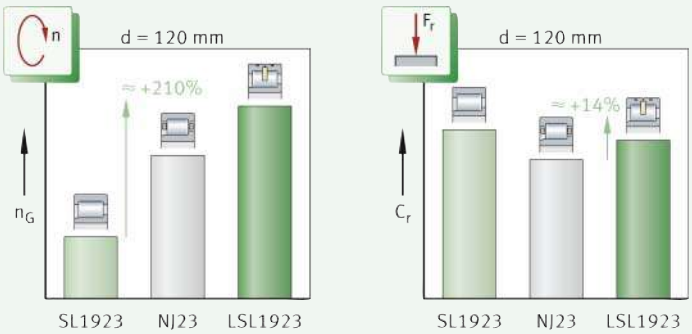
2 Cylindrical roller bearings with disc cage or with spacers

Cylindrical roller bearings with disc cage/with spacers are suitable where:

- bearing arrangements are subjected to very high radial loads and higher speeds occur ➤*480|2.2*, ➤*484|2.6*
- high dynamic inertia forces are present
- not only high radial forces but also axial loads from one direction must be supported by the bearing position (semi-locating bearing function) ➤*480|2.2*
- high shock loads occur
- thermally stable conditions are required in the bearing even at higher speeds
- the cages are subjected to high dynamic inertia forces; e.g. in vibratory machinery
- axial displacements of the shaft relative to the housing must be compensated without constraint in the bearing
- the bearings should be separable for easier mounting; in vibratory machinery, for example, the bearing ring with circumferential load as well as the ring with point load should have a tight fit ➤*478|2.1*, ➤*492|2.17*.

For an overview of other product-specific features, see the Matrix for bearing preselection ➤*410*.



1 *Cylindrical roller bearing with full complement bearing/standard cage/disc cage, comparison of speed and load carrying capacity*

n_G = *limiting speed*
C_r = *basic dynamic load rating*
SL1923 = *full complement cylindrical roller bearing*
NJ23 = *cylindrical roller bearing with standard cage*
LSL1923 = *cylindrical roller bearing with disc cage*

2.1 Bearing design

✎ *Design variants*

These cylindrical roller bearings are available as:

- type LSL1923 (bearing with disc cage) ➤*479|2*
- type ZSL1923 (bearing with spacers) ➤*479|3*
- special design for vibratory machinery ➤*480*
- X-life bearings ➤*480*.

Basic design – standard range

✎ *LSL1923 and ZSL1923 correspond to dimension series 23*

Cylindrical roller bearings with disc cage or with spacers are part of the group of radial roller bearings and correspond to dimension series 23. These single row bearings comprise radially split outer rings, removable inner rings, disc cages or spacers and cylindrical rollers. The rollers have profiled ends, i. e. they have a slight lateral curvature towards the ends. This modified line contact between the rolling elements and raceways prevents damaging edge stresses ➤*413*|⧉ *2*. For mounting of the bearings, the inner ring can be removed.

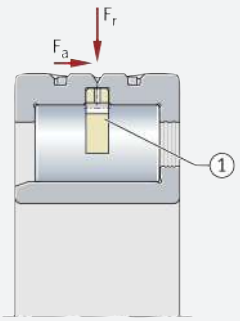
Series LSL1923 – bearings with disc cage

✎ *Bearings with semi-locating bearing function*

Cylindrical roller bearings LSL1923 have two rigid ribs on the outer ring and one rigid rib on the inner ring. An externally-guided flat brass disc cage prevents the rolling elements from coming into contact with each other during rolling ➤*479*|⧉ *2* and ➤*486*|*2.9*. The disc cage has pockets in which the rolling elements run. The rollers are guided between the ribs on the outer ring. The outer ring is axially split and held together by fasteners. Due to their design configuration, the bearings permit axial displacements of the shaft relative to the housing in one direction. In the opposite direction, they act as locating bearings. The maximum axial displacement s is given in the product tables.

⧉ *2*
Cylindrical roller bearing with disc cage

F_r = *radial load*
F_a = *axial load*
① *Brass disc cage*



0009CA72

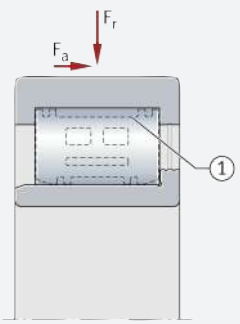
Series ZSL1923 – bearings with spacers

✎ *Bearings with semi-locating bearing function*

In the case of cylindrical roller bearings ZSL1923, plastic spacers prevent the rollers from coming into contact with each other during rolling ➤*479*|⧉ *3* and ➤*486*|*2.9*. The spacers are guided axially between the ribs on the outer ring. They are designed such that the rolling element set is self-retaining, so the outer ring with the rolling element set and the inner ring can be mounted separately from each other. Due to their design configuration, the bearings permit axial displacements of the shaft relative to the housing in one direction. In the opposite direction, they act as locating bearings. The maximum axial displacement s is given in the product tables.

⧉ *3*
Cylindrical roller bearing with spacers

F_r = *radial load*
F_a = *axial load*
① *Plastic spacers*



0009CA73

Special design of bearings LSL and ZSL for vibratory machinery

In addition to high basic dynamic load ratings C_r (and thus long rating life values), bearings for vibratory machinery must also be able to compensate or support considerable shaft tilting due to load or misalignment. The cylindrical roller bearings LSL and ZSL are therefore also available by agreement in the BIR design ➤488|⊞4. In these bearings, the inner ring raceway is ground slightly spherical.

X-life premium quality

Many sizes of the bearings are also available as X-life bearings. These bearings exhibit considerably higher performance than comparable standard cylindrical roller bearings. This is achieved, for example, through the modified internal construction, the optimised contact geometry between the rollers and raceways, better surface quality and the optimised roller guidance and lubricant film formation.

Increased customer benefits due to X-life

These technical enhancements offer a range of advantages, such as:

- a more favourable load distribution in the bearing and thus a higher dynamic load carrying capacity of the bearings
- a higher fatigue limit load
- lower heat generation in the bearing
- lower lubricant consumption and therefore longer maintenance intervals if relubrication is carried out
- a measurably longer operating life of the bearings
- high operational security
- compact, environmentally-friendly bearing arrangements.

Interchangeable with comparable standard bearings

Since X-life cylindrical roller bearings have the same dimensions as the corresponding standard bearings, the latter can be replaced without any problems by the higher-performance X-life bearings. The major advantages of X-life can therefore also be used for existing bearing arrangements with standard bearings.

Lower operating costs, higher machine availability

In conclusion, these advantages improve the overall cost-efficiency of the bearing position significantly and thus bring about a sustainable increase in the efficiency of the machine and equipment.

Suffix XL

X-life cylindrical roller bearings include the suffix XL in the designation ➤488|2.12 and ➤494|⊞.

X-life indicates a high product performance density and thus a particularly significant benefit to the customer. Further information on X-life ➤10.

2.2 Load carrying capacity

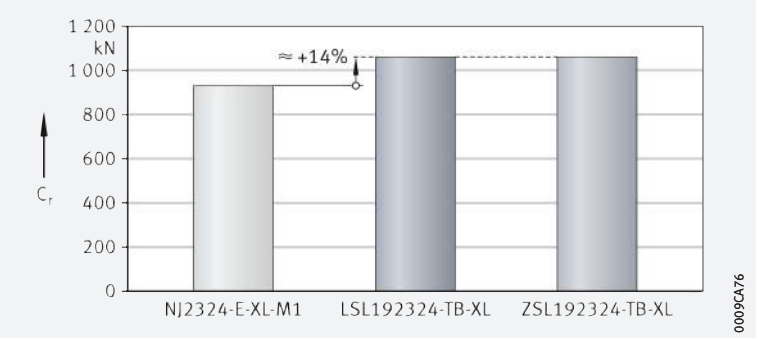
Designed for high radial loads

Cylindrical roller bearings LSL and ZSL are used as semi-locating bearings. These bearings can support not only high radial forces but also axial loads in one direction; i.e. they can guide the shaft axially in one direction. Furthermore, they can withstand high shock loads, vibrations and accelerations.

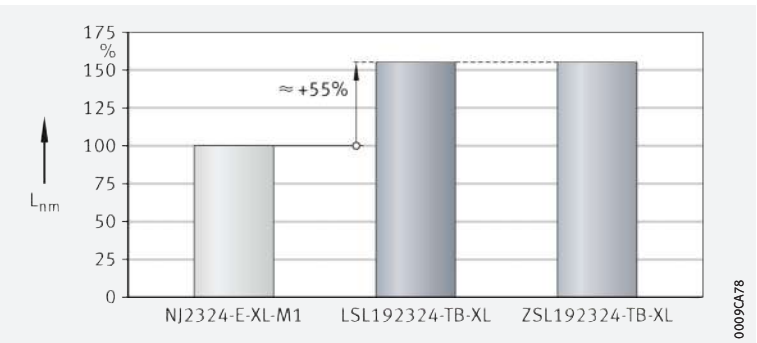
Higher basic dynamic load ratings lead to an increase in basic rating life

Due to the internal construction, the bearings can acommodate more rolling elements than conventional cylindrical roller bearings. As a result, there is a significant increase in the basic dynamic and static load rating and thus the basic rating life compared with conventional cylindrical roller bearings. ➤481|⧉4 shows a comparison of the basic dynamic load rating C_r between a cylindrical roller bearing NJ2324 with a conventional cage, a bearing with a disc cage and a bearing with spacers. The advantage in basic dynamic load rating of approx. 14% gives an increase in the basic rating life of approx. 55% ➤481|⧉5.

4
Comparison of basic dynamic load ratings – conventional cylindrical roller bearing NJ2324 with LSL192324 and ZSL192324



5
Comparison of basic percentage rating life – conventional cylindrical roller bearing NJ2324 with LSL192324 and ZSL192324



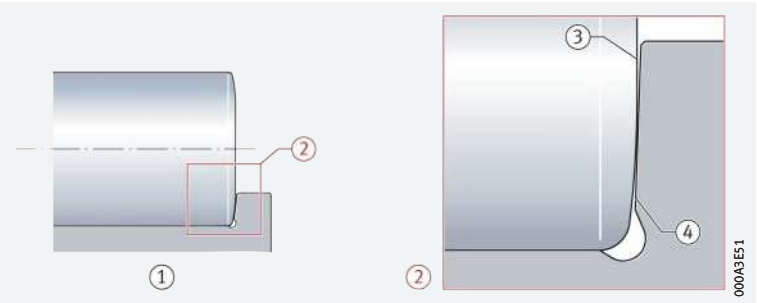
Higher axial load carrying capacity of bearings with toroidal crowned roller end face

✎ Neither wear nor fatigue occurs on the rib contact running and roller end faces

In the case of cylindrical roller bearings with toroidal crowned rollers (TB design), the axial load carrying capacity has been significantly improved with the aid of new calculation and manufacturing methods. A special curvature of the roller end faces facilitates optimum contact conditions between the rollers and ribs ➤*481*|*6*. As a result, the axial contact pressures on the rib are significantly minimised and a lubricant film capable of supporting higher loads is formed. Under standard operating conditions, this completely eliminates wear and fatigue at the rib contact running and roller end faces. In addition, the frictional torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower. Bearings of the toroidal crowned design are available for a bore diameter of, or larger than, d = 90 mm ➤*494*|.

6
Contact geometry of roller end face/rib face – modified roller end faces

① *Cylindrical roller with inner ring*
② *Detail (representation not to scale)*
③ *End of roller*
④ *Rib*



Load ratio F_a/F_r

✎ Ratio $F_a/F_r \leqq 0{,}4$ or 0,6

The bearings can support axial loads on one side by means of the ribs on the inner and outer ring ➤*482*|*7*. In order to ensure problem-free running (tilting of the rollers is prevented), they must always be subjected to radial load at the same time as axial load. The ratio F_a/F_r must not exceed the value 0,4. For bearings with toroidal crowned roller ends (TB design), values up to 0,6 are permissible.

Continuous axial loading without simultaneous radial loading is not permissible.

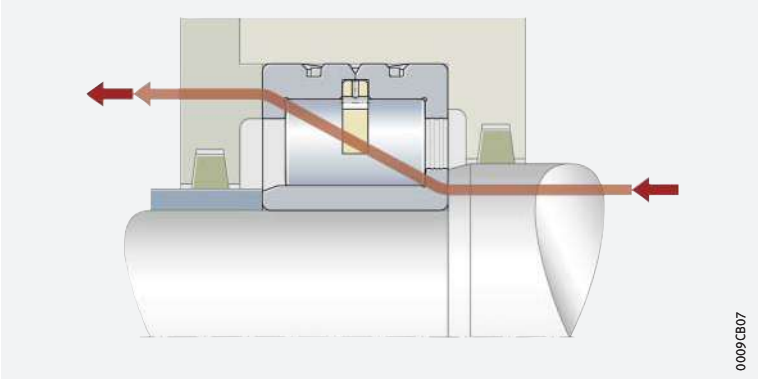
Permissible axial load

Influencing factors on the axial load carrying capacity

Axial loads are supported by the bearing ribs and the roller end faces ➤482|7 and ➤492|13. The axial load carrying capacity of the bearing is therefore essentially dependent on:

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

7 *Force flow under axial load – semi-locating bearing LSL1923*



Calculation of permissible axial load – cylindrical rollers with conventional roller ends

Bearings with standard roller ends

The permissible axial load $F_{a\,per}$ can be calculated from the hydrodynamic load carrying capacity of the contact ➤482|f1.

f1 *Permissible axial load – bearings of standard design*

$$F_{a\,per} = k_S \cdot k_B \cdot d_M^{\,1,54} \cdot n^{-0,6} \leqq F_{a\,max}$$

Legend

$F_{a\,per}$	N	Permissible continuous axial load. In order to prevent unacceptably high temperatures in the bearing, $F_{a\,per}$ must not be exceeded
$F_{a\,max}$	N	Maximum continuous axial load in relation to rib fracture. In order to prevent unacceptably high pressures at the contact surfaces, $F_{a\,max}$ must not be exceeded
k_S	–	Factor as a function of lubrication method ➤482|1. The factor takes into consideration the lubrication method used for the bearing. The better the lubrication and, in particular, the heat dissipation, the higher the permissible axial load
k_B	–	Factor as a function of the bearing series, k_B = 28
d_M	mm	Mean bearing diameter $d_M = (D + d)/2$ ➤494
n	min^{-1}	Operating speed.

1 *Factor k_S*

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

The precondition for these k_S values is an operating viscosity of the lubricant of at least the reference viscosity ν_1 in accordance with DIN ISO 281:2010.

Doped lubricating oils should be used, such as CLP (DIN 51517) and HLP (DIN 51524) of ISO VG grades 32 to 460, as well as ATF oils (DIN 51502) and transmission oils (DIN 51512) of SAE viscosity grades 75W to 140W.

Calculation of permissible axial load – cylindrical rollers with toroidal roller ends

Higher axial loads possible

For bearings with toroidal roller ends, the permissible axial loads are 50% higher ➤483| 2.

2
Permissible axial load – bearings of TB design

$$F_{a\,per} = 1{,}5 \cdot k_S \cdot k_B \cdot d_M^{\,1{,}54} \cdot n^{-0{,}6} \leqq F_{a\,max}$$

Calculation of maximum permissible axial load

For bearings with rollers of the standard or TB design, the maximum permissible axial load $F_{a\,max}$ ➤483| 3 is calculated from the rib strength and the security against wear. This must not be exceeded, even if $F_{a\,per}$ gives higher values ➤483| 4.

3
Maximum axial load – bearings of standard and TB design

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

4
Permissible axial load

$$F_{a\,per} \leqq F_{a\,max}$$

Axial load under shaft deflection

Permissible axial load under shaft deflection of up to 2′

Under considerable shaft deflection, the shaft shoulder presses against the inner ring rib. In combination with the active axial load, this can lead to high alternating loading of the inner ring ribs. Under a shaft deflection of up to 2′, the permissible axial load can be estimated ➤483| 5.

If more severe tilting is present, a separate strength analysis is required. In this case, please contact Schaeffler.

5
Axial load under misalignment

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

Legend

F_{as}	N	Permissible axial load under misalignment.

2.3 Compensation of angular misalignments

Angular deviations are misalignments between the inner and outer ring

The permissible misalignment between the inner ring and outer ring is influenced by the internal bearing construction, the operating clearance, the forces acting on the bearings etc. Due to these complex relationships, it is not possible to give generally valid absolute values here.
However, misalignments (angular deviations) between the inner ring and outer ring will generally always have an effect on the running noise and the operating life of the bearings.

Permissible tilting

The permissible guide value at which, based on experience, there is no significant reduction in operating life is 3′.

Scope of value

The value applies to:

- bearing arrangements with static misalignment (consistent position of the shaft and housing axis)
- bearings that are not required to perform an axial guidance function
- bearings subjected to small loads (with $C_{0r}/P \geqq 5$).

Checking by means of the calculation program BEARINX is recommended in all cases. If there is any uncertainty regarding possible misalignment, please consult Schaeffler.

2.4 Lubrication

Oil or grease lubrication is possible

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

Pay attention to the compatibility of the lubricant with plastic

When using bearings with plastic spacers, 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.

2.5 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.

2.6 Speeds

Limiting speeds and reference speeds in the product tables

The product tables give two speeds for most bearings ➤*494*|▦:

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

Limiting speeds

The limiting speed n_G is the kinematically permissible speed of the bearing. Even under favourable mounting and operating conditions, this value should not be exceeded without prior consultation with Schaeffler ➤*64*.

Reference speeds

$n_{\vartheta r}$ is used to calculate n_ϑ

The thermal speed rating $n_{\vartheta r}$ is not an application-oriented speed limit, but is a calculated ancillary value for determining the thermally safe operating speed n_ϑ ➤*64*.

2.7 Noise

The Schaeffler Noise Index (SGI) has been developed as a new feature for comparing the noise level of different bearing types and series. As a result, a noise evaluation of rolling bearings can now be carried out for the first time.

Schaeffler Noise Index

The SGI value is based on the maximum permissible noise level of a bearing in accordance with internal standards, which is calculated on the basis of ISO 15242. In order that different bearing types and series can be compared, the SGI value is plotted against the basic static load rating C_0.

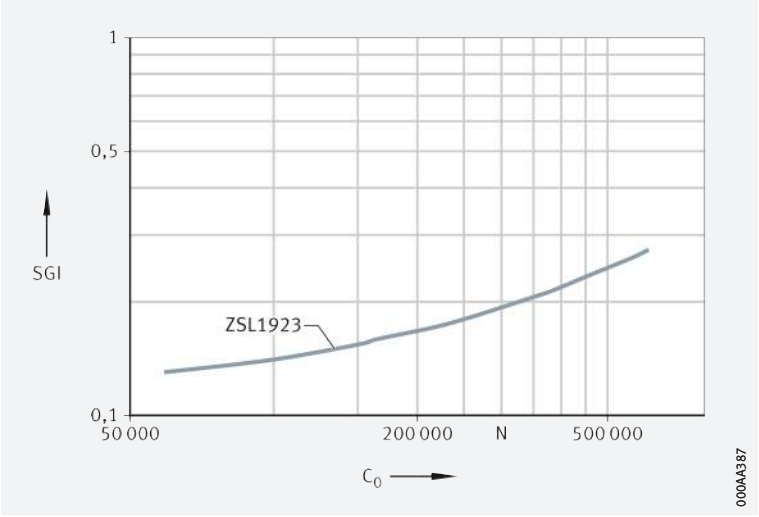
This permits direct comparisons between bearings with the same load carrying capacity. The upper limit value is given in each of the diagrams. This means that the average noise level of the bearings is lower than illustrated in the diagram.

The Schaeffler Noise Index is an additional performance characteristic in the selection of bearings for noise-sensitive applications. The specific suitability of a bearing for an application in terms of installation space, load carrying capacity or speed limit for example, must be checked independently of this.

The Noise Index is currently available for the main series. Additional series will be updated and introduced in subsequent publications.

Further information:

- ***medias*** ➤ *https://medias.schaeffler.com*.



8 *Schaeffler Noise Index for cylindrical roller bearings with spacers*

SGI = *Schaeffler Noise Index*
C_0 = *basic static load rating*

2.8 Temperature range

Limiting values

The operating temperature of the bearings is limited by:

- the dimensional stability of the bearing rings and cylindrical rollers
- the cage (disc cage or spacers)
- the lubricant.

Possible operating temperatures of bearings ➤*486*|▦ *2*.

▦ **2**
Permissible temperature ranges

Operating temperature	Cylindrical roller bearings with disc cage or with spacers
	–30 °C to +120 °C

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

2.9 Cages

Bearings with a disc cage or spacers are suitable for applications with high dynamic inertia forces

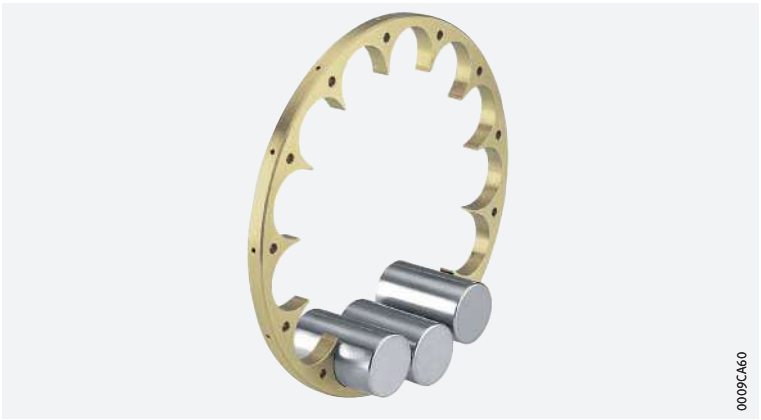
In addition to the actual task of a bearing cage, which is to hold rolling elements apart from each other, a cage designed for vibrations (e. g. for use in vibratory machinery) must be able to support, on a fatigue-resistant basis, principally the inertia forces that act on the cage due to its own mass, as well as the inertia forces of the rolling elements that act directly on the cage pockets. Since these applications also call for very high basic load ratings, conventional cages can only support this requirement under very limited conditions. As a result, bearings with a brass disc cage or plastic spacers have been developed, which constitute a transition from full complement bearings to conventional cage bearings.

Disc cage

Rolling elements are held by the cage

This cage is designed as a flat disc ➤*486*|⧉ *9*. Facing towards the inside diameter are rolling element pockets that support the rolling elements. The cage inside diameter is extended downwards to below the pitch circle line. This gives retention of the rolling elements, i. e. the inner ring can be mounted separately from the rest of the bearing. Facing the outside diameter, the disc cage is seated concentrically between the ribs in a slot in the outer ring.

⧉ **9**
Rollers and solid brass disc cage



Spacers

Lower bearing frictional torque due to the geometry of the spacers

The plastic spacers were developed specially for the series ZSL1923 ➤*487*|*10*. They are designed such that the rolling element set is self-retaining, i. e. the bearing and inner ring can be mounted separately from each other.

10
Rollers and plastic spacers

2.10 Internal clearance

Radial internal clearance

The standard is CN

As standard, cylindrical roller bearings with disc cage or with spacers have the radial internal clearance CN (normal) ➤*487*|*3*. CN is not stated in the designation.

When used in vibratory machinery, both bearing rings have a tight fit. As a result, and due to the temperature differential between the inner ring and outer ring, the internal clearance C4 is generally necessary. As standard, bearings for vibratory machinery therefore have this internal clearance group.

Certain sizes are also available by agreement with the larger internal clearance C3, C4 and C5 ➤*487*|*3*.

The values for radial internal clearance correspond to DIN 620-4:2004 (ISO 5753-1:2009) ➤*487*|*3*. They are valid for bearings which are free from load and measurement forces (without elastic deformation).

3
Radial internal clearance of cylindrical roller bearings with disc cage or with spacers

Nominal bore diameter d mm		Radial internal clearance							
		CN (Group N) µm		C3 (Group 3) µm		C4 (Group 4) µm		C5 (Group 5) µm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	20	45	35	60	50	75	65	90
24	30	20	45	35	60	50	75	70	95
30	40	25	50	45	70	60	85	80	105
40	50	30	60	50	80	70	100	95	125
50	65	40	70	60	90	80	110	110	140
65	80	40	75	65	100	90	125	130	165
80	100	50	85	75	110	105	140	155	190
100	120	50	90	85	125	125	165	180	200
120	140	60	105	100	145	145	190	200	245
140	160	70	120	115	165	165	215	225	275
160	180	75	125	120	170	170	220	250	300
180	200	90	145	140	195	195	250	275	330
200	225	105	165	160	220	220	280	305	365
225	250	110	175	170	235	235	300	330	395
250	280	125	195	190	260	260	330	370	440
280	315	130	205	200	275	275	350	410	485

2.11 Dimensions, tolerances

Dimension standards

The main dimensions of cylindrical roller bearings correspond to ISO 15:2017 (DIN 616:2000 and DIN 5412-1:2005).

