

Barrel roller bearings



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Matrix for bearing preselection

The matrix gives an overview of the types and design features of barrel roller bearings.

It can be used to make a preliminary assessment of whether a bearing is fundamentally suitable for the envisaged application.

The additional information provided in the product chapter (see column "detailed information") and in the Technical principles must, however, be observed in addition to this overview in selection of the bearing.

Design features and suitability			Barrel roller bearings		
+++ extremely suitable ++ highly suitable + suitable (+) suitable with restrictions - not suitable/not applicable ✓ available			cylindrical or tapered bore 	with adapter sleeve 	detailed information 642
Load carrying capacity	radial		+++	+++	➤ 643 1.2
	axial, one direction		+	+	➤ 643 1.2
	axial, both directions		+	+	➤ 643 1.2
	moments		-	-	
Compensation of angular misalignments	static		+++	+++	➤ 644 1.3
	dynamic		+	+	➤ 644 1.3
Bearing design	cylindrical bore		✓	✓	➤ 642 1.1
	tapered bore		✓	-	➤ 642 1.1
	separable		-	-	➤ 652 1.17
Lubrication	greased		-	-	➤ 644 1.4
Sealing	open		✓	✓	➤ 644 1.5
	non-contact		-	-	
	contact		-	-	
Operating temperature in °C		from to	-30 +150 ¹⁾	-30 +150 ¹⁾	➤ 645 1.8
Suitability for	high speeds		+	+	➤ 64
	high running accuracy		(+)	(+)	➤ 646 1.11 ➤ 114
	low-noise running		(+)	(+)	➤ 644 1.7 ➤ 27
	high rigidity		++	++	➤ 54
	reduced friction		+	+	➤ 56
	length compensation within bearing		-	-	
	non-locating bearing arrangement		+	+	➤ 139
	locating bearing arrangement		+	+	➤ 139
X-life bearings			-	-	
Bearing bore ²⁾ d in mm		from to	20 260 ³⁾	20 140 ³⁾	➤ 654
Product tables		from page	654	660	

¹⁾ Data valid for bearings with brass cages, D ≤ 120 mm

²⁾ For bearings with adapter sleeve: inside diameter of adapter sleeve

³⁾ Larger catalogue bearings
➤ GL 1



1 Barrel roller bearings



Barrel roller bearings are suitable:

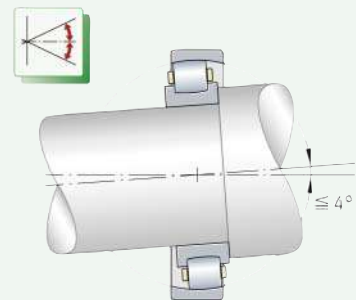
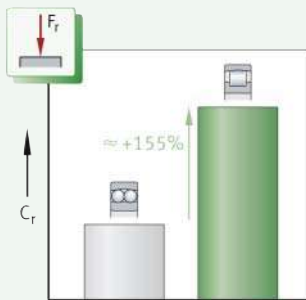
- for compensating angular misalignments where there is skewing between the outer and inner ring ➤ 644 | 1.3
- where high radial shock type loads occur, as a result of the line contact ➤ 643 | 1.2
- where angular misalignments and high radial loads occur, but speed is not a priority ➤ 642 | 1.

For an overview of other product-specific features, see the Matrix for bearing preselection ➤ 641.

1
Barrel roller bearing:
comparison of load carrying
capacity with
self-aligning ball bearing,
compensation of misalignments

F_r = radial load

C_r = radial basic dynamic load
rating



1.1 Bearing design

Design variants

Barrel roller bearings are available as:

- bearings of basic design ➤ 643 | 2
- bearings with adapter sleeve ➤ 643 | 3.

Bearings of basic design

The outer ring has a curved raceway

Barrel roller bearings are single row, self-retaining radial roller bearings, which are part of the group of self-aligning bearings. The outer ring has a concave raceway. As a result, the bearings permit the compensation of static and dynamic angular misalignments (skewing between the inner and outer ring) within certain limits ➤ 644 | 1.3. The inner ring has a formed raceway for the rolling elements and two rigid ribs. The rollers are barrel-shaped and are guided between the inner ring ribs. Their outside surface line closely follows the raceway profile of the outer and inner ring. Solid cages made from polyamide PA66 or brass are used ➤ 645 | 2.

The bore is cylindrical or tapered

Barrel roller bearings of basic design are available with a cylindrical or tapered bore, as a function of the bore diameter d ➤ 643 | 2.



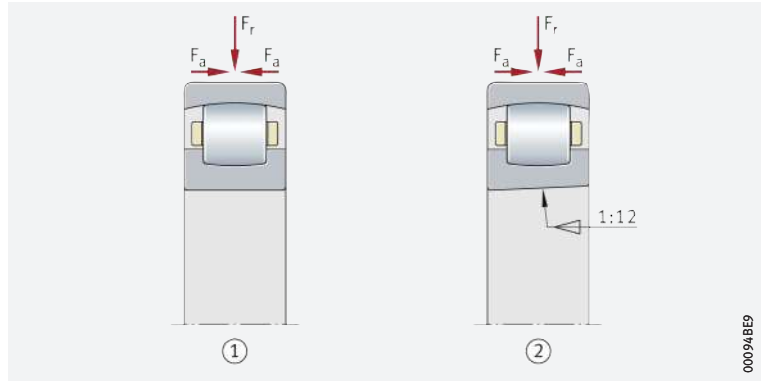
Bearings with a tapered bore have a bore taper of 1:12 and the suffix K ➤ 647 | 5.

2 Barrel roller bearings of basic design

F_r = radial load

F_a = axial load

- ① Barrel roller bearing with cylindrical bore
- ② Barrel roller bearing with tapered bore, bore taper 1:12



00094BE9

Ready-to-fit bearing mounting kits facilitate the ordering and mounting of barrel roller bearings

Bearings with adapter sleeve

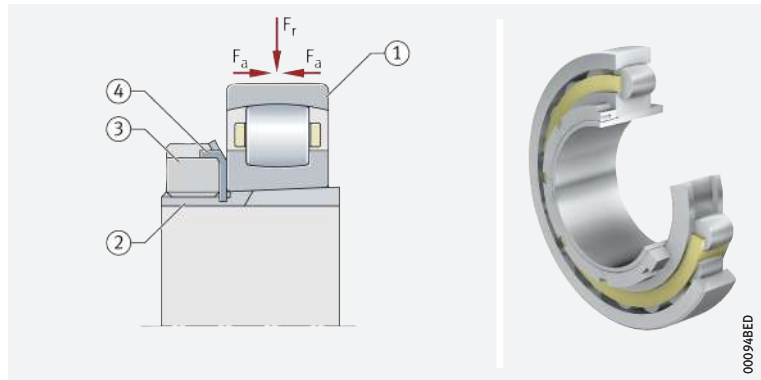
Complete bearing mounting kits comprising the bearing of basic design, slotted adapter sleeve, tab washer and locknut, are also available for use in the location of barrel roller bearings with a tapered bore on a cylindrical shaft journal (series 202...-K + H, 203...-K + H) ▶643| ③. Adapter sleeves allow bearings to be located on smooth and stepped shafts. The adapter sleeves must also be stated when placing the order. Ordering example ▶647| ⑤.

