

# SCHAEFFLER



## X-life High-Speed Spindle Bearings M

High-performance series for maximum productivity  
and low operating costs

**FAG**

## X-life High-Speed Spindle Bearings M



X-life high-speed spindle bearing made from Vacrodur

**Tool spindles and, in particular, motor spindles with integral direct drive, are at the heart of every machine tool. They are responsible for the achievable cutting performance values, workpiece accuracies and surface qualities.**

With the new high-speed series in X-life quality, Schaeffler offers a spindle bearing solution which will further increase the performance of motor spindles in terms of mechanical and thermal load carrying capacity and offers the customer a boost in both productivity and competitiveness.

### Combining the advantages of large-ball and small-ball bearings

With the new X-life high-speed spindle bearings of series M, HCM and VCM, Schaeffler is optimally combining the kinematic suitability for high speeds of existing small-ball high-speed series with the robustness and load carrying capacity of large-ball bearings by matching the ball size, osculation and radial internal clearance together in a targeted manner, *Figure 1*.

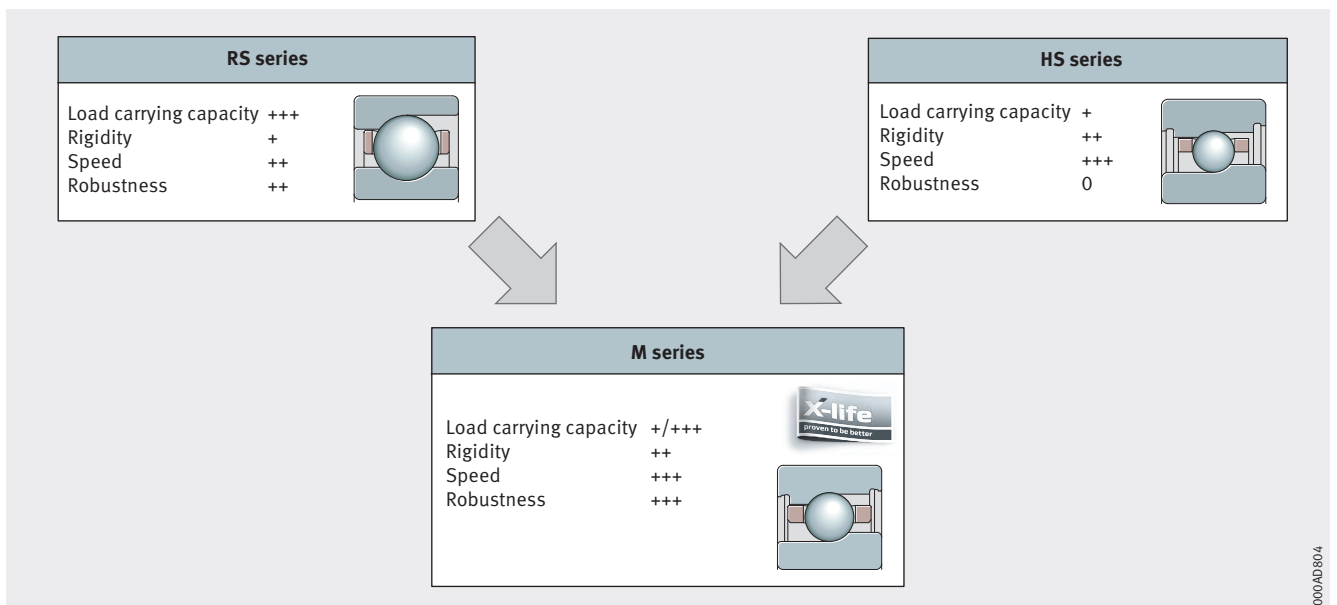


Figure 1: Combining the advantages of large-ball and small-ball high-speed spindle bearings

### Optimised X-life internal construction for higher thermal and mechanical loads

The new M series has an X-life internal construction with optimised friction behaviour and a high tolerance towards rapidly changing thermal operating conditions, such as those that frequently occur in motor spindles.

External influences due to interference between the bore and the bearing, high speeds and large temperature gradients between the shaft and housing reduce the radial internal clearance. The optimised X-life construction greatly reduces the rise in bearing preload, *Figure 2 to Figure 4*.

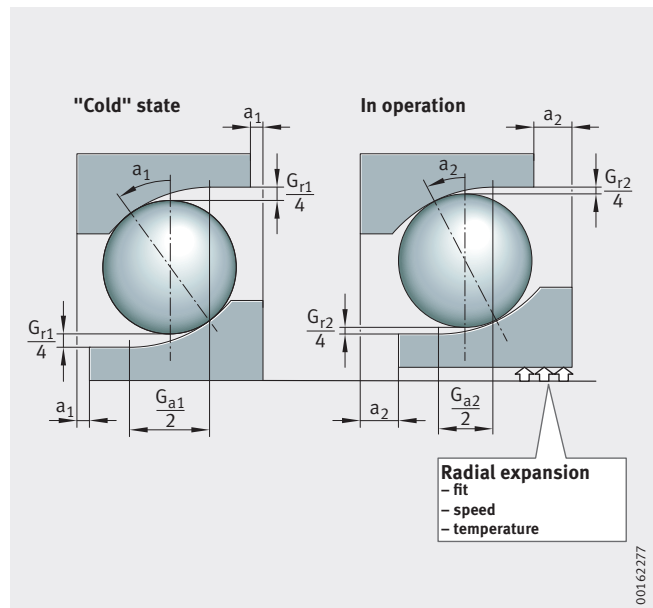


Figure 2: Bearing in original condition and under the influence of fit, speed and temperature

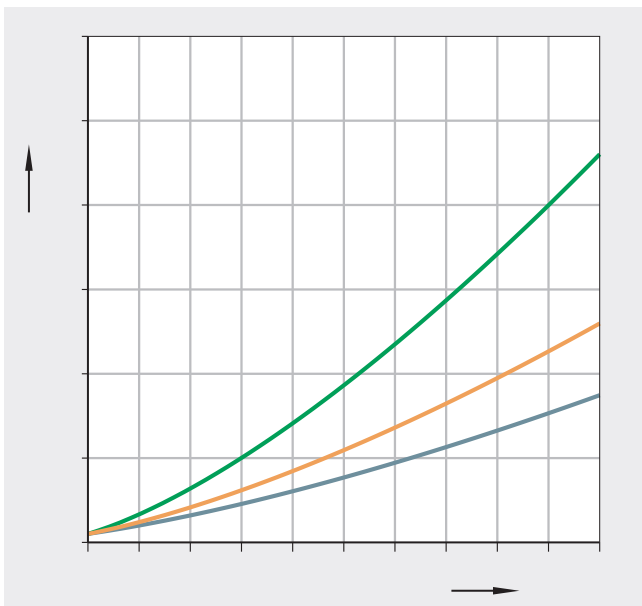


Figure 3: Increase in preload with reduction in radial internal clearance

Figure 4: Influences of fit, speed and temperature on the preload force

## Vacrodur

### Maximum bearing operating life under extremely difficult operating conditions

There are also other opportunities for increasing performance, over and above the new X-life design. This is made possible by combining a thermally robust bearing design, which has been tailored to the requirements of motor spindles, with the innovative, high-performance rolling bearing material Vacrodur.

Vacrodur has considerable advantages over material 100Cr6. Of particular note are the exceptionally high hardness values in excess of 65 HRC, which lead to a reduction in the amount of initial damage caused by the overrolling of particles if lubricant contamination occurs. In tests under controlled contamination conditions, i.e. defined contamination of the lubricant with mineral particles, an increase in the operating life of almost 24-fold was verified in comparison with the existing benchmark of Cronidur.

Tests have also shown that the rating lives for Vacrodur are increased by a factor of more than 13 under good lubrication conditions in the rating life test. Under controlled inadequate lubrication, i.e. with low to very low lubricant film heights, this difference in rating life even increases to a factor of 25.

In addition, Vacrodur offers outstanding thermal stability. Unlike conventional rolling bearing steels, the increased temperature stability of Vacrodur is not linked to reduced hardness values. The properties are stable up to exceptionally high application temperatures of +400 °C.

Schaeffler therefore offers the new X-life high-speed series with the optional addition of innovative, high-performance rolling bearing steel Vacrodur. This results in a further considerable and verifiable increase in the performance of motor spindles over existing high-performance solutions.

**As a result, this solution offers the customer a considerable boost in both productivity and competitiveness.**



Figure 5: Aluminium milling as application example

### Innovation gives rise to customer benefits

What benefits do the new X-life high-speed spindle bearings offer:

- in comparison with standard high-speed bearings?
- in combination with Vacrodur, in comparison with existing standard high-speed bearings?

The small-ball bearing versions commonly used in motor spindle designs usually have a relatively large contact angle ( $\alpha_0 = 25^\circ$ , suffix E). In contrast to a small contact angle of, for example,  $\alpha_0 = 15^\circ$ , this version offers the advantage of a significantly higher radial internal clearance, *Figure 6*.

This gives effective prevention of thermal constraint in operation.

However, bearings with a contact angle of  $25^\circ$  are prone to critical kinematic conditions under tilting. In such cases, the slippage values move into inadmissible ranges and the differences in velocity between the individual balls can also reach inadmissible values.

A further factor for consideration is that although bearings with a  $25^\circ$  contact angle can support higher axial forces than designs with a contact angle of  $15^\circ$ , their radial load carrying capacity is reduced.

With a contact angle as small as  $17^\circ$ , the new M series has a significantly larger radial internal clearance.

In terms of thermal constraint, the M series bearing is thus an extremely robust bearing solution and hence predestined for use in motor spindle applications.

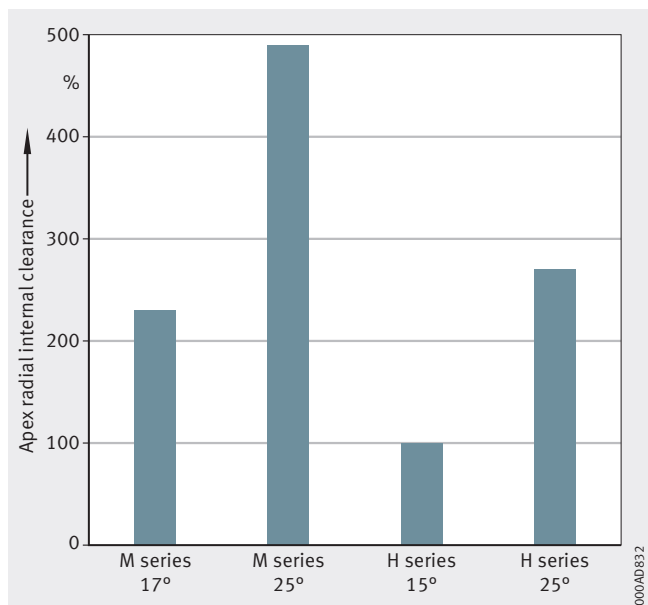


Figure 6: Comparison of initial apex radial internal clearance

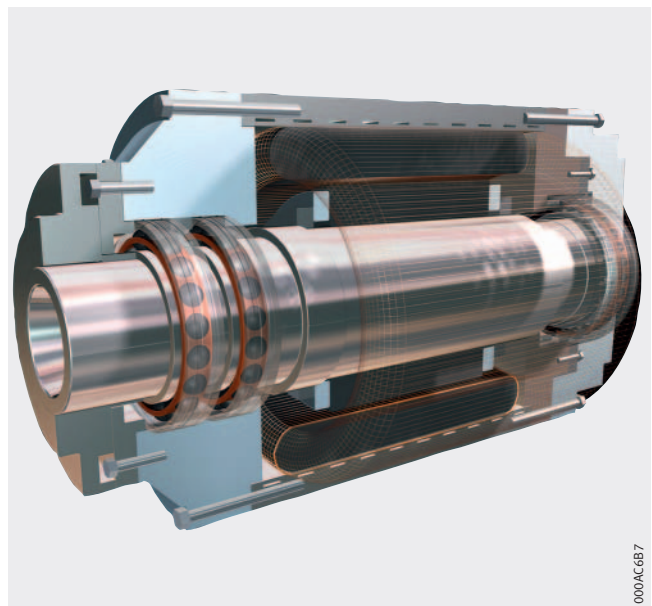


Figure 7: Motor spindle

### Motor spindle as application example

The advantages of the new M design, which can also be used with a small contact angle ( $C = 17^\circ$ ) in the motor spindle application with adequate operational reliability, become apparent in the specific application example. The bearing runs at distinct temperature gradients between the shaft and housing with smooth kinematics and operational reliability.

In the case shown here, a 3-fold increase in the maximum radial load carrying capacity is achieved with the HCM bearing (rings made from 100Cr6, ceramic balls) compared with conventional small-ball hybrid bearings with a large contact angle ( $25^\circ$ , suffix E).

Due to the high load carrying capacity of the HCM bearing, the smaller contact angle has no detrimental effect on the axial load carrying capacity. This remains almost constant.

A further significant increase in load carrying capacity can also be achieved by combining the new X-life high-speed design with the innovative high-performance material Vacrodur.