Chamfer dimensions

The limiting dimensions for chamfer dimensions correspond to DIN 620-6:2004. Overview and limiting values ➤*135*|*7.11*. Nominal value of chamfer dimension ➤*494*|▦.

Tolerances

The dimensional and running tolerances correspond to the tolerance class Normal in accordance with ISO 492:2014.
Tolerance values in accordance with ISO 492 ➤*122*|▦*8*.

2.12 Suffixes

For a description of the suffixes used in this chapter ➤*488*|▦*4* and ***medias*** interchange ➤*https://www.schaeffler.de/std/1D52*.

▦**4**
Suffixes and corresponding descriptions

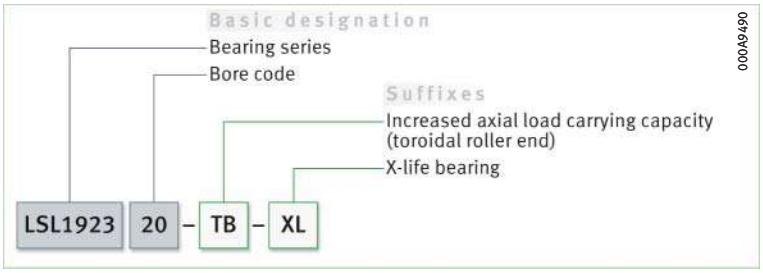
Suffix	Description of suffix	
BIR	Inner ring raceway ground slightly spherical	Available by agreement
BR	Black oxide coated	
C3	Radial internal clearance C3 (larger than normal)	
C4	Radial internal clearance C4 (larger than C3)	
C5	Radial internal clearance C5 (larger than C4)	
TB	Bearing with increased axial load carrying capacity	Standard dependent on bearing size
XL	X-life bearing	

2.13 Structure of bearing designation

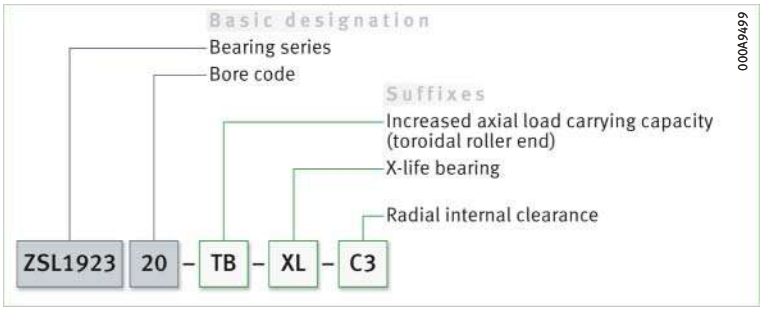
✎*Examples of composition of bearing designation*

The designation of bearings follows a set model. Examples ➤*488*|*11* and ➤*488*|*12*. The composition of designations is subject to DIN 623-1 ➤*102*|*10*.

11
Cylindrical roller bearing with disc cage: designation structure



12
Cylindrical roller bearing with spacers, internal clearance C3: designation structure



2.14 Dimensioning

Equivalent dynamic bearing load

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

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 ($P = F_r$).

Cylindrical roller bearings with non-locating bearing function

✎ *$P = F_r$*

Non-locating bearings can only support radial loads. For these bearings ➤*489*| *f 6*.

f 6 *Equivalent dynamic load*

$$P = F_r$$

Cylindrical roller bearings with semi-locating or locating bearing function

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

If the condition described above is not met, i. e. if, in addition to the radial force F_r, there is also an axial force F_a, 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.

✎ *$F_a/F_r \leqq e$ or $F_a/F_r > e$*

The calculation of P is dependent on the load ratio F_a/F_r and the calculation factors e and Y ➤*489*| *f 7* and ➤*489*| *f 8*.

f 7 *Equivalent dynamic load*

$$\frac{F_a}{F_r} \leqq e \quad \Rightarrow \quad P = F_r$$

f 8 *Equivalent dynamic load*

$$\frac{F_a}{F_r} > e \quad \Rightarrow \quad P = 0{,}92 \cdot F_r + Y \cdot F_a$$

Legend

P	N	Equivalent dynamic bearing load
F_r	N	Radial load
F_a	N	Axial load
e	–	Factor, e = 0,3
Y	–	Factor, Y = 0,4.

Equivalent static bearing load

✎ *$P_0 = F_{0r}$*

For cylindrical roller bearings subjected to static load ➤*489*| *f 9*.

f 9 *Equivalent static load*

$$P_0 = F_{0r}$$

Legend

P_0	N	Equivalent static bearing load
F_{0r}	N	Largest radial 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 ➤*489*| *f 10*.

f 10 *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.

2.15 Minimum load

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

In order that no slippage occurs between the contact partners, the cylindrical roller bearings must be constantly subjected to a sufficiently high radial load. For continuous operation, experience shows that 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.

2.16 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 seating surface. The seating and contact surfaces should not be interrupted by grooves, holes or other recesses. The accuracy of mating parts must meet specific requirements ➤*491*|▦ *5* to ➤*491*|▦ *7*.

Radial location

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*.

Axial location

The bearings must also be securely located in an axial direction

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; example ➤*492*|⧉ *13*.

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 cylindrical 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 the bearing seating surfaces ➤491|▦5, tolerances t_1 to t_3 in accordance with ➤168|🗀11. Numerical values for IT grades ➤491|▦6.

▦5 *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 t_1	Parallelism tolerance t_2	Total axial runout tolerance of abutment shoulder 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	

▦6 *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 ➤491|▦7.

▦7 *Roughness values for cylindrical bearing seating surfaces – guide values*

Nominal diameter of the bearing seat d (D) mm		Recommended mean roughness value for ground bearing seats Ramax 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

Mounting dimensions for the contact surfaces of bearing rings

The contact surfaces for the rings must be of sufficient height

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. The transition from the bearing seat to the abutment shoulder must be designed with rounding to DIN 5418:1993 or an undercut to DIN 509:2006. Proven mounting dimensions for the radii and diameters of abutment shoulders are given in the product tables ➤494| and ➤492| 13. These dimensions are limiting dimensions (maximum or minimum dimensions); the actual values should not be higher or lower than specified.

Rib support in axially loaded bearings

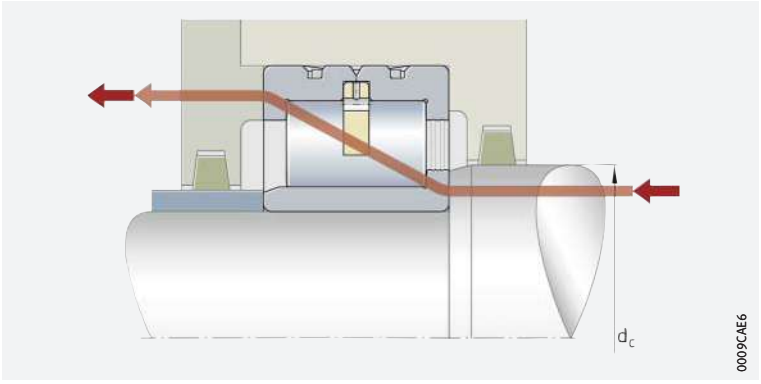
Ribs under axial load must be supported over their entire height and entire circumference. The size and axial runout accuracy of the contact surfaces on the inner ring rib must be observed especially in the case of cylindrical roller bearings subjected to high loads, since these factors also influence the uniformity of the rib load and the running accuracy of the shaft. This means that the ribs may be subjected to damaging alternating stresses even in the case of very small misalignments.
If the mounting dimensions indicated in the product tables are observed, the problems described can be reliably avoided ➤492| 13 and ➤494|.

Support in semi-locating bearings

In semi-locating bearings, it is sufficient to support the bearing rings on one side, on the rib supporting the axial load ➤492| 13.

13
Support of the inner ring rib – bearing with disc cage LSL 1923 (semi-locating bearing)

d_c = *recommended height of shaft shoulder with axially loaded rib*
Arrow = *force flow*



2.17 Mounting and dismounting

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

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

The cylindrical roller bearings LSL 1923 and ZSL 1923 are not self-retaining. As a result, the bearing parts can be mounted separately from each other ➤478|2.1. This gives simplified mounting of the bearings, especially when the two bearing rings have a tight fit.

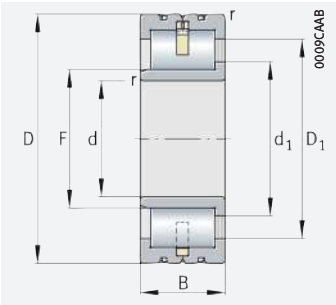
Schaeffler Mounting Handbook

Rolling bearings must be handled with great care

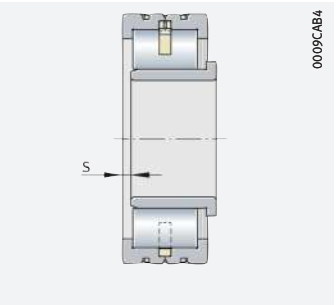
Rolling bearings are well-proven precision machine elements for the design of economical and reliable bearing arrangements, which offer high operational security. In order that these products can function correctly and achieve the envisaged operating life without detrimental effect, they must be handled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

Cylindrical roller bearings with disc cage

Semi-locating bearings



LSL 1923

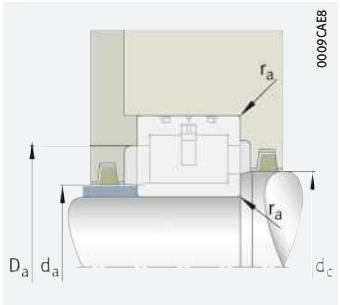


Axial displacement “s”

d = 80 – 300 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Mass	Designation
d	D	B	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	$n_{\vartheta r}$	m	➤*488|2.12* ➤*488|2.13* X-life ➤*480*
			N	N	N	min^{-1}	min^{-1}	≈ kg	
80	170	58	420 000	495 000	75 000	8 500	4 600	6,1	**LSL192316**
85	180	60	445 000	520 000	75 000	8 000	4 350	7,3	**LSL192317**
90	190	64	590 000	610 000	108 000	7 500	4 050	8,6	**LSL192318-TB-XL**
95	200	67	610 000	660 000	116 000	7 000	3 750	10	**LSL192319-TB-XL**
100	215	73	750 000	790 000	137 000	6 600	3 450	12,8	**LSL192320-TB-XL**
110	240	80	880 000	930 000	156 000	5 800	3 000	17,3	**LSL192322-TB-XL**
120	260	86	1 060 000	1 140 000	186 000	5 300	2 650	22	**LSL192324-TB-XL**
130	280	93	1 190 000	1 280 000	206 000	4 900	2 450	27,2	**LSL192326-TB-XL**
140	300	102	1 340 000	1 460 000	230 000	4 600	2 300	34	**LSL192328-TB-XL**
150	320	108	1 410 000	1 760 000	200 000	4 250	2 020	40,7	**LSL192330-TB**
160	340	114	1 600 000	2 010 000	223 000	3 900	1 820	48,1	**LSL192332-TB**
170	360	120	1 740 000	2 210 000	244 000	3 750	1 760	57,5	**LSL192334-TB**
180	380	126	1 840 000	2 430 000	265 000	3 500	1 620	67,4	**LSL192336-TB**
190	400	132	2 100 000	2 750 000	295 000	3 400	1 540	78,1	**LSL192338-TB**
200	420	138	2 340 000	3 050 000	320 000	3 200	1 420	89,3	**LSL192340-TB**
220	460	145	2 500 000	3 200 000	330 000	2 850	1 270	108	**LSL192344-TB**
240	500	155	2 750 000	3 550 000	355 000	2 700	1 220	138,6	**LSL192348-TB**
260	540	165	3 350 000	4 350 000	425 000	2 380	1 010	168	**LSL192352-TB**
280	580	175	3 700 000	4 850 000	460 000	2 250	950	206,6	**LSL192356-TB**
300	620	185	4 150 000	5 500 000	520 000	2 130	890	253	**LSL192360-TB**

medias ➤ *https://www.schaeffler.de/std/1E73*

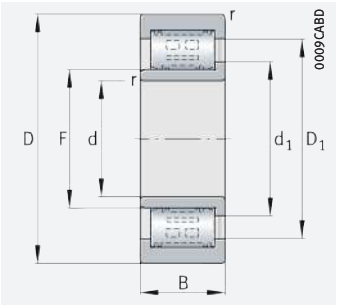


Mounting dimensions

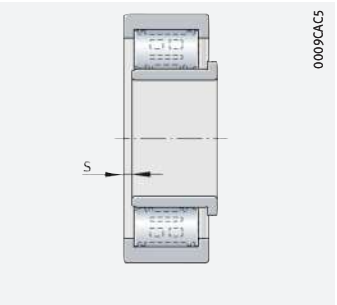
Dimensions						Mounting dimensions			
d	r min.	s	F	d_1 ≈	D_1 ≈	d_a	d_c	D_a	r_a max.
80	2,1	3,5	94	104,5	134,8	94	104,5	134,5	2,1
85	3	4	100	111,3	143,9	100	111,5	143,5	3
90	3	4	105,3	117,2	152,5	105	117,5	152,5	3
95	3	4	114,7	126,6	161	114,5	127	161	3
100	3	4	119,3	132,7	172	119	133	172	3
110	3	5	135,5	150,7	193,1	135,5	151	193	3
120	3	5	147,4	164,2	213,1	147	164,5	213	3
130	4	5	157,9	176	227,9	157,5	176	227,5	4
140	4	7	168,5	187,5	243,2	168	187,5	243	4
150	4	7	182,5	203,3	263,9	182	203,5	263,5	4
160	4	7	196,4	219	284,8	196	219	284,5	4
170	4	7	230,6	226,6	295,4	230,5	227	295	4
180	4	7	221,6	245	313,3	221,5	245	313	4
190	5	7	224,4	250	325,5	224	250	325,5	5
200	5	7	238,5	265,7	345,9	238	266	345,5	5
220	5	7	266,7	297	385,9	266,5	297	385,5	5
240	5	10	280,6	312,5	406,1	280,5	312,5	406	5
260	6	10	315,6	351,6	457,2	315,5	352	457	6
280	6	12	333,1	371	485	333	371	485	6
300	7,5	12	350,9	390,9	508,5	350,5	391	508,5	7,5

Cylindrical roller bearings with spacers

Semi-locating bearings



ZSL 1923

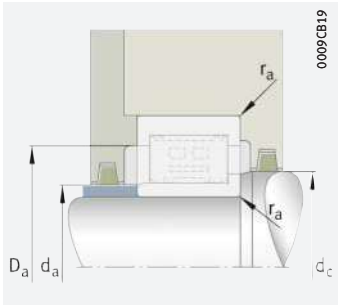


Axial displacement "s"

d = 25 – 120 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Mass	Designation
d	D	B	dyn. C_r	dyn. C_{0r}	C_{ur}	n_G	$n_{\vartheta r}$	m	➤488|2.12 ➤488|2.13 X-life ➤480
			N	N	N	min^{-1}	min^{-1}	≈ kg	
25	62	24	60 000	54 000	7 000	17 100	10 000	0,36	**ZSL192305**
30	72	27	83 000	80 000	10 800	14 400	8 500	0,55	**ZSL192306**
35	80	31	105 000	101 000	15 100	12 300	7 500	0,72	**ZSL192307**
40	90	33	141 000	142 000	21 300	10 600	6 300	1	**ZSL192308**
45	100	36	151 000	157 000	23 700	9 900	6 300	1,34	**ZSL192309**
50	110	40	193 000	199 000	30 000	8 900	5 800	1,76	**ZSL192310**
55	120	43	224 000	231 000	36 000	8 000	5 400	2,22	**ZSL192311**
60	130	46	240 000	255 000	40 000	7 400	5 200	2,82	**ZSL192312**
65	140	48	295 000	320 000	50 000	6 700	4 600	3,44	**ZSL192313**
70	150	51	325 000	355 000	55 000	6 400	4 600	4,27	**ZSL192314**
75	160	55	385 000	435 000	65 000	5 900	4 200	5,2	**ZSL192315**
80	170	58	450 000	520 000	75 000	5 500	3 850	6,2	**ZSL192316**
85	180	60	480 000	570 000	81 000	5 100	3 600	7,23	**ZSL192317**
90	190	64	590 000	610 000	108 000	5 100	3 750	8,7	**ZSL192318-TB-XL**
95	200	67	620 000	660 000	116 000	4 750	3 450	10	**ZSL192319-TB-XL**
100	215	73	750 000	790 000	137 000	4 450	3 200	12,7	**ZSL192320-TB-XL**
110	240	80	890 000	900 000	148 000	3 850	2 700	16,5	**ZSL192322-TB-XL**
120	260	86	1 060 000	1 140 000	186 000	3 600	2 400	21,9	**ZSL192324-TB-XL**

medias ➤ *https://www.schaeffler.de/std/1E74*



Mounting dimensions

Dimensions						Mounting dimensions			
d	r min.	s	F	d_1 ≈	D_1 ≈	d_a	d_c	D_a	r_a max.
25	1,1	2	31,7	36,7	47,5	31,5	37	47,5	1,1
30	1,1	2	38,3	43,5	56	38	43,5	56	1,1
35	1,5	2	44,7	50,7	65,8	44,5	51	65,5	1,5
40	1,5	2	51,1	57,5	75,2	51	57,5	75	1,5
45	1,5	3	56,1	62,5	80,3	56	62,5	80	1,5
50	2	3	60,7	68,3	89,7	60,5	68,5	89,5	2
55	2	3	67,1	75,5	99,3	67	75,5	99	2
60	2,1	3	73,6	82	105,8	73,5	82	105,5	2,1
65	2,1	3,5	80,7	90	116,5	80,5	90	116,5	2,1
70	2,1	3,5	84,1	93,5	121,6	84	93,5	121,5	2,1
75	2,1	3,5	91,2	101,6	131,9	91	102	131,5	2,1
80	2,1	3,5	98,2	109,5	142,1	98	109,5	142	2,1
85	3	4	107	118,5	150,9	107	118,5	150,5	3
90	3	4	105,3	117,5	152,5	105	117,5	152,5	3
95	3	4	114,7	126,6	161,9	114,5	127	161,5	3
100	3	4	119,3	132,7	172,8	119	133	172,5	3
110	3	5	134,3	151,1	199,9	134	151,5	199,5	3
120	3	5	147,4	164,2	213,1	147	164,5	213	3

3 Single row full complement cylindrical roller bearings

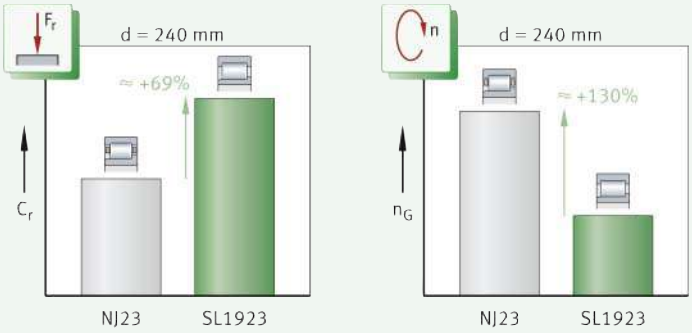
Single row full complement cylindrical roller bearings are suitable where:

- bearing arrangements are subjected to particularly high radial loads ➤*501|3.2*
- not only very high radial forces but also high axial loads from one direction must be supported by the bearing position (semi-locating bearing function) ➤*501|3.2*
- bearing arrangements operating under the conditions described above must have very high rigidity
- axial displacements of the shaft relative to the housing must be compensated without constraint in the bearing ➤*498|3.1*
- very high radial loads occur at lower speeds, i.e. the bearings do not need to achieve speeds as high as those of cylindrical roller bearings with cage ➤*504|3.6* and ➤*514|*
- particularly space-saving designs are required despite very high load
- the bearings should be separable (not self-retaining) for easier mounting ➤*498|3.1*.

For an overview of other product-specific features, see the Matrix for bearing preselection ➤*410*.

1
Cylindrical roller bearing with cage/full complement bearing, comparison of speed and load carrying capacity

C_r = *basic dynamic load rating*
n_G = *limiting speed*



3.1 Bearing design

✎ *Design variants*

Single row full complement cylindrical roller bearings are available as:

- series SL1818, SL1829, SL1830, SL1822 (semi-locating bearings) ➤*499|2*
- series SL1923 (semi-locating bearings) ➤*499|3*
- X-life bearings ➤*500*.

In addition to the bearings described here, Schaeffler supplies single row full complement cylindrical roller bearings in other types, series and dimensions. These products are described in some cases in special publications. If necessary, please contact Schaeffler. Larger catalogue bearings ➤ 🕮 *GL 1*.

Bearings of basic design – standard range

✎ *Key features*

Single row full complement cylindrical roller bearings are part of the group of radial roller bearings. These bearings comprise solid outer rings, inner rings and full complement rolling element sets. Due to the absence of a cage, the bearing can accommodate the largest possible number of rolling elements. The rollers have profiled ends, i.e. they have a slight lateral curvature towards the ends. This modified line contact between the rolling elements and raceways prevents damaging edge stresses ➤*413*|⧉ *2*. The series SL1923 is self-retaining. Certain sizes are also available in an increased capacity design ➤*514*|▦. These bearings have the suffix E ➤*507*|▦ *6*.

Series SL1818, SL1829, SL1830, SL1822

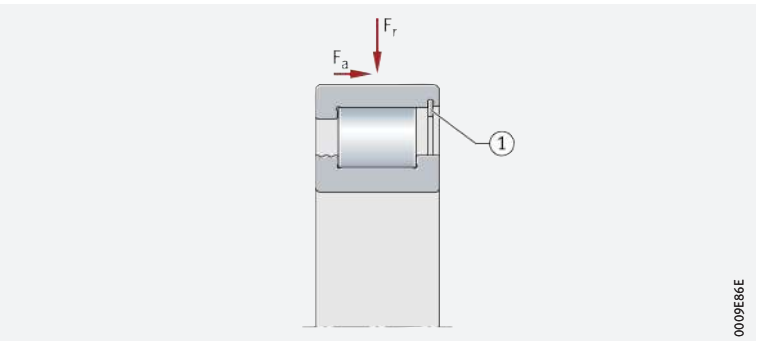
✎ *Bearings with semi-locating bearing function*

In these bearings, the outer ring has one rigid rib and the inner ring has two rigid ribs ➤*499*|⧉ *2*. As a result, axial displacements of the shaft relative to the housing can be compensated within certain limits. The maximum axial displacement s is given in the product tables. Since the axial motion occurs without constraint in the bearing itself, this is practically free from friction with a rotating bearing. Cylindrical roller bearings of this design are used as semi-locating bearings, i.e. they can guide the shaft axially in one direction, while they act in the opposite direction as non-locating bearings ➤*501*|*3.2*.

The bearings are held together in handling and mounting by a transport and mounting retaining device on the outer ring ➤*499*|⧉ *2*.
This retaining device remains in the bearing even after mounting and must not be subjected to axial load.

⧉ *2*
Single row full complement cylindrical roller bearing – semi-locating bearing

F_r = *radial load*
F_a = *axial load*
① *Transport and mounting retaining device*



Series SL1923

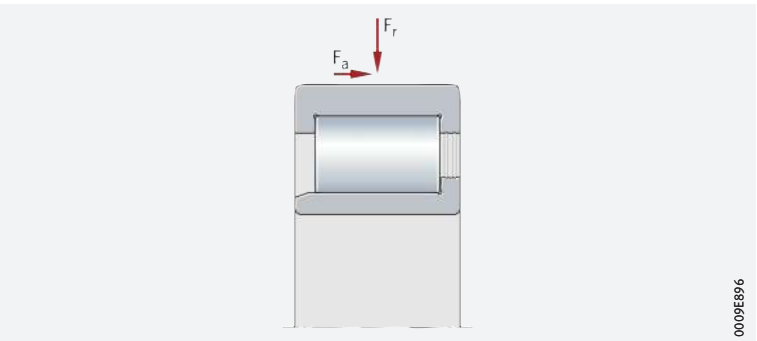
✎ *Bearings with semi-locating bearing function*

Cylindrical roller bearings of this design have two rigid ribs on the outer ring and a self-retaining rolling element set, while the inner ring has only one rigid rib ➤*499*|⧉ *3*. As a result, the inner ring can be removed from the bearing. This gives easier mounting of the cylindrical roller bearings.