3 Barrel roller bearing with adapter sleeve

F_r = radial load

F_a = axial load

- ① Barrel roller bearing with tapered bore
- ② Adapter sleeve
- ③ Locknut
- ④ Tab washer



00094BED

1.2 Load carrying capacity

Suitable for high radial loads

The rolling elements are in line contact with the raceways. As a result, barrel roller bearings have a very high radial load carrying capacity ▶643| ②. In contrast, they have only a low axial load carrying capacity.

Axial load carrying capacity of bearings with adapter sleeve



Where bearings with adapter sleeves are located on a smooth shaft without a fixed stop (e.g. rigid shoulder), their axial load carrying capacity is dependent on the friction between the shaft and the sleeve.



If there is any uncertainty regarding the axial load carrying capacity of the adapter sleeve location method, please consult Schaeffler.

1.3

Compensation of angular misalignments

☞ *Barrel roller bearings compensate dynamic and static angular misalignments*

Due to the concave rolling element raceway in the outer ring, barrel roller bearings are capable of angular adjustment ► 642 | 1.1. As a result, they permit skewing between the outer and inner ring within certain limits, without causing damage to the bearings, and can thus compensate misalignments, shaft deflections and housing deformations.

Permissible adjustment angle

☞ *With a rotating inner ring, barrel roller bearings can swivel up to 4° from their central position*

The magnitude of alignment and angular defects may only be so large when the bearings are mounted that the contact surfaces of the rolling elements under load still lie within the width of the raceway. Under normal operating conditions and with a rotating inner ring, barrel roller bearings can swivel by up to 4° from their central position. The extent to which this value can be used for skewing between the inner and outer ring is, however, essentially dependent on the design of the bearing arrangement.



If the outer ring rotates or the inner ring undergoes tumbling motion, the angular adjustment facility is smaller. In such cases, please consult Schaeffler.

1.4

Lubrication

☞ *Oil or grease lubrication*

The bearings are not greased. They must be lubricated with oil or grease and can be lubricated from the end faces.

☞ *Compatibility with plastic cages*

When using bearings with plastic cages, compatibility between the lubricant and the cage material must be ensured if synthetic oils, lubricating greases with a synthetic oil base or lubricants containing a high proportion of EP additives are used.

☞ *Observe oil change intervals*

Aged oil and additives in the oil can impair the operating life of plastics at high temperatures. As a result, stipulated oil change intervals must be strictly observed.

1.5

Sealing

☞ *The bearings are open; provide seals in the adjacent construction*

Barrel roller bearings are supplied without seals. As a result, sealing of the bearing position must be carried out in the adjacent construction. The sealing system should reliably prevent:

- moisture and contaminants from entering the bearing
- the egress of lubricant from the bearing position.

1.6

Speeds



The product tables give the limiting speed n_G . This is the kinematically permissible speed of a bearing. Even under favourable mounting and operating conditions, this value should not be exceeded without prior consultation with Schaeffler ► 64.

1.7

Noise

Schaeffler Noise Index

The Schaeffler Noise Index (SGI) is not yet available for this bearing type ► 69. The data for these bearing series will be introduced and updated in stages.

Further information:

- **medias** ► <https://medias.schaeffler.com>.

1.8 Temperature range

Limiting values

The operating temperature of the bearings is limited by:

- the dimensional stability of the bearing rings and rolling elements
- the cage
- the lubricant.

Possible operating temperatures of barrel roller bearings ▶645|1.

1
Permissible temperature ranges

Operating temperature	Barrel roller bearings	
	with brass cage	with polyamide cage PA66
	-30 °C to +150 °C, for D > 120 mm up to +200 °C	-30 °C to +120 °C



In the event of anticipated temperatures which lie outside the stated values, please contact Schaeffler.

1.9 Cages

2
Cage, cage suffix, bore code

Standard cages for barrel roller bearings ▶645|2.

Bearing series	Solid cage made from polyamide PA66	Solid brass cage
	TVP	MB
	Bore code	
202	up to 16	from 17
203	up to 12	from 13



For high continuous temperatures and applications with difficult operating conditions, bearings with brass cages should be used. If there is any uncertainty regarding cage suitability, please consult Schaeffler.

1.10 Internal clearance

The standard is CN

Radial internal clearance – bearings with cylindrical bore

Barrel roller bearings with cylindrical bore are manufactured as standard with radial internal clearance CN (normal) ▶645|3. CN is not stated in the designation.



Certain sizes are also available by agreement with the smaller internal clearance C2 and with the larger internal clearance C3 and C4. Values for radial internal clearance ▶645|3. These are valid for bearings which are free from load and measurement forces (without elastic deformation).

3
Radial internal clearance of barrel roller bearings with cylindrical bore

Nominal bore diameter d mm		Radial internal clearance							
		C2		CN		C3		C4	
		μm	μm	μm	μm	μm	μm	μm	μm
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	30	2	9	9	17	17	28	28	40
30	40	3	10	10	20	20	30	30	45
40	50	3	13	13	23	23	35	35	50
50	65	4	15	15	27	27	40	40	55
65	80	5	20	20	35	35	55	55	75
80	100	7	25	25	45	45	65	65	90
continued ▼									

 **3**
Radial internal clearance
of barrel roller bearings
with cylindrical bore

Nominal bore diameter d		Radial internal clearance							
		C2 (Group 2)		CN (Group N)		C3 (Group 3)		C4 (Group 4)	
		μm		μm		μm		μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
100	120	10	30	30	50	50	70	70	95
120	140	15	35	35	55	55	80	80	110
140	160	20	40	40	65	65	95	95	125
160	180	25	45	45	70	70	100	100	130
180	225	30	50	50	75	75	105	105	135
225	250	35	55	55	80	80	110	110	140
250	280	40	60	60	85	85	115	115	145
continued ▲									

 *C3 is normally used*

Radial internal clearance – bearings with tapered bore

Barrel roller bearings with tapered bore are normally manufactured with the larger radial internal clearance C3  4.



