AS-K-M-SP



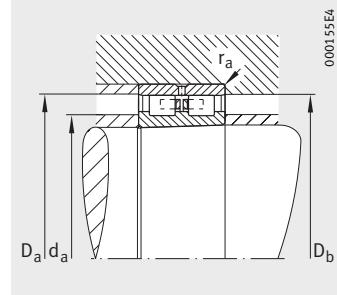
NNU49..-S-K-M-SP

Dimension table · Dimensions in mm

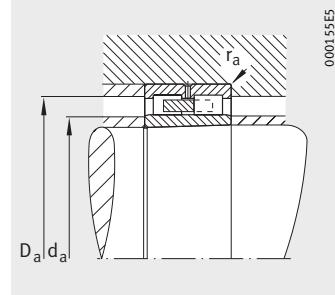
Designation	Mass m ≈kg	Dimensions								
		d	D	B	r min.	s ¹⁾	E	F	D ₁	d ₁
NN3044-AS-K-M-SP	29,1	220	340	90	3	4,5	310	—	—	265,2
NNU4948-S-K-M-SP	17,1	240	320	80	2,1	3,4	—	265	292,2	—
NN3048-AS-K-M-SP	31,5	240	360	92	3	6	330	—	—	285,2
NNU4952-S-K-M-SP	30,5	260	360	100	2,1	4	—	292	325,6	—
NN3052-AS-K-M-SP	46,2	260	400	104	4	6,5	364	—	—	312,8
NNU4956-S-K-M-SP	32,3	280	380	100	2,1	4	—	312	345,6	—
NN3056-AS-K-M-SP	49,7	280	420	106	4	6,8	384	—	—	332,8
NNU4960-S-K-M-SP	50,2	300	420	118	4	5	—	339	379	—
NN3060-AS-K-M-SP	68,5	300	460	118	4	7,5	418	—	—	360,4
NNU4964-S-K-M-SP	55,2	320	440	118	3	8,1	—	359	399	—
NN3064-AS-K-M-SP	73,8	320	480	121	4	7,9	438	—	—	380,4
NNU4968-S-K-M-SP	55,6	340	460	118	3	5	—	379	419	—
NN3068-AS-K-M-SP	99,3	340	520	133	5	8,7	473	—	—	409
NNU4972-S-K-M-SP	57,3	360	480	118	3	5	—	399	439	—
NN3072-AS-K-M-SP	104	360	540	134	5	8,7	493	—	—	429
NNU4976-S-K-M-SP	85,8	380	520	140	4	5,5	—	426	470	—
NN3076-AS-K-M-SP	110	380	560	135	5	9	513	—	—	449
NNU4980-S-K-M-SP	91	400	540	140	4	5,5	—	446	490,8	—
NN3080-AS-K-M-SP	143	400	600	148	5	9,5	549	—	—	477
NNU4984-S-K-M-SP	94,1	420	560	140	4	5,5	—	466	510,8	—
NN3084-AS-K-M-SP	150	420	620	150	5	10	569	—	—	497
NNU4988-S-K-M-SP	131	440	600	160	4	5,8	—	490	544,4	—
NN3088-AS-K-M-SP	172	440	650	157	6	10,3	597	—	—	520,2
NNU4992-S-K-M-SP	134	460	620	160	4	5,8	—	510	564,4	—
NN3092-AS-K-M-SP	197	460	680	163	6	10,5	624	—	—	544
NNU4996-S-K-M-SP	158	480	650	170	5	6	—	534	593	—
NN3096-AS-K-M-SP	208	480	700	165	6	11	644	—	—	564
NNU49/500-S-K-M-SP	162	500	670	170	5	6	—	554	613	—
NN30/500-AS-K-M-SP	214	500	720	167	6	11,5	664	—	—	584
NNU49/530-S-K-M-SP	193	530	710	180	5	5,8	—	588	655	—
NN30/530-AS-K-M-SP	289	530	780	185	6	11,3	715	—	—	617,5
NNU49/560-S-K-M-SP	235	560	750	190	5	5,8	—	617	684	—
NN30/560-AS-K-M-SP	331	560	820	195	6	11,6	756	—	—	652



000155E3



000155E4



000155E5

1) Axial displacement "s"
for NN30.. and NNU49..

Mounting dimensions
for NN30..

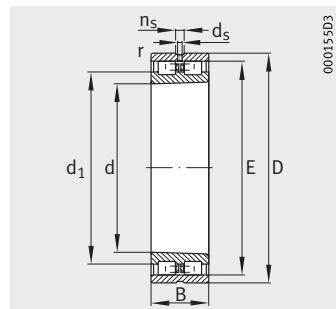
Mounting dimensions
for NNU49..

		Mounting dimensions				Basic load ratings		Fatigue limit load C_{ur} kN	Limiting speeds	
d_s	n_s	d_a min.	D_a max.	D_b min.	r_a max.	dyn. C_r kN	stat. C_{0r} kN		n_G grease min $^{-1}$	n_G oil min $^{-1}$
8	15	232	328	313	2,5	800	1 460	150	2 200	2 800
6,3	12,2	250	310	—	2	530	1 200	127	2 200	2 800
8	15	252	348	334	2,5	850	1 560	160	2 000	2 600
8	15	270	350	—	2	750	1 700	173	1 400	1 800
8	15	275	385	368	3	1 060	2 000	200	1 900	2 400
8	15	290	370	—	2	765	1 800	181	1 300	1 700
8	15	295	405	388	3	1 080	2 080	206	1 800	2 200
9,5	17,7	312	408	—	2,5	1 040	2 400	243	1 700	2 000
9,5	17,7	315	445	422	3	1 270	2 400	232	1 600	1 900
9,5	17,7	332	428	—	2,5	1 060	2 550	255	1 200	1 600
9,5	17,7	335	465	442	3	1 320	2 600	248	1 600	1 900
9,5	17,7	352	448	—	2,5	1 100	2 650	265	1 500	1 800
9,5	17,7	357	503	477	4	1 630	3 250	305	1 400	1 700
9,5	17,7	372	468	—	2,5	1 140	2 800	275	1 500	1 800
9,5	17,7	377	523	497	4	1 660	3 350	310	1 400	1 700
9,5	17,7	395	505	—	3	1 430	3 600	340	1 400	1 700
9,5	17,7	397	543	517	4	1 700	3 450	320	1 300	1 600
9,5	17,7	415	525	—	3	1 500	3 800	355	1 300	1 600
9,5	17,7	417	583	553	4	2 160	4 500	395	1 200	1 500
9,5	17,7	435	545	—	3	1 530	4 000	370	1 300	1 600
9,5	17,7	437	603	573	4	2 120	4 500	395	1 200	1 500
9,5	17,7	455	585	—	3	2 040	5 200	480	1 200	1 500
12,5	23,5	463	627	601	5	2 450	5 100	445	1 100	1 400
9,5	17,7	475	605	—	3	2 120	5 500	500	1 100	1 400
12,5	23,5	483	657	628	5	2 600	5 400	480	1 100	1 400
9,5	17,7	497	633	—	4	2 360	6 100	550	1 100	1 400
12,5	23,5	503	677	648	5	2 700	5 850	510	1 000	1 300
9,5	17,7	517	653	—	4	2 320	6 100	540	1 000	1 300
12,5	23,5	523	697	668	5	2 650	5 850	500	1 000	1 300
9,5	17,7	547	693	—	4	2 900	7 650	670	1 000	1 300
12,5	23,5	553	757	720	5	3 450	7 350	620	950	1 200
9,5	17,7	577	733	—	4	3 150	8 800	760	950	1 200
12,5	23,5	583	797	761	5	3 900	8 300	700	900	1 100

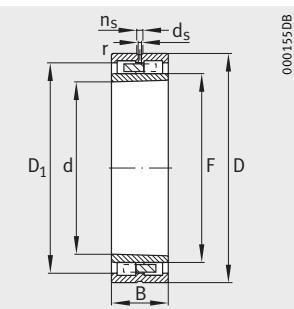


High precision cylindrical roller bearings

Double row,
with tapered bore
(taper 1:12)



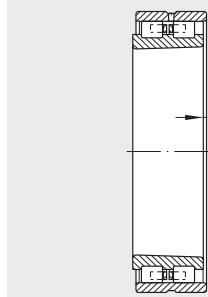
NN30..-AS-K-M-SP



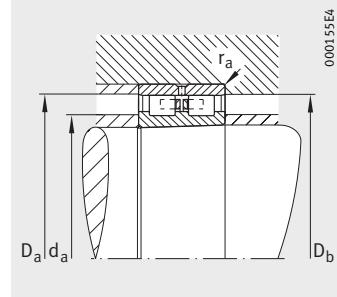
NNU49..-S-K-M-SP

Dimension table (continued) · Dimensions in mm

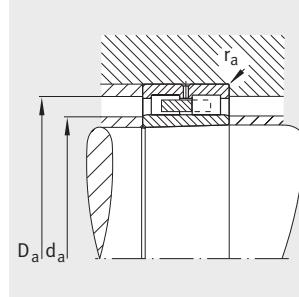
Designation	Mass m ≈kg	Dimensions								
		d	D	B	r min.	s ¹⁾	E	F	D ₁	d ₁
NNU49/600-S-K-M-SP	275	600	800	200	5	6,3	—	666	741	—
NN30/600-AS-K-M-SP	377	600	870	200	6	11	803	—	—	692,5
NNU49/630-S-K-M-SP	347	630	850	218	6	6,9	—	704	784,5	—
NN30/630-AS-K-M-SP	454	630	920	212	7,5	12,5	845	—	—	734,5
NNU49/670-S-K-M-SP	399	670	900	230	6	7	—	738	828,5	—
NN30/670-AS-K-M-SP	600	670	980	230	7,5	13,5	901	—	—	779
NNU49/710-S-K-M-SP	466	710	950	243	6	7,9	—	782	875,5	—
NN30/710-AS-K-M-SP	671	710	1030	236	7,5	13	951	—	—	820,5
NNU49/750-S-K-M-SP	538	750	1000	250	6	7,5	—	825	918,8	—
NN30/750-AS-K-M-SP	739	750	1090	250	7,5	11,5	1007	—	—	859,5
NNU49/800-S-K-M-SP	608	800	1060	258	6	10,2	—	880	980,8	—
NN30/800-AS-K-M-SP	836	800	1150	258	7,5	12,5	1065	—	—	917,5
NNU49/850-S-K-M-SP	689	850	1120	272	6	9,5	—	931	1031,8	—
NN30/850-AS-K-M-SP	989	850	1220	272	7,5	13	1130	—	—	974
NNU49/900-S-K-M-SP	784	900	1180	280	6	9,3	—	986	1093	—
NN30/900-AS-K-M-SP	1100	900	1280	280	7,5	14,5	1185	—	—	1029
NNU49/950-S-K-M-SP	962	950	1250	300	7,5	9,3	—	1046	1160	—
NN30/950-AS-K-M-SP	1460	950	1360	300	7,5	16,8	1255	—	—	1091
NNU49/1000-S-K-M-SP	1120	1000	1320	315	7,5	9,8	—	1103	1224	—
NN30/1000-AS-K-M-SP	1490	1000	1420	308	7,5	16,5	1316	—	—	1143
NNU49/1060-S-K-M-SP	1350	1060	1400	335	7,5	10,5	—	1160	1294	—
NN30/1060-AS-K-M-SP	1740	1060	1500	325	9,5	17	1391	—	—	1210
NNU49/1120-S-K-M-SP	1400	1120	1460	335	7,5	10,5	—	1220	1354	—
NN30/1120-AS-K-M-SP	2030	1120	1580	345	9,5	18,5	1467	—	—	1278
NNU49/1180-S-K-M-SP	1680	1180	1540	355	7,5	10	—	1285	1427,5	—
NN30/1180-AS-K-M-SP	2300	1180	1660	355	9,5	13,3	1542	—	—	1350
NNU49/1250-S-K-M-SP	1980	1250	1630	375	9,5	9,5	—	1360	1511	—
NNU49/1600-S-K-M-SP	3770	1600	2060	462	9,5	12	—	1740	1908	—
NN30/1700-AS-K-M-SP	6540	1700	2360	500	15	17	2185	—	—	1940



000155E3



000155E4



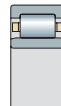
000155E5

1) Axial displacement "s"
for NN30.. and NNU49..

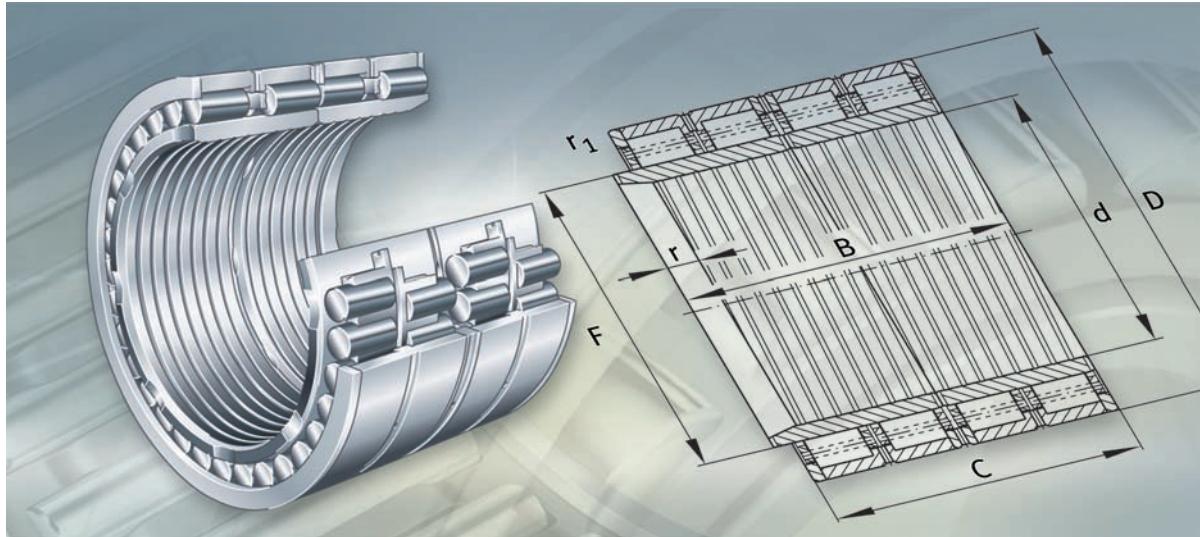
Mounting dimensions
for NN30..

Mounting dimensions
for NNU49..

d_s	n_s	Mounting dimensions				Basic load ratings		Fatigue limit load C_{ur} kN	Limiting speeds	
		d_a min.	D_a max.	D_b min.	r_a max.	dyn. C_r kN	stat. C_{0r} kN		n_G grease min^{-1}	n_G oil min^{-1}
9,5	17,7	617	783	—	4	3 750	10 400	860	850	1 000
12,5	23,5	623	847	808	5	4 400	9 500	760	850	1 000
12,5	23,5	653	827	—	5	4 150	11 400	940	800	950
12,5	23,5	658	892	850	6	4 500	9 800	780	800	950
12,5	23,5	693	877	—	5	5 000	13 400	1 110	750	900
12,5	23,5	698	952	906	6	5 300	11 600	910	750	900
12,5	23,5	733	927	—	5	5 500	15 000	1 240	750	900
12,5	23,5	738	1 002	956	6	6 000	13 200	1 000	700	850
12,5	23,5	773	977	—	5	5 850	16 600	1 330	700	850
12,5	23,5	778	1 062	1 013	6	7 100	15 300	1 170	670	800
12,5	23,5	823	1 037	—	5	6 100	17 300	1 350	630	750
12,5	23,5	828	1 120	1 071	6	7 500	16 600	1 250	630	750
12,5	23,5	873	1 097	—	5	6 300	18 000	1 400	600	700
12,5	23,5	878	1 192	1 136	6	8 300	18 600	1 700	600	700
12,5	23,5	923	1 157	—	5	7 100	20 400	1 920	560	670
12,5	23,5	928	1 252	1 191	6	8 300	19 300	1 740	560	670
12,5	23,5	978	1 222	—	6	8 150	24 000	2 190	530	630
12,5	23,5	978	1 332	1 261	6	9 500	22 400	1 950	530	630
12,5	23,5	1 028	1 292	—	6	9 000	26 500	2 390	500	600
12,5	23,5	1 028	1 392	1 322	6	10 400	25 000	2 130	500	600
12,5	23,5	1 088	1 372	—	6	10 400	30 000	2 600	480	560
12,5	23,5	1 094	1 466	1 397	8	11 400	27 500	2 320	480	560
12,5	23,5	1 148	1 432	—	6	10 400	31 000	2 650	450	530
12,5	23,5	1 154	1 546	1 473	8	12 200	30 000	2 030	450	530
12,5	23,5	1 208	1 512	—	6	12 200	37 500	3 200	430	500
12,5	23,5	1 214	1 626	1 548	8	13 400	32 500	2 650	430	500
12,5	23,5	1 284	1 596	—	8	13 700	41 500	2 850	400	480
12,5	23,5	1 634	2 026	—	8	18 300	61 000	4 800	320	380
20	41	1 750	2 310	2 191	12	23 200	64 000	3 850	300	360



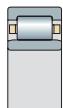
FAG



Four-row cylindrical roller bearings with cage

Four-row cylindrical roller bearings with cage

	Page
Product overview	Four-row cylindrical roller bearings with cage 416
Features	Four-row cylindrical roller bearings with cylindrical bore 417 Four-row cylindrical roller bearings with tapered bore 421 Non-locating bearings 422 Sealing 422 Lubricant 422 Operating temperature 422 Cages 423 Suffixes 423
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Accuracy	Radial internal clearance of cylindrical roller bearings with cylindrical bore 425 Radial internal clearance of cylindrical roller bearings with tapered bore 425
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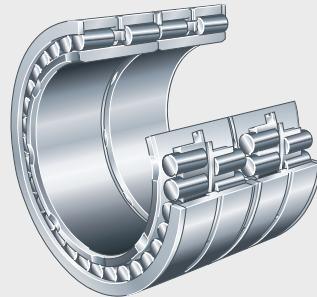


Product overview Four-row cylindrical roller bearings with cage

Non-locating bearings

With cylindrical bore for tight fit

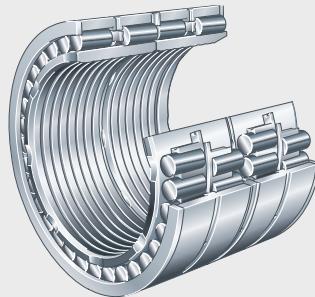
Z-5..ZL4-01, F-8..ZL4-01



00014E24

With cylindrical bore for loose fit

Z-5..ZL4-02, F-8..ZL4-02



00014E26

With tapered bore

Z-5..ZL4-03, F-8..ZL4-03



00014E27

Four-row cylindrical roller bearings with cage

Features

Four-row cylindrical roller bearings comprise solid bearing rings and cylindrical roller and cage assemblies with solid cages. The bearings are suitable for very high radial loads and high speeds and are used principally in rolling mills and roller presses. Four-row cylindrical roller bearings are separable and are therefore easy to fit and dismantle.

Four-row cylindrical roller bearings with cylindrical bore

Bearings for tight fit on the roll journal

Bearings with a cylindrical bore are available in special designs with non-standardised main dimensions and designations.

The design selected will depend on the type of application.

Design 1

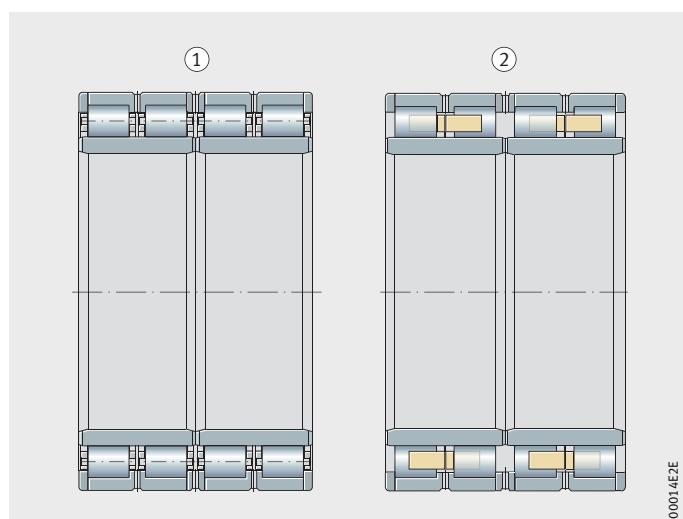
- Two outer rings each with one rigid central rib, one intermediate ring, two loose rib washers, two ribless inner rings
- Lubrication groove and lubrication holes in the outer rings and in the intermediate ring, lubrication grooves in the end faces of the inner rings
- One steel pin cage per row of rollers.

Design 2

- Two outer rings each with one rigid central rib, one intermediate ring, two loose rib washers, two ribless inner rings
- Lubrication groove and lubrication holes in the outer rings and in the intermediate ring, lubrication grooves in the end faces of the inner rings
- Brass or steel solid cages.

① Design 1
② Design 2

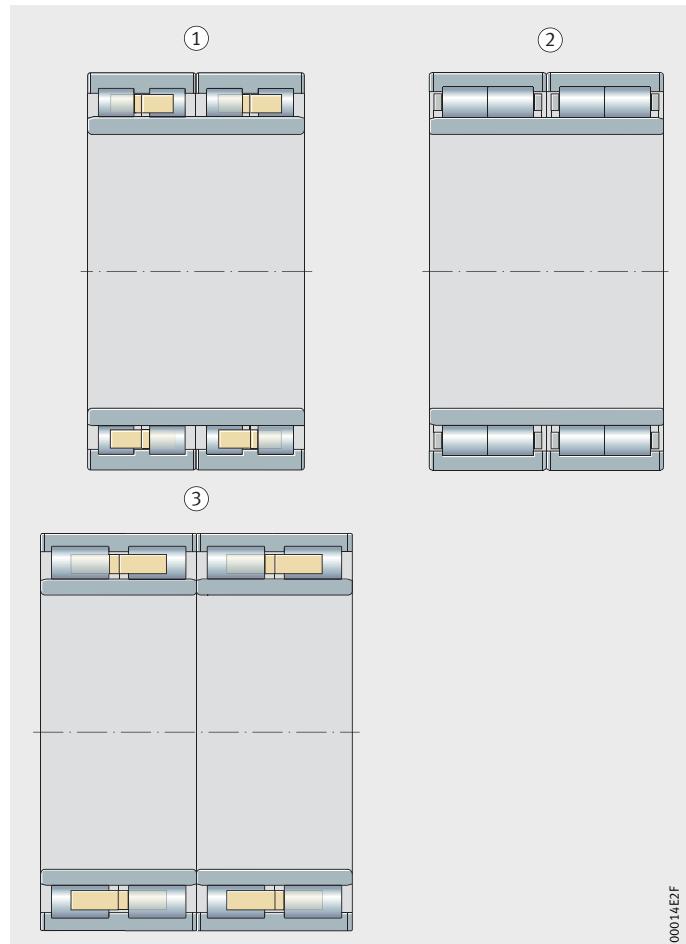
Figure 1
Four-row cylindrical roller bearings for tight fit



00014E2C

Four-row cylindrical roller bearings with cage

- Design 3**
- Two outer rings each with three rigid ribs, ribless single-piece inner ring
 - Lubrication grooves in the end faces of the outer rings
 - Brass or steel solid cages.
- Design 4**
- Two outer rings each with three rigid ribs, ribless single-piece inner ring
 - Lubrication grooves in the end faces of the outer rings
 - Brass or steel solid cages for each two rows of rollers.
- Design 5**
- Two outer rings each with three rigid ribs, two ribless inner rings
 - Lubrication grooves in the end faces of the outer rings
 - Brass or steel solid cages.



Bearings for loose fit on the roll journal

In Designs 6 to 10 for loose fit, the inner rings are wider than the outer rings. Due to the clearance between the inner ring and the journal, heating and wear of the journal occurs, so it is important to achieve good lubrication of the fit joint.

The radial grooves in the lateral faces of the inner rings are intended to achieve this objective.

In Designs 6 to 8 and 10, lubrication of the journal is improved by the helical groove in the inner ring bore. The inner rings are made from case hardening steel, the radial internal clearance C2 is smaller than normal, *Figure 3* and *Figure 4*, page 420.

The bearings for a loose fit do not achieve the same high speeds as the bearings for a tight fit on the roll journal, *Figure 1*, page 417 and *Figure 2*, page 418.

Design 6

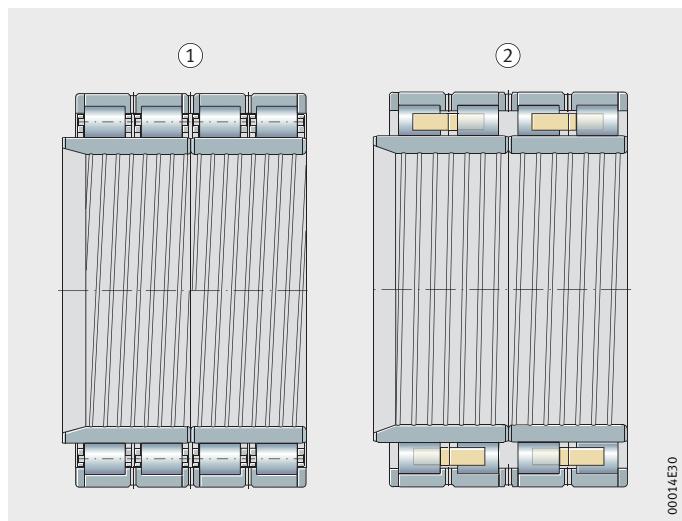
- Two outer rings each with one rigid central rib, one intermediate ring, two loose rib washers, two ribless inner rings
- Lubrication groove and lubrication holes in the outer rings and in the intermediate ring, lubrication grooves in the end faces of the inner rings
- One steel pin cage per row of rollers.

Design 7

- Two outer rings each with one rigid central rib, one intermediate ring, two loose rib washers
- Two ribless inner rings, lubrication groove and lubrication holes in the outer rings and in the intermediate ring, lubrication grooves in the end faces of the inner rings
- Brass or steel solid cages.

① Design 6
② Design 7

Figure 3
Four-row cylindrical roller bearings
for loose fit



00014E0

Four-row cylindrical roller bearings with cage

Design 8

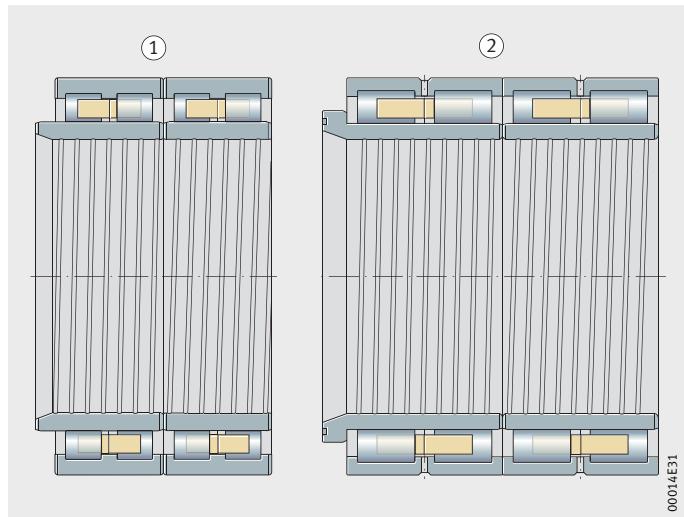
- Two outer rings each with three rigid ribs, two ribless inner rings
- Lubrication grooves in the end faces of the inner and outer rings
- Brass or steel solid cages.

Design 9

- Two outer rings each with three rigid ribs, two ribless inner rings
- Lubrication groove and lubrication holes in the outer rings, lubrication grooves in the end faces of the inner rings
- Brass or steel solid cages.

① Design 8
② Design 9

Figure 4
Four-row cylindrical roller bearings
for loose fit
(continued)



00014E31

Four-row cylindrical roller bearings with tapered bore

Four-row cylindrical roller bearings with tapered bore (taper 1:12) are frequently used as a replacement for oil film bearings. In these bearings, the radial internal clearance or preload can be set to an optimum value. The ribless inner ring is of a single-piece design, *Figure 5* and *Figure 6*, page 422.

Design 10

- Two outer rings each with three rigid ribs
- Lubrication grooves in the end faces of the outer rings
- Brass or steel solid cages.

Design 11

- Two outer rings each with three rigid ribs
- Lubrication grooves in the end faces of the outer rings
- Brass or steel solid cages.

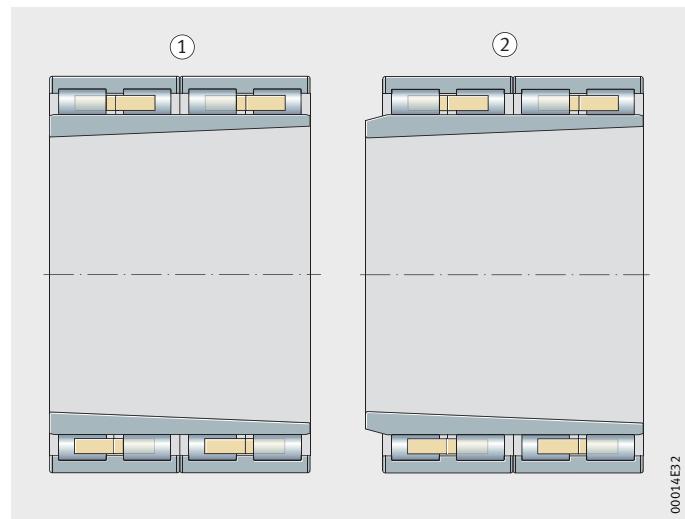


Figure 5
Four-row cylindrical roller bearings with tapered bore

Four-row cylindrical roller bearings with cage

Design 12

- Two outer rings each with one rigid central rib, one intermediate ring, two loose rib washers
- Lubrication groove and lubrication holes in the intermediate ring
- Brass or steel solid cages.

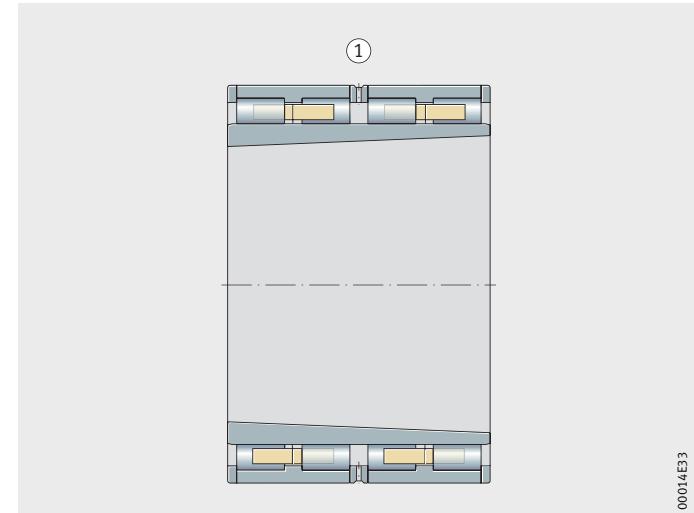


Figure 6
Four-row cylindrical roller bearings
with tapered bore
(continued)

Non-locating bearings

All the four-row cylindrical roller bearings described here are non-locating bearings and can support radial forces only. High axial forces are supported by using, for example, axial tapered roller bearings, axial spherical roller bearings or double row tapered roller bearings with a large contact angle. Angular contact ball bearings and deep groove ball bearings are used as axial bearings where small axial forces are present.

Sealing

Four-row cylindrical roller bearings are supplied without seals.

Lubricant

The lubricant should be supplied at two points. Many bearings have lubrication grooves and lubrication holes in the outer ring. In other bearings, there are radial lubrication grooves in the end faces of the outer rings.

Operating temperature

The four-row cylindrical roller bearings can be used at operating temperatures from -30°C to $+150^{\circ}\text{C}$.



For continuous operation above $+120^{\circ}\text{C}$, please contact us.

Cages In four-row cylindrical roller bearings for high rolling speeds, roller-guided solid cages made from brass or steel are used. These are used, for example, for work rolls in four-high stands and in small section and wire rolling lines.

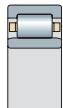
Pin cages allow the use of a large number of through-drilled rollers and thus very high load carrying capacity. Their particular strength is important in the case of bearings in large stands that are subjected to strong acceleration and deceleration, for example in reversing type operation. This design is also used for the backup rolls in four-high stands.

Suffixes The design of the four-row cylindrical roller bearings (for example radial internal clearance, accuracy, cage) is specified in the designation (Z-5..ZL or F-8..ZL). Please contact us for relevant information.

Where there are deviations from the original design, suffixes are used, for an example see the following table:

Available designs

Suffix	Description	Design
C4	Radial internal clearance larger than C3	Special design, available by agreement only
N12BA	Two double row cylindrical roller bearings in matched sets (when ordering, state double the quantity)	



Four-row cylindrical roller bearings with cage

Design and safety guidelines

Minimum radial load



In continuous operation, a minimum radial load of the order of $F_{r\min} = C_{0r}/60$ is necessary.

If $F_{r\min} < C_{0r}/60$, please contact us.

Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

$$P = F_r$$

P kN
Equivalent dynamic bearing load
 F_r kN
Radial dynamic bearing load.

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

P_0 kN
Equivalent static bearing load
 F_{0r} kN
Radial static bearing load.

Design of bearing arrangements

Tolerances of the roll journal

Bearing bore and journal tolerance

The tolerance of the roll journal depends on whether the bearing should have a tight fit or loose fit.

For four-row cylindrical roller bearings that should have a tight fit on the roll journal, we recommend the values in the following table:

Nominal bearing bore d mm	Journal tolerance mm
< 200	n6
200 – 400	p6/r6
> 400 – 630	+0,200 – +0,260
> 630 – 800	+0,250 – +0,330
> 800 – 1250	+0,320 – +0,420
> 1250 – 1400	+0,400 – +0,550
> 1400 – 1600	+0,520 – +0,650



Where the bearing inner ring has a loose fit, the roll journal should have a tolerance to e7.

For bearings with a tapered bore and at high speeds, please contact us to discuss tolerances.

Tolerances for the chock

We recommend the following tolerances for the bore of the chock:

H6 for $D \leq 800$ mm

H7 for $D > 800$ mm.



For bearings with a tapered bore, please contact us to discuss the tolerances for the adjacent parts.

Accuracy

The dimensional and running accuracy of the four-row cylindrical roller bearings of the basic design correspond to tolerance class PN to DIN 620.

Radial internal clearance of cylindrical roller bearings with cylindrical bore

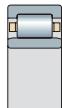
Radial internal clearance (cylindrical bore)

Bore d mm	Radial internal clearance								
	C2 μm		CN μm		C3 μm		C4 μm		
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
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
450	500	110	220	220	330	330	440	440	550
500	560	120	240	240	360	360	480	480	600
560	630	140	260	260	380	380	500	500	620
630	710	145	285	285	425	425	565	565	705
710	800	150	310	310	470	470	630	630	790
800	900	180	350	350	520	520	690	690	860
900	1000	200	390	390	580	580	770	770	960
1000	1120	220	430	430	640	640	850	850	1060
1120	1250	230	470	470	710	710	950	950	1190
1250	1400	270	530	530	790	790	1050	1050	1310
1400	1600	330	610	610	890	890	1170	1170	1450

Radial internal clearance of cylindrical roller bearings with tapered bore

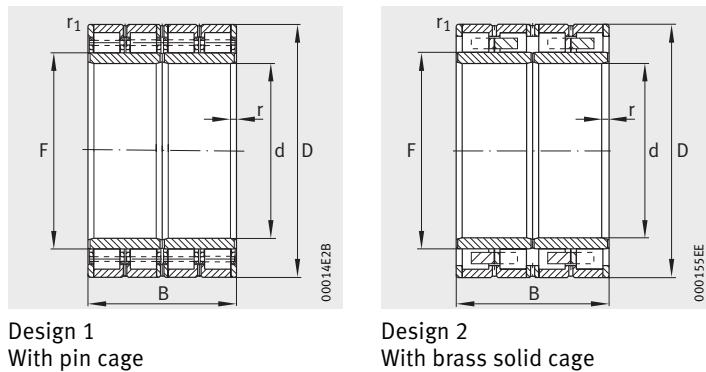
Radial internal clearance (tapered bore)

Bore d mm	Radial internal clearance						
	CN μm		C3 μm		C4 μm		
over	incl.	min.	max.	min.	max.	min.	max.
225	250	170	235	220	285	270	335
250	280	185	255	240	310	295	365
280	315	205	280	265	340	325	400
315	355	225	305	290	370	355	435
355	400	255	345	330	420	405	495
400	450	285	385	370	470	455	555
450	500	315	425	410	520	505	615



Cylindrical roller bearings

Four-row,
with cylindrical bore,
for tight fit on roll journals



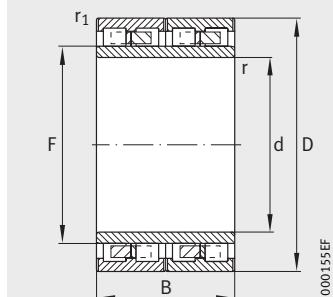
Dimension table · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions			
			d	D	B	F
Z-509216.ZL	5	59	220	320	210	246
Z-541452.ZL	3	67,6	220	330	230	249
Z-525147.ZL	2	95,4	220	340	290	250
Z-508727.02.ZL	3 ¹⁾	57,8	230	330	206	260
Z-504547.ZL	4	46,9	240	330	180	265
Z-508368.ZL	3	57,4	240	330	220	270
Z-512972.ZL	4	59,9	240	340	200	266
Z-513703.ZL	3	63,4	240	340	220	268
Z-514959.ZL	2	101	240	360	290	270
Z-522310.ZL	3 ³⁾	59,7	250	340	230	276
Z-533880.ZL	3	72,6	260	360	230	292,2
Z-507336.02.ZL	3	76,4	260	370	220	292
Z-507336.ZL	3	76,4	260	370	220	292
Z-518214.ZL	2	134	260	400	290	296
Z-521065.ZL	2	151	260	400	335	294
Z-517423.ZL	3	80,4	265	370	234	300
Z-536134.ZL	3	114	275	400	285	308
Z-507339.ZL	3 ¹⁾	81,5	280	390	220	312
Z-507339.02.ZL	3 ¹⁾	81,7	280	390	220	312
Z-513729.01.ZL	3 ³⁾	101	280	390	275	312
Z-527104.ZL	2	99,9	280	390	275	308
Z-513342.ZL-N12BA	5 ²⁾	57,1	280	400	286	316
Z-510350.ZL-N12BA-C4	5 ²⁾	66,2	280	410	300	313
Z-517796.ZL	3	164	290	440	310	328
Z-524289.02.ZL	2	130	300	420	300	332
Z-517795.ZL	1	233	300	460	350	341
Z-574469.ZL	3	115	310	440	240	345
Z-532220.ZL	1	161	320	440	340	350
F-804571.ZL	4	138	320	460	240	364
Z-532592.ZL	3	196	320	470	350	357
Z-532583.ZL	1	193	320	470	350	357
Z-541851.ZL	2	219	320	480	350	364
Z-513654.01.ZL	1	225	320	480	350	364

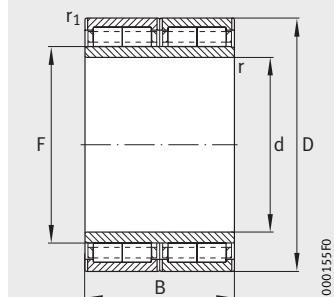
¹⁾ Steel double comb cage.

²⁾ Two double row bearings fitted in a set with a circumferential lubrication groove and lubrication holes in the outer rings.

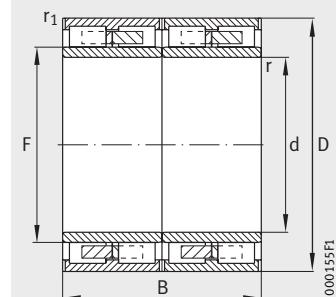
³⁾ Circumferential lubrication groove and lubrication holes in the outer rings.



Design 3
With brass solid cage



Design 4
With brass solid cage



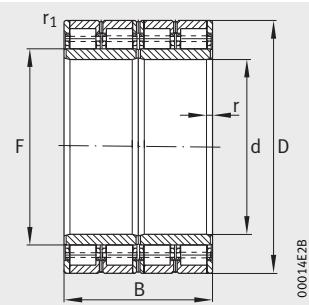
Design 5
With brass solid cage

		Basic load ratings		Fatigue limit load
r min.	r ₁ min.	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN
2,1	2,1	2 450	4 300	480
3	3	2 360	3 900	420
3	3	3 250	5 400	590
2	2	2 160	3 900	420
2,1	2,1	2 040	3 900	415
2	2	2 080	4 250	460
3	3	2 500	4 500	490
3	3	2 400	4 250	460
12,5X30°	1,2	3 450	6 000	640
2,1	2,1	2 120	4 050	435
4	4	2 500	5 000	520
3	3	2 200	4 050	430
3	3	2 200	4 050	430
4	4	4 000	6 800	710
4	1,5	4 300	7 200	760
2,1	2,1	2 500	5 100	530
4	2,5	3 750	6 800	325
3	3	2 280	4 300	450
3	3	2 400	4 550	480
2,1	2,1	3 150	6 400	670
3	2	3 600	6 800	700
4	4	2 500	6 300	560
4	4	2 850	6 900	620
4	4	4 250	6 950	700
7X20°	1,5	4 150	8 000	810
4	2,5	5 500	9 650	960
3	3	3 250	5 700	580
4	1,5	5 000	10 400	1 050
3	3	3 750	7 200	710
5	—	5 200	9 300	930
5	—	5 850	10 800	1 080
4	1,5	5 600	9 800	980
12X20°	1,5	5 850	10 800	1 070



Cylindrical roller bearings

Four-row, with cylindrical bore,
for tight fit on roll journals



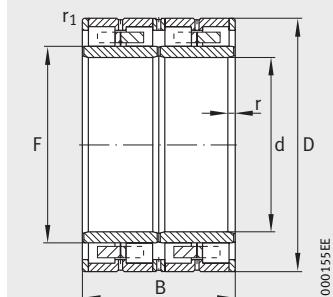
Design 1
With pin cage

Dimension table (continued) · Dimensions in mm

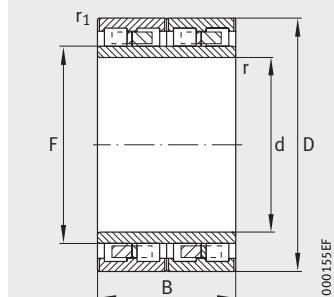
Designation	Design	Mass m ≈kg	Dimensions			
			d	D	B	F
Z-543447.ZL	2	174	330	460	340	365
Z-521593.01.ZL	1	176	330	460	340	365
Z-527634.ZL	2	205	340	480	350	378
Z-525837.01.ZL	1	209	340	480	350	378
Z-541185.ZL	1	203	340	480	350	378
Z-517794.ZL	1	253	340	500	370	385
Z-545171.ZL	1	379	340	560	380	396
Z-532381.ZL-N12BA	5 ¹⁾	122	350	500	380	389
Z-532001.ZL	1	268	350	500	410	388
Z-568450.ZL	2	220	350	520	300	401
Z-562913.ZL	2	264	360	520	380	405
Z-517793.01.ZL	1	274	360	520	380	405
Z-543975.ZL	2	250	370	520	380	409
Z-524678.01.ZL	1	251	370	520	380	409
Z-541192.ZL	1	261	370	520	380	409
Z-576360.ZL	3 ²⁾	182	380	520	290	418
Z-541982.ZL	2	217	380	540	300	421
Z-545768.ZL	1	221	380	540	300	421
Z-544794.ZL	2	298	380	540	400	422
Z-517792.ZL	1	303	380	540	400	422
Z-578278.ZL	1	224	390	540	320	431
Z-533426.ZL	1	254	400	540	380	436
Z-513769.01.ZL	1	321	400	560	410	445
Z-542395.ZL	2	408	400	590	440	450
Z-513770.ZL	1	421	400	590	440	450
Z-543736.ZL	2	280	410	560	400	450
Z-561005.ZL	1	293	410	560	400	450
Z-517436.ZL	1	435	410	600	440	460
Z-533053.ZL-N12BA	5 ¹⁾	128	420	580	320	463
Z-545467.ZL	2	409	420	600	440	470
Z-517464.ZL	1	414	420	600	440	470
Z-526415.ZL	1	243	430	570	340	465
Z-543174.ZL	1	386	433	600	435	478

¹⁾ Two double row bearings fitted in a set with a circumferential lubrication groove and lubrication holes in the outer rings.

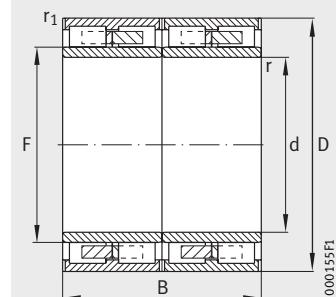
²⁾ Circumferential lubrication groove and lubrication holes in the outer rings.



Design 2
With brass solid cage



Design 3
With brass solid cage



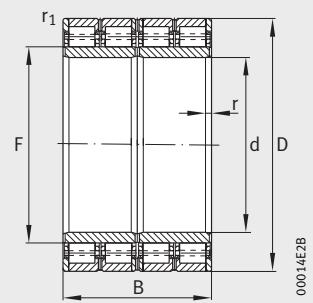
Design 5
With brass solid cage

		Basic load ratings		Fatigue limit load
r min.	r ₁ min.	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN
10,5X20°	1,5	4 650	9 500	950
4	2	5 100	10 800	1 070
10X20°	1,5	5 300	11 000	1 100
10X20°	1,5	5 700	12 000	1 200
5	1,5	5 700	12 000	1 200
6	3	6 400	12 500	1 220
4	1,5	7 650	12 200	1 150
5	5	4 200	11 200	940
5	2	7 100	14 300	1 410
5	5	5 100	8 800	830
13,5X20°	2	6 200	12 200	1 190
13,5X20°	2	6 550	13 200	1 270
10X20°	1,5	6 200	12 200	1 190
10X20°	1,5	6 400	12 900	1 250
10X20°	1,5	6 400	12 900	1 250
4	4	4 500	9 000	850
3	1	5 100	9 150	840
8,5X20°	2	5 850	10 800	1 010
5	2	6 700	13 400	1 300
5	2	7 100	15 000	1 430
10X20°	3	5 500	11 000	1 100
5	2	6 400	14 000	1 330
12X20°	2	7 800	16 600	1 590
4	4	8 300	16 000	1 490
4	4	9 150	17 600	1 670
11X20°	2	6 950	14 600	1 380
11X20°	2	7 650	16 600	1 550
13X20°	1,6	9 300	18 600	1 740
4	4	3 900	10 400	830
14X20°	1,6	8 150	17 000	1 550
14X20°	1,6	8 800	19 000	1 760
5	2	6 000	12 700	1 170
14X30°	2	9 150	19 600	1 810



Cylindrical roller bearings

Four-row, with cylindrical bore,
for tight fit on roll journals

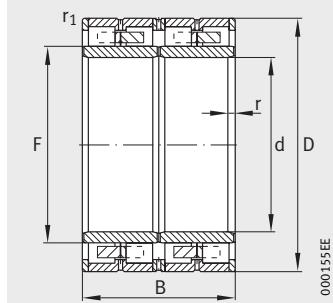


Design 1
With pin cage

Dimension table (continued) · Dimensions in mm

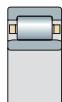
Designation	Design	Mass m ≈kg	Dimensions			
			d	D	B	F
Z-545628.ZL	2	427	440	620	450	487
Z-517454.01.ZL	1	434	440	620	450	487
Z-560371.ZL	1	479	447,295	635,176	464	495
Z-542648.ZL	1	311	450	590	435	486
Z-529095.ZL	2	1 140	459,95	760	600	535
Z-541756.ZL	1	375	460	650	355	509,5
Z-513584.01.ZL	1	446	460	650	424	510
Z-518846.ZL	1	498	460	650	470	509
Z-547660.ZL	2	429	480	650	450	525
Z-547659.ZL	1	437	480	650	450	525
Z-533522.ZL	1	500	480	680	420	528
Z-514445.02.ZL	1	582	480	680	500	532
Z-546152.ZL	1	656	480	700	500	534
Z-523399.ZL	2	691	480	700	530	536
Z-533023.ZL	1	464	500	670	450	556
Z-546335.ZL	1	479	500	680	450	550
Z-517692.ZL	1	612	500	700	500	554
Z-530488.ZL	1	640	500	710	480	558
Z-513378.01.ZL	1	735	500	720	530	568
Z-567725.01.ZL	1 ¹⁾	513	510	680	500	560
Z-541646.ZL	1	728	510	730	520	565
Z-517690.ZL	1	892	510	760	550	570
Z-541647.ZL	1	785	520	750	530	576
Z-537383.ZL	2	740	530	760	520	587
Z-531597.ZL	1	797	530	760	520	587
Z-517689.01.ZL	1	946	530	780	570	601
Z-543481.ZL	1	1 650	530	870	670	615
Z-524544.01.ZL	1	849	536,176	762,03	559	598
Z-560507.ZL	2	815	536,176	762,03	559	598
Z-532843.ZL	1	639	550	740	510	600
Z-517688.ZL	1	974	550	800	560	610
Z-517687.01.ZL	1	1 100	560	820	600	625
Z-514444.ZL	1	1 020	571,1	812,97	594	636

¹⁾ Bearing with four inner rings.



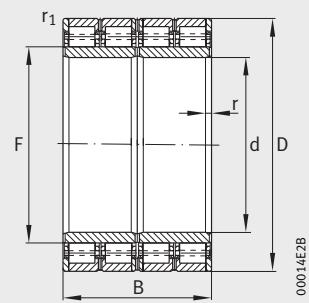
Design 2
With brass solid cage

		Basic load ratings		Fatigue limit load
r min.	r ₁ min.	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN
12X20°	3	8 800	18 000	1 650
12X20°	3	9 500	20 000	1 820
5	3	10 000	20 400	1 880
5	2	8 150	19 000	1 760
5	4,5	16 000	29 000	2 550
12X20°	3	7 350	14 300	1 270
6	3	9 000	18 300	1 660
14X20°	2,5	10 400	22 000	2 000
15X20°	3	9 000	19 600	1 750
15X20°	3	9 800	22 000	1 970
15X20°	3	9 800	19 300	1 730
15X20°	2,5	11 600	24 000	2 170
6	4	12 200	23 600	2 110
6	6	11 200	22 800	2 060
15X20°	4	9 000	22 800	2 050
5	2	10 200	22 800	2 010
6	3	11 600	25 000	2 240
18X20°	5	11 200	23 200	2 080
17X20°	3	12 700	27 500	2 450
7,5	3	10 400	25 500	2 300
6	3	13 400	28 000	2 470
16X20°	3	14 600	28 000	2 430
6	3	13 700	28 000	2 450
8	3	12 000	24 000	2 080
12X20°	6	13 700	29 000	2 550
15X20°	2,5	14 600	30 500	2 650
7,5	5	21 200	38 000	3 200
18X20°	3	13 400	30 000	2 650
5	2	14 600	31 500	2 750
15X20°	2	12 200	28 500	2 490
18,5X20°	4	15 000	30 500	2 600
20X20°	4	16 300	33 500	2 850
14X20°	4	16 000	35 500	3 000



Cylindrical roller bearings

Four-row, with cylindrical bore,
for tight fit on roll journals

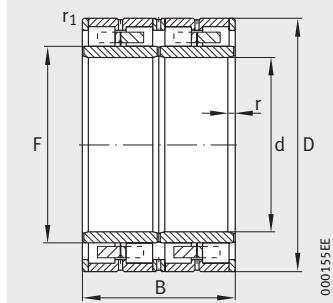


Design 1
With pin cage

Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions			
			d	D	B	F
Z-517685.ZL	1	1 260	580	850	640	648
Z-526413.ZL	2	605	585	770	480	630
Z-518780.ZL	1	886	600	820	550	660
Z-528518.ZL	1	936	600	820	575	660
Z-533259.ZL	1	1 110	600	870	540	672
Z-517684.01.ZL	1	1 310	600	870	640	672
Z-561221.ZL	1	1 400	628	922	600	702
Z-515141.ZL	1	1 430	634,5	901,87	674	705
Z-515194.01.ZL	1	1 470	650	920	670	723
Z-533258.ZL	1	827	670	870	530	725
Z-517682.ZL	1	1 610	670	950	690	740
Z-533683.ZL	1	1 290	680	940	600	743
Z-524229.ZL	1	1 640	680	980	640	760
Z-517681.ZL	1	1 800	690	980	715	767,5
Z-530487.ZL	1	1 210	700	930	620	763
Z-517680.01.ZL	1	1 820	710	1 000	715	787,5
Z-522815.ZL	1	2 220	725	1 040	750	809
Z-525438.ZL	1	1 220	730	960	620	790
Z-517679.ZL	1	2 040	730	1 030	750	809
Z-524881.01.ZL	1	1 500	750	1 000	670	813
F-800494.ZL	1	1 970	750	1 090	615	836
Z-524238.01.ZL	1	2 360	761,425	1 079,6	787	846
Z-540088.ZL	1	2 170	780	1 070	780	853
Z-517678.ZL	1	2 600	790	1 120	810	875
Z-526169.ZL	1	1 920	800	1 080	700	878
Z-524137.ZL	1	2 950	800	1 150	850	888
F-803317.ZL	1	2 480	820	1 130	800	903
Z-567729.ZL	1	1 720	830	1 080	710	896
Z-545636.ZL	1	2 580	850	1 150	840	928
Z-523397.ZL	1	3 570	850	1 220	900	960
Z-529054.ZL	1	1 900	860	1 131,57	670	940
Z-524239.01.ZL	1	3 480	863	1 219,302	889 ¹⁾	956
Z-566883.ZL	1	2 460	865	1 180	750	945,3
Z-523419.ZL	1	2 950	870	1 180	880	950

¹⁾ Inner ring width 873,3 mm.



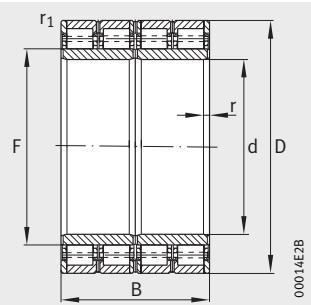
Design 2
With brass solid cage

		Basic load ratings		Fatigue limit load
r min.	r ₁ min.	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN
20X20°	4	18 000	38 000	3 200
5	2,5	11 600	27 000	2 340
6	3	14 000	33 500	2 800
15X20°	3	15 000	35 500	3 050
22X20°	4	15 300	31 000	2 550
20X20°	3	18 300	40 000	3 300
18X20°	6	19 000	38 000	3 050
20X15°	3	20 400	45 000	3 700
18X20°	4	20 800	46 500	3 800
6	3	13 700	34 500	2 900
18X20°	4	22 400	50 000	4 000
7,5	4	19 000	42 500	3 400
20X20°	4	21 200	45 000	3 550
20X20°	4	22 800	52 000	4 150
18X20°	3	17 000	44 000	3 650
22X20°	4	23 200	53 000	4 250
7,5	3	25 500	58 500	4 600
20X20°	3	17 600	45 000	3 650
20X20°	6	25 500	58 500	4 600
20X20°	3	20 400	50 000	4 000
7,5	7,5	21 600	43 000	3 300
22X20°	5	28 000	63 000	4 900
7,5	5	26 500	64 000	5 100
7,5	4	30 000	69 500	5 400
25X20°	3	22 800	58 500	4 500
9,5	9,5	31 000	69 500	5 300
7,5	7,5	27 000	67 000	4 900
20X20°	2,5	22 800	61 000	4 750
23X20°	4	30 500	76 500	5 800
23X20°	5	36 000	85 000	6 400
7,5	4	23 200	60 000	6 400
13X20°	5	34 500	85 000	6 400
20X20°	8,5	27 500	64 000	4 900
8	8	32 000	81 500	6 100



Cylindrical roller bearings

Four-row, with cylindrical bore,
for tight fit on roll journals



Design 1
With pin cage

Dimension table (continued) · Dimensions in mm

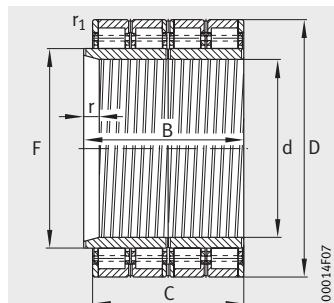
Designation	Design	Mass m ≈kg	Dimensions			
			d	D	B	F
Z-527048.ZL	1	2 950	900	1 220	840	989
Z-541812.ZL	1	3 950	900	1 280	930	1 000
Z-527977.ZL	1	3 130	937,5	1 270,25	826	1 027
Z-517676.ZL	1	4 380	940	1 320	1 000	1 029
Z-517369.01.ZL	1	5 030	950	1 360	1 000	1 075
Z-580309.ZL	1	3 450	980	1 310	880	1 061,7
Z-517740.ZL	1	4 670	980	1 360	1 000	1 080
Z-522071.ZL	1	3 270	990	1 360	760	1 080
Z-527021.ZL	1	3 520	1 000	1 360	800	1 101
Z-517675.ZL	1	5 070	1 040	1 440	1 000	1 133
Z-521910.ZL	1	3 010	1 060	1 360	800	1 137
Z-517737.ZL	1	5 300	1 100	1 500	1 000	1 194
Z-518206.ZL	1	3 620	1 150	1 500	760	1 240
Z-518649.ZL	1	5 790	1 200	1 590	1 050	1 305
Z-518578.ZL	1	7 010	1 200	1 620	1 150	1 305
Z-528717.ZL	1	9 470	1 400	1 900	1 150	1 520
Z-534900.ZL	1	9 880	1 500	1 950	1 230	1 610

		Basic load ratings		Fatigue limit load
r min.	r ₁ min.	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN
24X20°	4	31 500	80 000	6 000
6	3	36 500	85 000	6 300
25X20°	4	32 000	80 000	5 900
7,5	4	41 500	98 000	7 200
9,5	5	44 000	108 000	7 900
20X20°	6	35 500	93 000	6 900
25X20°	5	41 500	106 000	7 800
12	6	30 500	68 000	4 900
25X20°	3	34 000	83 000	6 000
20X20°	5	45 000	106 000	7 600
18X20°	5	32 500	91 500	6 500
7,5	4	46 500	114 000	8 000
20X20°	5	33 500	86 500	6 100
30X20°	6	47 500	129 000	8 900
9,5	9,5	56 000	146 000	10 200
40X20°	10	64 000	156 000	10 200
9,5	6	71 000	200 000	13 000

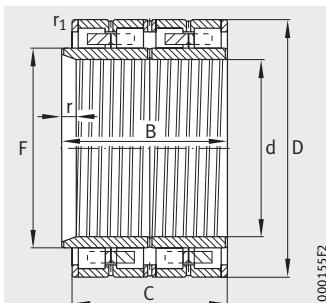


Cylindrical roller bearings

Four-row,
with cylindrical bore,
for loose fit on roll journals



Design 6
With pin cage



Design 7
With brass solid cage

Dimension table · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions			
			d	D	B	C
Z-580510.ZL	9 ¹⁾²⁾	100	220	340	320	290
F-801076.ZL	9	86,5	250	350	320	290
Z-536897.ZL	7 ³⁾	79,4	260	370	240	220
Z-522009.ZL	8 ⁴⁾	102	270	380	295	275
Z-533575.ZL	8	82,9	280	390	240	220
Z-532504.ZL	7	134	300	420	320	300
Z-580511.ZL	9 ²⁾	160	320	440	370	340
Z-531839.ZL	7	211	340	480	370	350
Z-580512.ZL	9 ²⁾⁴⁾	267	340	500	410	370
Z-538977.ZL	6 ²⁾	246	350	500	400	380
F-801476.ZL	7	225	350	520	320	300
Z-533808.ZL	7	244	360	510	400	380
F-801082.ZL	9	258	370	520	410	380
Z-522007.ZL	6	290	380	540	400	380
Z-565463.ZL	7	286	380	540	400	380
Z-536713.ZL	6	306	380	540	420	400
F-803580.ZL	9 ¹⁾⁵⁾	232	390	540	350	320
Z-561270.ZL	7	280	410	560	420	400
Z-561269.ZL	6	293	410	560	420	400
Z-533022.ZL	6	245	430	570	360	340
Z-579578.ZL	6	398	440	620	430	410
Z-572891.ZL	6	434	440	620	450	450
Z-561271.ZL	7	428	440	620	470	450
Z-533578.ZL	6	438	440	620	470	450
F-808290.ZL	9 ¹⁾⁵⁾	444	440	620	485	450
Z-532465.ZL	6 ²⁾	500	460	650	470	470
Z-536712.ZL	6 ⁶⁾	513	460	650	490	470
Z-567014.ZL	6	526	460	680	410	410
Z-524081.ZL	6	322	480	620	420	400
Z-533487.ZL	6	439	480	650	450	450

1) With rib washers.

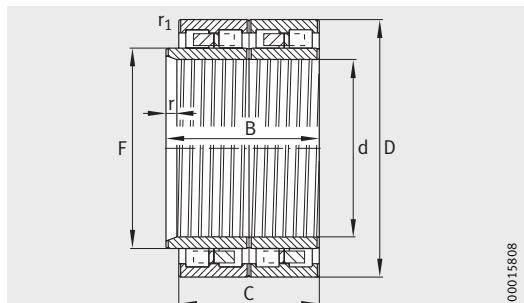
2) Chamfer distance instead of inner ring bevel.

3) Single-piece inner ring.

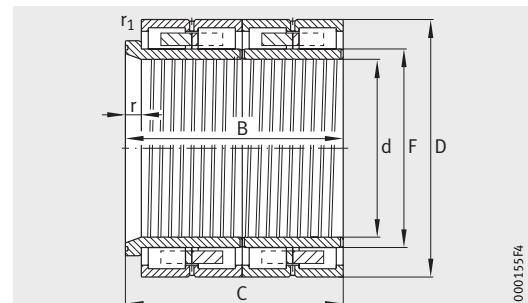
4) Circumferential lubrication groove and lubrication holes in the outer rings.

5) With pin cages.

6) Without helical groove in bearing bore.



Design 8
With brass solid cage



Design 9
With brass solid cage

00015898

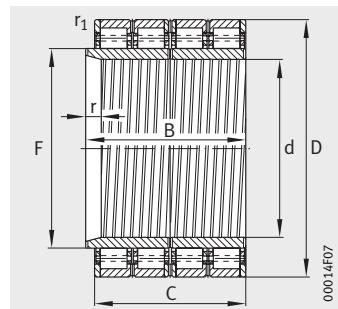
00015544

			Basic load ratings		Fatigue limit load
F	r min.	r ₁ min.	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN
250	3	2	3 550	5 850	640
277	28X20°	3	3 100	6 000	650
292	15X20°	2,5	2 200	4 050	430
300	15,5X15°	2,1	3 550	6 800	720
312	17X20°	3	2 280	4 300	450
332	15X20°	2	4 150	8 000	820
350	4	1,5	4 650	9 500	950
378	15X20°	1,5	5 300	11 000	1 100
385	6	3	5 850	11 200	1 110
388	6	3	6 550	13 200	1 280
401	28X20°	5	5 100	8 800	830
399	28X15°	2	6 100	11 800	1 150
409	30X20°	1,5	6 100	11 800	1 150
424	35X15°	1,5	6 700	13 700	1 300
422	20X20°	1,5	6 700	13 200	1 250
422	34X15°	2	7 100	15 000	1 430
431	10X20°	2	5 500	11 000	1 100
450	32X15°	2	6 700	13 700	1 300
450	30X15°	2	7 500	16 000	1 520
465	35X15°	5	6 200	13 200	1 230
487	12X20°	2	8 650	17 600	1 590
487	12X20°	3	9 500	20 000	1 820
487	32X20°	3	9 300	19 300	1 760
487	30X20°	3	9 500	20 000	1 820
487	44X10,3°	3	9 500	20 000	1 820
509	6	2,5	10 400	22 000	2 000
509	34X15°	2,5	10 400	22 000	2 000
516	14X20°	2,5	9 800	18 300	1 650
515	4	2	7 800	18 300	1 680
525	12,5X20°	3	9 800	22 000	1 970

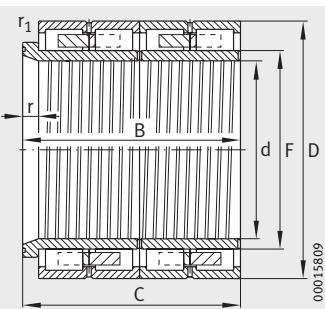


Cylindrical roller bearings

Four-row,
with cylindrical bore,
for loose fit on roll journals



Design 6
With pin cage



Design 9
With brass solid cage

Dimension table (continued) · Dimensions in mm

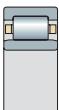
Designation	Design	Mass m ≈kg	Dimensions			
			d	D	B	C
Z-540386.ZL	6	459	500	670	450	450
Z-564182.ZL	6	454	500	670	470	450
Z-579713.ZL	9 ¹⁾ ²⁾	809	530	760	555	520
Z-566466.ZL	6	845	536,176	762,03	559	558,8
Z-579741.ZL	6	645	550	740	527	510
Z-532470.ZL	6 ³⁾	1 160	570	830	630	600
Z-572176.ZL	6	1 020	571,1	812,97	594	594
Z-565652.ZL	6	942	600	820	575	575
Z-572137.ZL	9	1 260	600	870	578	540

1) With pin cages.

2) With rib washers.

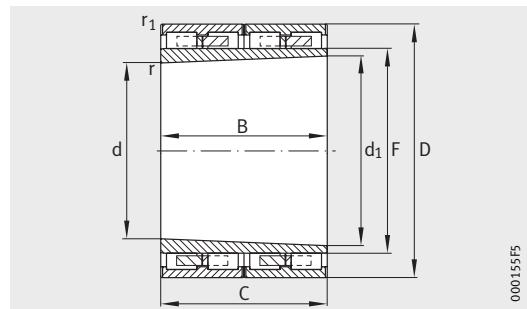
3) Without helical groove in bearing bore.

			Basic load ratings		Fatigue limit load
F	r min.	r ₁ min.	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN
540	13X20°	5	9 500	21 200	1 880
540	34X15°	4	9 500	21 600	1 900
587	45X12,5°	2,5	13 700	29 000	2 550
598	18X20°	4	13 400	30 000	2 650
600	15X20°	2	12 200	28 500	2 490
635	35X15°	4	16 600	34 500	2 950
636	15X20°	5	16 000	35 500	3 000
660	15X20°	3	15 000	35 500	3 050
672	53X12°	4	15 300	31 000	2 550



Cylindrical roller bearings

Four-row, with tapered bore
(taper 1:12)



Design 10

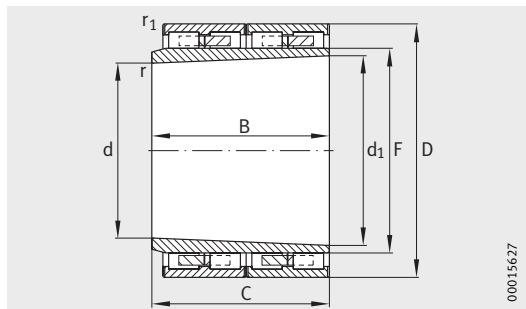
Dimension table · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions			
			d	d ₁	D	B
Z-506743.01.ZL	10	57,1	230	248,333	330	220
Z-500857.01.ZL	11	58,8	231	249,333	330	220
Z-507518.ZL	10	121	260	283,75	400	285
Z-522518.01.ZL	10	109	260	280,833	400	250
Z-505356.ZL	12	211	320	349,167	480	350
Z-510302.01.ZL	12	328	356,667	390	550	400
Z-527181.ZL	10 ¹⁾²⁾	580	412,335	453,002	650	488
Z-538221.ZL	10 ²⁾³⁾	382	440	469,583	650	355
Z-527388.ZL	12 ³⁾	806	485	530	740	540
Z-577938.ZL	12 ³⁾	803	485	530	740	540

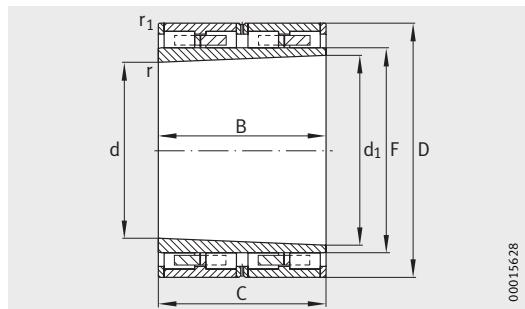
1) Circumferential lubrication groove and lubrication holes in the outer rings.

2) Without lubrication grooves in the end faces of the outer rings.

3) With pin cage.

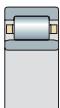


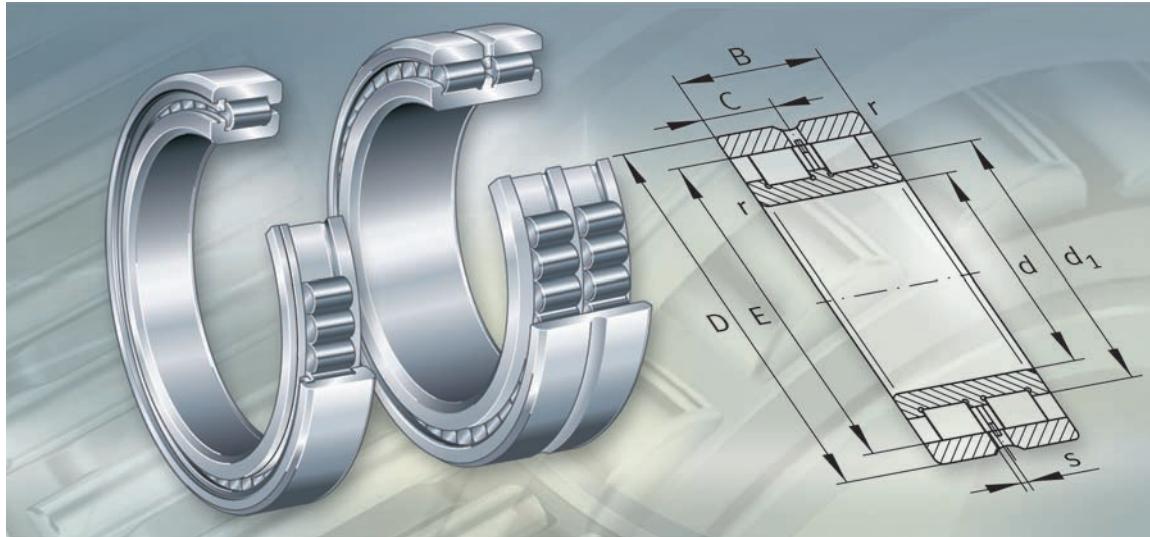
Design 11



Design 12

C	F	r min.	r ₁ min.	Basic load ratings		Fatigue limit load C _{ur} kN
				dyn. C _r kN	stat. C _{0r} kN	
220	266	2,1	1	2 200	4 250	455
235	270	1,5	2	2 080	4 250	460
285	316	4	1,5	3 400	6 300	650
250	310	1,5	3	3 000	5 400	550
350	378	1,5	1,5	5 400	11 200	1 090
400	423,4	2,5	4	6 700	13 400	1 270
488	494,5	4	1,5	9 650	18 600	1 720
355	509,5	6	3	8 800	17 600	1 600
540	572	3	5	13 200	27 500	2 410
540	572,3	5	5	13 200	27 500	2 410

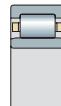




Full complement cylindrical roller bearings

Full complement cylindrical roller bearings

	Page
Product overview	Full complement cylindrical roller bearings 444
Features	Bearings of TB design 445 Non-locating bearings 445 Semi-locating bearings 446 Locating bearings 446 Operating temperature 447 Suffixes 447
Design and safety guidelines	Permissible skewing 448 Axial load carrying capacity 448 Equivalent dynamic bearing load 450 Equivalent static bearing load 451 Minimum radial load 451 Design of bearing arrangements 451
Accuracy	Radial internal clearance 453
Dimension tables	Cylindrical roller bearings, full complement, single row, semi-locating bearings 454 Cylindrical roller bearings, full complement, double row, semi-locating bearings, locating bearings, non-locating bearings 458 Cable sheave bearings (cylindrical roller bearings with annular slots), full complement, sealed, locating bearings 462



Product overview Full complement cylindrical roller bearings

Non-locating bearings Double row

SL0248, SL0249



00014E35

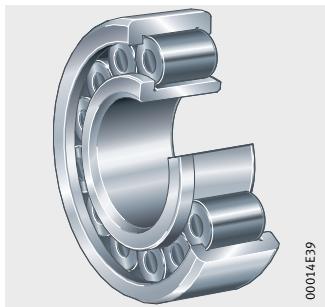
Semi-locating bearings Single row

SL1818, SL1829,
SL1830, SL1822



00014E36

SL1923



00014E39

Double row

SL1850



00014E3B

Locating bearings Double row, open Cable sheave bearings, sealed

SL0148, SL0149



00014E3C

SL0450--PP, SL04...-PP



00014E3E

Full complement cylindrical roller bearings

Features

Full complement cylindrical roller bearings comprise solid outer and inner rings and rib-guided cylindrical rollers. Since these bearings have the largest possible number of rolling elements, they have extremely high radial load carrying capacity, 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.

Single row full complement cylindrical roller bearings are available as non-locating, semi-locating and locating bearings.

Bearings of TB design

In the case of bearings of TB design, the axial load carrying capacity of cylindrical roller bearings was significantly improved with the aid of new calculation and manufacturing methods.

A special curvature in the end faces of the rollers ensures optimum contact conditions between roller and rib.

As a result, the axial contact pressures on the rib are significantly minimised and a lubricant film capable of supporting higher loads is formed. Under normal operating conditions, wear and fatigue at the rib contact running and roller end faces is completely eliminated.

In addition, axial torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower.

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.



The bearings are held together in handling and transport by a transport and mounting retaining device on the outer ring. This retaining device remains in the bearing and must not be subjected to axial load.

Axial displacement

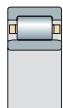
The outer ring without ribs can be axially displaced in both directions in relation to the inner ring. The inner ring has ribs on both sides.

Sealing

The cylindrical roller bearings are of an open design.

Lubrication

The bearings can be lubricated with oil or grease. For lubrication, the outer ring has a lubrication groove and lubrication holes.



Full complement cylindrical roller bearings

Semi-locating bearings

Semi-locating bearings are available in a single row design as SL1818 (dimension series 18), SL1829 (dimension series 29), SL1830 (dimension series 30), SL1822 (dimension series 22) and SL1923 (dimension series 23).

Bearings of series SL1850 (dimension series 50) are of a double row design.

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 and a self-retaining rolling element set. As a result, the inner ring can be removed from the bearing. This makes fitting and dismantling considerably easier.



The bearings SL1818, SL1829, SL1830, SL1822 and SL1850 are held together in handling and transport by a transport and mounting retaining device on the outer ring. This retaining device remains in the bearing and must not be subjected to axial load.

Axial displacement of the inner ring

The inner ring can be axially displaced in one direction by the dimension "s", see dimension table.

Sealing

The cylindrical roller bearings are supplied in an open design.

Lubrication

The single row bearings can be lubricated via the end faces with oil or grease.

Locating bearings

Bearings SL0148 (designation to DIN 5 412-9: NNC 48..V) and bearings SL0149 (designation to DIN 5 412-9: NNC 49..V) are double row locating bearings. These bearings can support axial forces in both directions as well as radial forces.



The outer ring has ribs on both sides, is axially split and held together by retaining rings. The inner ring has an additional central rib. The retaining rings must not be subjected to axial load.

Cable sheave bearings

Cable sheave bearings (cylindrical roller bearings with annular slots) are locating bearings. These bearings are very rigid and can support moderate axial forces in both directions as well as high radial forces. They comprise solid outer and inner rings with ribs, rib-guided cylindrical rollers and sealing rings.

The outer rings have annular slots 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.

Cylindrical roller bearings with annular slots are available as a light series SL04..-PP and in the dimension series 50 as SL0450..-PP.

Sealing	In the case of cable sheave bearings, the rolling element system is protected against contamination and moisture by sealing rings on both sides.																												
Lubrication	Open locating bearings can be lubricated with oil or grease. For lubrication, the outer ring has a lubrication groove and lubrication holes. Cable sheave bearings are greased using a lithium complex soap grease to GA08 and can be lubricated via the outer or inner ring. Arcanol LOAD150 is suitable for relubrication.																												
Operating temperature	Open full complement cylindrical roller bearings are suitable for operating temperatures from -30°C to $+120^{\circ}\text{C}$.  Cylindrical roller bearings with annular slots are suitable for operating temperatures from -20°C to $+80^{\circ}\text{C}$, restricted by the grease and seal material.																												
Suffixes	Suffixes for available designs: see table.																												
Available designs	<table border="1"> <thead> <tr> <th>Suffix</th> <th>Description</th> <th>Design</th> </tr> </thead> <tbody> <tr> <td>BR</td> <td>Black oxide coated</td> <td rowspan="5">Special design, available by agreement only</td> </tr> <tr> <td>C3</td> <td>Radial internal clearance larger than normal</td> </tr> <tr> <td>C4</td> <td>Radial internal clearance larger than C3</td> </tr> <tr> <td>C5</td> <td>Radial internal clearance larger than C4</td> </tr> <tr> <td>E</td> <td>Increased capacity design</td> </tr> <tr> <td>P</td> <td>Seal on one side</td> <td rowspan="3">Standard</td> </tr> <tr> <td>PP</td> <td>Seals on both sides</td> </tr> <tr> <td>RR</td> <td>Corrosion-resistant design, with Corrootect® coating</td> </tr> <tr> <td>2NR</td> <td>Cable sheave bearing supplied with two loose-packed retaining rings WRE</td> <td rowspan="3">Special design, available by agreement only</td> </tr> <tr> <td>–</td> <td>Without seals</td> </tr> <tr> <td>TB</td> <td>Bearing with increased axial load carrying capacity</td> </tr> </tbody> </table>	Suffix	Description	Design	BR	Black oxide coated	Special design, available by agreement only	C3	Radial internal clearance larger than normal	C4	Radial internal clearance larger than C3	C5	Radial internal clearance larger than C4	E	Increased capacity design	P	Seal on one side	Standard	PP	Seals on both sides	RR	Corrosion-resistant design, with Corrootect® coating	2NR	Cable sheave bearing supplied with two loose-packed retaining rings WRE	Special design, available by agreement only	–	Without seals	TB	Bearing with increased axial load carrying capacity
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BR	Black oxide coated	Special design, available by agreement only																											
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–	Without seals																												
TB	Bearing with increased axial load carrying capacity																												

Available bearings of TB design

Series available by agreement	From bore diameter d mm
SL1818	460
SL1822	180
SL1829	300
SL1830	240
SL1923	150
SL1850	300



Full complement cylindrical roller bearings

Design and safety guidelines

Permissible skewing

There is no significant reduction in rating life if the misalignment of the inner ring relative to the outer ring does not exceed the following values:

- 4' in bearings of series SL1818
- 3' in bearings of series SL1923, SL1822, SL1829, SL1830.

Double row bearings do not permit any skewing between the inner and outer ring.

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 speed at the ribs
- the lubrication of the contact surfaces
- tilting of the bearings (in single row bearings).



Ribs subjected to load must be supported across their entire height.

The permissible axial load $F_{a\ per}$ must not be exceeded in order to avoid an unacceptable increase in temperature.

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 must not exceed the value 0,4.

In the case of bearings of TB design, the value 0,6 is permissible.

Continuous axial loading without simultaneous radial loading is not permissible.

Permissible and maximum load

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

Bearings in standard design

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

Bearings of TB design

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

Bearings of standard and TB design

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

$F_{a\text{ per}}$ N
Permissible axial load

$F_{a\text{ max}}$ N
Axial limiting load

k_S –
Factor as a function of the lubrication method, see table

k_B –
Factor as a function of the bearing series, see table, page 450

d_M mm
Mean bearing diameter ($d + D$)/2, see dimension table

n min^{-1}
Operating speed.

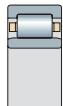
Cable sheave bearings



In the case of cylindrical roller bearings with annular slots, application engineering advice is necessary. The limit values and calculations for $F_{a\text{ per}}$ and $F_{a\text{ max}}$ are not therefore valid for these bearings.

Factor k_S for the 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 oils should be used, e.g. CLP (DIN 51517) and HLP (DIN 51524) of ISO VG classes 32 to 460 and ATF oils (DIN 51502) and gearbox oils (DIN 51512) of SAE viscosity classes 75 W to 140 W.

Full complement cylindrical roller bearings

Bearing factor k_B

Series	Factor k_B
SL1818, SL0148	4,5
SL1829, SL0149	11
SL1830, SL1850	17
SL1822	20
SL1923	30

Equivalent dynamic bearing load

Non-locating bearings and cable sheave bearings

Semi-locating and locating bearings

Load ratio and equivalent dynamic load

For bearings under dynamic loading, the following applies:

$$P = F_r$$

If an axial force F_a is present in addition to the radial force F_r , the load ratio must be taken into consideration.

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq e$	$P = F_r$
$\frac{F_a}{F_r} > e$	$P = 0,92 \cdot F_r + Y \cdot F_a$

P kN

Equivalent dynamic bearing load for combined load

F_a kN

Axial dynamic bearing load

F_r kN

Radial dynamic bearing load

e, Y —

Factors, see table.

Factors e and Y

Series	Calculation factors	
	e	Y
SL1830, SL1850	0,2	0,6
SL0148, SL0149	0,4	0,5
SL1822, SL1829, SL1830, SL1923	0,3	0,4

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

P_0 kN
Equivalent static bearing load
 F_{0r} kN
Radial static bearing load.

Minimum radial load



In continuous operation, a minimum radial load of the order of $F_{r\min} = C_{0r}/60$ is necessary.

If $F_{r\min} < C_{0r}/60$, please contact us.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

Cable sheave bearings

Cable sheave bearings are normally subjected to circumferential load on the outer ring. The outer ring must therefore have a press fit.

Axial location

In order to prevent lateral creep of the bearing rings, they must be located by force or physical locking means.

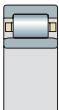
The abutment shoulders (shaft and housing) should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seating point to the abutment shoulder must be designed with rounding to DIN 5418 or an undercut to DIN 509. The minimum values for the chamfer dimensions r in the dimension tables must be observed.

For semi-locating bearings, the bearings only require support on one side, on the rib supporting the axial load.

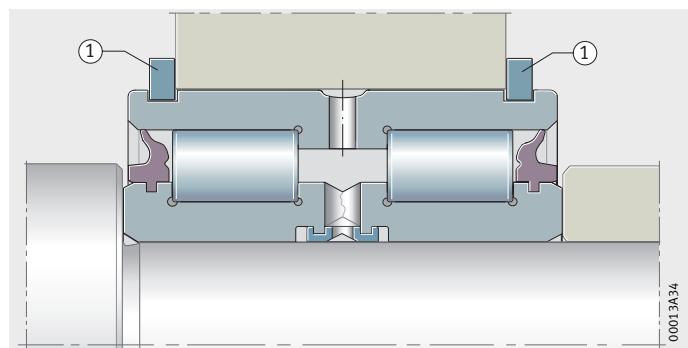


In axially loaded bearings, full support must be provided for the ribs transmitting forces, *Figure 1*.



① Retaining ring

Figure 1
Axial location of outer and inner ring, support of ribs



00013A34

Full complement cylindrical roller bearings

Location of cable sheave bearings

The annular slots allow axial location of the outer rings using retaining rings, *Figure 1*, page 451. Rings of series WRE or rings to DIN 471 are suitable. Locating rings are not included in the delivery. In the design 2NR, the delivery includes two retaining rings WRE packed loose.



The split inner ring must be axially secured, *Figure 1*, page 451. The fasteners must not be subjected to axial load.

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 must be observed, see dimension table.

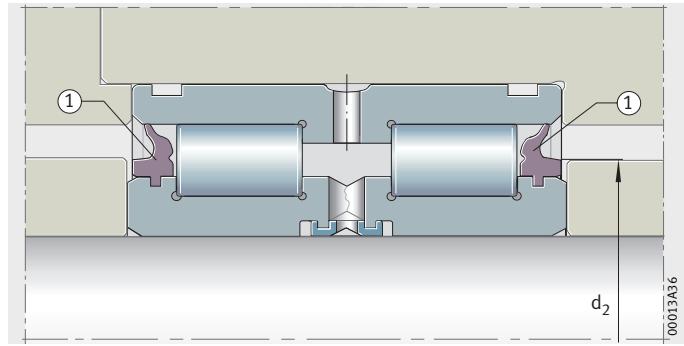
① Sealing ring

Figure 2
Support of sealing rings

Fitting and dismantling of cable sheave bearings



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

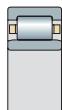
The dimensional and running tolerances of the bearings correspond to tolerance class PN to DIN 620.

Radial internal clearance

The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

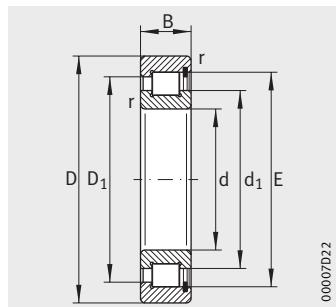
Radial internal clearance

Bore d mm	Radial internal clearance							
	CN μm		C3 μm		C4 μm		C5 μm	
over	incl.	min.	max.	min.	max.	min.	max.	
200	225	105	165	160	220	220	280	305
225	250	110	175	170	235	235	300	330
250	280	125	195	190	260	260	330	370
280	315	130	205	200	275	275	350	410
315	355	145	225	225	305	305	385	455
355	400	190	280	280	370	370	460	510
400	450	210	310	310	410	410	510	565
450	500	220	330	330	440	440	550	625
								735

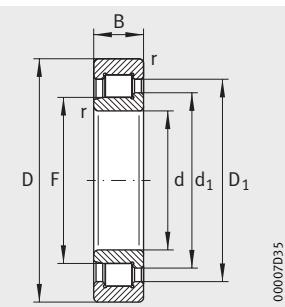


Single row full complement cylindrical roller bearings

Semi-locating bearings



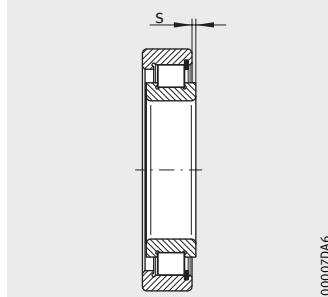
SL1818, SL1829, SL1830,
SL1822



SL1923

Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	s ¹⁾	F	d ₁ ≈
SL192330-TB	42,1	150	320	108	4	7	182,49	203,3
SL192332-TB	49,7	160	340	114	4	7	196,38	219
SL192334-TB	59,2	170	360	120	4	7	203,55	226,6
SL182236	29,8	180	320	86	4	7	–	232,4
SL192336-TB	69,1	180	380	126	4	7	221,56	245
SL182238	35,65	190	340	92	4	9	–	243,5
SL192338-TB	80,3	190	400	132	5	7	224,43	250
SL182240	43,12	200	360	98	4	9	–	246,6
SL192340-TB	92,1	200	420	138	5	7	238,45	265,7
SL183044	28,4	220	340	90	3	9	–	254,6
SL192344-TB	111,2	220	460	145	5	7	266,71	297
SL182948	10,6	240	320	48	2,1	3	–	267,5
SL183048	30,9	240	360	92	3	11	–	277,5
SL192348-TB	142,3	240	500	155	5	10	280,55	312,5
SL181852-E	4,61	260	320	28	2	2	–	281
SL182952	18,5	260	360	60	2,1	5	–	291,5
SL183052	44,5	260	400	104	4	11	–	304
SL192352-TB	173,2	260	540	165	6	10	315,6	351,6
SL181856-E	6,89	280	350	33	2	2,5	–	304
SL182956	19,7	280	380	60	2,1	3,5	–	314
SL183056	48	280	420	106	4	11	–	319,5
SL181860-E	9,79	300	380	38	2,1	3	–	323,5
SL182960	31,2	300	420	72	3	5	–	338
SL183060-TB	66,6	300	460	118	4	14	–	353,6
SL181864-E	10,36	320	400	38	2,1	3	–	344,5
SL182964	32,9	320	440	72	3	5	–	358,5
SL183064-TB	71,7	320	480	121	4	14	–	369,5
SL181868-E	10,93	340	420	38	2,1	3	–	365,5
SL182968	34,7	340	460	72	3	5	–	379
SL183068-TB	95,8	340	520	133	5	16	–	396,1
SL181872-E	11,49	360	440	38	2,1	3	–	387
SL182972	36,4	360	480	72	3	5	–	399,5
SL183072-TB	101	360	540	134	5	16	–	414
SL181876-E	18,87	380	480	46	2,1	4	–	415,5
SL182976	52,1	380	520	82	4	5	–	426
SL183076-TB	106	380	560	135	5	16	–	431,7



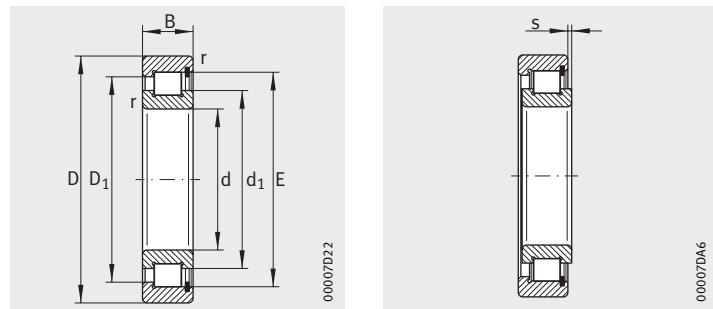
1) Axial displacement "s"

		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
D ₁	E	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
263,5	—	1 680	1 900	265	1 380	840
284,4	—	1 900	2 170	300	1 280	760
295	—	2 070	2 380	320	1 240	730
279,5	294	1 180	1 760	208	1 270	800
312,9	—	2 190	2 600	345	1 160	670
295,5	311,5	1 300	1 900	223	1 210	770
326,8	—	2 500	2 950	390	1 120	630
302,4	319,4	1 410	2 010	235	1 180	770
347,2	—	2 800	3 300	420	1 060	570
299,2	312	1 150	1 820	209	1 170	800
388,3	—	3 000	3 450	425	950	520
294,4	303,7	600	1 120	124	1 150	750
322,1	336	1 210	1 990	224	1 080	720
408,5	—	3 300	3 800	465	900	500
301,5	308	275	530	54	1 110	790
323,4	333,7	780	1 450	160	1 060	690
358,4	375,97	1 600	2 500	280	980	620
459,6	—	4 000	4 700	560	800	410
327	335	355	670	69	1 030	730
348,5	359,5	910	1 710	184	980	590
372,9	390,3	1 650	2 650	290	940	590
350,5	360	455	840	86	960	680
376,9	389,45	1 170	2 200	235	910	540
415,6	434,85	2 020	3 300	325	840	500
371,5	381	470	900	90	910	620
397,4	409,85	1 210	2 340	246	860	495
430,1	449,5	2 080	3 450	340	810	480
392,5	402,2	485	960	94	860	570
418,7	430,2	1 250	2 470	255	810	460
463,9	485,65	2 490	4 150	400	750	430
413,5	423,5	500	1 010	98	810	530
438,6	450,6	1 280	2 600	265	770	430
481,6	503,45	2 550	4 350	410	720	405
448	459	650	1 290	126	750	490
472,1	486,7	1 660	3 300	335	720	380
499,5	521,25	2 600	4 450	425	700	390



Single row full complement cylindrical roller bearings

Semi-locating bearings



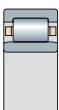
SL1818, SL1829, SL1830

¹⁾ Axial displacement “s”

Dimension table (continued) · Dimensions in mm

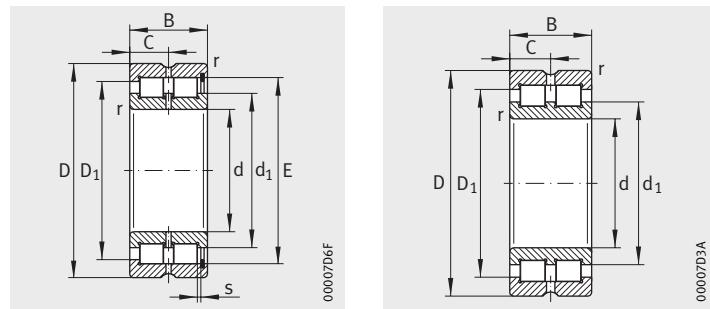
Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	s ¹⁾	d ₁ ≈
SL181880-E	19,81	400	500	46	2,1	4	432
SL182980	54,3	400	540	82	4	5	450
SL183080-TB	140	400	600	148	5	18	462,5
SL181884-E	20,6	420	520	46	2,1	4	457
SL182984	56,9	420	560	82	4	5	462
SL181888-E	21,54	440	540	46	2,1	4	473,5
SL182988	78,1	440	600	95	4	7	490
SL181892-E	33,21	460	580	56	3	5	501,5
SL182992	81,1	460	620	95	4	7	504
SL181896-E	34,53	480	600	56	3	5	522
SL182996	94,7	480	650	100	5	7	538
SL1818/500-E	35,73	500	620	56	3	5	542
SL1829/500	98,3	500	670	100	5	7	553

		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
D ₁	E	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
464,5	475,5	660	1 340	130	720	470
496,1	510,85	1 710	3 500	350	690	350
535,1	558,52	3 050	5 400	500	650	345
489,5	500	680	1 420	135	690	430
509	522,95	1 730	3 600	355	670	340
506	517	700	1 470	139	660	415
544,6	562	2 090	4 100	405	630	325
541	554	940	1 890	179	620	385
559,6	576,3	2 130	4 250	410	610	310
561	474,5	960	1 970	185	600	365
596,6	614,75	2 390	4 800	460	570	280
581,5	594,5	980	2 050	190	580	345
612,7	630	2 430	4 950	470	560	270



Double row full complement cylindrical roller bearings

Semi-locating, locating and
non-locating bearings



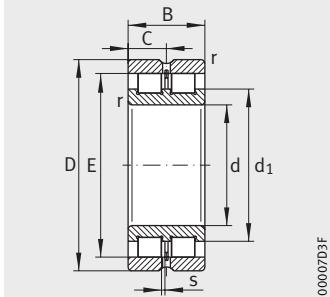
SL1850
Semi-locating bearings

SL0148, SL0149
Locating bearings

00007D3A

Dimension table · Dimensions in mm

Semi-locating bearings Designation	Locating bearings Designation	Non-locating bearings Designation	Designation to DIN 5412	Mass m ≈kg	Dimensions				
					d	D	B	r min.	s
SL185044	–	–	–	51,6	220	340	160	3	9
–	SL014948	–	NNC 4948 V	18,5	240	320	80	2,1	–
–	–	SL024948	NNCL 4948 V	17,9	240	320	80	2,1	5
SL185048	–	–	–	55,2	240	360	160	3	9
–	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
SL185052	–	–	–	82,6	260	400	190	4	11,3
–	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
SL185056	–	–	–	88	280	420	190	4	11,3
–	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
SL185060-TB	–	–	–	124	300	460	218	4	12,5
–	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
SL185064-TB	–	–	–	128,4	320	480	218	4	12,5
–	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
SL185068-TB	–	–	–	178	340	520	243	5	14,3
–	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
SL185072-TB	–	–	–	178	360	540	243	5	14



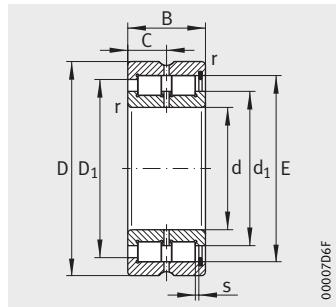
SL0248, SL0249
Non-locating bearings



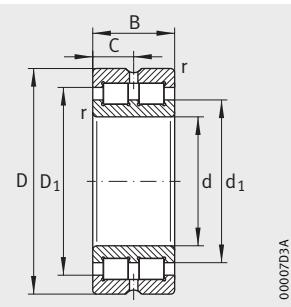
C	d_1 \approx	D_1 \approx	E	Basic load ratings		Fatigue limit load C_{ur} kN	Limiting speed n_G min^{-1}	Reference speed n_B min^{-1}
				dyn. C_r kN	stat. C_{0r} kN			
80	254,6	297,8	312,2	1 980	3 650	420	1 170	630
40	270,6	292,3	—	740	1 700	186	1 150	660
40	270,6	—	299,46	740	1 700	186	1 150	660
80	277,5	322,1	335,1	2 080	4 000	445	1 080	550
30	281,8	298,8	—	540	1 370	143	1 120	650
30	281,8	—	304,2	540	1 370	143	1 120	650
50	294,5	322,1	—	1 100	2 470	270	1 050	570
50	294,5	—	331,33	1 100	2 470	270	1 050	570
95	304	359,7	375,97	2 750	5 000	560	980	490
34,5	306,8	326,4	—	700	1 820	189	1 020	570
34,5	306,8	—	332,4	700	1 820	189	1 020	570
50	316,5	344,6	—	1 150	2 650	285	980	520
50	316,5	—	353,34	1 150	2 650	285	980	520
95	318,3	374,1	390,3	2 850	5 300	580	940	460
40	327,9	349,9	—	820	2 070	214	960	550
40	327,9	—	356,7	820	2 070	214	960	550
59	340,7	374,3	—	1 630	3 700	390	910	445
59	340,7	—	385,51	1 630	3 700	390	910	445
109	353,6	413,6	433,6	3 450	6 600	650	840	395
40	350,9	372,9	—	850	2 220	225	900	495
40	350,9	—	379,7	850	2 220	225	900	495
59	367,5	401,1	—	1 700	4 050	415	840	395
59	367,5	—	412,27	1 700	4 050	415	840	395
109	369,5	431,5	449,5	3 550	6 900	680	810	375
40	368,1	390,1	—	870	2 330	233	860	465
40	368,1	—	396,9	870	2 330	233	860	465
59	385,3	418,9	—	1 750	4 250	430	810	375
59	385,3	—	430,11	1 750	4 250	430	810	375
121,5	396	465,5	485,65	4 250	8 300	800	750	355
40	391	413,2	—	900	2 480	244	810	430
40	391	—	419,8	900	2 480	244	810	430
59	404	436,8	—	1 790	4 450	445	770	350
59	404	—	447,95	1 790	4 450	445	770	350
121,5	413,8	481	503,45	4 400	8 700	820	720	320

Double row full complement cylindrical roller bearings

Full complement, double row
Semi-locating, locating and
non-locating bearings



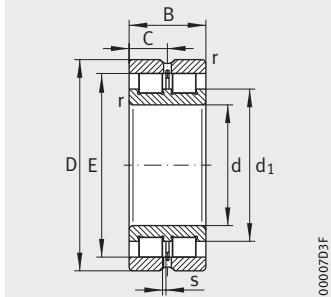
SL1850
Semi-locating bearings



SL0148, SL0149
Locating bearings

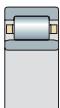
Dimension table (continued) · Dimensions in mm

Semi-locating bearings Designation	Locating bearings Designation	Non-locating bearings Designation	Designation to DIN 5412	Mass m ≈kg	Dimensions				
					d	D	B	r	s min.
–	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
SL185076-TB	–	–	–	196,5	380	560	243	5	14,1
–	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



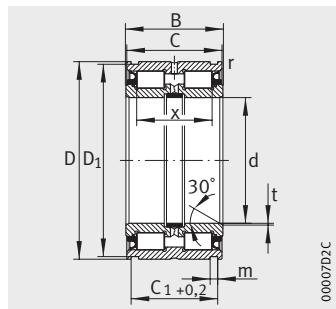
SL0248, SL0249
Non-locating bearings

				Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
C	d ₁	D ₁	E	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
50	419	447,2	–	1 320	3 500	345	750	375
50	419	–	455,8	1 320	3 500	345	750	375
70	430,2	468,7	–	2 250	5 500	560	720	325
70	430,2	–	481,35	2 250	5 500	560	720	325
121,5	432	499	521,25	4 450	8 900	850	700	305
50	433,8	462	–	1 350	3 650	355	720	360
50	433,8	–	470,59	1 350	3 650	355	720	360
70	450,5	489	–	2 310	5 800	580	690	300
70	450,5	–	501,74	2 310	5 800	580	690	300

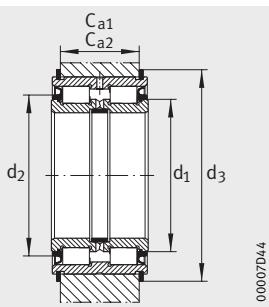


Cable sheave bearings

Cylindrical roller bearings
with annular slots
Full complement, sealed
Locating bearings



SL0450..-PP
SL04..-PP



Mounting dimensions

Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions									
		d	D	B	C	C ₁ +0,2	D ₁	m	r min.	t	x
SL045044-PP	52,5	220	340	160	159	138,2	334	6,3	1	2	132
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

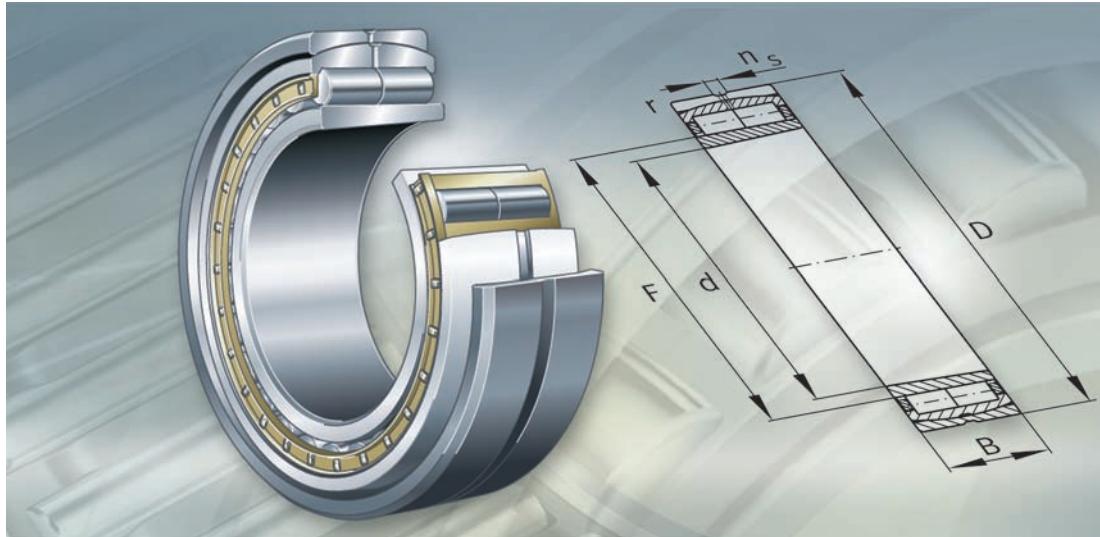
¹⁾ For snap rings WRE.

²⁾ For retaining ring to DIN 471.

Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed n _G grease min ⁻¹	Snap ring WRE	Retaining ring to DIN 471
C _{a1} ¹⁾ -0,2	C _{a2} ²⁾ -0,2	d ₁	d ₂	d ₃ ¹⁾	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN			
130	126	259,85	286	366	1 570	3 050	350	480	WRE340	340X6
130	126	279,25	305	386	1 630	3 300	370	440	WRE360	360X6
75	71	271,7	287	346	740	1 700	186	480	WRE320	320X6
154	150	304,95	336	426	2 380	4 700	520	400	WRE400	400X6
75	71	292,7	310	366	840	1 990	215	440	WRE340	340X6
154	149	320,95	354	453	2 600	5 200	570	380	WRE420	420X7
176	171	346,85	375	493	3 000	5 800	620	340	WRE460	460X7
75	71	328	346	406	900	2 250	234	380	WRE380	380X6



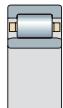
FAG



Self-aligning cylindrical roller bearings

Self-aligning cylindrical roller bearings

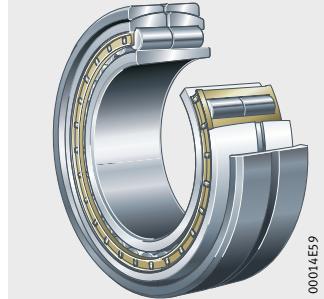
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Product overview Self-aligning cylindrical roller bearings

Non-locating bearings
With tapered bore

Z-5..ZL2-02, F-8..ZL2-02



Self-aligning cylindrical roller bearings

Features

These double row cylindrical roller bearings comprise solid bearing rings and cylindrical roller and cage assemblies with solid cages. The bearings have outer rings with two rigid ribs and ribless inner rings. The spherical outer ring is seated in a plain bearing pivot ring and can compensate misalignment of the bearing seats as well as deflections. The ribless inner ring allows constraint-free axial displacement in the bearing. The very high radial load carrying capacity of the cylindrical roller bearing is maintained in full even under large displacements.

The external dimensions of the complete bearing with the pivot ring correspond to the main dimensions of dimension series 30, 22 and 31 to DIN 616.

These bearings are used as non-locating bearings on the tending side of the dryer roll in paper machinery. They are fitted in normal paper machinery housings.

The same design is used in cylindrical roller bearings with main dimensions of dimension series 22, 23 and 32 that are intended for guide rolls.

Bearings with tapered bore

Self-aligning double row cylindrical roller bearings with a tapered bore (taper 1:12) are directly located on tapered journals. The radial internal clearance can thus be set to an optimum value.

Non-locating bearings

All self-aligning double row cylindrical roller bearings are non-locating bearings and can support radial forces only. The changes in length of the heated dryer roll are made possible without constraint in the cylindrical roller bearing between the raceway of the inner ring and the rolling elements. Axial forces are supported on the drive side of the dryer roll by spherical roller 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

The bearings are supplied without seals.



Lubrication

The plain bearing pivot ring and the bearing outer ring each have a lubrication groove and lubrication holes for the best possible supply of lubricant directly into the interior of the bearing. Due to the central position of the feed, oil outlet of a high quality oil corresponding to ISO-VG 220 or 320 is possible on both sides of the bearing.

Self-aligning cylindrical roller bearings

Operating temperature and material

The ambient temperature for bearings in the dry section of paper machinery may be more than +100 °C on a continuous basis. By means of bainitic hardening, the rings of the double row cylindrical roller bearings are dimensionally stabilised up to +200 °C. Connection to a central recirculating oil lubrication system allows heat to be continuously dissipated from the bearing. For dryer rolls and M.G. cylinders with steam heating, case hardened inner rings are recommended and these are indicated by the suffix W209B.

Cages

Self-aligning double row cylindrical roller bearings have a solid brass cage that encloses both rows of rollers.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
C3	Radial internal clearance larger than normal	Standard
C5	Radial internal clearance larger than C4	
K	Tapered bore (taper 1:12)	

Design and safety guidelines

Permissible skewing

The permissible misalignment between the plain bearing pivot ring and the bearing is 2°.

The pivot ring has a Durotect® Z (zinc phosphate) coating and the concave surface has a molybdenum disulphide coating.
The alignment movement in operation is additionally supported by the steady feed of lubricant.

Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

$$P = F_r$$

P kN
Equivalent dynamic bearing load
 F_r kN
Radial dynamic bearing load.

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

P_0 kN
Equivalent static bearing load
 F_{0r} kN
Radial static bearing load.

Minimum radial load

In continuous operation, a minimum radial load of the order of $F_{r\min} = C_{0r}/60$ is necessary.

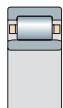
If $F_{r\min} < C_{0r}/60$, please contact us.



Design of bearing arrangements

Mounting dimensions

The dimension tables give the maximum dimension of the radius r_a and the diameters of the abutment shoulders D_a , d_a .



Self-aligning cylindrical roller bearings

Accuracy

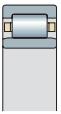
The dimensional and running tolerances of the bearings correspond to tolerance class PN to DIN 620.

Radial internal clearance

Due to the high operating temperatures and the associated large temperature differential between the inner and outer ring, the bearings for dryer rolls and M.G. cylinders are supplied with the increased radial internal clearance C5. Bearings for guide rolls have the increased radial internal clearance C3.

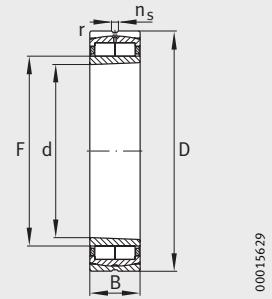
Radial internal clearance of cylindrical roller bearings with tapered bore

Bore d mm		Radial internal clearance							
over	incl.	CN μm		C3 μm		C4 μm		C5 μm	
		min.	max.	min.	max.	min.	max.	min.	max.
180	200	140	195	180	235	220	275	275	330
200	225	155	215	200	260	245	305	305	365
225	250	170	235	220	285	270	335	335	400
250	280	185	255	240	310	295	365	365	435
280	315	205	280	265	340	325	400	400	475
315	355	225	305	290	370	355	435	435	515
355	400	255	345	330	420	405	495	495	585
400	450	285	385	370	470	455	555	555	655
450	500	315	425	410	520	505	615	615	725
500	560	350	470	455	575	560	680	680	800
560	630	380	500	500	620	620	740	740	860
630	710	435	575	565	705	695	835	835	975



Self-aligning cylindrical roller bearings

Double row,
with tapered bore (taper 1:12)



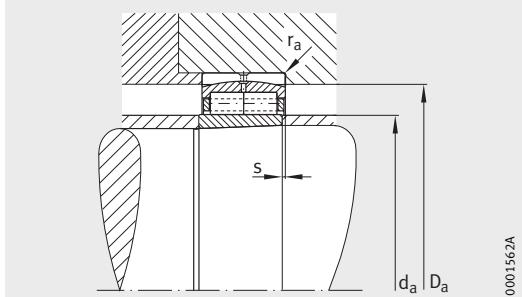
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Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	s ¹⁾	F	n _s
F-804272.ZL-K-C3	44,3	150	320	108	3	13	184	17,7
Z-548428.ZL-K-C3	53,9	160	340	114	4	13	196	17,7
Z-567601.ZL-K-C3	31,7	180	320	86	4	7,5	211	17,7
Z-567601.ZL-K-C5	31,7	180	320	86	4	7,5	211	17,7
F-803792.ZL-K-C3	40,5	180	320	112	4	12,5	211	15
Z-580454.ZL-K-C5	36	190	320	104	3	10,5	222	15
Z-566170.ZL-K-C3	38,5	190	340	92	4	8,5	223	17,7
Z-566170.ZL-K-C5	38,5	190	340	92	4	8,5	223	17,7
Z-566487.ZL-K-C5	44,6	200	340	112	3	9,5	233	17,7
F-804462.ZL-K-C3	60	200	360	128	4	12,5	234	17,7
Z-565531.ZL-K-C5	31,5	220	340	90	3	7,5	246	15
Z-565688.ZL-K-C5	55,5	220	370	120	4	8,5	256	17,7
Z-567498.ZL-K-C3	63,5	220	400	108	4	10,5	258	17,7
Z-567498.ZL-K-C5	63,5	220	400	108	4	10,5	258	17,7
F-804463.ZL-K-C3	86,7	220	400	144	4	10,5	260	17,7
Z-565668.ZL-K-C5	34,6	240	360	92	3	8	269	15
Z-566484.ZL-K-C5	68	240	400	128	4	12	278	17,7
F-804464.ZL-K-C3	115	240	440	160	4	13	285	23,5
Z-565499.ZL-K-C5	49,7	260	400	104	4	10	292	17,7
Z-566488.ZL-K-C5	93,6	260	440	144	4	16	301	17,7
Z-565669.ZL-K-C5	58,8	280	420	106	4	11	313	17,7
Z-566489.ZL-K-C5	102	280	460	146	5	16	324	17,7
Z-565670.ZL-K-C5	75,2	300	460	118	4	9,5	330	17,7
Z-566490.ZL-K-C5	133	300	500	160	5	17,5	348	17,7
Z-565671.ZL-K-C5	81,5	320	480	121	4	11	357	17,7
Z-566491.ZL-K-C5	174	320	540	176	5	20,5	369	23,5
Z-565672.ZL-K-C5	109	340	520	133	5	14	381	23,5
Z-566492.ZL-K-C5	221	340	580	190	5	17,5	390	23,5

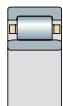
Bearings with case hardened inner rings have the suffix W209B.

Ordering example: Z-566490.ZL-K-W209B-C5.



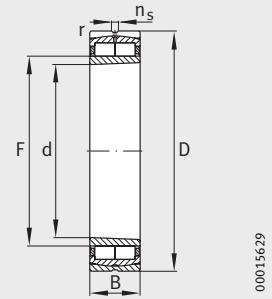
1) Axial displacement "s"

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
d _a	D _a	r _a	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹
182,5	303	2,5	1 110	1 600	177	2 800
194,4	323	3	1 240	1 870	206	2 600
209,2	303	3	910	1 530	167	2 600
209,2	303	3	910	1 530	167	2 600
209,2	303	3	1 040	1 830	204	2 600
213,1	306	2,5	950	1 860	212	2 400
221,1	323	3	1 020	1 740	187	2 400
221,1	323	3	1 020	1 740	187	2 400
231	326	2,5	1 150	2 250	247	2 200
232	343	3	1 380	2 600	285	2 200
243,8	327,6	2,5	920	1 900	206	2 200
253,8	353	3	1 320	2 750	295	2 000
255,8	383	3	1 440	2 350	242	1 900
255,8	383	3	1 440	2 350	242	1 900
257,8	383	3	1 860	3 500	370	1 900
266,6	347,6	2,5	950	2 100	222	1 900
275,6	383	3	1 490	3 000	315	1 800
282,6	423	3	2 160	4 200	440	1 800
289,4	385,4	3	1 200	2 550	260	1 800
298,4	423	3	1 790	3 600	370	1 700
310,2	405,4	3	1 170	2 650	270	1 700
321,2	440	4	1 830	3 950	405	1 600
327	445,4	3	1 580	3 450	345	1 600
345	480	4	2 170	4 650	460	1 600
353,8	465,4	3	1 640	3 700	360	1 500
365,8	520	4	2 650	5 400	520	1 500
377,6	502	4	1 940	4 150	395	1 500
386,6	560	4	3 250	6 700	640	1 400



Self-aligning cylindrical roller bearings

Double row,
with tapered bore (taper 1:12)



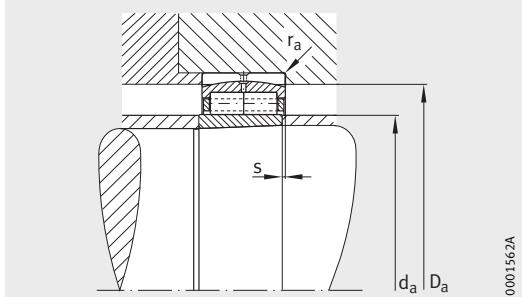
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Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	s ¹⁾	F	n _s
Z-565673.ZL-K-C5	114	360	540	134	5	10,5	403	23,5
F-800479.ZL-K-C5	219	360	600	192	5	19	425	23,5
Z-565674.ZL-K-C5	121	380	560	135	5	10	419	23,5
F-800480.ZL-K-C5	241	380	620	194	5	20,5	440	23,5
Z-565675.ZL-K-C5	159	400	600	148	5	11,5	449	23,5
Z-565874.ZL-K-C5	140	400	650	200	6	17,5	450	23,5
Z-565676.ZL-K-C5	164	420	620	150	5	12	469	23,5
Z-572777.ZL-K-C5	363	420	700	224	6	19	475	23,5
Z-565677.ZL-K-C5	188	440	650	157	6	15,5	488	23,5
F-800481.ZL-K-C5	378	440	720	226	6	25	492	23,5
Z-565678.ZL-K-C5	214	460	680	163	6	13,5	514	23,5
F-800482.ZL-K-C5	472	460	760	240	7,5	22	528	23,5
Z-565679.ZL-K-C5	225	480	700	165	6	13,5	532	23,5
F-800483.ZL-K-C5	507	480	790	248	7,5	27	544	23,5
Z-565680.ZL-K-C5	234	500	720	167	6	14,5	553	23,5
F-800484.ZL-K-C5	621	500	830	264	7,5	28	568	23,5
Z-565681.ZL-K-C5	322	530	780	185	6	14,5	592	23,5
Z-574099.ZL-K-C5	671	530	870	272	7,5	22	609	23,5
Z-565682.ZL-K-C5	365	560	820	195	6	15,5	618	23,5
F-800485.ZL-K-C5	771	560	920	280	7,5	28	630	23,5
Z-572367.ZL-K-C5	422	600	870	200	6	16	665	23,5
Z-573929.ZL-K-C5	962	600	980	300	7,5	26	678	23,5
Z-565684.ZL-K-C5	499	630	920	212	7,5	17	700	23,5
F-800592.ZL-K-C5	1110	630	1030	315	7,5	33,5	716	23,5
Z-565685.ZL-K-C5	627	670	980	230	7,5	21	738	23,5
F-800593.ZL-K-C5	1280	670	1090	336	7,5	34	755	23,5
Z-565686.ZL-K-C5	695	710	1030	236	7,5	21	778	23,5
F-800594.ZL-K-C5	1430	710	1150	345	7,5	38,5	795	23,5

Bearings with case hardened inner rings have the suffix W209B.

Ordering example: F-800484.ZL-K-W209B-C5.

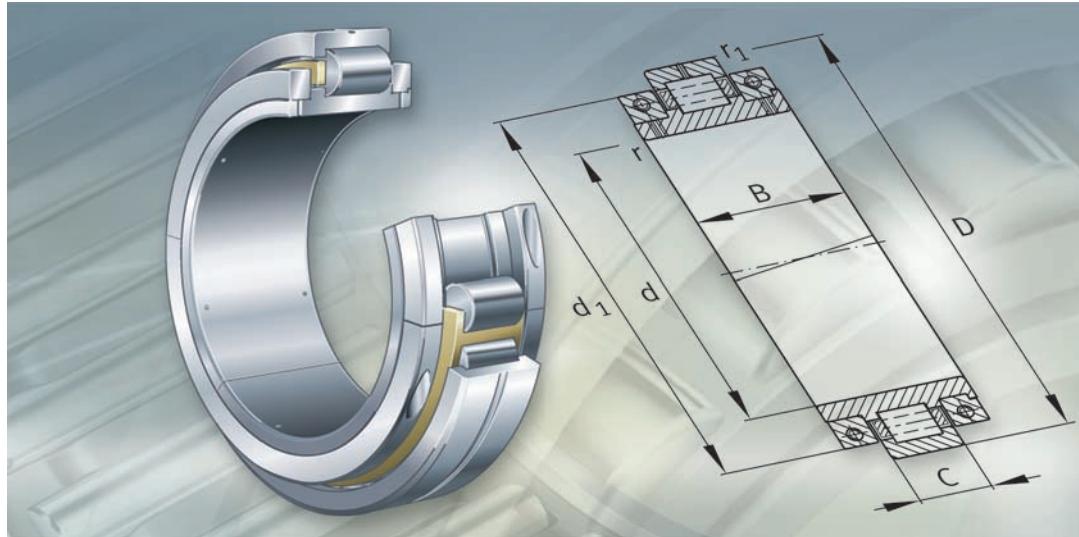


1) Axial displacement "s"

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
d _a	D _a	r _a	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹
399,4	522	4	2 070	4 750	450	1 400
421,4	580	4	3 200	6 700	630	1 300
415,2	542	4	2 080	5 000	480	1 300
436,2	600	4	3 300	7 300	670	1 200
445	582	4	2 600	6 100	560	1 200
446	624	5	3 550	7 800	730	1 200
464,8	602	4	2 550	6 300	580	1 200
470,8	674	5	4 500	9 600	870	1 000
483,6	627	5	2 750	6 600	590	1 100
487,6	694	5	4 450	9 400	850	1 000
509,4	657	5	3 050	7 600	680	1 000
523,4	728	6	5 300	11 500	1 000	950
527,2	677	5	3 100	7 800	700	950
539,2	758	6	5 300	11 200	970	900
548	697	5	3 150	8 100	710	950
563	798	6	6 000	12 800	1 090	850
586,7	757	5	3 900	9 900	850	850
603,7	838	6	6 800	15 500	1 300	800
612,4	797	5	4 350	10 900	930	850
624,4	888	6	7 100	15 400	1 260	750
659	847	5	4 400	12 100	1 010	750
672	948	6	8 200	18 800	1 520	700
693,7	892	6	5 200	13 600	1 130	700
709,7	998	6	9 000	20 000	1 600	670
731,3	952	6	5 700	15 000	1 220	670
748,3	1 058	6	10 200	23 000	1 810	630
770,9	1 002	6	6 500	16 500	1 290	630
787,9	1 110	6	10 800	24 200	1 850	600



FAG



Split cylindrical roller bearings

Split cylindrical roller bearings

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Product overview Split cylindrical roller bearings

Non-locating bearings

Single row

Z-5..ZL1-05, F-8..ZL1-05



Semi-locating bearings

Single row

Z-5..ZL1-06



Locating bearings

Single row

Z-5..ZL1-07, F-8..ZL1-07



Double row

Z-5..ZL2-03, F-8..ZL2-03



Split cylindrical roller bearings

Features

Split cylindrical roller bearings are generally single row bearings with a cylindrical bore. These bearings comprise two inner ring and two outer ring halves and a split cage with cylindrical rollers.

The outer rings have no rigid ribs, *Figure 1*, one rigid rib, *Figure 2*, page 480, or two rigid ribs, *Figure 3*, page 481.

Only the locating bearings of Design 8 have two rows of rollers, *Figure 4*, page 481.

The inner rings are located on the shaft by means of loose, split locking collars. The rings are split obliquely to the bearing axis in order to ensure that the rolling elements pass over the joints without shocks. The bearing dimensions and designations are not standardised.

Sealing

The split cylindrical roller bearings are supplied without seals.

Lubrication

Most bearings can be lubricated via the outer ring or the outer intermediate ring. We recommend grease lubrication due to the simple sealing arrangement and ease of relubrication.

Non-locating bearings

Non-locating bearings support radial forces only.

Design 1

■ Ribless outer ring, inner ring with two rigid ribs, solid cage, relubrication facility via the outer ring

■ Application:

- for example in air prewarmers, converter drives, drive spindles in rolling mills, bucket wheel excavators.

Design 2

■ Ribless outer ring, inner ring with two rigid ribs, pin cage, relubrication facility via the outer ring

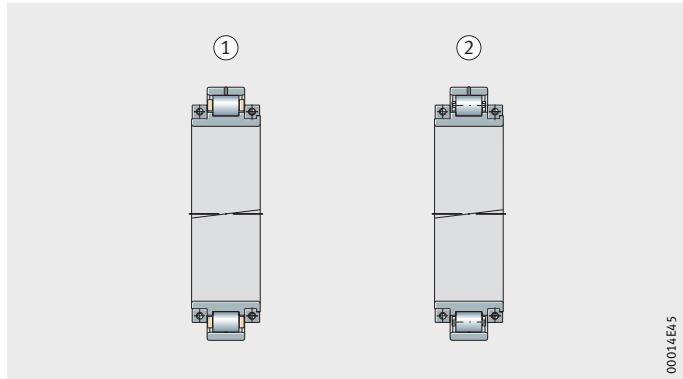
■ Application:

- for example in converter drives, bucket wheel excavators.

① Design 1
② Design 2

Figure 1

Split cylindrical roller bearings,
single row non-locating bearings



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Split cylindrical roller bearings

Semi-locating bearings

In addition to high radial forces, these bearings can also support axial forces in one direction.
They act as non-locating bearings in the opposite direction.

Design 3

- Outer ring with one rigid rib, inner ring with two rigid ribs, solid cage
- Application:
 - for example in air prewarmers, converter drives, drive spindles in rolling mills, bucket wheel excavators.

Design 4

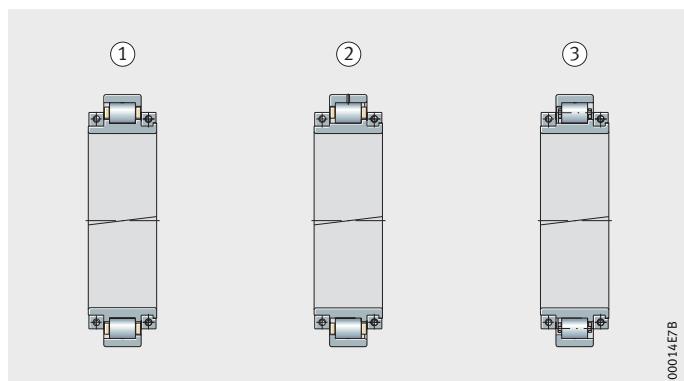
- Outer ring with one rigid rib, inner ring with one rigid rib, solid cage, relubrication facility via the outer ring
- Application:
 - for example in air prewarmers, converter drives, drive spindles in rolling mills, bucket wheel excavators.

Design 5

- Outer ring with one rigid rib, inner ring with one rigid rib, pin cage
- Application:
 - for example in converter drives, bucket wheel excavators.

- ① Design 3
② Design 4
③ Design 5

Figure 2
Split cylindrical roller bearings,
single row semi-locating bearings



Locating bearings

In addition to high radial forces, locating bearings can also support axial forces in both directions.

Single row locating bearings

Design 6

- Outer ring with two rigid ribs, inner ring with two rigid ribs, solid cage
- Application:
 - for example in air prewarmers, converter drives, drive spindles in rolling mills, bucket wheel excavators.

Design 7

- Outer ring with two rigid ribs, inner ring with two rigid ribs, pin cage, relubrication facility via the outer ring
- Application:
 - for example in converter drives, bucket wheel excavators.

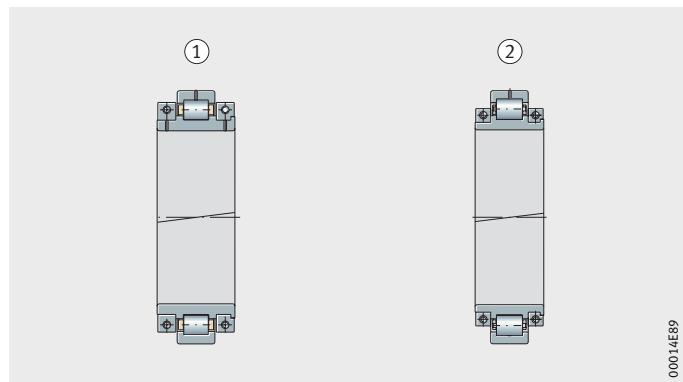
Double row locating bearings

Design 8

- Double row bearing (two matched single row bearings), specially for drive spindles in rolling mills
- Relubrication facility via the outer intermediate ring.

(1) Design 6
(2) Design 7

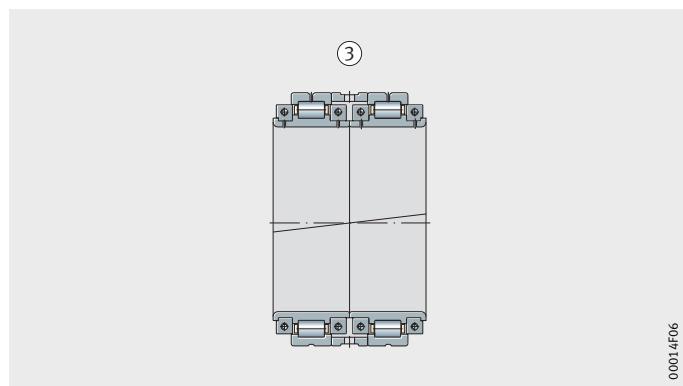
Figure 3
Split cylindrical roller bearings,
single row locating bearings



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(1) Design 8

Figure 4
Split cylindrical roller bearings,
double row locating bearings



00014F06

Split cylindrical roller bearings

Operating temperature	Split cylindrical roller bearings can be used at operating temperatures from -30°C to $+150^{\circ}\text{C}$.
Cages	The bearings of most designs are fitted with a split solid cage made from brass or steel. Bearings of Designs 2, 5 and 7 have a split pin cage made from steel. This offers very high load carrying capacity and is also suitable for strong accelerations and decelerations.
Suffixes	The design of the split cylindrical roller bearings (for example radial internal clearance, accuracy, cage) is specified in the designation (Z-5..ZL or F-8..ZL). Please contact us for further information on the bearing design.

Design and safety guidelines

Load limit



The loading of split bearings must be restricted.

The load limit $P/C_r \leq 0,2$ must be observed.

P kN

Equivalent dynamic bearing load

C_r kN

Basic dynamic load rating.

Axial load carrying capacity

Based on experience, the permissible axial force F_a of semi-locating and locating bearings is 10% to 20% of the radial force F_r .

If higher axial forces are expected, our advisory service should be contacted for assistance.

Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

$$P = f_s \cdot F_r$$

P kN

Equivalent dynamic bearing load

$f_s = 1,1$ –

Shock factor

F_r kN

Radial dynamic bearing load.

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 rating life must be calculated using our calculation program BEARINX®.

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

P_0 kN

Equivalent static bearing load

F_{0r} kN

Radial static bearing load.

Minimum radial load

In continuous operation, a minimum radial load of the order of $F_{r\ min} = C_{0r}/60$ is necessary.

If $F_{r\ min} < C_{0r}/60$, please contact us.

Design of bearing arrangements

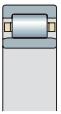
The shaft diameter and the bearing bore should match as precisely as possible. It is recommended that the shaft is machined to g6 or h6. Once the screws in the locking collars have been tightened, there is a gap at the parting lines of 0,3 mm to 0,4 mm. This gives a tight fit of the bearing inner ring.

The housing bore should be machined to H6 or H7.



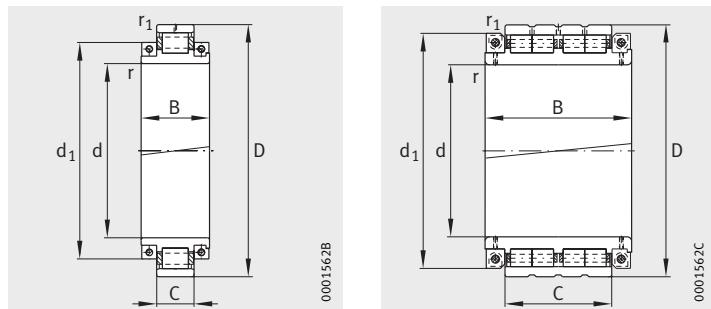
Split cylindrical roller bearings

Accuracy	The dimensional and running accuracy of the split cylindrical roller bearings of the basic design correspond to tolerance class PN to DIN 620.
Radial internal clearance	In most cases, split cylindrical roller bearings have a radial internal clearance to internal clearance group CN. Please contact us for further information on the radial internal clearance.



Split cylindrical roller bearings

Single and double row
Non-locating, semi-locating
and locating bearings



Design 1
Non-locating bearing

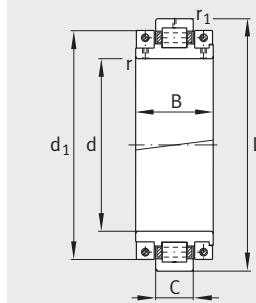
Design 1
Non-locating bearing, four-row

Dimension table · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions			
			d	D	B	C
Z-533705.ZL	6	111	279,4	430	203,35	110
F-804807.ZL	6 ¹⁾	131	300	558,8	220	139,7
Z-521220.ZL	1	50,9	304,8	438,15	142,875	74,613
Z-541234.ZL	8	111	350	470	240	170
Z-528438.ZL	1	73,5	355,6	488,95	146,05	74,613
Z-549659.ZL	6	18,7	360	440	80	38
Z-577892.ZL	8	89,5	360	460	225	164
Z-561001.ZL	1	115	400	600	160	90
Z-577677.ZL	8	289	400	600	328	244
Z-581006.ZL	8	334	400	600	420	200
Z-572885.ZL	1	190	400	615,95	200	115,9
Z-572886.ZL	1	194	400	615,95	200	115,9
Z-543717.ZL	1	73,3	406,4	546,1	161	76,2
Z-579574.ZL	6	224	440	666,75	200	115,9
Z-538563.ZL	1 ²⁾	213	450	600	275	200
F-807475.ZL	6	88,6	480	600	160	75
F-804678.ZL	6	109	500	635	155	73
Z-577893.ZL	8	234	500	635	310	228
Z-545148.ZL	8	337	500	680	332	220
Z-546551.ZL	6	760	500	850,9	360	210
Z-543852.ZL	1	117	533,4	692,15	187	81
Z-548795.ZL	8	239	553	700	260	184
Z-563458.ZL	8	255	553	710	260	184
Z-580869.ZL	6	95,8	560	680	142	72
F-807125.ZL	8	456	560	730	460	350
F-804627.ZL	6	218	580	750	257,5	85
F-801807.ZL	8	490	580	750	515	305
F-804300.ZL	8	307	600	735	380	278
Z-577936.ZL	8	432	600	775	380	278
Z-567618.ZL	6	200	610	775	190	88
Z-572298.ZL	1	202	610	775	190	100

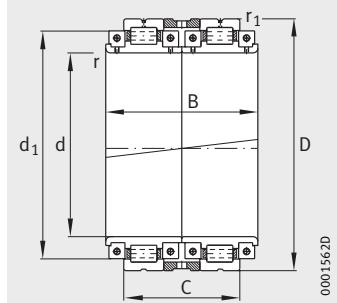
¹⁾ Outer ring split (in vee-shape).

²⁾ Four-row.



Design 6
Locating bearing

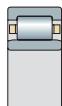
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Design 8
Locating bearing

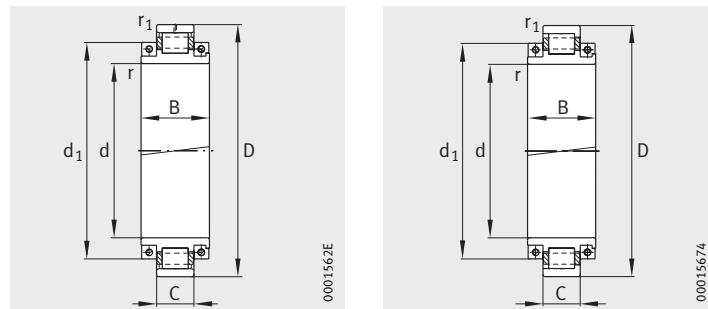
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			Basic load ratings		Fatigue limit load
d_1	r min.	r_1 min.	dyn. C_r kN	stat. C_{0r} kN	C_{ur} kN
378	6	6	1 460	2 600	270
440	12	4	2 400	3 400	325
-	2,4	3,2	815	1 530	134
433	5	5	1 900	4 750	470
443	2	2	915	1 900	182
-	3	3	415	880	71
433	4	4	1 160	2 900	280
-	5	5	1 630	2 500	198
-	5	5	2 240	4 300	335
549	7,5	3	3 100	7 800	730
508	5	5	2 080	3 750	350
508	5	5	2 080	3 750	350
-	2	2	1 160	2 320	186
580	3	3	2 200	4 150	380
-	5	5	2 850	7 650	640
565	3	3	1 060	2 500	223
600	8	5	1 290	2 900	260
600	8	5	2 240	5 850	520
622	12	5	3 200	8 150	730
-	12	5	5 300	9 300	780
-	2	2	1 120	2 280	178
668	3	3	2 750	8 150	710
668	3	3	2 750	8 150	710
645	3	3	1 250	3 200	280
678	8	5	3 750	10 000	850
-	5	5	1 730	3 900	330
-	18	5	3 000	7 800	660
690	6	6	3 000	8 800	750
720	15	6	3 250	9 000	750
720	5	5	1 900	4 500	380
730	5	5	1 900	4 500	380



Split cylindrical roller bearings

Single and double row
Non-locating, semi-locating
and locating bearings

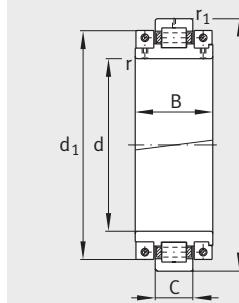


Design 1
Non-locating bearing

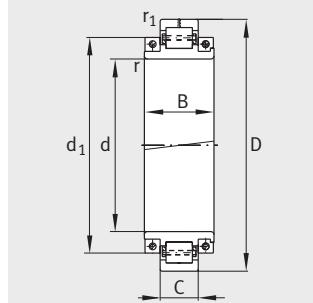
Design 3
Semi-locating bearing

Dimension table (continued) · Dimensions in mm

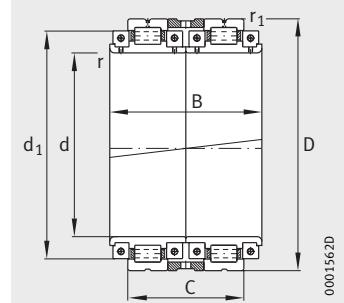
Designation	Design	Mass m ≈kg	Dimensions			
			d	D	B	C
Z-526783.01.ZL	1	190	630	794	190	88
Z-526783.02.ZL	1	200	630	794	190	88
Z-526783.03.ZL	6	193	630	794	190	88
Z-549642.ZL	6	191	630	794	190	88
Z-548937.ZL	1	231	630	850	172	100
Z-548907.ZL	1	277	630	850	230	128
Z-568614.ZL	6	209	640	805	190	88
Z-574879.ZL	8	425	640	805	380	290
Z-579611.ZL	8	350	650	785	310	228
Z-573047.ZL	6	694	650	940	320	200
Z-573048.ZL	1	669	650	940	320	200
F-809831.ZL	6	720	650	980	320	200
F-809832.ZL	1	706	650	980	320	200
Z-525120.ZL	1	115	670	820	120	69
Z-556785.ZL	3	117	670	820	120	69
Z-526784.01.ZL	1	203	690	864	196	94
Z-577902.ZL	8	531	690	865	390	284
Z-514893.ZL	1	158	710	870	140	76
F-809613.ZL	8	447	710	880	380	290
Z-522468.ZL	7	260	750	920	185	106
Z-578276.ZL	8	550	750	920	400	300
Z-514128.ZL	1	541	750	940	210	128
Z-523125.ZL	7	325	750	940	210	128
F-801623.01.ZL	6	220	775	945	165	80
F-809722.ZL	8	470	775	945	330	245
Z-529031.01.ZL	7	470	799,8	1080	210	128
F-801572.ZL	8	552	820	990	380	290



Design 6
Locating bearing



Design 7
With pin cage
Locating bearing



Design 8
Locating bearing

00015834

00015835

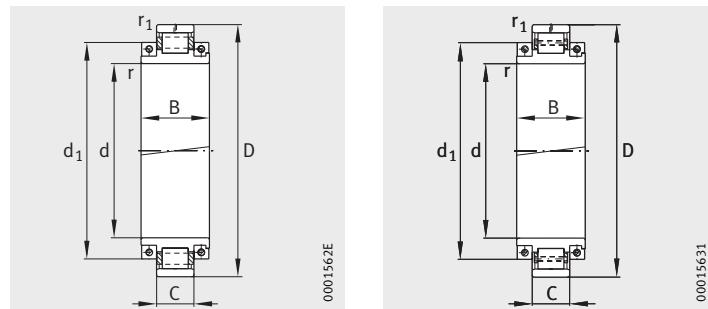
00015620

d ₁	r min.	r ₁ min.	Basic load ratings		Fatigue limit load C _{ur} kN
			dyn. C _r kN	stat. C _{0r} kN	
740	5	2	1 900	4 650	390
740	16	3	1 900	4 650	390
740	5	2	1 900	4 650	390
740	5	5	1 900	4 650	390
738	6	6	2 280	4 650	390
–	6	6	2 800	6 100	455
750	5	5	1 960	4 650	390
750	5	5	3 750	11 000	920
–	5	5	2 500	7 350	530
810	6	6	5 600	11 800	960
810	6	6	5 600	11 800	960
835	6	6	5 600	10 400	830
835	6	9,5	5 600	10 400	830
760	4	4	1 290	2 900	232
760	4	4	1 290	2 900	232
805	6	2	2 240	5 400	440
815	12	6	3 550	10 200	840
–	5	5	1 370	3 150	248
822	12	6	3 900	11 400	910
–	7,5	7,5	2 600	7 350	540
870	5	5	3 900	12 000	970
–	7,5	7,5	2 600	7 500	540
880	9,5	7,5	2 900	8 650	560
895	10	5	1 830	4 550	360
895	10	5	3 100	9 150	720
–	9,5	9,5	4 050	9 000	600
–	5	5	4 300	14 000	970



Split cylindrical roller bearings

Single and double row
Non-locating, semi-locating
and locating bearings



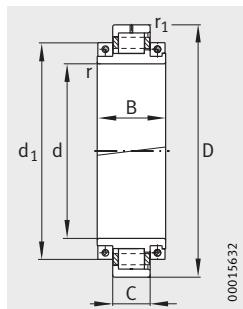
Design 1
Non-locating bearing

Design 2
With pin cage
Non-locating bearing

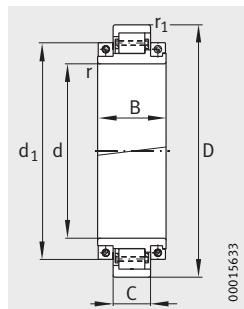
Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions			
			d	D	B	C
Z-540908.ZL	4	205	900	1 090	150	85
Z-522292.ZL	1	213	900	1 090	150	85
Z-537876.ZL	4	189	950	1 150	160	90
Z-527210.ZL	7	596	950	1 220	220	128
Z-525667.ZL	7	591	1 000	1 255	222,5	115
Z-513201.ZL	2	667	1 000	1 255	240	150
Z-533265.ZL	2	1 190	1 150	1 490	305	175
Z-533266.ZL	7	1 210	1 150	1 490	305	175
Z-526112.ZL	6 ¹⁾	603	1 250	1 500	192	112
Z-531338.01.ZL	5	909	1 400	1 700	225	132
Z-537179.ZL	1	1 680	1 700	2 060	300	160

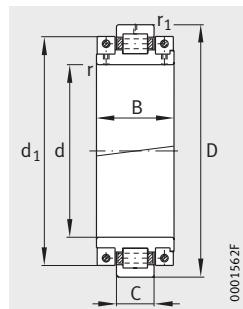
¹⁾ Without lubrication groove and lubrication hole.



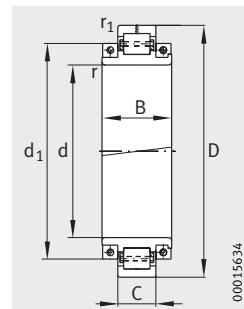
Design 4
Semi-locating bearing



Design 5
With pin cage
Semi-locating bearing

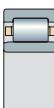


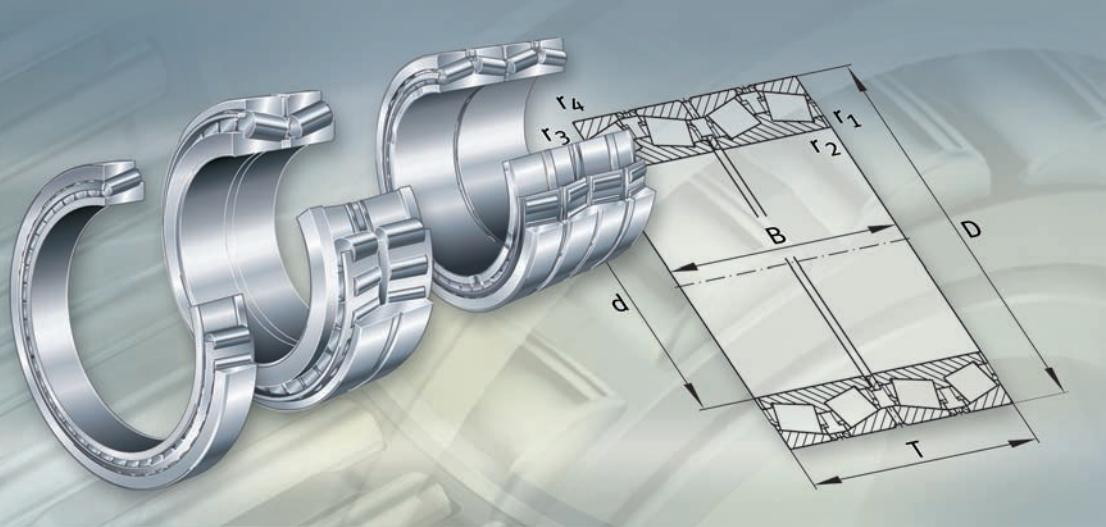
Design 6
Locating bearing



Design 7
With pin cage
Locating bearing

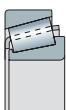
			Basic load ratings		Fatigue limit load
d_1	r min.	r_1 min.	dyn. C_r kN	stat. C_{0r} kN	C_{ur} kN
-	6	6	1 900	4 650	290
-	5	5	1 930	4 750	290
-	6	6	2 000	4 900	310
-	9,5	9,5	4 400	10 400	810
-	9,5	7,5	3 800	10 000	830
1 168	6	6	4 550	12 700	940
1 355	12	7,5	6 800	17 300	1 210
1 355	12	7,5	6 800	17 300	1 210
1 413	6	6	3 350	8 800	520
1 570	6	6	5 400	15 000	1 020
1 900	7,5	7,5	6 800	18 000	1 120





Tapered roller bearings

Single row
Double row
Four-row



Tapered roller bearings

Single row tapered roller bearings

..... 496

In some single row tapered roller bearings, the outer ring can be removed. As a result, the rings can be fitted separately. Tapered roller bearings can support high radial loads and can support axial forces in one direction. They must normally be axially adjusted against a second bearing fitted in a mirror image arrangement. Single row tapered roller bearings matched in an X arrangement can support high axial forces from both directions. In addition to bearings with standardised main dimensions (DIN 720), bearings in metric and inch sizes with non-standardised designations (Z-5..TR1 or F-8..TR1) are also available. A typical application for single row tapered roller bearings is in gearboxes.

Double row tapered roller bearings

..... 520

The bearings can support high radial and axial loads. The main dimensions and designations are not standardised in DIN and ISO.

Bearings with two outer rings and an outer intermediate ring are designed for a loose fit on the roll journal. A similar design with extended inner rings achieves a tight fit when used in conjunction with a tapered bore.

Bearings with one outer ring have two inner rings and are used, for example, as cable sheave bearings in drilling towers.

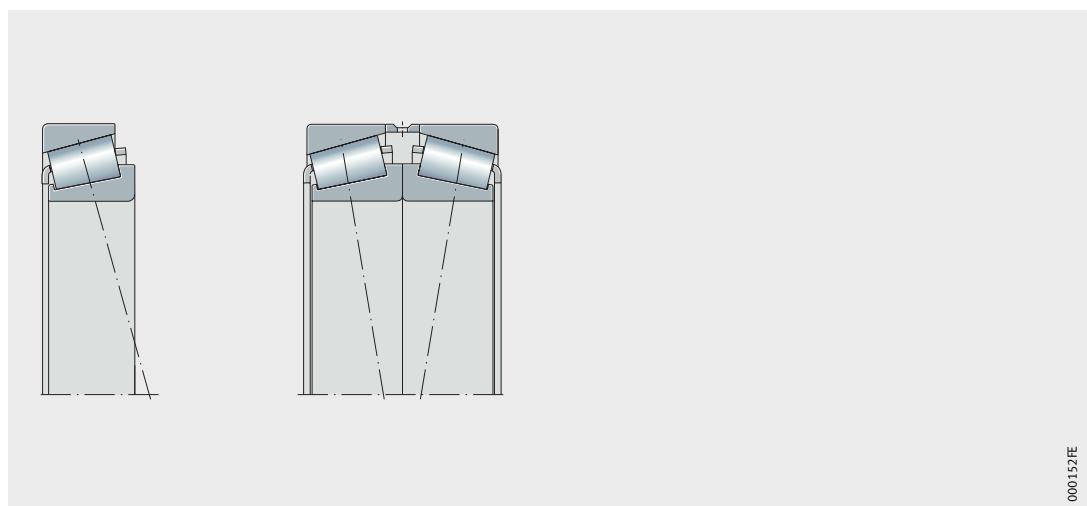
Bearings with one inner intermediate ring are used, for example, in rolling mills. Double row tapered roller bearings with two outer rings, without an intermediate ring and with a particularly large contact angle are suitable for supporting very high axial forces.

They are used as axial bearings, for example for work rolls or oil film bearings.

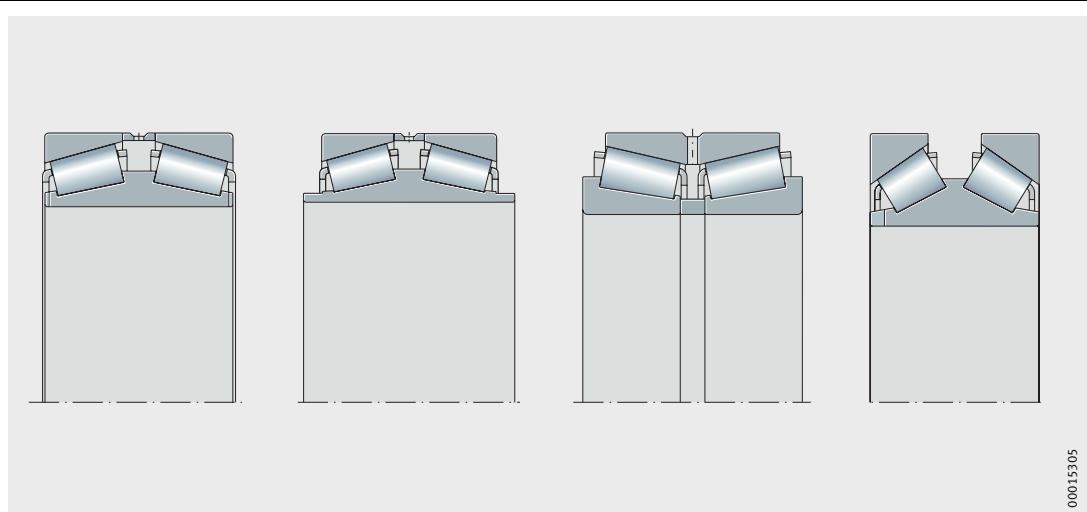
Four-row tapered roller bearings

..... 556

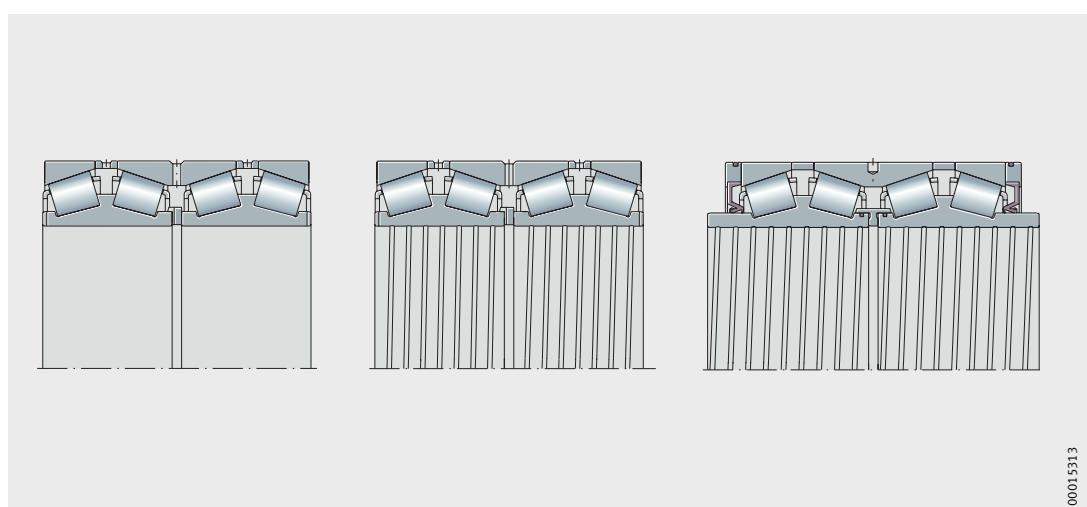
Four-row tapered roller bearings are special bearings for rolling mills. They can support axial forces in both directions as well as very high radial forces. The bearings are separable but must be mounted as complete units in the chock before this is slid onto the roll journal. Four-row bearings with a cylindrical bore are therefore designed for a loose fit on the roll journal. Lubrication of the journal is improved in many cases by a helical groove in the bore of the inner ring. For high speeds and loads, a tight fit on the journal is necessary. In this case, we can by agreement supply four-row bearings with a tapered bore. Four-row tapered roller bearings with integral seals can achieve longer life than open bearings as a result of better lubrication and cleanliness. The main dimensions and designations are not standardised in DIN and ISO.



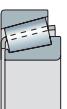
0001522F



0001530S



00015313



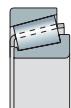
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Single row tapered roller bearings

Single row tapered roller bearings

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Tapered roller bearings, matched, in X arrangement	516



Product overview Single row tapered roller bearings

Single row

302, 303, 313, 320, 322, 323..-A, 329, Z-5..TR1, F-8..TR1



00014FE2

Matched In X arrangement

302..-N11CA, 303..-N11CA, 313..-N11CA, 320..-N11CA,
322..-N11CA, 323..-N11CA, 329..-N11CA



00015008

Single row tapered roller bearings

Features

Single row 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.

In addition to bearings with standardised main dimensions and standardised designations, special bearings in metric and inch sizes with non-standardised designations (Z-5..TR1 or F-8..TR1) are also available.

For new designs, bearings in metric sizes should always be used in preference.

Radial and axial load capacity

Single row 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, *Figure 1* and *Figure 2*, page 501.

Contact angle

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.

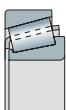
The size of the contact angle and thus the load carrying capacity is indicated by the bearing-specific value e in the dimension tables. Bearings of series 313 have a very high axial load carrying capacity due to their particularly large contact angle.

Compensation of angular misalignments

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.

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.



Single row tapered roller bearings

Matched bearings	Tapered roller bearings with the suffix N11CA are matched in pairs in an X arrangement and can therefore support high axial forces in both directions and moment loads. 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 section Axial internal clearance, page 510. We can also supply bearing pairs by agreement matched in an O arrangement (N11BA). When ordering, the number of bearings must be stated, not the number of bearing pairs.															
Sealing	Tapered roller bearings in either standard design or in matched pairs are not sealed.															
Lubrication	They can be lubricated using oil or grease.															
Operating temperature	Single row tapered roller bearings can be used at operating temperatures from -30°C to $+120^{\circ}\text{C}$. For continuous operating temperatures $> +120^{\circ}\text{C}$, please contact us. Bearings with outside diameters of more than 240 mm are dimensionally stable up to $+200^{\circ}\text{C}$.															
Cages	Single row 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 505, must be observed.															
Suffixes	Suffixes for available designs: see table.															
Available designs	<table border="1"><thead><tr><th>Suffix</th><th>Description</th><th>Design</th></tr></thead><tbody><tr><td>A</td><td>Modified internal construction</td><td rowspan="4">Standard</td></tr><tr><td>N11CA-A..</td><td>Two tapered roller bearings matched in an X arrangement, with an intermediate ring between the outer rings. Axial internal clearance in μm</td></tr><tr><td>W209C</td><td>Rings and rollers made from case hardening steel</td></tr><tr><td>X</td><td>External dimensions matched to international standards</td></tr><tr><td>P5</td><td>Increased accuracy</td><td>Special design, available by agreement and in certain series only</td></tr></tbody></table>	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 outer rings. Axial internal clearance in μm	W209C	Rings and rollers made from case hardening steel	X	External dimensions matched to international standards	P5	Increased accuracy	Special design, available by agreement and in certain series only
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 outer rings. Axial internal clearance in μm															
W209C	Rings and rollers made from case hardening steel															
X	External dimensions matched to international standards															
P5	Increased accuracy	Special design, 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, *Figure 1* and *Figure 2* as well as the table, page 502.

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 a load F_{rB} .
- F is an external axial force acting on bearing A.

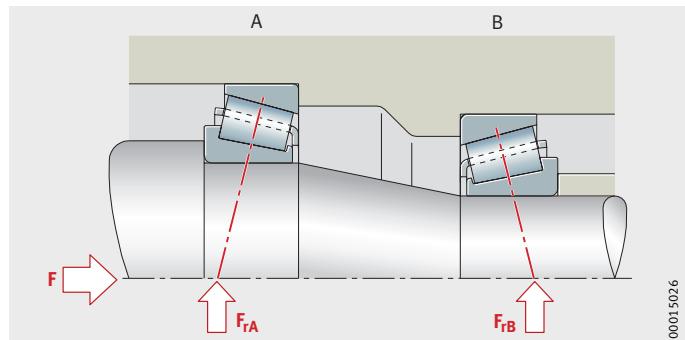


Figure 1
Bearings in O arrangement

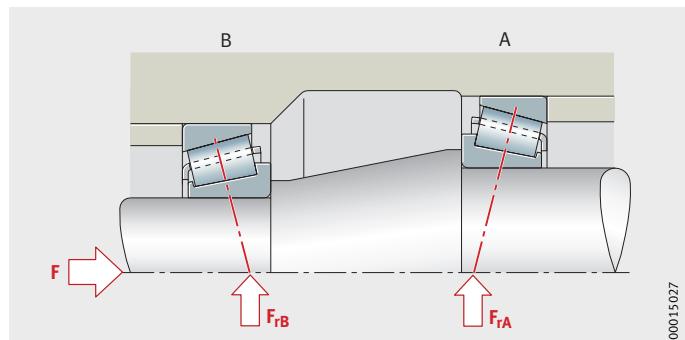


Figure 2
Bearings in X arrangement

Single row tapered roller bearings

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.

Equivalent dynamic bearing load

Single bearings under dynamic load

The equivalent dynamic load P is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

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 kN

Equivalent dynamic bearing load for combined load

F_a kN

Axial dynamic bearing load

F_r kN

Radial dynamic bearing load

e, Y –

Factors, see dimension tables.

For bearing pairs under dynamic load in an X or O arrangement, the following applies:

Bearing pairs under dynamic load

For bearing pairs under dynamic load in an X or O arrangement, the following applies:

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 kN

Equivalent dynamic bearing load for combined load

F_a kN

Axial dynamic bearing load of bearing pair

F_r kN

Radial dynamic bearing load of bearing pair

e, Y –

Factors for single bearing, see dimension tables.

For matched bearing pairs under dynamic load (suffix N11CA), the following applies:

Matched bearing pairs under dynamic load

For matched bearing pairs under dynamic load (suffix N11CA), 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 kN

Equivalent dynamic bearing load for combined load

F_a kN

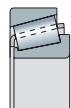
Axial dynamic bearing load of bearing pair

F_r kN

Radial dynamic bearing load of bearing pair

e, Y_1, Y_2 –

Factors for bearing pair, see dimension tables.



Single row tapered roller bearings

Equivalent static bearing load

The equivalent static load P_0 is valid for bearings that are subjected to radial and axial static loads. It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

For single bearings under static load, the following applies:

Single bearings under static load

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 kN

Equivalent static bearing load for combined load

F_{0a} kN

Axial static bearing load

F_{0r} kN

Radial static bearing load

Y_0 –

Factor, see dimension tables.

Bearing pairs under static load

For bearing pairs under static load in an X or O arrangement, the following applies:

$$P_0 = F_{0r} + 2 \cdot Y_0 \cdot F_{0a}$$

P_0 kN

Equivalent static bearing load for combined load

F_{0a} kN

Axial static bearing load of bearing pair

F_{0r} kN

Radial static bearing load of bearing pair

Y_0 –

Factor for single bearing, see dimension tables.

Matched bearing pairs under static load

For matched bearing pairs under static load (suffix N11CA), the following applies:

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

P_0 kN

Equivalent static bearing load for combined load

F_{0a} kN

Axial static bearing load of bearing pair

F_{0r} kN

Radial static bearing load of bearing pair

Y_0 –

Factor for bearing pair, see dimension tables.

Basic load ratings and fatigue limit load 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 , the basic static load rating C_{0r} and the fatigue limit load C_{ur} of the bearing pair are as follows:

- $C_r = 1,715 \cdot C_r$ single bearing
- $C_{0r} = 2 \cdot C_{0r}$ single bearing
- $C_{ur} = 2 \cdot C_{ur}$ single bearing

Matched bearings

For matched bearing pairs (suffix N11CA), the basic load ratings are given in the dimension tables.

Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum load $F_{r\min}$ in a radial direction. This applies particularly in the case of high speeds and high accelerations. For continuous operation, roller bearings with cage must therefore be subjected to a minimum radial load of the order of $P/C_r \geq 0,02$.

Speeds



The limiting speeds n_G in the dimension tables must not be exceeded.

Matched bearings

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.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

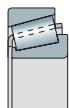
Mounting dimensions

The dimension tables give the maximum dimensions of the radii r_a and r_b and the diameters of the abutment shoulders.

Cage projection



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.



Single row tapered roller bearings

Accuracy Bearings in metric sizes

The main dimensions of the standardised bearings conform to DIN ISO 355 and DIN 720, the dimensional and running tolerances conform to DIN 620-2.

Width tolerance to PN

Single row tapered roller bearings 303, 313, 322 and 323..-A correspond to tolerance class PN.

Bearings 320 and 329 for shaft diameters of more than 200 mm have width tolerances to tolerance class PN.

Inner ring tolerances, Part 1

Bore		Bore deviation		Variation		Radial runout
d mm	Δ_{dmp} μm	V_{dp} μm	V_{dmp} μm	K_{ia} μm		
over	incl.	max.	min.	max.	max.	max.
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
400	500	0	-45	45	-	70
500	630	0	-50	50	-	85
630	800	0	-75	75	-	100

Inner ring tolerances, Part 2

Bore		Width deviation		Width deviation						
d mm	Δ_{Bs} μm	Δ_{Ts} μm	Δ_{T1s} μm	Δ_{T2s} μm	max.	min.	max.	min.	max.	min.
over	incl.	max.	min.	max.	min.	max.	min.	max.	min.	
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	
400	500	0	-450	+450	-450	-	-	-	-	
500	630	0	-500	+500	-500	-	-	-	-	
630	800	0	-750	+600	-600	-	-	-	-	

Outer ring tolerances

Outside diameter		Outside diameter deviation		Variation		Radial runout
D mm	Δ_{Dmp} μm	V_{Dp} μm	V_{Dmp} μm	K_{ea} μm		
over	incl.	max.	min.	max.	max.	max.
315	400	0	-40	40	30	70
400	500	0	-45	45	34	80
500	630	0	-50	50	38	100
630	800	0	-75	75	-	120
800	1000	0	-100	100	-	120

The width tolerance Δ_{Cs} is identical to Δ_{Bs} for the inner ring of the same bearing.

Restricted tolerance P5

We can by agreement supply tapered roller bearings with restricted tolerances to tolerance class P5 to DIN 620-2.

Inner ring tolerances, Part 1

Bore		Bore deviation		Variation		Radial runout
d mm	Δ_{dmp} μm	V_{dp} μm	V_{dmp} μm	K_{ia} μm		
over	incl.	max.	min.	max.	max.	max.
120	180	0	-18	14	9	11
180	250	0	-22	17	11	13
250	315	0	-25	-	-	-
315	400	0	-30	-	-	-
400	500	0	-35	-	-	-
500	630	0	-40	-	-	-
630	800	0	-75	-	-	-

Inner ring tolerances, Part 2

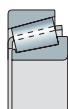
Bore		Width deviation		Width deviation		
d mm	Δ_{Bs} μm	Δ_{Ts} μm				
over	incl.	max.	min.	max.	min.	
120	180	0	-500	+350	-250	
180	250	0	-600	+350	-250	
250	315	0	-	+350	-250	
315	400	0	-	+400	-400	
400	500	0	-	+400	-400	
500	630	0	-	+500	-500	
630	800	0	-	+600	-600	

Outer ring tolerances

Outside diameter		Outside diameter deviation		Variation		Radial runout
D mm	Δ_{Dmp} μm	V_{Dp} μm	V_{Dmp} μm	K_{ea} μm		
over	incl.	max.	min.	max.	max.	max.
315	400	0	-28	22	14	20
400	500	0	-33	-	-	23
500	630	0	-38	-	-	25
630	800	0	-45	-	-	30
800	1000	0	-60	-	-	35

Total width tolerance of matched bearings

The total width tolerance of bearing pairs with the suffix N11CA is determined from the axial internal clearance and the deviations of the width Δ_{Ts} of the single bearings, see table Inner ring tolerances, Part 2, page 506.



Single row tapered roller bearings

Bearings in inch sizes

Tapered roller bearings in inch sizes are manufactured as standard with normal tolerances to ANSI/ABMA.

The deviation of the width Δ_{Bs} and radial runout correspond to tolerance class PN to 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 d mm		Bore deviation Δ_{dmp} μm		Width deviation Δ_{Ts} μm	
over	incl.	max.	min.	max.	min.
127	305	+25	0	+350	-250
305	508	+50	0	+375	-375
508	610	+50	0	+375	-375
610	915	+75	0	+375	-375
915	1220	+100	0	+375	-375
1220	-	+125	0	+375	-375

Inner ring tolerances, Part 2

Bore d mm		Width deviation (in relation to bore) Δ_{Bs} μm		Radial runout K_{ia} μm
over	incl.	max.	min.	max.
180	250	0	-300	50
250	315	0	-350	60
315	400	0	-400	70
400	500	0	-450	70
500	630	0	-500	85
630	800	0	-750	100
800	1000	0	-1000	120

Outer ring tolerances, Part 1

Outside diameter D mm		Outside diameter deviation Δ_{Dmp} μm	
over	incl.	max.	min.
–	305	+25	0
305	610	+50	0
610	915	+75	0
915	1 220	+100	0

Outer ring tolerances, Part 2

Outside diameter D mm		Radial runout K_{ea} μm
over	incl.	max.
315	400	70
400	500	80
500	630	100
630	800	120
800	1 000	120
1 000	1 250	120

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 section Technical principles, table, page 118.

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
101,6	254	+0,65	+1,8

¹⁾ r_{min} : see dimension table.

Limit values for chamfer dimensions r_{max} for the outer ring

Nominal outside diameter D mm		Chamfer dimension ¹⁾	
over	incl.	r_3 mm	r_4 mm
266,7	355,6	+1,7	+1,7

¹⁾ r_{min} : see dimension table.

Single row tapered roller bearings

Axial internal clearance

In tapered roller bearings, the axial internal clearance is the result of mounting against a second bearing during installation.

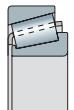
Matched bearings

The axial internal clearance is defined by an intermediate ring and is indicated in the suffix.

Example:

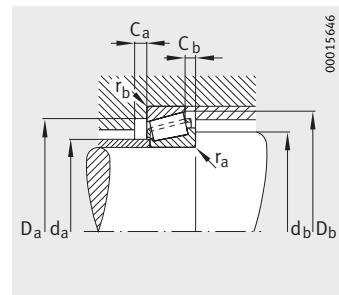
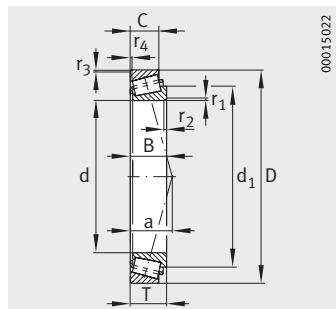
■ A400-450 indicates that the axial internal clearance of the bearing pair before fitting is between 400 µm and 450 µm.

Once bearing pairs are fitted, the preset axial internal clearance is reduced by the fit conditions and the axial clamping forces.



