

Axial cylindrical roller bearings




Matrix for bearing preselection 1075

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




























Matrix for bearing preselection

The matrix gives an overview of the types and design features of axial cylindrical 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			Axial cylindrical roller bearings	
+++ extremely suitable ++ highly suitable + suitable (+) suitable with restrictions - not suitable/not applicable ✓ available			 detailed information  1076	
Load carrying capacity	radial		-	▶ 1079 1.2
	axial, one direction		++	▶ 1079 1.2
	axial, both directions		-	▶ 1079 1.2
	moments		-	
Compensation of angular misalignments	static		-	▶ 1079 1.3
	dynamic		-	▶ 1079 1.3
Bearing design	cylindrical bore		✓	▶ 1076 1.1
	tapered bore		-	
	separable		✓	▶ 1085 1.17
Lubrication	greased		-	▶ 1079 1.4
Sealing	open		✓	▶ 1079 1.5
	non-contact		-	1079
	contact		-	▶ 1079 1.5
Operating temperature in °C		from to 	-20 +120	▶ 1080 1.8
Suitability for	high speeds		(+)	▶ 1080 1.6
	high running accuracy		++	▶ 1082 1.11 ▶ 114
	low-noise running		(+)	▶ 1080 1.7 ▶ 27
	high rigidity		++	▶ 54
	reduced friction		(+)	▶ 56
	length compensation within bearing		-	
	non-locating bearing arrangement		-	
	locating bearing arrangement		++	▶ 139
X-life bearings			-	
Bearing bore d in mm		from to 	15 320 ¹⁾	▶ 1088
Product tables		from page 	1088	

1) Larger catalogue bearings
▶ □ GL 1

1 Axial cylindrical roller bearings



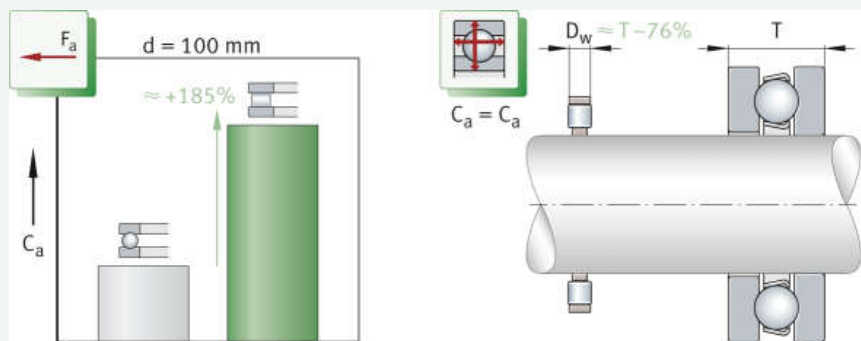
Single and double row axial cylindrical roller bearings are particularly suitable where:

- high axial and shock loads occur in one direction but no radial loads are present ▶ 1076 | 1 and ▶ 1079 | 1.2
- the load carrying capacity of the corresponding axial deep groove ball bearings is no longer adequate (in this case, bearings of series 811 and 812 are especially suitable) ▶ 1076 | 1
- the bearing arrangement must have very high axial rigidity
- the axial space available is very small ▶ 1076 | 1 and ▶ 1088 | 1
- the bearing arrangement can be configured, where the axial space is very small, as a direct bearing arrangement ▶ 1076 | 1.1
- the bearing parts can or must be mounted separately
- the bearing arrangement is not configured in itself but, for cost reasons, ready-to-fit standard bearings are to be used.

For an overview of other product-specific features, see the Matrix for bearing preselection ▶ 1075.

1
Axial cylindrical roller bearing and axial ball bearing – comparison of load carrying capacity and design envelope

F_a = axial load
 C_a = basic dynamic load rating
 D_w = roller diameter
 T = axial section height of axial deep groove ball bearing



1.1 Bearing design

Design variants

Axial cylindrical roller bearings are available as:

- single and double row bearings
- individual bearing parts for combination, comprising
 - axial cylindrical roller and cage assembly (prefix K)
 - housing locating washer (prefix GS)
 - shaft locating washer (prefix WS)
 - bearing washers (prefix LS, alternatively for shaft and housing locating washer).

Larger catalogue bearings and other bearing designs ▶ GL 1.

Axial cylindrical roller bearings

☞ *Designed for bearing arrangements with very small axial space*

Axial cylindrical roller bearings are part of the group of axial roller bearings. In contrast to the ball, the roller has a larger contact area perpendicular to the roller axis. As a result, it can transmit higher forces, has greater rigidity and allows smaller rolling element diameters under the same load. The single and double row bearings comprise flat, ribless washers (housing and shaft locating washers) between which axial cylindrical roller and cage assemblies are arranged ▶ 1077 | 2 and ▶ 1078 | 5. Their axial section height T corresponds only to the diameter of the rollers plus the thickness of the washers. Due to this design, the bearings are particularly small in axial height ▶ 1088 | 1. The axial cages are made from brass or plastic and are fitted with one or two rows of cylindrical rollers. Since sliding occurs towards the ends of the rollers during rolling of the rolling elements and this increases with the length of the roller, bearings with a wide cross-section have several short rollers arranged adjacent to each other, e.g. double row designs ▶ 1077 | 2.



☞ *Rollers with profiled ends increase the operating life of the bearings*

The cylindrical rollers have profiled ends, i.e. they have a slight lateral curvature towards the ends. This modified line contact between the rollers and raceways prevents damaging edge stresses ▶ 1077 | 3. This in turn has a positive effect on the operating life of the bearings.



The use of complete axial cylindrical roller bearings (shaft locating washer, axial cylindrical roller and cage assembly and housing locating washer) is then advisable if, for example, high speeds occur and the bearing washers must therefore be centred precisely.

☞ *Roller and cage assembly and bearing washers are also available individually*

The bearing parts for axial cylindrical roller bearings are also available individually ▶ 1078 | 4 and ▶ 1078 | 5. Axial cylindrical roller and cage assemblies (without shaft and housing locating washers) are suitable, for example, for bearing arrangements with very small axial design space.



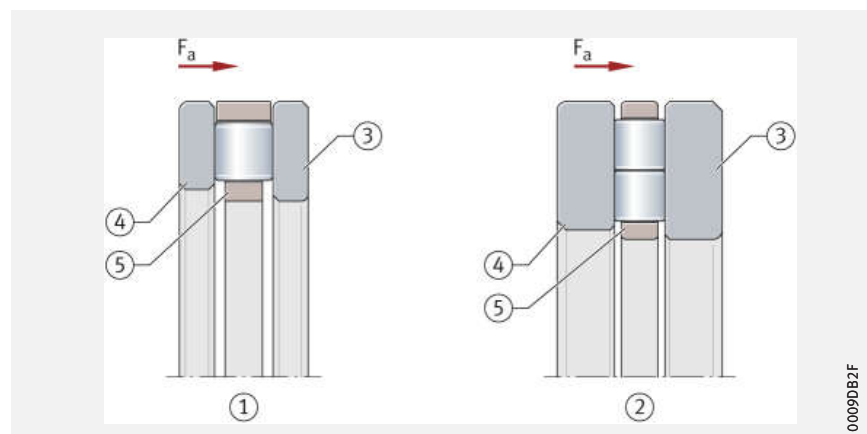
Cylindrical roller bearings 811 and 812 are of a single row design and correspond to DIN 722:2005 and ISO 104:2015. The bearings 893 and 894 are of a double row design and are configured in accordance with DIN 616:2000 and ISO 104:2015.



