

Self-Aligning Cylindrical Roller Bearings: The Ideal Non-Locating Bearing Concept

For dryer rolls, M.G. cylinders and guide rolls
in paper machinery

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Self-aligning cylindrical roller bearings

Extreme operating conditions · Ideal non-locating bearing concept

The extreme operating conditions in the dry section require rolling bearings with special characteristics

The rolling bearings in the dry section of a paper machinery, especially the bearings on the dryer roll, are subjected to extreme operating conditions. As the dryer rolls are heated by steam, the rolling bearings are subjected to high thermal stress. Appropriate heat treatment and dimensional stabilisation of rolling bearings, as well as good lubrication, are essential preconditions for trouble-free operation.

The ideal non-locating bearing concept

- for dryer rolls
- and also in conversion of bearing arrangements

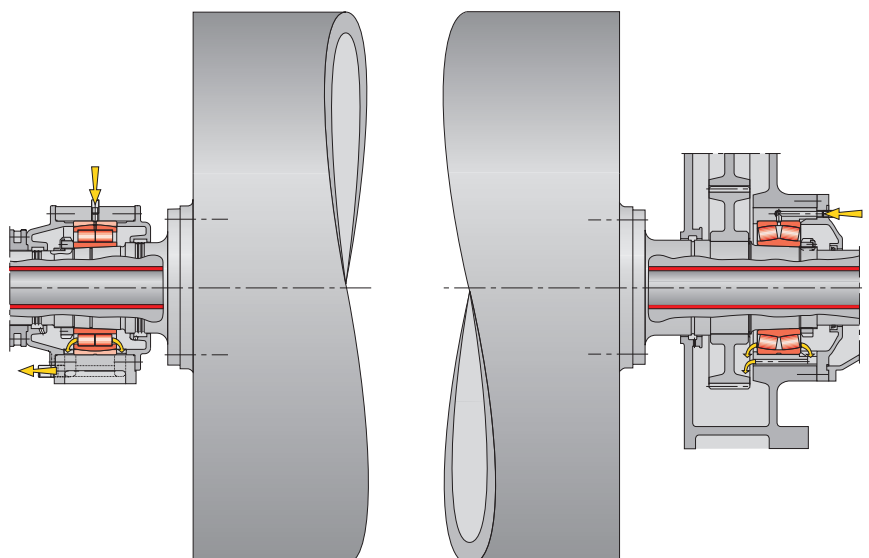
Due to the heating of the dryer rolls and, as a result, their sometimes considerable elongation by several millimetres (1 – 1,5 mm per metre of bearing distance), a design with a non-locating bearing on the operator end (guide end) of the paper machine is particularly important. In addition, misalignments must be compensated. For many years, self-aligning cylindrical roller bearings in plummer block housings have proved ideal as non-locating bearings (Figure 1). They offer significant advantages in comparison with the normal non-locating bearing arrangements with spherical roller bearings, mounted either with a displacement facility in the housing or in an axially movable rocker block housing, or with bearings of other types:

- Even large changes in the axial length of the dryer roll are compensated without constraint in the bearing between the inner raceway and the rolling elements. There is no need for a rocker block housing.
- There is a self-alignment facility due to the spherical outer ring and the plain bearing pivot ring.
- Optimum lubrication due to direct oil feed into the bearing interior and drainage on both sides of the bearing.
- Favourable vibration behaviour of the bearing arrangement system with cylindrical roller bearings and screw mounted housing.
- Other bearing types of dimension series 30, 22 and 31 can be

replaced by self-aligning cylindrical roller bearings without major modifications to the housing.

- Dimensionally stabilised up to +200 °C.
- Support of radial loads from all directions.
- Symmetrical loading of the rows of rollers even under large axial displacements.
- The plummer block housing screw mounted to the machine frame can support additional tilting moments, for example from the cable sheave and/or the steam joint.
- The rigid screw mounting securely protects the housing against lifting off when it is installed in earthquake-prone areas.

1: Bearing arrangement of a dryer roll with self-aligning cylindrical roller bearing at the operator end and a spherical roller bearing at the drive end



Self-aligning cylindrical roller bearings

Conventional non-locating bearing concepts · Locating bearing side · Bearing monitoring

Conventional non-locating bearing concepts

- Up to a working width of approx. 5 m, a spherical roller bearing is normally used which can undergo axial displacement in the housing in response to elongation of the dryer roll.
- In paper machinery with a working width of more than 5 m, a so-called rocker block housing is often used. In this type of bearing arrangement, the spherical roller bearing is fitted as a locating bearing in the plummer block housing, which can be axially displaced without constraints on three rocker blocks in response to elongation of the dryer roll.

Rolling bearings on the drive side (locating bearing side)

On the drive side, the dryer roll is supported and guided by spherical roller bearings. In older, smaller paper machinery, bearings of series 230 in designs -E1A-K-M-C4 (-W209B) and -K-MB-C4 (-W209B) are used, while bearings of series 231 are used in newer, larger machinery.

Bearing monitoring

Vibration monitoring of the bearings in the dry section is now common practice. In self-aligning cylindrical roller bearings, the vibration sensors must be mounted radially on the housing and close to the load zone. Since the cylindrical roller bearings cannot transmit axial forces, the axial vibration signals are less pronounced.

2: Comparison of non-locating bearing concepts for dryer rolls

Bearing arrangement system	Constraint-free axial displacement	Self-aligning facility	Lubrication feed / drainage	Vibration damping	Support of radial forces ($\pm 360^\circ$)	Load carrying capacity as function of tilt α	Support of tilting moments	Proven in practice over several years	Suitable for working width > 5 m	Without influence on steam joint design	Basic load rating	Mounting work	Rolling bearing price	System price (housing + bearing)
Plummer block / spherical roller bearing 	--	++	++	++	++	++	++	++	--	-	+	++	++	++
Rocker block housing 	++	++	++	--	--	++	--	++	++	+	--	++	-	-
Plummer block / self-aligning cylindrical roller bearing 	++	++	++	++	++	++	++	++	-	-	++	--	+	+

Self-aligning cylindrical roller bearings

Bearing design

Bearing design

The cylindrical roller bearing NU has two rows of rollers and ribs on the outer ring, Figure 3. The spherical outer ring is located in a plain bearing pivot ring and can compensate misalignments of the bearing seats. The self-alignment motion does therefore not occur in the rolling contact area. The ribless inner ring allows constraint-free axial displacement in the bearing. Even if the inner ring undergoes significant axial displacement, both rows of rollers remain subjected to equally high loads due to the symmetrical transmission of radial load. The load carrying capacity of the cylindrical roller bearing is maintained to its full extent in any position.