In the application example, the Vacrodur bearing (designation VCM) with ceramic balls and rings made from Vacrodur can demonstrate its full potential and bring about a significant upward shift in the performance limit. In combination with Vacrodur, the maximum permissible machining forces can even be increased by a factor of 7 in a radial direction and a factor of 2 in an axial direction compared with a conventional small-ball hybrid bearing solution, *Figure 8* and *Figure 9*.

### Conclusion

**The new high-speed series from Schaeffler permits significantly higher permissible machining forces. As a result, productivity and operational reliability can be significantly increased.**

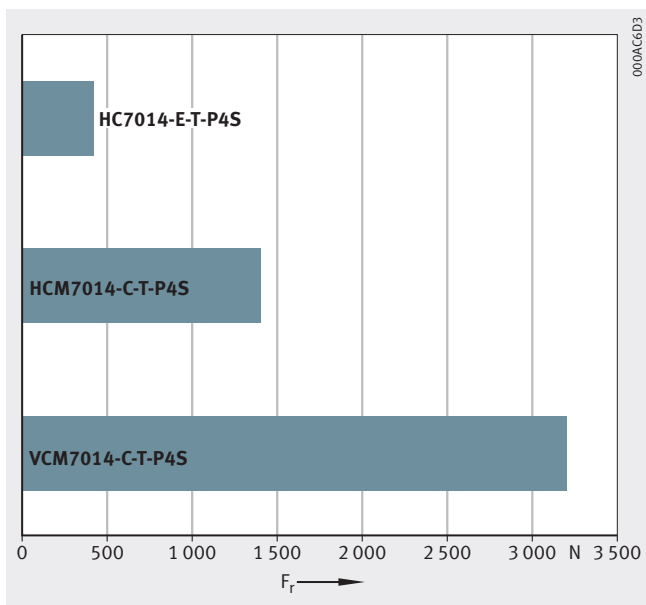


Figure 8: Application example – comparison of permissible radial machining forces

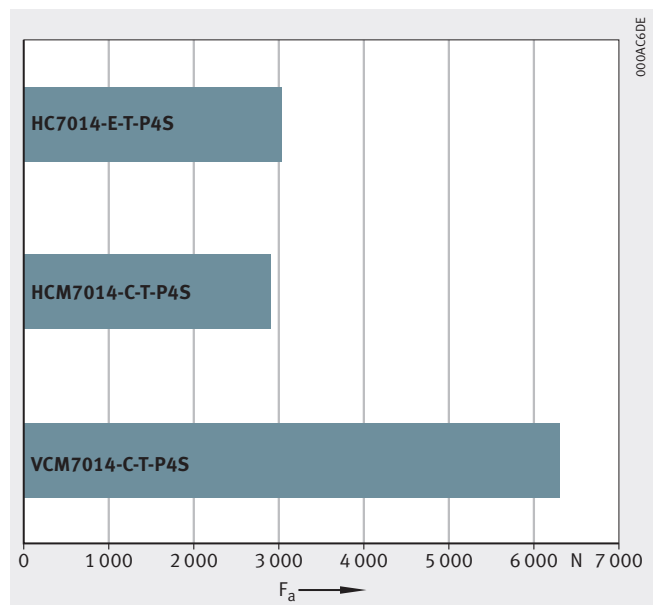


Figure 9: Application example – comparison of permissible axial machining forces

## Overview of X-life high-speed spindle bearings – the right solution for any application

The new X-life high-speed spindle bearings are available in three variants, *Figure 10*:

### ■ M variant:

The balls and rings of M-series X-life high-speed spindle bearings are manufactured from the proven rolling bearing steel 100Cr6. This variant provides a high-performance, cost-effective bearing solution for motor spindles.

### ■ HCM variant:

HCM-type X-life high-speed spindle bearings are equipped with ceramic balls and rings made from rolling bearing steel 100Cr6. Thanks to their high performance capability and suitability for very high speeds, HCM spindle bearings can increase the performance of motor spindles.

### ■ VCM variant:

Spindle bearings in the VCM X-life high-speed series also feature balls made from ceramic, but have bearing rings made from the new high-performance material Vacrodur. This steel is characterised by its extremely high load carrying capacity, wear resistance and very high temperature resistance – particularly in the case of abnormal lubrication conditions, such as insufficient lubrication or contamination. VCM-type spindle bearings in particular offer new levels of freedom when designing motor spindles compared to conventional solutions.

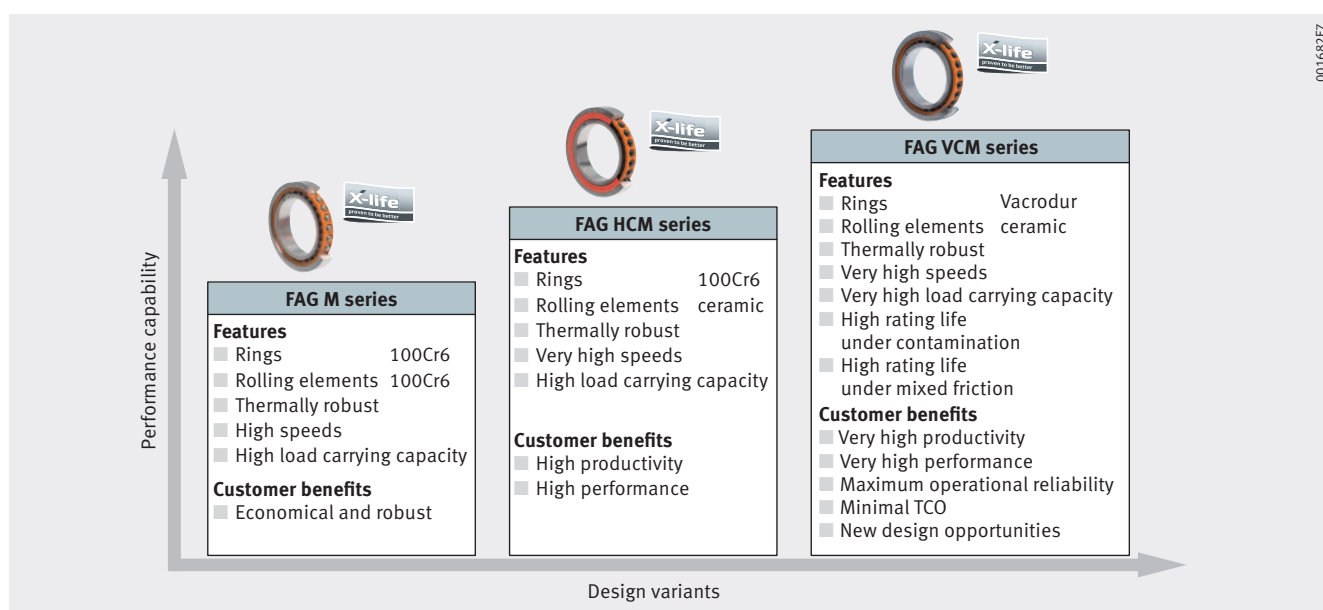


Figure 10: Overview of X-life high-speed spindle bearings

## Design variants of X-life high-speed spindle bearings

The M, HCM and VCM series of X-life high-speed spindle bearings are available for dimension series 70 and 719 and with nominal contact angles of 17° and 25°. There are also three preload options to choose from.

As is the standard practice for spindle bearings, these bearings are delivered with universal adjustment, which means that any desired arrangement of individual bearings and sets is possible. The spindle bearings can be designed in both open and sealed versions and are also available in a “direct lube” version with lubrication holes and O rings in the outer ring. Available bore diameters range from 05 to 26, *Figure 11*.

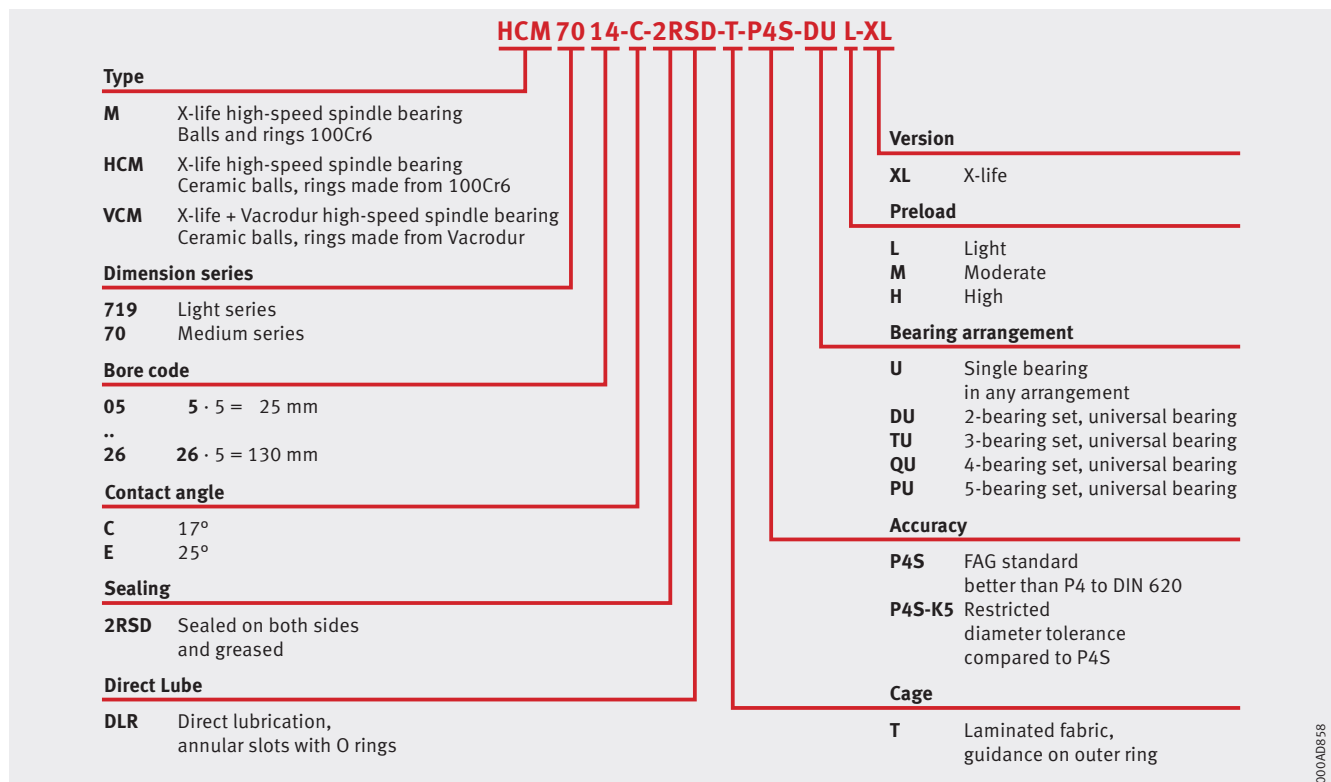


Figure 11: Nomenclature for X-life high-speed spindle bearings

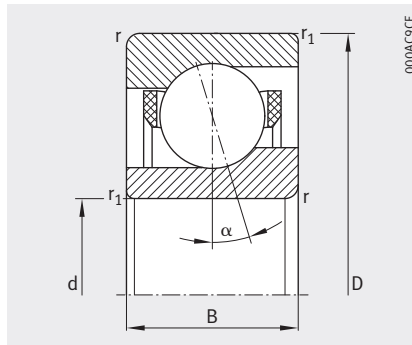




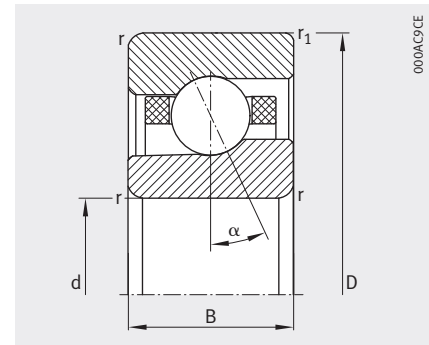
# High-speed spindle bearings

Steel or ceramic balls  
Rings made from steel or Vacrodur  
Open or sealed  
Design DLR