Tapered roller bearings

Single row

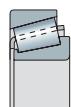


Mounting dimensions

Dimension table · Dimensions in mm

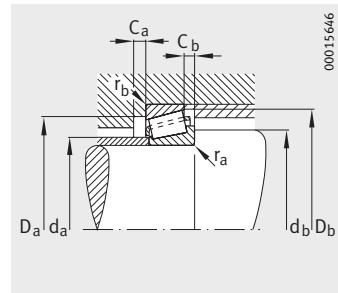
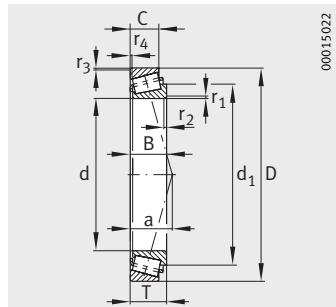
Designation	Mass m ≈kg	Dimensions									Mounting dimensions	
		d	D	T	B	C	r ₁ , r ₂ min.	r ₃ , r ₄ min.	a ≈	d ₁ ≈	d _a max.	d _b min.
31330-X	28	150	320	82	75	50	5	4	100	231	181	168
32330-A	46,1	150	320	114	108	90	5	4	79	230	184	167
30332-A	29,9	160	340	75	68	58	5	4	63	237	201	178
Z-536739.TR1	34	160	340	87	79	54	5	4	107	253	189	206
32332	49,5	160	340	121	114	95	5	4	86	245	190	177
Z-536748.01.TR1	29,6	170	330	85	79	54	5	4	103	253	191	218
30334-A	35,3	170	360	80	72	62	5	4	67	252	213	188
Z-529416.TR1	39,2	170	360	92	84	56	5	4	113	260	194	210
32334	61,3	170	360	127	120	100	5	4	89	256	208	187
30236-A	17,9	180	320	57	52	43	5	4	62	242	211	198
32236-A	30,1	180	320	91	86	71	5	4	77	249,5	204	198
30336	40,9	180	380	83	75	64	5	4	69	—	230	197
Z-534422.TR1	45,9	180	380	97	88	60	5	4	119	274	210	197
Z-534215.TR1	30,1	190	340	80	80	55	5	4	103	269,9	210	230
32238-A	39,1	190	340	97	92	75	5	4	81	263	216	207
Z-538034.TR1	54,1	190	400	100	90	65	5	4	115	292,9	224	242
32338	83,2	190	400	140	132	109	6	5	97	281	230	210
30240-A	25,2	200	360	64	58	48	5	4	69	272	237	217
32240-A	43,2	200	360	104	98	82	5	4	83	274,5	226	217
30340	52,3	200	420	89	80	67	6	5	76	294	250	220
Z-538035.TR1	65,1	200	420	110	100	70	5	4	130	308,6	229	250
Z-514561.TR1	33,4	206,375	336,55	98,425	100,012	77,788	3,3	3,3	74	271,7	227	231
Z-514561.TR1-W209C	33,3	206,375	336,55	98,425	100,012	77,788	3,3	3,3	74	271,7	227	231
32044-X	24,3	220	340	76	76	57	4	3	73	280	243	234
Z-534216.TR1	44,8	220	400	90	90	62	5	4	118	313	249	266
32244-A	59,5	220	400	114	108	90	5	4	95	310,5	258	237
Z-531856.TR1	47	230	425	85	78	50	6	6	133	330,5	53	54
Z-536377.TR1	22,8	234,95	355,6	68,263	66,675	47,625	7	3,3	86	295,9	249	265
32948	11,1	240	320	51	51	39	3	2,5	65	281	254	252
32048-X	25,9	240	360	76	76	57	4	3	79	300	261	254
30248	48	240	440	79	72	60	5	4	76	325	285	257
32248-A	80,5	240	440	127	120	100	5	4	105	332	286	257
30348	88,6	240	500	105	95	80	6	5	90	347,5	296	260
Z-501927.TR1	21,3	254	358,775	71,438	71,438	53,975	3,6	3,3	65	302	270	274
Z-521849.TR1	14,5	257,175	342,9	57,15	57,15	44,45	6,4	3,3	72	301,5	269	281

							Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed	Interchange designation to ISO 355
D _a		D _b	C _a	C _b	r _a	r _b	dyn. C _r kN	stat. C _{0r} kN	e	Y	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹	
min.	max.	min.	min.	min.	max.	max.									
251	302	300	9	32	5	4	790	1 040	0,83	0,73	0,4	115	2 240	1 530	T7GB150
264	302	299	12	24	5	4	1 330	1 950	0,35	1,74	0,96	221	2 240	1 320	–
290	322	310	9	17	5	4	890	1 140	0,35	1,74	0,96	123	2 240	1 510	T2GB160
268	–	321	9	33	5	4	890	1 190	0,83	0,73	0,4	128	2 200	–	–
280	–	320	12	26	5	4	1 170	1 740	0,38	1,58	0,87	194	2 100	1 390	–
260	–	311	9	31	5	4	810	1 150	0,8	0,75	0,41	126	2 100	–	–
307	342	329	9	18	5	4	1 040	1 360	0,35	1,74	0,96	146	2 100	1 350	–
304	–	336	9	30	5	4	1 010	1 360	0,83	0,73	0,4	145	2 000	–	–
295	–	335	12	27	5	4	1 640	2 550	0,36	1,67	0,92	280	1 960	1 090	–
278	302	297	9	14	5	4	610	850	0,45	1,33	0,73	93	2 240	1 500	T4GB180
267	302	303	10	20	5	4	1 010	1 640	0,45	1,33	0,73	187	2 100	1 230	T4GD180
327	–	350	10	19	5	4	1 120	1 470	0,35	1,74	0,96	155	1 960	1 260	–
297	–	356	10	37	5	4	1 100	1 500	0,83	0,73	0,4	158	1 800	–	–
269	–	320	12	25	5	4	810	1 310	0,78	0,77	0,42	144	2 000	–	–
286	322	323	10	22	5	4	1 140	1 820	0,44	1,38	0,76	203	1 960	1 260	T4GD190
314	–	370	11	35	5	4	1 170	1 620	0,73	0,82	0,45	169	1 700	–	–
330	–	373	14	31	6	5	1 960	2 950	0,35	1,73	0,95	315	1 680	970	–
315	342	336	9	16	5	4	760	1 060	0,44	1,38	0,76	113	1 960	1 300	T4GB200
302	342	340	11	22	5	4	1 320	2 080	0,41	1,48	0,81	225	1 960	1 060	T3GD200
360	–	385	10	22	6	5	1 300	1 720	0,35	1,74	0,96	174	1 680	1 110	–
328	–	395	12	40	5	4	1 390	1 890	0,79	0,76	0,42	192	1 500	–	–
306	–	318	8,5	14,5	3,3	3,3	1 120	2 000	0,34	1,78	0,98	223	2 000	–	–
306	–	317,7	10	16,5	3,3	3,3	1 120	2 000	0,34	1,78	0,98	223	2 000	–	–
300	326	326	12	19	4	3	890	1 630	0,43	1,39	0,77	179	1 820	1 130	T4FD220
321	–	376	10	28	5	4	1 020	1 570	0,75	0,8	0,44	164	1 500	–	–
336	382	380	12	24	5	4	1 540	2 550	0,44	1,38	0,76	270	1 540	910	–
68,4	–	78,6	9	35	6	6	950	1 440	0,88	0,68	0,37	146	1 400	–	–
318	–	333	7	21	7	3,3	660	1 310	0,59	1,02	0,56	144	1 800	–	–
294	308	311	9	12	3	2,5	510	1 050	0,46	1,31	0,72	116	1 960	1 160	T4EC240
318	346	346	12	19	4	3	900	1 680	0,46	1,31	0,72	181	1 680	1 060	T4FD240
383	–	410	10	19	5	4	870	1 260	0,36	1,68	0,92	126	1 540	1 120	–
372	422	415	14	27	5	4	1 850	3 100	0,44	1,38	0,76	320	1 400	800	–
425	–	454	12	25	6	5	1 780	2 410	0,35	1,74	0,96	232	1 330	870	–
335	–	343	8	17	3,6	3,3	800	1 560	0,34	1,76	0,97	168	1 700	–	–
322	–	333	6	12	6,4	3,3	500	1 150	0,46	1,29	0,71	126	1 800	–	–



Tapered roller bearings

Single row

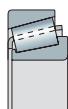


Mounting dimensions

Dimension table (continued) · Dimensions in mm

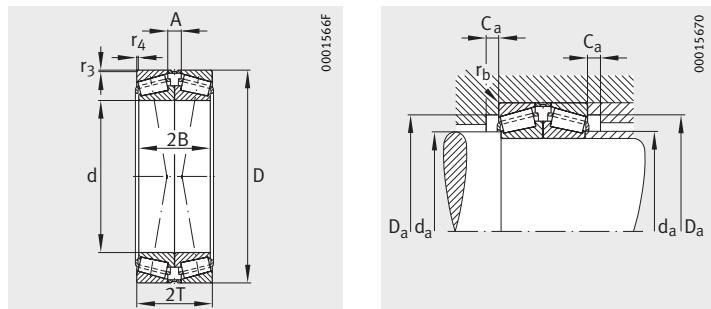
Designation	Mass m ≈kg	Dimensions										Mounting dimensions	
		d	D	T	B	C	r ₁ , r ₂	r ₃ , r ₄	a	d ₁	d _a	d _b	
32952	18,7	260	360	63,5	63,5	48	3	2,5	70	309	279	272	
32052-X	41,1	260	400	87	87	65	5	4	86	331,5	287	278	
30252-A	62,2	260	480	89	80	67	6	5	89	357	310	280	
Z-507531.TR1	29,6	260,35	400,05	69,85	67,47	46,038	9,7	6,4	76	320,7	280	296	
F-807586.TR1	15,7	262	355,6	57,15	57,15	44,45	3,6	3,3	61	312,5	281	285	
Z-534990.TR1	5,72	263,525	325,438	28,575	28,575	25,4	1,5	1,5	48	295	277	277	
32956	19,9	280	380	63,5	63,5	48	3	2,5	75	330	298	292	
32056-X	40,5	280	420	87	87	65	5	4	91	349	305	298	
32256	112	280	500	137	130	106	6	5	117	390	322	300	
32960	31,4	300	420	76	76	57	4	3	80	362	324	314	
32260	139	300	540	149	140	115	6	5	127	409,5	346	320	
32964	33,5	320	440	76	76	57	4	3	86	382	343	334	
32064-X	60,5	320	480	100	100	74	5	4	104	397,5	350	338	
32264	170	320	580	159	150	125	6	5	136	439	372	340	
32968	35,5	340	460	76	76	57	4	3	91	404	361	354	
32972	37,1	360	480	76	76	57	4	3	97	423	380	374	
Z-538300.TR1	19,1	381	479,425	49,212	47,625	34,925	6,4	3,3	75	429	395	406	
Z-531341.01.TR1	76,6	384,175	546,1	104,775	104,775	82,55	6,4	6,4	98	459,5	407	417	
Z-580755.TR1	6,68	403,225	460,375	28,575	28,575	20,638	3,5	3,3	70	431,1	414	418	
Z-511041.TR1	27,2	406,4	508	61,912	61,912	47,625	3,3	3,3	83	455	423	426	
Z-507170.TR1	43,3	406,4	546,1	76,2	61,12	55,562	6,4	6,4	113	469	425	435	
Z-532528.TR1	93,4	415,925	590,55	114,3	114,3	88,9	6,4	6,4	105	492	441	451	
Z-526434.TR1	115	447,675	635	120,65	120,65	95,25	6,4	6,4	111	534,9	474	484	
Z-535973.02.TR1	142	479,425	679,45	128,588	128,588	101,6	6,4	6,4	124	570	507	516	
Z-531546.TR1	68,1	482,6	634,873	80,962	80,962	63,5	6,4	3,3	116	564	510	516	
Z-535194.TR1	56,7	498,475	634,873	80,962	80,962	63,5	6,4	3,3	116	564	524	529	
Z-533416.TR1	115	558,8	736,6	104,775	104,775	80,962	6,4	6,4	121	645	585	594	
Z-521901.TR1	110	609,6	787,4	93,662	93,662	69,85	6,4	6,4	156	699,5	633	642	
F-808306.TR1	99,2	620	800	85	78	54	6	5	244	723	654	676	
Z-537536.02.TR1	289	660,4	939,8	136,525	127	98,425	6,4	6,4	165	781	699	708	
Z-507596.TR1	90,6	670	820	88	80	68	6	4	182	745	696	720	
Z-510362.TR1	118	723,9	914,4	84,138	80,962	60,325	5,6	6,4	138	809	750	756	
Z-534835.TR1	67	760	889	69,85	69,85	51,18	3,3	3,3	147	822,3	779	783	
F-808307.TR1	235	850	1090	115	106	77	7,5	7,5	218	963	900	918	
F-808305.TR1	319	1000	1250	115	115	85	9,5	9,5	180	1110	1058	1070	

							Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed	Interchange designation to ISO 355
D _a		D _b	C _a	C _b	r _a	r _b	dyn. C _r kN	stat. C _{or} kN	e	Y	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹	
min.	max.	min.	min.	min.	max.	max.									
328	348	347	11	15,5	3	2,5	750	1 500	0,41	1,48	0,81	161	1 680	990	T3EC260
352	382	383	14	22	5	4	1 150	2 140	0,43	1,38	0,76	225	1 540	920	T4FC260
419	–	447	10	22	6	5	1 460	2 090	0,4	1,48	0,81	202	1 330	860	–
366	–	371,5	7	18	9,7	6,4	710	1 260	0,44	1,36	0,75	132	1 500	–	–
335	–	346	6	11	3,6	3,3	590	1 200	0,36	1,69	0,93	129	1 700	–	–
312	–	315	5	3	1,5	1,5	226	530	0,37	1,64	0,9	36	1 800	–	–
348	368	368	11	15,5	3	2,5	740	1 520	0,43	1,39	0,76	162	1 540	940	T4EC280
370	402	402	14	22	5	4	1 200	2 300	0,46	1,31	0,72	238	1 400	840	T4FC280
418	–	475	14	31	6	5	2 290	3 950	0,45	1,34	0,73	395	1 190	660	–
383	406	405	12	19	4	3	990	2 030	0,39	1,52	0,84	208	1 330	820	T3FD300
453	–	510	16	34	6	5	2 650	4 550	0,43	1,38	0,76	445	1 120	590	–
402	426	426	13	19	4	3	1 060	2 270	0,42	1,44	0,79	229	1 260	740	–
424	462	461	15	26	5	4	1 560	3 050	0,46	1,31	0,72	305	1 190	690	T4GD320
486	–	555	16	34	6	5	3 000	5 200	0,44	1,38	0,76	490	1 050	530	–
421	446	446	12	19	4	3	1 080	2 370	0,44	1,37	0,75	236	1 190	690	–
439	466	466	14	19	4	3	1 060	2 370	0,46	1,31	0,72	233	1 120	660	–
455	–	465	5	12	6,4	3,3	455	1 140	0,38	1,57	0,86	110	1 100	–	–
507	–	519	10	17,5	6,4	6,4	1 780	3 950	0,33	1,8	0,99	375	1 100	–	–
445	–	452	5	6	3,5	3,3	233	670	0,4	1,49	0,82	41	1 100	–	–
483	–	492	7	14	3,3	3,3	810	1 980	0,36	1,65	0,9	191	1 100	–	–
504	–	516	–	16,5	6,4	6,4	1 030	2 120	0,47	1,27	0,7	195	1 100	–	–
549	–	562,4	12	25	6,4	6,4	1 970	4 150	0,34	1,76	0,97	385	950	–	–
591	–	610	10	20	6,4	6,4	2 460	5 200	0,33	1,84	1,01	470	900	–	–
620	–	648	10	20	6,4	6,4	2 750	6 100	0,33	1,8	0,99	540	800	–	–
603	–	609	5	13,5	6,4	3,3	1 170	2 800	0,43	1,4	0,77	250	850	–	–
603	–	610	9	13	6,4	3,3	1 170	2 800	0,43	1,4	0,77	250	850	–	–
696	–	708	11	19	6,4	6,4	2 270	5 500	0,35	1,73	0,95	470	700	–	–
747	–	756	10	19	6,4	6,4	1 800	4 500	0,5	1,2	0,66	380	670	–	–
723	–	776	13	31	6	5	1 450	3 550	0,88	0,68	0,38	295	670	–	–
851	–	892	16	35	6,4	6,4	3 800	8 200	0,4	1,49	0,82	650	600	–	–
770	–	804	10	15	6	4	1 400	3 650	0,57	1,05	0,58	305	630	–	–
873	–	876	9	19	5,6	6,4	1 980	4 750	0,38	1,57	0,87	375	560	–	–
857	–	860	7	19	3,3	3,3	1 120	3 700	0,43	1,38	0,76	300	560	–	–
1 006	–	1 047	13	38	7,5	7,5	2 750	6 800	0,53	1,14	0,63	520	500	–	–
1 175	–	1 201	15	30	9,5	9,5	3 650	9 900	0,35	1,72	0,95	720	450	–	–



Tapered roller bearings

Matched pairs
in X arrangement

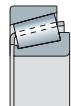


Mounting dimensions

Dimension table · Dimensions in mm

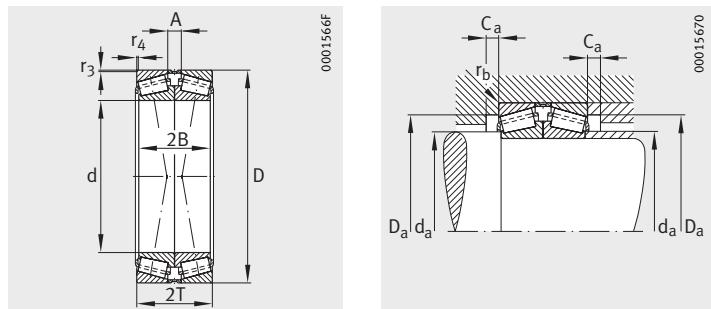
Designation	Mass for bearing pair m ≈kg	Dimensions						Mounting dimensions				
		d	D	2B	2T	r ₃ , r ₄	A	d _a	D _a		C _a	r _b
									min.	max.		
30330-A-N11CA-A380-430	51,6	150	320	130	144	4	34	189	273	302	9	4
31330-X-N11CA	57,7	150	320	150	164	4	64	181	251	302	9	4
32330-A-N11CA	87,9	150	320	216	228	4	48	184	264	302	12	4
30332-A-N11CA	60,7	160	340	136	150	4	34	201	290	322	9	4
32332-N11CA	92,9	160	340	228	242	4	52	190	280	322	12	4
30334-A-N11CA	73,3	170	360	144	160	4	36	213	307	342	9	4
32334-N11CA	125	170	360	240	254	4	54	208	295	342	12	4
30236-A-N11CA	36	180	320	104	114	4	28	211	278	302	9	4
32236-A-N11CA	61,3	180	320	172	182	4	40	204	267	302	10	4
32236-A-N11CA-A430-480	61,3	180	320	172	182	4	40	204	267	302	10	4
30336-N11CA	83,7	180	380	150	166	4	38	230	327	362	10	4
32336-N11CA	128	180	380	252	268	4	56	215	310	362	14	4
30238-N11CA	41,9	190	340	110	120	4	28	224	298	322	9	4
32338-N11CA	164	190	400	264	280	5	62	230	330	377	14	5
30240-A-N11CA	52,9	200	360	116	128	4	32	237	315	342	9	4
30240-A-N11CA-A550-600	52,9	200	360	116	128	4	32	237	315	342	9	4
32240-A-N11CA	88,2	200	360	196	208	4	44	226	302	342	11	4
32240-A-N11CA-A400-450	88,2	200	360	196	208	4	44	226	302	342	11	4
30340-N11CA	107	200	420	160	178	5	44	250	360	397	10	5
32340-N11CA	168	200	420	276	292	5	62	240	345	397	14	5
32044-X-N11CA	49,4	220	340	152	152	3	38	243	300	326	12	3
32044-X-N11CA-A300-350	49,4	220	340	152	152	3	38	243	300	326	12	3
32244-A-N11CA	123	220	400	216	228	4	48	258	336	382	12	4
32244-A-N11CA-A400-450	123	220	400	216	228	4	48	258	336	382	12	4
30344-N11CA	136	220	460	176	194	5	48	274	392	437	10	5
32048-X-N11CA	58,3	240	360	152	152	3	38	261	318	346	12	3
32048-X-N11CA-A450-500	58,3	240	360	152	152	3	38	261	318	346	12	3
30248-N11CA	87,6	240	440	144	158	4	38	285	383	417	10	4
32248-A-N11CA	166	240	440	240	254	4	54	286	372	422	14	4
32248-A-N11CA-A450-500	166	240	440	240	254	4	54	286	372	422	14	4
30348-N11CA	177	240	500	190	210	5	50	296	425	477	12	5
32052-X-N11CA	77,5	260	400	174	174	4	44	287	352	382	14	4
32052-X-N11CA-A500-550	77,5	260	400	174	174	4	44	287	352	382	14	4

Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed Bearing pair	Reference speed Bearing pair
dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
1 380	2 050	0,35	1,96	2,91	1,91	225	2 240	1 310
1 360	2 090	0,83	0,82	1,22	0,8	230	2 240	1 220
2 270	3 900	0,35	1,96	2,91	1,91	445	2 240	1 060
1 520	2 280	0,35	1,96	2,91	1,91	246	2 240	1 210
2 010	3 450	0,38	1,78	2,65	1,74	385	2 100	1 120
1 780	2 700	0,35	1,96	2,91	1,91	290	2 100	1 090
2 800	5 100	0,36	1,87	2,79	1,83	560	1 960	870
1 040	1 700	0,45	1,5	2,23	1,47	185	2 240	1 200
1 730	3 300	0,45	1,5	2,23	1,47	375	2 100	990
1 730	3 300	0,45	1,5	2,23	1,47	375	2 100	990
1 930	2 950	0,35	1,96	2,91	1,91	310	1 960	1 010
2 460	4 350	0,38	1,78	2,65	1,74	470	1 820	950
910	1 560	0,39	1,75	2,61	1,71	169	2 120	1 210
3 350	5 900	0,35	1,95	2,9	1,91	630	1 680	780
1 300	2 120	0,44	1,55	2,31	1,52	225	1 960	1 040
1 300	2 120	0,44	1,55	2,31	1,52	225	1 960	1 040
2 270	4 150	0,41	1,66	2,47	1,62	450	1 960	850
2 270	4 150	0,41	1,66	2,47	1,62	450	1 960	850
2 230	3 450	0,35	1,96	2,91	1,91	350	1 680	880
3 000	5 300	0,37	1,8	2,69	1,76	560	1 680	820
1 530	3 250	0,43	1,57	2,34	1,53	355	1 820	910
1 530	3 250	0,43	1,57	2,34	1,53	355	1 820	910
2 650	5 100	0,44	1,55	2,31	1,52	540	1 540	730
2 650	5 100	0,44	1,55	2,31	1,52	540	1 540	730
2 470	3 750	0,35	1,96	2,91	1,91	370	1 400	820
1 540	3 350	0,46	1,47	2,19	1,44	360	1 680	850
1 540	3 350	0,46	1,47	2,19	1,44	360	1 680	850
1 490	2 550	0,36	1,89	2,81	1,85	255	1 540	890
3 150	6 200	0,44	1,55	2,31	1,52	660	1 400	640
3 150	6 200	0,44	1,55	2,31	1,52	660	1 400	640
3 050	4 800	0,35	1,96	2,91	1,91	465	1 330	700
1 980	4 300	0,43	1,55	2,31	1,52	450	1 540	730
1 980	4 300	0,43	1,55	2,31	1,52	450	1 540	730



Tapered roller bearings

Matched pairs
In X arrangement

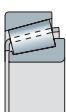


Mounting dimensions

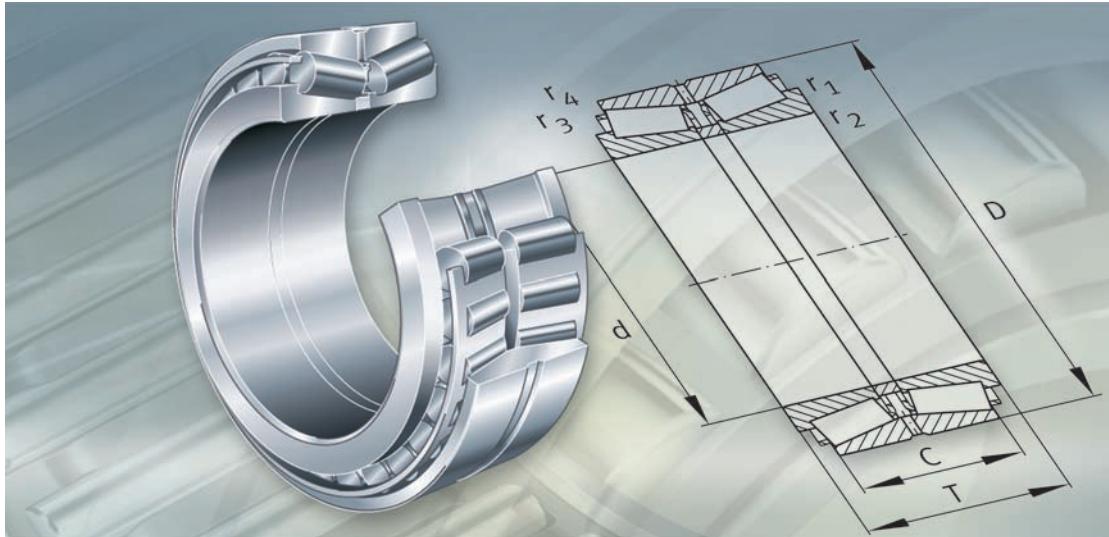
Dimension table (continued) · Dimensions in mm

Designation	Mass for bearing pair m ≈kg	Dimensions						Mounting dimensions				
		d	D	2B	2T	r ₃ , r ₄	A	d _a	D _a	C _a	r _b	
						min.		max.	min.	max.	min.	max.
32056-X-N11CA	82	280	420	174	174	4	44	305	370	402	14	4
32056-X-N11CA-A550-600	82	280	420	174	174	4	44	305	370	402	14	4
32256-N11CA	227	280	500	260	274	5	62	322	418	477	14	5
32960-N11CA	63,6	300	420	152	152	3	38	324	383	406	12	3
32960-N11CA-A650-700	63,6	300	420	152	152	3	38	324	383	406	12	3
32060-X-N11CA	117	300	460	200	200	4	52	329	404	442	15	4
32060-X-N11CA-A450-500	117	300	460	200	200	4	52	329	404	442	15	4
32964-N11CA	67,2	320	440	152	152	3	38	343	402	426	13	3
32964-N11CA-A600-650	67,2	320	440	152	152	3	38	343	402	426	13	3
32064-X-N11CA	125	320	480	200	200	4	52	350	424	462	15	4
32064-X-N11CA-A650-700	125	320	480	200	200	4	52	350	424	462	15	4
32968-N11CA	73,1	340	460	152	152	3	38	361	421	446	12	3
32968-N11CA-A550-600	73,1	340	460	152	152	3	38	361	421	446	12	3

Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed Bearing pair	Reference speed Bearing pair
dyn. C_r kN	stat. C_{0r} kN	e	γ_1	γ_2	γ_0	C_{ur} kN	n_G min ⁻¹	n_B min ⁻¹
2 050	4 600	0,46	1,47	2,19	1,44	475	1 400	670
2 050	4 600	0,46	1,47	2,19	1,44	475	1 400	670
3 950	7 900	0,45	1,5	2,24	1,47	790	1 190	520
1 760	4 300	0,39	1,71	2,54	1,67	440	1 330	630
1 760	4 300	0,39	1,71	2,54	1,67	440	1 330	630
2 600	5 700	0,43	1,55	2,31	1,52	580	1 260	600
2 600	5 700	0,43	1,55	2,31	1,52	580	1 260	600
1 810	4 550	0,42	1,62	2,42	1,59	460	1 260	590
1 810	4 550	0,42	1,62	2,42	1,59	460	1 260	590
2 700	6 100	0,46	1,47	2,19	1,44	610	1 190	580
2 700	6 100	0,46	1,47	2,19	1,44	610	1 190	580
1 850	4 750	0,44	1,54	2,3	1,51	475	1 190	550
1 850	4 750	0,44	1,54	2,3	1,51	475	1 190	550



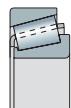
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Double row tapered roller bearings

Double row tapered roller bearings

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Product overview Double row tapered roller bearings

With two outer rings (X arrangement)

For loose fit on the journal
With extended inner ring

Z-5..TR2-06, F-8..TR2-06



Z-5..TR2-03, F-8..TR2-03



With two inner rings (O arrangement)

With intermediate ring
Without intermediate ring

Z-5..TR2-05, F-8..TR2-05



Z-5..TR2-04, F-8..TR2-04



With large contact angle (X arrangement)

Axial bearings for work rolls
Axial bearings for oil film bearings

Z-5..TR2-01, F-8..TR2-01



Z-5..TR2-02, F-8..TR2-02



Double row tapered roller bearings

Features

Double row tapered roller bearings of various designs are special bearings with the designation Z-5..TR2 or F-8..TR2. They comprise solid bearing rings and tapered roller and cage assemblies. The bearings are suitable for axial loads in both directions and high radial loads. Most of the bearings are separable and give a loose fit on the journal. The complete bearing is then mounted in the chock, after which the chock together with the bearing is slid onto the journal. The exception is bearings with an extended inner ring and tapered bore. These give a tight fit on the journal.

Bearings with two outer rings (X arrangement) for a loose fit on the journal

In bearings with two outer rings and one inner ring, the rows of rollers are in an X arrangement. The outer intermediate ring with a lubrication groove and lubrication holes defines the axial internal clearance suitable for the specific application.

Application: for example in roll stands, *Figure 1*.

Design 1

- Bearings with cylindrical bore for loose fit on the journal.
- Cages made from sheet steel.
- Main dimensions and tolerances in inches.

Design 2

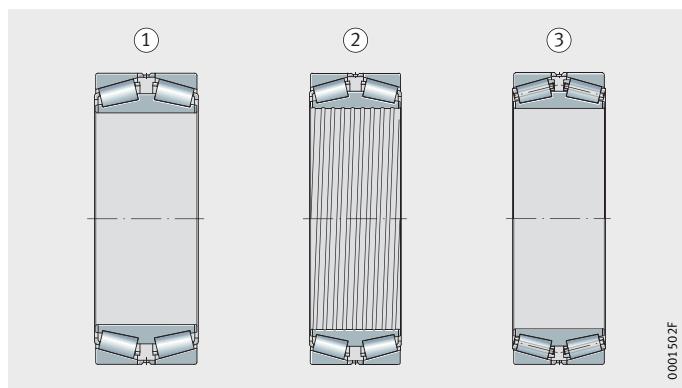
- Bearings with cylindrical bore for loose fit on the journal.
- Cages made from sheet steel.
- Main dimensions and tolerances in inches.
- Helical groove in the inner ring for improved journal lubrication.

Design 3

- Bearings with cylindrical bore for loose fit on the journal.
- Through-drilled rollers and pin cages for very high loads.
- Main dimensions and tolerances in inches.

- ① Design 1
② Design 2
③ Design 3

Figure 1
Double row tapered roller bearings
with two outer rings
for loose fit on the journal



0001502F

Double row tapered roller bearings

Bearings with two outer rings (X arrangement) and extended inner ring

These double row tapered roller bearings also have two outer rings. The lateral extended sections of the inner ring are ground on the outside and serve as running surfaces for rotary shaft seals. Application: for example in roll stands, *Figure 2*.

Design 4

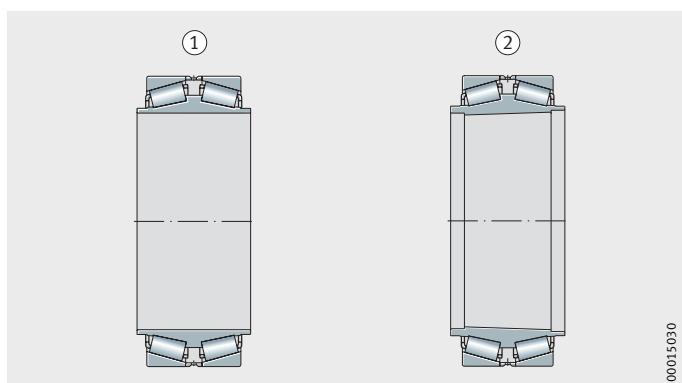
- Bearings with cylindrical bore for loose fit on the roll journal.
- Cages made from sheet steel.
- Metric or inch sizes and tolerances.

Design 5

- Bearings with tapered bore (taper 1:12 or 1:30) for loose fit on the roll journal.
- Cages made from sheet steel.
- Metric or inch sizes and tolerances.

① Design 4
② Design 5

Figure 2
Double row tapered roller bearings
with two outer rings and
extended inner ring



Bearings with two inner rings (O arrangement)

In tapered roller bearings with two inner rings and one outer ring, the two rows of rollers are in an O arrangement.

As a result, these bearings are also suitable for tilting moments. If the bearings are used as non-locating bearings, the outer ring must have a loose fit. Normally, an inner intermediate ring defines the axial internal clearance suitable for the specific application. The main dimensions and tolerances are metric or in inches. Application: for example in roll stands, *Figure 3*, page 525.

Design 6

- Bearings with sheet steel cages and inner intermediate ring.
- Lubrication groove and lubrication holes in the outer ring.

Design 7

- Bearings with sheet steel cages and inner intermediate ring.
- Lubrication groove and lubrication holes as well as retaining hole in the outer ring.

- Design 8**
- Bearings with pin cages and inner intermediate ring.
 - Lubrication groove and lubrication holes in the outer ring.
- Design 9**
- Bearings with pin cages and inner intermediate ring.
 - Lubrication groove and lubrication holes as well as retaining hole in the outer ring.
- Design 10**
- Bearings without intermediate ring, with lubrication hole at the joint between the two inner rings.
 - Cages made from sheet steel.
 - Application:
 - for example cable sheaves in drilling towers (additional lubrication groove and lubrication holes in the outer ring), vertical roll stands (preloaded bearings with rings and rollers made from case hardening steel).
- Design 11**
- Bearings with lubrication groove and lubrication holes in the intermediate ring.
 - Cages made from sheet steel.
 - Preloaded special bearings for vertical rolls in universal roll stands with rings and rollers made from case hardening steel.

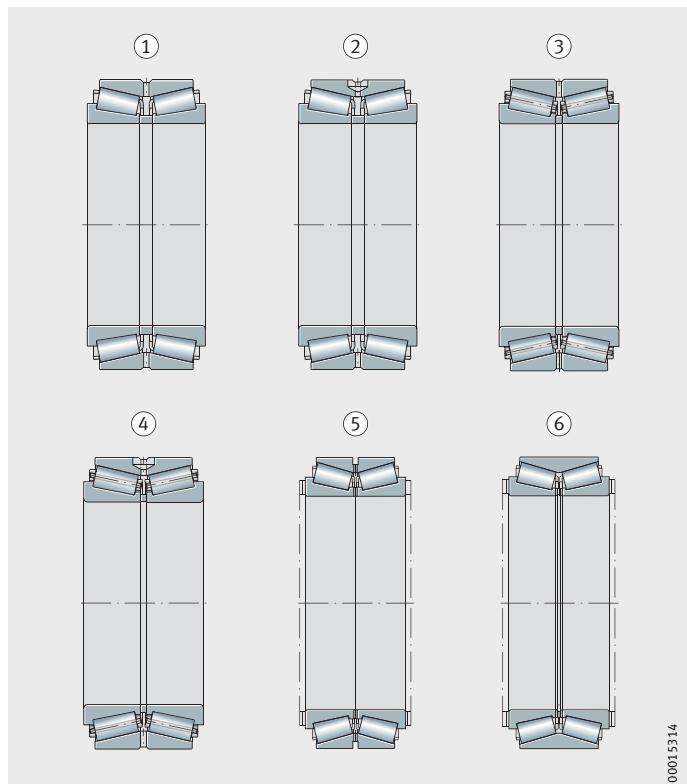


Figure 3
Double row tapered roller bearings
with two inner rings

Double row tapered roller bearings

Bearings with large contact angle Axial bearings for work rolls

Tapered roller bearings with two outer rings and a large contact angle are suitable for particularly high axial loads. They are therefore used as axial bearings.

Designs 12 to 14 in metric or inch sizes are intended for work rolls, *Figure 4*.

Integrated springs or a retaining sleeve are used to give acceptable rolling behaviour.

Design 12

- Bearings with sheet steel cages.
- Spring assemblies integrated in the outer rings.
- Retaining slot on one side of the inner ring.

Design 13

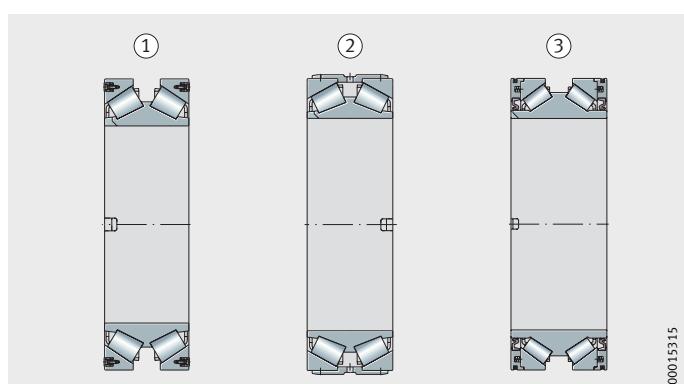
- Bearings with sheet steel cages.
- Self-retaining design with outer retaining sleeve.
- Retaining slot on one side of the inner ring.

Design 14

- Bearings with sheet steel cages.
- Seal carrier with springs and rotary shaft seal on both sides.
- Retaining slot on one side of the inner ring.

- ① Design 12
② Design 13
③ Design 14

Figure 4
Double row tapered roller bearings
with large contact angle
(axial bearings for work rolls)



00015315

Axial bearings for oil film bearings

In axial bearings for oil film bearings (Designs 15 to 19), the outer rings are axially adjusted by means of external springs to give acceptable rolling behaviour. Since the bearings are seated on the roll journal with a loose fit, the inner ring has different retaining slots depending on the bearing design to act as anti-rotation devices.

Bearings are available in metric and inch sizes, *Figure 5*.

Design 15

- Bearings with sheet steel cages.
- Retaining slot on one side of the inner ring.

Design 16

- Bearings with pin cages.
- Retaining slots on both sides of the inner ring.

Design 17

- Bearings with sheet steel cages.
- Retaining slot on one side of the inner ring.

Design 18

- Bearings with pin cages.
- Retaining slot on one side of the inner ring.

Design 19

- Bearings with sheet steel cages.
- Axial retaining slot in the inner ring.

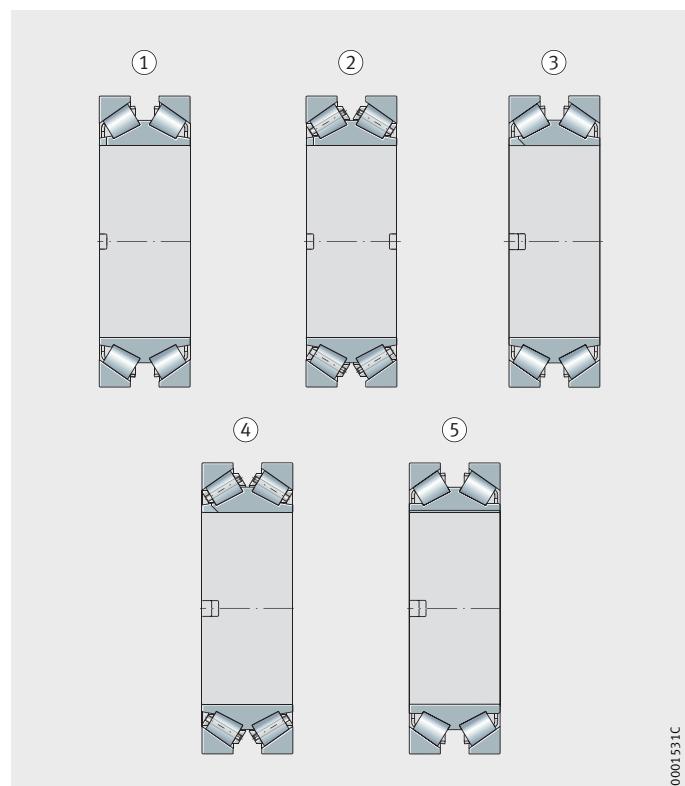


Figure 5
Double row tapered roller bearings
with large contact angle
(axial bearings for oil film bearings)

000151C

Double row tapered roller bearings

Sealing	With the exception of Design 14 (axial bearings for work rolls), all the bearings described here are supplied without seals.
Lubrication	These open double row tapered roller bearings can be lubricated with grease or oil. The sealed bearings are supplied filled with high quality rolling bearing grease.
Operating temperature	Double row tapered roller bearings can be used at operating temperatures from -30°C to $+150^{\circ}\text{C}$, depending on the lubricant. Sealed bearings are suitable for temperatures from -30°C to $+110^{\circ}\text{C}$, restricted by the lubricant and seal material.
Cages	Most double row tapered roller bearings have pressed cages made from sheet steel. Bearings with a pin cage and through-drilled rollers are specifically identified in the dimension tables. These bearings are designed for very high load carrying capacity and strong acceleration or deceleration.

Design and safety guidelines

Equivalent dynamic bearing load

Load ratio and equivalent dynamic load

The equivalent dynamic load P is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

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 kN

Equivalent dynamic bearing load for combined load

F_a kN

Axial dynamic bearing load

F_r kN

Radial dynamic bearing load

e, Y_1, Y_2 –

Factors, see dimension tables.

Bearings under axial load with large contact angle

For bearings under purely axial load with a large contact angle, the following applies:

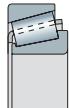
$$P = Y \cdot F_a$$

Y –

Factor, see dimension tables

F_a kN

Axial dynamic bearing load.



Double row tapered roller bearings

Equivalent static bearing load

The equivalent static load P_0 is valid for bearings that are subjected to radial and axial static loads. It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

For bearings under static loading, the following applies:

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

P_0 kN

Equivalent static bearing load for combined load

F_{0r} kN

Radial static bearing load

Y_0 –

Factor, see dimension tables

F_{0a} kN

Axial static bearing load.

Bearings under axial load with large contact angle

For bearings under purely axial load with a large contact angle, the following applies:

$$P_0 = Y_0 \cdot F_{0a}$$

P_0 kN

Equivalent static bearing load for combined load

Y_0 –

Factor, see dimension tables

F_{0a} kN

Axial 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 $C_r/P > 0,02$ is therefore necessary.

Comparative load ratings

The basic dynamic load ratings C_r to DIN ISO 281 are based on a basic rating life of 1 million revolutions. Competitors sometimes give different load ratings that are based on 90 million revolutions ($3\,000$ h at 500 min^{-1}).

Since it is not possible to compare these values with the basic load ratings calculated according to ISO, please contact us regarding the comparative load ratings C_{r90} and C_{a90} .

Design of bearing arrangements

Shaft tolerances

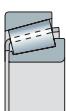
Double row tapered roller bearings	Nominal dimension d mm	Tolerance ¹⁾ mm
Metric tolerances, with loose fit	< 315	-0,180...-0,230
	315 ...630	-0,240...-0,300
	> 630 ...800	-0,325...-0,410
	> 800	-0,350...-0,450
Inch tolerances, with loose fit	> 152,4...203,2	-0,150...-0,175
	> 203,2...304,8	-0,180...-0,205
	> 304,8...609,6	-0,200...-0,249
	> 609,6...914,4	-0,250...-0,334
	> 914,4	-0,300...-0,400
Axial bearings	d	e7

¹⁾ In the case of high speeds and bearings with a tapered bore,
please contact us to discuss the tolerances for the adjacent parts.

Housing tolerances

Double row tapered roller bearings	Nominal dimension D mm	Tolerance ¹⁾ mm
Metric tolerances	\leq 800	H6
	> 800	H7
Inch tolerances	> 304,8... 609,6	+0,101...+0,150
	> 609,6... 914,4	+0,156...+0,230
	> 914,4...1219,2	+0,202...+0,300
	> 1219,6	+0,257...+0,380
Axial bearings	\leq 500	+0,6 ...+0,8
	> 500 ... 800	+0,8 ...+1,1
	> 800	+1,2 ...+1,5

¹⁾ In the case of high axial forces and bearings with a tapered bore,
please contact us to discuss the tolerances for the adjacent parts.



Double row tapered roller bearings

Accuracy

The dimensional and running tolerances of double row tapered roller bearings are generally defined for individual cases.
Please contact us regarding the values.
Normal tolerances for bearings in metric and inch sizes should be taken from the following tables.

Normal tolerances for bearings in metric sizes

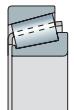
Nominal dimension mm		Bore deviation Δ_{dmp} μm		Outside diameter deviation Δ_{Dmp} μm		Width deviation $\Delta_{Bs} = \Delta_{Cs}$ μm	
over	incl.	max.	min.	max.	min.	max.	min.
180	250	0	-30	0	-30	0	-300
250	315	0	-35	0	-35	0	-350
315	400	0	-40	0	-40	0	-400
400	500	0	-45	0	-45	0	-450
500	630	0	-50	0	-50	0	-500
630	800	0	-75	0	-75	0	-750
800	1000	0	-100	0	-100	0	-1000
1000	1250	0	-125	0	-125	0	-1250
1250	1600	0	-160	0	-160	0	-1600
1600	2000	0	-200	0	-200	0	-2000

Normal tolerances for bearings in inch sizes

Nominal dimension mm		Bore deviation Δ_{dmp} μm		Outside diameter deviation Δ_{Dmp} μm		Width deviation $\Delta_{Bs} = \Delta_{Cs}$ μm	
over	incl.	max.	min.	max.	min.	max.	min.
304,8	609,6	+51	0	+51	0	± 762	0
609,6	914,4	+76	0	+76	0	± 762	0
914,4	1219,2	+102	0	+102	0	± 762	0
1219,2	-	+127	0	+127	0	± 762	0

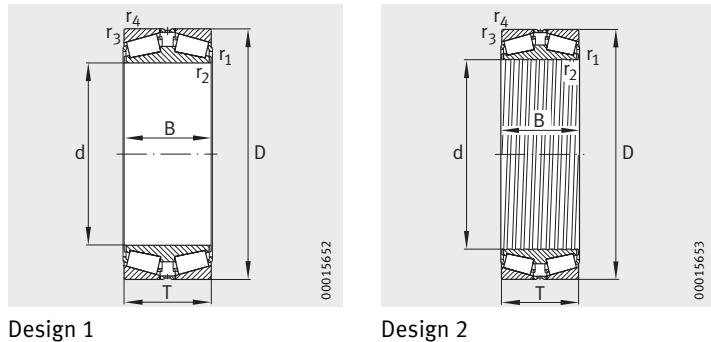
Axial internal clearance

The axial internal clearance of double row tapered roller bearings differs according to the bearing size and application.
Please contact us for values.



Tapered roller bearings

Double row,
in X arrangement
For loose fit
on the roll journal



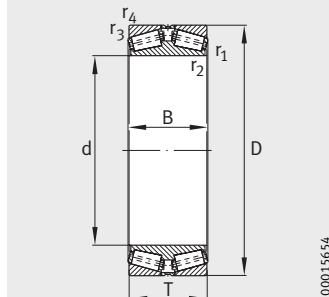
Design 1

Design 2

Dimension table · Dimensions in mm

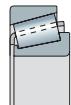
Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	B	r ₁ , r ₂ min.	r ₃ , r ₄ min.
Z-541397.TR2	1	77,1	203,2	368,3	158,75	152,4	3,3	3,3
F-800579.TR2	1	24,7	234,95	327,025	93,662	93,662	3,3	3,3
Z-564290.TR2	1	67,8	244,475	381	146,05	146,05	3,3	4,8
Z-511577.TR2	1	41,6	254	358,775	130,175	130,175	1,5	3,3
Z-547757.TR2	1	104	254	438,15	165,1	165,1	3,3	6,4
Z-505684.TR2	1	89,7	254	444,5	133,35	133,35	3,3	6,4
Z-517563.01.TR2	1	50,2	269,875	381	136,525	136,525	3,3	3,3
Z-564144.TR2	1	129	279,4	469,9	169,863	166,688	3,3	6,4
Z-546348.TR2	1	59,5	288,925	406,4	144,462	144,462	3,3	3,3
Z-542664.TR2	1	67,8	300,038	422,275	150,813	150,812	3,3	3,3
Z-572151.TR2	1	55,2	304,8	419,1	130,175	130,175	1,5	6,4
Z-575744.TR2	1	68	305	438,048	133,35	134,938	3,3	4,8
Z-510687.01.TR2	1	92	333,375	469,9	166,688	166,688	3,3	3,3
Z-515956.TR2	1	112	342,9	533,4	139,69	146,05	3,3	3,3
Z-575296.TR2	2	106	346,075	488,95	174,625	174,625	3,3	3,3
Z-518240.01.TR2	2	150	384,175	546,1	193,675	193,675	3,3	6,4
Z-533805.TR2	3	150	384,175	546,1	193,675	193,675	3,3	6,4
F-804701.TR2	2	89	406,4	546,1	138,112	138,112	1,5	6,4
Z-531821.TR2	1	145	406,4	565,15	184,15	184,15	3,3	6,4
Z-525090.TR2	1	115	409,575	546,1	161,925	161,925	1,5	6,4
Z-524903.TR2	1	184	415,925	590,55	209,55	209,55	3,3	6,4
Z-528949.TR2	1	474	431,902	685,698	330,2	330,2	6,4	6,4
Z-518667.TR2	1	222	447,675	635	223,838	223,838	3,3	6,4
Z-515087.01.TR2	1	281	479,425	679,45	238,125	238,125	3,3	6,4
Z-503772.TR2	2	320	501,65	711,2	250,825	250,825	3,3	6,4
Z-536245.TR2	1	351	508	762	219,075	219,075	6,4	6,4
Z-532273.TR2	3	610	520	820	300	300	4	6
Z-526165.TR2	2	392	536,575	761,873	269,875	269,875	3,3	6,4
Z-544145.TR2	1	228	558,8	736,6	196,85	196,85	3,3	6,4
Z-543718.TR2	3	505	571,5	812,8	285,75	285,75	3,3	6,4

¹⁾ The comparative designations were taken from documents available to us.
They give information on identical main dimensions and chamfer dimensions only.
The cage and bearing designs are not always identical.
Furthermore, the table makes no claims to completeness.



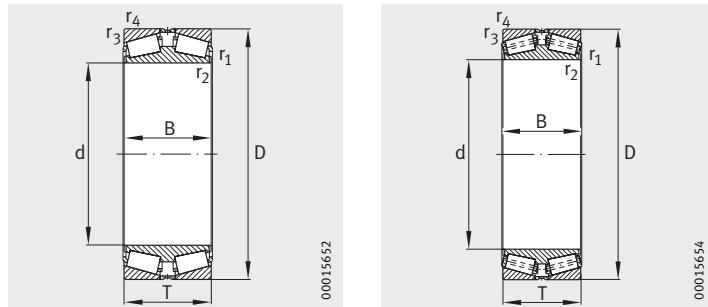
Design 3
With pin cage

Basic load ratings		Calculation factors				Fatigue limit load C_{ur} kN	Interchange designation ¹⁾ TDI types
dyn. C_r kN	stat. C_{or} kN	e	γ_1	γ_2	γ_0		
1 690	3 450	0,39	1,71	2,54	1,67	375	EE420800DW.450
830	1 960	0,41	1,66	2,47	1,62	—	85 76D W.8.520
1 600	3 500	0,46	1,46	2,17	1,43	370	EE126096DW.150
1 360	3 150	0,34	1,98	2,95	1,94	335	M249749DW.710
2 170	4 100	0,36	1,87	2,78	1,83	415	EE738101DW.712
1 710	3 050	0,36	1,85	2,76	1,81	305	EE822101DW.175
1 550	3 700	0,33	2,03	3,02	1,99	390	M252349DW.310
2 400	5 100	0,37	1,8	2,69	1,76	—	EE722111DW.185
1 730	4 100	0,35	1,94	2,89	1,9	430	M255449DW.410
1 790	4 350	0,36	1,86	2,77	1,82	450	HM256849DW.810
1 560	3 800	0,32	2,12	3,15	2,07	—	M257149DW.110
1 340	3 200	0,4	1,69	2,52	1,65	—	EE129123DW.172
2 120	5 400	0,38	1,79	2,67	1,75	540	HM261049DW.010
2 120	3 900	0,33	2,03	3,02	1,98	—	EE971355DW.100
2 480	6 300	0,33	2,03	3,02	1,98	620	HM262749DW.710
3 050	7 900	0,33	2,03	3,02	1,98	750	HM266449DW.410
3 050	7 900	0,33	2,03	3,02	1,98	750	HM266449D.410
1 910	4 650	0,43	1,56	2,33	1,53	435	LM767749DW.710
3 000	7 500	0,43	1,57	2,34	1,53	—	M267949DW.910
2 240	6 200	0,45	1,5	2,24	1,47	—	M667947DW.911
3 400	8 300	0,34	1,98	2,94	1,93	770	M268749DW.710
6 700	15 000	0,32	2,12	3,15	2,07	—	EE650171D.270
4 900	10 400	0,33	2,07	3,09	2,03	940	M270749DW.710
4 700	12 200	0,33	2,03	3,02	1,98	1 090	M272749DW.710
4 900	12 800	0,35	1,92	2,86	1,88	1 130	M274149DW.110
4 500	10 200	0,39	1,73	2,58	1,69	870	EE531201DW.300
7 600	17 300	0,4	1,68	2,5	1,64	1 440	—
5 900	15 000	0,3	2,28	3,39	2,23	1 290	M276449DW.410
3 900	10 800	0,35	1,95	2,9	1,91	—	LM377449.410
6 900	18 100	0,33	2,03	3,02	1,98	1 530	M278749DW.710



Tapered roller bearings

Double row,
in X arrangement
For loose fit
on the roll journal



Design 1

Design 3
With pin cage

Dimension table (continued) · Dimensions in mm

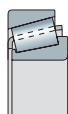
Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	B	r ₁ , r ₂ min.	r ₃ , r ₄ min.
Z-538086.TR2	1	267	609,6	820	171,45	171,45	3,3	6,4
F-804575.TR2	1	709	635	939,8	304,8	304,8	3,3	6,4
F-800501.TR2	3	746	635	939,8	304,8	304,8	3,3	6,4
Z-515897.01.TR2	3	735	657,225	933,45	328,613	328,613	3,3	6,4
Z-568023.TR2	3	828	682,625	965,2	338,138	338,138	3,3	6,4
Z-532828.TR2	3 ¹⁾	320	710	900	197	197	3,3	6,4
Z-518933.TR2	1	253	711,2	914,4	149,225	149,225	3,3	6,4
Z-524770.TR2	3	1 440	825,5	1 168,4	409,575	409,575	4,8	12,7
Z-539945.TR2	3 ²⁾	2 000	901,7	1 295,4	450,85	438,15	4,8	12,7
Z-521872.TR2	3	2 030	939,8	1 333,5	463,55	463,55	4,8	12,7

1) Bearing with helical grooves in the inner ring bore.

2) Bearing with lubrication holes through the central rib of the inner ring.

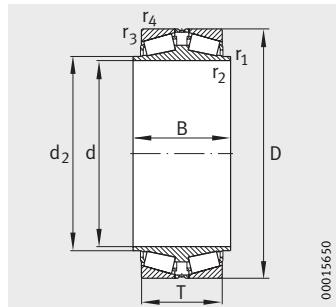
3) The comparative designations were taken from documents available to us.
They give information on identical main dimensions and chamfer dimensions only.
The cage and bearing designs are not always identical.
Furthermore, the table makes no claims to completeness.

Basic load ratings		Calculation factors				Fatigue limit load C_{ur} kN	Interchange designation ³⁾ TDI types
dyn. C_r kN	stat. C_{Or} kN	e	Y_1	Y_2	Y_0		
3 300	9 300	0,48	1,39	2,07	1,36	770	–
6 400	15 300	0,56	1,2	1,79	1,18	–	–
6 800	16 800	0,56	1,2	1,79	1,18	1 350	–
8 900	23 700	0,33	2,03	3,02	1,98	1 920	M281649D.610
9 000	25 500	0,33	2,03	3,02	1,98	2 050	M282249DW.210
4 550	13 500	0,35	1,95	2,9	1,91	1 090	SKF 331581A
3 400	9 500	0,38	1,77	2,63	1,73	750	EE755281D.360
12 800	36 500	0,34	2	2,98	1,96	2 750	M285848D.810
16 000	43 000	0,32	2,12	3,15	2,07	3 150	EE634356D.510
16 000	45 000	0,33	2,03	3,02	1,98	–	LM287849DW.810

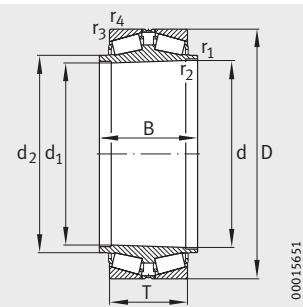


Tapered roller bearings

Double row,
in X arrangement
With two outer rings and
extended inner ring



Design 4
Cylindrical bore



Design 5
Tapered bore taper 1:12

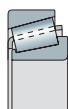
Dimension table · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					
			d	d ₁	D	T	B	r ₁ , r ₂ min.
Z-535082.TR2	5	70	208,89	188,517	336,55	180,975	244,475	1,5
Z-539084.TR2	5	58	219,605	206,243	336,55	160,34	223,83	1,5
Z-548244.TR2	4	51,3	220	—	340	140	200	1,5
Z-564232.TR2	5 ¹⁾	55	220	215,333	340	140	200	1,5
Z-542129.TR2	5	70,4	220,13	205,049	336,55	180,975	244,475	1,5
Z-539574.TR2	5	77	230	216,658	370	160	223,5	3
Z-535081.TR2	4	52,5	269,875	—	381	136,525	196,85	3,3
Z-542146.TR2	5	56	272,39	255,985	381	136,525	196,85	1,5
Z-544753.TR2	5	170	280	261,666	460	220	280	1
Z-548243.TR2	4	74	288,925	—	406,4	165,1	234,95	1,5
Z-564231.TR2	5 ¹⁾	76	288,925	283,422	406,4	165,1	234,95	1,5
Z-539576.TR2	5	92	317,5	304,271	447,675	159,512	222,25	3,3
F-803981.TR2	4 ²⁾	117	325	—	469,9	182,563	247,65	1,5
Z-548242.TR2	4	100	333,375	—	469,9	166,688	231,775	1,5
Z-564230.TR2	5 ¹⁾	102	333,375	327,819	469,9	166,688	231,775	1,5
Z-541965.TR2	5	115	333,375	318,161	469,9	182,563	247,65	1,5
Z-544754.TR2	5	228	340	321,666	520	220	280	1

¹⁾ With tapered bore, taper 1:30.

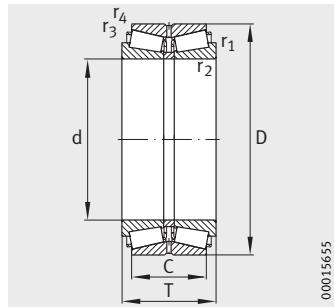
²⁾ With helical grooves in the inner ring bore.

		Basic load ratings		Calculation factors				Fatigue limit load
r ₃ , r ₄	d ₂	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN
min.								
3,3	228,6	1920	4 000	0,34	2	2,98	1,96	445
3	241,3	1680	3 600	0,35	1,95	2,9	1,91	395
4	244,5	1 530	3 250	0,43	1,57	2,34	1,53	355
4	241,3	1 530	3 250	0,43	1,57	2,34	1,53	355
3,3	242	1 860	4 200	0,35	1,95	2,9	1,91	465
3	260,35	1 820	3 700	0,39	1,71	2,55	1,67	395
3,3	292,1	1 550	3 700	0,33	2,03	3,02	1,99	390
3,3	292,1	1 550	3 700	0,33	2,03	3,02	1,99	390
6	311,15	3 150	6 300	0,35	1,93	2,87	1,88	640
3,3	307,975	2 000	4 750	0,33	2,06	3,07	2,02	495
3,3	307,975	2 000	4 750	0,33	2,06	3,07	2,02	495
3,3	342,9	2 070	5 200	0,33	2,03	3,02	1,98	520
3,3	355,6	2 550	6 400	0,32	2,12	3,15	2,07	–
3,3	355,6	2 120	5 400	0,38	1,79	2,67	1,75	540
3,3	355,6	2 120	5 400	0,38	1,79	2,67	1,75	540
3,3	361,9	2 550	6 400	0,32	2,12	3,15	2,07	–
6	371,475	3 350	7 200	0,4	1,67	2,49	1,63	–

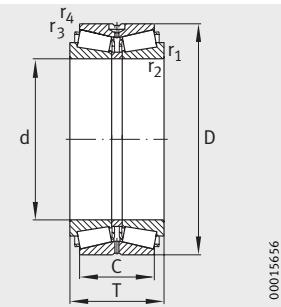


Tapered roller bearings

Double row,
in O arrangement



Design 6



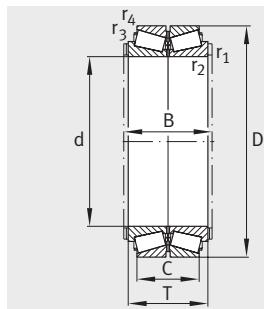
Design 7

Dimension table · Dimensions in mm

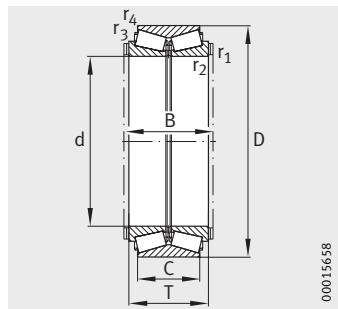
Designation	Design	Mass m ≈kg	Dimensions						
			d	D	T	B	C	r ₁ , r ₂ min.	r ₃ , r ₄ min.
Z-543034.TR2	10	77	165,1	336,55	194,15	—	149,7	3,3	3,3
Z-577350.TR2	6	49,6	190	320	172	—	134	4	1,5
Z-511982.TR2	6	61,1	200	340	184	—	150	4	1,5
F-800116.TR2	10	63,6	200	360	218	—	174	5	1,5
Z-577083.TR2	10	110	203,2	393,7	212	—	171,45	3	1,5
Z-567227.TR2	11	72	206,375	336,55	211,138	—	169,863	3,3	1,5
Z-566204.TR2	10	48,6	220	340	154	—	120	4	1,5
Z-511984.TR2	7	51,7	220	340	165	—	130	4	1,5
Z-548864.TR2	10	60	220	340	196	—	160	3	1,5
Z-580871.TR2	6	79,7	220	370	200	—	166	5	1,5
Z-573103.TR2	10	93,2	220	370	225	—	184	3	1,5
Z-541910.TR2	7	48,7	230	355	145	—	110	6	2,5
Z-568648.TR2	6	22,3	240	320	110	—	87	3	1
Z-511985.TR2	7	58,5	240	360	165	—	130	3	1
Z-511983.TR2	6	100	240	400	210	—	168	5	1,5
Z-566443.01.TR2	11 ¹⁾ ²⁾	174	240	440	268	278	200	5	4
F-803101.TR2	11	101	242	406	206	—	160	6	1,5
Z-543185.01.TR2	11 ¹⁾ ²⁾	102	242	406	206	216	150	6	5
Z-543325.01.TR2	11 ¹⁾	102	242	406	206	216	160	6	1,5
Z-564234.TR2	10 ¹⁾	102	242	406	206	216	162	5	1,5
Z-576107.TR2	10	158	255	440	265	—	214	3	1,5
Z-511987.TR2	6	37,8	260	360	134	—	108	3	1
Z-514164.TR2	6	60,9	260	400	150	—	110	6	2,5
Z-511988.TR2	7	81	260	400	186	—	146	5	3
Z-579708.TR2	10 ¹⁾	84	260	400	194	204	150	3	1,5
Z-577881.TR2	10	84	260	400	196	—	160	3	1,5
Z-539099.TR2	7	93,5	260	430	180	—	130	10	2,5
Z-511989.TR2	6	129	260	440	225	—	180	4	1
Z-564747.TR2	11 ¹⁾ ²⁾	220	260	480	282	292	212	6	5
Z-564746.TR2	10 ¹⁾	218	260	480	282	292	440	6	1,5
Z-565251.TR2	11 ¹⁾	219	260	480	284	294	220	6	1,5
Z-573594.TR2	11 ¹⁾	220	260	480,5	284	294	220	6	1,5
Z-538180.TR2	6	85,2	280	420	189	—	154	5	2
F-800117.TR2	10	231	280	500	284	—	222	6	2

¹⁾ Spacer ring on both sides.

²⁾ Two outer rings with intermediate ring.



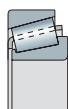
Design 10



Design 11

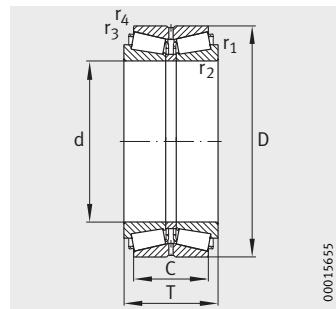
00015658

Basic load ratings		Calculation factors				Fatigue limit load
dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN
1 930	3 100	0,32	2,12	3,15	2,07	—
1 480	2 800	0,36	1,9	2,83	1,86	315
1 710	3 150	0,26	2,55	3,8	2,5	350
2 240	4 150	0,41	1,66	2,47	1,62	—
2 270	3 950	0,35	1,95	2,9	1,91	415
1 920	4 000	0,34	2	2,98	1,96	445
1 460	3 100	0,43	1,57	2,34	1,53	—
1 530	3 250	0,43	1,57	2,34	1,53	355
1 800	3 900	0,35	1,95	2,9	1,91	—
1 930	3 750	0,24	2,84	4,22	2,77	405
2 440	4 900	0,35	1,95	2,9	1,91	530
1 320	2 650	0,33	2,05	3,05	2	285
880	2 030	0,29	2,33	3,47	2,28	223
1 470	3 350	0,31	2,2	3,27	2,15	365
770	1 790	0,37	1,81	2,7	1,77	200
3 300	6 500	0,44	1,55	2,31	1,52	670
2 320	4 700	0,37	1,81	2,7	1,77	495
2 320	4 700	0,37	1,81	2,7	1,77	495
2 320	4 700	0,37	1,81	2,7	1,77	495
2 320	4 650	0,37	1,81	2,7	1,77	—
3 250	6 600	0,35	1,95	2,9	1,91	680
1 280	3 000	0,41	1,66	2,47	1,62	320
1 220	2 500	0,44	1,53	2,28	1,5	265
1 980	4 300	0,43	1,55	2,31	1,52	450
1 920	4 200	0,43	1,55	2,31	1,52	440
2 160	4 650	0,35	1,95	2,9	1,91	485
1 870	3 550	0,33	2,02	3	1,97	360
2 850	5 500	0,28	2,41	3,59	2,36	560
3 800	7 500	0,43	1,57	2,34	1,53	—
3 850	7 600	0,43	1,57	2,34	1,53	760
3 800	7 500	0,43	1,57	2,34	1,53	—
3 800	7 500	0,43	1,57	2,34	1,53	—
2 050	4 600	0,46	1,47	2,19	1,44	475
3 900	7 800	0,45	1,5	2,24	1,47	—

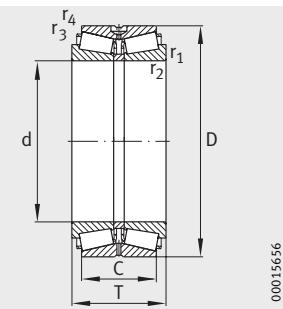


Tapered roller bearings

Double row,
in O arrangement



Design 6

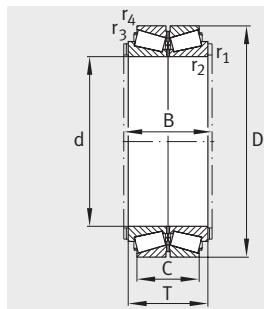


Design 7

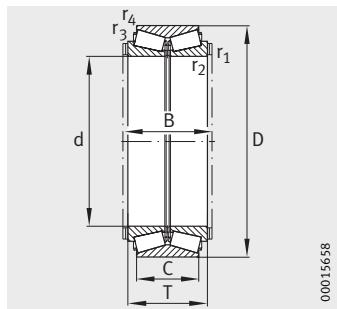
Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	C	r ₁ , r ₂ min.	r ₃ , r ₄ min.
Z-511990.TR2	7	63,8	300	420	159	128	4	1
Z-565735.TR2	6	121	300	500	180	125	9,5	2,5
Z-511991.TR2	7	145	300	500	205	152	6	2,5
Z-532655.TR2	6	72,6	340	460	160	128	4	1,5
Z-549929.TR2	6	126	340	520	180	135	6	2
Z-511992.TR2	6	228	340	580	242	170	6	2
Z-541911.TR2	7	208	350	590	200	140	12	2,5
Z-511993.TR2	7	73,3	360	480	160	128	4	1,5
Z-525858.TR2	6	135	360	540	185	140	5	1,5
Z-566764.TR2	10 ¹⁾	540	367,5	647,7	410	336	4,8	3,3
Z-566765.TR2	11 ¹⁾	540	367,5	647,7	410	336	4,8	3,2
Z-538179.TR2	7	86,4	380	520	149	112	5	2
Z-511994.TR2	6	244	380	620	242	170	5	2
F-808453.TR2	7	236	381	590,55	245	190	6,4	1,5
Z-565736.TR2	6	146	400	590	185	125	6	2,5
Z-511995.TR2	7	183	400	600	206	150	6	2
Z-549965.TR2	7	192	420	620	206	150	6	5
Z-511996.TR2	7	365	420	700	275	200	6	2
Z-511997.TR2	7	219	440	650	212	152	8	3
Z-579097.TR2	11 ¹⁾	244	447,675	635	257,175	206,375	6,4	1,5
Z-549964.TR2	7	135	460	620	170	131	5	4
Z-534866.TR2	7	255	460	680	230	175	7,5	3
Z-511998.TR2	7	152	480	650	180	130	5	2
Z-573216.TR2	10 ¹⁾	255	480	680	238	190	4	3
Z-541912.TR2	7	141	490	640	180	144	9,5	3
Z-539031.TR2	7	162	500	670	180	130	5	2
Z-544199.TR2	6	281	500	720	236	180	7,5	3
Z-539117.TR2	7	225	520	740	190	120	3	3
Z-510043.TR2	7	189	530	710	190	136	6	2,5
Z-532951.TR2	7	236	560	750	213	156	6	2,5
Z-578732.TR2	7	418	560	820	260	185	7,5	3
Z-541806.TR2	6	416	560	820	270	190	9,5	3

¹⁾ With pin cages.



Design 10

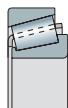


Design 11

00015657

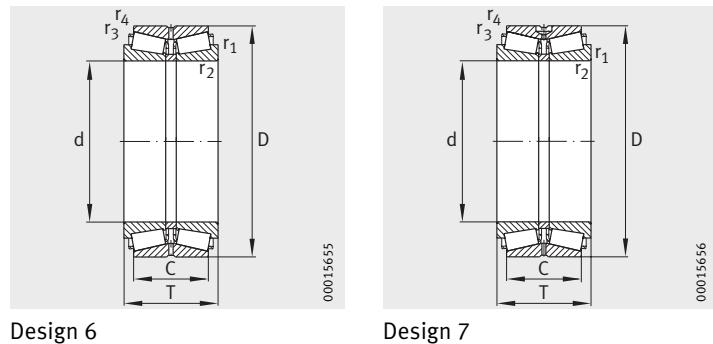
00015658

Basic load ratings		Calculation factors				Fatigue limit load
dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN
1 560	3 850	0,32	2,12	3,15	2,07	395
2 270	4 150	0,26	2,55	3,8	2,5	400
2 700	5 300	0,37	1,8	2,69	1,76	510
1 890	4 850	0,4	1,69	2,52	1,65	485
2 270	4 850	0,31	2,21	3,28	2,16	465
3 350	6 300	0,47	1,44	2,15	1,41	590
2 850	5 400	0,56	1,2	1,79	1,18	495
1 910	4 700	0,32	2,11	3,14	2,06	460
2 550	5 500	0,3	2,25	3,35	2,2	–
7 400	16 000	0,29	2,32	3,45	2,26	1 470
7 400	16 000	0,29	2,32	3,45	2,26	1 470
1 590	3 900	0,36	1,86	2,76	1,81	370
3 650	7 100	0,46	1,47	2,19	1,44	640
3 350	8 300	0,34	1,98	2,94	1,93	–
2 550	5 300	0,33	2,05	3,05	2	480
3 000	6 600	0,46	1,45	2,16	1,42	610
2 900	6 400	0,43	1,58	2,36	1,55	580
4 700	9 200	0,42	1,6	2,38	1,56	800
3 100	6 800	0,48	1,42	2,11	1,39	610
4 300	10 600	0,33	2,07	3,09	2,03	–
2 500	6 100	0,38	1,77	2,63	1,73	550
3 850	8 800	0,31	2,18	3,24	2,13	780
2 600	6 400	0,4	1,69	2,52	1,65	570
4 150	10 600	0,32	2,12	3,15	2,07	–
2 600	6 400	0,4	1,69	2,52	1,65	570
2 600	6 600	0,41	1,63	2,43	1,6	580
4 000	9 400	0,33	2,04	3,04	2	810
2 550	5 700	0,48	1,42	2,11	1,39	480
3 100	7 900	0,41	1,65	2,45	1,61	680
3 050	8 000	0,43	1,56	2,32	1,52	680
4 750	11 400	0,49	1,38	2,05	1,35	950
4 750	11 400	0,49	1,38	2,05	1,35	950



Tapered roller bearings

Double row,
in O arrangement

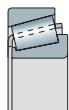


Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	C	r_1, r_2 min.	r_3, r_4 min.
Z-538181.TR2	7	262	600	800	208,5	160	6	2,5
Z-538183.TR2	7	473	600	870	270	198	7,5	3
Z-538182.TR2	7	293	630	850	242	182	7,5	2,5
Z-510041.TR2	7	422	710	950	240	175	7,5	3
Z-534867.TR2	6	753	710	1 030	315	220	9,5	4
Z-564801.TR2	7	587	800	1 060	270	204	6	2,5
Z-538339.TR2	7	638	850	1 120	268	190	7,5	3
Z-538341.TR2	7	883	950	1 250	298	220	9,5	4
Z-568323.TR2	6 ¹⁾	813	1 250	1 500	250	190	6	1,5
Z-572139.TR2	6 ¹⁾	1 390	1 450	1 770	290	170	9,5	5

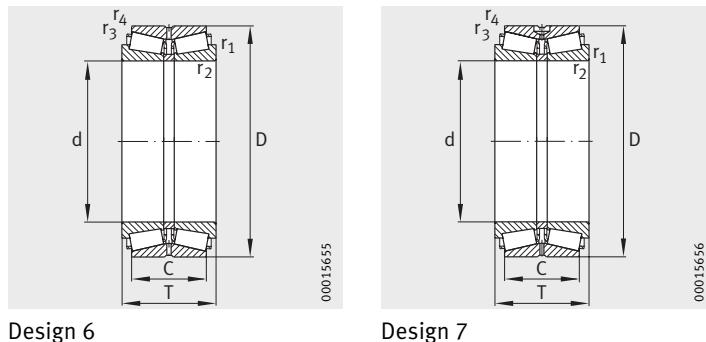
1) With pin cages.

Basic load ratings		Calculation factors				Fatigue limit load
dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN
3 700	9 100	0,32	2,08	3,1	2,04	750
5 200	12 300	0,41	1,66	2,47	1,62	1 000
4 450	11 500	0,4	1,69	2,52	1,65	940
5 100	13 000	0,46	1,47	2,19	1,44	1 030
7 200	17 000	0,43	1,57	2,34	1,53	1 300
6 100	16 400	0,35	1,95	2,9	1,91	1 250
5 600	15 500	0,46	1,45	2,16	1,42	1 170
7 500	21 300	0,32	2,12	3,15	2,07	1 550
7 100	24 100	0,37	1,8	2,69	1,76	1 650
7 600	26 500	0,87	0,78	1,16	0,76	1 710



Tapered roller bearings

Double row,
in O arrangement
In inch sizes



Design 6

Design 7

Dimension table · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	C	r ₁ , r ₂ min.	r ₃ , r ₄ min.
Z-523062.TR2	7	69,8	206,375	336,55	211,138	169,862	3,3	1,5
Z-503656.TR2	7	50,7	228,6	355,6	146,05	111,125	6,8	1,5
Z-514401.TR2	6	52,8	228,6	355,6	152,4	114,3	6,4	1,5
Z-518468.TR2	6	53,6	228,6	355,6	152,4	111,125	6,9	1,5
Z-515125.TR2	7	205	228,6	488,95	254	152,4	6,4	1,5
Z-547139.TR2	6 ²⁾	27,2	234,95	327,025	117,475	82,55	6,4	1,6
Z-547957.TR2	6 ²⁾	27,8	234,95	328,625	117,475	82,55	6,4	1,5
Z-517152.TR2	6 ²⁾	24,4	253,975	347,662	101,6	69,85	3,6	1,5
Z-505612.TR2	7	44,4	254	358,775	152,4	117,475	3,6	1,5
F-804367.TR2	8 ¹⁾	86,3	254	422,275	173,038	128,588	6,9	1,5
Z-515129.TR2	6	259	254	533,4	276,225	165,1	6,4	1,5
Z-514599.TR2	6	85,5	260,35	422,275	178,592	139,7	6,9	1,5
Z-535605.TR2	6 ²⁾	25,9	266,7	352,425	107,95	82,55	6,4	1,5
Z-524440.01.TR2	7	42	285,75	380,898	139,7	107,95	3,6	1,5
Z-525830.TR2	6	139	285,75	501,65	203,2	120,65	6,4	3,3
Z-505614.01.TR2	7	62,6	288,925	406,4	165,1	130,175	6,4	1,5
Z-526864.TR2	6	71,2	300,038	422,275	174,625	136,525	6,4	1,5
Z-539192.TR2	6 ²⁾	33,3	304,8	393,7	107,95	82,55	6,4	1,5
Z-527128.TR2	7	73,8	304,8	438,048	165,1	120,65	6,4	1,5
Z-512601.TR2	6	172	311,15	558,8	190,5	111,125	9,7	3,3
Z-521746.TR2	7	59,8	317,5	444,5	146,05	98,425	7,9	1,5
Z-510607.01.TR2	7	85	317,5	447,675	180,975	146,05	3,6	1,5
Z-515495.TR2	7	96,6	330,2	482,6	177,8	127	6,4	1,5
Z-526831.TR2	7	97,8	333,375	469,9	190,5	152,4	6,4	1,5
F-807462.TR2	8 ¹⁾	113	346,075	488,95	200,025	158,75	6,4	1,5
Z-505613.01.TR2	7	113	346,075	488,95	200,025	158,75	6,4	1,5
F-804108.TR2	8 ¹⁾	43,4	355,6	444,5	127	101,6	3,6	1,5
Z-523319.TR2	7	45	355,6	444,5	136,525	111,125	3,6	1,5
F-807283.TR2	8 ¹⁾	78,2	355,6	501,65	154	107,95	6,4	1,6
Z-510608.01.TR2	6	83,9	355,6	501,65	155,575	107,95	6,4	1,5
Z-581099.TR2	9	141	368,249	523,875	214,312	169,862	6,4	1,5
Z-573335.TR2	7	184	368,3	596,9	203,2	133,35	9,7	2,4

¹⁾ Without intermediate ring.

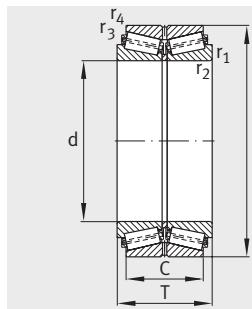
²⁾ Without intermediate ring, with lubrication groove in the inner and outer ring.

³⁾ The comparative designations were taken from documents available to us.

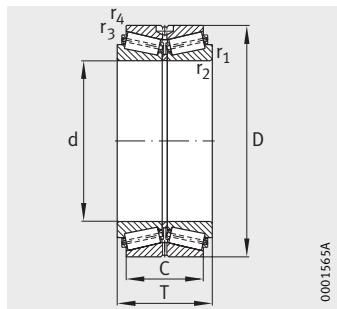
They give information on identical main dimensions and chamfer dimensions only.

The cage and bearing designs are not always identical.

Furthermore, the table makes no claims to completeness.



Design 8
With pin cage

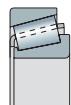


Design 9
With pin cage

00015659

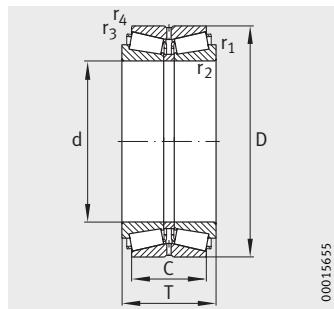
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Basic load ratings		Calculation factors				Fatigue limit load C_{ur} kN	Interchange designation ³⁾ TDO types
dyn. C_r kN	stat. C_{Or} kN	e	Y_1	Y_2	Y_0		
1 920	4 000	0,34	2	2,98	1,96	445	H242649.610CD
1 120	2 600	0,59	1,14	1,7	1,12	285	NA130902.131401D
1 120	2 600	0,59	1,14	1,7	1,12	285	HM746646.610D
1 120	2 600	0,59	1,14	1,7	1,12	285	130902.131401D
2 600	4 500	0,94	0,72	1,07	0,7	440	HH949549.510CD
830	1 960	0,41	1,66	2,47	1,62	—	NA8575SW.8520D
830	1 960	0,41	1,66	2,47	1,62	—	NA8575SW.8522D
820	1 720	0,33	2,03	3,02	1,98	182	LM249747NW.LM249710CD
1 360	3 150	0,34	1,98	2,95	1,94	335	M249749.710CD
1 870	3 550	0,33	2,02	3	1,97	360	HM252344NW.HM252311D
3 450	5 700	0,87	0,78	1,16	0,76	530	HH953749.710D
1 870	3 550	0,33	2,02	3	1,97	360	HM252349.310D
880	2 160	0,32	2,12	3,15	2,07	—	LM251649NW.LM251610D
1 180	3 200	0,43	1,56	2,33	1,53	—	LM654649.610CD
2 220	3 850	0,78	0,87	1,29	0,85	365	EE147112.198D
1 730	4 100	0,35	1,94	2,89	1,9	430	M255449.410CD
1 790	4 350	0,36	1,86	2,77	1,82	450	HM256849.810D
980	2 550	0,36	1,88	2,8	1,84	260	L357049NW.L357010D
1 350	3 200	0,4	1,69	2,52	1,65	325	EE129120X.173CD
2 210	4 000	0,88	0,76	1,14	0,75	370	EE148122.220D
1 250	2 800	0,38	1,79	2,67	1,75	280	EE291250.751CD
2 070	5 200	0,33	2,03	3,02	1,98	520	HM259049.010CD
2 070	4 500	0,47	1,43	2,12	1,4	440	EE526130.191CD
2 120	5 400	0,38	1,79	2,67	1,75	540	HM261049.010CD
2 480	6 300	0,33	2,03	3,02	1,98	620	—
2 480	6 300	0,33	2,03	3,02	1,98	620	HM262749.710CD
1 210	3 600	0,31	2,2	3,27	2,15	—	TIMKENSERIE L163100
1 250	3 750	0,31	2,2	3,27	2,15	—	L163149.110CD
1 620	3 650	0,44	1,53	2,28	1,5	345	—
1 620	3 650	0,44	1,53	2,28	1,5	345	EE231400.231976CD
2 750	6 800	0,35	1,92	2,86	1,88	660	HM265049.010CD
2 850	5 500	0,42	1,62	2,42	1,59	495	EE181453.351CD

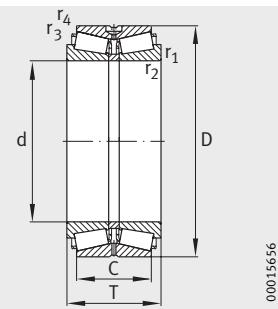


Tapered roller bearings

Double row,
in O arrangement
In inch sizes



Design 6



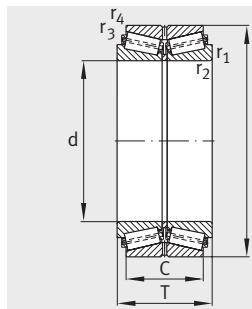
Design 7

Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	C	r ₁ , r ₂ min.	r ₃ , r ₄ min.
Z-527366.TR2	7	73,7	371,475	501,65	155,575	107,95	6,4	1,5
Z-526251.TR2	6	66,8	381	508	139,7	88,9	6,4	1,5
Z-547099.TR2	7	238	381	590,55	244,475	193,675	6,4	1,5
Z-581097.TR2	9	247	381	590,55	244,475	193,675	6,4	1,5
Z-505615.TR2	6	159	384,175	546,1	222,25	177,8	6,4	1,5
Z-579745.TR2	9	159	384,175	546,1	222,25	177,8	6,4	1,5
Z-505611.02.TR2	6	96,5	396,875	546,1	158,75	117,475	6,4	1,5
Z-525845.TR2	7	117	406,4	546,1	185,738	147,638	6,4	1,5
Z-507670.TR2	6 ¹⁾	110	406,4	574,675	157,162	106,362	6,4	1,5
Z-515494.TR2	7	167	406,4	609,524	177,8	133,35	8,1	1,5
Z-578129.TR2	9	207	415,925	590,55	244,475	193,675	6,4	1,5
Z-517498.01.TR2	7	200	415,925	590,55	244,475	193,675	6,4	1,5
Z-517498.TR2	6	200	415,925	590,55	244,475	193,675	6,4	1,5
Z-527127.TR2	7	95,5	431,8	571,5	155,575	111,125	3,3	1,5
Z-512346.TR2	6	241	447,675	635	257,175	206,375	6,4	1,6
Z-521467.01.TR2	7	241	447,675	635	257,175	206,375	6,4	1,5
Z-579097.TR2	8	244	447,675	635	257,175	206,375	6,4	1,5
Z-529635.TR2	7	110	457,2	596,9	165,1	120,65	9,7	1,5
Z-541705.TR2	7	238	457,2	660,4	228,6	171,45	6,4	1,5
Z-578647.TR2	9	304	479,425	679,45	276,225	222,25	6,4	1,5
Z-517499.02.TR2	7	299	479,425	679,45	276,225	222,25	6,4	1,5
Z-515917.01.TR2	7	135	488,95	634,873	180,975	136,525	6,4	1,5
Z-505610.TR2	6	184	488,95	660,4	206,375	158,75	6,4	1,5
Z-515127.01.TR2	7	122	498,475	634,873	177,8	142,875	6,4	1,5
Z-528996.TR2	7	344	501,65	711,2	292,1	231,775	6,4	1,5
Z-578586.TR2	9	354	501,65	711,2	292,1	231,775	6,4	1,5
Z-518884.TR2	6	589	508	838,2	304,8	222,25	9,7	3,3
Z-528407.TR2	7	210	520,7	736,6	186,502	114,3	6,4	1,5
Z-581098.TR2	9	427	536,575	761,873	311,15	247,65	6,4	1,5
Z-577417.TR2	9	431	536,575	761,873	311,15	247,65	6,4	1,5
Z-536948.01.TR2	7	191	558,8	736,6	187,328	138,112	6,4	1,5
Z-521229.02.TR2	7	244	558,8	736,6	225,425	177,8	6,4	1,5
Z-541361.TR2	9	255	558,8	736,6	225,425	177,8	6,4	1,5

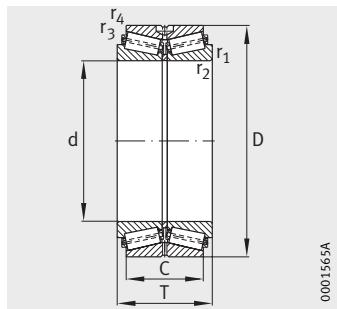
¹⁾ Without intermediate ring.

²⁾ The comparative designations were taken from documents available to us.
They give information on identical main dimensions and chamfer dimensions only.
The cage and bearing designs are not always identical.
Furthermore, the table makes no claims to completeness.



Design 8
With pin cage

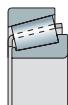
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Design 9
With pin cage

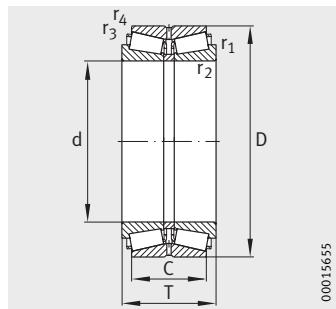
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Basic load ratings		Calculation factors				Fatigue limit load C_{ur} kN	Interchange designation ²⁾ TDO types
dyn. C_r kN	stat. C_{Or} kN	e	γ_1	γ_2	γ_0		
1 600	3 650	0,44	1,53	2,28	1,5	–	EE231462.976CD
1 280	3 200	0,53	1,27	1,89	1,24	305	EE192150.201CD
3 350	8 300	0,34	1,98	2,94	1,93	–	M268730.710CD
3 550	8 900	0,34	1,98	2,94	1,93	820	M268730.710CD
3 050	7 800	0,33	2,03	3,02	1,98	–	HM266449.HM410CD
3 050	7 900	0,33	2,03	3,02	1,98	750	HM266449.410CD
1 770	4 250	0,47	1,43	2,12	1,4	390	EE234156.216D
2 260	6 200	0,45	1,5	2,24	1,47	590	M667944.911CD
1 690	3 650	0,51	1,31	1,96	1,28	325	NA285160.228D
2 470	5 500	0,47	1,44	2,15	1,41	495	EE736160.239CD
3 550	8 900	0,34	1,98	2,94	1,93	820	M268749.710CD
3 600	9 150	0,33	2,03	3,02	1,98	–	M268749.710CD
3 600	9 150	0,33	2,03	3,02	1,98	–	M268749.710CD
2 000	4 800	0,55	1,24	1,84	1,21	445	LM869448.410CD
4 200	10 400	0,33	2,07	3,09	2,03	940	M270749.M270710D
4 200	10 400	0,33	2,07	3,09	2,03	940	M270749.710CD
4 300	10 700	0,33	2,07	3,09	2,03	970	M270749.M270710D
2 040	5 600	0,4	1,68	2,51	1,65	510	EE244180.236CD
3 750	9 000	0,35	1,95	2,9	1,91	800	M271648.610CD
4 600	11 900	0,35	1,92	2,86	1,88	1 060	M272749.710CD
4 650	12 200	0,33	2,03	3,02	1,98	–	M272749.710CD
2 490	6 700	0,47	1,43	2,12	1,4	600	LM772748.710CD
2 550	6 800	0,45	1,5	2,23	1,46	610	EE640192.261D
2 010	5 600	0,43	1,58	2,35	1,54	500	EE243196.251CD
4 900	12 800	0,35	1,92	2,86	1,88	1 130	M274149.110CD
5 000	13 200	0,35	1,92	2,86	1,88	1 160	M274149.110CD
5 500	11 900	0,49	1,38	2,06	1,35	1 000	EE426200.331D
2 550	5 700	0,48	1,42	2,11	1,39	480	EE982051.901CD
6 000	15 300	0,3	2,28	3,39	2,23	–	M276449.410CD
6 100	15 400	0,3	2,28	3,39	2,23	1 330	M276449.410CD
2 950	7 600	0,34	1,98	2,94	1,93	640	EE843220.291CD
3 900	11 000	0,35	1,95	2,9	1,91	940	LM377449.410CD
3 950	11 200	0,35	1,95	2,9	1,91	960	LM377449.410CD

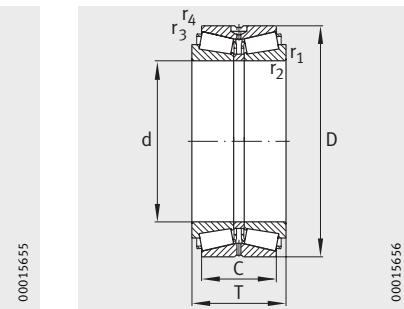


Tapered roller bearings

Double row,
in O arrangement
In inch sizes



Design 6



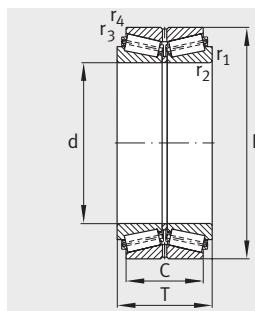
Design 7

00015656

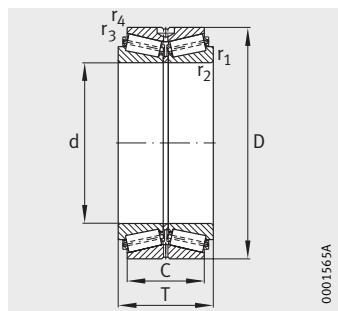
Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions						
			d	D	T	C	r ₁ , r ₂ min.	r ₃ , r ₄ min.	
Z-536529.TR2	7	514	571,5	812,8	333,375	263,525	6,4	1,5	
Z-566721.TR2	9	535	571,5	812,8	333,375	263,525	6,4	1,5	
Z-524528.TR2	7	248	602,945	787,4	206,375	158,75	6,4	1,5	
Z-513974.TR2	7	237	609,6	787,4	206,375	158,75	6,4	1,5	
Z-533433.TR2	6	244	609,6	812,8	190,5	146,05	6,4	3,3	
Z-574101.TR2	8	920	635	990,6	339,725	212,725	6,4	1,5	
Z-514502.TR2	7	207	660,4	812,8	203,2	158,75	6,4	1,5	
Z-512516.TR2	7	275	685,8	876,3	200,025	152,4	6,4	1,5	
Z-521233.TR2	6	285	711,2	914,4	190,5	139,7	6,4	1,5	
Z-512878.TR2	6	258	723,9	914,4	187,325	139,7	5,6	1,5	
Z-514528.TR2	6	293	762	965,2	187,325	133,35	6,4	1,5	
Z-512407.TR2	6	277	774,7	965,2	187,325	133,35	6,4	1,5	
Z-576448.TR2	7	269	774,7	965,2	187,325	133,35	6,4	1,5	
Z-521084.TR2	6	420	812,8	1 016	190,5	146,05	6,4	1,5	
Z-518817.TR2	6	430	812,8	1 066,8	190,5	146,05	6,4	3,3	
Z-512406.TR2	6	188	914,4	1 066,8	139,7	101,6	6,4	3,3	
Z-579565.TR2	8	200	914,4	1 066,8	139,7	101,6	6,4	3,3	
Z-579534.TR2	8	812	1 160	1 430	240	180	9,5	5	
Z-563113.TR2	8	2 370	1 320,8	1 727,2	412,75	254	31	3	

¹⁾ The comparative designations were taken from documents available to us.
They give information on identical main dimensions and chamfer dimensions only.
The cage and bearing designs are not always identical.
Furthermore, the table makes no claims to completeness.



Design 8
With pin cage

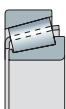


Design 9
With pin cage

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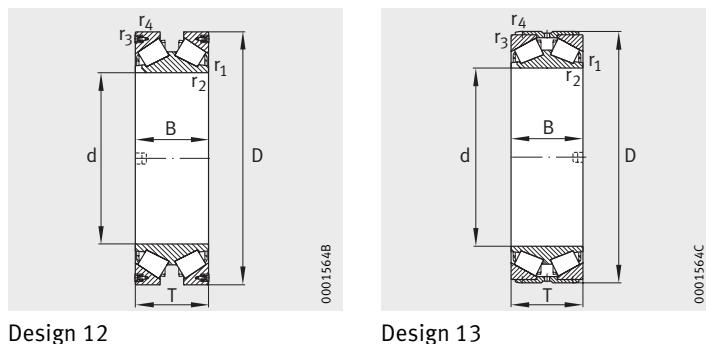
0001565A

Basic load ratings		Calculation factors				Fatigue limit load C_{ur} kN	Interchange designation ¹⁾ TDO types
dyn. C_r kN	stat. C_{Or} kN	e	Y_1	Y_2	Y_0		
6 600	17 000	0,33	2,03	3,02	1,98	1 440	M278749.710CD
6 900	18 100	0,33	2,03	3,02	1,98	1 530	M278749.M278710CD
3 100	9 000	0,5	1,35	2,01	1,32	760	EE649237.311CD
3 100	9 000	0,5	1,35	2,01	1,32	760	EE649240.311CD
3 150	8 200	0,33	2,03	3,02	1,98	670	EE743240.321D
7 400	16 500	0,87	0,78	1,16	0,76	1 260	SKF BT28 332493
3 550	10 600	0,33	2,03	3,02	1,98	–	L281148.110CD
3 350	9 900	0,41	1,66	2,47	1,62	810	EE655270.346CD
3 400	9 500	0,38	1,77	2,63	1,73	750	EE755280.361D
3 400	9 500	0,38	1,77	2,63	1,73	750	EE755285.361CD
3 500	10 100	0,4	1,67	2,49	1,63	780	EE752300.381D
3 500	10 100	0,4	1,67	2,49	1,63	780	EE752305.381D
3 500	10 100	0,4	1,67	2,49	1,63	780	EE752305.381CD
3 550	11 300	0,48	1,42	2,11	1,38	880	EE762320.401D
3 550	11 300	0,48	1,42	2,11	1,38	880	EE762320.420XD
2 400	7 700	0,41	1,64	2,44	1,6	570	LL686947.910D
2 550	8 300	0,41	1,64	2,44	1,6	620	LL686947.910D
6 700	23 000	0,4	1,68	2,5	1,64	1 600	–
13 500	42 000	0,83	0,81	1,21	0,79	2 750	SKF BT2B 332495



Tapered roller bearings

Double row,
in X arrangement
With large contact angle
Axial bearings for work rolls



Design 12

Design 13

Dimension table · Dimensions in mm

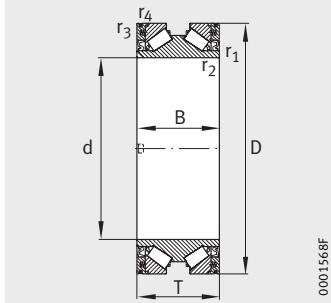
Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	B	r ₁ , r ₂ min.	r ₃ , r ₄ min.
F-803422.TR2	12	66	160	343	160	160	2	2
F-801948.TR2	12	77,5	190	370	170	170	2	2
F-801984.TR2	14	97	190	370	210	210	2	2
F-800942.TR2	12	74,3	230	404	152	144	2	2
F-803185.TR2	14	78	230	404	152	152	2	2
F-803722.TR2	13	62	300	460	105	105	4	2
F-801555.TR2	13	126	300	480	180	180	3	2
F-801521.TR2	12	112	300	480	180	180	2	3
F-801925.TR2	14 ¹⁾	140	300	480	220	220	5	4
F-801250.TR2	12	92,3	320	480	160	160	2	2
F-801949.TR2	12	86,6	365,6	514,35	140	140	2	2
F-804525.TR2	13	163	380	568	180	180	2	2
F-801926.TR2	12	154	380	570	180	180	2	2
F-801999.TR2	14 ¹⁾	245	380	590	260	260	2,5	3
Z-578815.TR2	13	150	390	568	180	180	2	2
F-804510.TR2	14	136	390	570	180	180	4	7
F-801249.TR2	12	145	390	570	180	180	2	2
Z-579673.TR2	13	191	390	570	200	200	5	2
F-800967.TR2	12	180	390	590	200	200	5	5
F-801950.TR2	12	280	400	650	240	240	6	6
F-803312.TR2	14 ²⁾	80	406,4	546,1	138,113	138,113	1,5	3
F-801951.TR2	12	107	406,4	566,1	150	150	2	4
Z-578243.TR2	13	64,4	420	525	112	112	1,5	2
F-803169.TR2	14	166	440	615,95	200	200	3,3	4,8
F-801946.TR2	14 ¹⁾	182	440	615,95	220	220	3,3	4,8
F-803717.TR2	12	138	445	620	160	160	2	2
Z-578242.TR2	13	140	445	620	160	160	2	2
F-801674.TR2	13	248	450	680	180	180	2,5	6
Z-578619.TR2	13	243	460	702	180	180	2,5	6
Z-580901.TR2	13	127	482	620	160	160	2	5
F-801495.TR2	12	140	482	640	160	160	2	2
Z-578620.TR2	13	152	540	685	146	146	3	4

¹⁾ No retaining slots in the inner ring.

²⁾ Outside diameter of seal carriers = 547 mm.

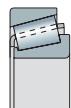
Design 12 Inner ring, outer rings and rollers made from case hardening steel.

Design 13, 14 Inner ring made from case hardening steel.



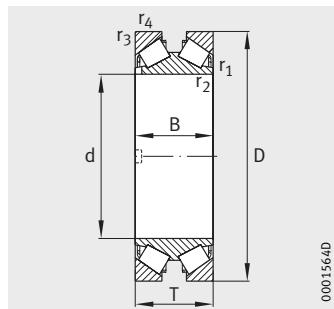
Design 14
Sealed

Basic load ratings		Calculation factors				Fatigue limit load
dyn. C_r kN	stat. C_{0r} kN	e	γ_1	γ_2	γ_0	C_{ur} kN
1 390	2 300	0,8	0,84	1,25	0,82	250
1 440	2 600	0,87	0,78	1,16	0,76	280
1 440	2 600	0,87	0,78	1,16	0,76	280
1 440	2 650	1,05	0,64	0,96	0,63	270
1 040	1 930	0,87	0,78	1,16	0,76	-
910	1 970	0,86	0,79	1,17	0,77	188
1 820	4 000	0,87	0,78	1,16	0,76	400
1 940	4 000	0,87	0,78	1,16	0,76	390
1 990	4 250	0,87	0,78	1,16	0,76	-
1 640	3 650	0,87	0,78	1,16	0,76	360
1 460	3 800	0,87	0,78	1,16	0,76	365
2 060	5 300	0,87	0,78	1,16	0,76	500
2 060	5 300	0,87	0,78	1,16	0,76	500
2 950	6 800	0,87	0,78	1,16	0,76	630
2 060	5 300	0,87	0,78	1,16	0,76	510
1 600	3 550	0,82	0,82	1,22	0,8	335
2 060	5 300	0,87	0,78	1,16	0,76	500
2 440	5 600	0,87	0,78	1,16	0,76	520
2 440	5 600	0,87	0,78	1,16	0,76	520
3 550	7 200	0,87	0,78	1,16	0,76	630
1 160	2 850	0,87	0,78	1,16	0,76	-
1 600	4 300	0,87	0,78	1,16	0,76	-
1 140	3 450	0,7	0,97	1,44	0,94	325
1 880	4 750	0,87	0,78	1,16	0,76	430
2 450	5 800	0,87	0,78	1,16	0,76	510
1 880	4 750	0,87	0,78	1,16	0,76	430
1 880	4 750	0,87	0,78	1,16	0,76	430
2 700	6 000	0,87	0,78	1,16	0,76	520
2 650	6 100	0,97	0,69	1,03	0,68	-
1 760	5 600	0,94	0,72	1,07	0,7	-
2 000	6 000	0,87	0,78	1,16	0,76	-
1 960	6 000	0,87	0,78	1,16	0,76	-

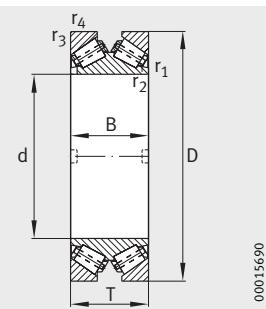


Tapered roller bearings

Double row,
in X arrangement
With large contact angle
Axial bearings
for oil film bearings



Design 15



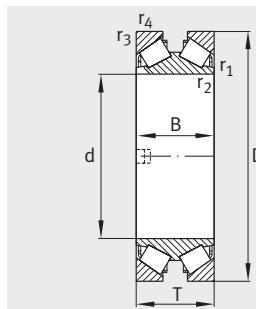
Design 16
With pin cage

Dimension table · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	B	r ₁ , r ₂ min.	r ₃ , r ₄ min.
Z-564447.TR2	15	19,1	250	340	76	76	2,5	2
Z-566446.TR2	15	17,8	250	350	67	67	2,5	2
Z-549122.TR2	15	21,5	250	350	76	76	2,5	2
Z-567453.TR2	15	57,3	280	420	130	130	2,5	2
Z-575386.TR2	15	28,1	285	380	92	92	2,5	2
Z-531529.TR2	19	49	300	440	105	105	4	4
Z-531296.01.TR2	19	143	305	500	200	200	6	6
Z-533062.TR2	18 ¹⁾	150	305	500	200	200	5	6
F-801264.TR2	16 ¹⁾	190	305	560	200	200	6	12
Z-525154.TR2	16	206	305	560	200	200	6	12
Z-575342.TR2	17	207	380	590	210	210	2,5	5
Z-535533.TR2	18 ¹⁾	270	400	650	200,025	200	2,5	5
Z-531295.01.TR2	19	281	400	650	240	240	6	6
F-801317.TR2	17	135	445	620	160	160	2	5
Z-525155.TR2	16	280	483	734	200	200	6,4	6,4
F-807792.TR2	17	271	510	734	200,025	200,025	3,3	4,8
Z-524209.01.TR2	17 ²⁾	285	510	734	200,025	200,025	3,3	4,8
Z-531530.TR2	19	484	510	800	285	285	7,5	6
Z-531531.02.TR2	17	684	635	940	304,8	304,8	3,3	6,4
Z-524241.TR2	15	761	635	940	304,8	304,8	3,3	6,4
Z-524210.TR2	18	475	686	940	228,575	235,077	3,3	6,4
Z-535959.TR2	17 ²⁾	869	800	1 100	300	300	1	6

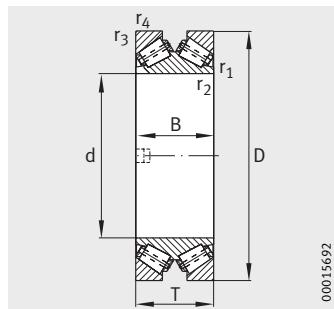
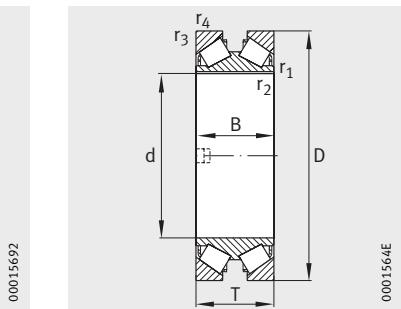
¹⁾ With sheet steel cages.

²⁾ With pin cages.



Design 17

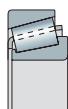
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Design 18
With pin cage

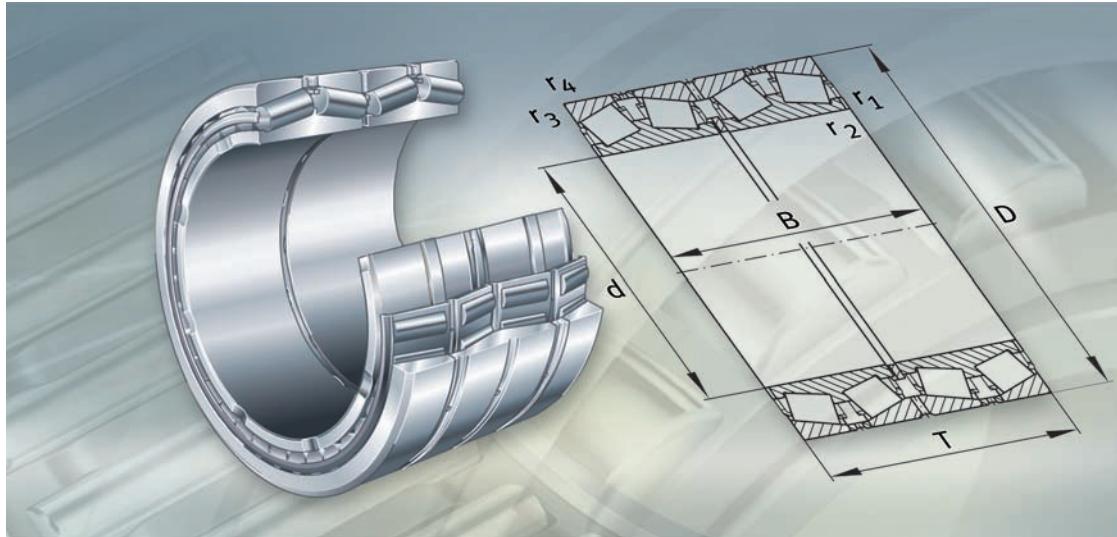
Design 19

0001564E

Basic load ratings		Calculation factors				Fatigue limit load
dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN
550	1 210	0,96	0,7	1,05	0,69	95
425	880	0,94	0,72	1,07	0,7	75
550	1 210	0,96	0,7	1,05	0,69	95
1 240	2 440	0,79	0,85	1,27	0,83	245
710	1 700	0,94	0,72	1,07	0,7	166
910	1 970	0,86	0,79	1,17	0,77	188
2 280	4 700	0,87	0,78	1,16	0,76	450
2 280	4 700	0,87	0,78	1,16	0,76	450
2 410	4 450	0,87	0,78	1,16	0,76	415
2 600	5 000	0,87	0,78	1,16	0,76	470
2 950	6 800	0,87	0,78	1,16	0,76	630
2 900	6 400	0,87	0,78	1,16	0,76	570
3 550	7 200	0,87	0,78	1,16	0,76	630
2 040	5 000	0,87	0,78	1,16	0,76	455
3 100	6 700	0,99	0,68	1,01	0,67	570
3 100	8 200	0,94	0,72	1,07	0,7	710
3 200	8 700	0,94	0,72	1,07	0,7	750
5 100	11 300	0,87	0,78	1,16	0,76	950
5 900	15 600	0,87	0,78	1,16	0,76	1 250
6 200	16 500	0,87	0,78	1,16	0,76	1 320
4 600	14 000	0,8	0,85	1,26	0,83	1 130
6 600	21 000	0,8	0,85	1,26	0,83	1 610



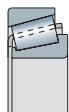
FAG



Four-row tapered roller bearings

Four-row tapered roller bearings

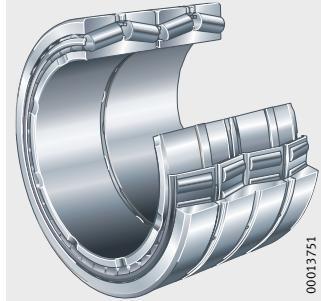
	Page
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Product overview Four-row tapered roller bearings

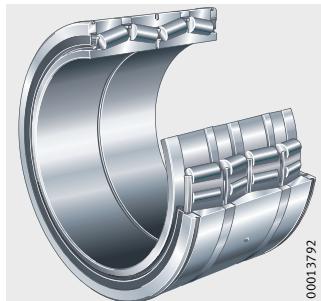
Metric sizes and inch sizes

Z-5..TR4-01, Z-5..TR4-02,
F-8..TR4-01, F-8..TR4-02



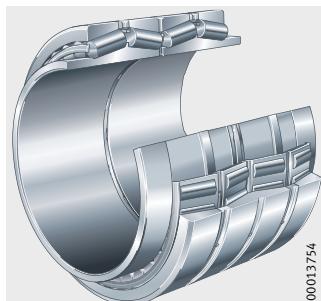
With integral seals

Z-5..TR4-03, F-8..TR4-03



With extended inner rings

Z-5..TR4-04, F-8..TR4-04



Four-row tapered roller bearings

Features

Four-row tapered roller bearings comprise solid bearing rings and tapered roller and cage assemblies. They are suitable for axial loads in both directions and high radial loads.

The bearings described here are separable. The complete bearing must be mounted in the chock, after which the chock together with the bearing is slid onto the journal. This requires a loose fit for the inner ring on the journal.

For high speeds and loads, however, the inner ring must have a tight fit. This can be achieved by mounting bearings with a tapered bore on tapered roll journals.

Four-row tapered roller bearings are normally supplied with spacer rings between the outer rings while, in a few cases, they do not have intermediate rings.

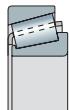
Four-row tapered roller bearings are used, for example, in bearing arrangements for work rolls (bearings with sheet metal cage) or back-up rolls (bearings with pin cage). In addition to open bearings, sealed designs are also available. They are used to reduce the grease consumption in work roll bearings.

Four-row tapered roller bearings have non-standardised metric or inch dimensions and designations Z-5..TR4 or F-8..TR4.

Design variants are indicated by the Technical Specification H122**. Please contact Schaeffler Group Industrial for information.

Radial and axial load capacity

Four-row tapered roller bearings can support axial forces in both directions as well as high radial forces. Where there are particularly high demands on axial guidance, an additional axial bearing is used in some cases.



Four-row tapered roller bearings

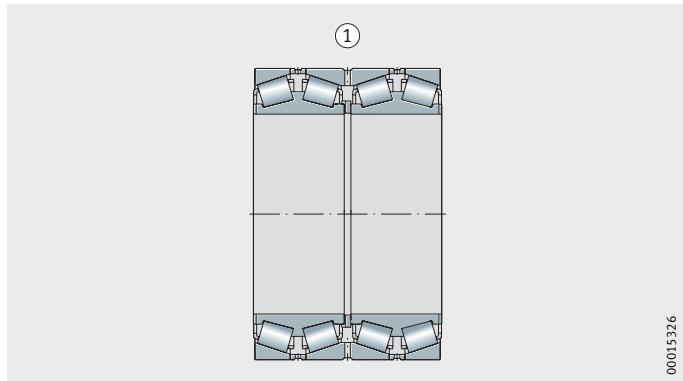
Open bearings

Open four-row tapered roller bearings are available in four designs in metric or inch sizes and tolerances, *Figure 1* and *Figure 2*, page 561.

Design 1

- The outer ring comprises a double ring and two single rings.
- The inner ring bore is smooth.
- The bearings have sheet metal cages.
- Design 1 is particularly suitable for smaller bearings in work rolls that are subjected to low loads and exhibit little journal wear.

① Design 1
Figure 1
Open four-row
tapered roller bearing



- Design 2**
- The outer ring comprises a double ring and two single rings.
 - The helical groove in the inner ring bore is intended to give good lubrication of the fit joint.
 - The bearings have sheet metal cages.
- Design 3**
- The outer ring comprises a double ring and two single rings.
 - The inner ring bore is smooth.
 - Large bearings have through-drilled rollers and pin cages. This is necessary in reversing type stands due to the high inertia forces.
- Design 4**
- The outer ring comprises a double ring and two single rings.
 - The inner ring bore has a helical groove.
 - The bearings have through-drilled rollers and pin cages.

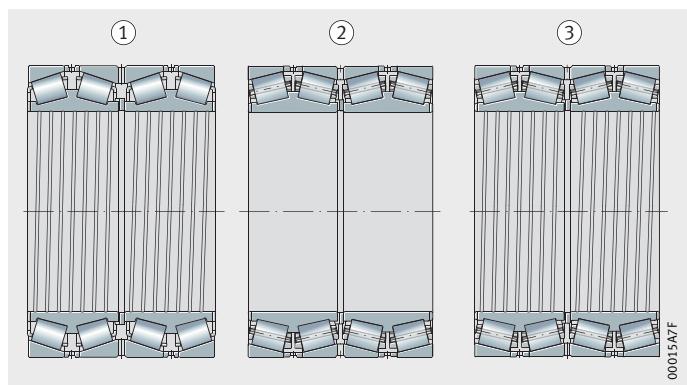


Figure 2
Open four-row
tapered roller bearings

Four-row tapered roller bearings

Sealed bearings

Work roll bearing arrangements in hot or cold rolling lines must be effectively sealed against large quantities of water or roll coolant that are mixed with contaminants.

These bearing arrangements are normally lubricated with grease. For cost and environmental reasons, it is desirable to achieve low levels of grease consumption. Four-row tapered roller bearings with integrated seals have therefore been developed, *Figure 3*. These bearings have main dimensions identical to those of the open bearings. Only small quantities of the high quality rolling bearing grease used are required.

Although the basic load ratings of the sealed bearings are lower, they normally have a longer life than the open bearings due to the improved cleanliness in the lubrication gap.

Design 5 ■ The outer ring comprises a double ring and two single rings.

■ The inner ring bore has a helical groove.

■ The bearings have sheet metal cages.

Design 6 ■ The outer ring comprises a double ring and two single rings.

■ The inner ring bore has a helical groove.

■ The bearings have pin cages.

Design 7 ■ The outer ring comprises a double ring and two single rings.

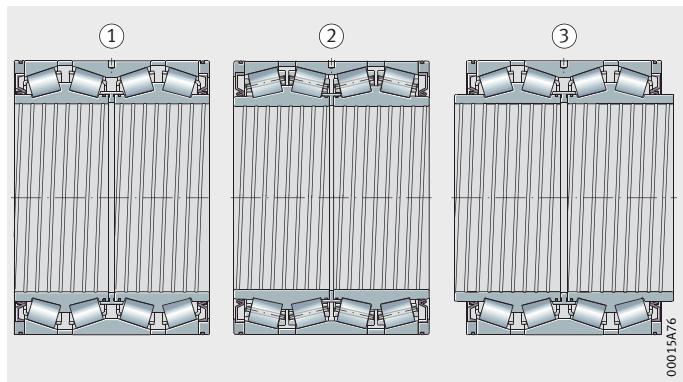
■ The inner rings are laterally extended.

■ The inner ring bore has a helical groove.

■ The bearings have sheet metal cages.

- ① Design 5
- ② Design 6
- ③ Design 7

Figure 3
Sealed four-row
tapered roller bearings



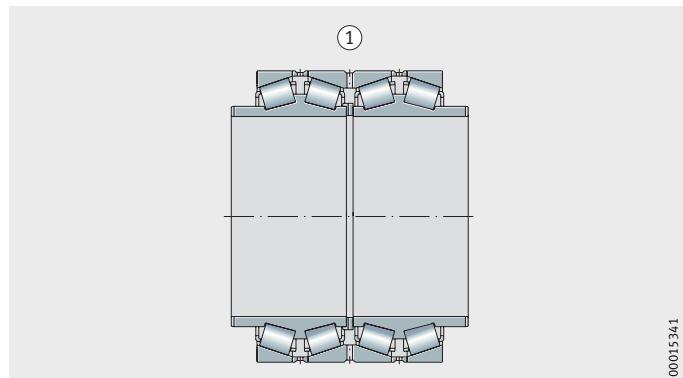
Bearings with extended inner rings

Design 8

- The outer ring comprises a double ring and two single rings.
- The inner ring bore is smooth.
- The bearings have sheet metal cages.
- The lateral extended sections of the inner ring are ground and designed as sliding surfaces for rotary shaft seals, *Figure 4*.

① Design 8

Figure 4
Four-row tapered roller bearing
with extended inner rings



Operating temperature



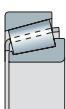
Open and sealed four-row tapered roller bearings can be used at operating temperatures from -30°C to $+150^{\circ}\text{C}$, depending on the lubricant.

The rotary shaft seals on the sealed bearings are made from fluoro elastomer, which can give off gases and vapours harmful to health at approx. $+300^{\circ}\text{C}$ or higher. This may occur, for example, if a welding torch is used in the dismantling of the bearings. If high temperatures are unavoidable, attention must be paid to the valid safety data sheet for the material.

Cages

Smaller four-row tapered roller bearings, which are used predominantly in work rolls, are subjected to smaller loads. For these bearings, a cage made from sheet steel is normally suitable.

Large back-up roll bearings must generally support very high loads. These bearings are fitted with through-drilled rollers and pin cages. Pin cages are necessary in reversing type stands due to the high inertia forces.



Four-row tapered roller bearings

Design and safety guidelines Equivalent loads

Equivalent dynamic bearing load

Four-row tapered roller bearings can support radial and axial loads. When determining the equivalent dynamic and static loads, only one row of rollers is considered, in contrast to DIN ISO 281.

The equivalent dynamic load P is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

For bearings under dynamic loading, the following applies (for one row):

Load ratio and equivalent dynamic load

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 kN

Equivalent dynamic bearing load for combined load

F_a kN

Axial dynamic bearing load

F_r kN

Radial dynamic bearing load

e, Y –

Factors, see dimension tables.

Equivalent static bearing load

The equivalent static load P_0 is valid for bearings that are subjected to radial and axial static loads. It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

For bearings under static loading, the following applies (for one row):

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

P_0 kN

Equivalent static bearing load for combined load

F_{0r} kN

Radial static bearing load

Y_0 –

Factor, see dimension tables

F_{0a} kN

Axial 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 $C_r/P > 0,02$ is therefore necessary.

Comparative load ratings

The basic dynamic load ratings C_r to DIN ISO 281 are based on a basic rating life of 1 million revolutions. Competitors sometimes give different load ratings that are based on 90 million revolutions ($3\,000\text{ h}$ at 500 min^{-1}).

Since it is not possible to compare these values with the basic load ratings calculated according to ISO, please contact us regarding the comparative load ratings C_{r90} and C_{a90} .

Design of bearing arrangements

Shaft tolerances

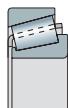
Four-row tapered roller bearings	Nominal dimension d mm	Tolerance ¹⁾ mm
Metric tolerances, with loose fit	< 315	-0,180...-0,230
	315 ... 630	-0,240...-0,300
	> 630 ... 800	-0,325...-0,410
	> 800	-0,350...-0,450
Inch tolerances, with loose fit	> 152,4...203,2	-0,150...-0,175
	> 203,2...304,8	-0,180...-0,205
	> 304,8...609,6	-0,200...-0,249
	> 609,6...914,4	-0,250...-0,334
	> 914,4	-0,300...-0,400
Axial bearings	d	e7

¹⁾ In the case of high speeds and bearings with a tapered bore, please contact us to discuss the tolerances for the adjacent parts.

Housing tolerances

Four-row tapered roller bearings	Nominal dimension D mm	Tolerance ¹⁾ mm
Metric tolerances	\leq 800	H6
	> 800	H7
Inch tolerances	> 304,8... 609,6	+0,101...+0,150
	> 609,6... 914,4	+0,156...+0,230
	> 914,4...1219,2	+0,202...+0,300
	> 1219,6	+0,257...+0,380

¹⁾ In the case of high axial forces and bearings with a tapered bore, please contact us to discuss the tolerances for the adjacent parts.



Four-row tapered roller bearings

Accuracy

The dimensional and running tolerances of four-row tapered roller bearings are generally defined for individual cases.
Please contact us regarding the values.
Normal tolerances for bearings in metric and inch sizes should be taken from the following tables.

Normal tolerances for bearings in metric sizes

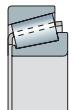
Nominal dimension mm		Bore deviation Δ_{dmp} μm		Outside diameter deviation Δ_{Dmp} μm		Width deviation $\Delta_{Bs} = \Delta_{Cs}$ μm	
over	incl.	max.	min.	max.	min.	max.	min.
180	250	0	-30	0	-30	0	-300
250	315	0	-35	0	-35	0	-350
315	400	0	-40	0	-40	0	-400
400	500	0	-45	0	-45	0	-450
500	630	0	-50	0	-50	0	-500
630	800	0	-75	0	-75	0	-750
800	1000	0	-100	0	-100	0	-1000
1000	1250	0	-125	0	-125	0	-1250
1250	1600	0	-160	0	-160	0	-1600
1600	2000	0	-200	0	-200	0	-2000

Normal tolerances for bearings in inch sizes

Nominal dimension mm		Bore deviation Δ_{dmp} μm		Outside diameter deviation Δ_{Dmp} μm		Width deviation $\Delta_{Bs} = \Delta_{Cs}$ μm	
over	incl.	max.	min.	max.	min.	max.	min.
304,8	609,6	+51	0	+51	0	± 1524	0
609,6	914,4	+76	0	+76	0	± 1524	0
914,4	1219,2	+102	0	+102	0	± 1524	0
1219,2	-	+127	0	+127	0	± 1524	0

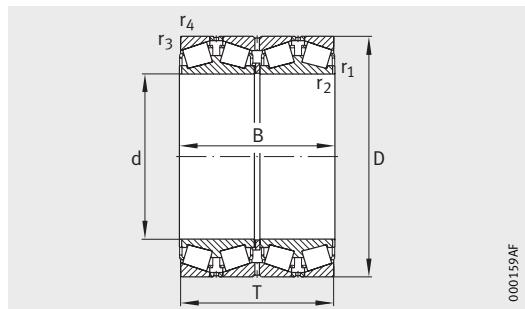
Axial internal clearance

The axial internal clearance of four-row tapered roller bearings differs according to the bearing size and application.
Please contact us for values.



Tapered roller bearings

Four-row,
in inch sizes



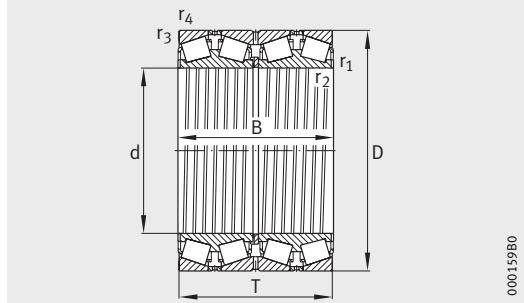
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Design 1
With sheet steel cages

Dimension table · Dimensions in mm

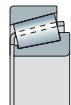
Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	B	r ₁ , r ₂ min.	r ₃ , r ₄ min.
Z-507747.TR4	1	104	215,9	355,6	254	254	1,6	1,6
F-802100.TR4	1	84,1	216,103	330,2	269,875	263,525	1,5	3,3
Z-511115.TR4	1	101	228,6	355,6	260,35	266,7	1,5	1,5
Z-524152.TR4	1	164	228,6	400,05	296,875	296,875	3,3	3,3
Z-564027.TR4	1	80	241,224	355,498	288,6	228,6	1,5	3,3
F-802115.TR4	1	72	241,478	349,148	228,6	228,6	1,5	3,3
F-802194.TR4	1	45,5	244,475	327,025	193,675	193,675	1,5	3,3
F-802194.TR4-H122AA	2	45,5	244,475	327,025	193,675	193,675	1,5	3,3
F-802199.TR4	1	129	244,475	381	304,8	304,8	3,3	4,8
F-802252.TR4	1	84,5	254	358,775	269,875	269,875	1,5	3,3
Z-510375.TR4	1	115	260,35	400,05	253,995	255,585	1,5	6,4
Z-517254.TR4	1	180	260,35	422,275	317,5	314,325	6,4	3,3
F-802010.TR4	1	62,6	266,7	355,6	228,6	230,188	1,5	3,3
F-802010.TR4-H122AA	2	62,6	266,7	355,6	228,6	230,188	1,5	3,3
Z-515700.TR4	1	116	266,7	393,7	269,878	269,878	3,3	6,4
F-802099.TR4	1	103	269,875	381	282,575	282,575	3,3	3,3
F-802279.TR4	1	101	276,225	393,7	269,878	269,878	1,5	6,4
F-802009.TR4	1	100	279,4	393,7	269,875	269,875	1,5	6,4
F-802009.TR4-H122AA	2	100	279,4	393,7	269,875	269,875	1,5	6,4
F-802051.TR4	1	84	279,578	380,898	244,475	244,475	1,5	3,3
F-802051.TR4-H122AA	2	84	279,578	380,898	244,475	244,475	1,5	3,3
F-802056.TR4	1	79	285,75	380,898	244,475	244,475	1,5	3,3
F-802056.TR4-H122AA	2	79	285,75	380,898	244,475	244,475	1,5	3,3
F-802228.TR4	1	121	288,925	406,4	298,45	298,45	3,3	3,3
Z-533455.TR4	1	114	298,45	438,15	228,6	228,6	3,2	3,2
F-802067.TR4	1	145	300	440	279,4	280,988	3,3	4,8
F-802067.TR4-H122AA	2	145	300	440	279,4	280,988	3,3	3,3
F-802136.TR4	1	137	300,038	422,275	311,15	311,15	3,3	3,3
Z-511861.TR4	1	115	304,8	419,1	269,875	269,875	1,5	6,4
Z-575220.TR4	1	271	304,8	495,3	349,25	342,9	3,3	6,4
F-802024.TR4	1	103	304,902	412,648	266,7	266,7	3,3	3,3
F-802024.TR4-H122AA	2	103	304,902	412,648	266,7	266,7	3,3	3,3
Z-518078.TR4	1	131	305,003	438,048	279,4	280,99	3,3	4,8

¹⁾ The comparative designations were taken from documents available to us.
They give information on identical main dimensions and chamfer dimensions only.
The cage and bearing designs are not always identical.
Furthermore, the table makes no claims to completeness.



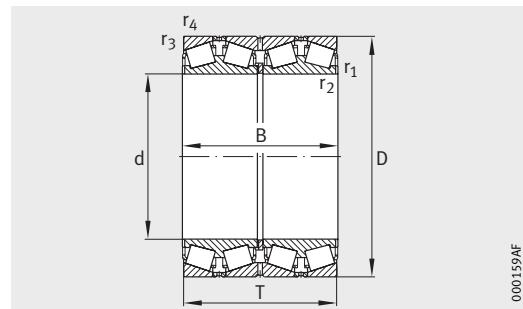
Design 2
With sheet steel cages

Basic load ratings		Calculation factors				Fatigue limit load C_{ur} kN	Interchange designation ¹⁾ TQO types
dyn. C_r kN	stat. C_{or} kN	e	γ_1	γ_2	γ_0		
3 050	5 400	0,34	1,96	2,91	1,91	580	130850DW.400.401D
2 750	5 200	0,56	1,21	1,81	1,19	570	9974DW.9920.9920D
2 900	5 000	0,34	1,96	2,91	1,91	540	EE130904DW.400.402D
4 150	6 400	0,31	2,18	3,25	2,13	670	EE529091DW.157.158D
2 400	4 500	0,35	1,92	2,86	1,88	–	EE127094DW.138.139D
2 400	4 500	0,35	1,92	2,86	1,88	490	EE127097DW.135.136D
1 590	3 400	0,48	1,41	2,1	1,38	370	LM247748DW.710.710D
1 590	3 400	0,48	1,41	2,1	1,38	370	LM247748DW.710.710D
3 750	6 950	0,46	1,46	2,17	1,43	–	EE126096DW.150.151D
3 200	6 300	0,34	1,98	2,95	1,94	–	M249749DW.710.710D
2 850	5 000	0,44	1,53	2,28	1,5	530	EE221027DW.575.576D
4 350	7 100	0,33	2,02	3	1,97	720	HM252349DW.310.310D
2 550	5 400	0,36	1,9	2,83	1,86	580	LM451349DW.310.310D
2 550	5 400	0,36	1,9	2,83	1,86	580	LM451349DGW.310.310D
3 200	6 000	0,45	1,49	2,21	1,45	–	EE275106DW.155.156D
3 600	7 400	0,33	2,03	3,02	1,99	780	M252349DW.310.310D
3 200	6 000	0,45	1,49	2,21	1,45	–	EE275109DW.155.156D
3 550	6 800	0,38	1,78	2,65	1,74	700	EE135111DW.155.156D
3 550	6 800	0,38	1,78	2,65	1,74	700	EE135111DGW.155.156D
2 600	6 100	0,42	1,6	2,39	1,57	650	LM654644DW.610.610D
2 600	6 100	0,42	1,6	2,39	1,57	650	LM654644DGW.610.610D
2 600	6 100	0,42	1,6	2,39	1,57	650	LM654648DW.610.610D
2 600	6 100	0,42	1,6	2,39	1,57	650	LM654648DGW.610.610D
4 050	8 200	0,35	1,94	2,89	1,9	860	M255449DW.410.410D
3 000	5 500	0,37	1,81	2,7	1,77	–	–
3 150	6 400	0,4	1,69	2,52	1,65	650	EE129119DW.174.175D
3 150	6 400	0,4	1,69	2,52	1,65	650	EE129119DGW.174.175D
4 150	8 700	0,36	1,86	2,77	1,82	900	HM256849DW.810.810D
3 650	7 650	0,32	2,12	3,15	2,07	–	M257149DW.110.110D
5 500	9 300	0,4	1,69	2,52	1,65	900	EE724121DW.195.196D
3 650	7 700	0,32	2,12	3,15	2,07	790	M257248DW.210.210D
3 650	7 700	0,32	2,12	3,15	2,07	790	M257248DGW.210.210D
3 900	7 200	0,47	1,43	2,12	1,4	720	M757449DW.410.410D



Tapered roller bearings

Four-row,
in inch sizes



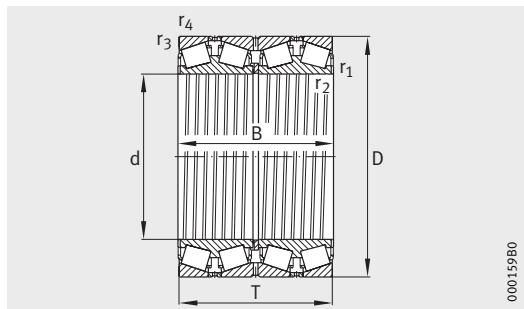
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Design 1
With sheet steel cages

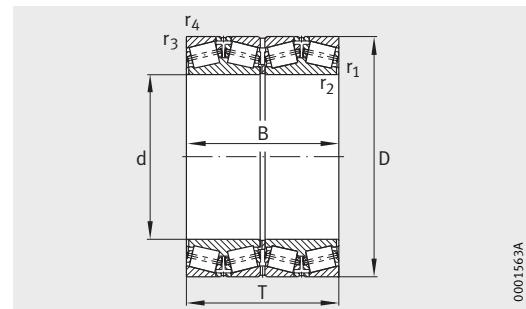
Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	B	r ₁ , r ₂ min.	r ₃ , r ₄ min.
F-802045.TR4	1	103	317,5	422,275	269,875	269,875	1,5	3,3
F-802045.TR4-H122AA	2	103	317,5	422,275	269,875	269,875	1,5	3,3
Z-531883.TR4	1	136	330,2	444,5	301,625	301,625	3,3	3,3
Z-531281.TR4	1	144	330,2	482,6	222,25	212,725	1,6	6,4
F-802287.TR4-H122AA	2	100	330,302	438,023	254	247,65	1,5	3,3
F-802062.TR4	1	187	333,375	469,9	342,9	342,9	3,3	3,3
F-802062.TR4-M	3	193	333,375	469,9	342,9	342,9	3,3	3,3
Z-539439.TR4	1	236	342,9	533,4	301,625	307,985	3,3	3,3
Z-572452.TR4	3	369	342,9	571,5	342,9	342,9	3,3	6,4
F-802002.TR4-A370-400	1	110	343,052	457,098	254	254	1,5	3,3
F-802002.TR4-H122AA-A370-400	2	110	343,052	457,098	254	254	1,5	3,3
F-802028.TR4	1	215	346,075	488,95	358,775	358,775	3,3	3,3
F-802052.TR4	1	140	347,662	469,9	292,1	292,1	3,3	3,3
F-802119.TR4	1	104	355,6	457,2	252,412	252,412	1,5	3,3
F-802022.TR4	1	143	355,6	482,6	269,875	265,112	1,5	3,3
F-802022.TR4-H122AA	2	142	355,6	482,6	269,875	265,112	1,5	3,3
F-802137.TR4-H122AA	2	179	355,6	488,95	317,5	317,5	1,5	3,3
Z-548757.TR4	1	272	368,3	523,875	382,588	382,588	3,3	6,4
F-802177.TR4	1	135	374,65	501,65	260,35	250,825	1,5	3,3
F-802251.TR4	1	306	384,175	546,1	400,05	400,05	3,3	6,4
F-802014.TR4	1	183	385,762	514,35	317,5	317,5	3,3	3,3
F-802014.TR4-H122AA	2	183	385,762	514,35	317,5	317,5	3,3	3,3
Z-508328.02.TR4	1	192	406,4	546,1	288,925	268,288	1,5	6,4
F-802104.TR4-H122AA	2	183	406,4	546,1	288,925	288,925	1,5	6,4
F-802104.TR4	1	183	406,4	546,1	288,925	288,925	1,5	6,4
F-802086.TR4	1	290	406,4	565,15	381	381	3,3	6,4
F-802086.TR4-H122AA	2	290	406,4	565,15	381	381	3,3	6,4
Z-511569.TR4	1	367	406,4	590,55	400,05	400,05	3,3	6,4
Z-517944.TR4	3	378	406,4	590,55	400,05	400,05	3,3	6,4
F-802047.TR4	1	218	409,575	546,1	334,962	334,962	1,5	6,4
F-802047.TR4-H122AA	2	218	409,575	546,1	334,962	334,962	1,5	6,4
F-802047.TR4-M	3	225	409,575	546,1	334,962	334,962	1,5	6,4

¹⁾ The comparative designations were taken from documents available to us.
They give information on identical main dimensions and chamfer dimensions only.
The cage and bearing designs are not always identical.
Furthermore, the table makes no claims to completeness.

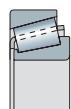


Design 2
With sheet steel cages



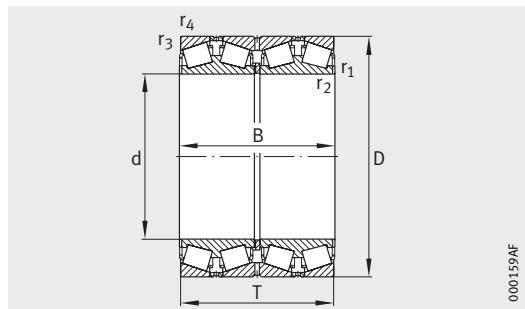
Design 3
With pin cages

Basic load ratings		Calculation factors				Fatigue limit load C_{ur} kN	Interchange designation ¹⁾ TQO types
dyn. C_r kN	stat. C_{or} kN	e	Y_1	Y_2	Y_0		
3 500	7 800	0,32	2,12	3,15	2,07	800	LM258648DW.610.610D
3 500	7 800	0,32	2,12	3,15	2,07	800	LM258648DGW.610.610D
3 800	8 500	0,4	1,69	2,52	1,65	850	M260149DW.110.110D
2 900	5 600	0,41	1,65	2,45	1,61	540	161301D.900.901D
3 250	6 700	0,44	1,54	2,29	1,5	670	EE138131DW.172.173D
4 950	10 700	0,38	1,79	2,67	1,75	1 070	HM261049DW.010.010D
5 000	11 000	0,38	1,79	2,67	1,75	1 100	HM261049DW.010.010D
4 950	8 000	0,33	2,03	3,02	1,98	740	971355DW.972100.972103D
6 550	10 600	0,33	2,03	3,02	1,98	–	EE536136DW.225.226D
3 250	6 700	0,47	1,43	2,12	1,4	–	LM761649DW.610.610D
3 250	6 700	0,47	1,43	2,12	1,4	–	LM761649DGW.610.610D
5 800	12 600	0,33	2,03	3,02	1,98	1 230	HM262749DW.710.710D
4 200	8 700	0,31	2,16	3,22	2,12	860	M262449DW.410.410D
3 450	8 100	0,32	2,12	3,15	2,07	810	LM263149DW.110.110D
3 550	7 900	0,45	1,51	2,25	1,48	770	LM763449DW.410.410D
3 550	7 900	0,45	1,51	2,25	1,48	770	LM763449DGW.410.410D
4 900	10 800	0,39	1,71	2,54	1,67	1 060	M263349DGW.310.310D
6 400	13 700	0,35	1,92	2,86	1,88	1 320	HM265049DW.010.010D
3 750	7 600	0,47	1,43	2,12	1,4	730	LM765149DW.110.110D
7 100	15 800	0,33	2,03	3,02	1,98	1 510	HM266449DW.410.410D
4 600	10 700	0,45	1,5	2,23	1,47	1 040	LM665949DW.910.910D
4 600	10 700	0,45	1,5	2,23	1,47	1 040	LM665949DGW.910.910D
4 150	8 500	0,47	1,43	2,12	1,4	780	EE234161DW.215.216D
4 400	9 300	0,43	1,56	2,33	1,53	–	LM767749DGW.710.710D
4 450	9 300	0,43	1,56	2,33	1,53	870	LM767749DW.710.710D
6 900	15 000	0,43	1,57	2,34	1,53	1 410	M267949DW.910.910D
6 900	15 000	0,43	1,57	2,34	1,53	1 410	M267949DGW.910.910D
7 350	15 000	0,34	1,99	2,96	1,94	–	EE833161DW.232.233D
7 700	16 100	0,34	1,99	2,96	1,94	1 490	EE833161DW.232.233D
5 300	12 400	0,45	1,5	2,24	1,47	1 190	M667947DW.910.910D
5 300	12 400	0,45	1,5	2,24	1,47	1 190	M667947DGW.910.910D
5 500	13 000	0,45	1,5	2,24	1,47	1 240	M667947DW.910.910D



Tapered roller bearings

Four-row,
in inch sizes



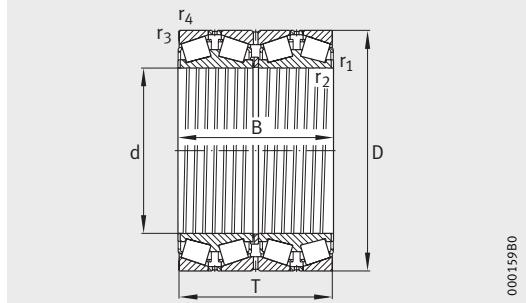
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Design 1
With sheet steel cages

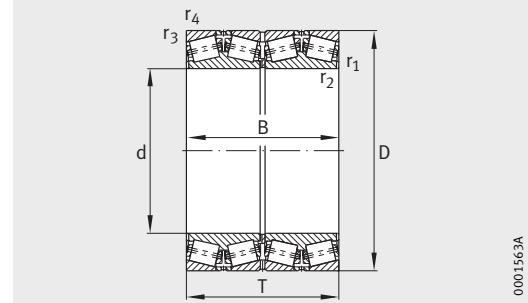
Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	B	r ₁ , r ₂ min.	r ₃ , r ₄ min.
F-802048.TR4-H122AA	2	376	415,925	590,55	434,975	434,975	3,3	6,4
F-802048.TR4-M	3	402	415,925	590,55	434,975	434,975	3,3	6,4
F-802155.TR4	1	185	431,8	571,5	279,4	279,4	1,5	3,3
F-802012.TR4	1	236	431,8	571,5	336,55	336,55	1,5	6,4
F-802012.TR4-H122BP	2	236	431,8	571,5	336,55	336,55	1,5	6,4
F-802012.TR4-M	3	246	431,8	571,5	336,55	336,55	1,5	6,4
Z-530985.TR4	1	385	431,8	635	355,6	355,6	6,4	6,4
Z-530731.TR4	3	396	431,8	635	355,6	355,6	6,4	6,4
F-802209.TR4-H122AC	1	279	432,003	609,524	317,5	317,5	3,6	6,4
F-802179.TR4-H122AA	2	461	447,675	635	463,55	463,55	3,3	6,4
F-802179.TR4-M-H122AD	3	477	447,675	635	463,55	463,55	3,3	6,4
F-802098.TR4	1	197	457,2	596,9	279,4	276,225	1,5	3,3
F-802098.TR4-M	3	205	457,2	596,9	279,4	276,225	1,5	3,3
Z-506201.TR4	1	574	479,425	679,45	495,3	495,3	3,3	6,4
Z-561038.TR4	3	576	479,425	679,45	495,3	495,3	3,3	6,4
F-802006.TR4-H122AB	1	244	482,6	615,95	330,2	330,2	6,4	6,4
F-802006.TR4-H122BA	2	244	482,6	615,95	330,2	330,2	6,4	6,4
Z-561772.TR4	1	358	482,6	635	421	421	3	6,4
F-802237.TR4	1	384	482,6	647,7	417,512	417,512	3,3	6,4
F-802122.TR4	1	348	488,95	660,4	361,95	365,125	8	6,4
Z-518570.03.TR4	2	256	489,026	634,873	320,675	320,675	3,3	3,3
F-802037.TR4	1	253	489,026	634,873	320,675	320,675	3,3	3,3
F-802037.TR4-H122BB	2	253	489,026	634,873	320,675	320,675	3,3	3,3
F-802085.TR4-H122AC	1	385	501,65	673,1	387,35	400,05	3,3	6,4
F-802085.TR4-M	3	400	501,65	673,1	387,35	400,05	3,3	6,4
F-802195.TR4	1	656	501,65	711,2	520,7	520,7	3,3	6,4
F-802195.TR4-H122CP	2	656	501,65	711,2	520,7	520,7	4,6	6,4
F-802195.TR4-M	3	680	501,65	711,2	520,7	520,7	3,3	6,4
F-802053.TR4	1	710	508	762	463,55	463,55	6,4	6,4
F-802053.TR4-M	3	762	508	762	463,55	463,55	6,4	6,4
F-802030.TR4	1	394	514,35	673,1	422,275	422,275	3,3	6,4
F-802030.TR4-H122AA	2	393	514,35	673,1	422,275	422,275	3,3	6,4
F-802030.TR4-M	3	395	514,35	673,1	422,275	422,275	3,3	6,4

¹⁾ The comparative designations were taken from documents available to us.
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Furthermore, the table makes no claims to completeness.

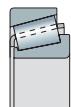


Design 2
With sheet steel cages



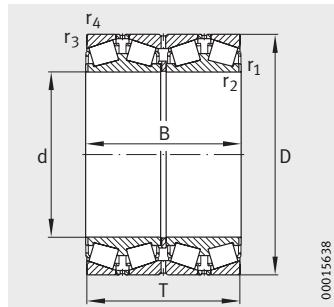
Design 3
With pin cages

Basic load ratings		Calculation factors				Fatigue limit load C_{ur} kN	Interchange designation ¹⁾ TQO types
dyn. C_r kN	stat. C_{or} kN	e	Y_1	Y_2	Y_0		
7 900	16 700	0,34	1,98	2,94	1,93	1 540	M268749DW.710.710D
8 200	17 700	0,34	1,98	2,94	1,93	1 640	M268749DW.710.710D
4 650	9 600	0,55	1,24	1,84	1,21	890	LM869449DW.410.410D
5 800	13 500	0,44	1,54	2,29	1,5	1 260	LM769349DW.310.310D
5 800	13 500	0,44	1,54	2,29	1,5	1 260	LM769349DW.310.310D
5 900	13 800	0,44	1,54	2,29	1,5	1 290	LM769349DW.310.310D
7 300	13 100	0,32	2,12	3,15	2,07	1 170	EE931170DW.250.251D
7 500	13 600	0,32	2,12	3,15	2,07	1 210	EE931170DW.250.251D
5 700	10 800	0,47	1,44	2,15	1,41	–	EE736173DW.238.239D
9 800	20 800	0,33	2,07	3,09	2,03	–	M270749DW.710.710D
10 000	21 200	0,33	2,07	3,09	2,03	–	M270749DW.710.710D
4 700	10 100	0,47	1,43	2,12	1,4	910	L770847DW.810.810D
4 750	10 300	0,47	1,43	2,12	1,4	930	L770847DW.810.810D
10 200	22 500	0,35	1,92	2,86	1,88	2 010	M272749DW.710.710D
10 700	23 900	0,35	1,92	2,86	1,88	2 130	M272749DW.710.710D
5 400	14 000	0,37	1,83	2,72	1,79	1 280	LM272248DW.210.210D
5 400	14 000	0,37	1,83	2,72	1,79	1 280	LM272248DW.210.210D
7 700	19 000	0,33	2,03	3,02	1,98	1 730	M272449DW.410.410D
7 800	18 400	0,31	2,18	3,24	2,13	1 670	M272647DW.610.610D
6 000	13 700	0,45	1,5	2,23	1,46	–	EE640193DW.260.261D
5 600	12 800	0,47	1,43	2,12	1,4	1 150	LM772749DW.710.710D
5 800	13 400	0,47	1,43	2,12	1,4	1 210	LM772749DW.710.710D
5 800	13 400	0,47	1,43	2,12	1,4	1 210	LM772749DW.710.710D
8 000	18 200	0,32	2,12	3,15	2,07	1 600	EE641198DW.265.266D
8 100	18 600	0,32	2,12	3,15	2,07	1 640	EE641198DW.265.266D
11 400	25 500	0,35	1,92	2,86	1,88	–	M274149DW.110.110D
11 400	25 500	0,35	1,92	2,86	1,88	–	Timken series: M274100
11 600	26 000	0,35	1,92	2,86	1,88	–	M274149DW.110.110D
10 500	20 300	0,39	1,73	2,58	1,69	1 730	EE531201DW.300.301D
11 000	21 700	0,39	1,73	2,58	1,69	1 850	EE531201DW.300.301D
8 200	19 800	0,33	2,07	3,09	2,03	1 770	LM274449DW.410.410D
8 200	19 800	0,33	2,07	3,09	2,03	1 770	LM274449DW.410.410D
8 300	20 300	0,33	2,07	3,09	2,03	1 810	LM274449DW.410.410D

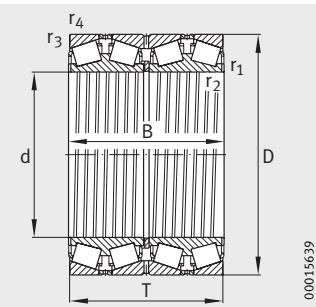


Tapered roller bearings

Four-row,
in inch sizes



Design 1
With sheet steel cages



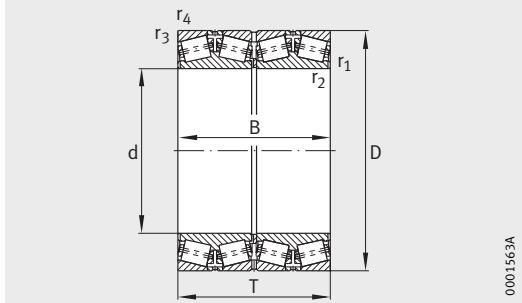
Design 2
With sheet steel cages

Dimension table (continued) · Dimensions in mm

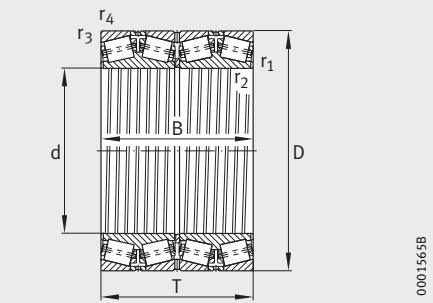
Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	B	r ₁ , r ₂ min.	r ₃ , r ₄ min.
F-802148.TR4-H122BD	1	734	519,112	736,6	536,575	536,575	3,3	6,4
F-802210.TR4	1	451	520,7	711,2	400,05	400,05	3,3	6,4
F-802038.TR4	1	800	536,575	761,873	558,8	558,8	3,3	6,4
F-802038.TR4-M	3	836	536,575	761,873	558,8	558,8	3,3	6,4
F-802102.TR4	1	363	558,8	736,6	322,268	322,265	3,3	6,4
F-802102.TR4-M	3	376	558,8	736,6	322,268	322,265	3,3	6,4
F-802093.TR4	1	466	558,8	736,6	409,575	409,575	3,3	6,4
F-802093.TR4-M	3	486	558,8	736,6	409,575	409,575	3,3	6,4
Z-521179.TR4	1 ¹⁾	530	558,8	736,6	457,2	455,612	3,3	6,4
F-802049.TR4	1	974	571,5	812,8	593,725	593,725	3,3	6,4
F-802049.TR4-M	3	1030	571,5	812,8	593,725	593,725	3,3	6,4
F-802090.TR4	1	470	584,2	762	401,638	396,875	3,3	6,4
F-802090.TR4-M	3	483	584,2	762	401,638	396,875	3,3	6,4
Z-535868.TR4	1	1500	584,2	901,7	539,747	584,2	3,2	9,7
F-802198.TR4-H122AA	2	589	585,788	771,525	479,425	479,425	3,3	6,4
F-802198.TR4-M	3	610	585,788	771,525	479,425	479,425	3,3	6,4
F-802185.TR4	1	1090	595,312	844,55	615,95	615,95	3,3	6,4
F-802185.TR4-M	3	1160	595,312	844,55	615,95	615,95	3,3	6,4
F-802075.TR4	1	1130	603,25	857,25	622,3	622,3	3,3	6,4
F-802075.TR4-M-H122AA	4	1200	603,25	857,25	622,3	622,3	3,3	6,4
F-802054.TR4-M-H122AB	3	463	609,6	787,4	361,95	361,95	3,3	6,4
F-802054.TR4-M-H122AP	3	463	609,6	787,4	361,95	361,95	6,4	6,4
Z-529150.TR4	4	710	609,6	813,562	479,425	479,425	6,4	3,3
Z-530986.TR4	3	1270	609,6	863,6	660,4	660,4	3,3	6,4
Z-513141.TR4	3	1360	635	901,7	654,05	654,05	3,3	6,4
F-802147.TR4-M	3	901	646,112	857,25	542,925	542,925	3,3	6,4
F-802183.TR4-M	3	1840	647,7	1028,7	565,15	558,8	11,2	6,4
F-802057.TR4-M-H122AA	4	1450	650	915	674	674	3,6	6,1
F-802057.TR4-M-H122AB	1	462	660	855	319,192	318,48	4,8	9,7
F-802203.TR4-H122AA	2	398	660,4	812,8	365,125	365,125	3,3	6,4
F-802203.TR4-M-H122AA	4	412	660,4	812,8	365,125	365,125	3,3	6,4
Z-515672.TR4	3	2210	660,4	1066,8	647,703	638,175	6,4	6,4

¹⁾ Bearing with lubrication holes through the central rib of the inner ring.

²⁾ The comparative designations were taken from documents available to us.
They give information on identical main dimensions and chamfer dimensions only.
The cage and bearing designs are not always identical.
Furthermore, the table makes no claims to completeness.

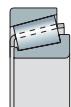


Design 3
With pin cages



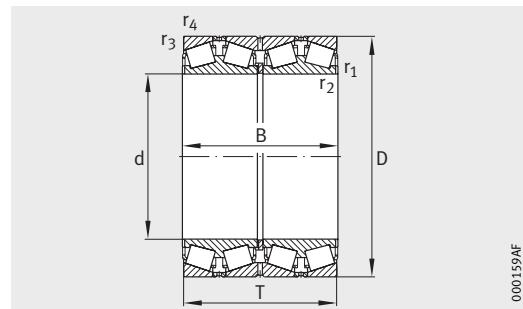
Design 4
With pin cages

Basic load ratings		Calculation factors				Fatigue limit load C_{ur} kN	Interchange designation ²⁾ TQO types
dyn. C_r kN	stat. C_{or} kN	e	γ_1	γ_2	γ_0		
11 800	27 000	0,33	2,04	3,04	2	–	M275349DW.310.310D
8 500	18 300	0,43	1,57	2,34	1,53	1 580	LM275349DW.310.310D
13 800	30 000	0,3	2,28	3,39	2,23	2 600	M276449DW.410.410D
14 200	31 000	0,3	2,28	3,39	2,23	2 650	M276449DW.410.410D
6 900	15 300	0,34	1,98	2,94	1,93	1 290	EE843221DW.290.291D
7 000	15 600	0,34	1,98	2,94	1,93	1 320	EE843221DW.290.291D
9 100	21 900	0,35	1,95	2,9	1,91	1 880	LM377449DW.410.410D
9 200	22 400	0,35	1,95	2,9	1,91	1 920	LM377449DW.410.410D
10 000	24 500	0,32	2,14	3,18	2,09	–	LM277149DA.110.110D
15 400	34 000	0,33	2,03	3,02	1,98	2 900	M278749DW.710.710D
16 100	36 000	0,33	2,03	3,02	1,98	3 050	M278749DW.710.710D
8 400	20 600	0,35	1,91	2,85	1,87	1 760	LM778549DW.510.510D
8 600	21 500	0,35	1,91	2,85	1,87	1 830	LM778549DW.510.510D
14 900	27 000	0,33	2,03	3,02	1,98	2 120	665231DW.355.356D
10 200	25 500	0,33	2,03	3,02	1,98	2 160	LM278849DW.810.810D
10 200	25 500	0,33	2,03	3,02	1,98	2 140	LM278849DW.810.810D
16 400	37 000	0,34	1,99	2,96	1,95	3 100	M280049DW.010.010D
17 200	39 500	0,34	1,99	2,96	1,95	3 300	M280049DW.010.010D
16 700	38 500	0,35	1,95	2,9	1,91	3 200	M280249DW.M210.210D
17 500	40 500	0,35	1,95	2,9	1,91	3 400	M280249DGW.210.210D
7 400	18 800	0,5	1,35	2,01	1,32	1 590	649241DW.310.311D
7 400	18 800	0,5	1,35	2,01	1,32	1 590	649242DW.310.311D
12 400	29 500	0,26	2,55	3,8	2,5	2 470	LM280249DGW.210.210D
18 100	42 500	0,35	1,95	2,9	1,91	3 500	M280349DW.310.310D
18 600	44 000	0,33	2,03	3,02	1,98	–	M281049DW.010.010D
14 500	35 500	0,33	2,03	3,02	1,98	2 950	LM281049DW.010.010D
18 000	32 500	0,31	2,16	3,22	2,12	–	EE424257DW.405.407D
18 700	45 000	0,33	2,03	3,02	1,98	3 650	M281349DGW.310.310D
7 650	17 600	0,35	1,91	2,84	1,87	–	EE749259DW.334.335D
8 200	21 400	0,33	2,03	3,02	1,98	1 780	L281149DGW.110.110D
8 400	22 200	0,33	2,03	3,02	1,98	1 850	L281149DGW.110.110D
23 100	42 500	0,31	2,15	3,2	2,1	3 200	428262DW.420.420XD



Tapered roller bearings

Four-row,
in inch sizes



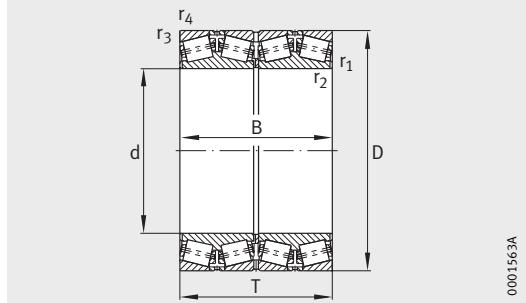
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Design 1
With sheet steel cages

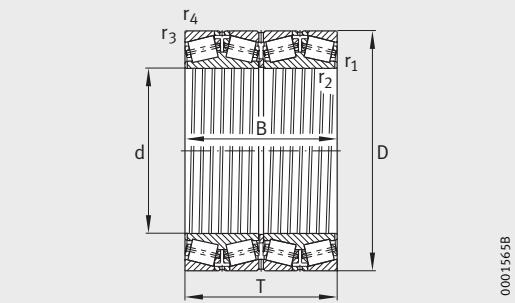
Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	B	r ₁ , r ₂ min.	r ₃ , r ₄ min.
Z-568422.TR4	3	995	679,45	901,7	552,45	552,45	3,3	6,4
Z-521612.TR4	1	970	679,45	901,7	552,45	679,45	3,2	6,4
F-802040.TR4	1	523	685,8	876,3	355,6	352,425	3,3	6,4
F-802040.TR4-M	3	542	685,8	876,3	355,6	352,425	3,3	6,4
F-802170.TR4-M	3	1070	708,025	930,275	565,15	565,15	3,3	6,4
F-802055.TR4	1	518	711,2	914,4	317,5	317,5	3,3	6,4
F-802055.TR4-M	3	542	711,2	914,4	317,5	317,5	3,3	6,4
F-802173.TR4-M-H122AB	3	1910	714,375	1016	704,85	704,85	3,3	6,4
F-802103.TR4-M	3	1120	717,55	946,15	565,15	565,15	3,3	6,4
F-802103.TR4-M-H122AA	4	1120	717,55	946,15	565,15	565,15	3,3	6,4
F-802182.TR4-M-H122AA	4	2060	730,25	1035,05	755,65	755,65	3,3	6,4
Z-526837.TR4	1	1270	749,3	990,6	605	605	3,3	6,4
Z-527082.TR4	3	1300	749,3	990,6	605	605	3,3	6,4
Z-513140.TR4	3	2190	749,3	1066,8	736,6	723,9	4,8	12,7
F-802032.TR4-M	3	2130	762	1066,8	736,6	723,9	7,9	12,7
Z-532879.TR4	3	3110	774,7	1220	838,474	774,7	6,4	12,7
Z-526416.TR4	3	3530	780	1220	838,474	838,474	6,4	12,7
F-802110.TR4-M-H122AA	4	2590	812,8	1143	768,35	768,35	6,4	12,7
F-802234.TR4-M	3	2990	825,5	1168,4	844,55	844,55	4,8	12,7
Z-514432.TR4	3	3110	825,5	1193,8	812,8	812,8	6,4	12,7
Z-528337.TR4	3	1360	863,6	1090	669,925	669,925	4,8	12,7
F-802204.TR4-M-A300-350	3	1870	863,6	1130,3	669,925	669,925	4,8	12,7
Z-561585.TR4	3	2170	863,6	1181,1	666,75	666,75	4,8	12,7
F-802247.TR4-M-H122AD	3	3400	863,6	1219,2	889	876,3	4,8	12,7
Z-521592.TR4	3	4080	901,7	1295,4	914,4	901,7	4,8	12,7
F-802139.TR4-M	3	3170	938,212	1270	825,5	825,5	4,8	12,7
Z-511781.TR4	3	4390	939,8	1333,5	952,5	952,5	4,8	12,7
Z-539519.TR4	3	2600	1 006,475	1295,4	764	764	4,8	12,7
F-802027.TR4-M	3	4690	1 139,825	1509,712	923,925	923,925	4,8	12,7
Z-523207.TR4	3	5770	1 200,15	1593,85	990,6	990,6	4,8	12,7
F-801326.TR4	4	6920	1 346,2	1729,74	1143	1143	4,8	12,7

¹⁾ The comparative designations were taken from documents available to us.
They give information on identical main dimensions and chamfer dimensions only.
The cage and bearing designs are not always identical.
Furthermore, the table makes no claims to completeness.

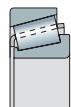


Design 3
With pin cages



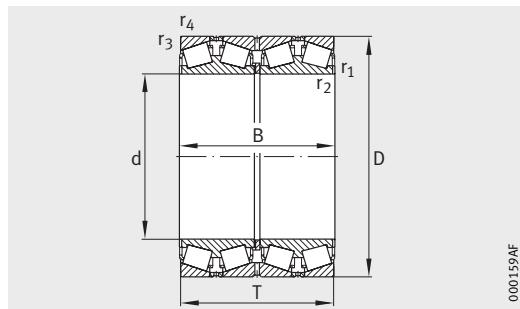
Design 4
With pin cages

Basic load ratings		Calculation factors				Fatigue limit load C_{ur} kN	Interchange designation ¹⁾ TQO types
dyn. C_r kN	stat. C_{or} kN	e	Y_1	Y_2	Y_0		
13 800	35 000	0,33	2,07	3,09	2,03	2 850	LM281849DW.810.810D
13 100	32 500	0,33	2,07	3,09	2,03	2 650	LM281849DW.810.810D
7 800	19 900	0,41	1,66	2,47	1,62	1 620	EE655271DW.345.346D
8 200	21 000	0,41	1,66	2,47	1,62	1 710	EE655271DW.345.346D
15 800	41 000	0,33	2,06	3,07	2,02	3 300	LM282549DW.510.510D
7 900	19 000	0,38	1,77	2,63	1,73	1 500	EE755281DW.360.361D
8 000	19 400	0,38	1,77	2,63	1,73	1 530	EE755281DW.360.361D
23 200	53 000	0,32	2,08	3,09	2,03	–	M383240DW.210.210D
15 700	41 000	0,33	2,03	3,02	1,98	3 300	LM282847DW.810.810D
15 700	41 000	0,33	2,03	3,02	1,98	3 300	LM282847DGW.810.810D
23 600	54 000	0,33	2,03	3,02	1,98	4 200	M283449DGW.410.410D
16 600	43 500	0,34	2,01	2,99	1,97	3 450	LM283649DW.610.610D
17 400	46 500	0,34	2,01	2,99	1,97	3 700	LM283649DW.610.610D
24 600	57 000	0,34	1,98	2,95	1,94	4 400	EE325296DW.420.421D
24 200	59 000	0,33	2,03	3,02	1,98	4 500	M284148DW.111.110D
31 500	70 000	0,39	1,72	2,56	1,68	5 200	EE631305D.484.483XD
30 000	67 000	0,39	1,72	2,56	1,68	–	EE631307D.484.483XD
26 500	65 000	0,37	1,83	2,72	1,79	4 900	–
29 500	72 000	0,34	2	2,98	1,96	5 500	M285848DW.810.810D
31 000	69 000	0,39	1,72	2,56	1,68	5 100	EE631325DW.470.470D
19 200	58 000	0,26	2,55	3,8	2,5	4 450	–
22 400	60 000	0,33	2,03	3,02	1,98	4 200	LM286249DW.210.210D
22 800	58 500	0,38	1,76	2,62	1,72	–	LM286449DW.410.410D
32 000	77 000	0,33	2,03	3,02	1,98	5 800	EE547341DW.480.481D
36 500	84 000	0,32	2,12	3,15	2,07	6 100	EE634356D.510.510D
32 000	82 000	0,32	2,12	3,15	2,07	6 000	LM287649DW.610.610D
38 000	93 000	0,33	2,03	3,02	1,98	6 800	LM287849DW.810.810D
28 000	80 000	0,33	2,03	3,02	1,98	5 800	LM288249DW.210.210D
38 000	105 000	0,32	2,09	3,11	2,04	7 300	SKF BT4B 331334/H4
46 500	129 000	0,33	2,06	3,06	2,01	–	LM288949D.910.910D
49 000	146 000	0,33	2,03	3,02	1,98	–	–



Tapered roller bearings

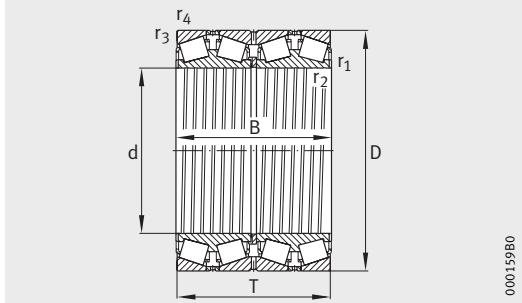
Four-row,
in metric sizes



Design 1
With sheet steel cages

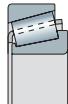
Dimension table · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	B	r ₁ , r ₂ min.	r ₃ , r ₄ min.
Z-533136.TR4	1	72,1	190	320	232	232	1	4
Z-512055.TR4	1	54	205	320	205	205	4	4
Z-567972.TR4	1	55	220	320	200	200	1,5	4
Z-532027.TR4	1	75	220	340	218	220	1,5	4
F-802105.TR4	1	100	220	340	305	305	4	3
F-802184.TR4	1	70	240	338	248	248	4	3
Z-532028.TR4	1	81	240	360	218	218	1	3
Z-534751.TR4	1	150	240	410	270	270	4	4
Z-508990.01.TR4	1	104	245	380	254	255,5	1	3
F-802200.TR4	1	88	260	368	268	268	5	5
Z-522614.TR4	1	79	260	380	200	200	2	5
Z-531025.TR4	1	119	260	400	250	250	5	5
Z-534480.TR4	1	163	260	400	345	345	5	5
F-802151.TR4	1	178	260	440	300	300	3	6
Z-574281.TR4	1	115	280	395	288	288	5	5
Z-548651.TR4	1	113	280	420	224	224	4	4
Z-532029.TR4	1	105	280	420	250	250	2	5
F-802132.TR4	1	167	280	420	345	345	5	5
Z-510039.TR4	1	197	280	460	324	324	6	6
Z-574613.TR4	1	156	300	460	248	248	5	4
F-802245.TR4	1	233	300	460	390	390	5	5
Z-534753.TR4	1	280	300	500	350	350	6	5
Z-576008.TR4	1	141	310	430	310	310	4	4
Z-566230.TR4	1	153	320	440	335	335	2	5
F-802232.TR4	1	248	340	520	325	325	6	5
Z-534754.TR4	1	485	350	590	420	420	3	6
Z-523453.TR4	2	183	355	490	316	316	1,5	2,5
Z-530758.TR4	1	260	360	510	380	380	1,5	5
Z-572344.TR4	1	267	360	520	370	370	3	4
Z-514166.TR4	1	270	360	540	325	325	6	6
Z-546304.TR4	1	282	360	540	340	340	4	5



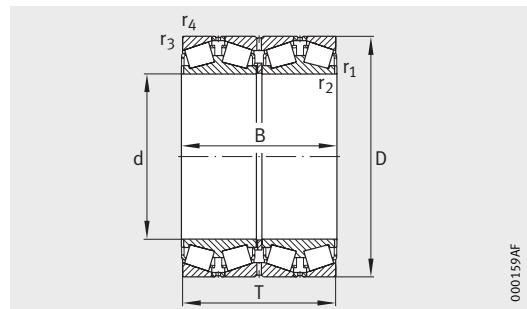
Design 2
With sheet steel cages

Basic load ratings		Calculation factors				Fatigue limit load C_{ur} kN
dyn. C_r kN	stat. C_{0r} kN	e	γ_1	γ_2	γ_0	
2 400	3 400	0,45	1,5	2,23	1,5	—
2 000	3 200	0,43	1,56	2,32	1,5	—
2 000	3 400	0,34	2	2,98	2	—
2 470	4 000	0,45	1,51	2,25	1,5	430
3 600	6 400	0,35	1,95	2,9	1,9	700
2 550	5 300	0,38	1,79	2,66	1,8	580
2 600	4 300	0,43	1,55	2,31	1,5	455
3 900	5 900	0,29	2,32	3,45	2,3	600
2 850	4 950	0,42	1,61	2,4	1,6	520
3 100	6 100	0,35	1,93	2,88	1,9	—
2 450	4 150	0,32	2,13	3,17	2,1	430
2 850	5 000	0,44	1,53	2,28	1,5	—
4 600	8 600	0,43	1,55	2,31	1,5	900
3 800	5 850	0,7	0,97	1,44	0,9	—
3 700	7 300	0,35	1,95	2,9	1,9	770
3 100	5 300	0,37	1,8	2,69	1,8	—
3 200	6 200	0,47	1,42	2,12	1,4	640
4 800	9 150	0,46	1,47	2,19	1,4	—
4 900	7 900	0,34	1,99	2,96	1,9	770
3 450	5 800	0,46	1,46	2,18	1,4	570
6 300	12 000	0,32	2,12	3,15	2,1	1 210
5 300	9 500	0,58	1,16	1,72	1,1	—
4 300	9 150	0,32	2,12	3,15	2,1	—
4 850	10 300	0,33	2,03	3,02	2	1 050
5 800	10 500	0,29	2,32	3,45	2,3	1 000
7 200	11 800	0,7	0,97	1,44	0,9	—
4 900	10 800	0,39	1,71	2,54	1,7	1 060
5 900	12 100	0,34	1,96	2,93	1,9	1 180
6 200	13 100	0,35	1,92	2,86	1,9	1 270
5 500	9 700	0,41	1,65	2,46	1,6	900
6 000	11 100	0,4	1,68	2,5	1,6	1 040



Tapered roller bearings

Four-row,
in metric sizes



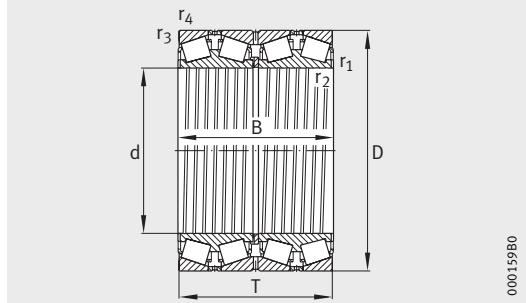
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Design 1
With sheet steel cages

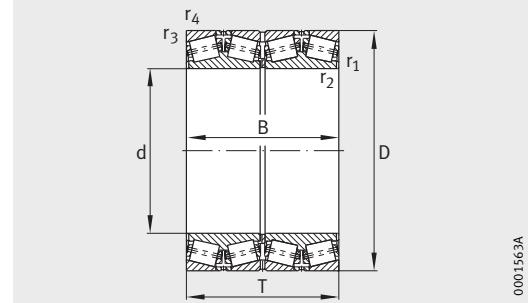
Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	B	r ₁ , r ₂ min.	r ₃ , r ₄ min.
Z-565625.TR4	1	282	380	560	325	325	2,5	6
F-802109.TR4	1	296	380	560	360	360	1,5	5
F-802109.TR4-M	3	312	380	560	360	360	1,5	5
Z-523695.TR4	1	427	380	620	388	388	5	5
Z-510038.TR4	1	510	380	620	420	420	5	5
F-802205.TR4	1	183	390	510	350	350	1,5	3
F-802116.TR4	1	193	395	545	288,7	268,7	5	7,5
F-802116.TR4-H122AA	2	193	395	545	288,7	268,7	5	7,5
F-802074.TR4	1	177	400	540	280	280	5	5
Z-534284.TR4	1	365	400	600	355	355	3	6
Z-575106.TR4	1	327	420	592	432	432	6	6
Z-539120.TR4	1	370	420	620	355	355	4	6
Z-510036.TR4	1	1000	420	760	500	500	9,5	9,5
F-802231.TR4-H122AA	2	235	430	570	336	336	1,5	6,4
Z-540515.TR4	3	432	440	620	454	454	6	6
Z-546420.TR4	1	440	440	620	454	454	6	6
F-802166.TR4	1	406	440	650	355	355	5	6
F-802063.TR4-H122AD	1 ¹⁾	277	450	595	368	368	3	6
F-802223.TR4	1	278	460	610	360	360	2,5	5
F-802208.TR4	1	368	460	625	421	421	3	9
Z-537420.TR4	1	585	460	700	420	420	6	5
Z-549349.TR4	1	950	460	760	520	520	3	6
F-802021.TR4	1	242	475	600	368	368	2	6
F-802034.TR4	1	220	475	620	380	380	2	6
Z-533018.TR4	1	470	475	660	450	450	4	6
Z-549928.TR4	1	545	480	700	420	420	6	6
F-802004.TR4	1	498	500	670	515	515	5	5
Z-535689.TR4	3	551	500	680	515	515	6	6
Z-533019.TR4	1	560	500	680	515	515	6	6
Z-532030.TR4	1	540	500	720	400	400	3	6
Z-537903.TR4	1	564	500	720	420	420	7,5	7,5
Z-527904.TR4	1	1 250	500	830	570	570	9,5	9,5

¹⁾ With lubrication holes through the inner ring central rib.