Axial cylindrical roller bearings

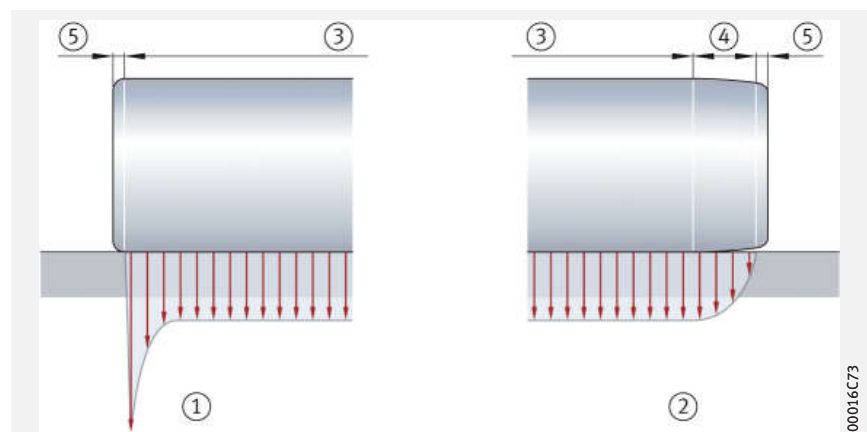
F_a = axial load

- ① Single row bearing
- ② Double row bearing
- ③ Shaft locating washer
- ④ Housing locating washer
- ⑤ Axial cylindrical roller and cage assembly



Roller profile and stress distribution

- ① Cylindrical roller profile (high stress peaks)
- ② Roller with profiled ends (no stress peak)
- ③ Cylindrical outside surface region
- ④ Region of logarithmic tapering
- ⑤ Rounding of edge



Axial cylindrical roller and cage assemblies

Very high axial load carrying capacity with low section height

For direct bearing arrangements, running surfaces must be produced as a rolling bearing raceway

The cage assemblies comprise axial cages and one or two rows of cylindrical rollers ▶ 1078 | 4. They have a particularly small axial section height and high axial load carrying capacity. The cages are made from polyamide or brass and are guided on the shaft.

Axial cylindrical roller and cage assemblies are generally combined with one housing locating washer and one shaft locating washer. If they are to be used directly – i.e. without axial bearing washers – in the adjacent construction, the raceway for the rollers must be produced as a rolling bearing raceway ▶ 1084 | 1.16. It is also possible to use two shaft locating washers or two housing locating washers in combination with one axial cylindrical roller and cage assembly.

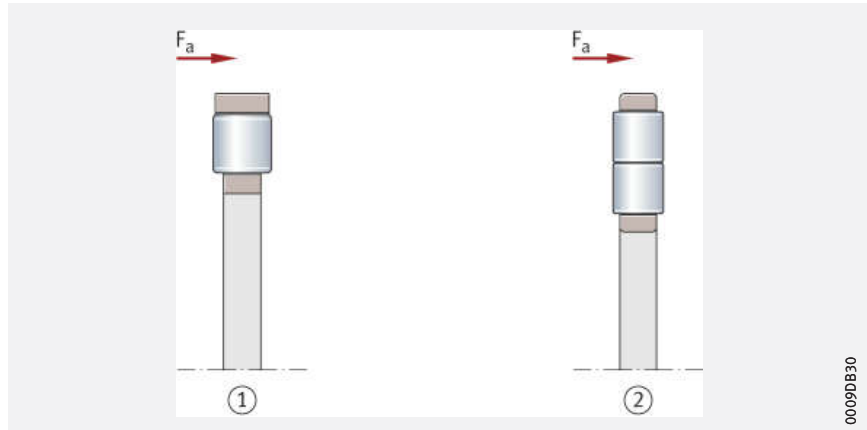
The diameter series 1, 2, 3, 4 of the axial cylindrical roller and cage assemblies correspond to DIN 616:2000 and ISO 104:2015.



Axial cylindrical roller and cage assemblies

F_a = axial load

- ① Single row
- ② Double row



Axial bearing washers

Housing and shaft locating washers

Housing locating washers are externally centred, shaft locating washers are internally centred ▶ 1078 | 5 and ▶ 1084 | 1.16. They must be used if the adjacent construction cannot be used as a raceway for the rolling elements. The washers are made from through hardening rolling bearing steel. The bore and outside diameter are precision machined, the raceways are ground to high accuracy.

The diameter series 1, 2, 3, 4 of the axial bearing washers correspond to DIN 616:2000 and ISO 104:2015.



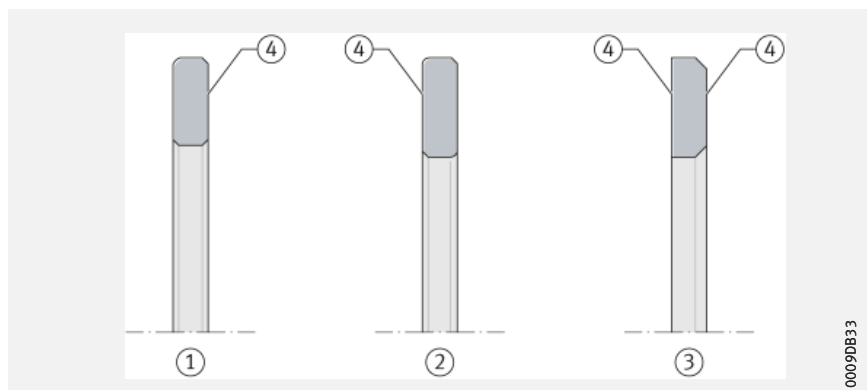
Bearing washers

Bearing washers are suitable for use as a housing or shaft locating washer. They are used in applications that do not require precise centring of the axial bearing washers. The raceway of the bearing washers is hardened and ground. The bearing washers are suitable for axial cylindrical roller and cage assemblies K811 and axial needle roller and cage assemblies AXK.



Axial bearing washers

- ① Housing locating washer, externally centred
- ② Shaft locating washer, internally centred
- ③ Bearing washer
- ④ Raceway



1.2 Load carrying capacity

☞ *For very high axial loads acting in one direction*

Single and double row axial cylindrical roller bearings can support high axial loads as well as axial shock loads in one direction, but must not be subjected to radial load ► 1083 | 1.14. If radial loads do occur, these forces must be supported by an additional bearing (e.g. by a needle roller and cage assembly) ► 1079 | 6.

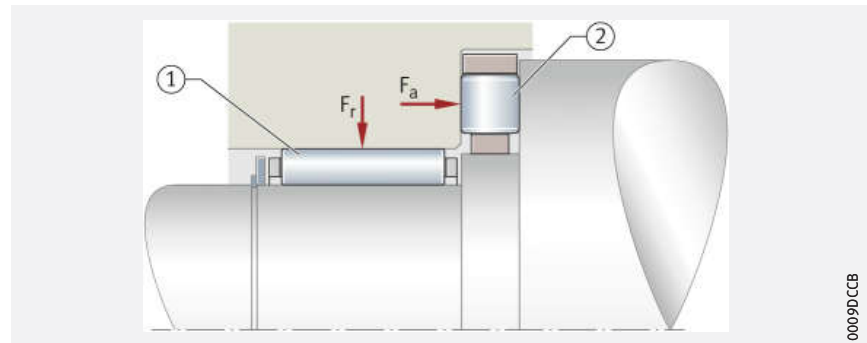


6
Axial and radial loads

F_r = radial load

F_a = axial load

- ① Needle roller and cage assembly as radial bearing (direct bearing arrangement)
- ② Axial cylindrical roller and cage assembly as axial bearing (direct bearing arrangement)



0009DCCB

1.3 Compensation of angular misalignments



The bearings do not permit any skewing between the shaft and the housing. If angular misalignments occur between the locating surfaces on the shaft and in the housing, this will cause damage to the bearing and considerably reduce its operating life.

1.4 Lubrication

☞ *Oil or grease lubrication is possible*

☞ *Compatibility with plastic cages*

Axial cylindrical roller bearings are not greased. The bearings must be lubricated with oil or grease.

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.



If there is any uncertainty regarding the suitability of the selected lubricant for the application, please consult Schaeffler or the lubricant manufacturer.

☞ *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


☞ *Provide seals in the adjacent construction*

The bearings are not sealed; i.e. sealing of the bearing position must be carried out in the adjacent construction. This must reliably prevent:

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

1.6 Speeds

📖 *Limiting speeds and reference speeds in the product tables*

Two speeds are generally indicated in the product tables ▶304|:

- the kinematic limiting speed n_G
- the thermal speed rating $n_{\theta r}$.

Limiting speed



The limiting speed n_G 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. The values in the product tables are valid for oil lubrication.

📖 *Values for grease lubrication*

For grease lubrication, 25% of the value stated in the product tables is permissible in each case.

Reference speeds

📖 *$n_{\theta r}$ is used to calculate n_{θ}*

The thermal speed rating $n_{\theta r}$ is not an application-oriented speed limit, but is a calculated ancillary value for determining the thermally safe operating speed n_{θ} ▶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 washers and cylindrical rollers
- the cage
- the lubricant.

Possible operating temperatures of axial cylindrical roller bearings ▶1080| 1.