The external dimensions of the complete cylindrical roller bearing with the pivot ring conform to the main dimensions, e.g. of dimension series 30, 31 and 32 (dimension plan DIN 616). These bearings are mounted in paper machinery plummer block housings and act as non-locating bearings at the operator end of the dryer roll.

The bearings for guide rolls that are in principle of the same design have the main dimensions of dimension series 22, 32 and 23 and are mounted in housings for guide rolls.

Self-aligning cylindrical roller bearings have a bore with a 1:12 taper for mounting directly on the tapered journal.

Due to the higher operating temperatures and the resulting significant temperature differences between the inner and outer ring, we produce the bearings for dryer rolls and M.G. cylinders to the increased radial internal clearance

C5, which corresponds approximately to the C4 radial internal clearance of spherical roller bearings after fitting. In contrast, the bearings for guide rolls have the increased radial internal clearance C3.



3: Self-aligning cylindrical roller bearings are ideal non-locating bearings for dryer rolls, M.G. cylinders and guide rolls. Lubrication grooves and lubrication holes in the outer ring and plain bearing pivot ring allow lubricant feed directly to the rolling contacts.

Self-aligning cylindrical roller bearings

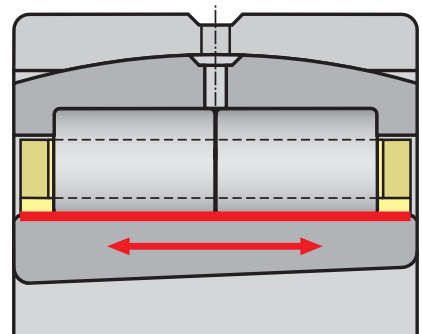
Constraint-free compensation of changes in axial length
Compensation of angular misalignments · Interchangeability with standard bearings

Constraint-free compensation of changes in axial length

The elongation of the heated dryer roll is made possible without constraint in the cylindrical roller bearing between the raceway of the lubricated inner ring and the rolling elements. This already applies when starting up in the heating phase, even at a bearing distance of 10,5 m and a roll temperature of +180 °C (approx. 15 mm axial displacement).

The cylindrical running surfaces ensure equally good kinematic conditions (identical internal clearance and low-friction rolling) in all axial displacement positions of the inner ring.

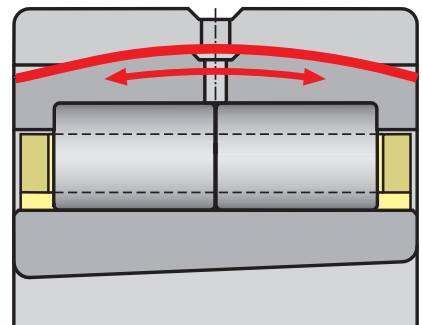
Under steam feed or condensate removal at the operator end, it must be ensured that the sealing system can be axially displaced within the steam joint, but only if the steam joint is fixed to the housing.



Compensation of angular misalignments

Any misalignments that may occur in mounting, for example as a result of an uneven machine frame or changes in the machine frame inclination during operation, can be compensated by the plain bearing pivot ring without deleterious effects on the rating life. This occurs without constraints, even up to tilt angles of 2°.

The pivot ring is phosphated and the spherical (concave) sliding surface has a molybdenum sulphide coating. The alignment movement in operation is additionally supported by the steady feed of lubricant.



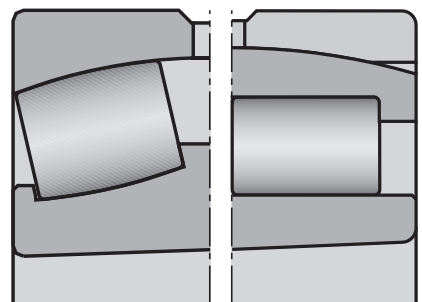
Interchangeable with standard bearings

All standard bearings of dimension series 30, 31, 22, 32 and 23 can be replaced by self-aligning cylindrical roller bearings without major modification work to the housings. It may be necessary to move the lubricant feed to the centre of the housing upper section.

We recommend this non-locating bearing concept where machinery is being modernised, speeds are being increased and for new designs.

The rolling bearing rings are heat treated as standard by an isothermal process (bainitic hardening) and are dimensionally stable up to operating temperatures of +200 °C. This leads to compressive stresses in the surface region. This is beneficial for bearings in the dry section which, due to the unfavourable lubrication conditions, run far into the mixed friction range.

For dryer rolls and M.G. cylinders with steam heating, we recommend case hardened inner rings, which are indicated by the suffix W209B.



Self-aligning cylindrical roller bearings

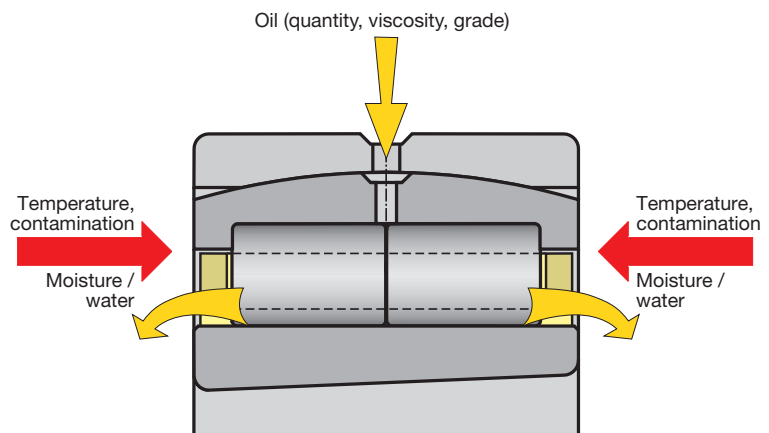
Optimum lubrication · Low operating temperature · Non-locating bearing design for reduced vibration

Optimum lubrication

The plain bearing pivot ring, like the bearing outer ring, has a lubrication groove and lubrication holes for optimum supply of lubricant direct to the bearing interior – straight to the rolling contacts. Since the oil feed is located at the centre of the bearing, oil can be drained from both sides. The risk of oil banking up and of leakage is significantly reduced.