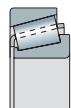


Design 2
With sheet steel cages



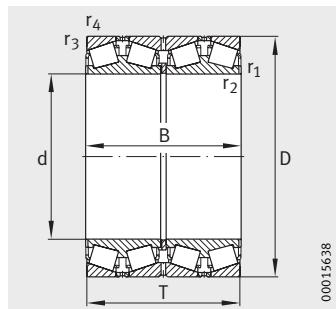
Design 3
With pin cages

Basic load ratings		Calculation factors				Fatigue limit load
dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN
5 900	11 000	0,35	1,95	2,9	1,9	1 020
6 600	12 700	0,35	1,95	2,9	1,9	1 180
6 800	13 100	0,35	1,95	2,9	1,9	1 220
7 900	13 300	0,43	1,57	2,34	1,5	1 190
8 500	14 200	0,46	1,47	2,19	1,4	1 290
5 300	12 200	0,33	2,03	3,02	2	1 180
4 150	8 500	0,47	1,43	2,12	1,4	780
4 150	8 500	0,47	1,43	2,12	1,4	780
4 150	8 500	0,47	1,43	2,12	1,4	780
6 700	13 500	0,34	1,99	2,96	1,9	1 230
8 000	17 000	0,4	1,68	2,5	1,6	1 560
6 800	12 800	0,43	1,58	2,36	1,6	1 150
12 300	20 200	0,35	1,95	2,9	1,9	1 700
5 800	13 500	0,44	1,54	2,29	1,5	1 260
9 300	20 000	0,4	1,68	2,5	1,6	1 830
9 000	19 500	0,4	1,68	2,5	1,6	1 770
7 200	13 400	0,48	1,42	2,11	1,4	–
6 800	15 900	0,33	2,03	3,02	2	1 470
6 600	14 600	0,38	1,77	2,64	1,7	1 330
8 100	18 300	0,33	2,03	3,02	2	1 660
8 800	16 600	0,43	1,56	2,32	1,5	–
12 500	22 400	0,45	1,5	2,23	1,5	–
6 300	16 000	0,26	2,55	3,8	2,5	–
7 100	17 000	0,29	2,32	3,45	2,3	–
9 300	20 500	0,37	1,8	2,69	1,8	1 830
9 150	18 000	0,32	2,11	3,14	2,1	–
9 900	23 900	0,33	2,03	3,02	2	2 130
11 100	26 000	0,29	2,32	3,45	2,3	2 310
10 700	24 600	0,29	2,32	3,45	2,3	2 190
8 800	16 800	0,46	1,48	2,2	1,5	1 440
9 300	18 800	0,33	2,04	3,04	2	1 630
14 300	25 000	0,37	1,8	2,69	1,8	–

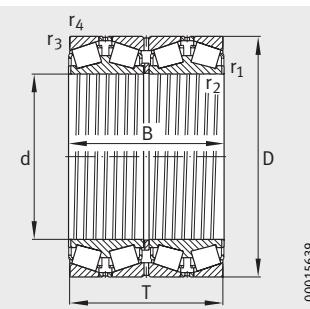


Tapered roller bearings

Four-row,
in metric sizes



Design 1
With sheet steel cages

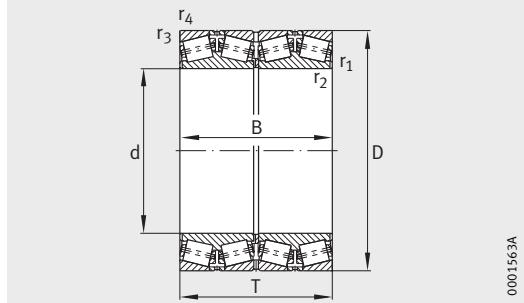


Design 2
With sheet steel cages

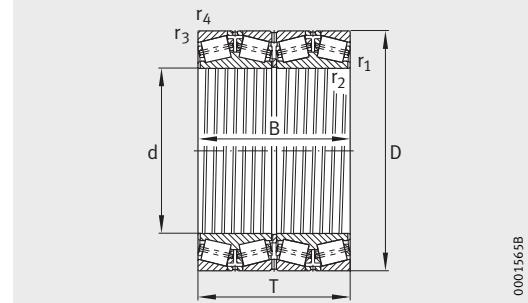
Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	B	r ₁ , r ₂ min.	r ₃ , r ₄ min.
F-802020.TR4-H122BR	2	314	510	655	379	377	1,5	6,4
Z-546305.TR4	1	735	530	780	450	450	3	6
Z-579827.TR4	1	1 380	530	880	544	544	9,5	9,5
F-802005.TR4	1	810	533	810	450	450	7,5	7,5
Z-565904.TR4	3	786	535	750	560	560	7,5	7,5
F-802202.TR4	1	373	540	690	400	400	2,5	5
Z-518888.TR4	1	224	560	740	460	460	3,3	6,4
Z-539193.TR4	3	1 690	560	920	620	620	9,5	9,5
Z-577804.TR4	3	753	570	780	515	515	6	6
Z-533792.TR4	1	975	570	810	590	590	3	6
F-802178.TR4-H122BD	1	485	600	800	365	365	6	5
Z-568986.TR4	1	968	600	870	488	488	3	7,5
F-802250.TR4	1	460	620	800	365	365	2,5	5
Z-534756.TR4	1	1 130	630	920	515	515	9,5	9,5
F-800695.TR4	4	1 400	635	900	660	660	9,5	9,5
F-802141.TR4-M	3	1 850	645	1 030	560	560	9,5	15
F-802061.TR4-M	3	1 840	647	1 030	560	560	9,5	15
F-802057.TR4-M	3	1 450	650	915	674	674	3,6	6,1
F-802060.TR4-M	3	1 830	650	1 030	560	560	9,5	15
Z-510033.TR4	1	472	660	855	320	320	5	7,5
Z-534757.TR4	3	2 310	660	1 070	650	650	9,5	9,5
Z-537905.TR4	3	2 700	670	1 090	710	710	9,5	9,5
Z-566305.TR4	4	1 150	676	910	620	620	4	7,5
F-802121.TR4-AD-H122EK	2	617	710	900	410	410	3,3	6,4
F-802121.TR4	1	617	710	900	410	410	3,3	6,4
F-802121.TR4-H122BR	1	617	710	900	410	410	3,3	6,4
F-802121.TR4-M	3 ¹⁾	638	710	900	410	410	3,3	6,4
F-802121.TR4-M-H122AA	4	638	710	900	410	410	3,3	6,4
F-802121.TR4-M-H122BR	3	638	710	900	410	410	3,3	6,4
F-802121.TR4-M-H122DZ	4	634	710	900	410	410	3,3	6,4

¹⁾ With plus tolerances for the bearing bore and outside diameter.



Design 3
With pin cages



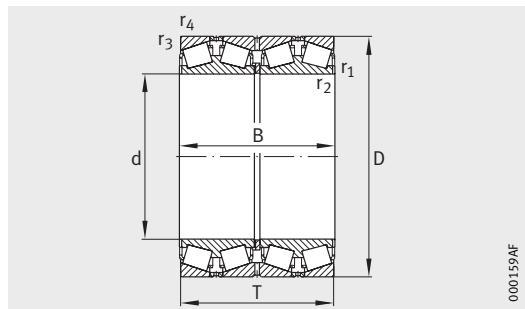
Design 4
With pin cages

Basic load ratings		Calculation factors				Fatigue limit load
dyn. C_r kN	stat. C_{0r} kN	e	γ_1	γ_2	γ_0	C_{ur} kN
7 300	18 000	0,35	1,95	2,9	1,9	1 610
11 200	21 600	0,36	1,86	2,77	1,8	-
14 300	27 500	0,46	1,47	2,19	1,4	2 240
10 600	20 600	0,37	1,82	2,71	1,8	1 720
13 000	29 000	0,35	1,95	2,9	1,9	2 500
7 800	21 200	0,37	1,8	2,69	1,8	1 870
10 000	24 500	0,32	2,14	3,18	2,1	-
18 700	34 000	0,4	1,68	2,5	1,6	2 750
12 700	29 500	0,36	1,87	2,79	1,8	2 500
14 300	32 000	0,31	2,15	3,2	2,1	2 700
8 600	18 200	0,32	2,08	3,1	2	1 500
12 900	26 000	0,43	1,57	2,34	1,5	2 090
7 500	18 300	0,37	1,83	2,73	1,8	-
14 600	29 500	0,43	1,57	2,34	1,5	2 370
18 600	44 000	0,33	2,03	3,02	2	-
18 400	34 000	0,31	2,16	3,22	2,1	2 650
18 400	34 000	0,31	2,16	3,22	2,1	2 650
18 700	45 000	0,33	2,03	3,02	2	3 650
18 400	34 000	0,31	2,16	3,22	2,1	2 650
7 700	17 800	0,35	1,91	2,84	1,9	1 440
23 100	42 500	0,31	2,15	3,2	2,1	3 200
26 000	50 000	0,29	2,32	3,45	2,3	3 800
17 400	41 500	0,37	1,8	2,69	1,8	3 400
10 400	26 500	0,35	1,95	2,9	1,9	-
10 500	26 500	0,35	1,95	2,9	1,9	2 140
10 500	26 500	0,35	1,95	2,9	1,9	2 140
10 600	27 000	0,35	1,95	2,9	1,9	2 180
10 600	27 000	0,35	1,95	2,9	1,9	2 180
10 600	27 000	0,35	1,95	2,9	1,9	2 180
10 600	27 000	0,35	1,95	2,9	1,9	2 180



Tapered roller bearings

Four-row,
in metric sizes

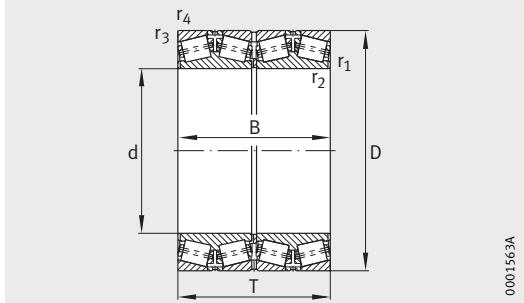


Design 1
With sheet steel cages

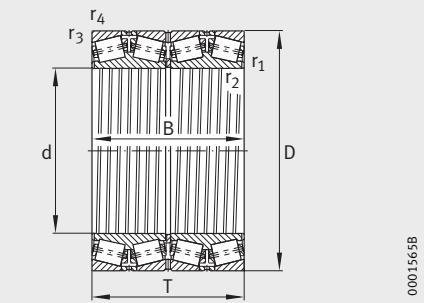
Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	B	r ₁ , r ₂ min.	r ₃ , r ₄ min.
F-802263.TR4-M-H122AA	4	895	730	940	500	500	3	6
F-802033.TR4-M	3	712	750	950	410	410	6	6
Z-572275.TR4	3	2 540	750	1 130	690	690	9,5	9,5
Z-581213.TR4	3	4 110	750	1 220	840	840	12	12
Z-533277.TR4	1	1 300	785	1 040	560	560	6	12
Z-549321.TR4	3	2 870	840	1 170	840	840	6	6
Z-522129.TR4	3	5 290	850	1 360	910	910	5	9,5
Z-525433.TR4	3	605	935	1 150	710	710	3	6
Z-533780.TR4	3	4 250	950	1 360	880	880	12	12
Z-531009.TR4	3	3 820	1 000	1 333,5	952,5	952,5	4,8	12,7
F-802070.01.TR4-M	3 ¹⁾	3 690	1 070	1 400	889,6	890	5,1	13,2
Z-577801.TR4	3	5 150	1 320	1 760	800	800	7,5	12
Z-521936.TR4	4	6 700	1 370	1 765	1 050	1 035	5	12
Z-543378.TR4	3	7 300	1 400	1 820	1 160	1 160	6,4	12,7
Z-533447.TR4	3	9 840	1 500	1 950	1 230	1 230	12	12
Z-534898.TR4	3	7 870	1 600	1 950	1 230	1 230	12	6
Z-535133.TR4	3	11 500	1 600	2 060	1 300	1 300	12	12
Z-535105.TR4	3	16 960	1 600	2 240	1 300	1 300	7,5	15

¹⁾ Bearing with four outer rings.

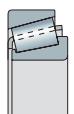


Design 3
With pin cages



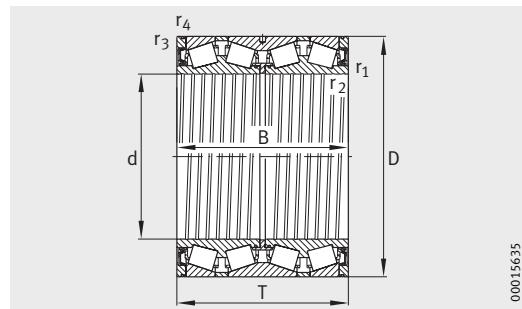
Design 4
With pin cages

Basic load ratings		Calculation factors				Fatigue limit load
dyn. C_r kN	stat. C_{0r} kN	e	γ_1	γ_2	γ_0	C_{ur} kN
14 400	36 500	0,35	1,95	2,9	1,9	2 950
11 400	29 000	0,35	1,95	2,9	1,9	-
24 300	49 000	0,49	1,38	2,06	1,4	3 650
32 500	64 000	0,32	2,12	3,15	2,1	-
16 300	42 000	0,41	1,63	2,43	1,6	3 300
30 000	72 000	0,29	2,31	3,44	2,3	-
39 000	78 000	0,32	2,12	3,15	2,1	-
22 800	69 500	0,26	2,55	3,8	2,5	-
36 500	85 000	0,37	1,8	2,69	1,8	6 100
33 500	98 000	0,35	1,95	2,9	1,9	7 200
32 500	91 500	0,36	1,87	2,79	1,8	-
38 500	97 000	0,35	1,95	2,9	1,9	6 400
51 000	152 000	0,33	2,03	3,02	2	10 100
51 000	151 000	0,38	1,78	2,65	1,7	9 900
64 000	190 000	0,32	2,12	3,15	2,1	12 300
57 000	215 000	0,26	2,55	3,8	2,5	13 900
73 000	225 000	0,26	2,55	3,8	2,5	14 200
81 500	212 000	0,4	1,68	2,5	1,6	-



Tapered roller bearings

Four-row,
sealed on both sides



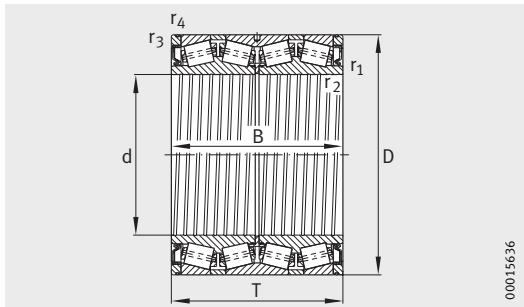
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Design 5
With sheet steel cages

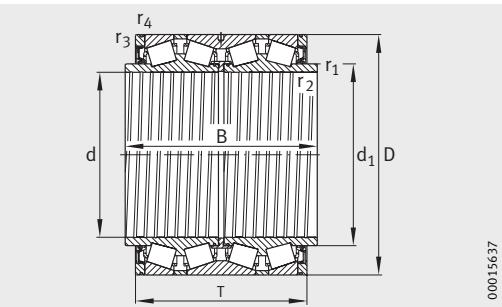
Dimension table · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions			
			d	D	T	B
F-802160.TR4	5	79	216,103	330,2	269,875	263,525
Z-576479.TR4	5	164	228,6	400,05	296,875	296,875
Z-573745.TR4	5	52	234,95	327,025	196,85	196,85
F-802190.TR4	5	69	241,478	349,148	228,6	228,6
F-802082.TR4	5	42,5	244,475	327,025	193,675	193,675
F-802192.TR4-H122AE	5	123	244,475	381	304,8	304,8
F-802066.TR4	5	83	254	358,775	269,875	269,875
Z-578395.TR4	6	180	260,35	422,275	317,5	314,325
F-802011.TR4	5	60,4	266,7	355,6	228,6	230,188
F-802011.TR4-H122AE	5 ¹⁾	60,6	266,7	355,6	228,6	230,188
Z-573688.TR4	5	115	266,7	393,7	269,878	269,878
Z-580961.TR4	5	84	273,05	381	244,475	244,475
F-802193.TR4-H122AE	5 ¹⁾	100	276,225	393,7	269,878	269,878
Z-575940.TR4	5	106	279,4	393,7	269,878	269,878
F-802101.TR4-A250-300	5	74	285,75	380,898	244,475	244,475
F-802096.TR4	5	117	288,925	406,4	298,45	298,45
F-802071.TR4-H122AG	5	128	304,648	438,048	279,4	280,99
F-802079.TR4	5	104	304,8	419,1	269,875	269,875
Z-577249.TR4	5	106	304,902	412,648	266,7	266,7
F-802025.TR4	5	98,6	304,902	412,648	266,7	266,7
F-802025.TR4-H122AF	5	98,1	304,902	412,648	266,7	266,7
Z-567640.TR4	7	113	304,902	412,648	266,7	336,55
F-802072.TR4-H122AG	5	128	305,003	438,048	279,4	280,99
F-802081.TR4-H122AE	5 ¹⁾	102	317,5	422,275	269,875	269,875
Z-581035.TR4	5	168	317,5	447,675	327,025	327,025
F-802068.TR4	5	97	330,302	438,023	254	247,65
Z-576210.TR4	5	193	333,375	469,9	342,9	342,9
F-802108.TR4-H122AG	5	109	341,312	457,098	254	254
Z-578862.TR4	5	119	343,052	457,098	254	254
F-802003.TR4-H122AF	5	108	343,052	457,098	254	254
F-802003.TR4-H122AG	5	108	343,052	457,098	254	254
F-802025.TR4-H122BJ	5 ¹⁾	108	343,052	457,098	254	254
F-802029.TR4	5	208	346,075	488,95	358,775	358,775

¹⁾ Without helical grooves in the inner ring bore.

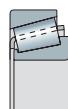


Design 6
With pin cages



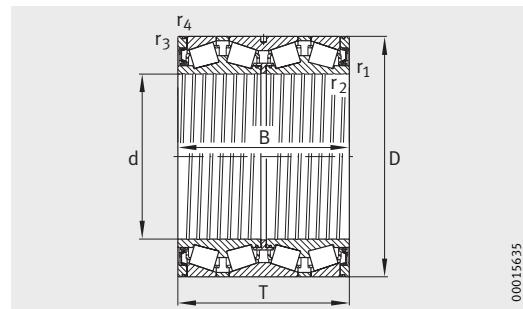
Design 7
With sheet steel cages

			Basic load ratings		Calculation factors				Fatigue limit load
r ₁ , r ₂	r ₃ , r ₄	d ₁	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN
min.	min.								
1,5	3,3	—	2 200	3 750	0,55	1,24	1,84	1,21	—
3,3	3,3	—	3 800	5 500	0,33	2,02	3	1,97	560
1,5	3,3	—	1 620	2 900	0,46	1,48	2,2	1,45	295
1,5	3,3	—	2 120	3 650	0,37	1,8	2,69	1,76	—
1,5	3,3	—	1 470	2 700	0,47	1,43	2,12	1,4	255
3,3	4,8	—	3 450	5 700	0,45	1,51	2,24	1,47	—
1,5	3,3	—	2 700	5 100	0,35	1,95	2,9	1,91	540
6,4	3,3	—	3 900	6 200	0,33	2,03	3,02	1,98	630
1,5	2	—	2 190	4 400	0,36	1,87	2,79	1,83	470
1,5	2	—	2 190	4 400	0,36	1,87	2,79	1,83	470
1,5	3,3	—	3 000	5 400	0,45	1,49	2,22	1,46	560
1,5	3,3	—	2 500	4 900	0,43	1,57	2,34	1,53	500
1,5	3,3	—	3 000	5 400	0,45	1,49	2,22	1,46	560
1,5	3,3	—	3 000	5 400	0,45	1,49	2,22	1,46	560
1,5	3,3	—	2 600	5 300	0,43	1,56	2,33	1,53	—
3,3	3,3	—	3 600	6 950	0,35	1,95	2,9	1,91	—
3,3	3,3	—	3 550	6 300	0,47	1,43	2,12	1,4	630
3,3	6,4	—	3 150	5 900	0,49	1,38	2,06	1,35	600
3,3	2	—	2 800	5 500	0,52	1,31	1,95	1,28	560
3,3	3,3	—	3 050	6 100	0,32	2,12	3,15	2,07	620
3,3	3,3	—	3 050	6 100	0,32	2,12	3,15	2,07	620
3,3	3,3	330,2	3 050	6 100	0,32	2,12	3,15	2,07	620
3,3	3,3	—	3 550	6 300	0,47	1,43	2,12	1,4	630
1,5	3,3	—	3 050	6 500	0,32	2,12	3,15	2,07	660
3,3	3,3	—	4 250	8 500	0,33	2,03	3,02	1,98	—
1,5	3,3	—	2 700	5 300	0,43	1,57	2,34	1,53	520
3,3	3,3	—	4 750	9 500	0,34	1,97	2,93	1,92	—
1,5	3,3	—	3 000	6 000	0,47	1,43	2,12	1,4	590
1,5	3,3	—	2 600	5 200	0,7	0,97	1,44	0,94	500
1,5	3,3	—	3 000	6 000	0,47	1,43	2,12	1,4	590
1,5	3,3	—	3 000	6 000	0,47	1,43	2,12	1,4	590
1,5	3,3	—	3 000	6 000	0,47	1,43	2,12	1,4	—
3,3	3,3	—	5 000	10 100	0,32	2,12	3,16	2,08	990



Tapered roller bearings

Four-row,
sealed on both sides



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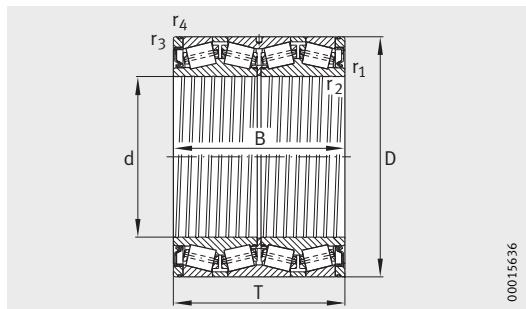
Design 5
With sheet steel cages

Dimension table (continued) · Dimensions in mm

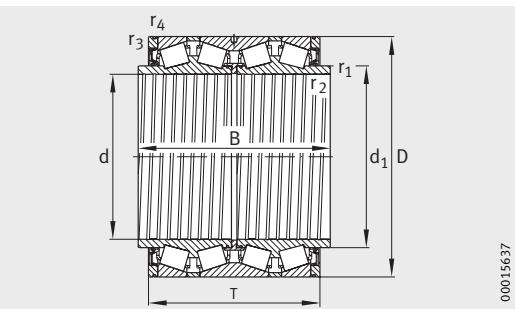
Designation	Design	Mass m ≈kg	Dimensions			
			d	D	T	B
F-802023.TR4	5	137	355,6	482,6	269,875	265,112
Z-575032.TR4	7	152	355,6	482,6	269,875	330,2
F-802111.TR4	5	177	355,6	488,95	317,5	317,5
Z-579769.TR4	5	255	368,3	523,875	382,588	382,588
F-802015.TR4	5	175	385,762	514,35	317,5	317,5
Z-573326.TR4	5	192	406,4	546,1	288,925	268,288
F-802039.TR4	5	182	406,4	546,1	288,925	288,925
F-802078.TR4	5	209	409,575	546,1	334,962	334,962
Z-576306.TR4	5	382	415,925	590,55	434,975	434,975
F-802046.TR4-M	6	385	415,925	590,55	434,975	434,975
Z-564363.TR4	5	180	431,8	571,5	279,4	279,4
F-802013.TR4-M	6	230	431,8	571,5	336,55	336,55
F-802044.TR4	5	359	440	590	480	480
F-800917.TR4	5	378	440	650	353,05	353,05
Z-574347.TR4	5	229	444,5	571,5	355,6	355,6
Z-575857.TR4	6	470	447,675	635	463,55	463,55
F-802180.TR4	5	275	450	595	368	368
F-802188.TR4	5	196	457,2	596,9	279,4	276,225
F-802042.TR4-M-H122AF	6	201	457,2	596,9	279,4	276,225
F-802167.TR4	5	286	460	610	360	360
Z-572067.TR4	5	574	479,425	679,45	495,3	495,3
F-802007.TR4-H122BH	5 ¹⁾	233	482,6	615,95	330,2	330,2
F-802007.TR4-H122AG	5	233	482,6	615,95	330,2	330,2
Z-579990.TR4	5 ²⁾	246	482,6	615,95	330,2	330,2
F-802260.TR4-H122DN-J44-W72D	5	274	482,6	615,95	385	385
F-802112.TR4	5	283	482,6	615,95	400	400
F-802143.TR4-H122AG	7	245	482,6	615,95	330,2	406,4
F-802149.TR4	7	273	482,6	615,95	377,825	406,4
F-802149.TR4-H122AF	7	272	482,6	615,95	377,825	406,4
Z-564537.TR4	7	247	482,6	615,95	330,2	419,1
Z-579576.TR4	5	251	482,6	615,95	402,05	419,1
F-802267.TR4	5	250	489,026	634,873	320,675	320,675

¹⁾ Without helical grooves in the inner ring bore.

²⁾ Bearing with lubrication holes through the inner ring central rib.

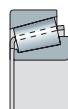


Design 6
With pin cages



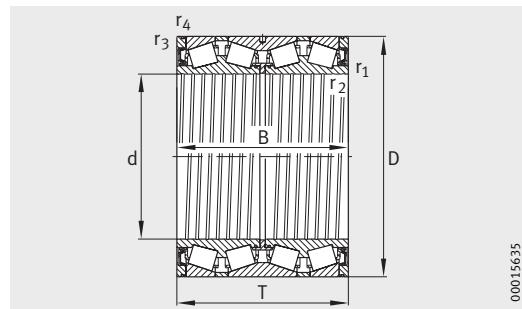
Design 7
With sheet steel cages

			Basic load ratings		Calculation factors				Fatigue limit load
r_1, r_2	r_3, r_4	d_1	dyn. C_r kN	stat. C_{0r} kN	e	γ_1	γ_2	γ_0	C_{ur} kN
min.	min.								
1,5	3,3	–	3 150	6 400	0,49	1,36	2,03	1,33	620
1,5	3,3	381	3 150	6 400	0,49	1,36	2,03	1,33	620
1,5	3,3	–	4 450	9 400	0,32	2,11	3,14	2,06	920
3,3	6,4	–	5 900	11 900	0,32	2,12	3,15	2,07	1 140
3,3	3,3	–	4 400	9 300	0,44	1,52	2,26	1,49	890
1,5	6,4	–	3 500	6 700	0,49	1,38	2,06	1,35	570
0,9	6,4	–	3 900	7 800	0,48	1,41	2,1	1,38	710
1,5	6,4	–	5 000	10 800	0,4	1,69	2,52	1,65	1 010
–	6,4	–	7 100	15 000	0,52	1,31	1,95	1,28	1 390
2,3	6,4	–	7 500	15 600	0,34	1,97	2,94	1,93	1 440
1,5	3,3	–	3 900	7 600	0,62	1,1	1,63	1,07	670
1,5	3,3	–	4 800	10 500	0,46	1,48	2,21	1,45	980
3	5	–	7 800	18 400	0,35	1,95	2,9	1,91	1 710
5	6	–	6 300	11 400	0,37	1,8	2,69	1,76	–
3,3	18,7X25°	–	5 400	12 900	0,35	1,95	2,9	1,91	–
3,3	6,4	–	8 500	18 000	0,35	1,95	2,9	1,91	1 620
3	3	–	5 600	13 600	0,29	2,31	3,44	2,26	1 260
1,5	3,3	–	3 700	7 700	0,47	1,43	2,12	1,4	640
1,5	3,3	–	3 800	8 200	0,61	1,11	1,66	1,09	740
2,5	5	–	5 600	12 900	0,39	1,72	2,57	1,69	–
3,3	3,3	–	9 900	20 900	0,35	1,92	2,86	1,88	1 850
6,4	3,3	–	5 200	12 300	0,36	1,87	2,79	1,83	1 110
6,4	3,3	–	5 200	12 200	0,36	1,87	2,79	1,83	–
6,4	3,3	–	5 200	12 200	0,36	1,87	2,79	1,83	–
6,4	6,4	–	6 000	15 000	0,35	1,95	2,9	1,91	–
6,4	6,4	–	6 300	15 800	0,31	2,21	3,29	2,16	1 440
4	3,3	514,35	5 200	12 300	0,36	1,87	2,79	1,83	1 110
4	3,3	514,35	5 800	14 300	0,31	2,21	3,29	2,16	1 300
4	3,3	514,35	5 800	14 300	0,31	2,21	3,29	2,16	1 300
3,3	6,4	514,35	5 200	12 300	0,36	1,87	2,79	1,83	1 110
3,3	3,3	–	5 400	14 000	0,37	1,83	2,72	1,79	1 280
3,3	3,3	–	5 200	11 600	0,43	1,57	2,34	1,53	–



Tapered roller bearings

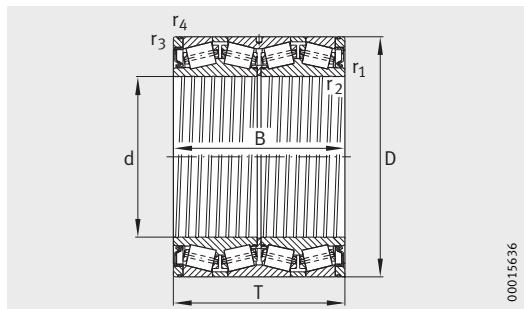
Four-row,
sealed on both sides



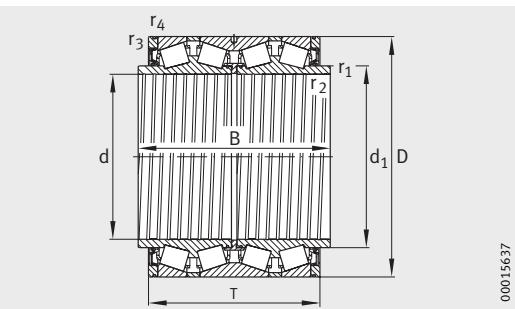
Design 5
With sheet steel cages

Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions			
			d	D	T	B
Z-577346.TR4	5	632	501,65	711,2	520,7	520,7
Z-574472.TR4	5	732	519,113	736,6	536,575	536,575
F-802152.TR4	5	356	540	690	400	400
Z-575848.TR4	5	371	558,8	736,6	322,263	322,263
F-802080.TR4	5	512	558,8	736,6	457,2	455,612
Z-574859.TR4	5	480	584,2	762	401,638	396,875
F-802186.TR4	5	586	585,788	771,525	479,425	479,425
F-802186.TR4-M	6	594	585,788	771,525	479,425	479,425
F-802171.01.TR4	5	1 130	595,312	844,55	615,95	615,95
Z-578717.TR4	6	820	600	850	450	450
F-802043.TR4-H122AG	5	426	609,6	787,4	361,95	361,95
Z-573689.TR4	5	695	609,6	813,562	479,425	479,425
Z-580638.TR4	6	1 360	635	901,7	624,05	654,05
Z-572660.TR4	6	1 530	657,225	933,45	676,275	676,275
Z-575037.TR4	5	970	679,45	901,7	552,45	552,45
F-802087.TR4-M	6	522	685,8	876,3	355,6	352,425
Z-574473.TR4	6	1 060	708,025	930,275	565,15	565,15
F-802095.TR4	5	570	710	900	410	410
F-802095.TR4-M	6	600	710	900	410	410
F-802031.TR4	5	507	711,2	914,4	317,5	317,5
F-802031.TR4-M	6	523	711,2	914,4	317,5	317,5
Z-567922.TR4	7	575	711,2	914,4	317,5	425,45
Z-565250.TR4	6	2 190	749,3	1 066,8	736,6	723,9
F-802069.TR4-M-H122BU	6	2 640	863,6	1 169,987	844,55	844,55
Z-576211.TR4	6	3 360	863,6	1 219,2	889	876,3

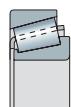


Design 6
With pin cages



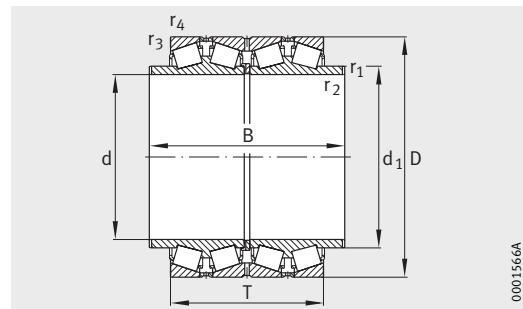
Design 7
With sheet steel cages

			Basic load ratings		Calculation factors				Fatigue limit load
r ₁ , r ₂	r ₃ , r ₄	d ₁	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN
min.	min.								
3,3	6,4	—	10 600	22 400	0,37	1,8	2,69	1,76	1 960
3,3	6,4	—	11 500	25 000	0,33	2,03	3,02	1,98	2 180
2,5	5	—	6 950	17 000	0,37	1,8	2,69	1,76	—
3,3	6,4	—	5 800	12 500	0,35	1,95	2,9	1,91	1 040
3,3	6,4	—	9 000	21 600	0,35	1,95	2,9	1,91	—
3,3	6,4	—	7 900	17 800	0,47	1,43	2,12	1,4	1 510
3,3	6,4	—	9 500	22 700	0,35	1,95	2,9	1,91	1 920
3,3	6,4	—	9 800	23 800	0,35	1,95	2,9	1,91	2 010
3,3	6,4	—	12 900	32 000	0,38	1,78	2,66	1,75	—
5	7,5	—	9 700	20 000	0,32	2,12	3,15	2,07	1 620
3,3	6,4	—	7 100	16 200	0,4	1,68	2,5	1,64	1 340
6,4	3,3	—	10 500	24 500	0,35	1,95	2,9	1,91	2 040
3,3	6,4	—	16 800	38 000	0,33	2,03	3,02	1,98	3 100
3,3	6,4	—	17 800	40 000	0,35	1,95	2,9	1,91	3 250
3,3	6,4	—	13 500	33 000	0,33	2,03	3,02	1,98	2 700
3,3	6,4	—	7 400	17 000	0,4	1,68	2,5	1,64	1 350
3,3	6,4	—	14 000	35 500	0,33	2,03	3,02	1,98	2 850
3,3	6,4	—	9 100	20 600	0,37	1,8	2,69	1,76	1 640
3,3	6,4	—	9 400	21 600	0,37	1,8	2,69	1,76	1 710
3,3	6,4	—	5 850	14 000	0,37	1,8	2,69	1,76	—
3,3	6,4	—	6 000	14 300	0,37	1,8	2,69	1,76	—
3,3	6,4	767	7 900	19 000	0,38	1,77	2,63	1,73	1 500
25,4X20°	9,7	—	22 200	49 500	0,35	1,95	2,9	1,91	3 750
4,8	12,7	—	25 000	64 000	0,37	1,84	2,74	1,8	4 750
4,8	12,7	—	29 000	68 000	0,35	1,95	2,9	1,91	5 100



Tapered roller bearings

Four-row,
with extended inner rings



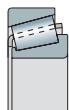
Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions				
		d	D	T	B	d ₁
F-802176.TR4	98	273,05	381	244,475	304,8	304,8
Z-547044.TR4	89,5	279,578	380,898	244,475	304,8	304,8
Z-522458.TR4	82	285,75	380,898	244,475	314,475	300
Z-549895.TR4	111	304,902	412,648	266,7	336,55	330,2
Z-572368.TR4	126	343,052	457,098	254	323,85	365,13
F-802120.TR4	110	355,6	457,2	252,412	323,85	374,65
Z-547043.TR4	150	355,6	482,6	269,875	330,2	381
Z-544260.TR4	190	355,6	488,95	317,5	381	381
Z-564155.TR4	154	374,65	501,65	260,35	323,85	400,05
Z-541941.TR4	210	431,8	571,5	279,4	368,3	457,2
Z-548232.TR4	245	431,8	571,5	336,55	412,75	454,03
Z-574289.TR4	220	444,5	571,5	317,5	355,6	469,9
Z-548641.TR4	199	482,6	615,95	330,2	406,4	514,35
F-802059.TR4-H122AB	261	482,6	615,95	330,2	419,1	514,35
Z-548234.TR4	680	501,65	711,2	520,7	603,25	539,75
Z-548233.TR4	838	536,575	761,873	558,8	638,175	577,85
Z-561017.TR4	625	585,788	771,525	479,425	555,625	622,3
Z-523039.TR4	551	685,8	876,3	355,6	457,2	736,6
F-802041.TR4-M¹⁾	588	685,8	876,3	355,6	457,2	736,6
Z-532479.TR4²⁾	588	711,2	914,4	317,5	425,45	774,7

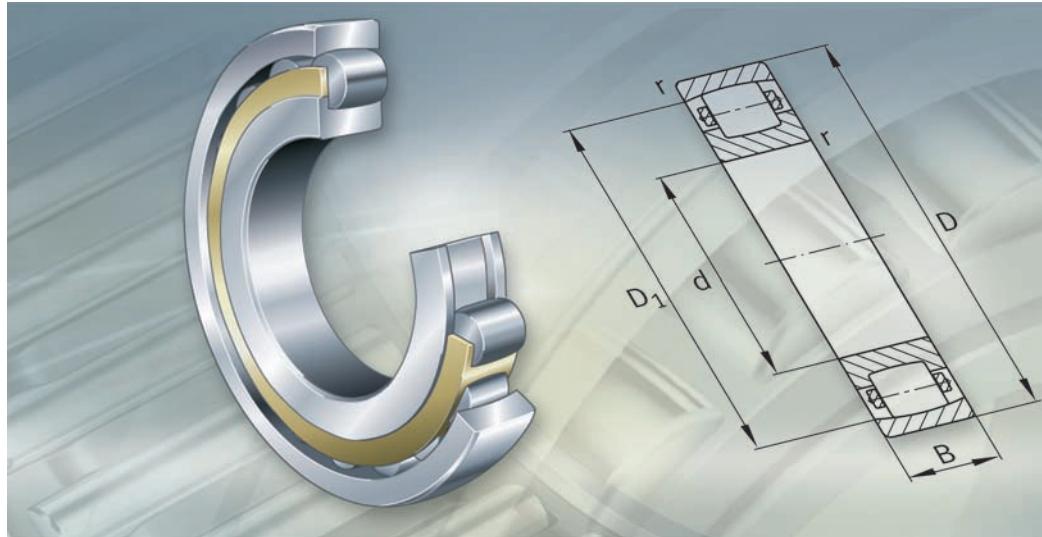
¹⁾ With pin cages.

²⁾ Helical grooves in the inner ring bores.

		Basic load ratings		Calculation factors				Fatigue limit load
r ₁ , r ₂	r ₃ , r ₄	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN
min.	min.							
1,5	3,3	2 600	6 100	0,42	1,6	2,39	1,57	650
1,5	3,3	2 600	6 100	0,42	1,6	2,39	1,57	650
1,5	3,3	2 600	6 100	0,42	1,6	2,39	1,57	650
6,4	3,3	3 650	7 700	0,32	2,12	3,15	2,07	790
1,5	3,3	3 450	7 100	0,47	1,43	2,12	1,4	–
1,5	3,3	3 450	8 100	0,32	2,12	3,15	2,07	810
1,5	3,3	3 550	7 900	0,45	1,51	2,25	1,48	770
1,5	3,3	4 900	10 800	0,39	1,71	2,54	1,67	1 060
1,5	3,3	3 750	7 600	0,47	1,43	2,12	1,4	730
1,5	3,3	4 650	9 600	0,55	1,24	1,84	1,21	890
1,5	6,4	5 800	13 500	0,44	1,54	2,29	1,5	1 260
1,5	3,3	5 400	12 900	0,35	1,95	2,9	1,91	1 200
4,1	6,4	5 400	14 000	0,37	1,83	2,72	1,79	1 280
3,6	6,4	5 400	14 000	0,37	1,83	2,72	1,79	1 280
3,3	6,4	11 400	25 500	0,35	1,92	2,86	1,88	–
3,3	6,4	13 800	30 000	0,3	2,28	3,39	2,23	2 600
3,3	6,4	10 200	25 500	0,33	2,03	3,02	1,98	2 160
3,3	6,4	7 800	19 900	0,41	1,66	2,47	1,62	1 620
3,3	6,4	8 200	21 000	0,41	1,66	2,47	1,62	1 710
8,1	6,4	7 400	19 100	0,38	1,77	2,63	1,73	1 520



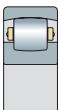
FAG



Barrel roller bearings

Barrel roller bearings

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Product overview Barrel roller bearings

Cylindrical bore

202, 203



00014EDD

Tapered bore

202..-K, 203..-K



00014EDE

With adapter sleeve

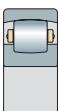
202..-K + H, 203..-K + H



00014EOF

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 are not separable. Barrel roller bearings are particularly suitable where high radial shock type loads occur and misalignments must be compensated, see section Compensation of angular misalignments. They have only a low axial load carrying capacity.											
With tapered bore and with adapter sleeve	Bearings with a tapered bore have the bore taper 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	Barrel roller bearings are not sealed.											
Lubrication	The bearings can be lubricated from the end faces 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. Bearings with an outside diameter of more than 120 mm are dimensionally stable up to +200 °C.											
Cages	Barrel roller bearings with solid brass cages have the suffix MB. The cages are guided on the inner ring.											
Suffixes	Suffixes for available designs: see table.											
Available designs	<table border="1"><thead><tr><th>Suffix</th><th>Description</th><th>Design</th></tr></thead><tbody><tr><td>C3</td><td>Radial internal clearance larger than normal</td><td>Standard for tapered bore</td></tr><tr><td>K</td><td>Tapered bore</td><td rowspan="2">Standard</td></tr><tr><td>MB</td><td>Solid brass cage</td></tr></tbody></table>	Suffix	Description	Design	C3	Radial internal clearance larger than normal	Standard for tapered bore	K	Tapered bore	Standard	MB	Solid brass cage
Suffix	Description	Design										
C3	Radial internal clearance larger than normal	Standard for tapered bore										
K	Tapered bore	Standard										
MB	Solid brass cage											



Barrel roller bearings

Design and safety guidelines

Equivalent dynamic bearing load

The equivalent dynamic load P is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

For bearings under dynamic loading, the following applies:

$$P = F_r + 9,5 \cdot F_a$$

P kN

Equivalent dynamic bearing load for combined load

F_a kN

Axial dynamic bearing load

F_r kN

Radial dynamic bearing load.

Equivalent static bearing load

The equivalent static load P_0 is valid for bearings that are subjected to radial and axial static loads. It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + 5 \cdot F_{0a}$$

P_0 kN

Equivalent static bearing load for combined load

F_{0a} kN

Axial static bearing load

F_{0r} kN

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, roller bearings with cage must therefore be subjected to a minimum radial load of the order of $P/C_r > 0,02$.

Speeds

ISO 15 312 does not give thermal reference speeds for barrel roller bearings.



The dimension tables therefore only state limiting speeds n_G . These values are for oil lubrication and must not be exceeded.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

Mounting dimensions

The dimension tables give the maximum dimensions of the radii r_a and the diameters of the abutment shoulders D_a and d_a .

Bearings with a tapered inner ring bore are:

- located either directly on a tapered shaft seat 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 of the support ring, see dimension tables.

Accuracy

The main dimensions of the bearings correspond to DIN 635-1. The dimensional and running tolerances correspond to tolerance class PN to DIN 620-2.

Radial internal clearance of bearings with cylindrical bore

Radial internal clearance

Bore d mm		Radial internal clearance							
		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
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

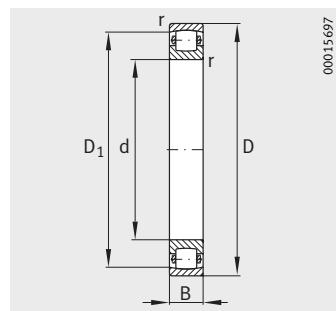
Bearings with a tapered bore correspond to internal clearance group C3 to DIN 620-4.

Radial internal clearance

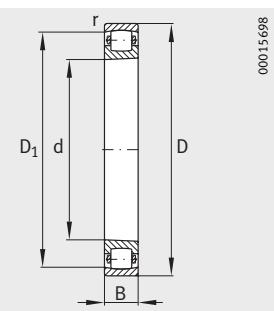
Bore d mm		Radial internal clearance							
		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
140	160	40	65	65	95	95	125	125	155
160	180	45	70	70	100	100	130	130	160
180	225	50	75	75	105	105	135	135	165
225	250	55	80	80	110	110	140	140	170
250	280	60	85	85	115	115	145	145	175

Barrel roller bearings

Cylindrical or tapered bore



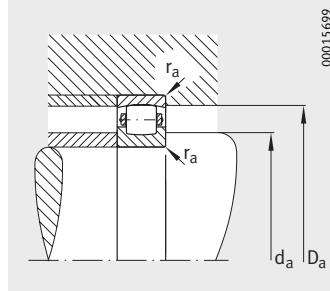
Cylindrical bore



Tapered bore
K = taper 1:12

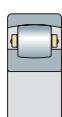
Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions				
		d	D	B	r min.	D ₁ ≈
20330-K-MB-C3	26,6	150	320	65	4	275,8
20330-MB	26,9	150	320	65	4	275,8
20332-K-MB-C3	31,3	160	340	68	4	293,6
20332-MB	31,7	160	340	68	4	293,6
20334-K-MB-C3	37,1	170	360	72	4	311,4
20334-MB	37,5	170	360	72	4	311,4
20236-K-MB-C3	18,1	180	320	52	4	284,3
20236-MB	18,4	180	320	52	4	284,3
20336-K-MB-C3	42,8	180	380	75	4	329,2
20336-MB	43,3	180	380	75	4	329,2
20238-K-MB-C3	22,2	190	340	55	4	301,2
20238-MB	22,5	190	340	55	4	301,2
20338-K-MB-C3	49,3	190	400	78	5	347,1
20338-MB	49,8	190	400	78	5	347,1
20240-K-MB-C3	26,4	200	360	58	4	319
20240-MB	26,7	200	360	58	4	319
20340-K-MB-C3	55,6	200	420	80	5	364,1
20340-MB	56,2	200	420	80	5	364,1
20244-K-MB-C3	36,9	220	400	65	4	353,5
20244-MB	37,4	220	400	65	4	353,5
20344-K-MB-C3	72,7	220	460	88	5	399,4
20344-MB	73,6	220	460	88	5	399,4
20248-K-MB-C3	49,9	240	440	72	4	388
20248-MB	50,5	240	440	72	4	388
20348-K-MB-C3	93,1	240	500	95	5	434,9
20348-MB	94,2	240	500	95	5	434,9
20252-K-MB-C3	67,4	260	480	80	5	421,3
20252-MB	68,2	260	480	80	5	421,3
20352-K-MB-C3	119	260	540	102	6	467,4
20352-MB	119	260	540	102	6	467,4
20256-K-MB-C3	70,5	280	500	80	5	443,6
20256-MB	71,3	280	500	80	5	443,6



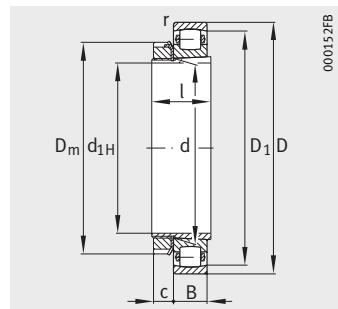
Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
d _a	D _a	r _a	dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹
167	303	3	720	950	74	1 200
167	303	3	720	950	74	1 200
177	323	3	800	1 060	82	1 000
177	323	3	800	1 060	82	1 000
187	343	3	880	1 180	91	950
187	343	3	880	1 180	91	950
197	303	3	585	850	74	1 000
197	303	3	585	850	74	1 000
197	363	3	965	1 290	100	950
197	363	3	965	1 290	100	950
207	323	3	640	950	81	950
207	323	3	640	950	81	950
210	380	4	1 040	1 400	109	900
210	380	4	1 040	1 400	109	900
217	343	3	735	1 080	91	950
217	343	3	735	1 080	91	950
220	400	4	1 080	1 460	116	850
220	400	4	1 080	1 460	116	850
237	383	3	880	1 320	109	850
237	383	3	880	1 320	109	850
240	440	4	1 290	1 760	136	750
240	440	4	1 290	1 760	136	750
257	423	3	1 060	1 600	129	750
257	423	3	1 060	1 600	129	750
260	480	4	1 530	2 120	157	700
260	480	4	1 530	2 120	157	700
280	460	4	1 270	1 930	148	700
280	460	4	1 270	1 930	148	700
286	514	5	1 800	2 550	185	670
286	514	5	1 800	2 550	185	670
300	480	4	1 290	2 000	157	670
300	480	4	1 290	2 000	157	670

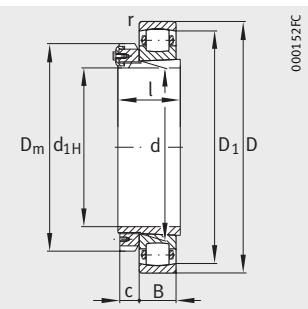


Barrel roller bearings

With adapter sleeve



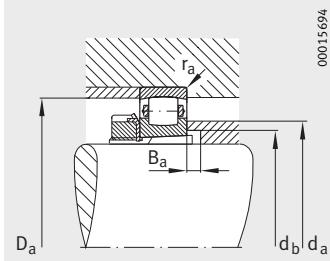
With tab washer
 $d_{1H} < 200$ mm



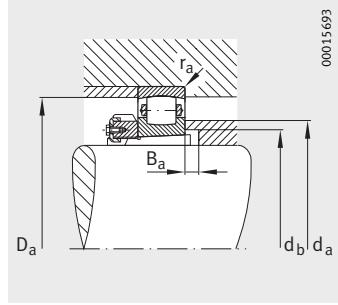
With retaining bracket
 $d_{1H} \geq 200$ mm

Dimension table · Dimensions in mm

Designation		Mass m		Dimensions									
Bearing	Adapter sleeve	Bearing	Adapter sleeve	d_{1H}	d	D	B	r	D_1	D_m	l	c	
20330-K-MB-C3	H3130	26,6	5,6	135	150	320	65	4	275,8	195	111	26	
20332-K-MB-C3	H3132	31,3	7,81	140	160	340	68	4	293,6	210	119	28	
20334-K-MB-C3	H3134	37,1	8,52	150	170	360	72	4	311,4	220	122	29	
20236-K-MB-C3	H3036	18,1	7,18	160	180	320	52	4	284,3	210	109	30	
20336-K-MB-C3	H3036	42,8	7,18	160	180	380	75	4	329,2	210	109	30	
20238-K-MB-C3	H3038	22,2	7,8	170	190	340	55	4	301,2	220	112	31	
20338-K-MB-C3	H3038	49,3	7,8	170	190	400	78	5	347,1	220	112	31	
20240-K-MB-C3	H3040	26,4	9,5	180	200	360	58	4	319	240	120	32	
20340-K-MB-C3	H3040	55,6	9,5	180	200	420	80	5	364,1	240	120	32	
20244-K-MB-C3	H3044X	36,9	10,5	200	220	400	65	4	353,5	260	126	30	
20344-K-MB-C3	H3044X	72,7	10,5	200	220	460	88	5	399,4	260	126	30	
20248-K-MB-C3	H3048	49,9	13,8	220	240	440	72	4	388	290	133	34	
20348-K-MB-C3	H3048	93,1	13,8	220	240	500	95	5	434,9	290	133	34	
20252-K-MB-C3	H3052X	67,4	16	240	260	480	80	5	421,3	310	145	34	
20352-K-MB-C3	H3052X	119	16	240	260	540	102	6	467,4	310	145	34	
20256-K-MB-C3	H3056	70,5	18,5	260	280	500	80	5	443,6	330	152	38	



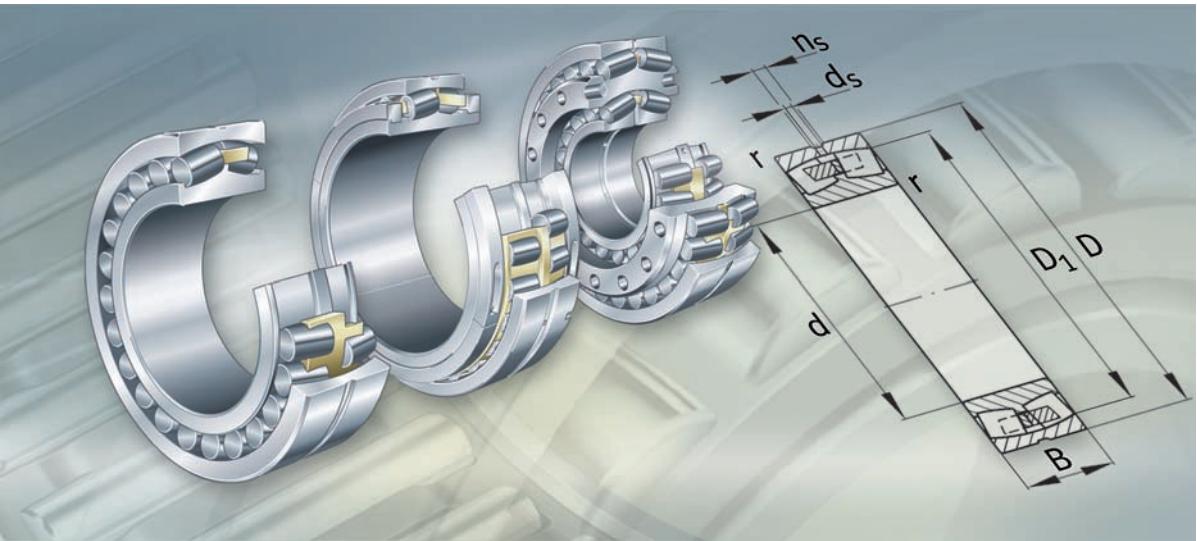
Mounting dimensions
With tab washer



Mounting dimensions
With retaining bracket

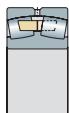
Mounting dimensions					Basic load ratings		Fatigue limit load C_{ur} kN	Limiting speed n_G min ⁻¹
d_a max.	D_a max.	d_b min.	B_a min.	r_a max.	dyn. C_r kN	stat. C_{0r} kN		
191	303	160	23	3	720	950	74	1 200
203	323	170	26	3	800	1 060	82	1 000
215	343	180	24	3	880	1 180	91	950
215	303	189	30	3	585	850	74	1 000
227	363	189	7	3	965	1 290	100	950
228	323	199	30	3	640	950	81	950
239	380	199	6	4	1 040	1 400	109	900
240	343	210	34	3	735	1 080	91	950
252	400	210	12	4	1 080	1 460	116	850
265	383	231	37	3	880	1 320	109	850
277	440	231	14	4	1 290	1 760	136	750
290	423	251	31	3	1 060	1 600	129	750
301	480	251	8	4	1 530	2 120	157	700
316	460	272	37	4	1 270	1 930	148	700
328	514	272	15	5	1 800	2 550	185	670
334	480	292	38	4	1 290	2 000	157	670





Spherical roller bearings

With cylindrical or tapered bore
Split
Triple ring bearings



Spherical roller bearings

Spherical roller bearings 608

Standard bearings with standardised main dimensions and designations can support axial loads from both sides as well as radial loads and can compensate for angular misalignments. Some sizes are of the X-life design.

Standard spherical roller bearings with a cylindrical ① or a tapered bore ② to ④ are used, for example, in gearboxes, tube mills, jaw crushers, belt conveyors and paper machinery.

Standard bearings with the suffix T41A (~D) are designed specially for the conditions in vibratory machinery.

Sealed special bearings ⑧ have been developed for use in continuous casting plant. These bearings with the designation F-8..PRL have the same main dimensions as standardised spherical roller bearings.

Special bearings of dimension series ⑤ for work rolls in cold pilger rolling machines have a tapered bore and reinforced cages. Their designations (Z-5..241..-A-K30) are not standardised.

Special bearings for light section lines ⑥ are designed for a loose fit on the roll journal. These bearings with main dimensions in the series 231, 240 and 241 have non-standardised designations (Z-5).

Special bearings ⑦ with main dimensions in series 249 and a cylindrical or tapered bore are used for the trunnion bearing arrangement in converters. Their designations (Z-5..249) are not standardised.

Split spherical roller bearings 702

Split cylindrical roller bearings are used in bearing positions that can only be accessed with difficulty, for example on cranked and very long shafts. These bearings are normally used to replace unsplit spherical roller bearings with adapter sleeves.

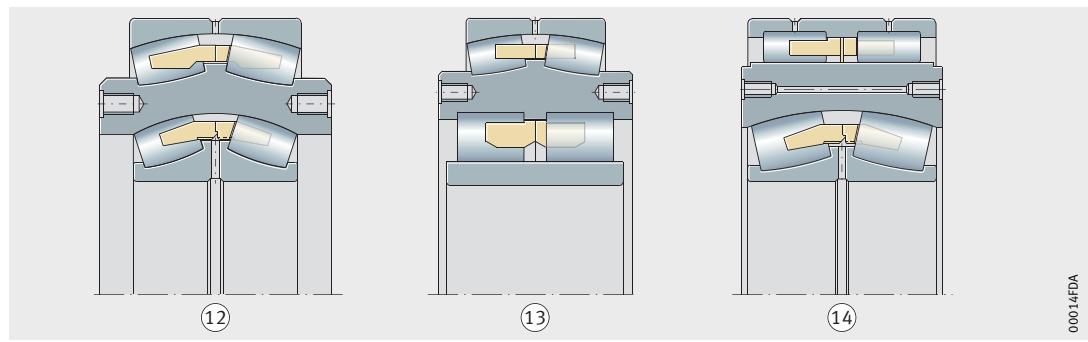
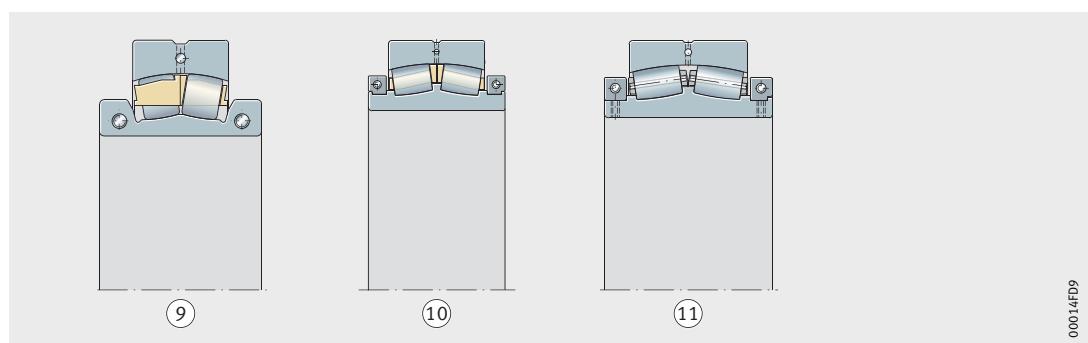
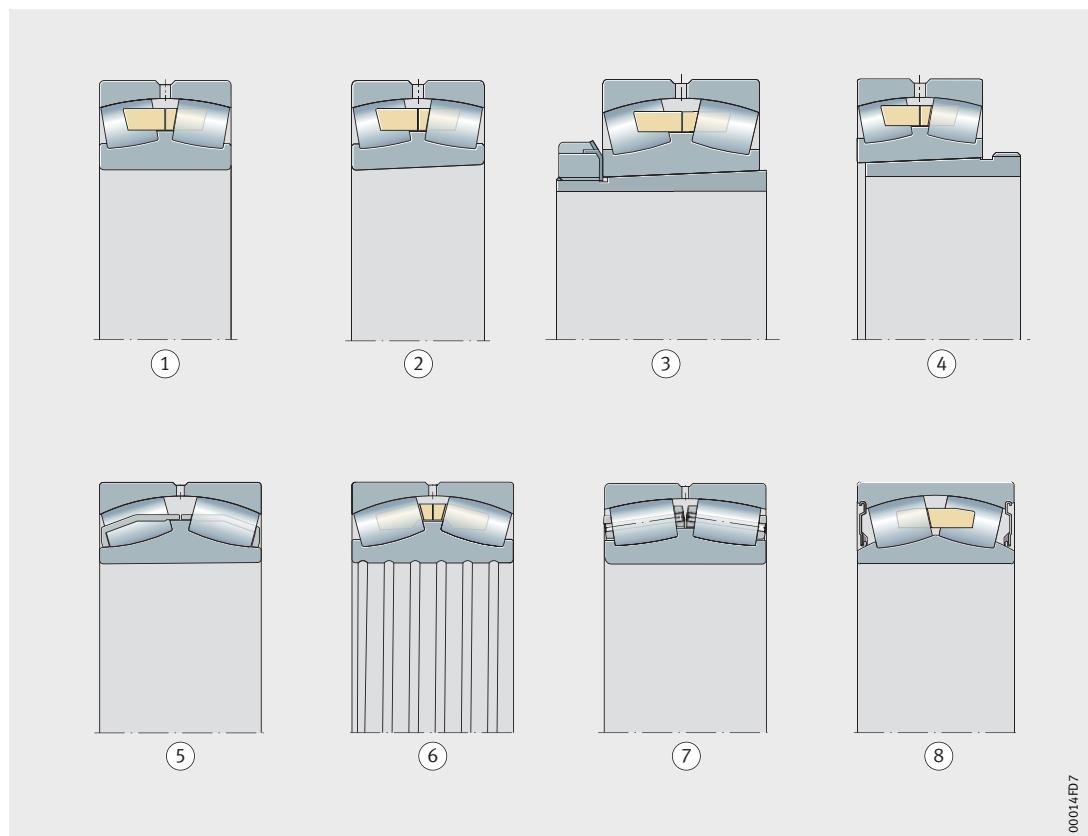
In the standard design ⑨, the locking rings are integrated in the inner rings.

Where there are large temperature differences between the shaft and the inner ring halves, bearings with separate locking rings ⑩ and ⑪ are used.

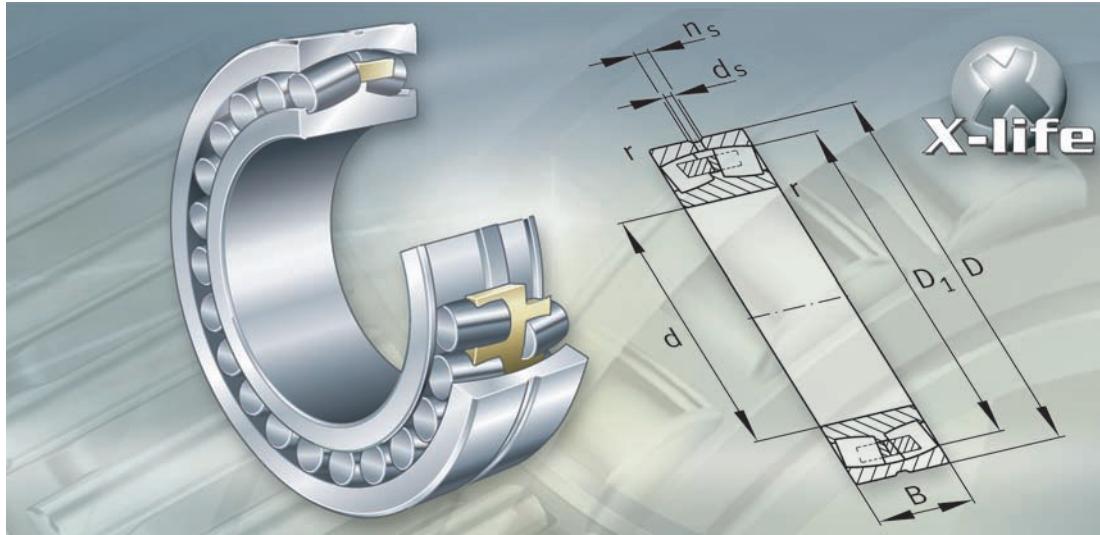
Split spherical roller bearings have non-standardised designations.

Triple ring bearings 722

Triple ring bearings ⑫ to ⑯ have been specially developed for deflection compensating rolls in paper machinery. In one design, the inner and outer bearings are spherical roller bearings, in two other designs either the inner or the outer bearing is a spherical roller bearing and the other bearing is a cylindrical roller bearing. The dimensions and designations of these special bearings (Z-5..04.DRGL) are not standardised.



FAG



Spherical roller bearings

Spherical roller bearings

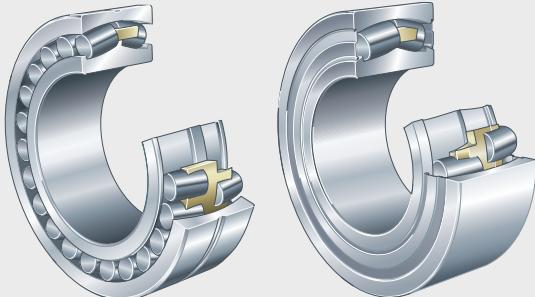
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	Static load safety factor for converter bearings 622
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Product overview Spherical roller bearings

Cylindrical bore Open (sealed)

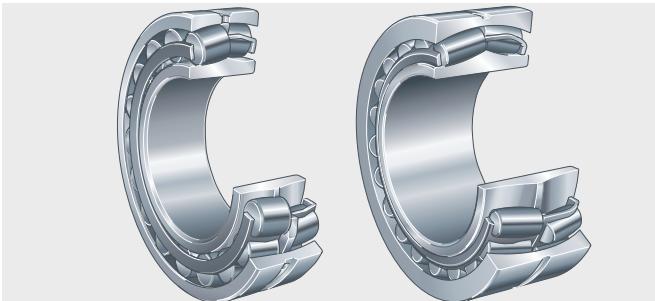
222, 223, 230, 231, 232, 233..-A, 238, 239, 240, 241, 248, 249,
Z-5..231, Z-5..232, Z-5..240, Z-5..241, Z-5..249, F-8..231,
F-8..240, F-8..PRL-01, F-8..PRL-02



00014F15

E1 design

222..-E1, 223..-E1, 231..-E1A, 232..-E1A, 241..-E1



0001360D

Tapered bore

222..-K, 223..-K, 230..-K, 231..-K, 232..-K, 238..-K, 239..-K,
240..-K30, 241..-K30, 248..-K30, 249..-K30, Z-5..241..-A-K30,
F-8..241..-A-K30



00014F16

E1 design

222..-E1-K, 223..-E1-K, 231..-E1A-K, 232..-E1A-K, 241..-E1-K30



0001360F

With adapter sleeve

222..-K + H, 223..-K + H, 230..-K + H, 231..-K + H, 232..-K + H,
239..-K + H, 240..-K30 + H, 241..-K30 + H, 248..-K30 + H,
249..-K30 + H



00013693

E1 design

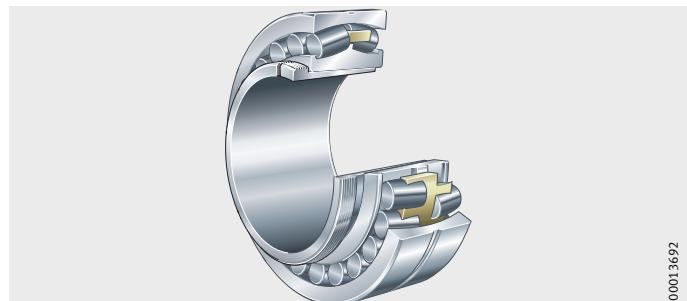
222..-E1-K + H, 223..-E1-K + H, 231..-E1A-K + H, 232..-E1A-K + H,
241..-E1-K30 + H



000136DA

With withdrawal sleeve

222..-K + AH, 223..-K + AH, 230..-K + AH, 231..-K + AH,
232..-K + AH, 238..-K + AH, 239..-K + AH, 240..-K30 + AH,
241..-K30 + AH, 248..-K30 + AH, Z-5..249..-K30 + Z-5..KH



00013692

E1 design

222..-E1-K + AH, 223..-E1-K + AH, 231..-E1A-K + AH,
232..-E1A-K + AH, 241..-E1-K30 + AH



000136E0



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 section Compensation of angular misalignments.

X-life

Some sizes of standard spherical roller bearings are of the X-life design. These bearings have improved kinematics and optimised surfaces, are made from higher performance materials and do not have a rigid central rib.

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.

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.

Compensation of angular misalignments

Spherical roller bearings compensate for angular misalignments. The permissible adjustment angle is stated for loads $P < 0,1 \cdot C_r$, see table.

These adjustment angles are permissible if:

- the angular deviation is constant (static angular misalignment)
- the rotating component is the inner ring.

Reduced adjustment angle

If the rotating component is the outer ring, the inner ring undergoes tumbling motion or the adjustment angles are larger than stated in the table, the angular adjustment facility is smaller. If such applications are present, please contact us.

Adjustment angle

Series	Adjustment angle °
222, 222..-E1, 230, 239, 240, 241..-E1	1,5
223, 223..-E1, 231, 231..-E1A, 232, 232..-E1A, 233..-A, 241	2

Special bearings for converters permit static angular misalignments of up to 10'.

Spherical roller bearings with cylindrical bore	Spherical roller bearings of all series are available with inner rings having a cylindrical bore.
Spherical roller bearings 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 the bore taper 1:12, bearings of series 240, 241, 248 and 249 have the bore taper 1:30 and the suffix K30. Special bearings for converters with a tapered bore also have the taper 1:30.
Spherical roller bearings with adapter sleeve or withdrawal sleeve	Spherical roller bearings with a tapered bore are also available with an adapter sleeve, locknut and tab washer or with a withdrawal sleeve. Adapter and withdrawal sleeves must be ordered in addition to the bearing.
Sealing	We can by agreement supply sealed and greased bearings. Such designs are used for continuous casting plant, light section lines, pumps, gearboxes and conveying equipment.
Lubrication	Open spherical roller bearings can be lubricated with oil or grease. Standardised spherical roller bearings have a circumferential groove and three lubrication holes in the outer ring for lubrication.  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.



Spherical roller bearings

Special spherical roller bearings

In addition to spherical roller bearings with standardised dimensions and standardised designations, we can also supply bearings specially designed for particular applications.

Bearings for vibratory machinery

Special spherical roller bearings of series 223..-E1, 223...-A and 233..-A with the suffix T41A (~D) are matched to the particularly difficult conditions in vibratory machinery. The bearings must be able to support not only high loads and speeds but also accelerations and centrifugal forces.

They are suitable for dynamic angular misalignments up to 0,15°. The diameter tolerances are restricted and the radial internal clearance is C4. Spherical roller bearings of series 223..-E1 have sheet steel cages that are guided on the outer ring and have a special surface treatment. Spherical roller bearings of series 223..-A and 233..-A are fitted with solid brass cages guided on the outer ring.

Bearings for continuous casting plant

Sealed spherical roller bearings were developed in particular for use in continuous casting plant in order to reduce grease consumption, *Figure 1*.

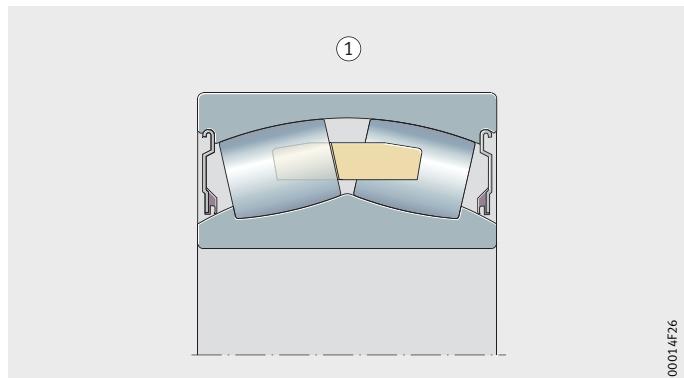
They are interchangeable with open bearings since they have the same main dimensions. The bearing inner ring does not have a central rib. The bearings are fitted with a solid brass cage.

The seals made from fluoro elastomer and the grease can be used at temperatures up to +180 °C. The bearings are dimensionally stable up to +200 °C. They have an increased radial internal clearance to C4.

Observe the safety guidelines on materials containing fluoride.



Figure 1
Sealed spherical roller bearing
for continuous casting plant



Bearings for work rolls in cold pilger rolling machines

Special bearings for work rolls in cold pilger rolling machines must be able to support high accelerations.

These spherical roller bearings of dimension series 241 have a tapered bore (taper 1:30), *Figure 2*. The reinforced sheet steel cage has a special surface treatment. The radial internal clearance is within the internal clearance group C2 and is marked on the bearing. These special bearings have non-standardised designations (Z-5..-241..-A-K30 or F-8..-241..-A-K30).

Bearings for light section lines

Spherical roller bearings for light section lines or wire mills generally have a loose fit on the roll journal. This is possible if the rolling speed is low and rapid removal from the roll journal is required.

The spherical roller bearings have an inner ring made from case hardening steel. In many cases, there is a helical groove in the bore which is intended to allow better lubrication of the fit surfaces. These special bearings have the designation Z-5..231, Z-5..232, Z-5..240, Z-5..241, F-8..231 or F-8..240 and have a reduced radial internal clearance to internal clearance group C2, *Figure 3*.

Figure 2
Special spherical roller bearing
for work rolls
in cold pilger rolling machines

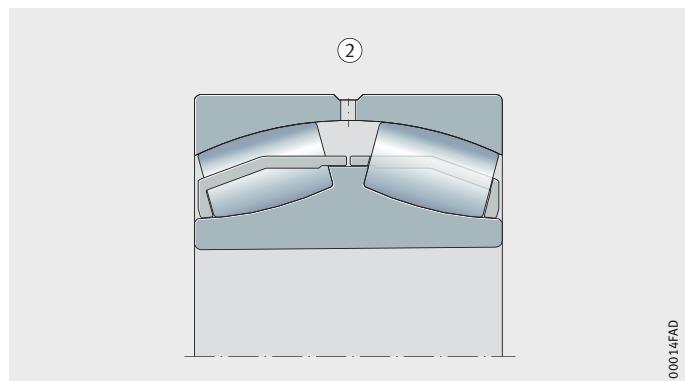
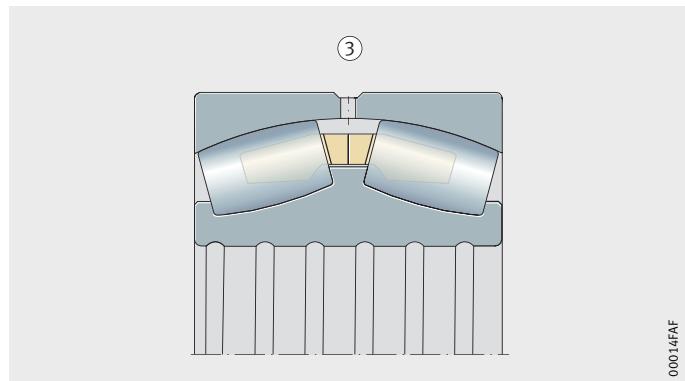


Figure 3
Special spherical roller bearings
for light section lines



Spherical roller bearings

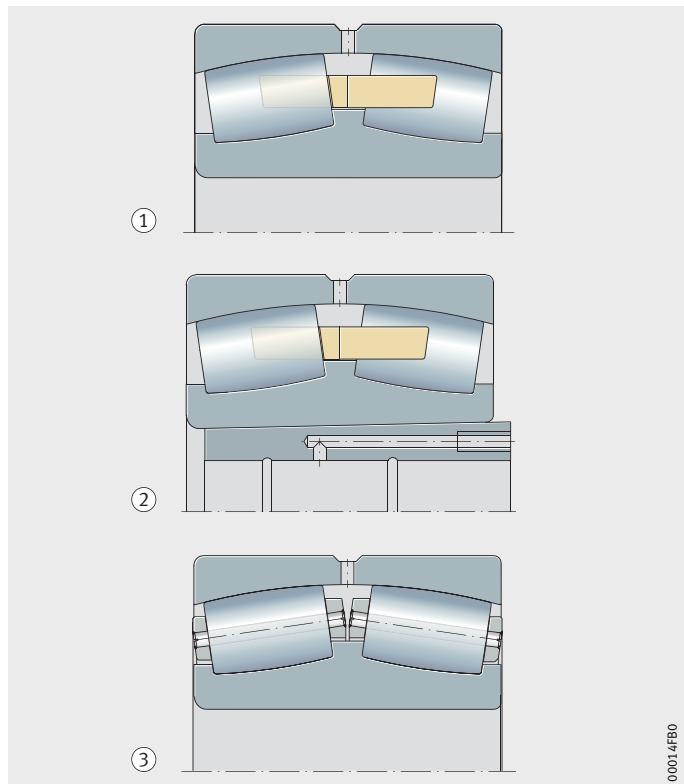
Bearings for converters

Spherical roller bearings with main dimensions in the standardised series 249 are generally used for the trunnion bearing arrangement in converters. The bearings have a cylindrical or tapered bore (taper 1:30).

Bearings with a cylindrical bore are located directly on the converter trunnion, *Figure 4 ①*. Bearings with a tapered bore are located on the trunnion using tapered sleeves, *Figure 4 ②*. For particular heavy loads, bearings with pin cages are used, *Figure 4 ③* and section Cages, page 617.

Special spherical roller bearings for converters have normal tolerances for radial bearings (tolerance class PN).

The radial internal clearance is selected in accordance with the operating temperature and the mounting fits. The special bearings for converter have non-standardised designations (Z-5..249 or Z-5..249..-K30 + Z-5..KH).



- ① Bearing for direct seating on journal
- ② Bearing with tapered bore on sleeve
- ③ Bearing with pin cage

Figure 4
Special spherical roller bearings
for converters

00014FB0

Operating temperature



Spherical roller bearings are dimensionally stable up to +200 °C. Open bearings with metal cages can be used at operating temperatures from –30 °C to +200 °C. Sealed special bearings for continuous casting lines can be used at temperatures up to +180 °C.

Due to the fluoro elastomer seals, sealed spherical roller bearings should not be heated to +300 °C or higher. This may occur, for example, if a welding torch is used in the dismantling of the bearings. If high temperatures are unavoidable, attention must be paid to the valid safety data sheet for the material.

Cages

The cages for standard spherical roller bearings are shown in the tables, page 618 and page 619.

Standard spherical roller bearings with a rigid central rib on the inner ring (design without suffix E1) have solid brass or sheet brass cages, *Figure 5*, page 618 and *Figure 6*, page 619.

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 have cages guided on the outer ring.

Bearings with the suffix M have a solid brass cage guided by the rollers.

Where special bearings for converters are subjected to particularly heavy loads, they are fitted with pin cages.

These have very high strength and can in particular accommodate numerous through-drilled rollers.

X-life bearings

Bearings of the E1 design without a cage suffix have sheet steel cages. The two cage halves are retained by a guiding ring in the outer or inner ring.

In bearings of the design E1, all the sheet steel cages are protected in particular against wear by surface hardening or coating.

In the other bearings of the E1 design, solid cages made from brass with the suffix M are used.



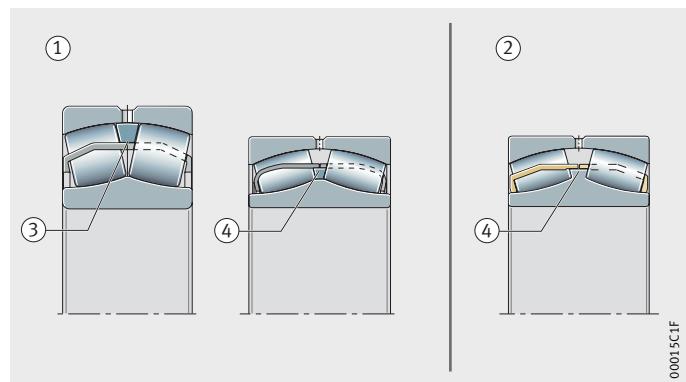
Spherical roller bearings

Cage with bore code
for standard bearings

Series	Sheet metal cage		
	Steel	Brass	
	Guidance on		
	outer ring	inner ring	inner ring
222..-E1	36	Bore code	
223..-E1	30	—	
223..-E1 (T41A, T41D)	30	—	
241	—	40 – 88	
241..-E1	—	38	—

- ① Sheet metal cages made from steel
- ② Sheet metal cage made from brass
- ③ Cage guidance on outer ring
- ④ Cage guidance on inner ring

Figure 5
Sheet metal cages
made from steel or brass



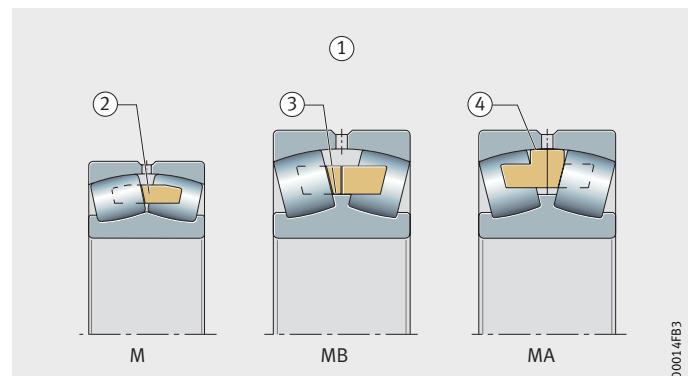
00015C1F

Cage and bore code
(continued)

Series	Solid cage		
	Brass		
	Guidance by rollers	Guidance on inner ring	Guidance on outer ring
M	MB	MA	
Bore code			
222	—	from 38	—
223	—	from 34	—
223..-A (T41A)	—	—	from 32
230	—	44, from 56	—
231	—	44, from 52	—
231..-E1A	38	—	—
232	—	from 38	—
232..-E1A	36	—	—
233..-A (T41A)	—	—	from 30
238	—	from 52	—
239	—	from 48	—
240	—	from 44	—
241	—	from 92	—
248	—	from 52	—
249	—	from 48	—

- ① Solid cages made from brass
- ② Cage guided by rollers
- ③ Cage guidance on inner ring
- ④ Cage guidance on outer ring

Figure 6
Solid cages made from brass



Spherical roller bearings

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
A	Modified internal construction	Standard
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, guided on outer ring	
MB	Solid brass cage, guided on inner ring	
T41A	For oscillating load with restricted diameter tolerances, radial internal clearance C4	
T41D	For oscillating load with restricted diameter tolerances, radial internal clearance C4, bore with thin chromium coating	

Design and safety guidelines

Equivalent dynamic bearing load

Load ratio and equivalent dynamic load

The equivalent dynamic load P is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

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 kN

Equivalent dynamic bearing load for combined load

F_a kN

Axial dynamic bearing load

F_r kN

Radial dynamic bearing load

e, Y_1, Y_2

—

Factors, see dimension tables.

Equivalent static bearing load

The equivalent static load P_0 is valid for bearings that are subjected to radial and axial static loads. It induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined bearing load occurring in practice.

For bearings under static loading, the following applies:

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

P_0 kN

Equivalent static bearing load for combined load

F_{0a} kN

Axial static bearing load

F_{0r} kN

Radial static bearing load

Y_0

—

Factor, see dimension tables.



Spherical roller bearings

Static load safety factor for converter bearings

For converter bearings, the requirement is normally:

$$S_0 \geq 2$$

$$S_0 = \frac{C_{0r}}{P_0}$$

S_0 –
Static load safety factor

C_{0r} kN

Basic static load rating, see dimension tables

P_0 kN

Equivalent static bearing load for combined load.

For locating bearings:

$$P_{0F} = F_{0rF} + Y_0 \cdot (F_{0a} + F_{0a1})$$

For non-locating bearings:

$$P_{0L} = F_{0rL} + Y_0 \cdot F_{0a1}$$

F_{0a} kN

Maximum axial static bearing load

F_{0rF} kN

Maximum radial static bearing load for locating bearings

F_{0rL} kN

Maximum radial static bearing load for non-locating bearings

Y_0 –

Factor, see dimension tables

$F_{0a1} = \mu \cdot F_{0rL}$ kN

Reaction force due to non-locating bearing displacement

$\mu = 0,15$ –

Friction factor for bush.

Minimum radial load

The minimum radial 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.

Axial load carrying capacity

Spherical roller bearings are suitable for axial loads in both directions. If very high loads occur in combination with very high speeds, the increased friction and bearing temperature must be taken into consideration.

Speeds



The limiting speeds n_G in the dimension tables must not be exceeded.

Design of bearing arrangements

Shaft and housing tolerances

Recommended shaft tolerances for bearings with cylindrical bore, see table, page 130.

Recommended housing tolerances for radial bearings, see table, page 131.

Mounting dimensions

The dimension tables give the maximum dimensions of the radii r_a and the diameters of the abutment shoulders D_a , d_a .

In order to achieve acceptable running of the spherical roller bearings, the abutment shoulders must be no smaller than D_1 and no larger than d_2 , see dimension tables.

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 withdrawal sleeves.

If high axial forces are present, a support ring can be used for adapter sleeves. For fitting, attention must be paid to the dimensions of the support ring, see dimension table.



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 tables will ensure secure seating on the shaft, see following table and table, page 625.

Reduction in radial internal clearance and displacement distance on taper 1:12

Nominal bearing bore diameter d mm		Reduction in radial internal clearance mm		Displacement distance on taper 1:12				Control value for minimum radial internal clearance after fitting		
				Shaft mm		Sleeve mm		CN mm min.	C3 mm min.	C4 mm min.
over	incl.	min.	max.	min.	max.	min.	max.			
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
900	1000	0,41	0,55	6,3	8,5	7	9,4	0,3	0,43	0,64
1000	1120	0,45	0,6	6,8	9	7,6	10,2	0,32	0,48	0,7
1120	1250	0,49	0,65	7,4	9,8	8,3	11	0,34	0,54	0,77
1250	1400	0,55	0,72	8,3	10,8	9,3	12,1	0,36	0,59	0,84
1400	1600	0,62	0,81	9,3	12,2	10,6	13,8	0,44	0,66	0,94
1600	1800	0,69	0,93	10,4	14	11,7	15,8	0,48	0,73	1,02
1800	2000	0,77	1,04	11,6	15,6	13,1	17,7	0,54	0,81	1,11
2000	2250	0,85	1,15	12,7	17,2	14,5	19,5	0,6	0,95	1,55
2250	2500	0,95	1,28	14,3	19,2	16,2	21,8	0,65	1,15	1,7

**Reduction in
radial internal clearance and
displacement distance
on taper 1:30**

Nominal bearing bore diameter d mm		Reduction in radial internal clearance mm		Displacement distance on taper 1:30				Control value for minimum radial internal clearance after fitting		
				Shaft mm		Sleeve mm		CN mm min.	C3 mm min.	C4 mm min.
over	incl.	min.	max.	min.	max.	min.	max.			
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
900	1000	0,41	0,55	15,8	21	16,4	22	0,3	0,43	0,64
1000	1120	0,45	0,6	17	23	18	24	0,32	0,48	0,7
1120	1250	0,49	0,65	18,5	25	19,6	26	0,34	0,54	0,77
1250	1400	0,55	0,72	21	27	22,2	28,3	0,36	0,59	0,84
1400	1600	0,62	0,81	23,6	30,8	24,8	32,4	0,44	0,66	0,94
1600	1800	0,69	0,93	26,2	35,3	27,6	37,2	0,48	0,73	1,02
1800	2000	0,77	1,04	29,3	39,5	30,8	41,6	0,54	0,81	1,11
2000	2250	0,85	1,15	32,4	43,9	34	46	0,6	0,95	1,55
2250	2500	0,95	1,28	36,2	48,8	38	51,2	0,65	1,15	1,7



Spherical roller bearings

Accuracy

The main dimensions of the standard bearings conform to DIN 635-2. The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620-2.

Tolerances for bearings to specification T41A and T41D

Tolerances

Tolerances	Inner ring				Outer ring			
	Nominal bearing bore diameter mm		Deviation Δ_{dmp} μm	Nominal outside diameter mm		Deviation Δ_{Dmp} μm		
	over	incl.		over	incl.			
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

Radial internal clearance

The radial internal clearance of standard bearings corresponds to internal clearance group CN 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.
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	
900	1000	260	480	480	710	710	930	930	1220	
1000	1120	290	530	530	770	770	1050	1050	1430	
1120	1250	320	580	580	840	840	1140	1140	1560	
1250	1400	350	630	630	910	910	1240	1240	1700	
1400	1600	380	700	700	1020	1020	1390	1390	1890	
1600	1800	420	780	780	1140	1140	1550	1550	2090	
1800	2000	460	860	860	1260	1260	1710	1710	2300	
2000	2250	500	950	950	1400	1400	1900	1900	2540	
2250	2500	550	1050	1050	1550	1550	2100	2100	2790	

Radial internal clearance of bearings with tapered bore

The radial internal clearance of standard bearings corresponds to internal clearance group CN to DIN 620-4.

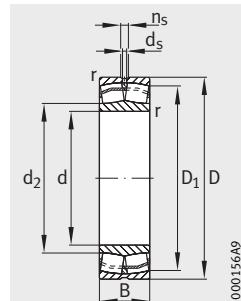
Radial internal clearance

Bore d mm		Radial internal clearance							
		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
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
900	1000	490	710	710	930	930	1190	1190	1520
1000	1120	540	780	780	1020	1020	1300	1300	1650
1120	1250	600	860	860	1120	1120	1420	1420	1800
1250	1400	660	940	940	1220	1220	1550	1550	1960
1400	1600	740	1060	1060	1380	1380	1750	1750	2200
1600	1800	820	1180	1180	1540	1540	1950	1950	2500
1800	2000	910	1310	1310	1710	1710	2150	2150	2750
2000	2250	1000	1450	1450	1900	1900	2400	2400	3050
2250	2500	1100	1600	1600	2100	2100	2650	2650	3350

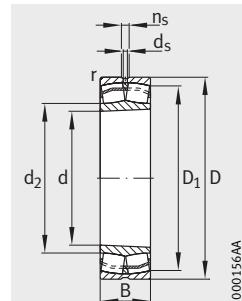


Spherical roller bearings

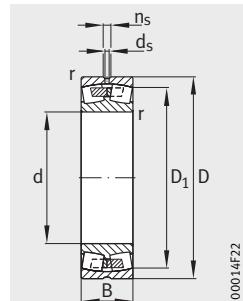
Cylindrical or tapered bore



Design 1
Cylindrical bore



Tapered bore
 $K = \text{taper } 1:12$
 $K30 = \text{taper } 1:30$

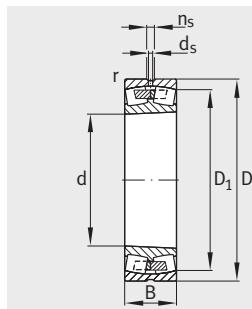


Design 2
With central rib
Cylindrical bore

Dimension table · Dimensions in mm

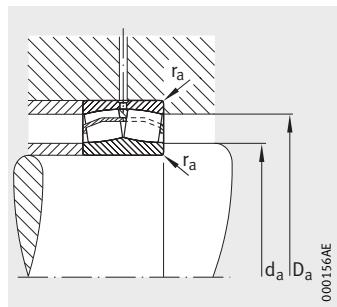
Designation	X-life	Design	Mass m ≈kg	Dimensions							
				d	D	B	r min.	D ₁ ≈	d ₂ ≈	d _s	n _s
22330-E1-K	XL	1	40,9	150	320	108	4	273,2	185,3	9,5	17,7
22330-E1-K-T41A	XL	1	40,9	150	320	108	4	273,2	185,3	9,5	17,7
22330-E1	XL	1	42,2	150	320	108	4	273,2	185,3	9,5	17,7
22330-E1-T41D	XL	1	42,2	150	320	108	4	273,2	185,3	9,5	17,7
23330-A-MA-T41A	-	2	49,8	150	320	128	4	264,5	-	8	15
22332-K-MB	-	2	50,1	160	340	114	4	288,3	-	9,5	17,7
22332-MB	-	2	51,1	160	340	114	4	288,3	-	9,5	17,7
22332-A-MA-T41A	-	2	52,4	160	340	114	4	288,3	-	9,5	17,7
23332-A-MA-T41A	-	2	61,3	160	340	136	4	280,6	-	9,5	17,7
22334-K-MB	-	2	58,4	170	360	120	4	304,2	-	9,5	17,7
22334-A-MA-T41A	-	2	59,5	170	360	120	4	304,2	-	9,5	17,7
22334-MB	-	2	59,5	170	360	120	4	304,2	-	9,5	17,7
23334-A-MA-T41A	-	2	71,9	170	360	140	4	300,7	-	9,5	17,7
22236-E1-K	XL	1	28,5	180	320	86	4	285,9	211,3	9,5	17,7
22236-E1	XL	1	29,2	180	320	86	4	285,9	211,3	9,5	17,7
23236-E1A-K-M	XL	1	37	180	320	112	4	277,3	-	8	15
23236-E1A-M	XL	1	38,5	180	320	112	4	277,3	-	8	15
22336-K-MB	-	2	66,7	180	380	126	4	323,4	-	12,5	23,5
22336-MB	-	2	69	180	380	126	4	323,4	-	12,5	23,5
22336-A-MA-T41A	-	2	71,7	180	380	126	4	323,4	-	12,5	23,5
23336-A-MA-T41A	-	2	86,4	180	380	150	4	315,9	-	9,5	17,7
23138-E1A-K-M	XL	1	32,4	190	320	104	3	281,6	-	8	15
23138-E1A-M	XL	1	33,9	190	320	104	3	281,6	-	8	15
24138-E1	XL	1 ¹⁾	41,5	190	320	128	3	271,2	217,4	6,3	12,2
24138-E1-K30	XL	1 ¹⁾	41,5	190	320	128	3	271,2	217,4	6,3	12,2
22238-K-MB	-	2	36,2	190	340	92	4	296	-	9,5	17,7
22238-MB	-	2	37	190	340	92	4	296	-	9,5	17,7
23238-B-K-MB	-	2	46	190	340	120	4	291,2	-	9,5	17,7
23238-B-MB	-	2	48,4	190	340	120	4	291,2	-	9,5	17,7
22338-K-MB	-	2	77,3	190	400	132	5	338,2	-	12,5	23,5
22338-A-MA-T41A	-	2	80,5	190	400	132	5	338,2	-	12,5	23,5
22338-MB	-	2	80,5	190	400	132	5	338,2	-	12,5	23,5
23338-A-MA-T41A	-	2	97,1	190	400	155	5	331,6	-	9,5	17,7

¹⁾ Cage guidance on inner ring central rib.



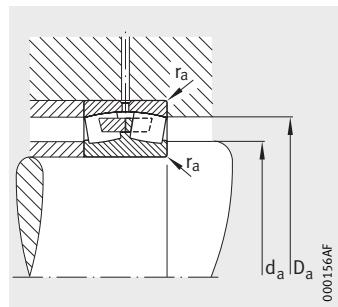
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With central rib
 $K = \text{taper } 1:12$
 $K30 = \text{taper } 1:30$



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Design 1
 Mounting dimensions



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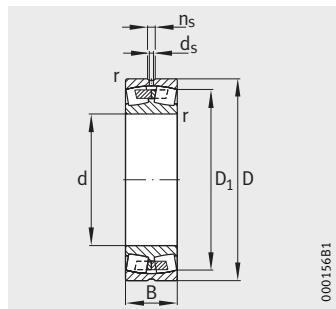
Design 2
 Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a min.	D _a max.	r _a max.	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
167	303	3	1 640	1 850	0,33	2,02	3	1,97	148	2 200	1 520
167	303	3	1 640	1 850	0,33	2,02	3	1,97	148	2 200	1 520
167	303	3	1 640	1 850	0,33	2,02	3	1,97	148	2 200	1 520
167	303	3	1 640	1 850	0,33	2,02	3	1,97	148	2 200	1 520
167	303	3	1 500	2 120	0,44	1,52	2,26	1,49	135	2 000	—
177	323	3	1 430	1 900	0,37	1,8	2,69	1,76	121	2 000	1 500
177	323	3	1 430	1 900	0,37	1,8	2,69	1,76	121	2 000	1 500
177	323	3	1 430	1 900	0,37	1,8	2,69	1,76	136	2 000	1 500
177	323	3	1 660	2 320	0,44	1,54	2,3	1,51	152	2 000	—
187	343	3	1 600	2 120	0,37	1,83	2,72	1,79	134	1 800	1 380
187	343	3	1 600	2 120	0,37	1,83	2,72	1,79	144	1 800	1 380
187	343	3	1 600	2 120	0,37	1,83	2,72	1,79	134	1 800	1 380
187	343	3	1 800	2 600	0,43	1,57	2,34	1,53	160	1 700	—
197	303	3	1 360	1 680	0,25	2,71	4,04	2,65	148	2 400	1 670
197	303	3	1 360	1 680	0,25	2,71	4,04	2,65	148	2 400	1 670
197	303	3	1 710	2 340	0,33	2,07	3,09	2,03	173	2 000	1 090
197	303	3	1 710	2 340	0,33	2,07	3,09	2,03	173	2 000	1 090
197	363	3	1 760	2 360	0,37	1,83	2,72	1,79	209	1 500	1 270
197	363	3	1 760	2 360	0,37	1,83	2,72	1,79	209	1 500	1 270
197	363	3	1 760	2 360	0,37	1,83	2,72	1,79	234	1 500	1 270
197	363	3	2 040	2 900	0,44	1,54	2,29	1,5	260	1 500	—
204	306	2,5	1 610	2 220	0,3	2,28	3,39	2,23	218	2 000	1 260
204	306	2,5	1 610	2 220	0,3	2,28	3,39	2,23	218	2 000	1 260
204	306	2,5	1 670	2 500	0,37	1,82	2,7	1,78	226	1 400	880
204	306	2,5	1 670	2 500	0,37	1,82	2,7	1,78	226	1 400	880
207	323	3	1 200	1 830	0,28	2,39	3,56	2,34	122	1 800	1 600
207	323	3	1 200	1 830	0,28	2,39	3,56	2,34	122	1 800	1 600
207	323	3	1 560	2 600	0,36	1,86	2,77	1,82	156	1 700	1 020
207	323	3	1 560	2 600	0,36	1,86	2,77	1,82	156	1 700	1 020
210	380	4	1 860	2 500	0,37	1,83	2,72	1,79	213	1 500	1 220
210	380	4	1 860	2 500	0,37	1,83	2,72	1,79	173	1 500	1 220
210	380	4	1 860	2 500	0,37	1,83	2,72	1,79	213	1 500	1 220
210	380	4	2 200	3 200	0,43	1,57	2,34	1,53	223	1 400	—



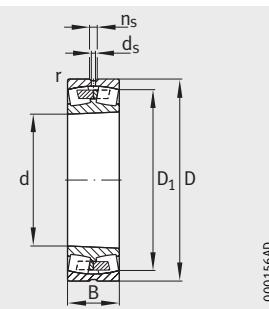
Spherical roller bearings

Cylindrical or tapered bore
Open or sealed



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Design 2
With central rib
Cylindrical bore

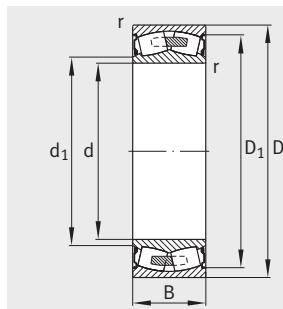


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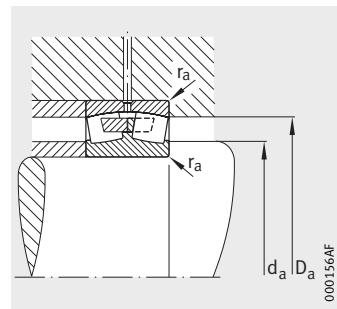
With central rib
K = taper 1:12
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

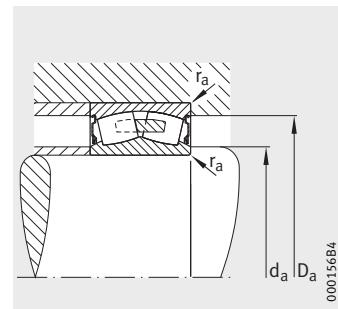
Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r min.	D ₁	d _s	n _s
F-803046.PRL	4	20	200	340	112	3	293,3	—	—
23140-B-K-MB	2	41,7	200	340	112	3	293,3	9,5	17,7
23140-B-MB	2	43	200	340	112	4	293,3	9,5	17,7
F-803040.PRL	4	52,5	200	340	140	3	285,9	—	—
F-803047.PRL	4	52,5	200	340	140	3	285,9	—	—
24140-B-K30	2	51,6	200	340	140	3	285,9	6,3	12,2
24140-B	2	52,4	200	340	140	3	285,9	6,3	12,2
22240-B-K-MB	2	42,3	200	360	98	4	312	9,5	17,7
22240-B-MB	2	44,2	200	360	98	4	312	9,5	17,7
23240-B-K-MB	2	55,8	200	360	128	4	307,5	9,5	17,7
23240-B-MB	2	60,5	200	360	128	4	307,5	9,5	17,7
22340-K-MB	2	89,5	200	420	138	5	357,4	12,5	23,5
22340-MB	2	91	200	420	138	5	357,4	12,5	23,5
22340-A-MA-T41A	2	92,4	200	420	138	5	357,4	12,5	23,5
23340-A-MA-T41A	2	108	200	420	165	5	350,2	9,5	17,7
23044-K-MB	2	30,3	220	340	90	3	301,8	8	15
23044-MB	2	31,7	220	340	90	3	301,8	8	15
24044-B-K30-MB	2	38,9	220	340	118	3	297,4	6,3	12,2
24044-B-MB	2	39,5	220	340	118	3	297,4	6,3	12,2
23144-B-K-MB	2	52	220	370	120	4	319,2	9,5	17,7
23144-B-MB	2	55,2	220	370	120	4	319,2	9,5	17,7
24144-B-K30	2	64,4	220	370	150	4	311,7	6,3	12,2
24144-B	2	65,6	220	370	150	4	311,7	6,3	12,2
22244-B-K-MB	2	59,6	220	400	108	4	348,7	9,5	17,7
22244-B-MB	2	61,5	220	400	108	4	348,7	9,5	17,7
23244-K-MB	2	79	220	400	144	4	337,6	9,5	17,7
23244-MB	2	81,1	220	400	144	4	337,6	9,5	17,7
F-803054.PRL	4	79,9	220	400	144	4	341	—	—
22344-K-MB	2	114	220	460	145	5	391,2	12,5	23,5
22344-A-MA-T41A	2	119	220	460	145	5	391,2	12,5	23,5
22344-MB	2	119	220	460	145	5	391,2	12,5	23,5
23344-A-MA-T41A	2	151	220	460	180	5	382,8	9,5	17,7
23948-K-MB	2	13,4	240	320	60	2,1	297,8	6,3	12,2
23948-MB	2	13,9	240	320	60	2,1	297,8	6,3	12,2
24948-B-K30-MB	2	18,6	240	320	80	2,1	294,3	4,8	9,5
24948-B-MB	2	18,6	240	320	80	2,1	294,3	4,8	9,5



Design 4
Cylindrical bore
Sealed



Design 2
Mounting dimensions



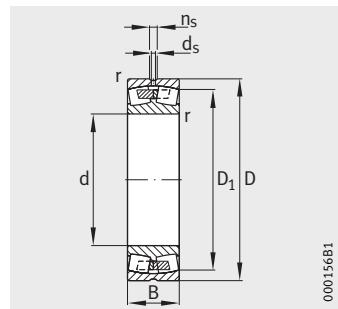
Design 4
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a min.	D _a max.	r _a max.	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
214	326	2,5	1 290	2 200	0,28	2,43	3,61	2,37	138	420	–
214	326	2,5	1 320	2 280	0,35	1,95	2,9	1,91	131	1 700	1 230
214	326	2,5	1 320	2 280	0,35	1,95	2,9	1,91	131	1 700	1 230
214	326	2,5	1 530	2 700	0,33	2,03	3,02	1,98	178	280	–
214	326	2,5	1 530	2 700	0,33	2,03	3,02	1,98	178	280	–
214	326	2,5	1 700	3 000	0,42	1,62	2,42	1,59	190	1 400	810
214	326	2,5	1 700	3 000	0,42	1,62	2,42	1,59	190	1 400	810
217	343	3	1 320	2 000	0,29	2,35	3,5	2,3	123	1 700	1 530
217	343	3	1 320	2 000	0,29	2,35	3,5	2,3	123	1 700	1 530
217	343	3	1 660	2 750	0,37	1,83	2,72	1,79	163	1 500	980
217	343	3	1 660	2 750	0,37	1,83	2,72	1,79	163	1 500	980
220	400	4	2 080	2 800	0,36	1,87	2,79	1,83	189	1 400	1 120
220	400	4	2 080	2 800	0,36	1,87	2,79	1,83	189	1 400	1 120
220	400	4	2 080	2 800	0,36	1,87	2,79	1,83	189	1 400	1 120
220	400	4	2 450	3 600	0,43	1,55	2,31	1,52	238	1 300	–
232,4	327,6	2,5	1 100	2 000	0,26	2,55	3,8	2,5	132	1 700	1 440
232,4	327,6	2,5	1 100	2 000	0,26	2,55	3,8	2,5	132	1 700	1 440
232,4	327,6	2,5	1 400	2 700	0,34	1,96	2,92	1,92	139	1 300	1 070
232,4	327,6	2,5	1 400	2 700	0,34	1,96	2,92	1,92	139	1 300	1 070
237	353	3	1 630	2 900	0,33	2,03	3,02	1,98	165	1 400	1 060
237	353	3	1 630	2 900	0,33	2,03	3,02	1,98	165	1 400	1 060
237	353	3	1 900	3 450	0,41	1,63	2,43	1,6	197	1 300	720
237	353	3	1 900	3 450	0,41	1,63	2,43	1,6	197	1 300	720
237	383	3	1 630	2 450	0,29	2,35	3,5	2,3	153	1 400	1 300
237	383	3	1 630	2 450	0,29	2,35	3,5	2,3	153	1 400	1 300
237	383	3	2 040	3 450	0,37	1,83	2,72	1,79	181	1 400	850
237	383	3	2 040	3 450	0,37	1,83	2,72	1,79	181	1 400	850
237	383	3	2 080	3 450	0,33	2,06	3,06	2,01	182	350	–
240	440	4	2 320	3 350	0,35	1,95	2,9	1,91	217	1 300	970
240	440	4	2 320	3 350	0,35	1,95	2,9	1,91	217	1 300	970
240	440	4	2 320	3 350	0,35	1,95	2,9	1,91	217	1 300	970
240	440	4	2 850	4 250	0,43	1,56	2,32	1,53	240	1 300	–
250,2	309,8	2,1	640	1 370	0,17	4,05	6,04	3,96	93	1 500	1 310
250,2	309,8	2,1	640	1 370	0,17	4,05	6,04	3,96	93	1 500	1 310
250,2	309,8	2,1	780	1 700	0,23	2,92	4,35	2,86	162	1 300	–
250,2	309,8	2,1	780	1 700	0,23	2,92	4,35	2,86	162	1 300	–

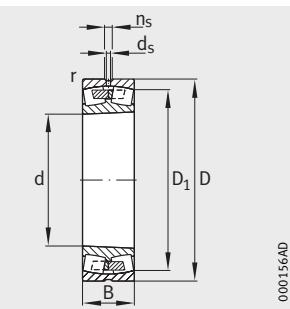


Spherical roller bearings

Cylindrical or tapered bore
Open or sealed



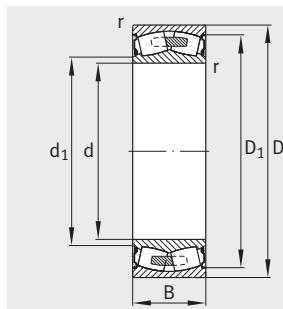
Design 2
With central rib
Cylindrical bore



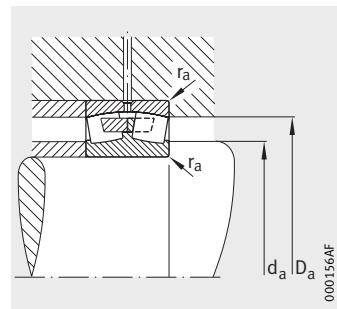
With central rib
K = taper 1:12
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

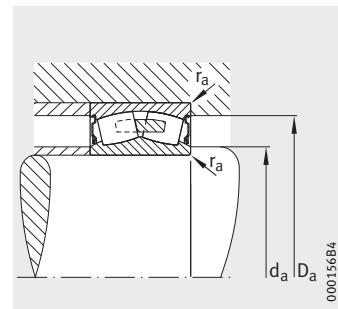
Designation	Design	Mass m ≈kg	Dimensions							
			d	D	B	r min.	D ₁	d _s	n _s	
23048-K-MB	2	31,9	240	360	92	3	322,1	8	15	
23048-MB	2	34,4	240	360	92	3	322,1	8	15	
F-803070.PRL	4	42	240	360	118	3	318,9	—	—	
24048-B-K30-MB	2	43,2	240	360	118	3	318,9	6,3	12,2	
24048-B-MB	2	43,6	240	360	118	3	318,9	6,3	12,2	
23148-B-K-MB	2	65,3	240	400	128	4	346,2	9,5	17,7	
23148-B-MB	2	67,3	240	400	128	4	346,2	9,5	17,7	
24148-B-K30	2	78,7	240	400	160	4	338	6,3	12,2	
24148-B	2	80,7	240	400	160	4	338	6,3	12,2	
22248-B-K-MB	2	81,2	240	440	120	4	380,7	12,5	23,5	
22248-B-MB	2	83,4	240	440	120	4	380,7	12,5	23,5	
23248-B-K-MB	2	105	240	440	160	4	371	12,5	23,5	
23248-B-MB	2	110	240	440	160	4	371	12,5	23,5	
22348-K-MB	2	145	240	500	155	5	420	12,5	23,5	
22348-MB	2	151	240	500	155	5	420	12,5	23,5	
23348-A-MA-T41A	2	187	240	500	195	5	416,7	12,5	23,5	
23852-B-K-MB	2	8,28	260	320	45	2	303,2	3,2	6,5	
23852-B-MB	2	8,28	260	320	45	2	303,2	3,2	6,5	
24852-B-K30-MB	2	11,4	260	320	60	2	301,8	3,2	6,5	
24852-B-MB	2	11,4	260	320	60	2	301,8	3,2	6,5	
23952-K-MB	2	22,4	260	360	75	2,1	330,5	8	15	
23952-MB	2	24,1	260	360	75	2,1	330,5	8	15	
24952-B-K30-MB	2	31,7	260	360	100	2,1	328,1	4,8	9,5	
24952-B-MB	2	31,7	260	360	100	2,1	328,1	4,8	9,5	
23052-K-MB	2	46,2	260	400	104	4	357,2	9,5	17,7	
23052-MB	2	49,3	260	400	104	4	357,2	9,5	17,7	
24052-B-K30-MB	2	64,5	260	400	140	4	349,1	6,3	12,2	
24052-B-MB	2	67,2	260	400	140	4	349,1	6,3	12,2	
23152-K-MB	2	89,6	260	440	144	4	379,7	9,5	17,7	
23152-MB	2	92,5	260	440	144	4	379,7	9,5	17,7	
24152-B-K30	2	112	260	440	180	4	370,3	8	15	
24152-B	2	114	260	440	180	4	370,3	8	15	
F-803064.PRL	4	113	260	440	180	4	368,4	—	—	



Design 4
Cylindrical bore
Sealed



Design 2
Mounting dimensions



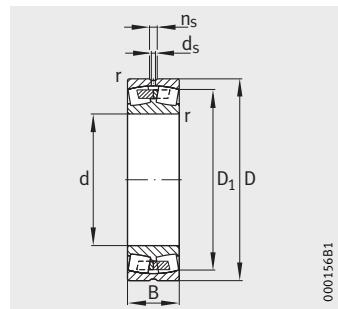
Design 4
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	r _a	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
252,4	347,6	2,5	1 160	2 200	0,25	2,74	4,08	2,68	130	1 400	1 310
252,4	347,6	2,5	1 160	2 200	0,25	2,74	4,08	2,68	130	1 400	1 310
252,4	347,6	2,5	1 460	2 850	0,27	2,49	3,71	2,43	150	315	—
252,4	347,6	2,5	1 500	2 900	0,32	2,1	3,13	2,06	150	1 300	970
252,4	347,6	2,5	1 500	2 900	0,32	2,1	3,13	2,06	150	1 300	970
257	383	3	1 860	3 250	0,33	2,06	3,06	2,01	177	1 300	970
257	383	3	1 860	3 250	0,33	2,06	3,06	2,01	177	1 300	970
257	383	3	2 120	3 900	0,41	1,66	2,47	1,62	231	1 200	660
257	383	3	2 120	3 900	0,41	1,66	2,47	1,62	231	1 200	660
257	423	3	1 960	3 050	0,29	2,35	3,5	2,3	184	1 300	1 180
257	423	3	1 960	3 050	0,29	2,35	3,5	2,3	184	1 300	1 180
257	423	3	2 450	4 250	0,37	1,8	2,69	1,76	231	1 300	750
257	423	3	2 450	4 250	0,37	1,8	2,69	1,76	231	1 300	750
260	480	4	2 650	3 900	0,35	1,95	2,9	1,91	249	1 500	870
260	480	4	2 650	3 900	0,35	1,95	2,9	1,91	249	1 500	870
260	480	4	3 350	5 200	0,43	1,58	2,35	1,54	270	1 100	—
268,8	311,2	2	415	1 000	0,12	5,72	8,51	5,59	67	1 540	—
268,8	311,2	2	415	1 000	0,12	5,72	8,51	5,59	67	1 540	—
268,8	311,2	2	570	1 400	0,17	3,95	5,88	3,86	—	1 300	—
268,8	311,2	2	570	1 400	0,17	3,95	5,88	3,86	—	1 300	—
270,2	349,8	2,1	930	1 930	0,19	3,54	5,27	3,46	108	1 400	1 190
270,2	349,8	2,1	930	1 930	0,19	3,54	5,27	3,46	108	1 400	1 190
270,2	349,8	2,1	1 120	2 400	0,26	2,57	3,83	2,52	218	1 200	—
270,2	349,8	2,1	1 120	2 400	0,26	2,57	3,83	2,52	218	1 200	—
274,6	385,4	3	1 500	2 800	0,26	2,64	3,93	2,58	155	1 300	1 160
274,6	385,4	3	1 500	2 800	0,26	2,64	3,93	2,58	155	1 300	1 160
274,6	385,4	3	1 900	3 800	0,35	1,94	2,88	1,89	204	1 100	870
274,6	385,4	3	1 900	3 800	0,35	1,94	2,88	1,89	204	1 100	870
277	423	3	2 200	4 000	0,33	2,03	3,02	1,98	213	1 200	850
277	423	3	2 200	4 000	0,33	2,03	3,02	1,98	213	1 200	850
277	423	3	2 700	5 100	0,42	1,61	2,4	1,58	315	1 100	550
277	423	3	2 700	5 100	0,42	1,61	2,4	1,58	315	1 100	550
277	423	3	2 700	5 100	0,42	1,61	2,4	1,58	340	260	—

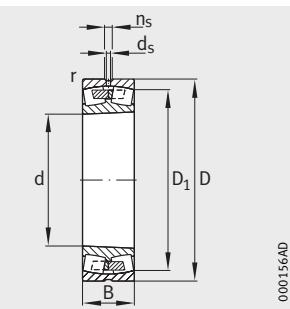


Spherical roller bearings

Cylindrical or tapered bore
Open or sealed



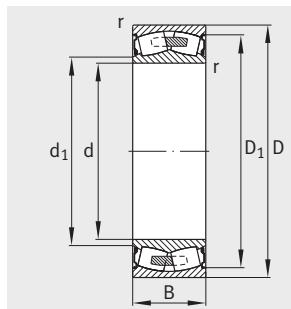
Design 2
With central rib
Cylindrical bore



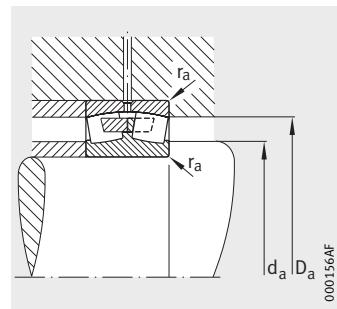
With central rib
K = taper 1:12
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

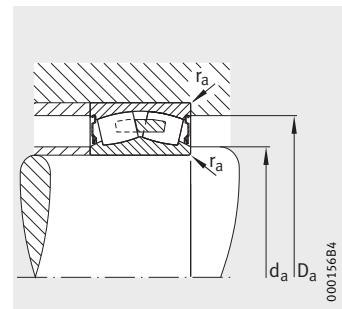
Designation	Design	Mass m ≈kg	Dimensions							
			d	D	B	r min.	D ₁	d _s	n _s	
22252-B-K-MB	2	106	260	480	130	5	415,3	12,5	23,5	
22252-B-MB	2	110	260	480	130	5	415,3	12,5	23,5	
23252-B-K-MB	2	138	260	480	174	5	405,4	12,5	23,5	
23252-B-MB	2	144	260	480	174	5	405,4	12,5	23,5	
22352-K-MB	2	177	260	540	165	6	452,1	12,5	23,5	
22352-MB	2	185	260	540	165	6	452,1	12,5	23,5	
23856-MB	2	11,9	280	350	52	2	330,7	4,8	9,5	
23856-K-MB	2	11,9	280	350	52	2	330,7	4,8	9,5	
24856-B-K30-MB	2	15,2	280	350	69	2	328,6	4,8	9,5	
24856-B-MB	2	15,2	280	350	69	2	328,6	4,8	9,5	
23956-K-MB	2	24,7	280	380	75	2,1	350	8	15	
23956-MB	2	25,5	280	380	75	2,1	350	8	15	
24956-K30-MB	2	33,1	280	380	100	2,1	349	4,8	9,5	
24956-MB	2	33,1	280	380	100	2,1	349	4,8	9,5	
23056-B-K-MB	2	50,3	280	420	106	4	376,5	9,5	17,7	
23056-B-MB	2	52,9	280	420	106	4	376,5	9,5	17,7	
F-803071.PRL	4	38,9	280	420	140	4	369,5	—	—	
24056-B-K30-MB	2	69,7	280	420	140	4	369,5	6,3	12,2	
24056-B-MB	2	70,8	280	420	140	4	369,5	6,3	12,2	
23156-B-K-MB	2	96,4	280	460	146	5	401,4	9,5	17,7	
23156-B-MB	2	99,5	280	460	146	5	401,4	9,5	17,7	
24156-B-K30	2	118	280	460	180	5	392,8	8	15	
24156-B	2	119	280	460	180	5	392,8	8	15	
22256-B-K-MB	2	110	280	500	130	5	435,2	12,5	23,5	
22256-B-MB	2	113	280	500	130	5	435,2	12,5	23,5	
23256-K-MB	2	153	280	500	176	5	426,3	12,5	23,5	
23256-MB	2	157	280	500	176	5	426,3	12,5	23,5	
22356-K-MB	2	224	280	580	175	6	489,3	12,5	23,5	
22356-MB	2	233	280	580	175	6	489,3	12,5	23,5	
23860-MB	2	16,3	300	380	60	2,1	357,8	4,8	9,5	
23860-K-MB	2	16,3	300	380	60	2,1	357,8	4,8	9,5	
24860-B-K30-MB	2	21,3	300	380	80	2,1	355	4,8	9,5	
24860-B-MB	2	21,3	300	380	80	2,1	355	4,8	9,5	



Design 4
Cylindrical bore
Sealed

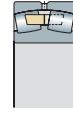


Design 2
Mounting dimensions



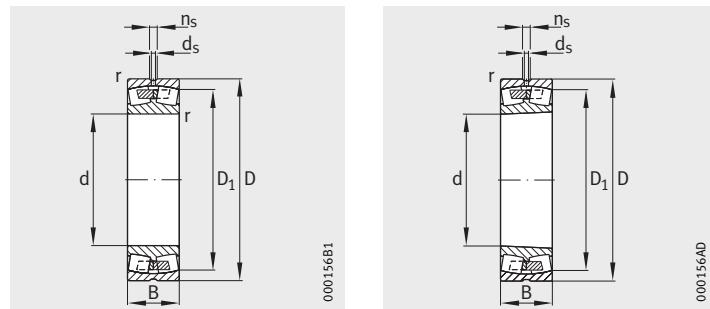
Design 4
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a min.	D _a max.	r _a max.	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
280	460	4	2 240	3 450	0,29	2,32	3,45	2,26	217	1 100	1 070
280	460	4	2 240	3 450	0,29	2,32	3,45	2,26	217	1 100	1 070
280	460	4	2 900	4 900	0,37	1,8	2,69	1,76	270	1 100	660
280	460	4	2 900	4 900	0,37	1,8	2,69	1,76	270	1 100	660
286	514	5	3 000	4 400	0,34	2	2,98	1,96	290	1 100	790
286	514	5	3 000	4 400	0,34	2	2,98	1,96	290	1 100	790
288,8	341,2	2	520	1 220	0,13	5,23	7,79	5,11	82	1 300	–
288,8	341,2	2	520	1 220	0,13	5,23	7,79	5,11	82	1 300	–
288,8	341,2	2	710	1 760	0,18	3,8	5,66	3,72	–	1 200	–
288,8	341,2	2	710	1 760	0,18	3,8	5,66	3,72	–	1 200	–
290,2	369,8	2,1	970	2 040	0,18	3,76	5,59	3,67	129	1 300	1 100
290,2	369,8	2,1	970	2 040	0,18	3,76	5,59	3,67	129	1 300	1 100
290,2	369,8	2,1	1 180	2 600	0,25	2,74	4,08	2,68	–	1 100	–
290,2	369,8	2,1	1 180	2 600	0,25	2,74	4,08	2,68	–	1 100	–
294,6	405,4	3	1 560	3 000	0,25	2,74	4,08	2,68	156	1 300	1 090
294,6	405,4	3	1 560	3 000	0,25	2,74	4,08	2,68	156	1 300	1 090
294,6	405,4	3	1 930	3 900	0,28	2,45	3,64	2,39	226	260	–
294,6	405,4	3	2 000	4 000	0,33	2,04	3,04	2	225	1 100	810
294,6	405,4	3	2 000	4 000	0,33	2,04	3,04	2	225	1 100	810
300	440	4	2 360	4 400	0,32	2,12	3,15	2,07	241	1 100	780
300	440	4	2 360	4 400	0,32	2,12	3,15	2,07	241	1 100	780
300	440	4	2 700	5 200	0,39	1,71	2,54	1,67	365	1 000	520
300	440	4	2 700	5 200	0,39	1,71	2,54	1,67	365	1 000	520
300	480	4	2 360	3 650	0,28	2,43	3,61	2,37	238	1 100	1 010
300	480	4	2 360	3 650	0,28	2,43	3,61	2,37	238	1 100	1 010
300	480	4	3 000	5 300	0,36	1,86	2,77	1,82	260	1 100	620
300	480	4	3 000	5 300	0,36	1,86	2,77	1,82	260	1 100	620
306	554	5	3 550	5 400	0,33	2,03	3,02	1,98	335	950	680
306	554	5	3 550	5 400	0,33	2,03	3,02	1,98	335	950	680
310,2	369,8	2,1	620	1 460	0,14	4,82	7,18	4,71	100	1 300	–
310,2	369,8	2,1	620	1 460	0,14	4,82	7,18	4,71	100	1 300	–
310,2	369,8	2,1	915	2 240	0,19	3,58	5,33	3,5	–	1 100	–
310,2	369,8	2,1	915	2 240	0,19	3,58	5,33	3,5	–	1 100	–



Spherical roller bearings

Cylindrical or tapered bore

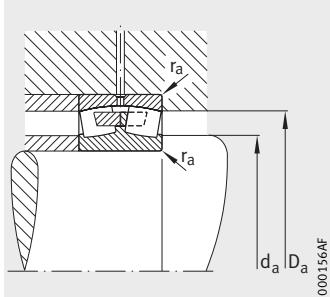


Design 2
With central rib
Cylindrical bore

With central rib
K = taper 1:12
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r min.	D ₁	d _s	n _s
23960-B-K-MB	2	39,1	300	420	90	3	384,6	9,5	17,7
23960-B-MB	2	40,6	300	420	90	3	384,6	9,5	17,7
24960-B-K30-MB	2	48	300	420	118	3	381,3	6,3	12,2
24960-B-MB	2	48	300	420	118	3	381,3	6,3	12,2
23060-K-MB	2	72,2	300	460	118	4	412,6	9,5	17,7
23060-MB	2	73,8	300	460	118	4	412,6	9,5	17,7
24060-B-K30-MB	2	97,7	300	460	160	4	401,5	8	15
24060-B-MB	2	102	300	460	160	4	401,5	8	15
23160-B-K-MB	2	123	300	500	160	5	434,7	9,5	17,7
23160-B-MB	2	131	300	500	160	5	434,7	9,5	17,7
24160-B-K30	2	158	300	500	200	5	424,4	8	15
24160-B	2	159	300	500	200	5	424,4	8	15
22260-K-MB	2	136	300	540	140	5	468,8	12,5	23,5
22260-MB	2	142	300	540	140	5	468,8	12,5	23,5
23260-K-MB	2	192	300	540	192	5	458,7	12,5	23,5
23260-MB	2	195	300	540	192	5	458,7	12,5	23,5
22360-MB	2	299	300	620	185	7,5	523,6	12,5	23,5
22360-K-MB	2	365	300	620	185	7,5	523,6	12,5	23,5
23864-K-MB	2	17,9	320	400	60	2,1	378,1	4,8	9,5
23864-MB	2	17,9	320	400	60	2,1	378,1	4,8	9,5
24864-B-K30-MB	2	24,6	320	400	80	2,1	375,4	4,8	9,5
24864-B-MB	2	24,6	320	400	80	2,1	375,4	4,8	9,5
23964-K-MB	2	41	320	440	90	3	406,2	9,5	17,7
23964-MB	2	41,8	320	440	90	3	406,2	9,5	17,7
24964-K30-MB	2	49,8	320	440	118	3	402,4	6,3	12,2
24964-MB	2	49,8	320	440	118	3	402,4	6,3	12,2
23064-K-MB	2	77,1	320	480	121	4	432,6	9,5	17,7
23064-MB	2	79,9	320	480	121	4	432,6	9,5	17,7
24064-B-K30-MB	2	103	320	480	160	4	424	8	15
24064-B-MB	2	107	320	480	160	4	424	8	15
23164-K-MB	2	167	320	540	176	5	466,2	12,5	23,5
23164-MB	2	171	320	540	176	5	466,2	12,5	23,5
24164-B-K30	2	197	320	540	218	5	456,1	9,5	17,7
24164-B	2	204	320	540	218	5	456,1	9,5	17,7



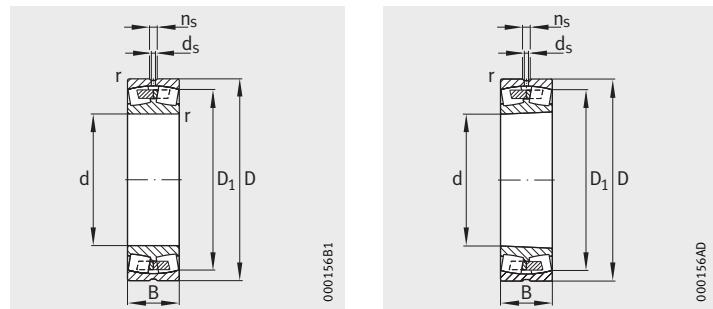
Mounting dimensions

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.	kN	kN					KN	min ⁻¹	min ⁻¹
312,4	407,6	2,5	1 270	2 650	0,2	3,42	5,09	3,34	165	1 190	1 000
312,4	407,6	2,5	1 270	2 650	0,2	3,42	5,09	3,34	165	1 190	1 000
312,4	407,6	2,5	1 560	3 400	0,26	2,57	3,83	2,52	—	1 000	—
312,4	407,6	2,5	1 560	3 400	0,26	2,57	3,83	2,52	—	1 000	—
314,6	445,4	3	1 960	3 650	0,25	2,69	4	2,63	223	1 100	960
314,6	445,4	3	1 960	3 650	0,25	2,69	4	2,63	223	1 100	960
314,6	445,4	3	2 500	5 200	0,35	1,95	2,9	1,91	300	1 000	700
314,6	445,4	3	2 500	5 200	0,35	1,95	2,9	1,91	300	1 000	700
320	480	4	2 650	4 900	0,33	2,06	3,06	2,01	270	1 100	720
320	480	4	2 650	4 900	0,33	2,06	3,06	2,01	270	1 100	720
320	480	4	3 250	6 300	0,4	1,67	2,49	1,63	540	900	455
320	480	4	3 250	6 300	0,4	1,67	2,49	1,63	540	900	455
320	520	4	2 750	4 400	0,27	2,47	3,67	2,41	300	1 000	900
320	520	4	2 750	4 400	0,27	2,47	3,67	2,41	300	1 000	900
320	520	4	3 450	6 200	0,37	1,83	2,72	1,79	300	1 000	560
320	520	4	3 450	6 200	0,37	1,83	2,72	1,79	300	1 000	560
332	588	6	4 000	6 100	0,33	2,06	3,06	2,01	375	900	630
332	588	6	4 000	6 100	0,33	2,06	3,06	2,01	375	900	630
330,2	389,8	2,1	680	1 630	0,13	5,06	7,53	4,95	113	1 200	—
330,2	389,8	2,1	680	1 630	0,13	5,06	7,53	4,95	113	1 200	—
330,2	389,8	2,1	965	2 450	0,18	3,8	5,66	3,72	220	1 100	—
330,2	389,8	2,1	965	2 450	0,18	3,8	5,66	3,72	220	1 100	—
332,4	427,6	2,5	1 310	2 750	0,19	3,62	5,39	3,54	202	1 100	930
332,4	427,6	2,5	1 310	2 750	0,19	3,62	5,39	3,54	202	1 100	930
332,4	427,6	2,5	1 630	3 600	0,25	2,71	4,04	2,65	—	1 000	—
332,4	427,6	2,5	1 630	3 600	0,25	2,71	4,04	2,65	—	1 000	—
334,6	465,4	3	2 040	4 000	0,25	2,74	4,08	2,68	243	1 100	900
334,6	465,4	3	2 040	4 000	0,25	2,74	4,08	2,68	243	1 100	900
334,6	465,4	3	2 600	5 400	0,33	2,06	3,06	2,01	360	950	660
334,6	465,4	3	2 600	5 400	0,33	2,06	3,06	2,01	360	950	660
340	520	4	3 200	6 000	0,34	1,98	2,94	1,93	305	950	650
340	520	4	3 200	6 000	0,34	1,98	2,94	1,93	305	950	650
340	520	4	3 800	7 350	0,41	1,65	2,46	1,61	530	850	415
340	520	4	3 800	7 350	0,41	1,65	2,46	1,61	530	850	415



Spherical roller bearings

Cylindrical or tapered bore

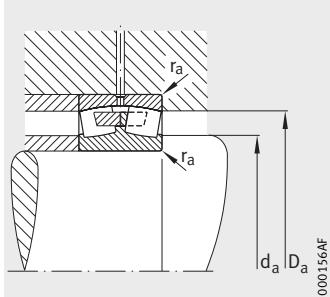


Design 2
With central rib
Cylindrical bore

With central rib
K = taper 1:12
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r min.	D ₁	d _s	n _s
22264-K-MB	2	166	320	580	150	5	503,5	12,5	23,5
22264-MB	2	177	320	580	150	5	503,5	12,5	23,5
23264-K-MB	2	229	320	580	208	5	489,6	12,5	23,5
23264-MB	2	242	320	580	208	5	489,6	12,5	23,5
22364-B-MB	2	350	320	670	200	7,5	568,1	12,5	23,5
22364-B-K-MB	2	433	320	670	200	7,5	568,1	12,5	23,5
23868-MB	2	18,7	340	420	60	2,1	398,3	4,8	9,5
23868-K-MB	2	18,7	340	420	60	2,1	398,3	4,8	9,5
24868-B-K30-MB	2	28,4	340	420	80	2,1	396	4,8	9,5
24868-B-MB	2	28,4	340	420	80	2,1	396	4,8	9,5
23968-MB	2	47,8	340	460	90	3	426,7	9,5	17,7
24968-B-K30-MB	2	56,7	340	460	118	3	422,4	6,3	12,2
24968-B-MB	2	56,7	340	460	118	3	422,4	6,3	12,2
23068-K-MB	2	101	340	520	133	5	464,6	12,5	23,5
23068-MB	2	105	340	520	133	5	464,6	12,5	23,5
24068-B-K30-MB	2	143	340	520	180	5	457,1	9,5	17,7
24068-B-MB	2	146	340	520	180	5	457,1	9,5	17,7
23168-B-K-MB	2	210	340	580	190	5	499,5	12,5	23,5
23168-B-MB	2	217	340	580	190	5	499,5	12,5	23,5
24168-B-K30	2	260	340	580	243	5	481,1	9,5	17,7
24168-B	2	266	340	580	243	5	481,1	9,5	17,7
22268-B-MB	2	226	340	620	165	6	538,7	12,5	23,5
22268-B-K-MB	2	311	340	620	165	6	538,7	12,5	23,5
23268-B-K-MB	2	291	340	620	224	6	521,2	12,5	23,5
23268-B-MB	2	309	340	620	224	6	521,2	12,5	23,5
22368-MB	2	451	340	710	212	7,5	602,1	12,5	23,5
23872-MB	2	19,7	360	440	60	2,1	418,5	4,8	9,5
23872-K-MB	2	19,7	360	440	60	2,1	418,5	4,8	9,5
24872-B-K30-MB	2	30,3	360	440	80	2,1	415,4	4,8	9,5
24872-B-MB	2	30,3	360	440	80	2,1	415,4	4,8	9,5
23972-K-MB	2	45	360	480	90	3	447,1	9,5	17,7
23972-MB	2	46,5	360	480	90	3	447,1	9,5	17,7
24972-B-MB	2	57,3	360	480	118	3	443,8	6,3	12,2
24972-B-K30-MB	2	57,3	360	480	118	3	443,8	6,3	12,2



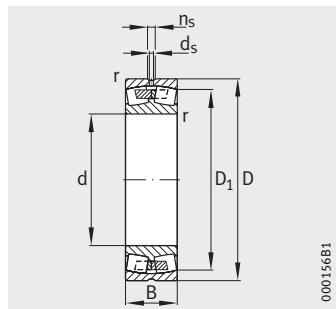
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d_a min.	D_a max.	r_a max.	dyn. C_r kN	stat. C_{0r} kN	e	γ_1	γ_2	γ_0	C_{ur} kN	n_G min ⁻¹	n_B min ⁻¹
340	560	4	3 050	4 900	0,27	2,47	3,67	2,41	345	950	830
340	560	4	3 050	4 900	0,27	2,47	3,67	2,41	345	950	830
340	560	4	3 900	6 950	0,37	1,8	2,69	1,76	330	950	510
340	560	4	3 900	6 950	0,37	1,8	2,69	1,76	330	950	510
352	638	6	4 400	6 800	0,33	2,06	3,06	2,01	495	800	560
352	638	6	4 400	6 800	0,33	2,06	3,06	2,01	540	800	560
350,2	409,8	2,1	710	1 730	0,13	5,32	7,92	5,2	121	1 100	–
350,2	409,8	2,1	710	1 730	0,13	5,32	7,92	5,2	121	1 100	–
350,2	409,8	2,1	965	2 500	0,18	3,8	5,66	3,72	151	980	–
350,2	409,8	2,1	965	2 500	0,18	3,8	5,66	3,72	151	980	–
352,4	447,6	2,5	1 370	3 000	0,18	3,85	5,73	3,76	199	1 100	860
352,4	447,6	2,5	1 700	3 750	0,24	2,84	4,23	2,78	–	950	–
352,4	447,6	2,5	1 700	3 750	0,24	2,84	4,23	2,78	–	950	–
358	502	4	2 360	4 550	0,25	2,69	4	2,63	285	1 000	840
358	502	4	2 360	4 550	0,25	2,69	4	2,63	285	1 000	840
358	502	4	3 100	6 550	0,34	1,98	2,94	1,93	530	850	600
358	502	4	3 100	6 550	0,34	1,98	2,94	1,93	530	850	600
360	560	4	3 650	6 950	0,34	1,98	2,94	1,93	570	900	590
360	560	4	3 650	6 950	0,34	1,98	2,94	1,93	570	900	590
360	560	4	4 400	8 500	0,43	1,56	2,32	1,53	680	800	380
360	560	4	4 400	8 500	0,43	1,56	2,32	1,53	680	800	380
366	594	5	3 550	5 850	0,28	2,43	3,61	2,37	470	850	750
366	594	5	3 550	5 850	0,28	2,43	3,61	2,37	470	850	750
366	594	5	4 500	8 150	0,38	1,78	2,65	1,74	650	850	465
366	594	5	4 500	8 150	0,38	1,78	2,65	1,74	650	850	465
372	678	6	5 200	8 150	0,33	2,06	3,06	2,01	485	750	500
370,2	429,8	2,1	750	1 900	0,12	5,72	8,51	5,59	129	1 100	–
370,2	429,8	2,1	750	1 900	0,12	5,72	8,51	5,59	129	1 100	–
370	430	2	1 040	2 700	0,16	4,22	6,29	4,13	181	940	–
370	430	2	1 040	2 700	0,16	4,22	6,29	4,13	181	940	–
372,4	467,6	2,5	1 430	3 200	0,17	4,05	6,04	3,96	209	1 000	800
372,4	467,6	2,5	1 430	3 200	0,17	4,05	6,04	3,96	209	1 000	800
372,4	467,6	2,5	1 730	3 900	0,22	3,01	4,48	2,94	330	850	–
372,4	467,6	2,5	1 730	3 900	0,22	3,01	4,48	2,94	330	850	–

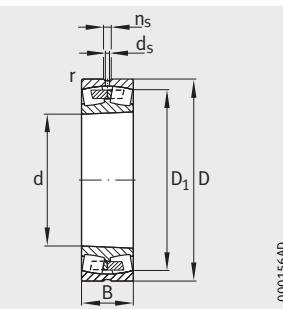


Spherical roller bearings

Cylindrical or tapered bore



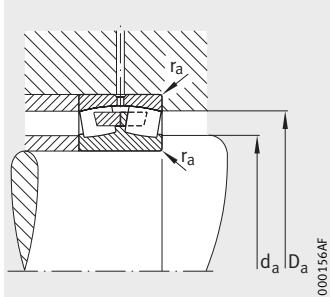
Design 2
With central rib
Cylindrical bore



With central rib
K = taper 1:12
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r min.	D ₁	d _s	n _s
23072-K-MB	2	107	360	540	134	5	485,2	12,5	23,5
23072-MB	2	112	360	540	134	5	485,2	12,5	23,5
24072-B-K30-MB	2	147	360	540	180	5	478,5	9,5	17,7
24072-B-MB	2	149	360	540	180	5	478,5	9,5	17,7
23172-K-MB	2	221	360	600	192	5	520	12,5	23,5
23172-MB	2	227	360	600	192	5	520	12,5	23,5
24172-B-K30	2	275	360	600	243	5	503,6	9,5	17,7
24172-B	2	279	360	600	243	5	503,6	9,5	17,7
22272-K-MB	2	257	360	650	170	6	565	12,5	23,5
22272-MB	2	257	360	650	170	6	565	12,5	23,5
23272-B-K-MB	2	328	360	650	232	6	548,3	12,5	23,5
23272-B-MB	2	347	360	650	232	6	548,3	12,5	23,5
22372-MB	2	500	360	750	224	7,5	634,9	12,5	23,5
22372-K-MB	2	625	360	750	224	7,5	634,9	12,5	23,5
23876-MB	2	33,5	380	480	75	2,1	450,7	6,3	12,2
23876-K-MB	2	33,5	380	480	75	2,1	450,7	6,3	12,2
24876-MB	2	44,7	380	480	100	2,1	448	6,3	12,2
24876-K30-MB	2	44,7	380	480	100	2,1	448	6,3	12,2
23976-K-MB	2	66,3	380	520	106	4	477,6	9,5	17,7
23976-MB	2	69,1	380	520	106	4	477,6	9,5	17,7
24976-B-K30-MB	2	91,1	380	520	140	4	475,1	6,3	12,2
24976-B-MB	2	91,1	380	520	140	4	475,1	6,3	12,2
23076-B-K-MB	2	115	380	560	135	5	505,6	12,5	23,5
23076-B-MB	2	117	380	560	135	5	505,6	12,5	23,5
24076-B-K30-MB	2	155	380	560	180	5	499	9,5	17,7
24076-B-MB	2	158	380	560	180	5	499	9,5	17,7
23176-K-MB	2	226	380	620	194	5	539,6	12,5	23,5
23176-MB	2	241	380	620	194	5	539,6	12,5	23,5
24176-B-K30	2	277	380	620	243	5	525,8	9,5	17,7
24176-B	2	279	380	620	243	5	525,8	9,5	17,7
22276-K-MB	2	284	380	680	175	6	592,6	12,5	23,5
22276-MB	2	284	380	680	175	6	592,6	12,5	23,5
23276-B-K-MB	2	367	380	680	240	6	576,4	12,5	23,5
23276-B-MB	2	390	380	680	240	6	576,4	12,5	23,5
22376-B-MB	2	533	380	780	230	7,5	663,5	12,5	23,5



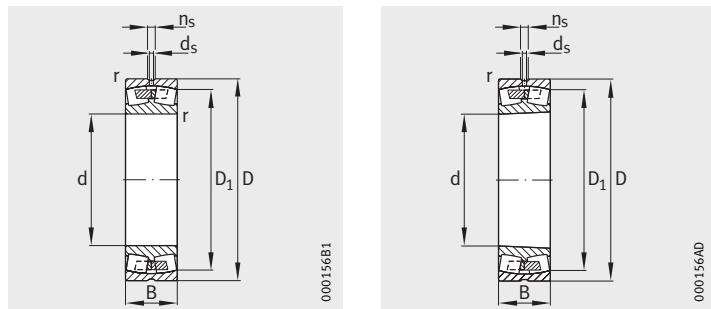
Mounting dimensions

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.	kN	kN					kN	min ⁻¹	min ⁻¹
378	522	4	2 450	4 800	0,25	2,74	4,08	2,68	295	950	790
378	522	4	2 450	4 800	0,25	2,74	4,08	2,68	295	950	790
378	522	4	3 250	6 800	0,33	2,06	3,06	2,01	530	800	560
378	522	4	3 250	6 800	0,33	2,06	3,06	2,01	530	800	560
380	580	4	3 800	7 350	0,33	2,06	3,06	2,01	360	850	550
380	580	4	3 800	7 350	0,33	2,06	3,06	2,01	360	850	550
380	580	4	4 500	9 000	0,41	1,63	2,43	1,6	550	750	355
380	580	4	4 500	9 000	0,41	1,63	2,43	1,6	550	750	355
386	624	5	3 900	6 550	0,28	2,43	3,61	2,37	420	800	700
386	624	5	3 900	6 550	0,28	2,43	3,61	2,37	420	800	700
386	624	5	4 900	9 150	0,38	1,78	2,65	1,74	720	800	425
386	624	5	4 900	9 150	0,38	1,78	2,65	1,74	720	800	425
392	718	6	5 600	8 800	0,33	2,06	3,06	2,01	650	700	480
392	718	6	5 600	8 800	0,33	2,06	3,06	2,01	650	700	480
390,2	469,8	2,1	965	2 400	0,14	4,98	7,41	4,87	163	1 000	–
390,2	469,8	2,1	965	2 400	0,14	4,98	7,41	4,87	163	1 000	–
390,2	469,8	2,1	1 400	3 600	0,18	3,66	5,46	3,58	–	850	–
390,2	469,8	2,1	1 400	3 600	0,18	3,66	5,46	3,58	–	850	–
394,6	505,4	3	1 760	4 000	0,19	3,58	5,33	3,5	265	950	750
394,6	505,4	3	1 760	4 000	0,19	3,58	5,33	3,5	265	950	750
394,6	505,4	3	2 280	5 200	0,25	2,69	4	2,63	435	800	–
394,6	505,4	3	2 280	5 200	0,25	2,69	4	2,63	435	800	–
398	542	4	2 550	5 300	0,24	2,84	4,23	2,78	430	900	730
398	542	4	2 550	5 300	0,24	2,84	4,23	2,78	430	900	730
398	542	4	3 350	7 200	0,31	2,15	3,2	2,1	580	750	520
398	542	4	3 350	7 200	0,31	2,15	3,2	2,1	580	750	520
400	600	4	4 050	8 150	0,32	2,12	3,15	2,07	385	800	510
400	600	4	4 050	8 150	0,32	2,12	3,15	2,07	385	800	510
400	600	4	4 650	9 500	0,39	1,71	2,54	1,67	770	700	330
400	600	4	4 650	9 500	0,39	1,71	2,54	1,67	770	700	330
406	654	5	4 150	7 100	0,27	2,51	3,74	2,45	550	750	630
406	654	5	4 150	7 100	0,27	2,51	3,74	2,45	550	750	630
406	654	5	5 300	9 800	0,37	1,8	2,69	1,76	780	750	395
406	654	5	5 300	9 800	0,37	1,8	2,69	1,76	780	750	395
412	748	6	6 000	9 500	0,32	2,13	3,17	2,08	690	670	450



Spherical roller bearings

Cylindrical or tapered bore

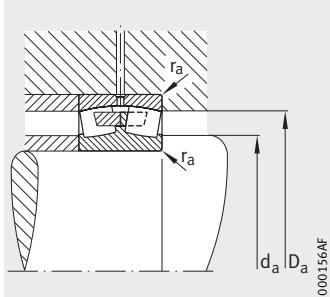


Design 2
With central rib
Cylindrical bore

With central rib
K = taper 1:12
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r min.	D ₁	d _s	n _s
23880-MB	2	35,2	400	500	75	2,1	471	6,3	12,2
23880-K-MB	2	43,6	400	500	75	2,1	471	6,3	12,2
24880-B-K30-MB	2	16,8	400	500	100	2,1	468,5	6,3	12,2
24880-B-MB	2	16,8	400	500	100	2,1	468,5	6,3	12,2
23980-B-K-MB	2	68,2	400	540	106	4	499	9,5	17,7
23980-B-MB	2	72,9	400	540	106	4	499	9,5	17,7
24980-B-K30-MB	2	95,7	400	540	140	4	494,6	6,3	12,2
24980-B-MB	2	95,7	400	540	140	4	494,6	6,3	12,2
23080-K-MB	2	143	400	600	148	5	540,5	12,5	23,5
23080-MB	2	151	400	600	148	5	540,5	12,5	23,5
24080-B-K30-MB	2	196	400	600	200	5	530,9	12,5	23,5
24080-B-MB	2	198	400	600	200	5	530,9	12,5	23,5
23180-B-K-MB	2	261	400	650	200	6	567,2	12,5	23,5
23180-B-MB	2	270	400	650	200	6	567,2	12,5	23,5
24180-B-K30	2	312	400	650	250	6	553,5	12,5	23,5
24180-B	2	326	400	650	250	6	553,5	12,5	23,5
22280-MB	2	329	400	720	185	6	629,3	12,5	23,5
22280-K-MB	2	414	400	720	185	6	629,3	12,5	23,5
23280-B-K-MB	2	442	400	720	256	6	609,8	12,5	23,5
23280-B-MB	2	469	400	720	256	6	609,8	12,5	23,5
22380-MB	2	627	400	820	243	7,5	694,4	12,5	23,5
22380-K-MB	2	800	400	820	243	7,5	694,4	12,5	23,5
23884-MB	2	36,3	420	520	75	2,1	491,3	6,3	12,2
23884-K-MB	2	36,3	420	520	75	2,1	491,3	6,3	12,2
24884-K30-MB	2	47,9	420	520	100	2,1	488,9	6,3	12,2
24884-MB	2	47,9	420	520	100	2,1	488,9	6,3	12,2
23984-MB	2	75,5	420	560	106	4	519,5	9,5	17,7
23984-K-MB	2	78	420	560	106	4	519,5	9,5	17,7
24984-B-K30-MB	2	101	420	560	140	4	516,8	6,3	12,2
24984-B-MB	2	101	420	560	140	4	516,8	6,3	12,2
23084-B-K-MB	2	155	420	620	150	5	560,7	12,5	23,5
23084-B-MB	2	162	420	620	150	5	560,7	12,5	23,5
24084-B-K30-MB	2	214	420	620	200	5	550,2	12,5	23,5
24084-B-MB	2	217	420	620	200	5	550,2	12,5	23,5



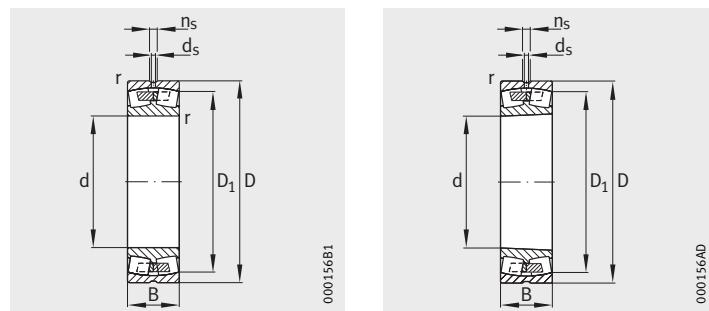
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	r _a	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
410,2	489,8	2,1	1 060	2 650	0,13	5,14	7,66	5,03	174	950	–
410,2	489,8	2,1	1 060	2 650	0,13	5,14	7,66	5,03	174	950	–
410,2	489,8	2,1	1 460	3 800	0,18	3,8	5,66	3,72	248	800	–
410,2	489,8	2,1	1 460	3 800	0,18	3,8	5,66	3,72	248	800	–
414,6	525,4	3	1 830	4 150	0,18	3,71	5,52	3,63	275	900	710
414,6	525,4	3	1 830	4 150	0,18	3,71	5,52	3,63	275	900	710
414,6	525,4	3	2 280	5 300	0,24	2,81	4,19	2,75	188	750	–
414,6	525,4	3	2 280	5 300	0,24	2,81	4,19	2,75	188	750	–
418	582	4	3 050	6 200	0,24	2,79	4,15	2,73	365	800	670
418	582	4	3 050	6 200	0,24	2,79	4,15	2,73	365	800	670
418	582	4	3 900	8 500	0,33	2,06	3,06	2,01	670	700	485
418	582	4	3 900	8 500	0,33	2,06	3,06	2,01	670	700	485
426	624	5	4 250	8 500	0,31	2,15	3,2	2,1	670	750	485
426	624	5	4 250	8 500	0,31	2,15	3,2	2,1	670	750	485
426	624	5	5 100	10 400	0,39	1,72	2,56	1,68	720	670	310
426	624	5	5 100	10 400	0,39	1,72	2,56	1,68	720	670	310
426	694	5	4 650	7 800	0,26	2,55	3,8	2,5	600	700	600
426	694	5	4 650	7 800	0,26	2,55	3,8	2,5	600	700	600
426	694	5	5 700	10 800	0,38	1,78	2,65	1,74	820	700	370
426	694	5	5 700	10 800	0,38	1,78	2,65	1,74	820	700	370
432	788	6	6 550	10 600	0,33	2,07	3,09	2,03	610	670	400
432	788	6	6 550	10 600	0,33	2,07	3,09	2,03	610	670	400
430,2	509,8	2,1	1 080	2 750	0,12	5,42	8,06	5,3	185	900	–
430,2	509,8	2,1	1 080	2 750	0,12	5,42	8,06	5,3	185	900	–
430,2	509,8	2,1	1 500	3 900	0,17	3,95	5,88	3,86	–	750	–
430,2	509,8	2,1	1 500	3 900	0,17	3,95	5,88	3,86	–	750	–
434,6	545,4	3	1 900	4 500	0,18	3,85	5,73	3,76	300	850	660
434,6	545,4	3	1 900	4 500	0,18	3,85	5,73	3,76	300	850	660
434,6	545,4	3	2 360	5 600	0,23	2,92	4,35	2,86	–	700	–
434,6	545,4	3	2 360	5 600	0,23	2,92	4,35	2,86	–	700	–
438	602	4	3 150	6 550	0,24	2,84	4,23	2,78	395	800	640
438	602	4	3 150	6 550	0,24	2,84	4,23	2,78	395	800	640
438	602	4	4 000	8 800	0,32	2,13	3,17	2,08	710	670	460
438	602	4	4 000	8 800	0,32	2,13	3,17	2,08	710	670	460



Spherical roller bearings

Cylindrical or tapered bore

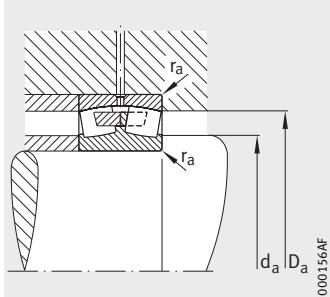


Design 2
With central rib
Cylindrical bore

With central rib
K = taper 1:12
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions							
			d	D	B	r min.	D ₁	d _s	n _s	
23184-K-MB	2	339	420	700	224	6	605,4	12,5	23,5	
23184-MB	2	360	420	700	224	6	605,4	12,5	23,5	
24184-B-K30	2	407	420	700	280	6	590,3	12,5	23,5	
24184-B	2	442	420	700	280	6	590,3	12,5	23,5	
22284-K-MB	2	404	420	760	195	7,5	661,8	12,5	23,5	
22284-MB	2	404	420	760	195	7,5	661,8	12,5	23,5	
23284-B-K-MB	2	539	420	760	272	7,5	642,2	12,5	23,5	
23284-B-MB	2	555	420	760	272	7,5	642,2	12,5	23,5	
22384-MB	2	746	420	850	250	9,5	722,6	12,5	23,5	
23888-K-MB	2	36	440	540	75	2,1	511,5	6,3	12,2	
23888-MB	2	38,5	440	540	75	2,1	511,5	6,3	12,2	
24888-B-K30-MB	2	49,2	440	540	100	2,1	509,5	6,3	12,2	
24888-B-MB	2	49,2	440	540	100	2,1	509,5	6,3	12,2	
23988-K-MB	2	98,3	440	600	118	4	552,8	12,5	23,5	
23988-MB	2	101	440	600	118	4	552,8	12,5	23,5	
24988-B-K30-MB	2	125	440	600	160	4	548,6	8	15	
24988-B-MB	2	125	440	600	160	4	548,6	8	15	
23088-K-MB	2	177	440	650	157	6	586,8	12,5	23,5	
23088-MB	2	190	440	650	157	6	586,8	12,5	23,5	
24088-B-K30-MB	2	247	440	650	212	6	575,6	12,5	23,5	
24088-B-MB	2	250	440	650	212	6	575,6	12,5	23,5	
23188-K-MB	2	378	440	720	226	6	626	12,5	23,5	
23188-MB	2	381	440	720	226	6	626	12,5	23,5	
24188-B-K30	2	451	440	720	280	6	612,4	12,5	23,5	
24188-B	2	453	440	720	280	6	612,4	12,5	23,5	
22288-MB	2	438	440	790	200	7,5	689,5	12,5	23,5	
22288-K-MB	2	440	440	790	200	7,5	689,5	12,5	23,5	
23288-B-K-MB	2	586	440	790	280	7,5	669,3	12,5	23,5	
23288-B-MB	2	615	440	790	280	7,5	669,3	12,5	23,5	
22388-B-MB	2	895	440	900	265	9,5	763,9	12,5	23,5	
23892-K-MB	2	58	460	580	90	3	545,7	6,3	12,2	
23892-MB	2	58	460	580	90	3	545,7	6,3	12,2	
24892-B-MB	2	71	460	580	118	3	542,6	6,3	12,2	
24892-B-K30-MB	2	71	460	580	118	3	542,6	6,3	12,2	

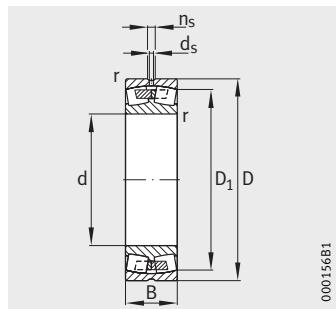


Mounting dimensions

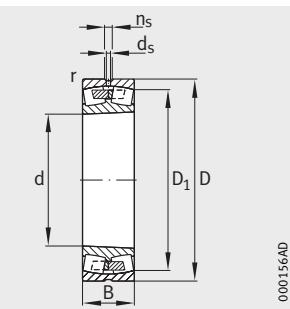
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a min.	D _a max.	r _a max.	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
446	674	5	5 000	9 650	0,33	2,03	3,02	1,98	465	700	455
446	674	5	5 000	9 650	0,33	2,03	3,02	1,98	465	700	455
446	674	5	6 200	12 700	0,4	1,67	2,49	1,63	980	630	265
446	674	5	6 200	12 700	0,4	1,67	2,49	1,63	980	630	265
452	728	6	5 100	8 650	0,27	2,51	3,74	2,45	630	670	500
452	728	6	5 100	8 650	0,27	2,51	3,74	2,45	630	670	500
452	728	6	6 550	12 200	0,38	1,77	2,64	1,73	930	670	340
452	728	6	6 550	12 200	0,38	1,77	2,64	1,73	930	670	340
460	810	8	6 950	11 200	0,33	2,07	3,09	2,03	780	630	400
450,2	529,8	2,1	1 120	3 000	0,12	5,72	8,51	5,59	199	850	–
450,2	529,8	2,1	1 120	3 000	0,12	5,72	8,51	5,59	199	850	–
450,2	530	2	1 500	4 000	0,18	3,76	5,59	3,67	265	740	–
450,2	530	2	1 500	4 000	0,18	3,76	5,59	3,67	265	740	–
454,6	585,4	3	2 240	5 200	0,18	3,66	5,46	3,58	295	800	620
454,6	585,4	3	2 240	5 200	0,18	3,66	5,46	3,58	295	800	620
454,6	585,4	3	2 900	6 700	0,25	2,71	4,04	2,65	–	670	–
454,6	585,4	3	2 900	6 700	0,25	2,71	4,04	2,65	–	670	–
463	627	5	3 400	7 100	0,24	2,84	4,23	2,78	405	750	610
463	627	5	3 400	7 100	0,24	2,84	4,23	2,78	405	750	610
463	627	5	4 300	9 650	0,32	2,12	3,15	2,07	750	630	430
463	627	5	4 300	9 650	0,32	2,12	3,15	2,07	750	630	430
466	694	5	5 200	10 400	0,32	2,1	3,13	2,06	485	700	425
466	694	5	5 200	10 400	0,32	2,1	3,13	2,06	485	700	425
466	694	5	6 400	13 200	0,38	1,76	2,62	1,72	1 020	600	255
466	694	5	6 400	13 200	0,38	1,76	2,62	1,72	1 020	600	255
472	758	6	5 400	9 300	0,27	2,51	3,74	2,45	680	630	530
472	758	6	5 400	9 300	0,27	2,51	3,74	2,45	680	630	530
472	758	6	7 100	13 400	0,37	1,8	2,69	1,76	990	630	320
472	758	6	7 100	13 400	0,37	1,8	2,69	1,76	990	630	320
480	860	8	7 800	12 700	0,31	2,15	3,2	2,1	910	600	360
472,4	567,6	2,5	1 430	3 650	0,14	4,98	7,41	4,87	236	800	–
472,4	567,6	2,5	1 430	3 650	0,14	4,98	7,41	4,87	236	800	–
472,4	567,6	2,5	1 930	5 100	0,18	3,76	5,59	3,67	330	670	–
472,4	567,6	2,5	1 930	5 100	0,18	3,76	5,59	3,67	330	670	–

Spherical roller bearings

Cylindrical or tapered bore



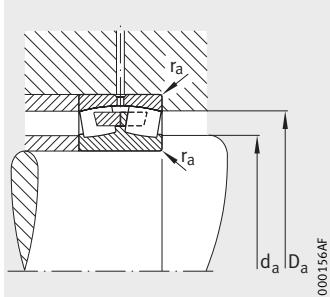
Design 2
With central rib
Cylindrical bore



With central rib
K = taper 1:12
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions							
			d	D	B	r min.	D ₁	d _s	n _s	
23992-B-K-MB	2	103	460	620	118	4	573,3	12,5	23,5	
23992-B-MB	2	111	460	620	118	4	573,3	12,5	23,5	
24992-K30-MB	2	137	460	620	160	4	569,3	8	15	
24992-MB	2	137	460	620	160	4	569,3	8	15	
23092-B-MB	2	208	460	680	163	6	612,2	12,5	23,5	
23092-B-K-MB	2	204	460	680	163	6	612,2	12,5	23,5	
24092-B-MB	2	282	460	680	218	6	603,3	12,5	23,5	
24092-B-K30-MB	2	277	460	680	218	6	603,3	12,5	23,5	
23192-K-MB	2	420	460	760	240	7,5	661,4	12,5	23,5	
23192-MB	2	447	460	760	240	7,5	661,4	12,5	23,5	
24192-B-K30-MB	2	578	460	760	300	7,5	642,8	12,5	23,5	
24192-B-MB	2	582	460	760	300	7,5	642,8	12,5	23,5	
22292-MB	2	543	460	830	212	7,5	723,8	12,5	23,5	
23292-K-MB	2	699	460	830	296	7,5	701,6	12,5	23,5	
23292-MB	2	700	460	830	296	7,5	701,6	12,5	23,5	
22392-MB	2	710	460	950	280	9,5	805,3	12,5	23,5	
23896-MB	2	60,8	480	600	90	3	566	6,3	12,2	
23896-K-MB	2	60,8	480	600	90	3	566	6,3	12,2	
24896-B-K30-MB	2	74	480	600	118	3	562,8	6,3	12,2	
24896-B-MB	2	74	480	600	118	3	562,8	6,3	12,2	
23996-B-K-MB	2	121	480	650	128	5	598,8	12,5	23,5	
23996-B-MB	2	126	480	650	128	5	598,8	12,5	23,5	
24996-B-K30-MB	2	153	480	650	170	5	596,1	8	15	
24996-B-MB	2	158	480	650	170	5	596,1	8	15	
23096-K-MB	2	214	480	700	165	6	632,6	12,5	23,5	
23096-MB	2	222	480	700	165	6	632,6	12,5	23,5	
24096-B-K30-MB	2	289	480	700	218	6	625,4	12,5	23,5	
24096-B-MB	2	291	480	700	218	6	625,4	12,5	23,5	
23196-K-MB	2	470	480	790	248	7,5	688,3	12,5	23,5	
23196-MB	2	508	480	790	248	7,5	688,3	12,5	23,5	
24196-B-K30-MB	2	628	480	790	308	7,5	669,9	12,5	23,5	
24196-B-MB	2	637	480	790	308	7,5	669,9	12,5	23,5	
22296-MB	2	597	480	870	224	7,5	757,8	12,5	23,5	
23296-K-MB	2	806	480	870	310	7,5	734,8	12,5	23,5	
23296-MB	2	830	480	870	310	7,5	734,8	12,5	23,5	
22396-B-MB	2	1 060	480	980	290	9,5	829,4	12,5	23,5	



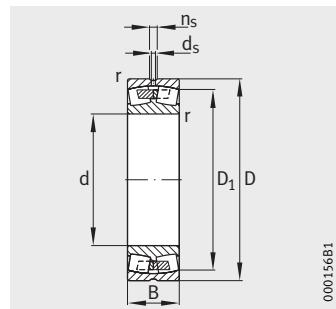
Mounting dimensions

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.	kN	kN					kn	min ⁻¹	min ⁻¹
474,6	605,4	3	2 280	5 400	0,18	3,85	5,73	3,76	370	750	590
474,6	605,4	3	2 280	5 400	0,18	3,85	5,73	3,76	370	750	590
474,6	605,4	3	3 000	6 950	0,24	2,81	4,19	2,75	—	670	—
474,6	605,4	3	3 000	6 950	0,24	2,81	4,19	2,75	—	670	—
483	657	5	3 650	7 650	0,24	2,84	4,23	2,78	520	700	560
483	657	5	3 650	7 650	0,24	2,84	4,23	2,78	520	700	560
483	657	5	4 750	10 600	0,31	2,16	3,22	2,12	710	630	405
483	657	5	4 750	10 600	0,31	2,16	3,22	2,12	710	630	400
492	728	6	5 850	11 600	0,32	2,12	3,15	2,07	530	630	390
492	728	6	5 850	11 600	0,32	2,12	3,15	2,07	530	630	390
492	728	6	7 500	15 600	0,39	1,73	2,58	1,69	1 160	560	227
492	728	6	7 500	15 600	0,39	1,73	2,58	1,69	1 160	560	227
492	798	6	6 100	10 800	0,27	2,51	3,74	2,45	—	600	480
492	798	6	7 800	15 000	0,37	1,8	2,69	1,76	620	600	295
492	798	6	7 800	15 000	0,37	1,8	2,69	1,76	620	600	295
492	798	6	8 500	14 000	0,33	2,07	3,09	2,03	—	560	340
492,4	587,6	2,5	1 460	3 900	0,13	5,23	7,79	5,11	248	750	—
492,4	587,6	2,5	1 460	3 900	0,13	5,23	7,79	5,11	248	750	—
492,4	587,6	2,5	2 000	5 400	0,17	3,9	5,81	3,81	—	670	—
492,4	587,6	2,5	2 000	5 400	0,17	3,9	5,81	3,81	—	670	—
498	632	4	2 550	6 000	0,18	3,76	5,59	3,67	460	700	570
498	632	4	2 550	6 000	0,18	3,76	5,59	3,67	460	700	570
498	632	4	3 250	7 800	0,24	2,76	4,11	2,7	—	630	—
498	632	4	3 250	7 800	0,24	2,76	4,11	2,7	—	630	—
503	677	5	3 800	8 150	0,23	2,9	4,31	2,83	455	670	550
503	677	5	3 800	8 150	0,23	2,9	4,31	2,83	455	670	550
503	677	5	4 900	11 200	0,3	2,25	3,34	2,2	830	600	380
503	677	5	4 900	11 200	0,3	2,25	3,34	2,2	830	600	380
512	758	6	6 300	12 700	0,32	2,12	3,15	2,07	570	630	370
512	758	6	6 300	12 700	0,32	2,12	3,15	2,07	570	630	370
512	758	6	8 000	16 600	0,39	1,75	2,61	1,71	1 190	560	213
512	758	6	8 000	16 600	0,39	1,75	2,61	1,71	1 190	560	220
512	838	6	6 550	11 400	0,27	2,51	3,74	2,45	—	600	480
512	838	6	8 800	17 000	0,37	1,83	2,72	1,79	700	600	265
512	838	6	8 800	17 000	0,37	1,83	2,72	1,79	700	600	265
520	940	8	9 000	15 000	0,33	2,06	3,06	2,01	1 070	530	320

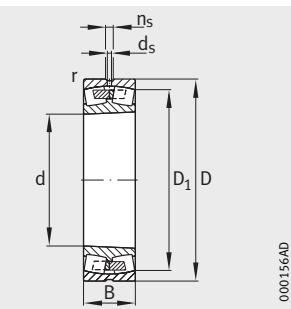


Spherical roller bearings

Cylindrical or tapered bore



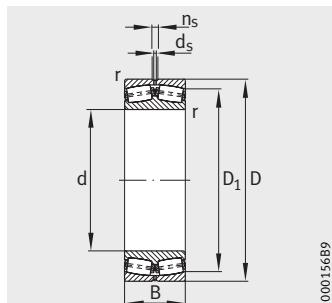
Design 2
With central rib
Cylindrical bore



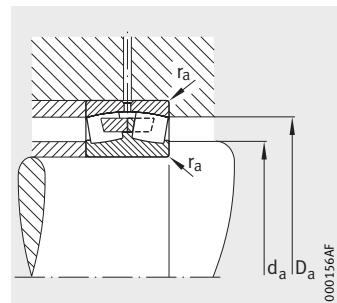
With central rib
K = taper 1:12
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

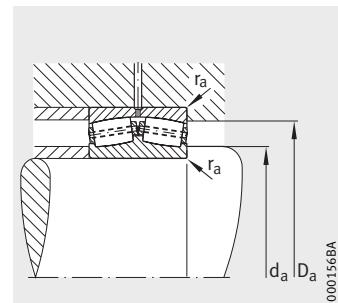
Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r min.	D ₁	d _s	n _s
238/500-B-MB	2	60,7	500	620	90	3	586,2	6,3	12,2
238/500-B-MB	2	63,6	500	620	90	3	586,2	6,3	12,2
248/500-B-K30-MB	2	84,3	500	620	118	3	583,5	6,3	12,2
248/500-B-MB	2	84,3	500	620	118	3	583,5	6,3	12,2
239/500-K-MB	2	124	500	670	128	5	619,3	12,5	23,5
239/500-MB	2	132	500	670	128	5	619,3	12,5	23,5
Z-528741.PRL	2	167	500	670	170	5	616,8	8	15
249/500-K30-MB	2	172	500	670	170	5	616,5	8	15
249/500-MB	2	172	500	670	170	5	616,5	8	15
Z-541821.249/500	3	177	500	670	170	5	616,8	8	15
230/500-B-K-MB	2	219	500	720	167	6	653,5	12,5	23,5
230/500-B-MB	2	233	500	720	167	6	653,5	12,5	23,5
240/500-B-MB	2	297	500	720	218	6	645,8	12,5	23,5
240/500-B-K30-MB	2	384	500	720	218	6	645,8	12,5	23,5
231/500-B-K-MB	2	556	500	830	264	7,5	720,9	12,5	23,5
231/500-B-MB	2	602	500	830	264	7,5	720,9	12,5	23,5
241/500-B-MB	2	725	500	830	325	7,5	701,8	12,5	23,5
241/500-B-K30-MB	2	738	500	830	325	7,5	701,8	12,5	23,5
222/500-MB	2	712	500	920	243	7,5	798,1	12,5	23,5
232/500-K-MB	2	984	500	920	336	7,5	773,8	12,5	23,5
232/500-MB	2	1 010	500	920	336	7,5	773,8	12,5	23,5
223/500-MB	2	1 030	500	1 030	300	12	872,4	12,5	23,5
238/530-MB	2	67,8	530	650	90	3	616,4	6,3	12,2
238/530-K-MB	2	67,8	530	650	90	3	616,4	6,3	12,2
248/530-B-MB	2	89,7	530	650	118	3	614,1	6,3	12,2
248/530-B-K30-MB	2	89,7	530	650	118	3	614,1	6,3	12,2
239/530-K-MB	2	146	530	710	136	5	656,5	12,5	23,5
239/530-MB	2	160	530	710	136	5	656,5	12,5	23,5
Z-528742.PRL	2	208	530	710	180	5	653,2	9,5	17,7
249/530-B-K30-MB	2	208	530	710	180	5	653,2	9,5	17,7
249/530-B-MB	2	208	530	710	180	5	653,2	9,5	17,7
Z-541822.249/530	3	209	530	710	180	5	653,2	9,5	17,7
230/530-K-MB	2	291	530	780	185	6	703,7	12,5	23,5
230/530-MB	2	321	530	780	185	6	703,7	12,5	23,5
240/530-B-MB	2	415	530	780	250	6	691,9	12,5	23,5
240/530-B-K30-MB	2	418	530	780	250	6	691,9	12,5	23,5



Design 3
Cylindrical bore with pin cage



Design 2
Mounting dimensions



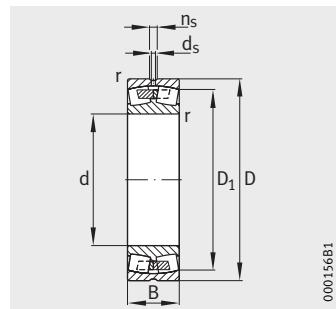
Design 3
Mounting dimensions

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.	kN	kN					kn	min ⁻¹	min ⁻¹
512,4	607,6	2,5	1 530	4 150	0,12	5,42	8,06	5,3	260	700	–
512,4	607,6	2,5	1 530	4 150	0,12	5,42	8,06	5,3	260	700	–
512,4	607,6	2,5	2 080	5 700	0,17	4	5,96	3,91	265	630	–
512,4	607,6	2,5	2 080	5 700	0,17	4	5,96	3,91	265	630	–
518	652	4	2 600	6 300	0,17	3,9	5,81	3,81	400	670	540
518	652	4	2 600	6 300	0,17	3,9	5,81	3,81	400	670	540
517	653	4	3 050	7 200	0,22	3,14	4,67	3,07	490	600	–
518	652	4	3 350	8 000	0,24	2,87	4,27	2,8	490	600	–
518	652	4	3 350	8 000	0,24	2,87	4,27	2,8	490	600	–
517	640	4	3 650	9 300	0,22	3,04	4,53	2,97	610	600	–
523	697	5	3 900	8 500	0,22	3,01	4,48	2,94	510	670	520
523	697	5	3 900	8 500	0,22	3,01	4,48	2,94	510	670	520
523	697	5	4 900	11 200	0,29	2,32	3,45	2,26	850	560	370
523	697	5	4 900	11 200	0,29	2,32	3,45	2,26	850	560	360
532	798	6	7 100	14 300	0,32	2,1	3,13	2,06	990	600	340
532	798	6	7 100	14 300	0,32	2,1	3,13	2,06	990	600	340
532	798	6	8 650	18 300	0,39	1,73	2,58	1,69	1 340	530	199
532	798	6	8 650	18 300	0,39	1,73	2,58	1,69	1 340	530	199
532	888	6	7 500	13 200	0,28	2,41	3,59	2,35	–	560	430
532	888	6	9 650	18 300	0,38	1,78	2,65	1,74	750	560	260
532	888	6	9 650	18 300	0,38	1,78	2,65	1,74	750	560	260
548	982	10	9 800	16 300	0,32	2,09	3,11	2,04	–	500	300
542	637,6	2,5	1 600	4 300	0,12	5,61	8,36	5,49	320	670	–
542	637,6	2,5	1 600	4 300	0,12	5,61	8,36	5,49	320	670	–
542,4	637,6	2,5	2 240	6 400	0,16	4,22	6,29	4,13	375	600	–
542,4	637,6	2,5	2 240	6 400	0,16	4,22	6,29	4,13	375	600	–
548	692	4	2 850	6 800	0,18	3,85	5,73	3,76	385	630	500
548	692	4	2 850	6 800	0,18	3,85	5,73	3,76	385	630	500
548	692	4	3 400	8 150	0,22	3,14	4,67	3,07	410	560	–
548	692	4	3 750	9 150	0,24	2,87	4,27	2,8	600	560	–
548	692	4	3 750	9 150	0,24	2,87	4,27	2,8	600	560	–
547	675	4	4 050	10 200	0,22	3,04	4,53	2,97	610	560	–
553	757	5	4 400	9 500	0,22	3,04	4,53	2,97	540	600	490
553	757	5	4 400	9 500	0,22	3,04	4,53	2,97	540	600	490
553	757	5	6 000	13 700	0,31	2,15	3,2	2,1	910	530	335
553	757	5	6 000	13 700	0,31	2,15	3,2	2,1	910	530	340

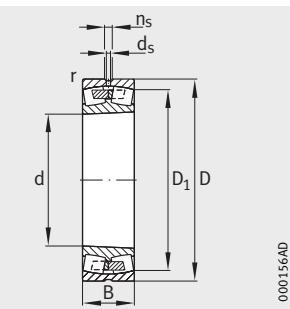


Spherical roller bearings

Cylindrical or tapered bore



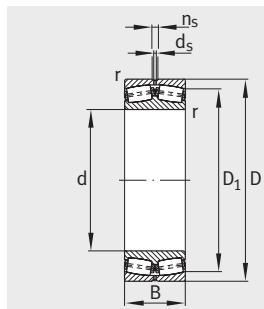
Design 2
With central rib
Cylindrical bore



With central rib
K = taper 1:12
K30 = taper 1:30

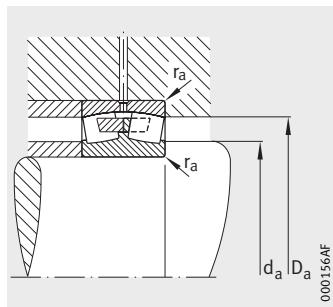
Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions							
			d	D	B	r min.	D ₁	d _s	n _s	
231/530-K-MB	2	643	530	870	272	7,5	756,3	12,5	23,5	
241/530-B-K30-MB	2	845	530	870	335	7,5	739,1	12,5	23,5	
241/530-B-MB	2	856	530	870	335	7,5	739,1	12,5	23,5	
222/530-MB	2	845	530	980	258	9,5	850	12,5	23,5	
232/530-MB	2	1 240	530	980	355	9,5	824,4	12,5	23,5	
232/530-K-MB	2	1 200	530	980	355	9,5	824,4	12,5	23,5	
223/530-MB	2	1 540	530	1 090	325	12	918,9	12,5	23,5	
238/560-K-MB	2	68,5	560	680	90	3	646,7	6,3	12,2	
238/560-MB	2	68,5	560	680	90	3	646,7	6,3	12,2	
248/560-B-K30-MB	2	92,7	560	680	118	3	644,6	6,3	12,2	
248/560-B-MB	2	92,7	560	680	118	3	644,6	6,3	12,2	
239/560-B-K-MB	2	176	560	750	140	5	693,4	12,5	23,5	
239/560-B-MB	2	181	560	750	140	5	693,4	12,5	23,5	
Z-528743.PRL	2	235	560	750	190	6	690	12,5	23,5	
249/560-K30-MB	2	246	560	750	190	5	690,2	9,5	17,7	
249/560-MB	2	246	560	750	190	5	690,2	9,5	17,7	
Z-541823.249/560	3	247	560	750	190	5	690,2	9,5	17,7	
230/560-B-K-MB	2	339	560	820	195	6	741,5	12,5	23,5	
230/560-B-MB	2	358	560	820	195	6	741,5	12,5	23,5	
240/560-B-K30-MB	2	458	560	820	258	6	731,2	12,5	23,5	
240/560-B-MB	2	472	560	820	258	6	731,2	12,5	23,5	
231/560-K-MB	2	737	560	920	280	7,5	800,2	12,5	23,5	
231/560-MB	2	760	560	920	280	7,5	800,2	12,5	23,5	
241/560-B-K30-MB	2	974	560	920	355	7,5	785	12,5	23,5	
241/560-B-MB	2	979	560	920	355	7,5	785	12,5	23,5	
222/560-MB	2	1 060	560	1 030	272	9,5	891,7	12,5	23,5	
232/560-K-MB	2	1 360	560	1 030	365	9,5	868,1	12,5	23,5	
232/560-MB	2	1 400	560	1 030	365	9,5	868,1	12,5	23,5	
223/560-MB	2	1 470	560	1 150	335	12	974,6	12,5	23,5	
238/600-MB	2	86,2	600	730	98	3	696,3	6,3	12,2	
238/600-K-MB	2	86,2	600	730	98	3	696,3	6,3	12,2	
248/600-B-MB	2	116	600	730	128	3	691,5	6,3	12,2	
248/600-B-K30-MB	2	116	600	730	128	3	691,5	6,3	12,2	



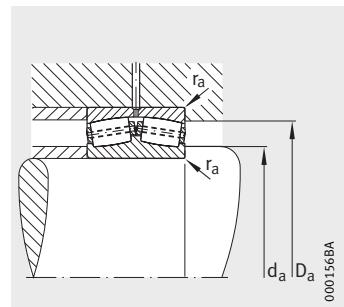
00015689

Design 3
Cylindrical bore with pin cage



00015689

Design 2
Mounting dimensions



00015689

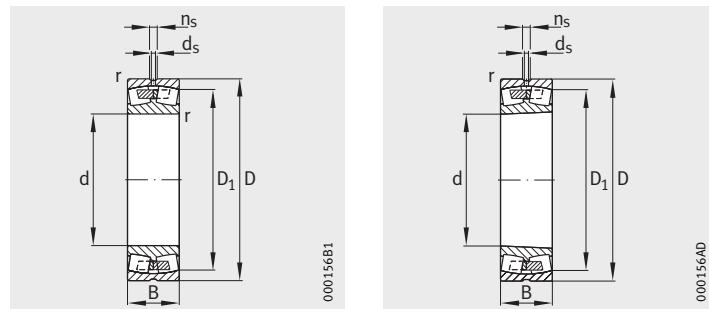
Design 3
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	r _a	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
562	838	6	7 350	15 300	0,32	2,12	3,15	2,07	670	560	325
562	838	6	9 500	20 000	0,38	1,77	2,64	1,73	1 450	500	184
562	838	6	9 500	20 000	0,38	1,77	2,64	1,73	1 450	500	180
570	940	8	8 300	15 000	0,28	2,43	3,61	2,37	—	530	400
570	940	8	10 800	20 800	0,38	1,77	2,64	1,73	1 200	530	240
570	940	8	10 800	20 800	0,38	1,77	2,64	1,73	1 200	530	240
578	1 042	10	11 000	18 600	0,33	2,06	3,06	2,01	—	500	280
572,4	667,6	2,5	1 630	4 650	0,11	5,94	8,84	5,81	325	630	—
572,4	667,6	2,5	1 630	4 650	0,11	5,94	8,84	5,81	325	630	—
572,4	667,6	2,5	2 200	6 300	0,15	4,47	6,65	4,37	390	560	—
572,4	667,6	2,5	2 200	6 300	0,15	4,47	6,65	4,37	390	560	—
578	732	4	3 100	7 650	0,17	3,95	5,88	3,86	570	600	465
578	732	4	3 100	7 650	0,17	3,95	5,88	3,86	570	600	465
600	710	5	4 050	10 000	0,21	3,2	4,77	3,13	415	530	—
578	732	4	4 150	10 400	0,24	2,87	4,27	2,8	610	530	—
578	732	4	4 150	10 400	0,24	2,87	4,27	2,8	610	530	—
577	710	4	4 550	11 600	0,22	3,07	4,57	3	680	530	—
583	797	5	5 100	11 000	0,23	2,95	4,4	2,89	740	560	450
583	797	5	5 100	11 000	0,23	2,95	4,4	2,89	740	560	450
583	797	5	6 400	14 600	0,31	2,2	3,27	2,15	1 050	500	320
583	797	5	6 400	14 600	0,31	2,2	3,27	2,15	1 050	500	315
592	888	6	8 150	16 600	0,31	2,21	3,29	2,16	750	530	300
592	888	6	8 150	16 600	0,31	2,21	3,29	2,16	750	530	300
592	888	6	10 600	22 400	0,38	1,77	2,64	1,73	1 600	480	167
592	888	6	10 600	22 400	0,38	1,77	2,64	1,73	1 600	480	170
600	990	8	9 150	16 300	0,28	2,39	3,56	2,34	1 100	500	380
600	990	8	11 600	22 400	0,38	1,78	2,65	1,74	910	500	220
600	990	8	11 600	22 400	0,38	1,78	2,65	1,74	910	500	220
608	1 102	10	12 000	20 400	0,32	2,12	3,15	2,07	—	480	260
612,4	717,6	2,5	1 960	5 300	0,12	5,78	8,61	5,65	350	600	—
612,4	717,6	2,5	1 960	5 300	0,12	5,78	8,61	5,65	350	600	—
612,4	717,6	2,5	2 550	7 350	0,15	4,4	6,56	4,31	440	530	—
612,4	717,6	2,5	2 550	7 350	0,15	4,4	6,56	4,31	440	530	—



Spherical roller bearings

Cylindrical or tapered bore

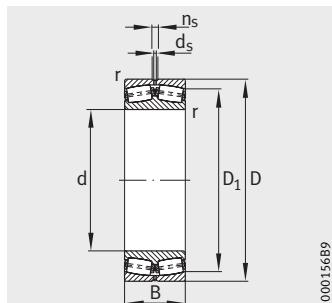


Design 2
With central rib
Cylindrical bore

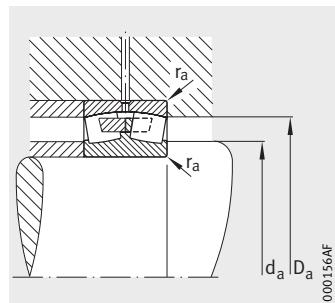
With central rib
K = taper 1:12
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

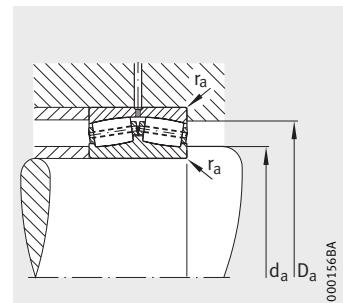
Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r min.	D ₁	d _s	n _s
239/600-B-K-MB	2	210	600	800	150	5	740,5	12,5	23,5
239/600-B-MB	2	224	600	800	150	5	740,5	12,5	23,5
Z-528744.PRL	2	281	600	800	200	5	736,1	9,5	17,7
Z-541824.249/600-B	3	294	600	800	200	5	736,1	9,5	17,7
249/600-K30-MB	2	293	600	800	200	5	736,1	9,5	17,7
249/600-MB	2	293	600	800	200	5	736,1	9,5	17,7
230/600-B-K-MB	2	388	600	870	200	6	791,9	12,5	23,5
230/600-B-MB	2	409	600	870	200	6	791,9	12,5	23,5
240/600-B-K30-MB	2	544	600	870	272	6	773,3	12,5	23,5
240/600-B-MB	2	553	600	870	272	6	773,3	12,5	23,5
231/600-K-MB	2	901	600	980	300	7,5	852,6	12,5	23,5
231/600-MB	2	929	600	980	300	7,5	852,6	12,5	23,5
241/600-B-K30-MB	2	1 170	600	980	375	7,5	833	12,5	23,5
241/600-B-MB	2	1 180	600	980	375	7,5	833	12,5	23,5
222/600-MB	2	1 170	600	1 090	280	9,5	947,7	12,5	23,5
232/600-B-K-MB	2	1 560	600	1 090	388	9,5	919,5	12,5	23,5
232/600-B-MB	2	1 600	600	1 090	388	9,5	919,5	12,5	23,5
223/600-B-MB	2	2 060	600	1 220	355	15	1 036,1	12,5	23,5
223/600-MB	2	2 200	600	1 220	355	15	1 036,1	12,5	23,5
238/630-MB	2	122	630	780	112	4	736,8	8	15
238/630-K-MB	2	122	630	780	112	4	736,8	8	15
239/630-B-K-MB	2	283	630	850	165	6	784,5	12,5	23,5
239/630-B-MB	2	292	630	850	165	6	784,5	12,5	23,5
249/630-K30-MB	2	363	630	850	218	6	780,2	9,5	17,7
249/630-MB	2	363	630	850	218	6	780,2	9,5	17,7
Z-541825.249/630	3	375	630	850	218	6	780,2	9,5	17,7
230/630-B-K-MB	2	480	630	920	212	7,5	834,3	12,5	23,5
230/630-B-MB	2	495	630	920	212	7,5	834,3	12,5	23,5
240/630-B-K30-MB	2	649	630	920	290	7,5	817,9	12,5	23,5
240/630-B-MB	2	660	630	920	290	7,5	817,9	12,5	23,5
231/630-B-K-MB	2	1 040	630	1 030	315	7,5	896,2	12,5	23,5
231/630-B-MB	2	1 070	630	1 030	315	7,5	896,2	12,5	23,5
241/630-B-K30-MB	2	1 360	630	1 030	400	7,5	872,2	12,5	23,5
241/630-B-MB	2	1 390	630	1 030	400	7,5	872,2	12,5	23,5



Design 3
Cylindrical bore with pin cage



Design 2
Mounting dimensions



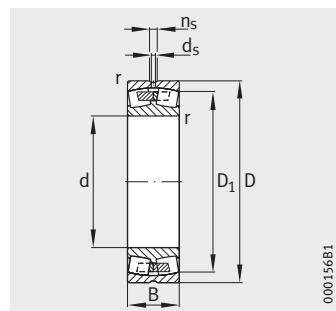
Design 3
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a min.	D _a max.	r _a max.	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
618	782	4	3 450	8 650	0,17	3,95	5,88	3,86	630	560	430
618	782	4	3 450	8 650	0,17	3,95	5,88	3,86	630	560	430
645	755	4	4 300	10 800	0,21	3,2	4,77	3,13	670	500	—
618	755	4	5 000	12 900	0,22	3,07	4,57	3	520	500	—
618	782	4	4 650	11 800	0,23	2,92	4,35	2,86	680	500	—
618	782	4	4 650	11 800	0,23	2,92	4,35	2,86	680	500	—
623	847	5	5 700	12 500	0,22	3,07	4,57	3	890	530	405
623	847	5	5 700	12 500	0,22	3,07	4,57	3	890	530	405
623	847	5	7 100	16 600	0,31	2,21	3,29	2,16	1 200	630	285
623	847	5	7 100	16 600	0,31	2,21	3,29	2,16	1 200	630	285
632	948	6	9 000	19 300	0,31	2,2	3,27	2,15	810	500	270
632	948	6	9 000	19 300	0,31	2,2	3,27	2,15	810	500	270
632	948	6	11 600	26 000	0,38	1,79	2,67	1,75	1 780	450	149
632	948	6	11 600	26 000	0,38	1,79	2,67	1,75	1 780	450	149
640	1 050	8	9 650	17 600	0,27	2,47	3,67	2,41	—	480	340
640	1 050	8	12 900	25 500	0,37	1,83	2,72	1,79	1 740	480	190
640	1 050	8	12 900	25 500	0,37	1,83	2,72	1,79	1 740	480	190
658	1 162	12	13 200	22 800	0,32	2,13	3,17	2,08	1 580	450	240
658	1 162	12	13 200	22 800	0,32	2,13	3,17	2,08	1 580	450	240
644,6	765,4	3	2 280	6 400	0,12	5,51	8,21	5,39	455	560	—
644,6	765,4	3	2 280	6 400	0,12	5,51	8,21	5,39	455	560	—
653	827	5	4 050	9 800	0,18	3,8	5,66	3,72	710	530	405
653	827	5	4 050	9 800	0,18	3,8	5,66	3,72	710	530	405
653	827	5	5 300	13 400	0,24	2,81	4,19	2,75	—	480	—
653	827	5	5 300	13 400	0,24	2,81	4,19	2,75	—	480	—
653	805	5	6 000	15 600	0,22	3,01	4,48	2,94	850	480	—
658	892	6	6 300	13 700	0,22	3,01	4,48	2,94	890	500	380
658	892	6	6 300	13 700	0,22	3,01	4,48	2,94	890	500	380
658	892	6	8 000	19 000	0,31	2,21	3,29	2,16	1 350	480	260
658	892	6	8 000	19 000	0,31	2,21	3,29	2,16	1 350	480	260
662	998	6	9 800	20 800	0,31	2,21	3,29	2,16	1 430	480	260
662	998	6	12 900	29 000	0,38	1,78	2,65	1,74	1 960	450	136
662	998	6	12 900	29 000	0,38	1,78	2,65	1,74	1 960	450	140



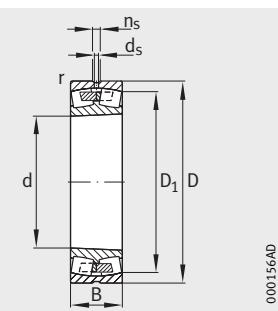
Spherical roller bearings

Cylindrical or tapered bore



00015681

Design 2
With central rib
Cylindrical bore



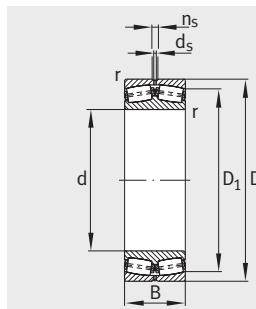
00015680

With central rib
K = taper 1:12
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

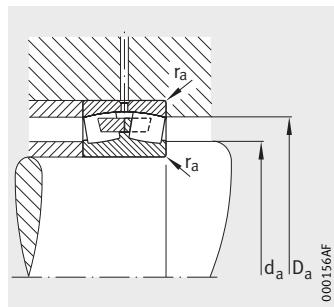
Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r min.	D ₁	d _s	n _s
222/630-MB	2	1 420	630	1 150	300	12	998,2	12,5	23,5
232/630-B-K-MB	2	1 885	630	1 150	412	12	969,2	12,5	23,5
232/630-B-MB	2	1 940	630	1 150	412	12	969,2	12,5	23,5
238/670-B-MB	2	120	670	820	112	4	777,2	8	15
238/670-B-K-MB	2	120	670	820	112	4	777,2	8	15
248/670-B-K30-MB	2	175	670	820	150	4	775,2	8	15
248/670-B-MB	2	175	670	820	150	4	775,2	8	15
239/670-B-K-MB	2	310	670	900	170	6	831,5	12,5	23,5
239/670-B-MB	2	320	670	900	170	6	831,5	12,5	23,5
Z-528746.PRL	2	418	670	900	230	7,5	826,5	12,5	23,5
249/670-B-K30-MB	2	433	670	900	230	6	826,5	12,5	23,5
249/670-B-MB	2	433	670	900	230	6	826,5	12,5	23,5
Z-541826.249/670	3	435	670	900	230	6	826,5	12,5	23,5
230/670-B-K-MB	2	590	670	980	230	7,5	888,7	12,5	23,5
230/670-B-MB	2	600	670	980	230	7,5	888,7	12,5	23,5
240/670-B-K30-MB	2	794	670	980	308	7,5	873,1	12,5	23,5
240/670-B-MB	2	813	670	980	308	7,5	873,1	12,5	23,5
231/670-B-K-MB	2	1 240	670	1 090	336	7,5	948,2	12,5	23,5
241/670-B-K30-MB	2	1 540	670	1 090	412	7,5	929,4	12,5	23,5
241/670-B-MB	2	1 540	670	1 090	412	7,5	929,4	12,5	23,5
F-804529.PRL	2, K30	1 660	670	1 090	445	2,8/7,5 ¹⁾	913,8	12,5	23,5
222/670-MB	2	1 730	670	1 220	315	12	1 061	12,5	23,5
232/670-B-K-MB	2	2 240	670	1 220	438	12	1 030,5	12,5	23,5
232/670-B-MB	2	2 320	670	1 220	438	12	1 030,5	12,5	23,5
238/710-K-MB	2	139	710	870	118	4	824,9	8	15
238/710-MB	2	154	710	870	118	4	824,9	8	15
248/710-B-MB	2	215	710	870	160	4	821,2	8	15
248/710-B-K30-MB	2	218	710	870	160	4	821,2	8	15
239/710-K-MB	2	336	710	950	180	6	877,5	12,5	23,5
239/710-MB	2	355	710	950	180	6	877,5	12,5	23,5
Z-528747.PRL	2	491	710	950	243	6	871,7	12,5	23,5
249/710-B-MB	2	494	710	950	243	6	871,7	12,5	23,5
249/710-B-K30-MB	2	505	710	950	243	6	871,7	12,5	23,5
Z-541827.249/710-B	3	526	710	950	243	6	871,7	12,5	23,5

¹⁾ Chamfer dimension on inner ring = 2,8 mm, chamfer dimension on outer ring = 7,5 mm.