 **1**
Permissible temperature range

Operating temperature	Axial cylindrical roller bearings with brass or polyamide cage PA66
	-20 °C to +120 °C



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

1.9 Cages

☞ *Solid cages made from brass and polyamide PA66 are used as standard*



Standard cages ▶ 1081 | 2. The cage design is dependent on the bearing series and the bearing size. Other cage designs are available by agreement. With such cages, however, suitability for high speeds and temperatures as well as the basic load ratings may differ from the values for the bearings with standard cages.

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.



Cage, cage suffix, bore code

Bearing series	Solid cage made from polyamide PA66	Solid brass cage
	TV standard	M standard
	Bore code	
811, K811	up to 34	from 36
812, K812	06 to 26	from 28
893, K893	06 to 16	17 to 30
894, K894	12 to 14	from 15



1.10 Internal clearance

☞ *Axial clearance and preload are determined by the application*

In the case of axial cylindrical roller bearings, the internal clearance (axial clearance) is only achieved when the bearings are mounted. The requisite axial clearance of the bearing arrangement is dependent on the application and must take account of the conditions in the bearing arrangement while warm from operation and subjected to load.

If axial cylindrical roller bearings are subjected to vibrations while under predominantly static load, for example, they must be lightly preloaded. Preload can be applied, for example, using calibrated sheets (shims) ▶ 1081 | 7. Other suitable means include shaft nuts, disc springs, etc. ▶ 1084 | 1.15. It must always be ensured that no slippage occurs in operation between the rolling elements and raceways ▶ 1084 | 1.15.

It must also be ensured that the preload does not exceed the optimum value, otherwise there will be an increase in friction and therefore in heat generation in the bearing. These will both have a negative effect on the operating life of the bearings.

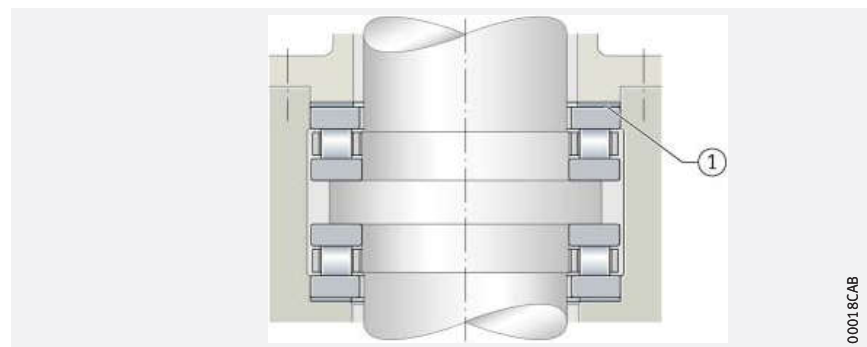


If there is any uncertainty regarding correct setting, please consult Schaeffler.



Setting the axial clearance by means of shims

① Calibrated sheet (shim)



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1.11 Dimensions, tolerances

Dimension standards



The main dimensions of axial cylindrical roller bearings correspond to ISO 104:2015.

Chamfer dimensions



The limiting dimensions for chamfer dimensions correspond to DIN 620-6:2004. Overview and limiting values ▶ 138. Nominal value of chamfer dimension ▶ 1088 | 3.

Tolerances



The dimensional and running tolerances of axial bearing washers GS and WS correspond to the tolerance class Normal in accordance with ISO 199:2014 ▶ 133 | 25 to ▶ 135 | 28.

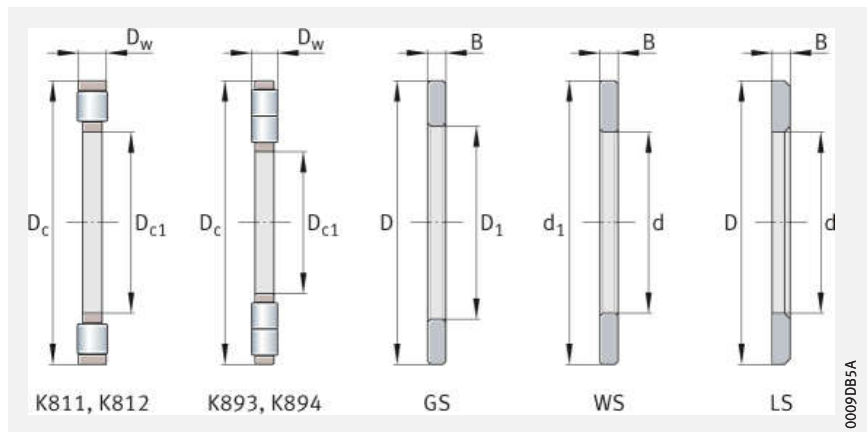
Tolerances of the bore and outside diameter as well as of the width of the bearing parts ▶ 1082 | 3 and ▶ 1082 | 8.

3
Dimensions and tolerances of bearing parts

Bearing component	Dimension	Tolerance
Axial cylindrical roller and cage assembly K	D_{c1}	E11 ¹⁾
	D_c	a13 ¹⁾
	D_w	to DIN 5402-1
Housing locating washer GS	D_1	–
	D	to ISO 199
	B	h11
Shaft locating washer WS	d	to ISO 199
	d_1	–
	B	h11
Bearing washer LS	d	E12 ¹⁾
	D	a12 ¹⁾
	B	h11

¹⁾ Deviation of the bore diameter Δ_{dmp} and deviation of the outside diameter Δ_{Dmp} ▶ 138.

8
Bearing parts – axial cylindrical roller and cage assemblies and bearing washers



1.12 Suffixes

For a description of the suffixes used in this chapter ▶ 1082 | 4 and **medias** interchange ▶ <https://www.schaeffler.de/std/1D52>.

4
Suffixes and corresponding descriptions

Suffix	Description of suffix	
M	Solid brass cage	Standard, dependent on bore code
TV	Solid cage made from glass fibre reinforced polyamide PA66	
P5	High dimensional, geometrical and running accuracy	Special design for axial bearing washers GS, WS; available by agreement

1.13 Structure of bearing designation

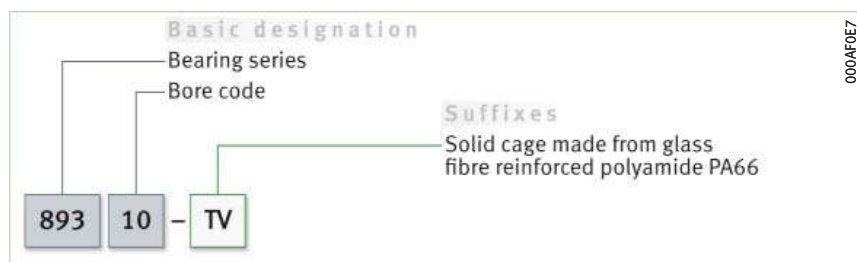
Examples of composition of bearing designation

The designation of bearings follows a set model. Examples ▶ 1083 | 9 and ▶ 1083 | 10. The composition of the designation is subject to DIN 623-1 ▶ 102 | 10.

9
Single row axial cylindrical roller bearing, comprising axial roller and cage assembly, shaft locating washer and housing locating washer: designation structure



10
Double row axial cylindrical roller bearing, comprising axial roller and cage assembly, shaft locating washer and housing locating washer: designation structure



1.14 Dimensioning

Equivalent dynamic bearing load



Axial cylindrical roller bearings can only support axial forces ▶ 1079 | 1.2. In the rating life equation, P is therefore substituted by the value for F_a ▶ 1083 | f1.

f1
Equivalent dynamic load

$$P = F_a$$

Legend

P	N	Equivalent dynamic bearing load
F_a	N	Axial load.

Equivalent static bearing load

Combined loads are not possible

In relation to the direction of load, the same conditions apply as for the equivalent dynamic bearing load, i.e. combined loads are not permissible. In the rating life equation, P_0 is therefore substituted by the value for F_{0a} ▶ 1083 | f2.

f2
Equivalent static load

$$P_0 = F_{0a}$$

Legend

P_0	N	Equivalent static bearing load
F_{0a}	N	Largest 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 ▶ 1083 | f3.

f3
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

Rolling bearings under low loads are particularly prone to slippage

In order to prevent slippage damage, the bearing must be subjected to a minimum axial load $F_{a\ min} \gg 1084 | f_4$ and $\gg 1084 | \text{5}$. In vertical bearing arrangements in particular, the requisite minimum axial load $F_{a\ min}$ is normally achieved, however, simply by the weight of the bearing parts and the external forces. If this is not the case, the bearing arrangement must be preloaded, for example by means of springs or a housing nut.

f_4
Minimum axial load

$$F_{a\ min} = 0,0005 \cdot C_{0a} + k_a \left(\frac{C_{0a} \cdot n}{10^8} \right)^2$$

Legend

$F_{a\ min}$	N	Minimum axial load
C_{0a}	N	Basic static load rating $\gg 1088 \text{5}$
k_a	-	Factor for determining the minimum axial load $\gg 1084 \text{5}$
n	min^{-1}	Speed.