X-life



M719, HCM719, VCM719



M70, HCM70, VCM70

Dimension table - Dimensions in mm

Designation <sup>1)</sup>		Mass m ≈ kg	Dimensions										Contact angle α °	Mounting dimensions	
Series 719	Series 70		d	D	B	r	r <sub>1</sub>	B <sub>N</sub>	B <sub>N1</sub>	S <sub>N</sub>	S <sub>B</sub>	d <sub>a</sub> h12		D <sub>a</sub> H12	
						min.	min.								
M71905-C-T-P4S-XL	–	0,038	25	42	9	0,3	0,15	–	–	–	–	17	29	38,5	
M71905-E-T-P4S-XL	–	0,038	25	42	9	0,3	0,15	–	–	–	–	25	29	38,5	
HCM71905-C-T-P4S-XL	–	0,034	25	42	9	0,3	0,15	1,4	1,1	5,35	1	17	29	38,5	
HCM71905-E-T-P4S-XL	–	0,034	25	42	9	0,3	0,15	1,4	1,1	5,35	1	25	29	38,5	
VCM71905-C-T-P4S-XL	–	0,034	25	42	9	0,3	0,15	1,4	1,1	5,35	1	17	29	38,5	
VCM71905-E-T-P4S-XL	–	0,034	25	42	9	0,3	0,15	1,4	1,1	5,35	1	25	29	38,5	
–	M7005-C-T-P4S-XL	0,076	25	47	12	0,6	0,3	–	–	–	–	17	30	42	
–	M7005-E-T-P4S-XL	0,076	25	47	12	0,6	0,3	–	–	–	–	25	30	42	
–	HCM7005-C-T-P4S-XL	0,069	25	47	12	0,6	0,3	1,6	1,6	6,95	1	17	30	42	
–	HCM7005-E-T-P4S-XL	0,069	25	47	12	0,6	0,3	1,6	1,6	6,95	1	25	30	42	
–	VCM7005-C-T-P4S-XL	0,069	25	47	12	0,6	0,3	1,6	1,6	6,95	1	17	30	42	
–	VCM7005-E-T-P4S-XL	0,069	25	47	12	0,6	0,3	1,6	1,6	6,95	1	25	30	42	
M71906-C-T-P4S-XL	–	0,044	30	47	9	0,3	0,15	–	–	–	–	17	34	43,5	
M71906-E-T-P4S-XL	–	0,044	30	47	9	0,3	0,15	–	–	–	–	25	34	43,5	
HCM71906-C-T-P4S-XL	–	0,039	30	47	9	0,3	0,15	1,4	1,1	5,35	1	17	34	43,5	
HCM71906-E-T-P4S-XL	–	0,039	30	47	9	0,3	0,15	1,4	1,1	5,35	1	25	34	43,5	
VCM71906-C-T-P4S-XL	–	0,039	30	47	9	0,3	0,15	1,4	1,1	5,35	1	17	34	43,5	
VCM71906-E-T-P4S-XL	–	0,039	30	47	9	0,3	0,15	1,4	1,1	5,35	1	25	34	43,5	
–	M7006-C-T-P4S-XL	0,12	30	55	13	1	0,6	–	–	–	–	17	36	49	
–	M7006-E-T-P4S-XL	0,12	30	55	13	1	0,6	–	–	–	–	25	36	49	
–	HCM7006-C-T-P4S-XL	0,11	30	55	13	1	0,6	2,4	2,4	7,4	1	17	36	49	
–	HCM7006-E-T-P4S-XL	0,11	30	55	13	1	0,6	2,4	2,4	7,4	1	25	36	49	
–	VCM7006-C-T-P4S-XL	0,11	30	55	13	1	0,6	2,4	2,4	7,4	1	17	36	49	
–	VCM7006-E-T-P4S-XL	0,11	30	55	13	1	0,6	2,4	2,4	7,4	1	25	36	49	

<sup>1)</sup> The ordering designation must always include data on the bearing arrangement and preload.

Further information on design variants, Figure 11.

Ordering example: HCM7014-E-T-P4S-DUL-XL.

The bearings are also available by agreement with gap seals (suffix 2RSD).

Ordering example: HCM7014-E-2RSD-T-P4S-UL-XL.

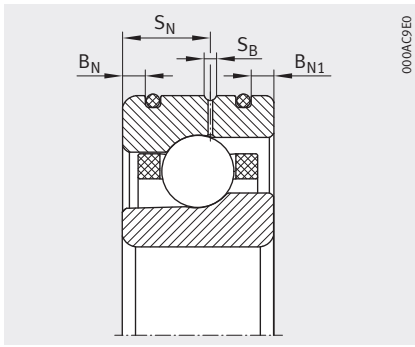
<sup>2)</sup> The limiting speeds are based on elastically preloaded single bearings.

<sup>3)</sup> Minimal quantity oil lubrication.

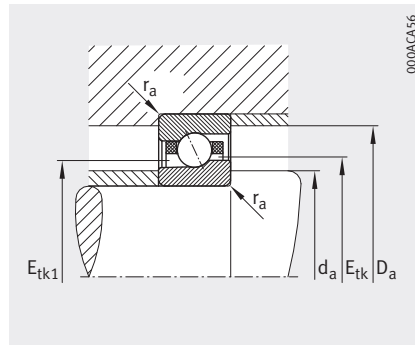
<sup>4)</sup> Ordering examples for Direct Lube design: HCM7014-EDLR-T-P4S-UL-XL.

DLR only available up to bore code 22.

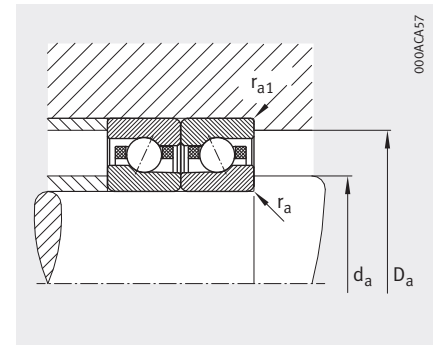
<sup>5)</sup> The chamfer radii of the adjacent construction must be smaller than r or r<sub>1</sub>.



Design DLR<sup>4)</sup>



Mounting dimensions<sup>5)</sup>



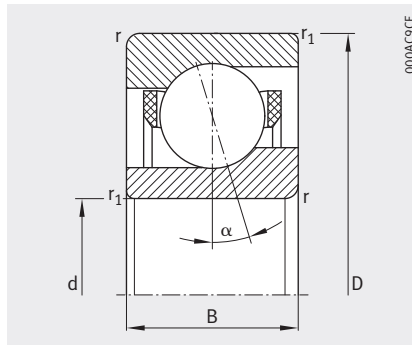
Mounting dimensions

			Basic load ratings		Limiting speeds <sup>2)</sup>		Preload force $F_v$			Lift-off force $K_{aE}$			Axial rigidity $C_a$		
$E_{tk}$ min.	$E_{tk1}$ min.	$E_{tk}$ $E_{tk1}$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N	$n_G$ grease $\text{min}^{-1}$	$n_G$ oil <sup>3)</sup> $\text{min}^{-1}$	L N	M N	H N	L N	M N	H N	L N/ $\mu\text{m}$	M N/ $\mu\text{m}$	H N/ $\mu\text{m}$
31	28,9	32	6 500	2 750	49 300	74 700	29	78	163	86	235	514	24	35	48
31	28,9	32	6 300	2 650	46 300	68 700	42	110	229	121	321	682	48	68	89
31	28,9	32	6 600	2 650	61 200	89 600	21	54	114	60	161	348	24	34	45
31	28,9	32	6 300	2 550	58 300	83 600	30	77	161	85	224	472	48	67	88
31	28,9	32	15 700	3 700	62 700	98 600	18	49	102	54	144	310	23	33	45
31	28,9	32	15 100	3 550	59 800	89 600	27	70	145	76	201	422	48	67	87
32,7	30,6	34,4	8 000	3 250	45 900	69 500	34	91	191	101	275	601	24	35	48
32,7	30,6	34,4	7 700	3 150	43 100	63 900	49	130	270	142	378	802	49	69	91
32,7	30,6	34,4	8 000	3 150	57 000	83 400	24	64	133	70	189	407	24	34	46
32,7	30,6	34,4	7 700	3 000	54 200	77 800	35	91	190	100	264	555	49	69	90
32,7	30,6	34,4	19 200	4 400	58 400	91 700	22	57	119	63	169	362	24	34	46
32,7	30,6	34,4	18 400	4 200	55 600	83 400	31	82	170	90	236	497	49	68	89
35,7	33,9	37	6 900	3 200	42 900	65 000	34	89	188	99	270	592	27	39	54
35,7	33,9	37	6 600	3 050	40 300	59 800	48	126	263	138	368	782	54	76	100
35,7	33,9	37	6 900	3 050	53 300	78 000	24	62	131	69	186	400	27	38	51
35,7	33,9	37	6 600	2 900	50 700	72 800	34	89	185	97	257	541	54	76	99
35,7	33,9	37	16 700	4 250	54 600	85 800	21	56	117	62	166	356	26	38	51
35,7	33,9	37	15 900	4 100	52 000	78 000	30	80	166	87	230	484	54	75	98
39,2	37,1	40,9	8 900	4 050	38 900	58 900	43	113	238	125	342	749	29	43	59
39,2	37,1	40,9	8 500	3 900	36 500	54 200	61	161	335	176	469	995	59	84	110
39,2	37,1	40,9	8 900	3 900	48 300	70 600	30	79	166	87	235	507	29	42	56
39,2	37,1	40,9	8 500	3 700	45 900	65 900	43	113	235	124	327	689	59	83	109
39,2	37,1	40,9	21 400	5 400	49 500	77 700	27	71	148	78	210	450	29	41	55
39,2	37,1	40,9	20 400	5 200	47 100	70 600	39	102	211	111	293	616	59	83	108

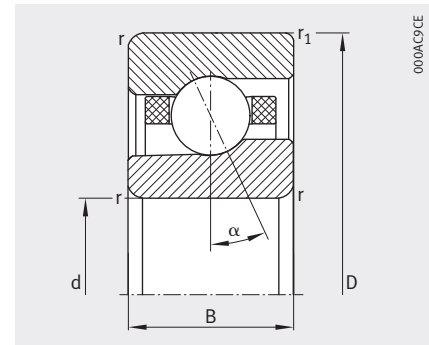
# High-speed spindle bearings

Steel or ceramic balls  
Rings made from steel or Vacrodur  
Open or sealed  
Design DLR

X-life



M719, HCM719, VCM719



M70, HCM70, VCM70

Dimension table (continued) · Dimensions in mm

Designation <sup>1)</sup>		Mass m ≈ kg	Dimensions										Contact angle α °	Mounting dimensions	
Series 719	Series 70		d	D	B	r	r <sub>1</sub>	B <sub>N</sub>	B <sub>N1</sub>	S <sub>N</sub>	S <sub>B</sub>	d <sub>a</sub> h12		D <sub>a</sub> H12	
						min.	min.								
M71907-C-T-P4S-XL	–	0,069	35	55	10	0,6	0,3	–	–	–	–	17	40	51,5	
M71907-E-T-P4S-XL	–	0,069	35	55	10	0,6	0,3	–	–	–	–	25	40	51,5	
HCM71907-C-T-P4S-XL	–	0,061	35	55	10	0,6	0,3	2	1,4	5,9	1,4	17	40	51,5	
HCM71907-E-T-P4S-XL	–	0,061	35	55	10	0,6	0,3	2	1,4	5,9	1,4	25	40	51,5	
VCM71907-C-T-P4S-XL	–	0,061	35	55	10	0,6	0,3	2	1,4	5,9	1,4	17	40	51,5	
VCM71907-E-T-P4S-XL	–	0,061	35	55	10	0,6	0,3	2	1,4	5,9	1,4	25	40	51,5	
–	M7007-C-T-P4S-XL	0,15	35	62	14	1	0,6	–	–	–	–	17	41	56	
–	M7007-E-T-P4S-XL	0,15	35	62	14	1	0,6	–	–	–	–	25	41	56	
–	HCM7007-C-T-P4S-XL	0,14	35	62	14	1	0,6	2,4	2,4	8,05	1,4	17	41	56	
–	HCM7007-E-T-P4S-XL	0,14	35	62	14	1	0,6	2,4	2,4	8,05	1,4	25	41	56	
–	VCM7007-C-T-P4S-XL	0,14	35	62	14	1	0,6	2,4	2,4	8,05	1,4	17	41	56	
–	VCM7007-E-T-P4S-XL	0,14	35	62	14	1	0,6	2,4	2,4	8,05	1,4	25	41	56	
M71908-C-T-P4S-XL	–	0,1	40	62	12	0,6	0,3	–	–	–	–	17	45	58,5	
M71908-E-T-P4S-XL	–	0,1	40	62	12	0,6	0,3	–	–	–	–	25	45	58,5	
HCM71908-C-T-P4S-XL	–	0,089	40	62	12	0,6	0,3	2,2	1,7	6,9	1,4	17	45	58,5	
HCM71908-E-T-P4S-XL	–	0,089	40	62	12	0,6	0,3	2,2	1,7	6,9	1,4	25	45	58,5	
VCM71908-C-T-P4S-XL	–	0,089	40	62	12	0,6	0,3	2,2	1,7	6,9	1,4	17	45	58,5	
VCM71908-E-T-P4S-XL	–	0,089	40	62	12	0,6	0,3	2,2	1,7	6,9	1,4	25	45	58,5	
–	M7008-C-T-P4S-XL	0,19	40	68	15	1	0,6	–	–	–	–	17	46	62	
–	M7008-E-T-P4S-XL	0,19	40	68	15	1	0,6	–	–	–	–	25	46	62	
–	HCM7008-C-T-P4S-XL	0,18	40	68	15	1	0,6	2,6	2,6	8,55	1,4	17	46	62	
–	HCM7008-E-T-P4S-XL	0,18	40	68	15	1	0,6	2,6	2,6	8,55	1,4	25	46	62	
–	VCM7008-C-T-P4S-XL	0,18	40	68	15	1	0,6	2,6	2,6	8,55	1,4	17	46	62	
–	VCM7008-E-T-P4S-XL	0,18	40	68	15	1	0,6	2,6	2,6	8,55	1,4	25	46	62	

<sup>1)</sup> The ordering designation must always include data on the bearing arrangement and preload.

Further information on design variants, Figure 11.

Ordering example: HCM7014-E-T-P4S-DUL-XL.

The bearings are also available by agreement with gap seals (suffix 2RSD).

Ordering example: HCM7014-E-2RSD-T-P4S-UL-XL.