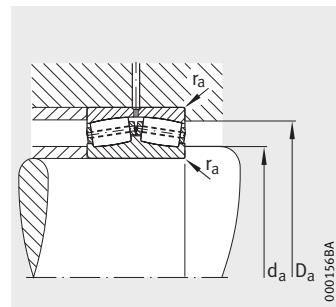
00015689

Design 3
Cylindrical bore with pin cage



00015689

Design 2
Mounting dimensions



00015689

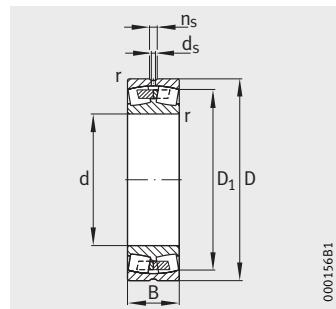
Design 3
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	r _a	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
678	1 102	10	11 000	20 000	0,28	2,43	3,61	2,37	1 320	450	320
678	1 102	10	14 300	28 500	0,37	1,8	2,69	1,76	1 370	450	180
678	1 102	10	14 300	28 500	0,37	1,8	2,69	1,76	1 370	450	180
684,6	805,4	3	2 360	6 950	0,12	5,72	8,51	5,59	445	530	–
684,6	805,4	3	2 360	6 950	0,12	5,72	8,51	5,59	445	530	–
684,6	805,4	3	3 350	9 800	0,16	4,22	6,29	4,13	590	480	–
684,6	805,4	3	3 350	9 800	0,16	4,22	6,29	4,13	590	480	–
693	877	5	4 300	10 600	0,17	3,95	5,88	3,86	750	500	375
693	877	5	4 300	10 600	0,17	3,95	5,88	3,86	750	500	375
720	850	6	5 500	13 700	0,22	3,1	4,62	3,03	620	450	–
693	877	5	5 850	15 000	0,24	2,81	4,19	2,75	940	450	–
693	877	5	5 850	15 000	0,24	2,81	4,19	2,75	940	450	–
693	850	5	6 550	17 000	0,22	3,04	4,53	2,97	690	450	–
698	952	6	7 200	16 000	0,22	3,01	4,48	2,94	1 100	480	350
698	952	6	7 200	16 000	0,22	3,01	4,48	2,94	1 100	480	350
698	952	6	9 000	21 600	0,31	2,2	3,27	2,15	1 460	450	240
698	952	6	9 000	21 600	0,31	2,2	3,27	2,15	1 460	450	240
702	1 058	6	11 000	24 000	0,31	2,21	3,29	2,16	1 560	450	220
702	1 058	6	14 000	31 500	0,37	1,83	2,72	1,79	2 110	430	127
702	1 058	6	14 000	31 500	0,37	1,83	2,72	1,79	2 110	430	130
682,4	1 058	2,5/6	14 300	32 500	0,36	1,86	2,77	1,82	2 130	430	–
718	1 172	10	12 200	22 400	0,27	2,47	3,67	2,41	–	430	300
718	1 172	10	16 300	32 500	0,37	1,8	2,69	1,76	2 150	430	160
718	1 172	10	16 300	32 500	0,37	1,8	2,69	1,76	2 150	430	160
724,6	855,4	3	2 600	7 500	0,12	5,72	8,51	5,59	540	500	–
724,6	855,4	3	2 600	7 500	0,12	5,72	8,51	5,59	540	500	–
725	855	3	3 750	11 000	0,16	4,22	6,29	4,13	780	450	–
725	855	3	3 750	11 000	0,16	4,22	6,29	4,13	780	450	–
733	927	5	4 800	12 000	0,18	3,85	5,73	3,76	720	480	350
733	927	5	4 800	12 000	0,18	3,85	5,73	3,76	720	480	350
760	900	5	6 200	15 600	0,22	3,14	4,67	3,07	630	450	–
733	927	5	6 550	17 000	0,24	2,81	4,19	2,75	1 040	450	–
733	927	5	6 550	17 000	0,24	2,81	4,19	2,75	1 040	450	–
733	900	5	6 800	18 000	0,22	3,04	4,53	2,97	1 290	450	–

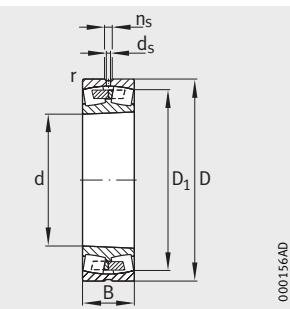


Spherical roller bearings

Cylindrical or tapered bore



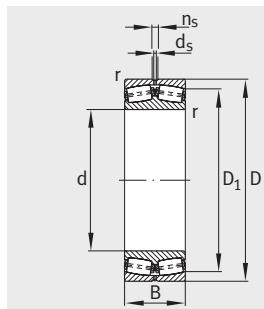
Design 2
With central rib
Cylindrical bore



With central rib
K = taper 1:12
K30 = taper 1:30

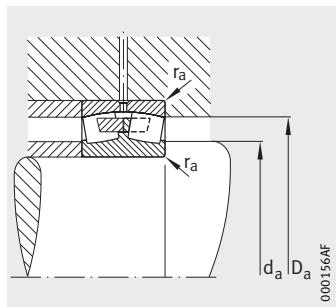
Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r min.	D ₁	d _s	n _s
230/710-B-K-MB	2	650	710	1 030	236	7,5	938,8	12,5	23,5
230/710-B-MB	2	674	710	1 030	236	7,5	938,8	12,5	23,5
240/710-B-K30-MB	2	873	710	1 030	315	7,5	921,6	12,5	23,5
240/710-B-MB	2	903	710	1 030	315	7,5	921,6	12,5	23,5
231/710-B-K-MB	2	1 420	710	1 150	345	9,5	1 006,6	12,5	23,5
231/710-B-MB	2	1 450	710	1 150	345	9,5	1 006,6	12,5	23,5
241/710-B-K30-MB	2	1 790	710	1 150	438	9,5	980,2	12,5	23,5
241/710-B-MB	2	1 820	710	1 150	438	9,5	980,2	12,5	23,5
222/710-MB	2	1 910	710	1 280	325	12	1 116,4	12,5	23,5
232/710-B-MB	2	2 620	710	1 280	450	12	1 088,4	12,5	23,5
232/710-B-K-MB	2	2 550	710	1 280	450	12	1 088,4	12,5	23,5
238/750-B-K-MB	2	188	750	920	128	5	872,1	8	15
238/750-B-MB	2	188	750	920	128	5	872,1	8	15
248/750-B-K30-MB	2	254	750	920	170	5	868,2	8	15
248/750-B-MB	2	254	750	920	170	5	868,2	8	15
239/750-K-MB	2	394	750	1 000	185	6	923,2	12,5	23,5
239/750-MB	2	426	750	1 000	185	6	923,2	12,5	23,5
F-801006.PRL	2	547	750	1 000	250	6	921,7	12,5	23,5
Z-528748.PRL	2	549	750	1 000	250	6	921,8	12,5	23,5
Z-541828.249/750-B	3	572	750	1 000	250	6	920	12,5	23,5
249/750-B-K30-MB	2	558	750	1 000	250	6	921,7	12,5	23,5
249/750-B-MB	2	571	750	1 000	250	6	921,7	12,5	23,5
230/750-K-MB	2	786	750	1 090	250	7,5	990,9	12,5	23,5
230/750-MB	2	806	750	1 090	250	7,5	990,9	12,5	23,5
240/750-B-MB	2	1 060	750	1 090	335	7,5	976,2	12,5	23,5
240/750-B-K30-MB	2	1 070	750	1 090	335	7,5	976,2	12,5	23,5
231/750-B-K-MB	2	1 670	750	1 220	365	9,5	1 067,4	12,5	23,5
231/750-B-MB	2	1 720	750	1 220	365	9,5	1 067,4	12,5	23,5
241/750-B-MB	2	2 280	750	1 220	475	9,5	1 035,8	12,5	23,5
241/750-B-K30-MB	2	2 300	750	1 220	475	9,5	1 035,8	12,5	23,5
222/750-MB	2	2 240	750	1 360	345	15	1 185,6	12,5	23,5
232/750-B-K-MB	2	3 050	750	1 360	475	15	1 154,1	12,5	23,5
232/750-B-MB	2	3 140	750	1 360	475	15	1 154,1	12,5	23,5



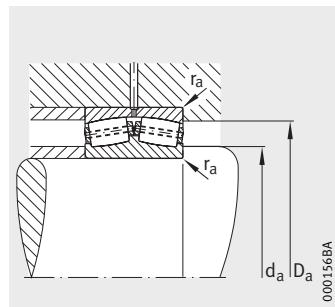
00015689

Design 3
Cylindrical bore with pin cage



00015689

Design 2
Mounting dimensions



00015689

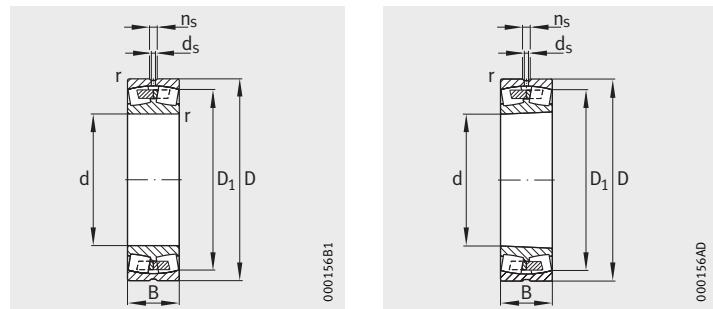
Design 3
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	r _a	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
738	1 002	6	7 650	17 000	0,22	3,07	4,57	3	1 140	480	325
738	1 002	6	7 650	17 000	0,22	3,07	4,57	3	1 140	480	325
738	1 002	6	9 500	22 800	0,3	2,26	3,37	2,21	1 550	430	223
738	1 002	6	9 500	22 800	0,3	2,26	3,37	2,21	1 550	430	220
750	1 110	8	12 500	27 000	0,3	2,25	3,34	2,2	1 810	450	200
750	1 110	8	12 500	27 000	0,3	2,25	3,34	2,2	1 810	450	200
750	1 110	8	15 600	35 500	0,38	1,79	2,67	1,75	2 340	400	116
750	1 110	8	15 600	35 500	0,38	1,79	2,67	1,75	2 340	400	116
758	1 232	10	13 700	25 000	0,27	2,49	3,71	2,43	—	430	280
758	1 232	10	17 300	35 500	0,37	1,83	2,72	1,79	2 300	430	150
758	1 232	10	17 300	35 500	0,37	1,83	2,72	1,79	2 300	430	150
768	902	4	3 000	8 650	0,12	5,61	8,36	5,49	600	480	—
768	902	4	3 000	8 650	0,12	5,61	8,36	5,49	600	480	—
768	902	4	4 150	12 500	0,16	4,11	6,12	4,02	740	450	—
768	902	4	4 150	12 500	0,16	4,11	6,12	4,02	740	450	—
773	977	5	5 200	12 900	0,17	3,95	5,88	3,86	790	480	325
773	977	5	5 200	12 900	0,17	3,95	5,88	3,86	790	480	325
773	977	5	6 700	17 000	0,21	3,2	4,77	3,13	660	430	—
800	950	5	6 700	17 000	0,21	3,2	4,77	3,13	660	430	—
773	977	5	6 950	19 600	0,2	3,31	4,92	3,23	750	430	—
773	977	5	7 200	19 000	0,22	3,1	4,62	3,03	1 180	430	—
773	977	5	7 200	19 000	0,22	3,1	4,62	3,03	1 180	430	—
778	1 062	6	8 500	19 000	0,22	3,01	4,48	2,94	1 010	450	305
778	1 062	6	8 500	19 000	0,22	3,01	4,48	2,94	1 010	450	305
778	1 062	6	10 800	26 000	0,3	2,26	3,37	2,21	1 730	400	200
778	1 062	6	10 800	26 000	0,3	2,26	3,37	2,21	1 730	400	204
790	1 180	8	14 000	30 500	0,29	2,3	3,42	2,25	1 990	430	190
790	1 180	8	14 000	30 500	0,29	2,3	3,42	2,25	1 990	430	190
790	1 180	8	18 000	40 500	0,38	1,76	2,62	1,72	2 600	300	110
790	1 180	8	18 000	40 500	0,38	1,76	2,62	1,72	2 600	300	110
808	1 302	12	14 600	27 000	0,27	2,49	3,71	2,43	—	400	260
808	1 302	12	19 300	40 000	0,37	1,83	2,72	1,79	2 550	400	140
808	1 302	12	19 300	40 000	0,37	1,83	2,72	1,79	2 550	400	140



Spherical roller bearings

Cylindrical or tapered bore



Design 2
With central rib
Cylindrical bore

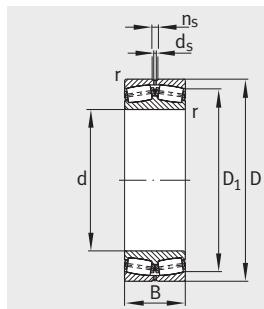
With central rib
K = taper 1:12
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r min.	D ₁	d _s	n _s
238/800-B-K-MB	2	226	800	980	136	5	927,6	8	15
238/800-B-MB	2	226	800	980	136	5	927,6	8	15
248/800-B-MB	2	301	800	980	180	5	925,4	8	15
248/800-B-K30-MB	2	399	800	980	180	5	925,4	8	15
239/800-B-K-MB	2	490	800	1060	195	6	983,7	12,5	23,5
239/800-B-MB	2	506	800	1060	195	6	983,7	12,5	23,5
Z-528749.PRL	2	621	800	1060	258	12/7,5 ¹⁾	978,6	12	23,5
249/800-B-K30-MB	2	650	800	1060	258	6	978,6	12,5	23,5
249/800-B-MB	2	650	800	1060	258	6	978,6	12,5	23,5
Z-541829.249/800-B	3	646	800	1060	258	7,5	976,5	12,5	23,5
230/800-K-MB	2	861	800	1150	258	7,5	1050,9	12,5	23,5
230/800-MB	2	899	800	1150	258	7,5	1050,9	12,5	23,5
240/800-B-K30-MB	2	1 190	800	1150	345	7,5	1034,1	12,5	23,5
240/800-B-MB	2	1 200	800	1150	345	7,5	1034,1	12,5	23,5
231/800-MB	2	1 970	800	1280	375	9,5	1119,1	12,5	23,5
231/800-K-MB	2	2 400	800	1280	375	9,5	1119,1	12,5	23,5
241/800-B-K30-MB	2	2 530	800	1280	475	9,5	1099,5	12,5	23,5
241/800-B-MB	2	2 530	800	1280	475	9,5	1099,5	12,5	23,5
F-804530.PRL	2, K30	2 550	800	1280	511	3,3/9,5 ²⁾	1 083	12,5	23,5
232/800-B-MB	2	3 380	800	1420	488	15	1 211,4	12,5	23,5
238/850-K-MB	2	238	850	1030	136	5	978,1	8	15
238/850-MB	2	238	850	1030	136	5	978,1	8	15
239/850-K-MB	2	554	850	1120	200	6	1 039,9	12,5	23,5
239/850-MB	2	579	850	1120	200	6	1 039,9	12,5	23,5
Z-528750.PRL	2	719	850	1120	272	6	1 034	12,5	23,5
Z-541830.249/850-B	3	695	850	1120	272	6	1 033,9	12,5	23,5
249/850-B-MB	2	756	850	1120	272	6	1 033,9	12,5	23,5
249/850-B-K30-MB	2	760	850	1120	272	6	1 033,9	12,5	23,5
230/850-B-K-MB	2	1 060	850	1220	272	7,5	1 113,5	12,5	23,5
230/850-B-MB	2	1 090	850	1220	272	7,5	1 113,5	12,5	23,5
240/850-B-K30-MB	2	1 420	850	1220	365	7,5	1 092,9	12,5	23,5
240/850-B-MB	2	1 440	850	1220	365	7,5	1 092,9	12,5	23,5

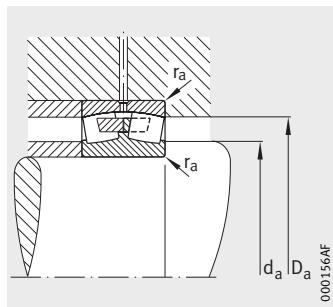
¹⁾ Chamfer dimension on inner ring = 12 mm, chamfer dimension on outer ring = 7,5 mm.

²⁾ Chamfer dimension on inner ring = 3,3 mm, chamfer dimension on outer ring = 9,5 mm.



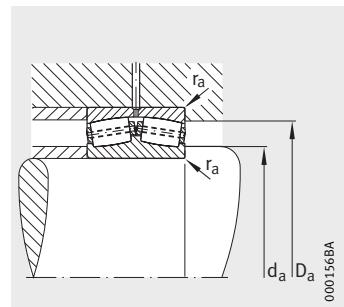
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Design 3
Cylindrical bore with pin cage



00015689

Design 2
Mounting dimensions



00015689

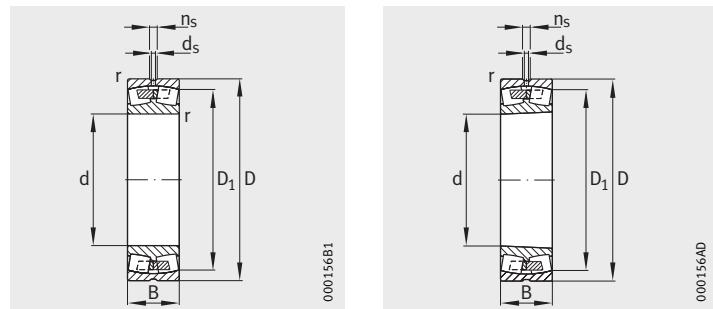
Design 3
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	r _a	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
818	962	4	3 400	10 000	0,12	5,72	8,51	5,59	680	450	–
818	962	4	3 400	10 000	0,12	5,72	8,51	5,59	680	450	–
818	962	4	4 650	14 000	0,16	4,11	6,12	4,02	840	430	–
818	962	4	4 650	14 000	0,16	4,11	6,12	4,02	840	430	–
823	1 037	5	5 850	15 000	0,17	4,05	6,04	3,96	1 010	450	295
823	1 037	5	5 850	15 000	0,17	4,05	6,04	3,96	1 010	450	295
860	1 010	10/6	7 200	18 600	0,2	3,31	4,92	3,23	1 160	400	–
823	1 037	5	7 650	20 400	0,23	2,98	4,44	2,92	1 340	400	–
823	1 037	5	7 650	20 400	0,23	2,98	4,44	2,92	1 340	400	–
823	1 010	6	8 300	22 800	0,21	3,17	4,72	3,1	800	400	–
828	1 122	6	9 300	21 200	0,22	3,07	4,57	3	1 430	430	280
828	1 122	6	9 300	21 200	0,22	3,07	4,57	3	1 430	430	280
828	1 122	6	11 600	28 500	0,29	2,33	3,47	2,28	1 810	360	190
828	1 122	6	11 600	28 500	0,29	2,33	3,47	2,28	1 810	360	188
840	1 240	8	15 000	33 500	0,29	2,32	3,45	2,26	1 680	400	170
840	1 240	8	15 000	33 500	0,29	2,32	3,45	2,26	1 680	400	170
840	1 240	8	18 600	44 000	0,36	1,86	2,77	1,82	2 430	340	95
840	1 240	8	18 600	44 000	0,36	1,86	2,77	1,82	2 430	340	95
814,6	1 240	3/8	19 300	45 500	0,36	1,86	2,77	1,82	2 900	340	–
858	1 362	12	20 000	41 500	0,36	1,87	2,79	1,83	1 940	360	130
868	1 012	4	3 550	10 600	0,11	6,06	9,02	5,92	710	450	–
868	1 012	4	3 550	10 600	0,11	6,06	9,02	5,92	710	450	–
873	1 097	5	6 300	16 300	0,16	4,11	6,12	4,02	960	430	275
873	1 097	5	6 300	16 300	0,16	4,11	6,12	4,02	960	430	275
910	1 070	5	7 800	20 400	0,21	3,27	4,87	3,2	740	360	–
873	1 070	5	8 300	22 400	0,21	3,27	4,87	3,2	740	670	–
873	1 097	5	8 300	22 400	0,23	2,98	4,44	2,92	1 380	360	–
873	1 097	5	8 300	22 400	0,23	2,98	4,44	2,92	1 380	360	–
878	1 192	6	10 400	23 600	0,22	3,07	4,57	3	1 540	400	260
878	1 192	6	10 400	23 600	0,22	3,07	4,57	3	1 540	400	260
878	1 192	6	12 900	32 000	0,29	2,33	3,47	2,28	2 060	480	173
878	1 192	6	12 900	32 000	0,29	2,33	3,47	2,28	2 060	480	170



Spherical roller bearings

Cylindrical or tapered bore



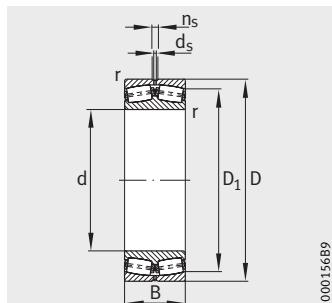
Design 2
With central rib
Cylindrical bore

With central rib
K = taper 1:12
K30 = taper 1:30

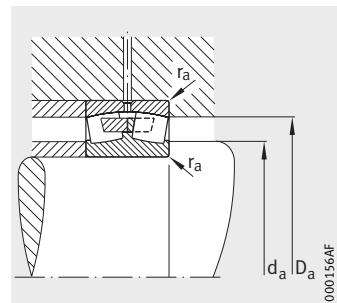
Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r min.	D ₁	d _s	n _s
231/850-B-K-MB	2	2 400	850	1 360	400	12	1 198,1	12,5	23,5
231/850-B-MB	2	2 400	850	1 360	400	12	1 198,1	12,5	23,5
241/850-B-K30-MB	2	2 840	850	1 360	500	12	1 171,7	12,5	23,5
241/850-B-MB	2	2 950	850	1 360	500	12	1 171,7	12,5	23,5
232/850-B-MB	2	3 920	850	1 500	515	15	1 277,2	12,5	23,5
238/900-B-K-MB	2	274	900	1 090	140	5	1 036,1	8	15
238/900-B-MB	2	274	900	1 090	140	5	1 036,1	8	15
248/900-B-K30-MB	2	248	900	1 090	190	5	1 030,5	8	15
248/900-B-MB	2	382	900	1 090	190	5	1 030,5	8	15
239/900-K-MB	2	641	900	1 180	206	6	1 098,8	12,5	23,5
239/900-MB	2	653	900	1 180	206	6	1 098,8	12,5	23,5
Z-528751.PRL	2	816	900	1 180	280	9,5/6 ¹⁾	1 090,6	12,5	23,5
249/900-K30-MB	2	831	900	1 180	280	6	1 088,6	12,5	23,5
249/900-MB	2	831	900	1 180	280	6	1 088,6	12,5	23,5
Z-541831.249/900-B	3	849	900	1 180	280	6	1 090,9	12,5	23,5
230/900-B-K-MB	2	1 280	900	1 280	280	7,5	1 171,3	12,5	23,5
230/900-B-MB	2	1 280	900	1 280	280	7,5	1 171,3	12,5	23,5
240/900-B-K30-MB	2	1 570	900	1 280	375	7,5	1 150,7	12,5	23,5
240/900-B-MB	2	1 590	900	1 280	375	7,5	1 150,7	12,5	23,5
231/900-B-K-MB	2	2 570	900	1 420	412	12	1 252,4	12,5	23,5
231/900-B-MB	2	2 570	900	1 420	412	12	1 252,4	12,5	23,5
241/900-B-K30-MB	2	3 040	900	1 420	515	12	1 230,4	12,5	23,5
241/900-B-MB	2	3 200	900	1 420	515	12	1 230,4	12,5	23,5
F-807608.PRL	2, K30	3 340	900	1 420	550	9,5	1 211	12,5	23,5
238/950-B-K-MB	2	335	950	1 150	150	5	1 092,8	8	15
238/950-B-MB	2	335	950	1 150	150	5	1 092,8	8	15
239/950-B-K-MB	2	746	950	1 250	224	7,5	1 162,5	12,5	23,5
Z-528752.PRL	2	1 000	950	1 250	300	7,5	1 152,6	12,5	23,5
249/950-B-K30-MB	2	1 030	950	1 250	300	7,5	1 155	12,5	23,5
249/950-B-MB	2	1 030	950	1 250	300	7,5	1 155	12,5	23,5
Z-541832.249/950-B	3	1 040	950	1 250	300	7,5	1 155	12,5	23,5
240/950-B-K30-MB	2	1 970	950	1 360	412	7,5	1 216	12,5	23,5
240/950-B-MB	2	2 010	950	1 360	412	7,5	1 216	12,5	23,5

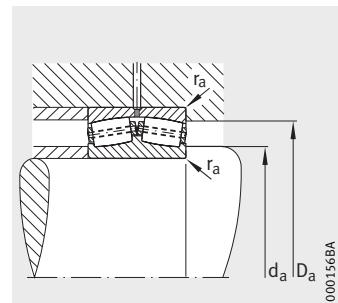
¹⁾ Chamfer dimension on inner ring = 9,5 mm, chamfer dimension on outer ring = 6 mm.



Design 3
Cylindrical bore with pin cage



Design 2
Mounting dimensions



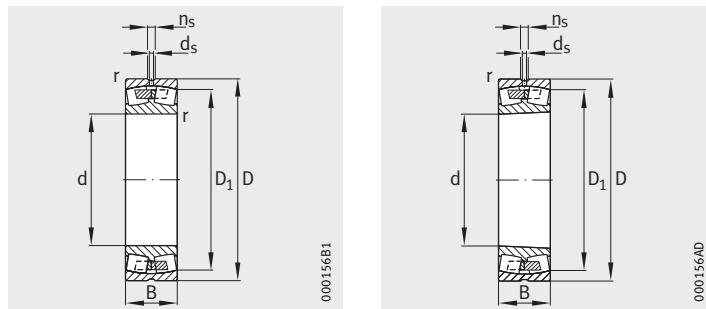
Design 3
Mounting dimensions

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.	kN	kN					KN	min ⁻¹	min ⁻¹
898	1 312	10	17 000	38 000	0,29	2,32	3,45	2,26	2 410	360	160
898	1 312	10	17 000	38 000	0,29	2,32	3,45	2,26	2 410	360	160
898	1 312	10	21 200	49 000	0,36	1,89	2,81	1,84	3 150	300	90
898	1 312	10	21 200	49 000	0,36	1,89	2,81	1,84	3 150	300	90
908	1 442	12	22 000	47 500	0,35	1,92	2,86	1,88	2 950	340	120
918	1 072	4	2 200	5 700	0,11	6,06	9,02	5,92	375	430	–
918	1 072	4	2 200	5 700	0,11	6,06	9,02	5,92	375	430	–
918	1 072	4	5 200	16 600	0,15	4,4	6,56	4,31	970	360	–
918	1 072	4	5 200	16 600	0,15	4,4	6,56	4,31	970	360	–
923	1 157	5	6 550	17 300	0,16	4,28	6,37	4,19	1 010	400	260
923	1 157	5	6 550	17 300	0,16	4,28	6,37	4,19	1 010	400	260
960	1 120	8/5	8 500	22 400	0,2	3,38	5,03	3,3	820	340	–
923	1 157	5	9 150	25 000	0,2	3,31	4,92	3,23	1 070	340	–
923	1 157	5	9 150	25 000	0,2	3,31	4,92	3,23	1 070	340	–
923	1 157	5	9 500	27 000	0,2	3,42	5,09	3,34	890	340	–
928	1 252	6	11 000	26 500	0,22	3,14	4,67	3,07	1 620	400	240
928	1 252	6	11 000	26 500	0,22	3,14	4,67	3,07	1 620	400	240
928	1 252	6	14 000	36 500	0,28	2,45	3,64	2,39	2 190	300	150
928	1 252	6	14 000	36 500	0,28	2,45	3,64	2,39	2 190	300	150
948	1 372	10	18 000	40 500	0,29	2,33	3,47	2,28	2 550	340	150
948	1 372	10	18 000	40 500	0,29	2,33	3,47	2,28	2 550	340	150
948	1 372	10	22 400	53 000	0,35	1,91	2,85	1,87	2 900	280	80
948	1 372	10	22 400	53 000	0,35	1,91	2,85	1,87	2 900	280	80
940	1 380	7,5	22 800	55 000	0,35	1,91	2,85	1,87	3 450	430	–
968	1 132	4	4 150	12 900	0,11	6,06	9,02	5,92	–	400	–
968	1 132	4	4 150	12 900	0,11	6,06	9,02	5,92	–	400	–
978	1 222	6	7 500	20 000	0,16	4,22	6,29	4,13	1 280	360	240
1 015	1 190	6	9 500	25 500	0,21	3,27	4,87	3,2	980	260	–
978	1 222	6	10 200	28 500	0,22	3,01	4,48	2,94	1 730	300	–
978	1 222	6	10 200	28 500	0,22	3,01	4,48	2,94	1 730	300	–
978	1 190	6	10 600	29 000	0,2	3,38	5,03	3,3	1 050	300	–
978	1 332	6	16 300	41 500	0,29	2,32	3,45	2,26	2 550	280	140
978	1 332	6	16 300	41 500	0,29	2,32	3,45	2,26	2 550	280	140



Spherical roller bearings

Cylindrical or tapered bore

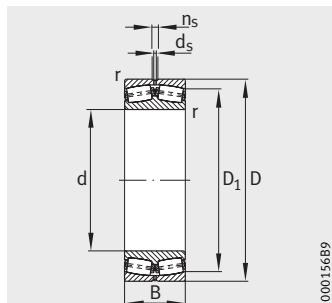


Design 2
With central rib
Cylindrical bore

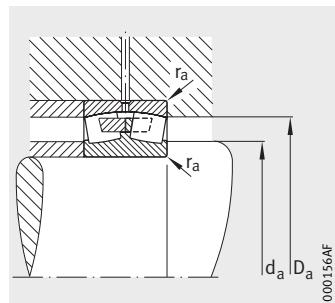
With central rib
K = taper 1:12
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

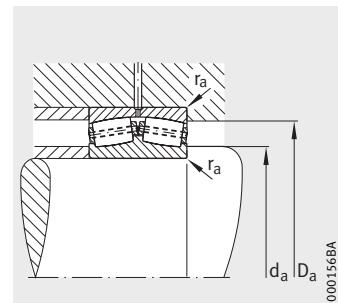
Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r min.	D ₁	d _s	n _s
231/950-B-K-MB	2	3 060	950	1 500	438	12	1 322,5	12,5	23,5
231/950-B-MB	2	3 060	950	1 500	438	12	1 322,5	12,5	23,5
241/950-B-K30-MB	2	3 820	950	1 500	545	12	1 306,7	12,5	23,5
241/950-B-MB	2	3 820	950	1 500	545	12	1 306,7	12,5	23,5
238/1000-MB	2	425	1 000	1 220	165	6	1 158	9,5	17,7
238/1000-K-MB	2	425	1 000	1 220	165	6	1 158	9,5	17,7
248/1000-B-MB	2	535	1 000	1 220	218	6	1 151,4	9,5	17,7
248/1000-B-K30-MB	2	535	1 000	1 220	218	6	1 151,4	9,5	17,7
239/1000-K-MB	2	898	1 000	1 320	236	7,5	1 227,4	12,5	23,5
239/1000-MB	2	898	1 000	1 320	236	7,5	1 227,4	12,5	23,5
Z-528753.PRL	2	1 120	1 000	1 320	315	7,5	1 218,4	12,5	23,5
249/1000-B-MB	2	1 220	1 000	1 320	315	7,5	1 218,4	12,5	23,5
249/1000-B-K30-MB	2	1 210	1 000	1 320	315	7,5	1 218,4	12,5	23,5
Z-541833.249/1000	3	1 230	1 000	1 320	315	7,5	1 218,4	12,5	23,5
230/1000-B-K-MB	2	1 590	1 000	1 420	308	7,5	1 300,3	12,5	23,5
230/1000-B-MB	2	1 590	1 000	1 420	308	7,5	1 300,3	12,5	23,5
240/1000-B-K30-MB	2	2 070	1 000	1 420	412	7,5	1 278,3	12,5	23,5
240/1000-B-MB	2	2 110	1 000	1 420	412	7,5	1 278,3	12,5	23,5
231/1000-B-MB	2	3 470	1 000	1 580	462	12	1 391,8	12,5	23,5
231/1000-K-MB	2	3 470	1 000	1 580	462	12	1 391,8	12,5	23,5
241/1000-B-K30-MB	2	4 380	1 000	1 580	580	12	1 372,6	12,5	23,5
241/1000-B-MB	2	4 430	1 000	1 580	580	12	1 372,6	12,5	23,5
F-809143.02.PRL	2, K30	4 540	1 059	1 620	615	15	1 396	12,5	23,5
238/1060-B-K-MB	2	444	1 060	1 280	165	6	1 218,2	9,5	17,7
238/1060-B-MB	2	444	1 060	1 280	165	6	1 218,2	9,5	17,7
248/1060-B-K30-MB	2	599	1 060	1 280	218	6	1 212,7	9,5	17,7
248/1060-B-MB	2	599	1 060	1 280	218	6	1 212,7	9,5	17,7
239/1060-B-K-MB	2	1 080	1 060	1 400	250	7,5	1 307,6	12,5	23,5
239/1060-B-MB	2	1 080	1 060	1 400	250	7,5	1 307,6	12,5	23,5
Z-541834.249/1060-B	3	1 470	1 060	1 400	335	7,5	1 290,7	12,5	23,5
249/1060-B-K30-MB	2	1 540	1 060	1 400	335	7,5	1 290,7	12,5	23,5
249/1060-B-MB	2	1 540	1 060	1 400	335	7,5	1 290,7	12,5	23,5
230/1060-B-K-MB	2	1 920	1 060	1 500	325	9,5	1 374,4	12,5	23,5
230/1060-B-MB	2	1 920	1 060	1 500	325	9,5	1 374,4	12,5	23,5
240/1060-B-K30-MB	2	2 520	1 060	1 500	438	9,5	1 353,5	12,5	23,5
240/1060-B-MB	2	2 520	1 060	1 500	438	9,5	1 353,5	12,5	23,5



Design 3
Cylindrical bore with pin cage



Design 2
Mounting dimensions



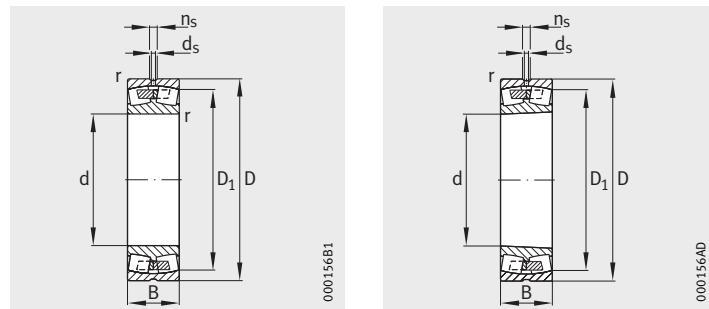
Design 3
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	r _a	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
998	1 452	10	20 000	45 500	0,29	2,33	3,47	2,28	2 210	300	140
998	1 452	10	20 000	45 500	0,29	2,33	3,47	2,28	2 210	300	140
998	1 452	10	23 600	54 000	0,36	1,87	2,79	1,83	1 720	260	80
998	1 452	10	23 600	54 000	0,36	1,87	2,79	1,83	1 720	260	80
1 023	1 197	5	4 900	15 000	0,12	5,72	8,51	5,59	960	360	–
1 023	1 197	5	4 900	15 000	0,12	5,72	8,51	5,59	960	360	–
1 023	1 197	5	6 700	21 600	0,16	4,28	6,37	4,19	1 220	300	–
1 023	1 197	5	6 700	21 600	0,16	4,28	6,37	4,19	1 220	300	–
1 028	1 292	6	8 150	21 600	0,16	4,22	6,29	4,13	1 420	340	220
1 028	1 292	6	8 150	21 600	0,16	4,22	6,29	4,13	1 420	340	220
1 065	1 250	6	10 400	28 000	0,2	3,42	5,09	3,34	940	630	–
1 028	1 292	6	11 400	31 000	0,22	3,01	4,48	2,94	1 840	280	–
1 028	1 292	6	11 400	31 000	0,22	3,01	4,48	2,94	1 840	280	–
1 028	1 250	6	12 500	35 500	0,21	3,24	4,82	3,16	2 050	280	–
1 028	1 392	6	13 200	31 500	0,21	3,2	4,77	3,13	1 570	340	200
1 028	1 392	6	13 200	31 500	0,21	3,2	4,77	3,13	1 570	340	200
1 028	1 392	6	16 600	42 500	0,28	2,41	3,59	2,35	2 550	260	140
1 028	1 392	6	16 600	42 500	0,28	2,41	3,59	2,35	2 550	260	140
1 048	1 532	10	22 000	51 000	0,29	2,33	3,47	2,28	3 150	280	130
1 048	1 532	10	22 000	51 000	0,29	2,33	3,47	2,28	3 150	280	130
1 048	1 532	10	27 500	64 000	0,35	1,91	2,85	1,87	4 000	260	70
1 048	1 532	10	27 500	64 000	0,35	1,91	2,85	1,87	4 000	260	70
1 117	1 562	12	27 000	65 500	0,32	2,12	3,15	2,07	3 900	260	67
1 083	1 257	5	5 100	16 000	0,11	6,18	9,2	6,04	980	340	–
1 083	1 257	5	5 100	16 000	0,11	6,18	9,2	6,04	980	340	–
1 083	1 257	5	6 950	22 800	0,15	4,54	6,75	4,43	1 280	280	–
1 083	1 257	5	6 950	22 800	0,15	4,54	6,75	4,43	1 280	280	–
1 088	1 372	6	9 800	26 000	0,17	4,05	6,04	3,96	1 590	300	200
1 088	1 372	6	9 800	26 000	0,17	4,05	6,04	3,96	1 590	300	200
1 088	1 325	6	12 700	36 500	0,2	3,31	4,92	3,23	1 190	260	–
1 088	1 372	6	12 900	36 000	0,21	3,17	4,72	3,1	2 270	260	–
1 088	1 372	6	12 900	36 000	0,21	3,17	4,72	3,1	2 270	260	–
1 094	1 466	8	14 300	35 500	0,21	3,27	4,87	3,2	1 740	280	240
1 094	1 466	8	14 300	35 500	0,21	3,27	4,87	3,2	1 740	280	240
1 094	1 466	8	18 600	50 000	0,27	2,47	3,67	2,41	2 950	260	120
1 094	1 466	8	18 600	50 000	0,27	2,47	3,67	2,41	2 950	260	120



Spherical roller bearings

Cylindrical or tapered bore



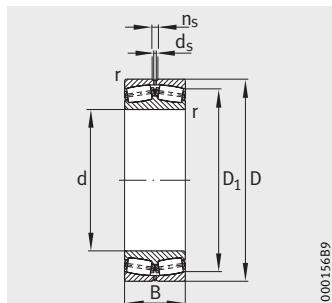
Design 2
With central rib
Cylindrical bore

With central rib
K = taper 1:12
K30 = taper 1:30

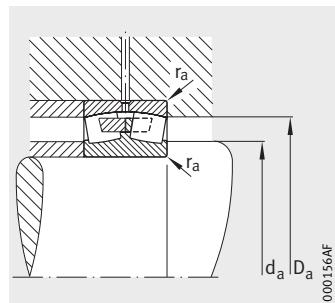
Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r min.	D ₁	d _s	n _s
241/1060-B-K30-MB	2	5 000	1 060	1 660	600	15	—	12,5	23,5
241/1060-B-MB	2	5 000	1 060	1 660	600	15	—	12,5	23,5
238/1120-K-MB	2	515	1 120	1 360	180	6	1 292,9	9,5	17,7
238/1120-MB	2	515	1 120	1 360	180	6	1 292,9	9,5	17,7
248/1120-B-K30-MB	2	778	1 120	1 360	243	6	1 285	9,5	17,7
248/1120-B-MB	2	778	1 120	1 360	243	6	1 285	9,5	17,7
239/1120-B-K-MB	2	1 160	1 120	1 460	250	7,5	1 368,1	12,5	23,5
239/1120-B-MB	2	1 160	1 120	1 460	250	7,5	1 368,1	12,5	23,5
249/1120-B-K30-MB	2	1 510	1 120	1 460	335	7,5	1 352,5	12,5	23,5
249/1120-B-MB	2	1 510	1 120	1 460	335	7,5	1 352,5	12,5	23,5
Z-541835.249/1120-B	3	1 520	1 120	1 460	335	13/7, ⁵ ¹⁾	1 352,5	12,5	23,5
230/1120-B-K-MB	2	2 210	1 120	1 580	345	9,5	1 447,7	12,5	23,5
230/1120-MB	2	2 210	1 120	1 580	345	9,5	1 447,7	12,5	23,5
240/1120-B-K30-MB	2	2 920	1 120	1 580	462	9,5	1 429,7	12,5	23,5
240/1120-B-MB	2	2 920	1 120	1 580	462	9,5	1 429,7	12,5	23,5
F-804636.PRL	2	2 920	1 120	1 580	462	9,5	1 429,9	12,5	23,5
241/1120-B-K30-MB	2	5 800	1 120	1 750	630	15	1 527,2	12,5	23,5
241/1120-B-MB	2	5 800	1 120	1 750	630	15	1 527,2	12,5	23,5
238/1180-B-K-MB	2	591	1 180	1 420	180	6	1 353,9	9,5	17,7
238/1180-B-MB	2	591	1 180	1 420	180	6	1 353,9	9,5	17,7
248/1180-B-MB	2	790	1 180	1 420	243	6	1 345	9,5	17,7
248/1180-B-K30-MB	2	1 030	1 180	1 420	243	6	1 345	9,5	17,7
239/1180-B-K-MB	2	1 340	1 180	1 540	272	7,5	1 438,3	12,5	23,5
239/1180-B-MB	2	1 380	1 180	1 540	272	7,5	1 438,3	12,5	23,5
249/1180-B-K30-MB	2	2 320	1 180	1 540	355	7,5	1 428,9	12,5	23,5
249/1180-B-MB	2	2 320	1 180	1 540	355	7,5	1 428,9	12,5	23,5
Z-541836.249/1180-B	3	1 750	1 180	1 540	355	7,5	1 428,9	12,5	23,5
230/1180-B-K-MB	2	2 510	1 180	1 660	355	9,5	1 523,4	12,5	23,5
230/1180-MB	2	2 510	1 180	1 660	355	9,5	1 523,4	12,5	23,5
241/1180-B-K30-MB	2	7 040	1 180	1 850	670	15	1 603,9	12,5	23,5
241/1180-B-MB	2	7 040	1 180	1 850	670	15	1 603,9	12,5	23,5
238/1250-K-MB	2	743	1 250	1 500	185	6	1 429,3	9,5	17,7
238/1250-MB	2	743	1 250	1 500	185	6	1 429,3	9,5	17,7
248/1250-B-K30-MB	2	918	1 250	1 500	250	6	1 423,5	9,5	17,7
248/1250-B-MB	2	918	1 250	1 500	250	6	1 423,5	9,5	17,7

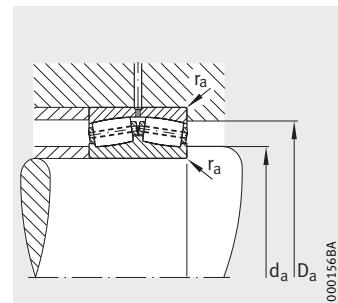
¹⁾ Chamfer dimension on inner ring = 13 mm, chamfer dimension on outer ring = 7,5 mm.



Design 3
Cylindrical bore with pin cage



Design 2
Mounting dimensions



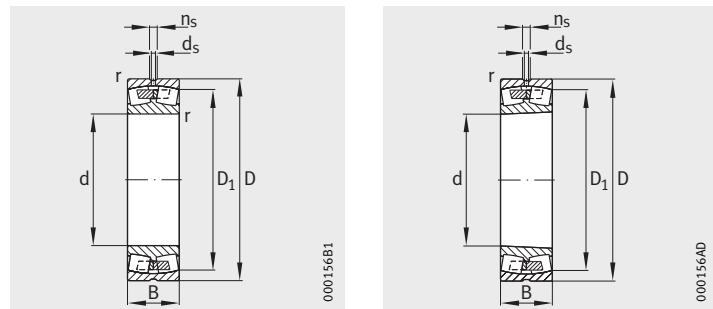
Design 3
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	r _a	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
1 118	1 602	12	29 000	69 500	0,35	1,95	2,9	1,91	4 100	260	67
1 118	1 602	12	29 000	69 500	0,35	1,95	2,9	1,91	4 100	260	67
1 143	1 337	5	5 850	18 300	0,12	5,83	8,67	5,7	—	300	—
1 143	1 337	5	5 850	18 300	0,12	5,83	8,67	5,7	—	300	—
1 143	1 337	5	8 150	27 000	0,16	4,28	6,37	4,19	1 490	260	—
1 143	1 337	5	8 150	27 000	0,16	4,28	6,37	4,19	1 490	260	—
1 148	1 432	6	10 200	27 500	0,16	4,28	6,37	4,19	1 740	280	190
1 148	1 432	6	10 200	27 500	0,16	4,28	6,37	4,19	1 740	280	190
1 148	1 432	6	12 900	36 500	0,22	3,14	4,67	3,07	1 720	260	—
1 148	1 432	6	12 900	36 500	0,22	3,14	4,67	3,07	1 720	260	—
1 195	1 385	10/6	14 300	41 500	0,2	3,38	5,03	3,3	1 300	260	—
1 154	1 546	8	15 000	38 000	0,21	3,27	4,87	3,2	2 130	260	180
1 154	1 546	8	15 000	38 000	0,21	3,27	4,87	3,2	2 130	260	180
1 154	1 546	8	20 800	55 000	0,28	2,45	3,64	2,39	3 250	260	110
1 154	1 546	8	20 800	55 000	0,28	2,45	3,64	2,39	3 250	260	110
1 154	1 546	8	20 800	55 000	0,28	2,45	3,64	2,39	3 250	260	110
1 178	1 692	12	31 000	72 000	0,35	1,91	2,85	1,87	3 950	240	60
1 178	1 692	12	31 000	72 000	0,35	1,91	2,85	1,87	3 950	240	60
1 203	1 397	5	6 000	19 300	0,11	6,18	9,2	6,04	1 110	280	—
1 203	1 397	5	6 000	19 300	0,11	6,18	9,2	6,04	1 110	280	—
1 203	1 397	5	8 300	28 000	0,15	4,54	6,75	4,43	1 550	260	—
1 203	1 397	5	8 300	28 000	0,15	4,54	6,75	4,43	1 550	260	—
1 208	1 512	6	11 400	31 000	0,17	4,05	6,04	3,96	1 760	260	180
1 208	1 512	6	11 400	31 000	0,17	4,05	6,04	3,96	1 760	260	180
1 208	1 512	6	14 600	41 500	0,22	3,14	4,67	3,07	2 380	500	—
1 208	1 512	6	14 600	41 500	0,22	3,14	4,67	3,07	2 380	500	—
1 260	1 460	6	15 000	42 500	0,2	3,42	5,09	3,34	1 470	280	—
1 214	1 626	8	16 600	41 500	0,21	3,27	4,87	3,2	2 400	260	170
1 214	1 626	8	16 600	41 500	0,21	3,27	4,87	3,2	2 400	260	170
1 238	1 792	12	35 500	86 500	0,34	1,99	2,96	1,94	4 900	220	53
1 238	1 792	12	35 500	86 500	0,34	1,99	2,96	1,94	4 900	220	53
1 273	1 477	5	6 400	20 800	0,11	6,3	9,39	6,16	—	260	—
1 273	1 477	5	6 400	20 800	0,11	6,3	9,39	6,16	—	260	—
1 273	1 477	5	9 000	30 500	0,14	4,67	6,96	4,57	1 230	240	—
1 273	1 477	5	9 000	30 500	0,14	4,67	6,96	4,57	1 230	240	—



Spherical roller bearings

Cylindrical or tapered bore

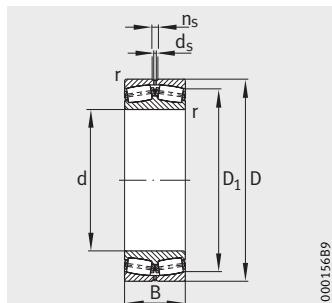


Design 2
With central rib
Cylindrical bore

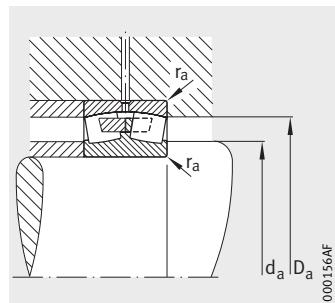
With central rib
K = taper 1:12
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

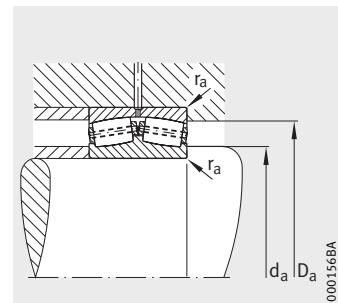
Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r min.	D ₁	d _s	n _s
239/1250-B-K-MB	2	1 630	1 250	1 630	280	7,5	1 516,4	12,5	23,5
239/1250-B-MB	2	1 630	1 250	1 630	280	7,5	1 516,4	12,5	23,5
Z-541837.249/1250-B	3	2 160	1 250	1 630	375	7,5	1 510,5	12,5	23,5
230/1250-B-K-MB	2	2 920	1 250	1 750	375	9,5	1 607,6	12,5	23,5
230/1250-B-MB	2	2 930	1 250	1 750	375	9,5	1 607,6	12,5	23,5
240/1250-B-K30-MB	2	3 640	1 250	1 750	500	9,5	1 580,6	12,5	23,5
240/1250-B-MB	2	3 640	1 250	1 750	500	9,5	1 580,6	12,5	23,5
241/1250-B-K30-MB	2	8 000	1 250	1 950	710	15	—	12,5	23,5
241/1250-B-MB	2	8 000	1 250	1 950	710	15	—	12,5	23,5
238/1320-B-K-MB	2	895	1 320	1 600	206	6	1 521,4	12,5	23,5
238/1320-B-MB	2	895	1 320	1 600	206	6	1 521,4	12,5	23,5
248/1320-B-K30-MB	2	1 230	1 320	1 600	280	7,5	1 512,8	12,5	23,5
248/1320-B-MB	2	1 230	1 320	1 600	280	7,5	1 512,8	12,5	23,5
239/1320-B-K-MB	2	1 950	1 320	1 720	300	7,5	1 602,2	12,5	23,5
239/1320-B-MB	2	1 950	1 320	1 720	300	7,5	1 602,2	12,5	23,5
Z-541838.249/1320-B	3	2 530	1 320	1 720	400	7,5	1 592,5	12,5	23,5
249/1320-B-K30-MB	2	2 560	1 320	1 720	400	7,5	1 595,5	12,5	23,5
249/1320-B-MB	2	2 560	1 320	1 720	400	7,5	1 595,5	12,5	23,5
230/1320-MB	2	3 500	1 320	1 850	400	12	1 697,8	12,5	23,5
238/1400-B-K-MB	2	1 110	1 400	1 700	224	7,5	1 613,9	12,5	23,5
238/1400-B-MB	2	1 110	1 400	1 700	224	7,5	1 613,9	12,5	23,5
248/1400-B-K30-MB	2	1 450	1 400	1 700	300	7,5	1 606,9	12,5	23,5
248/1400-B-MB	2	1 470	1 400	1 700	300	7,5	1 606,9	12,5	23,5
239/1400-B-K-MB	2	2 200	1 400	1 820	315	9,5	1 695,6	12,5	23,5
239/1400-B-MB	2	2 210	1 400	1 820	315	9,5	1 695,6	12,5	23,5
249/1400-K30-MB	2	2 930	1 400	1 820	425	9,5	1 687,1	12,5	23,5
249/1400-MB	2	2 930	1 400	1 820	425	9,5	1 687,1	12,5	23,5
230/1400-MB	2	4 050	1 400	1 950	412	12	1 793,5	12,5	23,5
240/1400-B-K30-MB	2	5 170	1 400	1 950	545	12	1 766,8	12,5	23,5
240/1400-B-MB	2	5 170	1 400	1 950	545	12	1 766,8	12,5	23,5
238/1500-K-MB	2	1 380	1 500	1 820	243	7	1 729,3	12,5	23,5
238/1500-MB	2	1 380	1 500	1 820	243	7	1 729,3	12,5	23,5
248/1500-B-K30-MB	2	1 660	1 500	1 820	315	7,5	1 722,1	12,5	23,5
248/1500-B-MB	2	1 660	1 500	1 820	315	7,5	1 722,1	12,5	23,5



Design 3
Cylindrical bore with pin cage



Design 2
Mounting dimensions



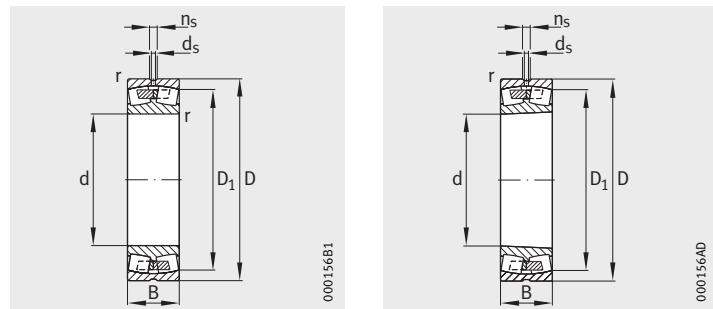
Design 3
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	r _a	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
1 278	1 602	6	12 000	32 500	0,15	4,47	6,65	4,37	1 970	260	160
1 278	1 602	6	12 000	32 500	0,15	4,47	6,65	4,37	1 970	260	160
1 148	1 550	6	16 000	50 000	0,19	3,5	5,21	3,42	1 530	240	–
1 284	1 716	8	18 000	46 500	0,2	3,34	4,98	3,27	2 700	260	150
1 284	1 716	8	18 000	46 500	0,2	3,34	4,98	3,27	2 700	260	150
1 284	1 716	8	23 200	62 000	0,25	2,69	4	2,63	3 600	240	–
1 284	1 716	8	23 200	62 000	0,25	2,69	4	2,63	3 600	240	–
1 308	1 892	12	37 500	91 500	0,34	1,99	2,96	1,94	5 100	220	50
1 308	1 892	12	37 500	91 500	0,34	1,99	2,96	1,94	5 100	220	50
1 343	1 577	5	7 650	24 500	0,11	6,18	9,2	6,04	1 500	260	–
1 343	1 577	5	7 650	24 500	0,11	6,18	9,2	6,04	1 500	260	–
1 343	1 577	5	10 200	35 500	0,15	4,4	6,56	4,31	1 880	240	–
1 343	1 577	5	10 200	35 500	0,15	4,4	6,56	4,31	1 880	240	–
1 348	1 692	6	13 700	39 000	0,16	4,28	6,37	4,19	2 190	260	150
1 348	1 692	6	13 700	39 000	0,16	4,28	6,37	4,19	2 190	260	150
1 348	1 640	6	17 300	52 000	0,19	3,54	5,27	3,46	1 650	220	–
1 348	1 692	6	17 600	52 000	0,22	3,1	4,62	3,03	2 460	220	–
1 348	1 692	6	17 600	52 000	0,22	3,1	4,62	3,03	2 460	220	–
1 362	1 808	10	20 400	53 000	0,21	3,2	4,77	3,13	2 900	240	140
1 428	1 672	6	8 650	28 000	0,11	5,94	8,84	5,81	1 470	240	–
1 428	1 672	6	8 650	28 000	0,11	5,94	8,84	5,81	1 470	240	–
1 428	1 672	6	12 000	40 500	0,16	4,34	6,47	4,25	2 200	220	–
1 428	1 672	6	12 000	40 500	0,16	4,34	6,47	4,25	2 200	220	–
1 434	1 786	8	14 600	42 500	0,16	4,28	6,37	4,19	2 390	240	140
1 434	1 786	8	14 600	42 500	0,16	4,28	6,37	4,19	2 390	240	140
1 434	1 786	8	20 000	58 500	0,21	3,2	4,77	3,13	–	220	–
1 434	1 786	8	20 000	58 500	0,21	3,2	4,77	3,13	2 850	220	–
1 442	1 908	10	22 000	57 000	0,2	3,34	4,98	3,27	–	220	130
1 442	1 908	10	28 000	76 500	0,24	2,76	4,11	2,7	4 450	220	80
1 442	1 908	10	28 000	76 500	0,24	2,76	4,11	2,7	4 450	220	80
1 528	1 792	6	10 000	33 500	0,12	5,83	8,67	5,7	1 910	220	–
1 528	1 792	6	10 000	33 500	0,12	5,83	8,67	5,7	1 910	220	–
1 528	1 792	6	12 900	45 000	0,15	4,47	6,65	4,37	2 390	220	–
1 528	1 792	6	12 900	45 000	0,15	4,47	6,65	4,37	2 390	220	–



Spherical roller bearings

Cylindrical or tapered bore

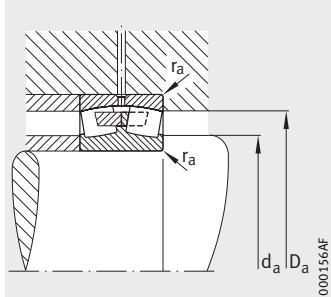


Design 2
With central rib
Cylindrical bore

With central rib
K = taper 1:12
K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions						
			d	D	B	r min.	D ₁	d _s	n _s
239/1500-B-K-MB	2	2 790	1 500	1 950	335	9,5	1 817,2	12,5	23,5
239/1500-B-MB	2	2 790	1 500	1 950	335	9,5	1 817,2	12,5	23,5
249/1500-B-K30-MB	2	3 630	1 500	1 950	450	9,5	1 799,6	12,5	23,5
249/1500-B-MB	2	3 630	1 500	1 950	450	9,5	1 799,6	12,5	23,5
240/1500-B-K30-MB	2	5 840	1 500	2 120	615	12	1 905,3	12,5	23,5
240/1500-B-MB	2	5 840	1 500	2 120	615	12	1 905,3	12,5	23,5
231/1500-B-K-MB	2	5 530	1 500	2 300	600	15	2 060,4	12,5	23,5
231/1500-B-MB	2	5 530	1 500	2 300	600	15	2 060,4	12,5	23,5
241/1500-B-K30-MB	2	12 200	1 500	2 300	800	15	2 014	12,5	23,5
241/1500-B-MB	2	12 200	1 500	2 300	800	15	2 014	12,5	23,5
238/1600-B-MB	2	1 770	1 600	1 950	265	7,5	1 848,5	12,5	23,5
248/1600-B-K30-MB	2	2 220	1 600	1 950	345	7,5	1 846,9	12,5	23,5
248/1600-B-MB	2	2 220	1 600	1 950	345	7,5	1 846,9	12,5	23,5
239/1600-B-MB	2	3 020	1 600	2 060	345	9,5	1 919,2	12,5	23,5
249/1600-MB	2	4 710	1 600	2 060	462	9,5	1 915,4	12,5	23,5
238/1700-MB	2	2 130	1 700	2 060	272	7,5	1 952,5	12,5	23,5
248/1700-MB	2	3 100	1 700	2 060	355	7,5	1 946,7	12,5	23,5
239/1700-B-MB	2	3 550	1 700	2 180	355	9,5	2 030,9	12,5	23,5
249/1700-B-MB	2	5 830	1 700	2 180	475	9,5	2 029,4	12,5	23,5
238/1800-MB	2	2 440	1 800	2 180	290	9,5	2 061,1	12,5	23,5
248/1800-B-MB	2	2 840	1 800	2 180	375	9,5	2 060	12,5	23,5
239/1800-MB	2	4 100	1 800	2 300	375	12	2 144,5	12,5	23,5
249/1800-MB	2	6 070	1 800	2 300	500	12	2 140,6	12,5	23,5
238/1900-MB	2	2 860	1 900	2 300	300	9,5	2 180,8	12,5	23,5
248/1900-MB	2	3 570	1 900	2 300	400	9,5	2 173,3	12,5	23,5
239/1900-MB	2	4 350	1 900	2 430	400	12	2 262,6	12,5	23,5
249/1900-MB	2	6 320	1 900	2 430	530	12	2 261	12,5	23,5
238/2000-MB	2	3 430	2 000	2 430	325	9,5	2 298,5	12,5	23,5
248/2000-B-MB	2	4 320	2 000	2 430	425	9,5	2 294,8	12,5	23,5
F-804544.PRL	2, K30	2 280	2 040	2 660	400	7,5	2 457	15	30
F-804543.PRL	2, K30	5 190	2 100	2 625	400	7,5	2 457	15	30



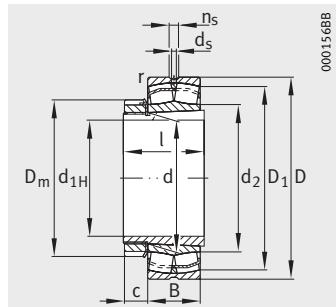
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a min.	D _a max.	r _a max.	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
1 534	1 916	8	16 300	49 000	0,16	4,28	6,37	4,19	2 550	220	130
1 534	1 916	8	16 300	49 000	0,16	4,28	6,37	4,19	2 550	220	130
1 534	1 916	8	21 600	67 000	0,22	3,14	4,67	3,07	2 700	200	–
1 534	1 916	8	21 600	67 000	0,22	3,14	4,67	3,07	2 700	200	–
1 542	2 078	10	34 000	93 000	0,26	2,64	3,93	2,58	5 400	200	–
1 542	2 078	10	34 000	93 000	0,26	2,64	3,93	2,58	5 400	200	–
1 558	2 242	12	40 000	96 500	0,25	2,67	3,97	2,61	5 600	220	67
1 558	2 242	12	40 000	96 500	0,25	2,67	3,97	2,61	5 600	220	67
1 558	2 242	12	45 000	110 000	0,32	2,1	3,13	2,06	5 900	220	50
1 558	2 242	12	45 000	110 000	0,32	2,1	3,13	2,06	5 900	220	50
1 628	1 922	6	11 600	39 000	0,12	5,72	8,51	5,59	2 060	220	–
1 628	1 922	6	16 000	54 000	0,15	4,54	6,75	4,43	3 000	200	–
1 628	1 922	6	16 000	54 000	0,15	4,54	6,75	4,43	3 000	200	–
1 634	2 026	8	17 300	52 000	0,15	4,6	6,85	4,5	2 850	220	120
1 634	2 026	8	23 600	73 500	0,21	3,24	4,82	3,16	–	200	–
1 728	2 032	6	12 500	42 500	0,11	5,94	8,84	5,81	–	220	–
1 728	2 032	6	17 000	60 000	0,15	4,47	6,65	4,37	–	180	–
1 734	2 146	8	19 300	60 000	0,15	4,6	6,85	4,5	–	220	110
1 734	2 146	8	25 000	78 000	0,21	3,27	4,87	3,2	–	170	–
1 834	2 146	8	14 000	47 500	0,12	5,83	8,67	5,7	–	200	–
1 834	2 146	8	18 600	67 000	0,15	4,47	6,65	4,37	3 400	170	–
1 842	2 258	10	20 800	64 000	0,15	4,54	6,75	4,43	–	200	170
1 842	2 258	10	27 000	85 000	0,21	3,27	4,87	3,2	–	150	–
1 842	2 258	10	15 300	53 000	0,11	5,94	8,84	5,81	–	180	–
1 934	2 266	8	20 800	75 000	0,15	4,4	6,56	4,31	–	150	–
1 934	2 266	8	23 200	73 500	0,15	4,54	6,75	4,43	–	180	90
1 942	2 388	10	30 000	95 000	0,21	3,27	4,87	3,2	–	140	–
1 942	2 388	10	17 300	58 500	0,12	5,83	8,67	5,7	–	170	–
2 034	2 396	8	23 200	83 000	0,14	4,67	6,96	4,57	4 400	140	–
2 078	2 466	6	22 400	72 000	0,13	5,14	7,66	5,03	3 700	150	–
2 138	2 466	6	22 400	72 000	0,13	5,14	7,66	5,03	3 700	150	–

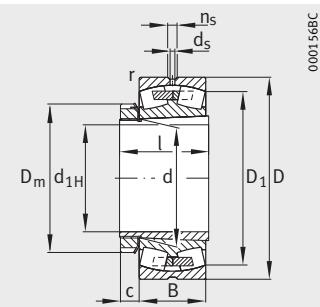


Spherical roller bearings

With adapter sleeve



E1 design

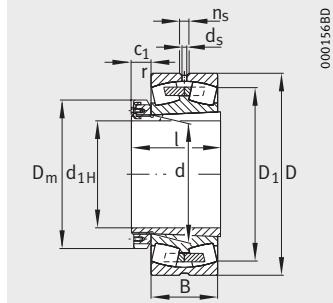


With central rib
Locknut with tab washer

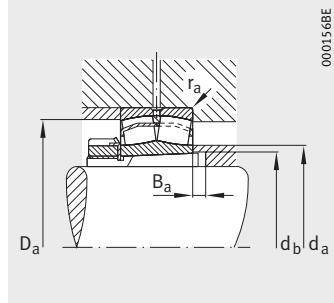
Dimension table · Dimensions in mm

Designation			Mass m		Dimensions											
Bearing	X-life	Adapter sleeve	Bearing	Adapter sleeve	d _{1H}	d	D	B	r	D ₁	d ₂	ds	n _s	D _m	l	
			≈kg	≈kg					min.	≈	≈					
22330-E1-K	XL	H2330	41,2	6,76	135	150	320	108	4	273,2	185,3	9,5	17,7	195	139	
22330-E1-K-T41A	XL	H2330	41,2	6,76	135	150	320	108	4	273,2	185,3	9,5	17,7	195	139	
22332-K-MB	-	H2332	50,1	9,32	140	160	340	114	4	288,3	-	9,5	17,7	210	147	
22334-K-MB	-	H2334	58,4	10,4	150	170	360	120	4	304,2	-	9,5	17,7	220	154	
22236-E1-K	XL	H3136	28,5	9,67	160	180	320	86	4	285,9	211,3	9,5	17,7	230	131	
23236-E1A-K-M	XL	H2336	37	11,6	160	180	320	112	4	277,3	-	8	15	230	161	
22336-K-MB	-	H2336	66,7	11,6	160	180	380	126	4	323,4	-	12,5	23,5	230	161	
23138-E1A-K-M	XL	H3138	32,4	11	170	190	320	104	3	281,6	-	8	15	240	141	
24138-E1-K30 ¹⁾	XL	H24138	39,5	11,9	170	190	320	128	3	269,7	217,5	6,3	12,2	240	172	
22238-K-MB	-	H3138	36,2	11	170	190	340	92	4	296	-	9,5	17,7	240	141	
23238-B-K-MB	-	H2338	46	12,9	170	190	340	120	4	291,2	-	9,5	17,7	240	169	
22338-K-MB	-	H2338	77,3	12,9	170	190	400	132	5	338,2	-	12,5	23,5	240	169	
23140-B-K-MB	-	H3140	41,7	12,3	180	200	340	112	3	293,3	-	9,5	17,7	250	150	
24140-B-K30	-	H24140	51,6	13,4	180	200	340	140	3	285,9	-	6,3	12,2	250	185	
22240-B-K-MB	-	H3140	42,3	12,3	180	200	360	98	4	312	-	9,5	17,7	250	150	
23240-B-K-MB	-	H2340	55,8	14,2	180	200	360	128	4	307,5	-	9,5	17,7	250	176	
22340-K-MB	-	H2340	89,5	14,2	180	200	420	138	5	357,4	-	12,5	23,5	250	176	
23044-K-MB	-	H3044X	30,3	10,5	200	220	340	90	3	301,8	-	8	15	260	126	
24044-B-K30-MB	-	H24044	38,9	12,1	200	220	340	118	3	297,4	-	6,3	12,2	260	162	
23144-B-K-MB	-	H3144X	52	15,7	200	220	370	120	4	319,2	-	9,5	17,7	280	161	
24144-B-K30	-	H24144	64,4	17,1	200	220	370	150	4	311,7	-	6,3	12,2	280	199	
22244-B-K-MB	-	H3144X	59,6	15,7	200	220	400	108	4	348,7	-	9,5	17,7	280	161	
23244-K-MB	-	H2344X	79	17,8	200	220	400	144	4	337,6	-	9,5	17,7	280	186	
22344-K-MB	-	H2344X	114	17,8	200	220	460	145	5	391,2	-	12,5	23,5	280	186	
23948-K-MB	-	H3948	13,4	11,3	220	240	320	60	2,1	297,8	-	6,3	12,2	290	101	
23048-K-MB	-	H3048	31,9	13,8	220	240	360	92	3	322,1	-	8	15	290	133	
24048-B-K30-MB	-	H24048	43,2	15,3	220	240	360	118	3	318,9	-	6,3	12,2	290	167	
23148-B-K-MB	-	H3148X	65,3	18,4	220	240	400	128	4	346,2	-	9,5	17,7	300	172	
24148-B-K30	-	H24148	78,7	19,9	220	240	400	160	4	338	-	6,3	12,2	300	212	
22248-B-K-MB	-	H3148X	81,2	18,4	220	240	440	120	4	380,7	-	12,5	23,5	300	172	
23248-B-K-MB	-	H2348X	105	20,9	220	240	440	160	4	371	-	12,5	23,5	300	199	
22348-K-MB	-	H2348X	145	20,9	220	240	500	155	5	420	-	12,5	23,5	300	199	
23952-K-MB	-	H3952	22,4	13,6	240	260	360	75	2,1	330,5	-	8	15	310	116	
23052-K-MB	-	H3052X	46,2	16	240	260	400	104	4	357,2	-	9,5	17,7	310	145	
24052-B-K30-MB	-	H24052	64,5	18,4	240	260	400	140	4	349,1	-	6,3	12,2	310	190	

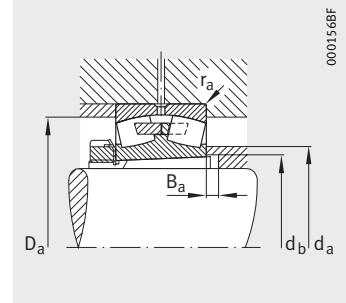
¹⁾ Cage guidance on inner ring central rib.



With central rib
Locknut with retaining bracket



Mounting dimensions
E1 design



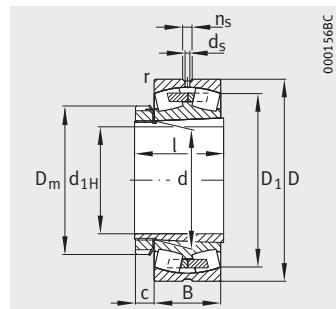
Mounting dimensions
With central rib

		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 kN	stat. C _{or} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
c ≈	c ₁ ≈	d _a max.	D _a max.	d _b min.	B _a min.	r _a max.	1 640	1 850	0,33	2,02	3	1,97	148	2 200	1 520
26	—	185	303	163	8	3	1 640	1 850	0,33	2,02	3	1,97	148	2 200	1 520
26	—	185	303	163	8	3	1 640	1 850	0,33	2,02	3	1,97	148	2 200	1 520
28	—	191	323	174	8	3	1 430	1 900	0,37	1,8	2,69	1,76	121	2 000	1 500
29	—	204	343	185	8	3	1 600	2 120	0,37	1,83	2,72	1,79	134	1 800	1 380
30	—	211	303	191	18	3	1 360	1 680	0,25	2,71	4,04	2,65	148	2 400	1 670
30	—	210	303	195	21	3	1 710	2 340	0,33	2,07	3,09	2,03	173	2 000	1 090
30	—	217	363	195	8	3	1 760	2 360	0,37	1,83	2,72	1,79	209	1 500	1 270
31	—	216	306	202	9	2,5	1 610	2 220	0,3	2,28	3,39	2,23	218	2 000	1 260
31	—	213	306	197	17	2,5	1 670	2 500	0,37	1,82	2,7	1,78	226	1 400	880
31	—	223	323	202	21	3	1 200	1 830	0,28	2,39	3,56	2,34	122	1 800	1 600
31	—	222	323	206	21	3	1 560	2 600	0,36	1,86	2,77	1,82	156	1 700	1 020
31	—	228	380	206	9	4	1 860	2 500	0,37	1,83	2,72	1,79	213	1 500	1 220
32	—	231	326	212	10	2,5	1 320	2 280	0,35	1,95	2,9	1,91	131	1 700	1 230
32	—	225	326	207	17	2,5	1 700	3 000	0,42	1,62	2,42	1,59	190	1 400	810
32	—	234	343	212	24	3	1 320	2 000	0,29	2,35	3,5	2,3	123	1 700	1 530
32	—	237	343	216	20	3	1 660	2 750	0,37	1,83	2,72	1,79	163	1 500	980
32	—	240	400	216	10	4	2 080	2 800	0,36	1,87	2,79	1,83	189	1 400	1 120
—	40	247	327,6	231	12	2,5	1 100	2 000	0,26	2,55	3,8	2,5	132	1 700	1 440
—	40	245	327,6	228	17	2,5	1 400	2 700	0,34	1,96	2,92	1,92	139	1 300	1 070
35	—	253	353	233	10	3	1 630	2 900	0,33	2,03	3,02	1,98	165	1 400	1 060
35	—	247	353	228	18	3	1 900	3 450	0,41	1,63	2,43	1,6	197	1 300	720
35	—	258	383	233	22	3	1 630	2 450	0,29	2,35	3,5	2,3	153	1 400	1 300
35	—	259	383	236	11	3	2 040	3 450	0,37	1,83	2,72	1,79	181	1 400	850
35	—	272	440	236	10	4	2 320	3 350	0,35	1,95	2,9	1,91	217	1 300	970
—	45	261	309,8	250	11	2,1	640	1 370	0,17	4,05	6,04	3,96	93	1 500	1 310
—	45	268	347,6	251	11	2,5	1 160	2 200	0,25	2,74	4,08	2,68	130	1 400	1 310
—	45	263	347,6	253	12	2,5	1 500	2 900	0,32	2,1	3,13	2,06	150	1 300	970
37	—	276	383	254	11	3	1 860	3 250	0,33	2,06	3,06	2,01	177	1 300	970
37	—	270	383	248	19	3	2 120	3 900	0,41	1,66	2,47	1,62	231	1 200	660
37	—	283	423	254	19	3	1 960	3 050	0,29	2,35	3,5	2,3	184	1 300	1 180
37	—	284	423	257	6	3	2 450	4 250	0,37	1,8	2,69	1,76	231	1 300	750
37	—	296	480	257	11	4	2 650	3 900	0,35	1,95	2,9	1,91	249	1 500	870
—	45	285	349,8	270	11	2,1	930	1 930	0,19	3,54	5,27	3,46	108	1 400	1 190
—	45	291	385,4	272	13	3	1 500	2 800	0,26	2,64	3,93	2,58	155	1 300	1 160
—	45	287	385,4	269	20	3	1 900	3 800	0,35	1,94	2,88	1,89	204	1 100	870

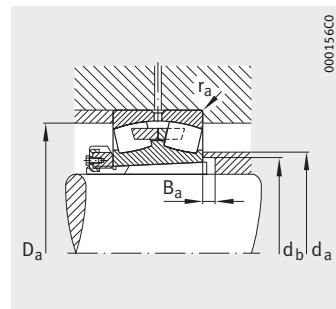


Spherical roller bearings

With adapter sleeve



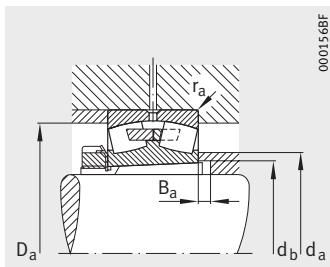
With central rib
Locknut with tab washer



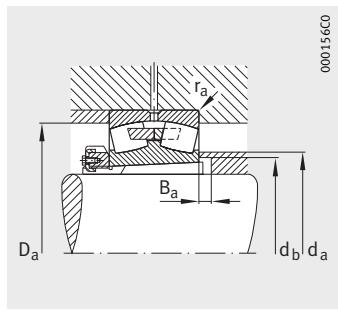
With central rib
Locknut with retaining bracket

Dimension table (continued) · Dimensions in mm

Designation		Mass m		Dimensions											
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d _{1H}	d	D	B	r min.	D ₁ ≈	d _s	n _s	D _m	l	c	c ₁ ≈
23152-K-MB	H3152X	89,6	23,5	240	260	440	144	4	379,7	9,5	17,7	330	190	38	—
24152-B-K30	H24152	112	25,2	240	260	440	180	4	370,3	8	15	330	235	38	—
22252-B-K-MB	H3152X	106	23,5	240	260	480	130	5	415,3	12,5	23,5	330	190	38	—
23252-B-K-MB	H2352X	136	25,7	240	260	480	174	5	405,4	12,5	23,5	330	211	38	—
22352-K-MB	H2352X	177	25,7	240	260	540	165	6	452,1	12,5	23,5	330	211	38	—
23956-K-MB	H3956	24,7	15,6	260	280	380	75	2,1	350	8	15	330	121	—	49
23056-B-K-MB	H3056	50,3	18,5	260	280	420	106	4	376,5	9,5	17,7	330	152	—	49
24056-B-K30-MB	H24056	69,7	20,9	260	280	420	140	4	369,5	6,3	12,2	330	195	—	49
23156-B-K-MB	H3156X	96,4	26,4	260	280	460	146	5	401,4	9,5	17,7	350	195	39	—
24156-B-K30	H24156	118	28	260	280	460	180	5	392,8	8	15	350	238	39	—
22256-B-K-MB	H3156X	110	26,4	260	280	500	130	5	435,2	12,5	23,5	350	195	39	—
23256-K-MB	H2356X	153	29,8	260	280	500	176	5	426,3	12,5	23,5	350	224	39	—
22356-K-MB	H2356X	224	29,8	260	280	580	175	6	489,3	12,5	23,5	350	224	39	—
23960-B-K-MB	H3960	39,1	20,9	280	300	420	90	3	384,6	9,5	17,7	360	140	—	53
23060-K-MB	H3060	72,2	23,8	280	300	460	118	4	412,6	9,5	17,7	360	168	—	53
24060-B-K30-MB	H24060	97,7	26,9	280	300	460	160	4	401,5	8	15	360	220	—	53
23160-B-K-MB	H3160	123	30,6	280	300	500	160	5	434,7	9,5	17,7	380	208	—	53
24160-B-K30	H24160	158	32,7	280	300	500	200	5	424,4	8	15	380	258	—	53
22260-K-MB	H3160	136	30,6	280	300	540	140	5	468,8	12,5	23,5	380	208	—	53
23260-K-MB	H3260	192	34,7	280	300	540	192	5	458,7	12,5	23,5	380	240	—	53
22360-K-MB	H3260	365	34,7	280	300	620	185	7,5	523,6	12,5	23,5	380	240	—	53
23964-K-MB	H3964	41	22	300	320	440	90	3	406,2	9,5	17,7	380	140	—	56
23064-K-MB	H3064	77,1	25,4	300	320	480	121	4	432,6	9,5	17,7	380	171	—	56
24064-B-K30-MB	H24064	103	28,4	300	320	480	160	4	424	8	15	380	220	—	56
23164-K-MB	H3164	167	35,4	300	320	540	176	5	466,2	12,5	23,5	400	226	—	56
24164-B-K30	H24164	197	37,4	300	320	540	218	5	456,1	9,5	17,7	400	278	—	56
22264-K-MB	H3164	166	35,4	300	320	580	150	5	503,5	12,5	23,5	400	226	—	56
23264-K-MB	H3264	229	40	300	320	580	208	5	489,6	12,5	23,5	400	258	—	56
22364-B-K-MB	H3264	433	40	300	320	670	200	7,5	568,1	12,5	23,5	400	258	—	56
23068-K-MB	H3068	101	30	320	340	520	133	5	464,6	12,5	23,5	400	187	—	57
24068-B-K30-MB	H24068	143	33,8	320	340	520	180	5	457,1	9,5	17,7	400	244	—	57
23168-B-K-MB	H3168	203	50,1	320	340	580	190	5	499,5	12,5	23,5	440	254	—	70
24168-B-K30	H24168	260	53	320	340	580	243	5	481,1	9,5	17,7	440	317	—	70
22268-B-K-MB	H3168	311	50,1	320	340	620	165	6	538,7	12,5	23,5	440	254	—	70
23268-B-K-MB	H3268	291	55,4	320	340	620	224	6	521,2	12,5	23,5	440	288	—	70



Mounting dimensions
With central rib



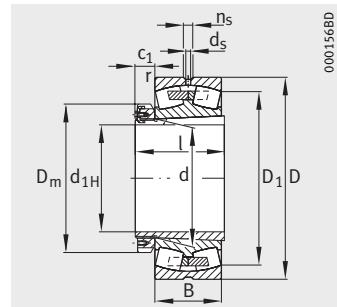
Mounting dimensions
With retaining bracket

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 _{or}	e	Y ₁	Y ₂	Y ₀	C _{ur}	n _G	n _B
max.	max.	min.	min.	max.	kN	kN					kN	min ⁻¹	min ⁻¹
302	423	276	11	3	2 200	4 000	0,33	2,03	3,02	1,98	213	1 200	850
294	423	269	19	3	2 700	5 100	0,42	1,61	2,4	1,58	315	1 100	550
308	460	276	25	4	2 240	3 450	0,29	2,32	3,45	2,26	217	1 100	1 070
309	460	278	2	4	2 900	4 900	0,37	1,8	2,69	1,76	270	1 100	660
322	514	278	11	5	3 000	4 400	0,34	2	2,98	1,96	290	1 100	790
303	369,8	290	12	2,1	970	2 040	0,18	3,76	5,59	3,67	129	1 300	1 100
310	405,4	292	12	3	1 560	3 000	0,25	2,74	4,08	2,68	156	1 300	1 090
307	405,4	289	20	3	2 000	4 000	0,33	2,04	3,04	2	225	1 100	810
321	440	296	12	4	2 360	4 400	0,32	2,12	3,15	2,07	241	1 100	780
316	440	289	21	4	2 700	5 200	0,39	1,71	2,54	1,67	365	1 000	520
324	480	296	28	4	2 360	3 650	0,28	2,43	3,61	2,37	238	1 100	1 010
329	480	299	11	4	3 000	5 300	0,36	1,86	2,77	1,82	260	1 100	620
349	554	299	12	5	3 550	5 400	0,33	2,03	3,02	1,98	335	950	680
329	407,6	311	12	2,5	1 270	2 650	0,2	3,42	5,09	3,34	165	1 190	1 000
337	445,4	313	12	3	1 960	3 650	0,25	2,69	4	2,63	223	1 100	960
331	445,4	310	21	3	2 500	5 200	0,35	1,95	2,9	1,91	300	1 000	700
347	480	318	12	4	2 650	4 900	0,33	2,06	3,06	2,01	270	1 100	720
340	480	311	21	4	3 250	6 300	0,4	1,67	2,49	1,63	540	900	455
352	520	318	32	4	2 750	4 400	0,27	2,47	3,67	2,41	300	1 000	900
353	520	321	12	4	3 450	6 200	0,37	1,83	2,72	1,79	300	1 000	560
374	588	321	19	6	4 000	6 100	0,33	2,06	3,06	2,01	375	900	630
349	427,6	332	12	2,5	1 310	2 750	0,19	3,62	5,39	3,54	202	1 100	930
357	465,4	334	13	3	2 040	4 000	0,25	2,74	4,08	2,68	243	1 100	900
353	465,4	330	21	3	2 600	5 400	0,33	2,06	3,06	2,01	360	950	660
369	520	338	13	4	3 200	6 000	0,34	1,98	2,94	1,93	305	950	650
362	520	332	21	4	3 800	7 350	0,41	1,65	2,46	1,61	530	850	415
378	560	338	39	4	3 050	4 900	0,27	2,47	3,67	2,41	345	950	830
378	560	343	13	4	3 900	6 950	0,37	1,8	2,69	1,76	330	950	510
406	638	343	20	6	4 400	6 800	0,33	2,06	3,06	2,01	540	800	560
382	502	355	14	4	2 360	4 550	0,25	2,69	4	2,63	285	1 000	840
378	502	351	15	4	3 100	6 550	0,34	1,98	2,94	1,93	530	850	600
395	560	360	14	4	3 650	6 950	0,34	1,98	2,94	1,93	570	900	590
383	560	353	23	4	4 400	8 500	0,43	1,56	2,32	1,53	680	800	380
405	594	360	39	5	3 550	5 850	0,28	2,43	3,61	2,37	470	850	750
402	594	364	14	5	4 500	8 150	0,38	1,78	2,65	1,74	650	850	465

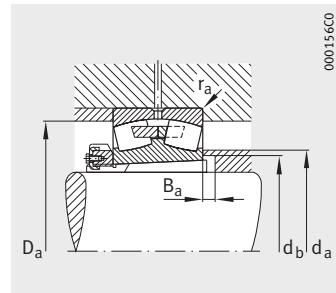


Spherical roller bearings

With adapter sleeve



With central rib
Locknut with retaining bracket



Mounting dimensions

Dimension table (continued) · Dimensions in mm

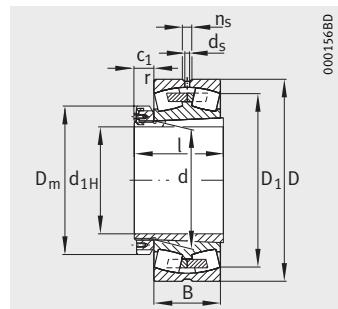
Designation		Mass m		Dimensions										
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d _{1H}	d	D	B	r min.	D ₁ ≈	d _s	n _s	D _m	l	c ₁ ≈
23972-K-MB	H3972	45	25,9	340	360	480	90	3	447,1	9,5	17,7	420	144	57
23072-K-MB	H3072	107	31,6	340	360	540	134	5	485,2	12,5	23,5	420	188	57
24072-B-K30-MB	H24072	147	35,5	340	360	540	180	5	478,5	9,5	17,7	420	244	57
23172-K-MB	H3172	217	54,3	340	360	600	192	5	520	12,5	23,5	460	259	73
24172-B-K30	H24172	275	57,1	340	360	600	243	5	503,6	9,5	17,7	460	321	73
22272-K-MB	H3172	257	54,3	340	360	650	170	6	565	12,5	23,5	460	259	73
23272-B-K-MB	H3272	328	61	340	360	650	232	6	548,3	12,5	23,5	460	299	73
22372-K-MB	H3272	625	61	340	360	750	224	7,5	634,9	12,5	23,5	460	299	73
23976-K-MB	H3976	66,3	32,1	360	380	520	106	4	477,6	9,5	17,7	450	164	62
23076-B-K-MB	H3076	115	36,2	360	380	560	135	5	505,6	12,5	23,5	450	193	62
24076-B-K30-MB	H24076	155	40,1	360	380	560	180	5	499	9,5	17,7	450	248	62
23176-K-MB	H3176	226	62,4	360	380	620	194	5	539,6	12,5	23,5	490	264	75
24176-B-K30	H24176	277	64,9	360	380	620	243	5	525,8	9,5	17,7	490	323	75
22276-K-MB	H3176	284	62,4	360	380	680	175	6	592,6	12,5	23,5	490	264	75
23276-B-K-MB	H3276	367	70,7	360	380	680	240	6	576,4	12,5	23,5	490	310	75
23980-B-K-MB	H3980	68,2	35,4	380	400	540	106	4	499	9,5	17,7	470	168	66
23080-K-MB	H3080	143	41,7	380	400	600	148	5	540,5	12,5	23,5	470	210	66
24080-B-K30-MB	H24080	196	46,4	380	400	600	200	5	530,9	12,5	23,5	470	272	66
23180-B-K-MB	H3180	261	71,3	380	400	650	200	6	567,2	12,5	23,5	520	272	81
24180-B-K30	H24180	312	73,8	380	400	650	250	6	553,5	12,5	23,5	520	332	81
22280-K-MB	H3180	414	71,3	380	400	720	185	6	629,3	12,5	23,5	520	272	81
23280-B-K-MB	H3280	442	82,1	380	400	720	256	6	609,8	12,5	23,5	520	328	81
22380-K-MB	H3280	800	82,1	380	400	820	243	7,5	694,4	12,5	23,5	520	328	81
23984-K-MB	H3984	78	36,9	400	420	560	106	4	519,5	9,5	17,7	490	168	66
23084-B-K-MB	H3084X	155	43,8	400	420	620	150	5	560,7	12,5	23,5	490	212	66
24084-B-K30-MB	H24084	214	48,6	400	420	620	200	5	550,2	12,5	23,5	490	274	66
23184-K-MB	H3184	339	85,1	400	420	700	224	6	605,4	12,5	23,5	540	304	89
24184-B-K30	H24184	407	87,8	400	420	700	280	6	590,3	12,5	23,5	540	372	89
22284-K-MB	H3184	404	85,1	400	420	760	195	7,5	661,8	12,5	23,5	540	304	89
23284-B-K-MB	H3284	539	95,3	400	420	760	272	7,5	642,2	12,5	23,5	540	352	89
23988-K-MB	H3988	98,3	59	410	440	600	118	4	552,8	12,5	23,5	520	189	75
23088-K-MB	H3088	177	67,7	410	440	650	157	6	586,8	12,5	23,5	520	228	75
24088-B-K30-MB	H24088	247	76,4	410	440	650	212	6	575,6	12,5	23,5	520	294	75

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.	kN	kN					kN	min ⁻¹	min ⁻¹
389	467,6	372	14	2,5	1 430	3 200	0,17	4,05	6,04	3,96	209	1 000	800
402	522	375	14	4	2 450	4 800	0,25	2,74	4,08	2,68	295	950	790
397	522	371	23	4	3 250	6 800	0,33	2,06	3,06	2,01	530	800	560
416	580	380	14	4	3 800	7 350	0,33	2,06	3,06	2,01	360	850	550
405	580	373	24	4	4 500	9 000	0,41	1,63	2,43	1,6	550	750	355
429	624	380	35	5	3 900	6 550	0,28	2,43	3,61	2,37	420	800	700
424	624	385	14	5	4 900	9 150	0,38	1,78	2,65	1,74	720	800	425
453	718	385	21	6	5 600	8 800	0,33	2,06	3,06	2,01	650	700	480
415	505,4	393	15	3	1 760	4 000	0,19	3,58	5,33	3,5	265	950	750
422	542	396	15	4	2 550	5 300	0,24	2,84	4,23	2,78	430	900	730
417	542	391	25	4	3 350	7 200	0,31	2,15	3,2	2,1	580	750	520
436	600	401	15	4	4 050	8 150	0,32	2,12	3,15	2,07	385	800	510
427	600	393	25	4	4 650	9 500	0,39	1,71	2,54	1,67	770	700	330
451	654	401	33	5	4 150	7 100	0,27	2,51	3,74	2,45	550	750	630
447	654	405	15	5	5 300	9 800	0,37	1,8	2,69	1,76	780	750	395
435	525,4	413	15	3	1 830	4 150	0,18	3,71	5,52	3,63	275	900	710
448	582	417	15	4	3 050	6 200	0,24	2,79	4,15	2,73	365	800	670
442	582	412	25	4	3 900	8 500	0,33	2,06	3,06	2,01	670	700	485
457	624	421	15	5	4 250	8 500	0,31	2,15	3,2	2,1	670	750	485
448	624	413	25	5	5 100	10 400	0,39	1,72	2,56	1,68	720	670	310
476	694	421	30	5	4 650	7 800	0,26	2,55	3,8	2,5	600	700	600
473	694	427	15	5	5 700	10 800	0,38	1,78	2,65	1,74	820	700	370
497	788	427	27	6	6 550	10 600	0,33	2,07	3,09	2,03	610	670	400
455	545,4	433	15	3	1 900	4 500	0,18	3,85	5,73	3,76	300	850	660
468	602	437	16	4	3 150	6 550	0,24	2,84	4,23	2,78	395	800	640
460	602	438	18	4	4 000	8 800	0,32	2,13	3,17	2,08	710	670	460
483	674	443	16	5	5 000	9 650	0,33	2,03	3,02	1,98	465	700	455
476	674	434	27	5	6 200	12 700	0,4	1,67	2,49	1,63	980	630	265
499	728	443	45	6	5 100	8 650	0,27	2,51	3,74	2,45	630	670	500
495	728	449	16	6	6 550	12 200	0,38	1,77	2,64	1,73	930	670	340
482	585,4	454	17	3	2 240	5 200	0,18	3,66	5,46	3,58	295	800	620
488	627	458	17	5	3 400	7 100	0,24	2,84	4,23	2,78	405	750	610
483	627	452	27	5	4 300	9 650	0,32	2,12	3,15	2,07	750	630	430

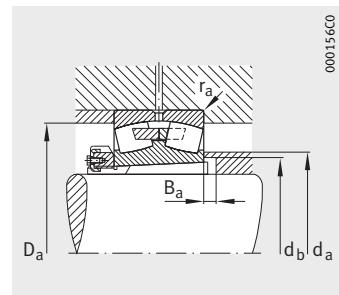


Spherical roller bearings

With adapter sleeve



With central rib
Locknut with retaining bracket



Mounting dimensions

Dimension table (continued) · Dimensions in mm

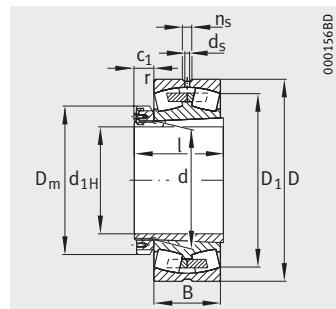
Designation		Mass m		Dimensions										
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d _{1H}	d	D	B	r min.	D ₁ ≈	d _s	n _s	D _m	l	c ₁ ≈
23188-K-MB	H3188	378	105	410	440	720	226	6	626	12,5	23,5	560	307	89
24188-B-K30	H24188	451	111	410	440	720	280	6	612,4	12,5	23,5	560	372	89
22288-K-MB	H3188	440	105	410	440	790	200	7,5	689,5	12,5	23,5	560	307	89
23288-B-K-MB	H3288	586	120	410	440	790	280	7,5	669,3	12,5	23,5	560	361	89
23992-B-K-MB	H3992	103	61,4	430	460	620	118	4	573,3	12,5	23,5	540	189	75
23092-B-K-MB	H3092	212	71,8	430	460	680	163	6	612,2	12,5	23,5	540	234	75
24092-B-K30-MB	H24092	359	80,8	430	460	680	218	6	603,3	12,5	23,5	540	300	75
23192-K-MB	H3192	420	118	430	460	760	240	7,5	661,4	12,5	23,5	580	326	94
24192-B-K30-MB	H24192	578	124	430	460	760	300	7,5	642,8	12,5	23,5	580	398	94
23292-K-MB	H3292	699	134	430	460	830	296	7,5	701,6	12,5	23,5	580	382	94
23996-B-K-MB	H3996	121	66,8	450	480	650	128	5	598,8	12,5	23,5	560	200	75
23096-K-MB	H3096	208	75,9	450	480	700	165	6	632,6	12,5	23,5	560	237	75
24096-B-K30-MB	H24096	289	84,7	450	480	700	218	6	625,4	12,5	23,5	560	301	75
23196-K-MB	H3196	470	135	450	480	790	248	7,5	688,3	12,5	23,5	620	335	94
24196-B-K30-MB	H24196	628	142	450	480	790	308	7,5	669,9	12,5	23,5	620	408	94
23296-K-MB	H3296	806	155	450	480	870	310	7,5	734,8	12,5	23,5	620	397	94
239/500-K-MB	H39/500	124	75,2	470	500	670	128	5	619,3	12,5	23,5	580	208	83
230/500-B-K-MB	H30/500	219	85,2	470	500	720	167	6	653,5	12,5	23,5	580	247	83
240/500-B-K30-MB	H240/500	384	93,8	470	500	720	218	6	645,8	12,5	23,5	580	309	83
231/500-B-K-MB	H31/500	556	145	470	500	830	264	7,5	720,9	12,5	23,5	630	356	99
241/500-B-K30-MB	H241/500	738	151	470	500	830	325	7,5	701,8	12,5	23,5	630	430	99
232/500-K-MB	H32/500	984	170	470	500	920	336	7,5	773,8	12,5	23,5	630	428	99
239/530-K-MB	H39/530	146	89	500	530	710	136	5	656,5	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
240/530-B-K30-MB	H240/530	418	115	500	530	780	250	6	691,9	12,5	23,5	630	343	89
231/530-K-MB	H31/530	643	161	500	530	870	272	7,5	756,3	12,5	23,5	670	364	102
241/530-B-K30-MB	H241/530	856	167	500	530	870	335	7,5	739,1	12,5	23,5	670	440	102
232/530-K-MB	H32/530	1 200	192	500	530	980	355	9,5	824,4	12,5	23,5	670	447	102
239/560-B-K-MB	H39/560	169	95,6	530	560	750	140	5	693,4	12,5	23,5	650	227	96
230/560-B-K-MB	H30/560	339	112	530	560	820	195	6	741,5	12,5	23,5	650	282	96
240/560-B-K30-MB	H240/560	458	124	530	560	820	258	6	731,2	12,5	23,5	650	358	96
231/560-K-MB	H31/560	737	184	530	560	920	280	7,5	800,2	12,5	23,5	710	377	107
241/560-B-K30-MB	H241/560	974	195	530	560	920	355	7,5	785	12,5	23,5	710	468	107
232/560-K-MB	H32/560	1 360	218	530	560	1 030	365	9,5	868,1	12,5	23,5	710	462	107

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.	kN	kN					kN	min ⁻¹	min ⁻¹
504	694	463	17	5	5 200	10 400	0,32	2,1	3,13	2,06	485	700	425
494	694	454	27	5	6 400	13 200	0,38	1,76	2,62	1,72	1 020	600	255
520	758	463	42	6	5 400	9 300	0,27	2,51	3,74	2,45	680	630	530
516	758	469	17	6	7 100	13 400	0,37	1,8	2,69	1,76	990	630	320
500	605,4	474	17	3	2 280	5 400	0,18	3,85	5,73	3,76	370	750	590
509	657	478	17	5	3 650	7 650	0,24	2,84	4,23	2,78	440	700	580
505	657	472	27	5	4 750	10 600	0,31	2,16	3,22	2,12	710	630	400
533	728	484	17	6	5 850	11 600	0,32	2,12	3,15	2,07	530	630	390
517	728	475	28	6	7 500	15 600	0,39	1,73	2,58	1,69	1 160	560	227
541	798	490	17	6	7 800	15 000	0,37	1,8	2,69	1,76	620	600	295
523	632	496	18	4	2 550	6 000	0,18	3,76	5,59	3,67	460	700	570
529	677	499	18	5	3 800	8 150	0,23	2,9	4,31	2,83	455	670	550
525	677	492	28	5	4 900	11 200	0,3	2,25	3,34	2,2	830	600	380
554	758	505	18	6	6 300	12 700	0,32	2,12	3,15	2,07	570	630	370
544	758	495	29	6	8 000	16 600	0,39	1,75	2,61	1,71	1 190	560	213
568	838	512	18	6	8 800	17 000	0,37	1,83	2,72	1,79	700	600	265
543	652	516	18	4	2 600	6 300	0,17	3,9	5,81	3,81	400	670	540
550	697	519	18	5	3 900	8 500	0,22	3,01	4,48	2,94	510	670	520
545	697	516	28	5	4 900	11 200	0,29	2,32	3,45	2,26	850	560	360
578	798	527	18	6	7 100	14 300	0,32	2,1	3,13	2,06	990	600	340
563	798	516	29	6	8 650	18 300	0,39	1,73	2,58	1,69	1 340	530	199
593	888	534	18	6	9 650	18 300	0,38	1,78	2,65	1,74	750	560	260
576	692	546	18	4	2 850	6 800	0,18	3,85	5,73	3,76	385	630	500
589	757	550	18	5	4 400	9 500	0,22	3,04	4,53	2,97	540	600	490
581	757	544	29	5	6 000	13 700	0,31	2,15	3,2	2,1	910	530	340
609	838	558	18	6	7 350	15 300	0,32	2,12	3,15	2,07	670	560	325
593	838	546	29	6	9 500	20 000	0,38	1,77	2,64	1,73	1 450	500	180
630	940	565	18	8	10 800	20 800	0,38	1,77	2,64	1,73	1 200	530	240
609	732	577	18	4	3 100	7 650	0,17	3,95	5,88	3,86	570	600	465
619	797	581	18	5	5 100	11 000	0,23	2,95	4,4	2,89	740	560	450
613	797	573	29	5	6 400	14 600	0,31	2,2	3,27	2,15	1 050	500	320
644	888	589	18	6	8 150	16 600	0,31	2,21	3,29	2,16	750	530	300
634	888	577	32	6	10 600	22 400	0,38	1,77	2,64	1,73	1 600	480	167
663	990	596	17	8	11 600	22 400	0,38	1,78	2,65	1,74	910	500	220

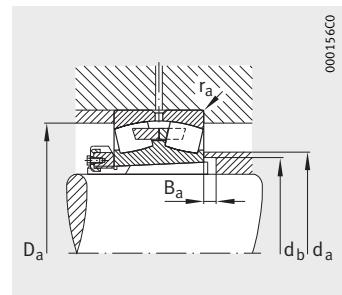


Spherical roller bearings

With adapter sleeve



With central rib
Locknut with retaining bracket



Mounting dimensions

Dimension table (continued) · Dimensions in mm

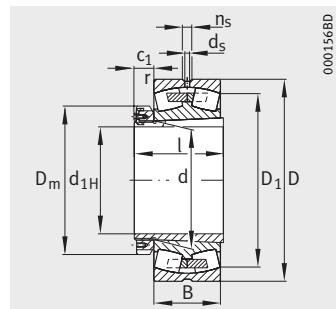
Designation		Mass m		Dimensions										
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d _{1H}	d	D	B	r min.	D ₁ ≈	d _s	n _s	D _m	l	c ₁ ≈
239/600-B-K-MB	H39/600	210	129	560	600	800	150	5	740,5	12,5	23,5	700	239	96
230/600-B-K-MB	H30/600	388	149	560	600	870	200	6	791,9	12,5	23,5	700	289	96
240/600-B-K30-MB	H240/600	544	171	560	600	870	272	6	773,3	12,5	23,5	700	377	96
231/600-K-MB	H31/600	901	234	560	600	980	300	7,5	852,6	12,5	23,5	750	399	107
241/600-B-K30-MB	H241/600	1 170	249	560	600	980	375	7,5	833	12,5	23,5	750	490	107
232/600-B-K-MB	H32/600	1 560	279	560	600	1090	388	9,5	919,5	12,5	23,5	750	487	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	480	139	600	630	920	212	7,5	834,3	12,5	23,5	730	301	96
240/630-B-K30-MB	H240/630	649	157	600	630	920	290	7,5	817,9	12,5	23,5	730	395	96
231/630-B-K-MB	H31/630	1 040	251	600	630	1030	315	7,5	896,2	12,5	23,5	800	424	117
241/630-B-K30-MB	H241/630	1 360	263	600	630	1030	400	7,5	872,2	12,5	23,5	800	525	117
232/630-B-K-MB	H32/630	1 885	297	600	630	1150	412	12	969,2	12,5	23,5	800	521	117
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
240/670-B-K30-MB	H240/670	813	218	630	670	980	308	7,5	873,1	12,5	23,5	780	418	101
231/670-B-K-MB	H31/670	1 650	341	630	670	1090	336	7,5	948,2	12,5	23,5	850	456	128
241/670-B-K30-MB	H241/670	1 540	355	630	670	1090	412	7,5	929,4	12,5	23,5	850	548	128
232/670-B-K-MB	H32/670	2 240	402	630	670	1220	438	12	1 030,5	12,5	23,5	850	558	128
239/710-K-MB	H39/710	336	200	670	710	950	180	6	877,5	12,5	23,5	830	286	111
230/710-B-K-MB	H30/710	650	228	670	710	1030	236	7,5	938,8	12,5	23,5	830	342	111
240/710-B-K30-MB	H240/710	873	254	670	710	1030	315	7,5	921,6	12,5	23,5	830	438	111
231/710-B-K-MB	H31/710	1 420	376	670	710	1150	345	9,5	1 006,6	12,5	23,5	900	467	131
241/710-B-K30-MB	H241/710	1 790	397	670	710	1150	438	9,5	980,2	12,5	23,5	900	577	131
232/710-B-K-MB	H32/710	2 550	444	670	710	1280	450	12	1 088,4	12,5	23,5	900	572	131
239/750-K-MB	H39/750	394	213	710	750	1 000	185	6	923,2	12,5	23,5	870	291	111
249/750-B-K30-MB	H249/750	558	236	710	750	1 000	250	6	921,7	12,5	23,5	870	367	111
230/750-K-MB	H30/750	786	248	710	750	1 090	250	7,5	990,9	12,5	23,5	870	356	111
240/750-B-K30-MB	H240/750	1 070	278	710	750	1 090	335	7,5	976,2	12,5	23,5	870	460	111
231/750-B-K-MB	H31/750	1 670	432	710	750	1 220	365	9,5	1 067,4	12,5	23,5	950	493	137
241/750-B-K30-MB	H241/750	2 300	461	710	750	1 220	475	9,5	1 035,8	12,5	23,5	950	622	137
232/750-B-K-MB	H32/750	3 050	508	710	750	1 360	475	15	1 154,1	12,5	23,5	950	603	137
239/800-B-K-MB	H39/800	490	263	750	800	1 060	195	6	983,7	12,5	23,5	920	303	111
230/800-K-MB	H30/800	861	305	750	800	1 150	258	7,5	1 050,9	12,5	23,5	920	366	111
240/800-B-K30-MB	H240/800	1 190	349	750	800	1 150	345	7,5	1 034,1	12,5	23,5	920	475	111

Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d _a max.	D _a max.	d _b min.	B _a min.	r _a max.	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
653	782	618	20	4	3 450	8 650	0,17	3,95	5,88	3,86	630	560	430
661	847	622	20	5	5 700	12 500	0,22	3,07	4,57	3	890	530	405
655	847	614	34	5	7 100	16 600	0,31	2,21	3,29	2,16	1 200	630	285
693	948	629	20	6	9 000	19 300	0,31	2,2	3,27	2,15	810	500	270
678	948	617	34	6	11 600	26 000	0,38	1,79	2,67	1,75	1 780	450	149
708	1 050	638	19	8	12 900	25 500	0,37	1,83	2,72	1,79	1 740	480	190
688	827	649	20	5	4 050	9 800	0,18	3,8	5,66	3,72	710	530	405
696	892	653	20	6	6 300	13 700	0,22	3,01	4,48	2,94	890	500	380
690	892	658	22	6	8 000	19 000	0,31	2,21	3,29	2,16	1 350	480	260
726	998	662	20	6	9 800	20 800	0,31	2,21	3,29	2,16	1 430	480	260
710	998	649	34	6	12 900	29 000	0,38	1,78	2,65	1,74	1 960	450	136
730	1 102	670	20	10	14 300	28 500	0,37	1,8	2,69	1,76	1 370	450	180
730	877	689	20	5	4 300	10 600	0,17	3,95	5,88	3,86	750	500	375
741	952	694	20	6	7 200	16 000	0,22	3,01	4,48	2,94	1 100	480	350
736	952	686	34	6	9 000	21 600	0,31	2,2	3,27	2,15	1 460	450	240
772	1 058	704	20	6	11 000	24 000	0,31	2,21	3,29	2,16	1 560	450	220
757	1 058	689	34	6	14 000	31 500	0,37	1,83	2,72	1,79	2 110	430	127
788	1 172	714	19	10	16 300	32 500	0,37	1,8	2,69	1,76	2 150	430	160
770	927	730	22	5	4 800	12 000	0,18	3,85	5,73	3,76	720	480	350
785	1 002	735	23	6	7 650	17 000	0,22	3,07	4,57	3	1 140	480	325
780	1 002	725	38	6	9 500	22 800	0,3	2,26	3,37	2,21	1 550	430	223
813	1 110	745	23	8	12 500	27 000	0,3	2,25	3,34	2,2	1 810	450	200
799	1 110	730	38	8	15 600	35 500	0,38	1,79	2,67	1,75	2 340	400	116
843	1 232	754	21	10	17 300	35 500	0,37	1,83	2,72	1,79	2 300	430	150
810	977	771	23	5	5 200	12 900	0,17	3,95	5,88	3,86	790	480	325
804	977	765	32	5	7 200	19 000	0,22	3,1	4,62	3,03	1 180	430	—
828	1 062	776	23	6	8 500	19 000	0,22	3,01	4,48	2,94	1 010	450	305
826	1 062	768	40	6	10 800	26 000	0,3	2,26	3,37	2,21	1 730	400	204
853	1 180	786	23	8	14 000	30 500	0,29	2,3	3,42	2,25	1 990	430	190
845	1 180	772	40	8	18 000	40 500	0,38	1,76	2,62	1,72	2 600	300	110
893	1 302	796	21	12	19 300	40 000	0,37	1,83	2,72	1,79	2 550	400	140
865	1 037	822	25	5	5 850	15 000	0,17	4,05	6,04	3,96	1 010	450	295
879	1 122	828	25	6	9 300	21 200	0,22	3,07	4,57	3	1 430	430	280
880	1 122	818	45	6	11 600	28 500	0,29	2,33	3,47	2,28	1 810	360	190

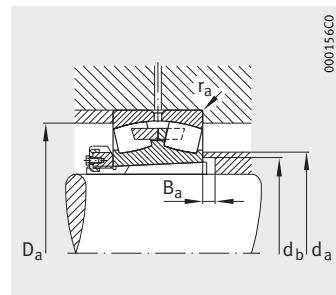


Spherical roller bearings

With adapter sleeve



With central rib
Locknut with retaining bracket



Mounting dimensions

Dimension table (continued) · Dimensions in mm

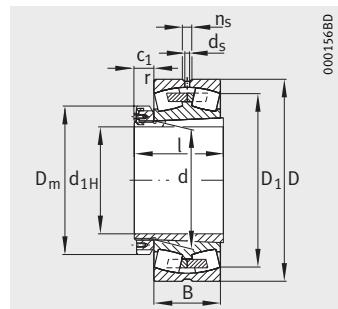
Designation		Mass m		Dimensions									
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d _{1H}	d	D	B	r min.	D ₁	d _s	n _s	D _m	
231/800-K-MB	H31/800	2 400	515	750	800	1 280	375	9,5	1 119,1	12,5	23,5	1 000	
241/800-B-K30-MB	H241/800	2 530	552	750	800	1 280	475	9,5	1 099,5	12,5	23,5	1 000	
239/850-K-MB	H39/850	554	292	800	850	1 120	200	6	1 039,9	12,5	23,5	980	
230/850-B-K-MB	H30/850	1 060	344	800	850	1 220	272	7,5	1 113,5	12,5	23,5	980	
240/850-B-K30-MB	H240/850	1 420	393	800	850	1 220	365	7,5	1 092,9	12,5	23,5	980	
231/850-B-K-MB	H31/850	2 340	590	800	850	1 360	400	12	1 198,1	12,5	23,5	1 060	
241/850-B-K30-MB	H241/850	2 840	624	800	850	1 360	500	12	1 171,7	12,5	23,5	1 060	
239/900-K-MB	H39/900	641	335	850	900	1 180	206	6	1 098,8	12,5	23,5	1 030	
249/900-K30-MB	H249/900	854	364	850	900	1 180	280	6	1 088,6	12,5	23,5	1 030	
230/900-B-K-MB	H30/900	1 280	392	850	900	1 280	280	7,5	1 171,3	12,5	23,5	1 030	
240/900-B-K30-MB	H240/900	1 570	446	850	900	1 280	375	7,5	1 150,7	12,5	23,5	1 030	
231/900-B-K-MB	H31/900	2 570	674	850	900	1 420	412	12	1 252,4	12,5	23,5	1 120	
241/900-B-K30-MB	H241/900	3 040	712	850	900	1 420	515	12	1 230,4	12,5	23,5	1 120	
239/950-B-K-MB	H39/950	746	369	900	950	1 250	224	7,5	1 162,5	12,5	23,5	1 080	
230/950-B-K-MB	H30/950	1 420	432	900	950	1 360	300	7,5	1 244,7	12,5	23,5	1 080	
240/950-B-K30-MB	H240/950	1 970	499	900	950	1 360	412	7,5	1 216	12,5	23,5	1 080	
231/950-B-K-MB	H31/950	3 060	738	900	950	1 500	438	12	1 322,5	12,5	23,5	1 170	
241/950-B-K30-MB	H241/950	3 820	776	900	950	1 500	545	12	1 306,7	12,5	23,5	1 170	
230/1000-B-K-MB	H30/1000	1 590	474	950	1 000	1 420	308	7,5	1 300,3	12,5	23,5	1 140	
240/1000-B-K30-MB	H240/1000	2 070	539	950	1 000	1 420	412	7,5	1 278,3	12,5	23,5	1 140	
231/1000-K-MB	H31/1000	4 640	840	950	1 000	1 580	462	12	1 392,5	12,5	23,5	1 240	
241/1000-B-K30-MB	H241/1000	4 380	886	950	1 000	1 580	580	12	1 372,6	12,5	23,5	1 240	
239/1000-B-K-MB	H39/1060	1 080	493	1 000	1 060	1 400	250	7,5	1 307,6	12,5	23,5	1 200	
230/1060-B-K-MB	H30/1060	1 920	574	1 000	1 060	1 500	325	9,5	1 374,4	12,5	23,5	1 200	
240/1060-B-K30-MB	H240/1060	2 520	665	1 000	1 060	1 500	438	9,5	1 353,5	12,5	23,5	1 200	
241/1060-B-K30-MB	H241/1060	5 000	1 060	1 000	1 060	1 660	600	15	—	12,5	23,5	1 300	
248/1060-B-K30-MB	H248/1060	599	263	1 020	1 060	1 280	218	6	1 212,7	9,5	17,7	1 150	
239/1120-B-K-MB	H39/1120	1 160	521	1 060	1 120	1 460	250	7,5	1 368,1	12,5	23,5	1 260	
230/1120-B-K-MB	H30/1120	2 210	631	1 060	1 120	1 580	345	9,5	1 447,7	12,5	23,5	1 260	
240/1120-B-K30-MB	H240/1120	2 920	728	1 060	1 120	1 580	462	9,5	1 429,7	12,5	23,5	1 260	
241/1120-B-K30-MB	H241/1120	5 800	1 170	1 060	1 120	1 750	630	15	1 527,2	12,5	23,5	1 360	
239/1180-B-K-MB	H39/1180	1 340	576	1 120	1 180	1 540	272	7,5	1 438,3	12,5	23,5	1 320	
230/1180-B-K-MB	H30/1180	2 510	682	1 120	1 180	1 660	355	9,5	1 523,4	12,5	23,5	1 320	
241/1180-B-K30-MB	H241/1180	7 040	1 290	1 120	1 180	1 850	670	15	1 603,9	12,5	23,5	1 420	

Bearing selection tables															
		Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
l	c ₁	d _a	D _a	d _b	B _a	r _a	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
505	137	909	1 240	838	25	8	15 000	33 500	0,29	2,32	3,45	2,26	1 680	400	170
627	137	900	1 240	823	45	8	18 600	44 000	0,36	1,86	2,77	1,82	2 430	340	95
308	115	917	1 097	873	25	5	6 300	16 300	0,16	4,11	6,12	4,02	960	430	275
380	115	932	1 192	879	25	6	10 400	23 600	0,22	3,07	4,57	3	1 540	400	260
495	115	930	1 192	869	45	6	12 900	32 000	0,29	2,33	3,47	2,28	2 060	480	173
536	143	969	1 312	890	25	10	17 000	38 000	0,29	2,32	3,45	2,26	2 410	360	160
658	143	955	1 312	873	45	10	21 200	49 000	0,36	1,89	2,81	1,84	3 150	300	90
326	122	972	1 157	923	27	5	6 550	17 300	0,16	4,28	6,37	4,19	1 010	400	260
410	122	958	1 157	916	35	5	9 150	25 000	0,2	3,31	4,92	3,23	1 070	340	–
400	122	990	1 252	930	28	6	11 000	26 500	0,22	3,14	4,67	3,07	1 620	400	240
520	122	995	1 252	919	52	6	14 000	36 500	0,28	2,45	3,64	2,39	2 190	300	150
557	150	1 015	1 372	941	28	10	18 000	40 500	0,29	2,33	3,47	2,28	2 550	340	150
685	150	1 010	1 372	924	52	10	22 400	53 000	0,35	1,91	2,85	1,87	2 900	280	80
344	122	1 030	1 222	974	27	6	7 500	20 000	0,16	4,22	6,29	4,13	1 280	360	240
420	122	1 048	1 332	980	28	6	12 200	29 000	0,22	3,14	4,67	3,07	1 810	340	220
557	122	1 035	1 332	971	52	6	16 300	41 500	0,29	2,32	3,45	2,26	2 550	280	140
583	150	1 075	1 452	992	28	10	20 000	45 500	0,29	2,33	3,47	2,28	2 210	300	140
715	150	1 060	1 452	975	52	10	23 600	54 000	0,36	1,87	2,79	1,83	1 720	260	80
430	122	1 100	1 392	1 030	30	6	13 200	31 500	0,21	3,2	4,77	3,13	1 570	340	200
562	122	1 090	1 392	971	60	6	16 600	42 500	0,28	2,41	3,59	2,35	2 550	260	140
609	150	1 135	1 532	1 044	30	10	22 000	51 000	0,29	2,33	3,47	2,28	3 150	280	130
755	150	1 110	1 532	1 028	60	10	27 500	64 000	0,35	1,91	2,85	1,87	4 000	260	70
372	122	1 150	1 372	1 088	30	6	9 800	26 000	0,17	4,05	6,04	3,96	1 590	300	200
447	122	1 170	1 466	1 095	30	8	14 300	35 500	0,21	3,27	4,87	3,2	1 740	280	240
588	122	1 150	1 466	1 083	60	8	18 600	50 000	0,27	2,47	3,67	2,41	2 950	260	120
775	150	1 200	1 602	1 089	60	12	29 000	69 500	0,35	1,95	2,9	1,91	4 100	260	67
335	101	1 110	1 257	1 075	45	5	6 950	22 800	0,15	4,54	6,75	4,43	1 280	280	–
372	122	1 200	1 432	1 148	30	6	10 200	27 500	0,16	4,28	6,37	4,19	1 740	280	190
467	122	1 245	1 546	1 156	30	8	15 000	38 000	0,21	3,27	4,87	3,2	2 130	260	180
612	122	1 210	1 546	1 144	60	8	20 800	55 000	0,28	2,45	3,64	2,39	3 250	260	110
805	150	1 260	1 692	1 150	60	12	31 000	72 000	0,35	1,91	2,85	1,87	3 950	240	60
394	122	1 270	1 512	1 210	30	6	11 400	31 000	0,17	4,05	6,04	3,96	1 760	260	180
479	122	1 290	1 626	1 218	32	8	16 600	41 500	0,21	3,27	4,87	3,2	2 400	260	170
845	150	1 350	1 792	1 210	60	12	35 500	86 500	0,34	1,99	2,96	1,94	4 900	220	53

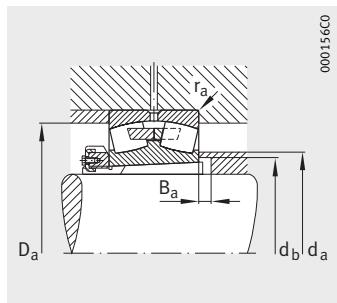


Spherical roller bearings

With adapter sleeve



With central rib
Locknut with retaining bracket



Mounting dimensions

Dimension table (continued) · Dimensions in mm

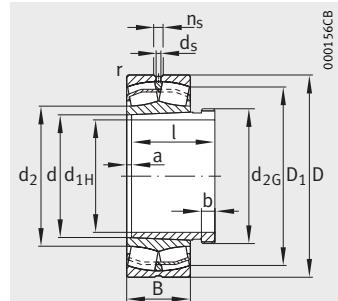
Designation		Mass m		Dimensions								
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d _{1H}	d	D	B	r min.	D ₁ ≈	d _s	n _s	D _m
239/1250-B-K-MB	H39/1250	1 630	708	1 180	1 250	1 630	280	7,5	1 516,1	12,5	23,5	1 390
230/1250-B-K-MB	H30/1250	2 920	858	1 180	1 250	1 750	375	9,5	1 607,6	12,5	23,5	1 390
240/1250-B-K30-MB	H240/1250	3 640	988	1 180	1 250	1 750	500	9,5	1 580,6	12,5	23,5	1 390
241/1250-B-K30-MB	H241/1250	8 000	1 540	1 180	1 250	1 950	710	15	—	12,5	23,5	1 490
239/1320-B-K-MB	H39/1320	1 950	781	1 250	1 320	1 720	300	7,5	1 602,2	12,5	23,5	1 460
239/1400-B-K-MB	H39/1400	2 200	924	1 320	1 400	1 820	315	9,5	1 695,6	12,5	23,5	1 540
240/1400-B-K30-MB	H240/1400	5 170	1 290	1 320	1 400	1 950	545	12	1 766,8	12,5	23,5	1 540
239/1500-B-K-MB	H39/1500	2 790	1 210	1 400	1 500	1 950	335	9,5	1 817,2	12,5	23,5	1 650
240/1500-B-K30-MB	H240/1500	3 350	1 790	1 400	1 500	2 120	615	12	1 905,3	12,5	23,5	1 650
231/1500-B-K-MB	H31/1500	5 530	2 230	1 400	1 500	2 300	600	19	2 060,4	12,5	23,5	1 740
241/1500-B-K30-MB	H241/1500	12 200	2 560	1 400	1 500	2 300	800	15	2 014	12,5	23,5	1 740
239/1600-B-K-MB	H39/1600	3 020	2 480	1 500	1 600	2 060	345	9,5	1 919,2	12,5	23,5	1 730
239/1700-B-K-MB	H39/1700	3 550	2 620	1 600	1 700	2 180	355	9,5	2 030,9	12,5	23,5	1 830

		Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
l	c ₁	d _a	D _a	d _b	B _a	r _a	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
	≈	max.	max.	min.	min.	max.									
407	132	1 345	1 602	1 210	35	8	12 000	32 500	0,15	4,47	6,65	4,37	1 970	260	160
509	132	1 380	1 716	1 290	34	8	18 000	46 500	0,2	3,34	4,98	3,27	2 700	260	150
660	132	1 370	1 716	1 275	60	8	23 200	62 000	0,25	2,69	4	2,63	3 600	240	—
885	150	1 425	1 892	1 282	60	12	37 500	91 500	0,34	1,99	2,96	1,94	5 100	220	50
430	132	1 425	1 692	1 353	30	6	13 700	39 000	0,16	4,28	6,37	4,19	2 190	260	150
445	132	1 510	1 786	1 434	30	8	14 600	42 500	0,16	4,28	6,37	4,19	2 390	240	140
705	132	1 520	1 908	1 427	60	10	28 000	76 500	0,24	2,76	4,11	2,7	4 450	220	80
465	132	1 625	1 916	1 536	30	8	16 300	49 000	0,16	4,28	6,37	4,19	2 550	220	130
775	132	1 660	2 078	1 529	60	10	34 000	93 000	0,26	2,64	3,93	2,58	5 400	200	—
755	155	1 700	2 242	1 560	35	12	40 000	96 500	0,25	2,67	3,97	2,61	5 600	220	67
990	155	1 705	2 242	1 536	75	12	45 000	110 000	0,32	2,1	3,13	2,06	5 900	220	50
465	122	1 725	2 026	1 638	30	8	17 300	52 000	0,15	4,6	6,85	4,5	2 850	220	120
475	122	1 810	2 146	1 740	30	8	19 300	60 000	0,15	4,6	6,85	4,5	—	220	110

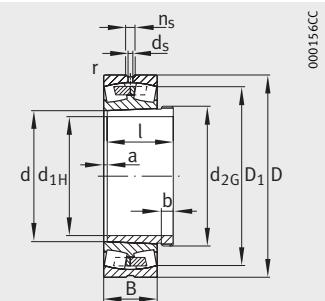


Spherical roller bearings

With withdrawal sleeve



E1 design

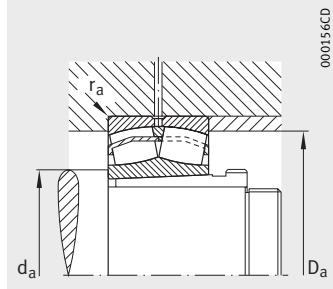


With central rib

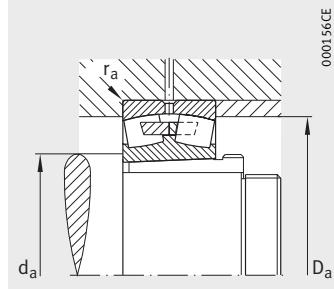
Dimension table · Dimensions in mm

Designation		Mass m		Dimensions												
Bearing	X-life	Withdrawal sleeve	Bearing	Withdrawal sleeve	d _{1H}	d	D	B	r	D ₁	d ₂	d _s	n _s	a	b	
≈kg	≈kg	≈kg	≈kg	≈kg	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
22330-E1-K	XL	AHX2330G	41,2	2,64	145	150	320	108	4	273,2	185,3	9,5	17,7	5	24	
22330-E1-K-T41A	XL	AHX2330G	41,2	2,64	145	150	320	108	4	273,2	185,3	9,5	17,7	5	24	
22332-K-MB	-	AH2332G	50,1	4,26	150	160	340	114	4	288,3	-	9,5	17,7	6	24	
22334-K-MB	-	AH2334G	58,4	4,78	160	170	360	120	4	304,2	-	9,5	17,7	6	24	
22236-E1-K	XL	AH2236G	28,5	3,35	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	
22336-K-MB	-	AH2336G	66,7	5,42	170	180	380	126	4	323,4	-	12,5	23,5	6	26	
23138-E1A-K-M	XL	AH3138G	32,4	4,39	180	190	320	104	3	281,6	-	8	15	6	20	
24138-E1-K30 ¹⁾	XL	AH24138	39,5	4,37	180	190	320	128	2	269,7	217,5	6,3	12,2	13	18	
22238-K-MB	-	AH2238G	36,2	3,83	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	6,02	180	190	400	132	5	338,2	-	12,5	23,5	7	26	
23140-B-K-MB	-	AH3140	41,7	5,6	190	200	340	112	3	293,3	-	9,5	17,7	6	21	
24140-B-K30	-	AH24140	51,6	5,02	190	200	340	140	3	285,9	-	6,3	12,2	13	18	
22240-B-K-MB	-	AH2240	42,3	4,8	190	200	360	98	4	312	-	9,5	17,7	5	19	
23240-B-K-MB	-	AH3240	55,8	6,61	190	200	360	128	4	307,5	-	9,5	17,7	7	24	
22340-K-MB	-	AH2340	89,5	7,64	190	200	420	138	5	357,4	-	12,5	23,5	7	30	
23044-K-MB	-	AH3044G	30,3	7,18	200	220	340	90	3	301,8	-	8	15	6	20	
24044-B-K30-MB	-	AH24044	38,9	8,22	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	10,3	200	220	370	150	4	311,7	-	6,3	12,2	14	20	
22244-B-K-MB	-	AH2244	59,6	9,17	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	5,26	220	240	320	60	2,1	297,8	-	6,3	12,2	6	16	
23048-K-MB	-	AH3048	31,9	8,92	220	240	360	92	3	322,1	-	8	15	7	21	
24048-B-K30-MB	-	AH24048	43,2	9,03	220	240	360	118	3	318,9	-	6,3	12,2	15	20	
23148-B-K-MB	-	AH3148	65,3	12,3	220	240	400	128	4	346,2	-	9,5	17,7	7	25	
24148-B-K30	-	AH24148	78,7	12,6	220	240	400	160	4	338	-	6,3	12,2	15	20	
22248-B-K-MB	-	AH2248	81,2	11,3	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	7,7	240	260	360	75	2,1	330,5	-	8	15	6	18	
23052-K-MB	-	AH3052	46,2	10,8	240	260	400	104	4	357,2	-	9,5	17,7	7	23	
24052-B-K30-MB	-	AH24052	64,5	11,6	240	260	400	140	4	349,1	-	6,3	12,2	16	20	

¹⁾ Cage guidance on inner ring central rib.