5
Factor k_a for calculating the minimum axial load

Series	Factor k_a
K811	1,4
K812	0,9
K893	0,7
K894	0,5

1.16 Design of bearing arrangements

Design of adjacent parts



Axial cylindrical roller bearings cannot tolerate angular misalignments $\gg 1079 | 1.3$. The locating surfaces for the bearing parts on the shaft and in the housing must therefore be vertical to the shaft axis, while the adjacent parts must be rigid and flat. They must be configured such that the bearing washers are supported as far as possible over the whole circumference and over the whole raceway width; values $\gg 1088 | \text{5}$. The radial cage guidance surfaces must be precision machined and wear-resistant (Ramax 0,8 (Rzmax 4)).

Mounting diameter on the shaft and in the housing

For the mounting dimensions, the following values apply $\gg 1088 | \text{5}$:

- mounting diameter on the shaft $\geq d_a$
- mounting diameter in the housing $\leq D_a$.

Tolerances for shaft and housing bore

Proven tolerances are given in $\gg 1084 | \text{6}$. If the data are observed, this will give correct radial guidance of the bearing elements.

6
Tolerances for shafts and housing bores

Bearing component		Tolerance class ¹⁾ for	
		Shaft	Bore
Axial cylindrical roller bearings	Shaft guided	h8	-
Housing locating washers	-	-	H9
Shaft locating washers	-	h8	-
Bearing washers	Externally centred as housing locating washer	Shaft released	H9
	Internally centred as shaft locating washer	h8	Bore released

¹⁾ The envelope requirement © applies.

🔧 *Release of shaft and housing locating washers, as a function of centring*

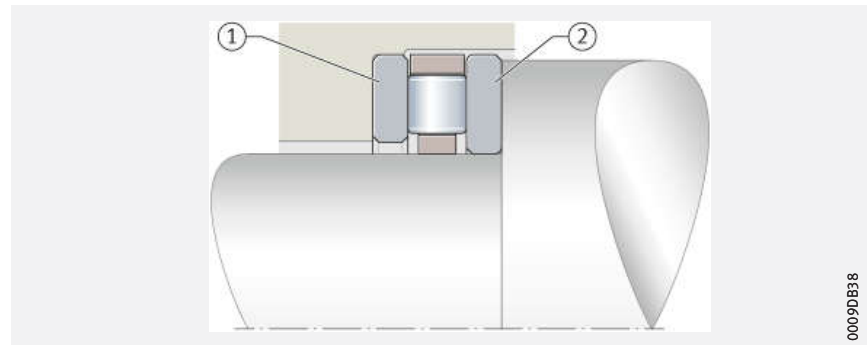
Guidance of bearing parts

If the bearing washers are centred on the shaft, they must have radial clearance in the housing bore while, if they are centred in the housing, there must be radial clearance between the washer bore and the shaft
 ▶ 1085 | 📐 11.



📐 **11**
 Guidance and release of shaft and housing locating washers

- ① Housing locating washer (guidance in the housing), radial clearance on the shaft
- ② Shaft locating washer (guidance on the shaft), radial clearance in the housing



🔧 *Guidance of axial roller and cage assemblies*

In order to achieve the lowest possible sliding speeds on the guidance surfaces, the axial cylindrical roller and cage assemblies are generally guided on the shaft. This is particularly important in the case of high speeds.

🔧 *For a direct bearing arrangement of roller and cage assemblies: harden and grind the raceways for the rollers*

If the axial design space is particularly small, axial cylindrical roller and cage assemblies can also run directly (without axial bearing washers) on the adjacent construction. In this case – and if the load carrying capacity of the axial cylindrical roller and cage assemblies is to be fully utilised – the raceways on the shaft and in the housing must be produced as a rolling bearing raceway or must correspond to the quality and hardness of axial bearing washers. The surface hardness of the raceway must be 670 HV to 840 HV, the hardening depth CHD or SHD must be sufficiently large ▶ 180. The surface roughness Ra must be ≤ 0,2 µm. At a mean roughness value of Ra > 0,2 µm, it is no longer possible to utilise the full load carrying capacity of the bearings. When designing the raceway on the shaft and in the housing, the raceway dimensions E_a and E_b must be observed ▶ 1088 | 📐. If the values are observed, this will ensure that the raceways for the cylindrical rollers – taking account of any possible axial offset of the roller and cage assembly – are adequately dimensioned.

1.17 Mounting and dismounting



The mounting and dismounting options for the bearings must be taken into consideration in the design of the bearing position.

🔧 *As the bearings are not self-retaining, they are easy to mount*

Axial cylindrical roller bearings are not self-retaining. As a result, the bearing parts (shaft locating washer, housing locating washer and axial cylindrical roller and cage assembly) can be mounted separately from each other. This gives simplified mounting of the bearings.

Mounting position of the bearing washers


The correct mounting position has a considerable influence on the function of the bearing arrangement. Axial bearing washers must always be mounted with the raceway side facing the rolling elements.

🔧 *Shaft locating washers*

On shaft locating washers, the raceway side is indicated by the smaller chamfer on the bore diameter of the washer.

🔧 *Housing locating washers*

On housing locating washers, the raceway side is indicated by the smaller chamfer on the outside diameter of the washer.

 *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.

1.18 Legal notice regarding data freshness

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

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.



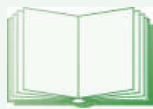
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Link to electronic product catalogue



The following link will take you to the Schaeffler electronic product catalogue: ► <https://medias.schaeffler.com>.

1.19 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:

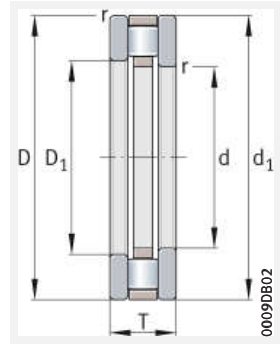
- Determining the bearing size ► 34
- Rigidity ► 54
- Friction and increases in temperature ► 56
- Speeds ► 64
- Bearing data ► 97
- Lubrication ► 70
- Sealing ► 182
- Design of bearing arrangements ► 139
- Mounting and dismounting ► 191.



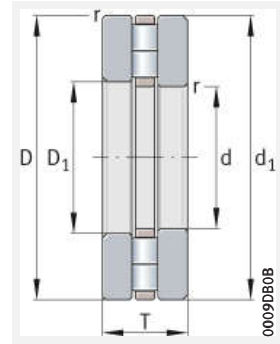


Axial cylindrical roller bearings

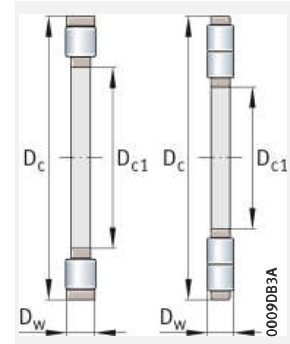
Axial cylindrical roller and cage assemblies
Axial bearing washers