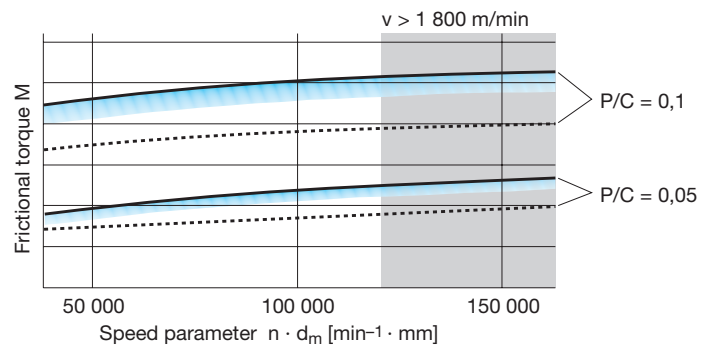
When a single row cylindrical roller bearing of type N or NU is being replaced by a self-aligning cylindrical roller bearing, the lubricant feed must be moved to the centre of the housing upper section.

Due to the high heating temperatures, the bearings must be connected to a central recirculating oil lubrication system and a high quality mineral or synthetic oil to ISO VG 220 or 320 (for M.G. cylinders in some cases also ISO VG 460) must be used.



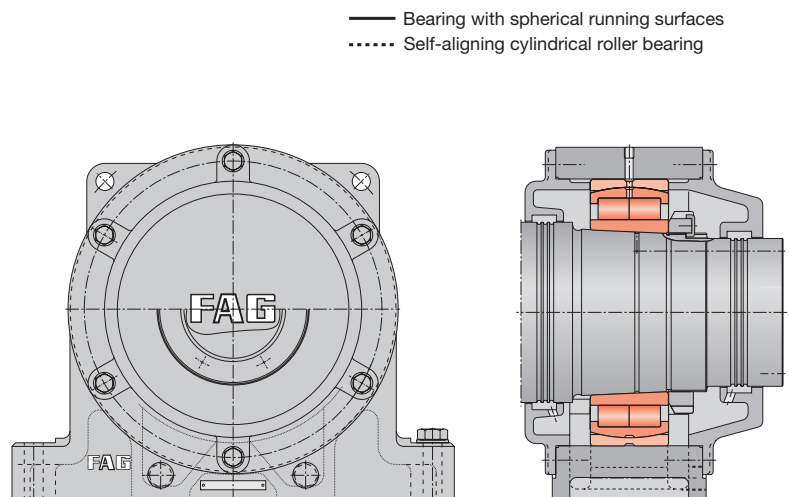
Low operating temperature

Under the same operating conditions, the operating temperature of self-aligning cylindrical roller bearings is lower due to their significantly lower frictional torque than that of bearings with spherical running surfaces.



Non-locating bearing design for reduced vibration

Self-aligning cylindrical roller bearings, when combined with a plummer block housing that is rigidly screw mounted to the machine frame, have favourable vibration behaviour and thus provide the conditions for higher speeds, especially for planned speed increases through modernisation and conversion.



Self-aligning cylindrical roller bearings

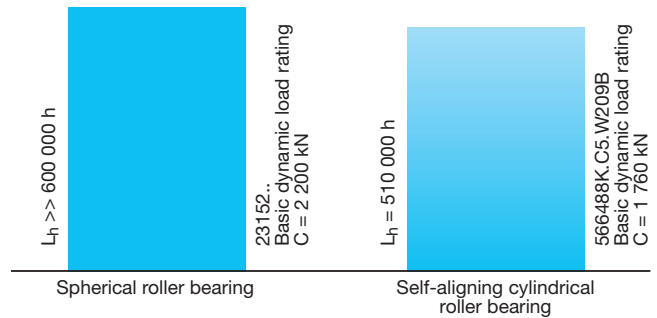
Satisfactory basic load ratings · Easy assembly · Conversion from rocker block housings

Satisfactory basic load ratings

The basic load ratings of the bearings is, due to their design, slightly lower than that of spherical roller bearings of the same size.

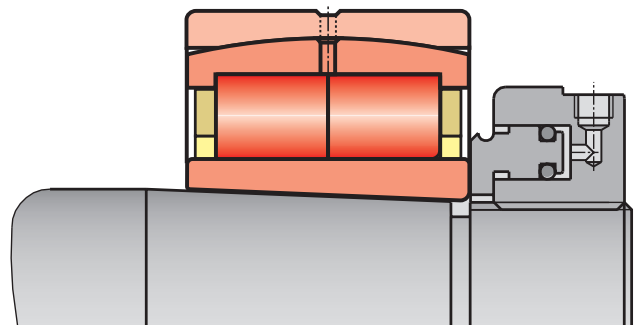
Bearings for dryer rolls and M.G. cylinders are designed, however, with very high rating life reserves. As a result, conversion from spherical roller bearings to self-aligning cylindrical roller bearings of the same size is possible without difficulty.

In contrast to rocker block housings, self-aligning cylindrical roller bearings in conjunction with screw mounted plummer block housings can be subjected to radial load in any angular position.