The bearings are used as semi-locating bearings, i.e. they can guide the shaft axially in one direction ➤*501*|*3.2* and permit axial displacements in the bearing between the shaft and housing in one direction. The maximum axial displacement s is given in the product tables.

⧉ *3*
Single row full complement cylindrical roller bearing

F_r = *radial load*
F_a = *axial load*



X-life premium quality

Many sizes are available as X-life bearings ➤*500*|*4*. These bearings exhibit considerably higher performance than comparable standard cylindrical roller bearings. This is achieved, for example, through the modified internal construction, the optimised contact geometry between the rollers and raceways, better surface quality and the optimised roller guidance and lubricant film formation.

4
Single row full complement cylindrical roller bearing in X-life design

① *Cylindrical roller, honed*
② *Outer ring, honed*
③ *Inner ring, honed*

Advantages

Increased customer benefits due to X-life

These technical enhancements offer a range of advantages, such as:

- a more favourable load distribution in the bearing and thus a higher dynamic load carrying capacity of the bearings
- a higher fatigue limit load
- lower heat generation in the bearing
- lower lubricant consumption and therefore longer maintenance intervals if relubrication is carried out
- a measurably longer operating life of the bearings
- high operational security
- compact, environmentally-friendly bearing arrangements.

Interchangeable with comparable standard bearings

Since the single row full complement X-life cylindrical roller bearings have the same dimensions as the corresponding standard bearings, the latter can be replaced without any problems by the higher-performance X-life bearings. The major advantages of X-life can therefore also be used for existing bearing arrangements with standard bearings.

Lower operating costs, higher machine availability

In conclusion, these advantages improve the overall cost-efficiency of the bearing position significantly and thus bring about a sustainable increase in the efficiency of the machine and equipment.

Suffix XL

X-life cylindrical roller bearings include the suffix XL in the designation ➤*507*|*3.12* and ➤*514*|▦.

Areas of application

Due to their special technical features, single row full complement X-life cylindrical roller bearings are highly suitable, for example, for bearing arrangements in:

- heavy industry (steel production)
- power transmission (gearbox engineering)
- processing machines and construction machinery
- wind turbines (gearbox applications).

X-life indicates a high product performance density and thus a particularly significant benefit to the customer. Further information on X-life ➤*10*.

3.2 Load carrying capacity

Designed for very high radial loads

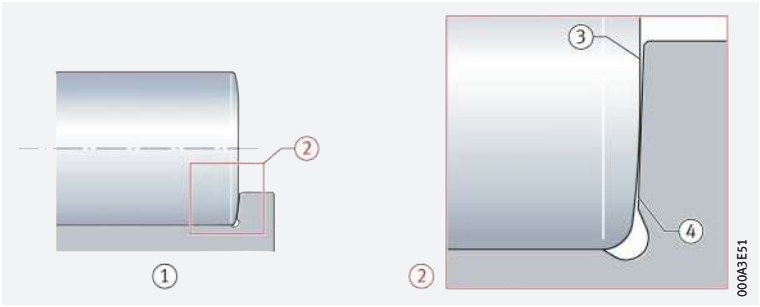
Due to the absence of a cage, the bearing can accommodate the largest possible number of rolling elements. As a result, full complement cylindrical roller bearings have very high radial load carrying capacity.

Higher axial load carrying capacity of bearings with toroidal crowned roller end face

Neither wear nor material fatigue occurs on the rib contact running and roller end faces

In the case of cylindrical roller bearings with toroidal crowned rollers (TB design), the axial load carrying capacity has been significantly improved with the aid of new calculation and manufacturing methods. A special curvature of the roller end faces facilitates optimum contact conditions between the rollers and ribs ➤501|5. As a result, the axial contact pressures on the rib are significantly minimised and a lubricant film capable of supporting higher loads is formed. Under standard operating conditions, this completely eliminates wear and fatigue at the rib contact running and roller end faces. In addition, the axial frictional torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower. Available bearings of toroidal crowned design ➤501|1.

5
Contact geometry of roller end face/rib face – modified roller end faces



① *Cylindrical roller with inner ring*
② *Detail (representation not to scale)*
③ *End of roller*
④ *Rib*

1
Single row full complement cylindrical roller bearings with toroidal crowned roller ends available by agreement

Series	Bore diameter d mm from
SL1818	460
SL1822	140
SL1829	300
SL1830	180
SL1923	90

Load ratio F_a/F_r

Ratio $F_a/F_r \leqq 0,4$ or 0,6

The bearings can support axial loads on one side by means of the ribs on the inner and outer ring ➤502|6. In order to ensure problem-free running (tilting of the rollers is prevented), they must always be subjected to radial load at the same time as axial load. The ratio F_a/F_r must not exceed the value 0,4. For bearings with toroidal crowned roller ends (TB design), values up to 0,6 are permissible.

Continuous axial loading without simultaneous radial loading is not permissible.

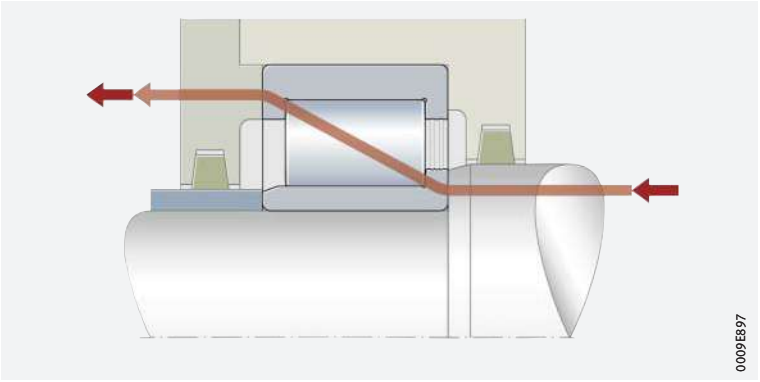
Permissible axial load

Influencing factors on the axial load carrying capacity

Axial loads are supported by the bearing ribs and the roller end faces ➤*502*| 6. The axial load carrying capacity of the bearing is therefore essentially dependent on:

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

6 *Force flow under axial load – semi-locating bearing SL1923*



Calculation of permissible axial load – cylindrical rollers with conventional roller ends

Bearings with standard roller ends

The permissible axial load $F_{a\,per}$ can be calculated from the hydrodynamic load carrying capacity of the contact ➤*502*| 1.

1 *Permissible axial load – bearings of standard design*

$$F_{a\,per} = k_S \cdot k_B \cdot d_M{}^{1,54} \cdot n^{-0,6} \leqq F_{a\,max}$$

Legend

$F_{a\,per}$	N	Permissible continuous axial load. In order to prevent unacceptably high temperatures in the bearing, $F_{a\,per}$ must not be exceeded
$F_{a\,max}$	N	Maximum continuous axial load in relation to rib fracture. In order to prevent unacceptably high pressures at the contact surfaces, $F_{a\,max}$ must not be exceeded
k_S	–	Factor as a function of lubrication method ➤*502*| 2. The factor takes into consideration the lubrication method used for the bearing. The better the lubrication and, in particular, the heat dissipation, the higher the permissible axial load
k_B	–	Factor as a function of the bearing series ➤*503*| 3
d_M	mm	Mean bearing diameter $d_M = (D + d)/2$ ➤*514*
n	min^{-1}	Operating speed.

2 *Factor k_S*

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

The precondition for these k_S values is an operating viscosity of the lubricant of at least the reference viscosity ν_1 in accordance with DIN ISO 281:2010.

Doped lubricating oils should be used, such as CLP (DIN 51517) and HLP (DIN 51524) of ISO VG grades 32 to 460, as well as ATF oils (DIN 51502) and transmission oils (DIN 51512) of SAE viscosity grades 75W to 140W.

3 *Bearing factor k_B*

Series	k_B
SL1818	4,5
SL1829	11
SL1830	17
SL1822	20
SL1923	30

Calculation of permissible axial load – cylindrical rollers with toroidal crowned roller ends

For bearings with toroidal roller ends, the permissible axial loads are 50% higher ➤*503*.

f2 *Permissible axial load – bearings of TB design*

$$F_{a\,per} = 1{,}5 \cdot k_S \cdot k_B \cdot d_M^{\,1{,}54} \cdot n^{-0{,}6} \leqq F_{a\,max}$$

Calculation of maximum permissible axial load

The maximum permissible axial load $F_{a\,max}$ ➤*503* *f3* is calculated from the rib strength and security against wear. This must not be exceeded, even if $F_{a\,per}$ gives higher values ➤*503* *f4*.

f3 *Maximum axial load – bearings of standard and TB design*

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

f4 *Permissible axial load*

$$F_{a\,per} \leqq F_{a\,max}$$

Axial load under shaft deflection

Permissible axial load under shaft deflection of up to 2′

Under considerable shaft deflection, the shaft shoulder presses against the inner ring rib. In combination with the active axial load, this can lead to high alternating loading of the inner ring ribs. Under a shaft deflection of up to 2′, the permissible axial load can be estimated ➤*503* *f5*.

If more severe tilting is present, a separate strength analysis is required. In this case, please contact Schaeffler.

f5 *Axial load under misalignment*

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

Legend

F_{as}	N	Permissible axial load under misalignment.

3.3 Compensation of angular misalignments

Angular deviations are misalignments between the inner and outer ring

The possible misalignment between the inner ring and outer ring is influenced by the internal bearing construction, the operating clearance, the forces acting on the bearing etc. Due to these complex relationships, it is not possible to give generally valid absolute values here.
However, misalignments (angular deviations) between the inner ring and outer ring will generally always have an effect on the running noise and the operating life of the bearings.

Permissible tilting

The permissible guide values at which, based on experience, there is no significant reduction in operating life are as follows:

- 4′ for series SL1818
- 3′ for series SL1923, SL1822, SL1829, SL1830.

Scope of values

The stated values apply to:
- bearing arrangements with static misalignment (consistent position of the shaft and housing axis)
- bearings that are not required to perform an axial guidance function
- bearings subjected to small loads (with $C_{0r}/P \geqq 5$).

Checking by means of the calculation program BEARINX is recommended in all cases. If there is any uncertainty regarding possible misalignment, please consult Schaeffler.

3.4 Lubrication

Oil or grease lubrication is possible

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

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.

3.5 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.

3.6 Speeds

Limiting speeds and reference speeds in the product tables

The product tables give two speeds for most bearings ➤*514*:
- the kinematic limiting speed n_G
- the thermal speed rating $n_{\vartheta r}$.

Lower speed capacity than bearings with cage

Due to the kinematic conditions, however, bearings without cage do not achieve the high speeds that are possible when using bearings with cage.

Limiting speeds

The limiting speed n_G is the kinematically permissible speed of the bearing. Even under favourable mounting and operating conditions, this value should not be exceeded without prior consultation with Schaeffler ➤*64*.

Reference speeds

$n_{\vartheta r}$ is used to calculate n_ϑ

The thermal speed rating $n_{\vartheta r}$ is not an application-oriented speed limit, but is a calculated ancillary value for determining the thermally safe operating speed n_ϑ ➤*64*.

3.7 Noise

The Schaeffler Noise Index (SGI) has been developed as a new feature for comparing the noise level of different bearing types and series. As a result, a noise evaluation of rolling bearings can now be carried out for the first time.

Schaeffler Noise Index

The SGI value is based on the maximum permissible noise level of a bearing in accordance with internal standards, which is calculated on the basis of ISO 15242. In order that different bearing types and series can be compared, the SGI value is plotted against the basic static load rating C_0.

This permits direct comparisons between bearings with the same load carrying capacity. The upper limit value is given in each of the diagrams. This means that the average noise level of the bearings is lower than illustrated in the diagram.

The Schaeffler Noise Index is an additional performance characteristic in the selection of bearings for noise-sensitive applications. The specific suitability of a bearing for an application in terms of installation space, load carrying capacity or speed limit for example, must be checked independently of this.

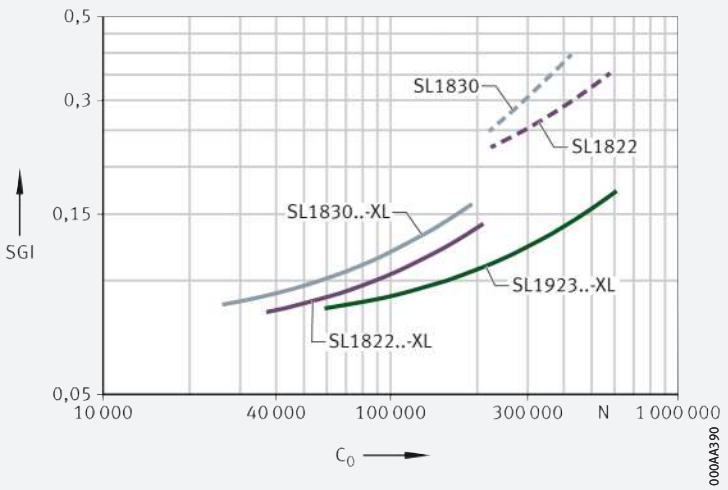
The Noise Index is currently available for the main series. Additional series will be updated and introduced in subsequent publications.

Further information:

- ***medias*** ➤ *https://medias.schaeffler.com*.

7
Schaeffler Noise Index for single row full complement cylindrical roller bearings

SGI = *Schaeffler Noise Index*
C_0 = *basic static load rating*



3.8 Temperature range

✎ *Limiting values*

The operating temperature of the bearings is limited by:

- the dimensional stability of the bearing rings and cylindrical rollers
- the cage
- the lubricant.

Possible operating temperatures of single row cylindrical roller bearings ➤ *505* | ▦ *4*.

4
Permissible temperature ranges

Operating temperature	Single row full complement cylindrical roller bearings
	–30 °C to +120 °C

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

3.9 Cages

Full complement cylindrical roller bearings do not have a cage for guidance and separation of the rolling elements. The cylindrical rollers are guided by the ribs on the bearing rings.

3.10 Internal clearance

Radial internal clearance

✎ *The standard is CN*

Single row full complement cylindrical roller bearings are manufactured as standard with the radial internal clearance CN (normal) ➤*506*|▦*5*. CN is not stated in the designation.

Certain sizes are also available by agreement with the larger internal clearance C3, C4 and C5 ➤*506*|▦*5*.

The values for radial internal clearance correspond to DIN 620-4:2004 (ISO 5753-1:2009) ➤*506*|▦*5*. They are valid for bearings which are free from load and measurement forces (without elastic deformation).

▦*5*
Radial internal clearance of single row full complement cylindrical roller bearings

Nominal bore diameter d		Radial internal clearance							
		CN (Group N)		C3 (Group 3)		C4 (Group 4)		C5 (Group 5)	
mm		µm		µm		µm		µm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	20	45	35	60	50	75	65	90
24	30	20	45	35	60	50	75	70	95
30	40	25	50	45	70	60	85	80	105
40	50	30	60	50	80	70	100	95	125
50	65	40	70	60	90	80	110	110	140
65	80	40	75	65	100	90	125	130	165
80	100	50	85	75	110	105	140	155	190
100	120	50	90	85	125	125	165	180	220
120	140	60	105	100	145	145	190	200	245
140	160	70	120	115	165	165	215	225	275
160	180	75	125	120	170	170	220	250	300
180	200	90	145	140	195	195	250	275	330
200	225	105	165	160	220	220	280	305	365
225	250	110	175	170	235	235	300	330	395
250	280	125	195	190	260	260	330	370	440
280	315	130	205	200	275	275	350	410	485
315	355	145	225	225	305	305	385	455	535
355	400	190	280	280	370	370	460	510	600
400	450	210	310	310	410	410	510	565	665
450	500	220	330	330	440	440	550	625	735

3.11 Dimensions, tolerances

Dimension standards

The main dimensions of cylindrical roller bearings correspond to ISO 15:2017 (DIN 616:2000 and DIN 5412-1:2005).

Chamfer dimensions

The limiting dimensions for chamfer dimensions correspond to DIN 620-6:2004. Overview and limiting values ➤*135*|*7.11*. Nominal value of chamfer dimension ➤*514*|▦.

Tolerances

The dimensional and running tolerances of the cylindrical roller bearings correspond to the tolerance class Normal in accordance with ISO 492:2014. Tolerance values in accordance with ISO 492 ➤*122*|▦*8*.

3.12 Suffixes

For a description of the suffixes used in this chapter ➤507|▦6 and ***medias*** interchange ➤https://www.schaeffler.de/std/1D52.

▦6
Suffixes and corresponding descriptions

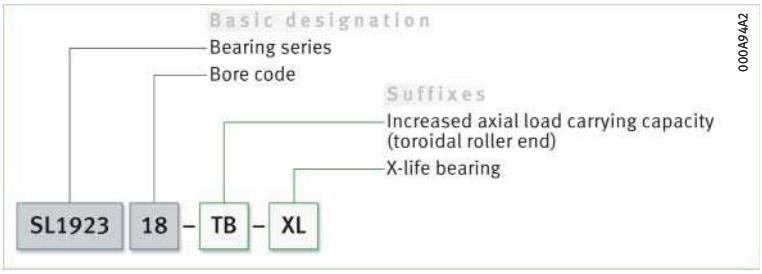
Suffix	Description of suffix	
BR	Black oxide coated	Available by agreement
C3	Radial internal clearance C3 (larger than normal)	
C4	Radial internal clearance C4 (larger than C3)	
C5	Radial internal clearance C5 (larger than C4)	
E	Increased capacity design	Standard, dependent on bore code and bearing series; others available by agreement
TB	Bearing with increased axial load carrying capacity	
XL	X-life bearing	

3.13 Structure of bearing designation

✎ *Example of composition of bearing designation*

The designation of bearings follows a set model. Example ➤507|⧉8. The composition of designations is subject to DIN 623-1 ➤102|⧉10.

⧉8
Single row full complement cylindrical roller bearing (semi-locating bearing): designation structure



3.14 Dimensioning

Equivalent dynamic bearing load

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

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 ($P = F_r$).

Cylindrical roller bearings with semi-locating bearing function

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

If the condition described above is not met, i. e. if, in addition to the radial force F_r, there is also an axial force F_a, 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.

✎ *$F_a/F_r \leqq e$ or $F_a/F_r > e$*

The calculation of P is dependent on the load ratio F_a/F_r and the calculation factors e and Y ➤507|𝑓⃞6 and ➤508|𝑓⃞7.

𝑓⃞6
Equivalent dynamic load

$$\frac{F_a}{F_r} \leqq e \quad \Rightarrow \quad P = F_r$$

*f*1**7**
Equivalent dynamic load

$$\frac{F_a}{F_r} > e \quad \Rightarrow \quad P = 0{,}92 \cdot F_r + Y \cdot F_a$$

Legend

P	N	Equivalent dynamic bearing load
F_r	N	Radial load
F_a	N	Axial load
e, Y	–	Factors ➤*508*|▦*7*.

▦**7**
Factors e and Y

Bearing series	Calculation factors	
	e	Y
SL1818	0,2	0,6
SL1923, SL1822, SL1829, SL1830	0,3	0,4

Equivalent static bearing load

✎ *$P_0 = F_{0r}$*

For cylindrical roller bearings subjected to static load ➤*508*\|*f*1*8*.

*f*1**8**
Equivalent static load

$$P_0 = F_{0r}$$

Legend

P_0	N	Equivalent static bearing load
F_{0r}	N	Largest radial 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 ➤*508*\|*f*1*9*.

*f*1**9**
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.

3.15 Minimum load

✎ *In order to prevent damage due to slippage, a minimum radial load of $P > C_{0r}/60$ is necessary during continuous operation*

In order that no slippage occurs between the contact partners, the cylindrical roller bearings must be constantly subjected to a sufficiently high radial load. For continuous operation, experience shows that 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.

3.16 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 seating surface. The seating and contact surfaces should not be interrupted by grooves, holes or other recesses. The accuracy of mating parts must meet specific requirements ➤*509*\|▦*8* to ➤*510*\|▦*10*.

Radial location

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.

Axial location

The bearings must also be securely located in an axial direction

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; example ➤511|9.

Dimensional, geometrical and running accuracy of cylindrical 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 cylindrical 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 the bearing seating surfaces ➤509|▦8, tolerances t_1 to t_3 in accordance with ➤168|9. Numerical values for IT grades ➤510|▦9.

▦8 *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 t_1	Parallelism tolerance t_2	Total axial runout tolerance of abutment shoulder 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	

9
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**	**315**	**400**
	incl.	**30**	**50**	**80**	**120**	**180**	**250**	**315**	**400**	**500**
	Values in µm									
IT4		6	7	8	10	12	14	16	18	20
IT5		9	11	13	15	18	20	23	25	27
IT6		13	16	19	22	25	29	32	36	40
IT7		21	25	30	35	40	46	52	57	63

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 ➤*510*|▦ *10*.

10
Roughness values for cylindrical bearing seating surfaces – guide values

Nominal diameter of the bearing seat d (D) mm		Recommended mean roughness value for ground bearing seats Ramax 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

Mounting dimensions for the contact surfaces of bearing rings

The contact surfaces for the rings must be of sufficient height

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. The transition from the bearing seat to the abutment shoulder must be designed with rounding to DIN 5418:1993 or an undercut to DIN 509:2006. Proven mounting dimensions for the radii and diameters of abutment shoulders are given in the product tables ➤*514*|▦ and ➤*511*|⧉ *9*. These dimensions are limiting dimensions (maximum or minimum dimensions); the actual values should not be higher or lower than specified.

Rib support in axially loaded bearings

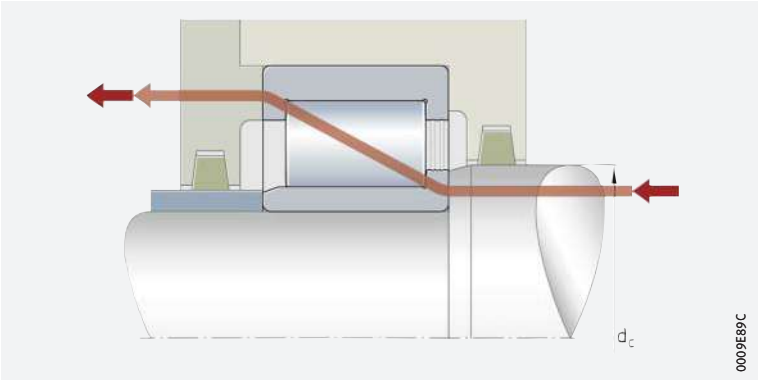
Ribs under axial load must be supported over their entire height and entire circumference ➤*511*|⧉ *9*. The size and axial runout accuracy of the contact surfaces on the inner ring rib must be observed especially in the case of cylindrical roller bearings subjected to high loads, since these factors also influence the uniformity of the rib load and the running accuracy of the shaft. This means that the ribs may be subjected to damaging alternating stresses even in the case of very small misalignments. If the mounting dimensions indicated in the product tables are observed, the problems described can be reliably avoided ➤*514*|▦.

Support in semi-locating bearings

In semi-locating bearings, it is sufficient to support the bearing rings on one side, on the rib supporting the axial load ➤*511*|⧉ *9*.

9
Support of the inner ring rib – series SL1923 (semi-locating bearing)

d_c = *recommended height of shaft shoulder with axially loaded rib*
Arrow = *force flow*



3.17 Mounting and dismounting

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

Schaeffler Mounting Handbook

Rolling bearings must be handled with great care

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.

3.18 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.

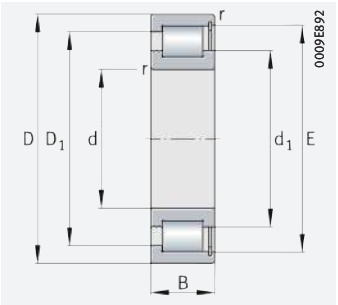
We therefore reserve the right to make changes to the data and illustrations in this catalogue. This catalogue reflects the status at the time of printing. More recent publications released by us (as printed or digital media) will automatically precede this catalogue if they involve the same subject. Therefore, please always use our electronic product catalogue to check whether more up-to-date information or modification notices exist for your desired product.

Link to electronic product catalogue

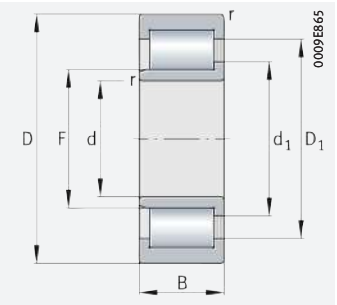
The following link will take you to the Schaeffler electronic product catalogue: ➤ *https://medias.schaeffler.com*.