Certain sizes are also available by agreement with the smaller internal clearance C2, with internal clearance CN (normal) and with the larger internal clearance C4.

Values for radial internal clearance  4. These are valid for bearings which are free from load and measurement forces (without elastic deformation).

 **4**
Radial internal clearance
of barrel roller bearings
with tapered bore

Nominal bore diameter d		Radial internal clearance							
		C2		CN		C3		C4	
		μm		μm		μm		μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	30	9	17	17	28	28	40	40	55
30	40	10	20	20	30	30	45	45	60
40	50	13	23	23	35	35	50	50	65
50	65	15	27	27	40	40	55	55	75
65	80	20	35	35	55	55	75	75	95
80	100	25	45	45	65	65	90	90	120
100	120	30	50	50	70	70	95	95	125
120	140	35	55	55	80	80	110	110	140
140	160	40	65	65	95	95	125	125	155
160	180	45	70	70	100	100	130	130	160
180	225	50	75	75	105	105	135	135	165
225	250	55	80	80	110	110	140	140	170
250	280	60	85	85	115	115	145	145	175

1.11

Dimensions, tolerances

Dimension standards



The main dimensions of barrel roller bearings correspond to DIN 635-1:2010. Nominal dimensions of barrel roller bearings  4.

Chamfer dimensions



The limiting dimensions for chamfer dimensions correspond to DIN 620-6:2004. Overview and limiting values  7.11. Nominal value of chamfer dimension  4.

Tolerances



The tolerances for the dimensional and running accuracy of barrel roller bearings correspond to tolerance class Normal in accordance with ISO 492:2014. Tolerance values in accordance with ISO 492 ► 122 | 8.

1.12 Suffixes

For a description of the suffixes used in this chapter ► 647 | 5 and **medias** interchange ► <https://www.schaeffler.de/std/1D52>.

5
Suffixes and
corresponding descriptions

Suffix	Description of suffix	
C2	Radial internal clearance C2 (smaller than normal)	Special design, available by agreement
C3	Radial internal clearance C3 (larger than normal)	Normally used for bearings with tapered bore, available by agreement for bearings with cylindrical bore
C4	Radial internal clearance C4 (larger than C3)	Special design, available by agreement
CN	Radial internal clearance CN (normal)	Standard for bearings with cylindrical bore, available by agreement for bearings with tapered bore
K	Tapered bore, taper 1:12	Standard
MB	Solid brass cage, guided on inner ring	Standard, cage material dependent on bore code
TVP	Solid cage made from glass fibre reinforced polyamide PA66	

1.13 Structure of bearing designation

Examples of composition of bearing designation

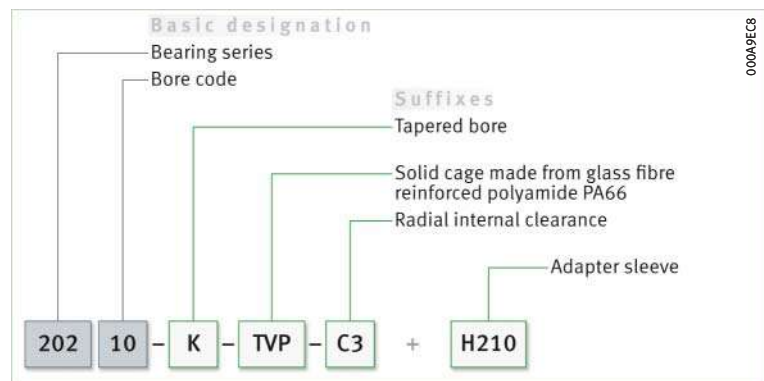
The designation of bearings follows a set model. Examples ► 647 | 4 and ► 647 | 5. The composition of designations is subject to DIN 623-1 ► 102 | 10.



4
Barrel roller bearing with cylindrical bore: designation structure



5
Barrel roller bearing with tapered bore and adapter sleeve: designation structure



1.14 Dimensioning

 $P = F_r$ under purely radial load of constant magnitude and direction

 P is a substitute force for combined load and various load cases

Equivalent dynamic bearing load

The basic rating life equation $L = (C_r/P)^P$ used in the dimensioning of bearings under dynamic load assumes a load of constant magnitude and direction. In radial bearings, this is a purely radial load F_r . If this condition is met, the bearing load F_r is used in the rating life equation for P ($P = F_r$). If this condition is not met, a constant radial force must first be determined for the rating life calculation that (in relation to the rating life) represents an equivalent load. This force is known as the equivalent dynamic bearing load P .

To calculate P for barrel roller bearings under dynamic load ➤ 648 |  1.

 1
Equivalent dynamic load

$$P = F_r + 9,5 \cdot F_a$$

Legend

P	N	Equivalent dynamic bearing load
F_r	N	Radial load
F_a	N	Axial load.

Equivalent static bearing load

For barrel roller bearings subjected to static load ➤ 648 |  2.

 2
Equivalent static load

$$P_0 = F_{0r} + 5 \cdot F_{0a}$$

Legend

P_0	N	Equivalent static bearing load
F_{0r}, F_{0a}	N	Largest radial or axial load present (maximum load).

Static load safety factor

 $S_0 = C_0/P_0$

In addition to the basic rating life L (L_{10h}), it is also always necessary to check the static load safety factor S_0 ➤ 648 |  3.

 3
Static load safety factor

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

Legend

S_0	–	Static load safety factor
C_0	N	Basic static load rating
P_0	N	Equivalent static bearing load.

1.15 Minimum load

 In order to prevent damage due to slippage, a minimum radial load of $P > C_{0r}/60$ is required

In order that no slippage occurs between the contact partners, the barrel roller bearings must be constantly subjected to a sufficiently high load. Based on experience, a minimum radial load of the order of $P > C_{0r}/60$ is thus necessary. In most cases, however, the radial load is already higher than the requisite minimum load due to the weight of the supported parts and the external forces.



If the minimum radial load is lower than indicated above, please consult Schaeffler.

1.16

Design of bearing arrangements

 *Support bearing rings over their entire circumference and width*

In order to allow full utilisation of the load carrying capacity of the bearings and achieve the requisite rating life, the bearing rings must be rigidly and uniformly supported by means of contact surfaces over their entire circumference and over the entire width of the raceway. Support can be provided by means of a cylindrical or tapered seating surface ▶650| 6 to ▶650| 8. The seating and contact surfaces should not be interrupted by grooves, holes or other recesses. The accuracy of mating parts must meet specific requirements ▶651| 6 to ▶651| 8.