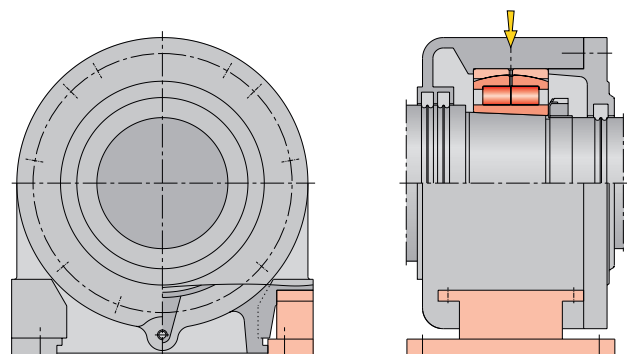
Easy assembly

Mounting and dismounting are as simple as with spherical roller bearings. In most cases, only a hydraulic nut is required with, in some cases (d > 200 mm), the normal hydraulic method. If mounting is carried out below room temperature, no axial offset must be taken into consideration between the bearing centre and the housing centre. The fitting manual can be found on page 9. The use of the displacement gauge HYDNUT.GAUGE-DISPLACE in conjunction with the FAG software MOUNTING MANAGER is possible and recommended.



Conversion from rocker block housings

Rocker block housings can be converted easily to screw mounted plummer block housings and savings can be achieved as a result. There is no need to change the oil inlet and oil outlet. No new housings are therefore required. The rocker block supports and rocker blocks are replaced by individually matched adapters.



Self-aligning cylindrical roller bearings

Bearing designs · Delivery · Reference list

Bearing designs

The self-aligning cylindrical roller bearings for dryer rolls listed in the bearing tables have a tapered bore and the increased radial internal clearance C5. For self-aligning cylindrical roller bearings with inner rings made from case hardened steel, the suffix W209B must be stated. A comparison is given of the relevant interchangeable bearing sizes from dimension series 30, 31 and 22 and the self-aligning bearings.

The self-aligning cylindrical roller bearings for guide rolls also have a tapered bore. But in this case they have the increased internal clearance C3. The comparable sizes from dimension series 22, 32 and 23 are listed for these bearings.

Delivery

Self-aligning cylindrical roller bearings for dryer rolls and M.G. cylinders and plummer block housings are available by agreement.

Bearings for guide rolls and the associated housings are also available by agreement. In the dimension tables (page 10 to 15), the preferred available designs are highlighted.

Special designs with extended inner rings are also available for special requirements in relation to increased displacement distances.

Reference list

The overview on page 16 shows a selection of previously supplied self-aligning cylindrical roller bearings that have been in successful operation worldwide in dryer rolls, M.G. cylinders and guide rolls for more than 20 years.

Self-aligning cylindrical roller bearings

Fitting manual · Mounting Manager

Fitting manual for self-aligning cylindrical roller bearings with tapered bore for dryer rolls and M.G. cylinders

After dimensional inspection of the bearing seats and adjacent parts, cleaning of the bearing seats and the oil inlet and outlet holes, the self-aligning cylindrical roller bearings are mounted in the same way as spherical roller bearings or cylindrical roller bearings with a tapered bore.

An overview of FAG equipment and services for mounting and maintenance of bearings is given in publication WL 80 250/3 EA.



Mounting procedure:

- Remove bearing from packaging and wipe the tapered bore to remove the anti-corrosion oil.
 - Measure the internal clearance using a feeler gauge and document the value.
 - Mount or position the parts that must be located behind the bearing.
 - Position the bearing outer ring in the housing and on the tapered journal.
 - Place the bearing inner ring on the taper and drive it up until both tapered surfaces have positive contact.
 - Place the hydraulic nut in its starting position on the thread.
 - Drive up the bearing
- Either: Calculate the starting pressure and drive-up distance using Mounting Manager and use the gauge.
- Or: Measure the radial internal clearance during drive-up. Drive up the bearing until the internal clearance is reduced as required.

- When the calculated drive-up distance is achieved, release the oil pressure and wait 1 to 2 minutes before removing the hydraulic nut.
- Check the reduction in radial internal clearance using a feeler gauge and document this check.
- Screw on and secure the shaft nut.
- Mount the housing cover and seal, observing the tightening torques.
- Connect the oil inlet and oil outlet to the housing.
- If necessary, position and fix the roll end sealing or labyrinth rings at the correct distance.

Mounting Manager

Mounting can be simplified by using the new Mounting Manager program and the displacement gauge.

The program calculates the starting pressure and drive-up distance. The inner ring is slid onto the seat and the hydraulic nut screwed in place. The calculated starting pressure is applied and the device is then set to 0. From this position, the ring is then driven up by the calculated distance.

In addition to data on the mounting process, the software also gives comprehensive information on the tools required.

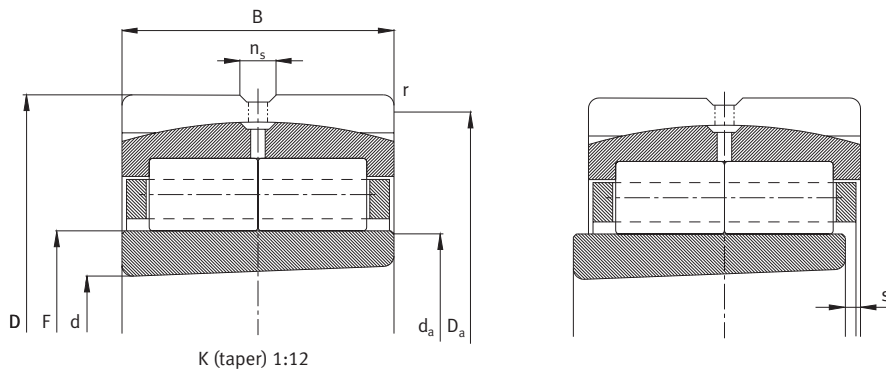


Self-aligning cylindrical roller bearings with tapered bore for dryer rolls and M.G. cylinders