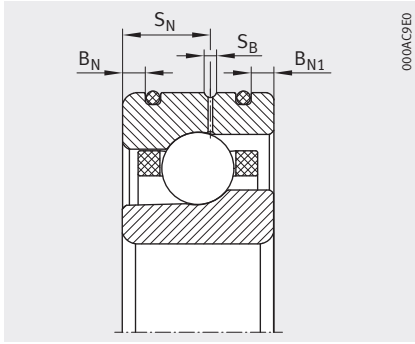
<sup>2)</sup> The limiting speeds are based on elastically preloaded single bearings.

<sup>3)</sup> Minimal quantity oil lubrication.

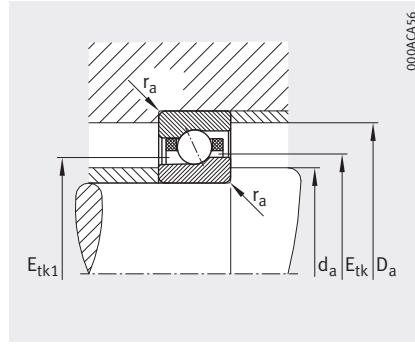
<sup>4)</sup> Ordering examples for Direct Lube design: HCM7014-EDLR-T-P4S-UL-XL.

DLR only available up to bore code 22.

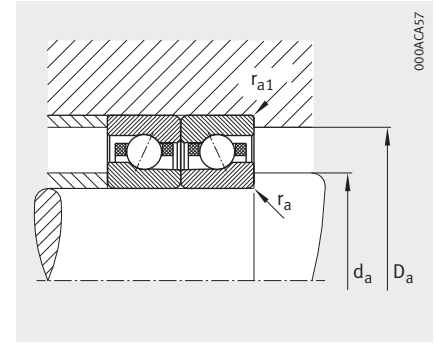
<sup>5)</sup> The chamfer radii of the adjacent construction must be smaller than r or r<sub>1</sub>.



Design DLR<sup>4)</sup>



Mounting dimensions<sup>5)</sup>

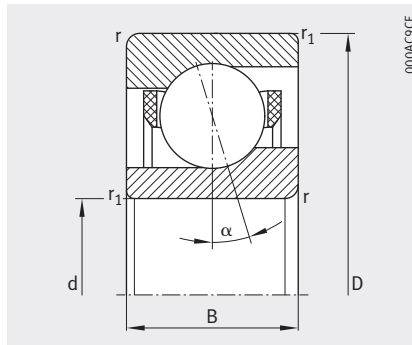


Mounting dimensions

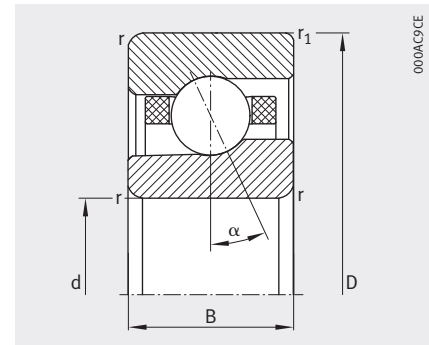
			Basic load ratings		Limiting speeds <sup>2)</sup>		Preload force $F_V$			Lift-off force $K_{aE}$			Axial rigidity $C_a$		
$E_{tk}$	$E_{tk1}$	$E_{tk}$ $E_{tk1}$ max.	dyn. $C_r$	stat. $C_{0r}$	$n_G$ grease	$n_G$ oil <sup>3)</sup>	L	M	H	L	M	H	L	M	H
min.	min.		N	N	$\text{min}^{-1}$	$\text{min}^{-1}$	N	N	N	N	N	N	N/ $\mu\text{m}$	N/ $\mu\text{m}$	N/ $\mu\text{m}$
41,7	39,6	43,3	9 500	4 550	36 700	55 600	48	127	267	141	384	841	33	48	66
41,7	39,6	43,3	9 000	4 350	34 500	51 200	69	180	376	198	526	1 117	66	93	123
41,7	39,6	43,3	9 500	4 350	45 600	66 700	34	89	186	98	264	569	33	47	63
41,7	39,6	43,3	9 100	4 150	43 400	62 300	48	127	264	139	367	773	66	93	121
41,7	39,6	43,3	22 700	6 100	46 700	73 400	30	79	166	88	235	506	32	46	62
41,7	39,6	43,3	21 700	5 800	44 500	66 700	44	114	237	125	329	692	66	92	120
44,7	42,3	46,6	11 300	5 300	34 100	51 600	56	148	311	164	448	979	34	49	67
44,7	42,3	46,6	10 800	5 000	32 000	47 500	80	210	438	230	613	1 302	68	96	126
44,7	42,3	46,6	11 300	5 000	42 300	61 900	39	103	217	114	307	663	33	48	64
44,7	42,3	46,6	10 800	4 850	40 300	57 800	57	148	308	162	428	901	68	95	124
44,7	42,3	46,6	27 000	7 100	43 300	68 100	35	93	194	102	274	589	33	47	63
44,7	42,3	46,6	26 000	6 800	41 300	61 900	51	133	276	145	383	806	68	95	123
47,2	44,8	49,1	11 600	5 600	32 400	49 100	59	157	331	174	477	1 044	36	52	71
47,2	44,8	49,1	11 100	5 400	30 400	45 100	85	224	466	245	653	1 386	72	101	134
47,2	44,8	49,1	11 600	5 400	40 200	58 900	42	110	231	121	327	706	35	51	68
47,2	44,8	49,1	11 100	5 100	38 300	55 000	60	157	327	172	456	960	72	101	132
47,2	44,8	49,1	28 000	7 500	41 200	64 800	37	99	207	109	292	628	35	50	67
47,2	44,8	49,1	26 500	7 200	39 300	58 900	54	141	294	155	408	858	72	100	131
50,2	47,8	52,1	11 900	6 000	30 600	46 300	63	167	352	185	507	1 110	38	55	76
50,2	47,8	52,1	11 400	5 700	28 800	42 600	91	238	495	261	694	1 473	76	107	141
50,2	47,8	52,1	11 900	5 700	38 000	55 600	44	117	245	129	348	751	37	54	72
50,2	47,8	52,1	11 400	5 500	36 200	51 900	64	167	348	183	484	1 020	76	107	139
50,2	47,8	52,1	28 500	8 000	38 900	61 200	40	105	220	116	311	668	37	53	71
50,2	47,8	52,1	27 500	7 700	37 100	55 600	57	150	312	164	434	912	76	106	138

# High-speed spindle bearings

Steel or ceramic balls  
Rings made from steel or Vacrodur  
Open or sealed  
Design DLR



M719, HCM719, VCM719



M70, HCM70, VCM70

Dimension table (continued) · Dimensions in mm

Designation <sup>1)</sup>		Mass m ≈ kg	Dimensions										Contact angle $\alpha$ °	Mounting dimensions	
Series 719	Series 70		d	D	B	r	r <sub>1</sub>	B <sub>N</sub>	B <sub>N1</sub>	S <sub>N</sub>	S <sub>B</sub>	d <sub>a</sub> h12		D <sub>a</sub> H12	
						min.	min.								
M71909-C-T-P4S-XL	–	0,12	45	68	12	0,6	0,3	–	–	–	–	17	50	63,5	
M71909-E-T-P4S-XL	–	0,12	45	68	12	0,6	0,3	–	–	–	–	25	50	63,5	
HCM71909-C-T-P4S-XL	–	0,11	45	68	12	0,6	0,3	2,2	1,7	6,9	1,4	17	50	63,5	
HCM71909-E-T-P4S-XL	–	0,11	45	68	12	0,6	0,3	2,2	1,7	6,9	1,4	25	50	63,5	
VCM71909-C-T-P4S-XL	–	0,11	45	68	12	0,6	0,3	2,2	1,7	6,9	1,4	17	50	63,5	
VCM71909-E-T-P4S-XL	–	0,11	45	68	12	0,6	0,3	2,2	1,7	6,9	1,4	25	50	63,5	
–	M7009-C-T-P4S-XL	0,25	45	75	16	1	0,6	–	–	–	–	17	51	69	
–	M7009-E-T-P4S-XL	0,25	45	75	16	1	0,6	–	–	–	–	25	51	69	
–	HCM7009-C-T-P4S-XL	0,23	45	75	16	1	0,6	2,6	2,6	9,3	1,4	17	51	69	
–	HCM7009-E-T-P4S-XL	0,23	45	75	16	1	0,6	2,6	2,6	9,3	1,4	25	51	69	
–	VCM7009-C-T-P4S-XL	0,23	45	75	16	1	0,6	2,6	2,6	9,3	1,4	17	51	69	
–	VCM7009-E-T-P4S-XL	0,23	45	75	16	1	0,6	2,6	2,6	9,3	1,4	25	51	69	
M71910-C-T-P4S-XL	–	0,12	50	72	12	0,6	0,3	–	–	–	–	17	55	67,5	
M71910-E-T-P4S-XL	–	0,12	50	72	12	0,6	0,3	–	–	–	–	25	55	67,5	
HCM71910-C-T-P4S-XL	–	0,11	50	72	12	0,6	0,3	2,2	1,7	7	1,4	17	55	67,5	
HCM71910-E-T-P4S-XL	–	0,11	50	72	12	0,6	0,3	2,2	1,7	7	1,4	25	55	67,5	
VCM71910-C-T-P4S-XL	–	0,11	50	72	12	0,6	0,3	2,2	1,7	7	1,4	17	55	67,5	
VCM71910-E-T-P4S-XL	–	0,11	50	72	12	0,6	0,3	2,2	1,7	7	1,4	25	55	67,5	
–	M7010-C-T-P4S-XL	0,27	50	80	16	1	0,6	–	–	–	–	17	56	74	
–	M7010-E-T-P4S-XL	0,27	50	80	16	1	0,6	–	–	–	–	25	56	74	
–	HCM7010-C-T-P4S-XL	0,26	50	80	16	1	0,6	2,6	2,6	9,3	1,4	17	56	74	
–	HCM7010-E-T-P4S-XL	0,26	50	80	16	1	0,6	2,6	2,6	9,3	1,4	25	56	74	
–	VCM7010-C-T-P4S-XL	0,26	50	80	16	1	0,6	2,6	2,6	9,3	1,4	17	56	74	
–	VCM7010-E-T-P4S-XL	0,26	50	80	16	1	0,6	2,6	2,6	9,3	1,4	25	56	74	

<sup>1)</sup> The ordering designation must always include data on the bearing arrangement and preload.

Further information on design variants, Figure 11.

Ordering example: HCM7014-E-T-P4S-DUL-XL.

The bearings are also available by agreement with gap seals (suffix 2RSD).

Ordering example: HCM7014-E-2RSD-T-P4S-UL-XL.

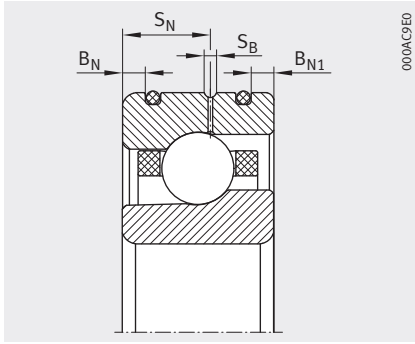
<sup>2)</sup> The limiting speeds are based on elastically preloaded single bearings.

<sup>3)</sup> Minimal quantity oil lubrication.

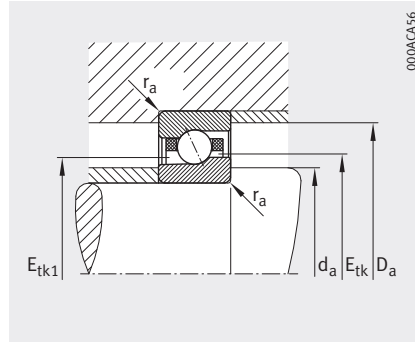
<sup>4)</sup> Ordering examples for Direct Lube design: HCM7014-EDLR-T-P4S-UL-XL.

DLR only available up to bore code 22.

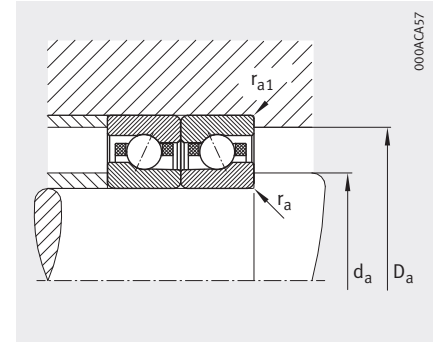
<sup>5)</sup> The chamfer radii of the adjacent construction must be smaller than r or r<sub>1</sub>.