Mounting dimensions
E1 design



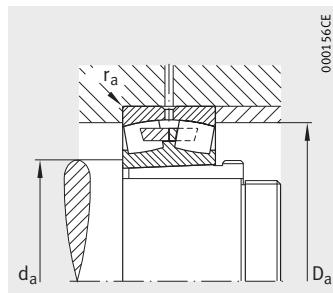
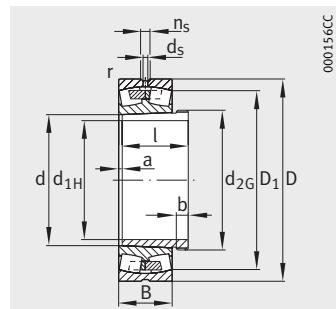
Mounting dimensions
With central rib

		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d_{2G}	l	d_a	D_a	r_a	dyn. C_r	stat. C_{Or}	e	Y_1	Y_2	Y_0	C_{ur}	n_G	n_B
\approx	\approx	min.	max.	max.	kN	kN					kN	min $^{-1}$	min $^{-1}$
M160X3	135	167	303	3	1 640	1 850	0,33	2,02	3	1,97	148	2 200	1 520
M160X3	135	167	303	3	1 640	1 850	0,33	2,02	3	1,97	148	2 200	1 520
M170X3	140	177	323	3	1 430	1 900	0,37	1,8	2,69	1,76	121	2 000	1 500
M180X3	146	187	343	3	1 600	2 120	0,37	1,83	2,72	1,79	134	1 800	1 380
M190X3	105	197	303	3	1 360	1 680	0,25	2,71	4,04	2,65	148	2 400	1 670
M190X3	140	197	303	3	1 710	2 340	0,33	2,07	3,09	2,03	173	2 000	1 090
M190X3	154	197	363	3	1 760	2 360	0,37	1,83	2,72	1,79	209	1 500	1 270
M200X3	125	204	306	2,5	1 610	2 220	0,3	2,28	3,39	2,23	218	2 000	1 260
M200X3	146	204	306	2,5	1 670	2 500	0,37	1,82	2,7	1,78	226	1 400	880
M200X3	112	207	323	3	1 200	1 830	0,28	2,39	3,56	2,34	122	1 800	1 600
M200X3	145	207	323	3	1 560	2 600	0,36	1,86	2,77	1,82	156	1 700	1 020
M200X3	160	210	380	4	1 860	2 500	0,37	1,83	2,72	1,79	213	1 500	1 220
Tr220X4	134	214	326	2,5	1 320	2 280	0,35	1,95	2,9	1,91	131	1 700	1 230
Tr210X4	158	214	326	2,5	1 700	3 000	0,42	1,62	2,42	1,59	190	1 400	810
Tr220X4	118	217	343	3	1 320	2 000	0,29	2,35	3,5	2,3	123	1 700	1 530
Tr220X4	153	217	343	3	1 660	2 750	0,37	1,83	2,72	1,79	163	1 500	980
Tr220X4	170	220	400	4	2 080	2 800	0,36	1,87	2,79	1,83	189	1 400	1 120
Tr230X4	111	232,4	327,6	2,5	1 100	2 000	0,26	2,55	3,8	2,5	132	1 700	1 440
Tr230X4	138	232,4	327,6	2,5	1 400	2 700	0,34	1,96	2,92	1,92	139	1 300	1 070
Tr240X4	145	237	353	3	1 630	2 900	0,33	2,03	3,02	1,98	165	1 400	1 060
Tr230X4	170	237	353	3	1 900	3 450	0,41	1,63	2,43	1,6	197	1 300	720
Tr240X4	130	237	383	3	1 630	2 450	0,29	2,35	3,5	2,3	153	1 400	1 300
Tr240X4	181	237	383	3	2 040	3 450	0,37	1,83	2,72	1,79	181	1 400	850
Tr240X4	181	240	440	4	2 320	3 350	0,35	1,95	2,9	1,91	217	1 300	970
Tr250X4	77	250,2	309,8	2,1	640	1 370	0,17	4,05	6,04	3,96	93	1 500	1 310
Tr260X4	116	252,4	347,6	2,5	1 160	2 200	0,25	2,74	4,08	2,68	130	1 400	1 310
Tr250X4	138	252,4	347,6	2,5	1 500	2 900	0,32	2,1	3,13	2,06	150	1 300	970
Tr260X4	154	257	383	3	1 860	3 250	0,33	2,06	3,06	2,01	177	1 300	970
Tr260X4	180	257	383	3	2 120	3 900	0,41	1,66	2,47	1,62	231	1 200	660
Tr260X4	144	257	423	3	1 960	3 050	0,29	2,35	3,5	2,3	184	1 300	1 180
Tr260X4	189	257	423	3	2 450	4 250	0,37	1,8	2,69	1,76	231	1 300	750
Tr260X4	189	260	480	4	2 650	3 900	0,35	1,95	2,9	1,91	249	1 500	870
Tr280X4	94	270,2	349,8	2,1	930	1 930	0,19	3,54	5,27	3,46	108	1 400	1 190
Tr280X4	128	274,6	385,4	3	1 500	2 800	0,26	2,64	3,93	2,58	155	1 300	1 160
Tr270X4	162	274,6	385,4	3	1 900	3 800	0,35	1,94	2,88	1,89	204	1 100	870



Spherical roller bearings

With withdrawal sleeve



Mounting dimensions

Dimension table (continued) · Dimensions in mm

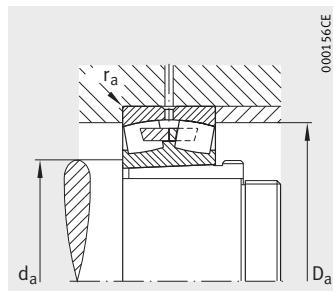
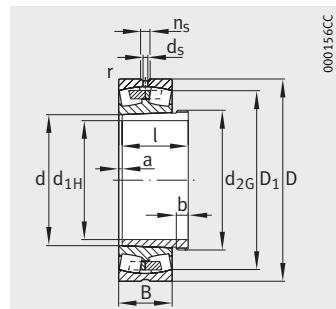
Designation		Mass m		Dimensions									
Bearing	Withdrawal sleeve	Bearing ≈kg	Withdrawal sleeve ≈kg	d _{1H}	d	D	B	r	D ₁	d _s	n _s	a	b
23152-K-MB	AH3152G	89,6	15,1	240	260	440	144	4	379,7	9,5	17,7	7	26
24152-B-K30	AH24152	112	15,5	240	260	440	180	4	370,3	8	15	16	22
22252-B-K-MB	AH2252G	106	13,3	240	260	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	8,3	260	280	380	75	2,1	350	8	15	6	18
23056-B-K-MB	AH3056	50,3	12	260	280	420	106	4	376,5	9,5	17,7	8	24
24056-B-K30-MB	AH24056	69,7	12,6	260	280	420	140	4	369,5	6,3	12,2	17	22
23156-B-K-MB	AH3156G	96,4	16,7	260	280	460	146	5	401,4	9,5	17,7	8	28
24156-B-K30	AH24156	118	16,7	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	20,9	260	280	500	176	5	426,3	12,5	23,5	8	30
22356-K-MB	AH2356G	224	20,9	260	280	580	175	6	489,3	12,5	23,5	8	30
23960-B-K-MB	AH3960G	39,1	10,8	280	300	420	90	3	384,6	9,5	17,7	7	21
23060-K-MB	AH3060	72,2	14,4	280	300	460	118	4	412,6	9,5	17,7	8	26
24060-B-K30-MB	AH24060	97,7	15,5	280	300	460	160	4	401,5	8	15	18	24
23160-B-K-MB	AH3160G	123	20	280	300	500	160	5	434,7	9,5	17,7	8	30
24160-B-K30	AH24160	158	20,1	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
22360-K-MB	AH3260G	365	24,6	280	300	620	185	7,5	523,6	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	17,5	300	320	480	160	4	424	8	15	18	24
23164-K-MB	AH3164G	167	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
22364-B-K-MB	AH3264G	433	28,9	300	320	670	200	7,5	568,1	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	21,1	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	28	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

		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d _{2G}	l	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.	kN	kN					kN	min ⁻¹	min ⁻¹
Tr280X4	172	277	423	3	2 200	4 000	0,33	2,03	3,02	1,98	213	1 200	850
Tr280X4	202	277	423	3	2 700	5 100	0,42	1,61	2,4	1,58	315	1 100	550
Tr280X4	155	280	460	4	2 240	3 450	0,29	2,32	3,45	2,26	217	1 100	1 070
Tr280X4	205	280	460	4	2 900	4 900	0,37	1,8	2,69	1,76	270	1 100	660
Tr280X4	205	286	514	5	3 000	4 400	0,34	2	2,98	1,96	290	1 100	790
Tr300X4	94	290,2	369,8	2,1	970	2 040	0,18	3,76	5,59	3,67	129	1 300	1 100
Tr300X4	131	294,6	405,4	3	1 560	3 000	0,25	2,74	4,08	2,68	156	1 300	1 090
Tr290X4	162	294,6	405,4	3	2 000	4 000	0,33	2,04	3,04	2	225	1 100	810
Tr300X4	175	300	440	4	2 360	4 400	0,32	2,12	3,15	2,07	241	1 100	780
Tr300X4	202	300	440	4	2 700	5 200	0,39	1,71	2,54	1,67	365	1 000	520
Tr300X4	155	300	480	4	2 360	3 650	0,28	2,43	3,61	2,37	238	1 100	1 010
Tr300X4	212	300	480	4	3 000	5 300	0,36	1,86	2,77	1,82	260	1 100	620
Tr300X4	212	306	554	5	3 550	5 400	0,33	2,03	3,02	1,98	335	950	680
Tr320X5	112	312,4	407,6	2,5	1 270	2 650	0,2	3,42	5,09	3,34	165	1 190	1 000
Tr320X5	145	314,6	445,4	3	1 960	3 650	0,25	2,69	4	2,63	223	1 100	960
Tr310X4	184	314,6	445,4	3	2 500	5 200	0,35	1,95	2,9	1,91	300	1 000	700
Tr320X5	192	320	480	4	2 650	4 900	0,33	2,06	3,06	2,01	270	1 100	720
Tr320X5	224	320	480	4	3 250	6 300	0,4	1,67	2,49	1,63	540	900	455
Tr320X5	170	320	520	4	2 750	4 400	0,27	2,47	3,67	2,41	300	1 000	900
Tr320X5	228	320	520	4	3 450	6 200	0,37	1,83	2,72	1,79	300	1 000	560
Tr320X5	228	332	588	6	4 000	6 100	0,33	2,06	3,06	2,01	375	900	630
Tr340X5	112	332,4	427,6	2,5	1 310	2 750	0,19	3,62	5,39	3,54	202	1 100	930
Tr340X5	149	334,6	465,4	3	2 040	4 000	0,25	2,74	4,08	2,68	243	1 100	900
Tr340X5	184	334,6	465,4	3	2 600	5 400	0,33	2,06	3,06	2,01	360	950	660
Tr340X5	209	340	520	4	3 200	6 000	0,34	1,98	2,94	1,93	305	950	650
Tr340X5	242	340	520	4	3 800	7 350	0,41	1,65	2,46	1,61	530	850	415
Tr340X5	180	340	560	4	3 050	4 900	0,27	2,47	3,67	2,41	345	950	830
Tr340X5	246	340	560	4	3 900	6 950	0,37	1,8	2,69	1,76	330	950	510
Tr340X5	246	352	638	6	4 400	6 800	0,33	2,06	3,06	2,01	540	800	560
Tr360X5	162	358	502	4	2 360	4 550	0,25	2,69	4	2,63	285	1 000	840
Tr360X5	206	358	502	4	3 100	6 550	0,34	1,98	2,94	1,93	530	850	600
Tr360X5	225	360	560	4	3 650	6 950	0,34	1,98	2,94	1,93	570	900	590
Tr360X5	269	360	560	4	4 400	8 500	0,43	1,56	2,32	1,53	680	800	380
Tr360X5	264	366	594	5	4 500	8 150	0,38	1,78	2,65	1,74	650	850	465



Spherical roller bearings

With withdrawal sleeve



Mounting dimensions

Dimension table (continued) · Dimensions in mm

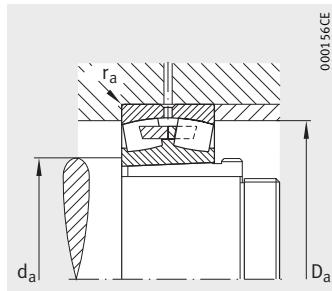
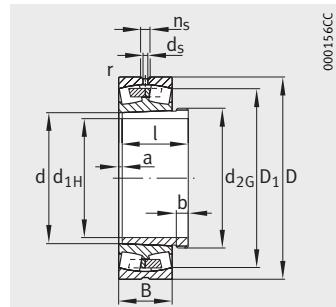
Designation		Mass m		Dimensions									
Bearing	Withdrawal sleeve	Bearing ≈kg	Withdrawal sleeve ≈kg	d _{1H}	d	D	B	r min.	D ₁	d _s	n _s	a	b
23972-K-MB	AH3972G	45	12,8	340	360	480	90	3	447,1	9,5	17,7	7	21
23072-K-MB	AH3072G	107	20,4	340	360	540	134	5	485,2	12,5	23,5	9	30
24072-B-K30-MB	AH24072	147	22,3	340	360	540	180	5	478,5	9,5	17,7	20	26
23172-K-MB	AH3172G	217	29,9	340	360	600	192	5	520	12,5	23,5	9	35
24172-B-K30	AH24172	275	29,7	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
22372-K-MB	AH3272G	625	37,5	340	360	750	224	7,5	634,9	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	115	22,1	360	380	560	135	5	505,6	12,5	23,5	10	31
24076-B-K30-MB	AH24076	155	24	360	380	560	180	5	499	9,5	17,7	20	28
23176-K-MB	AH3176G	226	32	360	380	620	194	5	539,6	12,5	23,5	10	36
24176-B-K30	AH24176	277	31,8	360	380	620	243	5	525,8	9,5	17,7	20	28
22276-K-MB	AH3176	284	32	360	380	680	175	6	592,6	12,5	23,5	10	36
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	27,8	380	400	600	200	5	530,9	12,5	23,5	20	28
23180-B-K-MB	AH3180G	261	35,1	380	400	650	200	6	567,2	12,5	23,5	10	38
24180-B-K30	AH24180	312	34,4	380	400	650	250	6	553,5	12,5	23,5	20	28
22280-K-MB	AH3180	414	35,1	380	400	720	185	6	629,3	12,5	23,5	10	38
23280-B-K-MB	AH3280G	442	47,4	380	400	720	256	6	609,8	12,5	23,5	10	44
22380-K-MB	AH3280G	800	47,4	380	400	820	243	7,5	694,4	12,5	23,5	10	44
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	29,6	400	420	620	200	5	550,2	12,5	23,5	22	30
23184-K-MB	AH3184G	339	42	400	420	700	224	6	605,4	12,5	23,5	10	40
24184-B-K30	AH24184	407	41	400	420	700	280	6	590,3	12,5	23,5	22	30
22284-K-MB	AH3184	404	42	400	420	760	195	7,5	661,8	12,5	23,5	10	40
23284-B-K-MB	AH3284G	539	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	32,8	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	42,9	420	440	720	280	6	612,4	12,5	23,5	22	30
22288-K-MB	AHX3188-H	440	49,7	420	440	790	200	7,5	689,5	12,5	23,5	11	42
23288-B-K-MB	AHX3288G	586	58,8	420	440	790	280	7,5	669,3	12,5	23,5	11	48

		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d _{2G}	l	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.	kN	kN					kN	min ⁻¹	min ⁻¹
Tr380X5	112	372,4	467,6	2,5	1 430	3 200	0,17	4,05	6,04	3,96	209	1 000	800
Tr380X5	167	378	522	4	2 450	4 800	0,25	2,74	4,08	2,68	295	950	790
Tr380X5	206	378	522	4	3 250	6 800	0,33	2,06	3,06	2,01	530	800	560
Tr380X5	229	380	580	4	3 800	7 350	0,33	2,06	3,06	2,01	360	850	550
Tr380X5	269	380	580	4	4 500	9 000	0,41	1,63	2,43	1,6	550	750	355
Tr380X5	274	386	624	5	4 900	9 150	0,38	1,78	2,65	1,74	720	800	425
Tr380X5	274	392	718	6	5 600	8 800	0,33	2,06	3,06	2,01	650	700	480
Tr400X5	130	394,6	505,4	3	1 760	4 000	0,19	3,58	5,33	3,5	265	950	750
Tr400X5	170	398	542	4	2 550	5 300	0,24	2,84	4,23	2,78	430	900	730
Tr400X5	208	398	542	4	3 350	7 200	0,31	2,15	3,2	2,1	580	750	520
Tr400X5	232	400	600	4	4 050	8 150	0,32	2,12	3,15	2,07	385	800	510
Tr400X5	271	400	600	4	4 650	9 500	0,39	1,71	2,54	1,67	770	700	330
Tr400X5	232	406	654	5	4 150	7 100	0,27	2,51	3,74	2,45	550	750	630
Tr400X5	284	406	654	5	5 300	9 800	0,37	1,8	2,69	1,76	780	750	395
Tr420X5	130	414,6	525,4	3	1 830	4 150	0,18	3,71	5,52	3,63	275	900	710
Tr420X5	183	418	582	4	3 050	6 200	0,24	2,79	4,15	2,73	365	800	670
Tr420X5	228	418	582	4	3 900	8 500	0,33	2,06	3,06	2,01	670	700	485
Tr420X5	240	426	624	5	4 250	8 500	0,31	2,15	3,2	2,1	670	750	485
Tr420X5	278	426	624	5	5 100	10 400	0,39	1,72	2,56	1,68	720	670	310
Tr420X5	240	426	694	5	4 650	7 800	0,26	2,55	3,8	2,5	600	700	600
Tr420X5	302	426	694	5	5 700	10 800	0,38	1,78	2,65	1,74	820	700	370
Tr420X5	302	432	788	6	6 550	10 600	0,33	2,07	3,09	2,03	610	670	400
Tr440X5	130	434,6	545,4	3	1 900	4 500	0,18	3,85	5,73	3,76	300	850	660
Tr440X5	186	438	602	4	3 150	6 550	0,24	2,84	4,23	2,78	395	800	640
Tr440X5	230	438	602	4	4 000	8 800	0,32	2,13	3,17	2,08	710	670	460
Tr440X5	266	446	674	5	5 000	9 650	0,33	2,03	3,02	1,98	465	700	455
Tr440X5	310	446	674	5	6 200	12 700	0,4	1,67	2,49	1,63	980	630	265
Tr440X5	266	452	728	6	5 100	8 650	0,27	2,51	3,74	2,45	630	670	500
Tr440X5	321	452	728	6	6 550	12 200	0,38	1,77	2,64	1,73	930	670	340
Tr460X5	145	454,6	585,4	3	2 240	5 200	0,18	3,66	5,46	3,58	295	800	620
Tr460X5	194	463	627	5	3 400	7 100	0,24	2,84	4,23	2,78	405	750	610
Tr460X5	242	463	627	5	4 300	9 650	0,32	2,12	3,15	2,07	750	630	430
Tr460X5	270	466	694	5	5 200	10 400	0,32	2,1	3,13	2,06	485	700	425
Tr460X5	310	466	694	5	6 400	13 200	0,38	1,76	2,62	1,72	1 020	600	255
Tr480X5	270	472	758	6	5 400	9 300	0,27	2,51	3,74	2,45	680	630	530
Tr480X5	330	472	758	6	7 100	13 400	0,37	1,8	2,69	1,76	990	630	320



Spherical roller bearings

With withdrawal sleeve



Mounting dimensions

Dimension table (continued) · Dimensions in mm

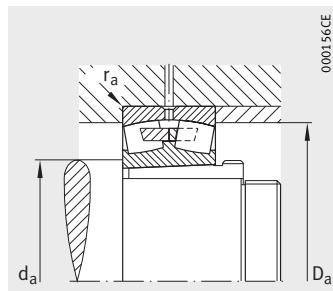
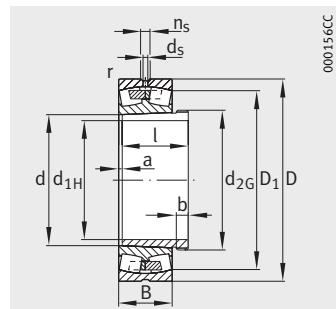
Designation		Mass m		Dimensions										
Bearing	Withdrawal sleeve	Bearing ≈kg	Withdrawal sleeve ≈kg	d _{1H}	d	D	B	r min.	D ₁	d _s	n _s	a	b	
23992-B-K-MB	AH3992	103	22,2	440	460	620	118	4	573,3	12,5	23,5	8	25	
23092-B-K-MB	AHX3092G	212	33,1	440	460	680	163	6	612,2	12,5	23,5	11	37	
24092-B-K30-MB	AH24092	359	35,6	440	460	680	218	6	603,3	12,5	23,5	23	32	
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	48,7	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	37,2	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	628	52,2	460	480	790	308	7,5	669,9	12,5	23,5	23	32	
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	29,6	480	500	670	128	5	619,3	12,5	23,5	10	32	
230/500-B-K-MB	AHX30/500G	219	40	480	500	720	167	6	653,5	12,5	23,5	12	40	
240/500-B-K30-MB	AH240/500	384	41,7	480	500	720	218	6	645,8	12,5	23,5	23	35	
231/500-B-K-MB	AHX31/500	556	65,3	480	500	830	264	7,5	720,9	12,5	23,5	12	47	
241/500-B-K30-MB	AH241/500	738	60,5	480	500	830	325	7,5	701,8	12,5	23,5	23	35	
232/500-K-MB	AHX32/500G	984	88,1	480	500	920	336	7,5	773,8	12,5	23,5	12	54	
239/530-K-MB	AH39/530	146	45,3	500	530	710	136	5	656,5	12,5	23,5	10	37	
230/530-K-MB	AH30/530A	291	61,7	500	530	780	185	6	703,7	12,5	23,5	12	45	
240/530-B-K30-MB	AH240/530	418	67,5	500	530	780	250	6	691,9	12,5	23,5	24	35	
231/530-K-MB	AH31/530A	643	92,3	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	24	35	
232/530-K-MB	AH32/530AG	1200	125	500	530	980	355	9,5	824,4	12,5	23,5	12	57	
239/560-B-K-MB	AH39/560	169	52,1	530	560	750	140	5	693,4	12,5	23,5	10	37	
230/560-B-K-MB	AH30/560A	339	71,8	530	560	820	195	6	741,5	12,5	23,5	12	45	
240/560-B-K30-MB	AH240/560	458	77,5	530	560	820	258	6	731,2	12,5	23,5	24	38	
231/560-K-MB	AH31/560A	737	106	530	560	920	280	7,5	800,2	12,5	23,5	12	55	
241/560-B-K30-MB	AH241/560	974	104	530	560	920	355	7,5	785	12,5	23,5	24	38	
232/560-K-MB	AH32/560AG	1360	140	530	560	1030	365	9,5	868,1	12,5	23,5	12	57	
239/600-B-K-MB	AH39/600	210	57	570	600	800	150	5	740,5	12,5	23,5	10	38	
230/600-B-K-MB	AH30/600A	388	75	570	600	870	200	6	791,9	12,5	23,5	14	45	
240/600-B-K30-MB	AH240/600	544	84,1	570	600	870	272	6	773,3	12,5	23,5	26	38	
231/600-K-MB	AH31/600A	901	116	570	600	980	300	7,5	852,6	12,5	23,5	14	55	
241/600-B-K30-MB	AH241/600	1170	114	570	600	980	375	7,5	833	12,5	23,5	26	38	
232/600-B-K-MB	AH32/600AG	1560	157	570	600	1090	388	9,5	919,5	12,5	23,5	14	57	

Technical data for deep groove ball bearings													
		Mounting dimensions			Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed	
Thread d _{2G} ≈	l ≈	d _a min.	D _a max.	r _a max.	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
Tr480X5	145	474,6	605,4	3	2 280	5 400	0,18	3,85	5,73	3,76	370	750	590
Tr480X5	202	483	657	5	3 650	7 650	0,24	2,84	4,23	2,78	440	700	580
Tr480X5	250	483	657	5	4 750	10 600	0,31	2,16	3,22	2,12	710	630	400
Tr480X5	285	492	728	6	5 850	11 600	0,32	2,12	3,15	2,07	530	630	390
Tr480X5	332	492	728	6	7 500	15 600	0,39	1,73	2,58	1,69	1 160	560	227
Tr480X5	349	492	798	6	7 800	15 000	0,37	1,8	2,69	1,76	620	600	295
Tr500X5	158	498	632	4	2 550	6 000	0,18	3,76	5,59	3,67	460	700	570
Tr500X5	205	503	677	5	3 800	8 150	0,23	2,9	4,31	2,83	455	670	550
Tr500X5	250	503	677	5	4 900	11 200	0,3	2,25	3,34	2,2	830	600	380
Tr500X5	295	512	758	6	6 300	12 700	0,32	2,12	3,15	2,07	570	630	370
Tr500X5	340	512	758	6	8 000	16 600	0,39	1,75	2,61	1,71	1 190	560	213
Tr500X5	364	512	838	6	8 800	17 000	0,37	1,83	2,72	1,79	700	600	265
Tr530X6	162	518	652	4	2 600	6 300	0,17	3,9	5,81	3,81	400	670	540
Tr530X6	209	523	697	5	3 900	8 500	0,22	3,01	4,48	2,94	510	670	520
Tr530X6	253	523	697	5	4 900	11 200	0,29	2,32	3,45	2,26	850	560	360
Tr530X6	313	532	798	6	7 100	14 300	0,32	2,1	3,13	2,06	990	600	340
Tr530X6	360	532	798	6	8 650	18 300	0,39	1,73	2,58	1,69	1 340	530	199
Tr530X6	393	532	888	6	9 650	18 300	0,38	1,78	2,65	1,74	750	560	260
Tr560X6	175	548	692	4	2 850	6 800	0,18	3,85	5,73	3,76	385	630	500
Tr560X6	230	553	757	5	4 400	9 500	0,22	3,04	4,53	2,97	540	600	490
Tr560X6	285	553	757	5	6 000	13 700	0,31	2,15	3,2	2,1	910	530	340
Tr560X6	325	562	838	6	7 350	15 300	0,32	2,12	3,15	2,07	670	560	325
Tr560X6	370	562	838	6	9 500	20 000	0,38	1,77	2,64	1,73	1 450	500	184
Tr580X6	412	570	940	8	10 800	20 800	0,38	1,77	2,64	1,73	1 200	530	240
Tr600X6	180	578	732	4	3 100	7 650	0,17	3,95	5,88	3,86	570	600	465
Tr600X6	240	583	797	5	5 100	11 000	0,23	2,95	4,4	2,89	740	560	450
Tr600X6	296	583	797	5	6 400	14 600	0,31	2,2	3,27	2,15	1 050	500	320
Tr600X6	335	592	888	6	8 150	16 600	0,31	2,21	3,29	2,16	750	530	300
Tr600X6	393	592	888	6	10 600	22 400	0,38	1,77	2,64	1,73	1 600	480	167
Tr600X6	422	600	990	8	11 600	22 400	0,38	1,78	2,65	1,74	910	500	220
Tr630X6	192	618	782	4	3 450	8 650	0,17	3,95	5,88	3,86	630	560	430
Tr630X6	245	623	847	5	5 700	12 500	0,22	3,07	4,57	3	890	530	405
Tr630X6	310	623	847	5	7 100	16 600	0,31	2,21	3,29	2,16	1 200	630	285
Tr630X6	355	632	948	6	9 000	19 300	0,31	2,2	3,27	2,15	810	500	270
Tr630X6	413	632	948	6	11 600	26 000	0,38	1,79	2,67	1,75	1 780	450	149
Tr630X6	445	640	1 050	8	12 900	25 500	0,37	1,83	2,72	1,79	1 740	480	190



Spherical roller bearings

With withdrawal sleeve



Mounting dimensions

Dimension table (continued) · Dimensions in mm

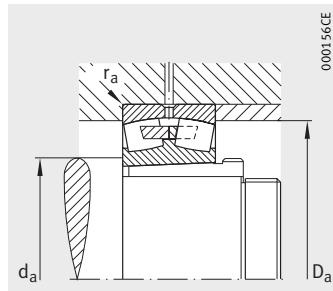
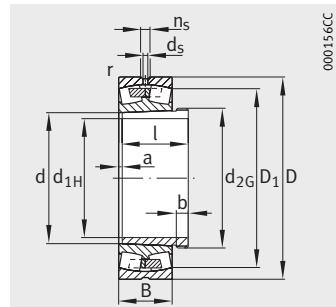
Designation		Mass m		Dimensions									
Bearing	Withdrawal sleeve	Bearing ≈kg	Withdrawal sleeve ≈kg	d _{1H}	d	D	B	r min.	D ₁ ≈	d _s	n _s	a	b
239/630-B-K-MB	AH39/630	283	69,4	600	630	850	165	6	784,5	12,5	23,5	12	40
230/630-B-K-MB	AH30/630A	480	87,3	600	630	920	212	7,5	834,3	12,5	23,5	14	46
240/630-B-K30-MB	AH240/630	649	97,9	600	630	920	290	7,5	817,9	12,5	23,5	26	40
231/630-B-K-MB	AH31/630A	1040	136	600	630	1030	315	7,5	896,2	12,5	23,5	14	60
241/630-B-K30-MB	AH241/630	1360	133	600	630	1030	400	7,5	872,2	12,5	23,5	26	40
232/630-B-K-MB	AH32/630AG	1885	185	600	630	1150	412	12	969,2	12,5	23,5	14	63
239/670-B-K-MB	AH39/670	310	92,9	630	670	900	170	6	831,5	12,5	23,5	12	41
230/670-B-K-MB	AH30/670A	590	124	630	670	980	230	7,5	888,7	12,5	23,5	14	50
240/670-B-K30-MB	AH240/670G	813	138	630	670	980	308	7,5	873,1	12,5	23,5	26	40
231/670-B-K-MB	AH31/670A	1650	185	630	670	1090	336	7,5	948,2	12,5	23,5	14	60
241/670-B-K30-MB	AH241/670	1540	180	630	670	1090	412	7,5	929,4	12,5	23,5	26	40
232/670-B-K-MB	AH32/670AG	2240	249	630	670	1220	438	12	1030,5	12,5	23,5	14	62
239/710-K-MB	AH39/710	336	105	670	710	950	180	6	877,5	12,5	23,5	12	43
230/710-B-K-MB	AH30/710A	650	135	670	710	1030	236	7,5	938,8	12,5	23,5	16	50
240/710-B-K30-MB	AH240/710	873	152	670	710	1030	315	7,5	921,6	12,5	23,5	26	45
231/710-B-K-MB	AH31/710A	1420	202	670	710	1150	345	9,5	1006,6	12,5	23,5	16	60
241/710-B-K30-MB	AH241/710	1790	207	670	710	1150	438	9,5	980,2	12,5	23,5	26	45
232/710-B-K-MB	AH32/710AG	2550	275	670	710	1280	450	12	1088,4	12,5	23,5	16	65
238/710-K-MB	AH38/710	139	58,6	680	710	870	118	4	824,9	8	15	12	43
239/750-K-MB	AH39/750	394	118	710	750	1000	185	6	923,2	12,5	23,5	12	44
230/750-K-MB	AH30/750A	786	155	710	750	1090	250	7,5	990,9	12,5	23,5	16	50
240/750-B-K30-MB	AH240/750	1070	174	710	750	1090	335	7,5	976,2	12,5	23,5	28	45
231/750-B-K-MB	AH31/750A	1670	232	710	750	1220	365	9,5	1067,4	12,5	23,5	16	60
241/750-B-K30-MB	AH241/750G	2300	244	710	750	1220	475	9,5	1035,8	12,5	23,5	28	45
232/750-B-K-MB	AH32/750A	3050	312	710	750	1360	475	15	1154,1	12,5	23,5	16	65
239/800-B-K-MB	AH39/800	490	155	750	800	1060	195	6	983,7	12,5	23,5	12	45
230/800-K-MB	AH30/800A	861	198	750	800	1150	258	7,5	1050,9	12,5	23,5	18	50
240/800-B-K30-MB	AH240/800G	1190	233	750	800	1150	345	7,5	1034,1	12,5	23,5	28	50
231/800-K-MB	AH31/800A	2400	297	750	800	1280	375	9,5	1119,1	12,5	23,5	18	63
241/800-B-K30-MB	AH241/800G	2530	313	750	800	1280	475	9,5	1099,5	12,5	23,5	28	50
239/850-K-MB	AH39/850	554	176	800	850	1120	200	6	1039,9	12,5	23,5	12	50
230/850-B-K-MB	AH30/850A	1060	224	800	850	1220	272	7,5	1113,5	12,5	23,5	18	53
240/850-B-K30-MB	AH240/850	1420	259	800	850	1220	365	7,5	1092,9	12,5	23,5	30	50
231/850-B-K-MB	AH31/850A	2340	336	800	850	1360	400	12	1198,1	12,5	23,5	18	63
241/850-B-K30-MB	AH241/850G	2840	363	800	850	1360	500	12	1171,7	12,5	23,5	40	60

Technical data for deep groove ball bearings													
		Mounting dimensions			Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed	
Thread d _{2G}	l	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.	kN	kN					kN	min ⁻¹	min ⁻¹
Tr655X6	210	653	827	5	4 050	9 800	0,18	3,8	5,66	3,72	710	530	405
Tr670X6	258	658	892	6	6 300	13 700	0,22	3,01	4,48	2,94	890	500	380
Tr670X6	330	658	892	6	8 000	19 000	0,31	2,21	3,29	2,16	1 350	480	260
Tr670X6	375	662	998	6	9 800	20 800	0,31	2,21	3,29	2,16	1 430	480	260
Tr670X6	440	662	998	6	12 900	29 000	0,38	1,78	2,65	1,74	1 960	450	136
Tr670X6	475	678	1 102	10	14 300	28 500	0,37	1,8	2,69	1,76	1 370	450	180
Tr710X7	216	693	877	5	4 300	10 600	0,17	3,95	5,88	3,86	750	500	375
Tr710X7	280	698	952	6	7 200	16 000	0,22	3,01	4,48	2,94	1 100	480	350
Tr710X7	348	698	952	6	9 000	21 600	0,31	2,2	3,27	2,15	1 460	450	240
Tr710X7	395	702	1 058	6	11 000	24 000	0,31	2,21	3,29	2,16	1 560	450	220
Tr710X7	452	702	1 058	6	14 000	31 500	0,37	1,83	2,72	1,79	2 110	430	127
Tr710X7	500	718	1 172	10	16 300	32 500	0,37	1,8	2,69	1,76	2 150	430	160
Tr750X7	228	733	927	5	4 800	12 000	0,18	3,85	5,73	3,76	720	480	350
Tr750X7	286	738	1 002	6	7 650	17 000	0,22	3,07	4,57	3	1 140	480	325
Tr750X7	360	738	1 002	6	9 500	22 800	0,3	2,26	3,37	2,21	1 550	430	223
Tr750X7	405	750	1 110	8	12 500	27 000	0,3	2,25	3,34	2,2	1 810	450	200
Tr750X7	483	750	1 110	8	15 600	35 500	0,38	1,79	2,67	1,75	2 340	400	116
Tr750X7	515	758	1 232	10	17 300	35 500	0,37	1,83	2,72	1,79	2 300	430	150
Tr740X7	163	724,6	855,4	3	2 600	7 500	0,12	5,72	8,51	5,59	540	500	–
Tr800X7	234	773	977	5	5 200	12 900	0,17	3,95	5,88	3,86	790	480	325
Tr800X7	300	778	1 062	6	8 500	19 000	0,22	3,01	4,48	2,94	1 010	450	305
Tr800X7	380	778	1 062	6	10 800	26 000	0,3	2,26	3,37	2,21	1 730	400	204
Tr800X7	425	790	1 180	8	14 000	30 500	0,29	2,3	3,42	2,25	1 990	430	190
Tr800X7	520	790	1 180	8	18 000	40 500	0,38	1,76	2,62	1,72	2 600	300	110
Tr800X7	540	808	1 302	12	19 300	40 000	0,37	1,83	2,72	1,79	2 550	400	140
Tr830X7	245	823	1 037	5	5 850	15 000	0,17	4,05	6,04	3,96	1 010	450	295
Tr850X7	308	828	1 122	6	9 300	21 200	0,22	3,07	4,57	3	1 430	430	280
Tr850X7	395	828	1 122	6	11 600	28 500	0,29	2,33	3,47	2,28	1 810	360	190
Tr850X7	438	840	1 240	8	15 000	33 500	0,29	2,32	3,45	2,26	1 680	400	170
Tr850X7	525	840	1 240	8	18 600	44 000	0,36	1,86	2,77	1,82	2 430	340	95
Tr900X7	258	873	1 097	5	6 300	16 300	0,16	4,11	6,12	4,02	960	430	275
Tr900X7	325	878	1 192	6	10 400	23 600	0,22	3,07	4,57	3	1 540	400	260
Tr900X7	415	878	1 192	6	12 900	32 000	0,29	2,33	3,47	2,28	2 060	480	173
Tr900X7	462	898	1 312	10	17 000	38 000	0,29	2,32	3,45	2,26	2 410	360	160
Tr900X7	560	898	1 312	10	21 200	49 000	0,36	1,89	2,81	1,84	3 150	300	90



Spherical roller bearings

With withdrawal sleeve



Mounting dimensions

Dimension table (continued) · Dimensions in mm

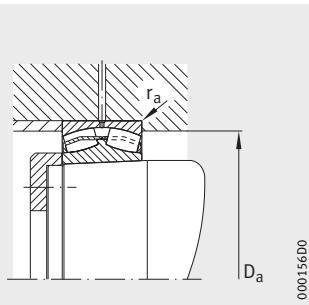
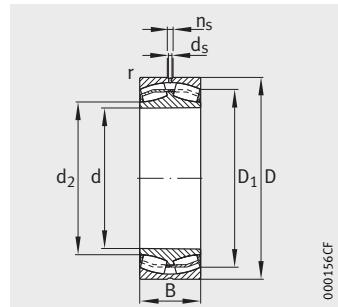
Designation		Mass m		Dimensions									
Bearing	Withdrawal sleeve	Bearing	Withdrawal sleeve	d _{1H}	d	D	B	r	D ₁	d _s	n _s	a	b
239/900-K-MB	AH39/900	641	191	850	900	1 180	206	6	1 098,8	12,5	23,5	12	51
230/900-B-K-MB	AH30/900A	1 280	246	850	900	1 280	280	7,5	1 171,3	12,5	23,5	20	55
240/900-B-K30-MB	AH240/900G	1 570	291	850	900	1 280	375	7,5	1 150,7	12,5	23,5	45	55
231/900-B-K-MB	AH31/900A	2 570	368	850	900	1 420	412	12	1 252,4	12,5	23,5	20	63
241/900-B-K30-MB	AH241/900G	3 040	397	850	900	1 420	515	12	1 230,4	12,5	23,5	45	60
238/900-B-K-MB	AH38/900	274	109	860	900	1 090	140	5	1 036,1	8	15	12	51
239/950-B-K-MB	AH39/950G-H	746	216	900	950	1 250	224	7,5	1 162,5	12,5	23,5	15	51
230/950-B-K-MB	AH30/950A	1 420	277	900	950	1 360	300	7,5	1 244,7	12,5	23,5	20	55
240/950-B-K30-MB	AH240/950G	1 970	335	900	950	1 360	412	7,5	1 216	12,5	23,5	45	55
231/950-B-K-MB	AH31/950A	3 060	414	900	950	1 500	438	12	1 322,5	12,5	23,5	20	63
241/950-B-K30-MB	AH241/950G	3 820	443	900	950	1 500	545	12	1 306,7	12,5	23,5	45	60
239/1000-B-K-MB	AH39/1000-H	898	229	950	1 000	1 320	236	7,5	1 227,4	12,5	23,5	15	52
230/1000-B-K-MB	AH30/1 000A	1 590	309	950	1 000	1 420	308	7,5	1 300,3	12,5	23,5	22	57
240/1000-B-K30-MB	AH240/1000	2 070	357	950	1 000	1 420	412	7,5	1 278,3	12,5	23,5	50	57
231/1000-K-MB	AH31/1 000A	4 640	471	950	1 000	1 580	462	12	1 392,5	12,5	23,5	22	63
241/1000-B-K30-MB	AH241/1000	4 380	502	950	1 000	1 580	580	12	1 372,6	12,5	23,5	50	65
230/1060-B-K-MB	AH30/1 060A	1 920	396	1 000	1 060	1 500	325	9,5	1 374,4	12,5	23,5	22	60
240/1060-B-K30-MB	AH240/1060	2 520	465	1 000	1 060	1 500	438	9,5	1 353,5	12,5	23,5	50	60
241/1060-B-K30-MB	AH241/1060	5 000	632	1 000	1 060	1 660	600	15	—	12,5	23,5	50	65
248/1060-B-K30-MB	AH248/1060	599	169	1 020	1 060	1 280	218	6	1 212,7	9,5	17,7	37	52
230/1120-B-K-MB	AH30/1 120A	2 210	451	1 060	1 120	1 580	345	9,5	1 447,7	12,5	23,5	22	65
240/1120-B-K30-MB	AH240/1120	2 920	524	1 060	1 120	1 580	462	9,5	1 429,7	12,5	23,5	50	65
241/1120-B-K30-MB	AH241/1120	5 800	717	1 060	1 120	1 750	630	15	1 527,2	12,5	23,5	50	75
239/1120-B-K-MB	AH39/1120G	1 160	291	1 070	1 120	1 460	250	7,5	1 368,1	12,5	23,5	15	52
230/1180-B-K-MB	AH30/1 180A	2 510	498	1 120	1 180	1 660	355	9,5	1 523,4	12,5	23,5	22	65
239/1180-B-K-MB	AH39/1180G	1 340	337	1 130	1 180	1 540	272	7,5	1 438,3	12,5	23,5	15	55
230/1250-B-K-MB	AH30/1 250A	2 920	629	1 180	1 250	1 750	375	9,5	1 607,6	12,5	23,5	22	70
240/1250-B-K30-MB	AH240/1250	3 640	733	1 180	1 250	1 750	500	0	1 580,6	12,5	23,5	50	70
239/1250-B-K-MB	AH39/1250G	1 630	370	1 200	1 250	1 630	280	7,5	1 516,1	12,5	23,5	18	55
240/1320-B-K30-MB	AH240/1320	4 550	828	1 250	1 320	1 850	530	12	1 667,8	12,5	23,5	50	70
239/1320-B-K-MB	AH39/1320G	1 950	425	1 270	1 320	1 720	300	7,5	1 602,2	12,5	23,5	18	55
240/1400-B-K30-MB	AH240/1400	5 170	1 030	1 320	1 400	1 950	545	12	1 766,8	12,5	23,5	50	70
239/1400-B-K-MB	AH39/1400G	2 200	504	1 350	1 400	1 820	315	9,5	1 695,6	12,5	23,5	20	60
238/1500-K-MB	AH38/1500	1 380	365	1 450	1 500	1 820	243	7	1 729,3	12,5	23,5	20	60
239/1500-B-K-MB	AH39/1500G	2 790	569	1 450	1 500	1 950	335	9,5	1 817,2	12,5	23,5	20	60

Technical data sheet													
Thread d _{2G}		Mounting dimensions			Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed	
Thread d _{2G} ≈	l ≈	d _a min.	D _a max.	r _a max.	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	n _G min ⁻¹	n _B min ⁻¹
Tr950X8	265	923	1 157	5	6 550	17 300	0,16	4,28	6,37	4,19	1 010	400	260
Tr950X8	335	928	1 252	6	11 000	26 500	0,22	3,14	4,67	3,07	1 620	400	240
Tr950X8	430	928	1 252	6	14 000	36 500	0,28	2,45	3,64	2,39	2 190	300	150
Tr950X8	475	948	1 372	10	18 000	40 500	0,29	2,33	3,47	2,28	2 550	340	150
Tr950X8	575	948	1 372	10	22 400	53 000	0,35	1,91	2,85	1,87	2 900	280	80
Tr930X8	193	918	1 072	4	2 200	5 700	0,11	6,06	9,02	5,92	375	430	—
Tr1000X8	282	978	1 222	6	7 500	20 000	0,16	4,22	6,29	4,13	1 280	360	240
Tr1000X8	355	978	1 332	6	12 200	29 000	0,22	3,14	4,67	3,07	1 810	340	220
Tr1000X8	467	978	1 332	6	16 300	41 500	0,29	2,32	3,45	2,26	2 550	280	140
Tr1000X8	500	998	1 452	10	20 000	45 500	0,29	2,33	3,47	2,28	2 210	300	140
Tr1000X8	605	998	1 452	10	23 600	54 000	0,36	1,87	2,79	1,83	1 720	260	80
Tr1035X8	296	1 028	1 292	6	8 150	21 600	0,16	4,22	6,29	4,13	1 590	340	220
Tr1060X8	365	1 028	1 392	6	13 200	31 500	0,21	3,2	4,77	3,13	1 570	340	200
Tr1060X8	469	1 028	1 392	6	16 600	42 500	0,28	2,41	3,59	2,35	2 550	260	140
Tr1060X8	525	1 048	1 532	10	22 000	51 000	0,29	2,33	3,47	2,28	3 150	280	130
Tr1060X8	645	1 048	1 532	10	27 500	64 000	0,35	1,91	2,85	1,87	4 000	260	70
Tr1120X8	385	1 094	1 466	8	14 300	35 500	0,21	3,27	4,87	3,2	1 740	280	240
Tr1120X8	498	1 094	1 466	8	18 600	50 000	0,27	2,47	3,67	2,41	2 950	260	120
Tr1120X8	665	1 118	1 602	12	29 000	69 500	0,35	1,95	2,9	1,91	4 100	260	67
Tr1095X8	270	1 083	1 257	5	6 950	22 800	0,15	4,54	6,75	4,43	1 280	280	—
Tr1180X8	410	1 154	1 546	8	15 000	38 000	0,21	3,27	4,87	3,2	2 130	260	180
Tr1180X8	527	1 154	1 546	8	20 800	55 000	0,28	2,45	3,64	2,39	3 250	260	110
Tr1180X8	705	1 178	1 692	12	31 000	72 000	0,35	1,91	2,85	1,87	3 950	240	60
Tr1180X8	310	1 148	1 432	6	10 200	27 500	0,16	4,28	6,37	4,19	1 740	280	190
Tr1250X8	420	1 214	1 626	8	16 600	41 500	0,21	3,27	4,87	3,2	2 400	260	170
Tr1250X8	330	1 208	1 512	6	11 400	31 000	0,17	4,05	6,04	3,96	1 760	260	180
Tr1320X8	445	1 284	1 716	8	18 000	46 500	0,2	3,34	4,98	3,27	2 700	260	150
Tr1320X8	570	1 284	1 716	8	23 200	62 000	0,25	2,69	4	2,63	3 600	240	—
Tr1320X8	340	1 278	1 602	6	12 000	32 500	0,15	4,47	6,65	4,37	1 970	260	160
Tr1400X8	600	1 362	1 808	8	26 000	69 500	0,25	2,69	4	2,63	4 100	260	110
Tr1400X8	360	1 348	1 692	6	13 700	39 000	0,16	4,28	6,37	4,19	2 190	260	150
Tr1500X8	615	1 442	1 908	10	28 000	76 500	0,24	2,76	4,11	2,7	4 450	220	80
Tr1500X8	380	1 434	1 786	8	14 600	42 500	0,16	4,28	6,37	4,19	2 390	240	140
Tr1500X8	306	1 528	1 792	6	10 000	33 500	0,12	5,83	8,67	5,7	1 910	220	—
Tr1600X8	400	1 534	1 916	8	16 300	49 000	0,16	4,28	6,37	4,19	2 550	220	130



Special spherical roller bearings

With tapered bore
For work rolls
in cold pilger rolling
machines



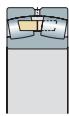
Mounting dimensions

Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions							
		d	D	B	r min.	D ₁	d ₂	d _s	n _s
Z-518393.24138-A-K30	41,3	190	320	128	3	270	215,8	6,3	12,2
Z-527490.24140-A-K30	50,4	200	340	140	3	285,9	225,7	6,3	12,2
Z-514842.24144-A-K30	63,6	220	370	150	4	311,7	247,2	6,3	12,2
Z-527491.24148-A-K30	77,6	240	400	160	4	338	—	6,3	12,2
Z-514242.24152-A-K30	114	260	440	180	4	370,3	294,5	8	15
Z-526655.24160-A-K30	159	300	500	200	5	424,3	340,7	6,3	12,2
Z-523187.24164-A-K30	197	320	540	218	5	456,1	362,8	9,5	17,7
F-801462.24172-A-K30	269	360	600	243	5	503,6	—	9,5	17,7
Z-525933.24184-A-K30	431	420	700	280	6	592,1	476,4	8	15

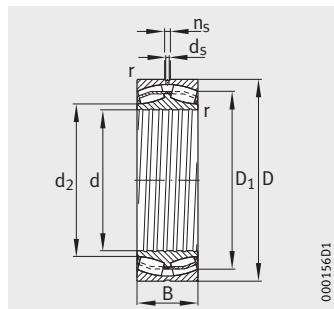
Bearings with reinforced sheet steel cage;
radial internal clearance to internal clearance group C2, actual value inscribed on bearing.

Mounting dimensions		Basic load ratings		Calculation factors				Fatigue limit load
D _a	r _a	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN
max.	max.							
306	2,5	1 340	2 360	0,41	1,66	2,47	1,62	111
326	2,5	1 560	2 700	0,42	1,62	2,42	1,59	123
353	3	1 760	3 100	0,41	1,63	2,43	1,6	139
383	3	1 960	3 450	0,41	1,66	2,47	1,62	195
423	3	2 700	5 100	0,42	1,61	2,4	1,58	213
480	4	3 000	5 700	0,4	1,67	2,49	1,63	295
520	4	3 550	6 550	0,41	1,65	2,46	1,61	265
580	4	4 250	8 150	0,41	1,63	2,43	1,6	395
674	5	5 700	11 600	0,4	1,67	2,49	1,63	520

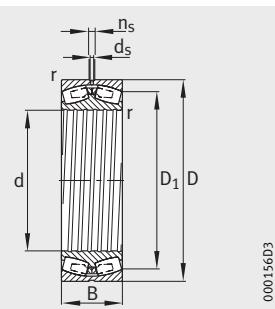


Special spherical roller bearings

With cylindrical bore
for light section lines,
with loose fit
on the roll journal



Design 1
Sheet brass cage



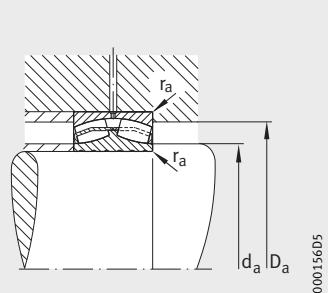
Design 2
Solid brass cage

Dimension table · Dimensions in mm

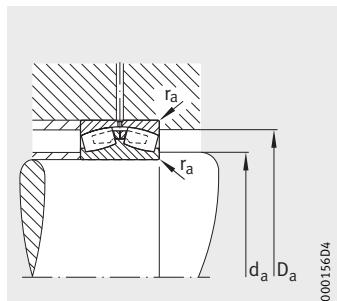
Designation	Design	Mass m ≈kg	Dimensions							
			d	D	B	r min.	D ₁	d ₂	d _s	n _s
Z-568924.23236-B	2	39	180	320	112	4	273,4	—	8	15
Z-536423.24138-B	1	42,1	190	320	128	3	270	215,7	6,3	12,2
Z-568923.23140-B	2	42,8	200	340	112	3	293,3	—	9,5	17,7
Z-541020.24140-B ¹⁾	1	51,3	200	340	140	3	285,4	225,6	6,3	12,2
Z-522444.24140-B	1	51,4	200	340	140	3	285,9	225,6	6,3	12,2
Z-572037.24044-B	2	40,6	220	340	118	3	297,4	—	6,3	12,2
F-804288.23144-B	2	55,2	220	370	120	4	319,2	—	9,5	17,7
Z-527514.24144-B	1	67	220	370	150	4	311,7	247,1	6,3	12,2
F-803679.24048-B	2	43,6	240	360	118	3	318,9	—	6,3	12,2
Z-517299.24148-B	1	81	240	400	160	4	338	270	6,3	12,2
Z-541021.24148-B ¹⁾	1	81	240	400	160	4	338,6	270	6,3	12,2
Z-572036.24052-B	2	66	260	400	140	4	349,1	—	6,3	12,2
Z-530662.24152-B	1	111	260	440	180	4	370,3	294,3	8	15
Z-561779.24152-B ¹⁾	1	111	260	440	180	4	369,4	294,3	6,3	12,2
Z-538565.24056-B	2	70	280	420	140	4	369,5	—	6,3	12,2
Z-531079.24156-B	1	119	280	460	180	5	392,8	315,9	8	15
Z-531119.24060-B	2	101	300	460	160	4	401,5	—	8	15
Z-541538.24160-B	1	160	300	500	200	5	424,4	340,5	8	15
F-804739.24064-B	2	107	320	480	160	4	424	—	8	15
Z-541539.24164-B	1	199	320	540	218	5	456,1	377,7	9,5	17,7
F-804546.24076-B	2	154	380	560	180	5	499	—	9,5	17,7
Z-528479.24184-B	1	443	420	700	280	6	590,3	476,2	12,5	23,5

All bearings have inner rings made from case hardening steel and a radial internal clearance to C2.

¹⁾ The inner and outer rings are made from case hardening steel.



Design 1
Mounting dimensions



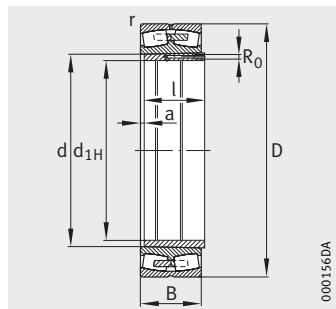
Design 2
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load
d _a	D _a	r _a	dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN
197	303	3	1 320	2 160	0,36	1,87	2,79	1,83	124
204	306	2,5	1 400	2 500	0,41	1,66	2,47	1,62	119
214	326	2,5	1 320	2 280	0,35	1,95	2,9	1,91	118
214	326	2,5	1 700	3 000	0,42	1,62	2,42	1,59	139
214	326	2,5	1 700	3 000	0,42	1,62	2,42	1,59	139
232,4	327,6	2,5	1 400	2 700	0,34	1,96	2,92	1,92	139
237	353	3	1 630	2 900	0,33	2,03	3,02	1,98	159
237	353	3	1 900	3 450	0,41	1,63	2,43	1,6	155
252,4	347,6	2,5	1 500	2 900	0,32	2,1	3,13	2,06	157
257	383	3	2 080	3 800	0,41	1,66	2,47	1,62	171
257	383	3	2 120	3 900	0,41	1,66	2,47	1,62	171
274,6	385,4	3	1 900	3 800	0,35	1,94	2,88	1,89	181
277	423	3	2 700	5 100	0,42	1,61	2,4	1,58	214
277	423	3	2 700	5 100	0,42	1,61	2,4	1,58	214
294,6	405,4	3	2 000	4 000	0,33	2,04	3,04	2	194
300	440	4	2 700	5 200	0,39	1,71	2,54	1,67	219
314,6	445,4	3	2 500	5 200	0,35	1,95	2,9	1,91	235
320	480	4	3 250	6 300	0,4	1,67	2,49	1,63	260
334,6	465,4	3	2 600	5 400	0,33	2,06	3,06	2,01	250
340	520	4	3 750	7 200	0,41	1,65	2,46	1,61	530
398	542	4	3 350	7 200	0,31	2,15	3,2	2,1	335
446	674	5	6 200	12 700	0,4	1,67	2,49	1,63	980

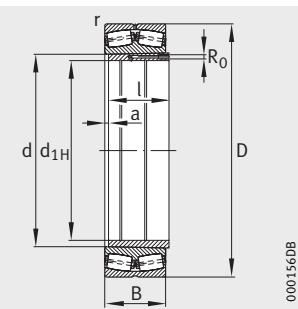


Special spherical roller bearings

Bearings of dimension
series 49
With sleeve
For converters



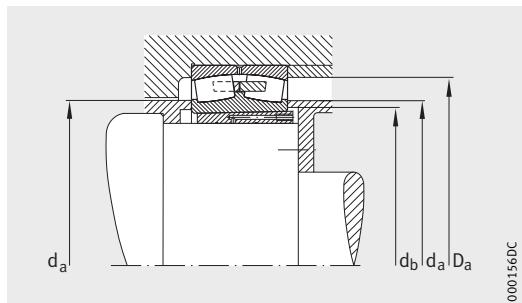
Design 1
With solid brass cage MB



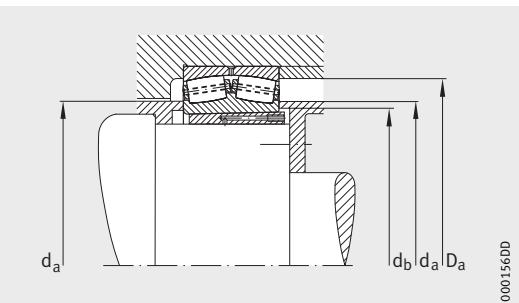
Design 2
With pin cage

Dimension table · Dimensions in mm

Designation		De-sign	Mass m		Initial grease filling quantity	Dimensions				
Bearing	Sleeve		Bearing	Sleeve		Bearing				
Bearing	Sleeve		≈kg	≈kg	≈kg	d _{1H}	d	D	B	r
Z-528741.PRL-K30	Z-524974.KH	1	167	33	5	470	500	670	170	5
Z-541821.249/500-K30	Z-524974.KH	2	177	33	5	470	500	670	170	5
Z-528742.PRL-K30	Z-524976.KH	1	208	38	5	500	530	710	180	5
Z-541822.249/530-K30	Z-524976.KH	2	209	38	5	500	530	710	180	5
Z-528743.PRL-K30	Z-524978.KH	1	235	44	6	530	560	750	190	6
Z-541823.249/560-B-K30	Z-524978.KH	2	247	44	6	530	560	750	190	5
Z-528744.PRL-K30	Z-524980.KH	1	281	48	7	570	600	800	200	5
Z-541824.249/600-B-K30	Z-524980.KH	2	294	48	7	570	600	800	200	5
Z-541825.249/630-K30	Z-524982.KH	2	375	60	9	600	630	850	218	6
Z-528746.PRL-K30	Z-524984.KH	1	418	78	10	630	670	900	230	7,5
Z-541826.249/670-K30	Z-524984.KH	2	435	78	10	630	670	900	230	6
Z-528747.PRL-K30	Z-524986.KH	1	491	95	12	670	710	950	243	6
Z-541827.249/710-B-K30	Z-524986.KH	2	526	95	12	670	710	950	243	6
Z-528748.PRL-K30	Z-524988.KH	1	549	105	14	710	750	1000	250	6
Z-541828.249/750-B-K30	Z-524988.KH	2	572	105	14	710	750	1000	250	6
Z-528749.PRL-K30	Z-524990.KH	1	621	140	15	750	800	1060	258	7,5
Z-541829.249/800-B-K30	Z-524990.KH	2	646	140	15	750	800	1060	258	7,5
Z-528750.PRL-K30	Z-524992.KH	1	719	155	18	800	850	1120	272	6
Z-541830.249/850-B-K30	Z-524992.KH	2	695	155	18	800	850	1120	272	6
Z-528751.PRL-K30	Z-524994.KH	1	816	175	20	850	900	1180	280	6
Z-541831.249/900-B-K30	Z-524994.KH	2	849	175	20	850	900	1180	280	6
Z-528752.PRL-K30	Z-524996.KH	1	1000	200	25	900	950	1250	300	7,5
Z-541832.249/950-B-K30	Z-524996.KH	2	1040	200	25	900	950	1250	300	7,5
Z-528753.PRL-K30	Z-524998.KH	1	1120	225	30	950	1000	1320	315	7,5
Z-541833.249/1000-B-K30	Z-524998.KH	2	1230	225	30	950	1000	1320	315	7,5
Z-541834.249/1060-B-K30	Z-525500.KH	2	1470	290	35	1000	1060	1400	335	7,5
Z-541835.249/1120-B-K30	Z-525001.KH	2	1520	305	37	1060	1120	1460	335	7,5
Z-541836.249/1180-B-K30	Z-525003.KH	2	1750	340	43	1120	1180	1540	355	7,5
Z-541837.249/1250-B-K30	Z-525005.KH	2	2160	390	50	1180	1250	1630	375	7,5
Z-541838.249/1320-B-K30	Z-525007.KH	2	2530	485	60	1250	1320	1720	400	7,5



Design 1
Mounting dimensions

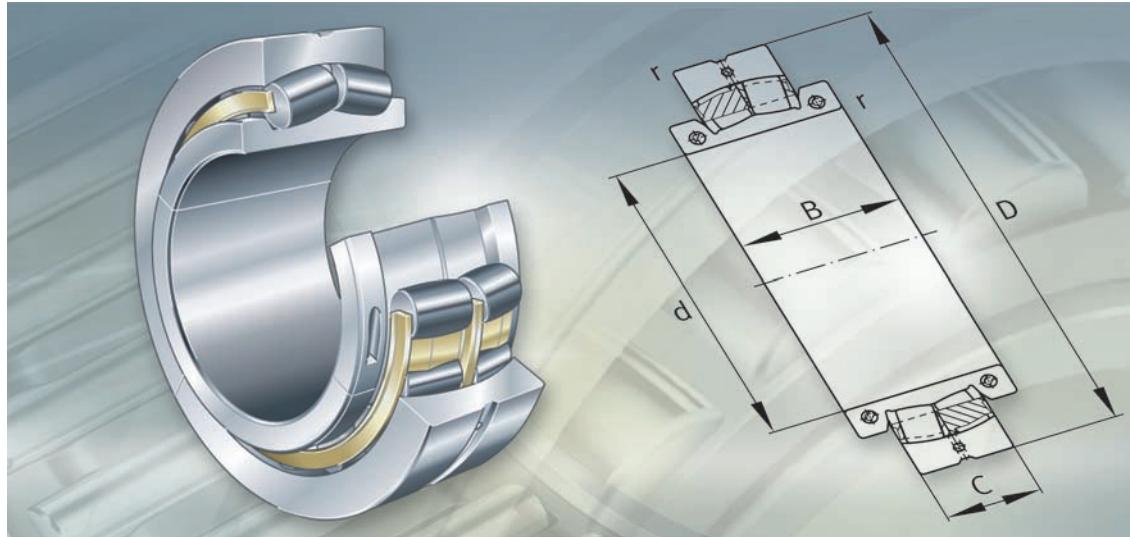


Design 2
Mounting dimensions

Sleeve			Mounting dimensions			Basic load rating stat. C_{0r} kN	Calculation factor Y_0
l	a \approx	R_0	d_a	D_a	d_b min.		
170	20	$G^{1/8}$	540	640	515	7 200	3,07
170	20	$G^{1/8}$	540	640	515	9 300	2,97
180	20	$G^{1/8}$	570	675	545	8 150	3,07
180	20	$G^{1/8}$	570	675	545	10 200	2,97
190	20	$G^{1/8}$	600	710	575	10 000	3,13
190	20	$G^{1/8}$	600	710	575	11 600	3
200	20	$G^{1/4}$	645	755	615	10 800	3,13
200	20	$G^{1/4}$	645	755	615	12 900	3
218	22	$G^{1/4}$	675	805	645	15 600	2,94
230	22	$G^{1/4}$	720	850	685	13 700	3,03
230	22	$G^{1/4}$	720	850	685	17 000	2,97
243	22	$G^{1/4}$	760	900	725	15 600	3,07
243	22	$G^{1/4}$	760	900	725	18 000	2,97
250	22	$G^{1/4}$	800	950	765	17 000	3,13
250	22	$G^{1/4}$	800	950	765	19 600	3,23
258	22	$G^{1/4}$	860	1 010	820	18 600	3,23
258	22	$G^{1/4}$	860	1 010	820	22 800	3,1
272	22	$G^{1/4}$	910	1 070	870	20 400	3,2
272	22	$G^{1/4}$	910	1 070	870	22 400	3,2
280	25	$G^{1/4}$	960	1 120	920	22 400	3,3
280	25	$G^{1/4}$	960	1 120	920	27 000	3,34
300	25	$G^{1/4}$	1 015	1 190	970	25 500	3,2
300	25	$G^{1/4}$	1 015	1 190	970	29 000	3,3
315	25	$G^{1/4}$	1 065	1 250	1 025	28 000	3,34
315	25	$G^{1/4}$	1 065	1 250	1 025	35 500	3,16
335	25	$G^{1/4}$	1 135	1 325	1 085	36 500	3,23
335	27	$G^{1/4}$	1 195	1 385	1 145	41 500	3,3
355	27	$G^{1/4}$	1 260	1 460	1 205	42 500	3,34
375	27	$G^{1/4}$	1 330	1 550	1 275	50 000	3,42
400	28	$G^{1/4}$	1 400	1 640	1 350	52 000	3,46



FAG



Split spherical roller bearings

Split spherical roller bearings

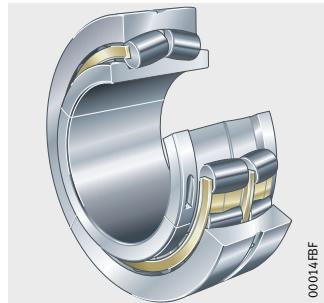
	Page
Product overview	Split spherical roller bearings 704
Features	Main dimensions..... 705 Inner ring without central rib 705 Inner ring with three rigid ribs 706 Radial and axial load capacity..... 707 Sealing..... 707 Lubrication 707 Compensation of angular misalignments 707 Operating temperature 707 Cages..... 707 Suffixes..... 707
Design and safety guidelines	Equivalent dynamic bearing load 708 Equivalent static bearing load 708 Static load safety factor 708 Minimum radial load 709 Load carrying capacity 709 Speeds..... 709 Design of bearing arrangements 709
Accuracy 710
Dimension tables	Spherical roller bearings, split 712



Product overview Split spherical roller bearings

Inner ring without central rib

222S, 222SM, 230S, 230SM,
231S, 231SM



Inner ring with three rigid ribs

230SM, 231SM, 239SM,
240SM, 241SM, Z-5..PRL-03



Split spherical roller bearings

Features

Split cylindrical roller bearings are used in bearing positions that can only be accessed with difficulty, for example on cranked and very long shafts. They are mainly used where the replacement of an unsplit spherical roller bearing would require costly additional work. The use of split spherical roller bearings shortens the downtime of machinery and plant and reduces costs.

Split spherical roller bearings have a cylindrical bore. The inner ring, outer ring and cage with the roller set are split in half. The split bearing rings are held together by screws.

Main dimensions

The main dimensions (outside diameter, outer ring width, bore diameter) are designed such that split spherical roller bearings can in general be fitted in our split plummer block housings instead of unsplit bearings with an adapter sleeve.

The bearings are available for metric shafts and for inch size shafts.

Inner ring without central rib

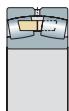
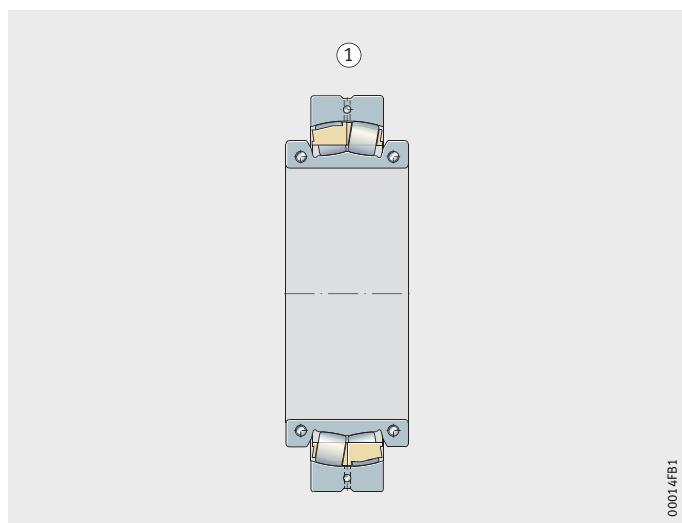
The internal construction of this standard design was carried over from the proven spherical roller bearing E1. Bearings without a central rib have the highest possible load carrying capacity. In Design 1, the locking rings are integrated in the inner rings, *Figure 1*.

Design 1

The bearings have solid cages made from brass.

① Design 1 with brass cages

Figure 1
Split spherical roller bearing,
inner ring without central rib



Split spherical roller bearings

Inner ring with three rigid ribs

Split spherical roller bearings with three rigid ribs and separate locking rings are used, for example, where large temperature differentials can occur between the shaft and inner ring halves, *Figure 2*.

Design 2

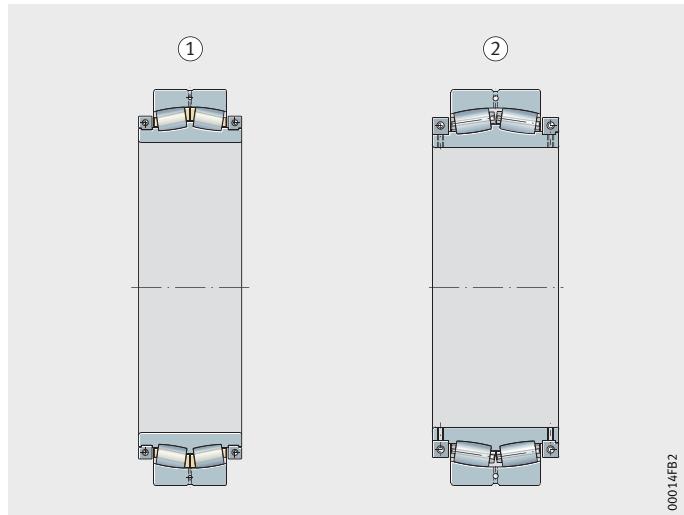
- These split spherical roller bearings with three rigid ribs and separate locking rings have solid brass cages.
- The bearings are used, for example, in conveying equipment.

Design 3

- This design with three rigid ribs has solid pin cages made from steel and separate locking rings.
- The bearings are designed for extreme loads, such as those occurring in converters.
- The main dimensions of the bearings, with the exception of the inner ring width, are matched to those of unsplit spherical roller bearings of series 249 with a cylindrical bore or with a tapered bore and sleeve.

① Design 2 with brass cages
② Design 3 with pin cages

Figure 2
Split spherical roller bearings,
inner ring with three rigid ribs



00014FB2

Radial and axial load capacity

Spherical roller bearings can support axial loads in both directions and high radial loads. Due to the maximum number of rollers with the largest possible dimensions, bearings without a central rib have a particularly high load carrying capacity.

The basic load ratings of split bearings are, however, generally lower than those of unsplit bearings, since the reference circle of the rollers is smaller due to the screw connections in the outer ring.



If the inner rings are not axially abutted, the permissible axial load must be observed, see dimension table.

Sealing

Split spherical roller bearings are not sealed.

Lubrication

The bearings are normally lubricated with lithium soap grease of consistency class 2 with EP additives.

The outer ring has a circumferential groove and three lubrication holes for lubrication.

Compensation of angular misalignments

Split spherical roller bearings compensate angular misalignments in the same way as unsplit bearings.

The static angular misalignment (rotating inner ring, constant angular deviation) should be no more than 1,5°.

In the case of converter bearings, the value is restricted to just 10', since gradual subsidence of the foundations and thermal influences must be taken into consideration.

If dynamic angular misalignments are present, for example where there is a rotating outer ring or rotating inner ring, please contact us.

Operating temperature

Split 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.

Cages

In the case of split spherical roller bearings of standard design with metric dimensions, the cage design can be identified from the designation. The suffix MA indicates solid brass cages guided on the outer ring.

In the case of bearings with an inch size bore \geq 7 inch, the suffix for the solid brass cages is not used.

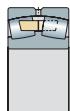
Due to the high loads involved, split spherical roller bearings for converters normally have pin cages that can accommodate the largest possible number of through-drilled rollers.

Suffixes

Suffixes for available designs: see table.

Available designs

Prefix	Description	Design
MA	Solid brass cages, guided on outer ring	Standard



Split spherical roller bearings

Design and safety guidelines Equivalent dynamic bearing load

Load ratio and equivalent dynamic load

For split spherical roller bearings subjected to dynamic loads, the overrolling of the joints is taken into consideration in calculation of the equivalent dynamic load by applying the shock factor 1,1.

For split spherical roller bearings under dynamic loading, the following applies:

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq e$	$P = 1,1 \cdot (F_r + Y_1 \cdot F_a)$
$\frac{F_a}{F_r} > e$	$P = 1,1 \cdot (0,67 \cdot F_r + Y_2 \cdot F_a)$

P kN

Equivalent dynamic bearing load for combined load

F_a kN

Axial dynamic bearing load

F_r kN

Radial dynamic bearing load

e, Y_1, Y_2 –

Factors, see dimension tables.

Equivalent static bearing load

For split spherical roller bearings under static loading, the following applies:

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

P_0 kN

Equivalent static bearing load for combined load

F_{0a} kN

Axial static bearing load

In the case of split spherical roller bearings used as locating bearings on converters, F_{0a} is determined from the external axial load and the reaction force due to non-locating bearing displacement, which can be taken as 15% of the maximum radial force of the non-locating bearing.

F_{0r} kN

Radial static bearing load

Y_0 –

Factor, see dimension tables.

Static load safety factor

The static load safety factor S_0 of converter bearings should be:

$$S_0 \geq 2$$

$$S_0 = \frac{C_{0r}}{P_0}$$

S_0 –

Static load safety factor

C_{0r} kN

Basic static load rating, see dimension tables

P_0 kN

Equivalent static bearing load for combined load.

Minimum radial load

The minimum radial load on the split spherical roller bearings should be:

$$P = 0,02 \cdot C_r$$

P kN
Equivalent dynamic bearing load for combined load
 C_r kN
Basic dynamic load rating.

Load carrying capacity

In order to prevent creep of the inner rings in a circumferential direction on the shaft, the value $P/C_r \leq 0,2$ is necessary. Higher values are permissible if the speed is significantly below the limiting speed n_G . In such cases, please contact us.

Speeds

The bearing tables state the limiting speeds n_G . The values take account of the cage strength and the vibrations generated through overrolling of the joints. If the limiting speeds are exceeded, consultation with Application Engineering is required.

Design of bearing arrangements Shaft and housing tolerances

In order that the inner rings have the necessary tight fit once the screws have been tightened, the shaft must be machined to between h6 and h9. These tolerances are the same as those normally used with unsplit bearings located by means of adapter sleeves. In the case of split spherical roller bearings for converters, trunnion tolerances up to m6 are possible.

The housing bore is normally machined to H7 or H8.

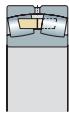


Split spherical roller bearings

Accuracy

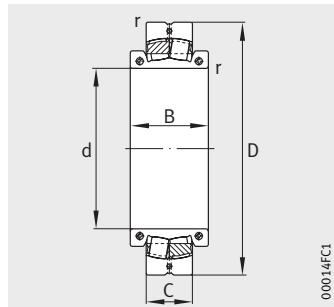
Split spherical roller bearings have normal tolerances used for unsplit radial bearings. The dimensional and running tolerances correspond to tolerance class PN to DIN 620-2.

The radial internal clearance of split spherical roller bearings corresponds to internal clearance group CN for unsplit bearings with a cylindrical bore (DIN 620-4). The radial internal clearance of split spherical roller bearings for converters is selected in accordance with the operating temperature and the mounting fits.

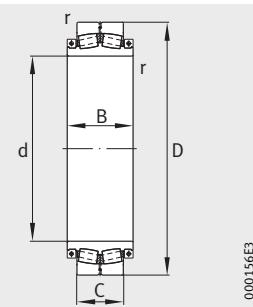


Spherical roller bearings

Split



Design 1
Inner ring without central rib



Design 2
Inner ring with three rigid ribs,
separate locking rings

Dimension table · Dimensions in mm

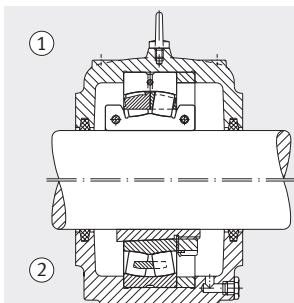
Designation	Design	Mass ≈kg	Dimensions					Basic load ratings		Calculation factors			
			d	D	B	C	r min.	dyn. C_r kN	stat. C_{0r} kN	e	γ_1	γ_2	γ_0
231SM170-MA	1	40,6	170	320	142	104	2,1	915	1430	0,28	2,37	3,53	2,32
231SM180-MA	1	56,4	180	340	160	112	3	1020	1530	0,29	2,32	3,45	2,26
222SM180-MA	1	55,7	180	360	154	98	4	1140	1630	0,25	2,71	4,04	2,65
222S.703	1	59	182,563	360	154	98	4	1140	1630	0,25	2,71	4,04	2,65
222S.708	1	76,8	190,5	400	162	108	4	1340	1900	0,25	2,69	4	2,63
Z-540788.PRL	1 ¹⁾	39	200	330	135	82	3,5	865	1500	0,26	2,55	3,8	2,5
230SM200-MA	1	41,5	200	340	136	90	3	965	1530	0,23	2,9	4,31	2,83
231SM200-MA	1	61,8	200	370	175	120	4	1320	2040	0,31	2,21	3,29	2,16
222SM200-MA	1	73,5	200	400	162	108	4	1340	1900	0,25	2,69	4	2,63
222S.715	1	75,4	201,613	400	162	108	4	1340	1900	0,25	2,69	4	2,63
222S.800	1	74,7	203,2	400	162	108	4	1340	1900	0,25	2,69	4	2,63
230S.807	1	58,9	214,313	360	156	92	3	1100	1830	0,23	2,9	4,31	2,83
230S.808	1	58,9	215,9	360	156	92	3	1100	1830	0,23	2,9	4,31	2,83
230SM220-MA	1	56,5	220	360	156	92	3	1100	1830	0,23	2,9	4,31	2,83
231SM220-MA	1	86	220	400	190	128	4	1630	2600	0,3	2,25	3,34	2,2
222SM220-MA	1	96,3	220	440	170	120	4	1460	2080	0,25	2,71	4,04	2,65
230S.900	1	52,8	228,6	360	160	92	3	1100	1830	0,23	2,9	4,31	2,83
231S.907	1	113	239,713	440	210	144	4	1860	3050	0,3	2,28	3,39	2,23
Z-540436.PRL	1 ¹⁾	60	240	375	150	92	4	1060	1960	0,25	2,74	4,08	2,68
230SM240-MA	1	57,4	240	400	160	104	4	1220	2120	0,22	3,04	4,53	2,97
Z-527567.PRL	2 ²⁾	68	240	400	166	104	4	1460	2450	0,23	2,95	4,4	2,89
231SM240-MA	1	118	240	440	210	144	4	1860	3050	0,3	2,28	3,39	2,23
222SM240-MA	1	129	240	480	200	130	5	1860	2600	0,26	2,64	3,93	2,58
230S.908	1	56,8	241,3	400	160	104	4	1220	2120	0,22	3,04	4,53	2,97
230S.1000	1	71,2	254	420	170	106	4	1460	2450	0,23	2,95	4,4	2,89
230SM260-MA	1	68	260	420	170	106	4	1460	2450	0,23	2,95	4,4	2,89
231S.915	1	116	260	460	190	146	5	2280	3800	0,3	2,23	3,32	2,18
231SM260-MA	1	111	260	460	190	146	5	2280	3800	0,3	2,23	3,32	2,18
222SM260-MA	1	130	260	500	200	130	5	2200	3100	0,25	2,67	3,97	2,61
230S.1008	1	64,3	266,7	420	170	106	4	1460	2450	0,23	2,95	4,4	2,89
230S.1100	1	91,7	279,4	460	176	118	4	1600	2800	0,22	3,04	4,53	2,97
231S.1100	1	150	279,4	500	218	160	5	2320	3900	0,29	2,32	3,45	2,26

1) With central rib.

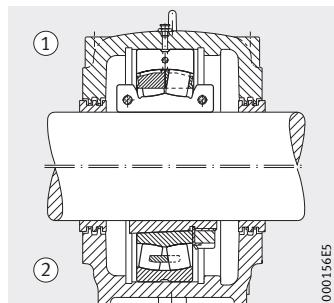
2) Without central rib.

3) For inner rings without axial abutment.

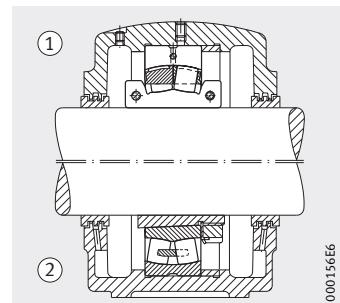
4) The bearings will also fit in housings from other manufacturers if the internal dimensions are identical.



Locating bearings
S30
① Split bearing, ② unsplit bearing



Non-locating bearings
SD



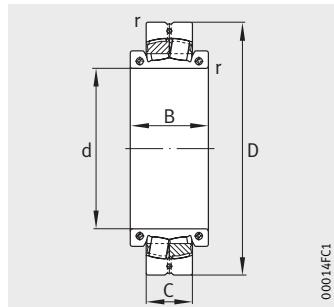
Locating bearings
SAF and SDAF

Fatigue limit load C _{ur} kN	Permissible axial load ³⁾ F _a max. kN	Limiting speed n _G min ⁻¹	Tightening torque for screws		Possible replacement for unsplit spherical roller bearing with adapter sleeve			Suitable plummer block housing ⁴⁾
			M _i Nm	M _a Nm	Bearing	Adapter sleeve	Adapter sleeve	
114	22	630	69	35	23138K	H3138	—	SD3168TS
119	22	600	69	35	23140K	H3140	—	SD3140TS
104	22,2	600	69	35	22240K	SNW40.703	H3140X703	SAF540
121	32	560	120	69	22244K	SNW44.708	H3144XX708	SAF544/7.1/2
145	—	—	—	—	—	—	—	—
136	22,2	630	69	35	23044K	H3044X	—	S3044K
151	32	530	120	69	23144K	H3144X	—	SD3144TS
121	32	560	120	69	22244K	H3144X	—	SD544
121	32	560	120	69	22244K	SNW44.715	H3144XX715	SAF544
121	32	560	120	69	22244K	SNW44.800	H3144XX800	SAF544/8
152	32	560	120	35	23048K	SNP3048.807	H3048X807	SAF048K/8.7/16
152	32	560	120	35	23048K	SNP3048.808	H3048X808	SAF048K/8.1/2
152	32	560	120	35	23048K	H3048	—	S3048K
191	32	480	120	69	23148K	H3148X	—	SD3148TS
126	32	500	120	69	22248K	H3148X	—	SD548
152	32	560	120	35	23048K	SNP3048.900	H3048X900	SAF048K/9
218	32	450	120	69	23152K	SNP3152.907	H3152XX907	SDAF3152K/9.7/16
166	—	—	—	—	—	—	—	—
177	32	560	120	69	23052K	H3052	—	S3052K
200	—	—	—	—	—	—	—	—
218	32	450	120	69	23152K	H3152X	—	SD3152TS
157	60	450	295	120	22252K	H3152X	—	SD552
177	32	560	120	69	23052K	SNP3052.908	H3052XX908	SAF052K/9.1/2
200	32	500	120	35	23056K	SNP3056.1000	H3056X1000	SAF056K/10
200	32	500	120	35	23056K	H3056	—	S3056K
255	32	400	120	35	23156K	SNP3156.915	H3156XX915	SDAF3156K/9.15/16
255	32	400	120	35	23156K	H3156X	—	SD3156TS
182	60	430	295	69	22256K	H3156X	—	SD556
200	32	500	120	35	23056K	SNP3056.1008	H3056X1008	SAF056K/10.1/2
228	32	480	120	69	23060K	SNP3060.1100	H3060X1100	SDAF060K/11
265	44	400	190	120	23160K	SNP3160.1100	H3160HGX1100	SDAF3160K/11

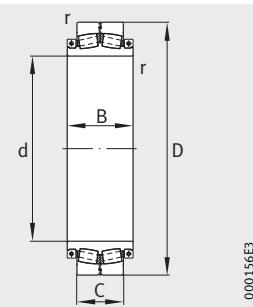


Spherical roller bearings

Split



Design 1
Inner ring without central rib



Design 2
Inner ring with three rigid ribs,
separate locking rings

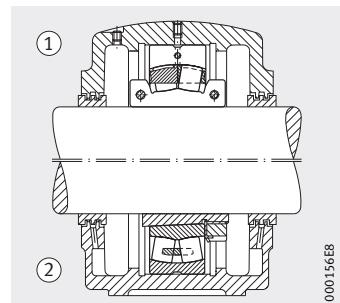
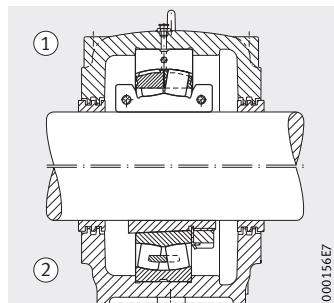
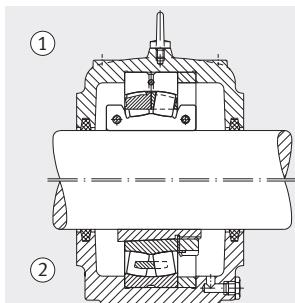
Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					Basic load ratings		Calculation factors			
			d	D	B	C	r min.	dyn. C_r kN	stat. C_{0r} kN	e	γ_1	γ_2	γ_0
Z-533468.PRL	2	77	280	420	202	140	5	1830	3550	0,33	2,04	3,04	2
Z-541420.PRL	1 ¹⁾	85	280	455	172	106	5	1370	2550	0,25	2,74	4,08	2,68
230SM280-MA	1	97	280	460	176	118	4	1600	2800	0,22	3,04	4,53	2,97
231SM280-MA	1	145	280	500	218	160	5	2320	3900	0,29	2,32	3,45	2,26
222SM280-MA	1	184	280	540	200	140	5	2400	3550	0,24	2,79	4,15	2,73
Z-538380.PRL	2	87,8	300	460	168	118	5	1700	3100	0,25	2,69	4	2,63
230SM300-MA	1	108	300	480	186	121	4	1860	3200	0,23	2,9	4,31	2,83
Z-541421.PRL	1 ¹⁾	117	300	490	195	118	4	1800	3250	0,25	2,69	4	2,63
231SM300-MA	1	184	300	540	225	176	5	2750	4750	0,29	2,3	3,42	2,25
222SM300-MA	1	214	300	580	212	150	5	2650	4050	0,24	2,84	4,23	2,78
230S.1200	1	96,5	304,8	480	186	121	4	1860	3200	0,23	2,9	4,31	2,83
231S.1200	1	182	304,8	540	225	176	5	2750	4750	0,29	2,3	3,42	2,25
230SM320-MA	1	132	320	520	200	133	5	2040	3650	0,22	3,04	4,53	2,97
Z-541422.PRL	1 ¹⁾	134	320	520	202	121	5	1930	3750	0,25	2,74	4,08	2,68
231SM320-MA	1	226	320	580	258	190	5	3100	5200	0,3	2,26	3,37	2,21
222SM320-MA	1	249	320	620	230	165	6	3100	4750	0,24	2,76	4,11	2,7
230S.1300	1	165	330,2	540	205	134	5	2360	4150	0,22	3,01	4,48	2,94
231S.1300	1	288	330,2	600	270	192	5	3900	6800	0,3	2,25	3,34	2,2
230SM340-MA	1	157	340	540	205	134	5	2360	4150	0,22	3,01	4,48	2,94
Z-541423.PRL	2	170	340	560	205	133	5	2450	4300	0,22	3,01	4,48	2,94
231SM340-MA	1	314	340	600	270	192	5	3900	6800	0,3	2,25	3,34	2,2
222SM340-MA	1	276	340	650	240	170	6	3450	5100	0,25	2,69	4	2,63
230S.1400	1	158	355,6	560	218	135	5	2550	4650	0,22	3,1	4,62	3,03
231S.1400	1	273	355,6	620	270	194	5	3900	6950	0,3	2,28	3,39	2,23
230SM360-MA	1	154	360	560	218	135	5	2550	4650	0,22	3,1	4,62	3,03
231SM360-MA	1	292	360	620	270	194	5	3900	6950	0,3	2,28	3,39	2,23
Z-549160.PRL	2	355	360	620	298	194	5	3650	7100	0,32	2,12	3,15	2,07
Z-535588.PRL	2	150	380	560	200	135	6	2450	4900	0,24	2,84	4,23	2,78
Z-538301.PRL	2	132	380	560	205	135	5	2450	4900	0,24	2,84	4,23	2,78
Z-544969.PRL	1 ¹⁾	157	380	585	216	135	5	2280	4550	0,24	2,84	4,23	2,78
230SM380-MA	1	204	380	600	225	148	5	2700	5100	0,21	3,2	4,77	3,13
231SM380-MA	1	326	380	650	270	200	6	4050	7200	0,28	2,39	3,56	2,34
Z-540759.PRL	2	424	380	680	340	240	8	5100	9300	0,37	1,8	2,69	1,76

¹⁾ With central rib.

²⁾ For inner rings without axial abutment.

³⁾ The bearings will also fit in housings from other manufacturers if the internal dimensions are identical.



Locating bearings

S30

① Split bearing, ② unsplit bearing

00015654

Locating bearings

SD

00015657

Non-locating bearings

SAF and SDAF

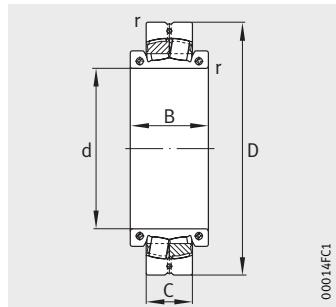
00015658

Fatigue limit load C _{ur} kN	Permissible axial load ²⁾ F _a max. kN	Limiting speed n _G min ⁻¹	Tightening torque for screws		Possible replacement for unsplit spherical roller bearing with adapter sleeve			Suitable plummer block housing ³⁾
			M _i Nm	M _a Nm	Bearing	Adapter sleeve	Adapter sleeve	
315	—	—	—	—	—	—	—	—
227	—	—	—	—	—	—	—	—
228	32	480	120	69	23060K	H3060	—	S3060K
265	44	400	190	120	23160K	H3160HG	—	SD3160TS
212	60	430	295	120	22260K	H3160HG	—	SD560
255	—	—	—	—	—	—	—	—
255	32	430	120	69	23064K	H3064HG	—	S3064K
198	—	—	295	—	—	—	—	—
305	60	360	295	120	23164K	H3164HG	—	SD3164TS
228	60	380	295	120	22264K	H3164HG	—	SD564
255	32	430	120	69	23064K	SNP3064.1200	H3064HGX1200	SDAF064K/12
305	60	360	295	120	23164K	SNP3164.1200	H3164HGX1200	SDAF3164K/12
285	60	430	295	69	23068K	H3068HG	—	S3068K
270	—	—	—	—	—	—	—	—
325	60	340	295	190	23168K	H3168HG	—	SD3168TS
270	60	360	295	120	22268K	H3168HG	—	—
315	60	380	295	69	23072K	SNP3072.1300	H3072HGX1300	SDAF072K/13
410	60	300	295	35	23172K	SNP3172.1300	H3172HGX1300	SDAF3172K/13
315	60	380	295	69	23072K	H3072HG	—	S3072K
315	60	—	295	120	—	—	—	—
410	60	300	295	35	23172K	H3172HG	—	SD3172TS
280	60	340	295	120	22272K	H3172HG	—	—
350	60	380	295	69	23076K	SNP3076.1400	H3076HGX1400	SDAF076K/14
420	60	300	295	69	23176K	SNP3176.1400	H3176HGX1400	SDAF3176K/14
350	60	380	295	69	23076K	H3076HG	—	S3076K
420	60	300	295	69	23176K	H3176HG	—	SD3176TS
425	—	—	—	—	—	—	—	—
400	—	—	—	—	—	—	—	—
400	—	—	—	—	—	—	—	—
375	—	—	—	—	—	—	—	—
350	60	380	295	120	23080K	H3080HG	—	S3080K
440	60	300	295	120	23180K	H3180HG	—	SD3180TS
740	—	—	—	—	—	—	—	—

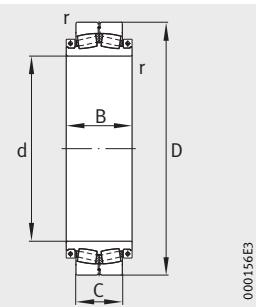


Spherical roller bearings

Split



Design 1
Inner ring without central rib



Design 2
Inner ring with three rigid ribs,
separate locking rings

Dimension table (continued) · Dimensions in mm

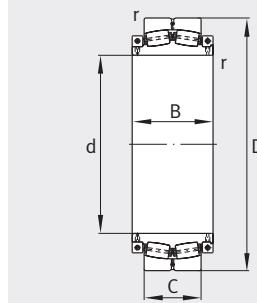
Designation	Design	Mass m ≈kg	Dimensions					Basic load ratings		Calculation factors			
			d	D	B	C	r min.	dyn. C_r kN	stat. C_{0r} kN	e	γ_1	γ_2	γ_0
230S.1500	1	192	381	600	225	148	5	2 700	5 100	0,21	3,2	4,77	3,13
231S.1500	1	296	381	650	270	200	6	4 050	7 200	0,28	2,39	3,56	2,34
Z-561566.PRL	2 ¹⁾	430	381	650	300	200	6	4 400	7 800	0,28	2,43	3,61	2,37
Z-524883.PRL	2	170	400	600	235	148	5	2 800	5 600	0,24	2,79	4,15	2,73
230SM400-MA	1	214	400	620	225	150	5	3 100	5 700	0,22	3,1	4,62	3,03
240SM400-MA	2	313	400	620	290	200	5	3 750	8 000	0,32	2,13	3,17	2,08
231SM400-MA	1	371	400	700	285	224	6	4 400	7 650	0,28	2,39	3,56	2,34
230S.1600	1	225	406,4	650	225	157	5	3 100	5 850	0,21	3,2	4,77	3,13
231S.1600	2	547	406,4	720	315	226	6	5 400	9 650	0,29	2,3	3,42	2,25
230SM410-MA	1	222	410	650	225	157	5	3 100	5 850	0,21	3,2	4,77	3,13
231SM410-MA	2	566	410	720	315	226	6	5 400	9 650	0,29	2,3	3,42	2,25
Z-536955.PRL	2	204	420	620	238	150	5	2 800	5 700	0,24	2,84	4,23	2,78
230SM420-MA	1	246	420	650	235	157	5	3 100	5 850	0,21	3,2	4,77	3,13
231SM430-MA	2	624	430	760	344	240	6	5 500	10 400	0,29	2,33	3,47	2,28
Z-542118.PRL	3	610	430	760	344	240	6	6 100	12 700	0,32	2,12	3,15	2,07
Z-537162.PRL	2	295	440	650	248	157	6	3 150	6 300	0,24	2,84	4,23	2,78
230SM450-MA	2	291	450	700	245	165	6	3 650	6 950	0,21	3,2	4,77	3,13
Z-529173.PRL	3	265	470	670	250	170	5	3 350	7 500	0,22	3,07	4,57	3
230SM470-MA	2	354	470	720	260	167	6	3 600	7 500	0,23	2,9	4,31	2,83
Z-538297.PRL	2	319	470	720	260	167	6	3 650	7 650	0,22	3,01	4,48	2,94
241SM470-MA	2	872	470	830	420	325	7,5	7 800	16 000	0,39	1,75	2,61	1,71
Z-547397.PRL	2	355	480	700	324	218	6	4 300	9 500	0,3	2,25	3,34	2,2
Z-537276.PRL	3	225	500	670	250	170	5	3 250	7 800	0,22	3,14	4,67	3,07
Z-528441.PRL	3	310	500	710	260	180	5	3 650	8 800	0,22	3,01	4,48	2,94
Z-548411.PRL	2	295	500	720	264	167	6	3 650	7 650	0,22	3,01	4,48	2,94
230SM500-MA	2	475	500	780	270	185	6	4 150	8 500	0,2	3,34	4,98	3,27
241SM500-MA	2	1 100	500	870	450	335	7,5	8 500	17 600	0,39	1,73	2,58	1,69

1) Without central rib.

2) For inner rings without axial abutment.

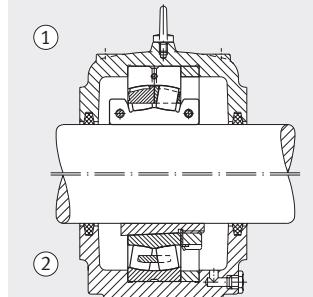
3) The bearings will also fit in housings from other manufacturers if the internal dimensions are identical.

4) Withdrawal sleeve.



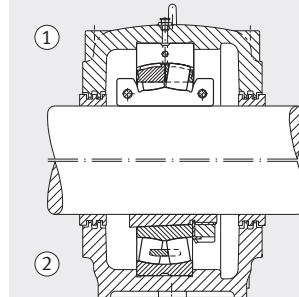
Design 3
With pin cage

00015669



Locating bearings
S30
① Split bearing, ② unsplit bearing

00015664



Locating bearings
SD

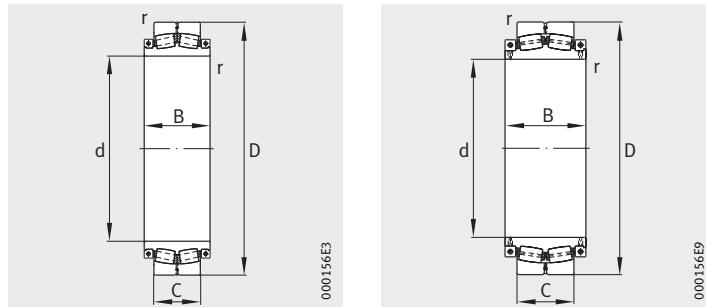
00015667

Fatigue limit load C_{ur} kN	Permissible axial load ²⁾ F_a max. kN	Limiting speed n_G min ⁻¹	Tightening torque for screws		Possible replacement for unsplitted spherical roller bearing with adapter sleeve			Suitable plummer block housing ³⁾
			M_i Nm	M_a Nm	Bearing	Adapter sleeve	Adapter sleeve	
350	60	380	295	120	23080K	SNP3080.1500	SNP3080X1500	SDAF080K/15
440	60	300	295	120	23180K	SNP3180.1500	H3180HGX1500	SDAF3180K/15
480	—	—	—	—	—	—	—	—
325	—	—	—	—	—	—	—	—
420	60	340	295	69	23084K	H3084XHG	—	S3084K
630	60	190	295	69	—	—	—	—
480	60	280	295	190	23184K	H3184HG	—	SD3184TS
425	60	340	295	120	23088K	SNP3088.1600	SNP3088X1600	SDAF088K/16
570	94	260	580	120	23188K	SNP3188.1600	H3188HGX1600	SDAF3188K/16
425	60	340	295	120	23088K	H3088HG	—	S3088K
570	60	260	295	120	23188K	H3188HG	—	SD3188TS
450	—	—	—	—	—	—	—	—
425	60,5	340	295	120	23088K	AHX3088GH ⁴⁾	—	—
600	94,2	300	580	295	23192K	H3192HG	—	—
730	—	—	—	—	—	—	—	—
450	—	—	—	—	—	—	—	—
495	60	300	190	190	23096K	H3096HG	—	S3096K
—	—	—	—	—	—	—	—	—
425	60	190	295	120	230/500K	H30/500HG	—	—
540	—	—	—	—	—	—	—	—
1 140	60	156	1 000	295	241/500K30	H241/500HG	—	—
720	—	—	—	—	—	—	—	—
530	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
580	—	—	—	—	—	—	—	—
580	60	300	295	120	230/530K	H30/530HG	—	—
1 280	60	148	1 000	295	241/530K30	H241/530HG	—	—



Spherical roller bearings

Split



Design 2
Inner ring with three rigid ribs,
separate locking rings

Design 3
With pin cage

Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					Basic load ratings		Calculation factors			
			d	D	B	C	r min.	dyn. C_r kN	stat. C_{0r} kN	e	γ_1	γ_2	γ_0
Z-537277.PRL	3	264	530	710	260	180	5	3 650	8 800	0,22	3,14	4,67	3,07
239SM530-MA	2	293	530	750	225	140	5	2 750	6 550	0,18	3,85	5,73	3,76
Z-529223.PRL	3	355	530	750	270	190	5	4 250	9 650	0,22	3,01	4,48	2,94
Z-532948.01.PRL	2	400	530	750	300	190	6	3 800	8 500	0,23	2,9	4,31	2,83
Z-548412.PRL	2	400	530	780	272	185	6	4 000	8 300	0,22	3,04	4,53	2,97
230SM530-MA	2	555	530	820	300	195	6	4 650	9 650	0,23	2,95	4,4	2,89
241SM530-MA	2	1 360	530	920	500	355	7,5	9 150	19 300	0,38	1,77	2,64	1,73
Z-537278.PRL	3	305	560	750	270	190	5	4 150	10 400	0,22	3,14	4,67	3,07
239SM560-MA	2	356	560	800	235	150	5	2 900	7 100	0,17	3,95	5,88	3,86
Z-548413.PRL	2	420	560	820	300	195	6	4 650	9 650	0,23	2,95	4,4	2,89
Z-529224.PRL	3	410	570	800	290	200	5	4 650	10 800	0,22	3,01	4,48	2,94
Z-512111.PRL	3	600	599,45	870	335	215	6	5 700	12 500	0,22	3,07	4,57	3
Z-547304.PRL	2	260	600	800	238	150	5	3 350	8 150	0,17	3,95	5,88	3,86
Z-533761.PRL	3	377	600	800	290	200	6	4 550	11 600	0,21	3,2	4,77	3,13
239SM600-MA	2	410	600	850	250	165	5	3 900	8 800	0,18	3,66	5,46	3,58
Z-529225.PRL	3	525	600	850	310	218	6	5 300	12 500	0,23	2,95	4,4	2,89
Z-538376.PRL	2	850	600	920	410	290	6	8 000	17 000	0,31	2,21	3,29	2,16
Z-539466.PRL	3	385	630	850	250	165	6	4 300	10 600	0,18	3,8	5,66	3,72
Z-537279.PRL	3	460	630	850	310	218	6	5 400	13 700	0,22	3,07	4,57	3
Z-529226.PRL	3	630	630	900	330	230	6	5 850	13 400	0,23	2,95	4,4	2,89
230SM630-MA	2	955	630	980	355	230	7,5	6 400	13 700	0,22	3,01	4,48	2,94
Z-561196.PRL	2	1 090	630	980	430	308	7,5	8 800	17 600	0,3	2,28	3,39	2,23
Z-537280.PRL	3	528	670	900	325	230	7,5	6 000	15 300	0,22	3,1	4,62	3,03
Z-529227.PRL	3	740	670	950	350	243	6	6 550	15 600	0,22	3,01	4,48	2,94
Z-535551.PRL	2	790	670	980	345	230	7,5	6 800	14 600	0,22	3,01	4,48	2,94
Z-546079.PRL	3	1 650	670	1 150	500	345	7,5	12 900	28 000	0,3	2,25	3,34	2,2
Z-547305.PRL	2	1 280	700	1 030	465	315	7,5	8 650	20 000	0,3	2,26	3,37	2,21
Z-526073.PRL	3	570	710	950	350	243	7,5	6 550	16 600	0,22	3,14	4,67	3,07
Z-527943.PRL	3	850	710	1 000	360	250	6	7 350	17 600	0,21	3,2	4,77	3,13
Z-533414.PRL	3	707	750	1 000	355	250	7,5	7 500	19 600	0,22	3,07	4,57	3
Z-533414.01.PRL	3	707	750	1 000	355	250	7,5	7 500	19 600	0,22	3,07	4,57	3
Z-529228.PRL	3	950	750	1 060	370	258	6	7 800	19 300	0,22	3,07	4,57	3
Z-547360.PRL	2	1 400	750	1 090	500	335	7,5	9 650	22 800	0,31	2,15	3,2	2,1
Z-549640.PRL	2	888	750	1 150	398	258	7,5	8 650	19 000	0,22	3,07	4,57	3

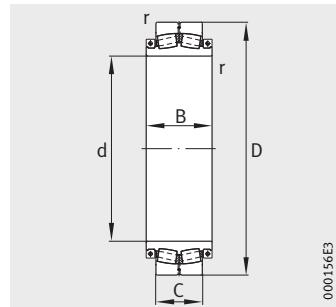
¹⁾ For inner rings without axial abutment.

Fatigue limit load C _{ur} kN	Permissible axial load ¹⁾ F _a max. kN	Limiting speed n _G min ⁻¹	Tightening torque for screws		Possible replacement for unsplit spherical roller bearing with adapter sleeve	
			M _i Nm	M _a Nm	Bearing	Adapter sleeve
410	–	–	–	–	–	–
365	60	170	295	69	239/560K	H39/560HG
–	–	–	–	–	–	–
630	–	–	–	–	–	–
570	–	–	–	–	–	–
700	94,2	160	580	120	230/560K	H30/560HG
1 390	135,3	140	2 000	295	241/560K30	H241/560HG
670	–	–	–	–	–	–
530	60	170	295	69	239/600K	H39/600HG
700	–	–	–	–	–	–
–	–	–	–	–	–	–
840	–	–	–	–	–	–
600	–	–	–	–	–	–
475	60	–	–	–	–	–
540	60	160	295	69	239/630K	H39/630HG
–	–	–	–	–	–	–
1 110	–	–	–	–	–	–
770	–	–	–	–	–	–
840	–	–	–	–	–	–
–	–	–	–	–	–	–
950	94,2	160	1 000	120	230/670K	H30/670HG
1 160	–	–	–	–	–	–
680	94	–	–	–	–	–
–	–	–	–	–	–	–
1 020	–	–	–	–	–	–
1 830	–	–	–	–	–	–
1 340	–	–	–	–	–	–
570	–	–	–	–	–	–
–	–	–	–	–	–	–
760	118	–	–	–	–	–
760	118	–	–	–	–	–
–	–	–	–	–	–	–
1 490	–	–	–	–	–	–
1 220	–	–	–	–	–	–

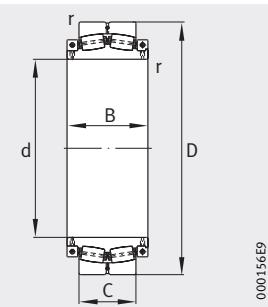


Spherical roller bearings

Split



Design 2
Inner ring with three rigid ribs,
separate locking rings



Design 3
With pin cage

Dimension table (continued) · Dimensions in mm

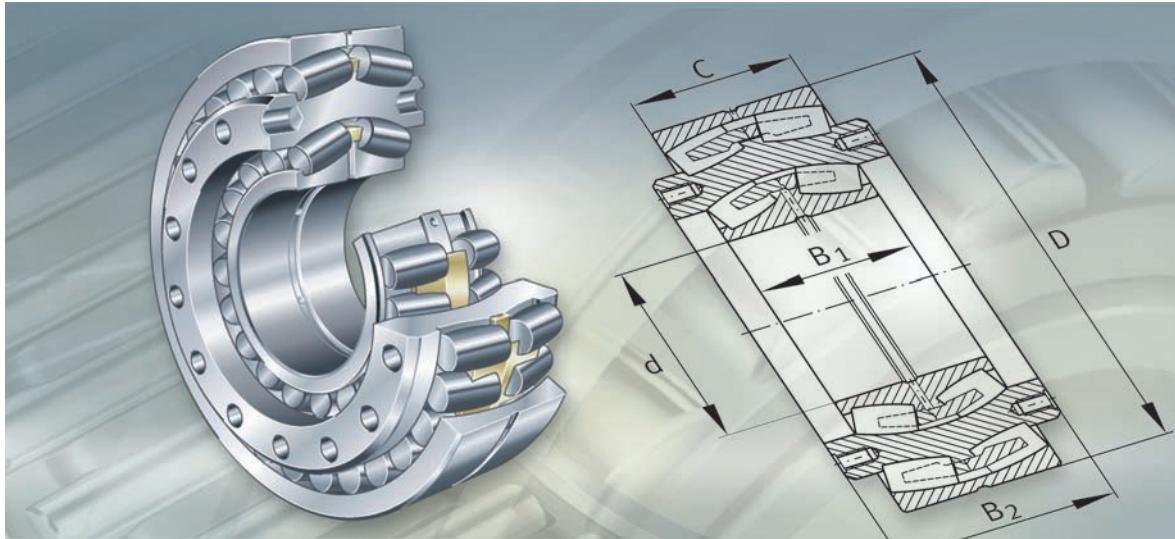
Designation	Design	Mass m ≈kg	Dimensions				
			d	D	B	C	r min.
Z-538984.PRL	2	1 080	777	1 110	320	207	7,5
Z-532063.PRL	3	840	800	1 060	370	258	7,5
Z-529229.PRL	3	1 100	800	1 120	390	272	6
Z-549639.PRL	2	1 170	800	1 150	398	258	7,5
Z-548414.PRL	2	1 210	800	1 150	412	258	7,5
Z-537281.PRL	3	1 030	850	1 120	385	272	6
Z-529230.PRL	3	1 250	850	1 180	400	280	6
Z-511962.01.PRL	3	1 500	850	1 220	445	287	7,5
Z-547266.PRL	2	1 900	850	1 220	540	365	7,5
Z-513411.PRL	3	1 620	850	1 280	480	300	7,5
Z-523269.PRL	3	1 990	850	1 280	480	310	7,5
Z-522013.PRL	3	2 030	850	1 280	540	375	7,5
Z-542824.PRL	2	663	900	1 180	300	206	6
Z-537282.PRL	3	1 050	900	1 180	390	280	6
Z-527254.PRL	3	1 490	900	1 250	420	300	7,5
Z-517015.PRL	3	2 290	900	1 360	490	330	7,5
Z-537240.PRL	2	439	950	1 150	235	150	6
Z-534826.PRL	3	1 270	950	1 250	410	300	7,5
Z-529231.PRL	3	1 800	950	1 320	460	315	7,5
Z-517972.PRL	3	2 880	950	1 420	585	412	7,5
Z-533567.PRL	3	1 565	1 000	1 320	450	315	7,5
Z-529232.PRL	3	2 180	1 000	1 400	490	335	7,5
Z-510504.PRL	3	2 690	1 000	1 470	530	345	7,5
Z-521868.PRL	3	2 880	1 000	1 520	475	315	7,5
Z-537283.PRL	3	1 750	1 060	1 400	475	335	7,5
Z-529233.01.PRL	3	2 300	1 060	1 460	490	335	7,5
Z-537284.PRL	3	1 930	1 120	1 460	475	335	7,5
Z-529234.PRL	3	2 650	1 120	1 540	520	355	7,5
Z-536806.PRL	3	2 280	1 180	1 540	500	355	7,5
Z-537285.PRL	3	2 800	1 250	1 630	545	375	7,5
Z-529215.PRL	3	3 800	1 250	1 720	580	400	7,5
Z-545161.PRL	3	3 300	1 320	1 720	580	400	7,5

¹⁾ For inner rings without axial abutment.

Basic load ratings		Calculation factors				Fatigue limit load	Permissible axial load ¹⁾
dyn. C _r kN	stat. C _{0r} kN	e	Y ₁	Y ₂	Y ₀	C _{ur} kN	F _a max. kN
6 550	14 600	0,18	3,76	5,59	3,67	1 040	–
7 650	20 400	0,2	3,31	4,92	3,23	1 210	–
8 650	20 800	0,22	3,14	4,67	3,07	–	–
8 650	19 000	0,22	3,07	4,57	3	1 220	–
8 150	17 600	0,22	3,07	4,57	3	1 130	–
8 300	22 400	0,21	3,27	4,87	3,2	740	135,3
9 300	23 600	0,21	3,2	4,77	3,13	–	–
10 600	24 500	0,22	3,07	4,57	3	1 530	–
11 800	29 000	0,29	2,33	3,47	2,28	1 860	–
11 600	25 500	0,22	3,14	4,67	3,07	1 610	–
11 600	25 500	0,22	3,14	4,67	3,07	1 610	–
14 000	33 500	0,26	2,55	3,8	2,5	1 380	–
6 400	16 600	0,16	4,28	6,37	4,19	990	–
8 800	24 000	0,2	3,38	5,03	3,3	1 000	–
10 400	26 000	0,21	3,2	4,77	3,13	–	–
12 500	28 500	0,22	3,07	4,57	3	1 010	318
3 800	11 200	0,11	6,06	9,02	5,92	680	–
10 400	28 500	0,2	3,38	5,03	3,3	1 030	135,3
11 400	29 000	0,21	3,2	4,77	3,13	1 010	216,9
17 300	41 500	0,26	2,55	3,8	2,5	2 100	–
11 800	32 500	0,21	3,27	4,87	3,2	1 960	–
12 900	33 500	0,22	3,14	4,67	3,07	2 020	–
13 700	32 000	0,22	3,07	4,57	3	2 010	–
13 200	31 500	0,19	3,5	5,21	3,42	1 120	318
12 700	36 500	0,2	3,31	4,92	3,23	1 190	216,9
14 300	41 500	0,2	3,38	5,03	3,3	1 300	–
12 900	36 500	0,19	3,58	5,33	3,5	2 050	–
13 900	37 500	0,2	3,38	5,03	3,3	1 750	–
14 600	41 500	0,2	3,42	5,09	3,34	1 480	–
16 000	49 000	0,19	3,5	5,21	3,42	1 490	318
18 000	49 000	0,2	3,42	5,09	3,34	2 900	–
17 300	52 000	0,19	3,54	5,27	3,46	1 750	–



FAG



Triple ring bearings

Triple ring bearings

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Product overview Triple ring bearings

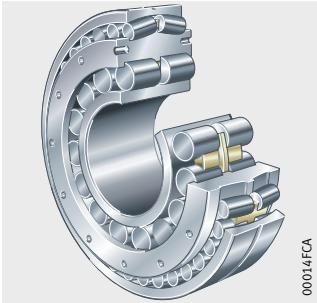
**Spherical roller bearings
as inner and outer bearings
(Beloit design)**

Z-5..04.DRGL-01



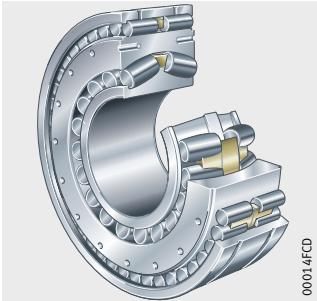
**Spherical roller bearing
as outer bearing,
cylindrical roller bearing
as inner bearing
(Küsters design)**

Z-5..04.DRGL-02



**Cylindrical roller bearing
as outer bearing,
spherical roller bearing
as inner bearing
(Farrel design)**

Z-5..04.DRGL-03



Triple ring bearings

Features

Triple ring bearings are special bearings for deflection compensating rolls in presses and calenders in paper machinery.

In these rolls, the roll sleeve rotates about the stationary roll axis. For driven rolls of older types, triple ring bearings are frequently used. The stationary axis is supported in the bearing interior. The rotating intermediate ring connects the drive to the roll sleeve. The intermediate ring has holes in both end faces so that it can be driven either directly or via a coupling. Depending on the type of deflection compensating roll, one of three bearing designs is used, *Figure 1*.

Spherical roller bearings as inner and outer bearings

Spherical roller bearing as outer bearing, cylindrical roller bearing as inner bearing

Spherical roller bearing as inner bearing, cylindrical roller bearing as outer bearing

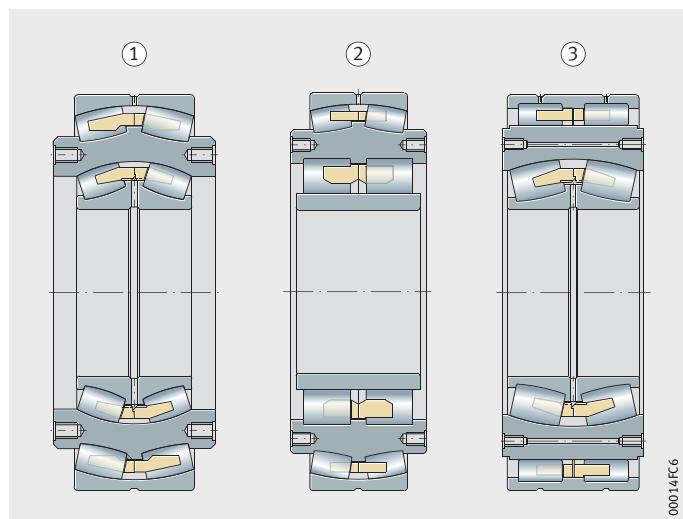
Bearing design 1 with one spherical roller bearing each as the inner and outer bearing is also described as the Beloit design for CC rolls (controlled crown rolls).

Design 2 has a double row cylindrical roller bearing as the inner bearing and a spherical roller bearing as the outer bearing. This is described as the Küsters design for S rolls (floating rolls).

In this so-called Farrel design 3, a spherical roller bearing is used as the inner bearing and a double row cylindrical roller bearing as the outer bearing.

- ① Beloit design
- ② Küsters design
- ③ Farrel design

Figure 1
Triple ring bearings are special bearings for deflection compensating rolls in presses and calenders in paper machinery



00014FC6

Triple ring bearings

Radial and axial load capacity	The spherical roller bearings can support axial loads in both directions and high radial loads. The designs with a cylindrical roller bearing allow axial displacements within the bearing.
Material	The inner rings, which are subjected to the very highest loads, are made from particularly clean rolling bearing steel (suffix 04).
Lubrication	Triple ring bearings are lubricated with oil. The bearings have the necessary lubrication grooves and lubrication slots for reliable lubricant supply.
Operating temperature	Triple ring bearings are dimensionally stable up to +200 °C. Bearings with metal cages can be used at operating temperatures from -30 °C to +200 °C.
Cages	Triple ring bearings are fitted with solid brass cages.

Design and safety guidelines

Equivalent dynamic bearing load

Load ratio and equivalent dynamic load

The equivalent dynamic load P is valid for bearings that are subjected to radial and axial dynamic loads. It gives the same rating life as the combined bearing load occurring in practice.

For spherical roller 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 kN
Equivalent dynamic bearing load for combined load

F_a kN
Axial dynamic bearing load

F_r kN
Radial dynamic bearing load

e, Y_1, Y_2 –
Factors, see dimension tables.

For cylindrical roller bearings under dynamic loading used as non-locating bearings, the following applies:

$$P = F_r$$

Minimum radial load

The minimum radial load on the triple ring bearings should be:

$$P = 0,02 \cdot C_r$$

Design of bearing arrangements

Shaft and housing tolerances

The inner rings and outer rings of triple ring bearings do not rotate. A loose fit is therefore permissible on the shaft and in the housing.



Triple ring bearings

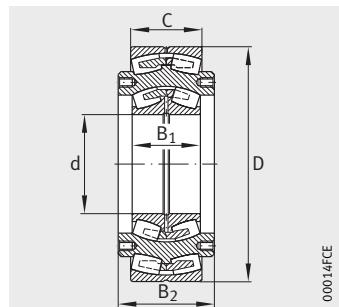
Accuracy

Triple ring bearings have the normal tolerances used for unsplit radial bearings. The dimensional tolerances correspond to tolerance class PN to DIN 620-2. However, the running accuracy is normally higher.

The radial internal clearance of triple ring bearings generally corresponds to internal clearance group CN for bearings with a cylindrical bore (DIN 620-4).

Triple ring bearings

Beloit design



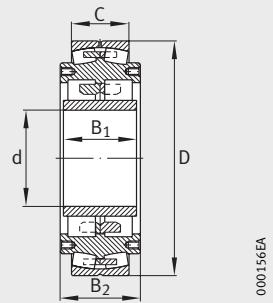
Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					Basic load ratings		Fatigue limit load	
		d	D	C	B ₁	B ₂	dyn. Inner bearing C _r kN	dyn. Outer bearing C _r kN	Inner bearing C _{ur} kN	Outer bearing C _{ur} kN
Z-525349.04.DRGL	177	180	480	160	140	215,9	1 470	2 600	158	360
Z-531033.04.DRGL	231	200	520	180	160	241,3	1 820	3 100	202	530
Z-527870.04.DRGL	356	220	600	200	180	279,4	2 240	3 900	233	670
Z-531040.04.DRGL	370	240	620	200	200	279,4	2 700	4 050	360	710
Z-522933.04.DRGL	498	260	680	218	218	317,5	3 250	4 750	485	710
Z-525350.04.DRGL	560	280	720	218	218	317,5	3 400	4 950	520	850
Z-522401.04.DRGL	750	300	780	250	243	342,9	4 050	5 900	550	910
Z-525351.04.DRGL	864	320	820	258	258	368,3	4 400	6 400	610	1 050
Z-522400.04.DRGL	1 020	340	870	272	280	393,7	5 500	7 100	820	1 200
Z-522934.04.DRGL	1 450	380	980	308	300	431,8	6 300	9 000	930	1 460
Z-563933.04.DRGL	1 650	400	1 030	315	315	444,5	7 000	9 600	960	1 550
Z-531796.04.DRGL	1 970	420	1 090	335	335	457,2	8 300	10 800	1 220	1 730



Triple ring bearings

Küsters design

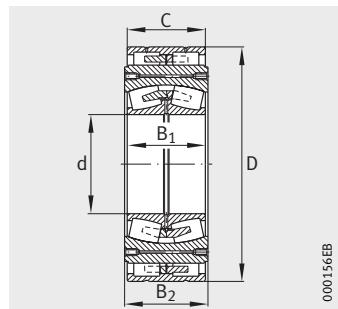


Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					Basic load ratings		Fatigue limit load	
		d	D	C	B ₁	B ₂	dyn. Inner bearing C _r kN	dyn. Outer bearing C _r kN	Inner bearing C _{ur} kN	Outer bearing C _{ur} kN
Z-531151.04.DRGL	58	140	360	100	119	129	900	1 130	151	218
Z-531152.04.DRGL	93	160	420	118	138	148	1 270	1 580	225	295
Z-531153.04.DRGL	131	180	460	118	153	160	1 430	1 690	255	320
Z-531154.04.DRGL	179	200	520	140	175	180	1 970	2 270	355	430
Z-531156.04.DRGL	237	220	560	140	195	205	2 240	2 380	395	450
Z-531158.04.DRGL	298	240	600	160	215	225	2 750	2 900	500	530
Z-531159.04.DRGL	380	240	650	170	215	225	2 900	3 250	490	600
Z-531160.04.DRGL	439	260	680	170	233	248	3 400	3 450	610	650
Z-531162.04.DRGL	453	280	700	180	233	248	3 400	3 750	600	680
Z-531163.04.DRGL	629	300	780	200	258	273	4 350	4 500	690	820
Z-531177.04.DRGL	727	300	780	240	280	300	4 750	5 500	800	980
Z-531164.04.DRGL	761	320	820	218	273	288	4 850	5 200	750	970
Z-531166.04.DRGL	928	340	870	230	295	310	5 500	5 700	890	1 040
Z-531165.04.DRGL	891	360	870	230	295	320	5 300	5 700	940	1 040
Z-531167.04.DRGL	1 170	380	960	243	315	335	6 500	6 800	990	1 170
Z-531168.04.DRGL	1 390	400	1 010	258	330	350	6 700	7 200	1 130	1 250

Triple ring bearings

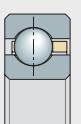
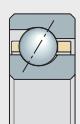
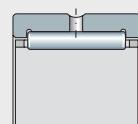
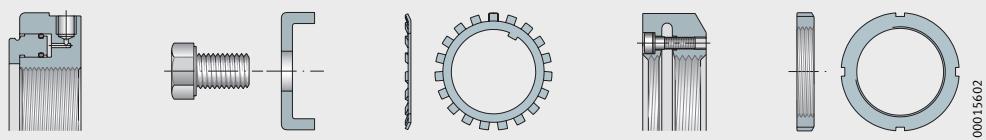
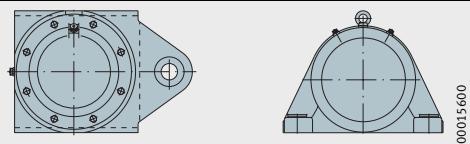
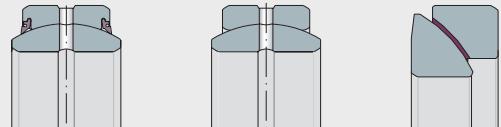
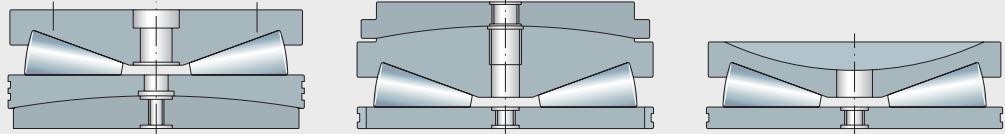
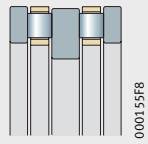
Farrel design



Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					Basic load ratings		Fatigue limit load	
		d	D	C	B ₁	B ₂	dyn. Inner bearing C _r kN	dyn. Outer bearing C _r kN	Inner bearing C _{ur} kN	Outer bearing C _{ur} kN
Z-548685.04.DRGL	82	150	393,7	118	118	130,7	1 040	1 320	108	280
Z-562656.04.DRGL	121	170	444,5	140	140	152,7	1 400	1 370	197	355
Z-562657.04.DRGL	157	190	482,6	150	150	162,7	1 630	1 700	163	405
Z-561310.04.DRGL	222	220	539,75	180	180	192,7	2 240	2 500	233	620
Z-534669.04.DRGL	294	240	590,55	200	200	212,7	2 700	2 800	360	690
Z-562132.04.DRGL	327	240	615,95	200	200	212,7	2 700	2 850	360	700
Z-549731.04.DRGL	404	280	666,75	218	218	230,7	3 400	3 500	520	850
Z-562658.04.DRGL	512	300	717,55	243	243	255,7	4 050	3 700	550	920
Z-561702.04.DRGL	642	320	768,35	258	258	270,7	4 400	4 250	600	1 110
Z-548181.04.DRGL	796	340	819,15	280	280	292,7	5 500	4 700	820	1 280
Z-562659.04.DRGL	937	360	869,95	290	290	302,7	5 900	5 500	880	1 440
Z-562660.04.DRGL	1 080	380	920,75	300	300	310,2	6 300	6 100	930	1 540
Z-562661.04.DRGL	1 270	400	971,55	315	315	327,7	7 000	7 000	960	1 740



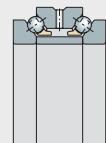
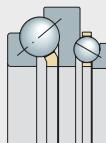


00015605

Axial deep groove ball bearings

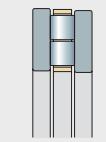
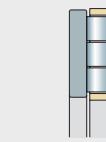


000155F6



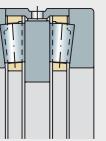
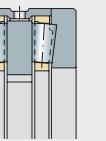
Axial angular contact ball bearings

000155F7



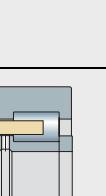
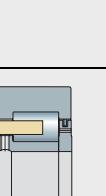
Axial cylindrical roller bearings

000155F9



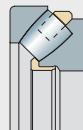
Axial tapered roller bearings

000155FB



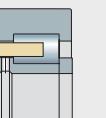
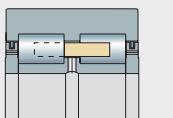
Axial spherical roller bearings

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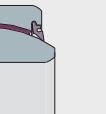
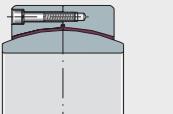
Back-up rollers

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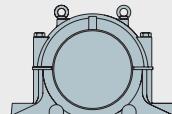
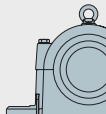
Spherical plain bearings

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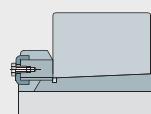
Bearing housings

00015601



Fasteners and retainers

00015603



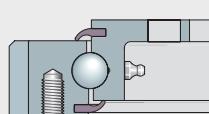
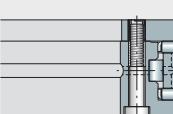
Arcanol rolling bearing greases

00015604



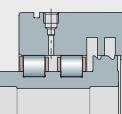
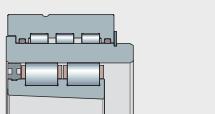
Other products

00015606



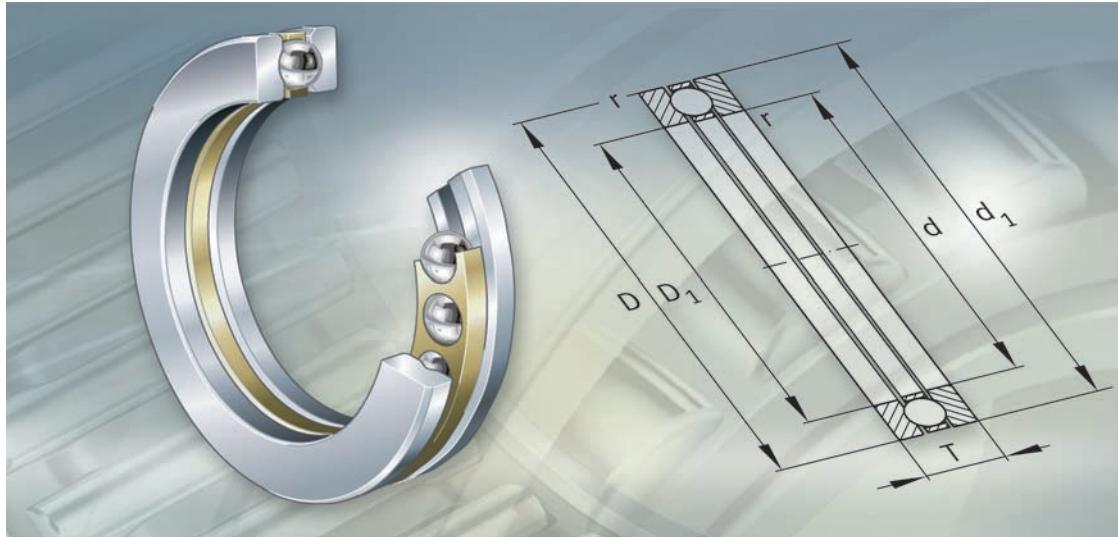
Market sectors

00015607



Appendix

FAG



Axial deep groove ball bearings



Axial deep groove ball bearings

	Page
Product overview	Axial deep groove ball bearings
Features	Operating temperature 737
	Cages 737
	Suffixes 737
Design and safety guidelines	Equivalent dynamic bearing load 738
	Equivalent static bearing load 738
	Minimum axial load 738
	Speeds 739
	Design of bearing arrangements 739
Accuracy 739
Dimension tables	Axial deep groove ball bearings, single direction 740

Product overview Axial deep groove ball bearings

Single direction

511, 512, 513, 514



00015019



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. Single direction axial deep groove ball bearings can support axial forces in one direction, but must not be subjected to radial loads. 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.

Operating temperature

Axial deep groove ball bearings can be used at operating temperatures from -30°C to $+150^{\circ}\text{C}$.

Cages

Large axial deep groove ball bearings have ball-guided solid cages made from brass (suffix M or MP) or steel (suffix F or FP), see table.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
F	Solid cage made from steel, ball-guided	Standard
FP	Solid window cage made from steel, ball-guided	
M	Solid cage made from brass, ball-guided	
MP	Solid window cage made from brass, ball-guided	
P5	Higher accuracy to tolerance class P5	Special design, available by agreement only
P6	Higher accuracy to tolerance class P5	

Axial deep groove ball bearings

Design and safety guidelines



Equivalent dynamic bearing load

Axial deep groove ball bearings can support axial forces only.

For bearings under dynamic loading, the following applies:

$$P = F_a$$

P kN
Equivalent dynamic bearing load
 F_a kN
Axial dynamic bearing load.

Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0a}$$

P_0 kN
Equivalent static bearing load
 F_{0a} kN
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 prevent slippage, 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.

$$F_{a \min} = A \cdot \left(\frac{n_{\max}}{1000} \right)^2$$

$F_{a \min}$ kN
Minimum axial load
 A –
Minimum load factor, see dimension table
 n_{\max} min^{-1}
Maximum operating speed.



Speeds



ISO 15 312 does not give thermal reference speeds for these bearings.

The dimension tables only state limiting speeds n_G . These values are for oil lubrication and must not be exceeded.

Design

of bearing arrangements

Shaft and housing tolerances

For single direction bearings, the shaft tolerance j6 should be selected.

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.

Adjacent parts

The shoulders on the adjacent construction (shaft and housing) must be sufficiently high that the shaft and housing locating washers are supported over at least half their height.

The abutment shoulders should be rigid, flat and perpendicular to the axis of rotation.

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.

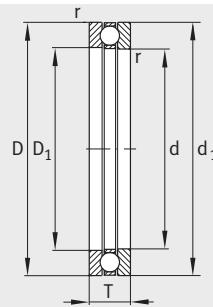
Accuracy

The dimensional and running tolerances correspond to tolerance class PN to DIN 620-3.

The main dimensions for single direction bearings correspond to ISO 104/DIN 711.

Axial deep groove ball bearings

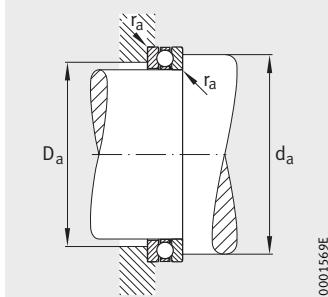
Single direction



0001501A

Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	T	D ₁	d ₁	r min.
51338-MP	36,7	190	320	105	195	315	4
51340-MP	40,9	200	340	110	205	335	4
51344-MP	47	220	360	112	225	355	4
51248-MP	22,9	240	340	78	244	335	2,1
51448-M	99,4	240	440	160	245	435	6
51152-MP	7,89	260	320	45	263	317	1,5
51252-MP	24,8	260	360	79	264	355	2,1
51352-MP	75,8	260	420	130	265	415	5
51156-MP	12	280	350	53	283	347	1,5
51256-MP	23,7	280	380	80	284	375	2,1
51356-MP	77,9	280	440	130	285	435	5
51456-M	195	280	520	190	285	515	6
51160-MP	17,1	300	380	62	304	376	2
51260-MP	41,8	300	420	95	304	415	3
51460-M	193	300	540	190	305	535	6
51164-MP	18,5	320	400	63	324	396	2
51264-MP	44,6	320	440	95	325	435	3
51364 F	102	320	500	140	325	495	5
51168-MP	19,9	340	420	64	344	416	2
51268-MP	47,6	340	460	96	345	455	3
51368 F	141	340	540	160	345	535	5
51368-M	141	340	540	160	345	535	5
51172-MP	21,5	360	440	65	364	436	2
51272-MP	70,4	360	500	110	365	495	4
51372-M	148	360	560	160	365	555	5
51176-MP	22,4	380	460	65	384	456	2
51276-MP	64,8	380	520	112	385	515	4
51376-M	202	380	600	175	385	595	6
51476-M	371	380	670	224	385	665	7,5

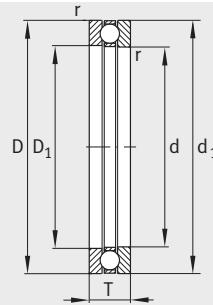


Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ua}	Minimum load factor A	Limiting speed n_G min ⁻¹
d_a min.	D_a max.	r_a max.	dyn. C_a kN	stat. C_{0a} kN			
268	242	3	585	2 160	60	24	1 000
284	256	3	620	2 400	65	30	950
304	276	3	640	2 550	67	34	670
300	280	2,1	465	1 860	48	18	1 100
360	320	5	1 080	4 750	114	120	480
296	284	1,5	236	1 020	31,5	5,6	1 500
320	300	2,1	490	2 040	52	22	1 000
356	324	4	815	3 600	85	67	560
322	308	1,5	315	1 340	40,5	10	1 300
340	320	2,1	490	2 160	53	24	950
376	344	4	830	3 800	88	75	560
424	376	5	1 250	5 850	129	190	430
348	332	2	365	1 600	46	14	1 200
372	348	2,5	585	2 700	62	38	850
444	396	5	1 460	7 200	158	260	400
368	352	2	375	1 700	47,5	16	1 100
392	368	2,5	600	2 800	64	43	850
428	392	4	980	4 900	108	120	480
388	372	2	380	1 800	49	18	750
412	388	2,5	620	3 050	67	50	600
460	420	4	1 080	5 600	118	160	450
460	420	4	1 080	5 600	118	160	450
408	392	2	405	2 000	45	22	700
444	416	3	720	3 650	79	70	530
480	440	4	1 120	5 850	122	180	450
428	412	2	430	2 240	48,5	24	670
464	436	3	750	4 000	84	80	530
512	468	5	1 220	6 700	134	240	430
554	496	6	1 830	10 400	201	560	360

Axial deep groove ball bearings

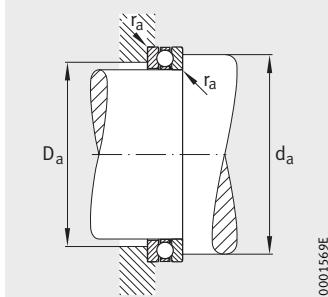
Single direction



0001501A

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	T	D ₁	d ₁	r min.
51180-MP	23,5	400	480	65	404	476	2
51280-MP	78,5	400	540	112	405	535	4
51480-M	454	400	710	243	405	705	7,5
51184-MP	24,4	420	500	65	424	495	2
51284-MP	108	420	580	130	425	575	5
51384-MP	220	420	650	180	425	645	6
51484-M	468	420	730	243	425	725	7,5
51288-MP	99,3	440	600	130	445	595	5
51388-M	276	440	680	190	445	675	6
51192-MP	37,2	460	560	80	464	555	2,1
51292-MP	103	460	620	130	465	615	5
51196-MP	38,7	480	580	80	484	575	2,1
51296-MP	130	480	650	135	485	645	5
511/500-MP	44,9	500	600	80	505	595	2,1
512/500-MP	144	500	670	135	505	665	5
511/530-MP	55,9	530	640	85	535	635	3
512/530-MP	158	530	710	140	535	705	5
511/560-MP	58,8	560	670	85	565	665	3
512/560-MP	204	560	750	150	565	745	5
511/600-MP	62,7	600	710	85	605	705	2
512/600-MP	240	600	800	160	605	795	5
513/600-M	572	600	900	236	605	895	7,5
511/630-FP	81,5	630	750	95	635	745	3
511/630-MP	82,1	630	750	95	635	745	3
512/630-M	287	630	850	175	635	845	6
512/630-MP	287	630	850	175	635	845	6
513/630-M	678	630	950	250	635	945	9,5
511/670-MP	105	670	800	105	675	795	4
512/670-MP	349	670	900	180	675	895	6
511/710-MP	113	710	850	112	715	845	4
512/710-MP	376	710	950	190	715	945	6
511/750-MP	147	750	900	120	755	895	4
512/750-MP	458	750	1 000	195	755	995	6

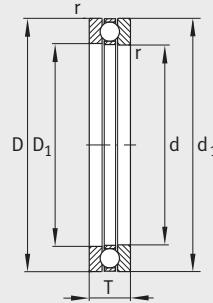


Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ua}	Minimum load factor A	Limiting speed n_G min ⁻¹
d_a min.	D_a max.	r_a max.	dyn. C_a kN	stat. C_{0a} kN			
448	432	2	440	2 320	49,5	28	670
484	456	3	800	4 400	92	100	500
586	524	6	1 930	11 400	218	670	340
468	452	2	440	2 450	51	30	630
516	484	4	930	5 200	101	140	480
558	512	5	1 320	7 500	145	300	400
606	544	6	1 900	11 400	214	670	340
536	504	4	930	5 400	104	150	450
584	536	5	1 460	8 800	164	400	380
520	500	2,1	530	3 100	61	50	560
556	524	4	950	5 600	106	170	450
540	520	2,1	540	3 250	63	53	530
582	548	4	1 020	6 200	114	200	430
560	540	2,1	550	3 350	63	56	530
602	568	4	1 020	6 400	116	220	430
596	574	2,5	620	3 900	73	80	480
638	602	4	1 120	7 100	126	260	400
626	604	2,5	630	4 150	74	85	480
674	636	4	1 220	8 150	143	340	380
666	644	2,5	640	4 400	76	100	450
720	680	4	1 320	9 000	151	430	360
780	720	6	2 000	14 300	229	1 100	320
702	678	2,5	720	5 000	84	130	430
702	678	2,5	720	5 000	84	130	430
762	718	5	1 460	10 400	172	600	340
762	718	5	1 460	10 400	172	600	340
822	758	8	2 120	15 600	248	1 300	300
744	722	3	800	5 700	94	170	400
808	762	5	1 560	11 600	183	700	340
794	766	3	865	6 550	104	220	380
854	806	5	1 660	12 700	201	850	320
840	810	3	1 020	7 800	124	320	360
900	850	5	1 800	14 000	212	1 000	320

Axial deep groove ball bearings

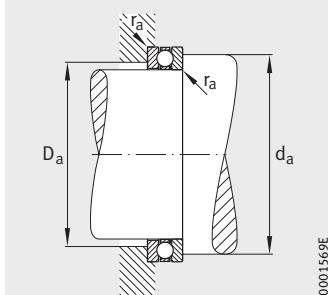
Single direction



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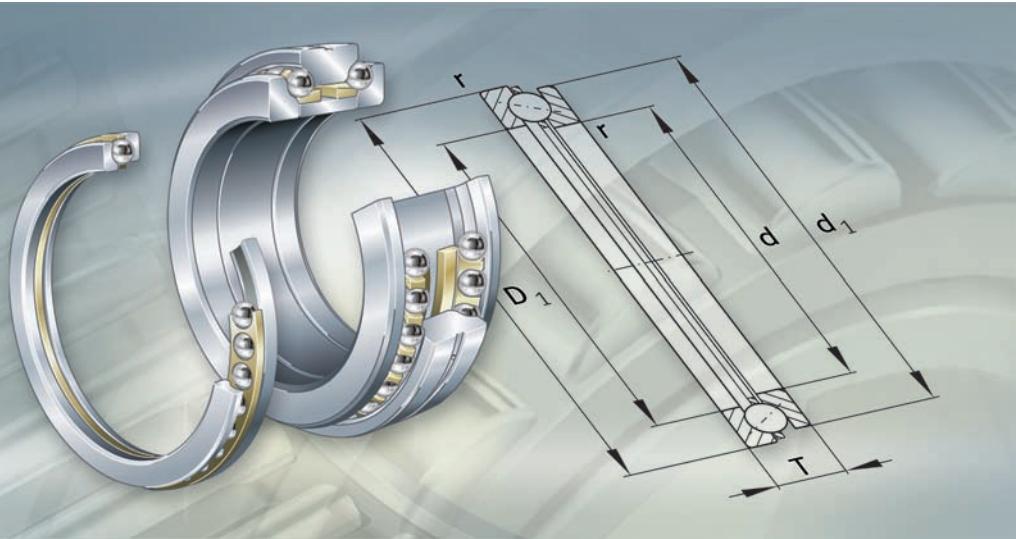
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	T	D ₁	d ₁	r min.
511/800-MP	157	800	950	120	805	945	4
512/800-M	532	800	1 060	205	805	1 055	7,5
512/800-MP	532	800	1 060	205	805	1 055	7,5
511/850-MP	168	850	1 000	120	855	995	4
512/850-MP	493	850	1 120	212	855	1 115	7,5
511/900-MP	217	900	1 060	130	905	1 055	5
512/900-MP	691	900	1 180	220	905	1 175	7,5
511/950-MP	250	950	1 120	135	955	1 115	5
512/950-M	838	950	1 250	236	955	1 245	7,5
512/950-MP	838	950	1 250	236	955	1 245	7,5
511/1000-MP	278	1 000	1 180	140	1 005	1 175	5
512/1000-MP	998	1 000	1 320	250	1 005	1 315	9,5
511/1060-MP	353	1 060	1 250	150	1 065	1 245	5
512/1060-MP	1 200	1 060	1 400	265	1 065	1 395	9,5
511/1120-MP	390	1 120	1 320	160	1 125	1 315	5
511/1180-MP	533	1 180	1 400	175	1 185	1 395	6
511/1250-MP	507	1 250	1 460	175	1 255	1 455	6
511/1320-MP	594	1 320	1 540	175	1 325	1 535	6
511/1400-MP	643	1 400	1 630	180	1 410	1 620	6
511/1500-M	836	1 500	1 750	195	1 510	1 740	6
511/1700-M	1 110	1 700	1 970	212	1 710	1 960	7,5



Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load C_{ua}	Minimum load factor A	Limiting speed n_G min ⁻¹
d_a min.	D_a max.	r_a max.	dyn. C_a kN	stat. C_{0a} kN			
890	860	3	1 020	8 300	125	360	340
956	904	6	1 860	15 000	221	1 200	300
956	904	6	1 860	15 000	221	1 200	300
940	910	3	1 060	8 800	130	400	340
1 012	958	6	2 040	17 300	243	1 500	280
996	964	4	1 080	9 300	132	450	320
1 068	1 012	6	2 160	19 000	265	1 900	260
1 052	1 018	4	1 220	11 000	151	630	320
1 130	1 070	6	2 320	20 800	280	2 200	240
1 130	1 070	6	2 320	20 800	280	2 200	240
1 108	1 072	4	1 320	12 200	163	750	300
1 192	1 128	8	2 550	24 000	315	3 000	220
1 174	1 136	4	1 530	14 600	193	1 100	280
1 264	1 196	8	2 800	27 000	340	3 800	200
1 240	1 200	4	1 500	14 600	187	1 100	260
1 312	1 268	5	1 660	17 000	209	1 500	240
1 378	1 332	5	1 730	18 300	221	1 700	220
1 454	1 406	5	1 760	19 000	224	1 900	200
1 540	1 490	5	1 930	22 000	250	2 400	200
1 651	1 599	5	2 120	25 000	270	3 200	180
1 862	1 808	6	2 400	30 000	315	4 800	170



Axial angular contact ball bearings

Single direction
Double direction

Axial angular contact ball bearings

Single direction axial angular contact ball bearings

..... 750

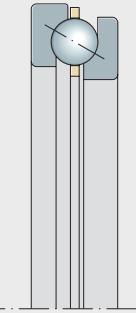
Single direction axial angular ball bearings can support high axial forces in one direction. They are only suitable for radial forces under certain conditions. The bearings are separable.

As a result, the rings can be fitted separately. At higher speeds, a minimum axial load is required. The inch size main dimensions and designations (Z-5..ASKL) of these special bearings are not standardised. A typical application for these axial angular contact ball bearings is in rotary tables for drilling rigs.

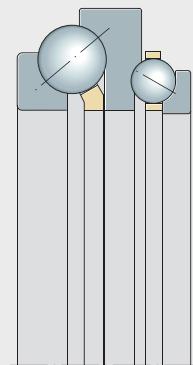
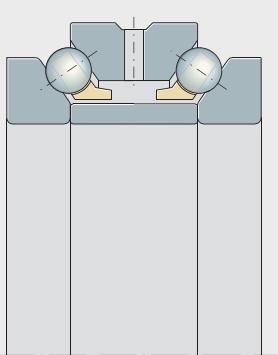
Double direction axial angular contact ball bearings

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Double direction axial angular contact ball bearings can support axial forces in both directions. Bearings of series 2344 and 2347 with metric dimensions are used as high precision bearings in machine tool spindles. The axial angular contact ball bearing is arranged against a double row cylindrical roller bearing of series NN30 that supports the radial forces. The parts of the axial bearing can be fitted separately. For rotary tables in drilling rigs, double direction axial angular contact ball bearings with inch size main dimensions and non-standardised designations (Z-5..ASKLZ) were developed. These special bearings comprise an upper bearing capable of supporting loads and a smaller bearing that fulfils the counterstay function. These bearings can support not only axial loads but also radial and moment loads. The bearing parts can be fitted separately.

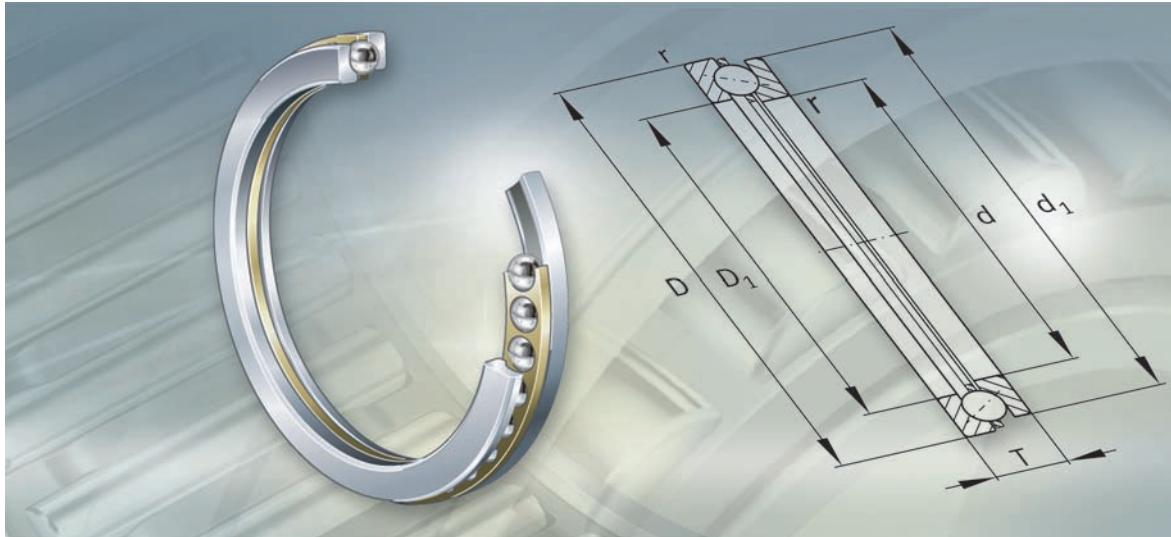


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Single direction axial angular contact ball bearings



Single direction axial angular contact ball bearings

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Product overview Single direction axial angular contact ball bearings

Bearings for rotary tables

Z-5..ASKL1



00015.01D

Single direction axial angular contact ball bearings



Features

Single direction axial angular contact ball bearings comprise a shaft locating washer and a housing locating washer, into which raceways are machined, and a cage with balls. Due to the large number of balls, the bearings have high rigidity. The cage is guided on the rib of the housing locating washer. Single direction axial angular contact ball bearings are separable. The bearing washers and the cage can be fitted separately.

Single direction axial angular contact ball bearings do not permit angular misalignment or skewing between the shaft and housing.

Single direction axial angular contact ball bearings have non-standardised inch size dimensions and designations (Z-5..ASKL).

Axial and radial load capacity

In their main application in rotary tables for drilling rigs, two axial angular contact ball bearings are axially adjusted against each other. The upper bearing with the higher load carrying capacity can support very high axial forces (the weight of the drill string) in one direction. The bearings are only suitable for radial loads under certain conditions.

Sealing

Axial angular contact ball bearings are of an open design.

Lubrication

Due to the vertical arrangement of the shaft, the single direction axial angular contact ball bearings are lubricated with oil.

Operating temperature

The single direction axial angular contact ball bearings can be used at operating temperatures from -30°C to $+150^{\circ}\text{C}$.

Cage

The solid brass cage is guided on the rib of the housing locating washer.

Single direction axial angular contact ball bearings

Design and safety guidelines

Equivalent dynamic bearing load

Single direction axial angular ball bearings can support axial forces and low radial forces.

For bearings under dynamic loading, the following applies:

$$P = F_a + 0,92 \cdot F_r$$

P kN
Equivalent dynamic bearing load
 F_a kN
Axial dynamic bearing load
 F_r kN
Radial dynamic bearing load.

Equivalent static bearing load

Single direction axial angular ball bearings can support axial forces and low radial forces.

For bearings under static loading, the following applies:

$$P_0 = F_{0a} + 4 \cdot F_{0r}$$

P_0 kN
Equivalent static bearing load
 F_{0a} kN
Axial static bearing load
 F_{0r} kN
Radial 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 prevent slippage, the bearings must be subjected to a minimum load $F_{a\ min}$.

The minimum load factor A is given in the dimension tables.

For n_{max} , the maximum operating speed must be used.

$$F_{a\ min} = A \cdot \left(\frac{n_{max}}{1000} \right)^2$$

$F_{a\ min}$ kN
Minimum axial load
A –
Minimum load factor, see dimension table
 n_{max} min^{-1}
Maximum operating speed.

In general, the axial load due to the inherent weight of the bearing parts or the preload is already higher than the required minimum load.



Accuracy

The normal tolerances of the bearings for rotary tables are given in the following tables.

Tolerances for shaft locating washer

Bore d mm	over	incl.	Bore deviation Δ_{dmp} μm
250	315	0	-36
315	400	0	-41
400	500	0	-46
500	630	0	-51
630	800	0	-76
800	1 000	0	-102
1 000	1 250	0	-127
1 250	1 600	0	-165

Tolerances for housing locating washer

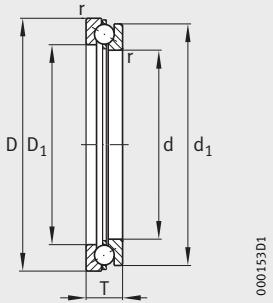
Outside diameter D mm	over	incl.	Outside diameter deviation Δ_{Dmp} μm
315	400	0	-41
400	500	0	-46
500	630	0	-51
630	800	0	-76
800	1 000	0	-102
1 000	1 250	0	-127
1 250	1 600	0	-165

Tolerances for nominal bearing height

Bore d mm	over	incl.	Deviation of nominal bearing height Δ_{Ts} μm
250	315	+254	-254
315	400	+254	-254
400	500	+254	-254
500	630	+381	-381
630	800	+381	-381
800	1 000	+381	-381
1 000	1 250	+381	-381
1 250	1 600	+381	-381

Axial angular contact ball bearings

Single direction



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Dimension table · Dimensions in mm

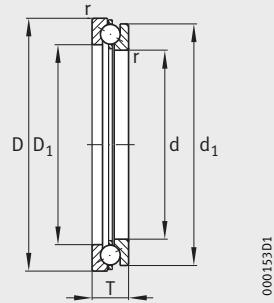
Designation	Mass m ≈kg	Dimensions					
		d	D	T	r min.	D ₁	d ₁
Z-547627.ASKL	16,3	292,1	368,3	63,5	3,2	298,45	361,95
Z-547628.ASKL	15,1	292,1	381	50,8	3,2	304,8	368,3
Z-547629.ASKL	17,5	304,8	406,4	57,15	3,2	342,9	368,3
Z-547630.ASKL	12,9	352,425	430,149	47,625	1,6	374,65	412,75
Z-547631.ASKL	22,7	371,475	476,25	57,15	4,8	401,625	446,075
Z-547632.ASKL	47,4	381	520,7	84,125	4,8	419,1	482,6
Z-560590.ASKL	27,4	420	520	65	3	440	500
Z-547633.ASKL	42,6	427,025	565,15	69,85	3,2	463,55	515,925
Z-547634.ASKL	87,9	431,8	635	88,9	8	488,95	565,15
Z-547635.ASKL	39,8	438,252	577,85	69,977	6,35	501,65	514,35
Z-547636.ASKL	28,5	450,85	558,8	58,725	3,2	482,6	525,145
Z-547637.ASKL	46,2	457,2	584,2	76,2	6,35	482,6	549,275
Z-547638.ASKL	70,7	457,2	624,475	92,075	3,2	508	549,275
Z-547640.ASKL	162	488,95	742,95	127	6,35	596,9	635
Z-535503.ASKL	26,1	495,3	584,2	57,15	3,2	508	571,5
Z-547560.ASKL	120	508	704,85	117,475	6,35	565,15	628,65
Z-547561.ASKL	121	508	704,85	117,475	6,35	565,15	628,65
Z-544556.ASKL	38,2	511,15	628,65	66,93	3	549,28	590,55
Z-547641.ASKL	38,9	511,175	628,65	66,675	3,2	549,275	590,55
Z-546868.ASKL	102	514,248	704,85	114,554	6,5	571,627	622,3
Z-544554.ASKL	107	514,248	704,85	114,554	6,35	571,5	622,3
Z-524431.ASKL	111	514,274	704,85	114,3	6,35	571,5	622,3
Z-547562.ASKL	115	514,35	704,85	114,3	6,35	571,5	622,3
Z-547643.ASKL	139	577,85	774,7	117,475	6,35	622,3	704,85
Z-547642.ASKL	140	577,85	774,7	117,475	6,35	622,3	704,85
Z-547409.ASKL	81	580	750	85	6	595	620
Z-546867.ASKL	125	593,699	790,575	117,729	6,5	650,748	720,725
Z-547644.ASKL	139	593,725	790,575	117,475	6,35	650,875	720,725
Z-547563.ASKL	140	593,725	790,575	117,475	6,35	650,875	720,725
Z-547565.ASKL	194	606,425	847,725	133,35	6,35	688,975	739,775
Z-547564.ASKL	189	606,425	847,725	133,35	6,35	688,975	739,775
Z-547645.ASKL	197	609,6	850,9	133,35	3,2	692,15	742,95



Basic load ratings		Minimum load factor	Limiting speed
dyn. C _a kN	stat. C _{0a} kN	A	n _G min ⁻¹
340	1 480	6,3	2 000
245	865	4,8	1 900
465	2 130	12	1 800
390	1 950	10	1 800
495	2 550	17	1 600
670	3 400	34	1 500
400	1 760	19	900
540	2 750	28	1 400
620	3 000	53	1 100
375	1 700	20	1 300
425	1 960	24	1 300
650	3 750	40	1 400
735	3 250	75	1 000
735	3 450	90	900
375	1 830	20	1 300
1 270	8 500	170	1 200
1 330	9 400	160	1 000
690	4 250	38	1 200
465	2 320	32	1 100
1 020	4 650	56	850
1 160	7 200	120	630
640	2 850	70	900
865	4 400	110	900
630	3 350	75	900
900	4 900	150	850
720	4 150	110	950
1 080	5 500	75	800
610	3 000	80	850
880	5 000	140	850
780	4 150	130	800
800	4 400	130	800
1 570	11 200	320	850

Axial angular contact ball bearings

Single direction



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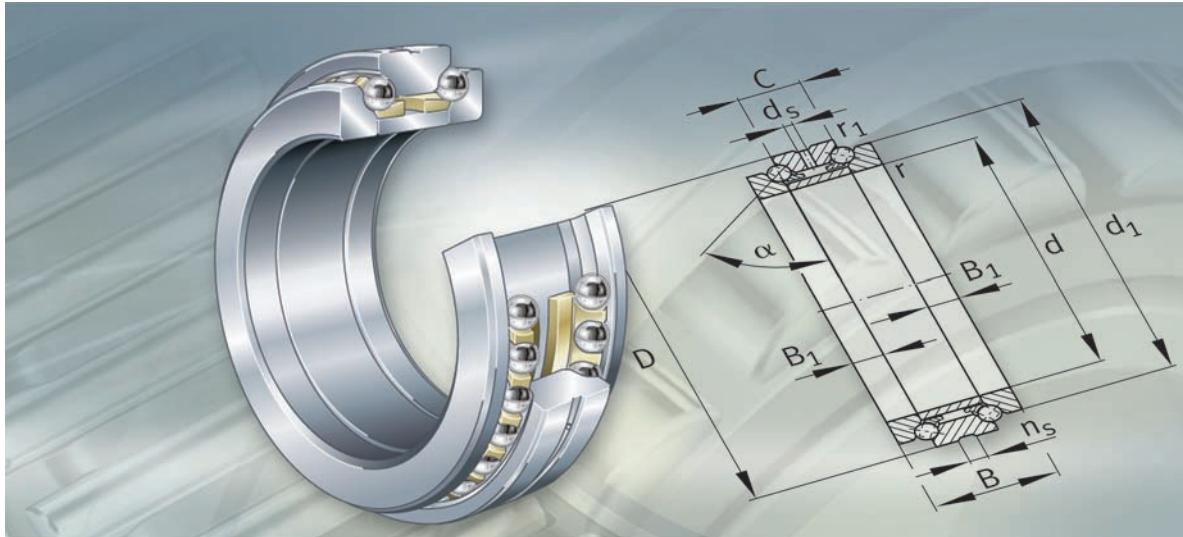
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	T	r min.	D ₁	d ₁
Z-547646.ASKL	157	622,3	831,85	117,475	6,35	679,45	742,95
Z-547647.ASKL	159	622,3	831,85	117,475	6,35	679,45	742,95
Z-547410.ASKL	161	635	855	110	6	720	770
Z-547648.ASKL	84,4	641,35	793,75	88,9	6,35	708,025	746,125
Z-544553.ASKL	65,9	641,426	793,75	133,35	6,35	727,075	790,575
Z-547650.ASKL	180	660,35	895,35	133,604	6,35	727,075	790,575
Z-547649.ASKL	209	660,4	895,35	133,35	6,35	727,075	790,575
Z-547650.ASKL	205	667,69	914,4	127	6,35	768,35	806,45
Z-547651.ASKL	293	723,9	977,9	168,275	6,35	825,5	876,3
Z-544552.ASKL	84,7	768,045	920,75	89,281	6,35	835,025	873,12
Z-547653.ASKL	254	768,35	1006,475	139,7	6,35	838,2	901,7
Z-547654.ASKL	250	768,604	1006,475	139,7	6,35	838,2	907,1
Z-546866.ASKL	47,8	771,449	898,525	63,881	6,5	809,625	860,425
Z-547655.ASKL	110	785,825	952,5	95,25	6,35	857,25	882,65
Z-547656.ASKL	216	787,4	1006,475	127	6,35	850,9	908,05
Z-547657.ASKL	237	787,4	1025,525	139,7	6,35	893,75	917,575
Z-547658.ASKL	237	787,4	1025,525	139,7	6,35	893,75	917,575
Z-544551.ASKL	193	787,4	1025,525	139,954	6,35	893,775	917,575
Z-546865.ASKL	204	806,399	1025,525	127,254	6,5	872,998	933,577
Z-543689.ASKL	218	806,45	1025,525	127	6,35	873,125	933,45
Z-541269.ASKL	171	1 020	1180	100	6	1 035	1 165
Z-547241.ASKL	132	1 022,223	1181,1	89,154	6,5	1 069,975	1 133,475
Z-546864.ASKL	118	1 022,223	1181,1	89,154	6,5	1 069,975	1 133,475
Z-560354.ASKL	448	1 030	1 290	160	10	1 080	1 240
Z-547242.ASKL	285	1 041,273	1 260,475	127,254	6,35	1 112,825	1 189,025
Z-546863.ASKL	257	1 066,673	1 285,875	127,38	6,5	1 138,098	1 214,552
Z-525290.ASKL	253	1 073,15	1 295,4	114,3	6,35	1 136,65	1 193,8
Z-540716.ASKL	208	1 330	1 490	110	6	1 345	1 475
Z-546862.ASKL	165	1 364,123	1 517,65	105,156	6,5	1 406,525	1 457,325
Z-546861.ASKL	385	1 371,523	1 619,25	140,081	6,5	1 457,325	1 533,525



Basic load ratings		Minimum load factor A	Limiting speed n_G min^{-1}
dyn. C_a kN	stat. C_{0a} kN		
830	4 650	140	800
915	5 000	170	800
1 170	8 000	220	800
670	3 800	90	850
940	6 400	110	850
1 560	11 300	300	750
1 080	6 400	240	700
1 000	5 700	220	700
1 850	14 800	530	700
1 030	8 100	150	500
1 200	7 800	360	630
830	5 100	190	670
800	7 200	75	560
850	7 100	130	800
1 020	6 300	280	630
850	5 200	200	670
1 140	7 500	340	630
1 670	13 500	400	450
1 460	8 800	190	450
900	5 850	220	670
1 060	9 500	320	600
980	8 400	240	400
1 320	13 200	240	600
1 630	14 700	750	530
1 590	14 000	670	380
1 600	11 400	320	360
1 350	13 400	450	560
950	9 150	530	480
1 310	14 800	360	450
2 360	29 000	1 100	430

FAG



Double direction axial angular contact ball bearings



Double direction axial angular contact ball bearings

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Product overview Double direction axial angular contact ball bearings

**High precision bearings
for machine tools**

2344, 2347



000156F3

Bearings for rotary tables

Z-5..ASKL2



000156F4

Double direction axial angular contact ball bearings



Features

Double direction axial angular contact ball bearings are available as high precision bearings for machine tools as well as rotary table bearings for drilling rigs.

High precision bearings

Double direction axial angular contact ball bearings of series 2344 and 2347 are high precision bearings with restricted tolerances corresponding 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. 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.

Axial angular contact ball bearings in a high precision design of series 2344 can be fitted to the small diameter of the shaft taper, while those of series 2347 can be fitted to the large diameter of the shaft taper.

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.

Sealing

The high precision bearings are not sealed.

Lubrication

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 from that of the axial angular contact ball bearing.

Double direction axial angular contact ball bearings

Bearings for rotary tables

Double direction axial angular contact ball bearings for rotary tables comprise an upper bearing capable of supporting loads and a smaller bearing that fulfils the counterstay function. The bearing unit with low section height has a joint shaft locating washer, a large upper shaft locating washer and small lower shaft locating washer as well as two solid brass cages with balls.

The raceways are machined into the bearing washers.

Due to the large number of balls, the bearings have high rigidity.

These double direction axial angular contact ball bearings have non-standardised inch size dimensions and designations (Z-5..ASKLZ). The bearings are separable. The bearing washers and the cage can be fitted separately.

Double direction axial angular contact ball bearings for rotary tables can support axial forces in both directions at moderate speeds as well as radial and moment loads. They can therefore be used as single bearings.

Sealing

Double direction axial angular contact ball bearings for rotary tables are not sealed.

Lubrication

Due to the vertical bearing axis, we recommend the use of oil lubrication so that all contact points in the bearing are continuously supplied with sufficient quantities of lubricant.

Operating temperature

The double direction axial angular contact ball bearings can be used at operating temperatures from -30 °C to +150 °C.

Cages

In the high precision bearings, 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.

The solid brass cages in the bearings for rotary tables are guided on the shaft locating washer or on the housing locating washer.

Suffixes

Suffixes for available designs of high precision bearings: see table.

Available designs

Suffix ¹⁾	Description	Design
M	Solid brass cage, ball-guided	Standard
SP	Restricted tolerance class SP	
UP	Restricted tolerance class UP	Special design, available by agreement only

¹⁾ The design of the bearings for rotary tables with non-standardised designations (Z-5..ASKLZ) is available by agreement from us.



Design and safety guidelines

Equivalent dynamic bearing load

Double direction axial angular contact ball bearings, fitted adjacent to a cylindrical roller bearing, can support axial forces only. This also applies in general to the bearings for rotary tables. For bearings under dynamic loading, the following applies:

$$P = F_a$$

P kN
Equivalent dynamic bearing load
 F_a kN
Axial dynamic bearing load.

Operating life of high precision bearings

High precision bearings must guide machine parts with high precision and support forces at very high speeds.

They are selected predominantly from the perspectives of:

- accuracy
- rigidity
- running behaviour.

In order that they can fulfil these tasks for as long as possible, the bearings must run without wear. The precondition for this is the creation of a load-bearing hydrodynamic lubricant film at the contact points of the rolling contact partners.

Under these conditions, rolling bearings will achieve their fatigue life in a large number of applications. If the design is appropriate to the fatigue life, the operating life of the bearing is normally restricted by the lubricant operating life.

The decisive factors for the operating life from the perspective of load are the Hertzian pressures occurring at the contacts and the bearing kinematics. For high performance assemblies, individual design with the aid of special calculation programs is therefore advisable.

Since failure as a result of fatigue plays no part in practice in the case of high precision bearings, calculation of the rating life L_{10} in accordance with DIN ISO 281 is not suitable as a means of determining the operating life.

Double direction axial angular contact ball bearings

Equivalent static bearing load

Double direction axial angular contact ball bearings, fitted adjacent to a cylindrical roller bearing, can support axial forces only. This also applies in general to the bearings for rotary tables.

For bearings under static loading, the following applies:

$$P_0 = F_{0a}$$

P_0 kN
Equivalent static bearing load
 F_{0a} kN
Axial static bearing load.

Static load safety factor

In order to achieve sufficiently smooth running of the high precision 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} kN
Basic static load rating, see dimension tables
 P_0 kN
Equivalent static bearing load.

Speeds of high precision bearings

Double direction axial angular contact ball bearings of a high precision design 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.



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 of high precision bearings

The preload is determined by the spacer ring arranged between the two shaft locating washers.

Design of bearing arrangements for high precision bearings

Shaft and housing tolerances

Guide values for the machining tolerances of the bearing seats: see Catalogue 41130, Super Precision Bearings.

Mounting dimensions

The dimension tables give the maximum dimensions of the radii r_a and the diameters of the abutment surfaces d_a , D_a .



Accuracy Bearing series 2344, 2347

The dimensional and running tolerances of the high precision bearings correspond to tolerance class SP according to the Schaeffler Group, see tables.

Bearings to tolerance class UP are available by agreement.

Tolerances for shaft locating washer

Bore		Bore deviation		Variation V_{dp} μm	Wall thickness variation S_i μm	Height deviation	
d mm	Δ_{dmp} μm	min.	max.			Δ_{Hs} μm	min.
over	incl.	min.	max.				max.
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 D mm		Outside diameter deviation Δ_{Dmp} μm		Variation V_{Dp} μm	Wall thickness variation S_e μm	
over	incl.	min.	max.			
250	315	-73	-41	12	The wall thickness variation S_e for the housing locating washer is identical to S_i for the shaft locating washer	
315	400	-82	-46	13		
400	500	-90	-50	15		
500	630	-99	-55	16		

Double direction axial angular contact ball bearings

Bearings for rotary tables

The normal tolerances of the bearings for rotary tables are given in the following tables.

Tolerances for shaft locating washer

Bore d mm		Bore deviation Δ_{dmp} μm	
over	incl.		
500	630	0	-51
630	800	0	-76
800	1 000	0	-102
1 000	1 250	0	-127
1 250	1 600	0	-165

Tolerances for housing locating washer

Outside diameter D mm		Outside diameter deviation Δ_{Dmp} μm	
over	incl.		
630	800	0	-76
800	1 000	0	-102
1 000	1 250	0	-127
1 250	1 600	0	-165

Tolerances for nominal bearing height

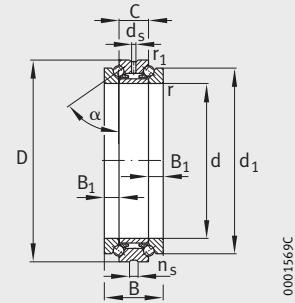
Bore d mm		Deviation of nominal bearing height Δ_{Ts} μm	
over	incl.		
500	630	+381	-381
630	800	+381	-381
800	1 000	+381	-381
1 000	1 250	+381	-381
1 250	1 600	+381	-381



Axial angular contact ball bearings

Double direction

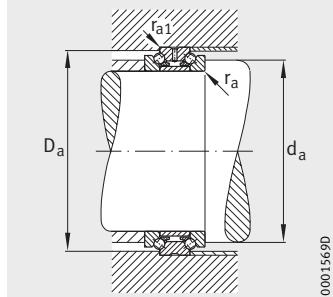
High precision bearings



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.	d _s	n _s
234444-M-SP	36,9	220	340	144	72	304	36	3	1,1	9,5	17,7
234744-M-SP	35,3	228	340	144	72	304	36	3	1,1	9,5	17,7
234448-M-SP	38,9	240	360	144	72	322	36	3	1,1	9,5	17,7
234748-M-SP	37,2	248	360	144	72	322	36	3	1,1	9,5	17,7
234452-M-SP	56,5	260	400	164	82	354	41	4	1,5	9,5	17,7
234752-M-SP	54,1	269	400	164	82	354	41	4	1,5	9,5	17,7
234456-M-SP	57,1	280	420	164	82	374	41	4	1,5	9,5	17,7
234756-M-SP	54,5	289	420	164	82	374	41	4	1,5	9,5	17,7
234460-M-SP	90,7	300	460	190	95	406	47,5	4	1,5	9,5	17,7
234760-M-SP	86,5	310	460	190	95	406	47,5	4	1,5	9,5	17,7
234464-M-SP	90,3	320	480	190	95	426	47,5	4	1,5	9,5	17,7
234764-M-SP	86,5	330	480	190	95	426	47,5	4	1,5	9,5	17,7
234468-M-SP	122	340	520	212	106	459	53	4	1,5	9,5	17,7
234768-M-SP	117	350	520	212	106	459	53	4	1,5	9,5	17,7
234472-M-SP	128	360	540	212	106	479	53	4	1,5	9,5	17,7
234772-M-SP	123	370	540	212	106	479	53	4	1,5	9,5	17,7
234476-M-SP	133	380	560	212	106	499	53	4	1,5	9,5	17,7
234776-M-SP	128	390	560	212	106	499	53	4	1,5	9,5	17,7
234480-M-SP	198	400	600	236	118	532	59	5	2	9,5	17,7
234780-M-SP	187	410	600	236	118	532	59	5	2	9,5	17,7
2344/500-M-SP	307	500	720	256	128	650	64	6	3	9,5	17,7
2347/500-M-SP	283	515	720	256	128	650	64	6	3	9,5	17,7



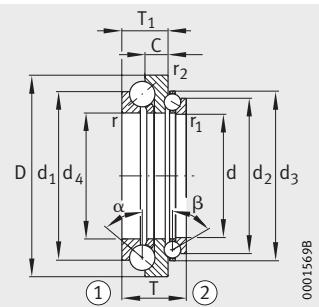
Mounting dimensions

Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	
d _a h12	D _a H12	r _a max.	r _{a1} max.	dyn. C _a kN	stat. C _{0a} kN	C _{ua} kN	n _G grease min ⁻¹	n _G oil min ⁻¹
269	318	2,5	1	340	1 330	71	1 600	2 200
269	318	2,5	1	340	1 330	71	1 600	2 200
289	338	2,5	1	350	1 420	73	1 500	2 000
289	338	3	1	350	1 420	73	1 500	2 000
317,5	374,5	3	1,5	400	1 680	83	1 400	1 900
317,5	374,5	3	1,5	400	1 680	83	1 400	1 900
337,5	394,5	3	1,5	415	1 790	86	1 300	1 800
337,5	394,5	3	1,5	415	1 790	86	1 300	1 800
366	428,5	3	1,5	480	2 170	99	1 200	1 700
366	428,5	3	1,5	480	2 170	99	1 200	1 700
386	448,5	3	1,5	495	2 310	103	1 200	1 700
386	448,5	3	1,5	495	2 310	103	1 200	1 700
413	485,5	3	1,5	580	2 850	124	1 100	1 600
413	485,5	3	1,5	580	2 850	124	1 100	1 600
433	505,5	3	1,5	590	2 950	125	1 000	1 500
433	505,5	3	1,5	590	2 950	125	1 000	1 500
453	525,5	3	1,5	610	3 150	130	1 000	1 500
453	525,5	4	1,5	610	3 150	130	1 000	1 500
480	561,5	4	2	680	3 650	147	900	1 300
480	561,5	4	2	680	3 650	147	900	1 300
591	680	6	3	800	4 800	174	750	1 000
591	680	6	3	800	4 800	174	750	1 000

Axial angular contact ball bearings

Double direction

For rotary tables



Dimension table · Dimensions in mm

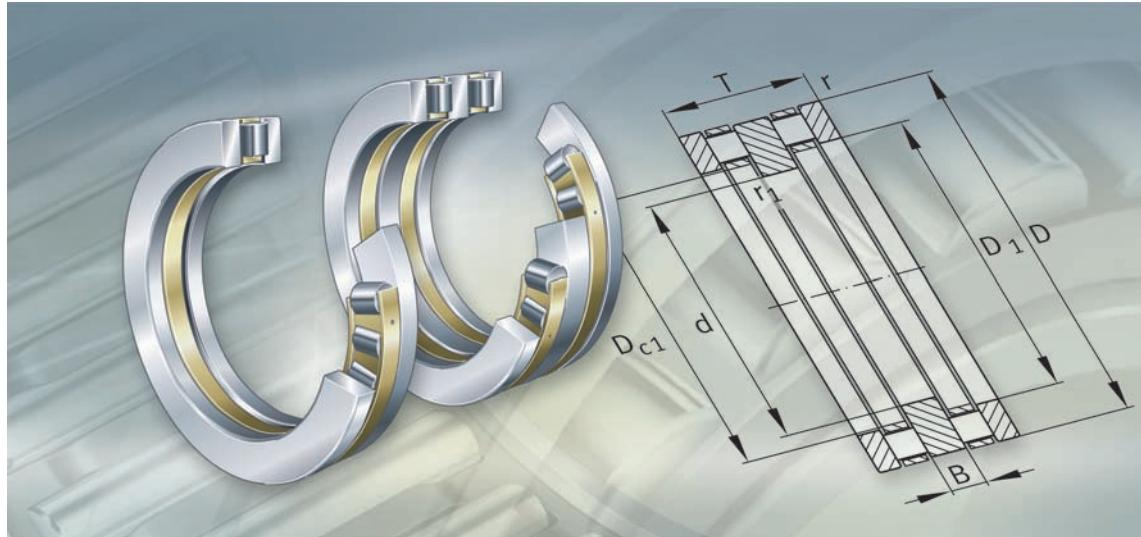
Designation	Mass m ≈kg	Dimensions						
		d	D	T	T ₁	C	d ₁	d ₂
Z-542060.ASKLZ	175	507,9	742,95	170,3	127	63,5	679,5	587,4
Z-542475.ASKLZ	320	786,917	1 006,2	197,74	139,547	69,85	901,7	999,2
Z-563286.ASKLZ	624	1 371,473	1 597,025	248,412	168,275	78,588	1 489,1	1 536,7



					Contact angle		Basic load ratings			
							Bearing ①		Bearing ②	
d ₃	d ₄	r min.	r ₁ min.	r ₂ min.	α °	β °	dyn. C _a kN	stat. C _{0a} kN	dyn. C _a kN	stat. C _{0a} kN
616	507,9	5	2,5	2	45	60	830	3 800	390	1 760
-	792	5	5	1,8	50	60	1 160	7 650	800	5 600
1 481,1	1 374,6	5	5	5	50	60	1 460	13 700	915	8 800



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Axial cylindrical roller bearings

Single direction

Double direction

Axial cylindrical roller bearings



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Product overview Axial cylindrical roller bearings

Single direction

Single row or double row

811, 812, Z-5..AR1



894, Z-5..AR1



Split

Double row or triple row

Z-5..AR1-01



Double direction

Z-5..AR2



Axial cylindrical roller bearings



Features

Axial cylindrical roller bearings have a low axial section height, high load capacity and high rigidity. Depending on the design, they can support axial forces in one direction or in both directions. Radial forces must be supported by separate means.

Single direction bearings

Single direction axial cylindrical roller bearings comprise an axial cylindrical roller and cage assembly, an externally centred housing locating washer and an internally centred shaft locating washer. The bore diameter, outside diameter and running surface of the housing locating washer and the shaft locating washer are precision machined. The bearings can support axial forces in one direction. Bearings 811, 812 are of a single row design and correspond to DIN 722/ISO 104, bearings 894 are of a double row design to DIN 616/ISO 104. Bearings with the designation Z-5..AR have non-standardised dimensions and designations.

Split bearings

Split axial cylindrical roller bearings are used for bearing positions that are difficult to access. They are fitted, for example, together with split radial cylindrical roller bearings in air preheaters. The bearings have two or three rows of rollers. The main dimensions and designations (Z-5..AR) of these bearings are not standardised.

Double direction bearings

Double direction axial cylindrical roller bearings comprise two axial cylindrical roller and cage assemblies, two externally centred housing locating washers and an internally centred intermediate washer. The bore diameter, outside diameter and running surface of the housing locating washers and the intermediate washer are precision machined. The intermediate washer is guided on the shaft and must be rigidly clamped in place. Double direction axial cylindrical roller bearings can support axial forces in both directions. The main dimensions and designations (Z-5..AR) of these bearings are not standardised.

Axial cylindrical roller bearings

Operating temperature

Axial cylindrical roller bearings and axial cylindrical roller and cage assemblies can be used at operating temperatures from -30 °C to +150 °C.

Cages

The bearings generally have brass cages. These are indicated in bearings of series 811 and 812 as well as 894 by the suffix M. We can provide information on the cage design in special bearings by agreement.

Suffixes

Suffixes for available designs of standardised bearings: see table.

Available designs

Suffix ¹⁾	Description	Design
M	Brass cage	Standard
P5	High dimensional, geometrical and running accuracy	Special design, available by agreement only

¹⁾ The design of the bearings with non-standardised designations (Z-5) is available by agreement from us.

Design and safety guidelines

Equivalent dynamic bearing load

Axial cylindrical roller bearings can support axial forces only.

For bearings under dynamic loading, the following applies:



$$P = F_a$$

P kN
Equivalent dynamic bearing load
 F_a kN
Axial dynamic bearing load.

Equivalent static bearing load

Axial cylindrical roller bearings can support axial forces only.

For bearings under static loading, the following applies:

$$P_0 = F_{0a}$$

P_0 kN
Equivalent static bearing load
 F_{0a} kN
Axial static bearing load.

Minimum axial load

In order to ensure reliable operation, the minimum axial load $F_{a\ min}$ in accordance with 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, see table
 C_{0a} N (observe the dimension)
Basic static load rating
 n min^{-1}
Speed.

Factor k_a

Series	Factor $k_a^{1)}$
811	1,4
812	0,9
894	0,5

¹⁾ We can provide k_a values for non-standardised bearings by agreement.

Axial cylindrical roller bearings

Limiting speed



The limiting speeds n_G given in the product tables are valid for oil lubrication. With grease lubrication, the permissible value is 25% of the value given in the table.

Design of adjacent parts



Axial bearing washers must be fully supported over their entire surface.

The abutment shoulders should be rigid, flat and perpendicular to the axis of rotation.

The radial cage guidance surfaces must be precision machined and wear-resistant ($R_z 4$ ($R_a 0,8$)).

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 + 70 HV and the hardening depth CHD or SHD must be sufficiently deep.

Tolerances for shafts and housing bores

Shaft and housing bore tolerances

Bearing component	Shaft tolerance	Bore tolerance
Cage	Shaft guided	h8
Housing locating washer	–	H9
Shaft locating washer	–	h8

Orientation of washers



The axial bearing washers must be fitted with the raceway side facing the rolling elements.

On housing locating washers, the raceway side is indicated by the smaller chamfer on the outside diameter.

On shaft locating washers, the raceway side is indicated by the smaller chamfer on the bore diameter.



Accuracy

The dimensional and running tolerances of axial bearing washers GS and WS correspond to tolerance class PN to DIN 620.

Tolerances for the bore diameter and outside diameter as well as the width of the bearing components are shown in the table and *Figure 1*.

**Tolerances
for bearing components**

Series	Tolerance					
	Bore		Outside diameter		Height	
K811	D_{c1}	E11 ¹⁾	D_c	a13 ¹⁾	D_w	to DIN 5402-1
K812						
K894						
GS811	D_1	–	D	to DIN 620	B	h11
GS812						
GS894						
WS811	d	to DIN 620	d_1	–	B	h11
WS812						
WS894						

¹⁾ Deviation from mean diameter.

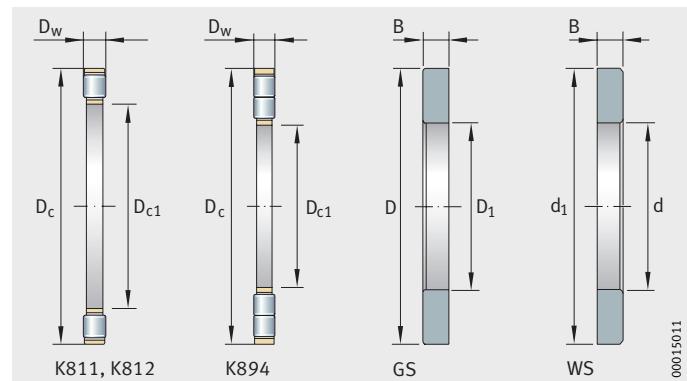


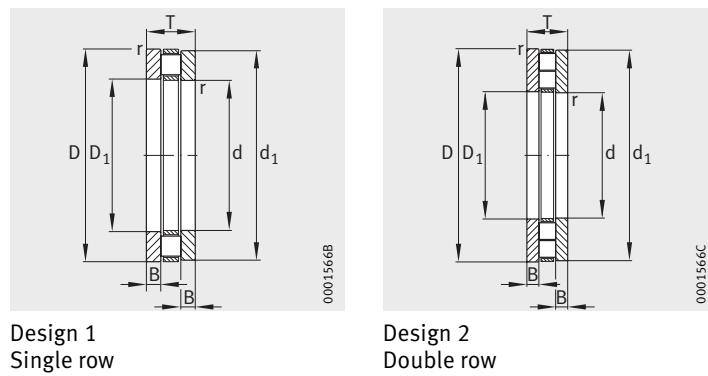
Figure 1
Bearing components

We can provide the tolerances for non-standardised bearings by agreement.