Dimension series 30, 22

Dimension table · Dimensions in mm								
Designation	Mass	Dimensions						
Bearing	m ≈kg	d	D	B	r min	n _s	F	s ¹⁾
Z-565664.ZL-K-W209B-C5	10,2	160	240	60	2,1	12,2	179	6
Z-565530.ZL-K-W209B-C5	13,3	170	260	67	2,1	12,2	190	6
Z-565665.ZL-K-W209B-C5	17,6	180	280	74	2,1	15	202	6,5
Z-565666.ZL-K-W209B-C5	18,7	190	290	75	2,1	15	213	7
Z-565667.ZL-K-W209B-C5	24,1	200	310	82	2,1	15	225	7,5
Z-565531.ZL-K-W209B-C5	32	220	340	90	3	15	246	7,5
Z-565668.ZL-K-W209B-C5	34,8	240	360	92	3	15	269	8
Z-565499.ZL-K-W209B-C5	49,7	260	400	104	4	17,7	292	10
Z-565669.ZL-K-W209B-C5	59	280	420	106	4	17,7	313	11
Z-565670.ZL-K-W209B-C5	74	300	460	118	4	17,7	330	9,5
Z-565671.ZL-K-W209B-C5	82	320	480	121	4	17,7	357	11
Z-565672.ZL-K-W209B-C5	109	340	520	133	5	23,5	381	14
Z-565673.ZL-K-W209B-C5	114	360	540	134	5	23,5	403	10,5
Z-565674.ZL-K-W209B-C5	121	380	560	135	5	23,5	419	10
Z-565675.ZL-K-W209B-C5	155	400	600	148	5	23,5	449	11,5
Z-565676.ZL-K-W209B-C5	165	420	620	150	5	23,5	469	12
Z-565677.ZL-K-W209B-C5	187	440	650	157	6	23,5	488	15,5
Z-565678.ZL-K-W209B-C5	214	460	680	163	6	23,5	514	13,5
Z-565679.ZL-K-W209B-C5	216	480	700	165	6	23,5	532	13,5
Z-565680.ZL-K-W209B-C5	235	500	720	167	6	23,5	553	14,5
Z-565681.ZL-K-W209B-C5	320	530	780	185	6	23,5	592	14,5
Z-565682.ZL-K-W209B-C5	370	560	820	195	6	23,5	618	15,5
Z-572367.ZL-K-W209B-C5	423	600	870	200	6	23,5	665	16
Z-565684.ZL-K-W209B-C5	525	630	920	212	7,5	23,5	700	17
Z-565685.ZL-K-W209B-C5	624	670	980	230	7,5	23,5	738	21
Z-565686.ZL-K-W209B-C5	695	710	1 030	236	7,5	23,5	778	21
F-804415-K-C5.ZL-K-W209B-C5	30,5	170	310	86	4	17,7	198	9,5
Z-567601.ZL-K-W209B-C5	32,4	180	320	86	4	17,7	211	7,5
Z-566170.ZL-K-W209B-C5	39	190	340	92	4	17,7	223	8,5
Z-567498.ZL-K-W209B-C5	63,5	220	400	108	4	17,7	258	10,5

¹⁾ Maximum axial displacement from central position, taking no account of roller edge shortening or outside surface profiles.



Dimension table · Dimensions in mm

Designation	Interchangeable with	Basic load ratings		Fatigue limit load	Limiting speed	Mounting dimensions	
		dyn. C _r kN	stat. C _{0r} kN	C _{ur} kN	n _G min ⁻¹	d _a max	D _a max
Z-565664.ZL-K-W209B-C5	..3032K...	425	850	99	3 200	177,4	229,8
Z-565530.ZL-K-W209B-C5	..3034K...	540	1 050	122	3 000	188,3	249,8
Z-565665.ZL-K-W209B-C5	..3036K...	650	1 240	144	2 800	200,2	269,8
Z-565666.ZL-K-W209B-C5	..3038K...	660	1 330	152	2 600	211,1	279,8
Z-565667.ZL-K-W209B-C5	..3040K...	770	1 560	176	2 400	223	299,8
Z-565531.ZL-K-W209B-C5	..3044K...	930	1 930	215	2 200	243,8	327,6
Z-565668.ZL-K-W209B-C5	..3048K...	960	2 120	232	1 900	266,6	347,6
Z-565499.ZL-K-W209B-C5	..3052K...	1 210	2 550	275	1 800	289,4	385,4
Z-565669.ZL-K-W209B-C5	..3056K...	1 180	2 650	285	1 700	310,2	405,4
Z-565670.ZL-K-W209B-C5	..3060K...	1 590	3 450	365	1 600	327	445,4
Z-565671.ZL-K-W209B-C5	..3064K...	1 650	3 700	385	1 500	353,8	465,4
Z-565672.ZL-K-W209B-C5	..3068K...	1 960	4 200	425	1 500	377,6	502
Z-565673.ZL-K-W209B-C5	..3072K...	2 080	4 800	480	1 400	399,4	522
Z-565674.ZL-K-W209B-C5	..3076K...	2 090	5 100	510	1 300	415,2	542
Z-565675.ZL-K-W209B-C5	..3080K...	2 600	6 100	600	1 200	445	582
Z-565676.ZL-K-W209B-C5	..3084K...	2 650	6 600	640	1 200	464,8	602
Z-565677.ZL-K-W209B-C5	..3088K...	2 850	7 100	690	1 100	483,6	627
Z-565678.ZL-K-W209B-C5	..3092K...	2 950	7 500	720	1 000	509,4	657
Z-565679.ZL-K-W209B-C5	..3096K...	3 400	8 300	780	950	527,2	677
Z-565680.ZL-K-W209B-C5	..30/500K...	3 500	8 900	820	950	548	697
Z-565681.ZL-K-W209B-C5	..30/530K...	3 950	10 000	920	850	586,7	757
Z-565682.ZL-K-W209B-C5	..30/560K...	4 500	11 100	900	850	612,4	797
Z-572367.ZL-K-W209B-C5	..30/600K...	4 450	12 200	1 080	750	659	847
Z-565684.ZL-K-W209B-C5	..30/630K...	5 200	13 700	1 070	700	693,7	892
Z-565685.ZL-K-W209B-C5	..30/670K...	6 000	16 000	1 250	670	731,3	952
Z-565686.ZL-K-W209B-C5	..30/710K...	6 800	18 000	1 380	630	770,9	1 002
F-804415-K-C5.ZL-K-W209B-C5	..2234K...	880	1 380	160	2 800	196,3	293
Z-567601.ZL-K-W209B-C5	..2236K...	920	1 550	179	2 600	209,2	303
Z-566170.ZL-K-W209B-C5	..2238K...	1 030	1 760	201	2 400	221,1	323
Z-567498.ZL-K-W209B-C5	..2244K...	1 450	2 380	265	1 900	255,8	383