Single row full complement cylindrical roller bearings

Semi-locating bearings



SL1829, SL1830, SL1822

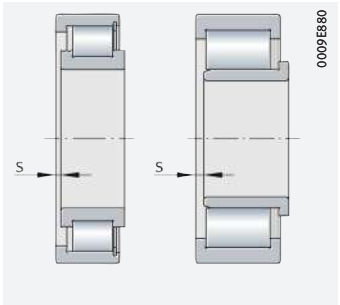


SL1923

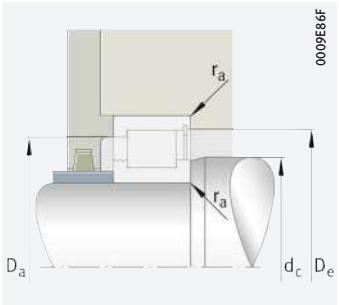
d = 20 – 65 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Mass	Designation
d	D	B	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	$n_{\vartheta r}$	m	➤ 507 | 3.12 ➤ 507 | 3.13 X-life ➤ 500
			N	N	N	min^{-1}	min^{-1}	≈ kg	
20	42	16	30 500	26 000	4 450	11 400	7 500	0,11	**SL183004-XL**
	47	18	45 500	37 000	6 100	10 400	6 500	0,16	**SL182204-XL**
25	47	16	35 000	32 000	5 500	9 500	6 000	0,12	**SL183005-XL**
	52	18	51 000	44 500	7 400	9 000	5 500	0,18	**SL182205-XL**
	62	24	73 000	59 000	9 400	8 100	4 800	0,37	**SL192305-XL**
30	55	19	45 000	42 000	7 500	8 100	5 600	0,2	**SL183006-XL**
	62	20	70 000	64 000	10 200	7 400	4 550	0,3	**SL182206-XL**
	72	27	100 000	87 000	14 500	6 800	4 050	0,56	**SL192306-XL**
35	62	20	55 000	53 000	9 400	7 100	4 950	0,26	**SL183007-XL**
	72	23	88 000	78 000	12 700	6 400	4 250	0,44	**SL182207-XL**
	80	31	126 000	110 000	20 200	5 800	3 600	0,74	**SL192307-XL**
40	68	21	66 000	67 000	11 200	6 300	4 350	0,31	**SL183008-XL**
	80	23	97 000	91 000	14 900	5 600	3 650	0,55	**SL182208-XL**
	90	33	170 000	153 000	28 500	5 000	3 050	1,01	**SL192308-XL**
45	75	23	70 000	74 000	12 500	5 800	4 200	0,4	**SL183009-XL**
	85	23	101 000	98 000	16 000	5 300	3 450	0,59	**SL182209-XL**
	100	36	181 000	164 000	30 500	4 600	3 000	1,37	**SL192309-XL**
50	80	23	88 000	94 000	15 100	5 300	3 700	0,43	**SL183010-XL**
	90	23	109 000	111 000	18 100	4 750	3 000	0,64	**SL182210-XL**
	110	40	232 000	215 000	40 500	4 200	2 800	1,81	**SL192310-XL**
55	90	26	120 000	136 000	22 600	4 550	3 100	0,64	**SL183011-XL**
	100	25	140 000	148 000	25 000	4 350	2 700	0,87	**SL182211-XL**
	120	43	270 000	250 000	48 000	3 750	2 550	2,28	**SL192311-XL**
60	85	16	63 000	76 000	13 700	4 700	2 900	0,29	**SL182912-XL**
	95	26	123 000	143 000	23 700	4 350	3 000	0,69	**SL183012-XL**
	110	28	169 000	176 000	32 500	3 900	2 550	1,18	**SL182212-XL**
	130	46	285 000	275 000	53 000	3 500	2 480	2,88	**SL192312-XL**
65	90	16	67 000	84 000	15 100	4 250	2 550	0,31	**SL182913-XL**
	100	26	130 000	157 000	26 000	4 000	2 700	0,73	**SL183013-XL**
	120	31	198 000	210 000	39 000	3 650	2 480	1,57	**SL182213-XL**
	140	48	350 000	345 000	66 000	3 200	2 180	3,52	**SL192313-XL**

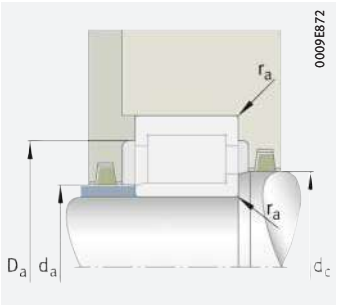
medias ➤ *https://www.schaeffler.de/std/1DFB*



Axial displacement "s"



Mounting dimensions for SL1829, SL1830, SL1822

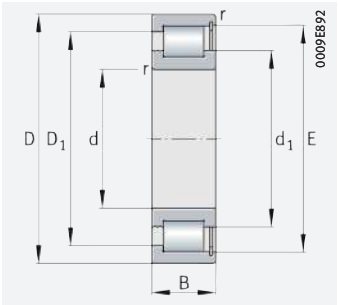


Mounting dimensions for SL1923

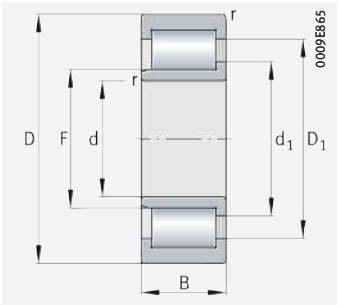
Dimensions							Mounting dimensions				
d	r min.	s	F	d_1 ≈	D_1 ≈	E	d_a	d_c	D_a	D_e	r_a max.
20	0,6	1,5	–	28,8	32,8	36,8	–	28,5	32,5	36,5	0,6
	1	1	–	30,3	36,9	41,5	–	30	36,5	41	1
25	0,6	1,5	–	34,6	38,5	42,5	–	34,5	38,5	42,5	0,6
	1	1	–	35,5	41,9	46,5	–	35,5	41,5	46,5	1
	1,1	2	31,7	36,7	47,5	–	31,5	36,5	47,5	–	1,1
30	1	2	–	40	45,4	49,6	–	40	45	49,5	1
	1	1	–	42	50,6	55,2	–	42	50,5	55	1
	1,1	2	38,3	43,5	56	–	38	43,5	56	–	1,1
35	1	2	–	44,9	51,3	55,5	–	44,5	51	55,5	1
	1,1	1	–	47	59,3	64	–	47	59	63,5	1,1
	1,5	2	44,7	50,7	65,8	–	44,5	50,5	65,5	–	1,5
40	1	2	–	50,5	57,1	61,7	–	50,5	57	61,5	1
	1,1	1	–	54	66,3	70,9	–	54	66	70,5	1,1
	1,5	2	51,1	57,5	75,2	–	51	57,5	75	–	1,5
45	1	2	–	55,3	62,2	66,9	–	55	62	66,5	1
	1,1	1	–	57,5	69,8	74,4	–	57,5	69,5	74	1,1
	1,5	3	56,1	62,5	80,3	–	56	62,5	80	–	1,5
50	1	2	–	59,1	67,7	72,3	–	59	67,5	72	1
	1,1	1	–	64,4	76,7	81,4	–	64	76,5	81	1,1
	2	3	60,7	68,3	89,7	–	60,5	68	89,5	–	2
55	1,1	2	–	68,5	78,8	83,5	–	68,5	78,5	83,5	1,1
	1,5	1	–	70	84,1	88,8	–	70	84	88,5	1,5
	2	3	67,1	75,5	99,3	–	67	75,5	99	–	2
60	1	1	–	69	74,4	78,6	–	69	74	78,5	1
	1,1	2	–	71,7	82,1	86,7	–	71,5	82	86,5	1,1
	1,5	1,5	–	76,8	93,9	99,2	–	76,5	93,5	99	1,5
	2,1	3	73,6	82	105,8	–	73,5	82	105,5	–	2,1
65	1	1	–	75,7	81	85,2	–	75,5	81	85	1
	1,1	2	–	78,1	88,4	93,1	–	78	88	93	1,1
	1,5	1,5	–	82,3	100,7	106,3	–	82	100,5	106	1,5
	2,1	3,5	80,7	90	116,5	–	80,5	90	116,5	–	2,1

Single row full complement cylindrical roller bearings

Semi-locating bearings



SL1829, SL1830, SL1822

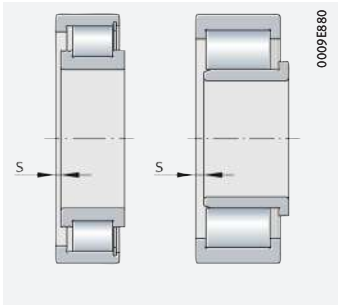


SL1923

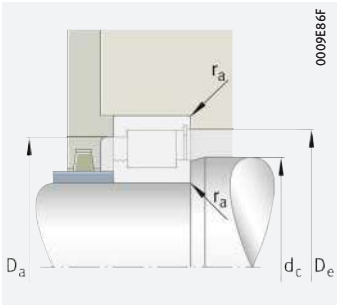
d = 70 – 110 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Mass	Designation
d	D	B	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	$n_{\vartheta r}$	m	➤*507|3.12* ➤*507|3.13* X-life ➤*500*
			N	N	N	min^{-1}	min^{-1}	≈ kg	
70	100	19	88 000	111 000	18 800	3 950	2 550	0,49	**SL182914-XL**
	110	30	153 000	174 000	29 500	3 750	2 800	1,02	**SL183014-XL**
	125	31	181 000	223 000	33 500	3 450	2 340	1,66	**SL182214**
	150	51	385 000	385 000	72 000	3 050	2 170	4,33	**SL192314-XL**
75	105	19	91 000	119 000	20 100	3 700	2 370	0,52	**SL182915-XL**
	115	30	162 000	192 000	32 500	3 450	2 490	1,06	**SL183015-XL**
	130	31	187 000	236 000	35 500	3 250	2 210	1,75	**SL182215**
	160	55	460 000	465 000	87 000	2 800	2 000	5,3	**SL192315-XL**
80	110	19	94 000	126 000	21 400	3 500	2 220	0,55	**SL182916-XL**
	125	34	170 000	220 000	33 000	3 200	2 470	1,43	**SL183016**
	140	33	223 000	280 000	41 000	3 000	2 040	2,15	**SL182216**
	170	58	540 000	560 000	100 000	2 600	1 820	6,32	**SL192316-XL**
85	120	22	118 000	159 000	25 500	3 300	2 200	0,81	**SL182917-XL**
	130	34	175 000	231 000	34 000	3 050	2 360	1,51	**SL183017**
	150	36	255 000	320 000	46 500	2 850	2 000	2,74	**SL182217**
	180	60	570 000	610 000	107 000	2 410	1 710	7,34	**SL192317-XL**
90	125	22	122 000	169 000	26 500	3 100	2 050	0,84	**SL182918-XL**
	140	37	205 000	275 000	40 000	2 850	2 240	1,97	**SL183018**
	160	40	285 000	365 000	53 000	2 700	1 990	3,48	**SL182218**
	190	64	620 000	650 000	116 000	2 400	1 760	8,83	**SL192318-TB-XL**
95	130	22	132 000	177 000	27 500	2 950	1 940	0,86	**SL182919-XL**
	170	43	330 000	425 000	61 000	2 420	1 780	4,17	**SL182219**
	200	67	650 000	710 000	124 000	2 240	1 620	10,2	**SL192319-TB-XL**
100	140	24	152 000	203 000	31 500	2 750	1 870	1,14	**SL182920-XL**
	150	37	216 000	300 000	43 000	2 600	2 040	2,15	**SL183020**
	180	46	390 000	510 000	73 000	2 300	1 700	5,13	**SL182220**
	215	73	790 000	850 000	148 000	2 110	1 490	13	**SL192320-TB-XL-BR**
110	150	24	155 000	213 000	34 000	2 500	1 710	1,23	**SL182922-XL**
	170	45	280 000	385 000	55 000	2 350	2 010	3,5	**SL183022**
	200	53	450 000	580 000	81 000	2 130	1 720	7,24	**SL182222**
	240	80	950 000	970 000	160 000	1 820	1 270	17	**SL192322-TB-XL-BR**

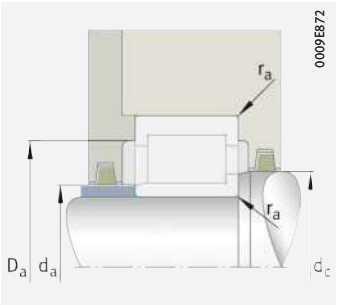
medias ➤ *https://www.schaeffler.de/std/1DFC*



Axial displacement "s"



Mounting dimensions for SL1829, SL1830, SL1822

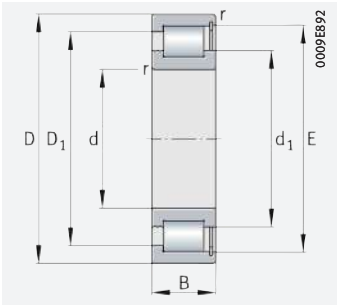


Mounting dimensions for SL1923

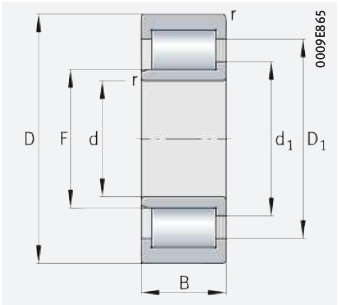
Dimensions							Mounting dimensions				
d	r min.	s	F	d_1 ≈	D_1 ≈	E	d_a	d_c	D_a	D_e	r_a max.
70	1	1	–	81,2	87,8	92,3	–	81	87,5	92	1
	1,1	3	–	81,5	95,6	100,3	–	81,5	95,5	100	1,1
	1,5	1,5	–	87	105,2	111,5	–	87	105	111	1,5
	2,1	3,5	84,1	93,5	121,6	–	84	93,5	121,5	–	2,1
75	1	1	–	86,3	92,8	97,4	–	86	92,5	97	1
	1,1	3	–	89	103,2	107,9	–	89	103	107,5	1,1
	1,5	1,5	–	91,8	110	116,2	–	91,5	110	116	1,5
	2,1	3,5	91,2	101,6	131,5	–	91	101,5	131,5	–	2,1
80	1	1	–	91,4	98	102,5	–	91	98	102,5	1
	1,1	4	–	95	111,7	117,4	–	95	111,5	117	1,1
	2	1,5	–	98,6	119,3	126,3	–	98,5	119	126	2
	2,1	3,5	98,2	109,5	142,1	–	98	109,5	142	–	2,1
85	1,1	1	–	96,4	105	109,6	–	96	105	109,5	1,1
	1,1	4	–	99,4	116,1	122	–	99	116	121,5	1,1
	2	1,5	–	104,4	126,3	133,8	–	104	126	133,5	2
	3	4	107	118,2	150,9	–	107	118	150,5	–	3
90	1,1	1	–	102	110,7	115,8	–	102	110,5	115,5	1,1
	1,5	4	–	106,1	124,5	130,1	–	106	124,5	130	1,5
	2	2,5	–	110,2	133,3	141,2	–	110	133	141	2
	3	4	105,3	117,5	152,5	–	105	117,5	152,5	–	3
95	1,1	1	–	106,7	117	122,3	–	106,5	117	122	1,1
	2,1	2,5	–	122	147,3	156	–	122	147	155,5	2,1
	3	4	114,7	126,6	161,9	–	114,5	126,5	161,5	–	3
100	1,1	1,5	–	113,4	125,7	131	–	113	125,5	130,5	1,1
	1,5	4	–	115,7	134	140,2	–	115,5	134	140	1,5
	2,1	2,5	–	127,5	154,3	163,4	–	127,5	154	163	2,1
	3	4	119,3	132,7	172,8	–	119	132,5	172,5	–	3
110	1,1	1,5	–	124	136,2	141,5	–	124	136	141,5	1,1
	2	5,5	–	127,3	149,3	156,7	–	127	149	156,5	2
	2,1	4	–	137	168	177,6	–	137	168	177,5	2,1
	3	5	134,3	151,1	199,9	–	134	151	199,5	–	3

Single row full complement cylindrical roller bearings

Semi-locating bearings



SL1829, SL1830, SL1822

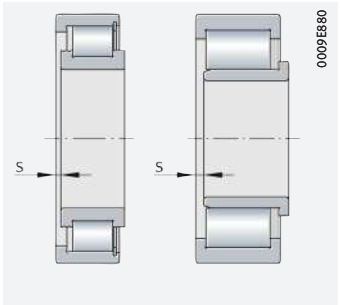


SL1923

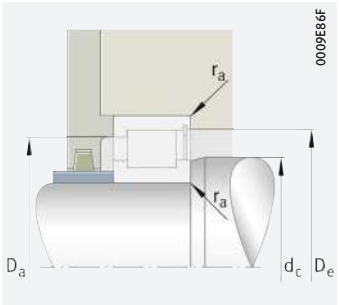
d = 120 – 190 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Mass	Designation
d	D	B	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	$n_{\vartheta r}$	m	➤ *507 | 3.12* ➤ *507 | 3.13* X-life ➤ *500*
			N	N	N	min^{-1}	min^{-1}	≈ kg	
120	165	27	199 000	285 000	45 500	2 290	1 590	1,73	**SL182924-XL**
	180	46	295 000	425 000	58 000	2 160	1 840	3,8	**SL183024**
	215	58	530 000	720 000	99 000	1 930	1 500	9,08	**SL182224**
	260	86	1 130 000	1 230 000	200 000	1 690	1 120	22,3	**SL192324-TB-XL-BR**
130	180	30	238 000	350 000	54 000	2 110	1 500	2,33	**SL182926-XL**
	200	52	425 000	600 000	82 000	1 990	1 660	5,65	**SL183026**
	230	64	620 000	850 000	113 000	1 790	1 360	11,25	**SL182226**
	280	93	1 260 000	1 380 000	222 000	1 570	1 040	27,95	**SL192326-TB-XL-BR**
140	190	30	260 000	375 000	60 000	1 950	1 370	2,42	**SL182928-XL**
	210	53	450 000	660 000	88 000	1 820	1 470	6,04	**SL183028**
	250	68	720 000	1 000 000	132 000	1 660	1 230	14,47	**SL182228**
	300	102	1 410 000	1 570 000	248 000	1 470	970	34,9	**SL192328-TB-XL-BR**
150	210	36	340 000	480 000	77 000	1 790	1 360	3,77	**SL182930-XL**
	225	56	475 000	700 000	91 000	1 740	1 430	7,33	**SL183030**
	270	73	820 000	1 160 000	151 000	1 560	1 130	18,43	**SL182230**
	320	108	1 490 000	1 900 000	231 000	1 350	840	42,1	**SL192330-TB-BR**
160	220	36	350 000	510 000	80 000	1 680	1 270	4	**SL182932-XL**
	240	60	540 000	800 000	103 000	1 600	1 280	8,8	**SL183032**
	290	80	1 020 000	1 470 000	184 000	1 370	920	23	**SL182232**
	340	114	1 690 000	2 170 000	240 000	1 250	760	49,7	**SL192332-TB-BR**
170	230	36	365 000	540 000	84 000	1 590	1 190	4,3	**SL182934-XL**
	260	67	700 000	1 050 000	133 000	1 480	1 120	12,2	**SL183034**
	310	86	1 140 000	1 660 000	205 000	1 300	870	28,65	**SL182234**
	360	120	1 830 000	2 380 000	265 000	1 200	730	59,2	**SL192334-TB-BR**
180	250	42	455 000	680 000	104 000	1 500	1 150	6,2	**SL182936-XL**
	280	74	810 000	1 240 000	155 000	1 370	1 020	16,1	**SL183036**
	320	86	1 180 000	1 760 000	214 000	1 230	800	29,8	**SL182236**
	380	126	1 940 000	2 600 000	280 000	1 120	670	69,1	**SL192336-TB-BR**
190	260	42	510 000	770 000	117 000	1 420	1 030	6,5	**SL182938-XL**
	290	75	830 000	1 300 000	160 000	1 320	970	17	**SL183038**
	340	92	1 300 000	1 900 000	229 000	1 170	770	35,65	**SL182238**
	400	132	2 220 000	2 950 000	315 000	1 090	630	80,3	**SL192338-TB-BR**

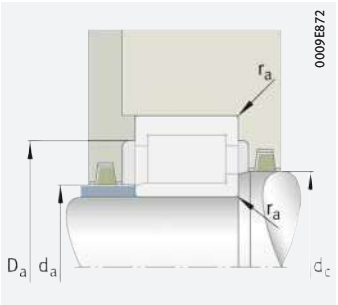
medias ➤ *https://www.schaeffler.de/std/1DFD*



Axial displacement "s"



Mounting dimensions for SL1829, SL1830, SL1822

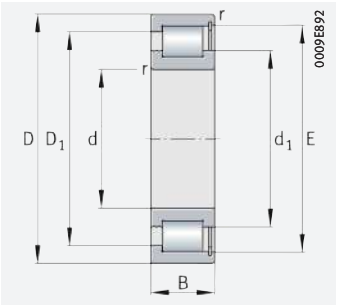


Mounting dimensions for SL1923

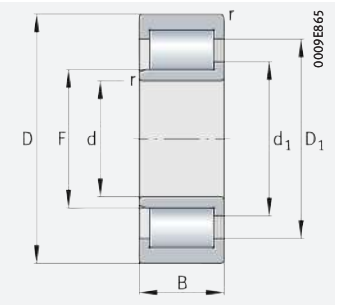
Dimensions							Mounting dimensions				
d	r min.	s	F	d_1 ≈	D_1 ≈	E	d_a	d_c	D_a	D_e	r_a max.
120	1,1	1,5	–	134,8	149	154,3	–	134,5	149	154	1,1
	2	5,5	–	138,8	160,7	168,2	–	138,5	160,5	168	2
	2,1	4	–	150,7	183	192,9	–	150,5	183	192,5	2,1
	3	5	147,4	164,2	213,1	–	147	164	213	–	3
130	1,5	2	–	146	161,1	167,2	–	146	161	167	1,5
	2	5,5	–	148,6	175,5	184,4	–	148,5	175,5	184	2
	3	5	–	162,3	197	207,8	–	162	197	207,5	3
	4	5	157,9	176	227,9	–	157,5	176	227,5	–	4
140	1,5	2	–	157	174	180	–	157	174	180	1,5
	2	5,5	–	162,2	189,5	198,4	–	162	189,5	198	2
	3	5	–	173,9	211,1	222,6	–	173,5	211	222,5	3
	4	7	168,4	187,8	243,4	–	168	187,5	243	–	4
150	2	2,5	–	169	189,6	196,8	–	169	189,5	196,5	2
	2,1	7	–	170	198	207,5	–	170	198	207	2,1
	3	6	–	185,5	225,2	237,4	–	185,5	225	237	3
	4	7	182,5	203,3	263,5	–	182	203	263,5	–	4
160	2	2,5	–	179,7	200,5	207,6	–	179,5	200,5	207,5	2
	2,1	7	–	184,8	215,8	225,5	–	184,5	215,5	225	2,1
	3	6	–	208,7	253,4	267,1	–	208,5	253	267	3
	4	7	196,4	219	284,4	–	196	219	284	–	4
170	2	2,5	–	190,6	211,3	218,5	–	190,5	211	218	2
	2,1	7	–	198,1	232,7	243,6	–	198	232,5	243,5	2,1
	4	7	–	220,3	267,4	281,9	–	220	267	281,5	4
	4	7	203,6	226,6	295	–	203,5	226,5	295	–	4
180	2	2,5	–	200,7	224	231,9	–	200,5	224	231,5	2
	2,1	7	–	212,2	249,4	261	–	212	249	261	2,1
	4	7	–	232,4	279,5	294	–	232	279,5	294	4
	4	7	221,6	245	312,9	–	221,5	245	312,5	–	4
190	2	2	–	211,5	238,5	244,2	–	211,5	238,5	244	2
	2,1	9	–	221,8	259	270,6	–	221,5	259	270,5	2,1
	4	9	–	243,5	295,5	311,5	–	243,5	295,5	311,5	4
	5	7	224,4	250	326,8	–	224	250	326,5	–	5