811, 812



893, 894

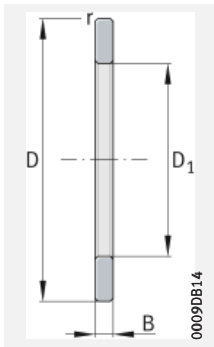


Single row: K811, K812
Double row: K893, K894

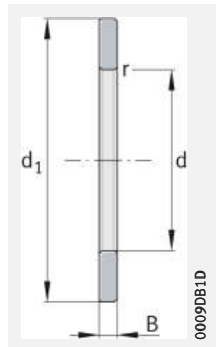
d = 15 – 60 mm

Main dimensions			Basic load ratings		Fatigue limit load C_{ua} N	Limiting speed n_G min^{-1}	Speed rating $n_{\theta r}$ min^{-1}	Axial cylindrical roller bearings		Axial cylindrical roller and cage assemblies	
d D_{c1}	D D_c	T	dyn. C_a N	stat. C_{0a} N				Mass m \approx kg	Designation ▶ 1082 1.12 ▶ 1083 1.13	Mass m \approx kg	Designation ▶ 1082 1.12 ▶ 1083 1.13
15	28	9	14 400	28 500	4 000	13 600	6 400	0,024	81102-TV	0,006	K81102-TV
17	30	9	16 000	33 500	4 650	12 800	5 800	0,027	81103-TV	0,009	K81103-TV
20	35	10	25 000	53 000	7 300	10 800	4 500	0,037	81104-TV	0,013	K81104-TV
25	42	11	33 500	76 000	7 100	8 900	3 650	0,053	81105-TV	0,015	K81105-TV
30	47	11	35 500	86 000	8 000	7 700	3 150	0,057	81106-TV	0,017	K81106-TV
	52	16	64 000	141 000	14 100	7 200	2 700	0,123	81206-TV	0,033	K81206-TV
	60	18	69 000	197 000	18 900	6 400	2 650	0,24	89306-TV	0,04	K89306-TV
35	52	12	39 000	101 000	9 500	6 800	2 700	0,073	81107-TV	0,019	K81107-TV
	62	18	80 000	199 000	20 000	6 000	2 360	0,195	81207-TV	0,043	K81207-TV
	68	20	80 000	237 000	23 200	5 700	2 420	0,34	89307-TV	0,053	K89307-TV
40	60	13	56 000	148 000	14 500	5 900	2 240	0,105	81108-TV	0,031	K81108-TV
	68	19	107 000	265 000	23 300	5 200	1 820	0,249	81208-TV	0,081	K81208-TV
	78	22	123 000	385 000	39 000	4 850	1 770	0,484	89308-TV	0,098	K89308-TV
45	65	14	59 000	163 000	16 000	5 300	2 020	0,13	81109-TV	0,035	K81109-TV
	73	20	105 000	265 000	23 300	4 950	1 840	0,287	81209-TV	0,085	K81209-TV
	85	24	139 000	445 000	44 500	4 400	1 600	0,615	89309-TV	0,121	K89309-TV
50	70	14	62 000	177 000	17 400	4 900	1 840	0,14	81110-TV	0,038	K81110-TV
	78	22	118 000	315 000	27 500	4 550	1 570	0,356	81210-TV	0,098	K81210-TV
	95	27	168 000	560 000	58 000	3 950	1 450	0,887	89310-TV	0,175	K89310-TV
55	78	16	90 000	300 000	31 000	4 350	1 350	0,218	81111-TV	0,045	K81111-TV
	90	25	155 000	405 000	38 500	4 050	1 540	0,568	81211-TV	0,166	K81211-TV
	105	30	184 000	600 000	52 000	3 600	1 500	1,18	89311-TV	0,195	K89311-TV
60	85	17	103 000	315 000	32 000	4 000	1 360	0,266	81112-TV	0,082	K81112-TV
	95	26	172 000	480 000	45 500	3 700	1 290	0,642	81212-TV	0,176	K81212-TV
	110	30	197 000	670 000	58 000	3 400	1 350	1,26	89312-TV	0,21	K89312-TV
	130	42	390 000	1 220 000	129 000	3 050	1 080	2,818	89412-TV	0,538	K89412-TV

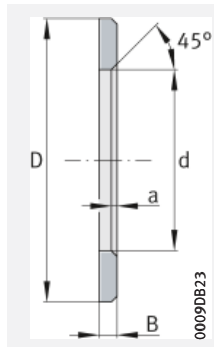
medias ▶ <https://www.schaeffler.de/std/1DCC>



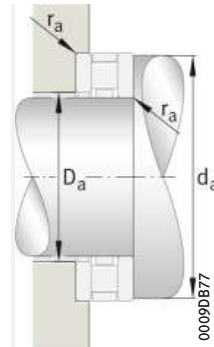
GS



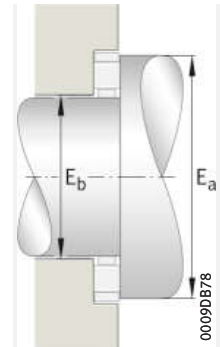
WS



LS



Mounting dimensions



Mounting dimensions, direct bearing arrangement

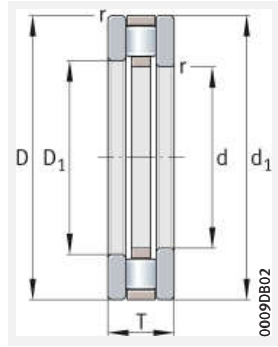


d Dc1	Axial bearing washers				Dimensions					Mounting dimensions			Raceway dimensions	
	m ≈ kg	Designation ▶ 1082 1.12 ▶ 1083 1.13			D1	d1	Dw	B	a r min.	da	Da	ra	Eb	Ea
		Housing locating washer	Shaft locating washer	Bearing washer										
15	0,008	GS81102	WS81102	LS1528	16	28	3,5	2,75	0,3	27	16	0,3	16	27
17	0,009	GS81103	WS81103	LS1730	18	30	3,5	2,75	0,3	29	18	0,3	18	29
20	0,011	GS81104	WS81104	LS2035	21	35	4,5	2,75	0,3	34	21	0,3	21	34
25	0,019	GS81105	WS81105	LS2542	26	42	5	3	0,6	41	26	0,6	26	41
30	0,02	GS81106	WS81106	LS3047	32	47	5	3	0,6	46	31	0,6	31	46
	0,045	GS81206	WS81206	-	32	52	7,5	4,25	0,6	50	31	0,6	31	50
	0,095	GS89306	WS89306	-	32	60	5,5	6,25	1	59	33	1	33	59
35	0,027	GS81107	WS81107	LS3552	37	52	5	3,5	0,6	51	36	0,6	36	51
	0,076	GS81207	WS81207	-	37	62	7,5	5,25	1	58	39	1	39	58
	0,134	GS89307	WS89307	-	37	68	6	7	1	67	38	1	38	67
40	0,037	GS81108	WS81108	LS4060	42	60	6	3,5	0,6	58	42	0,6	42	58
	0,084	GS81208	WS81208	-	42	68	9	5	1	66	43	1	43	66
	0,193	GS89308	WS89308	-	42	78	7	7,5	1	77	44	1	44	77
45	0,047	GS81109	WS81109	LS4565	47	65	6	4	0,6	63	47	0,6	47	63
	0,101	GS81209	WS81209	-	47	73	9	5,5	1	70	48	1	48	70
	0,247	GS89309	WS89309	-	47	85	7,5	8,25	1	83	49	1	49	83
50	0,051	GS81110	WS81110	LS5070	52	70	6	4	0,6	68	52	0,6	52	68
	0,129	GS81210	WS81210	-	52	78	9	6,5	1	75	53	1	53	75
	0,356	GS89310	WS89310	-	52	95	8	9,5	1,1	92	56	1,1	56	92
55	0,082	GS81111	WS81111	LS5578	57	78	6	5	0,6	77	56	0,6	57	77
	0,201	GS81211	WS81211	-	57	90	11	7	1	85	59	1	59	85
	0,485	GS89311	WS89311	-	57	105	9	10,5	1,1	103	61	1,1	61	103
60	0,092	GS81112	WS81112	LS6085	62	85	7,5	4,75	1	82	62	1	62	82
	0,233	GS81212	WS81212	-	62	95	11	7,5	1	91	64	1	64	91
	0,55	GS89312	WS89312	-	62	110	9	10,5	1,1	108	66	1,1	66	108
	1,115	GS89412	WS89412	-	62	130	14	14	1,5	126	65	1,5	65	126

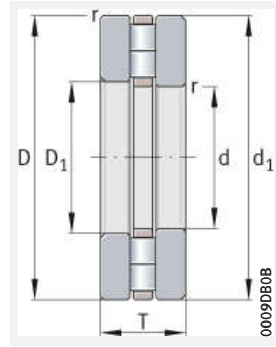


Axial cylindrical roller bearings

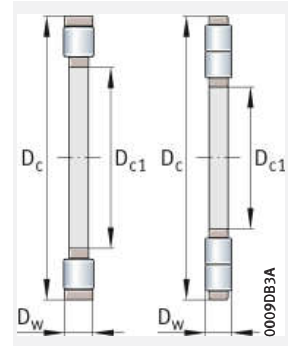
Axial cylindrical roller and cage assemblies
Axial bearing washers