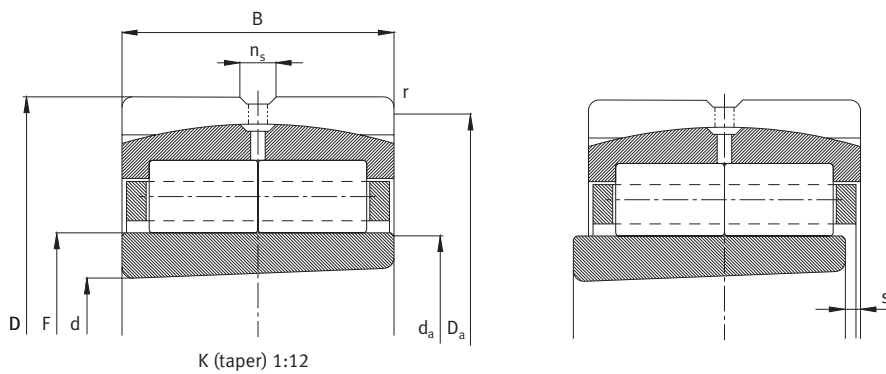
The designs highlighted in bold are available in preference.
Ordering example: FAG Z-565499.ZL-K-W209B-C5

Self-aligning cylindrical roller bearings with tapered bore for dryer rolls and M.G. cylinders

Dimension series 31

Dimension table · Dimensions in mm								
Designation	Mass	Dimensions						
Bearing	m ≈kg	d	D	B	r min	n _s	F	s ¹⁾
Z-567473.ZL-K-W209B-C5	22,5	170	280	88	2,1	15	193	8,5
Z-566486.ZL-K-W209B-C5	28,7	180	300	96	3	15	211	9,5
Z-580454.ZL-K-W209B-C5	38	190	320	104	3	15	215	10,5
Z-566487.ZL-K-W209B-C5	44,7	200	340	112	3	17,7	233	9,5
Z-565688.ZL-K-W209B-C5	55,5	220	370	120	4	17,7	256	8,5
Z-566484.ZL-K-W209B-C5	68	240	400	128	4	17,7	278	12
Z-566488.ZL-K-W209B-C5	93,6	260	440	144	4	17,7	301	16
Z-566489.ZL-K-W209B-C5	102	280	460	146	5	17,7	324	16
Z-566490.ZL-K-W209B-C5	133	300	500	160	5	17,7	348	17,5
Z-566491.ZL-K-W209B-C5	174	320	540	176	5	23,5	369	20,5
Z-566492.ZL-K-W209B-C5	221	340	580	190	5	23,5	390	17,5
F-800479.ZL-K-W209B-C5	238	360	600	192	5	23,5	425	19
F-800480.ZL-K-W209B-C5	241	380	620	194	5	23,5	440	20,5
Z-565874.ZL-K-W209B-C5	280	400	650	200	6	23,5	450	17,5
Z-572777.ZL-K-W209B-C5	368	420	700	224	6	23,5	475	19
F-800481.ZL-K-W209B-C5	378	440	720	226	6	23,5	492	25
F-800482.ZL-K-W209B-C5	472	460	760	240	7,5	23,5	528	22
F-800483.ZL-K-W209B-C5	507	480	790	248	7,5	23,5	544	27
F-800484.ZL-K-W209B-C5	560	500	830	264	7,5	23,5	568	28
Z-574099.ZL-K-W209B-C5	680	530	870	272	7,5	23,5	609	22
F-800485.ZL-K-W209B-C5	775	560	920	280	7,5	23,5	630	28
Z-573929.ZL-K-W209B-C5	950	600	980	300	7,5	23,5	678	26
F-800592.ZL-K-W209B-C5	1 090	630	1 030	315	7,5	23,5	716	33,5
F-800593.ZL-K-W209B-C5	1 300	670	1 090	336	7,5	23,5	755	34
F-800594.ZL-K-W209B-C5	1 450	710	1 150	345	9,5	23,5	795	38,5

¹⁾ Maximum axial displacement from central position, taking no account of roller edge shortening or outside surface profiles.



Dimension table · Dimensions in mm

Designation	Interchangeable with	Basic load ratings		Fatigue limit	Limiting speed	Mounting dimensions	
		dyn. C_r kN	stat. C_{0r} kN	load C_{ur} kN	n_G min^{-1}	d_a max	D_a max
Z-567473.ZL-K-W209B-C5	..3134K...	740	1 410	167	3 000	191,3	268
Z-566486.ZL-K-W209B-C5	..3136K...	830	1 680	196	2 600	209,2	286
Z-580454.ZL-K-W209B-C5	..3138K...	1 000	1 950	229	2 400	213,1	306
Z-566487.ZL-K-W209B-C5	..3140K...	1 160	2 270	260	2 200	231	326
Z-565688.ZL-K-W209B-C5	..3144K...	1 330	2 750	315	2 000	253,8	353
Z-566484.ZL-K-W209B-C5	..3148K...	1 500	3 050	335	1 800	275,6	383
Z-566488.ZL-K-W209B-C5	..3152K...	1 800	3 650	395	1 700	298,4	423
Z-566489.ZL-K-W209B-C5	..3156K...	1 840	4 000	430	1 600	321,2	440
Z-566490.ZL-K-W209B-C5	..3160K...	2 180	4 650	495	1 600	345	480
Z-566491.ZL-K-W209B-C5	..3164K...	2 650	5 500	560	1 500	365,8	520
Z-566492.ZL-K-W209B-C5	..3168K...	2 900	6 400	580	1 400	386,6	560
F-800479.ZL-K-W209B-C5	..3172K...	3 250	6 700	620	1 300	421,4	580
F-800480.ZL-K-W209B-C5	..3176K...	3 700	7 800	690	1 200	436,2	600
Z-565874.ZL-K-W209B-C5	..3180K...	3 650	8 200	810	1 100	446	624
Z-572777.ZL-K-W209B-C5	..3184K...	4 550	9 700	850	1 100	470,8	674
F-800481.ZL-K-W209B-C5	..3188K...	4 650	10 100	880	1 000	487,6	694
F-800482.ZL-K-W209B-C5	..3192K...	5 300	11 500	980	950	523,4	728
F-800483.ZL-K-W209B-C5	..3196K...	5 600	12 600	1 060	900	539,2	758
F-800484.ZL-K-W209B-C5	..31/500K...	6 600	14 200	1 160	900	563	798
Z-574099.ZL-K-W209B-C5	..31/530K...	6 800	15 600	1 240	800	603,7	838
F-800485.ZL-K-W209B-C5	..31/560K...	7 100	16 200	1 290	750	624,4	888
Z-573929.ZL-K-W209B-C5	..31/600K...	8 200	18 900	1 490	700	672	948
F-800592.ZL-K-W209B-C5	..31/630K...	9 100	20 200	1 570	670	709,7	998
F-800593.ZL-K-W209B-C5	..31/670K...	10 200	23 100	1 740	630	748,3	1 058
F-800594.ZL-K-W209B-C5	..31/710K...	10 800	24 300	1 810	600	787,9	1 110