Design DLR<sup>4)</sup>



Mounting dimensions<sup>5)</sup>

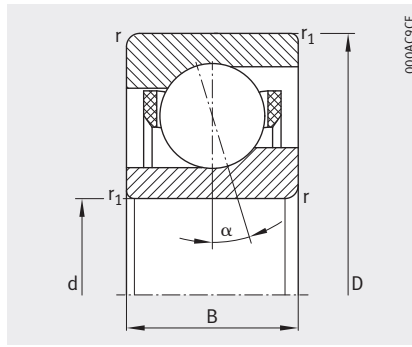


Mounting dimensions

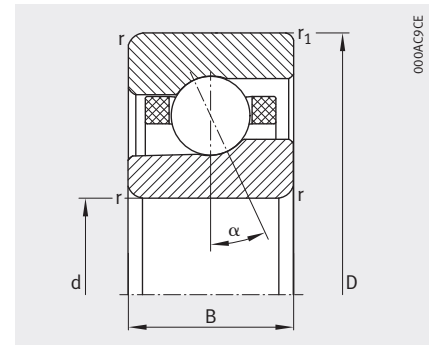
			Basic load ratings		Limiting speeds <sup>2)</sup>		Preload force $F_V$			Lift-off force $K_{aE}$			Axial rigidity $C_a$		
$E_{tk}$	$E_{tk1}$	$E_{tk}$ $E_{tk1}$ max.	dyn. $C_r$	stat. $C_{0r}$	$n_G$ grease	$n_G$ oil <sup>3)</sup>	L	M	H	L	M	H	L	M	H
min.	min.		N	N	$\text{min}^{-1}$	$\text{min}^{-1}$	N	N	N	N	N	N	N/ $\mu\text{m}$	N/ $\mu\text{m}$	N/ $\mu\text{m}$
52,7	50,3	54,6	12 200	6 300	29 300	44 300	67	177	372	196	537	1 175	40	58	80
52,7	50,3	54,6	11 700	6 000	27 500	40 800	96	251	524	276	734	1 558	80	113	149
52,7	50,3	54,6	12 300	6 000	36 300	53 100	47	124	260	136	368	795	39	57	76
52,7	50,3	54,6	11 700	5 800	34 600	49 600	68	177	368	194	512	1 078	80	112	146
52,7	50,3	54,6	29 500	8 500	37 200	58 500	42	111	232	122	329	707	39	56	75
52,7	50,3	54,6	28 000	8 100	35 400	53 100	61	159	330	174	459	964	80	111	145
57,2	54,8	59	12 800	7 000	27 100	41 000	74	196	413	217	595	1 303	44	64	88
57,2	54,8	59	12 200	6 700	25 500	37 800	106	278	580	305	812	1 726	88	124	164
57,2	54,8	59	12 900	6 700	33 700	49 200	52	137	288	151	408	881	43	62	84
57,2	54,8	59	12 300	6 400	32 000	46 000	75	196	407	214	567	1 194	88	123	161
57,2	54,8	59	31 000	9 400	34 500	54 100	47	123	258	135	364	784	43	62	82
57,2	54,8	59	29 500	9 000	32 800	49 200	67	176	365	192	508	1 068	88	123	160
57,2	54,8	58,9	12 800	7 000	27 100	41 000	74	196	413	217	595	1 303	44	64	88
57,2	54,8	58,9	12 200	6 700	25 500	37 800	106	278	580	305	812	1 726	88	124	164
57,2	54,8	58,9	12 900	6 700	33 700	49 200	52	137	288	151	408	881	43	62	84
57,2	54,8	58,9	12 300	6 400	32 000	46 000	75	196	407	214	567	1 194	88	123	161
57,2	54,8	58,9	31 000	9 400	34 500	54 100	47	123	258	135	364	784	43	62	82
57,2	54,8	58,9	29 500	9 000	32 800	49 200	67	176	365	192	508	1 068	88	123	160
61,2	58,8	63	13 100	7 400	25 400	38 500	78	206	435	229	627	1 373	46	67	92
61,2	58,8	63	12 400	7 000	23 900	35 400	112	293	610	321	855	1 816	92	130	171
61,2	58,8	63	13 100	7 100	31 600	46 200	55	144	303	159	430	928	45	65	88
61,2	58,8	63	12 500	6 700	30 000	43 100	79	206	429	225	596	1 257	92	129	169
61,2	58,8	63	31 500	9 900	32 400	50 800	49	129	271	143	384	825	45	64	86
61,2	58,8	63	30 000	9 400	30 800	46 200	71	185	385	202	534	1 124	92	128	167

# High-speed spindle bearings

Steel or ceramic balls  
Rings made from steel or Vacrodur  
Open or sealed  
Design DLR



M719, HCM719, VCM719



M70, HCM70, VCM70

Dimension table (continued) · Dimensions in mm

Designation <sup>1)</sup>		Mass m ≈ kg	Dimensions										Contact angle α °	Mounting dimensions	
Series 719	Series 70		d	D	B	r	r <sub>1</sub>	B <sub>N</sub>	B <sub>N1</sub>	S <sub>N</sub>	S <sub>B</sub>	d <sub>a</sub> h12		D <sub>a</sub> H12	
						min.	min.								
M71911-C-T-P4S-XL	–	0,16	55	80	13	1	0,6	–	–	–	–	17	60	75,5	
M71911-E-T-P4S-XL	–	0,16	55	80	13	1	0,6	–	–	–	–	25	60	75,5	
HCM71911-C-T-P4S-XL	–	0,13	55	80	13	1	0,6	2,8	2	7,6	1,4	17	60	75,5	
HCM71911-E-T-P4S-XL	–	0,13	55	80	13	1	0,6	2,8	2	7,6	1,4	25	60	75,5	
VCM71911-C-T-P4S-XL	–	0,13	55	80	13	1	0,6	2,8	2	7,6	1,4	17	60	75,5	
VCM71911-E-T-P4S-XL	–	0,13	55	80	13	1	0,6	2,8	2	7,6	1,4	25	60	75,5	
–	M7011-C-T-P4S-XL	0,39	55	90	18	1,1	0,6	–	–	–	–	17	62	83	
–	M7011-E-T-P4S-XL	0,39	55	90	18	1,1	0,6	–	–	–	–	25	62	83	
–	HCM7011-C-T-P4S-XL	0,36	55	90	18	1,1	0,6	2,8	2,8	10,15	1,4	17	62	83	
–	HCM7011-E-T-P4S-XL	0,36	55	90	18	1,1	0,6	2,8	2,8	10,15	1,4	25	62	83	
–	VCM7011-C-T-P4S-XL	0,36	55	90	18	1,1	0,6	2,8	2,8	10,15	1,4	17	62	83	
–	VCM7011-E-T-P4S-XL	0,36	55	90	18	1,1	0,6	2,8	2,8	10,15	1,4	25	62	83	
M71912-C-T-P4S-XL	–	0,17	60	85	13	1	0,6	–	–	–	–	17	65	80,5	
M71912-E-T-P4S-XL	–	0,17	60	85	13	1	0,6	–	–	–	–	25	65	80,5	
HCM71912-C-T-P4S-XL	–	0,14	60	85	13	1	0,6	2,8	2	7,6	1,4	17	65	80,5	
HCM71912-E-T-P4S-XL	–	0,14	60	85	13	1	0,6	2,8	2	7,6	1,4	25	65	80,5	
VCM71912-C-T-P4S-XL	–	0,14	60	85	13	1	0,6	2,8	2	7,6	1,4	17	65	80,5	
VCM71912-E-T-P4S-XL	–	0,14	60	85	13	1	0,6	2,8	2	7,6	1,4	25	65	80,5	
–	M7012-C-T-P4S-XL	0,42	60	95	18	1,1	0,6	–	–	–	–	17	67	88	
–	M7012-E-T-P4S-XL	0,42	60	95	18	1,1	0,6	–	–	–	–	25	67	88	
–	HCM7012-C-T-P4S-XL	0,39	60	95	18	1,1	0,6	2,8	2,8	10,15	1,4	17	67	88	
–	HCM7012-E-T-P4S-XL	0,39	60	95	18	1,1	0,6	2,8	2,8	10,15	1,4	25	67	88	
–	VCM7012-C-T-P4S-XL	0,39	60	95	18	1,1	0,6	2,8	2,8	10,15	1,4	17	67	88	
–	VCM7012-E-T-P4S-XL	0,39	60	95	18	1,1	0,6	2,8	2,8	10,15	1,4	25	67	88	

1) The ordering designation must always include data on the bearing arrangement and preload.

Further information on design variants, Figure 11.

Ordering example: HCM7014-E-T-P4S-DUL-XL.

The bearings are also available by agreement with gap seals (suffix 2RSD).

Ordering example: HCM7014-E-2RSD-T-P4S-UL-XL.

2) The limiting speeds are based on elastically preloaded single bearings.

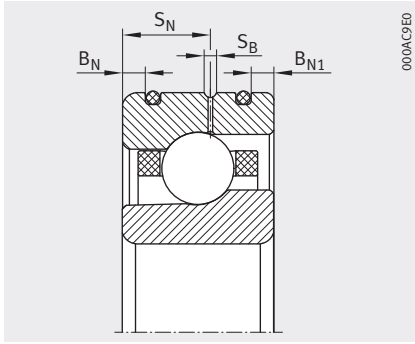
3) Minimal quantity oil lubrication.

4) Ordering examples for Direct Lube design: HCM7014-EDLR-T-P4S-UL-XL.

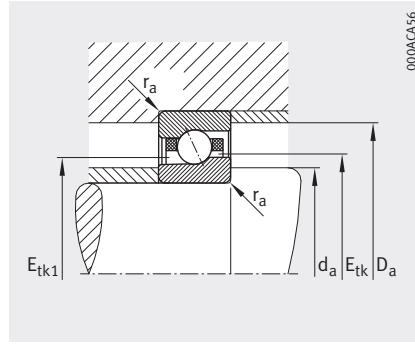
DLR only available up to bore code 22.

5) The chamfer radii of the adjacent construction must be smaller than r or r<sub>1</sub>.

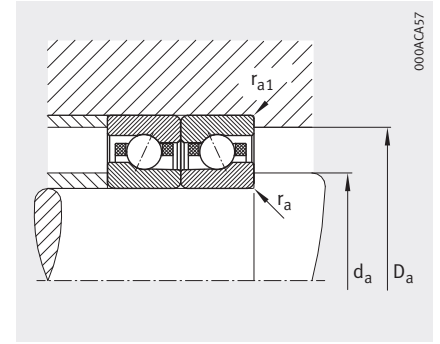




Design DLR<sup>4)</sup>



Mounting dimensions<sup>5)</sup>



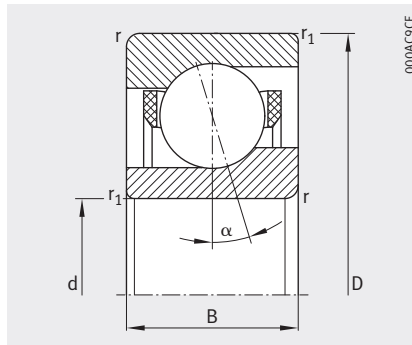
Mounting dimensions

			Basic load ratings		Limiting speeds <sup>2)</sup>		Preload force $F_V$			Lift-off force $K_{aE}$			Axial rigidity $c_a$		
$E_{tk}$	$E_{tk1}$	$E_{tk}$ $E_{tk1}$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N	$n_G$ grease $\text{min}^{-1}$	$n_G$ oil <sup>3)</sup> $\text{min}^{-1}$	L	M	H	L	M	H	L	M	H
min.	min.						N	N	N	N	N	N	N/ $\mu\text{m}$	N/ $\mu\text{m}$	N/ $\mu\text{m}$
62,7	59,7	65,1	18 500	9 900	24 500	37 100	104	276	583	307	840	1 838	50	73	100
62,7	59,7	65,1	17 700	9 500	23 000	34 100	150	393	820	431	1 148	2 438	100	141	186
62,7	59,7	65,1	18 500	9 500	30 400	44 500	73	194	406	213	576	1 243	49	71	95
62,7	59,7	65,1	17 700	9 100	28 900	41 500	106	277	575	303	801	1 687	100	140	183
62,7	59,7	65,1	44 500	13 300	31 200	48 900	66	174	363	191	514	1 105	49	70	94
62,7	59,7	65,1	42 500	12 700	29 700	44 500	95	249	516	272	718	1 509	100	139	182
67,7	64,7	70,1	19 400	11 000	22 800	34 500	116	306	645	340	931	2 038	55	80	110
67,7	64,7	70,1	18 500	10 500	21 400	31 800	166	435	908	477	1 271	2 700	110	155	205
67,7	64,7	70,1	19 500	10 500	28 300	41 400	81	214	450	236	638	1 378	54	78	105
67,7	64,7	70,1	18 600	10 000	26 900	38 700	117	306	637	335	887	1 869	110	154	201
67,7	64,7	70,1	46 500	14 700	29 000	45 600	73	192	403	212	570	1 225	54	77	103
67,7	64,7	70,1	44 500	14 000	27 600	41 400	105	275	572	301	794	1 671	109	153	200
67,7	64,7	70	19 400	11 000	22 800	34 500	116	306	645	340	931	2 038	55	80	110
67,7	64,7	70	18 500	10 500	21 400	31 800	166	435	908	477	1 271	2 700	110	155	205
67,7	64,7	70	19 500	10 500	28 300	41 400	81	214	450	236	638	1 378	54	78	105
67,7	64,7	70	18 600	10 000	26 900	38 700	117	306	637	335	887	1 869	110	154	201
67,7	64,7	70	46 500	14 700	29 000	45 600	73	192	403	212	570	1 225	54	77	103
67,7	64,7	70	44 500	14 000	27 600	41 400	105	275	572	301	794	1 671	109	153	200
72,7	69,7	75,1	19 800	11 600	21 300	32 300	122	323	680	358	981	2 150	57	84	115
72,7	69,7	75,1	18 800	11 000	20 000	29 700	175	458	956	503	1 339	2 845	115	162	214
72,7	69,7	75,1	19 800	11 100	26 500	38 800	86	226	474	249	673	1 453	57	81	110
72,7	69,7	75,1	18 900	10 600	25 200	36 200	123	323	671	353	934	1 968	115	161	211
72,7	69,7	75,1	47 500	15 500	27 100	42 600	77	203	424	223	601	1 292	56	81	108
72,7	69,7	75,1	45 500	14 800	25 900	38 800	111	290	602	317	837	1 760	115	160	209