Single row full complement cylindrical roller bearings

Semi-locating bearings



SL1818, SL1829, SL1830, SL1822

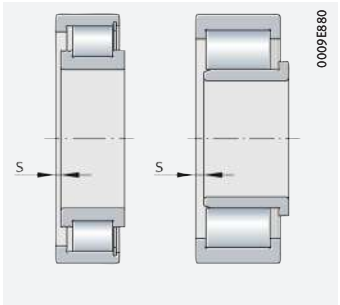


SL1923

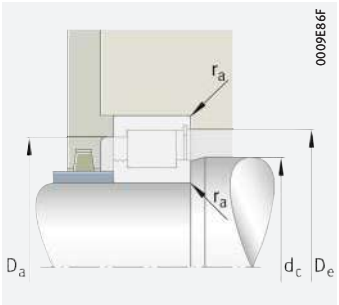
d = 200 – 360 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Mass	Designation
d	D	B	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	$n_{\vartheta r}$	m	➤*507|3.12* ➤*507|3.13* X-life ➤*500*
			N	N	N	min^{-1}	min^{-1}	≈ kg	
200	250	24	178 000	320 000	33 500	1 420	1 040	2,57	**SL181840**
	280	48	610 000	940 000	140 000	1 320	950	9,1	**SL182940-XL**
	310	82	950 000	1 510 000	184 000	1 230	890	21,8	**SL183040**
	360	98	1 410 000	2 010 000	242 000	1 150	770	43,12	**SL182240**
	420	138	2 470 000	3 300 000	345 000	1 020	570	92,1	**SL192340-TB-BR**
220	270	24	187 000	350 000	36 000	1 290	940	2,8	**SL181844**
	300	48	650 000	1 030 000	150 000	1 210	840	9,9	**SL182944-XL**
	340	90	1 150 000	1 820 000	215 000	1 140	800	28,4	**SL183044**
	460	145	2 650 000	3 450 000	355 000	910	520	111,2	**SL192344-TB-BR**
240	300	28	265 000	490 000	54 000	1 160	870	4,29	**SL181848-E**
	320	48	600 000	1 120 000	130 000	1 120	750	10,6	**SL182948**
	360	92	1 210 000	1 990 000	230 000	1 040	720	30,9	**SL183048**
	500	155	2 900 000	3 800 000	385 000	860	500	142,3	**SL192348-TB-BR**
260	320	28	275 000	530 000	57 000	1 080	790	4,61	**SL181852-E**
	360	60	780 000	1 450 000	166 000	1 020	690	18,5	**SL182952**
	400	104	1 600 000	2 500 000	285 000	940	620	44,5	**SL183052-TB**
	540	165	3 550 000	4 700 000	460 000	760	410	173,2	**SL192352-TB-BR**
280	350	33	355 000	670 000	73 000	990	730	6,89	**SL181856-E**
	380	60	910 000	1 710 000	190 000	940	590	19,7	**SL182956-TB**
	420	106	1 650 000	2 650 000	295 000	900	590	48	**SL183056-TB**
300	380	38	455 000	840 000	90 000	920	680	9,79	**SL181860-E**
	420	72	1 170 000	2 200 000	242 000	870	540	31,2	**SL182960-TB**
	460	118	2 020 000	3 300 000	330 000	800	500	66,6	**SL183060-TB**
320	400	38	470 000	900 000	94 000	870	620	10,36	**SL181864-E**
	440	72	1 210 000	2 340 000	255 000	820	495	32,9	**SL182964-TB**
	480	121	2 080 000	3 450 000	345 000	770	480	71,7	**SL183064-TB**
340	420	38	485 000	960 000	98 000	810	570	10,93	**SL181868-E**
	460	72	1 250 000	2 470 000	265 000	770	460	34,7	**SL182968-TB**
	520	133	2 490 000	4 150 000	395 000	710	430	95,8	**SL183068-TB**
360	440	38	500 000	1 010 000	102 000	770	530	11,49	**SL181872-E**
	480	72	1 280 000	2 600 000	275 000	730	430	36,4	**SL182972-TB**
	540	134	2 550 000	4 350 000	410 000	680	405	101	**SL183072-TB**

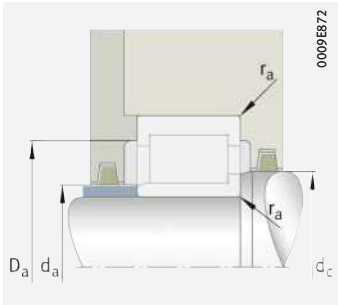
medias ➤ *https://www.schaeffler.de/std/1DFE*



Axial displacement "s"



Mounting dimensions for SL1818, SL1829, SL1830, SL1822

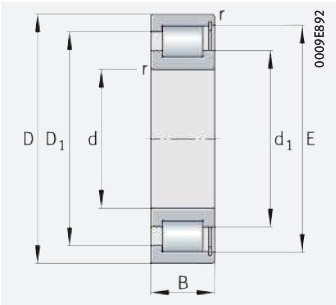


Mounting dimensions for SL1923

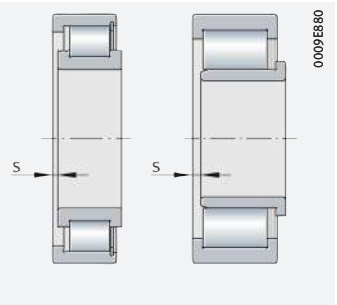
Dimensions							Mounting dimensions				
d	r min.	s	F	d_1 ≈	D_1 ≈	E	d_a	d_c	D_a	D_e	r_a max.
200	1,5	2	–	216,6	231,6	237,6	–	216,5	231,5	237,5	1,5
	2,1	3	–	225,5	252,4	261,6	–	225,5	252	261,5	2,1
	2,1	9	–	236,6	276,2	288,6	–	236,5	276	288,5	2,1
	4	9	–	246,6	302,4	319,4	–	246,5	302	319	4
	5	7	238,5	265,7	347,2	–	238	265,5	347	–	5
220	1,5	2	–	237,3	252,3	258,5	–	237	252	258,5	1,5
	2,1	3	–	246,3	273,2	282,5	–	246	273	282	2,1
	3	9	–	254,6	299,2	312	–	254,5	299	312	3
	5	7	266,7	297	388,3	–	266,5	297	388	–	5
240	2	2	–	260,5	281	287,5	–	260,5	281	287,5	2
	2,1	3	–	267,5	294,4	303,7	–	267,5	294	303,5	2,1
	3	11	–	277,5	322,1	336	–	277,5	322	336	3
	5	10	280,6	312,5	408,5	–	280,5	312,5	408,5	–	5
260	2	2	–	281	301,5	308	–	281	301,5	308	2
	2,1	5	–	291,5	323,4	333,7	–	291,5	323	333,5	2,1
	4	11	–	304	358,4	376	–	304	358	375,5	4
	6	10	315,6	351,6	459,6	–	315,5	351,5	459,5	–	6
280	2	2,5	–	304	327	335	–	304	327	335	2
	2,1	3,5	–	314	348,5	359,5	–	314	348,5	359,5	2,1
	4	11	–	319,5	372,9	390,3	–	319,5	372,5	390	4
300	2,1	3	–	323,5	350,5	360	–	323,5	350,5	360	2,1
	3	5	–	338	376,9	389,5	–	338	376,5	389	3
	4	14	–	353,6	415,6	434,9	–	353,5	415,5	434,5	4
320	2,1	3	–	344,5	371,5	381	–	344,5	371,5	381	2,1
	3	5	–	358,5	397,4	409,9	–	358,5	397	409,5	3
	4	14	–	369,5	430,1	449,5	–	369,5	430	449,5	4
340	2,1	3	–	365,5	392,5	402,2	–	365,5	392,5	402	2,1
	3	5	–	379	418,7	430,2	–	379	418,5	430	3
	5	16	–	396,1	463,9	485,7	–	396	463,5	485,5	5
360	2,1	3	–	387	413,5	423,5	–	387	413,5	423,5	2,1
	3	5	–	399,5	438,6	450,6	–	399,5	438,5	450,5	3
	5	16	–	414	481,6	503,5	–	414	481,5	503	5

Single row full complement cylindrical roller bearings

Semi-locating bearings



SL1818, SL1829, SL1830

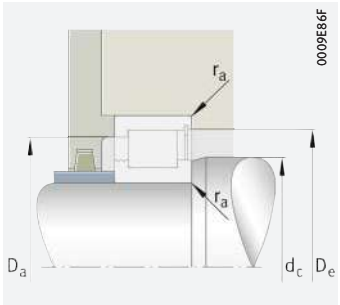


Axial displacement “s”

d = 380 – 500 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Mass	Designation
d	D	B	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	$n_{\vartheta r}$	m	➤*507|3.12* ➤*507|3.13*
			N	N	N	min^{-1}	min^{-1}	≈ kg	
380	480	46	650 000	1 290 000	131 000	710	490	18,87	**SL181876-E**
	520	82	1 660 000	3 300 000	340 000	680	380	52,1	**SL182976-TB**
	560	135	2 600 000	4 450 000	425 000	660	390	106	**SL183076-TB**
400	500	46	660 000	1 340 000	135 000	680	470	19,81	**SL181880-E**
	540	82	1 710 000	3 500 000	355 000	650	350	54,3	**SL182980-TB**
	600	148	3 050 000	5 400 000	510 000	610	345	140	**SL183080-TB**
420	520	46	680 000	1 420 000	141 000	650	430	20,6	**SL181884-E**
	560	82	1 730 000	3 600 000	365 000	630	340	56,9	**SL182984-TB**
440	540	46	700 000	1 470 000	145 000	620	415	21,54	**SL181888-E**
	600	95	2 090 000	4 100 000	410 000	590	325	78,1	**SL182988-TB**
460	580	56	940 000	1 890 000	186 000	580	385	33,21	**SL181892-E-TB**
	620	95	2 130 000	4 250 000	420 000	570	310	81,1	**SL182992-TB**
480	600	56	960 000	1 970 000	192 000	560	365	34,53	**SL181896-E-TB**
	650	100	2 390 000	4 800 000	470 000	530	280	94,7	**SL182996-TB**
500	620	56	980 000	2 050 000	197 000	540	345	35,73	**SL1818/500-E-TB**
	670	100	2 430 000	4 950 000	480 000	520	270	98,3	**SL1829/500-TB**

medias ➤ *https://www.schaeffler.de/std/1DFF*



Mounting dimensions
for SL1818, SL1829, SL1830

Dimensions						Mounting dimensions				
d	r min.	s	d_1 ≈	D_1 ≈	E	d_a	d_c	D_a	D_e	r_a max.
380	2,1	4	415,5	448	459	–	415,5	448	459	2,1
	4	5	426	472,1	486,7	–	426	472	486,5	4
	5	16	431,7	499,5	521,3	–	431,5	499,5	521	5
400	2,1	4	432	464,5	475,5	–	432	464,5	475,5	2,1
	4	5	450	496,1	510,9	–	450	496	510,5	4
	5	18	462,5	535,1	558,5	–	462,5	535	558,5	5
420	2,1	4	457	489,5	500	–	457	489,5	500	2,1
	4	5	462	509	523	–	462	509	522,5	4
440	2,1	4	473,5	506	517	–	473,5	506	517	2,1
	4	7	490	544,6	562	–	490	544,5	562	4
460	3	5	501,5	540	554	–	501,5	540	554	3
	4	7	504	559,6	576,3	–	504	559,5	576	4
480	3	5	522	560	574,5	–	522	560	574,5	3
	5	7	538	596,6	614,8	–	538	596,5	614,5	5
500	3	5	542	580,5	594,5	–	542	580,5	594,5	3
	5	7	553	612,7	630	–	553	612,5	630	5

4 Double row full complement cylindrical roller bearings

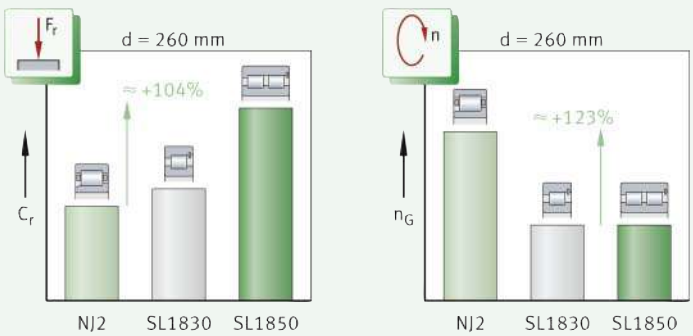
Double row full complement cylindrical roller bearings are suitable where:

- bearing arrangements are subjected to particularly high radial loads ➤*528*|*4.2*
- not only particularly high radial forces but also high axial loads from one or both directions must be supported by the bearing position (semi-locating or locating bearing function) ➤*528*|*4.2*
- bearing arrangements must have very high rigidity
- Axial displacements of the shaft relative to the housing must be aompensated without constraint in the bearing (in the case of bearings with a non-locating or semi-locating bearing function) ➤*524*|*4.1*
- very high radial loads occur at lower speeds, i. e. the bearings do not need to achieve speeds as high as those of cylindrical roller bearings with cage ➤*531*|*4.6* and ➤*542*|▦
- space-saving designs are required despite very high load
- the bearings should be separable for easier mounting (bearings with non-locating bearing function) ➤*524*|*4.1* and ➤*540*|*4.17*.

For an overview of other product-specific features, see the Matrix for bearing preselection ➤*410*.

1
Cylindrical roller bearing with cage/single row full complement bearing, double row full complement bearing, comparison of speed and load carrying capacity

C_r = *basic dynamic load rating*
n_G = *limiting speed*



4.1 Bearing design

✎ *Design variants*

The standard range of double row full complement cylindrical roller bearings comprises:

- series SL0248 and SL0249 (non-locating bearings) ➤*525*|*2*
- series SL1850 (semi-locating bearings) ➤*526*|*3*
- series SL0148 and SL0149 (locating bearings) ➤*526*|*4*
- series SL0450 and SL04 (cylindrical roller bearings with annular slots – rope sheave bearings) ➤*527*|*5*
- X-life bearings ➤*527*.

In addition to the bearings described here, Schaeffler supplies double row full complement cylindrical roller bearings in other types, series and dimensions. These products are described in some cases in special publications. If necessary, please contact Schaeffler. Larger catalogue bearings ➤ 🕮 *GL 1*.

Bearings of basic design – standard range

Key features

Double row full complement cylindrical roller bearings are part of the group of radial roller bearings. These bearings comprise solid outer rings, inner rings and full complement rolling element sets. Due to the absence of a cage, the bearing can accommodate the largest possible number of rolling elements. The rollers have profiled ends, i. e. they have a slight lateral curvature towards the ends. This modified line contact between the rolling elements and raceways prevents damaging edge stresses ➤*413*|⧉ *2*. Bearings in the standard range differ essentially in the arrangement of the ribs on the inner ring and outer ring. Depending on the design, they are used as non-locating bearings, semi-locating bearings or locating bearings.

Series SL0248, SL0249

Bearings with non-locating bearing function

In bearings of these series, the inner ring has three rigid ribs, while the outer ring is without ribs ➤*525*|⧉ *2*.
As a result, axial displacements of the shaft relative to the housing can be compensated within certain limits. During rotational motion, length compensation occurs without constraint in the bearing between the rollers and the raceway without ribs and is therefore practically free from friction. The maximum axial displacement s is given in the product tables. The bearings are used as non-locating bearings, i. e. they cannot guide the shaft axially in either direction ➤*528*|*4.2*. The series SL0248 and SL0249 are not self-retaining (the outer ring without ribs can be removed from the bearing). As a result, the bearing parts (the inner ring with the rolling element set and the outer ring) can be mounted separately from each other. This gives easier mounting of the bearings ➤*540*|*4.17*.

According to DIN 5412-9:1982, which has now been withdrawn, the bearings have the following designation:

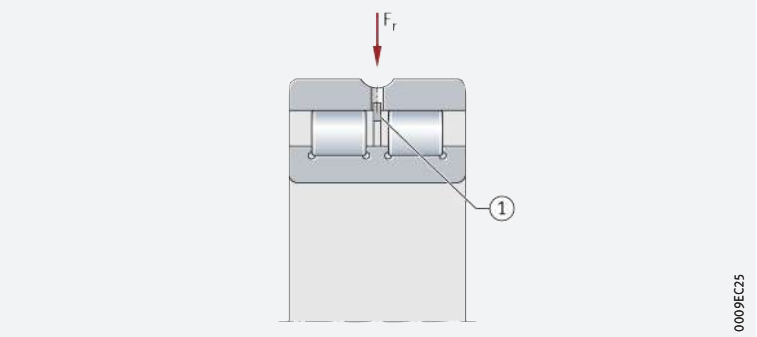
- SL0248: NNCL48..V
- SL0249: NNCL49..V

The bearings are held together in handling and mounting by a transport and mounting retaining device on the outer ring ➤*525*|⧉ *2*.
This retaining device remains in the bearing even after mounting and must not be subjected to axial load.

⧉ **2**
Double row full complement cylindrical roller bearing – non-locating bearing

F_r = *radial load*

① *Transport and mounting retaining device*



Series SL1850

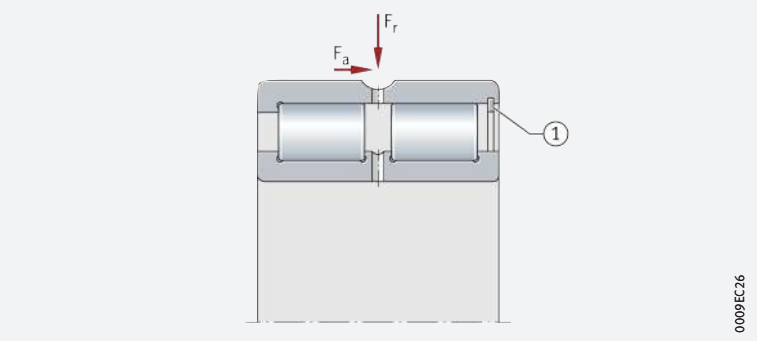
Bearings with semi-locating bearing function

Bearings of series SL1850 (dimension series 50) have three rigid ribs on the inner ring and one rigid rib on the outer ring ➤*526*|⧉ *3*. In these cylindrical roller bearings, axial displacements of the shaft relative to the housing are possible in one direction only. The maximum axial displacement s is given in the product tables ➤*542*|▦. The bearings are used as semi-locating bearings, i. e. they can guide the shaft axially in one direction ➤*528*|*4.2*.

The bearings are held together in handling and mounting by a transport and mounting retaining device on the outer ring ➤*526*|*3*.
This retaining device remains in the bearing even after mounting and must not be subjected to axial load.

3
Double row full complement cylindrical roller bearing – semi-locating bearing

F_r = *radial load*
F_a = *axial load*
① *Transport and mounting retaining device*



Series SL0148, SL0149

✎Bearings with locating bearing function

In these bearings, the inner ring has three rigid ribs and the outer ring has two rigid ribs ➤*526*|*4*. Axial displacements between the shaft and housing are not possible. The bearings are used as locating bearings, i.e. they can guide the shaft axially in both directions ➤*528*|*4.2*.

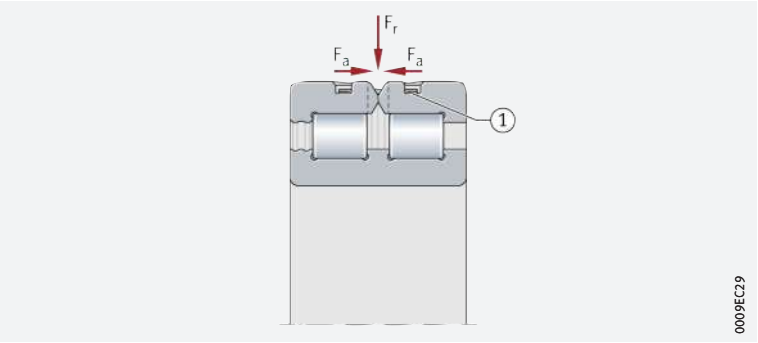
According to DIN 5412-9:1982, which has now been withdrawn, the bearings have the following designation:

- SL0148: NNC48..V
- SL0149: NNC49..V.

The split outer ring is held together by a transport and mounting retaining device ➤*526*|*4*. This retaining device remains in the bearing even after mounting and must not be subjected to axial load.

4
Double row full complement cylindrical roller bearing – locating bearing

F_r = *radial load*
F_a = *axial load*
① *Retaining ring*



Series SL0450..-PP and SL04..-PP – cylindrical roller bearings with annular slots

✎Bearings with locating bearing function, particularly suitable for the support of rope sheaves

These bearings comprise solid outer rings without ribs, inner rings with three ribs, rib-guided rolling element sets and sealing rings ➤*527*|*5*. The outer rings have annular slots for retaining rings. The inner rings are axially split, 1 mm wider than the outer rings and held together by a sheet metal ring. They are used as locating bearings (but can support only slight axial loads) and are used in preference for the support of rope sheaves.

✎Light series and dimension series 50

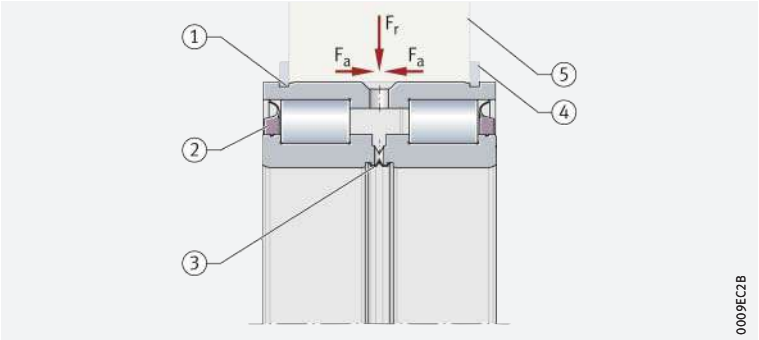
Cylindrical roller bearings with annular slots are available as a light series SL04..-PP and in the dimension series 50 as SL0450..-PP. The latter has a higher load carrying capacity than the light series ➤*550*|▦.

Extensive information on rope sheave bearing arrangements is given in the Technical Product Information TPI 237. This publication can be requested from Schaeffler.

5
Double row full complement cylindrical roller bearing with annular slots – locating bearing

F_r = *radial load*
F_a = *axial load*

① *Slots in outer ring*
② *Sealing rings*
③ *Sheet metal ring*
④ *Retaining rings*
⑤ *Rope sheave*



X-life premium quality

Double row full complement cylindrical roller bearings of series SL1850 are available in many sizes as X-life bearings ➤*542*|▦. These bearings exhibit considerably higher performance than comparable standard cylindrical roller bearings. This is achieved, for example, through the modified internal construction, the optimised contact geometry between the rollers and raceways, the better surface quality and the optimised roller guidance and lubricant film formation.

Advantages

Increased customer benefits due to X-life

These technical enhancements offer a range of advantages, such as:

- a more favourable load distribution in the bearing and thus a higher dynamic load carrying capacity of the bearings
- a higher fatigue limit load
- lower heat generation in the bearing
- lower lubricant consumption and therefore longer maintenance intervals if relubrication is carried out
- a measurably longer operating life of the bearings
- high operational security
- compact, environmentally-friendly bearing arrangements.

Interchangeable with comparable standard bearings

Since X-life cylindrical roller bearings have the same dimensions as the corresponding standard bearings, the latter can be replaced without any problems by the higher-performance X-life bearings. The major advantages of X-life can therefore also be used for existing bearing arrangements with standard bearings.

Lower operating costs, higher machine availability

In conclusion, these advantages improve the overall cost-efficiency of the bearing position significantly and thus bring about a sustainable increase in the efficiency of the machine and equipment.

Suffix XL

X-life cylindrical roller bearings include the suffix XL in the designation ➤*534*|*4.12* and ➤*542*|▦.

Areas of application

Due to their special technical features, double row full complement X-life cylindrical roller bearings are highly suitable, for example, for bearing arrangements in:

- heavy industry (steel production)
- power transmission (gearbox engineering)
- processing machines and construction machinery
- wind turbines (gearbox applications).

X-life indicates a high product performance density and thus a particularly significant benefit to the customer. Further information on X-life ➤*10*.

4.2 Load carrying capacity

Designed for very high radial loads

Depending on the type, double row full complement cylindrical roller bearings can support not only very high radial forces but also high axial loads on one or both sides:

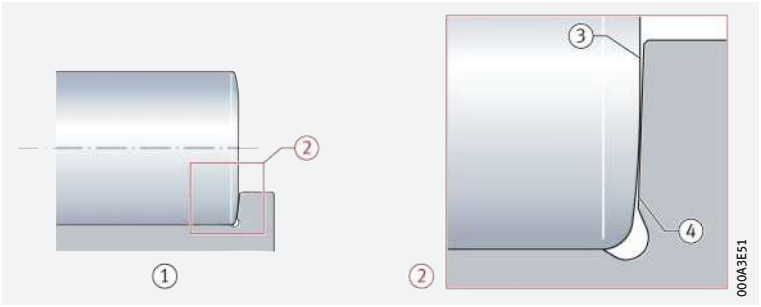
- The series SL0248 and SL0249 must only be subjected to radial load
- The series SL1850 can support radial loads as well as axial loads on one side
- The series SL0148 and SL0149 can support radial loads as well as axial loads on both sides
- The series SL0450..-PP and SL04..50-PP can support radial loads and are suitable for the support of moderate axial loads from both directions.