The **designs highlighted in bold** are available in preference.
Ordering example: FAG Z-565499.ZL-K-W209B-C5

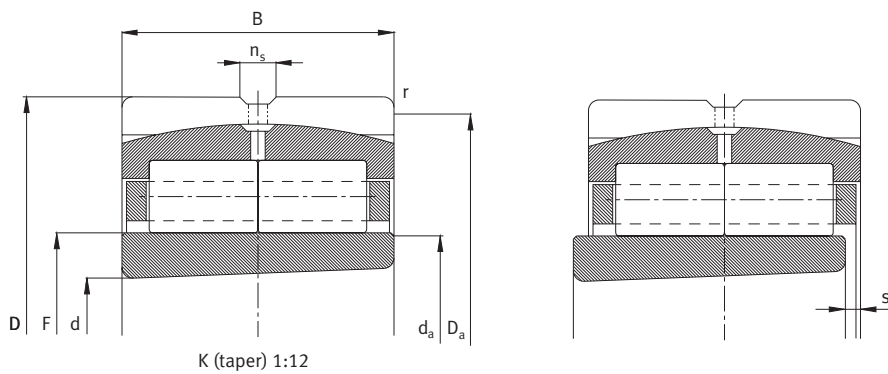
Self-aligning cylindrical roller bearings with tapered bore for guide rolls

Dimension series 22, 32, 23

Dimension table · Dimensions in mm

Designation	Mass	Dimensions						
Bearing	m ≈kg	d	D	B	r min	n _s	F	s ¹⁾
F-804415-K-C3	30,5	170	310	86	4	17,7	198	9,5
Z-567601-K-C3	32,4	180	320	86	4	17,7	211	7,5
Z-566170-K-C3	39	190	340	92	4	17,7	223	8,5
F-804655-K-C3	46,3	200	360	98	4	17,7	232	9,5
Z-567498-K-C3	63,5	220	400	108	4	17,7	258	10,5
Z-566290-K-C3	3,9	65	140	48	2,1	9,5	83,5	5
F-803186-K-C3	5,7	75	160	55	2,1	9,5	92	6,5
F-804203-K-C3	6,9	80	170	58	2,1	9,5	100,5	6
F-803723-K-C3	7,8	85	180	60	3	9,5	105	7
Z-566293-K-C3	10,6	95	200	67	3	12,2	119	8,5
F-803158-K-C3	12,5	100	215	73	3	12,2	125	7,5
Z-567445-K-C3	19,2	110	240	80	3	15	137	9
Z-566296-K-C3	24	120	260	86	3	15	147	10
F-804305-K-C3	31	130	280	93	4	17,7	169	9,5
F-804272-K-C3	45,6	150	320	108	4	17,7	184	13
Z-548428-K-C3	54,7	160	340	114	4	17,7	196	13
F-804459-K-C3	12,7	120	215	76	2,1	9,5	139,5	7
F-804460-K-C3	20	140	250	88	3	12,2	162,5	9
F-804461-K-C3	32	160	290	104	3	15	188	9
F-803792-K-C3	40,5	180	320	112	4	15	211	12,5
F-804462-K-C3	60	200	360	128	4	17,7	234	12,5
F-804463-K-C3	86,7	220	400	144	4	17,7	260	10,5
F-804464-K-C3	117	240	440	160	4	23,5	285	13

¹⁾ Maximum axial displacement from central position, taking no account of roller edge shortening or outside surface profiles.



Dimension table · Dimensions in mm

Designation	Interchangeable with	Basic load ratings		Fatigue limit load C_{ur} kN	Limiting speed n_G min^{-1}	Mounting dimensions	
		dyn. C_r kN	stat. C_{0r} kN			d_a max	D_a max
F-804415-K-C3	..2234K...	880	1 380	160	2 800	196,3	293
Z-567601-K-C3	..2236K...	920	1 550	179	2 600	209,2	303
Z-566170-K-C3	..2238K...	1 030	1 760	201	2 400	221,1	323
F-804655-K-C3	..2240K...	1 140	1 950	225	2 200	230	343
Z-567498-K-C3	..2244K...	1 450	2 380	265	1 900	255,8	383
Z-566290-K-C3	..2313K...	230	320	43,5	6 000	82,8	128
F-803186-K-C3	..2315K...	280	360	48,5	5 300	91,2	148
F-804203-K-C3	..2316K...	325	470	63	5 000	99,7	158
F-803723-K-C3	..2317K...	370	490	64	4 500	104,1	166
Z-566293-K-C3	..2319K...	435	620	80	4 000	118	186
F-803158-K-C3	..2320K...	540	770	101	3 800	124	201
Z-567445-K-C3	..2322K...	660	910	114	3 600	135,9	226
Z-566296-K-C3	..2324K...	740	1 040	130	3 400	145,8	246
F-804305-K-C3	..2326K...	840	1 370	165	3 200	167,7	263
F-804272-K-C3	..2330K...	1 120	1 620	194	2 800	182,5	303
Z-548428-K-C3	..2332K...	1 250	1 890	224	2 600	194,4	323
F-804459-K-C3	..3224K...	520	880	112	3 600	138,3	203
F-804460-K-C3	..3228K...	700	1 210	150	3 200	161,1	236
F-804461-K-C3	..3232K...	940	1 690	208	3 000	186,4	276
F-803792-K-C3	..3236K...	1 130	2 040	240	2 600	209,2	303
F-804462-K-C3	..3240K...	1 390	2 600	305	2 200	232	343
F-804463-K-C3	..3244K...	1 870	3 500	400	1 900	257,8	383
F-804464-K-C3	..3248K...	2 170	4 250	470	1 800	282,6	423