811, 812



893, 894

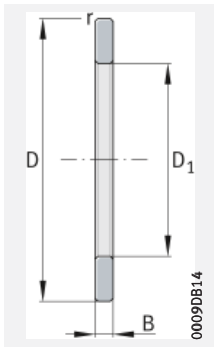


Single row: K811, K812
Double row: K893, K894

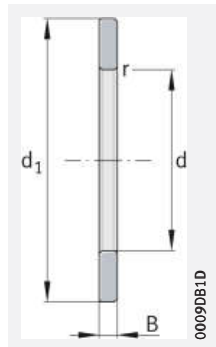
d = 65 – 100 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Axial cylindrical roller bearings		Axial cylindrical roller and cage assemblies	
								Mass	Designation	Mass	Designation
d	D _{c1}	T	dyn. C _a	stat. C _{0a}	C _{ua}	n _G	n _{gr}	m		m	
			N	N	N	min ⁻¹	min ⁻¹	≈ kg		≈ kg	
65	90	18	107 000	340 000	34 000	3 700	1 260	0,31	81113-TV	0,09	K81113-TV
	100	27	177 000	500 000	48 000	3 550	1 250	0,721	81213-TV	0,185	K81213-TV
	115	30	194 000	670 000	58 000	3 200	1 330	1,33	89313-TV	0,21	K89313-TV
	140	45	445 000	1 410 000	148 000	2 850	1 010	3,52	89413-TV	0,72	K89413-TV
70	95	18	111 000	365 000	36 500	3 500	1 170	0,332	81114-TV	0,092	K81114-TV
	105	27	187 000	550 000	53 000	3 250	1 120	0,768	81214-TV	0,212	K81214-TV
	125	34	239 000	830 000	75 000	2 950	1 200	1,82	89314-TV	0,29	K89314-TV
	150	48	475 000	1 500 000	158 000	2 650	1 010	4,18	89414-TV	0,76	K89414-TV
75	100	19	107 000	350 000	35 500	3 300	1 190	0,393	81115-TV	0,096	K81115-TV
	110	27	173 000	500 000	48 000	3 150	1 220	0,8	81215-TV	0,195	K81215-TV
	135	36	290 000	1 010 000	92 000	2 750	1 090	2,23	89315-TV	0,375	K89315-TV
	160	51	500 000	1 580 000	160 000	2 440	1 000	5,96	89415-M	1,78	K89415-M
80	105	19	106 000	350 000	35 500	3 150	1 180	0,4	81116-TV	0,095	K81116-TV
	115	28	201 000	630 000	60 000	2 900	980	0,9	81216-TV	0,234	K81216-TV
	140	36	305 000	1 110 000	100 000	2 650	1 000	2,37	89316-TV	0,42	K89316-TV
	170	54	560 000	1 770 000	180 000	2 280	940	7,04	89416-M	2,04	K89416-M
85	110	19	113 000	385 000	39 000	3 000	1 090	0,42	81117-TV	0,118	K81117-TV
	125	31	217 000	660 000	65 000	2 800	1 080	1,26	81217-TV	0,28	K81217-TV
	150	39	325 000	1 140 000	104 000	2 450	1 030	3,39	89317-M	0,93	K89317-M
	180	58	620 000	1 980 000	199 000	2 160	890	8,65	89417-M	2,71	K89417-M
90	120	22	141 000	465 000	40 000	2 750	1 070	0,62	81118-TV	0,15	K81118-TV
	135	35	290 000	890 000	94 000	2 550	910	1,77	81218-TV	0,54	K81218-TV
	155	39	335 000	1 200 000	109 000	2 350	980	3,63	89318-M	0,97	K89318-M
	190	60	680 000	2 200 000	221 000	2 040	840	9,94	89418-M	3,04	K89418-M
100	135	25	199 000	650 000	60 000	2 480	930	0,95	81120-TV	0,25	K81120-TV
	150	38	340 000	1 080 000	111 000	2 300	840	2,2	81220-TV	0,6	K81220-TV
	170	42	380 000	1 400 000	123 000	2 130	910	4,56	89320-M	1,18	K89320-M
	210	67	850 000	2 850 000	280 000	1 830	710	13,42	89420-M	3,92	K89420-M

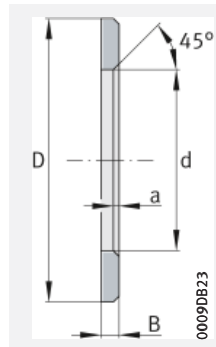
medias ► <https://www.schaeffler.de/std/1DCD>



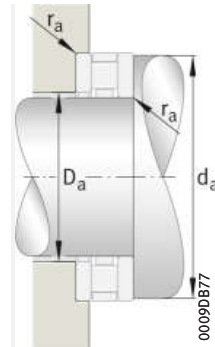
GS



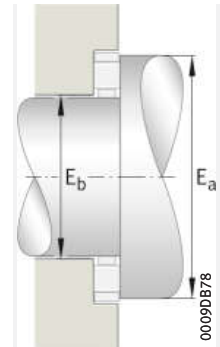
WS



LS



Mounting dimensions



Mounting dimensions, direct bearing arrangement

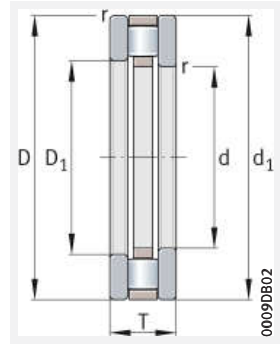


d Dc1	Axial bearing washers				Dimensions					Mounting dimensions			Raceway dimensions	
	m ≈ kg	Designation ▶ 1082 1.12 ▶ 1083 1.13			D1	d1	Dw	B	a r min.	da	Da	ra	Eb	Ea
		Housing locating washer	Shaft locating washer	Bearing washer										
65	0,11	GS81113	WS81113	LS6590	67	90	7,5	5,25	1	87	67	1	67	87
	0,268	GS81213	WS81213	–	67	100	11	8	1	96	69	1	69	96
	0,535	GS89313	WS89313	–	67	115	9	10,5	1,1	113	71	1,1	71	113
	1,4	GS89413	WS89413	–	68	140	15	15	2	135	70	2	70	135
70	0,12	GS81114	WS81114	LS7095	72	95	7,5	5,25	1	92	72	1	72	92
	0,278	GS81214	WS81214	–	72	105	11	8	1	102	74	1	74	102
	0,8	GS89314	WS89314	–	72	125	10	12	1,1	123	76	1,1	76	123
	1,73	GS89414	WS89414	–	73	150	16	16	2	147	76	2	76	147
75	0,136	GS81115	WS81115	LS75100	77	100	7,5	5,75	1	97	78	1	78	97
	0,293	GS81215	WS81215	–	77	110	11	8	1	106	79	1	79	106
	0,97	GS89315	WS89315	–	77	135	11	12,5	1,5	132	81	1,5	81	132
	2,09	GS89415	WS89415	–	78	160	17	17	2	156	82	2	82	156
80	0,144	GS81116	WS81116	LS80105	82	105	7,5	5,75	1	102	83	1	83	102
	0,333	GS81216	WS81216	–	82	115	11	8,5	1	112	84	1	84	112
	1,02	GS89316	WS89316	–	82	140	11	12,5	1,5	137	86	1,5	86	137
	2,5	GS89416	WS89416	–	83	170	18	18	2,1	165	88	2,1	88	165
85	0,151	GS81117	WS81117	LS85110	87	110	7,5	5,75	1	108	87	1	87	108
	0,49	GS81217	WS81217	–	88	125	12	9,5	1	119	90	1	90	119
	1,23	GS89317	WS89317	–	88	150	12	13,5	1,5	147	93	1,5	93	146
	2,97	GS89417	WS89417	–	88	180	19	19,5	2,1	175	93	2,1	93	175
90	0,225	GS81118	WS81118	LS90120	92	120	9	6,5	1	117	93	1	93	117
	0,614	GS81218	WS81218	–	93	135	14	10,5	1,1	129	95	1,1	95	129
	1,33	GS89318	WS89318	–	93	155	12	13,5	1,5	152	98	1,5	98	151
	3,45	GS89418	WS89418	–	93	190	20	20	2,1	185	99	2,1	99	185
100	0,35	GS81120	WS81120	LS100135	102	135	11	7	1	131	104	1	104	131
	0,8	GS81220	WS81220	–	103	150	15	11,5	1,1	142	107	1,1	107	142
	1,69	GS89320	WS89320	–	103	170	13	14,5	1,5	167	107	1,5	109	166
	4,75	GS89420	WS89420	–	103	210	22	22,5	3	205	111	3	111	205