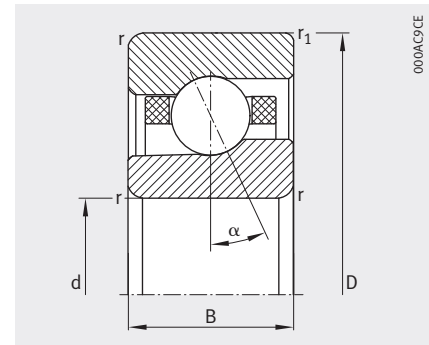
# High-speed spindle bearings

Steel or ceramic balls  
Rings made from steel or Vacrodur  
Open or sealed  
Design DLR

X-life



M719, HCM719, VCM719



M70, HCM70, VCM70

Dimension table (continued) · Dimensions in mm

Designation <sup>1)</sup>		Mass m ≈ kg	Dimensions										Contact angle $\alpha$ °	Mounting dimensions	
Series 719	Series 70		d	D	B	r	r <sub>1</sub>	B <sub>N</sub>	B <sub>N1</sub>	S <sub>N</sub>	S <sub>B</sub>	d <sub>a</sub> h12		D <sub>a</sub> H12	
						min.	min.								
M71913-C-T-P4S-XL	–	0,18	65	90	13	1	0,6	–	–	–	–	17	70	85,5	
M71913-E-T-P4S-XL	–	0,18	65	90	13	1	0,6	–	–	–	–	25	70	85,5	
HCM71913-C-T-P4S-XL	–	0,15	65	90	13	1	0,6	2,8	2	7,6	1,4	17	70	85,5	
HCM71913-E-T-P4S-XL	–	0,15	65	90	13	1	0,6	2,8	2	7,6	1,4	25	70	85,5	
VCM71913-C-T-P4S-XL	–	0,15	65	90	13	1	0,6	2,8	2	7,6	1,4	17	70	85,5	
VCM71913-E-T-P4S-XL	–	0,15	65	90	13	1	0,6	2,8	2	7,6	1,4	25	70	85,5	
–	M7013-C-T-P4S-XL	0,44	65	100	18	1,1	0,6	–	–	–	–	17	72	93	
–	M7013-E-T-P4S-XL	0,44	65	100	18	1,1	0,6	–	–	–	–	25	72	93	
–	HCM7013-C-T-P4S-XL	0,41	65	100	18	1,1	0,6	2,8	2,8	10,4	1,4	17	72	93	
–	HCM7013-E-T-P4S-XL	0,41	65	100	18	1,1	0,6	2,8	2,8	10,4	1,4	25	72	93	
–	VCM7013-C-T-P4S-XL	0,41	65	100	18	1,1	0,6	2,8	2,8	10,4	1,4	17	72	93	
–	VCM7013-E-T-P4S-XL	0,41	65	100	18	1,1	0,6	2,8	2,8	10,4	1,4	25	72	93	
M71914-C-T-P4S-XL	–	0,3	70	100	16	1	0,6	–	–	–	–	17	76	94,5	
M71914-E-T-P4S-XL	–	0,3	70	100	16	1	0,6	–	–	–	–	25	76	94,5	
HCM71914-C-T-P4S-XL	–	0,25	70	100	16	1	0,6	2,8	2,8	9,3	1,4	17	76	94,5	
HCM71914-E-T-P4S-XL	–	0,25	70	100	16	1	0,6	2,8	2,8	9,3	1,4	25	76	94,5	
VCM71914-C-T-P4S-XL	–	0,25	70	100	16	1	0,6	2,8	2,8	9,3	1,4	17	76	94,5	
VCM71914-E-T-P4S-XL	–	0,25	70	100	16	1	0,6	2,8	2,8	9,3	1,4	25	76	94,5	
–	M7014-C-T-P4S-XL	0,61	70	110	20	1,1	0,6	–	–	–	–	17	77	102	
–	M7014-E-T-P4S-XL	0,61	70	110	20	1,1	0,6	–	–	–	–	25	77	102	
–	HCM7014-C-T-P4S-XL	0,56	70	110	20	1,1	0,6	3	3	11,6	1,4	17	77	102	
–	HCM7014-E-T-P4S-XL	0,56	70	110	20	1,1	0,6	3	3	11,6	1,4	25	77	102	
–	VCM7014-C-T-P4S-XL	0,56	70	110	20	1,1	0,6	3	3	11,6	1,4	17	77	102	
–	VCM7014-E-T-P4S-XL	0,56	70	110	20	1,1	0,6	3	3	11,6	1,4	25	77	102	

1) The ordering designation must always include data on the bearing arrangement and preload.

Further information on design variants, Figure 11.

Ordering example: HCM7014-E-T-P4S-DUL-XL.

The bearings are also available by agreement with gap seals (suffix 2RSD).

Ordering example: HCM7014-E-2RSD-T-P4S-UL-XL.

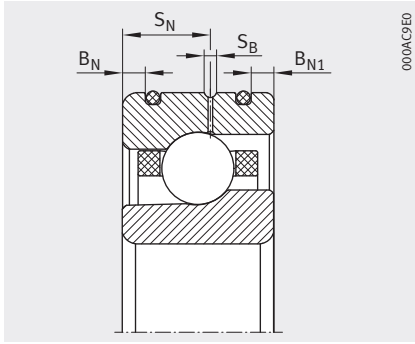
2) The limiting speeds are based on elastically preloaded single bearings.

3) Minimal quantity oil lubrication.

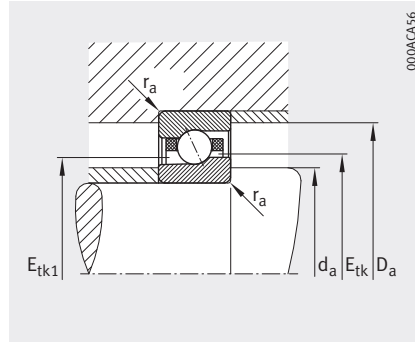
4) Ordering examples for Direct Lube design: HCM7014-EDLR-T-P4S-UL-XL.

DLR only available up to bore code 22.

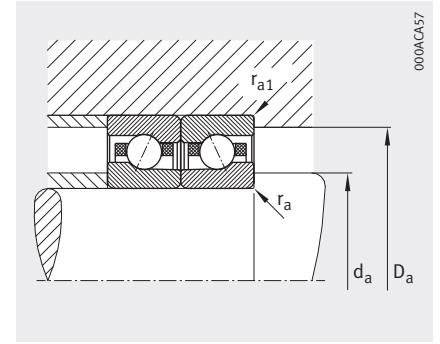
5) The chamfer radii of the adjacent construction must be smaller than r or r<sub>1</sub>.



Design DLR<sup>4)</sup>



Mounting dimensions<sup>5)</sup>

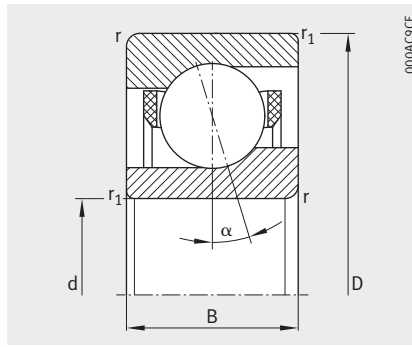


Mounting dimensions

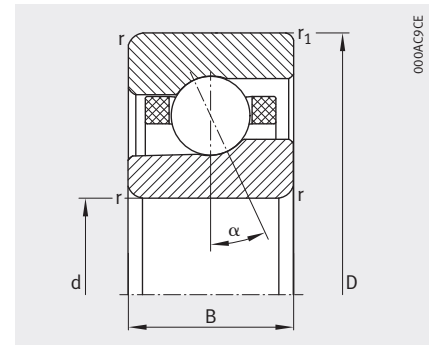
			Basic load ratings		Limiting speeds <sup>2)</sup>		Preload force $F_V$			Lift-off force $K_{aE}$			Axial rigidity $c_a$		
$E_{tk}$	$E_{tk1}$	$E_{tk}$ $E_{tk1}$ max.	dyn. $C_r$	stat. $C_{0r}$	$n_G$ grease	$n_G$ oil <sup>3)</sup>	L	M	H	L	M	H	L	M	H
min.	min.		N	N	$\text{min}^{-1}$	$\text{min}^{-1}$	N	N	N	N	N	N	N/ $\mu\text{m}$	N/ $\mu\text{m}$	N/ $\mu\text{m}$
72,7	69,7	75	19 800	11 600	21 300	32 300	122	323	680	358	981	2 150	57	84	115
72,7	69,7	75	18 800	11 000	20 000	29 700	175	458	956	503	1 339	2 845	115	162	214
72,7	69,7	75	19 800	11 100	26 500	38 800	86	226	474	249	673	1 453	57	81	110
72,7	69,7	75	18 900	10 600	25 200	36 200	123	323	671	353	934	1 968	115	161	211
72,7	69,7	75	47 500	15 500	27 100	42 600	77	203	424	223	601	1 292	56	81	108
72,7	69,7	75	45 500	14 800	25 900	38 800	111	290	602	317	837	1 760	115	160	209
77,7	74,7	80	20 100	12 100	20 000	30 400	128	339	715	377	1 032	2 260	60	88	120
77,7	74,7	80	19 100	11 600	18 800	27 900	183	481	1 004	528	1 406	2 988	120	170	224
77,7	74,7	80	20 100	11 600	24 900	36 400	90	237	498	262	707	1 528	59	85	115
77,7	74,7	80	19 200	11 100	23 700	34 000	129	339	705	371	981	2 067	120	169	220
77,7	74,7	80	48 000	16 300	25 500	40 000	81	213	446	234	631	1 358	59	84	113
77,7	74,7	80	46 000	15 500	24 300	36 400	116	304	632	333	879	1 849	120	168	218
79,3	75,7	82,1	27 000	15 700	19 500	29 500	165	437	921	485	1 327	2 905	65	96	131
79,3	75,7	82,1	26 000	15 000	18 300	27 100	237	621	1 295	681	1 813	3 851	131	186	245
79,3	75,7	82,1	27 000	15 000	24 200	35 300	116	306	641	337	910	1 965	65	93	125
79,3	75,7	82,1	26 000	14 300	23 000	33 000	167	437	909	478	1 265	2 665	132	184	241
79,3	75,7	82,1	65 000	21 000	24 800	38 900	104	274	574	302	812	1 747	64	92	123
79,3	75,7	82,1	62 000	20 100	23 600	35 300	150	393	816	429	1 133	2 383	131	183	239
84,3	80,7	87,2	27 500	16 500	18 400	27 800	173	460	969	510	1 397	3 060	68	100	137
84,3	80,7	87,2	26 500	15 700	17 300	25 600	249	653	1 362	716	1 908	4 053	137	194	256
84,3	80,7	87,2	27 500	15 800	22 800	33 400	122	322	675	355	958	2 069	68	97	131
84,3	80,7	87,2	26 500	15 100	21 700	31 200	176	460	956	503	1 331	2 804	138	193	252
84,3	80,7	87,2	66 000	22 100	23 400	36 700	110	289	605	318	855	1 839	67	96	129
84,3	80,7	87,2	63 000	21 100	22 300	33 400	158	413	858	451	1 192	2 508	137	192	250

# High-speed spindle bearings

Steel or ceramic balls  
Rings made from steel or Vacrodur  
Open or sealed  
Design DLR