Reference list

(arranged by bearing size)

Self-aligning cylindrical roller bearing (designation at first delivery) FAG	Equivalent bearing size	Mounting location	Used in
Z-544444.ZL-K-C5 (566047.ZL-K-C5)	..3940K...	Hot air rolls	Germany, Denmark, Canada, England
Z-566047.ZL-K-C5	..3940K...	Dryer rolls	Great Britain, Slovenia, Canada
Z-565530.ZL-K-C5	..3034K...	Dryer rolls	Finland
Z-547536.ZL-K-C5 (565665.ZL-K-C5)	..3036K...	Dryer rolls	Germany
Z-565665.ZL-K-W209B-C5	..3036K...	Dryer rolls	Germany, Indonesia, Australia, Italy
Z-565666.ZL-K-W209B-C5	..3038K...	Dryer rolls	Germany, Colombia, Finland, Mexico, USA, India
Z-547538.ZL-K-C5 (565667.ZL-K-C5)	..3040K...	Dryer rolls	Germany, Canada
Z-565667.ZL-K-W209B-C5	..3040K...	Dryer rolls	Germany, New Zealand, Slovenia, Spain, Croatia, Austria, Canada, South Africa
F-808304.ZL-K-C5	..3044K (abnormal)	Dryer rolls	Canada
Z-546147.ZL-K-C5 (565531.ZL-K-C5)	..3044K...	Dryer rolls	Germany, Canada
Z-547539.ZL-K-C5 (565531.ZL-K-C5)	..3044K...	Dryer rolls	USA, Canada
Z-565531.ZL-K-W209B-C5	..3044K...	Dryer rolls	Ecuador, Germany, Canada, Croatia, Austria, Yugoslavia, New Zealand, France, Belgium, USA, South Africa
Z-565668.ZL-K-W209B-C5	..3048K...	Dryer rolls	Austria, Canada, Finland, Spain, USA
Z-547541.ZL-K-C5 (565499.ZL-K-C5)	..3052K...	Dryer rolls	Germany, USA, Canada
Z-565499.ZL-K-C5	..3052K...	Dryer rolls	Germany, Canada, Colombia, USA
Z-565754.ZL-K-C5	..3056K...	Dryer rolls	Canada, Colombia, South Africa, Russia
Z-565671.ZL-K-C5	..3064K...	M.G. cylinders	Germany
Z-565672.ZL-K-C5	..3068K...	M.G. cylinders	Germany
Z-547554.ZL-K-C5 (565681.ZL-K-C5)	..30/530K...	M.G. cylinders	Austria
Z-565681.ZL-K-C5	..30/530K...	M.G. cylinders	Canada
Z-547555.ZL-K-C5 (565682.ZL-K-C5)	..30/560K...	M.G. cylinders	Germany
Z-547556.ZL-K-C5 (572367.ZL-K-C5)	..30/600K...	M.G. cylinders	Germany
Z-572367.ZL-K-C5	..30/600K...	M.G. cylinders	Germany, Belgium
Z-565684.ZL-K-C5	..30/630K...	M.G. cylinders	Slovenia
Z-566486.ZL-K-W209B-C5	..3136K...	Dryer rolls	England
Z-566487.ZL-K-W209B-C5	..3140K...	Dryer rolls	Germany, Austria, Brazil, Switzerland
Z-568629.ZL-C5	..3144K (abnormal)	Dryer rolls	Canada, USA
Z-565688.ZL-K-W209B-C5	..3144K...	Dryer rolls	Germany, Australia, Norway, USA
Z-566503.ZL-K-W209B-C5	..3148K (abnormal)	Dryer rolls	Canada
Z-566488.ZL-K-W209B-C5	..3152K...	Dryer rolls	Canada, USA, Finland
Z-566490.ZL-K-W209B-C5	..3160K...	Dryer rolls	Canada
Z-566491.ZL-K-C5	..3164K...	M.G. cylinders	USA, Canada
Z-574099.ZL-K-C5	..31/530K...	M.G. cylinders	Taiwan, Italy

**Self-aligning
cylindrical roller bearing
(designation at first delivery)
FAG**

Self-aligning cylindrical roller bearing (designation at first delivery) FAG	Equivalent bearing size	Mounting location	Used in
Z-566170.ZL-K-W209B-C5	..2238K...	Dryer rolls	Canada, USA
F-804655.ZL-K-C5	..2240K...	Dryer rolls	Germany
Z-567498.ZL-K-W209B-C5	..2244K...	Dryer rolls	Canada, Australia
Z-562651.ZL-K-C3	..2311K...	Guide rolls	Austria
Z-547340.ZL-K-C3 (566290K.C3)	..2313K...	Guide rolls	Germany
Z-547341.ZL-K-C3 (803186K.C3)	..2315K...	Guide rolls	Germany
F-803186.ZL-K-C3	..2315K...	Guide rolls	Austria, Germany
Z-547342.ZL-K-C3 (803723K.C3)	..2317K...	Guide rolls	Germany
Z-547343.ZL-K-C3 (566293K.C3)	..2319K...	Guide rolls	Germany, Austria
Z-547345.ZL-K-C3 (566293K.C3)	..2322K...	Guide rolls	Germany
Z-547346.ZL-K-C3 (566296K.C3)	..2324K...	Guide rolls	Germany
Z-547347.ZL-K-C3 (804305K.C3)	..2326K...	Guide rolls	Germany

Notes

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