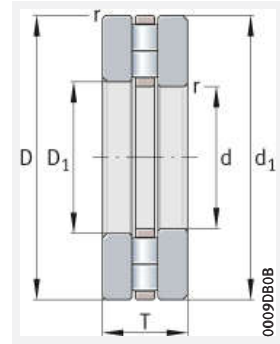


Axial cylindrical roller bearings

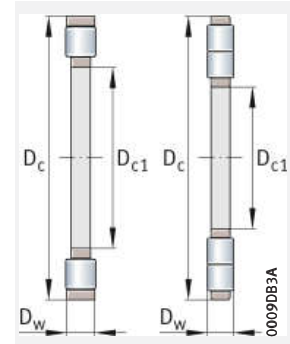
Axial cylindrical roller and cage assemblies
Axial bearing washers



811, 812



893, 894

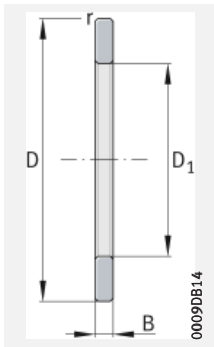


Single row: K811, K812
Double row: K893, K894

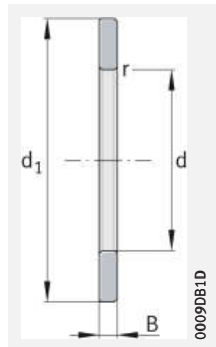
d = 110 – 170 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Axial cylindrical roller bearings		Axial cylindrical roller and cage assemblies	
								Mass	Designation	Mass	Designation
d	D _{c1}	T	dyn. C _a	stat. C _{0a}	C _{ua}	n _G	n _{dr}	m		m	
			N	N	N	min ⁻¹	min ⁻¹	≈ kg		≈ kg	
110	145	25	207 000	700 000	63 000	2 280	860	1,04	81122-TV	0,27	K81122-TV
	160	38	325 000	1 030 000	104 000	2 150	870	2,29	81222-TV	0,53	K81222-TV
	190	48	500 000	1 870 000	177 000	1 900	780	6,7	89322-M	1,83	K89322-M
	230	73	1 010 000	3 400 000	330 000	1 680	640	17,41	89422-M	5,11	K89422-M
120	155	25	214 000	760 000	66 000	2 110	790	1,12	81124-TV	0,29	K81124-TV
	170	39	340 000	1 120 000	111 000	2 000	800	2,54	81224-TV	0,58	K81224-TV
	210	54	640 000	2 420 000	224 000	1 730	690	9,44	89324-M	2,64	K89324-M
	250	78	1 170 000	4 000 000	385 000	1 540	570	21,9	89424-M	6,37	K89424-M
130	170	30	255 000	900 000	79 000	1 940	770	1,67	81126-TV	0,38	K81126-TV
	190	45	480 000	1 520 000	151 000	1 820	720	3,98	81226-TV	0,92	K81226-TV
	225	58	720 000	2 700 000	250 000	1 620	650	11,2	89326-M	2,09	K89326-M
	270	85	1 330 000	4 600 000	430 000	1 420	520	27,1	89426-M	7,96	K89426-M
140	180	31	260 000	960 000	83 000	1 820	720	1,9	81128-TV	0,4	K81128-TV
	200	46	455 000	1 450 000	141 000	1 690	730	5,07	81228-M	1,8	K81228-M
	240	60	820 000	3 200 000	290 000	1 520	570	13,2	89328-M	2,57	K89328-M
	280	85	1 390 000	4 950 000	455 000	1 350	480	29,8	89428-M	8,53	K89428-M
150	190	31	270 000	1 020 000	86 000	1 710	670	2,2	81130-TV	0,43	K81130-TV
	215	50	590 000	1 940 000	188 000	1 580	610	7,17	81230-M	2,81	K81230-M
	250	60	840 000	3 350 000	300 000	1 440	540	13,9	89330-M	3,75	K89330-M
	300	90	1 580 000	5 700 000	520 000	1 250	440	35,4	89430-M	10,4	K89430-M
160	200	31	270 000	1 050 000	87 000	1 610	640	2,12	81132-TV	0,44	K81132-TV
	225	51	600 000	2 030 000	194 000	1 500	580	7,6	81232-M	3,01	K81232-M
	320	95	1 780 000	6 500 000	590 000	1 170	400	42	89432-M	12,4	K89432-M
170	215	34	360 000	1 380 000	124 000	1 510	570	2,41	81134-TV	0,66	K81134-TV
	240	55	680 000	2 340 000	222 000	1 400	540	9,3	81234-M	3,5	K81234-M
	340	103	1 990 000	7 400 000	660 000	1 100	365	51,9	89434-M	14,9	K89434-M

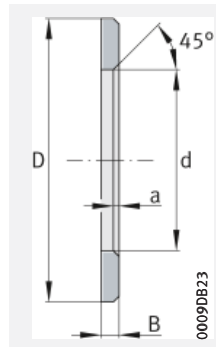
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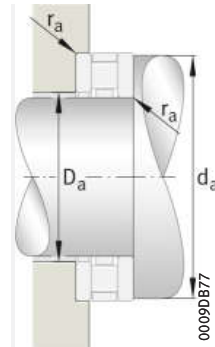
GS



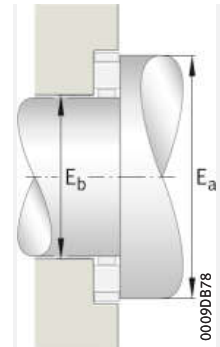
WS



LS



Mounting dimensions



Mounting dimensions, direct bearing arrangement

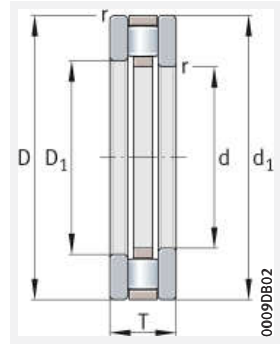


Axial bearing washers					Dimensions					Mounting dimensions			Raceway dimensions	
d Dc1	Mass	Designation			D1	d1	Dw	B	a r	da	Da	ra	Eb	Ea
	m ≈ kg	Housing locating washer	Shaft locating washer	Bearing washer										
110	0,385	GS81122	WS81122	LS110145	112	145	11	7	1	141	114	1	114	141
	0,88	GS81222	WS81222	–	113	160	15	11,5	1,1	152	117	1,1	117	152
	2,44	GS89322	WS89322	–	113	190	15	16,5	2	186	120	2	120	185
	6,15	GS89422	WS89422	–	113	230	24	24,5	3	223	121	3	121	223
120	0,415	GS81124	WS81124	LS120155	122	155	11	7	1	151	124	1	124	151
	0,98	GS81224	WS81224	–	123	170	15	12	1,1	162	127	1,1	127	162
	3,4	GS89324	WS89324	–	123	210	17	18,5	2,1	206	130	2,1	132	205
	7,7	GS89424	WS89424	–	123	250	26	26	4	243	133	4	133	243
130	0,643	GS81126	WS81126	LS130170	132	170	12	9	1	165	135	1	135	165
	1,53	GS81226	WS81226	–	133	187	19	13	1,5	181	137	1,5	137	181
	4,045	GS89326	WS89326	–	134	225	18	20	2,1	220	141	2,1	141	219
	9,5	GS89426	WS89426	–	134	270	28	28,5	4	263	145	4	145	263
140	0,749	GS81128	WS81128	LS140180	142	178	12	9,5	1	175	145	1	145	175
	1,635	GS81228	WS81228	–	143	197	19	13,5	1,5	191	147	1,5	151	195
	4,8	GS89328	WS89328	–	144	240	19	20,5	2,1	235	152	2,1	152	234
	10,6	GS89428	WS89428	–	144	280	28	28,5	4	273	155	4	155	273
150	0,796	GS81130	WS81130	LS150190	152	188	12	9,5	1	185	155	1	155	185
	2,18	GS81230	WS81230	–	153	212	21	14,5	1,5	211	158	1,5	162	210
	5,06	GS89330	WS89330	–	154	250	19	20,5	2,1	245	162	2,1	162	244
	12,5	GS89430	WS89430	–	154	300	30	30	4	293	167	4	167	293
160	0,842	GS81132	WS81132	LS160200	162	198	12	9,5	1	195	165	1	165	195
	2,3	GS81232	WS81232	–	163	222	21	15	1,5	220	168	1,5	171	219
	14,8	GS89432	WS89432	–	164	320	32	31,5	5	313	179	5	179	313
170	1,1	GS81134	WS81134	–	172	213	14	10	1,1	209	176	1,1	176	209
	2,9	GS81234	WS81234	–	173	237	22	16,5	1,5	235	180	1,5	184	233
	18,5	GS89434	WS89434	–	174	340	34	34,5	5	333	191	5	191	333