Higher axial load carrying capacity of bearings with toroidal crowned roller end face

Neither wear nor material fatigue occurs on the rib contact running and roller end faces

In the case of cylindrical roller bearings with toroidal crowned rollers (TB design), the axial load carrying capacity has been significantly improved with the aid of new calculation and manufacturing methods. A special curvature of the roller end faces facilitates optimum contact conditions between the rollers and ribs ➤528| 6. As a result, the axial contact pressures on the rib are significantly minimised and a lubricant film capable of supporting higher loads is formed. Under standard operating conditions, this completely eliminates wear and fatigue at the rib contact running and roller end faces. In addition, the axial frictional torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower. Bearings of toroidal crowned design ➤542|.

By agreement, bearings of series SL1850 are available starting from a bore diameter d = 180 mm in the TB design.



6 *Contact geometry of roller end face/rib face – modified roller end faces*

① *Cylindrical roller with inner ring*
② *Detail (representation not to scale)*
③ *End of roller*
④ *Rib*

Load ratio F_a/F_r

Ratio $F_a/F_r \leqq 0{,}4$ or 0,6

The bearings can support axial loads on one side by means of the ribs on the inner and outer ring ➤529| 7. In order to ensure problem-free running (tilting of the rollers is prevented), they must always be subjected to radial load at the same time as axial load. The ratio F_a/F_r must not exceed the value 0,4. For bearings with toroidal crowned roller ends (TB design), values up to 0,6 are permissible.

Continuous axial loading without simultaneous radial loading is not permissible.

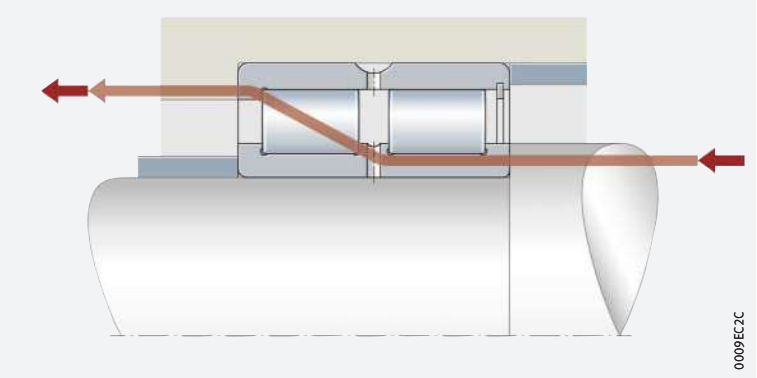
Permissible axial load

Influencing factors on the axial load carrying capacity

Axial loads are supported by the bearing ribs and the roller end faces ➤529| 7. The axial load carrying capacity of the bearing is therefore essentially dependent on:

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

7 *Force flow under axial load – semi-locating bearing SL1850*



Calculation of permissible axial load – cylindrical rollers with conventional roller ends

Bearings with standard roller ends

The permissible axial load $F_{a\,per}$ can be calculated from the hydrodynamic load carrying capacity of the contact ➤529| 1.

1 *Permissible axial load – bearings of standard design*

$$F_{a\,per} = k_S \cdot k_B \cdot d_M^{\,1,54} \cdot n^{-0,6} \leqq F_{a\,max}$$

Legend

$F_{a\,per}$	N	Permissible continuous axial load. In order to prevent unacceptably high temperatures in the bearing, $F_{a\,per}$ must not be exceeded
$F_{a\,max}$	N	Maximum continuous axial load in relation to rib fracture. In order to prevent unacceptably high pressures at the contact surfaces, $F_{a\,max}$ must not be exceeded
k_S	–	Factor as a function of lubrication method ➤529| 1. The factor takes into consideration the lubrication method used for the bearing. The better the lubrication and, in particular, the heat dissipation, the higher the permissible axial load
k_B	–	Factor as a function of bearing series ➤530| 2
d_M	mm	Mean bearing diameter $d_M = (D + d)/2$ ➤542|
n	min^{-1}	Operating speed.

1 *Factor k_S*

Lubrication method	Factor k_S	
	from	up to
Standard greasing, no heat dissipation by the lubricant	1,5	3
Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ($\nu < 0,5 \cdot \nu_1$)	7,5	10
Poor heat dissipation, oil sump lubrication, oil spray lubrication, low oil flow	10	15
Good heat dissipation, recirculating oil lubrication (pressurised oil lubrication)	12	18
Very good heat dissipation, recirculating oil lubrication with oil cooling, high operating viscosity ($\nu > 2 \cdot \nu_1$)	16	24

The precondition for these k_S values is an operating viscosity of the lubricant of at least the reference viscosity ν_1 in accordance with DIN ISO 281:2010.

Doped lubricating oils should be used, such as CLP (DIN 51517) and HLP (DIN 51524) of ISO VG grades 32 to 460, as well as ATF oils (DIN 51502) and transmission oils (DIN 51512) of SAE viscosity grades 75W to 140W.

2 *Bearing factor k_B*

Series	k_B
SL0148	4,5
SL0149	11
SL1850	17
SL0450	17
SL04	10

Calculation of permissible axial load – cylindrical rollers with toroidal roller ends

For bearings with toroidal roller ends, the permissible axial loads are 50% higher ➤*530*| *f 2*.

f 2 *Permissible axial load – bearings of TB design*

$$F_{a\,per} = 1{,}5 \cdot k_S \cdot k_B \cdot d_M^{\,1{,}54} \cdot n^{-0{,}6} \leqq F_{a\,max}$$

Calculation of maximum permissible axial load

For bearings with rollers of the standard or TB design, the maximum permissible axial load $F_{a\,max}$ ➤*530*| *f 3* is calculated from the rib strength and the security against wear. This must not be exceeded, even if $F_{a\,per}$ gives higher values ➤*530*| *f 4*.

f 3 *Maximum axial load – bearings of standard and TB design*

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

f 4 *Permissible axial load*

$$F_{a\,per} \leqq F_{a\,max}$$

Axial load carrying capacity of cylindrical roller bearings with annular slots (rope sheave bearings)

For cylindrical roller bearings with annular slots in the outer ring, the calculations of $F_{a\,per}$ and $F_{a\,max}$ cannot be used. For the axial load carrying capacity of these bearings, please consult Schaeffler.

4.3 Compensation of angular misalignments

The bearings do not permit any misalignments between the inner and outer ring, i. e. the bearing positions must be well aligned.

4.4 Lubrication

✎ *Oil or grease lubrication is possible*

The cylindrical roller bearings are not greased. They must be lubricated with oil or grease. The bearings can be lubricated via the end faces of the outer ring as well as via a lubrication groove and lubrication holes in the outer ring.

✎ *The bearings have an initial greasing*

Cylindrical roller bearings with annular slots (rope sheave bearings)

These bearings are supplied greased and can be relubricated via the outer ring or inner ring. The grease used is a lithium complex soap grease to GA08. Arcanol LOAD150 ➤*70* is suitable for relubrication. The greases named are highly suitable, due to their good moisture resistance and high load carrying capacity, for applications in rope sheaves at low to moderate speeds.

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

4.5 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.

Cylindrical roller bearings with annular slots (rope sheave bearings)

The bearings are sealed on both sides

In the case of these bearings, the rolling element system is protected against contamination and moisture by polyurethane sealing rings on both sides of the bearing. The seals have low friction and are particularly resistant to climate and temperature. Where environmental conditions are particularly critical, sealing of the bearings can be improved further by means of additional seals, such as V rings, in the adjacent construction.

4.6 Speeds

Limiting speeds and reference speeds in the product tables

The product tables give two speeds for most bearings:

- the kinematic limiting speed n_G
- the thermal speed rating n_ϑ.

Lower speed capacity than bearings with cage

Due to the kinematic conditions, full complement cylindrical roller bearings do not achieve the high speeds that are possible when using cylindrical roller bearings with cage.

Limiting speeds

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

Reference speeds

$n_{\vartheta r}$ is used to calculate n_ϑ

The thermal speed rating $n_{\vartheta r}$ is not an application-oriented speed limit, but is a calculated ancillary value for determining the thermally safe operating speed n_ϑ ➤64.

Bearings with contact seals

For bearings with contact seals, no reference speeds are defined in accordance with DIN ISO 15312:2004. As a result, only the limiting speed n_G is given in the product tables for these bearings.

4.7 Noise

The Schaeffler Noise Index (SGI) has been developed as a new feature for comparing the noise level of different bearing types and series. As a result, a noise evaluation of rolling bearings can now be carried out for the first time.

Schaeffler Noise Index

The SGI value is based on the maximum permissible noise level of a bearing in accordance with internal standards, which is calculated on the basis of ISO 15242. In order that different bearing types and series can be compared, the SGI value is plotted against the basic static load rating C_0.

This permits direct comparisons between bearings with the same load carrying capacity. The upper limit value is given in each of the diagrams. This means that the average noise level of the bearings is lower than illustrated in the diagram.

The Schaeffler Noise Index is an additional performance characteristic in the selection of bearings for noise-sensitive applications. The specific suitability of a bearing for an application in terms of installation space, load carrying capacity or speed limit for example, must be checked independently of this.

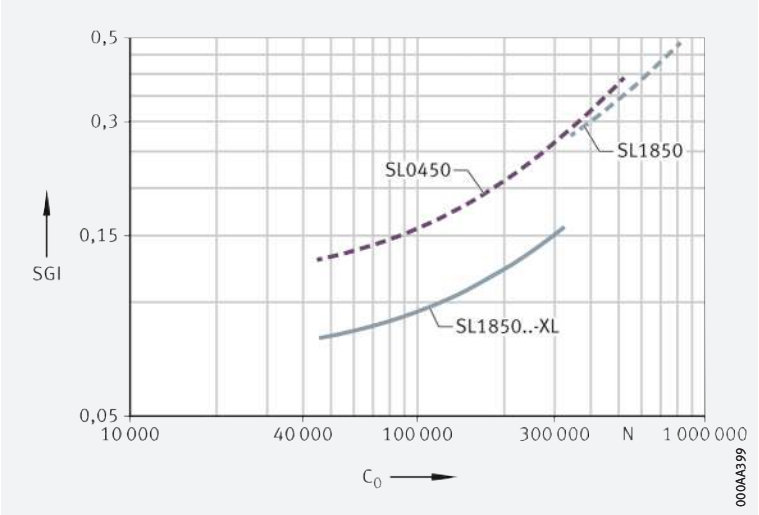
The Noise Index is currently available for the main series. Additional series will be updated and introduced in subsequent publications.

Further information:

- ***medias*** ➤ *https://medias.schaeffler.com*.

8
Schaeffler Noise Index for double row full complement cylindrical roller bearings

SGI = *Schaeffler Noise Index*
C_0 = *basic static load rating*



4.8 Temperature range

✎ *Limiting values*

The operating temperature of the bearings is limited by:

- the dimensional stability of the bearing rings and cylindrical rollers
- the lubricant
- the seals.

Possible operating temperatures of double row cylindrical roller bearings ➤ *532* | ▦ *3*.

3
Permissible temperature ranges

Operating temperature	Open full complement bearings	Rope sheave bearings
	–30 °C to +120 °C	–20 °C to +80 °C, limited by the lubricant, cage material and seal material –40 °C to +80 °C with greasing by means of GA22

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

4.9 Cages

Full complement cylindrical roller bearings do not have a cage for guidance and separation of the rolling elements. The cylindrical rollers are guided by the ribs on the bearing rings.

4.10 Internal clearance

Radial internal clearance

The standard is CN

Double row full complement cylindrical roller bearings are manufactured as standard with the radial internal clearance CN (normal) ➤*533*|▦*4*. CN is not stated in the designation.

Certain sizes are also available by agreement with the larger internal clearance C3, C4 and C5 ➤*533*|▦*4*.

The values for radial internal clearance correspond to DIN 620-4:2004 (ISO 5753-1:2009) ➤*533*|▦*4*. They are valid for bearings which are free from load and measurement forces (without elastic deformation).

▦**4** *Radial internal clearance of double row full complement cylindrical roller bearings*

Nominal bore diameter d mm		Radial internal clearance							
		CN (Group N) µm		C3 (Group 3) µm		C4 (Group 4) µm		C5 (Group 5) µm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	20	45	35	60	50	75	65	90
24	30	20	45	35	60	50	75	70	95
30	40	25	50	45	70	60	85	80	105
40	50	30	60	50	80	70	100	95	125
50	65	40	70	60	90	80	110	110	140
65	80	40	75	65	100	90	125	130	165
80	100	50	85	75	110	105	140	155	190
100	120	50	90	85	125	125	165	180	220
120	140	60	105	100	145	145	190	200	245
140	160	70	120	115	165	165	215	225	275
160	180	75	125	120	170	170	220	250	300
180	200	90	145	140	195	195	250	275	330
200	225	105	165	160	220	220	280	305	365
225	250	110	175	170	235	235	300	330	395
250	280	125	195	190	260	260	330	370	440
280	315	130	205	200	275	275	350	410	485
315	355	145	225	225	305	305	385	455	535
355	400	190	280	280	370	370	460	510	600

Radial internal clearance of cylindrical roller bearings with annular slots (rope sheave bearings)

The correct radial internal clearance is of decisive importance for the correct function of rope sheaves. The radial internal clearance group is dependent on the material of the rope sheave ➤*533*|▦*5*.

▦**5** *Radial internal clearance of cylindrical roller bearings with annular slots for the support of rope sheaves as a function of the material of adjacent parts – recommendation*

Nominal bore diameter d mm		Material of rope sheave	
		Steel	Plastic
		Internal clearance group of bearing	
over	incl.		
–	85	CN or C3	C5
85	300	C3	

4.11 Dimensions, tolerances

Dimension standards

The main dimensions of cylindrical roller bearings correspond to ISO 15:2017 (DIN 616:2000).

Chamfer dimensions

The limiting dimensions for chamfer dimensions correspond to DIN 620-6:2004. Overview and limiting values ➤ *135*|*7.11*. Nominal value of chamfer dimension ➤ *542*|▦.

Tolerances

The dimensional and running tolerances of the cylindrical roller bearings correspond to the tolerance class Normal in accordance with ISO 492:2014. Tolerance values in accordance with ISO 492 ➤ *122*|▦ *8*.

4.12 Suffixes

For a description of the suffixes used in this chapter ➤ *534*|▦ *6*, cylindrical roller bearings with annular slots ➤ *534*|▦ *7* and ***medias*** interchange ➤ *https://www.schaeffler.de/std/1D52*.

▦ *6*
Suffixes and corresponding descriptions, double row full complement cylindrical roller bearings

Suffix	Description of suffix	
BR	Black oxide coated	Available by agreement
C3	Radial internal clearance C3 (larger than normal)	
C4	Radial internal clearance C4 (larger than C3)	
C5	Radial internal clearance C5 (larger than C4)	
TB	Bearing with increased axial load carrying capacity	Standard, dependent on bore code and bearing series
XL	X-life bearing	

▦ *7*
Suffixes and corresponding descriptions, cylindrical roller bearings with annular slots (rope sheave bearings)

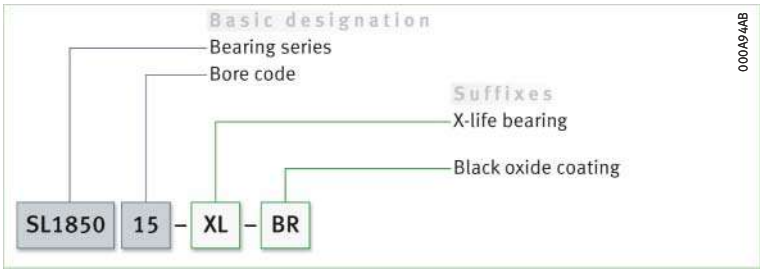
Suffix	Description of suffix	
C3	Radial internal clearance C3 (larger than normal)	Special design, available by agreement
C4	Radial internal clearance C4 (larger than C3)	
C5	Radial internal clearance C5 (larger than C4)	
D	Improved outer ring profile, with an enlarged load-bearing area and optimised edge transitions	Standard
GA22	Bearing greased with lithium soap grease GA22 for expanded temperature range	Special design, available by agreement
P	Contact seal on one side	
PP	Contact seal on both sides	Standard
RR	Corrosion-resistant design, with Corrotect coating	Special design, available by agreement
2NR	Supplied with two loose-packed retaining rings WRE	
2WR	Supplied with two loose-packed retaining rings WR	
–	Without seals	

4.13 Structure of bearing designation

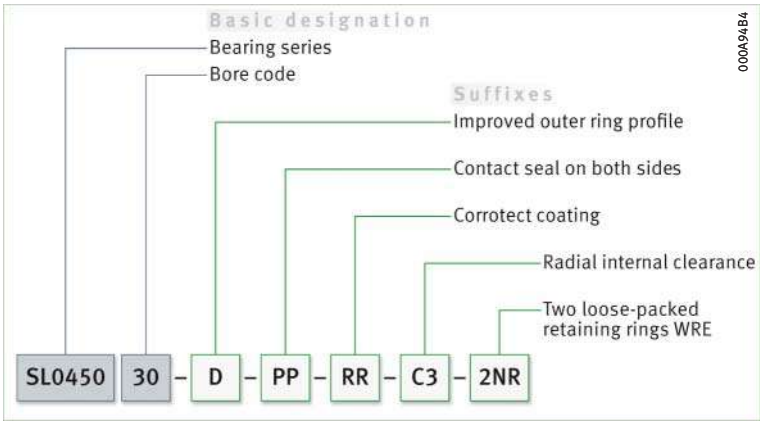
✎ *Examples of composition of bearing designation*

The designation of bearings follows a set model. Examples are shown in ➤ *535*|🗀 *9* and ➤ *535*|🗀 *10*. The composition of designations is subject to DIN 623-1 ➤ *102*|🗀 *10*.

🗀 ***9***
Double row full complement cylindrical roller bearing (semi-locating bearing): designation structure



🗀 ***10***
Double row full complement cylindrical roller bearing (rope sheave bearing): designation structure



4.14 Dimensioning

Equivalent dynamic bearing load

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

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 ($P = F_r$).

Bearings with non-locating bearing function and cylindrical roller bearings with annular slots (rope sheave bearings)

✎ *$P = F_r$*

Non-locating bearings can only support radial loads, rope sheave bearings only have a small axial load carrying capacity. For these bearings ➤ *535*|𝑓 *5*.

𝑓 ***5***
Equivalent dynamic load

$$P = F_r$$

Cylindrical roller bearings with semi-locating and locating bearing function

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

If the condition described above is not met, i.e. if, in addition to the radial force F_r, there is also an axial force F_a, 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.

✎ $F_a/F_r \leqq e$ or $F_a/F_r > e$

The calculation of P is dependent on the load ratio F_a/F_r and the calculation factors e and Y ➤*536*| ⫝*6* and ➤*536*| ⫝*7*.

⫝**6**
Equivalent dynamic load

$$\frac{F_a}{F_r} \leqq e \quad \Rightarrow \quad P = F_r$$

⫝**7**
Equivalent dynamic load

$$\frac{F_a}{F_r} > e \quad \Rightarrow \quad P = 0{,}92 \cdot F_r + Y \cdot F_a$$

Legend

P	N	Equivalent dynamic bearing load
F_r	N	Radial load
F_a	N	Axial load
e, Y	–	Factors ➤*536*| ▦*8*.

▦**8**
Factors e and Y

Bearing series	Calculation factors	
	e	Y
SL1850	0,2	0,6
SL0148, SL0149	0,24	0,5

Equivalent static bearing load

✎ $P_0 \geqq F_{0r}$

For cylindrical roller bearings subjected to static load ➤*536*| ⫝*8*.

⫝**8**
Equivalent static load

$$P_0 = F_{0r}$$

Legend

P_0	N	Equivalent static bearing load
F_{0r}	N	Largest radial 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 ➤*536*| ⫝*9*.

⫝**9**
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.

4.15 Minimum load

✎ *In order to prevent damage due to slippage, a minimum radial load of $P > C_{0r}/60$ is necessary during continuous operation*

In order that no slippage occurs between the contact partners, the cylindrical roller bearings must be constantly subjected to a sufficiently high radial load. For continuous operation, experience shows that 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.

4.16 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 seating surface. The seating and contact surfaces should not be interrupted by grooves, holes or other recesses. The accuracy of mating parts must meet specific requirements ➤538|▦9 to ➤539|▦12.

Radial location

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.

Radial location of cylindrical roller bearings with annular slots (rope sheave bearings)

The outer ring must have an interference fit to achieve rigid seating

The axial loads occurring cannot be securely transmitted by the retaining rings. Transmission of the loads is only possible if sufficient joint pressure is present. Due to the operating conditions present in rope sheave bearing arrangements, an interference fit between the outer ring and rope sheave is absolutely critical in order to achieve correct bearing function and load transmission. The joint pressure must be between p_{min} = 2 N/mm² and p_{max} = 25 N/mm². The internal clearance has a considerable influence on bearing function ➤533|▦5.

Axial location

The bearings must also be securely located in an axial direction

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; example ➤540|⧉12.

Axial location of cylindrical roller bearings with annular slots (rope sheave bearings)

Axial location is carried out by means of retaining rings

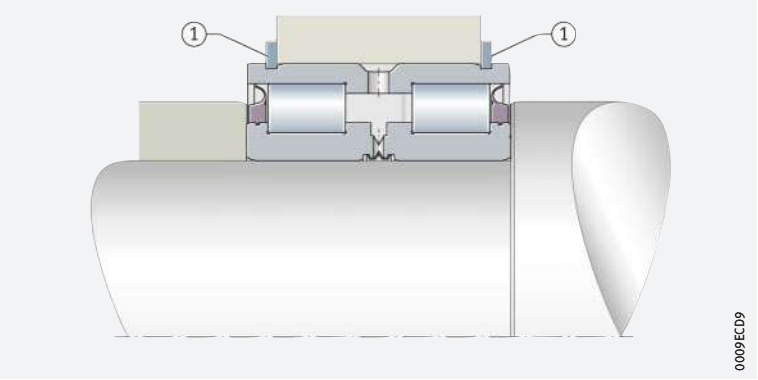
The annular slots allow axial location of the outer rings using retaining rings ➤538|⧉11. Suitable fasteners are WRE rings or rings in accordance with DIN 471. Locating rings are not included in the scope of delivery. The design 2NR is supplied with two retaining rings WRE packed loose. The split inner ring must be axially secured ➤538|⧉11. The fasteners must not be subjected to axial load.

Arrangement of several rope sheaves adjacent to each other

If housing tolerances are present or several rope sheaves are arranged adjacent to each other, axial clearance may occur between the inner rings. This must always be prevented by means of design measures. For example, shims are suitable for this purpose.

11
Cylindrical roller bearing with annular slots (rope sheave bearing) – location of outer ring, support of ribs

① *Retaining ring*



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 cylindrical 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 the bearing seating surfaces ➤*538*| ▦ *9*, tolerances t_1 to t_3 in accordance with ➤*168*| ⧉ *11*. Numerical values for IT grades ➤*538*| ▦ *10*.

9
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 t_1	Parallelism tolerance t_2	Total axial runout tolerance of abutment shoulder 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	

10
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**	**315**
	incl.	**30**	**50**	**80**	**120**	**180**	**250**	**315**	**400**
	Values in µm								
IT4		6	7	8	10	12	14	16	18
IT5		9	11	13	15	18	20	23	25
IT6		13	16	19	22	25	29	32	36
IT7		21	25	30	35	40	46	52	57

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 ➤*539*| 11.

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

Nominal diameter of the bearing seat d (D) mm		Recommended mean roughness value for ground bearing seats Ramax 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

Bearing seat design (roughness) for cylindrical roller bearings with annular slots (rope sheave bearings)

Recommended roughness values for bearing seating surfaces ➤*539*| 12.