Radial location – fit recommendations for bearings with cylindrical bore

 *For secure radial location, tight fits are necessary*

In addition to supporting the rings adequately, the bearings must also be securely located in a radial direction, to prevent creep of the bearing rings on the mating parts under load. This is generally achieved by means of tight fits between the bearing rings and the mating parts. If the rings are not secured adequately or correctly, this can cause severe damage to the bearings and adjacent machine parts. Influencing factors, such as the conditions of rotation, magnitude of the load, internal clearance, temperature conditions, design of the mating parts and the mounting and dismounting options must be taken into consideration in the selection of fits.



If shock type loads occur, tight fits (transition fit or interference fit) are required to prevent the rings from coming loose at any point. Clearance, transition or interference fits ▶150| 6 and ▶158| 7.



The following information provided in Technical principles must be taken into consideration in the design of bearing arrangements:

- conditions of rotation ▶145
- tolerance classes for cylindrical shaft seats (radial bearings) ▶147| 2
- shaft fits ▶150| 6
- tolerance classes for bearing seats in housings (radial bearings) ▶148| 4
- housing fits ▶158| 7
- shaft tolerances for adapter sleeves and withdrawal sleeves ▶166| 8.



 *The bearings must also be securely located in an axial direction*

Axial location – location methods for bearings with cylindrical bore

As a tight fit alone is not normally sufficient to also locate the bearing rings securely on the shaft and in the housing bore in an axial direction, this must usually be achieved by means of an additional axial location or retention method. The axial location of the bearing rings must be matched to the type of bearing arrangement. Shaft and housing shoulders, housing covers, nuts, spacer rings, retaining rings, adapter and withdrawal sleeves etc., are fundamentally suitable.

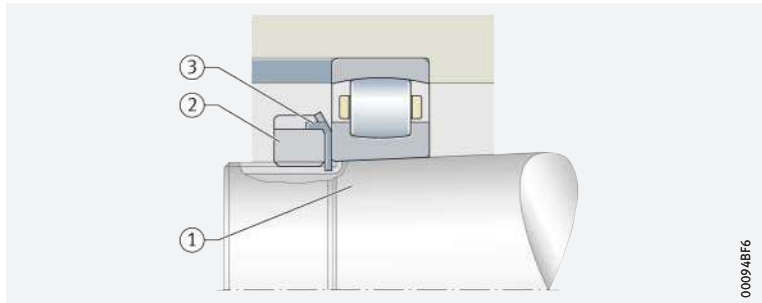
*Location by means
of locknut and tab washer*

6
Barrel roller bearing with tapered bore, mounted directly on the tapered shaft journal

- ① Tapered journal with fixing thread
- ② Locknut
- ③ Tab washer

Location of bearings with tapered bore

If a bearing with a tapered bore is mounted directly on a tapered journal, the bearing can be axially located with ease using a locknut and tab washer ►650| 6.



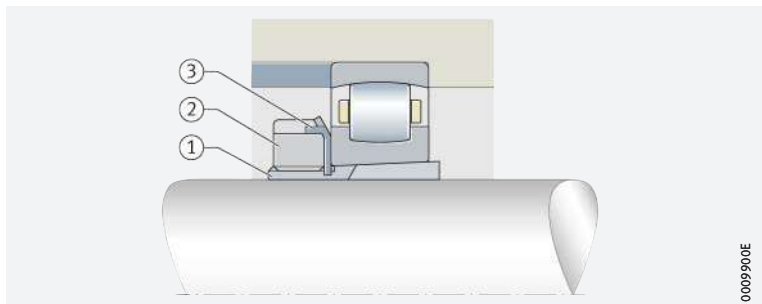
*Mounting can be carried
out quickly and reliably
by means of wrench sets
from Schaeffler*

7
Barrel roller bearing with adapter sleeve, located on smooth shaft

- ① Adapter sleeve
- ② Locknut
- ③ Tab washer

Location of bearings by means of adapter sleeve

Barrel roller bearings with a tapered bore can be located easily and with operational reliability on smooth or stepped shafts by means of an adapter sleeve ►650| 7. The adapter sleeves do not need to be secured on the shaft by any additional means. The bearings can be positioned at any point on smooth shafts. Axial load carrying capacity of bearing arrangements by means of adapter sleeve connection ►643| 1.2.

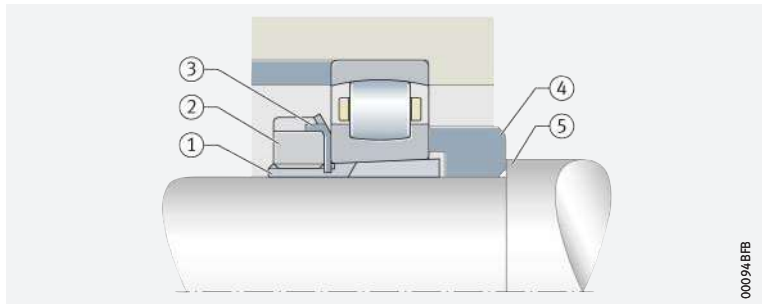


Location by means of adapter sleeve, axial abutment by means of a support ring

If very high axial forces are present, a support ring can also be used to provide axial abutment ►650| 8. In this instance, the mounting dimensions of the support ring B_a and d_b in the product tables must be observed ►660| 8.

8
Stepped shaft, axial abutment by means of a support ring

- ① Adapter sleeve
- ② Locknut
- ③ Tab washer
- ④ Support ring
- ⑤ Shaft shoulder



Dimensional, geometrical and running accuracy of cylindrical bearing seats

 A minimum of IT6 should be provided for the shaft seat and a minimum of IT7 for the housing seat

The accuracy of the cylindrical bearing seat on the shaft and in the housing should correspond to the accuracy of the bearing used.

For barrel roller bearings with the tolerance class Normal, the shaft seat should correspond to a minimum of standard tolerance grade IT6 and the housing seat to a minimum of IT7. Guide values for the geometrical and positional tolerances of bearing seating surfaces ► 651 |  6, tolerances t_1 to t_3 in accordance with ► 168 |  11. Numerical values for IT grades ► 651 |  7.