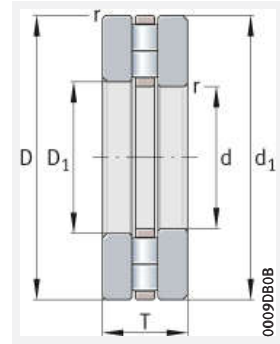


Axial cylindrical roller bearings

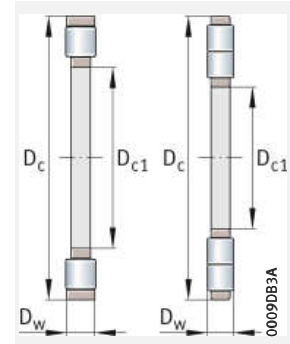
Axial cylindrical roller and cage assemblies
Axial bearing washers



811, 812



893, 894

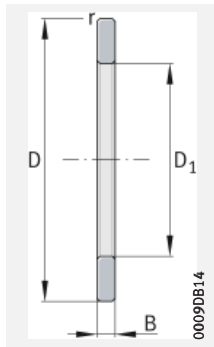


Single row: K811, K812
Double row: K893, K894

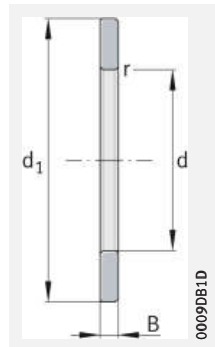
d = 180 – 320 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Axial cylindrical roller bearings		Axial cylindrical roller and cage assemblies	
								Mass	Designation	Mass	Designation
d	D _{c1}	T	dyn. C _a	stat. C _{0a}	C _{ua}	n _G	n _{gr}	m	▶ 1082 1.12	m	▶ 1083 1.13
			N	N	N	min ⁻¹	min ⁻¹	≈ kg	▶ 1083 1.13	≈ kg	▶ 1083 1.13
180	225	34	340 000	1 300 000	115 000	1 430	590	3,3	81136-M	1,46	K81136-M
	250	56	700 000	2 440 000	228 000	1 340	520	9,9	81236-M	3,67	K81236-M
	360	109	2 210 000	8 200 000	720 000	1 050	345	60	89436-M	17,6	K89436-M
190	240	37	390 000	1 500 000	131 000	1 340	570	4,74	81138-M	1,84	K81138-M
	270	62	880 000	3 000 000	285 000	1 250	475	12,8	81238-M	5,17	K81238-M
	380	115	2 460 000	9 200 000	800 000	1 010	330	72,1	89438-M	20,9	K89438-M
200	250	37	395 000	1 550 000	134 000	1 290	550	4,95	81140-M	1,93	K81140-M
	280	62	900 000	3 150 000	295 000	1 190	450	14,2	81240-M	5,4	K81240-M
	400	122	2 700 000	10 200 000	880 000	960	305	82,6	89440-M	24	K89440-M
220	270	37	420 000	1 730 000	146 000	1 180	490	5,22	81144-M	2,04	K81144-M
	300	63	950 000	3 450 000	310 000	1 100	405	15,3	81244-M	5,8	K81244-M
	420	122	2 900 000	11 500 000	980 000	880	265	90,1	89444-M	25,7	K89444-M
240	300	45	600 000	2 500 000	212 000	1 070	420	8,45	81148-M	3,32	K81148-M
	340	78	1 370 000	5 000 000	445 000	970	330	26,2	81248-M	9,94	K81248-M
	440	122	3 000 000	12 200 000	1 030 000	850	250	95,9	89448-M	27,3	K89448-M
260	320	45	620 000	2 650 000	219 000	990	390	9,08	81152-M	3,55	K81152-M
	360	79	1 440 000	5 400 000	475 000	910	305	28,6	81252-M	10,8	K81252-M
	480	132	3 600 000	14 700 000	1 200 000	780	224	125	89452-M	36,8	K89452-M
280	350	53	870 000	3 650 000	305 000	910	330	12,6	81156-M	5,31	K81156-M
	380	80	1 460 000	5 600 000	485 000	860	290	31	81256-M	11,5	K81256-M
	520	145	4 250 000	17 600 000	1 420 000	700	195	159	89456-M	48,5	K89456-M
300	380	62	1 070 000	4 500 000	370 000	840	295	19,4	81160-M	7,6	K81160-M
	420	95	1 930 000	7 300 000	620 000	780	255	48,25	81260-M	17,8	K81260-M
	540	145	4 350 000	18 500 000	1 480 000	670	184	170	89460-M	49,8	K89460-M
320	400	63	1 100 000	4 750 000	385 000	800	280	20,7	81164-M	8,04	K81164-M
	580	155	5 500 000	19 900 000	1 460 000	640	184	203	89464-M	80,3	K89464-M

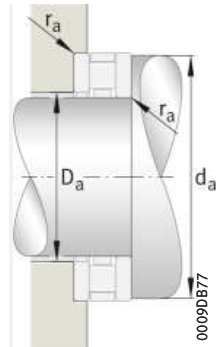
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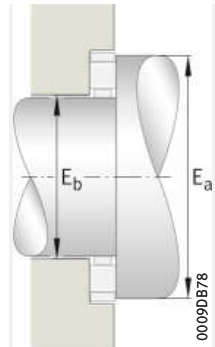
GS



WS



Mounting dimensions



Mounting dimensions, direct bearing arrangement



d Dc1	Axial bearing washers				Dimensions					Mounting dimensions			Raceway dimensions	
	Mass m ≈ kg	Designation ➤ 1082 1.12 ➤ 1083 1.13		D1	d1	Dw	B	a r min.	da	Da	ra	Eb	Ea	
		Housing locating washer	Shaft locating washer											
180	1,12	GS81136	WS81136	183	222	14	10	1,1	219	185	1,1	186	220	
	3,13	GS81236	WS81236	183	247	22	17	1,5	245	190	1,5	194	243	
	21,3	GS89436	WS89436	184	360	36	36,5	5	351	200	5	200	351	
190	1,45	GS81138	WS81138	193	237	15	11	1,1	233	197	1,1	198	234	
	3,835	GS81238	WS81238	194	267	26	18	2	265	200	2	205	263	
	25,6	GS89438	WS89438	195	380	38	38,5	5	373	214	5	212	371	
200	1,51	GS81140	WS81140	203	247	15	11	1,1	243	206	1,1	208	244	
	4,41	GS81240	WS81240	204	277	26	18	2	275	210	2	215	273	
	29,3	GS89440	WS89440	205	400	40	41	5	393	226	5	224	391	
220	1,59	GS81144	WS81144	223	267	15	11	1,1	263	226	1,1	228	264	
	4,75	GS81244	WS81244	224	297	26	18,5	2	296	230	2	236	294	
	32,2	GS89444	WS89444	225	420	40	41	6	411	244	6	244	411	
240	2,57	GS81148	WS81148	243	297	18	13,5	1,5	296	248	1,5	253	294	
	8,15	GS81248	WS81248	244	335	32	23	2,1	335	261	2,1	263	333	
	34,3	GS89448	WS89448	245	440	40	41	6	433	266	6	264	431	
260	2,765	GS81152	WS81152	263	317	18	13,5	1,5	316	268	1,5	272	314	
	8,9	GS81252	WS81252	264	355	32	23,5	2,1	353	280	2,1	281	351	
	44,25	GS89452	WS89452	265	480	44	44	6	472	288	6	286	468	
280	3,65	GS81156	WS81156	283	347	22	15,5	1,5	346	288	1,5	294	344	
	9,75	GS81256	WS81256	284	375	32	24	2,1	373	300	2,1	301	371	
	55,6	GS89456	WS89456	285	520	48	48,5	6	512	311	6	309	508	
300	5,92	GS81160	WS81160	304	376	25	18,5	2	373	315	2	316	372	
	15,2	GS81260	WS81260	304	415	38	28,5	3	413	328	3	329	412	
	60,15	GS89460	WS89460	305	540	48	48,5	6	533	331	6	329	528	
320	6,35	GS81164	WS81164	324	396	25	19	2	394	334	2	336	392	
	61,5	GS89464	WS89464	325	575	68	43,5	6	573	340	6	343	566	