Axial cylindrical roller bearings

Single direction

Single row and double row

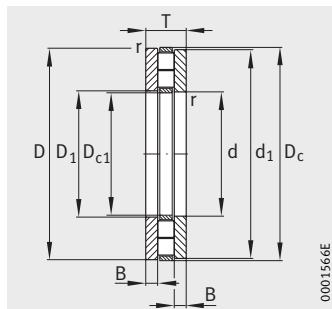


Design 1
Single row

Design 2
Double row

Dimension table · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	B	r min.	D ₁
89432-M	2	42	160	320	95	31,5	5	164
89434-M	2	51,9	170	340	103	34,5	5	174
89436-M	2	60	180	360	109	36,5	5	184
89438-M	2	72,1	190	380	115	38,5	5	195
89440-M	2	82,6	200	400	122	41	5	205
89444-M	2	90,1	220	420	122	41	6	225
81248-M	1	26,2	240	340	78	23	2,1	244
89448-M	2	95,9	240	440	122	41	6	245
81152-M	1	9,08	260	320	45	13,5	1,5	263
81252-M	1	28,6	260	360	79	23,5	2,1	264
89452-M	2	125	260	480	132	44	6	265
81156-M	1	12,6	280	350	53	15,5	1,5	283
81256-M	1	31	280	380	80	24	2,1	284
89456-M	2	159	280	520	145	48,5	6	285
Z-548745.AR	1	52,2	285	430	95	25	4	285
81160-M	1	19,4	300	380	62	18,5	2	304
81260-M	1	48,25	300	420	95	28,5	3	304
89460-M	2	170	300	540	145	48,5	6	305
81164-M	1	20,7	320	400	63	19	2	324
81264-MB	1	46,9	320	440	95	28,5	3	325
89464-M	2	203	320	580	155	43,5	7,5	325
Z-525487.AR	4	70,7	330	495	89	28,5	2,1	330
81168-MB	1	21,3	340	420	64	19,5	2	344
81268-MB	1	50	340	460	96	29	3	345
89468-MB	2	257	340	620	170	57	7,5	345
81172-MB	1	22,5	360	440	65	20	2	364
81272-MB	1	71,4	360	500	110	32,5	4	365
89472-MB	2	267	360	640	170	57	7,5	365
81176-MB	1	27,7	380	460	65	20	2	384
81276-MB	1	76,5	380	520	112	33,5	4	385
89476-MB	2	298	380	670	175	57,5	7,5	385
81180-MB	1	24,7	400	480	65	20	2	404
81280-MB	1	79,4	400	540	112	33,5	4	405
89480-MB	2	353	400	710	185	60,5	7,5	405



Design 4
Double row

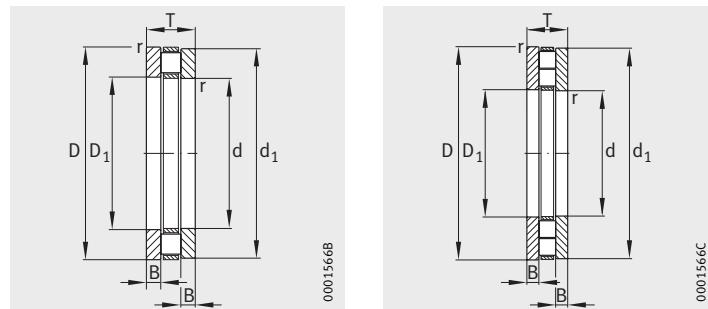


d ₁	D _c	D _{c1}	Basic load ratings		Fatigue limit load C _{ua} kN	n _G min ⁻¹	n _B min ⁻¹
			dyn. C _a kN	stat. C _{0a} kN			
320	–	–	1 780	6 500	560	1 160	410
340	–	–	1 990	7 400	640	1 090	375
360	–	–	2 210	8 200	690	1 040	360
380	–	–	2 450	9 200	770	990	330
400	–	–	2 700	10 200	840	940	315
420	–	–	2 900	11 500	940	870	270
335	–	–	1 370	5 000	425	960	395
440	–	–	3 000	12 200	980	830	250
317	–	–	620	2 650	205	980	390
355	–	–	1 440	5 400	455	910	355
480	–	–	3 600	14 700	1 150	760	224
347	–	–	860	3 650	285	900	345
375	–	–	1 460	5 600	465	850	335
520	–	–	4 200	17 600	1 360	700	199
430	–	–	2 160	7 500	600	900	–
376	–	–	1 060	4 500	355	840	330
415	–	–	1 930	7 300	600	780	305
540	–	–	4 350	18 500	1 420	670	188
396	–	–	1 100	4 750	370	790	290
435	–	–	1 760	6 550	510	800	220
575	–	–	5 500	19 900	1 430	630	185
495	493,5	318	2 360	11 000	810	750	–
416	–	–	1 040	4 500	345	760	220
455	–	–	1 860	7 100	550	750	200
620	–	–	5 500	23 600	1 700	630	–
436	–	–	1 100	4 900	370	750	200
495	–	–	2 400	9 150	690	670	180
640	–	–	5 700	25 000	1 770	630	–
456	–	–	1 080	4 900	365	750	200
515	–	–	2 500	9 500	710	640	170
670	–	–	6 200	27 000	1 880	600	–
476	–	–	1 120	5 100	375	650	190
535	–	–	2 550	10 000	740	670	160
710	–	–	7 100	30 500	2 130	560	–

Axial cylindrical roller bearings

Single direction

Single row and double row

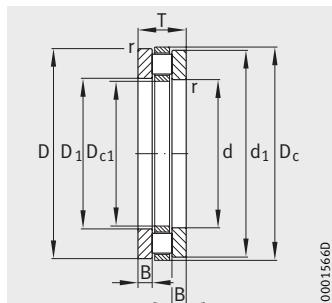


Design 1
Single row

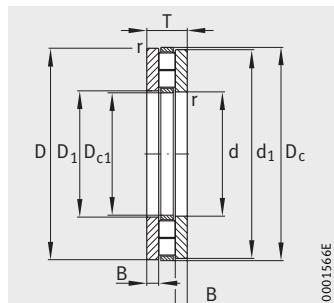
Design 2
Double row

Dimension table (continued) · Dimensions in mm

Designation	Design	Mass \approx kg	Dimensions					
			d	D	T	B	r min.	D_1
81184-MB	1	25,7	420	500	65	20	2	424
81284-MB	1	112	420	580	130	39	5	425
89484-MB	2	369	420	730	185	60,5	7,5	425
Z-525488.AR	4	71,1	431,4	571,4	89	28,5	4	431,4
81188-MB	1	40,2	440	540	80	24	2,1	444
81288-MB	1	117	440	600	130	39	5	445
89488-MB	2	484	440	780	206	69	9,5	445
Z-560390.01.AR	3	24,3	460	540	54	18	2	463
81192-MB	1	51,9	460	560	80	24	2,1	464
81292-MB	1	120	460	620	130	39	5	465
89492-MB	2	496	460	800	206	69	9,5	465
81196-MB	1	45,2	480	580	80	24	2,1	484
81296-MB	1	139	480	650	135	39,5	5	485
89496-MB	2	619	480	850	224	74,5	9,5	485
Z-525141.AR	4	144	482,6	673,1	114,3	34,65	5	482,6
811/500-MB	1	54,2	500	600	80	24	2,1	505
812/500-MB	1	144	500	670	135	39,5	5	505
894/500-MB	2	626	500	870	224	67	9,5	505
Z-560076.AR	1	12,6	530	590	36	11,5	2	532
811/530-MB	1	58,2	530	640	85	25,5	3	535
Z-525429.AR	1	140	530	710	120	30	4	535
812/530-MB	1	169	530	710	140	40	5	535
894/530-MB	2	736	530	920	236	70,5	9,5	535
811/560-MB	1	61,8	560	670	85	25,5	3	565
812/560-MB	1	202	560	750	150	45	5	565
Z-547234.AR	4	168	572	763	115	35	5	572
Z-560401.AR	3	28,4	585	665	54	18	3	588
811/600-MB	1	65,3	600	710	85	25,5	3	605
812/600-MB	1	244	600	800	160	48	5	605
Z-545106.AR	4	176	622,3	812,8	114,3	32,15	5	622,3
811/630-MB	1	81,2	630	750	95	28,5	3	635
812/630-MB	1	311	630	850	175	53,5	6	635
Z-529071.AR	2	1 190	630	1 090	280	77,5	15	635
Z-529509.AR	2	323	650	930	130	40	4	650



Design 3
Single row



Design 4
Double row



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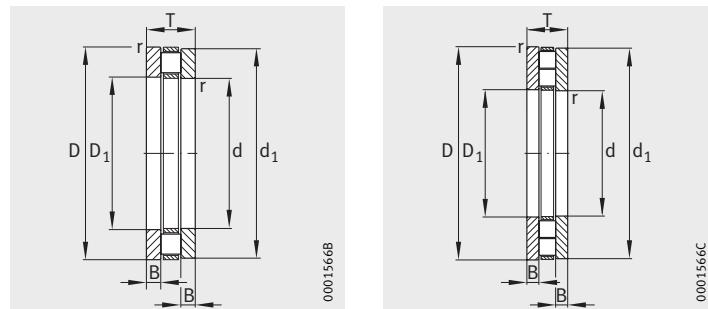
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d ₁	D _c	D _{c1}	Basic load ratings		Fatigue limit load C _{ua} kN	Limiting speed n _G min ⁻¹	Reference speed n _B min ⁻¹
			dyn. C _a kN	stat. C _{0a} kN			
495	—	—	1 140	5 400	390	630	180
575	—	—	3 200	12 200	900	630	150
730	—	—	7 350	32 500	2 220	530	—
571,4	569,5	419,5	2 280	11 200	760	630	—
535	—	—	1 660	7 350	530	590	160
595	—	—	3 250	12 900	930	600	140
780	—	—	8 150	36 500	2 420	530	—
537	545	455,135	750	4 000	270	630	—
555	—	—	1 700	7 800	550	560	150
615	—	—	3 350	13 400	960	560	140
800	—	—	8 500	38 000	2 500	480	—
575	—	—	1 730	8 000	560	540	150
645	—	—	3 750	15 000	1 070	530	130
850	—	—	9 500	42 500	2 750	450	—
673,1	672	470,154	3 900	18 300	1 210	530	—
595	—	—	1 760	8 500	590	560	140
665	—	—	3 800	15 600	1 100	530	120
870	—	—	11 200	47 500	3 000	450	—
588	—	—	465	2 850	179	530	—
635	—	—	2 000	9 500	660	530	130
705	—	—	4 650	19 300	1 340	530	—
705	—	—	4 400	18 000	1 240	530	110
920	—	—	12 000	50 000	3 150	430	—
665	—	—	2 040	10 000	680	530	120
745	—	—	4 400	18 600	1 270	480	110
763	760	560	4 250	21 600	1 370	480	—
662	—	—	765	4 500	285	530	—
705	—	—	2 080	10 600	700	480	120
795	—	—	5 000	21 200	1 430	450	100
812,8	825,5	610,5	5 000	25 500	1 480	430	—
745	—	—	2 500	12 500	810	450	110
845	—	—	5 600	24 000	1 550	430	95
1 090	—	—	16 300	64 000	3 750	360	—
930	—	—	6 300	35 500	2 200	380	—

Axial cylindrical roller bearings

Single direction

Single row and double row



Design 1
Single row

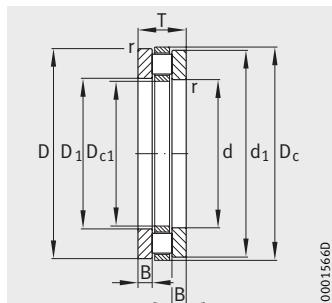
Design 2
Double row

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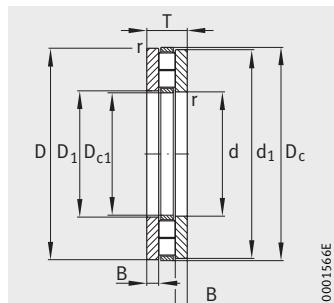
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Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions					
			d	D	T	B	r min.	D ₁
811/670-MB	1	209	670	800	105	31,5	4	675
812/670-MB	1	352	670	900	180	52,5	6	675
Z-534632.AR	4	196	673,303	876,173	111,125	29,562	3	673,303
811/710-MB	1	134	710	850	112	33,5	4	715
812/710-MB	1	413	710	950	190	57,5	6	715
812/710-MB	1	413	710	950	190	57,5	6	715
Z-530311.01.AR	4	343	711,327	964,514	127,127	39,56	7,5	711,327
811/750-MB	1	160	750	900	120	36	4	755
812/750-MB	1	464	750	1000	195	57,5	6	755
Z-560389.01.AR	3	43,1	760	840	57	19	4	763
811/800-MB	1	170	800	950	120	36	4	805
812/800-MB	1	539	800	1060	205	60	7,5	805
811/850-MB	1	181	850	1000	120	36	4	855
812/850-MB	1	611	850	1120	212	61	7,5	855
811/900-MB	1	216	900	1060	130	39	5	905
812/900-MB	1	697	900	1180	220	65	7,5	905
Z-560391.01.AR	3	63,7	950	1050	60	20	4	953
811/950-MB	1	252	950	1120	135	40,5	5	955
812/950-MB	1	837	950	1250	236	68	7,5	955
811/1000-MB	1	303	1 000	1180	140	42	5	1 005
812/1000-MB	1	1 010	1 000	1320	250	75	9,5	1 005
811/1060-MB	1	356	1 060	1250	150	45	5	1 065
812/1060-MB	1	1 210	1 060	1400	265	77,5	9,5	1 065
811/1120-MB	1	503	1 120	1320	160	48	5	1 125
811/1180-MB	1	541	1 180	1400	175	53,5	6	1 185
Z-560392.AR	3	76,2	1 205	1295	64	21,5	5	1 208
811/1250-MB	1	538	1 250	1460	175	53,5	6	1 255
811/1320-MB	1	616	1 320	1540	175	53,5	6	1 325
811/1400-MB	1	702	1 400	1630	180	54	6	1 405
811/1800-MB	1	1 430	1 800	2080	220	65	7,5	1 806



Design 3
Single row



Design 4
Double row



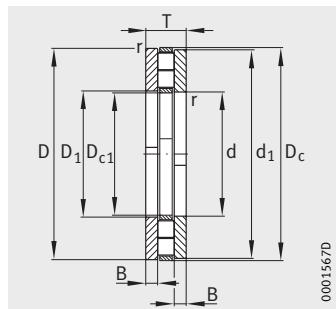
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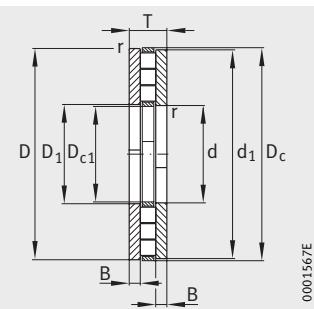
d ₁	D _c	D _{c1}	Basic load ratings		Fatigue limit load C _{ua} kN	Limiting speed n _G min ⁻¹	Reference speed n _B min ⁻¹
			dyn. C _a kN	stat. C _{0a} kN			
795	—	—	2 900	14 600	940	430	100
895	—	—	6 550	28 000	1 810	400	85
876,173	876	674,624	5 500	29 000	1 770	530	—
845	—	—	3 350	16 600	1 050	400	90
945	—	—	6 950	30 500	1 920	380	85
945	—	—	6 950	30 500	1 920	380	85
964,514	956	695,58	6 000	34 000	2 110	380	—
895	—	—	3 750	19 000	1 190	380	85
995	—	—	7 800	34 500	2 120	360	75
837	845	755	1 000	6 550	390	380	—
945	—	—	3 900	20 000	1 230	360	80
1 055	—	—	8 650	39 000	2 370	340	70
995	—	—	3 900	20 800	1 260	340	80
1 115	—	—	9 650	44 000	2 650	320	63
1 055	—	—	4 650	24 500	1 480	320	70
1 175	—	—	9 800	45 500	2 700	280	63
1 047	1 055	945	1 290	9 500	530	320	—
1 115	—	—	5 000	27 500	1 610	320	67
1 245	—	—	11 800	54 000	3 150	280	56
1 175	—	—	5 500	30 000	1 750	280	63
1 315	—	—	12 000	56 000	3 200	260	56
1 245	—	—	6 100	33 500	1 920	260	60
1 395	—	—	14 000	65 500	3 700	260	53
1 315	—	—	6 950	38 000	2 170	260	56
1 395	—	—	7 650	43 000	2 360	240	53
1 292	1 300	1 200	1 250	9 300	485	240	—
1 455	—	—	8 000	45 500	2 480	220	48
1 535	—	—	8 150	48 000	2 550	220	45
1 625	—	—	9 300	56 000	2 950	200	40
2 074	—	—	15 000	95 000	4 650	160	30

Axial cylindrical roller bearings

Split, single direction
Double row and triple row



Design 1
Double row



Design 2
Triple row

Dimension table · Dimensions in mm

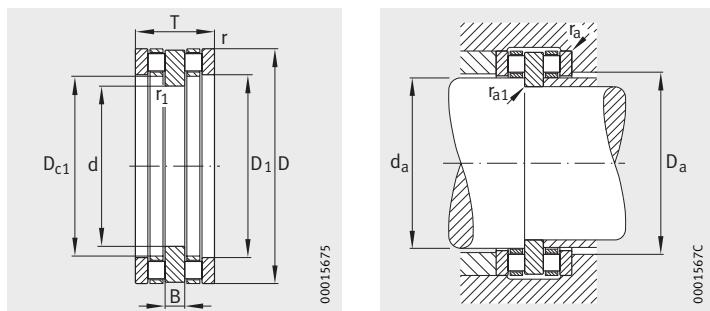
Designation	Design	Mass m ≈kg	Dimensions				
			d	D	T	B	r min.
Z-543424.AR	1	66,4	330	495,3	88,9	27,45	5
Z-528428.AR	2	233	355,58	660,55	133,4	44,7	5
Z-543509.AR	2	236	365	660,4	133,3	44,65	6
Z-543342.AR	1	144	425	635	114,3	35,15	10
Z-528429.AR	1	258	475,235	736,75	146,1	47,05	5
Z-543463.AR	1	265	482	736,6	146,1	47,05	7,5
Z-543809.AR	2	446	635	939,8	146	48	9,5



				Basic load ratings		Fatigue limit load	Limiting speed
D ₁	d ₁	D _c	D _{c1}	dyn. C _a kN	stat. C _{0a} kN	C _{ua} kN	n _G min ⁻¹
330	495,3	495	317,5	2 280	10 000	750	750
373,635	658,14	671	356,05	4 550	21 600	1 470	600
365	658	680	355,6	4 550	21 600	1 470	600
425	635	635	406,4	3 800	17 600	1 050	600
475,235	736,75	745	457,735	5 200	24 500	1 670	530
482	736,6	746	457,2	5 200	24 500	1 670	530
635	939,8	981,3	533,545	6 800	39 000	2 370	400

Axial cylindrical roller bearings

Double direction



Mounting dimensions

Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions								
		d	D	T	B	r min.	r_1 min.	D_1	d_1	$D_{c1}^{1)}$
Z-507120.AR	33,9	240	340	120	32	2,1	1,1	264	338	260
Z-507121.AR	35,1	260	360	120	32	2,1	1,1	284	358	280
Z-507122.AR	39,9	280	380	120	32	2,1	1,1	304	378	300
Z-507122.AR-MBS	37,3	280	380	120	32	2,1	1,1	304	378	300
Z-507123.AR	60	300	420	146	38	3	1,5	330	417	325
Z-507124.AR	64	320	440	146	38	3	1,5	350	437	345
Z-507125.AR	64,6	340	460	146	38	3	1,5	370	459	365
Z-507130.AR	141	440	600	190	50	5	3	485	597	475
Z-507131.AR	175	460	620	190	50	5	3	505	617	495,135
Z-507131.AR-MBS	175	460	620	190	50	5	3	505	617	495,135
Z-507132.AR	182	480	650	206	54	5	3	525	646	515,145
Z-507132.AR-MBS	182	480	650	206	54	5	3	525	646	515,145
Z-507133.AR	196	500	670	206	54	5	3	545	666	535
Z-507134.AR	224	530	710	218	57	5	3	580	706	567
Z-507134.AR-MBS	224	530	710	218	57	5	3	580	706	567
Z-507135.AR	271	560	750	230	60	5	3	615	746	600
Z-507136.AR	327	600	800	244	64	5	3	655	796	640
Z-507137.AR	411	630	850	264	70	8	5	690	845	675
Z-507138.AR	479	670	900	280	75	6	4	735	895	720
Z-507140.AR	623	750	1000	300	80	6	4	820	995	805
Z-507141.AR	708	800	1060	310	82	7,5	5	875	1 054	855
Z-507142.AR	799	850	1120	320	85	7,5	5	930	1 114	910
Z-507143.AR	938	900	1180	340	90	7,5	5	980	1 174	960
Z-507144.AR	1 120	950	1250	360	92	7,5	5	1 035	1 246	1 015
Z-507145.AR	1 330	1 000	1 320	380	96	9,5	6	1 090	1 316	1 070
Z-507146.AR	1 630	1 060	1 400	412	102	9,5	6	1 155	1 394	1 135

¹⁾ Tolerance to E11.

²⁾ Shaft tolerances, see table.

Shaft tolerances

Nominal dimension of shaft d_a in mm

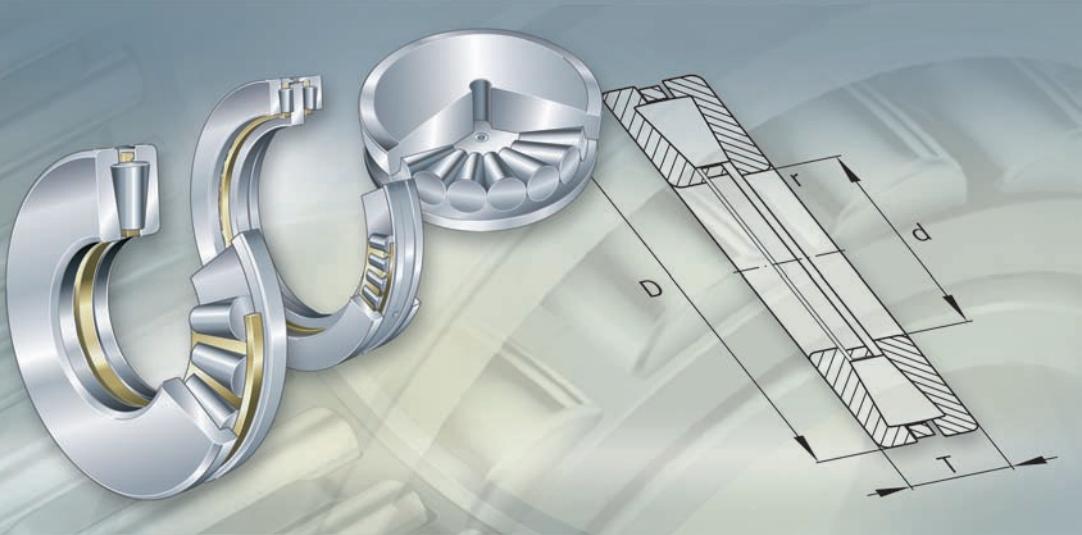
over incl.	120 300	300 600	600 760	760 960	960 1 135
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Deviations in μm

upper	0	0	0	0	0
lower	-50	-70	-100	-125	-150



Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed
$d_a^{2)}$	D_a	r_a	r_{a1}	dyn. C_a kN	stat. C_{0a} kN	C_{ua} kN	n_G min^{-1}
260	274	2	1	880	3 350	275	1 000
280	294	2	1	950	3 750	300	950
300	314	2	1	980	4 000	305	900
300	314	2	1	980	4 000	305	900
325	341	2,5	1,5	1 290	5 200	355	850
345	361	2,5	1,5	1 320	5 400	410	800
365	381	2,5	1,5	1 370	5 700	430	750
475	498	4	2,5	2 160	9 500	670	560
495	518	4	2,5	2 240	10 200	700	560
495	518	4	2,5	2 240	10 200	700	560
515	539	4	2,5	2 600	11 800	810	530
515	539	4	2,5	2 600	11 800	810	530
535	559	4	2,5	2 650	12 000	830	530
567	592	4	2,5	3 000	13 700	920	480
567	592	4	2,5	3 000	13 700	920	480
600	625	4	2,5	3 350	15 300	1 010	450
640	668	4	2,5	3 650	17 000	1 120	430
675	706	6,5	4	4 250	20 000	1 300	400
720	752	5	3	4 550	21 600	1 380	380
805	840	5	3	5 300	26 000	1 610	340
855	891	6	4	5 850	29 000	1 770	340
910	948	6	4	6 100	31 500	1 830	280
960	999	6	4	6 950	35 500	2 060	280
1 015	1 056	6	4	8 000	41 500	2 360	260
1 070	1 113	8	5	9 000	46 500	2 600	260
1 135	1 185	8	5	9 300	49 000	2 700	240



Axial tapered roller bearings

Single direction
Double direction
For screw-down mechanisms

Single direction axial tapered roller bearings

Single direction axial tapered roller bearings

..... 796

Single direction axial tapered roller bearings with two tapered raceways can support very high axial forces in one direction. The bearings are separable. As a result, the rings can be fitted separately.

The inch size main dimensions and the designations Z-5..TA1 or F-8..TA1 of these special bearings are not standardised. A typical application for these axial tapered roller bearings is in flush heads for drilling rigs.

Double direction axial tapered roller bearings

..... 804

Double direction axial tapered roller bearings can support very high axial forces in both directions.

In these ready-to-fit bearings, the axial internal clearance is set by the ring between the housing locating washers. The bearings are used, for example, in blooming stands and section rolling stands.

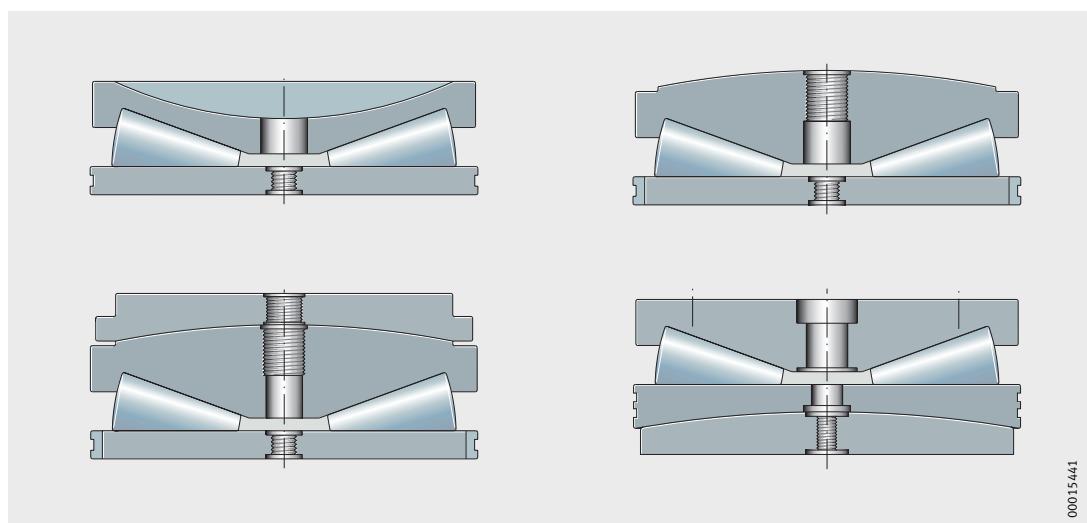
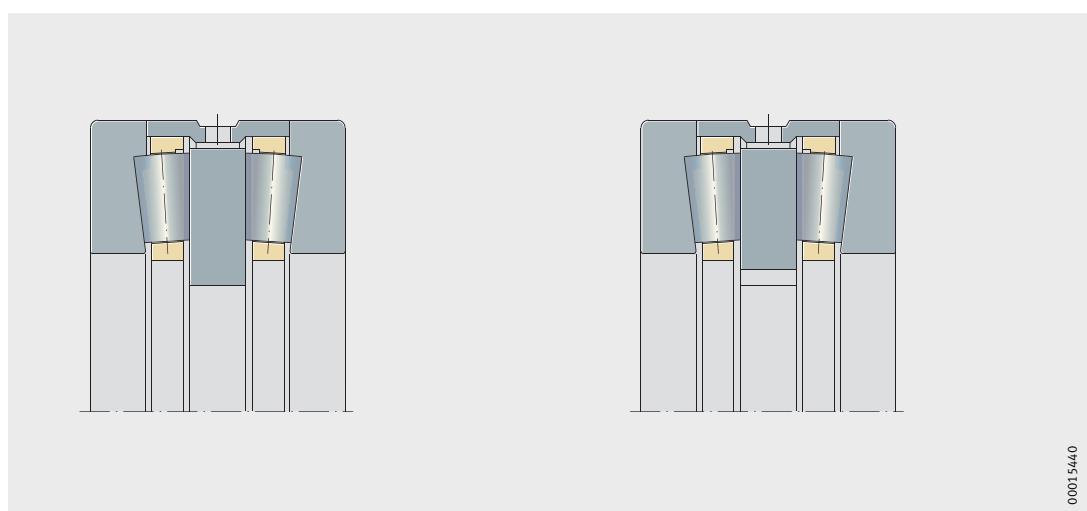
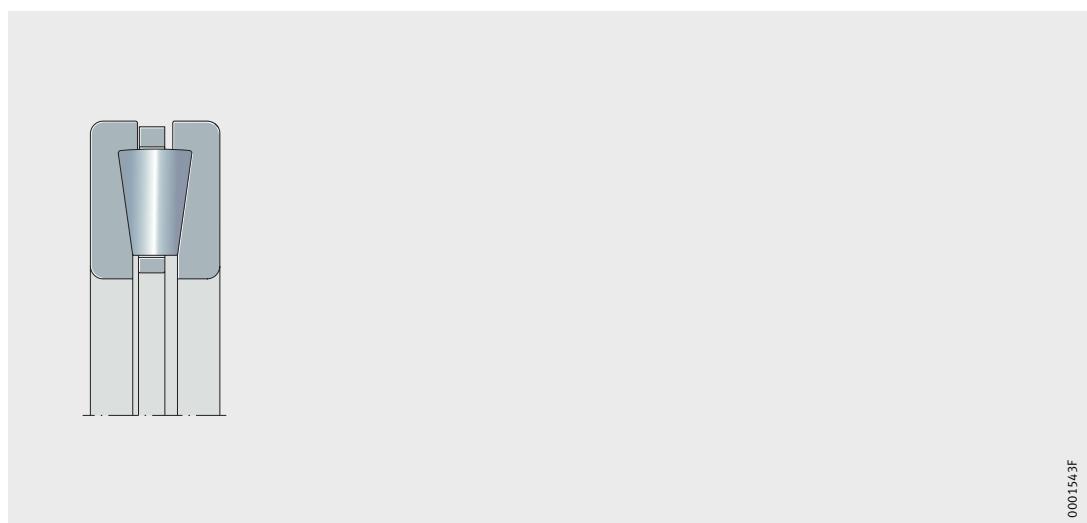
The metric main dimensions and designations Z-5..TA2 of these special bearings are not standardised.

Axial tapered roller bearings for screw-down mechanisms

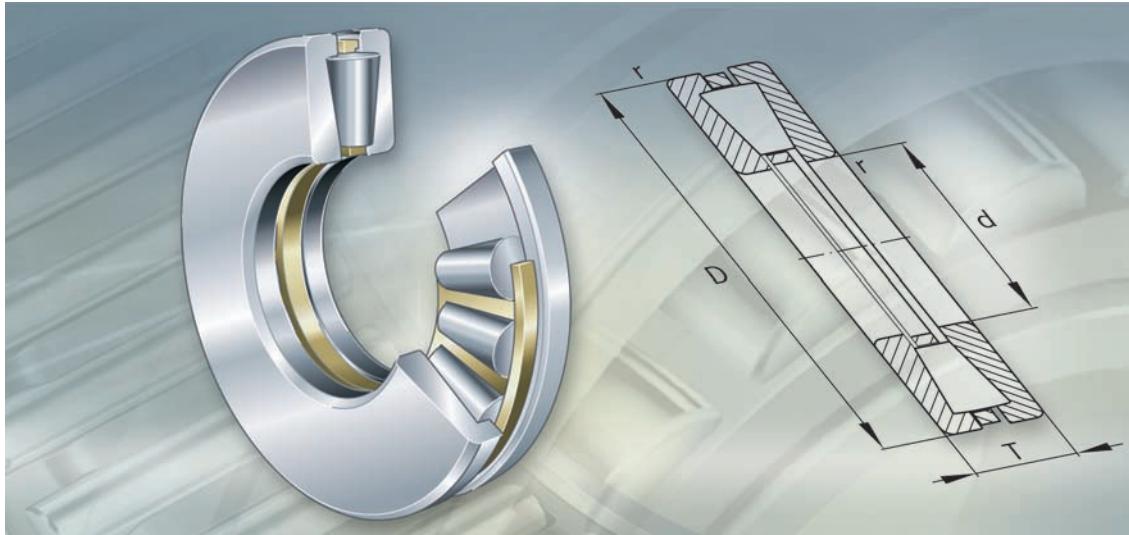
..... 812

Axial tapered roller bearings for screw-down mechanisms in rolling stands can support extremely high axial forces in one direction. The separable bearings are fitted between the upper chock and the screw-down mechanism. Due to their low friction, these bearings reduce the screw-down forces.

Axial tapered roller bearings for screw-down mechanisms have non-standardised dimensions and designations Z-5..TA1 or F-8..TA1. The bearings are available in various designs.



FAG



Single direction axial tapered roller bearings

Single direction axial tapered roller bearings

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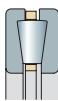
Product overview **Single direction
axial tapered roller bearings**

Single direction

Z-5..TA1-01, F-8..TA1-01



Single direction axial tapered roller bearings



Features

Single direction axial tapered roller bearings comprise a shaft locating washer and a housing locating washer, into which tapered raceways are machined, and a cage with tapered rollers. Due to the large number of tapered rollers, the bearings have high rigidity. Single direction axial tapered roller bearings are separable. The bearing washers and the cage with the roller set can be fitted separately. Single direction axial tapered roller bearings have non-standardised dimensions and designations Z-5..TA1 or F-8..TA1.

Axial load capacity

In their main application in flush heads for drilling rigs, the bearings can support very high axial forces (the weight of the rotating drill string) in one direction. The axial counterstay function is performed by a radial tapered roller bearing. As a result, the shaft locating washer cannot lift off if shocks occur in an upward direction.

Sealing

Single direction axial tapered roller bearings are not sealed.

Lubrication

Due to the vertical arrangement of the shaft, the single direction axial tapered roller bearings are lubricated with oil.

Operating temperature

Single direction axial tapered roller bearings can be used at operating temperatures from -30°C to $+150^{\circ}\text{C}$.

Cage

Single direction axial tapered roller bearings have a solid cage made from brass.

Single direction axial tapered roller bearings

Design and safety guidelines

Equivalent dynamic bearing load

Single direction axial tapered roller bearings can support axial forces only.

For bearings under dynamic loading, the following applies:

$$P = F_a$$

P kN
Equivalent dynamic bearing load
 F_a kN
Axial dynamic bearing load.

Equivalent static bearing load

Single direction axial tapered roller bearings can support axial forces only.

For bearings under static loading, the following applies:

$$P_0 = F_{0a}$$

P_0 kN
Equivalent static bearing load
 F_{0a} kN
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.

We can provide the minimum load factor A by agreement.

For n_{\max} , the maximum operating speed must be used.

$$F_{a \min} = A \cdot \left(\frac{n_{\max}}{1000} \right)^2$$

$F_{a \min}$ kN
Minimum axial load
A –
Minimum load factor A, values available by agreement
 n_{\max} min⁻¹
Maximum operating speed.

Accuracy

Normal tolerances for single direction axial tapered roller bearings, see tables.

Tolerances for shaft locating washer

Bore d mm		Bore deviation Δ_{dmp} μm	
over	incl.		
76,2	304,8	+25	0
304,8	609,6	+51	0
609,6	914,4	+76	0
914,4	1219,2	+102	0



Tolerances for housing locating washer

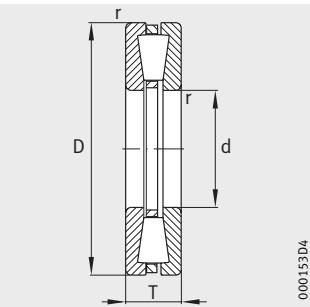
Outside diameter D mm		Outside diameter deviation Δ_{Dmp} μm	
over	incl.		
152,4	304,8	+25	0
304,8	609,6	+51	0
609,6	914,4	+76	0
914,4	1219,2	+102	0

Tolerances for nominal bearing height

Bore d mm		Deviation of nominal bearing height Δ_{Ts} μm	
over	incl.		
76,2	304,8	+381	-381
304,8	609,6	+381	-381
609,6	914,4	+381	-381
914,4	1219,2	+381	-381

Axial tapered roller bearings

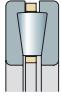
Single direction



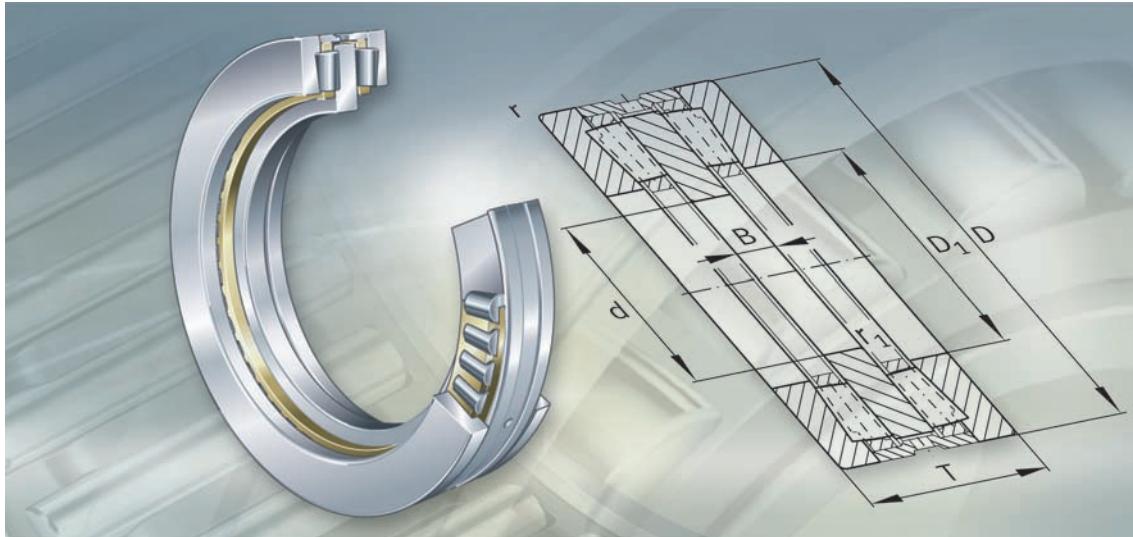
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Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions				Basic load ratings		Fatigue limit load C _{ua} kN
		d	D	T	r min.	dyn. C _a kN	stat. C _{0a} kN	
Z-535741.01.TA1	42,4	174,626	358,775	82,55	6,4	2 120	9 100	740
Z-547667.TA1	47,3	177,8	368,3	82,55	8	2 200	9 100	740
Z-549585.TA1	85,9	177,8	431,8	101,6	3,3	3 450	15 100	1 170
Z-547712.TA1	36,8	190	355,6	74,219	6,4	1 910	8 100	670
Z-514560.TA1	64,6	203,2	419,1	92,075	9,7	2 800	12 300	970
Z-547713.TA1	91,5	203,2	419,1	120,65	9,7	2 800	12 300	970
Z-547380.TA1	62	228,6	431,8	88,773	9,7	2 700	11 900	930
Z-512133.01.TA1	103	228,6	482,6	104,775	11,2	3 700	16 500	1 240
Z-546631.TA1	102	234,95	482,6	104,775	11,2	3 700	16 500	1 240
Z-513052.01.TA1	162	234,95	546,1	127	16	4 900	23 000	1 660
Z-537504.TA1	127	241,3	495,3	127	8	3 650	16 000	1 210
Z-547591.TA1	145	254	539,75	117,475	11,2	4 500	19 700	1 440
Z-539210.TA1	165	273,05	552,45	133,35	8	4 400	19 600	1 430
Z-539209.TA1	265	273,05	577,85	177,8	10	4 950	19 800	1 420
Z-539211.TA1	226	273,05	603,25	146,05	8	5 400	25 000	1 780
Z-546633.TA1	216	279,4	603,25	136,525	11,2	6 000	26 500	1 860
Z-547931.TA1	321	292,1	660,4	165,1	12,7	7 500	32 000	2 190
Z-549175.TA1	144	368,3	603,25	120,65	9,7	4 150	17 600	–
Z-549176.TA1	261	406,4	711,2	146,05	9,7	6 700	30 000	2 010
Z-533633.01.TA1	525	406,4	838,2	177,8	12,7	10 000	50 000	–
Z-521644.TA1	788	508	990,6	196,85	12,7	13 300	72 000	4 400
F-807320.TA1	630	1240	1 540	140	9,7	11 000	77 000	4 150



FAG



Double direction axial tapered roller bearings

Double direction axial tapered roller bearings

	Page
Product overview	Double direction axial tapered roller bearings
Features	Axial load capacity Operating temperature Cage
Design and safety guidelines	Equivalent dynamic bearing load Equivalent static bearing load..... Minimum axial load Design of bearing arrangements
Accuracy
Dimension tables	Axial tapered roller bearings, double direction, with intermediate ring.....



**Product overview Double direction
axial tapered roller bearings**

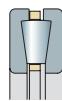
Double direction

Z-5..TA2



0001539

Double direction axial tapered roller bearings



Features

Double direction axial tapered roller bearings have a flat shaft locating washer and two housing locating washers. Tapered raceways are machined into the housing locating washers. A spacer ring between the housing locating washers guides the two cages with tapered rollers and sets the axial internal clearance. Due to the large number of tapered rollers, the bearings have high rigidity. Double direction axial tapered roller bearings have non-standardised metric dimensions and designations Z-5..TA2. The bearings are separable. The bearing washers and the cages with rollers can be fitted separately. Bearings of Design 2 have, in contrast to those of Design 1, a retaining slot in the shaft locating washer, see section Design of bearing arrangements, page 808.

Axial load capacity

Double direction axial tapered roller bearings can support very high axial forces in both directions at moderate speeds. The bearings are fitted in preference in blooming stands and section rolling stands, in which multi-row cylindrical roller bearings are used as radial bearings.

Operating temperature

The double direction axial tapered roller bearings can be used at operating temperatures from $-30\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$.

Cage

The solid brass cages are guided by the spacer ring which is arranged between the two housing locating washers.

Double direction axial tapered roller bearings

Design and safety guidelines Equivalent dynamic bearing load

Double direction axial tapered roller bearings can support axial forces only.

For bearings under dynamic loading, the following applies:

$$P = F_a$$

P kN
Equivalent dynamic bearing load
 F_a kN
Axial dynamic bearing load.

Equivalent static bearing load

Double direction axial tapered roller bearings can support axial forces only.

For bearings under static loading, the following applies:

$$P_0 = F_{0a}$$

P_0 kN
Equivalent static bearing load
 F_{0a} kN
Axial static bearing load.

Minimum axial load

The spacer ring between the housing locating washers is matched such that slight preload is present once the cover screws on the chock have been tightened.

Design of bearing arrangements Shaft and housing tolerances

The double direction axial tapered roller bearings are generally mounted loose on the journal and also located loose in the chocks. Bearings of Design 2 have a retaining slot in the shaft locating washer. Feather keys, for example, are then used to ensure that this washer also rotates reliably.

If the bearings are located on a sleeve for easier fitting, the shaft locating washer should have a slight interference fit.

Mounting dimensions

The dimension tables give the maximum value of the radii r_a and r_{a1} and the diameters of the abutment shoulders d_a .

Accuracy

The diameter tolerances correspond to tolerance class PN to DIN 620-3. Please contact us for information on the section height tolerances.

Tolerances for shaft locating washer

Bore d mm	over	incl.	Bore deviation Δ_{dmp} μm
180	250	0	-30
250	315	0	-35
315	400	0	-40
400	500	0	-45
500	630	0	-50
630	800	0	-75
800	1000	0	-100

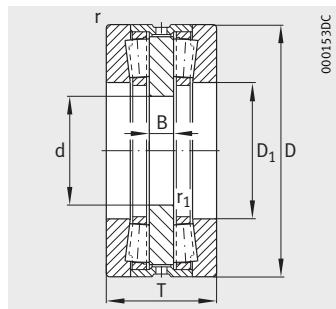


Tolerances for housing locating washer

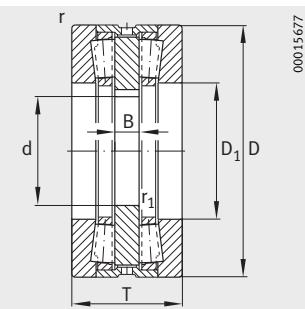
Outside diameter D mm	over	incl.	Outside diameter deviation Δ_{Dmp} μm
180	250	0	-30
250	315	0	-35
315	400	0	-40
400	500	0	-45
500	630	0	-50
630	800	0	-75
800	1000	0	-100

Axial tapered roller bearings

Double direction
With intermediate ring



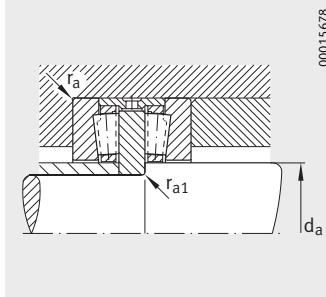
Design 1



Design 2
With retaining slot
in the shaft locating washer

Dimension table · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions						
			d	D	T	D ₁	B	r min.	r ₁ min.
Z-529086.TA2	1	20,5	240	320	96	256	22	2	0,6
Z-545678.TA2	1	44	240	380	105	275	27	2	2
Z-532584.TA2	1	140	240	470	180	290	45	6	3
Z-547482.TA2	1	26	250	360	96	285	24	2,1	1,1
Z-522010.TA2	2	41	250	380	100	275	22	2	1,1
Z-509352.TA2	1	26	260	360	92	285	20	2,1	1,1
Z-527907.TA2	2	110	270	450	180	316	44	6	3
Z-524740.TA2	1	45	300	420	100	330	23	1,1	1,1
Z-544025.TA2	1	192	305	530	200	345	56	5	1,5
Z-528562.TA2	1	41,8	320	440	108	355	26	3	1,5
Z-509654.TA2	1	74,5	320	470	130	350	30	3	1,1
Z-540295.TA2	1	157	320	500	218	350	60	5	2
Z-522837.TA2	1	324	320	600	240	380	50	4	2
Z-530739.TA2	2	73	350	490	130	390	30	3	1,1
Z-579703.TA2	1	81	350	490	145	390	45	3	1,5
Z-522008.TA2	1	106	350	540	135	400	30	3	1
Z-573320.TA2	1	104	360	530	145	410	45	4	2
Z-524194.TA2	1	175	360	560	200	396	48	5	2
Z-513828.TA2	1	90	380	530	130	410	30	5	3
Z-513125.TA2	1	102	380	560	130	430	32	2,5	1,5
Z-548285.TA2	1	110	380	560	138	430	40	2,5	1,5
Z-567356.TA2	1	129	380	560	145	430	47	2,5	1,5
Z-545936.TA2	2	275	380	650	215	450	65	6	3
Z-540162.TA2	1	235	400	650	200	450	50	5	2
Z-524134.TA2	1	108	410	560	160	440	40	5	2
Z-509392.TA2	1	185	420	620	170	470	35	3	1,5
Z-545991.TA2	1	202	420	620	185	470	50	3	1
Z-579704.TA2	1	217	420	620	200	470	65	3	3
Z-534038.TA2	2	170	440	645	167	500	50	5	2
Z-513401.TA2	2	150	450	645	155	500	38	5	3
Z-509391.TA2	2	283	470	720	200	535	50	3	2
Z-549701.TA2	1	296	470	720	210	535	60	3	2
Z-547584.TA2	2	280	480	710	218	575	57	5	3
Z-511746.TA2	2	235	530	710	218	575	57	5	2
Z-515196.TA2	2	296	550	760	230	610	50	5	2
Z-521823.TA2	2	395	670	900	230	725	50	5	2

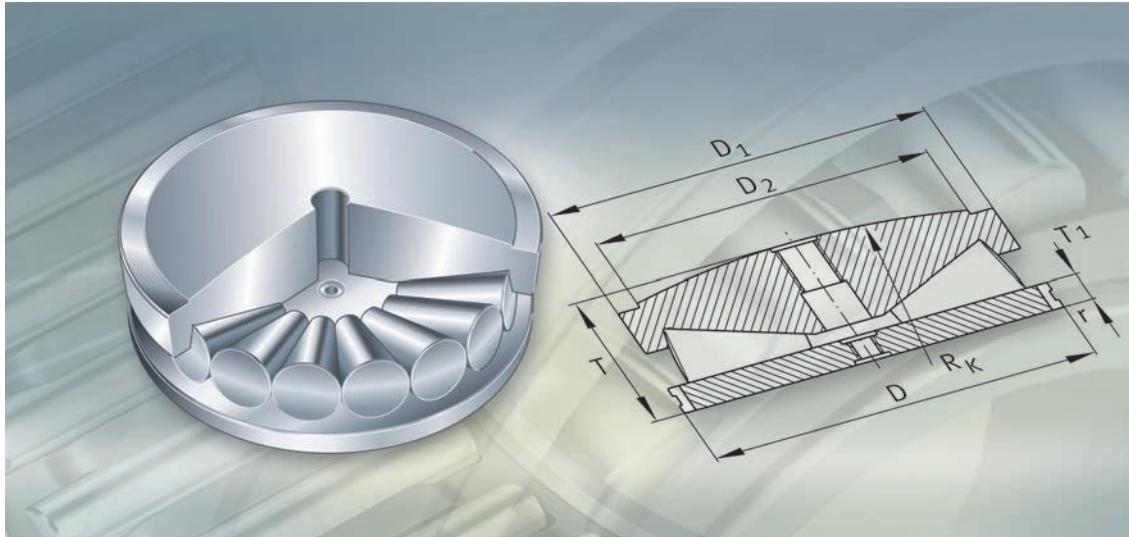


Mounting dimensions



Mounting dimensions			Basic load ratings		Fatigue limit load
d _a	r _a	r _{a1}	dyn. C _a kN	stat. C _{0a} kN	C _{ua} kN
249	2	0,6	640	2 750	217
267	2	2	1 000	5 300	435
278	5	2,5	2 550	12 100	910
274	2	1	710	3 250	255
267	2	1	1 000	5 300	435
274	2	1	710	3 250	255
302	5	2,5	2 100	8 900	650
322	1	1	890	4 550	350
–	4	1,5	3 000	14 700	1 080
345	2,5	1,5	1 020	5 200	390
335	2,5	1	1 400	6 900	510
–	4	2	2 400	10 100	730
360	3	2	4 000	18 300	1 280
375	2,5	1	1 370	7 100	510
375	2,5	1,5	1 370	7 100	510
385	2,5	1	1 860	10 800	790
398	3	2	1 570	8 300	590
383	4	2	3 050	13 800	970
398	4	2,5	1 540	8 000	580
411	2,5	1,5	1 860	11 100	800
411	2,5	1,5	1 860	11 100	800
411	2,5	1,5	1 860	11 100	800
430	5	2,5	3 850	20 000	1 390
–	4	2	3 850	20 000	1 390
426	4	2	1 840	9 400	650
450	2,5	1,5	2 350	12 500	870
450	2,5	1	2 350	12 500	870
450	2,5	2,5	2 350	12 500	870
480	4	2	2 300	13 100	900
480	4	2,5	2 300	13 100	900
517	2,5	2	3 500	19 900	1 330
517	2,5	2	3 500	19 900	1 330
555	4	2,5	2 800	14 800	960
555	4	2	2 800	14 800	960
581	4	2	3 350	17 300	1 100
700	4	2	4 000	22 400	1 380

FAG



Axial tapered roller bearings for screw-down mechanisms

Axial tapered roller bearings for screw-down mechanisms

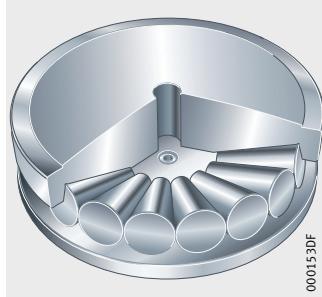
	Page
Product overview	Axial tapered roller bearings for screw-down mechanisms 814
Features	Axial load capacity 815
	Compensation of angular misalignments 815
	Operating temperature 816
Design and safety guidelines	Equivalent static bearing load 817
	Requisite static load safety factor 817
Accuracy 817
Dimension tables	Axial tapered roller bearings for screw-down mechanisms 818



Product overview Axial tapered roller bearings for screw-down mechanisms

Single direction

Z-5..TA1-02, F-8..TA1-02



Axial tapered roller bearings for screw-down mechanisms

Features

These single direction axial tapered roller bearings are special bearings for screw-down mechanisms on rolling stands. The tapered rollers are guided by the rib of the shaft locating washer and run on a plain washer arranged below this. Due to their low friction, these bearings reduce the screw-down forces of the mechanisms. Axial tapered roller bearings have non-standardised metric or inch size main dimensions and designations Z-5..TA1 or F-8..TA1. The bearings are separable. The bearing washers and rollers can be fitted separately.



Axial load capacity

In order that the bearings have an extremely high axial load carrying capacity in one direction, they are generally of a full complement design. Some bearing sizes are also available with a cage.

Compensation of angular misalignments

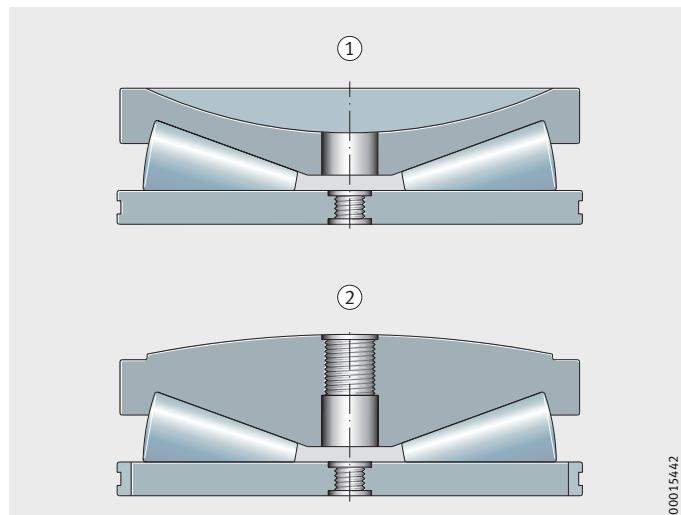
Axial tapered roller bearings for screw-down mechanisms are designed such that they can support the adjustment movements of chocks. The various bearing designs are matched to the specific application. Some bearings have a concave or convex shaft locating washer, *Figure 1*. The adjustment movement can also be facilitated by concave or convex thrust washers, *Figure 2*, page 816.

Design 1

- The bearings have a shaft locating washer with a concave upper surface, *Figure 1* ①. The screw-down mechanism is of a crowned design.

Design 2

- In these bearings, the shaft locating washer has a convex upper surface, *Figure 1* ②. The screw-down mechanism is of a concave design.



① Design 1
② Design 2

Figure 1
Axial tapered roller bearings for screw-down mechanisms

Axial tapered roller bearings for screw-down mechanisms

Design 3

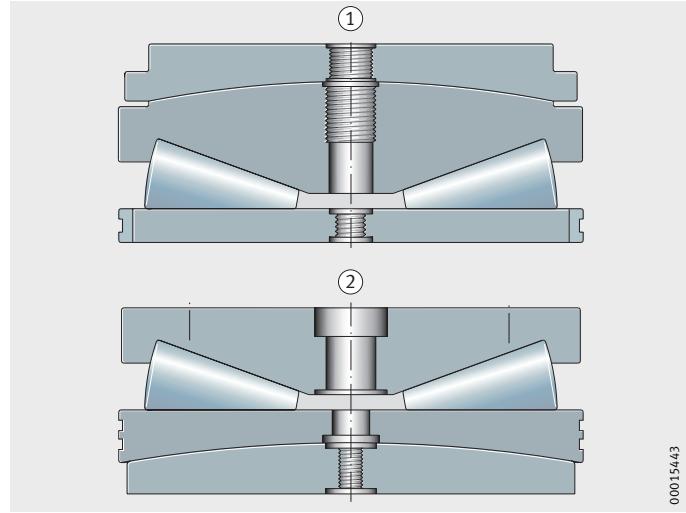
In these bearings, the adjustment movements are supported between a shaft locating washer with a convex upper surface and a concave thrust washer, *Figure 2* ①.

Design 4

Bearings of this design support the adjustment movements between a plain washer with a concave lower surface and a convex thrust washer, *Figure 2* ②.

- ① Design 3
② Design 4

Figure 2
Axial tapered roller bearings
for screw-down mechanisms
(continued)



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Operating temperature

Axial tapered roller bearings for screw-down mechanisms can be used at operating temperatures from -30°C to $+150^{\circ}\text{C}$.

Design and safety guidelines

Equivalent static bearing load

Axial tapered roller bearings for screw-down mechanisms can only support static axial forces in one direction.

For bearings under static loading, the following applies:

$$P_0 = F_{0a}$$

P_0 kN
Equivalent static bearing load
 F_{0a} kN
Axial static bearing load.



Requisite static load safety factor

The security against excessive plastic deformations at the contact points of the rolling elements is indicated by the static load safety factor S_0 .

In the case of bearings for screw-down mechanisms, the aim should be to achieve a value of $S_0 = 1,8$ to 2.

$$S_0 = \frac{C_{0a}}{P_0}$$

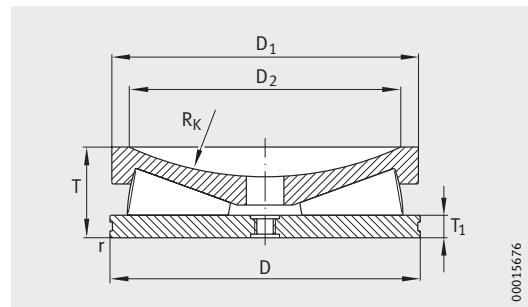
S_0 –
Static load safety factor
 C_{0a} kN
Basic static load rating, see dimension tables
 P_0 kN
Equivalent static bearing load.

Accuracy

The dimensional and running tolerances of non-standardised axial tapered roller bearings are matched to the specific application and should be requested from Schaeffler Group Industrial.

Axial tapered roller bearings

For screw-down mechanisms



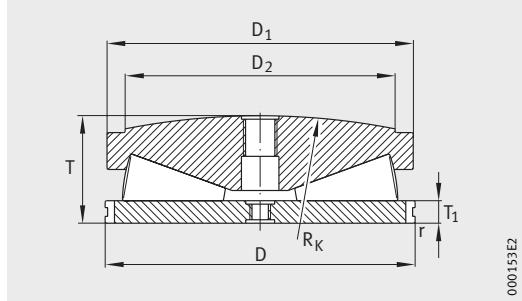
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Design 1
Design 3, page 820
Design 4, page 821

Dimension table · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions				
			D	D ₁	D ₂	D ₃	D ₄
Z-525469.TA1	2	62	320,68	318,31	279,4	—	—
Z-567355.TA1	3 ¹⁾	75	320,68	318,31	—	275	318,31
Z-534470.TA1	2	100	377,825	375,46	330,2	—	—
Z-573271.TA1	3 ¹⁾	125	377,825	375,46	—	300	370
Z-542974.TA1	1	127	409,575	407,16	330,2	—	—
Z-533632.TA1	2	110	409,58	409,58	355,6	—	—
Z-524192.TA1	2 ¹⁾	128	409,58	407,21	355,6	—	—
Z-580635.TA1	3	157	409,58	407,21	—	355	355
Z-565300.TA1	1	156	438,15	435,79	381	—	—
Z-517113.TA1	2 ¹⁾	157	438,15	435,79	381	—	—
Z-548480.TA1	1	184	457,2	448,34	336,6	—	—
Z-528348.TA1	2	185	482,6	482,6	444,5	—	—
Z-580692.TA1	3	260	482,6	482,6	—	425	508
Z-517982.TA1	2	228	495,3	492,94	431,8	—	—
Z-522978.TA1	2	228	495,3	492,94	431,8	—	—
Z-573917.TA1	2	228	495,3	492,94	431,8	—	—
Z-525914.TA1	4	274	495,3	495,3	—	—	476
Z-536435.TA1	2	278	514,35	521,25	403,1	—	—
Z-517979.TA1	2 ¹⁾	258	523,875	521,51	457,2	—	—
Z-527580.TA1	2	243	523,875	521,51	457,2	—	—
Z-531555.TA1	2 ¹⁾	274	533,4	533,4	457,2	—	—
Z-548693.TA1	1	255	533,4	533,4	460,3	—	—
Z-512525.01.TA1	2 ¹⁾	274	533,4	533,4	495	—	—
Z-547666.TA1	1	287	533,4	533,4	460	—	—
Z-566306.TA1	3 ¹⁾	373	533,4	533,4	—	416	530
F-800901.TA1	3	352	533,4	533,4	—	410	500
Z-534972.TA1	2 ¹⁾	292	533,45	533,4	495	—	—
Z-527805.TA1	1	260	551,69	539,75	406,4	—	—
Z-542654.TA1	1	318	555	555	414	—	—
Z-527795.TA1	1	274	555,63	553,26	482,6	—	—
Z-524340.TA1	2 ¹⁾	318	555,63	553,26	482,5	—	—
Z-542752.TA1	2	340	578,66	578,66	495	—	—

¹⁾ Without retaining slot in the plain washer.



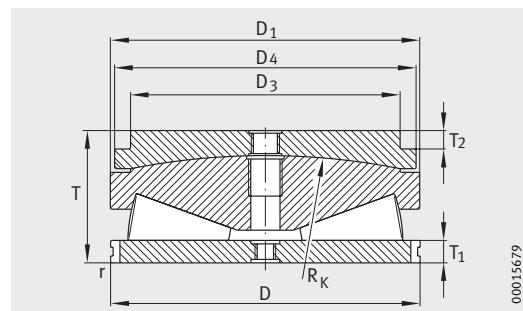
Design 2



T	T ₁	T ₂	R _K	r min.	Basic load rating stat. C _{0a} kN
110,97	22,23	–	762	1,6	12 500
135	22,23	6	762	1,6	12 800
129,01	25,4	–	914,4	1,6	17 500
164,01	25,4	10	914,4	1,6	17 000
139,7	28,575	–	508	–	20 700
122,2	–	–	508	–	20 700
140,77	28,58	–	1 016	6	20 700
188	28,58	–	1 016	2,3	20 400
149,23	50,4	–	1 270	3,2	24 100
150,673	31,75	–	1 016	3,2	23 600
161,925	31,075	–	508	3	26 500
145,54	38,1	–	1 905	1,6	27 000
205,54	38,1	44	1 905	1,6	27 000
170,61	34,93	–	1 066,8	3,2	31 000
170,61	34,93	–	1 066,8	3,2	31 000
170,61	34,93	–	1 066,8	3,2	31 000
210	100	–	885	–	30 500
189,1	34,92	–	635	–	36 500
175,768	34,925	–	1 270	3,2	36 000
175,768	34,925	–	1 610,7	3,2	36 500
177,8	31,75	–	1 981,2	3,2	36 500
177,8	31,75	–	1 270	3	36 500
177,8	31,75	–	1 981,2	1,6	39 500
190,5	50,8	–	–	–	36 500
237,8	31,75	8,8	1 981,2	3,2	39 500
245	31,75	45	1 981,2	3,2	39 500
190,5	31,75	–	1 219,2	3,2	36 500
158,75	25,4	–	635	3,2	36 000
190,5	50	–	1 270	–	39 000
165,1	38,1	–	635	3,2	38 000
190,86	38,1	–	1 270	3,2	38 000
187,81	38,1	–	1 981,2	–	43 500

Axial tapered roller bearings

For screw-down mechanisms



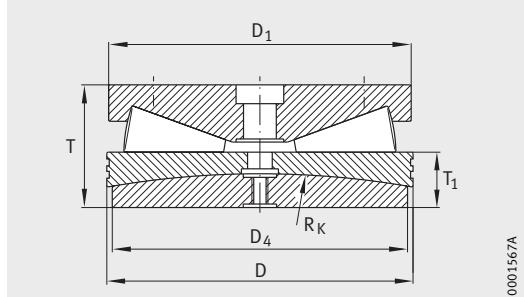
Design 3
Design 2, page 819

Dimension table (continued) · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions				
			D	D ₁	D ₂	D ₃	D ₄
Z-547440.TA1	2 ¹⁾	355	581,02	578,66	508	—	—
Z-531065.TA1	2 ¹⁾	355	581,03	578,66	508	—	—
Z-525652.TA1	4 ²⁾	435	581,03	581,03	—	—	571,5
Z-525652.TA1-V	4	435	581,03	581,03	—	—	571,5
F-800903.TA1	3	450	581,03	578,66	—	500	570
Z-565906.TA1	3 ¹⁾	450	581,03	578,66	—	460	570
Z-526199.TA1	2	413	609,6	607,24	533,4	—	—
Z-533179.01.TA1	4	415	609,6	609,6	—	—	582,63
Z-563648.TA1	3	512	609,6	607,24	533,4	585	710
Z-526198.TA1	2 ¹⁾	419	641,35	638,99	558,8	—	—
Z-578367.01.TA1	3	565	641,35	638,99	—	560	635
Z-547969.TA1	4	700	641,35	655	—	—	634
F-801496.TA1	2	900	768,35	765,81	609,6	—	—
Z-527184.TA1	4 ²⁾	1 100	800	800	—	—	740
Z-527184.TA1-V	4	1 100	800	800	—	—	740
Z-523387.TA1	4 ²⁾	1 320	850	850	—	—	775
Z-544992.TA1	4 ²⁾	1 650	900	900	—	—	830
Z-544992.TA1-V	4	1 650	900	900	—	—	830
Z-543242.TA1	3 ²⁾	1 740	920	920	—	768	915
Z-543242.TA1-V	3	1 670	920	920	—	768	915
Z-530866.TA1	4	2 100	1 016	1 016	—	—	—
Z-565979.TA1	4	2 490	1 095	1 100	—	—	1 050

¹⁾ Without retaining slot in the plain washer.

²⁾ Axial tapered roller bearings for screw-down mechanisms with solid brass cage; all other bearings are of a full complement roller design.

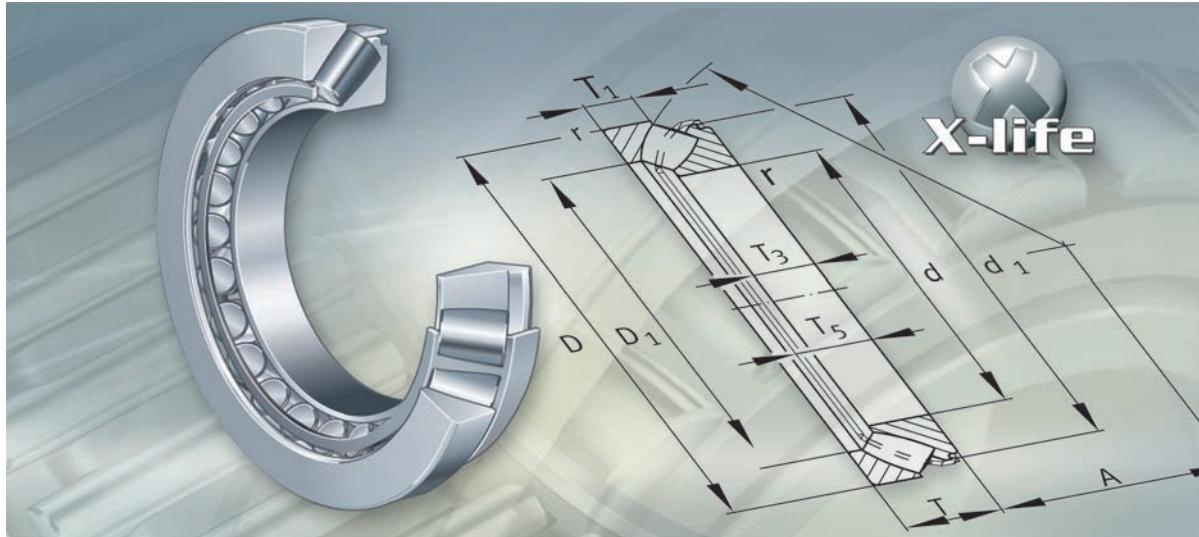


Design 4



T	T ₁	T ₂	R _K	r min.	Basic load rating stat. C _{0a} kN
196,65	38,1	–	1 308,1	3,2	43 500
193,78	38,1	–	1 422,4	3,2	42 500
240,77	108	–	1 270	–	31 500
240,77	108	–	1 270	–	43 500
243,78	38,1	39	1 422,4	3,2	43 500
243,78	38,1	5	1 422,4	3,2	43 500
204,01	38,1	–	1 524	3,2	49 000
249,96	108	–	1 270	–	49 000
254,01	38,1	40	1 524	3,2	48 000
212,67	38,1	–	1 524	3,2	49 000
260	38,1	45	1 524	3,2	54 000
282	136,3	–	1 270	–	42 500
295,275	70	–	1 524	3,2	68 000
320	175	–	1 500	–	53 000
320	175	–	1 500	–	64 000
360	195	–	1 500	–	60 000
390	130	–	1 500	–	79 000
390	130	–	1 500	–	93 000
370	70	20	2 300	7,5	65 500
370	70	20	2 300	7,5	80 000
412,75	111,15	–	1 900	–	83 000
380	175	–	3 000	–	131 000

FAG



Axial spherical roller bearings

Axial spherical roller bearings

	Page
Product overview	Axial spherical roller bearings.....
Features	X-life
	Axial and radial load capacity
	Compensation of angular misalignments
	Sealing.....
	Lubrication.....
	Operating temperature
	Cages.....
	Suffixes.....
Design and safety guidelines	Equivalent dynamic bearing load
	Equivalent static bearing load.....
	Static load safety factor
	Minimum axial load
	Speeds.....
	Design of bearing arrangements
Accuracy
Dimension tables	Axial spherical roller bearings.....



Product overview Axial spherical roller bearings

Increased capacity design With sheet metal cage

293..-E1, 294..-E1



000148BD

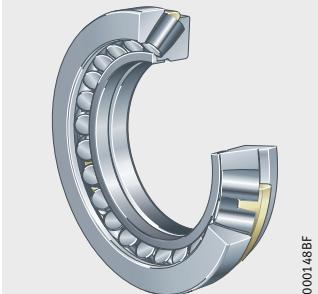
293..-E, 294..-E



000148BE

With solid cage

292..-E, 293..-E, 294..-E



000148BF

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 are separable.

As a result, the bearing components can be fitted separately.

X-life

Some axial spherical roller bearings of the series 293..-E1 and 294..-E1 are of X-life quality. These bearings are indicated in the dimension tables.

The bearings have an internal construction that gives increased basic load ratings as well as a precise contact geometry between the guidance rib and the end of the roller for improved kinematics. Friction and wear are reduced as a result of optimum lubricant film formation and a new cage design with improved guidance of the rollers and lubricant. Optimised osculation conditions give more uniform distribution of pressure between the rollers and raceways.

Due to the increased axial load carrying capacity and reduced bearing temperature, the rating life is significantly improved under the same operating conditions.



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, see section Radial load, page 827.

Compensation of angular misalignments

Axial spherical roller bearings can be swivelled about their central position by a few degrees, see table.

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 given in the table are permissible under the following conditions:

- $P \text{ or } P_0 \leq 0,05 \cdot C_{0a}$
- the angular deviation is constant (static angular misalignment)
- the rotating component is the shaft locating washer.

Permissible skewing

Series	Permissible skewing ¹⁾
292..-E(-E1)	1°
293..-E(-E1)	1,5°
294..-E(-E1)	2°

¹⁾ If the rotating component is the housing locating washer or the shaft locating washer undergoes tumbling motion, the angular adjustment facility is smaller.

Axial spherical roller bearings

Sealing	Axial spherical roller bearings are not sealed.		
Lubrication	The bearings are not greased. They are generally lubricated using oil. In some cases, lubrication with greases containing EP additives is also possible. Adequate supply to the contact points between the rollers and guidance rib is best achieved if the bearings are completely filled with grease.		
Operating temperature	Axial spherical roller bearings can be used at operating temperatures from -30°C to $+200^{\circ}\text{C}$.		
Cages	<p>The standard cages for axial spherical roller bearings are shown in the table.</p> <p>Bearings with the suffix MB have a solid brass cage that is guided on the shaft locating washer.</p> <p>The other bearings have sheet steel cages and do not have a cage suffix.</p>		
Cage and bore code	Series	Sheet steel cage Bore code	Solid brass cage
	292..-E(-E1)	–	all
	293..-E1	all	–
	294..-E1	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	Design
	E, E1	Increased capacity design	Standard
	MB	Solid brass cage	

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 kN

Equivalent dynamic bearing load for combined load

F_a kN

Axial dynamic bearing load

F_r kN

Radial dynamic bearing load.

Radial load



Equivalent static bearing load

The radial bearing load must not exceed 55% of the axial load:

$$F_r \leq 0,55 \cdot F_a$$



For bearings under static loading, the following applies:

$$P_0 = F_{0a} + 2,7 \cdot F_{0r}$$

P₀ kN

Equivalent static bearing load for combined load

F_{0a} kN

Axial static bearing load

F_{0r} kN

Radial static bearing load.

Radial load



Static load safety factor

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 S ₀	Preconditions
S ₀ ≥ 8	Axial support by the abutment 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 on the entire abutment 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)

Axial spherical roller bearings

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

C_{0a} N
Basic static load rating, see dimension table (observe dimension)

k_a –
Factor for determining the minimum load, see table

n min^{-1}
Maximum speed.

Factor k_a

Series	Factor k_a
292..-E(-E1)	0,6
293..-E(-E1)	0,9
294..-E(-E1)	0,7

Speeds



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 in accordance with ISO 15 312.



Design of bearing arrangements

The tolerances for the shaft and locating bore must be selected in accordance with the table.

Shaft and housing tolerances

Adjacent part	Type of load	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 over 200 mm	k6 (m6)
Housing	Axial load	Normal loads	E8
		High loads	G7
	Combined load	Point load for housing locating washer	H7
		Circumferential load for housing locating washer	K7

Adjacent parts

The axial runout tolerances of the abutment shoulders should be to IT5 or better. The abutment shoulders should be rigid, flat and perpendicular to the axis of rotation.

Above the housing locating washer, a recess of diameter $D_b \text{ min}$ must be provided in the housing bore, see dimension table.

Otherwise, the rollers will foul the housing when the shaft swivels.



In the new internal construction of the E1 design, attention must be paid to the mounting dimensions. This also applies to the design of the spacer sleeve on the shaft locating washer (dimensions d_b , d_{b1}).

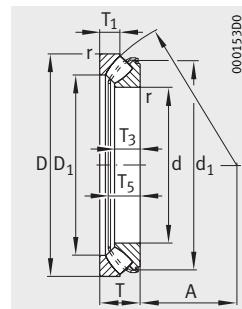
Accuracy

The main dimensions of the bearings conform to ISO 104 and DIN 728.

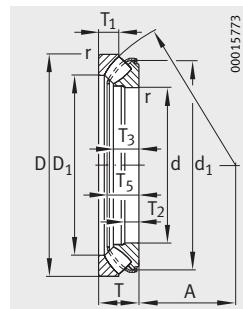
The dimensional and running tolerances correspond to tolerance class PN to DIN 620-3.

The section height tolerance for axial spherical roller bearings of the E1 design is restricted by up to 70% compared to the standard.

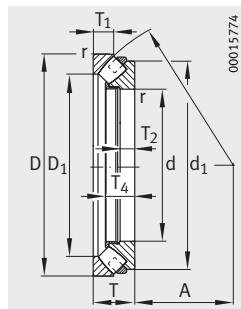
Axial spherical roller bearings



293...-E1, 294...-E1



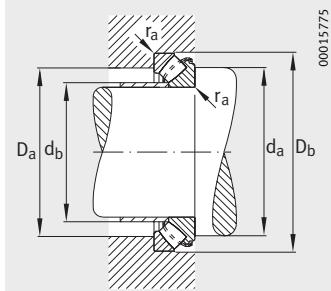
293...-E, 294...-E



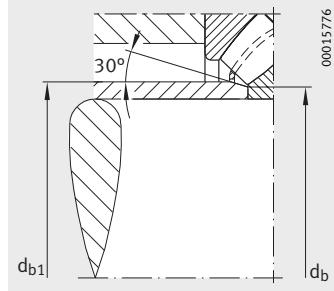
292...-E(E1)-MB,
293...-E-MB, 294...-E-MB

Dimension table · Dimensions in mm

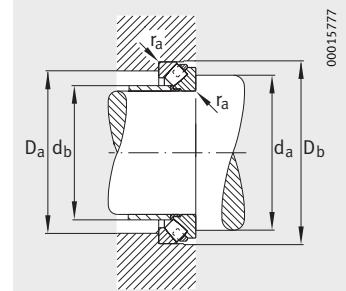
Designation	Mass m ≈kg	Dimensions												
		d	D	T	D ₁	d ₁	r min.	T ₁	T ₂	T ₃	T ₄	T ₅	A	
29432-E1	XL	32,1	160	320	95	223,5	283,5	5	45,5	—	60,5	—	84,3	99
29434-E1	XL	39,6	170	340	103	236	305	5	50	—	65,5	—	91,2	104
29436-E1	XL	47,6	180	360	109	250	315,5	5	53	—	69,5	—	96,4	110
29338-E1	XL	22,3	190	320	78	243,5	290,1	4	36	—	49	—	71,3	110
29438-E	—	54,9	190	380	115	268	340	5	55	41	73	—	94	117
29340-E1	XL	27,3	200	340	85	257	308,8	4	40	—	53,5	—	76,7	116
29440-E	—	64,7	200	400	122	282	360	5	59	44	77	—	99	122
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
29248-E1-MB	—	16,6	240	340	60	283	320	2,1	30	22	37	57	—	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	—	—	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



Mounting dimensions
293..-E, 294..-E,
293..-E1, 294..-E1



Mounting dimensions
293..-E1, 294..-E1

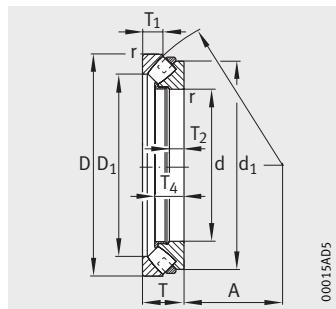


Mounting dimensions
292..-E(E1)-MB,
293..-E-MB, 294..-E-MB

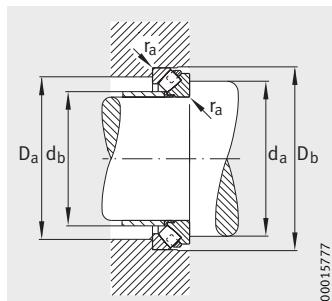


Mounting dimensions						Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d _a	D _a	D _b	d _b	d _{b1}	r _a	dyn. C _a kN	stat. C _{0a} kN	C _{ua} kN	n _G min ⁻¹	n _B min ⁻¹
235	271	326	176	189	4	2 240	6 000	630	2 200	1 090
250	288	346	186	199	4	2 550	6 900	700	2 000	1 030
265	305	366	197	210	4	2 850	7 700	770	1 800	940
250	281	325	201	211	3	1 680	4 850	580	2 200	1 090
275	322	386	214	—	4	2 320	7 500	470	1 200	970
265	298	348	213	224	3	1 900	5 600	640	2 000	1 030
290	338	406	225	—	4	2 550	8 500	510	1 100	920
285	316	368	235	—	3	1 560	5 600	335	1 400	980
310	360	428	243	—	5	2 600	8 500	520	1 100	860
290	311	344	250	—	2	1 010	4 150	465	1 800	1 070
300	337	390	256	—	3	1 630	6 100	355	1 400	890
330	381	448	265	—	5	2 700	9 500	570	1 100	790
305	331	365	272	—	2,1	1 060	4 750	260	1 700	960
330	372	430	277	—	4	2 040	7 650	445	1 200	810
360	419	488	291	—	5	3 100	11 000	650	1 000	730
325	351	385	291	—	2,1	1 120	5 100	270	1 500	890
350	394	450	298	—	4	2 120	8 300	470	1 200	750
390	446	530	310	—	5	3 650	12 900	750	900	670
355	386	426	317	—	2,5	1 430	6 550	345	1 400	830
380	429	490	320	—	4	2 550	9 650	540	1 100	700
410	471	550	326	—	5	3 900	14 000	810	900	620
375	406	450	336	—	2,5	1 500	6 950	360	1 300	770
400	449	510	340	—	4	2 650	10 600	580	1 100	660
435	507	590	354	—	6	4 300	15 600	890	800	590
395	427	470	353	—	2,5	1 560	7 350	385	1 300	730
430	484	550	364	—	4	3 250	12 900	700	950	600
465	541	630	373	—	6	5 200	19 000	1 070	750	530
420	461	510	380	—	3	1 900	8 800	455	1 200	700
450	504	572	384	—	4	3 350	13 400	720	900	570
485	560	650	391	—	6	5 400	20 400	1 130	750	495
440	480	530	395	—	3	2 080	9 650	495	1 100	650
480	538	612	404	—	5	3 900	16 000	860	850	530
510	587	682	415	—	6	5 850	22 400	1 220	700	465

Axial spherical roller bearings



292..-E-MB,
293..-E-MB, 294..-E-MB



Mounting dimensions
292..-E-MB,
293..-E-MB, 294..-E-MB

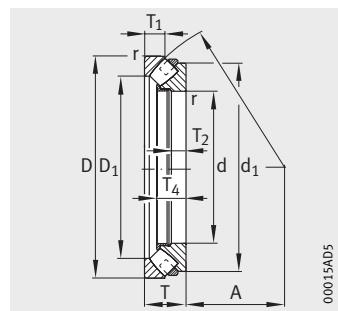
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions											
		d	D	T	D ₁	d ₁	r min.	T ₁	T ₂	T ₃	T ₄	A	
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	
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	
293/560-E-MB	320	560	850	175	690	790	7,5	85	63	105,5	121	310	
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	
293/600-E-MB	373	600	900	180	727	840	7,5	87	65	113,5	129	335	
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	
293/630-E-MB	437	630	950	190	765	885	9,5	92	68	122	138	345	
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	
294/670-E-MB	1080	670	1150	290	869	1050	15	138	104	186	208	387	

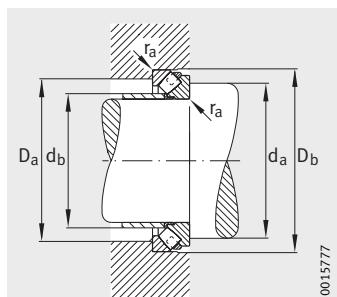


Mounting dimensions					Basic load ratings		Fatigue limit load C _{ua} kN	Limiting speed n _G min ⁻¹	Reference speed n _B min ⁻¹
d _a min.	D _a max.	D _b min.	d _b max.	r _a max.	dyn. C _a kN	stat. C _{0a} kN			
460	500	550	415	3	2 120	10 200	510	1 100	610
500	557	634	424	5	4 000	16 600	880	850	510
540	622	722	441	6	6 400	25 000	1 330	670	440
490	534	590	437	4	2 650	12 500	620	1 000	580
525	585	664	447	5	4 300	18 000	940	800	475
560	643	742	455	6	6 700	26 000	1 390	630	420
510	554	610	458	4	2 650	13 400	660	1 000	550
548	614	695	470	5	4 550	19 000	990	750	460
595	684	794	486	8	7 650	30 000	1 570	600	395
530	575	632	477	4	2 700	13 400	660	950	530
575	638	726	487	5	5 000	21 200	1 120	700	440
615	704	815	502	8	7 800	31 000	1 620	600	380
555	603	662	508	4	2 800	14 600	700	900	510
593	660	746	507	5	5 200	22 400	1 160	700	410
645	744	865	521	8	9 300	36 500	1 920	530	350
575	622	682	527	4	2 900	15 300	740	900	490
615	683	768	532	5	5 100	22 800	1 160	700	400
670	765	886	542	8	9 300	37 500	1 930	530	340
611	661	722	560	4	3 100	16 300	770	850	465
650	724	818	561	6	6 000	26 500	1 350	630	375
700	810	937	573	8	10 200	41 500	2 160	500	320
645	697	762	586	4	3 650	19 300	910	800	435
691	770	868	595	6	6 700	29 000	1 460	600	355
750	860	997	606	10	11 800	49 000	2 480	480	290
690	744	814	633	4	3 800	20 400	960	750	410
735	815	920	633	6	7 350	33 500	1 660	560	325
800	900	1 055	653	10	12 200	52 000	2 600	450	275
730	789	864	657	5	4 800	25 500	1 180	670	375
839	856	970	665	8	8 300	38 000	1 830	530	305
840	960	1 115	681	10	14 000	58 500	2 850	430	260
775	836	915	710	5	4 900	26 000	1 190	630	365
880	1 015	1 175	729	12	15 000	64 000	3 150	400	245

Axial spherical roller bearings



292..-E-MB,
293..-E-MB, 294..-E-MB



Mounting dimensions
292..-E-MB,
293..-E-MB, 294..-E-MB

Dimension table (continued) · Dimensions in mm

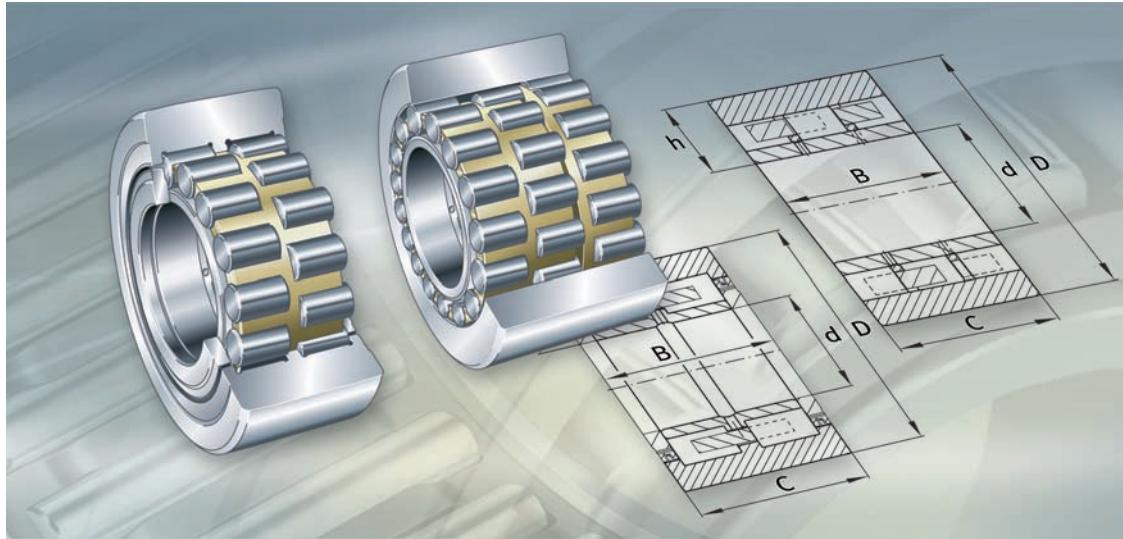
Designation	Mass m ≈kg	Dimensions										
		d	D	T	D ₁	d ₁	r min.	T ₁	T ₂	T ₃	T ₄	A
292/710-E-MB	261	710	950	145	815	905	6	75	52	88	101	380
293/710-E-MB	590	710	1 060	212	861	990	9,5	102	76	132,5	150	394
294/710-E-MB	1 420	710	1 220	308	916	1 115	15	150	111	198	221	415
292/750-E-MB	299	750	1 000	150	861	955	6	81	54	88	100	406
293/750-E-MB	716	750	1 120	224	909	1 045	9,5	108	81	140	159	415
294/750-E-MB	1 130	750	1 280	315	972	1 170	15	152	113	200	225	436
292/800-E-MB	341	800	1 060	155	915	1 010	7,5	81	56	96	110	426
293/800-E-MB	801	800	1 180	230	961	1 100	9,5	112	83	145,5	165	440
294/800-E-MB	1 900	800	1 360	335	1 030	1 245	15	163	121	214,5	241	462
292/850-E-MB	395	850	1 120	160	963	1 065	7,5	82	58	101,5	116	453
293/850-E-MB	933	850	1 250	243	1 021	1 165	12	118	87	152	173	468
294/850-E-MB	1 590	850	1 440	354	1 099	1 315	15	172	127	222	249	490
292/900-E-MB	444	900	1 180	170	1 023	1 125	7,5	84	61	105	121	477
293/900-E-MB	1 060	900	1 320	250	1 068	1 235	12	120	90	158	180	496
294/900-E-MB	2 610	900	1 520	372	1 149	1 395	15	180	134	241	266	518
292/950-E-MB	548	950	1 250	180	1 079	1 190	7,5	90	65	112	129	507
294/950-E-MB	3 070	950	1 600	390	1 211	1 470	15	188	140	256	290	546
292/1000-E-MB	640	1 000	1 320	190	1 139	1 260	9,5	98	68	117,5	134	540
294/1000-E-MB	3 400	1 000	1 670	402	1 268	1 530	15	194	145	264	299	581
292/1060-E-MB	789	1 060	1 400	206	1 208	1 335	9,5	108	74	124	142	566
294/1060-E-MB	4 040	1 060	1 770	426	1 347	1 625	15	205	153	279	317	608
292/1120-E-MB	832	1 120	1 460	206	1 270	1 395	9,5	108	74	125	146	593
294/1120-E-MB	4 630	1 120	1 860	444	1 419	1 710	15	214	160	290	329	642
292/1180-E-MB	867	1 180	1 520	206	1 330	1 455	9,5	108	74	125	146	625
294/1180-E-MB	5 280	1 180	1 950	462	1 490	1 795	19	224	166	303	344	673
292/1250-E-MB	1 020	1 250	1 610	216	1 411	1 540	9,5	113	78	131	154	650
293/1250-E-MB	2 570	1 250	1 800	330	1 465	1 685	15	160	119	208	236	690
294/1250-E-MB	5 980	1 250	2 050	480	1 573	1 885	19	233	173	314	357	711
292/1700-E-MB	2 230	1 700	2 160	280	1 900	2 070	12	145	101	170	200	892
292/1800-E-MB	2 530	1 800	2 280	290	2 012	2 185	15	150	104	175	207	945



Mounting dimensions					Basic load ratings		Fatigue limit load C _{ua} kN	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 kN	stat. C _{0a} kN			
820	882	966	743	5	5 600	30 500	1 390	600	335
869	962	1 082	752	8	9 800	46 500	2 200	480	265
925	1 073	1 250	768	12	17 300	75 000	3 600	400	224
863	930	1 017	798	5	5 600	32 000	1 410	600	325
915	1 015	1 142	795	8	10 800	51 000	2 420	450	255
1 000	1 130	1 310	812	12	18 300	80 000	3 800	360	213
918	987	1 078	837	6	6 550	37 500	1 640	530	295
970	1 070	1 202	842	8	11 800	57 000	2 700	450	232
1 050	1 200	1 390	862	12	20 800	91 500	4 250	340	196
973	1 043	1 138	881	6	7 350	42 500	1 860	500	270
1 028	1 137	1 273	896	10	12 900	64 000	2 900	430	215
1 119	1 229	1 470	875	12	22 800	100 000	4 700	300	184
1 025	1 101	1 198	933	6	8 000	44 000	1 930	480	260
1 090	1 203	1 343	947	10	14 300	71 000	3 250	400	206
1 170	1 345	1 555	974	12	25 000	114 000	5 300	300	172
1 147	1 089	1 268	983	6	9 000	51 000	2 190	450	244
1 372	1 241	1 635	1 022	12	27 500	129 000	5 800	280	158
1 216	1 151	1 340	1 045	8	9 800	57 000	2 450	430	232
1 435	1 298	1 705	1 074	12	29 000	137 000	6 200	280	151
1 290	1 220	1 422	1 111	8	10 800	64 000	2 700	400	218
1 521	1 377	1 815	1 138	12	32 500	153 000	6 800	260	141
1 350	1 280	1 482	1 196	8	11 200	68 000	2 800	400	203
1 604	1 449	1 905	1 211	12	35 500	170 000	7 400	260	132
1 340	1 415	1 542	1 227	8	11 200	69 500	2 850	360	195
1 683	1 520	2 007	1 267	15	39 000	190 000	8 100	240	122
1 425	1 500	1 632	1 298	8	12 900	80 000	3 150	360	179
1 520	1 640	1 830	1 315	12	24 000	127 000	5 400	280	142
1 771	1 603	2 107	1 338	15	41 500	204 000	8 700	220	116
1 915	2 010	2 187	1 757	10	21 200	140 000	5 300	260	127
2 025	2 120	2 313	1 864	12	22 800	150 000	5 700	260	120



FAG



Back-up rollers for multi-roll cold rolling mills

Back-up rollers for multi-roll cold rolling mills

	Page
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Features	Non-locating bearings 839 Locating bearings 840 Materials 841 Sealing 841 Lubrication 841 Cages 841
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Accuracy 842
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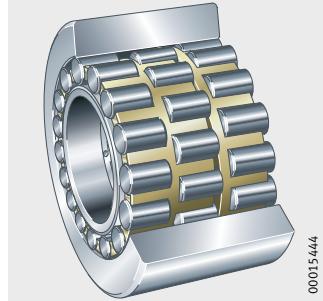


Product overview Back-up rollers for multi-roll cold rolling mills

Non-locating bearings

Design 1

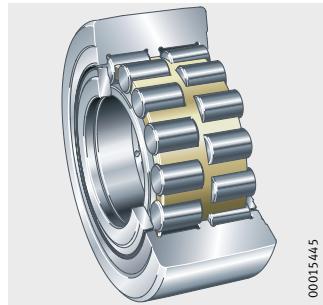
Z-5..WGTR3



Locating bearings

Design 2

Z-5..WGTR2, F-8..WGTR2



Back-up rollers for multi-roll cold rolling mills

Features

These back-up rollers were developed for the particular operating conditions in multi-roll cold rolling mills.

A detailed description is given in TPI 129, Back-up rollers for multi-roll cold rolling mills.

The rolling process requires bearings with high load carrying capacity and high accuracy. The bearings contain cylindrical rollers and have particularly thick-walled, rotating outer rings.

The inner rings are located on the stationary support shaft.

The back-up rollers are suitable for high radial forces or high radial forces and axial forces. The important factors for the quality of the rolled sheet metal are the section height tolerance, the running accuracy and the surface quality of the outer ring outside surface of the back-up rollers. They are separable and are therefore easier to fit and dismantle.

Non-locating bearings

Design 1

The raceways of these back-up rollers are completely cylindrical. The first and second rows of rollers are guided by a double comb cage, while the third row is guided by a single comb cage.

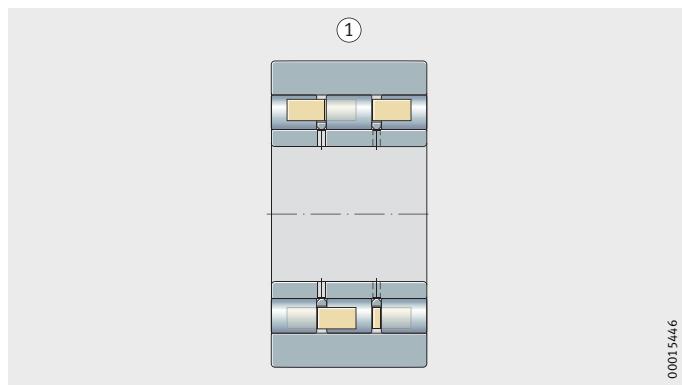
The rollers are guided axially by rib washers on the inner ring.

The simple geometrical form facilitates very high accuracy in production and in the rework of the rollers.

The outer ring must be laterally guided by plain washers in the support saddles. These plain bearings restrict the speed of the rollers and thus the rolling speed.

We supply back-up rollers of Design 1 without seals, *Figure 1*.

① Design 1
Figure 1
Back-up roller

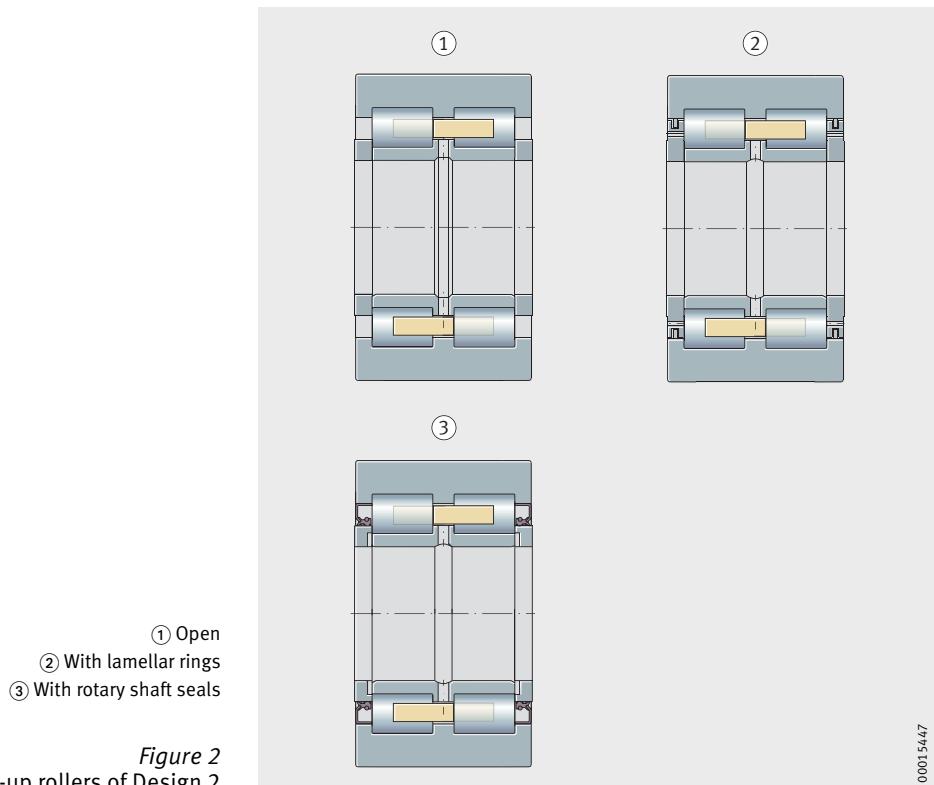


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Back-up rollers for multi-roll cold rolling mills

Locating bearings Design 2

The double row back-up rollers of this design have outer rings with three rigid ribs and two loose rib washers on the inner ring. After fitting, the roller is self-retaining and require no axial guidance. The rollers are guided by a double comb cage made from brass. In accordance with the lubrication method, these back-up rollers are supplied with or without seals, *Figure 2*.



Materials	The inner rings and cylindrical rollers are made from rolling bearing steel. The outer rings can be chill hardened or made from case hardening steel.
Sealing	<p>Back-up rollers of Design 1 are open. These and open back-up rollers of Design 2 are suitable for rolling emulsion lubrication.</p> <p>For recirculating oil lubrication, back-up rollers of Design 2 with rotary shaft seals are selected.</p> <p>Bearings with gap seals (lamellar rings) are suitable for minimal quantity lubrication.</p>
Lubrication	<p>Back-up rollers are designed such that the lubricant is distributed uniformly among the rollers and, in the case of back-up rollers lubricated with rolling emulsion, that the rolling emulsion can flow out of the bearings on both sides without hindrance.</p> <p>Lubrication with rolling emulsion is cost-effective since this is already available in large quantities for the rolling process.</p> <p>Due to the low viscosity of the rolling emulsion, a high volume flow through the bearings is necessary. The high rate of lubricant egress from the back-up rollers prevents the ingress of foreign matter into the bearings. Bearings without seals are suitable for rolling emulsion lubrication.</p> <p>When using recirculating oil lubrication, the oil flows through the back-up rollers in its own recirculation system. Oils of higher viscosity can thus be used, allowing a longer operating life of the back-up rollers. The design must provide inlet and outlet holes.</p> <p>For minimal quantity lubrication (pneumatic oil lubrication) an oil should be selected with a viscosity of at least $220 \text{ mm}^2/\text{s}$.</p> <p>The supply of lubricant should be agreed with the manufacturer of the lubrication equipment.</p>
Cages	Back-up rollers for multi-roll mills have solid cages made from brass.



Back-up rollers for multi-roll cold rolling mills

Design and safety guidelines

Application as back-up roller

The thick-walled outer rings of the back-up rollers can support high radial loads. If these rollers are used on a flat mating track, the outer rings undergo elastic deformation.

Compared with a rolling bearing supported in a housing bore, back-up rollers have a modified load distribution in the bearing.

The basic rating life is calculated using the effective dynamic load rating C_{rw} .

Application as bearing

If the back-up rollers are fitted in a housing bore as is normal with rolling bearings, the bearing rating life is calculated using the basic dynamic load rating C_r of the rolling bearing.

Equivalent dynamic load

For back-up rollers under dynamic loading, the following applies:

$$P = F_r$$

P kN

Equivalent dynamic bearing load for combined load

F_r kN

Radial dynamic bearing load.

Accuracy

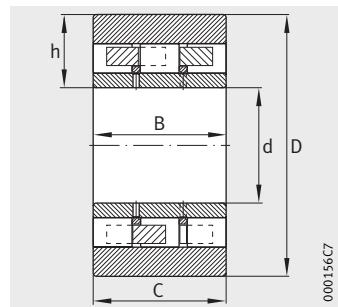
The narrow tolerances for the rolled product require high bearing accuracy, especially in the radial runout of the outer rings and the bearing section height tolerance. This is achieved by heavily restricted manufacturing tolerances and subsequent sorting of all individual parts.

The back-up rollers are sorted in several section height groups. Each back-up roller is marked with the designation of the section height group. Back-up rollers of the same section height group are used for each support shaft. Further information is given in TPI 129, Back-up rollers for multi-roll cold rolling mills.

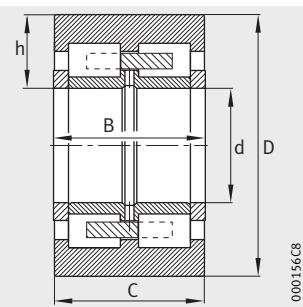


Back-up rollers

Double row or multi-row



Design 1
Non-locating bearing



Design 2
Locating bearing, open

Dimension table · Dimensions in mm

Designation	Design	Mass m ≈kg	Dimensions				
			d	D	B	C	h
Z-577888.WGTR	2 ¹⁾²⁾	54,9	130	300,02	130	129	85,01
Z-578270.01.WGTR	2 ²⁾	56,5	130	300,02	132	129	85,01
Z-564604.WGTR	2 ²⁾	60	130	300,02	150	149	85
Z-548963.WGTR	2 ¹⁾²⁾	67,4	130	300,02	161,5	160,5	85
Z-567455.01.WGTR	2 ²⁾	71,3	130	300,02	172,65	171,6	85
Z-567998.01.WGTR	2 ³⁾⁵⁾	73,5	130	300,02	172,65	171,6	85,01
Z-549722.WGTR	2 ²⁾	73,6	130	300,02	172,65	171,6	85,01
Z-549722.01.WGTR	2 ¹⁾²⁾	73,6	130	300,02	172,65	171,6	85,01
Z-512497.03.WGTR	1 ²⁾	74,8	130	300,02	172,64	172,6	84,955
F-800115.01.WGTR	2 ¹⁾²⁾	132	180	406,42	171,04	170	113,143
Z-564247.02.WGTR	2 ¹⁾²⁾	125	180	406,4	171,04	170	113,2
Z-564247.WGTR	2 ²⁾	125	180	406,4	171,04	170	113,2
Z-527502.03.WGTR	1 ²⁾	130	180	406,42	171,04	171	113,143
Z-543307.01.WGTR	1 ³⁾	130	180	406,42	171,04	171	113,2
F-809717.WGTR	2 ⁴⁾	136	180	406,42	176	170	113,2
Z-514278.01.WGTR	1 ²⁾	150	180	406,42	217	217	113,143
F-804209.WGTR	2 ²⁾⁵⁾	174	180	406,4	224	220	113,2
Z-523247.02.WGTR	1 ²⁾	169	180	406,42	224	224	113,2
Z-523247.03.WGTR	1 ³⁾	169	180	406,42	224	224	113,2

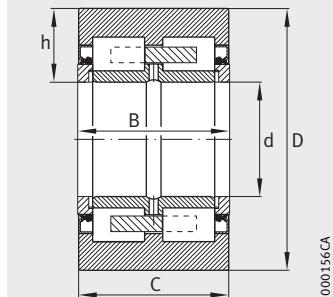
¹⁾ Sealing with rotary shaft seals for recirculating oil lubrication.

²⁾ Chill hardened outer ring.

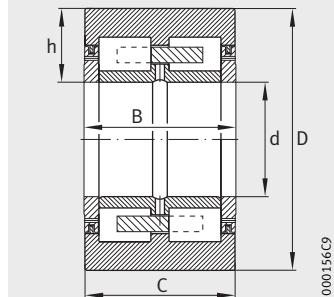
³⁾ Outer ring made from case hardening steel.

⁴⁾ Back-up roller made from rolling bearing steel (chromium steel).

⁵⁾ Sealing with lamellar rings for minimal quantity lubrication.



Design 2
With rotary shaft seal¹⁾



Design 2
With gap seals⁵⁾

Basic load ratings

Bearing		Back-up roller	
dyn. C_r kN	stat. C_{0r} kN	dyn. C_{rw} kN	stat. C_{0rw} kN
1 040	1 560	760	1 180
1 040	1 560	760	1 180
1 200	1 860	890	1 450
1 200	1 880	910	1 490
1 440	2 370	1 010	1 680
1 440	2 370	1 010	1 680
1 440	2 370	1 010	1 680
1 440	2 370	1 010	1 680
1 500	2 700	1 030	1 810
1 570	2 650	1 170	2 040
1 710	3 000	1 250	2 190
1 710	3 000	1 250	2 190
2 080	3 850	1 420	2 550
2 080	3 850	1 420	2 550
1 710	3 000	1 250	2 190
2 500	4 900	1 720	3 250
1 910	3 450	1 420	2 600
2 600	5 100	1 790	3 350
2 600	5 100	1 790	3 350





ELGES spherical plain bearings

Technical principles

ELGES spherical plain bearings, maintenance-free
ELGES spherical plain bearings, requiring maintenance

ELGES spherical plain bearings

ELGES spherical plain bearings 874

Spherical plain bearings are ready-to-fit, standardised machine elements. The outer ring with its concave inner slideway and the inner ring with its crowned outer slideway facilitate spatial adjustment motion.

In the large bearing range, the bearings are available as radial and axial spherical plain bearings. They can support static loads, are suitable for tilting and swivel motion, compensate for shaft misalignment, are not subject to edge stresses under misalignment and allow substantial manufacturing tolerances in the adjacent construction.

Maintenance-free 874

These spherical plain bearings are completely maintenance-free. They are used where particular requirements for operating life apply in conjunction with maintenance-free operation or where, for reasons of lubrication, bearings with metallic sliding contact surfaces are not suitable, for example under unilateral load.

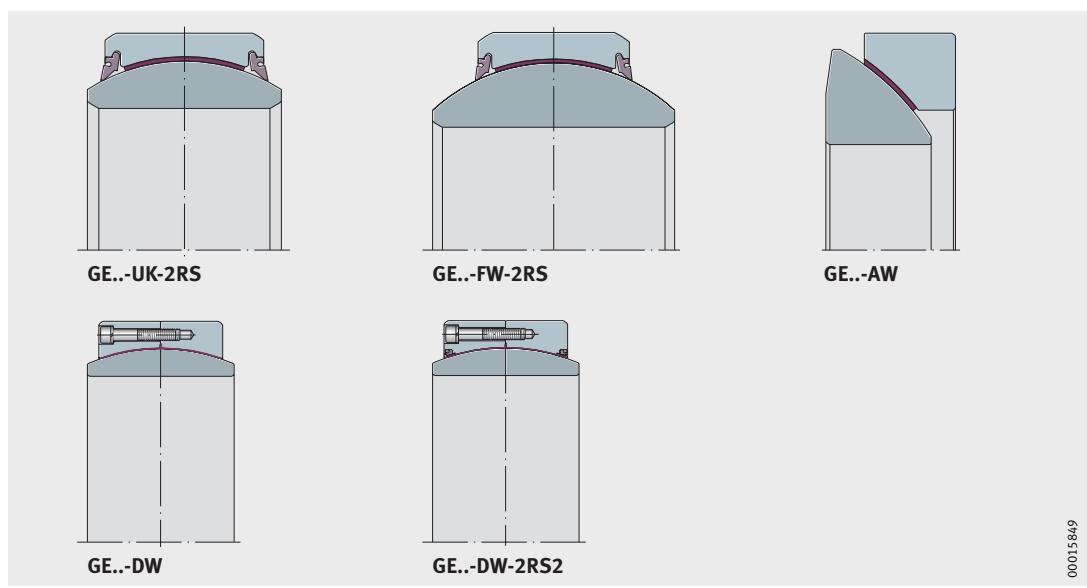
The standard sliding layer used is ELGOGLIDE[®]-800.

Requiring maintenance 890

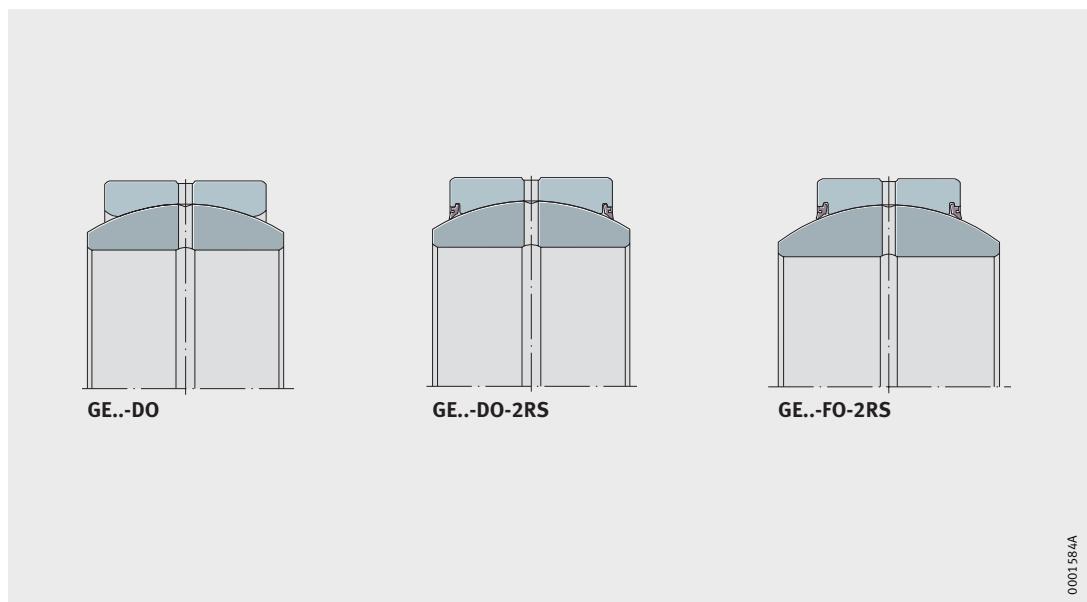
These bearings correspond in their construction to the maintenance-free designs but are lubricated via the outer and inner ring.

They transmit movements and forces with low moment levels – thus keeping bending stresses away from the construction elements – and are particularly suitable for alternating loads with impact and shock type stresses.

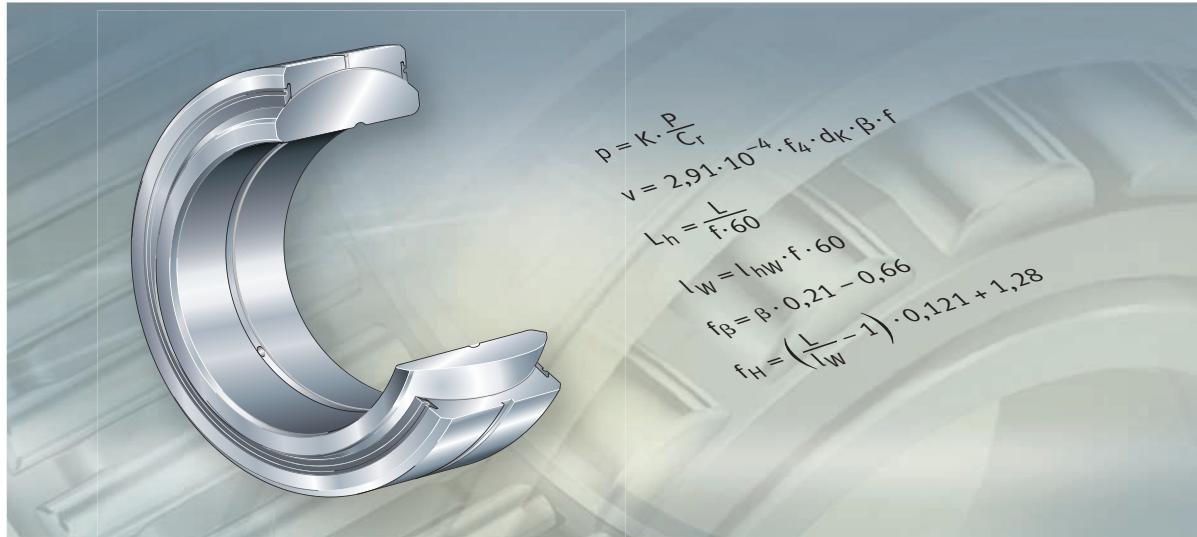
The sliding contact surface is the metallic combination steel/steel.



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$$p = K \cdot \frac{P}{C_r}$$
$$\nu = 2,91 \cdot 10^{-4} \cdot f_4 \cdot d_k \cdot \beta \cdot f$$
$$l_h = \frac{L}{f \cdot 60}$$
$$l_w = l_{hw} \cdot f \cdot 60$$
$$f_\beta = 8 \cdot 0,21 - 0,66$$
$$f_H = \left(\frac{L}{l_w} - 1 \right) \cdot 0,121 + 1,28$$

Technical principles

Load carrying capacity and life

Friction

Sliding layers for maintenance-free spherical plain bearings

Lubrication

Internal clearance

Design of bearing arrangements

Fitting and dismantling

Technical principles

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Load carrying capacity and life

Basic load ratings

Basic load ratings are bearing-specific key data that are not standardised and may differ from manufacturer to manufacturer. They are derived from the material-specific load parameters K and the projected load-bearing area of the bearing in each case.

Basic dynamic load rating

The basic dynamic load rating C_r (C_d) is used in cases of dynamic loading. A spherical plain bearing is subjected to dynamic loading if it performs swivel, tilting or rotary motion under load.

The basic dynamic load rating is the maximum permissible dynamic load. It can only be utilised to the full if the load acts in a purely radial manner in radial spherical plain bearings and in a purely axial, concentric manner in axial spherical plain bearings.

If the basic dynamic load rating is utilised to the full, there is often a considerable reduction in the operating life of the bearings.

The degree to which the basic load rating is utilised should therefore always be matched to the required operating life, see also section Predimensioning, page 856.

Basic static load rating

The basic static load rating C_{0r} (C_{0a}) is used if a spherical plain bearing is subjected to load while stationary.

It indicates the load that the spherical plain bearing can support at room temperature without damage to the sliding surfaces. This is subject to the precondition that the components adjacent to the bearing must prevent deformation of the bearing.

If the basic load rating C_{0r} (C_{0a}) is utilised to the full, the shaft and housing must be made from high strength materials.



Load carrying capacity and life

Rating life

The calculation of the theoretical rating life is based on a large number of laboratory tests and takes account of certain operational data.

The rating life is defined as the number of motion cycles or operating hours that can be achieved by the majority of a sufficiently large number of spherical plain bearings under identical operating conditions before certain failure criteria are met.

The failure criteria are test limit values defined by the manufacturer that are related to a quantity of wear – as a function of the bearing size – or an upper friction value that is exceeded.

The quantity of wear and the increase in friction are dependent on the sliding contact surface and the application.

Under identical operating conditions, the operating life achieved may therefore differ significantly.

The calculation of the theoretical rating life gives comparative values for the bearings. They give information about the higher or lower performance of the selected bearings.



For calculation of the rating life, see Catalogue 238, Spherical Plain Bearings, Plain Bushes, Rod Ends (from 2010: Catalogue HG 1).

Concentric constant force F

Load values can be applied directly in the calculation of the rating life if they act in a purely radial manner on radial spherical plain bearings and in a purely axial, concentric manner on axial spherical plain bearings. The load value F for calculating the rating life is, in this case, the calculation value P ($F = P$).

Combined loading by radial and axial forces

If spherical plain bearings are subjected simultaneously to radial and axial forces, the equivalent calculation value P must be used in the rating life formula. This value has the same effect on the rating life as the forces acting in combination.

For radial spherical plain bearings, the following applies,
Figure 1, page 855:

$$P = X \cdot F_r$$

For axial spherical plain bearings, the following applies,
Figure 2, page 855:

$$P = Y \cdot F_a$$

P N
Equivalent dynamic bearing load

F_r N
Radial dynamic bearing load

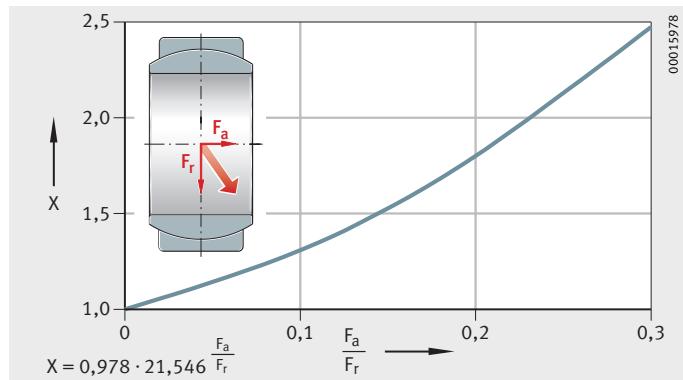
F_a N
Axial dynamic bearing load

X –
Factor for the axial load in radial spherical plain bearings, *Figure 1*, page 855

Y –
Factor for the radial load in axial spherical plain bearings, *Figure 2*, page 855.

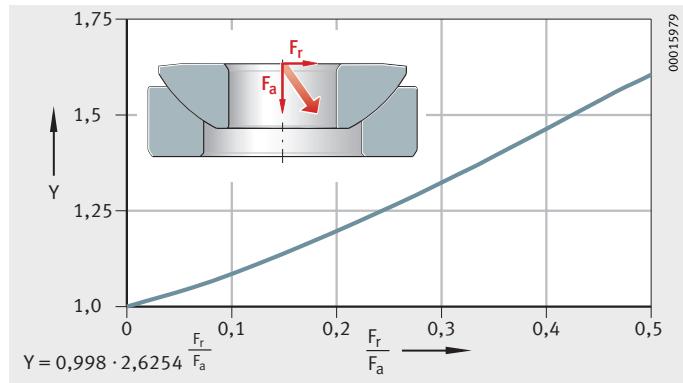
F_a = axial dynamic bearing load
 F_r = radial dynamic bearing load
 X = factor for the axial load
 in radial spherical plain bearings

Figure 1
Radial spherical plain bearings,
combined loading



F_a = axial dynamic bearing load
 F_r = radial dynamic bearing load
 Y = factor for the radial load
 in axial spherical plain bearings

Figure 2
Axial spherical plain bearings,
combined loading



Variable bearing load and equivalent operating values

If the quantity of a force varies in a linear manner during swivel motion, the equivalent calculation value P must be used. This value has the same effect on the rating life as the variable bearing load occurring in practice.

$$P = \sqrt{\frac{F_{\min}^2 + F_{\max}^2}{2}}$$

P N
 Equivalent dynamic bearing load
 F_{\max} N
 Maximum bearing load
 F_{\min} N
 Minimum bearing load.

Calculation service

The influences that must be taken into consideration in calculation are expressed as mathematical functions. As a result, the calculation principles can be programmed, eliminating the need for time-consuming manual calculation work. Furthermore, there are calculation programs that can be applied by agreement.



The theoretical rating life calculations are only valid for the products described in this catalogue. They cannot be transferred to other products under any circumstances.

Load carrying capacity and life

Operating life

The operating life is the number of motion cycles or operating hours achieved in practice by a spherical plain bearing. It may differ from the calculated theoretical rating life.

The operating life is dependent on factors including:

- the type and magnitude of load
- any shocks occurring
- the sealing arrangement
- corrosion
- contamination
- maintenance.

Dimensioning of spherical plain bearings

Predimensioning

The required size of a spherical plain bearing depends on the requirements placed on its rating life, load carrying capacity and operational reliability.



If the basic dynamic load rating C_r (C_a) is utilised to the full, there is often a considerable reduction in the operating life of bearings with metallic sliding surfaces. The degree to which the basic load rating is utilised should therefore always be matched to the required operating life. This is indicated by the ratio C_r (C_a)/P.

The ratio C_r (C_a)/P must not be less than 1.

Depending on the application and bearing type, it is between 1 and 10.

Predimensioning is not a substitute for more extensive bearing calculation.

The load ratios C_r (C_a)/P required for predimensioning of maintenance-free spherical plain bearings or spherical plain bearings requiring maintenance are shown in the tables.

**Load ratio
for maintenance-free spherical
plain bearings under dynamic load
– guide values**

Spherical plain bearing	Ratio C_r /P or C_a /P	
Series	Alternating load	Unilateral load
GE..-UK-2RS	suitable at ≥ 2	suitable from 5 to 1
GE..-FW-2RS	suitable at ≥ 2	suitable from 5 to 1
GE..-DW	suitable at > 2	suitable from 3 to 1
GE..-DW-2RS2	suitable at > 2	suitable from 3 to 1
GE..-AW	suitable at ≥ 2	suitable from 5 to 1

**Load ratio
for spherical plain bearings
requiring maintenance
under dynamic load
– guide values**

Spherical plain bearing	Ratio C_r /P	
Series	Alternating load	Unilateral load
GE..-DO-2RS	suitable from 3 to 1	suitable from 4 to 1,7
GE..-DO	suitable from 3 to 1	suitable from 4 to 1,7
GE..-FO-2RS	suitable from 3 to 1	suitable from 4 to 1,7

Friction and increases in temperature

Friction is essentially dependent on:

- the sliding contact surface
- the load
- the sliding speed
- the bearing temperature
- the lubrication condition
- the quality of the sliding surfaces.



Maintenance-free spherical plain bearings must not be lubricated. The PTFE particles to be transferred do not adhere to oily surfaces. Lubricant therefore prevents the necessary smoothing of the surface.

If spherical plain bearings that have undergone dry running-in are then lubricated, this damages the internal tribology and reduces the operating life.

Friction behaviour

The friction behaviour changes during the operating life. Bearings that have been well run in give the lowest friction values. During the running-in and failure phases, the values are sometimes significantly higher.

For the running-in phase of maintenance-free spherical plain bearings, see page 858.



Friction and increases in temperature

Running-in phase of maintenance-free spherical plain bearings

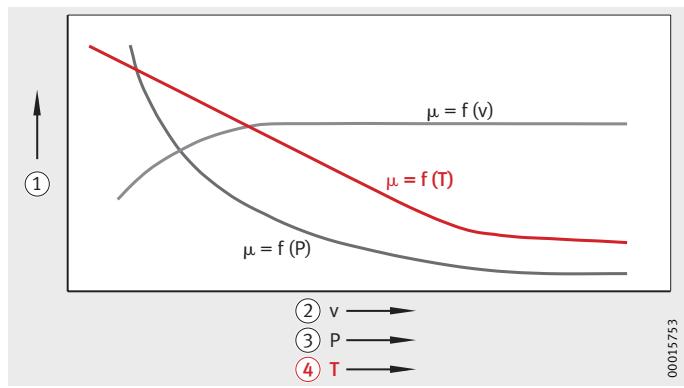
During the running-in phase, PTFE particles are transferred from the sliding layer of the outer ring to the opposing running surface of the inner ring. This fills in the areas of slight roughness in the inner ring surface. A long operating life is only achieved with this tribologically smooth surface.

With new spherical plain bearings, the bearing frictional torque may be significantly higher during the early running-in phase due to:

- plastic moulding of the PTFE material onto the surface structure of the opposing running surface
- the as yet incomplete internal bearing tribology, the deposit of PTFE particles on the opposing running/functional surface (PTFE/PTFE friction), *Figure 3*.

- ① Coefficient of friction μ
- ② Sliding speed v
- ③ Load P
- ④ Temperature T

Figure 3
Friction behaviour
of maintenance-free
sliding materials based on PTFE



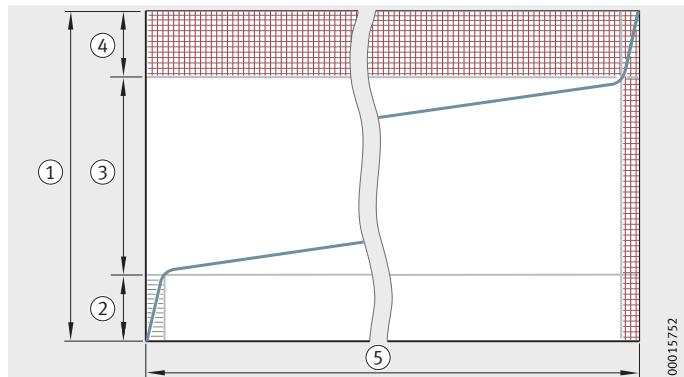
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Wear behaviour

- ① Wear
- ② Running-in phase
- ③ Main wear phase
- ④ Failure phase
- ⑤ Rating life

Figure 4
Wear behaviour
of maintenance-free
spherical plain bearings

The wear behaviour of maintenance-free spherical plain bearings is shown in *Figure 4*.



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Sliding layers for maintenance-free spherical plain bearings

ELGOGLIDE® sliding layers

Maintenance-free spherical plain bearings have special sliding layers based on PTFE (polytetrafluoroethylene).

In terms of performance capability, these are:

- ELGOGLIDE®, *Figure 5*
 - ELGOGLIDE®-800, the highest performance sliding layer
 - ELGOGLIDE®-600, the sliding layer for low friction.

These materials form the slideway of the outer ring or the housing locating washer. They transmit the forces occurring and perform the lubrication function. Additional lubrication of the bearings must not be carried out.

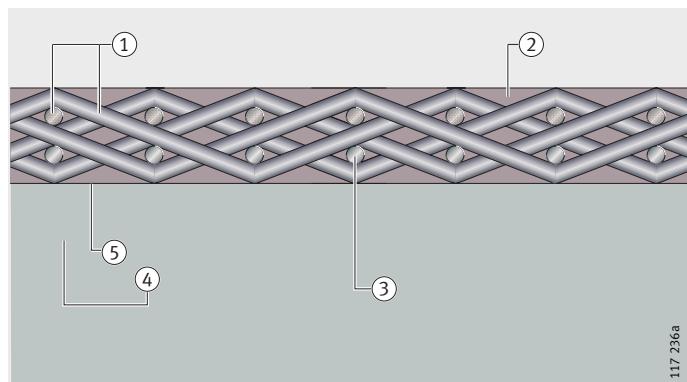
The sliding layer comprises 0,5 mm thick ELGOGLIDE®, is embedded in synthetic resin and attached by a high strength bond to the supporting body, *Figure 5*.

The flow behaviour of the sliding layer is, in conjunction with the supporting 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 support fibres
- ② Resin matrix
- ③ Supporting fibres
- ④ Steel supporting body
- ⑤ Adhesive bond

Figure 5
ELGOGLIDE®,
cross-section



ELGOGLIDE® designs

For the different requirements, the following are available:

- ELGOGLIDE®-800
 - The standard material for very high contact pressures from 25 N/mm² to 300 N/mm² and a long operating life.
- ELGOGLIDE®-600
 - The material for contact pressures from 1 N/mm² to 100 N/mm² and with low coefficients of friction even at low contact pressures.
- ELGOGLIDE®-800-X-life
 - In the series GE..-DW, GE..-DW-2RS2 and GE..-AW, this material combines high load carrying capacity with low coefficients of friction and low running-in wear. This material is only available in the series indicated.

Lubrication

Principles	Large spherical plain bearings requiring maintenance and with a steel/steel sliding contact surface must be lubricated. They are subjected to a special surface treatment and supplied already provided with MoS ₂ . Nevertheless, the quality of maintenance has a considerable influence on the function and wear of spherical plain bearings.
Functions of the lubricant	<p>The lubricant should:</p> <ul style="list-style-type: none">■ reduce friction■ form a lubricant film sufficiently capable of supporting loads on the contact surfaces and thus prevent wear and premature fatigue■ provide the bearing with additional protection against contamination if grease lubrication is used■ give protection against corrosion. <p> It is more important to use a suitable lubricant than to provide generously defined, short lubrication intervals. The lubricant must always be chosen in consultation with lubricant manufacturers.</p>
Criteria for lubricant selection	<p>In the case of grease lubrication, the following criteria must be considered:</p> <ul style="list-style-type: none">■ the load■ the load direction■ the swivel angle■ the sliding speed■ the ambient temperature■ the environmental conditions. <p>Suitable lubricants have a content of approx. 3% MoS₂ or solid additives based on calcium and zinc phosphate compounds. Even under high contact pressure, these additives separate the sliding surfaces from each other.</p>

Grease lubrication For standard applications with a steel/steel sliding contact surface, suitable greases are conventional, corrosion-inhibiting, high-pressure types with a lithium soap base, EP additives and solid lubricant additives.

Running-in phase The running-in phase has a significant influence on the later wear behaviour of the bearing. Correct lubrication is therefore of particular importance at this point.

During running-in, the surfaces of the contact zones undergo smoothing and elastic moulding. This gives additional load-bearing areas and reduces the strain on the material.

Guidelines on greasing During the running-in phase, the pressure in the bearing is particularly high. Spherical plain bearings are therefore manganese phosphated and treated with MoS₂. The running-in wear phase proceeds all the more favourably the more MoS₂ is embedded in the porous-crystalline manganese phosphate.

This process is most effective if the bearing runs undergoes ten swivel movements under load without additional greasing and is then provided with its initial greasing.

If this is not possible, the initial greasing must be metered carefully in order to avoid flushing an excessive quantity of MoS₂ out of the bearing.

Relubrication During relubrication, old grease is replaced by fresh grease. At the same time, the grease flushes wear debris and contaminants out of the bearing.



The bearings must be relubricated periodically. The relubrication intervals should not be established arbitrarily but determined by calculation or in consultation with the lubricant manufacturer.

If relubrication is carried out too frequently, the operating life of the bearing may be reduced, since the friction of spherical plain bearings always increases for a short time after relubrication.



Relubrication conditions The grease used for relubrication must be the same as that used in initial greasing.

If other greases are used, the miscibility and compatibility of the greases must be checked.

Relubrication should always be carried out as follows:

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

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



Spherical plain bearings requiring maintenance must be lubricated via the outer and inner ring.

Internal clearance

Radial internal clearance of radial spherical plain bearings requiring maintenance

The radial internal clearance of spherical plain bearings requiring maintenance and with a steel/steel sliding contact surface is defined as the distance by which the inner ring can be moved in a radial direction relative to the outer ring from one extreme position to the precisely opposite extreme position.

The radial internal clearance is, in accordance with DIN ISO 12240-1, subdivided into three groups, see table.

This is subject to the precondition that the housing bore, apart from the correction of geometrical inaccuracies, causes no dimensional changes in the bearing.

Radial internal clearance groups

Internal clearance group	Description	Standard	Application
CN	<input type="checkbox"/> Normal radial internal clearance <input type="checkbox"/> CN is not included in bearing designations	ISO 12240-1	Under normal operating conditions and with the recommended fits, this gives optimum operating clearance
C2 ¹⁾²⁾	<input type="checkbox"/> Internal clearance < CN (suffix C2)		For bearing arrangements with very small clearance
C3	<input type="checkbox"/> Internal clearance > CN (suffix C3)		For bearing rings with press fits or a large temperature differential between the inner and outer ring

¹⁾ Relubrication only possible with a tilt angle $\alpha = 0^\circ$.

²⁾ Example of bearing with restricted internal clearance: GE220-DO-2RS-C2.

Axial internal clearance

The axial internal clearance is defined as the distance by which the inner ring can be moved in an axial direction relative to the outer ring from one extreme position to the precisely opposite extreme position.

It is dependent on the bearing geometry and is in a direct relationship with the radial internal clearance.

Depending on the bearing type, it may be several times greater than the radial internal clearance.

Design of bearing arrangements

Design of shaft and housing bore

The seating surfaces of the bearings should be designed such that the forces transmitted through the bearing:

- do not cause unacceptable geometrical changes to the shaft and housing
- do not cause permanent deformation of the spherical plain bearing.



Where spherical plain bearings are subjected to high loads of $p \geq 80 \text{ N/mm}^2$, the shaft and housing must be checked.

Recommendations for the surface quality (shaft and housing bore) are given in the values according to the table.

Roughness values of bearing seating surfaces

Bearing seating surface	Roughness ¹⁾ µm
Shaft	$\leq R_z10$
Housing bore	$\leq R_z16$

¹⁾ If larger roughness values are present, please contact the engineering service of the Schaeffler Group.

Radial location of spherical plain bearings

In spherical plain bearings, the sliding motion should take place between the curved sliding surfaces of the inner and outer ring. The quality and treatment of the surface is matched to this requirement. The internal clearance and osculation of the sliding surfaces must therefore be in a balanced relationship.

Spherical plain bearings requiring maintenance

The operating life of spherical plain bearings requiring maintenance is reduced by:

- preload on the sliding surfaces
- excessively small load-bearing areas on the sliding surfaces due to unacceptably large internal clearance.

Recommendations for fits: see table.



If tighter fits are necessary, for example under high, impact type loads, the operating clearance must be checked by means of calculation.

Shaft and housing fits

Spherical plain bearing	Internal clearance group	Material	
		Housing/shaft Steel/steel	Housing/shaft Light metal/steel
Radial spherical plain bearing	C2	K7/j6	M7/j6
	CN (normal)	M7/m6	N7/m6
	C3	M7/m6	N7/m6
Axial spherical plain bearing	-	M7/n6	-



Design of bearing arrangements

Maintenance-free spherical plain bearings

Looser fits may be used with maintenance-free spherical plain bearings. Due to the hard chromium/PTFE sliding contact surface, the bearing friction in this case is lower than that of spherical plain bearings requiring maintenance.

Recommendations for fits: see table.

Shaft and housing fits

Spherical plain bearing	Bore d	Material	
		Housing/shaft Steel/steel	Housing/shaft Light metal/steel
Radial spherical plain bearing	≤ 300 mm	K7/j6	M7/j6
	> 300 mm	J7/j6	–

Axial spherical plain bearing

The shaft and bore fits must be selected such that no sliding motion occurs on the shaft or in the housing bore. Tight fits prevent damage to the adjacent construction.

If tight fits are present, elastic deformations of the bearing rings reduce the internal clearance of the spherical plain bearing.

These deformations occur as a result of:

- interference between the housing and outer ring (constriction of the outer ring)
- interference between the shaft and bearing bore (expansion of the inner ring).

If a tight fit is not possible, the bearing rings must be secured against axial sliding motion on the shaft or in the housing, see section Axial location of spherical plain bearings, page 865.

Application as non-locating bearings (between shaft and bearing bore)



The surface of the shaft must be wear-resistant as follows:

- surface hardness ≥ 56 HRC
- surface roughness $\leq R_z 10$.

Spherical plain bearings requiring maintenance should then only be lubricated via the shaft.

Axial location of spherical plain bearings



Spherical plain bearings under high loads undergo elastic deformation. This leads to relative micromovements in the fits. As a result, the bearing rings can creep in an axial direction despite a tight fit.

In order to prevent axial displacement, the bearing rings must always be located axially.

Non-locating bearing side

The axial displacement should occur between the shaft and bearing bore because:

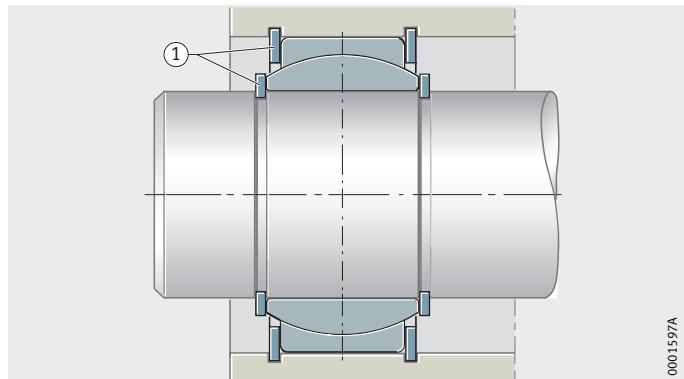
- the length/diameter ratio of the guidance is more favourable at this point than on the outer ring of the bearing
- the axially split outer ring expands under axial load and can therefore jam in the bearing location
- no wear should occur in the housing bore.

Location by retaining rings

Location can usefully be carried out using retaining rings, which allow the bearings to be easily fitted and dismantled, *Figure 6*.

① Retaining rings

Figure 6
Location by retaining rings



Design of bearing arrangements

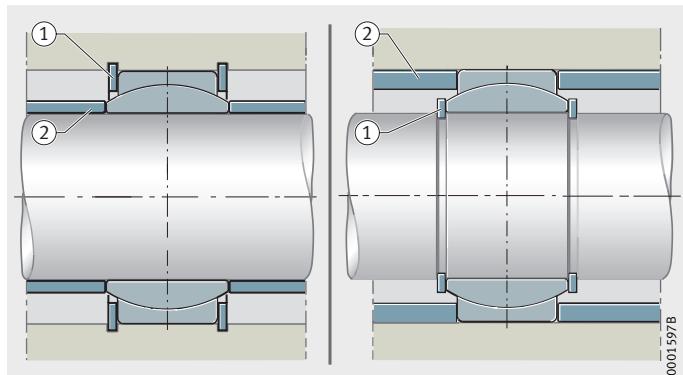
Location by spacer rings

Spacer rings between the bearing ring and adjacent component are suitable if the shaft must not be weakened by annular slots or the bearings are to be axially preloaded, *Figure 7*.

Axial preload prevents rotary motion between the bearing ring and adjacent construction even with a loose fit.

- ① Retaining rings
- ② Spacer rings

Figure 7
Location by retaining rings
and spacer rings

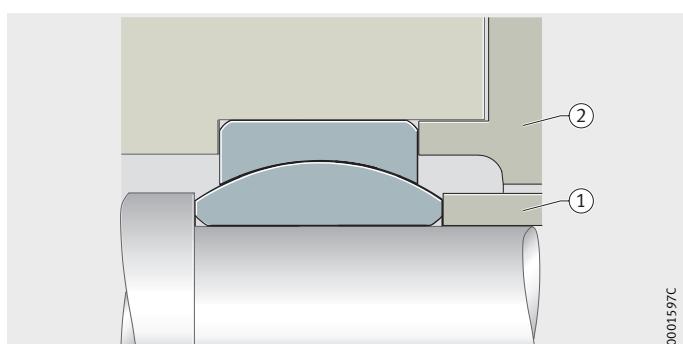


Location by spacer sleeve and sealing cover

It is also possible to locate spherical plain bearings with the aid of a spacer sleeve or end plate and a sealing cover, *Figure 8* and *Figure 9*.

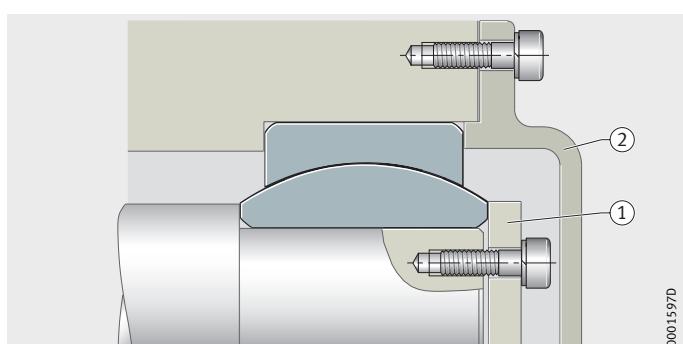
- ① Spacer sleeve
- ② Sealing cover

Figure 8
Location by spacer sleeve
and sealing cover



- ① End plate
- ② Sealing cover

Figure 9
Location by end plate
and sealing cover



Sealing of the bearing position

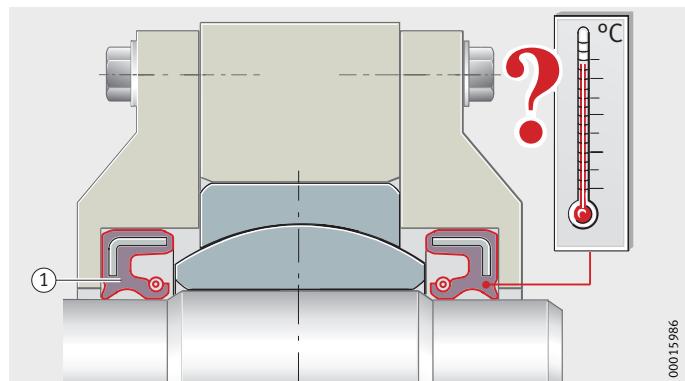
Additional sealing ensures a long operating life and simultaneously acts to prevent the ingress of contamination and moisture.

In the design (selection) of this sealing arrangement, it must be borne in mind that the clearance of the bearing arrangement increases due to the wear of the sliding layer.

If bearings are subjected to higher temperatures, an open bearing with external heat-resistant seals can be used, *Figure 10*.

① Rotary shaft seal

Figure 10
Open spherical plain bearing
with external seals



Fitting and dismantling

Fitting

Spherical plain bearings must be handled very carefully both before and during fitting. Problem-free functioning is substantially dependent on the care taken in fitting. The bearings will only achieve their maximum operating life and functional capability if they are fitted correctly.

Guidelines



The guidelines on fitting must be observed. If not, there is a direct or indirect hazard to personnel, the product or the adjacent construction.

The assembly area must be kept clean and free from dust.

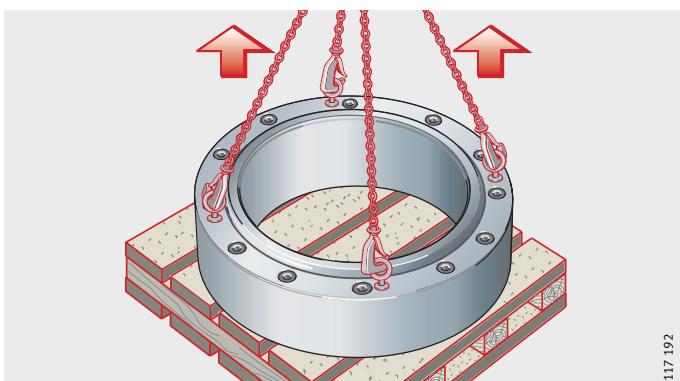
The bearings must be protected against moisture and aggressive media.

The bearings must always be located concentrically.

Fitting may only be carried out by trained personnel.

If bearings are fitted incorrectly, no liability can be accepted.

Large spherical plain bearings should only be transported using the eye bolts supplied and have threaded holes on the end faces of the inner and outer rings for this purpose, *Figure 11*.



117 192

Figure 11
Transport by means of eye bolts

Delivered condition and storage

The surface of spherical plain bearings is coated with a preservative. Any change, irrespective of the bearing type, will reduce the operating life.

The bearings must only be stored:

- in the original packaging
- in dry, clean rooms with the temperature as constant as possible
- at a relative humidity of max. 65%.

Unpacking of bearings

Spherical plain bearings should only be removed from their packaging immediately before fitting:

- Hands should be kept clean and dry and protective gloves worn if necessary (perspiration leads to corrosion).
- If the original packaging is damaged, the products must be checked.
- If the products are contaminated, they must be wiped with a clean cloth only.

Tools for thermally assisted fitting



In order to reduce the forces required for fitting, the spherical plain bearings can be heated: heating cabinets with a controllable thermostat are suitable for heating. The advantages include uniform heating, no contamination of components and the absence of long preheating times.

Local overheating should be avoided; the bearing temperature must be monitored using a thermometer.

Information in the catalogue and the manufacturer's data on grease and seals must be observed.

Checking the adjacent construction

Before spherical plain bearings are fitted, the adjacent construction must be checked for the following:

- the quality of the bearing seating surfaces of the shaft and housing bore
- the dimensional and geometrical accuracy of the seating and locating faces
- the shaft and housing seat
- the lead chamfer on the shaft and housing bore from 10° to 20° , *Figure 12*.

Any burrs present must be removed.

If tight fits are present or fitting conditions present difficulties, the surface of the shaft and housing bore should be lightly oiled.

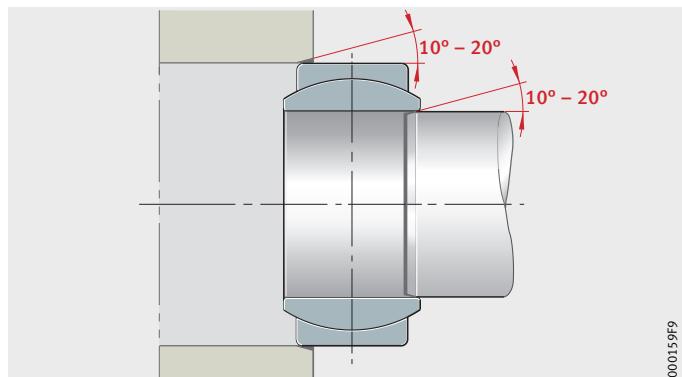


Figure 12
Lead chamfers

Fitting and dismantling

Mechanical assistance



Avoid direct blows with a hammer and drift on the end faces of the bearing rings, since this can lead to microcracks in the bearing.

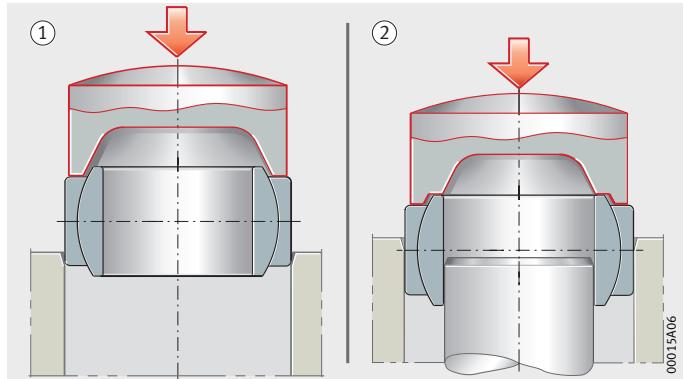
Always apply fitting forces to the bearing ring to be fitted, *Figure 13*. If these forces are directed through the sliding surfaces, this could lead to jamming of the bearings during fitting.

When fitting the bearings on a shaft and in a housing, fitting tools must be used that act simultaneously on the end faces of the inner and outer ring, *Figure 13*.

Larger bearings must be fitted using special fitting equipment, *Figure 14*. As the bearing diameter increases, so do the fitting forces required and simple impact type tools are no longer adequate in these cases.

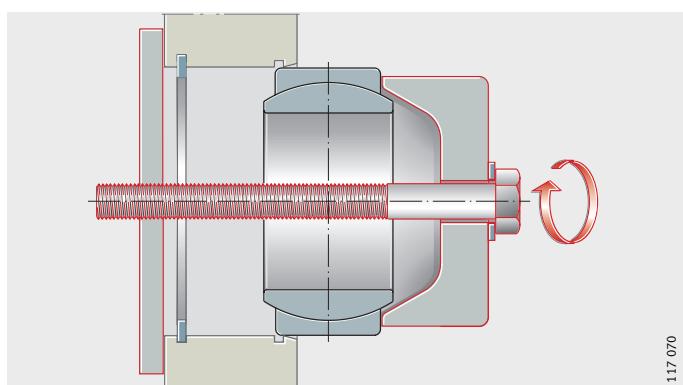
- ① Fitting in housing
- ② Simultaneous fitting on shaft and in housing

Figure 13
Fitting forces and
bearing ring to be fitted



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Figure 14
Special fitting equipment
for larger bearings



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Thermal assistance



In order to reduce the fitting forces, spherical plain bearings can be heated.

Do not heat bearings to more than +130 °C, since higher temperatures will damage the seals in sealed bearings.

Do not heat spherical plain bearings in an oil bath.

In bearings with a steel/steel sliding contact surface, this will change the concentration of molybdenum disulphide on the sliding surfaces.

Do not heat bearings using a naked flame.

The material undergoes excessive localised heating, reducing its hardness.

Stresses also occur in the bearing and seals may melt.

Maintenance-free sliding layers could be damaged.

Fitting by means of refrigeration

The structure of the rings of spherical plain bearings will change at temperatures below –61 °C. Due to the structural change, their volume may increase; the change to the tolerances may lead to jamming of the bearing.

If this fitting method is to be used, the bearing rings can be supplied with appropriate heat treatment. In this case, please contact the engineering service of the Schaeffler Group.

Adhesive bonding of bearing rings

If the recommended fits are adhered to, adhesive bonding of the bearing rings is not generally necessary.

Adhesives may only be used on spherical plain bearings with a steel/steel sliding contact surface under the following conditions:

- The surfaces to be bonded must be clean and free from grease.
- The raceways must be cleaned using a cleaning agent and well lubricated using a paste with a high MoS₂ content.
- It must be ensured that the lubricant ducts and lubricant holes are not blocked by adhesive.



Fitting and dismantling

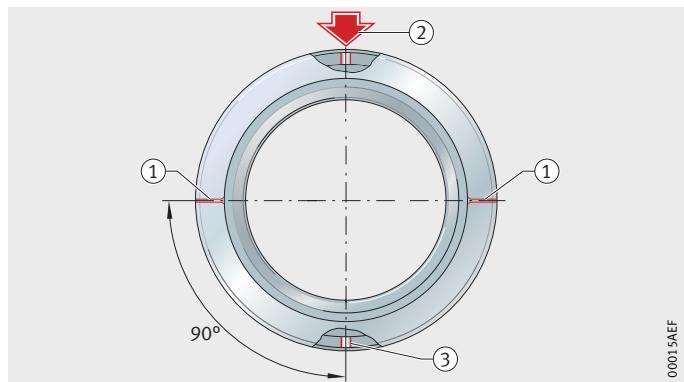
Positioning of the joint

In radial spherical plain bearings with split outer rings (split 2×), the joints must be positioned at 90° to the main load direction, *Figure 15*.

The lubrication holes of bearings requiring maintenance are thus positioned directly in the load zone. This allows good lubricant distribution in the load zone area.

- ① Joint
- ② Main load direction
- ③ Lubrication hole

Figure 15
Position of joint
in main load direction



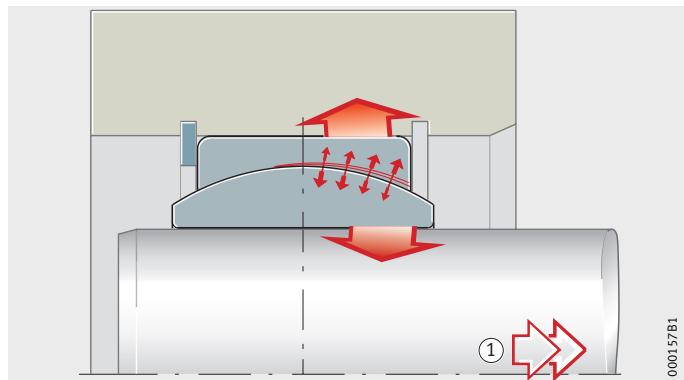
Dismantling

Even if the load is applied to the ring to be dismantled in accordance with the specification, the frictional contact of the other ring due to the fit presents difficulties in dismantling.

Depending on the joint interference pressure, the inner ring will be constricted and the outer ring will be expanded, *Figure 16*. The extraction forces also increase with increasing joint interference pressure.

- ① Motion

Figure 16
Constriction of the inner ring and
expansion of the outer ring



Precautions for dismantling

If the following precautions are taken during design, this will make dismantling of the bearings easier:

- a threaded hole for an extraction screw in the shaft, *Figure 17*
- threaded holes for extraction screws in the housing, *Figure 18*
- milled areas on the stud for the jaws of the removal device, *Figure 18.*

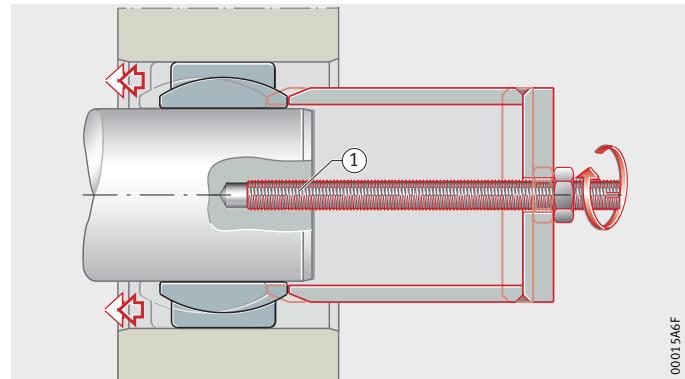


Figure 17
Threaded holes in the shaft

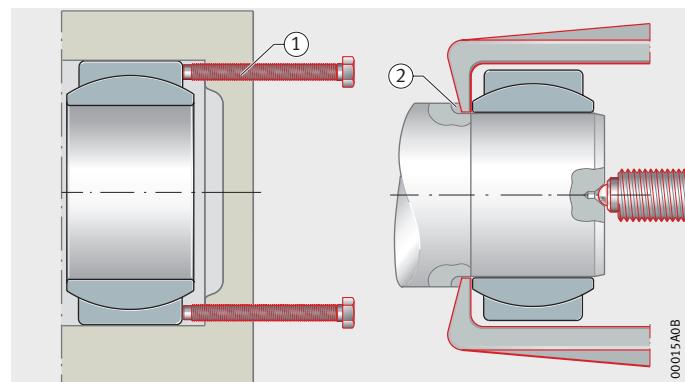
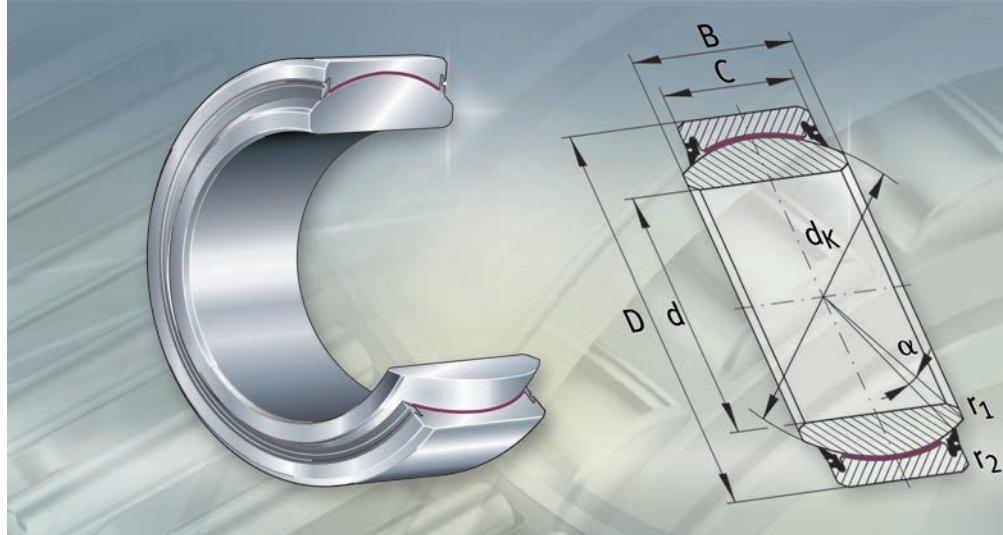


Figure 18
Threaded holes in the housing and
milled areas for extractors



ELGES spherical plain bearings, maintenance-free

Radial spherical plain bearings
Axial spherical plain bearings

ELGES spherical plain bearings, maintenance-free

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	Axial spherical plain bearings 878
	Operating temperature 879
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	Axial spherical plain bearings, maintenance-free, DIN ISO 12240-3 888



Product overview

ELGES spherical plain bearings, maintenance-free

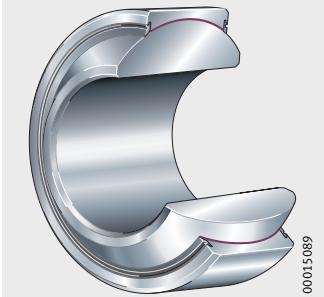
Radial spherical plain bearings

With lip seals or open
Hard chromium/ELGOGLIDE®-800

GE..-UK-2RS



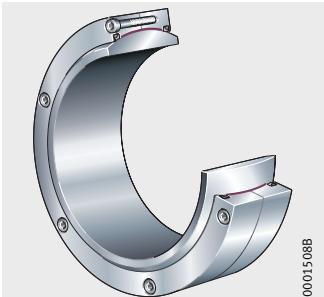
GE..-FW-2RS



GE..-DW



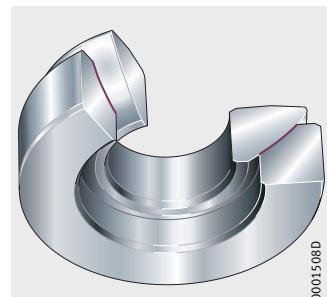
GE..-DW-2RS2



Axial spherical plain bearings

Hard chromium/ELGOGLIDE®-800

GE..-AW



ELGES spherical plain bearings, maintenance-free

Features

Maintenance-free large spherical plain bearings are available as radial and axial bearings.

The bearings are suitable for alternating and unilateral dynamic loads, ratio C_r/P (C_a/P) see page 856.

Spherical plain bearings are maintenance-free for their operating life and must not be lubricated.

Radial spherical plain bearings

Radial spherical plain bearings comprise inner rings and outer rings with a maintenance-free sliding layer. The inner ring has a cylindrical bore and a curved outer slideway. The outer ring has a cylindrical outside surface and a concave inner slideway. The standard sliding layer is ELGOGLIDE®-800. Technical data on ELGOGLIDE® sliding layers: see table.

Radial spherical plain bearings are used:

- where there are particular requirements on bearing life under maintenance-free operation
- under mainly radial loads
- where, for reasons of lubrication, bearings with a metallic sliding contact surface are not suitable, e.g. under unilateral load.

Technical data on ELGOGLIDE® sliding layers

Characteristics		ELGOGLIDE®	
		800	600
Maximum permissible specific contact pressure p	Static	500 N/mm ²	500 N/mm ²
	Dynamic, constant	300 N/mm ²	100 N/mm ²
	Dynamic, variable	100 N/mm ²	100 N/mm ²
Minimum permissible specific contact pressure p	Dynamic	25 N/mm ²	1 N/mm ²
Sliding speed v		1 mm/s $\leq v \leq$ 296 mm/s	
$p \cdot v$ value		1 N/mm ² · mm/s $\leq p \cdot v \leq$ 2 200 N/mm ² · mm/s	
Temperature t		-50 °C to +150 °C	
Coefficient of friction μ		0,02 to 0,2	



At increased sliding speeds, good heat dissipation is necessary.

For dimensioning, see Catalogue 238, Spherical Plain Bearings, Plain Bushes, Rod Ends (from 2010: HG 1).

Available bore diameters and dimension series: see table.

Bore diameters and dimension series

Radial spherical plain bearing Series	Design to	Dimension series	Bore diameter d mm	
			from	incl.
GE..-UK-2RS	DIN ISO 12 240-1	E	220	300
GE..-FW-2RS	DIN ISO 12 240-1	G	200	280



ELGES spherical plain bearings, maintenance-free

X-life

The series GE..-DW and GE..-DW-2RS2 are of the X-life design. These bearings have even higher performance materials, lower coefficients of friction and lower running-in wear than comparable bearings.

The outer ring is radially split and held together axially by screws and dowel pins.

Available bore diameters and dimension series: see table.

Bore diameters and dimension series

Series	Radial spherical plain bearing	Design to	Dimension series	Bore diameter d mm	
				from	to
GE..-DW		DIN ISO 12 240-1	C	320	1 000
GE..-DW-2RS2					

Sealing

Sealed radial spherical plain bearings are protected against contamination and water spray by lip seals.

Axial spherical plain bearings

Axial spherical plain bearings comprise shaft locating and housing locating washers. The shaft locating washer is supported in the ball socket-shaped sliding zone of the housing locating washer. The housing locating washer has an adhesive bonded layer of ELGOGLIDE®-800.

Axial spherical plain bearings are preferably used to support axial forces. They are suitable as support or base bearings and can be combined with radial spherical plain bearings of dimension series E to DIN ISO 12240-1, see page 880.

Axial large spherical plain bearings are also supplied in X-life quality. For the advantages of X-life, see section Radial spherical plain bearings, page 877.

Available bore diameters: see table.

Bore diameter

Series	Axial spherical plain bearing	Design to	Bore diameter d mm	
			from	to
GE..-AW		DIN ISO 12 240-3	220	360

Operating temperature



The permissible operating temperature is dependent on the sliding contact surface and the sealing arrangement.

If the temperature exceeds the values according to the table, there will be a reduction in the operating life and the effect of the sealing arrangement.

Temperature and rating life

Spherical plain bearing			Tempera-ture °C		Reduced rating life °C from
	Series	Sliding layer material	from	to	
Radial spherical plain bearing	GE..-UK-2RS ¹⁾	ELGOGLIDE®-800	-30	+130	<-20
	GE..-FW-2RS ¹⁾		-30	+130	
	GE..-DW	ELGOGLIDE®-800-X-life	-50	+150	
	GE..-DW-2RS2 ¹⁾		-40	+120	
Axial spherical plain bearing	GE..-AW	ELGOGLIDE®-800-X-life	-50	+150	

¹⁾ Open, for temperatures from -50 °C to +150 °C.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
2RS	Lip seals on both sides	Standard
2RS2	Lip seals on both sides with increased sealing action	
W1	Inner and outer ring made from corrosion-resistant steel	Special design, available by agreement only
W3	Inner ring made from corrosion-resistant steel	
W7	Inner ring bore lined with ELGOGLIDE®-800, bore diameter smaller than nominal dimension ($d_{NEW} = d - 1,08$)	
W8	Inner ring bore lined with ELGOGLIDE®-800 ($d_{NEW} = d$)	
W11	Maintenance-free ELGOGLIDE®-600 sliding layer, for contact pressures between 1 N/mm ² and 100 N/mm ² and reduced friction	



ELGES spherical plain bearings, maintenance-free

Design and safety guidelines



In predimensioning, the ratio C_r/P or C_a/P must be observed, see page 856. The permissible ratio is decisively dependent on the operating conditions and the required operating life.

The parts of different bearings are not interchangeable with each other.

Support of radial forces

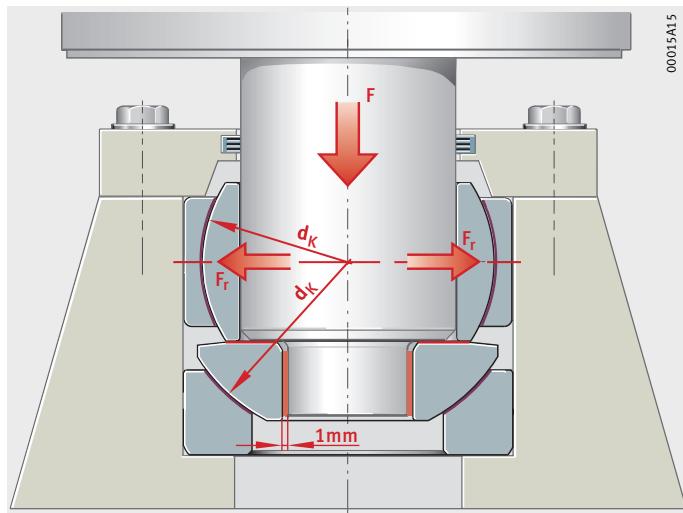


If axial spherical plain bearings are combined with radial spherical plain bearings of dimension series E to DIN ISO 12240-1 in order to support radial forces, the axial and radial load must be distributed over both bearings. The pin in the shaft locating washer must have a radial release of approx. 1 mm or the pin must only be in contact with the large end face of the shaft locating washer, *Figure 1*.

Axial spherical plain bearings must always be fitted in a closed housing. The diameter D of the axial bearing corresponds to the inside diameter of the housing.

d_K = sphere diameter
 F_r = radial dynamic bearing load

Figure 1
Combination
of axial and radial
spherical plain bearing



Accuracy

The main dimensions correspond to DIN ISO 12 240-1 or 3.
The dimensional and geometrical accuracy of the inside and outside diameter corresponds to DIN ISO 12 240-1 or 3.
Dimensional and tolerance data are arithmetic mean values.
Dimensional checking is carried out in accordance with ISO 8 015.

Spherical plain bearings with split outer ring



The outside diameters are within the deviations given in the tables before surface treatment and splitting.

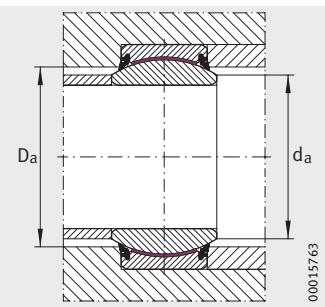
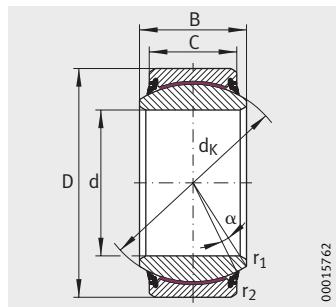
The outer rings become slightly out of round due to splitting.
The roundness of the outer ring is restored once it is fitted
in a housing bore produced in accordance with the specifications.

Measurements taken of the outside diameter of the unfitted bearing cannot be used as the original actual values for the outside diameter.



Radial spherical plain bearings

Maintenance-free
DIN ISO 12240-1,
dimension series E
Sealed



GE..-UK-2RS,
sliding contact surface,
hard chromium/ELGOGLIDE®-800

Mounting dimensions

Dimension table · Dimensions in mm

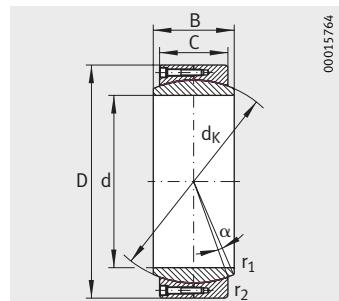
Designation	Mass m ≈kg	Dimensions						
		d	D	B	C	dk	α °	r ₁ , r ₂ min.
GE220-UK-2RS	35,4	220_{-0,03}	320 _{-0,04}	135 _{-0,3}	100 _{-0,8}	275	8	1,1
GE240-UK-2RS	39,4	240_{-0,03}	340 _{-0,04}	140 _{-0,3}	100 _{-0,8}	300	8	1,1
GE260-UK-2RS	51,1	260_{-0,035}	370 _{-0,04}	150 _{-0,35}	110 _{-0,8}	325	7	1,1
GE280-UK-2RS	64,5	280_{-0,035}	400 _{-0,04}	155 _{-0,35}	120 _{-0,8}	350	6	1,1
GE300-UK-2RS	77,2	300_{-0,035}	430 _{-0,045}	165 _{-0,35}	120 _{-0,9}	375	7	1,1

Mounting dimensions		Basic load ratings		Radial internal clearance
d _a	D _a	dyn. C _r kN	stat. C _{0r} kN	
max.	min.			
239,5	267	6 600	11 000	0 – 0,11
265,3	295	7 200	12 000	0 – 0,11
288,3	319	8 550	14 250	0 – 0,125
313,8	342	10 050	16 750	0 – 0,125
336,7	370	10 800	18 000	0 – 0,125

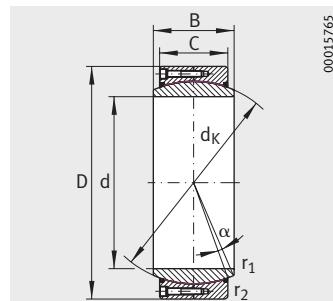


Radial spherical plain bearings

Maintenance-free
DIN ISO 12240-1,
dimension series C
Open or sealed



GE..-DW, sliding contact surface, hard chromium/
ELGOGLIDE®-800-X-life



GE..-DW-2RS2, sliding contact surface, hard chromium/
ELGOGLIDE®-800-X-life

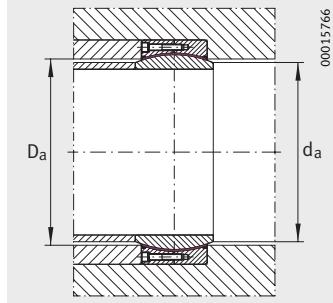
Dimension table · Dimensions in mm

Designation			Mass m		Dimensions				
Open	X-life	Sealed	X-life	Open ≈kg	Sealed ≈kg	d	D	B	C
GE320-DW	XL	GE320-DW-2RS2	XL	77,5	76,6	320_{-0,04}	440 _{-0,045}	160 _{-0,4}	135 _{-0,9}
GE340-DW	XL	GE340-DW-2RS2	XL	82	81,1	340_{-0,04}	460 _{-0,045}	160 _{-0,4}	135 _{-0,9}
GE360-DW	XL	GE360-DW-2RS2	XL	86,3	85,3	360_{-0,04}	480 _{-0,045}	160 _{-0,4}	135 _{-0,9}
GE380-DW	XL	GE380-DW-2RS2	XL	126,9	125,7	380_{-0,04}	520 _{-0,05}	190 _{-0,4}	160 ₋₁
GE400-DW	XL	GE400-DW-2RS2	XL	133,1	132	400_{-0,04}	540 _{-0,05}	190 _{-0,4}	160 ₋₁
GE420-DW	XL	GE420-DW-2RS2	XL	139,2	138	420_{-0,045}	560 _{-0,05}	190 _{-0,45}	160 ₋₁
GE440-DW	XL	GE440-DW-2RS2	XL	194,1	191,7	440_{-0,045}	600 _{-0,05}	218 _{-0,45}	185 ₋₁
GE460-DW	XL	GE460-DW-2RS2	XL	202,2	199,8	460_{-0,045}	620 _{-0,05}	218 _{-0,45}	185 ₋₁
GE480-DW	XL	GE480-DW-2RS2	XL	237	234,4	480_{-0,045}	650 _{-0,075}	230 _{-0,45}	195 _{-1,1}
GE500-DW	XL	GE500-DW-2RS2	XL	246,1	243,5	500_{-0,045}	670 _{-0,075}	230 _{-0,45}	195 _{-1,1}
GE530-DW	XL	GE530-DW-2RS2	XL	291,2	288,4	530_{-0,05}	710 _{-0,075}	243 _{-0,5}	205 _{-1,1}
GE560-DW	XL	GE560-DW-2RS2	XL	342	339,1	560_{-0,05}	750 _{-0,075}	258 _{-0,5}	215 _{-1,1}
GE600-DW	XL	GE600-DW-2RS2	XL	409,7	406,4	600_{-0,05}	800 _{-0,075}	272 _{-0,5}	230 _{-1,1}
GE630-DW	XL	GE630-DW-2RS2	XL	532,8	529,6	630_{-0,05}	850 _{-0,1}	300 _{-0,5}	260 _{-1,2}
GE670-DW	XL	GE670-DW-2RS2	XL	598	594,5	670_{-0,075}	900 _{-0,1}	308 _{-0,75}	260 _{-1,2}
GE710-DW	XL	GE710-DW-2RS2	XL	697,7	693,7	710_{-0,075}	950 _{-0,1}	325 _{-0,75}	275 _{-1,2}
GE750-DW	XL	GE750-DW-2RS2	XL	785,4	781,1	750_{-0,075}	1 000 _{-0,1}	335 _{-0,75}	280 _{-1,2}
GE800-DW	XL	GE800-DW-2RS2	XL	926,8	922,3	800_{-0,075}	1 060 _{-0,125}	355 _{-0,75}	300 _{-1,3}
GE850-DW	XL	GE850-DW-2RS2	XL	1 054,1	1 049,3	850_{-0,1}	1 120 _{-0,125}	365 ₋₁	310 _{-1,3}
GE900-DW	XL	GE900-DW-2RS2	XL	1 190,2	1 185,1	900_{-0,1}	1 180 _{-0,125}	375 ₋₁	320 _{-1,3}
GE950-DW	XL	GE950-DW-2RS2	XL	1 435,3	1 430	950_{-0,1}	1 250 _{-0,125}	400 ₋₁	340 _{-1,3}
GE1000-DW	XL	GE1000-DW-2RS2	XL	1 757,3	1 752,1	1 000_{-0,1}	1 320 _{-0,16}	438 ₋₁	370 _{-1,6}

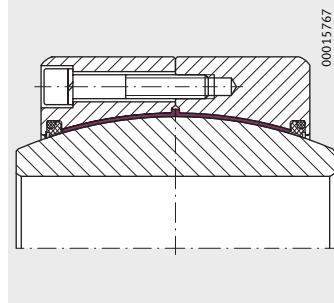
Attention!

The screw design is only valid for the basic load rating C.

If the load is greater, the outer ring halves must be supported by lateral clamping covers.



Mounting dimensions



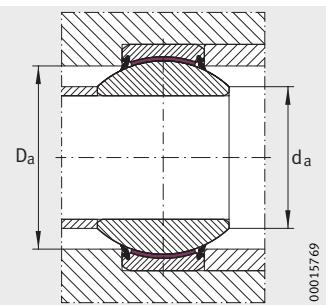
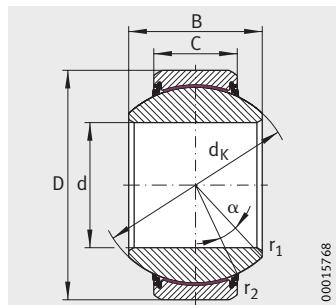
Detail

d_K	α °	Mounting dimensions		Basic load ratings				Radial internal clearance
		r ₁ min.	r ₂ min.	d _a max.	D _a min.	Open	Sealed	
380	4	1,1	3	344,6	361	15 390	25 650	0 - 0,125
400	3,8	1,1	3	366,6	382	16 200	27 000	0 - 0,125
420	3,6	1,1	3	388,3	403	17 010	28 350	0 - 0,135
450	4,1	1,5	4	407,9	426	21 600	36 000	0 - 0,135
470	3,9	1,5	4	429,8	447	22 560	37 600	0 - 0,135
490	3,7	1,5	4	451,6	469	23 520	39 200	0 - 0,135
520	3,9	1,5	4	472	491	28 860	48 100	0 - 0,145
540	3,7	1,5	4	494	513	29 970	49 950	0 - 0,145
565	3,8	2	5	516	536	33 050	55 080	0 - 0,145
585	3,6	2	5	537,8	557	34 220	57 030	0 - 0,145
620	3,7	2	5	570,3	591	38 130	63 550	0 - 0,145
655	4	2	5	602	624	42 240	70 410	0 - 0,16
700	3,6	2	5	644,9	667	48 300	80 500	0 - 0,16
740	3,3	3	6	676,4	698	57 720	96 200	0 - 0,16
785	3,7	3	6	722	746	61 230	102 050	0 - 0,16
830	3,7	3	6	763,7	789	68 470	114 120	0 - 0,17
875	3,8	3	6	808,3	834	73 500	122 500	0 - 0,17
930	3,6	3	6	859,5	886	83 700	139 500	0 - 0,17
985	3,4	3	6	914,8	940	91 600	152 670	0 - 0,17
1 040	3,2	3	6	970	995	99 840	166 400	0 - 0,195
1 100	3,3	4	7,5	1 024,6	1 052	112 200	187 000	0 - 0,195
1 160	3,5	4	7,5	1 074,1	1 105	128 760	214 600	0 - 0,195



Radial spherical plain bearings

Maintenance-free
DIN ISO 12240-1,
dimension series G
Sealed



GE..-FW-2RS,
sliding contact surface,
hard chromium/ELGOGLIDE®-800

Mounting dimensions

Dimension table · Dimensions in mm

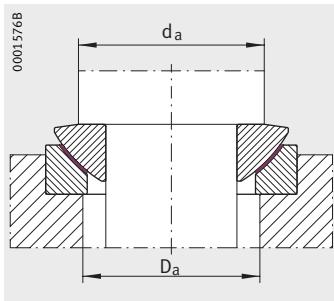
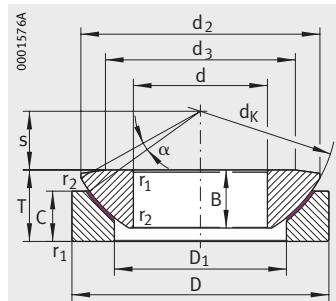
Designation	Mass m ≈kg	Dimensions						
		d	D	B	C	d_K	α °	r ₁ , r ₂ min.
GE200-FW-2RS	44,8	200-0,03	320-0,04	165-0,3	100-0,8	275	15	1,1
GE220-FW-2RS	50,9	220-0,03	340-0,04	175-0,3	100-0,8	300	16	1,1
GE240-FW-2RS	65	240-0,03	370-0,04	190-0,35	110-0,8	325	15	1,1
GE260-FW-2RS	81,7	260-0,035	400-0,04	205-0,35	120-0,8	350	15	1,1
GE280-FW-2RS	96,6	280-0,035	430-0,045	210-0,35	120-0,9	375	15	1,1

Mounting dimensions		Basic load ratings		Radial internal clearance
d _a	D _a	dyn. C _r kN	stat. C _{0r} kN	
max.	min.			
220	267	6 600	11 000	0 – 0,11
243,6	295	7 200	12 000	0 – 0,11
263,6	319	8 550	14 250	0 – 0,125
283,6	342	10 050	16 750	0 – 0,125
310,6	370	10 800	18 000	0 – 0,125



Axial spherical plain bearings

Maintenance-free
DIN ISO 12240-3



GE..-AW, sliding contact surface,
hard chromium/
ELGOGLIDE®-800-X-life

Mounting dimensions

Dimension table · Dimensions in mm

Designation	X-life	Mass m ≈kg	Dimensions						
			d	D	T	d _K	d ₂	d ₃	D ₁
GE220-AW	XL	45,6	220-0,03	370-0,04	97-0,6	388	350	289	265
GE240-AW	XL	57	240-0,03	400-0,04	103-0,6	420	382	314	294
GE260-AW	XL	71,3	260-0,035	430-0,045	115-0,7	449	409	336	317
GE280-AW	XL	84,1	280-0,035	460-0,045	110-0,7	480	445	366	337
GE300-AW	XL	88,6	300-0,035	480-0,045	110-0,7	490	460	388	356
GE320-AW	XL	111,5	320-0,04	520-0,05	116-0,8	540	500	405	380
GE340-AW	XL	117	340-0,04	540-0,05	116-0,8	550	510	432	380
GE360-AW	XL	132,3	360-0,04	560-0,05	125-0,8	575	535	452	400

B	C	s	α °			Mounting dimensions		Basic load ratings	
				r ₁ min.	r ₂ min.	d _a max.	D _a min.	dyn. C _a kN	stat. C _{0a} kN
82 _{-0,6}	67 _{-0,6}	75	7	1,5	0,6	289	279	8 530	14 220
87 _{-0,6}	73 _{-0,6}	77,5	6	1,5	0,6	314	309	10 300	17 170
95 _{-0,7}	80 _{-0,7}	82,5	7	1,5	0,6	336	332	10 810	18 010
100 _{-0,7}	85 _{-0,7}	80	4	3	1	366	355	17 130	28 560
100 _{-0,7}	90 _{-0,7}	80	3,5	3	1	388	375	17 280	28 800
105 _{-0,8}	91 _{-0,8}	95	4	4	1,1	405	402	21 110	35 180
105 _{-0,8}	91 _{-0,8}	95	4	4	1,1	432	402	23 670	39 460
115 _{-0,8}	95 _{-0,8}	95	4	4	1,1	452	422	25 470	42 460





ELGES spherical plain bearings, requiring maintenance

Radial spherical plain bearings

ELGES spherical plain bearings, requiring maintenance

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Product overview

ELGES spherical plain bearings, requiring maintenance

Radial spherical plain bearings

With lip seals or open
Steel/steel

GE..-DO-2RS



GE..-DO



GE..-FO-2RS



ELGES spherical plain bearings, requiring maintenance

Features

Large spherical plain bearings requiring maintenance are available as radial bearings.

The bearings are suitable for alternating and unilateral dynamic loads, ratio C_r/P see page 856.

Radial spherical plain bearings

The bearings comprise inner and outer rings with a steel/steel sliding contact surface. Technical data on the sliding contact surface: see table. The inner ring has a cylindrical bore and a curved outer slideway. The outer ring has a cylindrical outside surface and a concave inner slideway.

They can support radial forces, transmit motion and loads with low moment levels and thus keep bending stresses away from the construction elements. The bearings are particularly suitable for alternating loads with impact and shock type stresses and support axial loads in both directions.

Technical data

Characteristics	Load	
Specific load parameters K and K_0	Dynamic, alternating	100 N/mm ²
	Dynamic, unilateral	60 N/mm ²
	Static	500 N/mm ²
Contact pressure p	Alternating	1 N/mm ² ≤ p ≤ 100 N/mm ²
	Unilateral	1 N/mm ² ≤ p ≤ 60 N/mm ²
Sliding speed v	1 mm/s ≤ v ≤ 100 mm/s	
$p \cdot v$ value	1 N/mm ² · mm/s ≤ $p \cdot v$ ≤ 400 N/mm ² · mm/s	
Ratio C/P	Alternating	3 to 1
	Unilateral	4 to 1,7
Friction factor μ		0,08 ≤ μ ≤ 0,22



Available bore diameters and dimension series: see table.

Bore diameters and dimension series

Radial spherical plain bearing Series	Design to	Dimension series	Bore diameter d mm	
			from	to
GE..DO-2RS	DIN ISO 12 240-1	E	220	300
GE..DO	DIN ISO 12 240-1	C	320	1 000
GE..FO-2RS	DIN ISO 12 240-1	G	200	280

Sealing

Sealed radial spherical plain bearings are protected against contamination and water spray by lip seals.

Lubrication

The bearings are lubricated via the outer and inner ring.

The relubrication intervals must be observed.