 **6**
Guide values
for the geometrical and
positional tolerances
of bearing seating surfaces

Bearing tolerance class		Bearing seating surface	Standard tolerance grades to ISO 286-1 (IT grades)			
to ISO 492	to DIN 620		Diameter tolerance	Roundness tolerance	Parallelism tolerance	Total axial runout tolerance of abutment shoulder
				t_1	t_2	t_3
Normal	PN (P0)	Shaft	IT6 (IT5)	Circumferential load IT4/2	Circumferential load IT4/2	IT4
				Point load IT5/2	Point load IT5/2	
		Housing	IT7 (IT6)	Circumferential load IT5/2	Circumferential load IT5/2	IT5
				Point load IT6/2	Point load IT6/2	

 **7**
Numerical values
for ISO standard tolerances
(IT grades) to ISO 286-1:2010

IT grade	Nominal dimension in mm						
	over 18	30	50	80	120	180	250
	incl. 30	50	80	120	180	250	315
Values in μm							
IT4	6	7	8	10	12	14	16
IT5	9	11	13	15	18	20	23
IT6	13	16	19	22	25	29	32
IT7	21	25	30	35	40	46	52



Roughness of cylindrical bearing seating surfaces

 Ra must not be too high

The roughness of the bearing seats must be matched to the tolerance class of the bearings. The mean roughness value Ra must not be too high, in order to maintain the interference loss within limits. The shafts must be ground, while the bores must be precision turned. Guide values as a function of the IT grade of bearing seating surfaces ► 651 |  8.

 **8**
Roughness values
for cylindrical bearing seating
surfaces – guide values

Nominal diameter of the bearing seat d (D)		Recommended mean roughness value for ground bearing seats Ramax			
mm		μm			
		Diameter tolerance (IT grade)			
over	incl.	IT7	IT6	IT5	IT4
–	80	1,6	0,8	0,4	0,2
80	500	1,6	1,6	0,8	0,4

Tolerances for tapered bearing seats

 Specifications for tapered bearing seats

For bearings located directly on a tapered shaft journal ► 650 |  6, the data are in accordance with ► 171 |  12.

☞ *The contact surfaces for the rings must be of sufficient height*

Mounting dimensions for the contact surfaces of bearing rings

The mounting dimensions of the shaft and housing shoulders, and spacer rings etc., must ensure that the contact surfaces for the bearing rings are of sufficient height. However, they must also reliably prevent rotating parts of the bearing from grazing stationary parts. Proven mounting dimensions for the radii and diameters of the abutment shoulders are given in the product tables. These dimensions are limiting dimensions (maximum or minimum dimensions); the actual values should not be higher or lower than specified.

☞ *A large range of housings is available*

Suitable bearing housings for barrel roller bearings

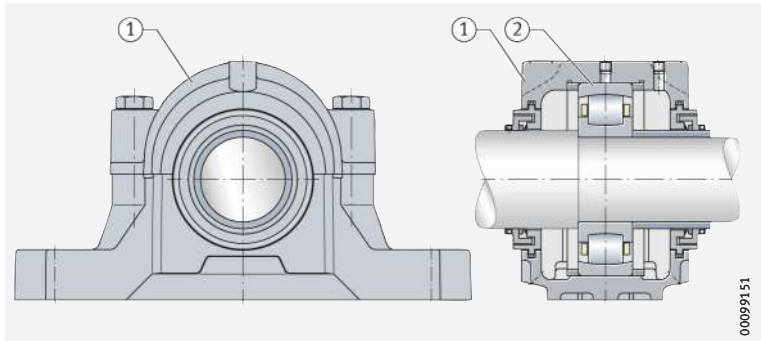
For economical, operationally reliable and easily interchangeable bearing arrangement units, the barrel roller bearings can also be combined with Schaeffler bearing housings ► 652 | 9. These easy-to-fit units fulfil all of the requirements for modern machine and plant designs with favourable maintenance-related characteristics.



Due to the large number of application areas, an extensive range of split plummer block housings and flanged housings is available for bearings with cylindrical and tapered bores. Detailed information on bearing housings can be found in publication GK 1 ► <https://www.schaeffler.de/std/1D54>. This book can be ordered from Schaeffler.

9
Split plummer block housing with a barrel roller bearing

- ① Split plummer block housing SNV
- ② Barrel roller bearing



1.17

Mounting and dismounting



The mounting and dismounting options for barrel roller bearings, by thermal, hydraulic or mechanical methods, must be taken into consideration in the design of the bearing position.

☞ *Ensure that the bearings are not damaged during mounting*

Barrel roller bearings are not separable. In the mounting of non-separable bearings, the mounting forces must always be applied to the bearing ring with a tight fit.

☞ *Suitable methods: measuring the reduction in radial internal clearance or axial drive-up distance*

Bearings with tapered bore – methods for achieving a sufficiently tight fit

Bearings with a tapered bore are mounted with a tight fit on the shaft or adapter and withdrawal sleeve. The tight fit can be checked:

- by measuring the reduction in radial internal clearance or
- by measuring the axial drive-up distance of the inner ring on the tapered bearing seat.



The malfunction-free operation of barrel roller bearings presupposes that these have been mounted correctly. An insufficient operating clearance or inadequately tight fit on the shaft generally leads to bearing damage.



If there is any uncertainty regarding the practical application of both methods, Schaeffler must always be consulted.

🔧 *Rolling bearings must be handled with great care*



Schaeffler Mounting Handbook

Rolling bearings are well-proven precision machine elements for the design of economical and reliable bearing arrangements, which offer high operational security. In order that these products can function correctly and achieve the envisaged operating life without detrimental effect, they must be handled with care.

The Schaeffler Mounting Handbook MH 1 gives comprehensive information about the correct storage, mounting, dismounting and maintenance of rotary rolling bearings ➤ <https://www.schaeffler.de/std/1D53>. It also provides information which should be observed by the designer, in relation to the mounting, dismounting and maintenance of bearings, in the original design of the bearing position. This book is available from Schaeffler on request.

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🔧 *The further development of products may also result in technical changes to catalogue products*

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Of central interest to Schaeffler is the further development and optimisation of its products and the satisfaction of its customers. In order that you, as the customer, can keep yourself optimally informed about the progress that is being made here and with regard to the current technical status of the products, we publish any product changes which differ from the printed version in our electronic product catalogue.



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Further information



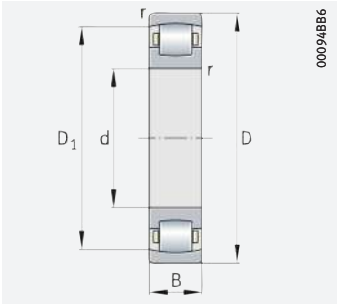
In addition to the data in this chapter, the following chapters in Technical principles must also be observed in the design of bearing arrangements:

- Determining the bearing size ➤ 34
- Rigidity ➤ 54
- Friction and increases in temperature ➤ 56
- Speeds ➤ 64
- Bearing data ➤ 97
- Lubrication ➤ 70
- Sealing ➤ 182
- Design of bearing arrangements ➤ 139
- Mounting and dismounting ➤ 191.