12 *Roughness for bearing seating surfaces on the shaft and in the housing bore for cylindrical roller bearings with annular slots – recommendation*

Nominal diameter of bearing seat d (D) mm		Roughness	
over	incl.	Shaft	Housing bore
20	300	Rz 4	Rz 16

Mounting dimensions for the contact surfaces of bearing rings

The contact surfaces for the rings must be of sufficient height

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. The transition from the bearing seat to the abutment shoulder must be designed with rounding to DIN 5418:1993 or an undercut to DIN 509:2006. Proven mounting dimensions for the radii and diameters of abutment shoulders are given in the product tables ➤*542*|. These dimensions are limiting dimensions (maximum or minimum dimensions); the actual values should not be higher or lower than specified.

Rib support in axially loaded bearings

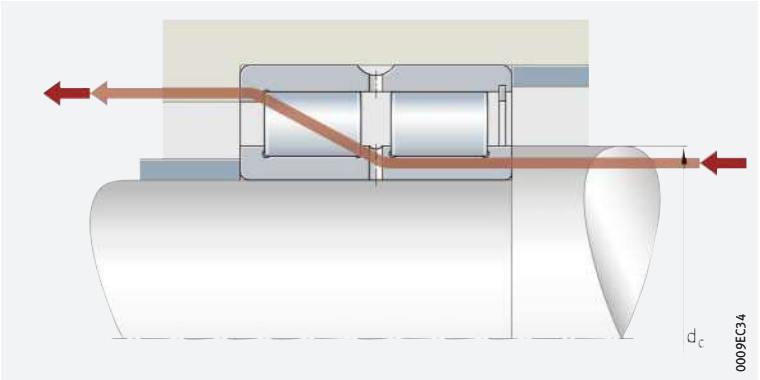
Ribs under axial load must be supported over their entire height and entire circumference ➤*542*| and ➤*540*| *12*. The size and axial runout accuracy of the contact surfaces on the inner ring rib must be observed especially in the case of cylindrical roller bearings subjected to high loads, since these factors also influence the uniformity of the rib load and the running accuracy of the shaft. This means that the ribs may be subjected to damaging alternating stresses even in the case of very small misalignments. If the mounting dimensions indicated in the product tables are observed, the problems described can be reliably avoided ➤*542*|.

Support in semi-locating bearings

In semi-locating bearings, it is sufficient to support the bearing rings on one side, on the rib supporting the axial load ➤*540*|*12*.

12
Support of inner ring rib supporting axial load

d_c = *recommended height of shaft shoulder with axially loaded rib*
Arrow = *force flow*



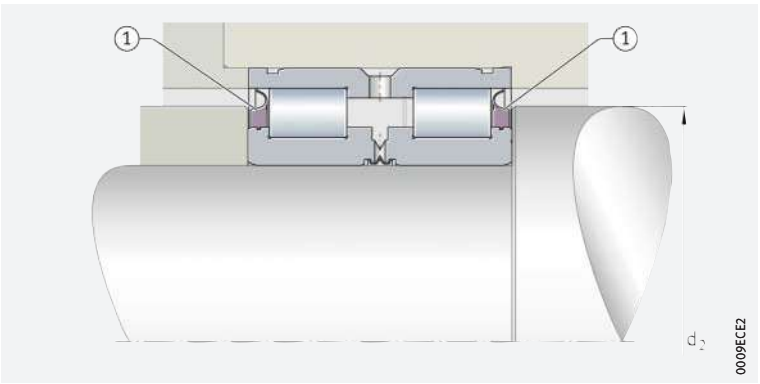
Support of sealing rings in cylindrical roller bearings with annular slots (rope sheave bearings)

Observe the abutment dimension of the sealing rings

The sealing rings must be supported to a sufficient height that they are not pressed out during lubrication of the bearings ➤*540*|*13*.
The dimension d_2 in the product tables must be observed ➤*550*|▦.

13
Rope sheave bearings – support of sealing rings

d_2 = *abutment dimension*
① *Sealing ring*



4.17 Mounting and dismounting

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

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

The series SL0248 and SL0249 are not self-retaining. As a result, the bearing parts (the inner ring with the rolling element set and the outer ring) can be mounted separately from each other ➤*524*|*4.1*. This gives simplified mounting of the bearings, especially when the two bearing rings have a tight fit.

Mounting and dismounting of cylindrical roller bearings with annular slots (rope sheave bearings)

During mounting and dismounting of the bearings, the mounting forces must never be directed through the rolling elements, sealing rings or the fasteners on the split bearing ring.

Schaeffler Mounting Handbook

✎ Rolling bearings must be handled with great care

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.

4.18 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.

§ We therefore reserve the right to make changes to the data and illustrations in this catalogue. This catalogue reflects the status at the time of printing. More recent publications released by us (as printed or digital media) will automatically precede this catalogue if they involve the same subject. Therefore, please always use our electronic product catalogue to check whether more up-to-date information or modification notices exist for your desired product.

Link to electronic product catalogue

The following link will take you to the Schaeffler electronic product catalogue: ➤ *https://medias.schaeffler.com*.

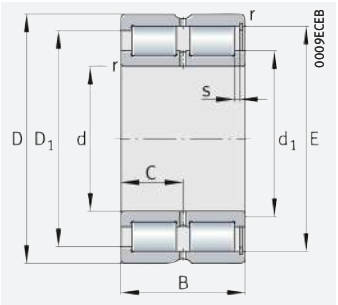
4.19 Further information

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

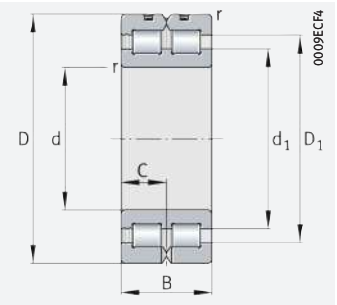
- Determining the bearing size ➤ *34*
- Rigidity ➤ *54*
- Friction and increases in temperature ➤ *56*
- Speeds ➤ *64*
- Bearing data ➤ *97*
- Lubrication ➤ *70*
- Sealing ➤ *182*
- Design of bearing arrangements ➤ *139*
- Mounting and dismounting ➤ *191*.

Double row full complement cylindrical roller bearings

Semi-locating, locating and non-locating bearings



SL1850
Semi-locating bearing

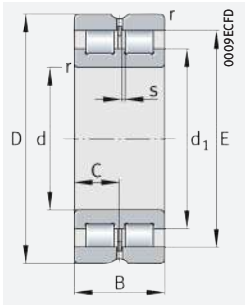


SL0148, SL0149
Locating bearings

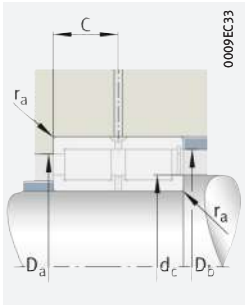
d = 20 – 120 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Mass	Designation ➤534|4.12 ➤535|4.13 X-life ➤527		
d	D	B	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	$n_{\vartheta r}$	m	Semi-locating bearing	Locating bearing	Non-locating bearing
			N	N	N	min^{-1}	min^{-1}	≈ kg			
20	42	30	53 000	52 000	8 900	11 400	7 400	0,2	**SL185004-XL**	–	–
25	47	30	60 000	64 000	11 100	9 500	6 000	0,23	**SL185005-XL**	–	–
30	55	34	78 000	84 000	15 000	8 100	5 300	0,35	**SL185006-XL**	–	–
35	62	36	94 000	107 000	18 800	7 100	4 750	0,46	**SL185007-XL**	–	–
40	68	38	113 000	133 000	22 400	6 300	4 200	0,56	**SL185008-XL**	–	–
45	75	40	120 000	148 000	24 900	5 800	3 950	0,71	**SL185009-XL**	–	–
50	80	40	151 000	188 000	30 000	5 300	3 450	0,76	**SL185010-XL**	–	–
55	90	46	206 000	275 000	45 000	4 550	2 900	1,16	**SL185011-XL**	–	–
60	85	25	70 000	121 000	17 300	4 650	2 650	0,49	–	**SL014912**	–
	85	25	70 000	121 000	17 300	4 650	2 650	0,47	–	–	**SL024912**
	95	46	212 000	285 000	47 500	4 350	2 800	1,24	**SL185012-XL**	–	–
65	100	46	223 000	315 000	52 000	4 000	2 500	1,32	**SL185013-XL**	–	–
70	100	30	106 000	185 000	27 000	3 900	2 330	0,78	–	**SL014914**	–
	100	30	106 000	185 000	27 000	3 900	2 330	0,75	–	–	**SL024914**
	110	54	265 000	350 000	59 000	3 750	2 650	1,85	**SL185014-XL**	–	–
75	115	54	275 000	385 000	65 000	3 450	2 370	1,93	**SL185015-XL**	–	–
80	110	30	112 000	206 000	30 000	3 550	2 090	0,88	–	**SL014916**	–
	110	30	112 000	206 000	30 000	3 550	2 090	0,85	–	–	**SL024916**
	125	60	330 000	440 000	81 000	3 200	2 320	2,59	**SL185016-XL**	–	–
85	130	60	300 000	465 000	68 000	3 050	2 210	2,72	**SL185017**	–	–
90	125	35	153 000	290 000	39 000	3 050	1 870	1,35	–	**SL014918**	–
	125	35	153 000	290 000	39 000	3 050	1 870	1,3	–	–	**SL024918**
	140	67	350 000	550 000	80 000	2 850	2 140	3,62	**SL185018**	–	–
100	140	40	191 000	370 000	47 500	2 700	1 720	1,95	–	**SL014920**	–
	140	40	191 000	370 000	47 500	2 700	1 720	1,9	–	–	**SL024920**
	150	67	370 000	600 000	86 000	2 600	1 930	3,94	**SL185020**	–	–
110	150	40	198 000	400 000	50 000	2 500	1 600	2,15	–	**SL014922**	–
	150	40	198 000	400 000	50 000	2 500	1 600	2,1	–	–	**SL024922**
	170	80	485 000	770 000	109 000	2 350	1 730	6,32	**SL185022**	–	–
120	165	45	222 000	440 000	55 000	2 260	1 540	2,95	–	**SL014924**	–
	165	45	222 000	440 000	55 000	2 260	1 540	2,85	–	–	**SL024924**
	180	80	510 000	850 000	117 000	2 160	1 530	6,77	**SL185024**	–	–

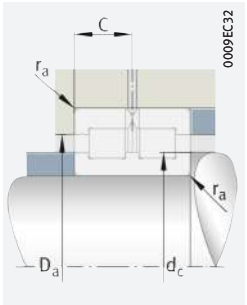
medias ➤ *https://www.schaeffler.de/std/1E43*



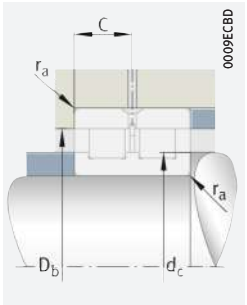
SL0248, SL0249
Non-locating bearings



Mounting dimensions
for semi-locating bearings



Mounting dimensions
for locating bearings

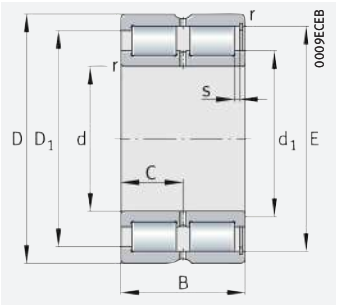


Mounting dimensions
for non-locating bearings

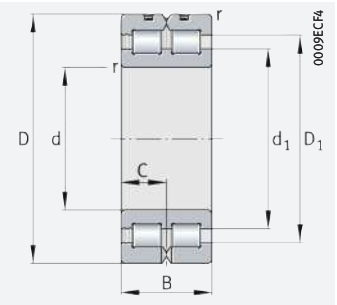
d	Designation to DIN 5412	Dimensions						Mounting dimensions			
		r min.	s	C	d_1 ≈	D_1 ≈	E	d_c	D_a	D_b	r_a max.
20	–	0,6	1	15	28,4	33,3	36,8	28	33,5	36,5	0,6
25	–	0,6	1	15	34,5	39	42,5	34,5	39	42,5	0,6
30	–	1	1,5	17	40	45,3	49,6	40	45,5	49,5	1
35	–	1	1,5	18	44,9	51,2	55,5	44,5	51,5	55,5	1
40	–	1	1,5	19	50,5	57,2	61,7	50,5	57,5	61,5	1
45	–	1	1,5	20	55,3	62,6	66,9	55	63	66,5	1
50	–	1	1,5	20	59,1	67,6	72,3	59	68	72	1
55	–	1,1	1,5	23	68,5	78,7	83,5	68,5	79	83,5	1,1
60	NNC4912V	1	–	12,5	70,3	73,5	–	70	73,5	–	1
	NNCL4912V	1	1	12,5	70,3	–	77,51	70,5	–	77,5	1
	–	1,1	1,5	23	71,7	81,9	86,7	71,5	82	86,5	1,1
65	–	1,1	1,5	23	78,1	88,3	93,1	78	88,5	93	1,1
70	NNC4914V	1	–	15	82,5	87,4	–	82,5	87,5	–	1
	NNCL4914V	1	1	15	82,5	–	91,87	82,5	–	91,5	1
	–	1,1	3	27	81,5	95,7	100,3	81,5	96	100	1,1
75	–	1,1	3	27	89	102,9	107,9	89	103	107,5	1,1
80	NNC4916V	1	–	15	91,4	96,2	–	91	96,5	–	1
	NNCL4916V	1	1	15	91,4	–	100,78	91,5	–	100,5	1
	–	1,1	3,5	30	95	111,7	117,4	95	112	117	1,1
85	–	1,1	3,5	30	99	116,1	122	99	116,5	121,5	1,1
90	NNC4918V	1,1	–	17,5	103,9	110,7	–	103,5	111	–	1,1
	NNCL4918V	1,1	1,5	17,5	103	–	115,2	103	–	115	1,1
	–	1,5	4	33,5	106,1	124,5	130,7	106	124,5	130,5	1,5
100	NNC4920V	1,1	–	20	116,4	125	–	116	125	–	1,1
	NNCL4920V	1,1	2	20	116,4	–	129,6	116,5	–	129,5	1,1
	–	1,5	4	33,5	115,7	134	140,2	115,5	134	140	1,5
110	NNC4922V	1,1	–	20	125	133,6	–	125	134	–	1,1
	NNCL4922V	1,1	2	20	125	–	138,2	125	–	138	1,1
	–	2	5	40	127,3	149,3	156,7	127	149,5	156,5	2
120	NNC4924V	1,1	–	22,5	138,6	148,6	–	138,5	149	–	1,1
	NNCL4924V	1,1	3	22,5	138,6	–	153,55	139	–	153,5	1,1
	–	2	5	40	138,8	160,7	168,2	138,5	161	168	2

Double row full complement cylindrical roller bearings

Semi-locating, locating and non-locating bearings



SL1850
Semi-locating bearing

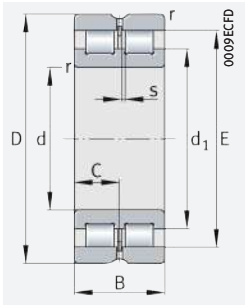


SL0148, SL0149
Locating bearings

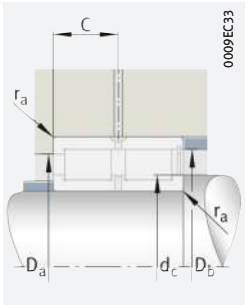
d = 130 – 190 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Mass	Designation ➤534|4.12 ➤535|4.13		
d	D	B	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	$n_{\vartheta r}$	m	Semi-locating bearing	Locating bearing	Non-locating bearing
			N	N	N	min^{-1}	min^{-1}	≈ kg			
130	180	50	260 000	510 000	63 000	2 090	1 500	3,95	–	**SL014926**	–
	180	50	260 000	510 000	63 000	2 090	1 500	3,8	–	–	**SL024926**
	200	95	730 000	1 210 000	164 000	1 990	1 340	10,2	**SL185026**	–	–
140	190	50	270 000	550 000	66 000	1 950	1 370	4,2	–	**SL014928**	–
	190	50	270 000	550 000	66 000	1 950	1 370	4,1	–	–	**SL024928**
	210	95	770 000	1 330 000	177 000	1 820	1 180	11,1	**SL185028**	–	–
150	190	40	231 000	530 000	62 000	1 900	1 270	2,9	–	**SL014830**	–
	190	40	231 000	530 000	62 000	1 900	1 270	2,8	–	–	**SL024830**
	210	60	410 000	820 000	104 000	1 790	1 200	6,65	–	**SL014930**	–
	210	60	410 000	820 000	104 000	1 790	1 200	6,45	–	–	**SL024930**
	225	100	810 000	1 390 000	183 000	1 740	1 150	13,3	**SL185030**	–	–
160	200	40	237 000	560 000	64 000	1 800	1 200	3,1	–	**SL014832**	–
	200	40	237 000	560 000	64 000	1 800	1 200	3	–	–	**SL024832**
	220	60	425 000	880 000	110 000	1 660	1 080	7	–	**SL014932**	–
	220	60	425 000	880 000	110 000	1 660	1 080	6,8	–	–	**SL024932**
	240	109	930 000	1 610 000	207 000	1 600	1 030	12,2	**SL185032**	–	–
170	215	45	260 000	600 000	68 000	1 670	1 180	4,1	–	**SL014834**	–
	215	45	260 000	600 000	68 000	1 670	1 180	3,95	–	–	**SL024834**
	230	60	435 000	930 000	114 000	1 580	1 010	7,35	–	**SL014934**	–
	230	60	435 000	930 000	114 000	1 580	1 010	7,1	–	–	**SL024934**
	260	122	1 200 000	2 110 000	265 000	1 480	900	22,5	**SL185034**	–	–
180	225	45	270 000	640 000	72 000	1 560	1 070	4,3	–	**SL014836**	–
	225	45	270 000	640 000	72 000	1 560	1 070	4,15	–	–	**SL024836**
	250	69	570 000	1 200 000	147 000	1 480	920	10,8	–	**SL014936**	–
	250	69	570 000	1 200 000	147 000	1 480	920	10,5	–	–	**SL024936**
	280	136	1 390 000	2 480 000	310 000	1 370	820	29,9	**SL185036-TB**	–	–
190	240	50	310 000	730 000	81 000	1 480	1 030	5,65	–	**SL014838**	–
	240	50	310 000	730 000	81 000	1 480	1 030	5,45	–	–	**SL024838**
	260	69	580 000	1 270 000	152 000	1 410	860	11,2	–	**SL014938**	
	260	69	580 000	1 270 000	152 000	1 410	860	10,9	–	–	**SL024938**
	290	136	1 430 000	2 600 000	320 000	1 320	770	31,3	**SL185038-TB**	–	–

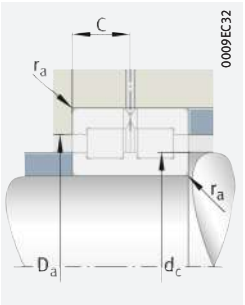
medias ➤ *https://www.schaeffler.de/std/1E44*



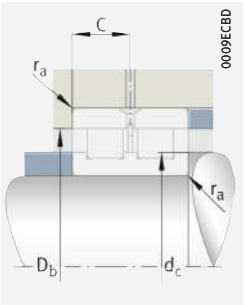
SL0248, SL0249
Non-locating bearings



Mounting dimensions
for semi-locating bearings



Mounting dimensions
for locating bearings

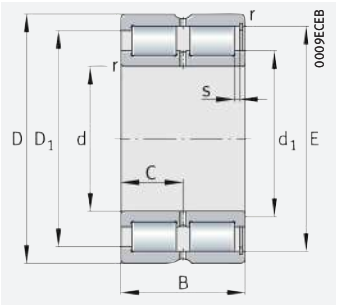


Mounting dimensions
for non-locating bearings

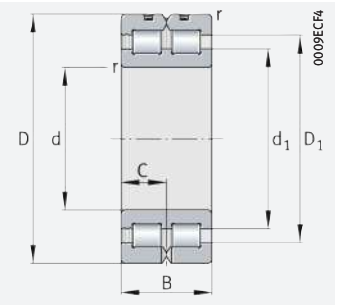
d	Designation to DIN 5412	Dimensions						Mounting dimensions			
		r min.	s	C	d_1 ≈	D_1 ≈	E	d_c	D_a	D_b	r_a max.
130	NNC4926V	1,5	–	25	148,4	160	–	148	160	–	1,5
	NNCL4926V	1,5	4	25	149,5	–	165,4	149,5	–	165	1,5
	–	2	5	47,5	148,6	175,5	184,4	148,5	175,5	184	2
140	NNC4928V	1,5	–	25	159	170,5	–	159	170,5	–	1,5
	NNCL4928V	1,5	4	25	160	–	175,9	160	–	175,5	1,5
	–	2	5	47,5	162,6	189,5	198,4	162,5	189,5	198	2
150	NNC4830V	1,1	–	20	165,1	174,2	–	165	174,5	–	1,1
	NNCL4830V	1,1	2	20	165,1	–	178,3	165,5	–	178	1,1
	NNC4930V	2	–	30	171,8	187,2	–	171,5	187,5	–	2
	NNCL4930V	2	4	30	171,8	–	192,77	172	–	192,5	2
	–	2	6	50	170	198	207,5	170	198	207	2
160	NNC4832V	1,1	–	20	173,7	182,8	–	173,5	183	–	1,1
	NNCL4832V	1,1	2	20	173,7	–	186,9	174	–	186,5	1,1
	NNC4932V	2	–	30	184,2	200,3	–	184	200,5	–	2
	NNCL4932V	2	4	30	184,2	–	206,16	184,5	–	206	2
	–	2,1	6	54,5	184,8	215,8	224,8	184,5	216	224,5	2,1
170	NNC4834V	1,1	–	22,5	186,3	197	–	186	197	–	1,1
	NNCL4834V	1,1	3	22,5	186,3	–	201,3	186,5	–	201	1,1
	NNC4934V	2	–	30	193,1	209,1	–	193	209,5	–	2
	NNCL4934V	2	4	30	193,1	–	215,08	193,5	–	215	2
	–	2,1	6	61	198	232,7	242,9	198	233	242,5	2,1
180	NNC4836V	1,1	–	22,5	199,1	209,8	–	199	210	–	1,1
	NNCL4836V	1,1	3	22,5	199,1	–	214,1	199,5	–	214	1,1
	NNC4936V	2	–	34,5	204,9	224,1	–	204,5	224,5	–	2
	NNCL4936V	2	4	34,5	204,9	–	230,5	205	–	230,5	2
	–	2,1	8	68	212,2	249,4	260,2	212	249,5	260	2,1
190	NNC4838V	1,5	–	25	207,6	220,7	–	207,5	221	–	1,5
	NNCL4838V	1,5	4	25	207,6	–	225	208	–	225	1,5
	NNC4938V	2	–	34,5	215	234,3	–	215	234,5	–	2
	NNCL4938V	2	4	34,5	215	–	240,7	215	–	240,5	2
	–	2,1	8,2	68	221,8	259	269,8	221,5	259	269,5	2,1