M719, HCM719, VCM719



M70, HCM70, VCM70

Dimension table (continued) · Dimensions in mm

Designation <sup>1)</sup>		Mass m ≈ kg	Dimensions										Contact angle α °	Mounting dimensions	
Series 719	Series 70		d	D	B	r	r <sub>1</sub>	B <sub>N</sub>	B <sub>N1</sub>	S <sub>N</sub>	S <sub>B</sub>	d <sub>a</sub> h12		D <sub>a</sub> H12	
						min.	min.								
M71915-C-T-P4S-XL	–	0,32	75	105	16	1	0,6	–	–	–	–	17	81	99,5	
M71915-E-T-P4S-XL	–	0,32	75	105	16	1	0,6	–	–	–	–	25	81	99,5	
HCM71915-C-T-P4S-XL	–	0,27	75	105	16	1	0,6	2,8	2,8	9,3	1,4	17	81	99,5	
HCM71915-E-T-P4S-XL	–	0,27	75	105	16	1	0,6	2,8	2,8	9,3	1,4	25	81	99,5	
VCM71915-C-T-P4S-XL	–	0,27	75	105	16	1	0,6	2,8	2,8	9,3	1,4	17	81	99,5	
VCM71915-E-T-P4S-XL	–	0,27	75	105	16	1	0,6	2,8	2,8	9,3	1,4	25	81	99,5	
–	M7015-C-T-P4S-XL	0,64	75	115	20	1,1	0,6	–	–	–	–	17	82	107	
–	M7015-E-T-P4S-XL	0,64	75	115	20	1,1	0,6	–	–	–	–	25	82	107	
–	HCM7015-C-T-P4S-XL	0,59	75	115	20	1,1	0,6	3	3	11,6	1,4	17	82	107	
–	HCM7015-E-T-P4S-XL	0,59	75	115	20	1,1	0,6	3	3	11,6	1,4	25	82	107	
–	VCM7015-C-T-P4S-XL	0,59	75	115	20	1,1	0,6	3	3	11,6	1,4	17	82	107	
–	VCM7015-E-T-P4S-XL	0,59	75	115	20	1,1	0,6	3	3	11,6	1,4	25	82	107	
M71916-C-T-P4S-XL	–	0,33	80	110	16	1	0,6	–	–	–	–	17	86	104	
M71916-E-T-P4S-XL	–	0,33	80	110	16	1	0,6	–	–	–	–	25	86	104	
HCM71916-C-T-P4S-XL	–	0,28	80	110	16	1	0,6	2,8	2,8	9,3	1,4	17	86	104	
HCM71916-E-T-P4S-XL	–	0,28	80	110	16	1	0,6	2,8	2,8	9,3	1,4	25	86	104	
VCM71916-C-T-P4S-XL	–	0,28	80	110	16	1	0,6	2,8	2,8	9,3	1,4	17	86	104	
VCM71916-E-T-P4S-XL	–	0,28	80	110	16	1	0,6	2,8	2,8	9,3	1,4	25	86	104	
–	M7016-C-T-P4S-XL	0,87	80	125	22	1,1	0,6	–	–	–	–	17	88	117	
–	M7016-E-T-P4S-XL	0,87	80	125	22	1,1	0,6	–	–	–	–	25	88	117	
–	HCM7016-C-T-P4S-XL	0,81	80	125	22	1,1	0,6	3,3	3,3	12,35	2,2	17	88	117	
–	HCM7016-E-T-P4S-XL	0,81	80	125	22	1,1	0,6	3,3	3,3	12,35	2,2	25	88	117	
–	VCM7016-C-T-P4S-XL	0,81	80	125	22	1,1	0,6	3,3	3,3	12,35	2,2	17	88	117	
–	VCM7016-E-T-P4S-XL	0,81	80	125	22	1,1	0,6	3,3	3,3	12,35	2,2	25	88	117	

1) The ordering designation must always include data on the bearing arrangement and preload.

Further information on design variants, Figure 11.

Ordering example: HCM7014-E-T-P4S-DUL-XL.

The bearings are also available by agreement with gap seals (suffix 2RSD).

Ordering example: HCM7014-E-2RSD-T-P4S-UL-XL.

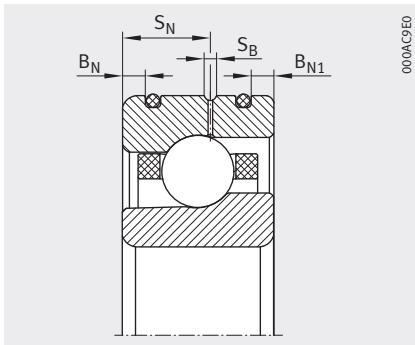
2) The limiting speeds are based on elastically preloaded single bearings.

3) Minimal quantity oil lubrication.

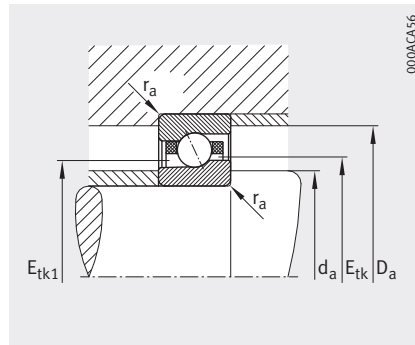
4) Ordering examples for Direct Lube design: HCM7014-EDLR-T-P4S-UL-XL.

DLR only available up to bore code 22.

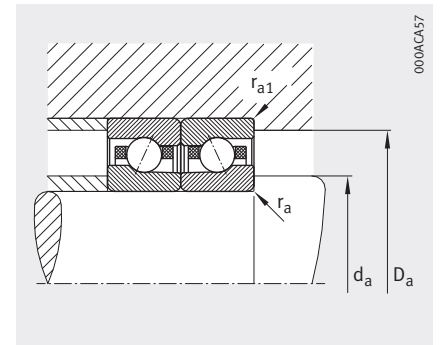
5) The chamfer radii of the adjacent construction must be smaller than r or r<sub>1</sub>.



Design DLR<sup>4)</sup>



Mounting dimensions<sup>5)</sup>

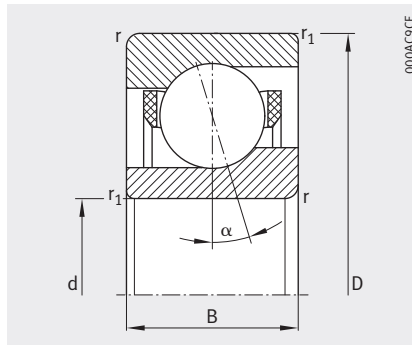


Mounting dimensions

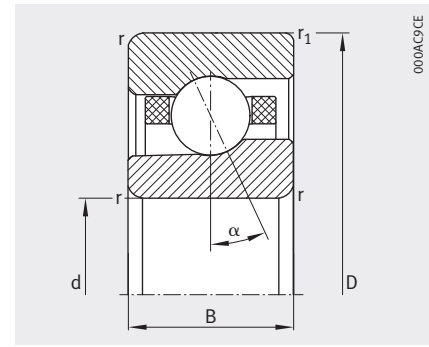
			Basic load ratings		Limiting speeds <sup>2)</sup>		Preload force $F_V$			Lift-off force $K_{aE}$			Axial rigidity $c_a$		
$E_{tk}$	$E_{tk1}$	$E_{tk}$ $E_{tk1}$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N	$n_G$ grease $\text{min}^{-1}$	$n_G$ oil <sup>3)</sup> $\text{min}^{-1}$	L	M	H	L	M	H	L	M	H
min.	min.						N	N	N	N	N	N	N/ $\mu\text{m}$	N/ $\mu\text{m}$	N/ $\mu\text{m}$
84,3	80,7	87,1	27 500	16 500	18 400	27 800	173	460	969	510	1 397	3 060	68	100	137
84,3	80,7	87,1	26 500	15 700	17 300	25 600	249	653	1 362	716	1 908	4 053	137	194	256
84,3	80,7	87,1	27 500	15 800	22 800	33 400	122	322	675	355	958	2 069	68	97	131
84,3	80,7	87,1	26 500	15 100	21 700	31 200	176	460	956	503	1 331	2 804	138	193	252
84,3	80,7	87,1	66 000	22 100	23 400	36 700	110	289	605	318	855	1 839	67	96	129
84,3	80,7	87,1	63 000	21 100	22 300	33 400	158	413	858	451	1 192	2 508	137	192	250
89,3	85,7	92,1	28 000	17 300	17 400	26 400	182	483	1 017	536	1 467	3 214	71	105	143
89,3	85,7	92,1	26 500	16 500	16 400	24 300	261	685	1 429	752	2 002	4 254	143	203	268
89,3	85,7	92,1	28 000	16 600	21 600	31 600	128	338	709	373	1 006	2 173	71	102	137
89,3	85,7	92,1	27 000	15 800	20 600	29 500	184	483	1 003	528	1 396	2 943	144	202	263
89,3	85,7	92,1	67 000	23 200	22 200	34 800	115	303	635	334	898	1 932	70	101	135
89,3	85,7	92,1	64 000	22 100	21 100	31 600	166	433	900	474	1 251	2 632	143	200	261
89,3	85,7	92,1	28 000	17 300	17 400	26 400	182	483	1 017	536	1 467	3 214	71	105	143
89,3	85,7	92,1	26 500	16 500	16 400	24 300	261	685	1 429	752	2 002	4 254	143	203	268
89,3	85,7	92,1	28 000	16 600	21 600	31 600	128	338	709	373	1 006	2 173	71	102	137
89,3	85,7	92,1	27 000	15 800	20 600	29 500	184	483	1 003	528	1 396	2 943	144	202	263
89,3	85,7	92,1	67 000	23 200	22 200	34 800	115	303	635	334	898	1 932	70	101	135
89,3	85,7	92,1	64 000	22 100	21 100	31 600	166	433	900	474	1 251	2 632	143	200	261
96,3	92,4	99,6	34 000	22 800	16 100	24 400	241	640	1 353	715	1 977	4 374	83	122	170
96,3	92,4	99,6	32 500	21 700	15 200	22 500	345	907	1 895	996	2 668	5 705	164	234	311
96,3	92,4	99,6	34 000	21 800	20 000	29 300	169	447	941	495	1 348	2 936	81	118	161
96,3	92,4	99,6	32 500	20 800	19 100	27 400	243	638	1 328	698	1 855	3 929	164	231	304
96,3	92,4	99,6	82 000	30 500	20 500	31 900	152	401	842	443	1 200	2 604	81	117	158
96,3	92,4	99,6	78 000	29 000	19 600	29 300	218	572	1 191	627	1 661	3 509	163	230	301

# High-speed spindle bearings

Steel or ceramic balls  
Rings made from steel or Vacrodur  
Open or sealed  
Design DLR



M719, HCM719, VCM719



M70, HCM70, VCM70

Dimension table (continued) · Dimensions in mm

Designation <sup>1)</sup>		Mass m ≈ kg	Dimensions										Contact angle α °	Mounting dimensions	
Series 719	Series 70		d	D	B	r	r <sub>1</sub>	B <sub>N</sub>	B <sub>N1</sub>	S <sub>N</sub>	S <sub>B</sub>	d <sub>a</sub> h12		D <sub>a</sub> H12	
						min.	min.								
M71917-C-T-P4S-XL	–	0,49	85	120	18	1,1	0,6	–	–	–	–	17	92	114	
M71917-E-T-P4S-XL	–	0,49	85	120	18	1,1	0,6	–	–	–	–	25	92	114	
HCM71917-C-T-P4S-XL	–	0,43	85	120	18	1,1	0,6	3,1	3,1	10,4	1,4	17	92	114	
HCM71917-E-T-P4S-XL	–	0,43	85	120	18	1,1	0,6	3,1	3,1	10,4	1,4	25	92	114	
VCM71917-C-T-P4S-XL	–	0,43	85	120	18	1,1	0,6	3,1	3,1	10,4	1,4	17	92	114	
VCM71917-E-T-P4S-XL	–	0,43	85	120	18	1,1	0,6	3,1	3,1	10,4	1,4	25	92	114	
–	M7017-C-T-P4S-XL	0,92	85	130	22	1,1	0,6	–	–	–	–	17	93	122	
–	M7017-E-T-P4S-XL	0,92	85	130	22	1,1	0,6	–	–	–	–	25	93	122	
–	HCM7017-C-T-P4S-XL	0,85	85	130	22	1,1	0,6	3,3	3,3	12,35	2,2	17	93	122	
–	HCM7017-E-T-P4S-XL	0,85	85	130	22	1,1	0,6	3,3	3,3	12,35	2,2	25	93	122	
–	VCM7017-C-T-P4S-XL	0,85	85	130	22	1,1	0,6	3,3	3,3	12,35	2,2	17	93	122	
–	VCM7017-E-T-P4S-XL	0,85	85	130	22	1,1	0,6	3,3	3,3	12,35	2,2	25	93	122	
M71918-C-T-P4S-XL	–	0,52	90	125	18	1,1	0,6	–	–	–	–	17	97	119	
M71918-E-T-P4S-XL	–	0,52	90	125	18	1,1	0,6	–	–	–	–	25	97	119	
HCM71918-C-T-P4S-XL	–	0,45	90	125	18	1,1	0,6	3,1	3,1	10,4	2,2	17	97	119	
HCM71918-E-T-P4S-XL	–	0,45	90	125	18	1,1	0,6	3,1	3,1	10,4	2,2	25	97	119	
VCM71918-C-T-P4S-XL	–	0,45	90	125	18	1,1	0,6	3,1	3,1	10,4	2,2	17	97	119	
VCM71918-E-T-P4S-XL	–	0,45	90	125	18	1,1	0,6	3,1	3,1	10,4	2,2	25	97	119	
–	M7018-C-T-P4S-XL	1,2	90	140	24	1,5	1	–	–	–	–	17	100	131	
–	M7018-E-T-P4S-XL	1,2	90	140	24	1,5	1	–	–	–	–	25	100	131	
–	HCM7018-C-T-P4S-XL	1,1	90	140	24	1,5	1	4	4	14,5	2,2	17	100	131	
–	HCM7018-E-T-P4S-XL	1,1	90	140	24	1,5	1	4	4	14,5	2,2	25	100	131	
–	VCM7018-C-T-P4S-XL	1,1	90	140	24	1,5	1	4	4	14,5	2,2	17	100	131	
–	VCM7018-E-T-P4S-XL	1,1	90	140	24	1,5	1	4	4	14,5	2,2	25	100	131	

1) The ordering designation must always include data on the bearing arrangement and preload.

Further information on design variants, Figure 11.