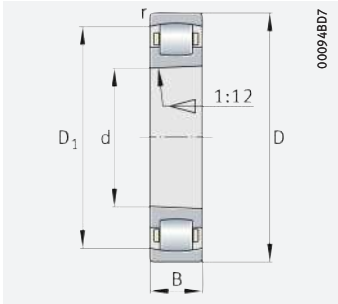


Barrel roller bearings

With cylindrical or tapered bore



Cylindrical bore

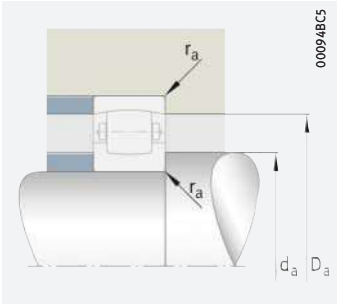


Tapered bore

d = 20 – 65 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Mass	Designation
d	D	B	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	m ≈ kg	➤ 647 1.12 ➤ 647 1.13
20	47	14	20 400	19 400	1 680	13 100	0,114	20204-TVP
	52	15	27 000	24 600	2 300	11 800	0,152	20304-TVP
25	52	15	24 100	24 900	2 190	11 500	0,132	20205-K-TVP-C3
	52	15	24 100	24 900	2 190	11 500	0,134	20205-TVP
	62	17	36 000	35 000	2 950	9 800	0,243	20305-TVP
30	62	16	28 000	28 500	2 850	10 800	0,203	20206-K-TVP-C3
	62	16	28 000	28 500	2 850	10 800	0,207	20206-TVP
	72	19	48 500	48 500	4 200	8 800	0,37	20306-TVP
35	72	17	41 000	43 000	4 900	9 700	0,296	20207-K-TVP-C3
	72	17	41 000	43 000	4 900	9 700	0,301	20207-TVP
	80	21	58 000	61 000	5 400	8 000	0,493	20307-TVP
40	80	18	49 500	53 000	5 000	8 700	0,38	20208-K-TVP-C3
	80	18	49 500	53 000	5 000	8 700	0,386	20208-TVP
	90	23	76 000	81 000	7 100	7 000	0,671	20308-TVP
45	85	19	52 000	58 000	5 900	8 400	0,433	20209-K-TVP-C3
	85	19	52 000	58 000	5 900	8 400	0,441	20209-TVP
	100	25	87 000	94 000	8 400	6 500	0,914	20309-TVP
50	90	20	59 000	69 000	7 000	7 700	0,489	20210-K-TVP-C3
	90	20	59 000	69 000	7 000	7 700	0,499	20210-TVP
	110	27	108 000	118 000	10 300	5 800	1,17	20310-TVP
55	100	21	74 000	85 000	8 700	7 100	0,642	20211-K-TVP-C3
	100	21	74 000	85 000	8 700	7 100	0,653	20211-TVP
	120	29	120 000	138 000	12 300	5 400	1,49	20311-K-TVP-C3
	120	29	120 000	138 000	12 300	5 400	1,53	20311-TVP
60	110	22	85 000	100 000	10 700	6 600	0,822	20212-K-TVP-C3
	110	22	85 000	100 000	10 700	6 600	0,836	20212-TVP
	130	31	147 000	171 000	15 000	4 950	1,89	20312-K-TVP-C3
	130	31	147 000	171 000	15 000	4 950	1,92	20312-TVP
65	120	23	94 000	117 000	12 400	6 000	1,07	20213-K-TVP-C3
	120	23	94 000	117 000	12 400	6 000	1,08	20213-TVP
	140	33	168 000	195 000	17 700	4 700	2,14	20313-K-MB-C3
	140	33	168 000	195 000	17 700	4 700	2,18	20313-MB

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Mounting dimensions

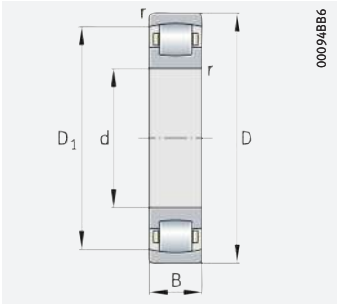
Dimensions			Mounting dimensions		
d	r	D ₁	d _a	D _a	r _a
	min.	≈	min.	max.	max.
20	1	39	25,6	41,4	1
	1,1	43,5	27	45	1
25	1	43,9	30,6	46,4	1
	1	43,9	30,6	46,4	1
	1,1	51,9	32	55	1
30	1	53	35,6	56,4	1
	1	53	35,6	56,4	1
	1,1	60,7	37	65	1
35	1,1	62,3	42	65	1
	1,1	62,3	42	65	1
	1,5	67,4	44	71	1,5
40	1,1	70,1	47	73	1
	1,1	70,1	47	73	1
	1,5	76,8	49	81	1,5
45	1,1	74,6	52	78	1
	1,1	74,6	52	78	1
	1,5	85,2	54	91	1,5
50	1,1	79,5	57	83	1
	1,1	79,5	57	83	1
	2	94,4	61	99	2
55	1,5	89,2	64	91	1,5
	1,5	89,2	64	91	1,5
	2	101,7	66	109	2
	2	101,7	66	109	2
60	1,5	97,8	69	101	1,5
	1,5	97,8	69	101	1,5
	2,1	111,2	72	118	2,1
	2,1	111,2	72	118	2,1
65	1,5	105,1	74	111	1,5
	1,5	105,1	74	111	1,5
	2,1	120,6	77	128	2,1
	2,1	120,6	77	128	2,1