ELGES spherical plain bearings, requiring maintenance

Operating temperature



The permissible operating temperature is dependent on the sliding contact surface and the sealing arrangement.

If the temperature exceeds the values according to the table, there will be a reduction in the operating life and the effect of the sealing arrangement.

Temperature and rating life

Radial spherical plain bearing Series	Temperature °C		Reduced rating life °C from
	from	to	
GE..-DO	-60	+200	+150
GE..-DO-2RS ¹⁾	-30	+130	-
GE..-FO-2RS ¹⁾	-30	+130	-

¹⁾ Open, for temperatures from -60 °C to +200 °C.

Suffixes

Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
2RS	Lip seals on both sides	Standard

Design and safety guidelines



In predimensioning, the ratio C_r/P must be observed, see page 856. The permissible ratio is decisively dependent on the operating conditions and the required operating life.

The parts of different bearings are not interchangeable with each other.

For the support of radial forces, see page 880.

Accuracy

The main dimensions correspond to DIN ISO 12 240-1.

The dimensional and geometrical accuracy of the inside and outside diameter corresponds to DIN ISO 12 240-1.

Dimensional and tolerance data are arithmetic mean values.

Dimensional checking is carried out in accordance with ISO 8 015.

Spherical plain bearings with split outer ring



The outside diameters are within the deviations given in the tables before surface treatment and splitting.

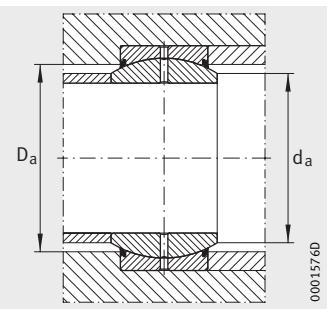
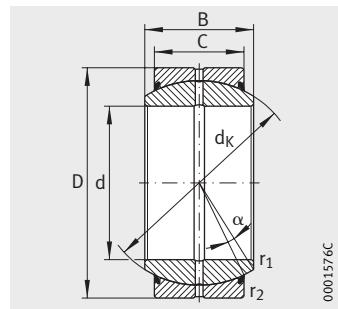
The outer rings become slightly out of round due to splitting. The roundness of the outer ring is restored once it is fitted in a housing bore produced in accordance with the specifications.

Measurements taken of the outside diameter of the unfitted bearing cannot be used as the original actual values for the outside diameter.



Radial spherical plain bearings

Requiring maintenance
DIN ISO 12240-1,
dimension series E
Sealed



GE..-DO-2RS,
sliding contact surface,
steel/steel

Mounting dimensions

Dimension table · Dimensions in mm

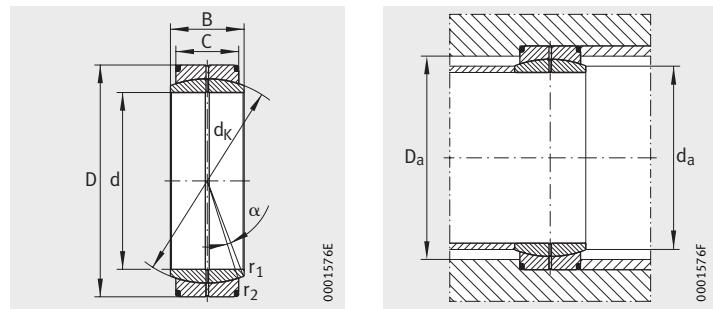
Designation	Mass m ≈kg	Dimensions						
		d	D	B	C	dk	α °	r ₁ , r ₂ min.
GE220-DO-2RS	35,5	220-0,03	320-0,04	135-0,3	100-0,8	275	8	1,1
GE240-DO-2RS	39,5	240-0,03	340-0,04	140-0,3	100-0,8	300	8	1,1
GE260-DO-2RS	51,2	260-0,035	370-0,04	150-0,35	110-0,8	325	7	1,1
GE280-DO-2RS	64,8	280-0,035	400-0,04	155-0,35	120-0,8	350	6	1,1
GE300-DO-2RS	77,5	300-0,035	430-0,045	165-0,35	120-0,9	375	7	1,1

Mounting dimensions		Basic load ratings		Radial internal clearance
d _a	D _a	dyn. C _r kN	stat. C _{0r} kN	CN
max.	min.			
239,5	267	2 320	11 600	0,11 – 0,214
265,3	295	2 550	12 700	0,11 – 0,214
288,3	319	3 050	15 300	0,125 – 0,239
313,8	342	3 550	18 000	0,125 – 0,239
336,7	370	3 800	19 000	0,125 – 0,239



Radial spherical plain bearings

Requiring maintenance
DIN ISO 12240-1,
dimension series C
Open



GE..-DO,
sliding contact surface,
steel/steel

Mounting dimensions

Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	C	dk	α °	
GE320-DO	77,2	320-0,04	440-0,045	160-0,4	135-0,9	380	4	
GE340-DO	81,4	340-0,04	460-0,045	160-0,4	135-0,9	400	3,8	
GE360-DO	85,8	360-0,04	480-0,045	160-0,4	135-0,9	420	3,6	
GE380-DO	126,7	380-0,04	520-0,05	190-0,4	160-1	450	4,1	
GE400-DO	132,9	400-0,04	540-0,05	190-0,4	160-1	470	3,9	
GE420-DO	138,6	420-0,045	560-0,05	190-0,45	160-1	490	3,7	
GE440-DO	193	440-0,045	600-0,05	218-0,45	185-1	520	3,9	
GE460-DO	200,9	460-0,045	620-0,05	218-0,45	185-1	540	3,7	
GE480-DO	235,6	480-0,045	650-0,075	230-0,45	195-1,1	565	3,8	
GE500-DO	244,3	500-0,045	670-0,075	230-0,45	195-1,1	585	3,6	
GE530-DO	289,4	530-0,05	710-0,075	243-0,5	205-1,1	620	3,7	
GE560-DO	339,8	560-0,05	750-0,075	258-0,5	215-1,1	655	4	
GE600-DO	407,2	600-0,05	800-0,075	272-0,5	230-1,1	700	3,6	
GE630-DO	530,2	630-0,05	850-0,1	300-0,5	260-1,2	740	3,3	
GE670-DO	594,4	670-0,075	900-0,1	308-0,75	260-1,2	785	3,7	
GE710-DO	693	710-0,075	950-0,1	325-0,75	275-1,2	830	3,7	
GE750-DO	779,2	750-0,075	1 000-0,1	335-0,75	280-1,2	875	3,8	
GE800-DO	920	800-0,075	1 060-0,125	355-0,75	300-1,3	930	3,6	
GE850-DO	1 047	850-0,1	1 120-0,125	365-1	310-1,3	985	3,4	
GE900-DO	1 184,2	900-0,1	1 180-0,125	375-1	320-1,3	1 040	3,2	
GE950-DO	1 421,8	950-0,1	1 250-0,125	400-1	340-1,3	1 100	3,3	
GE1000-DO	1 743,6	1 000-0,1	1 320-0,16	438-1	370-1,6	1 160	3,5	

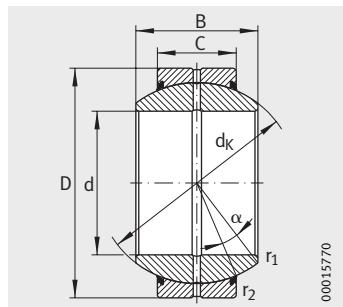
1) $D_a \text{ max} = D_a \text{ min} + 20 \text{ mm}$



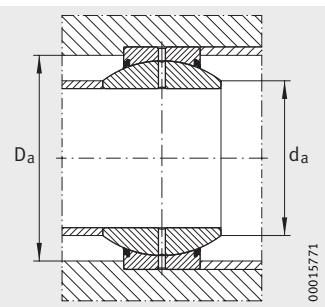
		Mounting dimensions		Basic load ratings		Radial internal clearance CN
r ₁ min.	r ₂ min.	d _a max.	D _a ¹⁾ min.	dyn. C _r kN	stat. C _{0r} kN	
1,1	3	344,6	361	4 400	22 000	0,125 – 0,239
1,1	3	366,6	382	4 650	23 200	0,125 – 0,239
1,1	3	388,3	403	4 800	24 000	0,135 – 0,261
1,5	4	407,9	426	6 300	31 500	0,135 – 0,261
1,5	4	429,8	447	6 550	32 500	0,135 – 0,261
1,5	4	451,6	469	6 800	34 500	0,135 – 0,261
1,5	4	472	491	8 650	42 300	0,145 – 0,285
1,5	4	494	513	9 000	45 000	0,145 – 0,285
2	5	516	536	9 800	49 000	0,145 – 0,285
2	5	537,8	557	10 200	51 000	0,145 – 0,285
2	5	570,3	591	11 400	57 000	0,145 – 0,285
2	5	602	624	12 700	64 000	0,16 – 0,32
2	5	644,9	667	14 600	73 500	0,16 – 0,32
3	6	676,4	698	17 600	88 000	0,16 – 0,32
3	6	722	746	19 000	95 000	0,16 – 0,32
3	6	763,7	789	21 200	106 000	0,17 – 0,35
3	6	808,3	834	22 800	114 000	0,17 – 0,35
3	6	859,5	886	26 000	129 000	0,17 – 0,35
3	6	914,8	940	28 500	143 000	0,17 – 0,35
3	6	970	995	31 000	156 000	0,195 – 0,405
4	7,5	1 024,6	1 052	35 500	176 000	0,195 – 0,405
4	7,5	1 074,1	1 105	40 500	204 000	0,195 – 0,405

Radial spherical plain bearings

Requiring maintenance
DIN ISO 12240-1,
dimension series G
Sealed



GE..-FO-2RS,
sliding contact surface,
steel/steel



Mounting dimensions

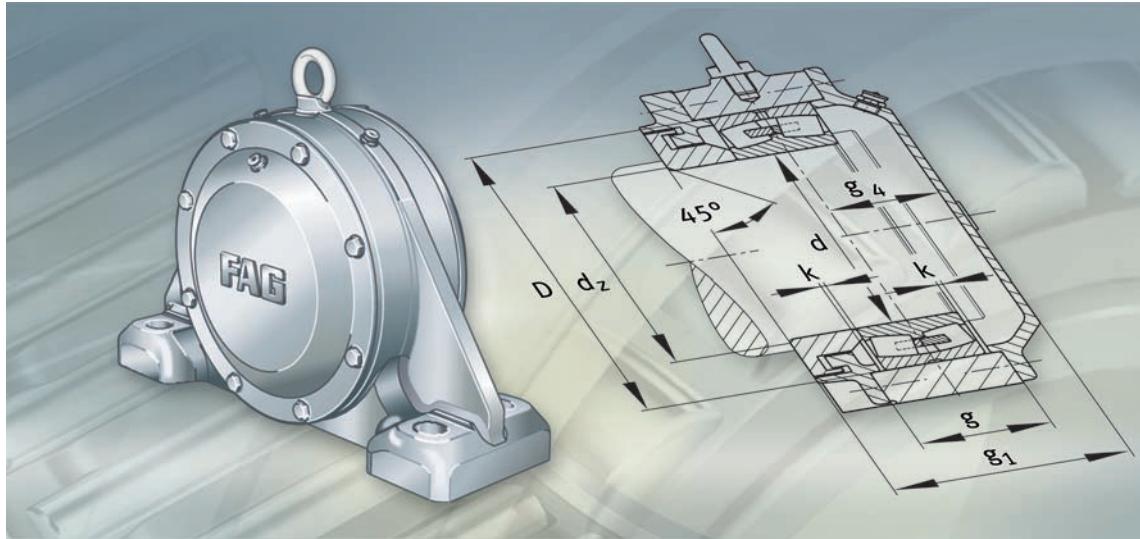
Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	C	d_K	α °	r ₁ , r ₂ min.
GE200-FO-2RS	44,8	200-0,03	320-0,04	165-0,3	100-0,8	275	15	1,1
GE220-FO-2RS	50,9	220-0,03	340-0,04	175-0,3	100-0,8	300	16	1,1
GE240-FO-2RS	64,9	240-0,03	370-0,04	190-0,35	110-0,8	325	15	1,1
GE260-FO-2RS	81,7	260-0,035	400-0,04	205-0,35	120-0,8	350	15	1,1
GE280-FO-2RS	96,5	280-0,035	430-0,045	210-0,35	120-0,9	375	15	1,1

Mounting dimensions		Basic load ratings		Radial internal clearance
d _a	D _a	dyn. C _r kN	stat. C _{0r} kN	CN
max.	min.			
220	267	2 320	11 600	0,11 – 0,214
243,6	295	2 550	12 700	0,11 – 0,214
263,6	319	3 050	15 300	0,125 – 0,239
283,6	342	3 550	18 000	0,125 – 0,239
310,6	370	3 800	19 000	0,125 – 0,239



FAG



Bearing housings

Bearing housings

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Features	Housing materials and outer surfaces 908 Locating and non-locating bearings 908 Sealing 908
Split and unsplit plummer block housings	Split plummer block housings KPG, KPGZ 910 Split plummer block housings LOE, LOU 913 Split plummer block housings PM 917 Split plummer block housings RA 919 Split plummer block housings RLE 921 Split plummer block housings S30 923 Split plummer block housings SD5 925 Split plummer block housings SD31 927 Unsplit plummer block housings BND 930 Unsplit plummer block housings BNM 937
Take-up housings	Unsplit take-up housings SPA 939
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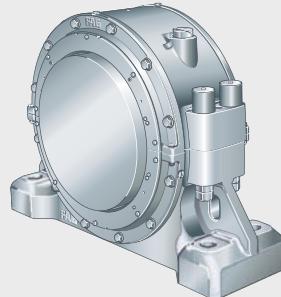
Bearing housings

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Product overview Bearing housings

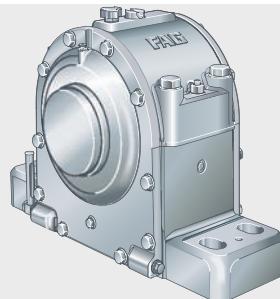
Plummer block housings Split

KPG, KPGZ



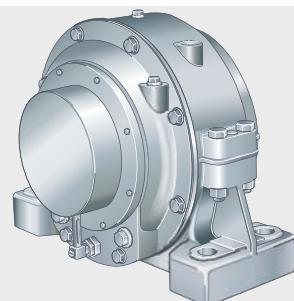
00015346

LOE, LOU



0001553F

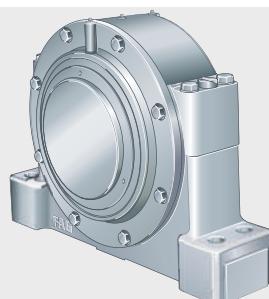
PM



0001534C



RA



00015350

Product overview Bearing housings

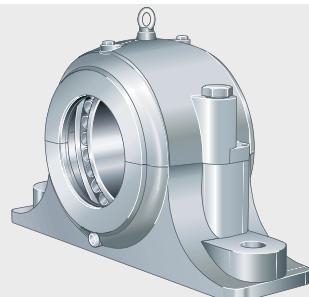
Plummer block housings Split

RLE



00015351

S30



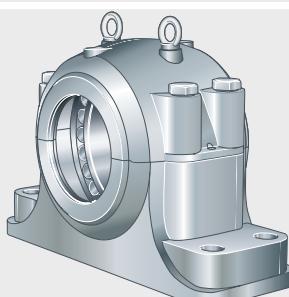
00015369

SD5



00015393

SD31



000153C0

Plummer block housings
Unsplit

BND, BNM



0001540

Take-up housings

SPA



000153C4

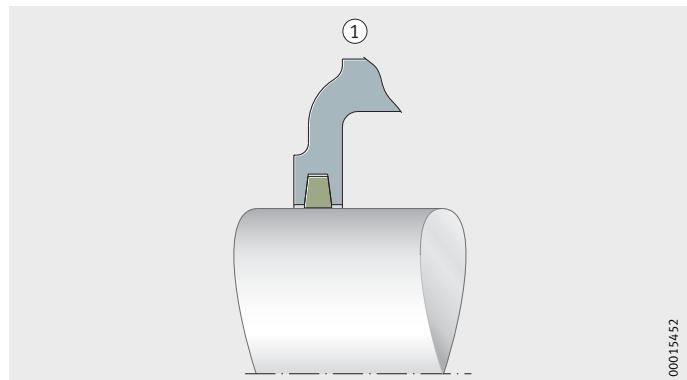


Bearing housings

Features	FAG housings and the associated bearings form bearing units that have proven successful in machinery, plant and equipment. It is only possible, however, to show here a small selection of the numerous sizes and designs (for an overview of the FAG series housings see TI WL 90-30). For other housings or housing designs, please contact Schaeffler Group Industrial.
Housing materials and outer surfaces	The normal material for the housings, depending on the series, is flake graphite cast iron, cast steel or spheroidal graphite cast iron. If a material other than the normal material is possible, a suffix must be used to indicate the material, i.e.: <ul style="list-style-type: none">■ L for flake graphite cast iron (GG)■ S for cast steel (GS)■ D for spheroidal graphite cast iron (GGG). 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. 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, chloro elastomer, 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.
Locating and 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 sealing of bearing housings according to the operating conditions, contact seals, non-contact seals and combinations of these are available, <i>Figure 1</i> to <i>Figure 3</i> , page 909.

① Felt seal

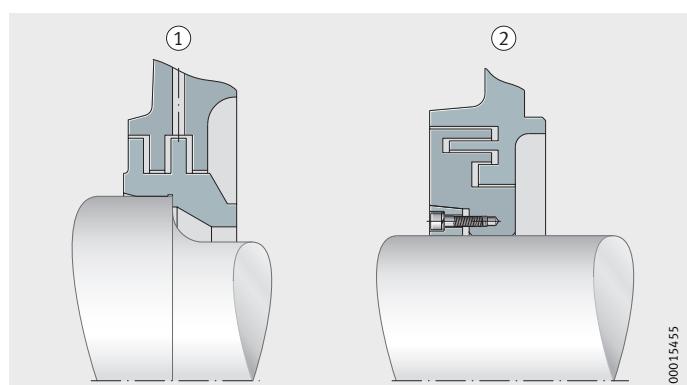
Figure 1
Example of contact seals



00015452

- ① Radial labyrinth
② Axial labyrinth

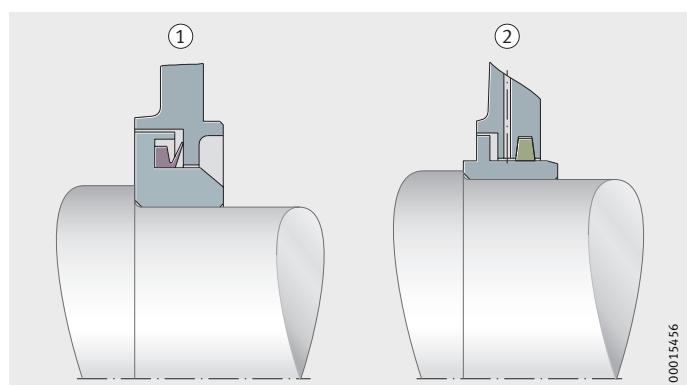
Figure 2
Examples of non-contact seals



00015455

- ① Labyrinth and V ring
② Labyrinth and felt seal

Figure 3
Examples of combined seals



00015456



Bearing housings

Split and unsplit plummer block housings

Large split and unsplit plummer block housings are generally intended for bearing arrangements with 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 KPG, KPGZ

Split plummer block housings KPG and KPGZ were developed specifically for trunnion bearing arrangements on converters.

Description of plummer block housings KPG and KPGZ:
see also TPI 148, Rolling bearing arrangements for converters.

Dimensions, material

The housings are matched to the main dimensions of series 249.

The normal material for the housing body is cast steel (suffix S).
Housings made from spheroidal graphite cast iron (suffix D) are available by agreement.

Bearing seat and fitting of bearings

The housings KPG, *Figure 4*, page 911, are intended for spherical roller bearings with a tapered bore and sleeve, while the housings KPGZ, *Figure 5*, page 912, are intended for spherical roller bearings with a cylindrical bore.

The locating bearing on the drive side provides axial guidance of the converter.

The locating bearing design F of the housings KPG and KPGZ is originally designed for the fitting of unsplit spherical roller bearings. The locating bearing is formed by fitting locating rings on both sides of the bearing, *Figure 4 ①*, page 911 and *Figure 5 ①*, page 912.

A housing of design F can also accommodate a split spherical roller bearing, replacing an unsplit bearing, *Figure 4 ②*, page 911 and *Figure 5 ②*, page 912. As a result, the bearing can be replaced without dismantling the drive.

The non-locating bearing design L is fitted with unsplit bearings. The bearing outer ring can be displaced axially in a bearing bush.

Seals and covers

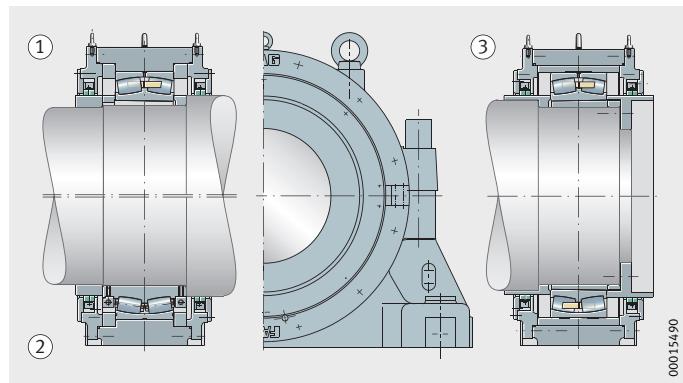
The covers on both sides of the housings accommodate high-pressure packing as seals, *Figure 6 ①*, page 912.

Profiled rubber seals are available by agreement, *Figure 6 ②*, page 912.

Lubrication	<p>The housings KPG and KPGZ are designed for grease lubrication. Lithium soap greases with effective EP and anti-corrosion additives should be used that preferably also contain an MoS₂ additive.</p> <p>The housing cavities are filled to 60%, the bearings are completely filled. The grease quantities for the initial filling of the housings are given in the housing tables.</p> <p>Relubrication should be carried out using the same grease as for the initial lubrication. The bearings are relubricated every three months with approx. 8% of the initial filling quantity.</p> <p>The lubricant used for the bearings should also be used to relubricate the seals.</p>
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- ① Locating bearing F
- ② Locating bearing F with split bearing
- ③ Non-locating bearing L

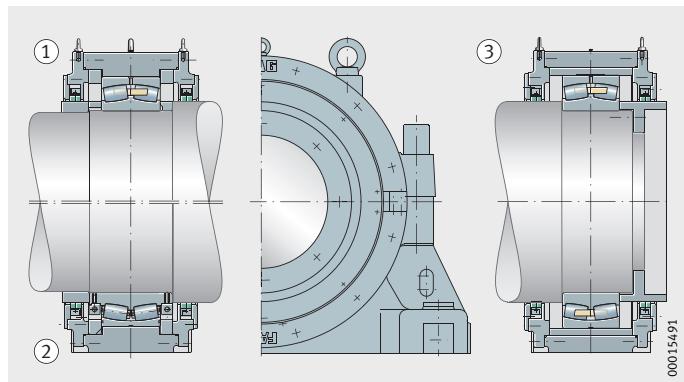
Figure 4
Housing KPG for bearings
with tapered bore and sleeve



Bearing housings

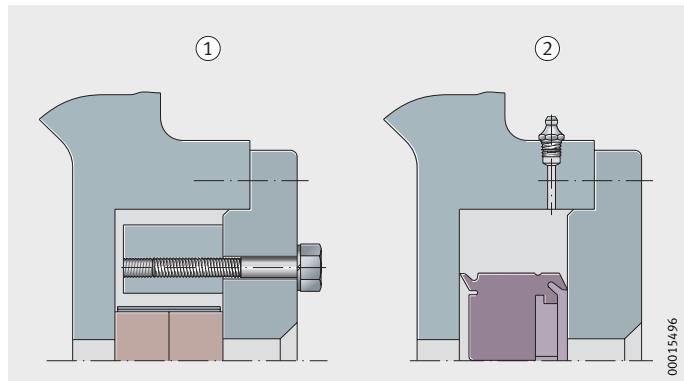
- ① Locating bearing F
- ② Locating bearing F with split bearing
- ③ Non-locating bearing L

Figure 5
Housing KPGZ for bearings
with cylindrical bore



- ① High-pressure packing
- ② Profiled rubber seal

Figure 6
Seals for housings KPG and KPGZ



Split plummer block housings LOE, LOU for oil lubrication

Split plummer block housings LOE and LOU are designed for oil lubrication.

Plummer block housings LOE2, LOE3, LOU2 und LOU3 are fitted with spherical roller bearings of series 222 and 223 with a cylindrical bore, *Figure 7 to Figure 10*, page 914.

The bearings are located on the shaft using an interference fit and axially secured by means of a locknut.

Housings of design A are closed on one side.

Housings of design B are intended for continuous shafts.

The housing is split, the labyrinth covers are unsplitt.

The seal comprises two labyrinth rings.

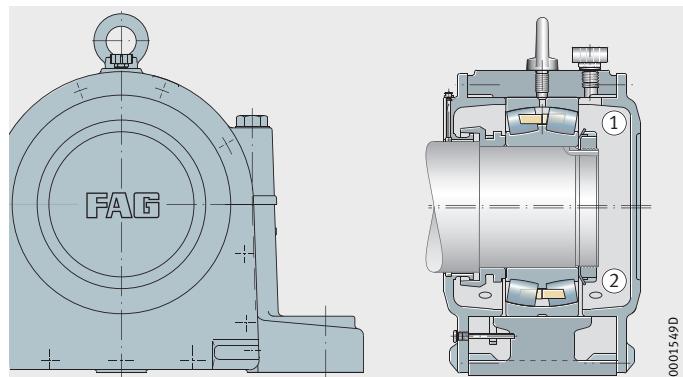
Labyrinth seals allow shaft misalignment of up to $0,25^\circ$ in both directions. The grease chamber in the cover labyrinth can be relubricated. The housing base has four extended slots.

The eye bolt in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

The normal material for the housing body is flake graphite cast iron (suffix L). If required, housings are also available made from cast steel (suffix S) or spheroidal graphite cast iron (suffix D).

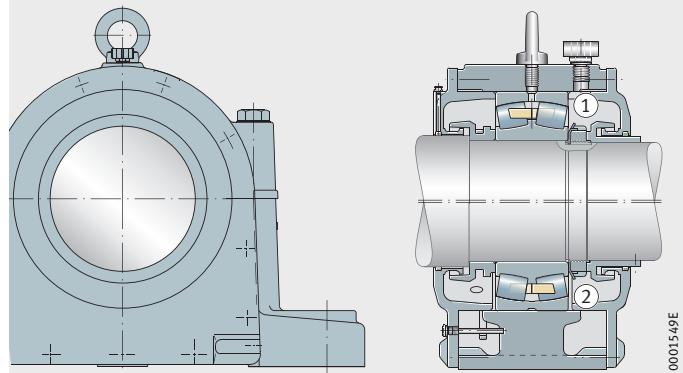
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

Figure 7
Plummer block housings
LOE2, LOE3, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

Figure 8
Plummer block housings
LOE2, LOE3, design B



Bearing housings

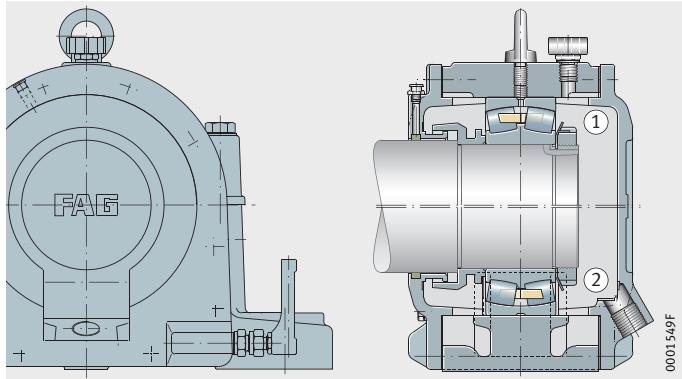
Plummer block housings of series LOE and LOU are suitable for high speed bearing arrangements and are designed for oil lubrication.

In the case of housings LOE, *Figure 7* and *Figure 8*, page 913 as well as *Figure 11* and *Figure 12*, page 915, the oil is supplied from the oil sump in the lower section of the housing to the rolling bearing by means of a ring oiler. An angled oil level indicator is screwed to one cover.

Housings of series LOU for recirculating oil lubrication, *Figure 9* and *Figure 10* as well as *Figure 13* and *Figure 14*, page 916, have an oil inlet connector in the upper section and an oil outlet connector in the lower section.

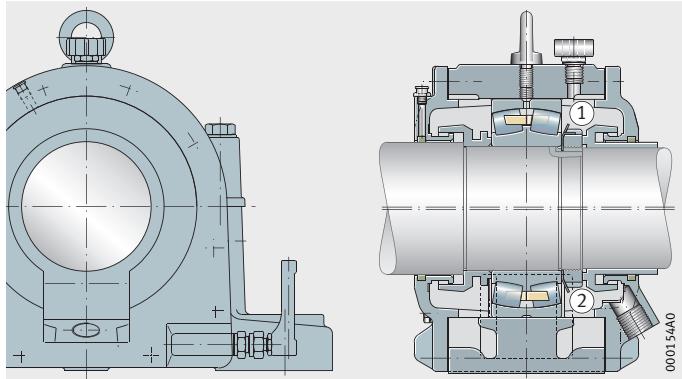
- ① Locating bearing (AF)
② Non-locating bearing (AL)

Figure 9
Plummer block housings
LOU2, LOU3, design A



- ① Locating bearing (BF)
② Non-locating bearing (BL)

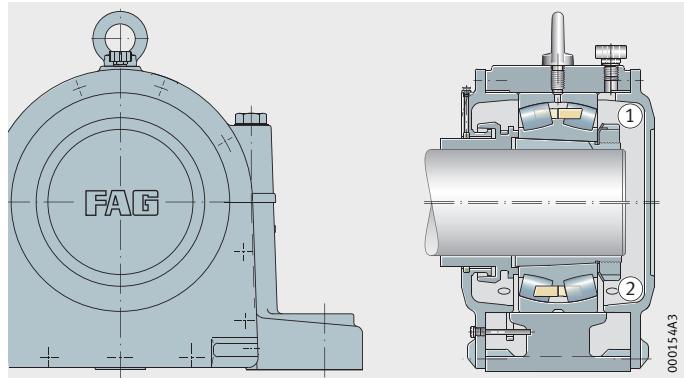
Figure 10
Plummer block housings
LOU2, LOU3, design B



Plummer block housings LOE5 and LOE6 as well as LOU5 and LOU6 are intended for the fitting of spherical roller bearings with a tapered bore and location by means of adapter sleeves, *Figure 11* to *Figure 14*, page 916.

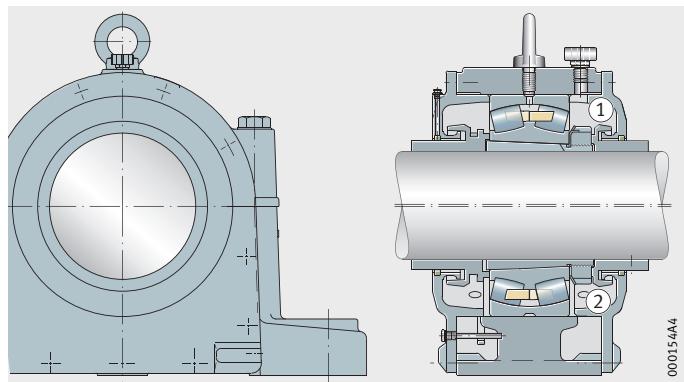
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

Figure 11
Plummer block housings
LOE5, LOE6, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

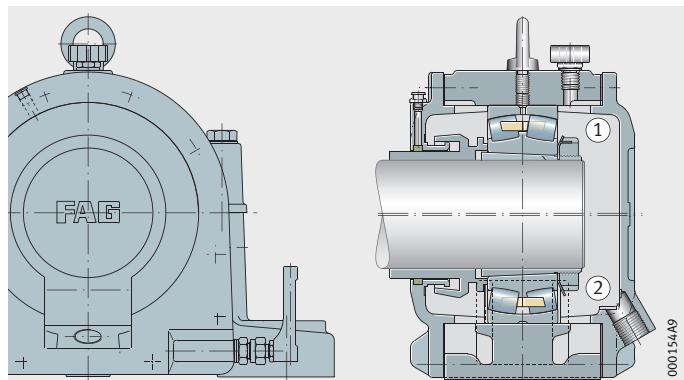
Figure 12
Plummer block housings
LOE5, LOE6, design B



Bearing housings

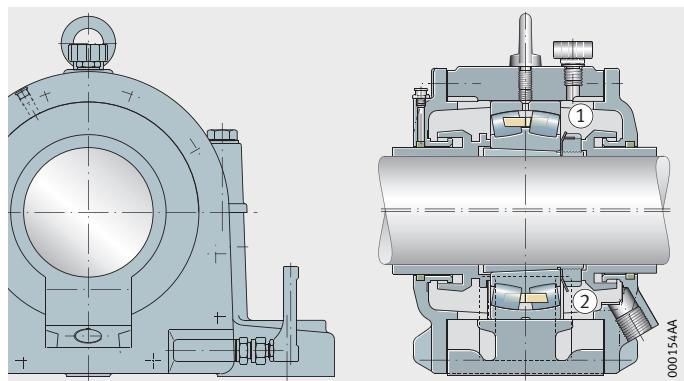
- ① Locating bearing (AF)
② Non-locating bearing (AL)

Figure 13
Plummer block housings
LOU5, LOU6, design A



- ① Locating bearing (BF)
② Non-locating bearing (BL)

Figure 14
Plummer block housings
LOU5, LOU6, design B



Split plummer block housings PM

Split plummer block housings of series PM30 were developed for the bearing arrangements of drying rolls and M.G. cylinders in paper machinery, but are also suitable for other applications.

The housings are fitted with spherical roller bearings of series 230..-K.

The shaft openings in the housings differ in design depending on whether the bearings are located using adapter sleeves (PM30..-H), *Figure 15* and *Figure 16*, or whether they are seated directly on the tapered shaft (PM30..-K), *Figure 17* and *Figure 18*, page 918.

Housings for bearings with withdrawal sleeves (PM30..-AH) are available by agreement.

Locating bearing designs are available for shaft ends (AF) and for continuous shafts (BF).

A corresponding distinction is made for the non-locating designs AL and BL.

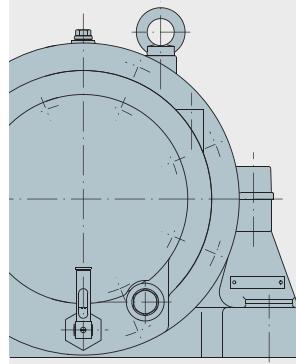
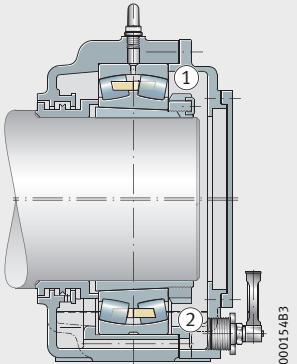
- 
- 
- ① Locating bearing (AF)
 - ② Non-locating bearing (AL)

Figure 15

Plummer block housing PM30..-H for bearings with tapered bore and adapter sleeve, design A

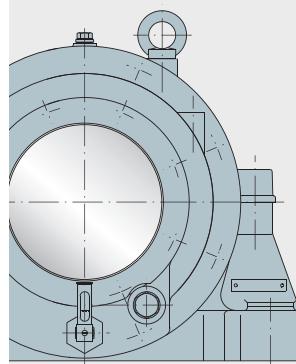
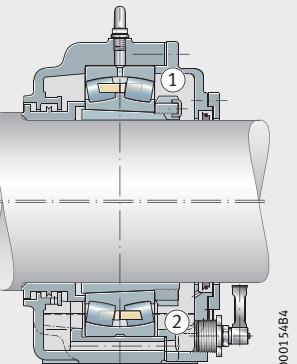
- 
- 
- ① Locating bearing (BF)
 - ② Non-locating bearing (BL)

Figure 16

Plummer block housing PM30..-H for bearings with tapered bore and adapter sleeve, design B

Bearing housings

The normal material for the housing body is GG (suffix L).
Housings made from GGG (suffix D) are also available by agreement.

The housings are designed for oil sump lubrication.
If recirculating oil lubrication is to be used, the housings must
be converted.

The seal comprises a labyrinth.

The eye bolts in the upper section of the housing must not be
subjected to a load greater than the mass of the housing including
the bearing.

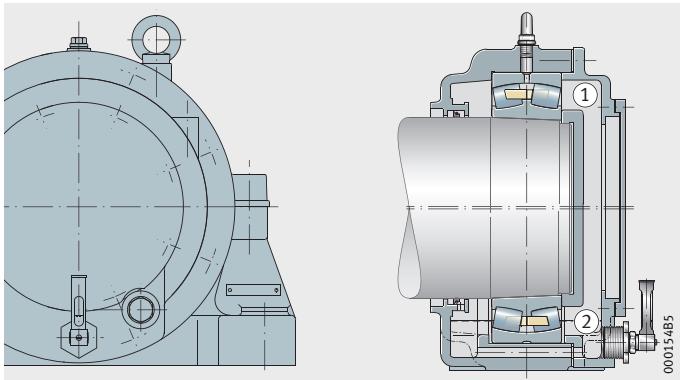


Figure 17
Plummer block housing PM30..-K
for bearings with tapered bore,
direct seat, design A

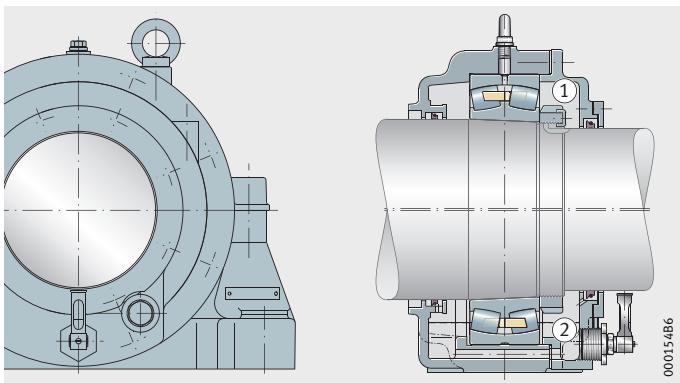


Figure 18
Plummer block housing PM30..-K
for bearings with tapered bore,
direct seat, design B

Split plummer block housings RA

The split plummer block housings RA were originally developed for the bearing arrangements of pinion drives.

They are suitable for spherical roller bearings of series 230 and 239 with a cylindrical bore (housing RA..-Z), *Figure 19* and *Figure 20*, or for bearings of the same series with a tapered bore and withdrawal sleeve (housing RA..-AH), *Figure 21* and *Figure 22*, page 920.

The housings are produced as non-locating bearing housings or as locating bearing housings. When ordering housings of series RA..-Z and RA..-AH closed on one side, design A must be indicated in the order.

Housings RA..-Z and RA..-AH of design B are intended for continuous shafts.

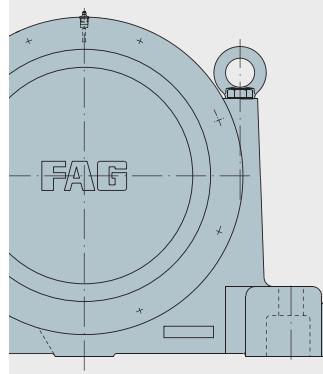
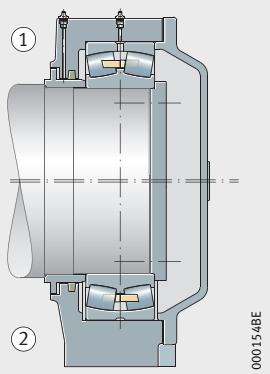
- 
- 
- ① Locating bearing (AF)
② Non-locating bearing (AL)

Figure 19
Plummer block housing RA..-Z,
for bearings with cylindrical bore,
design A

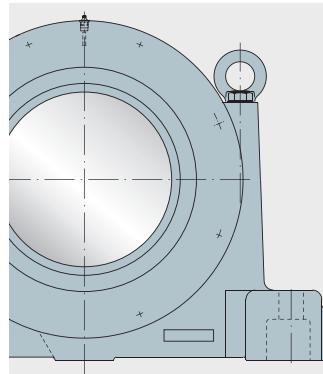
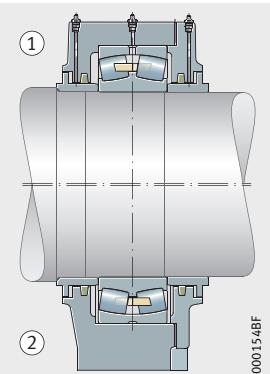
- 
- 
- ① Locating bearing (BF)
② Non-locating bearing (BL)

Figure 20
Plummer block housing RA..-Z,
for bearings with cylindrical bore,
design B

Bearing housings

The housings are designed for grease lubrication.

Grease can be fed directly into the centre of the bearing for relubrication via a nipple in the upper section of the housing.

The labyrinth seal can also be relubricated.

The labyrinth is separated from the bearing cavity by a felt seal, so a more economical grease can be used for labyrinth lubrication.

The normal material for the housing body is GG (suffix L).

Housings made from GGG (suffix D) are also available by agreement.

The eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

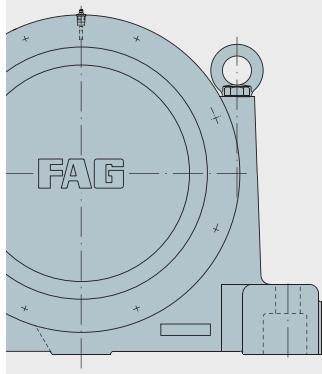
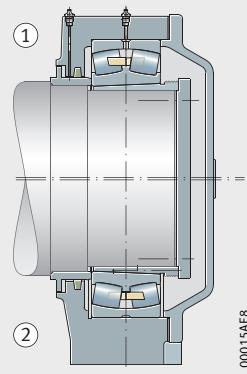
- 
- ① Locating bearing (AF)
 - ② Non-locating bearing (AL)

Figure 21
Plummer block housing RA..-AH,
for bearings with tapered bore and
withdrawal sleeve, design A



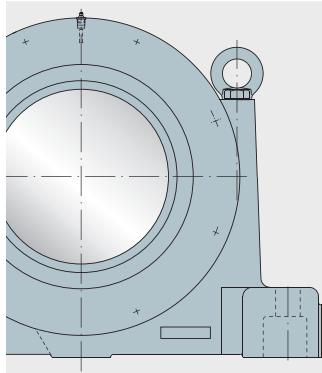
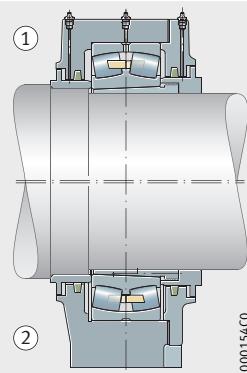
- 
- ① Locating bearing (BF)
 - ② Non-locating bearing (BL)

Figure 22
Plummer block housing RA..-AH,
for bearings with tapered bore and
withdrawal sleeve, design B



Split plummer block housings RLE

The split plummer block housings RLE were developed for the bearing arrangements of back-up rollers.

They are suitable for spherical roller bearings of series 241 with a cylindrical bore (housing design Z), *Figure 23* and *Figure 24*, or for bearings of the same series with a tapered bore and withdrawal sleeve (design AH), *Figure 25* and *Figure 26*, page 922.

The housings 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. Housings of design B are intended for continuous shafts.

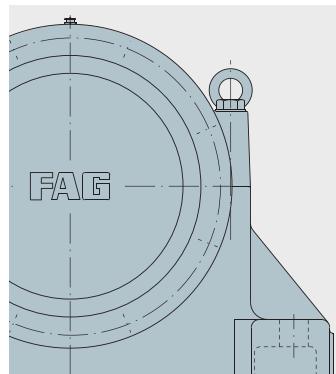
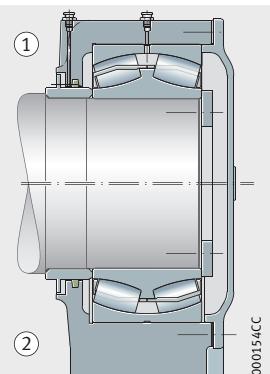
- 
- 
- ① Locating bearing (AF)
② Non-locating bearing (AL)

Figure 23

Plummer block housing RLE..-Z,
for bearings with cylindrical bore,
design A

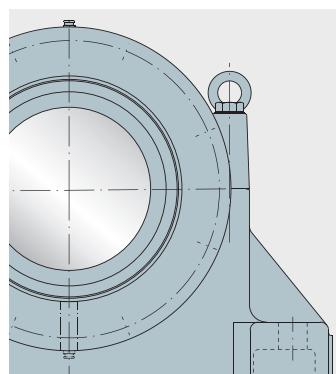
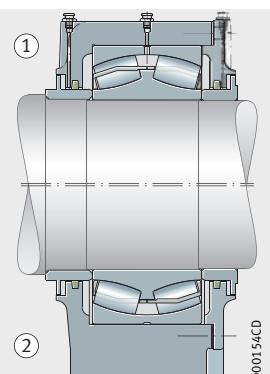
- 
- 
- ① Locating bearing (BF)
② Non-locating bearing (BL)

Figure 24

Plummer block housing RLE..-Z,
for bearings with cylindrical bore,
design B

Bearing housings

The housings are designed for grease lubrication. Grease can be fed into the bearing for relubrication via a nipple in the upper section of the housing.

The labyrinth seal can also be relubricated. The labyrinth is separated from the bearing cavity by a felt seal, so a more economical grease can be used for labyrinth lubrication.

The normal material for the housing body is GG (suffix L). Housings made from GS (suffix S) or GGG (suffix D) are also available by agreement.

The eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

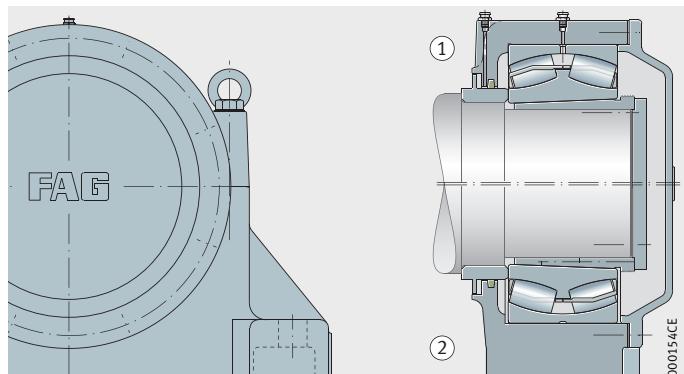


Figure 25
Plummer block housing RLE..-AH,
for bearings with tapered bore and
withdrawal sleeve, design A

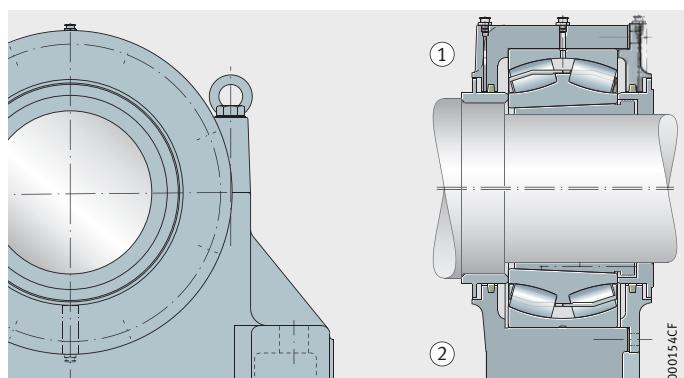


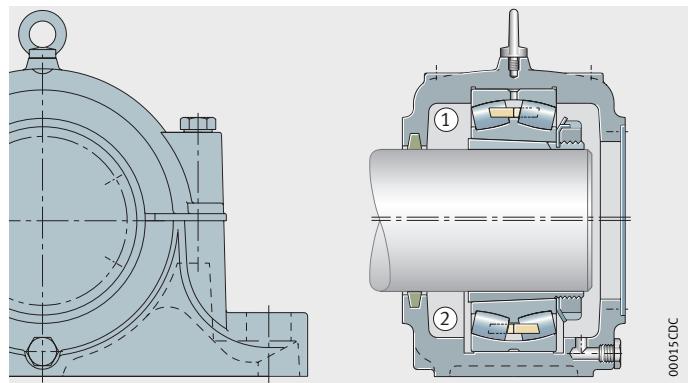
Figure 26
Plummer block housing RLE..-AH,
for bearings with tapered bore and
withdrawal sleeve, design B

Split plummer block housings S30

Split plummer block housings for spherical roller bearings 230..-K with tapered bore and adapter sleeve, *Figure 27* and *Figure 28*. The housings can also be fitted with split spherical roller bearings 230SM.

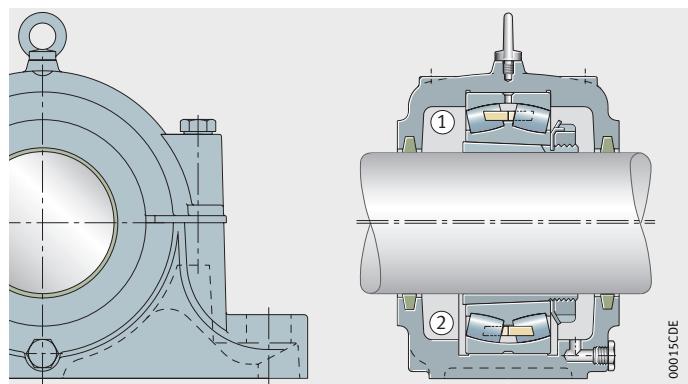
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

Figure 27
Plummer block housing S30
from size S3044, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

Figure 28
Plummer block housing S30
from size S3044, design B



Bearing housings

**Plummer block housings
of series S30
for spherical roller bearings
of series 230..-K
with tapered bore and
adapter sleeve**

The 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 (suffix FZ).

Felt seals allow shaft misalignment of up to $0,5^\circ$ in both directions.

Labyrinth seals (suffix SS) or Taconite seals (suffix TCS) are also available by agreement.

Housings of series S30 can be relubricated via a lubrication connector in the centre of the housing.

The eye bolt must not be subjected to a load greater than the mass of the housing including the bearing.

The normal material used is flake graphite cast iron (suffix L).

Housings made from GGG (D) or GS (S) are available by agreement.

Load carrying capacity: see also section Load carrying capacity of split plummer block housings, page 942.

The axial load carrying capacity is max. 35% of F_{180° .



Lubrication

The quantities stated are valid for the initial filling of S30 housings. The bearings are thus filled completely and the housing cavities are filled to 60%.

Recommended grease quantity

Housing	Grease quantity for initial filling ≈g
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 SD5

Split plummer block housings of series SD5 are combined with spherical roller bearings, seals and grease filling to form bearing units, for use in applications such as general machine building.

The dimensions of split plummer block housings SD5 are matched to spherical roller bearings of series 222..K with adapter sleeve and split spherical roller bearings 222SM.

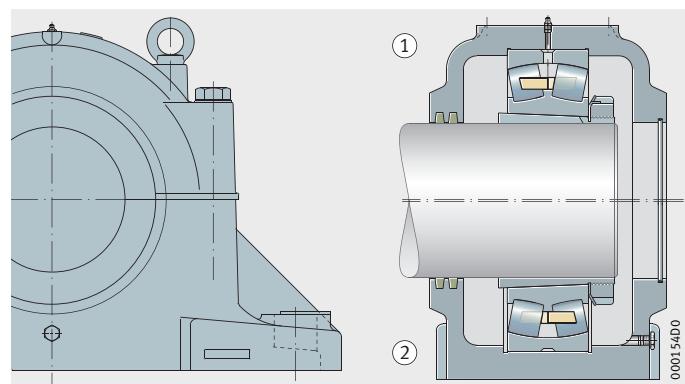
In design A for bearing arrangements on shaft ends, one side is closed off by a cover, *Figure 29*.

Design B is intended for continuous shafts, *Figure 30*.

The normal material for the housing body is flake graphite cast iron (suffix L). Housings made from GGG (suffix D) or GS (suffix S) are also available by agreement.

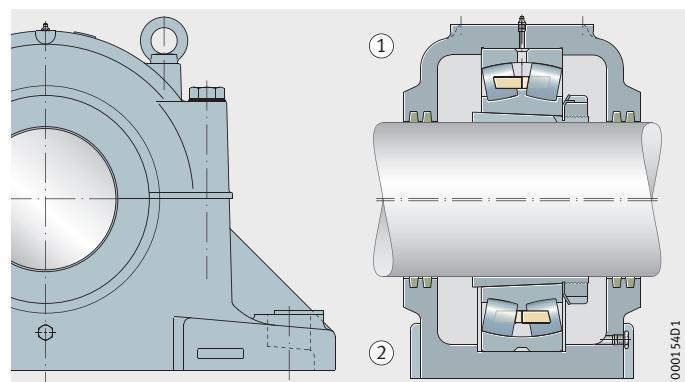
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

Figure 29
Plummer block housing SD5
for bearings with tapered bore and
adapter sleeve, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

Figure 30
Plummer block housing SD5
for bearings with tapered bore and
adapter sleeve, design B



Bearing housings

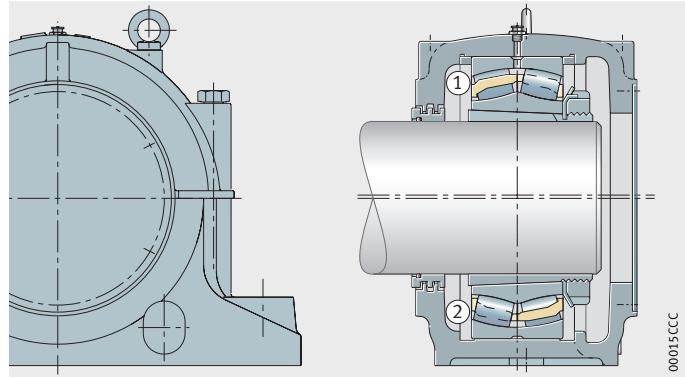
Bearing seat and fitting of bearings	The bearing seat in the housing is machined to H7. The housings are supplied as a locating bearing design or non-locating bearing design. Shaft seats for bearings with a tapered bore seated on adapter sleeves should be machined to h8. Housings SD5 can be fitted with spherical roller bearings 222..-K with adapter sleeve and split spherical roller bearings 222SM.
Lubrication	The housings are designed for grease lubrication. Housings of the normal design have the suffix N. For housings with grease valves, the suffix R is used.
Sealing	Plummer block housings SD5 are generally sealed on one side (design A) or on both sides (design B) with felt seals (suffix FZ). Housings with labyrinth seals (SS) are also available by agreement.

Split plummer block housings SD31

Split plummer block housings for spherical roller bearings 231..-K with tapered bore and adapter sleeves, *Figure 31* to *Figure 34*, page 928.

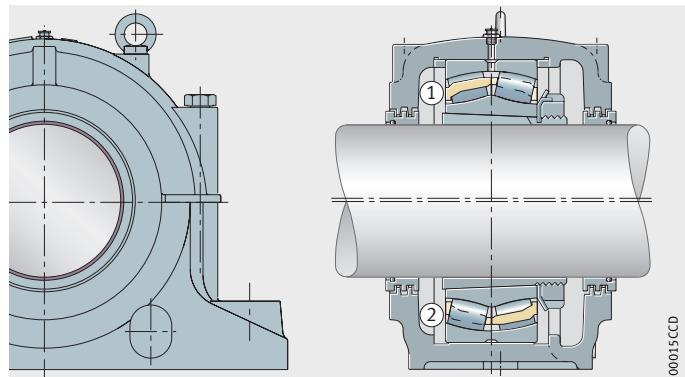
- ① Locating bearing
- ② Non-locating bearing

Figure 31
Plummer block housing SD31
up to and including size SD3140,
design A



- ① Locating bearing
- ② Non-locating bearing

Figure 32
Plummer block housing SD31
up to and including size SD3140,
design B



Bearing housings

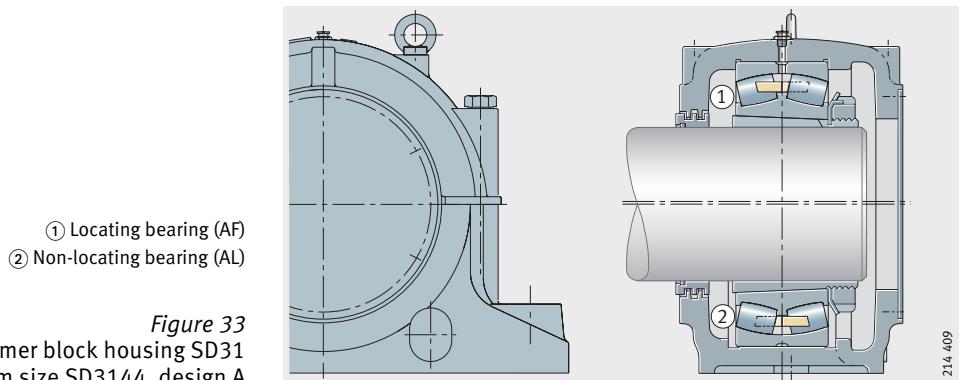


Figure 33
Plummer block housing SD31
from size SD3144, design A

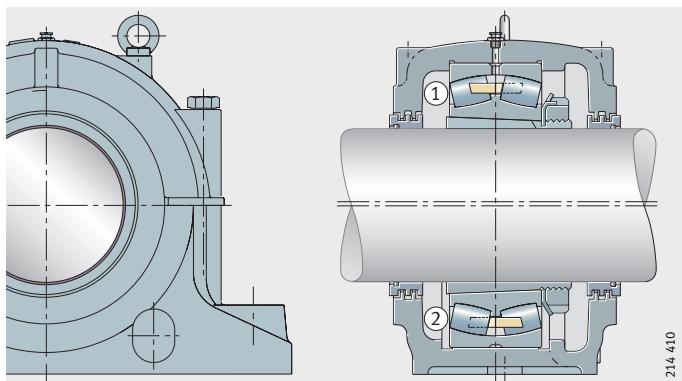


Figure 34
Plummer block housing SD31
from size SD3144, design B

**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. The housings can also be fitted with split spherical roller bearings 231SM.

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 comprises a three-section labyrinth (TS). Labyrinth seals allow shaft misalignments of 0,25° in both directions. Housings with Taconite seals (D) are also available by agreement. Housings closed on one side (design A) are supplied with a steel cover.

The eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

The normal material used is flake graphite cast iron (suffix L). Housings made from GGG (D) or GS (S) are available by agreement.

Load carrying capacity: see also section Load carrying capacity of split plummer block housings, page 942.

The axial load carrying capacity is max. $\frac{2}{3}$ of F_{180° .



Lubrication

The quantities stated are valid for the initial filling of SD31 housings. The bearings are thus filled completely and the housing cavities are filled to 60%.

Recommended grease quantity

Housing	Grease quantity for initial filling ≈g
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



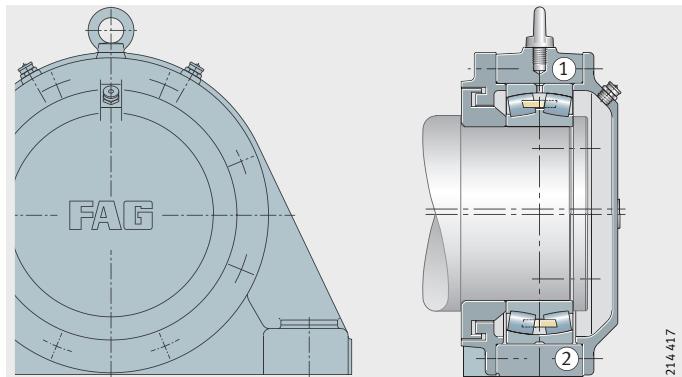
Bearing housings

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 high demands, *Figure 35* to *Figure 46*, page 933.

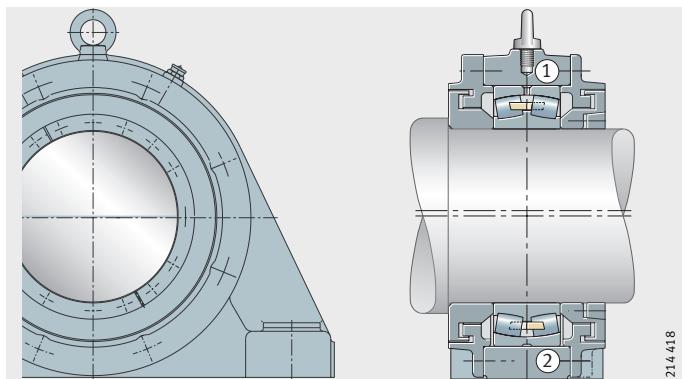
- ① Locating bearing BND..-Z-Y-AF-S
- ② Non-locating bearing BND..-Z-Y-AL-S

Figure 35
Plummer block housing BND
for bearings with cylindrical bore
(labyrinth seal), design A



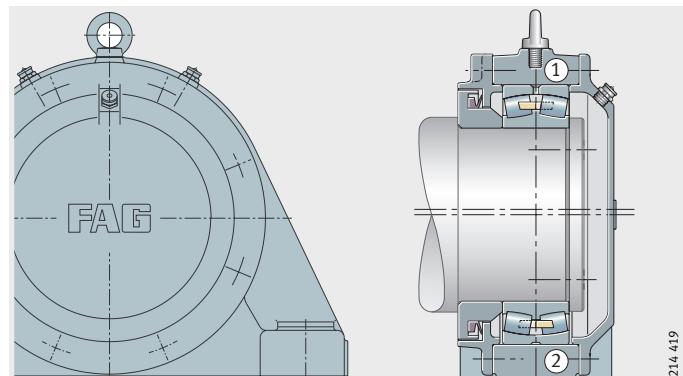
- ① Locating bearing BND..-Z-Y-BF-S
- ② Non-locating bearing BND..-Z-Y-BL-S

Figure 36
Plummer block housing BND
for bearings with cylindrical bore
(labyrinth seal), design B



- ① Locating bearing BND..-Z-T-AF-S
 ② Non-locating bearing BND..-Z-T-AL-S

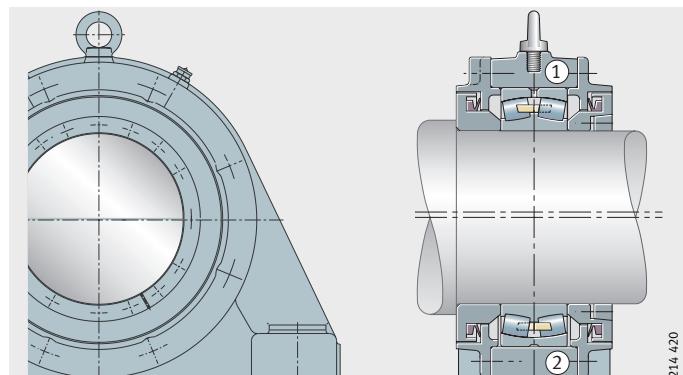
Figure 37
 Plummer block housing BND
 for bearings with cylindrical bore
 (Taconite seal), design A



214 419

- ① Locating bearing BND..-Z-T-BF-S
 ② Non-locating bearing BND..-Z-T-BL-S

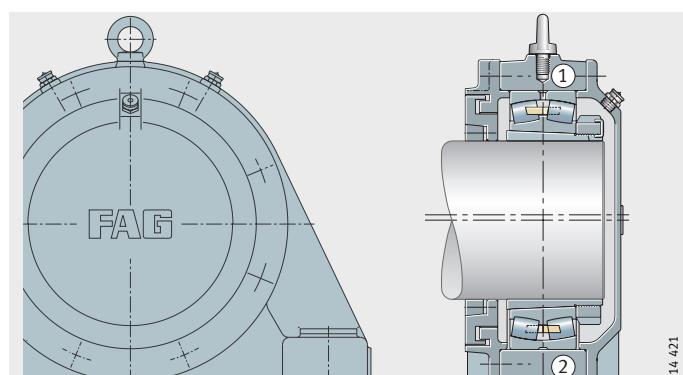
Figure 38
 Plummer block housing BND
 for bearings with cylindrical bore
 (Taconite seal), design B



214 420

- ① Locating bearing BND..-H-W-Y-AF-S
 ② Non-locating bearing BND..-H-W-Y-AL-S

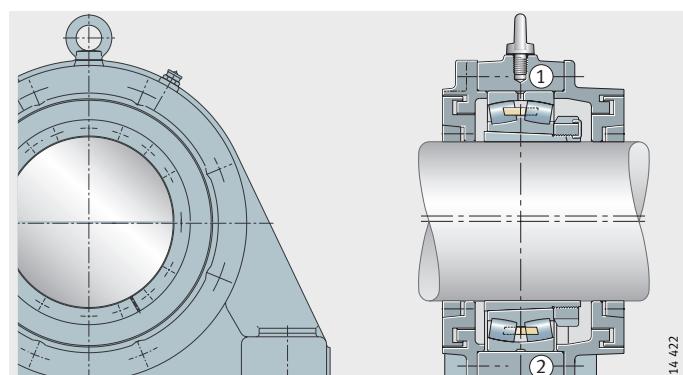
Figure 39
 Plummer block housing BND
 for bearings with tapered bore and
 adapter sleeve (labyrinth seal),
 design A



214 421

- ① Locating bearing BND..-H-W-Y-BF-S
 ② Non-locating bearing BND..-H-W-Y-BL-S

Figure 40
 Plummer block housing BND
 for bearings with tapered bore and
 adapter sleeve (labyrinth seal),
 design B

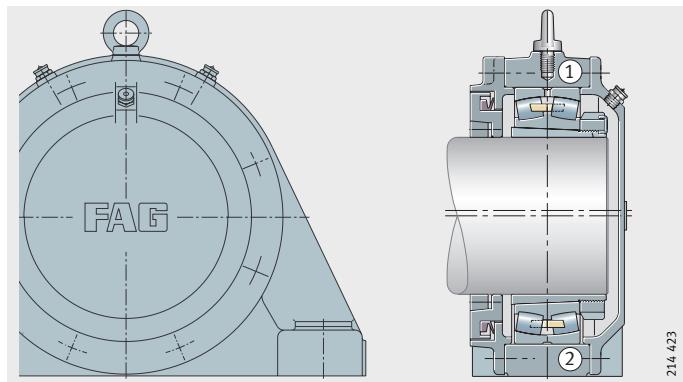


214 422

Bearing housings

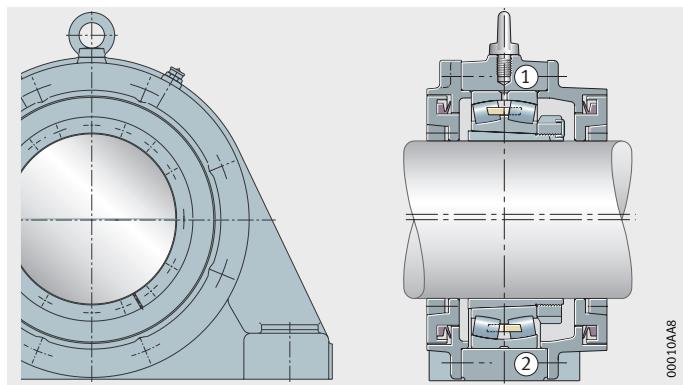
- ① Locating bearing BND..-H-W-T-AF-S
② Non-locating bearing BND..-H-W-T-AL-S

Figure 41
Plummer block housing BND
for bearings with tapered bore and
adapter sleeve (Taconite seal),
design A



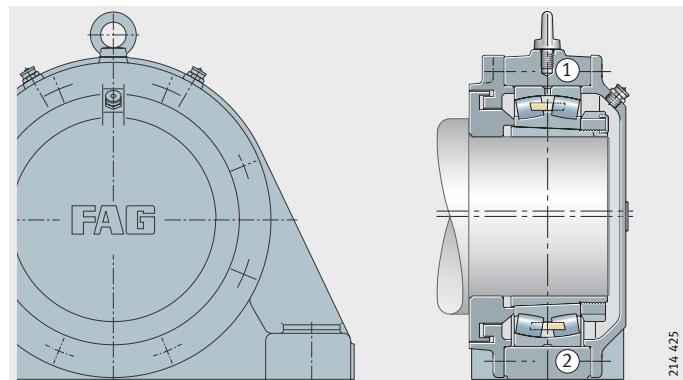
- ① Locating bearing BND..-H-W-T-BF-S
② Non-locating bearing BND..-H-W-T-BL-S

Figure 42
Plummer block housing BND
for bearings 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

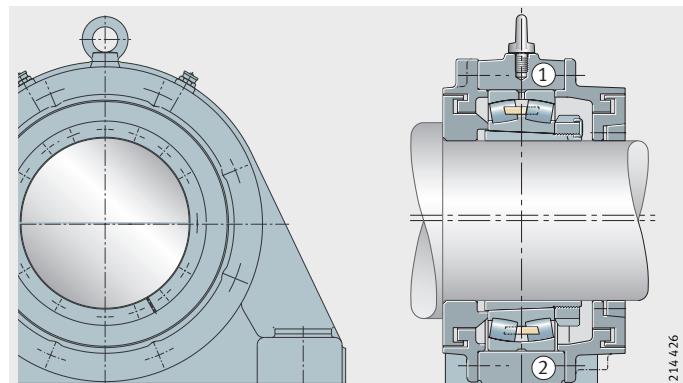
Figure 43
 Plummer block housing BND
 for bearings with tapered bore and
 adapter sleeve and for shaft with
 abutment shoulder (labyrinth seal),
 design A



214 425

- ① Locating bearing BND..-H-C-Y-BF-S
 ② Non-locating bearing BND..-H-C-Y-BL-S

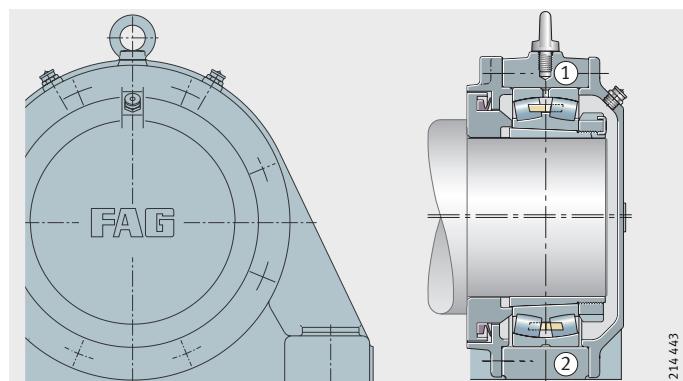
Figure 44
 Plummer block housing BND
 for bearings with tapered bore and
 adapter sleeve and for shaft with
 abutment shoulder (labyrinth seal),
 design B



214 426

- ① Locating bearing BND..-H-C-T-AF-S
 ② Non-locating bearing BND..-H-C-T-AL-S

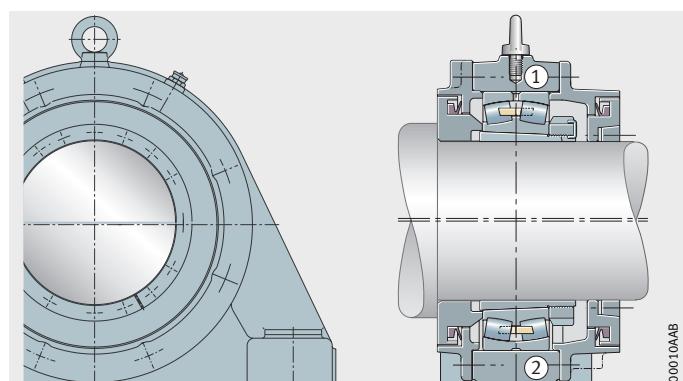
Figure 45
 Plummer block housing BND
 for bearings with tapered bore and
 adapter sleeve and for shaft with
 abutment shoulder (Taconite seal),
 design A



214 443

- ① Locating bearing BND..-H-C-T-BF-S
 ② Non-locating bearing BND..-H-C-T-BL-S

Figure 46
 Plummer block housing BND
 for bearings with tapered bore and
 adapter sleeve and for shaft with
 abutment shoulder (Taconite seal),
 design B



00010AAB

Bearing housings

Unsplit housings of series BND, originally developed for belt conveyors, can also be beneficially used in materials processing, for example in hard crushers and sugar cane mill drives as well as on 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 shaft can undergo deflection of approx. $0,5^\circ$ in both directions without the labyrinth rings 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) with labyrinth seals (suffix Y). If required, Taconite seals (suffix T) are available with a V ring integrated in the labyrinth (these must be provided with a separate relubrication facility).
Load carrying capacity	<p>Guide values for the rupture load of housings BND: see section Housings BND, page 946.</p> <p>When determining the permissible load, a safety factor of 6 should be applied to the housing rupture load.</p> <p> Housings BND have a maximum axial load carrying capacity corresponding to 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.</p> <p>The eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.</p>
Lubrication	<p>The housings BND are designed for grease lubrication. Suitable lubricants are lithium soap greases of consistency 2 and 3, for example the rolling bearing grease MULTI3 for low loads and MULTITOP and LOAD400 for high and very high loads.</p> <p>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.</p> <p>In initial lubrication, the cavities in the bearing, the housing and the labyrinth seals are completely filled with grease.</p> <p>Recommended grease quantities: see tables, page 936.</p> <p>The relubrication intervals should be matched to the environmental conditions. The bearings should be relubricated after an interval of no more than four weeks.</p> <p>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.</p> <p>The quantities stated are valid for the initial filling of BND housings. The bearings and housing cavities are thus filled completely.</p>



Bearing housings

Recommended grease quantity

Bearing bore mm	Grease quantity for initial filling	
	BND22, BND31, BND32 ≈g	BND30 ≈g
180	2 500	–
190	3 000	–
200	3 600	–
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

Unsplit plummer block housings BNM

Unsplit FAG housings of series BNM are combined with spherical roller bearings with tapered bore and withdrawal sleeves, seals and grease filling to form bearing units, *Figure 47* and *Figure 48*. The housings are used in applications such as mills.

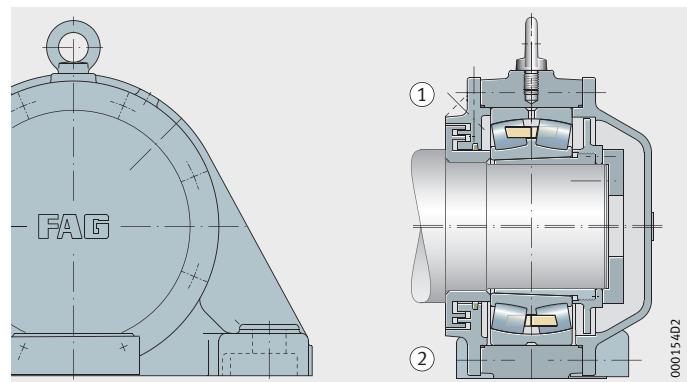
The dimensions of unsplit plummer block housings BNM are matched to spherical roller bearings of series 232..-K.

In housings BNM 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 normal material for the housing body is cast steel.

- ① Locating bearing BNM..-AH-R-AF
- ② Non-locating bearing BNM..-AH-R-AL

Figure 47

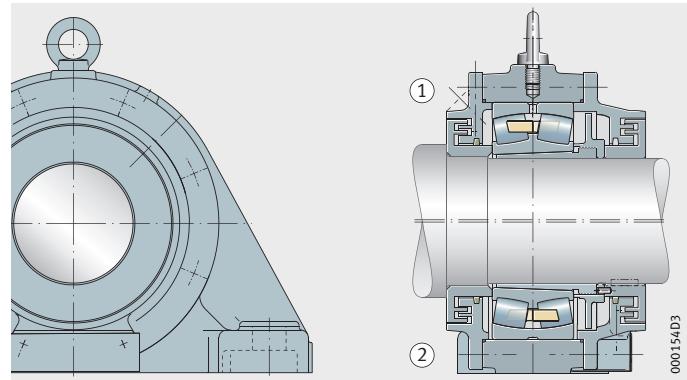
Plummer block housing BNM
for bearings with tapered bore
and withdrawal sleeve, design A



- ① Locating bearing BNM..-AH-R-BF
- ② Non-locating bearing BNM..-AH-R-BL

Figure 48

Plummer block housing BNM
for bearings with tapered bore and
withdrawal sleeve, design B



Bearing housings

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. Shaft seats for bearings with a tapered bore seated on adapter sleeves should be machined to h8.

Lubrication

The housings BNM are designed for grease lubrication. For operation at high speeds, the housings have grease valves (suffix R). Plummer block housings BNM are sealed on one side (design A) or on both sides (design B) by labyrinth seals.

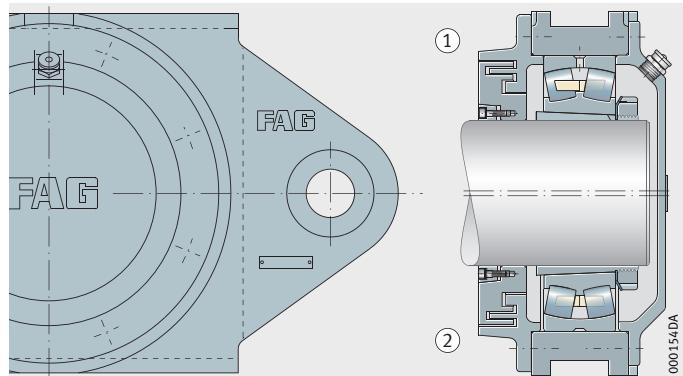
Take-up housings

Unsplit take-up housings SPA

Unsplit FAG housings of series SPA are combined with FAG spherical roller bearings, seals and grease filling to form bearing units for very high demands, *Figure 49* and *Figure 50*.

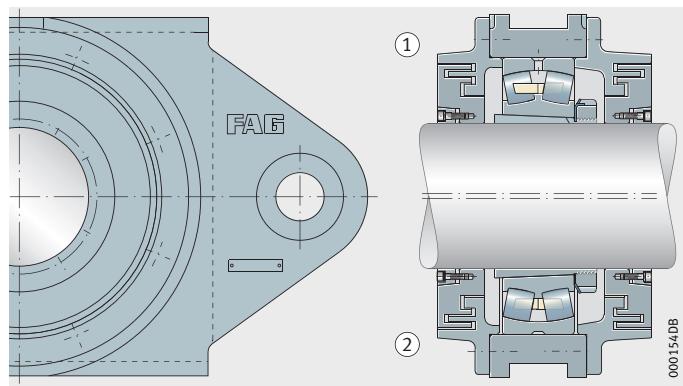
- ① Locating bearing SPA..-H-W-Y-AF-S
- ② Non-locating bearing SPA..-H-W-Y-AL-S

Figure 49
Take-up housing SPA
for bearings with tapered bore and
adapter sleeve (labyrinth seal),
design A



- ① Locating bearing SPA..-H-W-Y-BF-S
- ② Non-locating bearing SPA..-H-W-Y-BL-S

Figure 50
Take-up housing SPA
for bearings with tapered bore and
adapter sleeve (labyrinth seal),
design B



Housings of series SPA were developed specifically for tensioner drum bearing arrangements in belt conveyor plant. A yoke-shaped drawbar eye is cast on for attachment to the tensioning device. The housing is guided by means of rails in the belt support structure.

The dimensions of housings SPA are matched to spherical roller bearings of series 222, 230, 231 and 232. In housings SPA 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, cover and labyrinth rings 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 shaft can undergo deflection of approx. 0,5° in both directions without the labyrinth touching the bore.

Bearing housings

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 (F), the bearing is clamped between the housing covers. In the non-locating bearing (L), the bearing can align itself axially, since the covers have shorter centring collars. The housings can accommodate spherical roller bearings with a tapered bore located on adapter sleeves. For machining of the shaft seat, we recommend the tolerance h8.
Seals	Take-up housings SPA are sealed on one side (design A) or on both sides (design B) by labyrinth seals (suffix Y). If required, Taconite seals (suffix T) are available with a V ring integrated in the labyrinth (these must be provided with a separate relubrication facility).

Lubrication	The housings SPA are designed for grease lubrication. Suitable lubricants are lithium soap greases of consistency 2 or 3, for example the rolling bearing grease MULT13 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 3404 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 labyrinth 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.
	The quantities stated are valid for the initial filling of SPA housings. The bearings and housing cavities are thus filled completely.

Recommended grease quantity

Bearing bore mm	Grease quantity for initial filling	
	SPA22, SPA31, SPA32 ≈g	SPA30 ≈g
180	2 500	–
190	3 000	–
200	3 600	–
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



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 for housings S30 and SD31 are given on pages 943 and 944. Values for other split housings are available by agreement.

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.

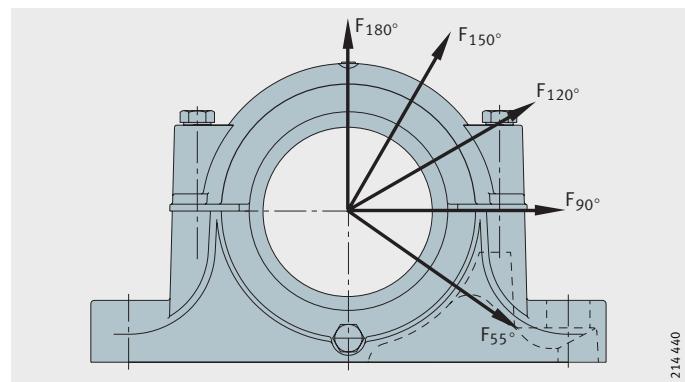
The values in the tables apply if the mounting surface of the mating parts is in accordance with DIN ISO 2 768-H. A precondition for supporting loads is that the housing base surface is completely and rigidly supported.



Housings SD31 have a maximum axial load carrying capacity corresponding to $\frac{2}{3}$ of the housing rupture load F_{180° , housings S30 have a maximum axial load carrying capacity corresponding to 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 eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

Housings S30



214 460

Figure 51

Guide values for the rupture load of housings S30 and the maximum load carrying capacity of the connecting screws (tightening torques, see also page 947)

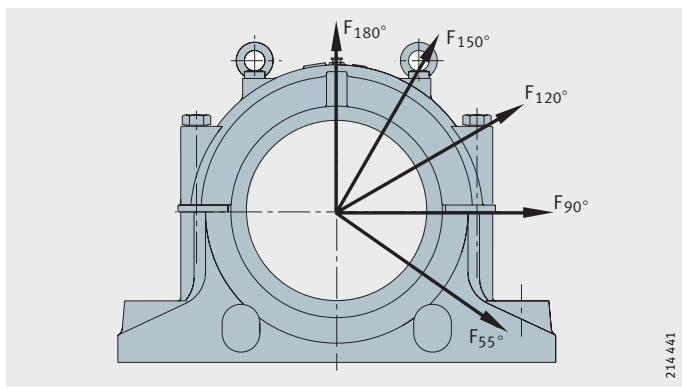
Housing Designation	Housing rupture load in load direction F					Connecting screws			
	Housings made from flake graphite cast iron (suffix L) For housings made from spheroidal graphite cast iron (suffix D), multiply the stated values by 1,6					Thread to DIN 13	Maximum load carrying capacity of both screws with contact between parting surfaces in load direction		
	55° kN	90°	120°	150°	180°		Grade 8.8	120° kN	150°
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 52
 Guide values for the rupture load of housings SD31 and the maximum load carrying capacity of the connecting screws (tightening torques, see also page 947)



214441

Housing Designation	Housing rupture load in load direction F					Connecting screws			
	Housings made from flake graphite cast iron (suffix L) For housings made from spheroidal graphite cast iron (suffix D), multiply the stated values by 1,6					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°		Grade 8.8	120° kN	150°
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 housings BND are given in the following table, page 946.

Values for other unsplit housings are available by agreement.

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 apply if the mounting surface of the mating parts is in accordance with DIN ISO 2 768-H.

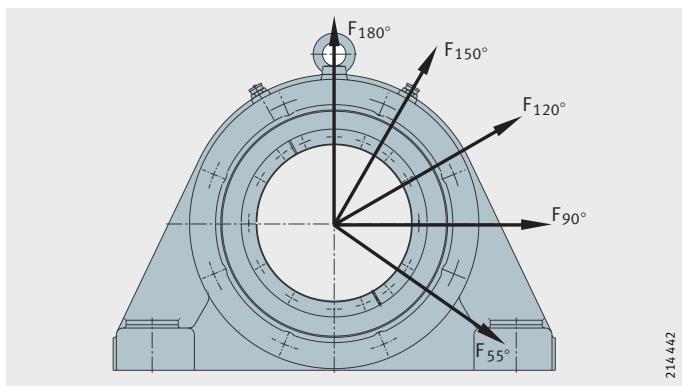
A precondition for supporting loads is that the housing base surface is completely and rigidly supported.



Bearing housings

Housings BND

Figure 53
Guide values for the rupture load
of housings BND
made from cast steel and
spheroidal graphite cast iron



214442

Housing Designation				Housing rupture load in load direction F				
				55° kN	90°	120°	150°	180°
BND2236	-	-	-	4 435	3 570	3 470	2 755	3 470
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 screw material 8.8 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

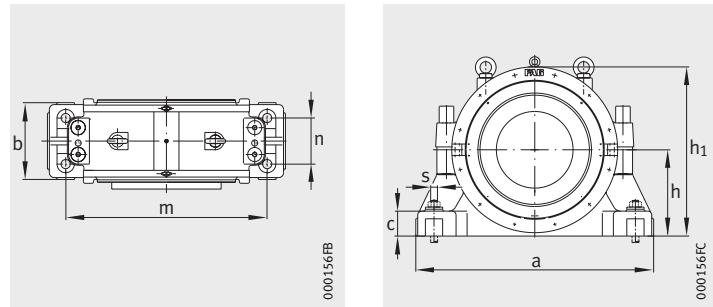
Nominal screw size	Tightening torque Nm
M16	215
M20	430
M24	740
M30	1 450
M36	2 600
M42	4 000
M45	4 950
M48	6 000
M56	9 650
M64	14 400
M72	21 100
M80	29 300
M90	42 500
M100	59 200



Plummer block housings

KPG, split

For spherical roller bearings
with tapered bore
and sleeve, for split
spherical roller bearings



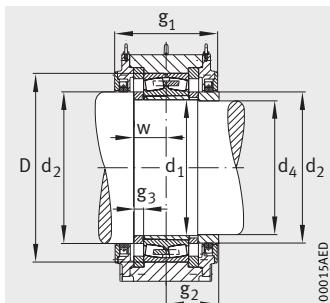
Dimension table · Dimensions in mm

Designation¹⁾

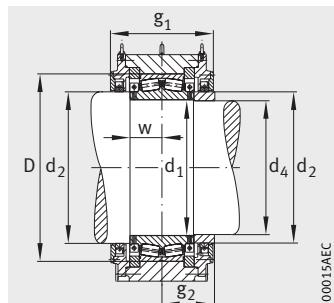
Housing		Bearing		Sleeve
Locating bearing	Non-locating bearing	MB cage	Pin cage	
KPG49/470-F-S	KPG49/470-L-S	Z-528741.PRL-K30	Z-541821.249/500-B-K30	Z-524974.KH
KPG49/500-F-S	KPG49/500-L-S	Z-528742.PRL-K30	Z-541822.249/530-B-K30	Z-524976.KH
KPG49/530-F-S	KPG49/530-L-S	Z-528743.PRL-K30	Z-541823.249/560-B-K30	Z-524978.KH
KPG49/570-F-S	KPG49/570-L-S	Z-528744.PRL-K30	Z-541824.249/600-B-K30	Z-524980.KH
KPG49/600-F-S	KPG49/600-L-S	—	Z-541825.249/630-B-K30	Z-524982.KH
KPG49/630-F-S	KPG49/630-L-S	Z-528746.PRL-K30	Z-541826.249/670-B-K30	Z-524984.KH
KPG49/670-F-S	KPG49/670-L-S	Z-528747.PRL-K30	Z-541827.249/710-B-K30	Z-524986.KH
KPG49/710-F-S	KPG49/710-L-S	Z-528748.PRL-K30	Z-541828.249/750-B-K30	Z-524988.KH
KPG49/750-F-S	KPG49/750-L-S	Z-528749.PRL-K30	Z-541829.249/800-B-K30	Z-524990.KH
KPG49/800-F-S	KPG49/800-L-S	Z-528750.PRL-K30	Z-541830.249/850-B-K30	Z-524992.KH
KPG49/850-F-S	KPG49/850-L-S	Z-528751.PRL-K30	Z-541831.249/900-B-K30	Z-524994.KH
KPG49/900-F-S	KPG49/900-L-S	Z-528752.PRL-K30	Z-541832.249/950-B-K30	Z-524996.KH
KPG49/950-F-S	KPG49/950-L-S	Z-528753.PRL-K30	Z-541833.249/1000-B-K30	Z-524998.KH
KPG49/1000-F-S	KPG49/1000-L-S	—	Z-541834.249/1060-B-K30	Z-525000.KH
KPG49/1060-F-S	KPG49/1060-L-S	—	Z-541835.249/1120-B-K30	Z-525001.KH
KPG49/1120-F-S	KPG49/1120-L-S	—	Z-541836.249/1180-B-K30	Z-525003.KH
KPG49/1180-F-S	KPG49/1180-L-S	—	Z-541837.249/1250-B-K30	Z-525005.KH
KPG49/1250-F-S	KPG49/1250-L-S	—	Z-541838.249/1320-B-K30	Z-525007.KH

1) Ordering example:

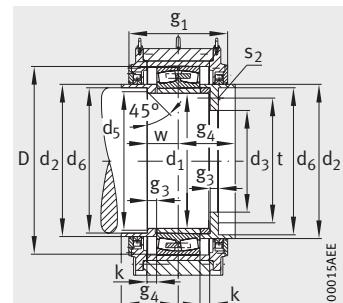
Housing KPG49/1000-F-S (see also page 911),
bearing with pin cage Z-541834.249/1060-B-K30 (see bearing tables),
sleeve Z-525000.KH (see bearing tables).



KPG49..F (unsplit bearing)
Locating bearing



KPG49..F (split bearing)
Locating bearing



KPG49..L (unsplit bearing)
Non-locating bearing

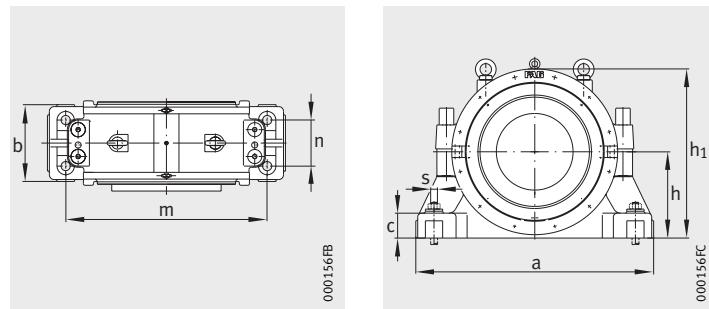
	Initial grease filling quantity			Mass m Housing ≈kg
Split bearing	Locating bearing	Unsplit ≈kg	Split ≈kg	
Z-529173.PRL	10	8	14	945
Z-528441.PRL	10	8	14	1 050
Z-529223.PRL	13	10	15	1 365
Z-529224.PRL	15	12	20	1 575
Z-529225.PRL	20	15	24	2 205
Z-529226.PRL	22	18	25	2 625
Z-529227.PRL	26	20	30	2 835
Z-527943.PRL	30	24	35	2 940
Z-529228.PRL	35	26	40	3 465
Z-529229.PRL	40	30	50	3 885
Z-529230.PRL	45	35	55	4 515
Z-527254.PRL	55	45	65	5 460
Z-529231.PRL	65	50	80	5 660
Z-529232.PRL	75	60	95	7 140
Z-529233.01.PRL	80	65	100	8 400
Z-529234.PRL	95	75	110	9 450
-	110	-	130	11 550
Z-529215.PRL	125	100	170	13 440



Plummer block housings

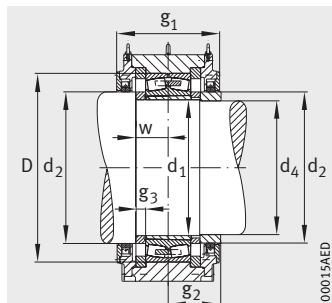
KPG, split

For spherical roller bearings
with tapered bore
and sleeve, for split
spherical roller bearings

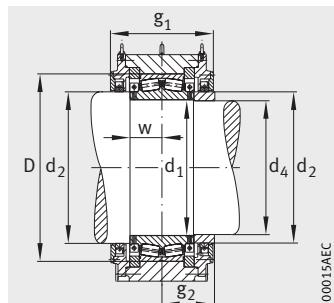


Dimension table (continued) · Dimensions in mm

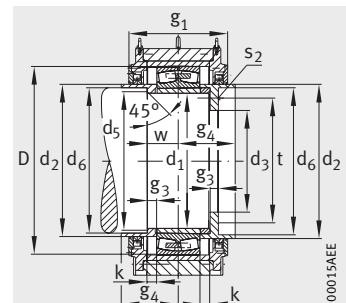
Designation		Dimensions											
Housing		d ₁	a	g ₁	h ₁	b	c	D	d ₂	d ₃	d ₅	d ₆	
Locating bearing	Non-locating bearing												
KPG49/470-F-S	KPG49/470-L-S	470	1 170	400	820	375	130	670	540	375	480	505	
KPG49/500-F-S	KPG49/500-L-S	500	1 240	410	875	400	140	710	570	400	510	535	
KPG49/530-F-S	KPG49/530-L-S	530	1 320	420	930	420	145	750	600	420	540	565	
KPG49/570-F-S	KPG49/570-L-S	570	1 400	460	980	440	155	800	645	450	580	610	
KPG49/600-F-S	KPG49/600-L-S	600	1 500	480	1 040	480	165	850	675	475	612	640	
KPG49/630-F-S	KPG49/630-L-S	630	1 570	500	1 110	500	175	900	720	505	642	675	
KPG49/670-F-S	KPG49/670-L-S	670	1 660	560	1 170	535	185	950	760	535	682	715	
KPG49/710-F-S	KPG49/710-L-S	710	1 750	590	1 240	550	195	1 000	800	565	722	755	
KPG49/750-F-S	KPG49/750-L-S	750	1 850	600	1 310	570	205	1 060	860	600	762	805	
KPG49/800-F-S	KPG49/800-L-S	800	1 960	630	1 390	600	220	1 120	910	640	812	855	
KPG49/850-F-S	KPG49/850-L-S	850	2 060	660	1 450	620	230	1 180	960	675	862	905	
KPG49/900-F-S	KPG49/900-L-S	900	2 200	680	1 550	660	250	1 250	1 015	715	915	960	
KPG49/950-F-S	KPG49/950-L-S	950	2 330	720	1 620	650	255	1 320	1 065	750	965	1 010	
KPG49/1000-F-S	KPG49/1000-L-S	1 000	2 450	780	1 710	740	275	1 400	1 135	795	1 015	1 070	
KPG49/1060-F-S	KPG49/1060-L-S	1 060	2 560	800	1 780	740	285	1 460	1 195	840	1 075	1 130	
KPG49/1120-F-S	KPG49/1120-L-S	1 120	2 700	820	1 880	780	300	1 540	1 260	885	1 135	1 190	
KPG49/1180-F-S	KPG49/1180-L-S	1 180	2 850	850	1 985	820	320	1 630	1 330	940	1 195	1 255	
KPG49/1250-F-S	KPG49/1250-L-S	1 250	3 000	900	2 100	850	340	1 720	1 400	990	1 265	1 325	



KPG49..F (unsplit bearing)
Locating bearing



KPG49..F (split bearing)
Locating bearing



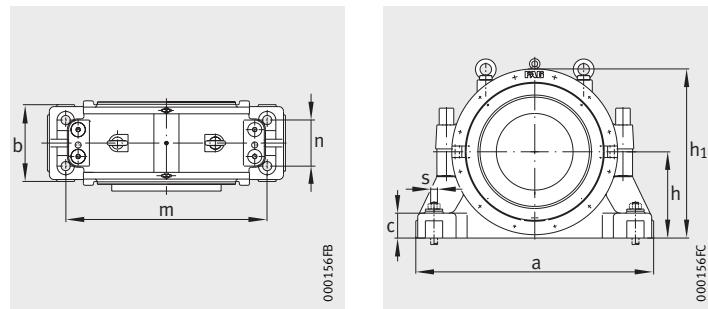
KPG49..L (unsplit bearing)
Non-locating bearing

g ₂	g ₃	g ₄	h	k	m	n	s	t	s ₂		w
									DIN 931	Quantity	
210	40	230	425	40	975	230	M42	437,5	M20X70	8	125
215	40	235	450	40	1 050	240	M42	465	M20X70	8	130
220	40	240	475	40	1 100	255	M48	490	M20X70	8	135
240	45	260	500	40	1 150	270	M52	525	M20X80	8	145
250	46	270	535	40	1 225	295	M56	552,5	M20X80	8	155
260	50	280	570	40	1 300	310	M56	587,5	M24X90	8	165
290	53,5	317,5	600	50	1 375	325	M64	622,5	M24X90	8	175
305	55	332,5	630	50	1 450	335	M64	657,5	M30X100	8	180
310	56	337,5	670	50	1 550	345	M72	700	M30X100	8	185
325	59	352,5	710	50	1 600	360	M72	745	M30X110	8	195
340	60	375	740	60	1 700	370	M80	787,5	M30X110	8	200
350	60	385	800	60	1 820	390	M90	832,5	M36X110	8	210
370	72,5	412,5	830	70	1 980	360	M90	875	M36X130	8	230
400	77,5	435	880	60	2 000	460	M100	927,5	M36X130	8	245
410	77,5	452,5	920	70	2 150	460	M100	980	M42X140	8	245
420	82,5	462,5	970	70	2 300	480	M110	1 032,5	M42X140	8	260
435	87,5	477,5	1 010	70	2 400	510	M110	1 095	M42X150	8	275
460	90	502,5	1 080	70	2 500	520	M125	1 155	M48X180	8	290



Plummer block housings

KPGZ, split
For spherical roller bearings
with cylindrical bore,
for split
spherical roller bearings



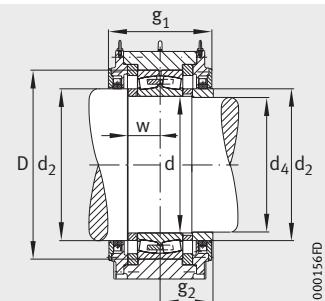
Dimension table · Dimensions in mm

Designation¹⁾

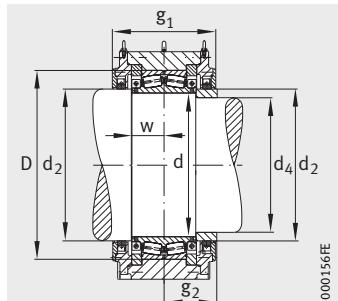
Housing		Bearing		
Locating bearing	Non-locating bearing	MB cage	Pin cage	Split
KPGZ49/500-F-S	KPGZ49/500-L-S	Z-528741.PRL	Z-541821.249/500	Z-537276.PRL
KPGZ49/530-F-S	KPGZ49/530-L-S	Z-528742.PRL	Z-541822.249/530	Z-537277.PRL
KPGZ49/560-F-S	KPGZ49/560-L-S	Z-528743.PRL	Z-541823.249/560-B	Z-537278.PRL
KPGZ49/600-F-S	KPGZ49/600-L-S	Z-528744.PRL	Z-541824.249/600-B	Z-533761.PRL
KPGZ49/630-F-S	KPGZ49/630-L-S	—	Z-541825.249/630	Z-537279.PRL
KPGZ49/670-F-S	KPGZ49/670-L-S	Z-528746.PRL	Z-541826.249/670-B	Z-537280.PRL
KPGZ49/710-F-S	KPGZ49/710-L-S	Z-528747.PRL	Z-541827.249/710-B	Z-526073.PRL
KPGZ49/750-F-S	KPGZ49/750-L-S	Z-528748.PRL	Z-541828.249/750-B	Z-533414.01.PRL
KPGZ49/800-F-S	KPGZ49/800-L-S	Z-528749.PRL	Z-541829.249/800-B	Z-532063.PRL
KPGZ49/850-F-S	KPGZ49/850-L-S	Z-528750.PRL	Z-541830.249/850-B	Z-537281.PRL
KPGZ49/900-F-S	KPGZ49/900-L-S	Z-528751.PRL	Z-541831.249/900-B	Z-537282.PRL
KPGZ49/950-F-S	KPGZ49/950-L-S	Z-528752.PRL	Z-541832.249/950-B	Z-534826.PRL
KPGZ49/1000-F-S	KPGZ49/1000-L-S	Z-528753.PRL	Z-541833.249/1000-B	Z-533567.PRL
KPGZ49/1060-F-S	KPGZ49/1060-L-S	—	Z-541834.249/1060-B	Z-537283.PRL
KPGZ49/1120-F-S	KPGZ49/1120-L-S	—	Z-541835.249/1120-B	Z-537284.PRL
KPGZ49/1180-F-S	KPGZ49/1180-L-S	—	Z-541836.249/1180-B	Z-536806.PRL
KPGZ49/1250-F-S	KPGZ49/1250-L-S	—	Z-541837.249/1250-B	Z-537285.PRL
KPGZ49/1320-F-S	KPGZ49/1320-L-S	—	Z-541838.249/1320-B	Z-545161.PRL

1) Ordering example:

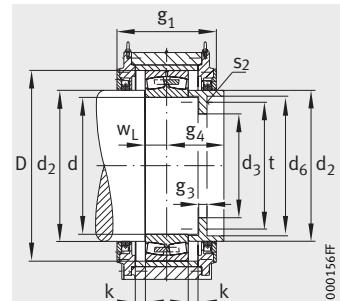
Housing KPGZ49/1000-F-S (see also page 912),
split bearing Z-533567.PRL (see bearing tables).



KPGZ49..-F (unsplit bearing)
Locating bearing



KPGZ49..-F (split bearing)
Locating bearing



KPGZ49..-L (unsplit bearing)
Non-locating bearing

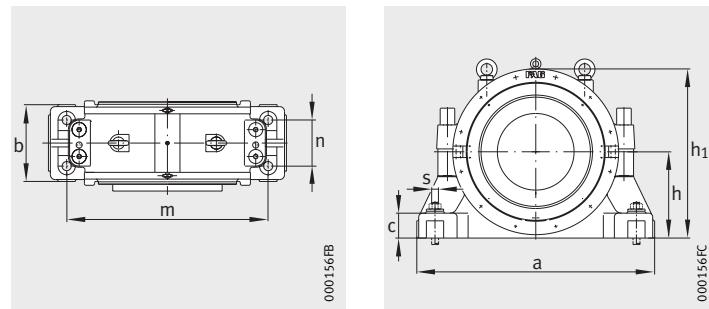
Initial grease filling quantity

Locating bearing		Non-locating bearing ≈kg	Mass m Housing ≈kg
Unsplit ≈kg	Split ≈kg		
10	8	14	900
10	8	14	1 000
13	10	15	1 300
15	12	20	1 500
20	15	24	2 100
22	18	25	2 500
26	20	30	2 700
30	24	35	2 800
35	26	40	3 300
40	30	50	3 700
45	35	55	4 300
55	45	65	5 200
65	50	80	5 770
75	60	95	6 800
80	65	100	8 000
95	75	110	9 000
110	85	130	11 000
125	100	170	12 800



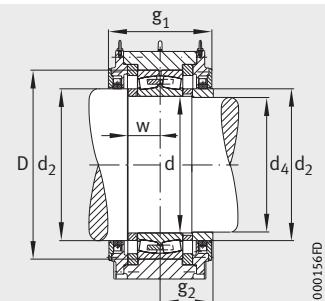
Plummer block housings

KPGZ, split
For spherical roller bearings
with cylindrical bore,
for split
spherical roller bearings

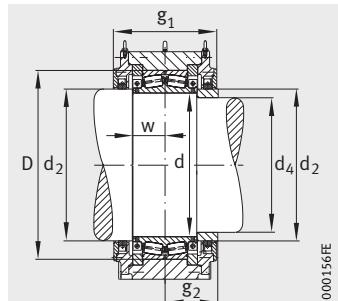


Dimension table (continued) · Dimensions in mm

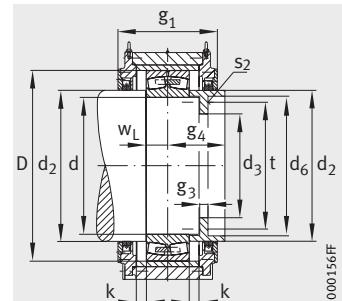
Designation		Dimensions											
Housing		d	a	g ₁	h ₁	b	c	D	d ₂	d ₃	d ₄	d ₅	
Locating bearing	Non-locating bearing												
KPGZ49/500-F-S	KPGZ49/500-L-S	500	1 170	400	820	375	130	670	540	375	495	510	
KPGZ49/530-F-S	KPGZ49/530-L-S	530	1 240	410	875	400	140	710	570	400	525	540	
KPGZ49/560-F-S	KPGZ49/560-L-S	560	1 320	420	930	420	145	750	600	420	555	570	
KPGZ49/600-F-S	KPGZ49/600-L-S	600	1 400	460	980	440	155	800	645	450	595	610	
KPGZ49/630-F-S	KPGZ49/630-L-S	630	1 500	480	1 040	480	165	850	675	475	625	642	
KPGZ49/670-F-S	KPGZ49/670-L-S	670	1 570	500	1 110	500	175	900	720	505	665	682	
KPGZ49/710-F-S	KPGZ49/710-L-S	710	1 660	560	1 170	535	185	950	760	535	695	722	
KPGZ49/750-F-S	KPGZ49/750-L-S	750	1 750	590	1 240	550	195	1 000	800	565	745	762	
KPGZ49/800-F-S	KPGZ49/800-L-S	800	1 850	600	1 310	570	205	1 060	860	600	795	812	
KPGZ49/850-F-S	KPGZ49/850-L-S	850	1 960	630	1 390	600	220	1 120	910	640	845	862	
KPGZ49/900-F-S	KPGZ49/900-L-S	900	2 060	660	1 450	620	230	1 180	960	675	895	912	
KPGZ49/950-F-S	KPGZ49/950-L-S	950	2 200	680	1 550	660	250	1 250	1 015	715	945	965	
KPGZ49/1000-F-S	KPGZ49/1000-L-S	1 000	2 330	720	1 620	650	255	1 320	1 065	750	985	1 015	
KPGZ49/1060-F-S	KPGZ49/1060-L-S	1 060	2 450	780	1 710	740	275	1 400	1 135	795	1 055	1 075	
KPGZ49/1120-F-S	KPGZ49/1120-L-S	1 120	2 560	800	1 780	740	285	1 460	1 195	840	1 115	1 135	
KPGZ49/1180-F-S	KPGZ49/1180-L-S	1 180	2 700	820	1 880	780	300	1 540	1 260	885	1 175	1 195	
KPGZ49/1250-F-S	KPGZ49/1250-L-S	1 250	2 850	850	1 985	820	320	1 630	1 330	940	1 245	1 265	
KPGZ49/1320-F-S	KPGZ49/1320-L-S	1 320	3 000	900	2 100	850	340	1 720	1 400	990	1 315	1 335	



KPGZ49..-F (unsplit bearing)
Locating bearing



KPGZ49..-F (split bearing)
Locating bearing



KPGZ49..-L (unsplit bearing)
Non-locating bearing

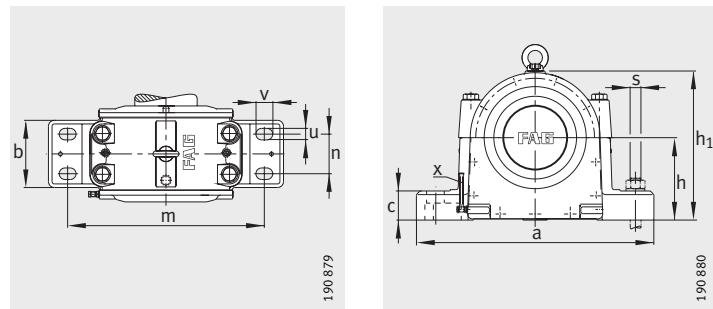
d ₆	g ₂	g ₃	g ₄	h	k	m	n	s	t	s ₂		w	w _L
										DIN 931	Quantity		
505	210	40	230	425	40	975	230	M42	437,5	M20X70	8	125	85
535	215	40	235	450	40	1050	240	M42	465	M20X70	8	130	90
565	220	40	240	475	40	1100	255	M48	490	M20X70	8	135	95
610	240	45	260	500	40	1150	270	M52	525	M20X80	8	145	100
640	250	46	270	535	40	1225	295	M56	552,5	M20X80	8	155	109
675	260	47,5	280	570	40	1300	310	M56	587,5	M24X90	8	162,5	115
715	290	53,5	317,5	600	50	1375	325	M64	622,5	M24X90	8	175	121,5
755	305	52,5	332,5	630	50	1450	335	M64	657,5	M30X100	8	177,5	125
805	310	56	337,5	670	50	1550	345	M72	700	M30X100	8	185	129
855	325	56,5	352,5	710	50	1600	360	M72	745	M30X110	8	192,5	136
905	340	55	375	740	60	1700	370	M80	787,5	M30X110	8	195	140
960	350	55	385	800	60	1820	390	M90	832,5	M36X110	8	205	150
1 010	370	67,5	412,5	830	70	1980	360	M90	875	M36X130	8	225	157,5
1 070	400	70	435	880	60	2000	460	M100	927,5	M36X130	8	237,5	167,5
1 130	410	70	452,5	920	70	2150	460	M100	980	M42X140	8	237,5	167,5
1 190	420	72,5	462,5	970	70	2300	480	M110	1032,5	M42X140	8	250	177,5
1 255	435	85	477,5	1 010	70	2 400	510	M110	1 095	M42X150	8	272,5	187,5
1 325	460	90	502,5	1 080	70	2 500	520	M125	1 155	M48X180	8	290	200



Plummer block housings

LOE, split

For spherical roller bearings
with cylindrical bore,
oil lubrication



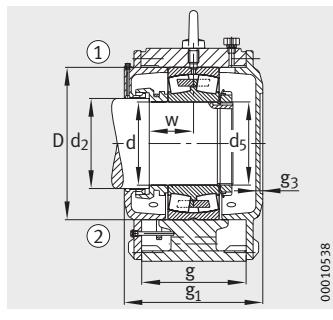
Dimension table · Dimensions in mm

Designation ¹⁾				Initial oil filling quantity l	Oil level Height x mm	Mass m ≈kg	Dimensions	
Housing		Bearing	Shaft nut				d	a
Locating bearing	Non-locating bearing							
LOE330-N-AF-L	LOE330-N-AL-L	22330-E1	KM30	MB30	6,2	75–110	200	150 760
LOE330-N-BF-L	LOE330-N-BL-L	22330-E1	KM30	MB30	6,2	75–110	200	150 760
LOE332-N-AF-L	LOE332-N-AL-L	22332-MB	KM32	MB32	7	80–105	240	160 820
LOE332-N-BF-L	LOE332-N-BL-L	22332-MB	KM32	MB32	7	80–105	240	160 820
LOE334-N-AF-L	LOE334-N-AL-L	22334-MB	KM34	MB34	7,2	80–105	270	170 830
LOE334-N-BF-L	LOE334-N-BL-L	22334-MB	KM34	MB34	7,2	80–105	270	170 830
LOE236-N-AF-L	LOE236-N-AL-L	22236-E1	KM36	MB36	6	75–110	200	180 710
LOE236-N-BF-L	LOE236-N-BL-L	22236-E1	KM36	MB36	6	75–110	200	180 710
LOE336-N-AF-L	LOE336-N-AL-L	22336-MB	KM36	MB36	7,4	80–105	330	180 840
LOE336-N-BF-L	LOE336-N-BL-L	22336-MB	KM36	MB36	7,4	80–105	330	180 840
LOE238-N-AF-L	LOE238-N-AL-L	22238-MB	KM38	MB38	7,2	70–100	230	190 820
LOE238-N-BF-L	LOE238-N-BL-L	22238-MB	KM38	MB38	7,2	70–100	230	190 820
LOE240-N-AF-L	LOE240-N-AL-L	22240-B-MB	KM40	MB40	7,2	75–100	250	200 830
LOE240-N-BF-L	LOE240-N-BL-L	22240-B-MB	KM40	MB40	7,2	75–100	250	200 830
LOE244-N-AF-L	LOE244-N-AL-L	22244-B-MB	HM44T	MB44	8,2	80–110	310	220 880
LOE244-N-BF-L	LOE244-N-BL-L	22244-B-MB	HM44T	MB44	8,2	80–110	310	220 880
LOE248-N-AF-L	LOE248-N-AL-L	22248-B-MB	HM48T	MB48	8,4	100–120	385	240 980
LOE248-N-BF-L	LOE248-N-BL-L	22248-B-MB	HM48T	MB48	8,4	100–120	385	240 980

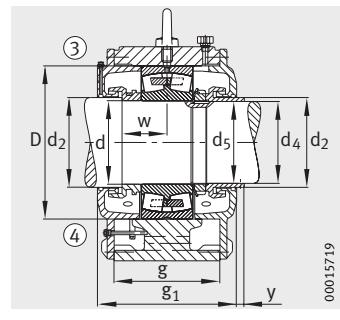
¹⁾ Ordering example:

Housing LOE238-N-BF-L (see also page 913), bearing 22238-MB (see bearing tables), locknut KM38, tab washer MB38 (see dimension tables).

- ²⁾ ① Locating bearing AF
② Non-locating bearing AL
③ Locating bearing BF
④ Non-locating bearing BL



Design A
①, ②²⁾



Design B
③, ④²⁾

00010538

00015719

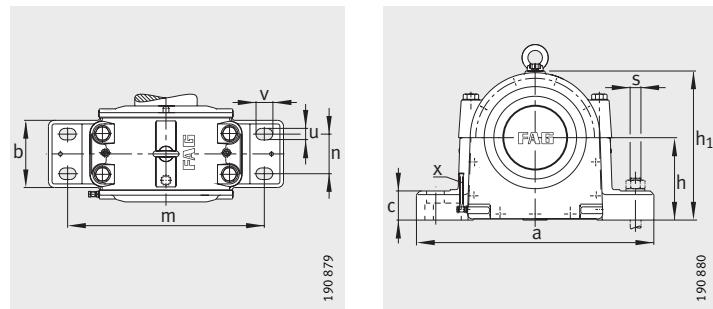
g_1	h_1	d_2	d_4	d_5	w	b	c	D	g	g_3	h	k	m	n	u	v	s	y
335	465	160	—	M150X2	95	200	85	320	240	18	265	10	630	125	42	60	M36	—
335	465	160	147	M150X2	95	200	85	320	240	—	265	10	630	125	42	60	M36	15
350	485	166	—	M160X3	100	240	90	340	250	20	270	10	670	130	48	70	M42	—
350	485	166	155	M160X3	100	240	90	340	250	—	270	10	670	130	48	70	M42	15
350	510	180	—	M170X3	105	240	90	360	255	18	280	10	670	130	48	70	M42	—
350	510	180	165	M170X3	105	240	90	360	255	—	280	10	670	130	48	70	M42	15
300	465	190	—	M180X3	90	200	85	320	210	20	260	10	580	110	42	60	M36	—
300	465	190	175	M180X3	90	200	85	320	210	—	260	10	580	110	42	60	M36	22
360	530	190	—	M180X3	108	240	90	380	260	20	290	10	680	130	48	70	M42	—
360	530	190	175	M180X3	108	240	90	380	260	—	290	10	680	130	48	70	M42	15
350	485	196	—	M190X3	95	240	90	340	250	20	270	10	670	130	48	70	M42	—
350	485	196	185	M190X3	95	240	90	340	250	—	270	10	670	130	48	70	M42	15
344	510	210	—	M200X3	100	240	90	360	260	20	280	10	670	130	48	70	M42	—
344	510	210	195	M200X3	100	240	90	360	260	—	280	10	670	130	48	70	M42	15
380	565	230	—	Tr220X4	108	240	105	400	280	20	310	10	720	130	48	70	M42	—
380	565	230	212	Tr220X4	108	240	105	400	280	—	310	10	720	130	48	70	M42	15
400	615	260	—	Tr240X4	120	280	120	440	300	20	340	10	820	165	48	70	M42	—
400	615	260	235	Tr240X4	120	280	120	440	300	—	340	10	820	165	48	70	M42	22



Plummer block housings

LOE, split

For spherical roller bearings
with tapered bore
and adapter sleeve,
oil lubrication



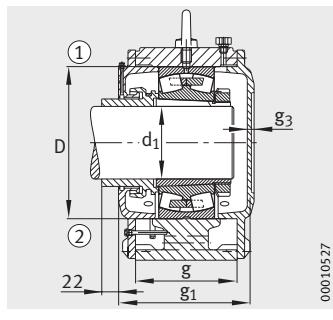
Dimension table · Dimensions in mm

Designation ¹⁾			Bearing	Adapter sleeve	Initial oil filling quantity l	Oil level Height x mm	Mass m Housing ≈kg
Housing	Locating bearing	Non-locating bearing					
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	
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	
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	

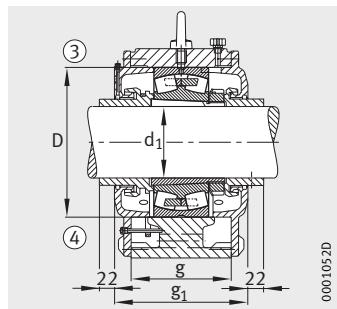
1) Ordering example:

Housing LOE538-N-BF-L (see also page 915), bearing 22238-K-MB (see bearing tables),
adapter sleeve H3138 (see dimension tables).

- 2)
 ① Locating bearing AF
 ② Non-locating bearing AL
 ③ Locating bearing BF
 ④ Non-locating bearing BL



Design A
①, ②²⁾



Design B
③, ④²⁾

Dimensions

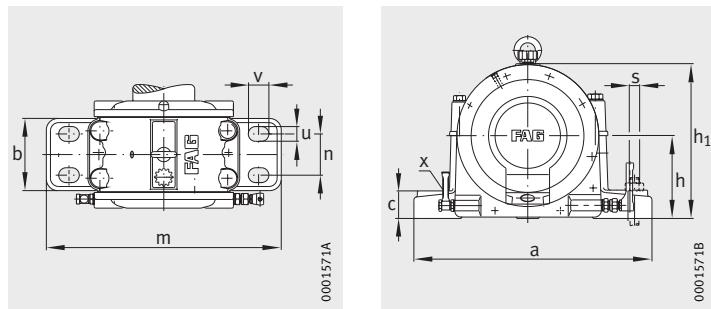
d ₁	a	g ₁	h ₁	b	c	D	g	g ₃	h	k	m	n	u	v	s
135	760	335	465	200	85	320	240	18	265	10	630	125	42	60	M36
135	760	335	465	200	85	320	240	—	265	10	630	125	42	60	M36
140	820	350	485	240	90	340	250	20	270	10	670	130	48	70	M42
140	820	350	485	240	90	340	250	—	270	10	670	130	48	70	M42
150	830	350	510	240	90	360	255	18	280	10	670	130	48	70	M42
150	830	350	510	240	90	360	255	—	280	10	670	130	48	70	M42
160	710	300	465	200	85	320	210	20	260	10	580	110	42	60	M36
160	710	300	465	200	85	320	210	—	260	10	580	110	42	60	M36
160	840	360	530	240	90	380	260	20	290	10	680	130	48	70	M42
160	840	360	530	240	90	380	260	—	290	10	680	130	48	70	M42
170	820	350	485	240	90	340	250	20	270	10	670	130	48	70	M42
170	820	350	485	240	90	340	250	—	270	10	670	130	48	70	M42
180	830	344	510	240	90	360	260	20	280	10	670	130	48	70	M42
180	830	344	510	240	90	360	260	—	280	10	670	130	48	70	M42
200	880	380	565	240	105	400	280	20	310	10	720	130	48	70	M42
200	880	380	565	240	105	400	280	—	310	10	720	130	48	70	M42
220	980	400	625	280	120	440	300	20	340	10	820	165	48	70	M42
220	980	400	625	280	120	440	300	—	340	10	820	165	48	70	M42



Plummer block housings

LOU, split

For spherical roller bearings
with cylindrical bore,
recirculating oil lubrication



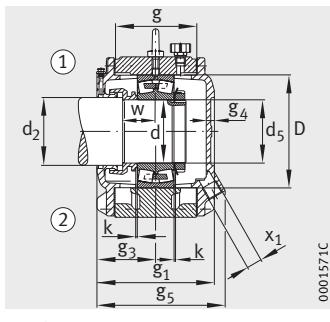
Dimension table · Dimensions in mm

Designation ¹⁾				Oil level Height x mm	Mass m Housing ≈kg	Dimensions						
Housing		Bearing	Shaft nut	Tab washer		d	a	g ₁	h ₁	d ₂		
Locating bearing	Non-locating bearing										d ₄	
LOU330-AF-L	LOU330-AL-L	22330-E1	KM30	MB30	135	200	150	760	335	465	160	—
LOU330-BF-L	LOU330-BL-L	22330-E1	KM30	MB30	135	200	150	760	—	465	160	147
LOU332-AF-L	LOU332-AL-L	22332-MB	KM32	MB32	133	240	160	820	350	485	166	—
LOU332-BF-L	LOU332-BL-L	22332-MB	KM32	MB32	133	240	160	820	—	485	166	155
LOU334-AF-L	LOU334-AL-L	22334-MB	KM34	MB34	133	270	170	830	350	510	180	—
LOU334-BF-L	LOU334-BL-L	22334-MB	KM34	MB34	133	270	170	830	—	510	180	165
LOU236-AF-L	LOU236-AL-L	22236-E1	KM36	MB36	125	200	180	710	300	465	190	—
LOU236-BF-L	LOU236-BL-L	22236-E1	KM36	MB36	125	200	180	710	—	465	190	175
LOU336-AF-L	LOU336-AL-L	22336-MB	KM36	MB36	133	330	180	840	360	530	190	—
LOU336-BF-L	LOU336-BL-L	22336-MB	KM36	MB36	133	330	180	840	—	530	190	175
LOU238-AF-L	LOU238-AL-L	22238-MB	KM38	MB38	127	230	190	820	350	485	196	—
LOU238-BF-L	LOU238-BL-L	22238-MB	KM38	MB38	127	230	190	820	—	485	196	185
LOU240-AF-L	LOU240-AL-L	22240-B-MB	KM40	MB40	130	250	200	830	360	510	210	—
LOU240-BF-L	LOU240-BL-L	22240-B-MB	KM40	MB40	130	250	200	830	—	510	210	195
LOU244-AF-L	LOU244-AL-L	22244-B-MB	HM44T	MB44	145	310	220	880	380	565	230	—
LOU244-BF-L	LOU244-BL-L	22244-B-MB	HM44T	MB44	145	310	220	880	—	565	230	212
LOU248-AF-L	LOU248-AL-L	22248-B-MB	HM48T	MB48	155	385	240	980	400	615	260	—
LOU248-BF-L	LOU248-BL-L	22248-B-MB	HM48T	MB48	155	385	240	980	—	615	260	235

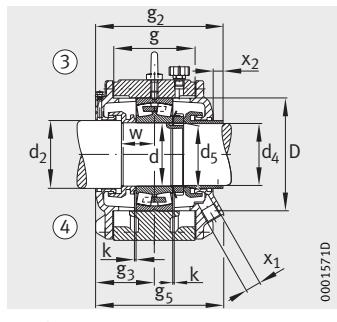
1) Ordering example:

Housing LOU238-BF-L (see also page 914), bearing 22238-MB (see bearing tables), locknut KM38, tab washer MB38 (see dimension tables).

- 2)
 ① Locating bearing AF
 ② Non-locating bearing AL
 ③ Locating bearing BF
 ④ Non-locating bearing BL



Design A
①, ②²⁾



Design B
③, ④²⁾

0001571C

0001571D

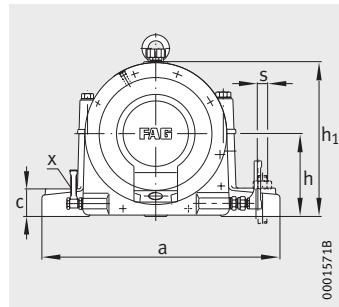
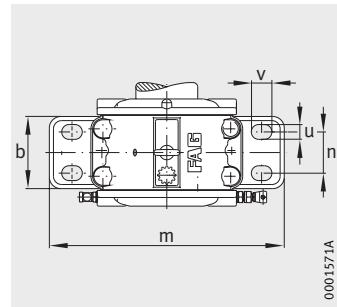
d_5	w	b	c	D	g	g_2	g_3	g_4	g_5	h	k	m	n	u	v	s	x_1 Inch size thread	x_2
M150X2	95	200	85	320	240	—	168	18	—	265	10	630	125	42	60	M36	G11/4	—
M150X2	95	200	85	320	240	350	168	—	—	265	10	630	125	42	60	M36	G11/4	15
M160X3	100	240	90	340	250	—	175	20	395	270	10	670	130	48	70	M42	G11/4	—
M160X3	100	240	90	340	250	365	175	—	395	270	10	670	130	48	70	M42	G11/4	15
M170X3	105	240	90	360	255	—	175	18	—	280	10	670	130	48	70	M42	G11/4	—
M170X3	105	240	90	360	255	365	175	—	—	280	10	670	130	48	70	M42	G11/4	15
M180X3	90	200	85	320	210	—	150	20	325	260	10	580	110	42	60	M36	G11/4	—
M180X3	90	200	85	320	210	315	150	—	325	260	10	580	110	42	60	M36	G11/4	15
M180X3	108	240	90	380	260	—	180	20	—	290	10	680	130	48	70	M42	G11/4	—
M180X3	108	240	90	380	260	375	180	—	—	290	10	680	130	48	70	M42	G11/4	15
M190X3	95	240	90	340	250	—	175	20	383	270	10	670	130	48	70	M42	G11/4	—
M190X3	95	240	90	340	250	365	175	—	383	270	10	670	130	48	70	M42	G11/4	15
M200X3	100	240	90	360	260	—	180	20	389	280	10	670	130	48	70	M42	G11/4	—
M200X3	100	240	90	360	260	375	180	—	389	280	10	670	130	48	70	M42	G11/4	15
Tr220X4	108	240	105	400	280	—	190	20	405	310	10	720	130	48	70	M42	G11/4	—
Tr220X4	108	240	105	400	280	395	190	—	405	310	10	720	130	48	70	M42	G11/4	15
Tr240X4	120	280	120	440	300	—	200	20	428	340	10	820	165	48	70	M42	G11/4	—
Tr240X4	120	280	120	440	300	415	200	—	428	340	10	820	165	48	70	M42	G11/4	15



Plummer block housings

LOU, split

For spherical roller bearings
with tapered bore
and adapter sleeve,
recirculating oil lubrication



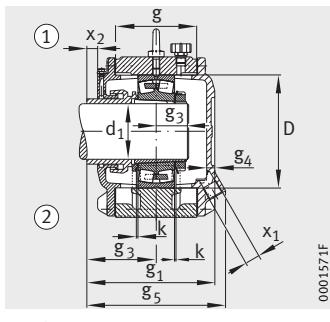
Dimension table · Dimensions in mm

Designation ¹⁾			Oil level Height x mm	Mass m Housing ≈kg	Dimensions				
Housing		Bearing			d ₁	a	g ₁	h ₁	
Locating bearing	Non-locating bearing								
LOU630-AF-L	LOU630-AL-L	22330-E1-K	H2330	135	200	135	760	335	465
LOU630-BF-L	LOU630-BL-L	22330-E1-K	H2330	135	200	135	760	—	465
LOU632-AF-L	LOU632-AL-L	22332-K-MB	H2332	133	240	140	820	350	485
LOU632-BF-L	LOU632-BL-L	22332-K-MB	H2332	133	240	140	820	—	485
LOU634-AF-L	LOU634-AL-L	22334-K-MB	H2334	133	270	150	830	350	510
LOU634-BF-L	LOU634-BL-L	22334-K-MB	H2334	133	270	150	830	—	510
LOU536-AF-L	LOU536-AL-L	22236-E1-K	H3136	125	200	160	710	300	465
LOU536-BF-L	LOU536-BL-L	22236-E1-K	H3136	125	200	160	710	—	465
LOU636-AF-L	LOU636-AL-L	22336-K-MB	H2336	133	330	160	840	360	530
LOU636-BF-L	LOU636-BL-L	22336-K-MB	H2336	133	330	160	840	—	530
LOU538-AF-L	LOU538-AL-L	22238-K-MB	H3138	127	230	170	820	350	485
LOU538-BF-L	LOU538-BL-L	22238-K-MB	H3138	127	230	170	820	—	485
LOU540-AF-L	LOU540-AL-L	22240-B-K-MB	H3140	130	250	180	830	360	510
LOU540-BF-L	LOU540-BL-L	22240-B-K-MB	H3140	130	250	180	830	—	510
LOU544-AF-L	LOU544-AL-L	22244-B-K-MB	H3144X	145	310	200	880	380	565
LOU544-BF-L	LOU544-BL-L	22244-B-K-MB	H3144X	145	310	200	880	—	565
LOU548-AF-L	LOU548-AL-L	22248-B-K-MB	H3148X	155	385	220	980	400	625
LOU548-BF-L	LOU548-BL-L	22248-B-K-MB	H3148X	155	385	220	980	—	625

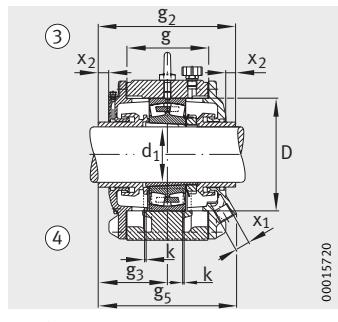
¹⁾ Ordering example:

Housing LOU538-BF-L (see also page 916), bearing 22238-K-MB (see bearing tables),
adapter sleeve H3138 (see dimension tables).

- 2)
 - ① Locating bearing AF
 - ② Non-locating bearing AL
 - ③ Locating bearing BF
 - ④ Non-locating bearing BL



Design A
①, ②²⁾



Design B
③, ④²⁾

0001571F

00015720

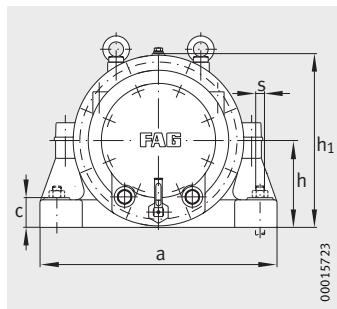
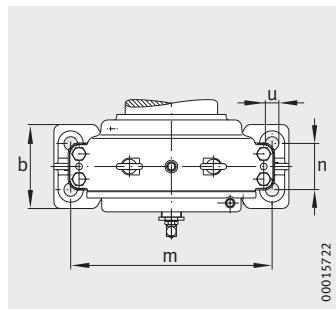
b	c	D	g	g ₂	g ₃	g ₄	g ₅	h	k	m	n	u	v	s	x ₁ Inch size thread	x ₂
200	85	320	240	—	168	18	—	265	10	630	125	42	60	M36	G11/4	15
200	85	320	240	350	168	—	—	265	10	630	125	42	60	M36	G11/4	15
240	90	340	250	—	175	20	395	270	10	670	130	48	70	M42	G11/4	15
240	90	340	250	365	175	—	395	270	10	670	130	48	70	M42	G11/4	15
240	90	360	255	—	175	18	—	280	10	670	130	48	70	M42	G11/4	15
240	90	360	255	365	175	—	—	280	10	670	130	48	70	M42	G11/4	15
200	85	320	210	—	150	20	325	260	10	580	110	42	60	M36	G11/4	15
200	85	320	210	315	150	—	325	260	10	580	110	42	60	M36	G11/4	15
240	90	380	260	—	180	20	—	290	10	680	130	48	70	M42	G11/4	15
240	90	380	260	375	180	—	—	290	10	680	130	48	70	M42	G11/4	15
240	90	340	250	—	175	20	383	270	10	670	130	48	70	M42	G11/4	15
240	90	340	250	365	175	—	383	270	10	670	130	48	70	M42	G11/4	15
240	90	360	260	—	180	20	389	280	10	670	130	48	70	M42	G11/4	15
240	90	360	260	375	180	—	389	280	10	670	130	48	70	M42	G11/4	15
240	105	400	280	—	190	20	405	310	10	720	130	48	70	M42	G11/4	15
240	105	400	280	395	190	—	405	310	10	720	130	48	70	M42	G11/4	15
280	120	440	300	—	200	20	428	340	10	820	165	48	70	M42	G11/4	15
280	120	440	300	415	200	—	428	340	10	820	165	48	70	M42	G11/4	15



Plummer block housings

PM30, split

For spherical roller bearings
with tapered bore
and adapter sleeve,
for direct bearing seat



①, ②, ③, ④⁴⁾

Dimension table · Dimensions in mm

Designation ¹⁾			Mass m Housing ≈kg	Dimensions					
Housing	Bearing	Adapter sleeve		d ₁	d ₂	d ₃	d ₄	d ₅	a
PM3044	23044-	H3044X	105	200	228	212	200	Tr220X4	560
PM3048	23048-	H3048	120	220	248	236	220	Tr240X4	580
PM3052	23052-	H3052X	145	240	269	256	240	Tr260X4	620
PM3056	23056-	H3056	170	260	289	276	260	Tr280X4	660
PM3060	23060-	H3060	200	280	310	300	280	Tr300X4	700
PM3064	23064-	H3064	220	300	330	320	300	Tr320X5	730
PM3068	23068-	H3068	290	320	352	340	320	Tr340X5	800
PM3072	23072-	H3072	300	340	372	360	340	Tr360X5	830
PM3076	23076-	H3076	330	360	392	380	360	Tr380X5	860
PM3080	23080-	H3080	445	380	413	400	380	Tr400X5	920
PM3084	23084-	H3084X	550	400	433	420	400	Tr420X5	950
PM3088	23088-	H3088	645	410	454	430	410	Tr440X5	1 000
PM3092	23092-	H3092	700	430	474	450	430	Tr460X5	1 050
PM3096	23096-	H3096	820	450	494	470	450	Tr480X5	1 080
PM30/500	230/500-	H30/500	900	470	514	490	470	Tr500X5	1 100
PM30/530	230/530-	H30/530	1 100	500	546	524	500	Tr530X6	1 200
PM30/560	230/560-	H30/560	1 250	530	577	554	530	Tr560X6	1 300
PM30/600	230/600-	H30/600	1 400	560	617	584	560	Tr600X6	1 400
PM30/630	230/630-	H30/630	1 780	600	648	624	600	Tr630X6	1 440
PM30/670	230/670-	H30/670	1 900	630	690	654	630	Tr670X6	1 470
PM30/710	230/710-	H30/710	2 000	670	730	694	670	Tr710X6	1 500

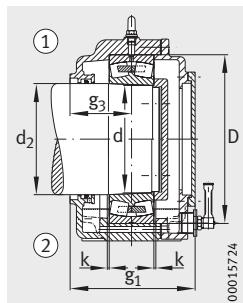
1) Ordering example:

Housing PM30/500-H-AL-L (see also page 917), bearing 230/500-B-K-MB (see bearing tables),
adapter sleeve H30/500-HG (see dimension tables).

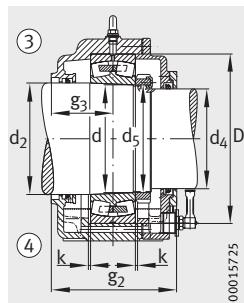
2) With adapter sleeve.

3) Direct bearing seat.

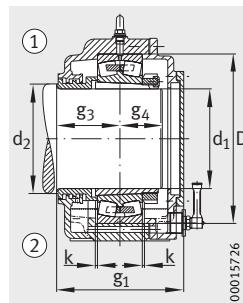
- 4) ① Locating bearing AF
② Non-locating bearing AL
③ Locating bearing BF
④ Non-locating bearing BL



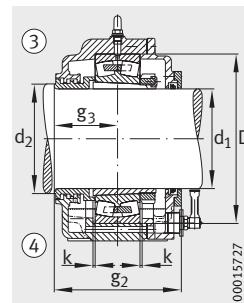
Design A
for direct bearing seat



Design B
for direct bearing seat



Design A
with adapter sleeve



Design B
with adapter sleeve

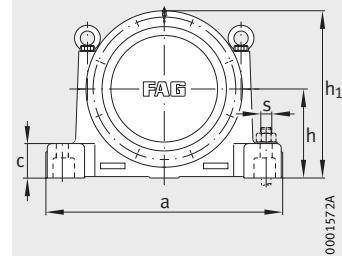
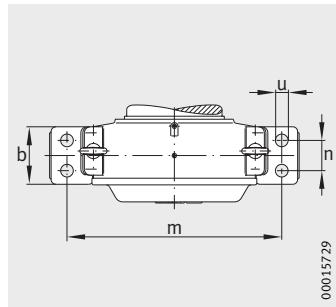
$g_1^{2)}$	$g_1^{3)}$	h_1	b	c	D	$g_2^{2)}$	$g_2^{3)}$	$g_3^{2)}$	$g_3^{3)}$	g_4	h	k	m	n	u	s
255	253	410	200	70	340	255	253	127	125	118	205	6	480	110	28	M24
280	270	427,5	200	70	360	280	270	140	130	130	215	6	490	110	35	M30
300	298	475	240	80	400	300	298	150	148	140	240	6	530	150	35	M30
310	300	500	240	85	420	310	300	155	145	145	250	6	570	150	42	M36
345	335	540	260	90	460	345	335	170	160	165	270	8	600	160	42	M36
355	345	560	270	90	480	355	345	175	165	170	280	8	630	165	42	M36
390	380	608	300	95	520	390	380	190	180	190	305	10	690	190	42	M36
395	385	628	310	95	540	395	385	195	185	190	315	10	720	200	42	M36
400	390	643	320	95	560	400	390	200	190	190	325	10	750	210	42	M36
422	412	695	340	100	600	422	412	210	200	202	350	10	790	220	49	M42
430	420	720	350	100	620	430	420	215	205	205	360	10	820	230	49	M42
455	445	760	370	100	650	455	445	225	215	220	380	10	860	240	49	M42
465	455	785	390	110	680	465	455	230	220	225	395	11	900	250	56	M48
475	465	805	400	110	700	475	465	235	225	230	405	11	930	260	56	M48
485	475	825	410	110	720	485	475	240	230	235	415	11	950	270	56	M48
530	520	895	450	120	780	530	520	260	250	260	450	12	1 040	290	56	M48
585	565	960	440	140	820	585	565	270	250	305	485	12	1 080	280	56	M48
610	585	1 020	460	140	870	610	585	290	265	310	515	12	1 200	300	56	M48
615	590	1 075	480	160	920	615	590	290	265	315	540	14	1 260	320	56	M48
675	660	1 135	500	170	980	675	660	320	305	345	570	14	1 280	320	56	M48
720	700	1 190	520	180	1 030	720	700	340	320	370	600	14	1 300	320	56	M48



Plummer block housings

RA, split

For spherical roller bearings
with cylindrical bore,
with tapered bore
and withdrawal sleeve



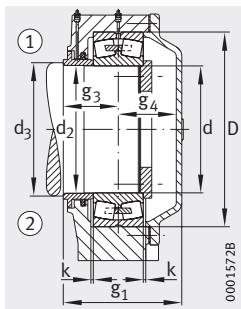
①, ②, ③, ④²⁾

Dimension table · Dimensions in mm

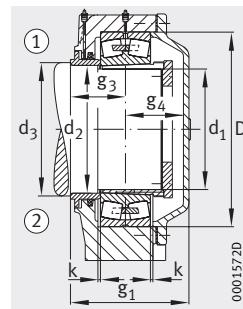
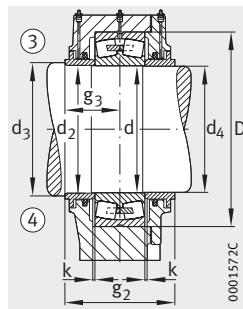
Designation ¹⁾			Mass m Housing ≈kg	Dimensions						
Housing	Bearing	Withdrawal sleeve		d	d ₁	d ₂	d ₃ min.	d ₄	a	
RA3044	23044-	AH3044	110	220	200	222	228	218	600	
RA3948	23948-	AH3948	85	240	220	242	250	238	580	
RA3048	23048-	AH3048	130	240	220	242	250	238	670	
RA3952	23952-	AH3952	100	260	240	262	270	258	670	
RA3052	23052-	AH3052	160	260	240	262	270	258	710	
RA3956	23956-	AH3956	110	280	260	282	292	278	670	
RA3056	23056-	AH3056	180	280	260	282	292	278	730	
RA3960	23960-	AH3960	145	300	280	302	312	298	730	
RA3060	23060-	AH3060	270	300	280	302	312	298	825	
RA3964	23964-	AH3964	150	320	300	322	334	318	730	
RA3064	23064-	AH3064	320	320	300	322	334	318	855	
RA3968	23968-	AH3968	230	340	320	342	354	338	825	
RA3068	23068-	AH3068	350	340	320	342	354	338	900	
RA3972	23972-	AH3972	260	360	340	362	374	358	855	
RA3072	23072-	AH3072	380	360	340	362	374	358	970	
RA3976	23976-	AH3976	310	380	360	382	394	378	900	
RA3076	23076-	AH3076	410	380	360	382	396	378	1000	
RA3980	23980-	AH3980	350	400	380	402	416	398	970	
RA3080	23080-	AH3080	470	400	380	402	416	398	1060	
RA3984	23984-	AH3984	400	420	400	422	436	418	1000	
RA3084	23084-	AH3084	520	420	400	422	436	418	1130	
RA3988	23988-	AH3988	410	440	420	442	456	438	1060	
RA3088	23088-	AHX3088	620	440	420	442	456	438	1160	
RA3992	23992-	AH3992	520	460	440	462	476	458	1130	
RA3092	23092-	AHX3092	650	460	440	462	476	458	1250	
RA3996	23996-	AH3996	610	480	460	482	496	478	1160	
RA3096	23096-	AHX3096	670	480	460	482	496	478	1260	
RA39/500	239/500-	AH39/500	610	500	480	502	516	498	1160	
RA30/500	230/500-	AHX30/500	700	500	480	502	516	498	1280	

¹⁾ Ordering example:
Housing RA3072-Z-AF-L (see also page 919), bearing 23072-MB (see bearing tables).

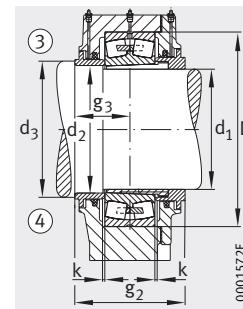
²⁾ ① Locating bearing AF
② Non-locating bearing AL
③ Locating bearing BF
④ Non-locating bearing BL



Design A
For bearings with cylindrical bore



Design A
For bearings with tapered bore and
withdrawal sleeve



Design B

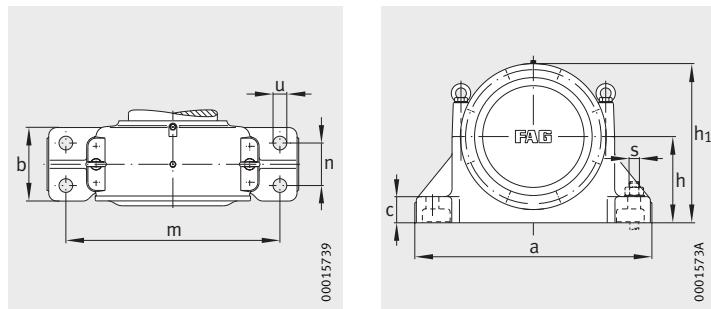
g_1	h_1	b	D	c	g_2	g_3	g_4 min.	h	k	m	n	u	s
225	430	150	340	90	204	102	111	230	4	520	80	28	M24
190	395	140	320	95	170	85	93	210	4	490	70	28	M24
240	450	160	360	95	220	110	118	240	4	560	80	35	M30
220	450	160	360	95	200	100	108	240	5	560	80	35	M30
255	510	160	400	108	226	113	130	270	5	620	80	35	M30
225	465	160	380	95	200	100	113	240	5	560	240	35	M30
260	525	165	420	115	232	116	132	280	5	635	80	35	M30
240	525	165	420	115	216	108	120	280	5	635	80	35	M30
280	580	190	460	120	260	130	136	310	5	710	100	42	M36
240	535	165	440	115	216	108	120	280	5	635	80	35	M30
285	600	200	480	130	270	135	138	320	5	735	105	42	M36
240	575	190	460	120	220	110	118	310	5	710	100	42	M36
310	650	210	520	140	280	140	158	350	5	780	110	42	M36
240	595	200	480	130	220	110	118	320	5	735	105	42	M36
318	672	220	540	145	290	145	161	360	5	840	110	48	M42
275	650	210	520	140	250	125	138	350	6	780	110	42	M36
330	695	230	560	150	300	150	168	370	6	870	110	48	M42
275	370	220	540	145	250	125	138	360	6	840	110	48	M42
335	750	240	600	160	300	150	173	400	6	920	120	56	M48
275	690	230	560	150	250	125	138	370	6	870	110	48	M42
360	770	240	620	165	300	150	195	410	6	960	120	56	M48
315	745	240	600	160	270	135	168	400	7	920	120	56	M48
375	810	260	650	170	324	162	198	430	7	1000	120	56	M48
315	765	240	620	162	270	135	165	410	7	960	120	56	M48
400	850	280	680	180	348	174	211	450	7	1070	130	66	M56
335	815	260	650	170	300	150	170	430	7	1000	130	56	M48
405	870	290	700	185	358	179	211	460	7	1080	140	66	M56
335	815	260	670	170	300	150	170	430	7	1000	130	56	M48
420	880	290	720	190	358	179	226	460	7	1100	140	66	M56



Plummer block housings

RLE, split

For spherical roller bearings
with cylindrical bore,
with tapered bore
and withdrawal sleeve



(1), (2), (3), (4)²⁾

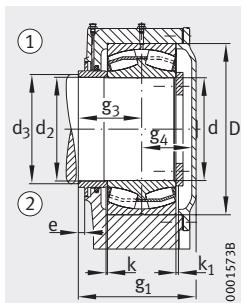
Dimension table · Dimensions in mm

Designation ¹⁾			Mass m Housing ≈kg	Dimensions						
Housing	Bearing	Withdrawal sleeve		d	d ₁	d ₂	d ₃ min.	d ₄	a	g ₁
RLE4138	24138-	AH24138	115	190	180	192	198	175	600	230
RLE4140	24140-	AH24140	145	200	190	202	212	185	690	250
RLE4144	24144-	AH24144	175	220	200	222	232	195	720	265
RLE4148	24148-	AH24148	220	240	220	242	252	215	770	275
RLE4152	24152-	AH24152	295	260	240	262	272	235	860	305
RLE4156	24156-	AH24156	320	280	260	282	292	255	880	305
RLE4160	24160-	AH24160	415	300	280	302	315	275	940	335
RLE4164	24164-	AH24164	550	320	300	322	335	295	1 060	365
RLE4168	24168-	AH24168	685	340	320	342	355	315	1 110	400
RLE4172	24172-	AH24172	765	360	340	362	375	335	1 190	400
RLE4176	24176-	AH24176	775	380	360	382	395	355	1 190	400
RLE4180	24180-	AH24180	870	400	380	402	415	375	1 230	410
RLE4184	24184-	AH24184	1 100	420	400	422	435	395	1 300	450
RLE4188	24188-	AH24188	1 150	440	420	442	455	415	1 370	450
RLE4192	24192-	AH24192	1 400	460	440	462	475	435	1 500	485
RLE4196	24196-	AH24196	1 550	480	460	482	495	455	1 530	500
RLE41/500	241/500-	AH241/500	1 600	500	480	502	515	475	1 580	515

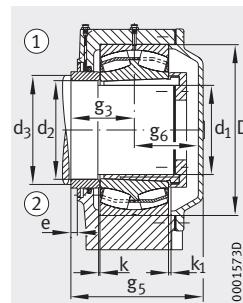
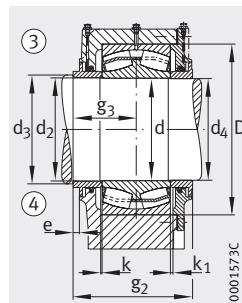
¹⁾ Ordering example:

Housing RLE4180-AH-BL-L (see also page 922), bearing 24180-B-K30 (see bearing tables),
withdrawal sleeve AH24180-H (see dimension tables).

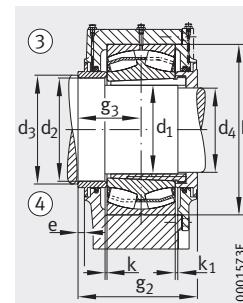
- ²⁾
 ① Locating bearing AF
 ② Non-locating bearing AL
 ③ Locating bearing BF
 ④ Non-locating bearing BL



Design A
For bearings with cylindrical bore



Design A
For bearings with tapered bore and
withdrawal sleeve



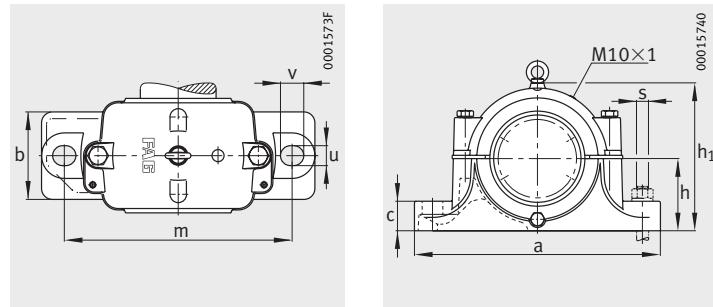
h₁	b	c	D	e	g₂	g₃	g₄ min.	g₅	g₆ min.	h	k	k₁	m	n	u	s
412	180	70	320	15	240	127	95	272	137	225	1	4	510	100	36	M30
442	195	75	340	15	260	137	105	287	142	240	1	4	580	105	42	M36
477	210	80	370	15	270	142	113	307	155	260	1	4	610	120	42	M36
517	225	85	400	15	280	148	117	323	165	280	1	5	655	130	42	M36
567	250	95	440	15	315	165	130	350	175	310	1	5	730	140	49	M42
587	250	100	460	15	315	165	130	350	175	320	2	5	750	145	49	M42
642	280	110	500	15	335	176	147	386	198	350	2	5	800	165	49	M42
697	305	120	540	20	370	196	157	421	213	380	2	5	900	170	56	M48
752	340	130	580	20	405	210	178	480	258	410	2	5	940	195	56	M48
792	340	135	600	20	405	210	178	480	258	430	2	5	1010	195	56	M48
792	340	140	620	20	405	210	175	490	265	430	2	5	1010	195	68	M56
827	350	145	650	20	415	215	180	500	270	450	2	5	1040	200	68	M56
897	390	155	700	20	455	232	203	555	308	490	2	5	1110	225	68	M56
917	390	155	720	20	455	232	203	555	308	500	2	5	1165	225	68	M56
972	420	160	760	25	495	252	218	595	328	530	2	6	1270	240	76	M64
1 012	430	165	790	25	500	256	228	610	338	550	2	6	1300	245	76	M64
1 032	450	180	830	25	520	265	235	630	350	550	2	6	1300	260	76	M64



Plummer block housings

S30, split

For spherical roller bearings
with tapered bore
and adapter sleeve



Cross-sections of split bearings
see page 973

①, ②, ③, ④³⁾

Dimension table · Dimensions in mm

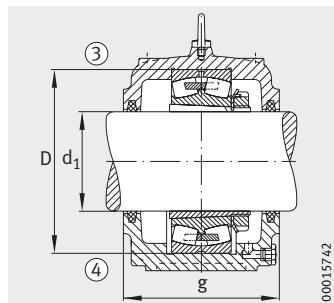
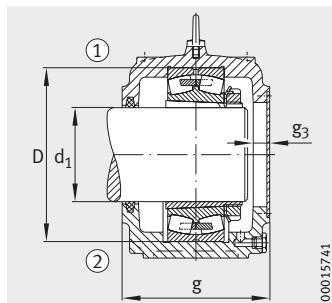
Designation ¹⁾				Felt strips		Mass m Housing ≈kg
Housing	Bearing	Adapter sleeve	Split bearing	aXbXl mm	Quantity	
S3044-H-N-FZ-AF-L	23044-K-MB	H3044X	230SM200-MB	16X12X350	2	98
S3044-H-N-FZ-AL-L	23044-K-MB	H3044X	230SM200-MB	16X12X350	2	98
S3044-H-N-FZ-BF-L	23044-K-MB	H3044X	230SM200-MB	16X12X350	4	98
S3044-H-N-FZ-BL-L	23044-K-MB	H3044X	230SM200-MB	16X12X350	4	98
S3048-H-N-FZ-AF-L	23048-K-MB	H3048	230SM220-MB	16X12X380	2	110
S3048-H-N-FZ-AL-L	23048-K-MB	H3048	230SM220-MB	16X12X380	2	110
S3048-H-N-FZ-BF-L	23048-K-MB	H3048	230SM220-MB	16X12X380	4	110
S3048-H-N-FZ-BL-L	23048-K-MB	H3048	230SM220-MB	16X12X380	4	110
S3052-H-N-FZ-AF-L	23052-K-MB	H3052X	230SM240-MB	16X12X410	2	148
S3052-H-N-FZ-AL-L	23052-K-MB	H3052X	230SM240-MB	16X12X410	2	148
S3052-H-N-FZ-BF-L	23052-K-MB	H3052X	230SM240-MB	16X12X410	4	148
S3052-H-N-FZ-BL-L	23052-K-MB	H3052X	230SM240-MB	16X12X410	4	148
S3056-H-N-FZ-AF-L	23056-B-K-MB	H3056	230SM260-MB	16X12X445	2	165
S3056-H-N-FZ-AL-L	23056-B-K-MB	H3056	230SM260-MB	16X12X445	2	165
S3056-H-N-FZ-BF-L	23056-B-K-MB	H3056	230SM260-MB	16X12X445	4	165
S3056-H-N-FZ-BL-L	23056-B-K-MB	H3056	230SM260-MB	16X12X445	4	165
S3060-H-N-FZ-AF-L	23060-K-MB	H3060	230SM280-MB	16X12X470	2	205
S3060-H-N-FZ-AL-L	23060-K-MB	H3060	230SM280-MB	16X12X470	2	205
S3060-H-N-FZ-BF-L	23060-K-MB	H3060	230SM280-MB	16X12X470	4	205
S3060-H-N-FZ-BL-L	23060-K-MB	H3060	230SM280-MB	16X12X470	4	205
S3064-H-N-FZ-AF-L	23064-K-MB	H3064-HG	230SM300-MB	16X12X505	2	235
S3064-H-N-FZ-AL-L	23064-K-MB	H3064-HG	230SM300-MB	16X12X505	2	235
S3064-H-N-FZ-BF-L	23064-K-MB	H3064-HG	230SM300-MB	16X12X505	4	235
S3064-H-N-FZ-BL-L	23064-K-MB	H3064-HG	230SM300-MB	16X12X505	4	235
S3068-H-N-FZ-AF-L	23068-K-MB	H3068-HG	230SM320-MB	16X12X535	2	280
S3068-H-N-FZ-AL-L	23068-K-MB	H3068-HG	230SM320-MB	16X12X535	2	280
S3068-H-N-FZ-BF-L	23068-K-MB	H3068-HG	230SM320-MB	16X12X535	4	280
S3068-H-N-FZ-BL-L	23068-K-MB	H3068-HG	230SM320-MB	16X12X535	4	280

¹⁾ Ordering example:

Housing S3056-H-N-FZ-AL-L (see also page 923), bearing 23056-B-K-MB (see bearing tables),
adapter sleeve H3056 (see dimension tables).

²⁾ Four holes in base from S3060-H-N-FZ.

- ³⁾ ① Locating bearing AF
- ② Non-locating bearing AL
- ③ Locating bearing BF
- ④ Non-locating bearing BL



Design A
For bearings with tapered bore and adapter sleeve

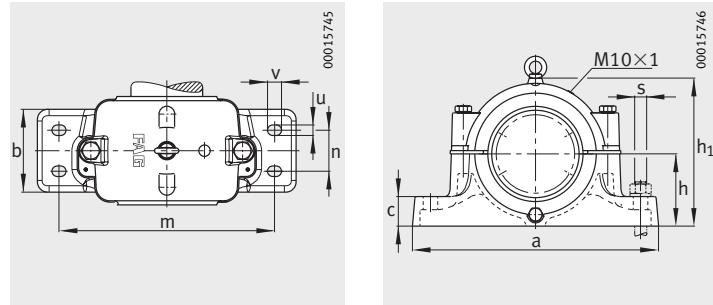
Dimensions

d ₁	a	g	h ₁	b	c	D	g ₃	h	m	n ²⁾	u	v	s	
													mm	inch
200	690	255	408	190	70	340	25	200	580	-	42	50	M36	1 ³ / ₈
200	690	255	408	190	70	340	25	200	580	-	42	50	M36	1 ³ / ₈
200	690	255	408	190	70	340	-	200	580	-	42	50	M36	1 ³ / ₈
200	690	255	408	190	70	340	-	200	580	-	42	50	M36	1 ³ / ₈
220	720	265	433	200	75	360	30	210	610	-	42	50	M36	1 ³ / ₈
220	720	265	433	200	75	360	30	210	610	-	42	50	M36	1 ³ / ₈
220	720	265	433	200	75	360	-	210	610	-	42	50	M36	1 ³ / ₈
220	720	265	433	200	75	360	-	210	610	-	42	50	M36	1 ³ / ₈
240	820	285	485	220	80	400	30	240	680	-	52	70	M45	1 ³ / ₄
240	820	285	485	220	80	400	30	240	680	-	52	70	M45	1 ³ / ₄
240	820	285	485	220	80	400	-	240	680	-	52	70	M45	1 ³ / ₄
240	820	285	485	220	80	400	-	240	680	-	52	70	M45	1 ³ / ₄
260	860	295	505	230	80	420	30	250	720	-	52	70	M45	1 ³ / ₄
260	860	295	505	230	80	420	30	250	720	-	52	70	M45	1 ³ / ₄
260	860	295	505	230	80	420	-	250	720	-	52	70	M45	1 ³ / ₄
260	860	295	505	230	80	420	-	250	720	-	52	70	M45	1 ³ / ₄
280	920	320	565	260	90	460	30	280	780	130	42	50	M36	1 ³ / ₈
280	920	320	565	260	90	460	30	280	780	130	42	50	M36	1 ³ / ₈
280	920	320	565	260	90	460	-	280	780	130	42	50	M36	1 ³ / ₈
280	920	320	565	260	90	460	-	280	780	130	42	50	M36	1 ³ / ₈
300	940	320	570	260	90	480	30	280	800	130	42	50	M36	1 ³ / ₈
300	940	320	570	260	90	480	30	280	800	130	42	50	M36	1 ³ / ₈
300	940	320	570	260	90	480	-	280	800	130	42	50	M36	1 ³ / ₈
300	940	320	570	260	90	480	-	280	800	130	42	50	M36	1 ³ / ₈
320	1000	340	615	280	95	520	30	300	860	140	42	50	M36	1 ³ / ₈
320	1000	340	615	280	95	520	30	300	860	140	42	50	M36	1 ³ / ₈
320	1000	340	615	280	95	520	-	300	860	140	42	50	M36	1 ³ / ₈
320	1000	340	615	280	95	520	-	300	860	140	42	50	M36	1 ³ / ₈



Plummer block housings

S30, split
For spherical roller bearings
with tapered bore
and adapter sleeve



Cross-sections of
unsplit bearings
see page 971

①, ②, ③, ④³⁾

Dimension table (continued) · Dimensions in mm

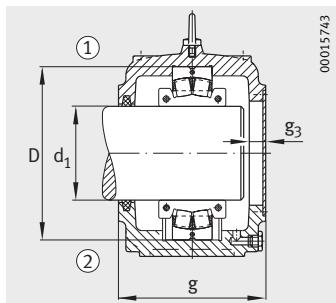
Designation ¹⁾				Felt strips		Mass m Housing ≈kg
Housing	Bearing	Adapter sleeve	Split bearing	aXbXl mm	Quantity	
S3072-H-N-FZ-AF-L	23072-K-MB	H3072-HG	230SM340-MB	16X12X565	2	340
S3072-H-N-FZ-AL-L	23072-K-MB	H3072-HG	230SM340-MB	16X12X565	2	340
S3072-H-N-FZ-BF-L	23072-K-MB	H3072-HG	230SM340-MB	16X12X565	4	340
S3072-H-N-FZ-BL-L	23072-K-MB	H3072-HG	230SM340-MB	16X12X565	4	340
S3076-H-N-FZ-AF-L	23076-B-K-MB	H3076-HG	230SM360-MB	16X12X600	2	400
S3076-H-N-FZ-AL-L	23076-B-K-MB	H3076-HG	230SM360-MB	16X12X600	2	400
S3076-H-N-FZ-BF-L	23076-B-K-MB	H3076-HG	230SM360-MB	16X12X600	4	400
S3076-H-N-FZ-BL-L	23076-B-K-MB	H3076-HG	230SM360-MB	16X12X600	4	400
S3080-H-N-FZ-AF-L	23080-K-MB	H3080-HG	230SM380-MB	16X12X630	2	460
S3080-H-N-FZ-AL-L	23080-K-MB	H3080-HG	230SM380-MB	16X12X630	2	460
S3080-H-N-FZ-BF-L	23080-K-MB	H3080-HG	230SM380-MB	16X12X630	4	460
S3080-H-N-FZ-BL-L	23080-K-MB	H3080-HG	230SM380-MB	16X12X630	4	460
S3084-H-N-FZ-AF-L	23084-B-K-MB	H3084X-HG	230SM400-MB	16X12X660	2	500
S3084-H-N-FZ-AL-L	23084-B-K-MB	H3084X-HG	230SM400-MB	16X12X660	2	500
S3084-H-N-FZ-BF-L	23084-B-K-MB	H3084X-HG	230SM400-MB	16X12X660	4	500
S3084-H-N-FZ-BL-L	23084-B-K-MB	H3084X-HG	230SM400-MB	16X12X660	4	500
S3088-H-N-FZ-AF-L	23088-K-MB	H3088-HG	230SM410-MB	16X12X675	2	600
S3088-H-N-FZ-AL-L	23088-K-MB	H3088-HG	230SM410-MB	16X12X675	2	600
S3088-H-N-FZ-BF-L	23088-K-MB	H3088-HG	230SM410-MB	16X12X675	4	600
S3088-H-N-FZ-BL-L	23088-K-MB	H3088-HG	230SM410-MB	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	230SM450-MB ²⁾	16X12X740	2	800
S3096-H-N-FZ-AL-L	23096-K-MB	H3096-HG	230SM450-MB ²⁾	16X12X740	2	800
S3096-H-N-FZ-BF-L	23096-K-MB	H3096-HG	230SM450-MB ²⁾	16X12X740	4	800
S3096-H-N-FZ-BL-L	23096-K-MB	H3096-HG	230SM450-MB ²⁾	16X12X740	4	800

¹⁾ Ordering example:

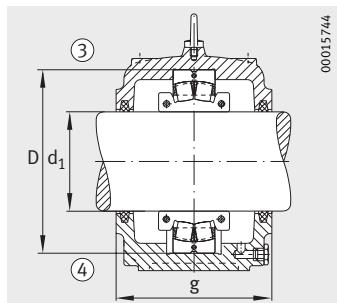
Housing S3080-H-N-FZ-AL-L (see also page 923), bearing 23080-K-MB (see bearing tables), adapter sleeve H3080-HG (see dimension tables).

²⁾ With separate locking rings.

- ³⁾ ① Locating bearing AF
- ② Non-locating bearing AL
- ③ Locating bearing BF
- ④ Non-locating bearing BL



Design A
For split bearings



Design B
For split bearings

Dimensions

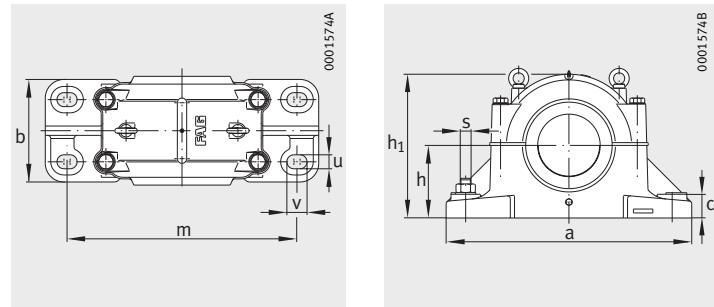
d ₁	a	g	h ₁	b	c	D	g ₃	h	m	n	u	v	s	
													mm	inch
340	1060	345	655	280	95	540	30	320	900	140	42	50	M36	1 ³ / ₈
340	1060	345	655	280	95	540	30	320	900	140	42	50	M36	1 ³ / ₈
340	1060	345	655	280	95	540	—	320	900	140	42	50	M36	1 ³ / ₈
340	1060	345	655	280	95	540	—	320	900	140	42	50	M36	1 ³ / ₈
360	1060	380	675	280	100	560	30	330	900	140	42	50	M36	1 ³ / ₈
360	1060	380	675	280	100	560	30	330	900	140	42	50	M36	1 ³ / ₈
360	1060	380	675	280	100	560	—	330	900	140	42	50	M36	1 ³ / ₈
360	1060	380	675	280	100	560	—	330	900	140	42	50	M36	1 ³ / ₈
380	1100	400	715	325	120	600	30	350	950	160	42	50	M36	1 ³ / ₈
380	1100	400	715	325	120	600	30	350	950	160	42	50	M36	1 ³ / ₈
380	1100	400	715	325	120	600	—	350	950	160	42	50	M36	1 ³ / ₈
380	1100	400	715	325	120	600	—	350	950	160	42	50	M36	1 ³ / ₈
400	1160	430	750	340	120	620	30	375	980	170	42	50	M36	1 ³ / ₈
400	1160	430	750	340	120	620	30	375	980	170	42	50	M36	1 ³ / ₈
400	1160	430	750	340	120	620	—	375	980	170	42	50	M36	1 ³ / ₈
400	1160	430	750	340	120	620	—	375	980	170	42	50	M36	1 ³ / ₈
410	1200	430	780	340	125	650	30	390	1020	170	42	50	M36	1 ³ / ₈
410	1200	430	780	340	125	650	30	390	1020	170	42	50	M36	1 ³ / ₈
410	1200	430	780	340	125	650	—	390	1020	170	42	50	M36	1 ³ / ₈
410	1200	430	780	340	125	650	—	390	1020	170	42	50	M36	1 ³ / ₈
430	1260	440	805	360	130	680	30	400	1080	180	56	75	M48	1 ⁷ / ₈
430	1260	440	805	360	130	680	30	400	1080	180	56	75	M48	1 ⁷ / ₈
430	1260	440	805	360	130	680	—	400	1080	180	56	75	M48	1 ⁷ / ₈
430	1260	440	805	360	130	680	—	400	1080	180	56	75	M48	1 ⁷ / ₈
450	1380	440	825	380	190	700	30	410	1180	190	56	75	M48	1 ⁷ / ₈
450	1380	440	825	380	190	700	30	410	1180	190	56	75	M48	1 ⁷ / ₈
450	1380	440	825	380	190	700	—	410	1180	190	56	75	M48	1 ⁷ / ₈
450	1380	440	825	380	190	700	—	410	1180	190	56	75	M48	1 ⁷ / ₈



Plummer block housings

SD5, split

For spherical roller bearings
with tapered bore
and adapter sleeve



Cross-sections of split bearings
see page 977

①, ②, ③, ④²⁾

Dimension table · Dimensions in mm

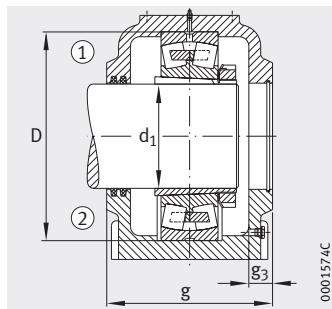
Designation¹⁾

Housing	Bearing	Adapter sleeve	Split bearing	Felt strips		Mass m Housing ≈kg
				mm	Quantity	
SD536-N-FZ-AF-L	22236-E1-K	H3136	—	16X12X290	4	118
SD536-N-FZ-AL-L	22236-E1-K	H3136	—	16X12X290	4	118
SD536-N-FZ-BF-L	22236-E1-K	H3136	—	16X12X290	8	118
SD536-N-FZ-BL-L	22236-E1-K	H3136	—	16X12X290	8	118
SD538-N-FZ-AF-L	22238-K-MB	H3138	—	16X12X305	4	136
SD538-N-FZ-AL-L	22238-K-MB	H3138	—	16X12X305	4	136
SD538-N-FZ-BF-L	22238-K-MB	H3138	—	16X12X305	8	136
SD538-N-FZ-BL-L	22238-K-MB	H3138	—	16X12X305	8	136
SD540-N-FZ-AF-L	22240-B-K-MB	H3140	222SM180-MA	16X12X320	4	170
SD540-N-FZ-AL-L	22240-B-K-MB	H3140	222SM180-MA	16X12X320	4	170
SD540-N-FZ-BF-L	22240-B-K-MB	H3140	222SM180-MA	16X12X320	8	170
SD540-N-FZ-BL-L	22240-B-K-MB	H3140	222SM180-MA	16X12X320	8	170
SD544-N-FZ-AF-L	22244-B-K-MB	H3144X	222SM200-MA	16X12X350	4	216
SD544-N-FZ-AL-L	22244-B-K-MB	H3144X	222SM200-MA	16X12X350	4	216
SD544-N-FZ-BF-L	22244-B-K-MB	H3144X	222SM200-MA	16X12X350	8	216
SD544-N-FZ-BL-L	22244-B-K-MB	H3144X	222SM200-MA	16X12X350	8	216
SD548-N-FZ-AF-L	22248-B-K-MB	H3148X	222SM220-MA	16X12X385	4	258
SD548-N-FZ-AL-L	22248-B-K-MB	H3148X	222SM220-MA	16X12X385	4	258
SD548-N-FZ-BF-L	22248-B-K-MB	H3148X	222SM220-MA	16X12X385	8	258
SD548-N-FZ-BL-L	22248-B-K-MB	H3148X	222SM220-MA	16X12X385	8	258

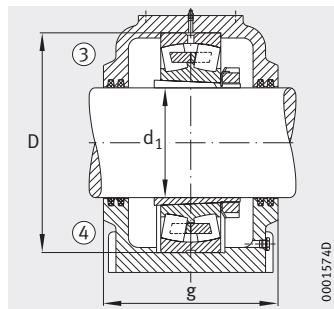
¹⁾ Ordering example:

Housing SD540-N-FZ-BF-L (see also page 925), bearing 22240-B-K-MB (see bearing tables),
adapter sleeve H3140 (see dimension tables).