Double row full complement cylindrical roller bearings

Semi-locating, locating and non-locating bearings



SL1850
Semi-locating bearing

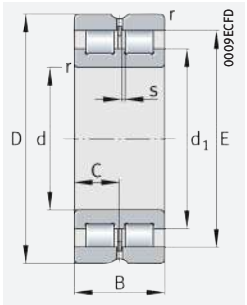


SL0148, SL0149
Locating bearings

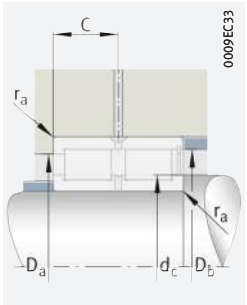
d = 200 – 300 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Mass	Designation ➤534|4.12 ➤535|4.13		
d	D	B	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	$n_{\vartheta r}$	m	Semi-locating bearing	Locating bearing	Non-locating bearing
			N	N	N	min^{-1}	min^{-1}	≈ kg			
200	250	50	320 000	770 000	84 000	1 410	960	5,9	–	**SL014840**	–
	250	50	320 000	770 000	84 000	1 410	960	5,7	–	–	**SL024840**
	280	80	680 000	1 440 000	173 000	1 310	820	15,8	–	**SL014940**	–
	280	80	680 000	1 440 000	173 000	1 310	820	15,3	–	–	**SL024940**
	310	150	1 630 000	3 000 000	365 000	1 230	710	40,4	**SL185040-TB**	–	–
220	270	50	335 000	840 000	90 000	1 290	850	6,4	–	**SL014844**	–
	270	50	335 000	840 000	90 000	1 290	850	6,2	–	–	**SL024844**
	300	80	700 000	1 550 000	182 000	1 220	750	17,2	–	**SL014944**	–
	300	80	700 000	1 550 000	182 000	1 220	750	16,7	–	–	**SL024944**
	340	160	1 980 000	3 650 000	430 000	1 140	630	51,6	**SL185044-TB**	–	–
240	300	60	510 000	1 260 000	143 000	1 170	730	10	–	**SL014848**	–
	300	60	510 000	1 260 000	143 000	1 170	730	9,9	–	–	**SL024848**
	320	80	740 000	1 700 000	195 000	1 110	660	18,5	–	**SL014948**	–
	320	80	740 000	1 700 000	195 000	1 110	660	17,9	–	–	**SL024948**
	360	160	2 080 000	4 000 000	460 000	1 040	550	55,2	**SL185048-TB**	–	–
260	320	60	540 000	1 370 000	152 000	1 080	650	11	–	**SL014852**	–
	320	60	540 000	1 370 000	152 000	1 080	650	10,6	–	–	**SL024852**
	360	100	1 100 000	2 470 000	280 000	1 010	570	32	–	**SL014952**	–
	360	100	1 100 000	2 470 000	280 000	1 010	570	31,2	–	–	**SL024952**
	400	190	2 750 000	5 000 000	570 000	940	490	82,6	**SL185052-TB**	–	–
280	350	69	700 000	1 820 000	198 000	980	570	16	–	**SL014856**	–
	350	69	700 000	1 820 000	198 000	980	570	15,6	–	–	**SL024856**
	380	100	1 150 000	2 650 000	295 000	940	520	34	–	**SL014956**	–
	380	100	1 150 000	2 650 000	295 000	940	520	33,1	–	–	**SL024956**
	420	190	2 850 000	5 300 000	590 000	900	460	88	**SL185056-TB**	–	–
300	380	80	820 000	2 070 000	225 000	920	550	23	–	**SL014860**	–
	380	80	820 000	2 070 000	225 000	920	550	22	–	–	**SL024860**
	420	118	1 630 000	3 700 000	405 000	870	445	53	–	**SL014960**	–
	420	118	1 630 000	3 700 000	405 000	870	445	51,9	–	–	**SL024960**
	460	218	3 450 000	6 600 000	660 000	800	395	124	**SL185060-TB**	–	–

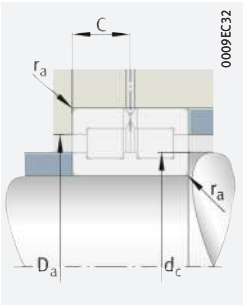
medias ➤ *https://www.schaeffler.de/std/1E45*



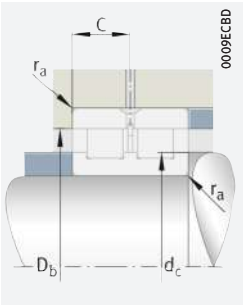
SL0248, SL0249
Non-locating bearings



Mounting dimensions
for semi-locating bearings



Mounting dimensions
for locating bearings

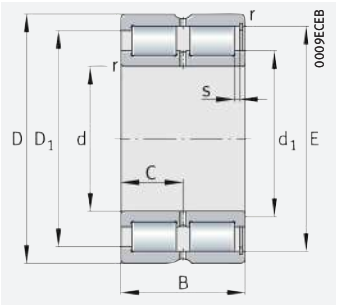


Mounting dimensions
for non-locating bearings

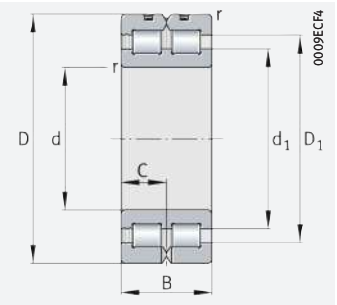
d	Designation to DIN 5412	Dimensions						Mounting dimensions			
		r min.	s	C	d_1 ≈	D_1 ≈	E	d_c	D_a	D_b	r_a max.
200	NNC4840V	1,5	–	25	218,1	231,2	–	218	231,5	–	1,5
	NNCL4840V	1,5	4	25	218,1	–	235,5	218,5	–	235,5	1,5
	NNC4940V	2,1	–	40	230,5	252,3	–	230,5	252,5	–	2,1
	NNCL4940V	2,1	5	40	230,5	–	259,34	230,5	–	259	2,1
	–	2,1	8,9	75	236,6	276,2	287,8	236,5	276,5	287,5	2,1
220	NNC4844V	1,5	–	25	239,1	252,3	–	239	252,5	–	1,5
	NNCL4844V	1,5	4	25	239,1	–	256,5	239,5	–	256,5	1,5
	NNC4944V	2,1	–	40	248	268,5	–	248	268,5	–	2,1
	NNCL4944V	2,1	5	40	248	–	276,52	248	–	276,5	2,1
	–	3	9	80	254,6	297,8	312,2	254,5	298	312	3
240	NNC4848V	2	–	30	259,5	276,7	–	259,5	277	–	2
	NNCL4848V	2	4	30	259,5	–	281,9	259,5	–	281,5	2
	NNC4948V	2,1	–	40	270,6	292,3	–	270,5	292,5	–	2,1
	NNCL4948V	2,1	5	40	270,6	–	299,46	271	–	299	2,1
	–	3	9	80	277,5	322,1	335,1	277,5	322,5	335	3
260	NNC4852V	2	–	30	281,8	298,8	–	281,5	299	–	2
	NNCL4852V	2	4	30	281,8	–	304,2	282	–	304	2
	NNC4952V	2,1	–	50	294,5	322,1	–	294,5	322,5	–	2,1
	NNCL4952V	2,1	6	50	294,5	–	331,33	294,5	–	331	2,1
	–	4	11,3	95	304	359,7	376	304	360	375,5	4
280	NNC4856V	2	–	34,5	306,8	326,4	–	306,5	326,5	–	2
	NNCL4856V	2	4	34,5	306,8	–	332,4	307	–	332	2
	NNC4956V	2,1	–	50	316,5	344,6	–	316,5	345	–	2,1
	NNCL4956V	2,1	6	50	316,5	–	353,34	316,5	–	353	2,1
	–	4	11,3	95	318,3	374,1	390,3	318	374,5	390	4
300	NNC4860V	2,1	–	40	327,9	349,9	–	327,5	350	–	2,1
	NNCL4860V	2,1	6	40	327,9	–	356,7	328	–	356,5	2,1
	NNC4960V	3	–	59	340,7	374,3	–	340,5	374,5	–	3
	NNCL4960V	3	6	59	340,7	–	385,51	341	–	385,5	3
	–	4	12,5	109	353,6	413,6	433,6	353,5	414	433,5	4

Double row full complement cylindrical roller bearings

Semi-locating, locating and non-locating bearings



SL1850
Semi-locating bearing

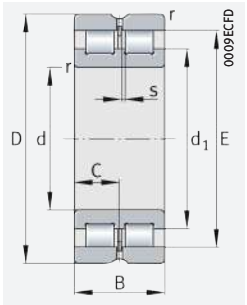


SL0148, SL0149
Locating bearings

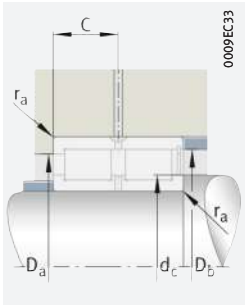
d = 320 – 400 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Speed rating	Mass	Designation ➤534|4.12 ➤535|4.13		
d	D	B	dyn. C_r	stat. C_{0r}	C_{ur}	n_G	$n_{\vartheta r}$	m	Semi-locating bearing	Locating bearing	Non-locating bearing
			N	N	N	min^{-1}	min^{-1}	≈ kg			
320	400	80	850 000	2 220 000	236 000	860	495	24	–	**SL014864**	–
	400	80	850 000	2 220 000	236 000	860	495	23,5	–	–	**SL024864**
	440	118	1 700 000	4 050 000	430 000	800	395	56	–	**SL014964**	–
	440	118	1 700 000	4 050 000	430 000	800	395	54,9	–	–	**SL024964**
	480	218	3 550 000	6 900 000	690 000	770	375	128,4	**SL185064-TB**	–	–
340	420	80	870 000	2 330 000	244 000	810	465	25,5	–	**SL014868**	–
	420	80	870 000	2 330 000	244 000	810	465	25	–	–	**SL024868**
	460	118	1 750 000	4 250 000	445 000	770	375	59	–	**SL014968**	–
	460	118	1 750 000	4 250 000	445 000	770	375	57,8	–	–	**SL024968**
	520	243	4 250 000	8 300 000	790 000	710	335	178	**SL185068-TB**	–	–
360	440	80	900 000	2 480 000	255 000	770	430	27	–	**SL014872**	–
	440	80	900 000	2 480 000	255 000	770	430	26	–	–	**SL024872**
	480	118	1 790 000	4 450 000	460 000	730	350	62,1	–	**SL014972**	–
	480	118	2 020 000	4 450 000	560 000	730	350	60,8	–	–	**SL024972**
	540	243	4 400 000	8 700 000	820 000	680	320	178	**SL185072-TB**	–	–
380	480	100	1 320 000	3 500 000	360 000	710	375	45,5	–	**SL014876**	–
	480	100	1 320 000	3 500 000	360 000	710	375	44	–	–	**SL024876**
	520	140	2 250 000	5 500 000	580 000	680	325	92,4	–	**SL014976**	–
	520	140	2 250 000	5 500 000	580 000	680	325	90,5	–	–	**SL024976**
	560	243	4 450 000	8 900 000	850 000	660	305	196,5	**SL185076-TB**	–	–
400	500	100	1 350 000	3 650 000	370 000	680	360	46,5	–	**SL014880**	–
	500	100	1 350 000	3 650 000	370 000	680	360	45,8	–	–	**SL024880**
	540	140	2 310 000	5 800 000	600 000	650	300	96,5	–	**SL014980**	–
	540	140	2 310 000	5 800 000	600 000	650	300	94,6	–	–	**SL024980**

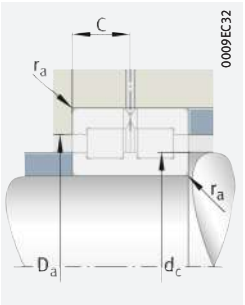
medias ➤ *https://www.schaeffler.de/std/1E46*



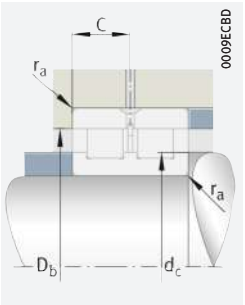
SL0248, SL0249
Non-locating bearings



Mounting dimensions
for semi-locating bearings



Mounting dimensions
for locating bearings

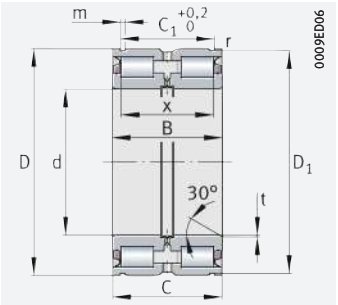


Mounting dimensions
for non-locating bearings

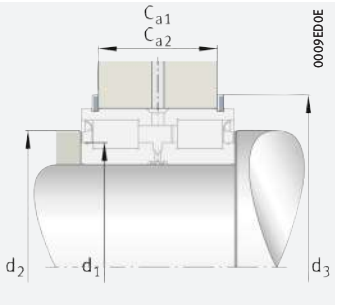
d	Designation to DIN 5412	Dimensions						Mounting dimensions			
		r min.	s	C	d_1 ≈	D_1 ≈	E	d_c	D_a	D_b	r_a max.
320	NNC4864V	2,1	–	40	350,9	372,9	–	350,5	373	–	2,1
	NNCL4864V	2,1	6	40	350,9	–	379,7	351	–	379,5	2,1
	NNC4964V	3	–	59	367,5	401,1	–	367,5	401,5	–	3
	NNCL4964V	3	6	59	367,5	–	412,27	367,5	–	412	3
	–	4	12,5	109	369,5	431,5	449,5	369,5	431,5	449,5	4
340	NNC4868V	2,1	–	40	368,1	390,1	–	368	390,5	–	2,1
	NNCL4868V	2,1	6	40	368,1	–	396,9	368,5	–	396,5	2,1
	NNC4968V	3	–	59	385,3	418,9	–	385	419	–	3
	NNCL4968V	3	6	59	385,3	–	430,11	385,5	–	430	3
	–	5	14,3	121,5	396	465,5	485,7	396	465,5	485,5	5
360	NNC4872V	2,1	–	40	391	413,2	–	391	413,5	–	2,1
	NNCL4872V	2,1	6	40	391	–	419,8	391	–	419,5	2,1
	NNC4972V	3	–	59	404	436,8	–	404	437	–	3
	NNCL4972V	3	6	59	404	–	447,95	404	–	447,5	3
	–	5	14	121,5	413,8	481	503,5	413,5	481	503	5
380	NNC4876V	2,1	–	50	419	447,2	–	419	447,5	–	2,1
	NNCL4876V	2,1	6	50	419	–	455,8	419	–	455,5	2,1
	NNC4976V	4	–	70	430,2	468,7	–	430	469	–	4
	NNCL4976V	4	7	70	430,2	–	481,35	430,5	–	481	4
	–	5	14,1	121,5	432	499	521,3	432	499	521	5
400	NNC4880V	2,1	–	50	433,8	462	–	433,5	462	–	2,1
	NNCL4880V	2,1	6	50	433,8	–	470,59	434	–	470,5	2,1
	NNC4980V	4	–	70	450,5	489	–	450,5	489	–	4
	NNCL4980V	4	7	70	450,5	–	501,74	450,5	–	501,5	4

Double row full complement cylindrical roller bearings

With annular slots
Locating bearings



SL0450..-PP
SL04..-PP



Mounting dimensions

d = 20 – 160 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Mass	Designation
d	D	B	dyn. C_r	stat. C_{0r}	C_{ur}	n_G grease	m	➤*534|4.12* ➤*535|4.13*
			N	N	N	min^{-1}	≈ kg	
20	42	30	41 500	51 000	6 900	5 500	0,2	**SL045004-D-PP**
25	47	30	46 000	60 000	8 100	4 700	0,24	**SL045005-D-PP**
30	55	34	50 000	67 000	9 500	4 100	0,37	**SL045006-D-PP**
35	62	36	63 000	88 000	12 400	3 550	0,48	**SL045007-D-PP**
40	68	38	80 000	111 000	16 000	3 150	0,56	**SL045008-D-PP**
45	75	40	97 000	139 000	19 900	2 800	0,7	**SL045009-D-PP**
50	80	40	102 000	151 000	21 700	2 600	0,76	**SL045010-D-PP**
55	90	46	120 000	186 000	25 500	2 340	1,18	**SL045011-D-PP**
60	95	46	125 000	201 000	27 500	2 180	1,26	**SL045012-D-PP**
65	100	46	130 000	215 000	29 500	2 040	1,33	**SL045013-D-PP**
70	110	54	175 000	275 000	36 000	1 850	1,87	**SL045014-D-PP**
75	115	54	201 000	315 000	42 000	1 740	1,96	**SL045015-D-PP**
80	125	60	210 000	340 000	45 000	1 620	2,71	**SL045016-D-PP**
85	130	60	219 000	365 000	47 500	1 510	2,83	**SL045017-D-PP**
90	140	67	305 000	510 000	69 000	1 410	3,71	**SL045018-D-PP**
95	145	67	315 000	530 000	71 000	1 360	3,88	**SL045019-D-PP**
100	150	67	330 000	550 000	78 000	1 300	3,95	**SL045020-D-PP**
110	170	80	395 000	680 000	94 000	1 170	6,57	**SL045022-D-PP**
120	180	80	410 000	740 000	99 000	1 090	7,04	**SL045024-D-PP**
130	200	95	540 000	960 000	128 000	960	10,5	**SL045026-D-PP**
	190	80	430 000	790 000	105 000	1 020	7,5	**SL04130-D-PP**
140	210	95	610 000	1 100 000	146 000	910	11,1	**SL045028-D-PP**
	200	80	445 000	840 000	110 000	960	8	**SL04140-D-PP**
150	225	100	710 000	1 260 000	163 000	850	13,3	**SL045030-D-PP**
	210	80	465 000	920 000	117 000	880	8,4	**SL04150-D-PP**
160	240	109	740 000	1 360 000	173 000	790	16,6	**SL045032-D-PP**
	220	80	480 000	970 000	122 000	830	8,8	**SL04160-D-PP**

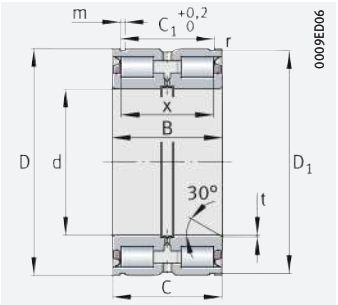
medias ➤ *https://www.schaeffler.de/std/1E47*

1) For snap rings WRE.
2) For retaining ring to DIN 471.

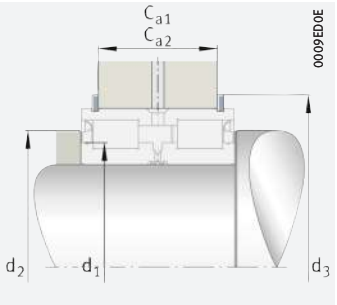
Dimensions								Mounting dimensions					Snap ring WRE	Retaining ring to DIN 471
d	C	C_1 +0,2	D_1	m	r min.	t	x	C_{a1} [1] −0,2	C_{a2} [2] −0,2	d_1	d_2	d_3 [1]		
20	29	24,7	40,2	1,8	0,3	0,5	22,5	21,5	21	31	34	47	WRE42	42×1,75
25	29	24,7	45,2	1,8	0,3	0,5	22,5	21,5	21	35,5	39	52	WRE47	47×1,75
30	33	28,2	53	2,1	0,3	0,5	25,5	25	24	41	44	60	WRE55	55×2
35	35	30,2	60	2,1	0,3	0,5	27,5	27	26	46,5	50	67	WRE62	62×2
40	37	32,2	65,8	2,7	0,6	0,8	28,5	28	27	51,5	55	75	WRE68	68×2,5
45	39	34,2	72,8	2,7	0,6	0,8	30,5	30	29	57	61	82	WRE75	75×2,5
50	39	34,2	77,8	2,7	0,6	0,8	30,5	30	29	62	66	87	WRE80	80×2,5
55	45	40,2	87,4	3,2	0,6	1	36	35	34	69	73	99	WRE90	90×3
60	45	40,2	92,4	3,2	0,6	1	36	35	34	74	79	104	WRE95	95×3
65	45	40,2	97,4	3,2	0,6	1	36	35	34	79	84	109	WRE100	100×3
70	53	48,2	107,1	4,2	0,6	1	42	43	40	84,5	91	119	WRE110	110×4
75	53	48,2	112,1	4,2	0,6	1	42	43	40	90	97	124	WRE115	115×4
80	59	54,2	122,1	4,2	0,6	1,5	48	49	46	97,5	105	137	WRE125	125×4
85	59	54,2	127,1	4,2	0,6	1,5	48	49	46	104	112	142	WRE130	130×4
90	66	59,2	137	4,2	0,6	1,5	54	54	51	109,5	118	152	WRE140	140×4
95	66	59,2	142	4,2	0,6	1,5	54	54	51	113,5	122	157	WRE145	145×4
100	66	59,2	147	4,2	0,6	1,5	54	54	51	117,5	128	162	WRE150	150×4
110	79	70,2	167	4,2	0,6	1,8	64	65	62	132	143	182	WRE170	170×4
120	79	71,2	176	4,2	0,6	1,8	64	65	63	141	153	196	WRE180	180×4
130	94	83,2	196	4,2	0,6	1,8	77	77	75	157	170	216	WRE200	200×4
	79	71,2	186	4,2	0,6	1,8	64	65	63	151	160	206	WRE190	190×4
140	94	83,2	206	5,2	0,6	1,8	77	77	73	165,5	181	226	WRE210	210×5
	79	71,2	196	4,2	0,6	1,8	64	65	63	160	170	216	WRE200	200×4
150	99	87,2	221	5,2	0,6	2	80	81	77	176	192	245	WRE225	225×5
	79	71,2	206	5,2	0,6	1,8	64	65	61	174,5	185	226	WRE210	210×5
160	108	95,2	236	5,2	0,6	2	89	89	85	189	207	260	WRE240	240×5
	79	71,2	216	5,2	0,6	1,8	64	65	61	184,5	196	236	WRE220	220×5

Double row full complement cylindrical roller bearings

With annular slots
Locating bearings



SL0450..-PP
SL04..-PP



Mounting dimensions

d = 170 – 300 mm

Main dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Mass	Designation
d	D	B	dyn. C_r	stat. C_{0r}	C_{ur}	n_G grease	m	➤*534|4.12* ➤*535|4.13*
			N	N	N	min^{-1}	≈ kg	
170	260	122	960 000	1 750 000	220 000	740	22,6	**SL045034-D-PP**
	230	80	490 000	1 030 000	127 000	790	9,3	**SL04170-D-PP**
180	280	136	1 140 000	2 130 000	265 000	680	30,1	**SL045036-D-PP**
	240	80	500 000	1 080 000	132 000	750	9,8	**SL04180-D-PP**
190	290	136	1 160 000	2 210 000	270 000	660	31,5	**SL045038-D-PP**
	260	80	520 000	1 160 000	139 000	700	12,7	**SL04190-D-PP**
200	310	150	1 350 000	2 600 000	310 000	610	40,8	**SL045040-D-PP**
	270	80	540 000	1 210 000	143 000	670	13,2	**SL04200-D-PP**
220	340	160	1 570 000	3 050 000	365 000	560	52,5	**SL045044-D-PP**
	300	95	700 000	1 550 000	182 000	610	19,5	**SL04220-D-PP**
240	360	160	1 630 000	3 300 000	385 000	530	56	**SL045048-D-PP**
	320	95	740 000	1 700 000	195 000	560	21	**SL04240-D-PP**
260	400	190	2 380 000	4 700 000	530 000	475	84,5	**SL045052-D-PP**
	340	95	840 000	1 990 000	225 000	520	22,5	**SL04260-D-PP**
280	420	190	2 600 000	5 200 000	580 000	450	90	**SL045056-D-PP**
	360	95	870 000	2 120 000	235 000	485	24	**SL04280-D-PP**
300	460	218	3 000 000	5 800 000	640 000	415	126	**SL045060-D-PP**
	380	95	900 000	2 250 000	245 000	455	25,5	**SL04300-D-PP**

medias ➤*https://www.schaeffler.de/std/1E48*

[1] For snap rings WRE.

[2] For retaining ring to DIN 471.

Dimensions								Mounting dimensions					Snap ring WRE	Retaining ring to DIN 471
d	C	C_1 +0,2	D_1	m	r min.	t	x	C_{a1} [1] −0,2	C_{a2} [2] −0,2	d_1	d_2	d_3 [1]		
170	121	107,2	254	5,2	0,6	2	100	99	97	201	220	282	WRE260	260×5
	79	71,2	226	5,2	0,6	1,8	64	65	61	194	206	250	WRE230	230×5
180	135	118,2	274	5,2	0,6	2	112	110	108	218	239	302	WRE280	280×5
	79	71,2	236	5,2	0,6	1,8	64	65	61	203,5	216	260	WRE240	240×5
190	135	118,2	284	5,2	0,6	2	112	110	108	226	248	312	WRE290	290×5
	79	73,2	254	5,2	0,6	1,8	64	65	63	218	231	282	WRE260	260×5
200	149	128,2	304	6,3	0,6	2	126	120	116	243,5	267	336	WRE310	310×6
	79	73,2	264	5,2	0,6	1,8	64	65	63	227,5	241	292	WRE270	270×5
220	159	138,2	334	6,3	1	2	132	130	126	260	286	366	WRE340	340×6
	94	83,2	294	5,2	1	2	72	75	73	249	264	322	WRE300	300×5
240	159	138,2	354	6,3	1	2	132	130	126	279,5	305	386	WRE360	360×6
	94	83,2	314	6,3	1	2	72	75	71	272	287	346	WRE320	320×6
260	189	162,2	394	6,3	1,1	3	150	154	150	305	336	426	WRE400	400×6
	94	83,2	334	6,3	1	3	75	75	71	293	310	366	WRE340	340×6
280	189	163,2	413	7,3	1,1	3	150	154	149	321	354	453	WRE420	420×7
	94	83,2	354	6,3	1	3	75	75	71	310,5	386	327	WRE360	360×6
300	216	185,2	453	7,3	1,1	3	170	176	171	347	375	493	WRE460	460×7
	94	83,2	374	6,3	1	3	75	75	71	328	346	406	WRE380	380×6