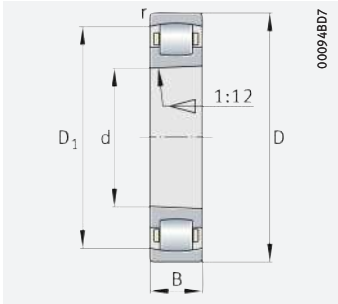


Barrel roller bearings

With cylindrical or tapered bore



Cylindrical bore

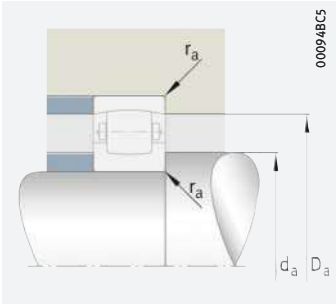


Tapered bore

d = 70 – 140 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Mass	Designation
d	D	B	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	m ≈ kg	➤ 647 1.12 ➤ 647 1.13
70	125	24	107 000	133 000	13 900	5 700	1,17	20214-TVP
	150	35	184 000	215 000	19 400	4 450	3,15	20314-MB
75	130	25	112 000	143 000	16 000	5 500	1,25	20215-K-TVP-C3
	130	25	112 000	143 000	16 000	5 500	1,28	20215-TVP
	160	37	216 000	255 000	22 200	4 100	3,76	20315-MB
80	140	26	126 000	163 000	15 400	5 200	1,56	20216-K-TVP-C3
	140	26	126 000	163 000	15 400	5 200	1,58	20216-TVP
	170	39	243 000	285 000	25 000	3 950	4,58	20316-MB
85	150	28	155 000	201 000	20 200	4 750	2,19	20217-K-MB-C3
	150	28	155 000	201 000	20 200	4 750	2,22	20217-MB
	180	41	270 000	320 000	28 500	3 750	5,25	20317-MB
90	160	30	174 000	220 000	21 900	4 550	2,68	20218-K-MB-C3
	160	30	174 000	220 000	21 900	4 550	2,72	20218-MB
	190	43	300 000	360 000	30 500	3 500	6,17	20318-K-MB-C3
	190	43	300 000	360 000	30 500	3 500	6,25	20318-MB
95	170	32	206 000	265 000	26 000	4 200	3,19	20219-MB
	200	45	330 000	400 000	33 500	3 400	7,29	20319-MB
100	180	34	225 000	290 000	28 000	4 000	3,9	20220-K-MB-C3
	180	34	225 000	290 000	28 000	4 000	3,96	20220-MB
	215	47	365 000	440 000	37 500	3 250	8,58	20320-K-MB-C3
	215	47	365 000	440 000	37 500	3 250	8,69	20320-MB
105	190	36	244 000	315 000	30 000	3 850	4,74	20221-MB
110	200	38	285 000	370 000	34 000	3 600	5,45	20222-K-MB-C3
	200	38	285 000	370 000	34 000	3 600	5,53	20222-MB
	240	50	405 000	480 000	44 500	3 000	11,6	20322-MB
120	215	40	305 000	415 000	37 500	3 350	6,51	20224-K-MB-C3
	215	40	305 000	415 000	37 500	3 350	6,6	20224-MB
	260	55	490 000	630 000	51 000	2 750	15,2	20324-MB
130	230	40	330 000	450 000	42 000	3 300	7,21	20226-K-MB-C3
	230	40	330 000	450 000	42 000	3 300	7,31	20226-MB
	280	58	560 000	720 000	58 000	2 600	18,4	20326-MB
140	250	42	395 000	540 000	49 500	3 050	8,98	20228-K-MB-C3
	250	42	395 000	540 000	49 500	3 050	9,09	20228-MB
	300	62	650 000	840 000	66 000	2 370	22,5	20328-MB

medias ➤ <https://www.schaeffler.de/std/1D89>



Mounting dimensions

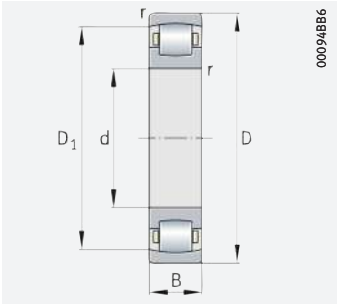
Dimensions			Mounting dimensions		
d	r	D ₁	d _a	D _a	r _a
	min.	≈	min.	max.	max.
70	1,5	111	79	116	1,5
	2,1	128,7	82	138	2,1
75	1,5	115,9	84	121	1,5
	1,5	115,9	84	121	1,5
	2,1	138,1	87	148	2,1
80	2	124,5	91	129	2
	2	124,5	91	129	2
	2,1	147,5	92	158	2,1
85	2	133,9	96	139	2
	2	133,9	96	139	2
	3	156,9	99	166	2,5
90	2	143,8	101	149	2
	2	143,8	101	149	2
	3	165,1	104	176	2,5
	3	165,1	104	176	2,5
95	2,1	152,7	107	158	2,1
	3	174,5	109	186	2,5
100	2,1	160,8	112	168	2,1
	2,1	160,8	112	168	2,1
	3	186,6	114	201	2,5
	3	186,6	114	201	2,5
105	2,1	169,2	117	178	2,1
110	2,1	178,6	122	188	2,1
	2,1	178,6	122	188	2,1
	3	208,1	124	226	2,5
120	2,1	191,1	132	203	2,1
	2,1	191,1	132	203	2,1
	3	222,3	134	246	2,5
130	3	205,7	144	216	2,5
	3	205,7	144	216	2,5
	4	240,3	147	263	3
140	3	223,9	154	236	2,5
	3	223,9	154	236	2,5
	4	257,9	157	283	3



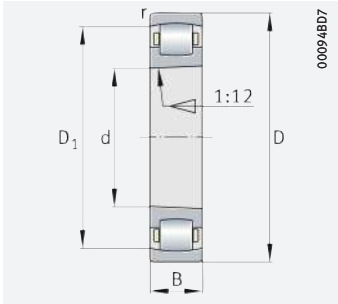


Barrel roller bearings

With cylindrical or tapered bore



Cylindrical bore

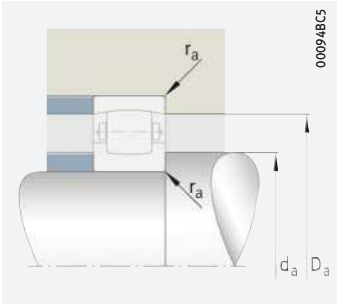


Tapered bore

d = 150 – 200 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Mass	Designation
d	D	B	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	m ≈ kg	➤ 647 1.12 ➤ 647 1.13
150	270	45	430 000	610 000	54 000	2 850	11,6	20230-K-MB-C3
	270	45	430 000	610 000	54 000	2 850	11,7	20230-MB
	320	65	720 000	950 000	74 000	2 250	26,9	20330-MB
160	290	48	500 000	720 000	63 000	2 650	14,4	20232-K-MB-C3
	290	48	500 000	720 000	63 000	2 650	14,5	20232-MB
170	310	52	570 000	830 000	70 000	2 460	17,9	20234-MB
180	320	52	590 000	850 000	73 000	2 420	18,4	20236-MB
190	340	55	650 000	950 000	80 000	2 290	22,5	20238-MB
200	360	58	730 000	1 080 000	90 000	2 180	26,7	20240-MB

medias ➤ <https://www.schaeffler.de/std/1D8A>



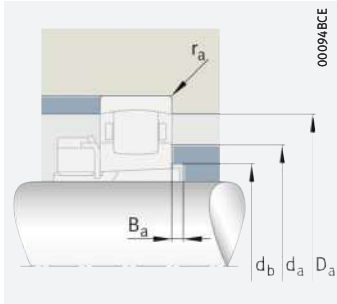
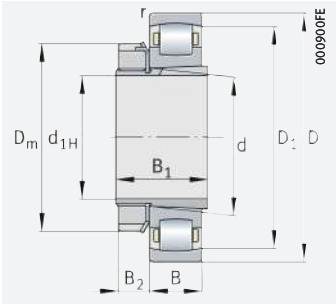
Mounting dimensions