- ²⁾ ① Locating bearing AF
② Non-locating bearing AL
③ Locating bearing BF
④ Non-locating bearing BL



Design A
For bearings with tapered bore and adapter sleeve



Dimensions

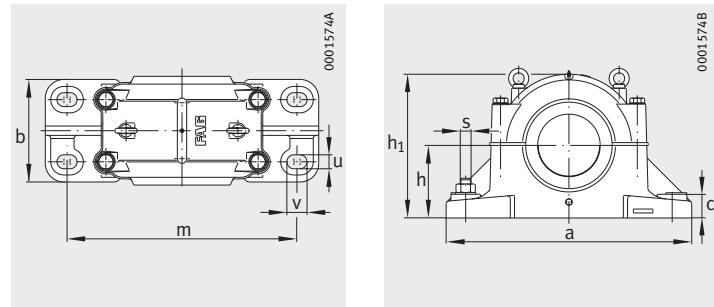
d ₁	a	g	h ₁	b	c	D	g ₃	h	m	n	u	v	s	
													mm	inch
160	650	280	380	260	60	320	50	190	540	150	36	50	M30	1 ¹ / ₈
160	650	280	380	260	60	320	50	190	540	150	36	50	M30	1 ¹ / ₈
160	650	280	380	260	60	320	—	190	540	150	36	50	M30	1 ¹ / ₈
160	650	280	380	260	60	320	—	190	540	150	36	50	M30	1 ¹ / ₈
170	700	290	400	280	65	340	50	200	570	160	40	55	M33	1 ¹ / ₄
170	700	290	400	280	65	340	50	200	570	160	40	55	M33	1 ¹ / ₄
170	700	290	400	280	65	340	—	200	570	160	40	55	M33	1 ¹ / ₄
170	700	290	400	280	65	340	—	200	570	160	40	55	M33	1 ¹ / ₄
180	740	300	420	290	65	360	50	210	610	170	40	55	M33	1 ¹ / ₄
180	740	300	420	290	65	360	50	210	610	170	40	55	M33	1 ¹ / ₄
180	740	300	420	290	65	360	—	210	610	170	40	55	M33	1 ¹ / ₄
180	740	300	420	290	65	360	—	210	610	170	40	55	M33	1 ¹ / ₄
200	820	330	475	320	70	400	50	240	680	190	42	62	M36	1 ³ / ₈
200	820	330	475	320	70	400	50	240	680	190	42	62	M36	1 ³ / ₈
200	820	330	475	320	70	400	—	240	680	190	42	62	M36	1 ³ / ₈
200	820	330	475	320	70	400	—	240	680	190	42	62	M36	1 ³ / ₈
220	880	340	515	330	85	440	50	260	740	200	45	65	M39	1 ¹ / ₂
220	880	340	515	330	85	440	50	260	740	200	45	65	M39	1 ¹ / ₂
220	880	340	515	330	85	440	—	260	740	200	45	65	M39	1 ¹ / ₂
220	880	340	515	330	85	440	—	260	740	200	45	65	M39	1 ¹ / ₂



Plummer block housings

SD5, split

For spherical roller bearings
with tapered bore
and adapter sleeve



Cross-sections of
unsplittable bearings
see page 975

①, ②, ③, ④²⁾

Dimension table (continued) · Dimensions in mm

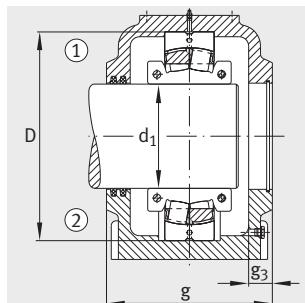
Designation¹⁾

Housing	Bearing	Adapter sleeve	Split bearing	Felt strips		Mass m Housing ≈kg
				mm	Quantity	
SD552-N-FZ-AF-L	22252-B-K-MB	H3152X	222SM240-MA	16X12X415	4	323
SD552-N-FZ-AL-L	22252-B-K-MB	H3152X	222SM240-MA	16X12X415	4	323
SD552-N-FZ-BF-L	22252-B-K-MB	H3152X	222SM240-MA	16X12X415	8	323
SD552-N-FZ-BL-L	22252-B-K-MB	H3152X	222SM240-MA	16X12X415	8	323
SD556-N-FZ-AF-L	22256-B-K-MB	H3156X	222SM260-MA	16X12X445	4	404
SD556-N-FZ-AL-L	22256-B-K-MB	H3156X	222SM260-MA	16X12X445	4	404
SD556-N-FZ-BF-L	22256-B-K-MB	H3156X	222SM260-MA	16X12X445	8	404
SD556-N-FZ-BL-L	22256-B-K-MB	H3156X	222SM260-MA	16X12X445	8	404
SD560-N-FZ-AF-L	22260-K-MB	H3160	222SM280-MA	16X12X480	4	480
SD560-N-FZ-AL-L	22260-K-MB	H3160	222SM280-MA	16X12X480	4	480
SD560-N-FZ-BF-L	22260-K-MB	H3160	222SM280-MA	16X12X480	8	480
SD560-N-FZ-BL-L	22260-K-MB	H3160	222SM280-MA	16X12X480	8	480
SD564-N-FZ-AF-L	22264-K-MB	H3164	222SM300-MA	16X12X510	4	605
SD564-N-FZ-AL-L	22264-K-MB	H3164	222SM300-MA	16X12X510	4	605
SD564-N-FZ-BF-L	22264-K-MB	H3164	222SM300-MA	16X12X510	8	605
SD564-N-FZ-BL-L	22264-K-MB	H3164	222SM300-MA	16X12X510	8	605

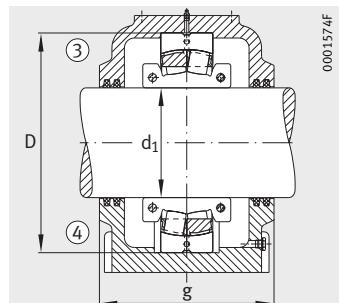
1) Ordering example:

Housing SD556-N-FZ-BF-L (see also page 925), bearing 22256-B-K-MB (see bearing tables),
adapter sleeve H3156X (see dimension tables).

- 2) ① Locating bearing AF
② Non-locating bearing AL
③ Locating bearing BF
④ Non-locating bearing BL



Design A
For split bearings



Design B
For split bearings

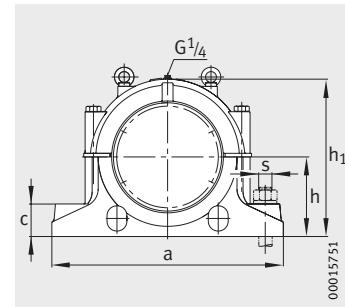
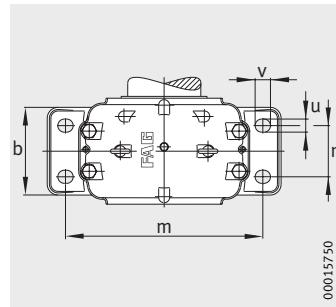
Dimensions

d ₁	a	g	h ₁	b	c	D	g ₃	h	m	n	u	v	s	
													mm	inch
240	940	370	555	360	85	480	50	280	790	210	45	65	M39	1 ¹ / ₂
240	940	370	555	360	85	480	50	280	790	210	45	65	M39	1 ¹ / ₂
240	940	370	555	360	85	480	—	280	790	210	45	65	M39	1 ¹ / ₂
240	940	370	555	360	85	480	—	280	790	210	45	65	M39	1 ¹ / ₂
260	990	390	590	380	100	500	50	300	830	230	52	77	M45	1 ³ / ₄
260	990	390	590	380	100	500	50	300	830	230	52	77	M45	1 ³ / ₄
260	990	390	590	380	100	500	—	300	830	230	52	77	M45	1 ³ / ₄
260	990	390	590	380	100	500	—	300	830	230	52	77	M45	1 ³ / ₄
280	1 060	410	640	400	100	540	50	325	890	250	52	77	M45	1 ³ / ₄
280	1 060	410	640	400	100	540	50	325	890	250	52	77	M45	1 ³ / ₄
280	1 060	410	640	400	100	540	—	325	890	250	52	77	M45	1 ³ / ₄
280	1 060	410	640	400	100	540	—	325	890	250	52	77	M45	1 ³ / ₄
300	1 110	440	690	430	110	580	50	355	930	270	56	85	M48	2
300	1 110	440	690	430	110	580	50	355	930	270	56	85	M48	2
300	1 110	440	690	430	110	580	—	355	930	270	56	85	M48	2
300	1 110	440	690	430	110	580	—	355	930	270	56	85	M48	2



Plummer block housings

SD31, split
For spherical roller bearings
with tapered bore
and adapter sleeve



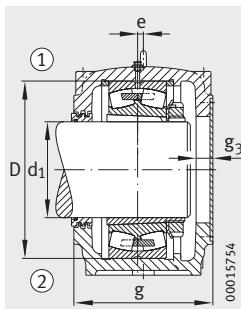
Cross-section of split bearings
see page 981

Dimension table · Dimensions in mm

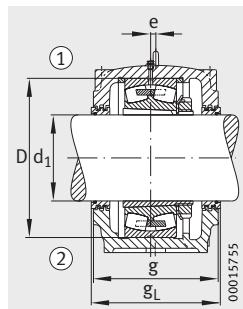
Designation ¹⁾							Mass m Housing ≈kg	
	Housing	Bearing	Adapter sleeve	Split bearing	Locating ring	Labyrinth ring with round cord		
					Quantity		Quantity	
SD3138-H-TS-A-L	23138-E1A-K-M	H3138	231SM170-MA	FRM320/10	2	TS38	1	95
SD3138-H-TS-B-L	23138-E1A-K-M	H3138	231SM170-MA	FRM320/10	2	TS38	2	95
SD3140-H-TS-A-L	23140-B-K-MB	H3140	231SM180-MA	FRM340/10	2	TS40	1	120
SD3140-H-TS-B-L	23140-B-K-MB	H3140	231SM180-MA	FRM340/10	2	TS40	2	120
SD3144-H-TS-AF-L	23144-B-K-MB	H3144X	231SM200-MA	—	—	TS44	1	135
SD3144-H-TS-AL-L	23144-B-K-MB	H3144X	231SM200-MA	—	—	TS44	1	135
SD3144-H-TS-BF-L	23144-B-K-MB	H3144X	231SM200-MA	—	—	TS44	2	135
SD3144-H-TS-BL-L	23144-B-K-MB	H3144X	231SM200-MA	—	—	TS44	2	135
SD3148-H-TS-AF-L	23148-B-K-MB	H3148X	231SM220-MA	—	—	TS48	1	175
SD3148-H-TS-AL-L	23148-B-K-MB	H3148X	231SM220-MA	—	—	TS48	1	175
SD3148-H-TS-BF-L	23148-B-K-MB	H3148X	231SM220-MA	—	—	TS48	2	175
SD3148-H-TS-BL-L	23148-B-K-MB	H3148X	231SM220-MA	—	—	TS48	2	175
SD3152-H-TS-AF-L	23152-K-MB	H3152X	231SM240-MA	—	—	TS52	1	210
SD3152-H-TS-AL-L	23152-K-MB	H3152X	231SM240-MA	—	—	TS52	1	210
SD3152-H-TS-BF-L	23152-K-MB	H3152X	231SM240-MA	—	—	TS52	2	210
SD3152-H-TS-BL-L	23152-K-MB	H3152X	231SM240-MA	—	—	TS52	2	210
SD3156-H-TS-AF-L	23156-B-K-MB	H3156X	231SM260-MA	—	—	TS56	1	240
SD3156-H-TS-AL-L	23156-B-K-MB	H3156X	231SM260-MA	—	—	TS56	1	240
SD3156-H-TS-BF-L	23156-B-K-MB	H3156X	231SM260-MA	—	—	TS56	2	240
SD3156-H-TS-BL-L	23156-B-K-MB	H3156X	231SM260-MA	—	—	TS56	2	240
SD3160-H-TS-AF-L	23160-B-K-MB	H3160-HG	231SM280-MA	—	—	TS60	1	290
SD3160-H-TS-AL-L	23160-B-K-MB	H3160-HG	231SM280-MA	—	—	TS60	1	290
SD3160-H-TS-BF-L	23160-B-K-MB	H3160-HG	231SM280-MA	—	—	TS60	2	290
SD3160-H-TS-BL-L	23160-B-K-MB	H3160-HG	231SM280-MA	—	—	TS60	2	290
SD3164-H-TS-AF-L	23164-K-MB	H3164-HG	231SM300-MA	—	—	TS64	1	330
SD3164-H-TS-AL-L	23164-K-MB	H3164-HG	231SM300-MA	—	—	TS64	1	330
SD3164-H-TS-BF-L	23164-K-MB	H3164-HG	231SM300-MA	—	—	TS64	2	330
SD3164-H-TS-BL-L	23164-K-MB	H3164-HG	231SM300-MA	—	—	TS64	2	330
SD3168-H-TS-AF-L	23168-B-K-MB	H3168-HG	231SM320-MA	—	—	TS68	1	380
SD3168-H-TS-AL-L	23168-B-K-MB	H3168-HG	231SM320-MA	—	—	TS68	1	380
SD3168-H-TS-BF-L	23168-B-K-MB	H3168-HG	231SM320-MA	—	—	TS68	2	380
SD3168-H-TS-BL-L	23168-B-K-MB	H3168-HG	231SM320-MA	—	—	TS68	2	380

¹⁾ Ordering example:

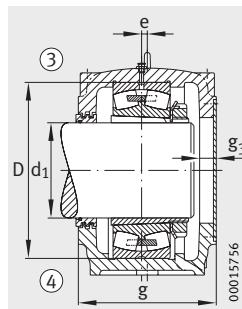
Housing SD3164-H-TS-BL-L (see also page 928), bearing 23164-K-MB (see bearing tables),
adapter sleeve H3164-HG (see dimension tables).



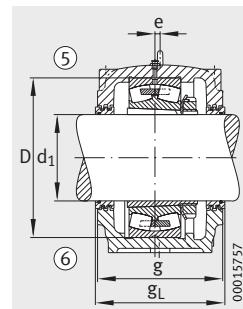
Design A (TS-A)
① Locating bearing
② Non-locating bearing



Design B (TS-B)
① Locating bearing
② Non-locating bearing



Design A
③ Loc. brg. TS-AF
④ Non-loc. brg. TS-AL



Design B
⑤ Loc. brg. TS-BF
⑥ Non-loc. brg. TS-BL

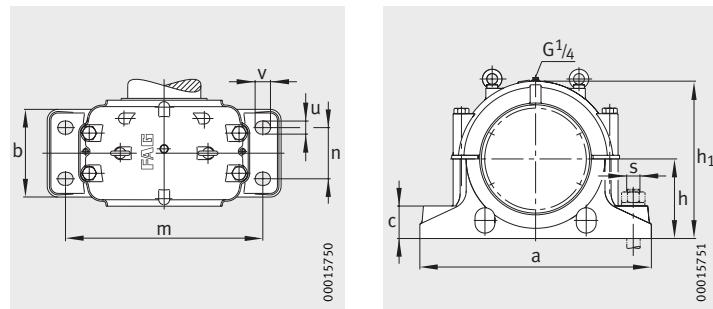
Dimensions

d ₁	a	g	h ₁	b	c	D	e	g _L	g ₃	h	m	n	u	v	s	
															mm	inch
170	560	260	375	210	80	320	10	—	35	190	480	120	30	36	M24	1
170	560	260	375	210	80	320	10	270	—	190	480	120	30	36	M24	1
180	610	280	410	230	85	340	10	—	35	210	510	130	36	42	M30	1 ¹ / ₈
180	610	280	410	230	85	340	10	290	—	210	510	130	36	42	M30	1 ¹ / ₈
200	640	290	435	240	90	370	12	—	35	220	540	140	36	42	M30	1 ¹ / ₈
200	640	290	435	240	90	370	12	—	35	220	540	140	36	42	M30	1 ¹ / ₈
200	640	290	435	240	90	370	12	300	—	220	540	140	36	42	M30	1 ¹ / ₈
200	640	290	435	240	90	370	12	300	—	220	540	140	36	42	M30	1 ¹ / ₈
220	700	310	475	260	95	400	12	—	35	240	600	150	36	42	M30	1 ¹ / ₈
220	700	310	475	260	95	400	12	—	35	240	600	150	36	42	M30	1 ¹ / ₈
220	700	310	475	260	95	400	12	320	—	240	600	150	36	42	M30	1 ¹ / ₈
220	700	310	475	260	95	400	12	320	—	240	600	150	36	42	M30	1 ¹ / ₈
240	770	320	515	280	100	440	13	—	35	260	650	160	42	52	M36	1 ³ / ₈
240	770	320	515	280	100	440	13	—	35	260	650	160	42	52	M36	1 ³ / ₈
240	770	320	515	280	100	440	13	330	—	260	650	160	42	52	M36	1 ³ / ₈
240	770	320	515	280	100	440	13	330	—	260	650	160	42	52	M36	1 ³ / ₈
260	790	320	550	280	105	460	16	—	35	280	670	160	42	52	M36	1 ³ / ₈
260	790	320	550	280	105	460	16	—	35	280	670	160	42	52	M36	1 ³ / ₈
260	790	320	550	280	105	460	16	330	—	280	670	160	42	52	M36	1 ³ / ₈
260	790	320	550	280	105	460	16	330	—	280	670	160	42	52	M36	1 ³ / ₈
280	830	350	590	310	110	500	22	—	35	300	710	190	42	52	M36	1 ³ / ₈
280	830	350	590	310	110	500	22	—	35	300	710	190	42	52	M36	1 ³ / ₈
280	830	350	590	310	110	500	22	360	—	300	710	190	42	52	M36	1 ³ / ₈
280	830	350	590	310	110	500	22	360	—	300	710	190	42	52	M36	1 ³ / ₈
300	880	370	630	330	115	540	23	—	35	320	750	200	42	52	M36	1 ³ / ₈
300	880	370	630	330	115	540	23	—	35	320	750	200	42	52	M36	1 ³ / ₈
300	880	370	630	330	115	540	23	380	—	320	750	200	42	52	M36	1 ³ / ₈
300	880	370	630	330	115	540	23	380	—	320	750	200	42	52	M36	1 ³ / ₈
320	950	400	675	360	120	580	24	—	35	340	810	220	42	52	M36	1 ³ / ₈
320	950	400	675	360	120	580	24	—	35	340	810	220	42	52	M36	1 ³ / ₈
320	950	400	675	360	120	580	24	410	—	340	810	220	42	52	M36	1 ³ / ₈
320	950	400	675	360	120	580	24	410	—	340	810	220	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

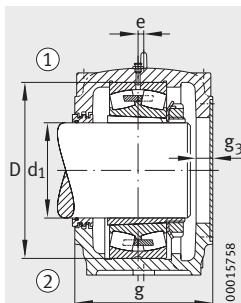
Designation ¹⁾	Housing	Bearing	Adapter sleeve	Split bearing	Labyrinth ring with round cord	Mass m	Housing
						Quantity	
SD3172-H-TS-AF-L	23172-K-MB	H3172-HG	231SM340-MA	TS72	1	420	
SD3172-H-TS-AL-L	23172-K-MB	H3172-HG	231SM340-MA	TS72	1	420	
SD3172-H-TS-BF-L	23172-K-MB	H3172-HG	231SM340-MA	TS72	2	420	
SD3172-H-TS-BL-L	23172-K-MB	H3172-HG	231SM340-MA	TS72	2	420	
SD3176-H-TS-AF-L	23176-K-MB	H3176-HG	231SM360-MA	TS76	1	490	
SD3176-H-TS-AL-L	23176-K-MB	H3176-HG	231SM360-MA	TS76	1	490	
SD3176-H-TS-BF-L	23176-K-MB	H3176-HG	231SM360-MA	TS76	2	490	
SD3176-H-TS-BL-L	23176-K-MB	H3176-HG	231SM360-MA	TS76	2	490	
SD3180-H-TS-AF-L	23180-B-K-MB	H3180-HG	231SM380-MA	TS80	1	570	
SD3180-H-TS-AL-L	23180-B-K-MB	H3180-HG	231SM380-MA	TS80	1	570	
SD3180-H-TS-BF-L	23180-B-K-MB	H3180-HG	231SM380-MA	TS80	2	570	
SD3180-H-TS-BL-L	23180-B-K-MB	H3180-HG	231SM380-MA	TS80	2	570	
SD3184-H-TS-AF-L	23184-K-MB	H3184-HG	231SM400-MA	TS84	1	610	
SD3184-H-TS-AL-L	23184-K-MB	H3184-HG	231SM400-MA	TS84	1	610	
SD3184-H-TS-BF-L	23184-K-MB	H3184-HG	231SM400-MA	TS84	2	610	
SD3184-H-TS-BL-L	23184-K-MB	H3184-HG	231SM400-MA	TS84	2	610	
SD3188-H-TS-AF-L	23188-K-MB	H3188-HG	231SM410-MA ²⁾	TS88	1	770	
SD3188-H-TS-AL-L	23188-K-MB	H3188-HG	231SM410-MA ²⁾	TS88	1	770	
SD3188-H-TS-BF-L	23188-K-MB	H3188-HG	231SM410-MA ²⁾	TS88	2	770	
SD3188-H-TS-BL-L	23188-K-MB	H3188-HG	231SM410-MA ²⁾	TS88	2	770	
SD3192-H-TS-AF-L	23192-K-MB	H3192-HG	231SM430-MA ²⁾	TS92	1	830	
SD3192-H-TS-AL-L	23192-K-MB	H3192-HG	231SM430-MA ²⁾	TS92	1	830	
SD3192-H-TS-BF-L	23192-K-MB	H3192-HG	231SM430-MA ²⁾	TS92	2	830	
SD3192-H-TS-BL-L	23192-K-MB	H3192-HG	231SM430-MA ²⁾	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	

¹⁾ Ordering example:

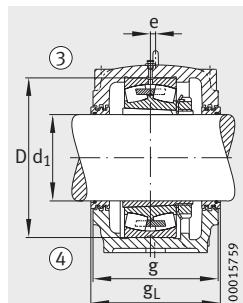
Housing SD3188-H-TS-BL-L (see also page 928), bearing 23188-K-MB (see bearing tables), adapter sleeve H3188-HG (see dimension tables).

²⁾ With separate locking rings.

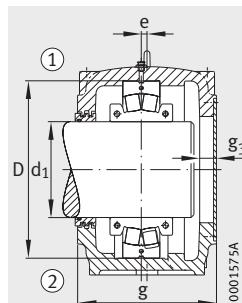
³⁾ With split bearings.



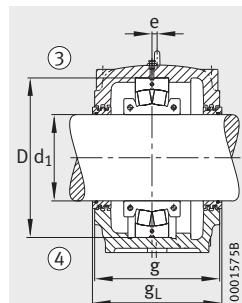
Design A
 ① Loc. brg. TS-AF
 ② Non-loc. brg. TS-AL



Design B
 ③ Loc. brg. TS-BF
 ④ Non-lock. brg. TS-BL



Design A³
 ① Loc. brg. TS-AF
 ② Non-loc. brg. TS-AL



Design B³
 ③ Loc. brg. TS-BF
 ④ Non-lock. brg. TS-BL

Dimensions

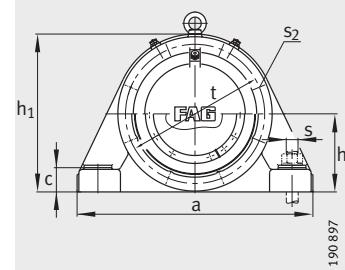
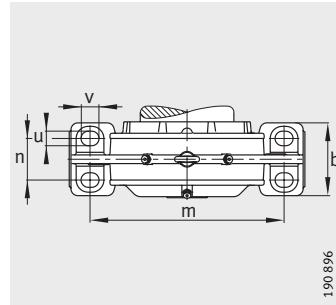
d ₁	a	g	h ₁	b	c	D	e	g _L	g ₃	h	m	n	u	v	s	
															mm	inch
340	1 000	400	695	360	120	600	30	—	35	350	840	220	42	52	M36	1 ³ / ₈
340	1 000	400	695	360	120	600	30	—	35	350	840	220	42	52	M36	1 ³ / ₈
340	1 000	400	695	360	120	600	30	410	—	350	840	220	42	52	M36	1 ³ / ₈
340	1 000	400	695	360	120	600	30	410	—	350	840	220	42	52	M36	1 ³ / ₈
360	1 040	400	715	360	120	620	30	—	35	360	870	220	42	52	M36	1 ³ / ₈
360	1 040	400	715	360	120	620	30	—	35	360	870	220	42	52	M36	1 ³ / ₈
360	1 040	400	715	360	120	620	30	410	—	360	870	220	42	52	M36	1 ³ / ₈
360	1 040	400	715	360	120	620	30	410	—	360	870	220	42	52	M36	1 ³ / ₈
380	1 120	430	755	390	125	650	30	—	35	380	950	240	48	60	M42	1 ⁵ / ₈
380	1 120	430	755	390	125	650	30	—	35	380	950	240	48	60	M42	1 ⁵ / ₈
380	1 120	430	755	390	125	650	30	440	—	380	950	240	48	60	M42	1 ⁵ / ₈
380	1 120	430	755	390	125	650	30	440	—	380	950	240	48	60	M42	1 ⁵ / ₈
400	1 170	460	810	420	130	700	35	—	35	410	1 000	260	48	60	M42	1 ⁵ / ₈
400	1 170	460	810	420	130	700	35	—	35	410	1 000	260	48	60	M42	1 ⁵ / ₈
400	1 170	460	810	420	130	700	35	470	—	410	1 000	260	48	60	M42	1 ⁵ / ₈
400	1 170	460	810	420	130	700	35	470	—	410	1 000	260	48	60	M42	1 ⁵ / ₈
410	1 220	460	835	430	135	720	35	—	35	420	1 030	260	48	60	M42	1 ⁵ / ₈
410	1 220	460	835	430	135	720	35	—	35	420	1 030	260	48	60	M42	1 ⁵ / ₈
410	1 220	460	835	430	135	720	35	470	—	420	1 030	260	48	60	M42	1 ⁵ / ₈
410	1 220	460	835	430	135	720	35	470	—	420	1 030	260	48	60	M42	1 ⁵ / ₈
430	1 280	470	875	440	145	760	35	—	35	440	1 070	260	48	60	M42	1 ⁵ / ₈
430	1 280	470	875	440	145	760	35	—	35	440	1 070	260	48	60	M42	1 ⁵ / ₈
430	1 280	470	875	440	145	760	35	480	—	440	1 070	260	48	60	M42	1 ⁵ / ₈
430	1 280	470	875	440	145	760	35	480	—	440	1 070	260	48	60	M42	1 ⁵ / ₈
450	1 330	470	920	440	155	790	45	—	35	460	1 110	260	66	80	M56	2 ¹ / ₄
450	1 330	470	920	440	155	790	45	—	35	460	1 110	260	66	80	M56	2 ¹ / ₄
450	1 330	470	920	440	155	790	45	480	—	460	1 110	260	66	80	M56	2 ¹ / ₄
450	1 330	470	920	440	155	790	45	480	—	460	1 110	260	66	80	M56	2 ¹ / ₄



Plummer block housings

BND, unsplit

For spherical roller bearings
with cylindrical bore,
with tapered bore
and adapter sleeve



Cross-sections of bearings
with tapered bore
see page 985 and page 987

①, ②, ③, ④²⁾

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	d _c min.	d _z min.
BND2236	22236-	H3136	130	180	160	680	214	425	210	65	320	176	196
BND3236	23236-	H2336	140	180	160	680	240	425	210	65	320	176	196
BND3138	23138-	H3138	125	190	170	680	232	425	210	65	320	182	202
BND2238	22238-	H3138	170	190	170	710	222	455	220	85	340	186	206
BND3238	23228-	H2338	170	190	170	710	250	455	220	85	340	186	206
BND3140	23140-	H3140	170	200	180	710	242	455	220	85	340	192	212
BND2240	22240-	H3140	185	200	180	780	230	475	240	75	360	196	216
BND3240	23240-	H2340	205	200	180	780	260	475	240	75	360	196	216
BND3044	23044-	H3044X	100	220	200	640	206	430	200	65	340	212	232
BND3144	23144-	H3144X	190	220	200	780	252	475	240	75	370	216	236
BND2244	22244-	H3144X	290	220	200	890	264	550	250	80	400	216	236
BND3244	23244-	H2344X	240	220	200	850	279	525	250	80	400	216	236
BND3048	23048-	H3048	130	240	220	680	216	455	210	70	360	232	252
BND3148	23148-	H3148X	280	240	220	890	284	550	250	80	400	236	256
BND2248	22248-	H3148X	315	240	220	900	268	585	250	90	440	236	256
BND3248	23248-	H2348X	330	240	220	900	308	585	250	90	440	236	256
BND3052	23052-	H3052X	160	260	240	720	226	500	220	75	400	256	276
BND3152	23152-	H3152X	310	260	240	900	292	585	250	90	440	256	276
BND2252	22252-	H3152X	370	260	240	960	286	625	290	95	480	260	280
BND3252	23252-	H2352X	380	260	240	960	330	625	290	95	480	260	280

¹⁾ Ordering example:

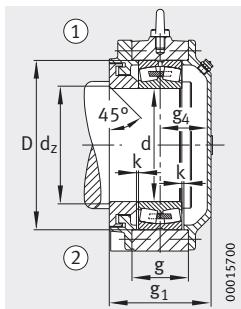
Housing BND3148-Z-Y-BF-S (see also page 930),
bearing 23148-B-MB (see bearing tables).

²⁾ ① Locating bearing AF

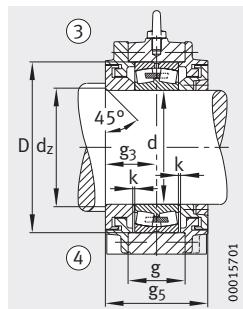
② Non-locating bearing AL

③ Locating bearing BF

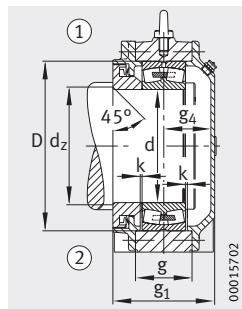
④ Non-locating bearing BL



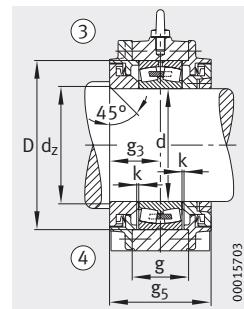
Design A
Housing with labyrinth seal
for bearings with cylindrical bore



Design B



Design A
Housing with Taconite seal
for bearings with cylindrical bore



Design B

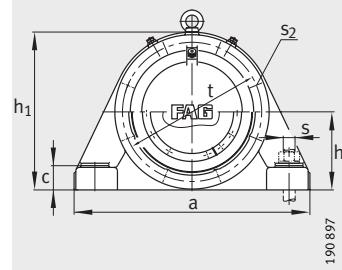
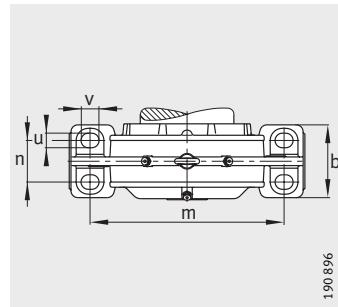
g	g ₂	g ₃	g ₄ min.	g ₅	h	k	m	n	u	v	s	t	s ₂		Quantity
112	248	114	92	228	210	3	550	120	36	45	M30	370	M16	8	
138	274	127	105	254	210	3	550	120	36	45	M30	370	M16	8	
130	266	123	98	246	210	3	550	120	36	45	M30	370	M16	8	
115	258	114	98	228	220	3	560	120	42	52	M36	380	M16	8	
143	286	128	112	256	220	3	560	120	42	52	M36	380	M16	8	
135	278	124	108	248	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	
158	299	138	114	276	235	4	640	140	42	52	M36	420	M16	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	
140	314	142	112	284	270	4	720	140	42	52	M36	455	M20	8	
175	329	147	122	294	260	4	700	140	42	52	M36	445	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	
150	311	138	120	276	290	4	750	140	42	52	M36	510	M20	8	
190	351	158	140	316	290	4	750	140	42	52	M36	510	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	
161	326	148	126	296	310	3	800	160	42	52	M36	535	M20	8	
205	370	170	148	340	310	3	800	160	42	52	M36	535	M20	8	



Plummer block housings

BND, unsplit

For spherical roller bearings
with cylindrical bore,
with tapered bore
and adapter sleeve



Cross-sections of bearings
with cylindrical bore
see page 983

①, ②, ③, ④²⁾

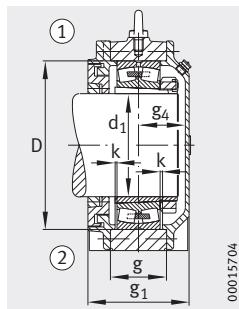
Dimension table (continued) · Dimensions in mm

Designation ¹⁾			Mass m Housing ≈kg	Dimensions									
Housing	Bearing	Adapter sleeve		d	d ₁	a	g ₁	h ₁	b	c	D	d _c min.	d _z min.
BND3056	23056-	H3056	180	280	260	760	236	520	240	80	420	276	296
BND3156	23156-	H3156X	335	280	260	900	294	585	250	90	460	280	300
BND2256	22256-	H3156X	420	280	260	1 000	297	645	300	100	500	280	300
BND3256	23256-	H2356X	490	280	260	1 000	343	645	300	100	500	280	300
BND3060	23060-	H3060	220	300	280	820	261	570	250	85	460	296	316
BND3160	23160-	H3160	400	300	280	1 000	327	645	300	100	500	300	320
BND2260	22260-	H3160	485	300	280	1 100	317	695	330	105	540	300	320
BND3260	23260-	H3260	570	300	280	1 100	369	705	330	105	540	300	320
BND3064	23064-	H3064	250	320	300	860	266	590	260	90	480	316	336
BND3164	23164-	H3164	500	320	300	1 150	359	700	300	100	540	320	340
BND2264	22264-	H3164	600	320	300	1 150	333	745	360	115	580	320	340
BND3264	23264-	H3264	665	320	300	1 150	391	745	360	115	580	320	340
BND3068	23068-	H3068	300	340	320	900	276	630	270	95	520	340	360
BND3168	23168-	H3168	520	340	320	1 150	373	745	360	115	580	340	360
BND2268	22268-	H3168	635	340	320	1 200	375	790	380	125	620	344	364
BND3268	23268-	H3268	755	340	320	1 200	434	790	380	125	620	344	364

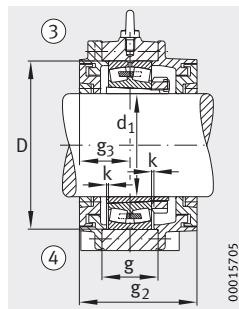
1) Ordering example:

Housing BND3260-H-W-T-AL-S (see also page 932),
bearing 23260-K-MB (see bearing tables), adapter sleeve H3260-HG (see dimension tables).

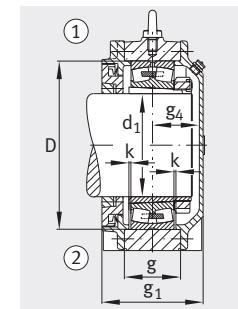
- 2) ① Locating bearing AF
② Non-locating bearing AL
③ Locating bearing BF
④ Non-locating bearing BL



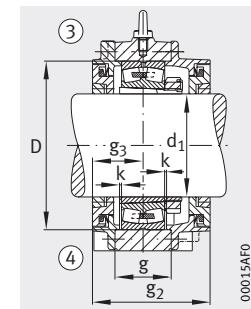
Design A
Housing with labyrinth seal
for bearings with tapered bore



Design B



Design A
Housing with Taconite seal
for bearings with tapered bore



Design B

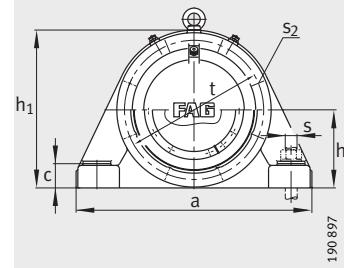
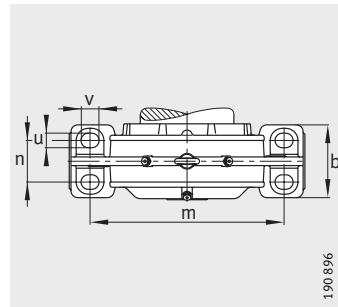
g	g ₂	g ₃	g ₄ min.	g ₅	h	k	m	n	u	v	s	t	s ₂		Quantity
135	281	118	108	236	260	4	630	140	42	52	M36	460	M16	8	
176	337	151	133	302	290	4	750	140	42	52	M36	510	M20	8	
160	354	157	128	314	320	4	840	170	42	52	M36	555	M24	8	
206	400	180	151	360	320	4	840	170	42	52	M36	555	M24	8	
140	296	128	121	256	285	4	690	150	42	52	M36	510	M16	8	
190	384	172	143	344	320	4	840	170	42	52	M36	555	M24	8	
178	352	156	149	312	350	4	920	180	56	75	M48	600	M24	8	
230	404	182	175	364	350	4	920	180	56	75	M48	600	M24	8	
150	311	133	123	266	295	4	730	160	42	52	M36	530	M16	8	
210	412	186	161	372	350	4	940	160	42	52	M36	590	M24	8	
180	381	163	158	326	370	5	960	200	56	75	M48	640	M24	8	
238	439	192	187	384	370	5	960	200	56	75	M48	640	M24	8	
160	311	133	132	266	315	5	770	170	42	52	M36	565	M20	8	
220	421	183	178	366	370	5	960	200	56	75	M48	640	M24	8	
201	430	187,5	176	375	390	5	990	200	64	85	M56	680	M30	8	
260	489	217	205	434	390	5	990	200	64	85	M56	680	M30	8	



Plummer block housings

BND, unsplit

For spherical roller bearings
with cylindrical bore,
with tapered bore
and adapter sleeve



Cross-sections of bearings
with cylindrical bore
see page 983

①, ②, ③, ④²⁾

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	d _c min.	d _z min.
BND3072	23072-	H3072	330	360	340	960	290	660	280	100	540	360	380
BND3172	23172-	H3172	600	360	340	1 200	400	760	370	115	600	360	380
BND2272	22272-	H3172	690	360	340	1 280	375	820	400	130	650	364	384
BND3272	23272-	H3272	950	360	340	1 280	437	820	400	130	650	364	384
BND3076	23076-	H3076	360	380	360	1 000	294	680	300	105	560	380	400
BND3176	23176-	H3176	720	380	360	1 200	404	790	380	125	620	380	400
BND2276	22276-	H3176	900	380	360	1 350	433	865	405	135	680	384	404
BND3276	23276-	H3276	1 100	380	360	1 350	489	860	405	135	680	384	404
BND3080	23080-	H3080	400	400	380	1 060	310	720	320	110	600	400	420
BND3180	23180-	H3180	750	400	380	1 280	405	820	400	130	650	404	424
BND2280	22280-	H3180	940	400	380	1 430	433	900	450	145	720	404	424
BND3280	23280-	H3280	1 205	400	380	1 430	504	900	450	145	720	404	424
BND3084	23084-	H3084	435	420	400	1 100	310	755	340	115	620	420	440
BND3184	23184-	H3184	950	420	400	1 350	440	900	420	135	700	424	444
BND2284	22284-	H3184	1 055	420	400	1 500	433	950	470	150	760	430	450
BND3284	23284-	H3284	1 310	420	400	1 500	510	950	470	150	760	430	450

1) Ordering example:

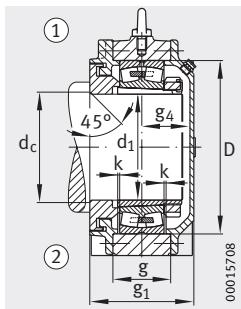
Housing BND3084-H-C-T-BF-S (see also page 933),
bearing 23084-B-K-MB (see bearing tables), adapter sleeve H3084X-HG (see dimension tables).

2) ① Locating bearing AF

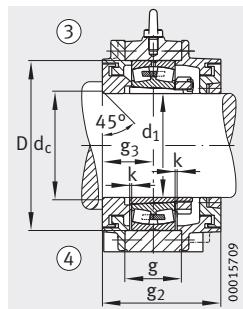
② Non-locating bearing AL

③ Locating bearing BF

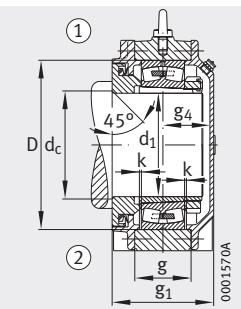
④ Non-locating bearing BL



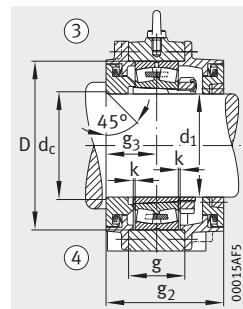
Design A
Housing with labyrinth seal for bearings
with tapered bore, shaft with abutment shoulder



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



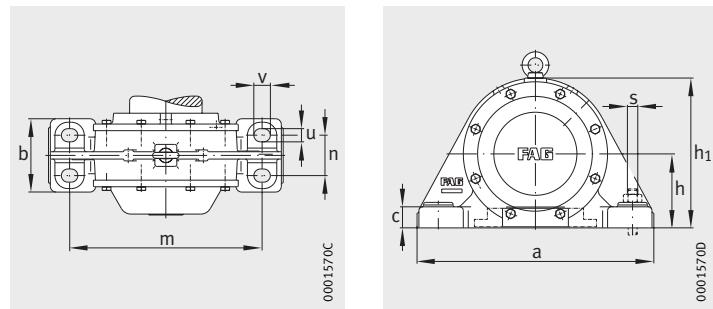
Design B
Housing with Taconite seal for bearings
with tapered bore, shaft with abutment shoulder

g	g ₂	g ₃	g ₄ min.	g ₅	h	k	m	n	u	v	s	t	s ₂		Quantity
170	325	140	138	280	330	5	820	180	42	52	M36	590	M20	8	
225	450	200	188	400	380	4	1000	200	56	75	M48	650	M24	8	
205	435	185	178	370	410	5	1040	210	72	90	M64	710	M30	8	
267	497	216	209	432	410	5	1040	210	72	90	M64	710	M30	8	
160	329	142	141	284	340	7	840	190	56	75	M48	610	M20	8	
230	459	202	190	404	390	5	1000	200	64	85	M56	680	M30	8	
230	470	203	218	406	425	5	1100	225	72	90	M64	745	M30	8	
295	529	232	244	464	425	5	1100	225	72	90	M64	745	M30	8	
175	355	150	145	300	360	7	900	200	56	75	M48	650	M20	8	
235	465	200	193	400	410	5	1040	210	72	90	M64	710	M30	8	
229	498	216,5	202	433	450	5	1160	240	72	90	M64	790	M30	8	
300	569	252	237	504	450	5	1160	240	72	90	M64	790	M30	8	
180	350	150	149	300	375	7	940	210	56	75	M48	670	M20	8	
260	510	210	215	420	450	7	1100	210	64	85	M56	760	M30	8	
238	498	216,5	202	433	470	5	1220	255	72	90	M64	835	M30	8	
315	575	255	240	510	470	5	1220	255	72	90	M64	835	M30	8	



Plummer block housings

BNM, unsplit
For spherical roller bearings
with tapered bore
and withdrawal sleeve



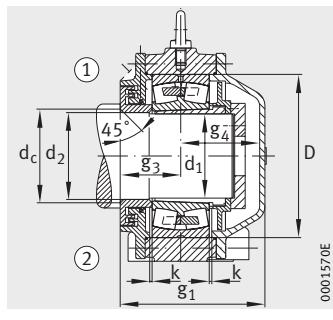
Dimension table · Dimensions in mm

Designation ¹⁾			Mass m Housing ≈kg	Dimensions						
Housing	Bearing	Withdrawal sleeve		d ₁	a	g ₁	h ₁	b	c	D
BNM3236	23236-	AH3236	160	170	680	310	425	210	65	320
BNM3238	23238-	AH3238	180	180	710	325	455	220	85	340
BNM3240	23240-	AH3240	240	190	780	350	475	240	75	360
BNM3244	23244-	AH3244	290	200	850	375	525	250	80	400
BNM3248	23248-	AH3248	330	220	900	360	585	250	90	440
BNM3252	23252-	AH3252	480	240	960	415	625	290	95	480
BNM3256	23256-	AH3256	550	260	1 000	435	645	300	100	500
BNM3260	23260-	AH3260	660	280	1 100	455	705	330	105	540
BNM3264	23264-	AH3264	800	300	1 150	490	745	360	115	580
BNM3268	23268-	AH3268	930	320	1 200	515	790	380	125	620
BNM3272	23272-	AH3272	1 100	340	1 280	545	820	400	130	650
BNM3276	23276-	AH3276	1 210	360	1 350	570	860	405	135	680
BNM3280	23280-	AH3280	1 510	380	1 430	605	900	450	145	720
BNM3284	23284-	AH3284	1 710	400	1 500	615	950	470	150	760

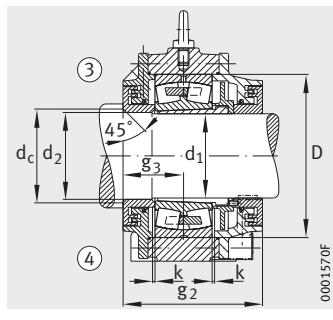
1) Ordering example:

Housing BNM3260-AH-R-AF (see also page 937),
bearing 23260-K-MB (see bearing tables), withdrawal sleeve AH3260G-H (see dimension tables).

- 2)
 ① Locating bearing AF
 ② Non-locating bearing AL
 ③ Locating bearing BF
 ④ Non-locating bearing BL



Design A
①, ②²⁾



Design B
③, ④²⁾

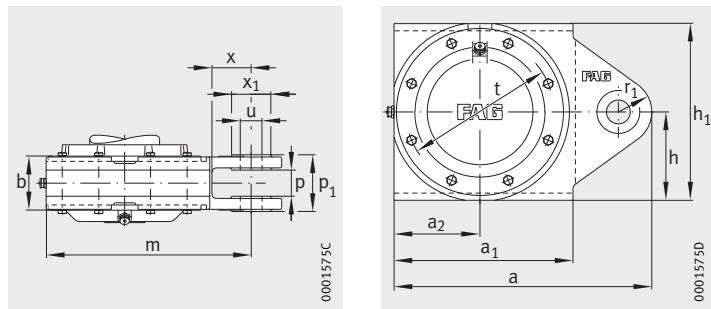
d_2	d_c min.	g_2	g_3	g_4 min.	h	k	m	n	u	v	s
175	185	310	135	165	210	4	550	120	36	45	M30
185	195	330	145	170	220	4	560	120	42	52	M36
195	205	350	155	185	235	4	640	140	42	52	M36
210	220	385	165	200	260	4	700	140	42	52	M36
230	242	365	155	195	290	4	750	140	42	52	M36
250	262	410	180	220	310	5	800	160	42	52	M36
270	282	440	190	230	320	5	840	170	42	52	M36
290	302	450	200	240	350	5	920	180	56	75	M48
310	326	475	210	265	370	5	960	200	56	75	M48
330	350	505	220	280	390	6	990	200	64	85	M56
350	370	535	235	295	410	6	1 040	210	72	90	M64
370	390	575	255	300	425	6	1 100	225	72	90	M64
390	410	605	270	320	450	6	1 160	240	72	90	M64
410	430	625	280	320	470	7,5	1 220	255	72	90	M64



Take-up housings

SPA, unsplit

For spherical roller bearings
with tapered bore
and adapter sleeve



①, ②, ③, ④²⁾

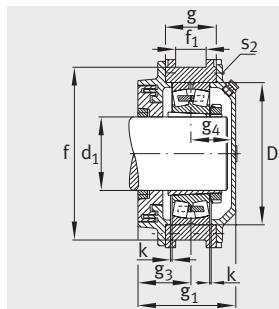
Dimension table · Dimensions in mm

Designation ¹⁾			Mass m Housing ≈kg	Dimensions									
Housing	Bearing	Adapter sleeve		d ₁	a	a ₁	a ₂	D	f	f ₁	g	g ₁	g ₂
SPA3236	23236-	H2336	170	160	600	420	210	320	410	93	138	240	274
SPA3140	23140-	H3140	165	180	650	420	210	340	410	100	135	242	278
SPA3240	23240-	H2340	260	180	650	470	235	360	460	103	158	260	299
SPA3044	23044-	H3044X	180	200	615	430	210	340	440	65	115	206	241
SPA3144	23144-	H3144X	280	200	885	470	235	370	480	105	150	252	291
SPA3244	23244-	H2344X	325	200	940	520	260	400	500	90	175	279	329
SPA3148	23148-	H3148X	330	220	925	520	260	400	500	65	160	284	334
SPA3248	23248-	H2348X	430	220	970	560	280	440	545	95	190	308	351
SPA3052	23052-	H3052X	225	240	910	500	245	400	500	65	130	226	261
SPA3152	23152-	H3152X	325	240	990	550	275	440	540	80	174	292	335
SPA3252	23252-	H2352X	410	240	1063	596	298	480	570	103	205	330	370
SPA3056	23056-	H3056	310	260	910	500	245	420	500	65	135	236	281
SPA3256	23256-	H2356X	520	260	1095	630	315	500	610	123	206	343	400
SPA3160	23160-	H3160	440	280	1115	630	315	500	610	130	190	327	384
SPA3260	23260-	H3260	620	280	1200	680	340	540	650	115	230	369	404
SPA3164	23164-	H3164	560	300	1140	665	340	540	630	123	210	359	412
SPA3264	23264-	H3264	810	300	1280	710	355	580	670	123	238	391	439
SPA3168	23168-	H3168	630	320	1290	740	370	580	700	150	220	373	421
SPA3268	23268-	H3268	920	320	1335	735	385	620	700	123	260	434	489
SPA3272	23272-	H3272	885	340	1390	800	400	650	790	123	267	437	497
SPA3176	23176-	H3176	700	360	1325	750	375	620	740	120	230	404	459
SPA3276	23276-	H3276	900	360	1385	810	405	680	780	123	295	489	529
SPA3280	23280-	H3280	1600	380	1460	880	440	720	900	190	300	504	569
SPA3284	23284-	H3284	1800	400	1488	925	465	760	900	190	315	510	575

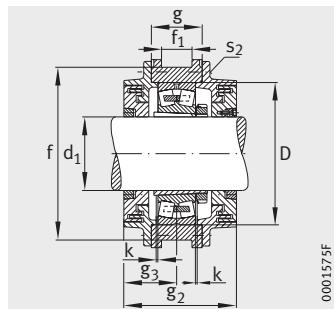
¹⁾ Ordering example:

Housing SPA3260-H-W-Y-BF-S (see also page 939),
bearing 23260-K-MB (see bearing tables), adapter sleeve H3260-HG (see dimension tables).

- ²⁾
 ① Locating bearing AF
 ② Non-locating bearing AL
 ③ Locating bearing BF
 ④ Non-locating bearing BL



Guidance on both sides
Design A



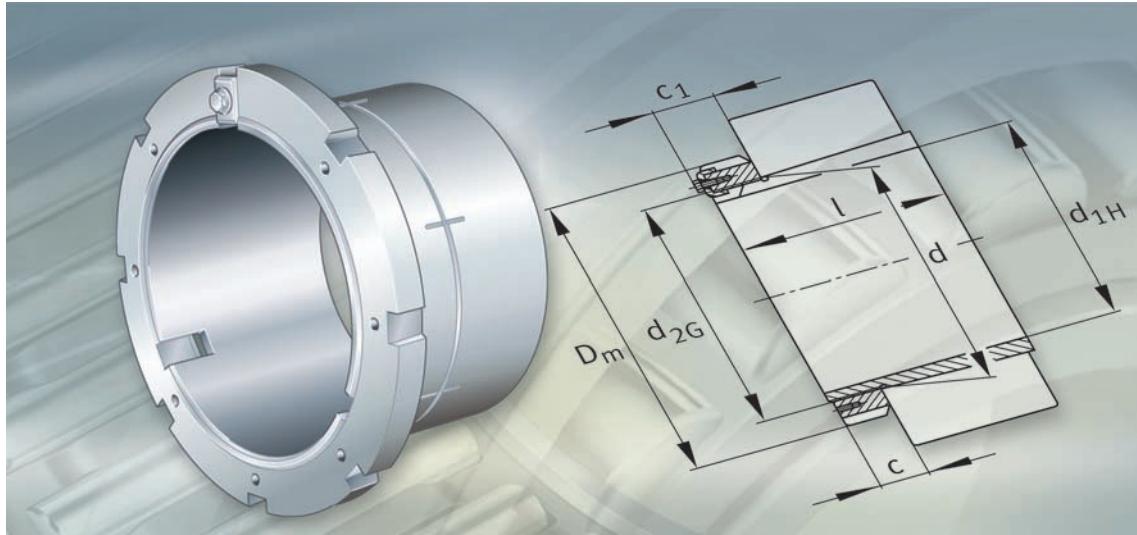
Guidance on both sides
Design B

0001575E

0001575F

g ₃	g ₄	h ₁	k	m	p	p ₁	r ₁	t	s ₂		u	x	x ₁
										Quantity			
127	105	450	3	300	72	140	90	370	M16	8	80	90	120
124	108	440	3	360	70	140	80	380	M16	8	60	140	100
138	114	500	4	325	72	140	90	420	M16	8	80	85	120
103	95	480	3	325	70	200	80	375	M16	8	60	100	100
134	110	510	4	530	74	144	120	420	M16	8	100	260	140
147	122	540	4	530	130	200	150	445	M20	8	100	250	140
152	122	540	4	515	123	215	150	455	M20	8	100	250	140
158	140	580	4	540	130	220	150	510	M20	8	100	260	140
113	103	540	4	515	123	215	150	440	M16	8	100	250	140
150	132	570	4	565	135	225	150	510	M20	8	100	270	140
170	148	610	3	615	173	240	150	535	M20	8	100	300	140
118	108	540	4	515	123	215	150	460	M16	8	100	250	140
180	151	650	4	630	173	240	150	555	M24	8	100	220	140
172	143	650	4	650	170	270	150	555	M24	8	100	310	140
182	175	690	4	680	190	270	180	600	M24	8	100	310	140
186	161	670	4	650	170	240	150	590	M24	8	100	310	175
192	187	710	5	725	213	300	200	640	M24	8	110	275	170
183	178	740	5	720	180	300	200	640	M24	8	120	310	180
217	205	740	5	750	213	300	200	680	M30	8	110	310	170
216	209	830	5	765	213	330	225	710	M30	8	130	310	190
202	190	790	5	750	200	300	200	680	M30	8	110	320	170
232	244	820	5	780	213	300	200	745	M30	8	110	305	170
252	237	960	5	820	180	300	200	790	M30	8	110	350	170
255	240	960	5	825	180	300	200	835	M30	8	110	350	170





Fasteners and retainers

Adapter sleeves
Withdrawal sleeves
Locknuts
Shaft nuts
Tab washers
Retaining brackets
Hydraulic nuts

Fasteners and retainers

	Page
Product overview	Fasteners and retainers 994
Features	Adapter sleeves 996 Withdrawal sleeves 997 Locknuts 997 Shaft nuts 998 Tab washers 999 Retaining brackets 999 Hydraulic nuts 1000 Suffixes 1001
Design and safety guidelines	Shaft tolerances 1002
Accuracy	Adapter sleeves 1003 Withdrawal sleeves 1003 Locknuts and shaft nuts 1003 Hydraulic nuts 1003
Dimension tables	Adapter sleeves 1004 Withdrawal sleeves 1014 Locknuts 1030 Shaft nuts 1033 Tab washers 1035 Retaining brackets 1036 Hydraulic nuts Threads in metric sizes 1038 Threads in inch sizes 1042 Increased capacity design 1044



Product overview Fasteners and retainers

Adapter sleeves

With nut and tab washer,
taper 1:12 or 1:30

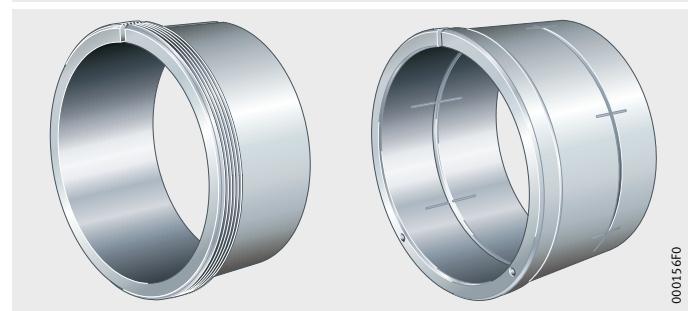
H23, H30, H31, H32, H33, H39, H240, H241



Withdrawal sleeves

Taper 1:12 or 1:30

AH22, AH(X)23, AH(X)30, AH(X)31, AH(X)32, AH33, AH38, AH39, AH240, AH241



Locknuts

Shaft nuts

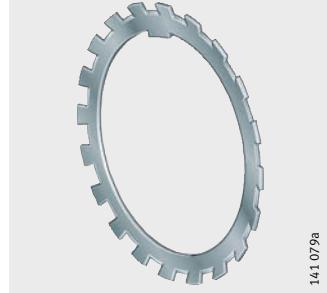
KM, KML, HM, HM30, HM31

HMZ, HMZ30

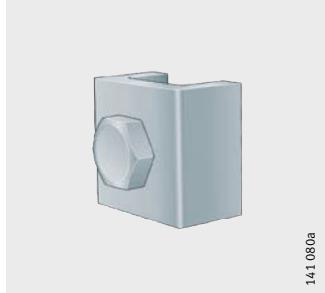


Tab washers
Retaining brackets with screw

MB, MBL

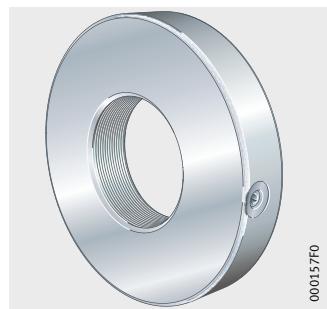


MS30, MS31



Hydraulic nuts
With thread
Increased capacity design
with smooth bore

HYDNUT, HYDNUT..-INCH



HYDNUT..-HEAVY



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 withdrawal sleeves. Locknuts or shaft nuts can be used to locate bearings on shafts or adapter sleeves. Gradual loosening of nuts can be prevented using tab washers or retaining brackets. Shaft nuts are secured by means of force locking.
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 do not need to be secured on the shaft by any additional means. 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. In addition, this gives simpler dismantling of the bearings. Adapter sleeves comprise slotted adapter sleeves, locknuts and tab washers. For larger sizes, retaining brackets are used instead of tab washers. The tensile strength of the material is at least 430 N/mm^2 . The outside surface of the sleeves has a taper 1:12 while series H240 and H241 have a taper 1:30. The dimension tables contain 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 threads for the pump connector.

Withdrawal sleeves

Withdrawal 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/mm².

The outside surface of the slotted steel sleeves has a taper 1:12, while series AH240 and AH241 have a taper 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 withdrawal sleeves with oil slots on the tapered outside surface and two pump connectors offset to each other by 90°.

These withdrawal sleeves have the suffix H.

The dimension tables give the mounting dimensions for the pump connector.

Locknuts

Locknuts can be used to locate 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 withdrawal 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.



Fasteners and retainers

Shaft nuts

Shaft nuts HMZ allow precise, secure axial location of bearings on cylindrical and tapered shafts or on adapter sleeves.

The shaft nuts are made from steel and the tensile strength is at least 350 N/mm².

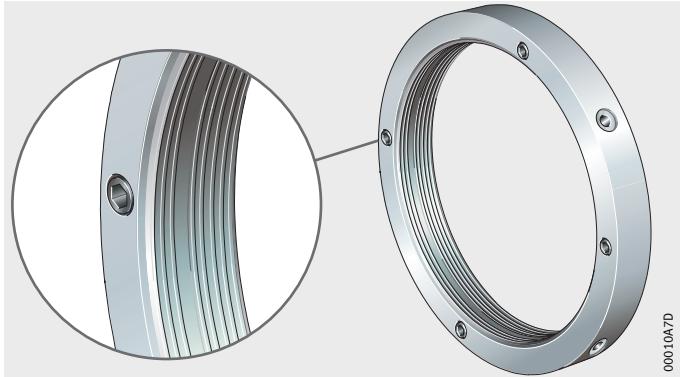
Shaft nuts HMZ are interchangeable with conventional locknuts HM and KM. They are secured, however, not by means of washers or brackets but by force locking. Four or eight axial clamping screws allow uniform clamping around the circumference, *Figure 1*.

For screw mounting on the shaft thread, the circumference of the nut has four or eight threaded blind holes into which the threaded rod also supplied is screwed. There is no need either for slots on the outside diameter of the nut or for any retainers.

Since the shaft does not have a retaining slot, it has higher strength and is more economical to manufacture.

Shaft nuts HMZ are described in TPI WL 91-8, HMZ Shaft Nuts.

Figure 1
Clamping screws for generating
a force locking connection between
the nut and shaft thread



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Tab washers

Tab washers 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, while one of the outer tabs is bent into a slot in the nut for location.

The washers are made from steel and the tensile strength is at least 300 N/mm².

Retaining brackets

Retaining brackets of series MS are fixed to the locknut using a hexagonal screw. They engage in a slot in the nut and in the adapter sleeve or shaft.

The fixing screw has a self-locking thread up to M16, for sizes from M20 a standardised hexagonal screw with a retainer is used.

Retaining brackets are used with locknuts of series HM30 and HM31.



Fasteners and retainers

Hydraulic nuts

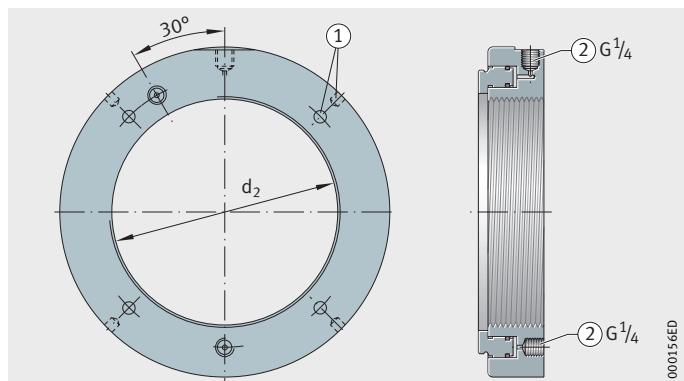
FAG hydraulic nuts HYDNUT are used to press parts with a tapered bore onto their tapered seat. Presses are mainly used if the drive-up forces required cannot be applied using other accessories, such as shaft nuts or pressure screws.

A main area of application is the mounting of rolling bearings with a tapered bore. The bearings can be seated directly on a tapered shaft, on an adapter sleeve or a withdrawal sleeve. If the bearing is located using a withdrawal sleeve or an adapter sleeve, the hydraulic nut can also be used for dismantling.

The hydraulic nuts HYDNUT comprise a press ring and an annular piston. The piston is operated by hydraulic means. The pressure chamber is sealed off by two packing cords made from plasticised PVC fused to form rings, *Figure 2*.

- ① Handling holes
- ② Oil connector

Figure 2
Hydraulic nuts with thread



The hydraulic nuts are designed for an oil pressure of max. 800 bar. The stroke is dimensioned such that the parts with a tapered bore can be mounted in a single operation.

Hydraulic nuts with thread	For all standardised adapter and withdrawal sleeves of metric sizes, we supply hydraulic nuts in which the bore of the press ring d_2 has a metric precision thread or a trapezoidal thread. Designs with an inch size thread (suffix INCH) are also available. All hydraulic nuts with a thread have holes to make handling easier. FAG hydraulic nuts with a thread have two oil connectors G1/4 on the end face and one on the outside surface. The second connector on the end face allows the use of a displacement gauge.
Hydraulic nuts of increased capacity design with smooth bore	Hydraulic nuts of increased capacity design for high drive-up forces, developed principally for shipbuilding, have a smooth bore. The design is indicated by the suffix HEAVY. We supply a comprehensive, matched range of accessories including pressure generators and connectors, see also TPI WL 80-50, FAG Pressure Generation Devices. Selection of suitable products is assisted by the computer program MOUNTING MANAGER. Hydraulic nuts HYDNUT are described in detail in TPI WL 80-57, FAG Hydraulic Nuts.
Suffixes	Suffixes for available designs: see table.

Available designs	Design
Standard	
H	Hydraulic withdrawal sleeve
HG	Hydraulic adapter sleeve
HEAVY	Hydraulic nut of increased capacity design
INCH	Hydraulic nut with inch size thread



Fasteners and retainers

Design and safety guidelines

Shaft tolerances

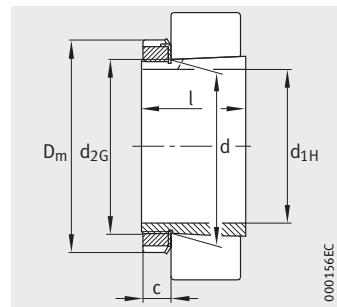
Adapter and withdrawal sleeves adapt themselves to the shaft. Larger diameter tolerances are therefore permissible for shafts than in the case of a direct cylindrical seat for a bearing on the shaft. For general applications, bearing seats toleranced to h9 are sufficient. The geometrical tolerances must 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	<p>The dimensions and material conform to DIN 5 415/ISO 2 982-1.</p> <p>The bore tolerance of adapter sleeves before slitting for a taper 1:12 lies in tolerance zone JS9 and for a taper 1:30 in zone JS7.</p> <p>Up to M200, the thread is a metric precision thread to tolerance grade 6g to DIN/ISO 965-3, over M200 trapezoidal threads are used.</p>
Withdrawal sleeves	<p>The dimensions and material conform to DIN 5 416/ISO 2 982-1.</p> <p>The bore tolerance of adapter sleeves before slitting for a taper 1:12 lies in tolerance zone JS9 and for a taper 1:30 in zone JS7.</p> <p>Up to M200, the thread is a metric precision thread to tolerance grade 6g to DIN/ISO 965-3, over M200 trapezoidal threads are used.</p> <p>Designs with a modified thread d_{2G} have the suffix G.</p>
Locknuts and shaft nuts	<p>The dimensions and material conform to DIN 981/ISO 2 982-2.</p> <p>Deviations are indicated in the dimension tables.</p> <p>Up to a thread diameter 200 mm, the thread is a metric precision thread, larger locknuts and shaft nuts have trapezoidal threads.</p>
Hydraulic nuts	<p>FAG hydraulic nuts with a metric thread are available to fit all standardised adapter and withdrawal sleeves of metric sizes.</p> <p>Up to M200, the thread is a metric precision thread to DIN 13, over M200 trapezoidal threads to DIN 103 are used.</p> <p>Inch size threads conform to the ABMA Standards for Bearing Mounting Accessories, Section 8, Locknuts Series N-00.</p>

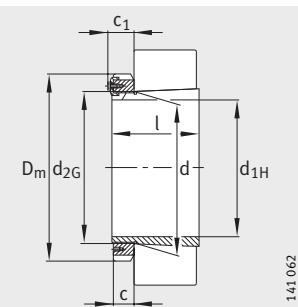


Adapter sleeves

With nut and retainer



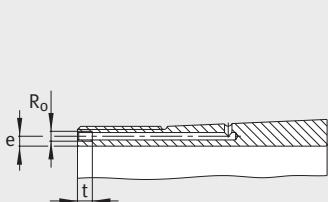
Taper 1:12
(taper 1:30 for H241)
Tab washer MB



Taper 1:12
(taper 1:30 for H240)
Retaining bracket MS30

Dimension table · Dimensions in mm

Designation	Nut	Retainer	Mass m ≈kg	Dimensions							Mounting dimensions		
				d _{1H}	d	D _m ≈	l	c ≈	d _{2G}	R ₀	e	t	
H2330	KM30	MB30	6,76	135	150	195	139	26	M150X2	—	—	—	
H3330	KM30	MB30	7,66	135	150	195	159	26	M150X2	—	—	—	
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	
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	
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	
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	
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	
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	
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	



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Hydraulic adapter sleeve (suffix HG)

Mounting dimensions

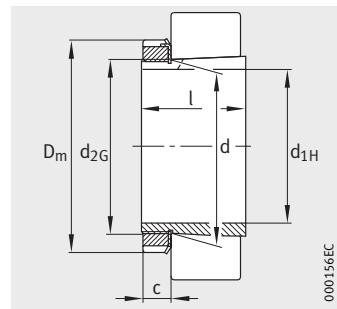
Dimension table (continued) · Dimensions in mm

Designation	Nut	Retainer	Mass m ≈kg	Dimensions							Mounting dimensions		
				d _{1H}	d	D _m ≈	l	c	c ₁ ≈	d _{2G}	R ₀	e	t
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	35	Tr220X4	—	—	—
H3144X-HG	HM44T	MB44	15,7	200	220	280	161	35	35	Tr220X4	M6	4,2	7
H2344X	HM44T	MB44	17,8	200	220	280	186	35	35	Tr220X4	—	—	—
H2344X-HG	HM44T	MB44	17,8	200	220	280	186	35	35	Tr220X4	M6	4,2	7
H24144	HM44T	MB44	17,1	200	220	280	199	35	35	Tr220X4	—	—	—
H24144-HG	HM44T	MB44	17,1	200	220	280	199	35	35	Tr220X4	M6	4,2	7
H3344	HM44T	MB44	21,1	200	220	280	223	35	35	Tr220X4	—	—	—
H3344-HG	HM44T	MB44	21,1	200	220	280	223	35	35	Tr220X4	M6	4,2	7
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	37	Tr240X4	—	—	—
H3148X-HG	HM48T	MB48	18,4	220	240	300	172	37	37	Tr240X4	M6	4,2	7
H2348X	HM48T	MB48	20,9	220	240	300	199	37	37	Tr240X4	—	—	—
H2348X-HG	HM48T	MB48	20,9	220	240	300	199	37	37	Tr240X4	M6	4,2	7
H24148	HM48T	MB48	19,9	220	240	300	212	37	37	Tr240X4	—	—	—
H24148-HG	HM48T	MB48	19,9	220	240	300	212	37	37	Tr240X4	M6	4,2	7
H3348	HM48T	MB48	25,1	220	240	300	240	37	37	Tr240X4	—	—	—
H3348-HG	HM48T	MB48	25,1	220	240	300	240	37	37	Tr240X4	M6	4,2	7

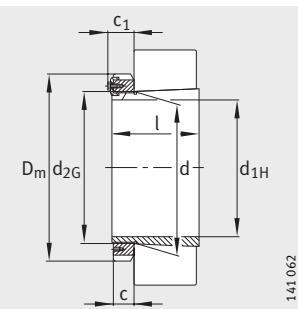


Adapter sleeves

With nut and retainer



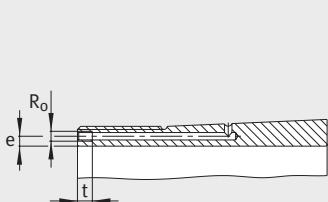
Taper 1:12
(taper 1:30 for H241)
Tab washer MB



Taper 1:12
(taper 1:30 for H240, H241)
Retaining bracket MS30, MS31

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	
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	38	Tr260X4	—	—	—	
H3152X-HG	HM52T	MB52	23,5	240	260	330	190	38	38	Tr260X4	M6	4,2	7	
H2352X	HM52T	MB52	25,7	240	260	330	211	38	38	Tr260X4	—	—	—	
H2352X-HG	HM52T	MB52	25,7	240	260	330	211	38	38	Tr260X4	M6	4,2	7	
H24152	HM52T	MB52	25,2	240	260	330	235	38	38	Tr260X4	—	—	—	
H24152-HG	HM52T	MB52	25,2	240	260	330	235	38	38	Tr260X4	M6	4,2	7	
H3352	HM52T	MB52	30,5	240	260	330	253	38	38	Tr260X4	—	—	—	
H3352-HG	HM52T	MB52	30,5	240	260	330	253	38	38	Tr260X4	M6	4,2	7	
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	39	Tr280X4	—	—	—	
H3156X-HG	HM56T	MB56	26,4	260	280	350	195	39	39	Tr280X4	M6	4,2	7	
H2356X	HM56T	MB56	29,8	260	280	350	224	39	39	Tr280X4	—	—	—	
H2356X-HG	HM56T	MB56	29,8	260	280	350	224	39	39	Tr280X4	M6	4,2	7	
H24156	HM56T	MB56	28	260	280	350	238	39	39	Tr280X4	—	—	—	
H24156-HG	HM56T	MB56	28	260	280	350	238	39	39	Tr280X4	M6	4,2	7	
H3356	HM56T	MB56	36	260	280	350	273	39	39	Tr280X4	—	—	—	
H3356-HG	HM56T	MB56	36	260	280	350	273	39	39	Tr280X4	M6	4,2	7	



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Hydraulic adapter sleeve (suffix HG)

Mounting dimensions

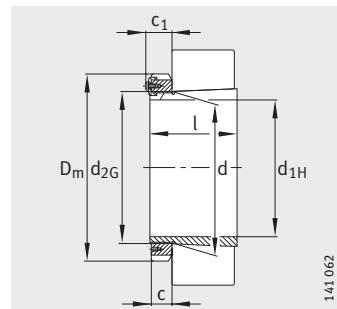
Dimension table (continued) · Dimensions in mm

Designation	Nut	Retainer	Mass m ≈kg	Dimensions							Mounting dimensions		
				d _{1H}	d	D _m ≈	l	c	c ₁ ≈	d _{2G}	R ₀	e	t
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
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

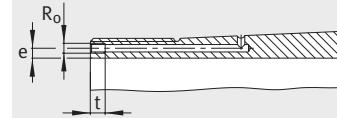


Adapter sleeves

With nut and retainer



Taper 1:12
(taper 1:30 for H240, H241)
Retaining bracket MS30, MS31



141072

Hydraulic adapter sleeve
(suffix HG)
Mounting dimensions

Dimension table (continued) · Dimensions in mm

Designation	Nut	Retainer	Mass m ≈ kg	Dimensions								Mounting dimensions		
				d _{1H}	d	D _m ≈	l	c ≈	c ₁ ≈	d _{2G}	R ₀	e	t	
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	
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	

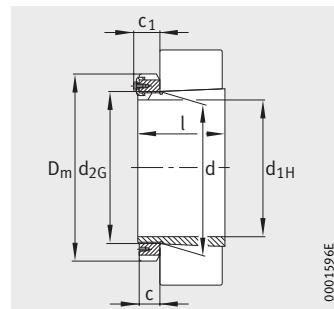
Dimension table (continued) · Dimensions in mm

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	
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	Tr530X6	M8	6	12	
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	

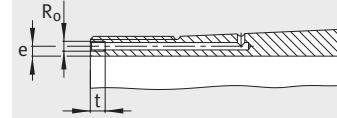


Adapter sleeves

With nut and retainer



Taper 1:12
(taper 1:30 for H240, H241,
H248, H249)



141072

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	
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	
H39/750-HG	HM30/750	MS30/750	213	710	750	870	291	90	111	Tr750X7	G1/8	8	12	
H240/750-HG	HM30/750	MS30/750	236	710	750	870	367	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	

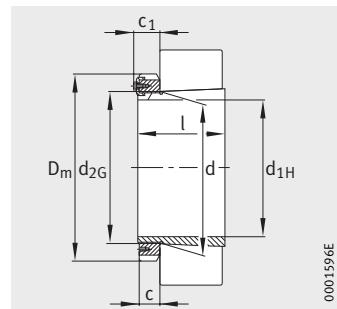
Dimension table (continued) · Dimensions in mm

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	
H39/850-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	1 060	536	118	143	Tr850X7	G1/8	10	12	
H32/850-HG	HM31/850	MS31/850	696	800	850	1 060	651	118	143	Tr850X7	G1/8	10	12	
H241/850-HG	HM31/850	MS31/850	624	800	850	1 060	658	118	143	Tr850X7	G1/8	10	12	
H33/850-HG	HM31/850	MS31/850	814	800	850	1 060	766	118	143	Tr850X7	G1/8	10	12	
H39/900-HG	HM30/900	MS30/850	335	850	900	1 030	326	100	122	Tr900X7	G1/8	10	12	
H240/900-HG	HM30/900	MS30/850	364	850	900	1 030	410	100	122	Tr900X7	G1/8	10	12	
H30/900-HG	HM30/900	MS30/850	392	850	900	1 030	400	100	122	Tr900X7	G1/8	10	12	
H240/900-HG	HM30/900	MS30/850	446	850	900	1 030	520	100	122	Tr900X7	G1/8	10	12	
H31/900-HG	HM31/900	MS31/900	674	850	900	1 120	557	125	150	Tr900X7	G1/8	10	12	
H32/900-HG	HM31/900	MS31/900	775	850	900	1 120	660	125	150	Tr900X7	G1/8	10	12	
H241/900-HG	HM31/900	MS31/900	712	850	900	1 120	685	125	150	Tr900X7	G1/8	10	12	
H33/900-HG	HM31/900	MS31/900	923	850	900	1 120	795	125	150	Tr900X7	G1/8	10	12	
H39/950-HG	HM30/950	MS30/950	369	900	950	1 080	344	100	122	Tr950X8	G1/8	10	12	
H30/950-HG	HM30/950	MS30/950	432	900	950	1 080	420	100	122	Tr950X8	G1/8	10	12	
H240/950-HG	HM30/950	MS30/950	499	900	950	1 080	557	100	122	Tr950X8	G1/8	10	12	
H31/950-HG	HM31/950	MS31/950	738	900	950	1 170	583	125	150	Tr950X8	G1/8	10	12	
H32/950-HG	HM31/950	MS31/950	835	900	950	1 170	675	125	150	Tr950X8	G1/8	10	12	
H241/950-HG	HM31/950	MS31/950	776	900	950	1 170	715	125	150	Tr950X8	G1/8	10	12	
H33/950-HG	HM31/950	MS31/950	1 000	900	950	1 170	815	125	150	Tr950X8	G1/8	10	12	
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	1 140	950	1 000	1 240	857	125	150	Tr1000X8	G1/8	10	12	

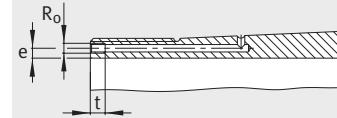


Adapter sleeves

With nut and retainer



Taper 1:12
(taper 1:30 for H240, H241,
H248, H249)



141072

Hydraulic adapter sleeve
(suffix HG)
Mounting dimensions

Dimension table (continued) · Dimensions in mm

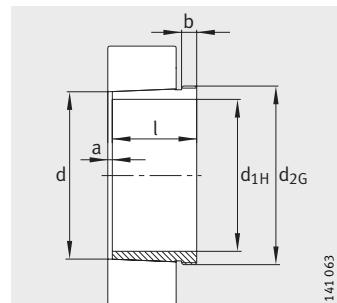
Designation			Mass m ≈kg	Dimensions								Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d _{1H}	d	D _m ≈	l	c	c ₁	d _{2G}	R ₀	e	t	
H39/1060-HG	HM30/1060	MS30/1000	493	1000	1060	1200	372	100	122	Tr1060X8	G1/4	12	15	
H30/1060-HG	HM30/1060	MS30/1000	574	1000	1060	1200	447	100	122	Tr1060X8	G1/4	12	15	
H240/1060-HG	HM30/1060	MS30/1000	665	1000	1060	1200	588	100	122	Tr1060X8	G1/4	12	15	
H31/1060-HG	HM31/1060	MS31/1000	985	1000	1060	1300	622	125	150	Tr1060X8	G1/4	12	15	
H241/1060-HG	HM31/1060	MS31/1000	1060	1000	1060	1300	775	125	150	Tr1060X8	G1/4	12	15	
H248/1060-HG	Z-195070.0	MS30/560	263	1020	1060	1150	335	80	101	Tr1060X8	G1/8	9	12	
H39/1120-HG	HM30/1120	MS30/1000	521	1060	1120	1260	372	100	122	Tr1120X8	G1/4	12	15	
H30/1120-HG	HM30/1120	MS30/1000	631	1060	1120	1260	467	100	122	Tr1120X8	G1/4	12	15	
H240/1120-HG	HM30/1120	MS30/1000	728	1060	1120	1260	612	100	122	Tr1120X8	G1/4	12	15	
H31/1120-HG	HM31/1120	MS31/1000	1060	1060	1120	1360	622	125	150	Tr1120X8	G1/4	12	15	
H241/1120-HG	HM31/1120	MS31/1000	1170	1060	1120	1360	805	125	150	Tr1120X8	G1/4	13	15	
H39/1180-HG	HM30/1180	MS30/1000	576	1120	1180	1320	394	100	122	Tr1180X8	G1/4	12	15	
H30/1180-HG	HM30/1180	MS30/1000	682	1120	1180	1320	479	100	122	Tr1180X8	G1/4	12	15	
H240/1180-HG	HM30/1180	MS30/1000	782	1120	1180	1320	625	100	122	Tr1180X8	G1/4	12	15	
H31/1180-HG	HM31/1180	MS31/1000	1160	1120	1180	1420	647	125	150	Tr1180X8	G1/4	12	15	
H241/1180-HG	HM31/1180	MS31/1000	1290	1120	1180	1420	845	125	150	Tr1180X8	G1/4	13	15	
H39/1250-HG	HM30/1250	MS30/1000	708	1180	1250	1390	407	110	132	Tr1250X8	G1/4	14	15	
H30/1250-HG	HM30/1250	MS30/1000	858	1180	1250	1390	509	110	132	Tr1250X8	G1/4	15	15	
H240/1250-HG	HM30/1250	MS30/1000	988	1180	1250	1390	660	110	132	Tr1250X8	G1/4	14	15	
H31/1250-HG	HM31/1250	MS31/1000	1380	1180	1250	1490	677	125	150	Tr1250X8	G1/4	14	15	
H241/1250-HG	HM31/1250	MS31/1000	1540	1180	1250	1490	885	125	150	Tr1250X8	G1/4	14	15	
H39/1320-HG	HM30/1320	MS30/1000	781	1250	1320	1460	430	110	132	Tr1320X8	G1/4	14	15	
H30/1320-HG	HM30/1320	MS30/1000	946	1250	1320	1460	534	110	132	Tr1320X8	G1/4	15	15	
H240/1320-HG	HM30/1320	MS30/1000	1080	1250	1320	1460	690	110	132	Tr1320X8	G1/4	14	15	
H31/1320-HG	HM31/1320	MS31/1000	1510	1250	1320	1560	710	125	150	Tr1320X8	G1/4	14	15	
H241/1320-HG	HM31/1320	MS31/1000	1700	1250	1320	1560	935	125	150	Tr1320X8	G1/4	14	15	
H39/1400-HG	HM30/1400	MS30/1000	924	1320	1400	1540	445	110	132	Tr1400X8	G1/4	15	15	
H30/1400-HG	HM30/1400	MS30/1000	1110	1320	1400	1540	546	110	132	Tr1400X8	G1/4	15	15	
H240/1400-HG	HM30/1400	MS30/1000	1290	1320	1400	1540	705	110	132	Tr1400X8	G1/4	14	15	
H31/1400-HG	HM31/1400	MS31/1000	1790	1320	1400	1640	735	130	155	Tr1400X8	G1/4	15	15	
H241/1400-HG	HM31/1400	MS31/1000	2030	1320	1400	1640	965	130	155	Tr1400X8	G1/4	15	15	

Dimension table (continued) · Dimensions in mm

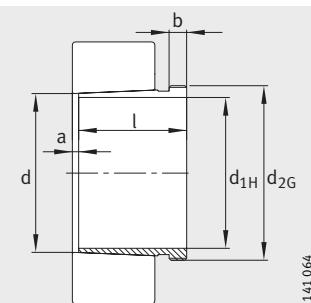
Designation			Mass m ≈kg	Dimensions								Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d _{1H}	d	D _m ≈	l	c	c ₁ ≈	d _{2G}	R ₀	e	t	
H39/1500-HG	HM30/1500	MS30/1500	1 210	1 400	1 500	1 650	465	110	132	Tr1500X8	G1/4	15	15	
H30/1500-HG	HM30/1500	MS30/1500	1 530	1 400	1 500	1 650	600	110	132	Tr1500X8	G1/4	15	15	
H240/1500-HG	HM30/1500	MS30/1500	1 790	1 400	1 500	1 650	775	110	132	Tr1500X8	G1/4	14	15	
H31/1500-HG	HM31/1500	MS31/1000	2 230	1 400	1 500	1 740	755	130	155	Tr1500X8	G1/4	15	15	
H241/1500-HG	HM31/1500	MS31/1000	2 560	1 400	1 500	1 740	990	130	155	Tr1500X8	G1/4	15	15	
H39/1600-HG	Z-195077.01.HM	MS30/850	2 480	1 500	1 600	1 730	465	100	122	Tr1600X8	G1/4	15	15	
H39/1700-HG	Z-195078.01.HM	MS30/850	2 620	1 600	1 700	1 830	475	100	122	Tr1600X8	G1/4	15	15	



Withdrawal sleeves



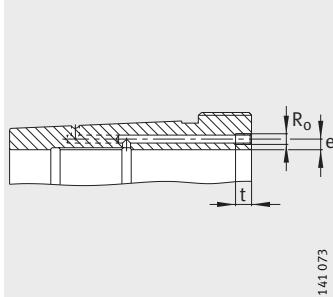
Taper 1:12



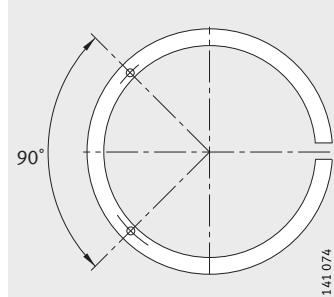
AH240, AH241
Taper 1:30

Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
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	–	–	–
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
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
AH2236	3,76	170	180	105	5	17	M200X3	–	–	–
AH2236G	3,35	170	180	105	5	17	M190X3	–	–	–
AH2236G-H	3,28	170	180	105	5	17	M190X3	M6	4,5	7
AH2236-H	3,68	170	180	105	5	17	M200X3	M6	4,5	7
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



Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions

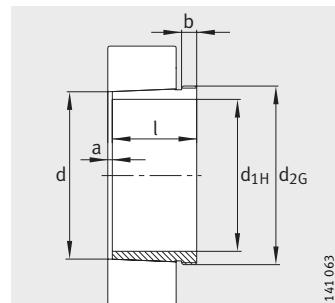


Pump connectors
for hydraulic withdrawal sleeve

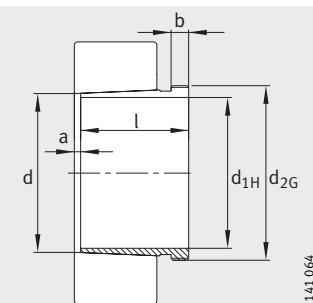
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AH2238	4,28	180	190	112	5	18	Tr210X4	-	-	-
AH2238G	3,83	180	190	112	5	18	M200X3	-	-	-
AH2238G-H	3,75	180	190	112	5	18	M200X3	M6	4,5	7
AH2238-H	4,19	180	190	112	5	18	Tr210X4	M6	4,5	7
AH3138	4,89	180	190	125	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
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
AH2240	4,8	190	200	118	5	19	Tr220X4	-	-	-
AH2240-H	4,7	190	200	118	5	19	Tr220X4	M6	4,5	7
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	Tr220X4	-	-	-
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



Withdrawal sleeves



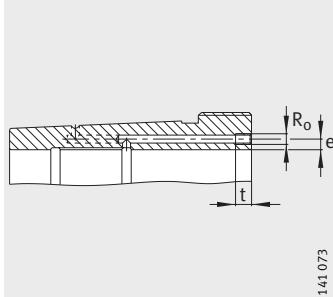
Taper 1:12



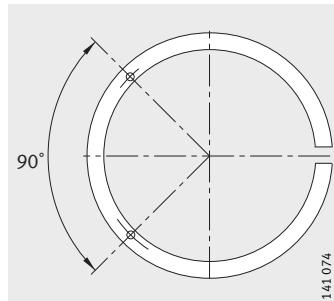
AH240, AH241
Taper 1:30

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
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
AH2244	9,17	200	220	130	6	20	Tr240X4	—	—	—
AH2244-H	8,99	200	220	130	6	20	Tr240X4	G1/8	8,5	12
AH24044	8,22	200	220	138	14	18	Tr230X4	—	—	—
AH24044-H	8,22	200	220	138	14	18	Tr230X4	M6	8	7
AH3144	10,4	200	220	145	6	23	Tr240X4	G1/8	8,5	12
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	M6	7,5	12
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
AH2248	11,3	220	240	144	6	21	Tr260X4	—	—	—
AH2248-H	11	220	240	144	6	21	Tr260X4	G1/8	8,5	12
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



Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions

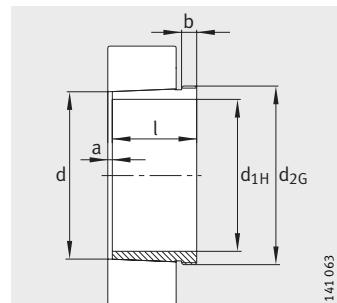


Pump connectors
for hydraulic withdrawal sleeve

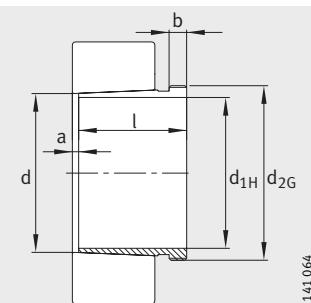
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
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
AH3052	10,8	240	260	128	7	23	Tr280X4	-	-	-
AH3052-H	10,8	240	260	128	7	23	Tr280X4	G1/8	8,5	12
AH2252	14,1	240	260	155	6	23	Tr290X4	-	-	-
AH2252G	13,3	240	260	155	6	23	Tr280X4	-	-	-
AH2252G-H	13,1	240	260	155	6	23	Tr280X4	G1/8	8,5	12
AH2252-H	13,8	240	260	155	6	23	Tr290X4	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
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	Tr280X4	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

Withdrawal sleeves



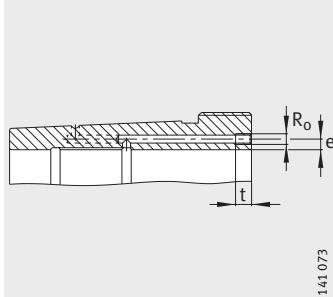
Taper 1:12



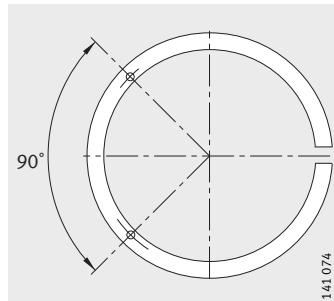
AH240, AH241
Taper 1:30

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
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
AH3056	12	260	280	131	8	24	Tr300X4	–	–	–
AH3056-H	12	260	280	131	8	24	Tr300X4	G1/8	8,5	12
AH2256	15,3	260	280	155	8	24	Tr310X4	–	–	–
AH2256G	14,4	260	280	155	8	24	Tr300X4	–	–	–
AH2256G-H	14,1	260	280	155	8	24	Tr300X4	G1/8	8,5	12
AH2256-H	15	260	280	155	8	24	Tr310X4	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	–	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



Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions

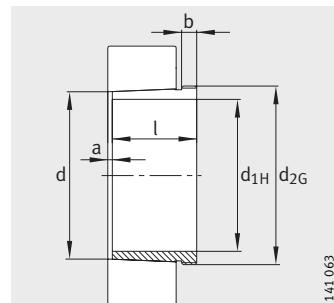


Pump connectors
for hydraulic withdrawal sleeve

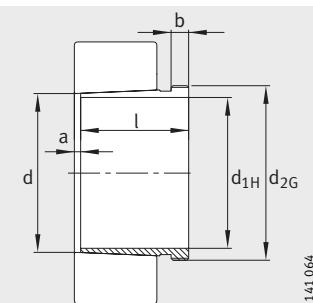
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
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
AH2260	18,3	280	300	170	8	26	Tr330X5	—	—	—
AH2260G	17,2	280	300	170	8	26	Tr320X5	—	—	—
AH2260G-H	16,9	280	300	170	8	26	Tr320X5	G1/8	8,5	12
AH2260-H	17,9	280	300	170	8	26	Tr330X5	G1/8	8,5	12
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

Withdrawal sleeves



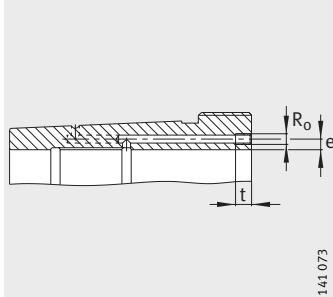
Taper 1:12



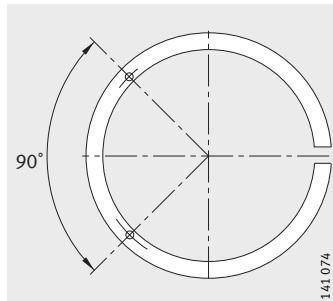
AH240, AH241
Taper 1:30

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
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
AH2264G	19,8	300	320	180	10	27	Tr340X5	–	–	–
AH2264G-H	19,6	300	320	180	10	27	Tr340X5	G1/8	8,5	12
AH2264-H	20,6	300	320	180	10	27	Tr350X5	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
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	229	9	35	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



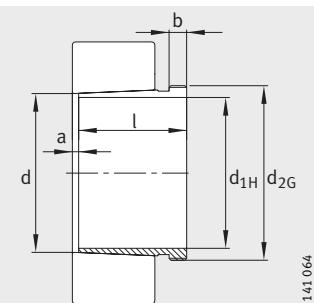
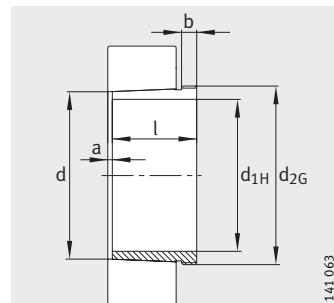
Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions



Pump connectors
for hydraulic withdrawal sleeve

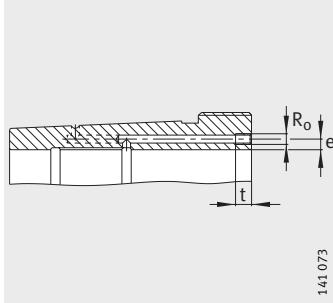
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AH3976G-H	16,1	360	380	130	8	22	Tr400X5	M8	7,5	12
AH3976-H	15,6	360	380	130	8	22	Tr395X5	M8	7,5	12
AH3076G-H	22,1	360	380	170	10	31	Tr400X5	G1/8	8,5	12
AH3076-H	23,6	360	380	170	10	31	Tr410X5	G1/8	8,5	12
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
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

Withdrawal sleeves

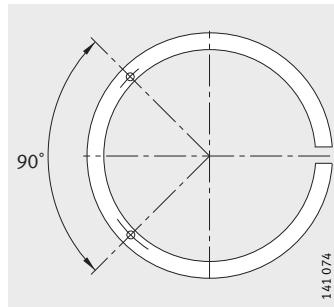


Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
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
AHX3092-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
AHX3196G-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



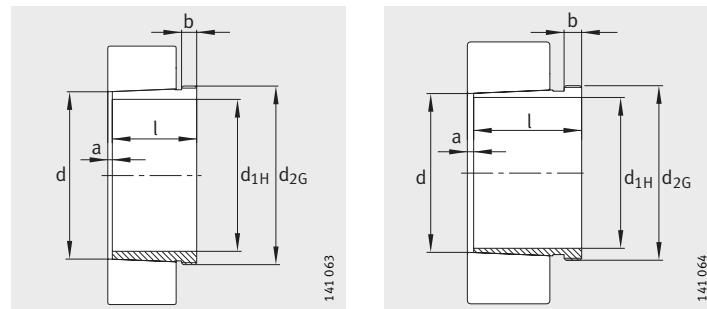
Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions



Pump connectors
for hydraulic withdrawal sleeve

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
AH32/530A-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

Withdrawal sleeves

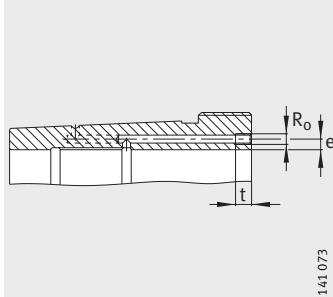


Taper 1:12

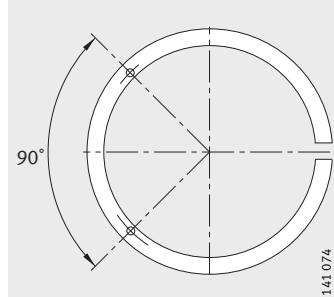
AH240, AH241
Taper 1:30

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
AH39/600G-H	57	570	600	192	10	38	Tr630X6	G1/4	12	15
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



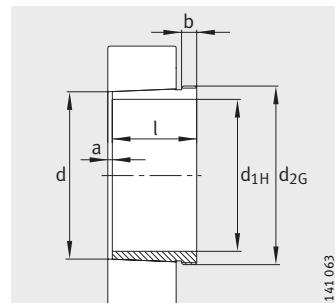
Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions



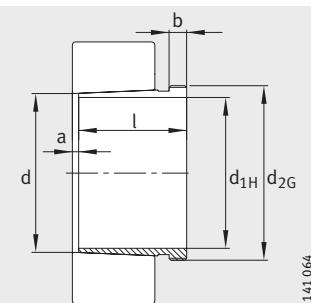
Pump connectors
for hydraulic withdrawal sleeve

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R _o	e	t
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
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
AH39/710G-H	62	680	710	163	12	43	Tr750X7	G1/4	15	15
AH38/710-H	58,6	680	710	163	12	43	Tr740X7	G1/4	12	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

Withdrawal sleeves



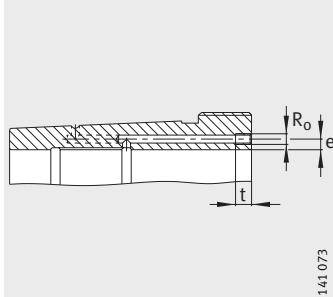
Taper 1:12



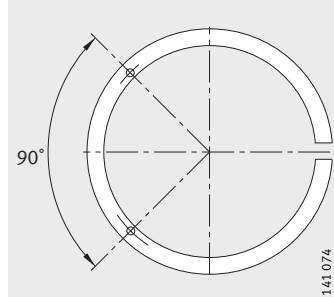
AH240, AH241, AH248
Taper 1:30

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
AH39/850G-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
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
AH39/900G-H	116	860	900	193	12	51	Tr950X8	G1/4	15	15
AH38/900-H	109	860	900	193	12	51	Tr930X8	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



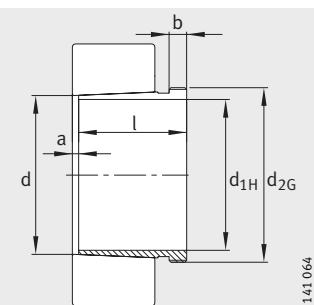
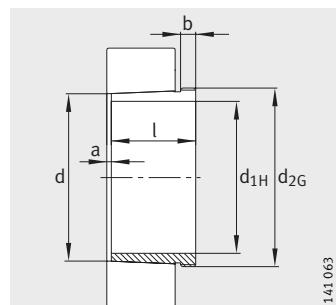
Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions



Pump connectors
for hydraulic withdrawal sleeve

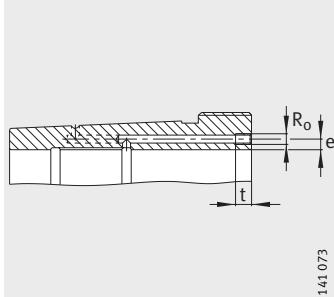
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R _o	e	t
AH39/1000G-H	246	950	1 000	296	15	52	Tr1060X8	G1/4	15	15
AH39/1000-H	229	950	1 000	296	15	52	Tr1035X8	G1/4	15	15
AH30/1 000A-H	309	950	1 000	365	22	57	Tr1060X8	G1/4	15	15
AH240/1000G-H	357	950	1 000	469	50	57	Tr1060X8	G1/4	15	15
AH240/1000-H	339	950	1 000	469	50	57	Tr1035X8	G1/4	15	15
AH31/1 000A-H	471	950	1 000	525	22	63	Tr1060X8	G1/4	15	15
AH32/1000A-H	591	950	1 000	630	22	70	Tr1060X8	G1/4	15	15
AH241/1000-H	502	950	1 000	645	50	65	Tr1060X8	G1/4	15	15
AH33/1000-H	781	950	1 000	780	22	70	Tr1060X8	G1/4	15	15
AH39/1060G-H	312	1 000	1 060	310	15	52	Tr1120X8	G1/4	15	15
AH39/1060-H	294	1 000	1 060	310	15	52	Tr1095X8	G1/4	15	15
AH30/1 060A-H	396	1 000	1 060	385	22	60	Tr1120X8	G1/4	15	15
AH240/1060G-H	465	1 000	1 060	498	50	60	Tr1120X8	G1/4	15	15
AH240/1060-H	445	1 000	1 060	498	50	60	Tr1095X8	G1/4	15	15
AH31/1060A-H	583	1 000	1 060	540	22	65	Tr1120X8	G1/4	15	15
AH241/1060-H	632	1 000	1 060	665	50	65	Tr1120X8	G1/4	15	15
AH241/1060-H	169	1 020	1 060	270	37	52	Tr1095X8	G1/4	15	15
AH30/1 120A-H	451	1 060	1 120	410	22	65	Tr1180X8	G1/4	15	15
AH240/1120G-H	524	1 060	1 120	527	50	65	Tr1180X8	G1/4	15	15
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	1 050	1 180	1 250	795	50	85	Tr1320X8	G1/4	15	15

Withdrawal sleeves

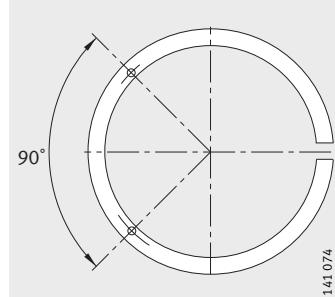


Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AH39/1250G-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	1 190	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	1 030	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	1 500	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



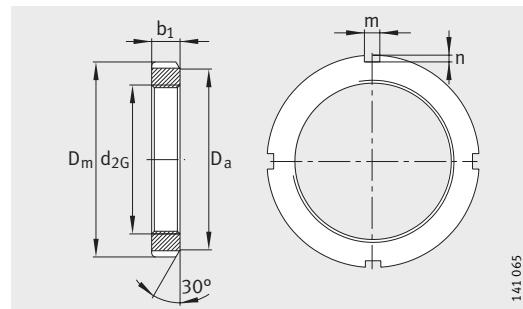
Hydraulic withdrawal sleeve
(suffix H)
Mounting dimensions



Pump connectors
for hydraulic withdrawal sleeve

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d _{1H}	d	l	a ≈	b	d _{2G}	R ₀	e	t
AH30/1500A-H	1 260	1 400	1 500	537	22	75	Tr1600X8	G1/4	15	15
AH241/1500-H	1 960	1 400	1 500	895	50	95	Tr1600X8	G1/4	15	15
AH39/1500G-H	405	1 450	1 500	306	20	60	Tr1600X8	G1/4	15	15
AH38/1500-H	365	1 450	1 500	306	20	60	Tr1540X8	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

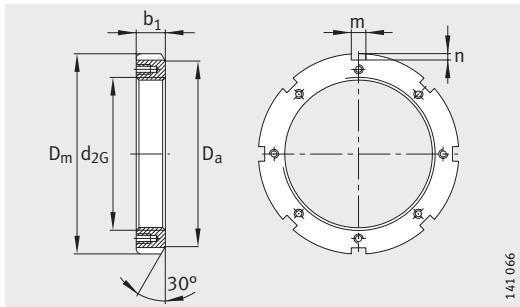


141065

KM, KML, HM..T

Dimension table · Dimensions in mm

Designation		Mass m ≈kg	Dimensions						
Nut	Suitable retainer		d_{2G}	D_m	b_1	D_a	m	n	
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	
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	

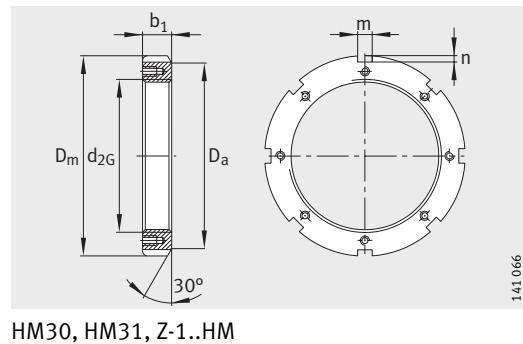


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HM30, HM31

Dimension table (continued) · Dimensions in mm								
Designation		Mass m ≈ kg	Dimensions					
Nut	Suitable retainer		d _{2G}	D _m	b ₁	D _a	m	n
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
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

Locknuts



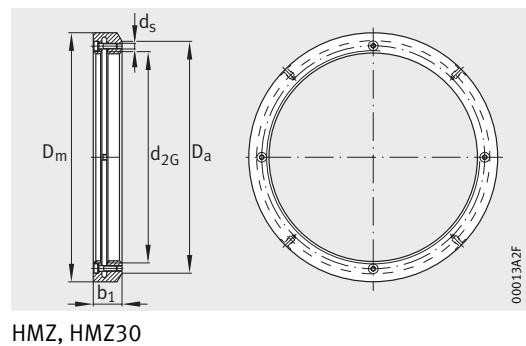
HM30, HM31, Z-1..HM

141 066

Dimension table (continued) · Dimensions in mm

Designation		Mass m ≈kg	Dimensions					
Nut	Suitable retainer		d_{2G}	D_m	b_1	D_a	m	n
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	1 000	112	925	60	34
HM30/850	MS30/850	113	Tr850X7	980	90	925	60	25
HM31/850	MS31/850	246	Tr850X7	1 060	118	975	70	38
HM30/900	MS30/850	135	Tr900X7	1 030	100	975	60	25
HM31/900	MS31/900	293	Tr900X7	1 120	125	1 030	70	38
HM30/950	MS30/950	143	Tr950X8	1 080	100	1 025	60	25
HM31/950	MS31/950	310	Tr950X8	1 170	125	1 080	70	38
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
Z-195070.01.HM	MS30/560	94	Tr1060X8	1 150	80	1 108	40	21
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
Z-195077.01.HM	MS30/850	273	Tr1600X8	1 730	100	1 675	60	25
Z-195078.01.HM	MS30/850	273	Tr1700X8	17 830	100	1 775	60	25

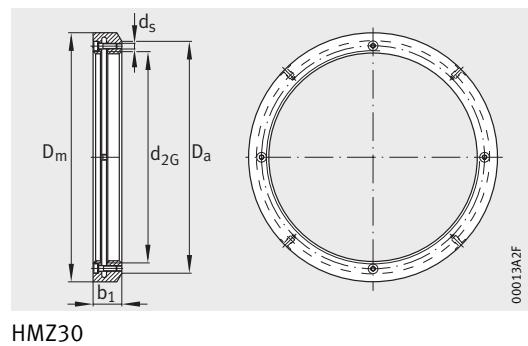
Shaft nuts



Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					Clamping screw Quantity	Tightening torque per clamping screw M _{aL} Nm
		d _{2G}	D _m	b ₁	D _a	d _s		
HMZ26	1,3	M130X2	165	21	149	M6	4	11
HMZ27	1,6	M135X2	175	22	160	M6	4	11
HMZ28	1,6	M140X2	180	22	160	M6	4	11
HMZ29	2,2	M145X2	190	24	171	M6	4	11
HMZ30	2,2	M150X2	195	24	171	M6	4	11
HMZ31	2,4	M155X3	200	25	182	M6	4	11
HMZ32	2,6	M160X3	210	25	182	M6	4	11
HMZ33	2,8	M165X3	210	26	193	M8	4	27
HMZ34	2,9	M170X3	220	26	193	M8	4	27
HMZ36	3,2	M180X3	230	27	203	M8	4	27
HMZ38	3,5	M190X3	240	28	214	M8	4	27
HMZ40	3,9	M200X3	250	29	226	M8	4	27
HMZ3044	3,4	Tr220X4	260	30	242	M8	4	27
HMZ3048	5,4	Tr240X4	290	34	270	M10	4	54
HMZ3052	5,8	Tr260X4	310	34	290	M10	4	54
HMZ3056	6,9	Tr280X4	330	38	310	M10	4	54
HMZ3060	10	Tr300X4	360	42	336	M10	4	54
HMZ3064	10,6	Tr320X5	380	42	356	M10	4	54
HMZ3068	12,1	Tr340X5	400	45	376	M12	4	93
HMZ3072	12,5	Tr360X5	420	45	394	M12	4	93
HMZ3076	16,7	Tr380X5	450	48	422	M12	4	93
HMZ3080	19,1	Tr400X5	470	52	442	M16	4	230
HMZ3084	19,8	Tr420X5	490	52	462	M16	4	230
HMZ3088	27,8	Tr440X5	520	60	490	M16	4	230
HMZ3092	29,1	Tr460X5	540	60	510	M16	4	230
HMZ3096	30,1	Tr480X5	560	60	530	M16	4	230
HMZ30/500	35,7	Tr500X5	580	68	550	M20	4	464
HMZ30/530	46,9	Tr530X6	630	68	590	M20	4	464
HMZ30/560	48,5	Tr560X6	650	75	610	M20	4	464
HMZ30/600	58,7	Tr600X6	700	75	660	M20	4	464
HMZ30/630	61,2	Tr630X6	730	75	690	M20	4	464
HMZ30/670	77,5	Tr670X6	780	80	740	M20	4	464
HMZ30/710	99,5	Tr710X7	830	90	780	M20	4	464

Shaft nuts

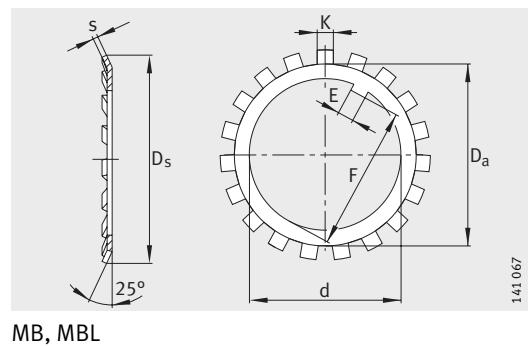


HMZ30

Dimension table · Dimensions in mm

Designation	Mass ≈kg	Dimensions					Clamping screw Quantity	Tightening torque per clamping screw M_{aL} Nm
		d _{2G}	D _m	b ₁	D _a	d _s		
HMZ30/750	105	Tr750X7	870	90	820	M20	4	464
HMZ30/800	111	Tr800X7	920	90	870	M20	4	464
HMZ30/850	119	Tr850X7	980	90	925	M20	4	464
HMZ30/900	142	Tr900X7	1 030	100	975	M24	8	798
HMZ30/950	150	Tr950X8	1 080	100	1 025	M24	8	798
HMZ30/1000	173	Tr1000X8	1 140	100	1 085	M24	8	798
HMZ30/1060	184	Tr1060X8	1 200	100	1 145	M24	8	798
HMZ30/1120	194	Tr1120X8	1 260	100	1 205	M24	8	798
HMZ30/1180	206	Tr1180X8	1 320	100	1 265	M24	8	798
HMZ30/1250	245	Tr1250X8	1 390	110	1 335	M24	8	798
HMZ30/1320	257	Tr1320X8	1 460	110	1 405	M24	8	798
HMZ30/1400	272	Tr1400X8	1 540	110	1 485	M24	8	798
HMZ30/1500	312	Tr1500X8	1 650	110	1 595	M24	8	798

Tab washers



141 067

Dimension table · Dimensions in mm

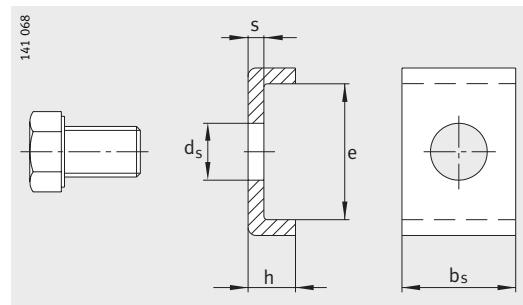
Designation	Mass m 100 piece ≈kg	Dimensions						
		d	D_s	s	D_a	$E^{1)}$	F	K
MBL26	8,7	130	161	2	145	14	125	12
MB26	11,3	130	175	2	149	14	125	12
MB27	14,4	135	185	2	160	14	130	14
MBL28	10,9	140	171	2	155	16	135	12
MB28	14,2	140	192	2	160	16	135	14
MB29	16,8	145	202	2	171	16	140	14
MBL30	11,3	150	188	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

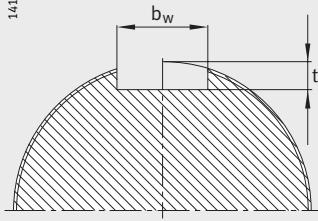
With hexagon head cap screw



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

¹⁾ Up to thread M16: self-retaining screw.



Shaft

Dimension table (continued) · Dimensions in mm

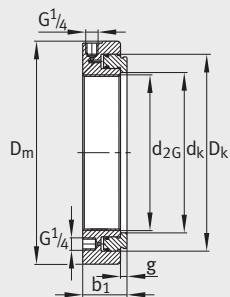
Designation		Tightening torque Nm	Mass m ≈kg	Dimensions					Mounting dimensions Shaft slot	
Retaining bracket Complete	Hexagon head cap screw ¹⁾			s	b _s	h	d _s	e	b _w	t
MS31/500	M16X25	215	0,178	5	40	15	18	45	42	12
MS30/530	M16X25	215	0,223	7	40	21	18	34	42	14
MS31/530	M20X40	430	0,347	7	40	21	22	51	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) From thread M20: standardised hexagon head cap screw with retainer.



Hydraulic nuts

Threads in metric sizes



00015873

Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions							Drive-up force at 800 bar kN	
		d_{2G}	D_m	b_1	D_k	d_k	g	Stroke length		
HYDNUT150	6,8	M150X2	220	46	191	151	7	5	75,3	602
HYDNUT155	7,2	M155X3	225	46	200	156	7	5	81,8	654
HYDNUT160	8	M160X3	235	47	206	161	7	6	87,2	698
HYDNUT165	8,2	M165X3	240	47	211	166	7	6	92,3	739
HYDNUT170	8,6	M170X3	245	48	216	171	7	6	94,7	758
HYDNUT180	9,1	M180X3	255	48	227	181	7	6	103	824
HYDNUT190	10,5	M190X3	270	50	240	191	8	8	116	928
HYDNUT200	11,5	M200X3	280	50	251	201	8	8	125	1 000
HYDNUT205	12,3	Tr205X4	290	51	258	207	8	8	132,2	1 058
HYDNUT210	12,7	Tr210X4	295	52	263	212	9	9	135	1 080
HYDNUT215	13,2	Tr215X4	300	53	268	217	9	9	137,7	1 102
HYDNUT220	13,5	Tr220X4	305	53	273	222	9	9	144,2	1 154
HYDNUT225	15	Tr225X4	315	54	282	227	9	10	153	1 224
HYDNUT230	15,3	Tr230X4	320	54	287	232	9	10	160	1 280
HYDNUT235	15,5	Tr235X4	325	54	290	237	9	10	161,7	1 294
HYDNUT240	16,1	Tr240X4	330	55	296	242	9	10	165,3	1 323
HYDNUT250	18	Tr250X4	345	56	310	252	10	10	182,2	1 458
HYDNUT260	19	Tr260X4	355	57	319	262	10	11	188	1 504
HYDNUT270	21,1	Tr270X4	370	58	332	272	10	12	196	1 568
HYDNUT275	21,5	Tr275X4	375	58	337	277	10	12	204	1 632
HYDNUT280	22,3	Tr280X4	380	59	342	282	10	12	211,7	1 694
HYDNUT290	23,3	Tr290X4	390	60	352	292	10	13	218,3	1 747
HYDNUT295	25	Tr295X4	400	60	362	297	10	13	230	1 840
HYDNUT300	25,8	Tr300X4	405	61	365	302	10	13	237	1 896
HYDNUT310	27	Tr310X5	415	62	375	312	10	13	249	1 992
HYDNUT315	27,5	Tr315X5	420	62	380	317	10	13	252,5	2 020
HYDNUT320	29,9	Tr320X5	430	63	389	322	10	14	264	2 112
HYDNUT330	31	Tr330X5	440	64	398	332	11	14	270,8	2 166
HYDNUT335	32	Tr335X5	445	65	403	337	11	14	275	2 200
HYDNUT340	32,5	Tr340X5	450	65	408	342	11	14	284	2 272
HYDNUT345	33,5	Tr345X5	455	66	413	347	11	14	288	2 304
HYDNUT350	35	Tr350X5	465	66	422	352	11	14	306	2 448
HYDNUT355	36,5	Tr355X5	470	67	427	357	11	15	304	2 432

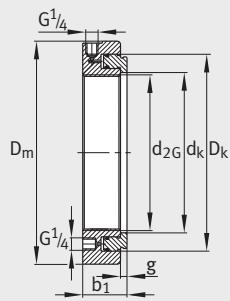
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions								Drive-up force at 800 bar kN
		d _{2G}	D _m	b ₁	D _k	d _k	g	Stroke length	Piston surface cm ²	
HYDNUT360	37	Tr360X5	475	67	431	362	11	15	313	2 504
HYDNUT365	38	Tr365X5	482	67	436	367	11	15	317	2 536
HYDNUT370	40	Tr370X5	490	68	444	372	11	16	323	2 584
HYDNUT375	41	Tr375X5	495	68	450	377	11	16	334	2 672
HYDNUT380	41,5	Tr380X5	500	69	454	382	11	16	337	2 696
HYDNUT385	42	Tr385X5	505	69	460	387	11	16	348	2 784
HYDNUT395	43	Tr395X5	512	69	470	397	11	16	356	2 848
HYDNUT400	47	Tr400X5	525	71	477	402	11	17	368	2 944
HYDNUT410	48	Tr410X5	535	71	485	412	11	17	382	3 056
HYDNUT415	49	Tr415X5	540	71	490	417	11	17	386	3 088
HYDNUT420	50	Tr420X5	545	72	495	422	12	17	390	3 120
HYDNUT430	52	Tr430X5	555	74	505	432	12	17	398	3 184
HYDNUT435	53	Tr435X5	560	74	510	437	12	17	403	3 224
HYDNUT440	54	Tr440X5	565	74	519	442	12	17	425	3 400
HYDNUT450	58	Tr450X5	580	76	530	452	12	17	442	3 536
HYDNUT460	59,5	Tr460X5	590	76	540	462	12	18	450	3 600
HYDNUT470	61	Tr470X5	600	76	550	472	12	18	459	3 672
HYDNUT480	63	Tr480X5	612	76	560	482	12	18	460	3 680
HYDNUT490	69	Tr490X5	625	80	575	492	13	19	506	4 048
HYDNUT500	70	Tr500X5	635	80	585	502	13	20	523	4 185
HYDNUT510	72	Tr510X6	645	80	595	512	13	20	533	4 264
HYDNUT520	75	Tr520X6	657	80	605	522	13	21	542	4 336
HYDNUT530	80	Tr530X6	670	83	617	532	13	22	562	4 496
HYDNUT540	82,5	Tr540X6	680	83	628	542	13	22	581	4 648
HYDNUT550	84,5	Tr550X6	692	83	639	552	13	22	592	4 736
HYDNUT560	88	Tr560X6	705	83	650	562	13	22	612	4 896
HYDNUT570	92	Tr570X6	715	85	660	572	13	23	631	5 048
HYDNUT580	93	Tr580X6	725	85	670	582	13	23	641	5 128
HYDNUT590	98	Tr590X6	740	85	685	592	13	23	666	5 328
HYDNUT600	100	Tr600X6	750	85	695	603	13	23	677	5 416
HYDNUT610	104	Tr610X6	760	88	705	613	14	24	687	5 496
HYDNUT625	107	Tr625X6	775	88	720	628	14	24	702	5 516
HYDNUT630	109	Tr630X6	780	88	725	633	14	24	728	5 824



Hydraulic nuts

Threads in metric sizes



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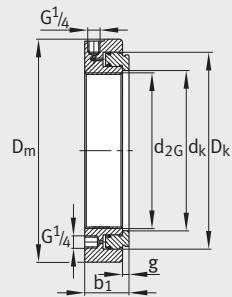
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions							Drive-up force at 800 bar kN	
		d_{2G}	D_m	b_1	D_k	d_k	g	Stroke length		
HYDNUT650	115	Tr650X6	805	88	748	653	14	24	763	6 104
HYDNUT655	116	Tr655X6	810	88	753	658	14	24	768	6 144
HYDNUT670	121	Tr670X6	825	90	768	673	14	24	795	6 360
HYDNUT680	124	Tr680X6	837	90	780	683	14	24	819	6 552
HYDNUT690	128	Tr690X6	850	90	792	693	14	25	844	6 752
HYDNUT695	133	Tr695X6	855	93	798	698	14	25	862	6 896
HYDNUT710	136	Tr710X7	870	93	812	713	14	25	877	7 020
HYDNUT720	144	Tr720X7	883	95	825	723	15	25	928	7 424
HYDNUT740	154	Tr740X7	910	95	848	743	15	25	991	7 928
HYDNUT750	160	Tr750X7	922	96	862	753	15	26	1 033	8 265
HYDNUT760	165	Tr760X7	935	96	872	763	15	26	1 045	8 360
HYDNUT780	172	Tr780X7	955	98	890	783	15	28	1 068	8 544
HYDNUT800	170	Tr800X7	970	98	909	803	16	28	1 079	8 632
HYDNUT830	176	Tr830X7	1 000	98	938	833	16	29	1 101	8 808
HYDNUT850	180	Tr850X7	1 020	98	960	853	16	29	1 156	9 248
HYDNUT880	185	Tr880X7	1 050	98	988	883	16	29	1 148	9 184
HYDNUT900	194	Tr900X7	1 070	100	1 012	903	16	29	1 251	10 008
HYDNUT930	200	Tr930X8	1 100	100	1 042	933	16	30	1 290	10 320
HYDNUT950	210	Tr950X8	1 120	100	1 065	953	16	30	1 365	10 920
HYDNUT1000	228	Tr1000X8	1 170	100	1 123	1 003	16	30	1 490	11 920
HYDNUT1060	300	Tr1060X8	1 255	115	1 185	1 063	18	32	1 610	12 880
HYDNUT1080	322	Tr1080X8	1 280	118	1 207	1 083	18	33	1 680	13 440
HYDNUT1120	392	Tr1120X8	1 340	125	1 260	1 123	19	36	1 900	15 200
HYDNUT1180	503	Tr1180X8	1 430	135	1 315	1 183	22	39	2 100	16 800



Hydraulic nuts

Threads in inch sizes



Dimension table · Dimensions in mm

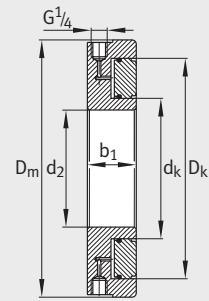
Designation	Mass m ≈kg	Thread d_{2G}		Flank diameter		Number of turns per inch
		mm	inch	mm	inch	
HYDNUT150-INCH	6,8	149,555	5,888	148,181	5,8339	12
HYDNUT160-INCH	8	159,614	6,284	157,551	6,2028	8
HYDNUT170-INCH	8,6	169,139	6,659	167,067	6,5778	8
HYDNUT180-INCH	8,1	179,476	7,066	177,414	6,9848	8
HYDNUT190-INCH	10,5	189,789	7,472	187,726	7,3908	8
HYDNUT200-INCH	11,5	199,314	7,847	197,251	7,7658	8
HYDNUT220-INCH	13,5	219,151	8,628	217,089	8,5468	8
HYDNUT240-INCH	16,1	239,827	9,442	237,076	9,3337	6
HYDNUT260-INCH	19	258,877	10,192	256,126	10,0837	6
HYDNUT280-INCH	22,3	279,502	11,004	276,751	10,8975	6
HYDNUT300-INCH	25,8	299,339	11,785	296,588	11,6767	6
HYDNUT320-INCH	29,9	319,075	12,562	316,324	12,4537	6
HYDNUT340-INCH	32,5	338,811	13,339	335,763	13,219	5
HYDNUT360-INCH	37	359,918	14,17	356,87	14,05	5
HYDNUT380-INCH	41,5	379,908	14,957	376,86	14,837	5
HYDNUT400-INCH	47	399,923	15,745	396,875	15,625	5
HYDNUT420-INCH	50	419,913	16,532	416,865	16,412	5
HYDNUT440-INCH	54	439,903	17,319	436,855	17,199	5
HYDNUT460-INCH	59,5	459,918	18,107	456,87	17,987	5
HYDNUT480-INCH	63	479,908	18,894	476,86	18,774	5
HYDNUT500-INCH	70	499,923	19,682	496,875	19,562	5
HYDNUT530-INCH	80	530,022	20,867	526,339	20,722	4

Dimensions							Drive-up force at 800 bar kN
D _m	b ₁	D _k	d _k	g	Stroke length	Piston surface cm ²	
220	46	191	151	7	5	75,3	602
235	47	206	161	7	6	87,2	698
245	48	216	171	7	6	94,7	758
255	48	227	181	7	6	103	824
270	50	240	191	8	8	116	928
280	50	251	201	8	8	125	1 000
305	53	273	222	9	9	144,2	1 154
330	55	296	242	9	10	165,3	1 323
355	57	319	262	10	11	188	1 504
380	59	342	282	10	12	211,7	1 694
405	61	365	302	10	13	237	1 896
430	63	389	322	10	14	264	2 112
450	65	408	342	11	14	284	2 272
475	67	431	362	11	15	313	2 504
500	69	454	382	11	16	337	2 696
525	71	477	402	11	17	368	2 944
545	72	495	422	11	17	390	3 120
565	74	519	442	12	17	425	3 400
590	76	540	462	12	18	450	3 600
612	76	560	482	12	18	460	3 680
635	80	585	502	13	20	523	4 185
670	83	617	542	13	22	562	4 496



Hydraulic nuts

Increased capacity design



Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions							Drive-up force at 800 bar kN
		d ₂ H7	D _m	b ₁	D _k	d _k	Stroke length	Piston surface cm ²	
HYDNUT150-HEAVY	12,5	150	270	40	226	180	10	147	1 170
HYDNUT175-HEAVY	17	175	305	45	250	205	11	161	1 280
HYDNUT200-HEAVY	21	200	330	50	280	230	12	200	1 600
HYDNUT225-HEAVY	23	225	365	50	313	255	12	259	2 070
HYDNUT250-HEAVY	28	250	390	50	345	280	12	319	2 550
HYDNUT275-HEAVY	34	275	430	50	380	305	12	403	3 220
HYDNUT300-HEAVY	44	300	470	55	410	335	13	439	3 510
HYDNUT325-HEAVY	49	325	500	55	440	360	13	503	4 020
HYDNUT350-HEAVY	57	350	540	55	475	385	13	608	4 860
HYDNUT375-HEAVY	65	375	575	55	510	410	13	723	5 780
HYDNUT400-HEAVY	83	400	620	60	545	440	15	812	6 500
HYDNUT425-HEAVY	90	425	650	60	575	465	15	899	7 190
HYDNUT450-HEAVY	100	450	690	65	610	490	17	1 037	8 290
HYDNUT475-HEAVY	120	475	725	65	642	515	17	1 154	9 230
HYDNUT500-HEAVY	142	500	760	70	675	540	20	1 288	10 300
HYDNUT525-HEAVY	158	525	800	70	710	565	20	1 452	11 620
HYDNUT550-HEAVY	183	550	835	75	742	590	22	1 590	12 720
HYDNUT575-HEAVY	197	575	870	75	775	615	22	1 747	13 980
HYDNUT600-HEAVY	230	600	910	80	808	645	25	1 860	14 880
HYDNUT625-HEAVY	248	625	945	80	840	670	25	2 016	16 130
HYDNUT650-HEAVY	282	650	980	85	875	695	28	2 220	17 760
HYDNUT675-HEAVY	307	675	1 020	85	906	720	28	2 375	19 000
HYDNUT700-HEAVY	351	700	1 060	90	940	750	30	2 522	20 180
HYDNUT750-HEAVY	431	750	1 130	95	1 007	800	32	2 938	23 500
HYDNUT800-HEAVY	500	800	1 205	100	1 070	855	35	3 250	26 000
HYDNUT850-HEAVY	583	850	1 275	105	1 135	905	38	3 685	29 480
HYDNUT900-HEAVY	688	900	1 350	110	1 200	960	40	4 072	32 580



FAG



Arcanol rolling bearing greases

Arcanol rolling bearing greases

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Product overview Arcanol rolling bearing greases

Arcanol greases



155 253a

Arcanol rolling bearing greases

Features

Schaeffler Group Industrial 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.

Graduated range

The range is graduated such that almost all areas of application can be covered to an optimum extent.

For automatic or manual grease lubrication

For grease lubrication, we supply automatic lubricators of the designs COMPACT, CHAMPION and 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 hose 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 ¹⁾	Tube			Car- tridge 400 g	Can 1 kg	Bucket		Hobbock		Drum 180 kg
	20 g	70 g	250 g			5 kg	10 kg	25 kg	50 kg	
MULTITOP	-	-	●	●	●	●	●	●	-	●
MULTI3	-	-	●	●	●	●	●	●	-	●
LOAD150	-	-	-	●	●	-	●	-	-	-
LOAD220	-	-	-	-	●	-	●	●	-	●
LOAD400	-	-	-	●	●	●	●	●	●	●
LOAD1000	-	-	-	-	-	●	-	●	-	●
TEMP90	●	-	-	●	●	●	-	●	-	●
TEMP110	-	-	-	●	●	-	-	-	●	-
TEMP120	-	-	-	-	●	●	-	●	-	-
TEMP200	-	●	-	-	●	-	-	-	-	-
SPEED2,6	-	-	●	-	●	-	-	●	-	-
VIB3	-	-	-	●	●	●	-	●	●	-
BIO2	-	-	-	●	●	-	●	●	-	●
FOOD2	-	-	-	●	●	-	●	●	-	●

¹⁾ Other containers are available by agreement.



Arcanol rolling bearing greases

Arcanol greases

The chemical/physical characteristics of the greases, their principal characteristics and application examples are shown in table. Ordering examples for the greases are listed below.

Arcanol rolling bearing greases

Designation	Designation to DIN 51825	Thickener	Base oil viscosity at +40 °C mm ² /s	Consistency NLGI class
MULTITOP	KP2N-40	Lithium soap	≥ ISO VG 68	2
MULTI3	KP3K-30	Lithium soap	≥ ISO VG 68	3
LOAD150	KP2N-20	Lithium complex	≥ ISO VG 150	2
LOAD220	KP2N-20	Mixed thickener	ISO VG 220	1 to 2
LOAD400	KP2N-20	Mixed thickener	≥ 400	2
LOAD1000	KP2N-20	Mixed thickener	ISO VG 1000	2
TEMP90	KP2N-30	Mixed thickener	≥ ISO VG 100	2
TEMP110	KPE2P-40	Lithium complex	≥ ISO VG 68	2 to 3
TEMP120	KPHC2R-30	Polycarbamide	ISO VG 460	2
TEMP200	KFK2U-30	PTFE	ISO VG 220 to ISO VG 460	2
SPEED2,6	KE3K-30	Polycarbamide	≥ ISO VG 22	2 to 3
VIB3	KP3N-30	Lithium complex	≥ ISO VG 150	3
BIO2	KPE2K-30	Mixed thickener	≥ ISO VG 68	2
FOOD2	KPF2K-30	Aluminium complex	≥ ISO VG 100	1 to 2

Ordering examples:

- ARCANOL-MULTITOP-5KG
- ARCANOL-MULTI3-25KG
- ARCANOL-LOAD150-10KG
- ARCANOL-LOAD220-1KG
- ARCANOL-LOAD400-400G
- ARCANOL-LOAD1000-5KG.

Grease range chart			
Operating temperature °C	Continuous limit temperature °C	Principal characteristics	Application examples
-40 +140	+80	Universal grease for ball and roller bearings at increased speeds, high loads, low and high temperatures	Rolling mills, construction machinery, automotive, spinning and grinding spindles
-30 +120	+75	Universal grease for ball bearings D > 62 mm	Large electric motors, agricultural and construction machinery, fans
-20 +140	+90	Special grease for ball, roller and needle roller bearings, linear guidance systems at high loads, wide speed range, swivel motion	Machine tools
-20 +140	+80	Special grease for ball and roller bearings at high loads, wide speed range, high humidity	Rolling mill equipment, rail vehicles
-20 +140	+80	Special grease for ball and roller bearings at very high loads, moderate temperature, low speed	Mining machinery, construction machinery, wind turbines
-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
-30 +140	+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
-30 +180	+120	Special grease for ball and roller bearings at high temperature, high loads	Continuous casting plant
-30 +250	+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
-30 +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 wind turbine rotors, packaging machinery, rail vehicles
-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:

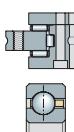
- ARCANOL-TEMP90-180KG
- ARCANOL-TEMP110-400G
- ARCANOL-TEMP120-25KG
- ARCANOL-TEMP200-70G
- ARCANOL-SPEED2,6-250G
- ARCANOL-VIB3-25KG
- ARCANOL-BIO2-1KG
- ARCANOL-FOOD2-10KG.





Other products

Slewing rings
High precision bearings for combined loads
Thin section bearings
Needle roller bearings with ribs
Equipment and services
for the mounting and maintenance of rolling bearings



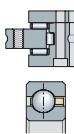


Slewing rings

Four point contact bearings
Crossed roller bearings

Slewing rings

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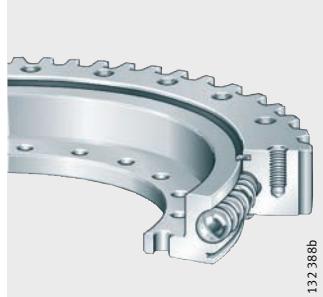


Product overview Slewing rings

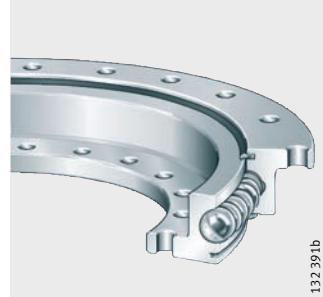
Four point contact bearings

Light series 20

VLA20

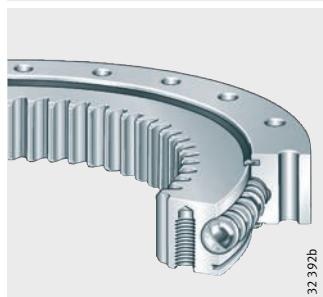


VLU20

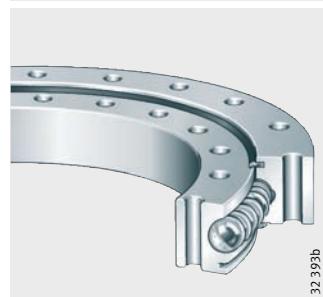


Standard series 20, 25

VSI20, VSI25



VSU20, VSU25



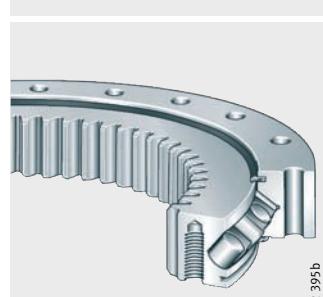
Crossed roller bearings

Standard series 14

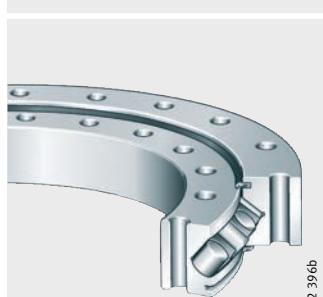
XSA14



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 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 lower requirements for accuracy and rigidity of the bearing arrangement, for example in simple metalworking machines, wind power equipment and construction machinery.

Crossed roller bearings

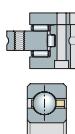
Crossed roller bearings are available with external teeth, internal teeth and without teeth in the standard series 14 as well as the series XA, XI and XU.

These preloaded slewing rings can support higher loads than four point contact bearings. They have proved themselves particularly effective where bearings are subjected to high radial forces as well as to 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.

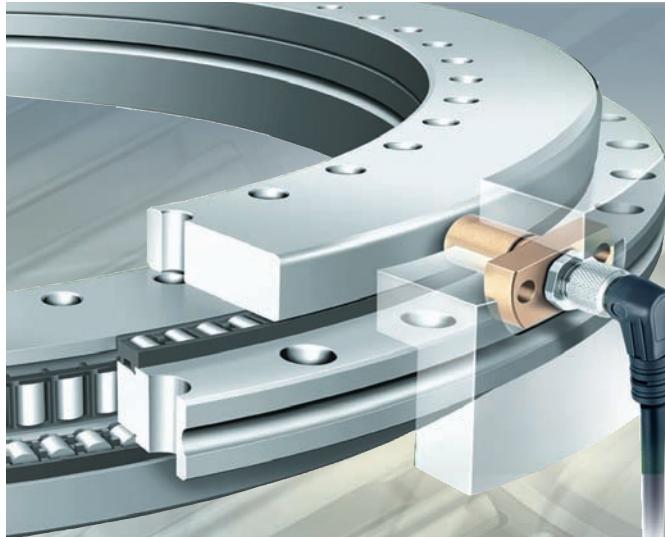
Product catalogue

The standard range is described comprehensively in Catalogue 404 and the CD and online versions of **medias® professional**.





FAG



High precision bearings for combined loads

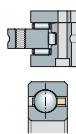
Axial/radial bearings

Axial angular contact ball bearings

Axial/radial bearings with integral angular measuring system

High precision bearings for combined loads

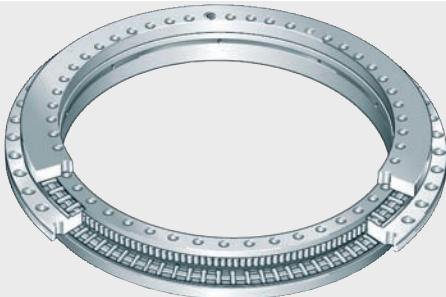
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Product overview	Axial/radial bearings, axial angular contact ball bearings, axial/radial bearings with integral angular measuring system..... 1060
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Product overview High precision bearings for combined loads

Axial/radial bearings

YRT



107 303a

RTC



107 520b

For higher speeds

YRT_{Speed}



107 485c

Axial angular contact ball bearings

ZKLDF



107 306a

**Axial/radial bearings
with integral
angular measuring system**
With magnetic dimensional scale

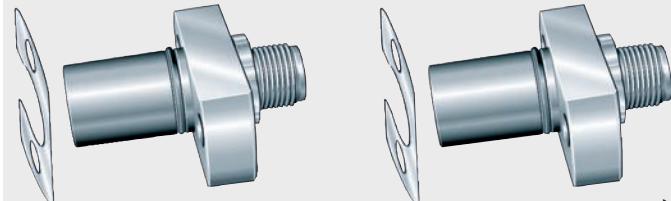
YRTM, YRTSM



107485c

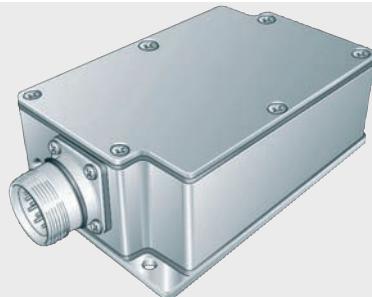
**Electronic measuring system
Measuring heads with shims**

SRM



107707

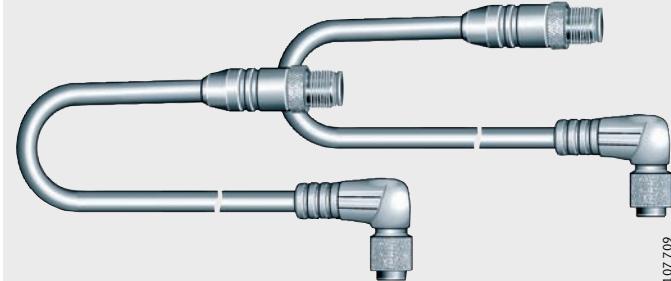
Electronic evaluation system



107506a

**Connection cable
For measuring heads and
electronic measuring system**

SRMC



107709

High precision bearings for combined loads

Features

Axial/radial bearings YRT, RTC and YRT_{Speed} as well as 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 with high requirements 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.

Operating limits

For standard applications with low speeds and small operating durations, such as indexing tables and swivel type milling heads, the most suitable bearing is series YRT, *Figure 1 ④*. These bearings are available in two axial and radial runout accuracies.

Where comparatively lower friction and higher speeds are required, bearings of series RTC can be used, *Figure 1 ③*. For higher accuracy requirements, these bearings are also available with restricted axial runout accuracy.

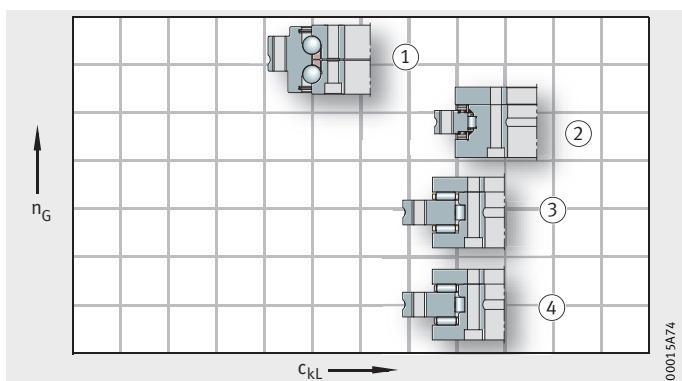
For the bearing arrangements of direct drive axes, series YRTS is available. Due to their high limiting speeds and very low, uniform frictional torque across the whole speed range, these bearings are particularly suitable for combination with torque motors, *Figure 1 ②*.

Axial angular contact ball bearings ZKLDF are particularly suitable for high speed applications with long operating duration, *Figure 1 ①*. They are characterised by high tilting rigidity, low friction and low lubricant consumption.

n_G = limiting speed
 c_{KL} = tilting rigidity

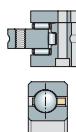
- ① ZKLDF
- ② YRT_{Speed}
- ③ RTC
- ④ YRT

Figure 1
Speed and tilting rigidity



00015A74

Axial/radial bearings	<p>Axial/radial bearings YRT, RTC and YRT_{Speed} have an axial component and a radial component.</p> <p>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.</p> <p>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.</p> <p>The unit is located by means of retaining screws for transport and safe handling.</p>
Sealing	Axial/radial bearings are supplied without seals.
Lubrication	<p>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.</p> <p>Arcanol LOAD150 is suitable for relubrication.</p> <p>Bearings of series RTC are greased with Arcanol MULTITOP.</p>
Axial angular contact ball bearings	<p>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.</p> <p>The unit is located by means of retaining screws for transport and safe handling.</p>
Sealing	Axial angular contact ball bearings have sealing shields on both sides.
Lubrication	The bearings are greased with a barium complex soap grease to DIN 51825-KPE2K-30 and can be lubricated via the outer ring.
Further information	Axial/radial bearings and axial angular contact ball bearings are described in detail in Catalogue HR 1, Rolling Bearings.



High precision bearings for combined loads

Axial/radial bearings with integral 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.

Axial/radial bearings with an integral angular measuring system comprise an axial/radial bearing YRTM or YRTSM with a dimensional scale, an SRM electronic measuring system and signal leads SRMC.

The electronic measuring system SRM comprises two measuring heads, two stacks of shims and an electronic evaluation system.

The signal leads for connecting the measuring heads to the electronic evaluation system can be ordered individually in various designs.

The electronic measuring system MEKO/U will continue to be available but should no longer be used for new designs.

Bearings of series YRTM or YRTSM correspond in mechanical terms to axial/radial bearings YRT or YRTS 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 or YRTSM, please refer to the information on page 1063.

Advantages of the angular measuring system

The measuring system, *Figure 2*:

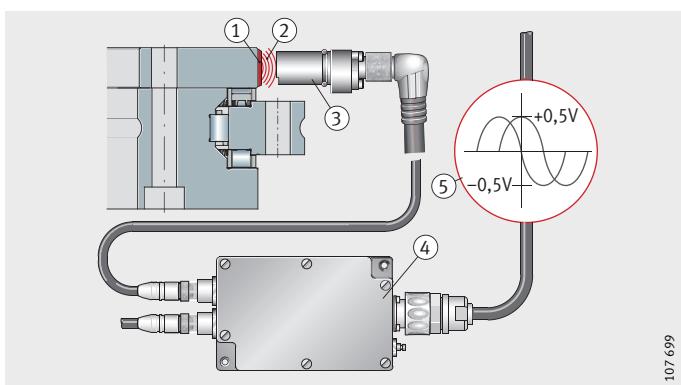
- allows, due to the rigid connection to the adjacent construction, very good control characteristics (control stability and dynamics) and is therefore particularly suitable for axes with torque motor drive
- offers a high maximum measuring speed of up to 16,5 m/s
- operates by non-contact means and 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 and 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 lines, since these can be laid within the adjacent construction directly through the large bearing bore
- gives savings on components, overall design envelope 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

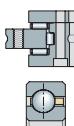
Figure 2
Measurement principle

Further information

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.



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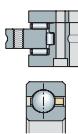




Thin section bearings

Thin section bearings

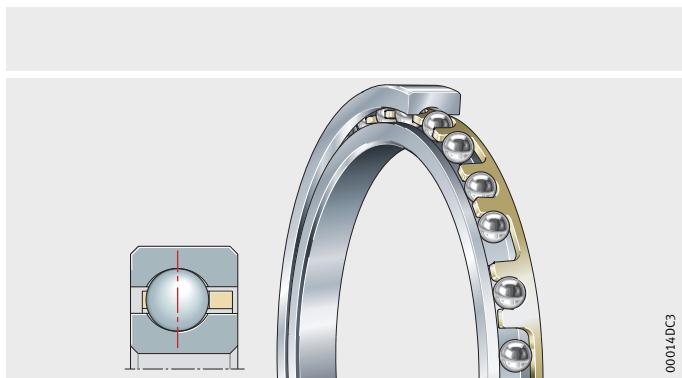
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Product overview Thin section bearings

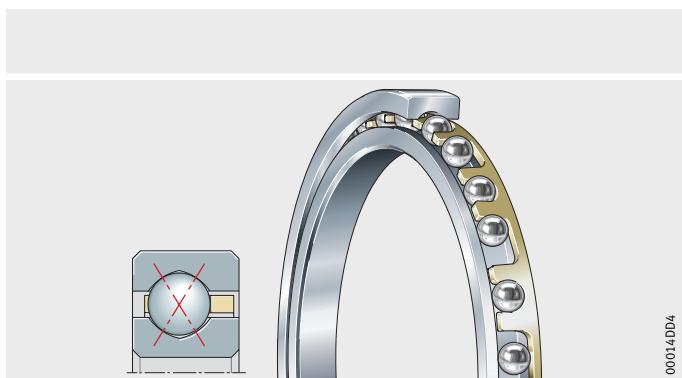
Deep groove ball bearings

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 in the case of larger 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 designs that are either open or sealed on both sides.

The seals are made from synthetic rubber (NBR) with a steel insert.

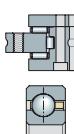
Sealed bearings are greased.

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).

Product catalogue

The standard range is described comprehensively in Catalogue 575, Thin Section Bearings.





Needle roller bearings with ribs

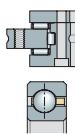
Needle roller bearings without inner ring

Needle roller bearings with inner ring

Inner rings

Needle roller bearings with ribs

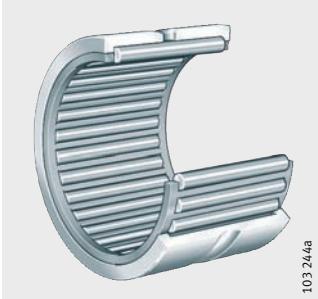
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Product overview Needle roller bearings with ribs

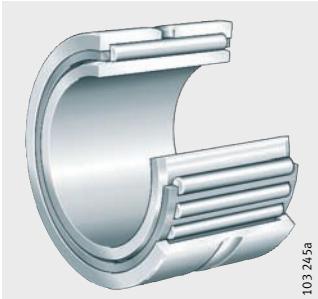
Needle roller bearings without inner ring

RNA48



Needle roller bearings with inner ring

NA48



Inner rings

IR



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.

X-life Needle roller bearings with ribs are X-life bearings.

These bearings have optimised raceway surfaces.

This gives higher load carrying capacity and longer rating life.

Needle roller bearings without inner ring Bearings without inner ring RNA48 have particularly compact radial dimensions. However, they require a shaft raceway that is hardened and ground.

The bearings are of a single row design.

Needle roller bearings with inner ring Bearings with inner ring NA48 are used if the shaft is not configured as a rolling bearing raceway.

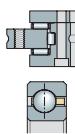
The bearings are of a single row design.

Inner rings Inner rings IR are made from hardened rolling bearing steel and have precision machined raceways.

They are used where:

- the shaft cannot be used as a raceway for 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.

Further information Needle roller bearings are described in detail in Catalogue HR 1, Rolling Bearings.



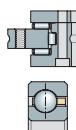
FAG



**F'IS – Equipment and services
for mounting and maintenance
of rolling bearings**

F'IS – Equipment and services for mounting and maintenance of rolling bearings

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F'IS – Equipment and services for mounting and maintenance of rolling bearings

Equipment and services

F'IS – Expertise in maintenance

Since the integration of FAG into the Schaeffler Group, F'IS has undertaken service tasks for the whole Group.

F'IS (FAG Industrial Services) 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 competence centres around the world. All F'IS employees worldwide undergo a comprehensive training programme and are audited regularly. This ensures that F'IS services throughout the world comply with a uniformly high standard of quality. 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:

- assembly
- lubrication
- condition monitoring
- rolling bearing reconditioning
- maintenance management.

For a detailed overview, see publication WL 80250.

Products for mounting

Products for mechanical mounting and dismounting

Products for mechanical mounting and dismounting are mainly used for small and medium sized rolling bearings.

Hydraulic extractors are used where higher extraction forces are required, *Figure 1*.



Figure 1

Dismounting of a bearing using a hydraulic extractor

Products for hydraulic mounting and dismounting

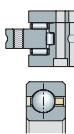
In order to give easier mounting and dismounting of bearings with a tapered bore, hydraulic nuts are often used.

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 pumps
- Hydraulic systems and units
- Connectors, accessories.



F'IS – Equipment and services for mounting and maintenance of rolling bearings

Products for thermal mounting and dismounting

- Rapid and energy-efficient heating of rolling bearings can be achieved with induction heating devices.
F'IS has table top equipment including equipment for mobile use and particularly effective standalone equipment.
- Electric heating plates
 - Induction heating devices
 - Heating rings, heat conducting paste
 - Electric induction heating devices.

Products for measurement and inspection

- Feeler gauges
- Taper gauges
- Snap gauges
- Enveloping circle gauges.

Accessories for mounting and dismounting

- Transport and mounting tools
- Gloves
- Mounting paste
- Anti-corrosion oil.

Products for lubrication

Lubricants

- Arcanol rolling bearing greases, *Figure 2*. See also page 1046.

Lubrication systems

- Motion Guard SELECT MANAGER (software for selection of greases and lubrication systems)
- Motion Guard COMPACT
- Motion Guard CHAMPION
- Motion Guard CONCEPT6
- Metering devices
- Drum pumps
- Metering pistols
- Grease gun.

Figure 2
Lubricants and lubrication systems



155 253a

Products

for condition monitoring

Alignment of belt and chain drives

- Belt pulley alignment device Top-Laser SMARTY2

- Belt tension measuring device Top-Laser TRUMMY2.

Alignment of shaft couplings

- Shaft alignment device Top-Laser INLINE2, *Figure 3*.

Accessories for alignment

- Shims Top-Laser SHIM.

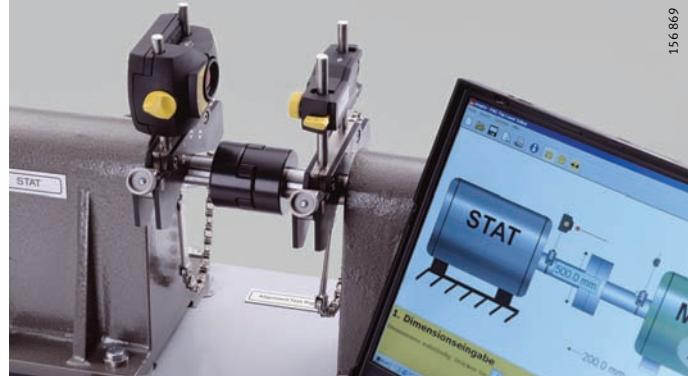


Figure 3
Shaft alignment device
Top-Laser INLINE2

Monitoring of operating condition

- Temperature measuring devices

- Digital hand tachometer

- Sonar device.

Vibration diagnosis

- Detector series, *Figure 4*

- EasyCheck series

- DTECT X1

- WiPro

- VibroCheck

- ProCheck.



Figure 4
Condition monitoring

F'IS – Equipment and services for mounting and maintenance of rolling bearings

Products for maintenance management

Mounting service

■ CMMS Interface.

The F'IS Mounting Team offers mounting services for rolling bearings across different market sectors, *Figure 5*. We have extensive experience, for example in railways, mining, steel and aluminium, wind power and paper.



Figure 5
Mounting of a large rolling bearing

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. F'IS 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.

Corrective maintenance

Incorrect alignment of belts and shafts is among the most common causes of unplanned machine downtime.

In addition to detailed analysis of causes, the F'IS 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 F'IS 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 F'IS 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
Vibration diagnosis as a service

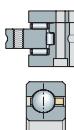
Rolling bearing reconditioning

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 reconditioning of rolling bearings and rolling bearing units is one of the core competences of F'IS and is offered at several certified locations worldwide. Our services for rolling bearings of all types apply irrespective of manufacturer and are not restricted to Schaeffler Group products.

F'IS is able to recondition and modify rolling bearings with an outside diameter of up to 4 250 mm. It is thus an expert partner for customers from a very wide range of industrial sectors such as general and special machine building, steelmaking, pulp and paper production, wind power, shipbuilding, private and public railways, mining etc.



F'IS – Equipment and services for 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.

CMMS systems

In the field of computerised maintenance management systems (CMMS) F'IS draws on its sound technical knowledge to offer analysis of customer-specific requirements independent of the manufacturer. On this basis, the F'IS team achieves a CMMS concept optimised and tailor-made for the customer. The F'IS service covers both complete solutions in the form of CMMS 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*.

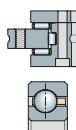
The individual training units are based on a modular concept with the result that customers can compile their own customised training course on the basis of these training components.

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





Market sectors

Production machinery
Power transmission
Railway engineering
Wind turbines
Heavy industry
Energy
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 areas of production machinery, power transmission, railway engineering, wind turbines, heavy industry and consumer products.

Production machinery

High performance production machinery is a precondition for, 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 high speeds. Comprehensive information is given in Catalogue AC 41130, Super Precision Bearings.

Bearings for machine tools

Hybrid spindle bearings with rings made from steel and balls made from ceramic 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 balls made from ceramic 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 and 2347 are used as particularly rigid axial bearings when cylindrical roller bearings of series N10 and 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*, page 1088.

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.



Market sectors

Due to the wide range of requirements, standardisation of printing machinery 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 with and without eccentric geometries, locating bearing units, polygon bearings, linear bearing units, rotary bearing units and tapered roller bearing units. The bearings are available with and without seals. The bearing seat for the cylindrical stud can be of a cylindrical or tapered design.

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.



122222P

Figure 1
Printing machine bearing unit
with eccentric outer ring
as non-locating bearing

Special publications

Publication LFD
Publication PDM

High Precision Bearings for Printing Machinery
Bearings Solutions for Printing Machinery.

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, right around the clock. There is no question that the right bearing components play a crucial role here.

In this context, “right” 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 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



119 321

Market sectors

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.

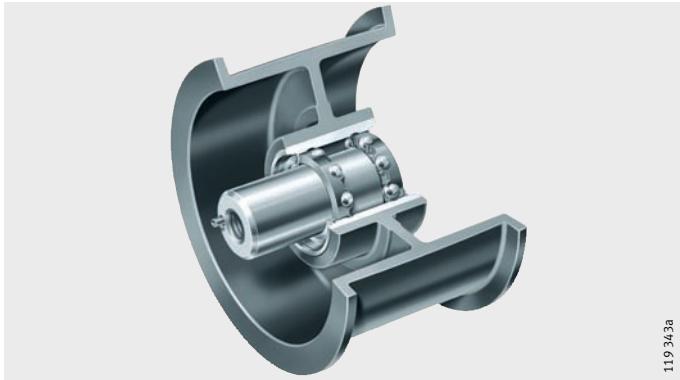


Figure 3
Tape tension pulley
with optimised noise characteristics
for twisting machines

Such ready-to-fit units are used in single and multi-head knitting machines and are simply screw mounted on the adjacent construction.

This eliminates the matching of individual components to each other and reduces errors involved in mounting. This solution also gives a simplified adjacent construction since the gearbox that was previously required can be completely eliminated.

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 knitting operation. Due to the smooth, high accuracy running of the bearings, the unit can achieve more than 1 000 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 and packaging industry

Food production must proceed economically and with high efficiency. In general, the processes run fully automatically and often take place under extreme operating conditions. This requires a high degree of security and reliability. High quality machine components designed for continuous performance are an indispensable element here.

Our contribution in this field:

robust bearings with anti-corrosion protection, effective sealing and in many cases lubricated for life, for reliable round-the-clock operation.

Modern materials and surface coatings, which we work to improve by ongoing development, give our bearing arrangements the necessary advantages in rating life, *Figure 4*.



135 443

Figure 4
Open and sealed
deep groove ball bearings

In the case of insert bearings, track rollers, slewing rings or the entire range of linear motion products, catalogue products or specifically designed units, the focus of our development efforts on all these Schaeffler Group products is the benefit to the customer: reducing the presence of interfaces by functional integration, compact construction, freedom from maintenance, reliable operating life, effective matching of components and subsystems to each other.

Special publications

Publication PVP

Bearing Arrangements In Food and
Packaging Machinery.

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

Motors and transmissions must operate with increasing efficiency. In power transmission and construction machinery engineering as well as in industrial conveying trucks, high demands are placed on the quality and rating life of rolling bearings.

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, reliable and cost-effective bearing arrangements also require appropriate design of the adjacent parts, lubrication and sealing. 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.

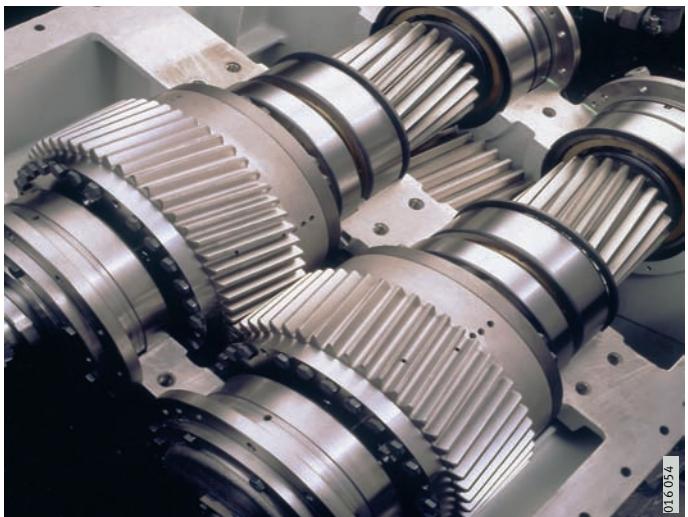


Figure 5
Rolling bearings
in a cylindrical gear unit

Special publications

PKI Expertise for Bearing Arrangements in Industrial Gearboxes.

016054

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 or angular contact ball 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 exciter 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 of the designs N and NU 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 rating life. For greater tilting, the transverse profile can be adapted.

Special publications

PLB Expertise for Bearing Arrangements in Construction Machinery.

Bearing arrangements in industrial 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.



Market sectors

Bearing arrangements and components in the fluid technology sector

Bearing arrangements and components for hydraulic drives and fluid pumps are subject to high requirements for functional security and cost-efficiency. These requirements are fulfilled predominantly using customer-specific developments but also in some cases with highly developed standard bearings and components.

High torque motors are used, for example, in industry, in agricultural equipment, rolling mills, paper machinery and conveying equipment. They generate extremely high torques at low speeds. A decisive contribution to low starting friction, jolt-free and reliable operation is made by special cylindrical roller bearings and further components such as high precision locknuts. In addition to bearings with coated rolling elements, inner rings machined free from spiral marks are used to provide an optimum sliding surface for sealing rings.

In construction machinery, hydraulic power is an indispensable source of energy for earthmoving and transport. Hydraulic cylinders with maintenance-free spherical plain bearings from ELGES have sliding areas with ELGOGLIDE® coating. The dry plain bearings with low friction and high load carrying capacity are suitable for oscillating motion under high load. The bearings require very little space and are particularly environmentally-friendly. In axial piston pumps of a swash plate design, axial roller bearings support the high forces of the pistons acting in the direction of stroke.

The high imbalance forces and radial forces are supported by double row cylindrical roller bearings with optimised speed characteristics. Swash plate pumps with an adjustable cradle are used to allow precise control of excavators or road making machinery. Full complement or nearly full complement cylindrical roller bearings allow precise adjustment of the volume flow, even at high pressures.

Gear pumps convey coolants, transport foodstuffs and keep hydraulic systems moving. Permaglide® plain bearings or high quality needle roller bearings ensure that gears move with practically no losses. In most cases, the medium being conveyed is also used as the lubricant for the bearings. If fluids with poor lubrication ability are to be conveyed, plain bearings are increasingly replaced by needle roller bearings. In this way, higher speeds and a longer operating life of the gear pumps can be achieved.



Figure 6
Cylindrical roller bearings
with spacers
for low friction

Hydrostatic gearboxes give stepless transmission of the drive force in tractors, ride-on lawnmowers and similar machines. Their reliable function is ensured by means of rolling and plain bearings as well as INA precision components such as hollow pistons, valves and fine blanked parts.

Fluid pumps facilitate the supply of water for the purposes of drinking, extinguishing, heating and cooling, the conveying of aggressive or abrasive media and the disposal of, for example, contaminated and waste water.

Economical plain and rolling bearings ensure smooth running over the long term. Depending on the speed and load, ball bearings, cylindrical roller or spherical roller bearings or plain bearings are fitted, *Figure 6*. Rolling and plain bearings help to ensure that valves and shut-off systems function reliably after long periods of stoppage.

In various types of pumps, very high requirements are fulfilled using X-life bearings.

Special publications	Publication PHP	Bearing Supports and Components for Hydraulic Drives and Pumps
	Publication PFS	Fine Blanking and Systems Engineering
	TPI 16	Steel Sealing Rings DRG
	TPI 92	Axial Swash Plate Ball Bearings
	TPI 128	Sealing Rings
	Catalogue 238 from 2010: HG 1	Spherical Plain Bearings, Plain Bushes, Rod Ends
	Catalogue 706	Permaglide® Plain Bearings.

Market sectors

Railway engineering

People and goods are being moved with increasing speed and over increasing distances from one place to another.

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 traction motors are selected by the Application Engineering specialists so that they are ideally matched to the customer requirements, *Figure 7*.

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 7
Tapered roller bearing unit
for passenger train carriages

212015a

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, which is normally lubricated by grease, 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, current-insulated deep groove ball bearings and cylindrical roller bearings to DIN/ISO dimensions, special Arcanol rolling bearing greases and mounting tools.

Special publications		
TPI 155	Tapered Roller Bearing Units TAROL– Products and Services	
TPI 156	Tapered Roller Bearing Units TAROL– Mounting, Maintenance, Repair	
TPI 158	Products for Railway Applications	
TPI 184	Suspension Tube Roller Bearings for Rail Vehicles	
Publication PBS	Expertise in Bearing Technology and Service for Rail Vehicles	



Market sectors

Wind turbines	Wind turbines can now generate power levels of more than 3 MW.
Bearing arrangements in wind turbines	<p>The bearings must be able to support moderate to high loads, oscillation and vibration.</p> <p>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.</p> <p>Rolling bearings for wind turbines must in many cases fulfil high quality requirements involving the presentation of appropriate evidence (German Lloyd certification guidelines).</p> <p>The rotor bearing arrangement can be in the form of a shaft or hub bearing arrangement, <i>Figure 8</i>. Locating/non-locating bearing arrangements with spherical, cylindrical or tapered roller bearings have proved successful.</p> <p>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.</p> <p>For single bearing designs, support of forces and moments is combined in a multiple-row rolling bearing.</p>

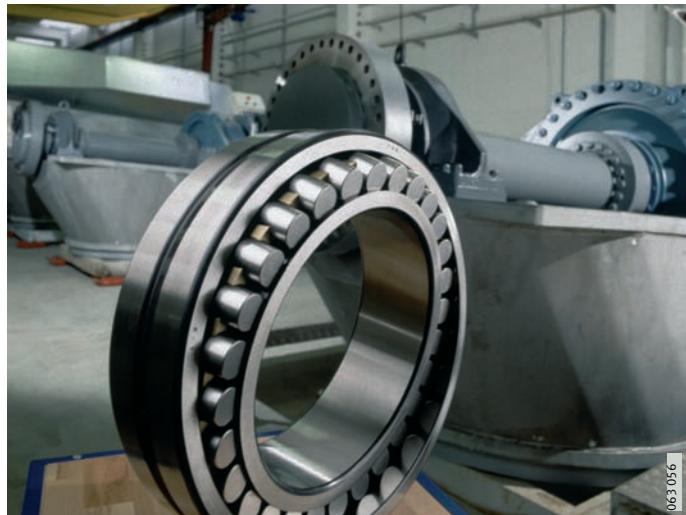


Figure 8
Self-aligning
FAG spherical roller bearings
for rotor bearing arrangement

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 large masses 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.

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, materials processing, the steel industry, the paper industry and the air handling sector.

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 contamination. In addition to standard rolling bearings, bearings specially designed for these conditions are required.

The rolling bearings for converters must support not only large masses but also severe shocks. Large spherical roller bearings of split or unsplit design fulfil these requirements.

Axial spherical roller bearings or slewing rings are used as the main bearings in the turrets of continuous casting plant to support the masses and the tilting moment. The swivel arms are supported in radial spherical plain bearings.

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 grease consumption and thus the environmental impact, *Figure 9*.



Figure 9
Sealed spherical roller bearing
for strand guide rollers

213 057



Market sectors

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 grease consumption and thus the environmental impact, *Figure 10*. Axial tapered roller bearings for screw-down mechanisms ensure low screw-down forces due to their low friction.



Figure 10
Sealed
four-row tapered roller bearing
for work rolls

212 016

Single row cylindrical roller bearings as well as single and double row angular contact ball bearings are found predominantly in high speed rolling stands on wire and light section 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 of various designs fulfil these requirements as back-up rollers.

Special publications		
TPI 148		Rolling Bearing Arrangements for Converters
TPI 157		Split Cylindrical Roller Bearings for the Bearing Arrangements of Rolling Mill Drive Shafts
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
WL 80154		Four-row Tapered Roller Bearings, Fitting Manual
Publication PLS		The Bearing Solution for Strand Guide Rollers.



Market sectors

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 11*.

Attention must also be paid to ensuring ease of mounting. There are also special requirements depending on the type of paper machinery and the subassemblies involved. In the wet end section, the emphasis is on preventing ingress of water, 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 11
Condition-based
rolling bearing monitoring
using FAG VibroCheck

An angular adjustment facility and high load carrying capacity are required in central press rolls, so spherical roller bearings are used, *Figure 12*.

Sophisticated labyrinth seals are required in the wet section in order to avoid ingress of water spray. In deflection compensating 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 directly driven rolls, triple 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 12
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 self-aligning double row cylindrical roller bearings in normal plummer block housings, *Figure 13*, page 1104. The spherical roller bearings have an increased internal clearance C4 and the cylindrical roller bearings have an internal clearance to C5.

Market sectors

For guide rollers in the dry section too, significant changes in length due to high ambient temperatures must be taken into consideration. The bearings are connected to the oil loop of the dryer rolls.

Calender 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 large, high speed machines, the bearing inner rings with a conical bore are mounted directly on the tapered roll journals in order to achieve smooth running. The spherical roller bearings normally used have the radial internal clearance C3 or C4.

In spreader rolls running at high speeds, the use of hybrid deep groove ball bearings with rings made from steel and balls made from ceramic has proved effective. Since these bearings have only half the usual number of balls, the risk of slippage is reduced.



113 433a

Figure 13
Self-aligning double row
cylindrical roller bearing

Special publications	WL 13103	Rolling Bearing Arrangements for the Paper Industry
Publication PPL		Optimum Paper Production
TPI 147		Self-Aligning FAG Cylindrical Roller Bearings: The Ideal Non-Locating Bearing Concept
TPI 169		FAG Triple Ring Bearings for the Paper Industry in Deflection Compensating Rolls
TPI 173		Relevant Suffixes for Spherical Roller Bearings in the Paper Industry
TPI WL 13-4		Hybrid Deep Groove Ball Bearings for Expander Rolls.

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 triple ring axial/radial cylindrical roller bearing in which the crown gear can be integrated, *Figure 14*.

The bearing unit can withstand all load combinations of axial force, radial force and tilting moment.



Figure 14
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.

108 266

Market sectors

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 15*. 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 rating life
- sealing against slurry, moisture, contamination and sand
- simple maintenance as well as low time and cost outlay in mounting and dismantling.



Figure 15
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. 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 masses are 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 16
Large spherical roller bearings
for tube mills

213 060

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.

Large masses 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 16*, page 1108. 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 17*.

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 17
Spherical roller bearings
for oscillating stresses

213 061



Market sectors

The high combined loads at low speeds are supported in the radial support 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 support 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 plummer block housings of series RA have proven successful.

The particular operating conditions in sintering and pelletising plants are best met by spherical roller bearings with a tapered bore on withdrawal sleeves. The bearings are mounted in split plummer block housings of series RA or SGB. 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

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 18*. 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 18
Plummer block housing unit VRE3
for fans

214 445



Market sectors

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. Through the use of BEARINX® for design work, it is possible to achieve a high level of functional reliability even taking account of extreme operating conditions.

Special publications

WL 22102

Bearing Technology for Compressors,
Fans and Centrifuges.

Energy

Bearing arrangements in drilling and conveying plant

Drilling and conveying plant for oil and gas include various machines such as Crown Block, Crown Compensator, Top Drive and flushing pumps. These machines are fitted with a large number of standard and special bearings. These bearings must often support severe shocks and large masses.

The Schaeffler Group, with its comprehensive product range, offers solutions matched to the application for both the onshore and offshore sectors.

For example, the rotary tables are fitted with large special axial angular contact ball bearings. They support the large mass of the drill string. In addition, adjacent parts such as spacer sleeves and flanges are integrated in some cases.

In flushing pumps (Triplex pumps), strongly alternating loads occur in the crank drive. In order to support these loads, large special cylindrical roller bearings are used for the big end and double row needle roller bearings or four-row cylindrical roller bearings in the crosstail.

The drill string is raised and lowered by means of pulley blocks with a large number of cable sheaves. The resulting load is transmitted by double row tapered roller bearings with adjusted axial internal clearance. Cable sheaves are also used in the so-called Crown Compensator application that compensates the tidal range (amplitude of the tides) for drilling vessels and wave movements in deep sea drilling.



Figure 19
Rolling bearings
for drilling and conveying plant

00015C22

Market sectors

Bearing arrangements in power stations

Power stations are industrial plant for the provision of electrical and in some cases also thermal power.

These highly complex installations play an important role in the consumption of economic and ecological resources, which will increase in the coming decades.

Schaeffler Group Industrial is one of the leading suppliers of rolling and plain bearings, including those for applications in power stations. Under the brands FAG and INA, Schaeffler offers a large number of products and services for machinery in the energy generation sector.

The standard bearings and customer-specific special bearings from Schaeffler have proved themselves under the most challenging application conditions, for example in typical bearing positions in coal-fired power stations such as impact wheel and bowl mills or air preheaters. Large masses and shock type loads are characteristic of impact wheel mills.

Spherical roller bearings are highly suitable for these requirements. In vertical 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.

The air preheater recovers heat from the flue gas, transfers this to fresh air brought in through ventilators and thus achieves preheating of the combustion air.

A distinction is made here between horizontal and vertical air preheaters. Due to the large masses in conjunction with low speeds, the radial and axial spherical roller bearings used here normally run in the mixed friction range.



Figure 20
Spherical roller bearings
for power stations



Market sectors

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.

Bearings for consumer products

Rolling bearings in electrical devices are found in household appliances, in communications and entertainment 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, current-insulated bearings are available, *Figure 21*.

In such deep groove ball bearings, cylindrical roller bearings and tapered roller bearings of the design 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 21
Current-insulated rolling bearings



00013682

Special publications	TPI WL 43-1189	Current-insulated Rolling Bearings Prevent Damage due to the Passage of Electrical Current
	TI WL 43-1206	FAG Deep Groove Ball Bearings with Integral Sensor
	TI WL 43-1210	FAG Hybrid Deep Groove Ball Bearings
	TPI 152	Flanged Housing Units for Large Electrical Machinery.



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