Dimensions			Mounting dimensions		
d	r	D ₁	d _a	D _a	r _a
	min.	≈	min.	max.	max.
150	3	238,6	164	256	2,5
	3	238,6	164	256	2,5
	4	275,8	167	303	3
160	3	256,5	174	276	2,5
	3	256,5	174	276	2,5
170	4	273,1	187	293	3
180	4	284,3	197	303	3
190	4	301,2	207	323	3
200	4	319	217	343	3





Barrel roller bearings
With adapter sleeve



Mounting dimensions

d_{1H} = 20 – 140 mm

Main dimensions				Basic load ratings		Fatigue limit load	Limiting speed	Mass m		Designation	
d _{1H}	d	D	B	dyn. C _r N	stat. C _{0r} N	C _{ur} N	n _G min ⁻¹	Bearing ≈ kg	Adapter sleeve ≈ kg	Bearing	Adapter sleeve
20	25	52	15	24 100	24 900	2 190	11 500	0,132	0,07	20205-K-TVP-C3	H205
25	30	62	16	28 000	28 500	2 850	10 800	0,203	0,1	20206-K-TVP-C3	H206
30	35	72	17	41 000	43 000	4 900	9 700	0,296	0,136	20207-K-TVP-C3	H207
35	40	80	18	49 500	53 000	5 000	8 700	0,38	0,177	20208-K-TVP-C3	H208
40	45	85	19	52 000	58 000	5 900	8 400	0,433	0,23	20209-K-TVP-C3	H209
45	50	90	20	59 000	69 000	7 000	7 700	0,489	0,276	20210-K-TVP-C3	H210
50	55	100	21	74 000	85 000	8 700	7 100	0,642	0,319	20211-K-TVP-C3	H211
	55	120	29	120 000	138 000	12 300	5 400	1,49	0,358	20311-K-TVP-C3	H311
55	60	110	22	85 000	100 000	10 700	6 600	0,822	0,35	20212-K-TVP-C3	H212
	60	130	31	147 000	171 000	15 000	4 950	1,89	0,401	20312-K-TVP-C3	H312
60	65	120	23	94 000	117 000	12 400	6 000	1,07	0,4	20213-K-TVP-C3	H213
	65	140	33	168 000	195 000	17 700	4 700	2,14	0,471	20313-K-MB-C3	H313
65	75	130	25	112 000	143 000	16 000	5 500	1,25	0,71	20215-K-TVP-C3	H215
70	80	140	26	126 000	163 000	15 400	5 200	1,56	0,89	20216-K-TVP-C3	H216
75	85	150	28	155 000	201 000	20 200	4 750	2,19	1,03	20217-K-MB-C3	H217
80	90	160	30	174 000	220 000	21 900	4 550	2,68	1,21	20218-K-MB-C3	H218
	90	190	43	300 000	360 000	30 500	3 500	6,17	1,41	20318-K-MB-C3	H318
90	100	180	34	225 000	290 000	28 000	4 000	3,9	1,52	20220-K-MB-C3	H220
	100	215	47	365 000	440 000	37 500	3 250	8,58	1,76	20320-K-MB-C3	H320
100	110	200	38	285 000	370 000	34 000	3 600	5,45	1,95	20222-K-MB-C3	H222
110	120	215	40	305 000	415 000	37 500	3 350	6,51	2,01	20224-K-MB-C3	H3024
115	130	230	40	330 000	450 000	42 000	3 300	7,21	2,96	20226-K-MB-C3	H3026
125	140	250	42	395 000	540 000	49 500	3 050	8,98	3,3	20228-K-MB-C3	H3028
135	150	270	45	430 000	610 000	54 000	2 850	11,6	4,02	20230-K-MB-C3	H3030
140	160	290	48	500 000	720 000	63 000	2 650	14,4	5,44	20232-K-MB-C3	H3032

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Dimensions						Mounting dimensions				
d_{1H}	r	D_1	D_m	B_1	B_2	d_a	D_a	d_b	B_a	r_a
	min.	≈	≈		≈	max.	max.	min.	min.	max.
20	1	43,9	25	26	8,25	33	46,4	28	6	1
25	1	53	45	27	8,25	39	56,4	33	5	1
30	1,1	62,3	52	29	9,25	45	65	38	5	1
35	1,1	70,1	58	31	10,25	51	73	43	5	1
40	1,1	74,6	65	33	11,25	56	78	48	5	1
45	1,1	79,5	70	35	12,25	61	83	53	5	1
50	1,5	89,2	75	37	12,5	68	91	60	6	1,5
	2	101,7	75	45	12,5	72	109	60	6	2
55	1,5	97,8	80	38	12,5	73	101	64	6	1,5
	2,1	111,2	80	47	12,5	78	118	65	5	2,1
60	1,5	105,1	85	40	13,5	80	111	70	5	1,5
	2,1	120,6	85	50	13,5	84	128	70	5	2,1
65	1,5	115,9	98	43	14,5	90	121	80	5	1,5
70	2	124,5	105	46	16,75	96	129	85	5	2
75	2	133,9	110	50	17,75	102	139	90	6	2
80	2	143,8	120	52	17,75	108	149	95	6	2
	3	165,1	120	65	17,75	113	176	96	6	2,5
90	2,1	160,8	130	58	19,75	120	168	106	7	2,1
	3	186,6	130	71	19,75	127	201	108	7	2,5
100	2,1	178,6	145	63	20,75	132	188	116	7	2,1
110	2,1	191,1	145	72	22	143	203	127	13	2,1
115	3	205,7	155	80	23	154	216	137	20	2,5
125	3	223,9	165	82	24	166	236	147	19	2,5
135	3	238,6	180	87	26	181	256	158	19	2,5
140	3	256,5	190	93	27,5	193	276	168	20	2,5