Ordering example: HCM7014-E-T-P4S-DUL-XL.

The bearings are also available by agreement with gap seals (suffix 2RSD).

Ordering example: HCM7014-E-2RSD-T-P4S-UL-XL.

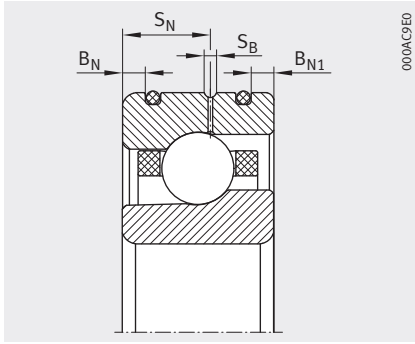
2) The limiting speeds are based on elastically preloaded single bearings.

3) Minimal quantity oil lubrication.

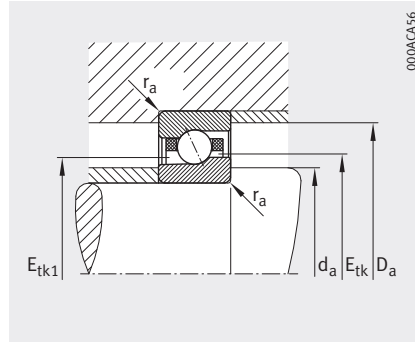
4) Ordering examples for Direct Lube design: HCM7014-EDLR-T-P4S-UL-XL.

DLR only available up to bore code 22.

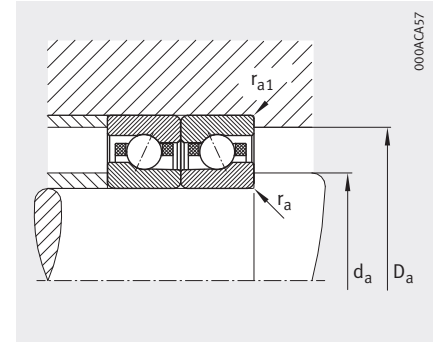
5) The chamfer radii of the adjacent construction must be smaller than r or r<sub>1</sub>.



Design DLR<sup>4)</sup>



Mounting dimensions<sup>5)</sup>

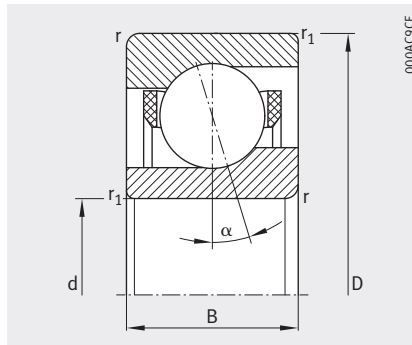


Mounting dimensions

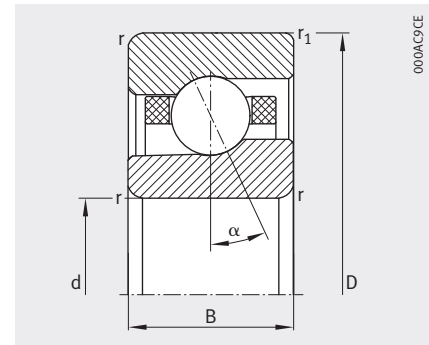
			Basic load ratings		Limiting speeds <sup>2)</sup>		Preload force			Lift-off force			Axial rigidity		
$E_{tk}$	$E_{tk1}$	$E_{tk}$ $E_{tk1}$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N	$n_G$ grease $\text{min}^{-1}$	$n_G$ oil <sup>3)</sup> $\text{min}^{-1}$	L	M	H	L	M	H	L	M	H
min.	min.						N	N	N	N	N	N	N/ $\mu\text{m}$	N/ $\mu\text{m}$	N/ $\mu\text{m}$
96,3	92,4	99,5	31 500	19 300	16 100	24 400	203	537	1 131	596	1 630	3 569	74	108	148
96,3	92,4	99,5	30 000	18 400	15 200	22 500	291	764	1 592	838	2 230	4 737	149	210	277
96,3	92,4	99,5	31 500	18 500	20 000	29 300	142	376	788	414	1 118	2 414	73	105	142
96,3	92,4	99,5	30 000	17 600	19 100	27 400	205	538	1 118	588	1 556	3 278	149	209	273
96,3	92,4	99,5	75 000	26 000	20 500	32 200	128	337	706	371	998	2 146	73	104	139
96,3	92,4	99,5	72 000	24 700	19 600	29 300	185	483	1 003	528	1 394	2 932	148	208	270
101,3	97,4	104,5	35 500	24 800	15 400	23 300	262	698	1 476	780	2 157	4 772	90	133	185
101,3	97,4	104,5	33 500	23 700	14 500	21 400	376	988	2 066	1 086	2 909	6 220	178	254	337
101,3	97,4	104,5	35 500	23 800	19 100	28 000	184	488	1 026	540	1 470	3 203	88	128	175
101,3	97,4	104,5	34 000	22 700	18 200	26 100	265	695	1 448	761	2 022	4 283	178	251	330
101,3	97,4	104,5	85 000	33 500	19 600	29 100	165	437	918	483	1 309	2 841	88	127	171
101,3	97,4	104,5	81 000	32 000	18 700	28 000	238	624	1 298	683	1 811	3 826	177	249	327
101,3	97,4	104,4	33 000	21 000	15 400	23 300	221	585	1 233	650	1 778	3 894	80	117	161
101,3	97,4	104,4	31 000	20 100	14 500	21 400	317	832	1 736	913	2 431	5 164	161	228	301
101,3	97,4	104,4	33 000	20 100	19 100	28 000	155	410	859	452	1 220	2 633	80	114	154
101,3	97,4	104,4	31 500	19 200	18 200	26 100	224	586	1 219	641	1 696	3 574	162	227	296
101,3	97,4	104,4	79 000	28 000	19 600	30 600	139	367	769	405	1 089	2 341	79	113	151
101,3	97,4	104,4	75 000	27 000	18 700	28 000	201	526	1 093	575	1 520	3 196	161	225	294
108,3	104,1	111,7	39 500	27 500	14 400	21 800	291	775	1 639	866	2 395	5 299	93	137	191
108,3	104,1	111,7	37 500	26 000	13 500	20 000	418	1 098	2 295	1 207	3 232	6 910	184	262	349
108,3	104,1	111,7	39 500	26 500	17 900	26 100	205	542	1 140	599	1 632	3 557	91	133	181
108,3	104,1	111,7	37 500	25 000	17 000	24 400	295	772	1 608	846	2 247	4 759	184	260	341
108,3	104,1	111,7	95 000	37 000	18 300	27 600	184	485	1 020	536	1 454	3 155	91	131	177
108,3	104,1	111,7	90 000	35 000	17 400	26 100	265	693	1 443	759	2 012	4 250	183	258	338

# High-speed spindle bearings

Steel or ceramic balls  
Rings made from steel or Vacrodur  
Open or sealed  
Design DLR



M719, HCM719, VCM719



M70, HCM70, VCM70

Dimension table (continued) · Dimensions in mm

Designation <sup>1)</sup>		Mass m ≈ kg	Dimensions										Contact angle α °	Mounting dimensions	
Series 719	Series 70		d	D	B	r	r <sub>1</sub>	B <sub>N</sub>	B <sub>N1</sub>	S <sub>N</sub>	S <sub>B</sub>	d <sub>a</sub> h12		D <sub>a</sub> H12	
						min.	min.								
M71919-C-T-P4S-XL	–	0,54	95	130	18	1,1	0,6	–	–	–	–	17	102	124	
M71919-E-T-P4S-XL	–	0,54	95	130	18	1,1	0,6	–	–	–	–	25	102	124	
HCM71919-C-T-P4S-XL	–	0,47	95	130	18	1,1	0,6	3,1	3,1	10,4	2,2	17	102	124	
HCM71919-E-T-P4S-XL	–	0,47	95	130	18	1,1	0,6	3,1	3,1	10,4	2,2	25	102	124	
VCM71919-C-T-P4S-XL	–	0,47	95	130	18	1,1	0,6	3,1	3,1	10,4	2,2	17	102	124	
VCM71919-E-T-P4S-XL	–	0,47	95	130	18	1,1	0,6	3,1	3,1	10,4	2,2	25	102	124	
–	M7019-C-T-P4S-XL	1,3	95	145	24	1,5	1	–	–	–	–	17	105	136	
–	M7019-E-T-P4S-XL	1,3	95	145	24	1,5	1	–	–	–	–	25	105	136	
–	HCM7019-C-T-P4S-XL	1,2	95	145	24	1,5	1	4	4	14,5	2,2	17	105	136	
–	HCM7019-E-T-P4S-XL	1,2	95	145	24	1,5	1	4	4	14,5	2,2	25	105	136	
–	VCM7019-C-T-P4S-XL	1,2	95	145	24	1,5	1	4	4	14,5	2,2	17	105	136	
–	VCM7019-E-T-P4S-XL	1,2	95	145	24	1,5	1	4	4	14,5	2,2	25	105	136	
M71920-C-T-P4S-XL	–	0,76	100	140	20	1,1	0,6	–	–	–	–	17	107	133	
M71920-E-T-P4S-XL	–	0,76	100	140	20	1,1	0,6	–	–	–	–	25	107	133	
HCM71920-C-T-P4S-XL	–	0,67	100	140	20	1,1	0,6	3,4	3,4	12	2,2	17	107	133	
HCM71920-E-T-P4S-XL	–	0,67	100	140	20	1,1	0,6	3,4	3,4	12	2,2	25	107	133	
VCM71920-C-T-P4S-XL	–	0,67	100	140	20	1,1	0,6	3,4	3,4	12	2,2	17	107	133	
VCM71920-E-T-P4S-XL	–	0,67	100	140	20	1,1	0,6	3,4	3,4	12	2,2	25	107	133	
–	M7020-C-T-P4S-XL	1,3	100	150	24	1,5	1	–	–	–	–	17	110	141	
–	M7020-E-T-P4S-XL	1,3	100	150	24	1,5	1	–	–	–	–	25	110	141	
–	HCM7020-C-T-P4S-XL	1,2	100	150	24	1,5	1	4	4	14,5	2,2	17	110	141	
–	HCM7020-E-T-P4S-XL	1,2	100	150	24	1,5	1	4	4	14,5	2,2	25	110	141	
–	VCM7020-C-T-P4S-XL	1,2	100	150	24	1,5	1	4	4	14,5	2,2	17	110	141	
–	VCM7020-E-T-P4S-XL	1,2	100	150	24	1,5	1	4	4	14,5	2,2	25	110	141	

1) The ordering designation must always include data on the bearing arrangement and preload.

Further information on design variants, Figure 11.

Ordering example: HCM7014-E-T-P4S-DUL-XL.

The bearings are also available by agreement with gap seals (suffix 2RSD).

Ordering example: HCM7014-E-2RSD-T-P4S-UL-XL.

2) The limiting speeds are based on elastically preloaded single bearings.

3) Minimal quantity oil lubrication.

4) Ordering examples for Direct Lube design: HCM7014-EDLR-T-P4S-UL-XL.

DLR only available up to bore code 22.

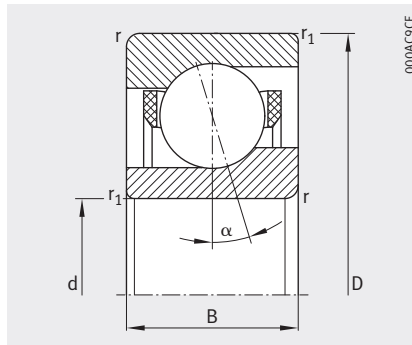
5) The chamfer radii of the adjacent construction must be smaller than r or r<sub>1</sub>.



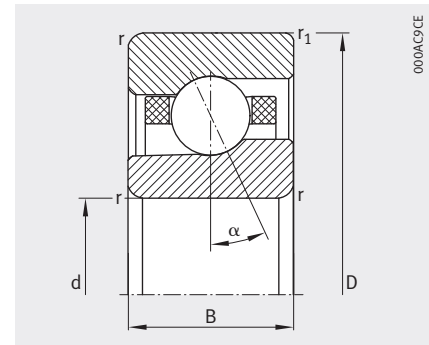


# High-speed spindle bearings

Steel or ceramic balls  
Rings made from steel or Vacrodur  
Open or sealed  
Design DLR



M719, HCM719, VCM719



M70, HCM70, VCM70

Dimension table (continued) · Dimensions in mm

Designation <sup>1)</sup>		Mass m ≈ kg	Dimensions										Contact angle α °	Mounting dimensions	
Series 719	Series 70		d	D	B	r	r <sub>1</sub>	B <sub>N</sub>	B <sub>N1</sub>	S <sub>N</sub>	S <sub>B</sub>	d <sub>a</sub> h12		D <sub>a</sub> H12	
						min.	min.								
M71921-C-T-P4S-XL	–	0,79	105	145	20	1,1	0,6	–	–	–	–	17	112	138	
M71921-E-T-P4S-XL	–	0,79	105	145	20	1,1	0,6	–	–	–	–	25	112	138	
HCM71921-C-T-P4S-XL	–	0,69	105	145	20	1,1	0,6	3,4	3,4	12	2,2	17	112	138	
HCM71921-E-T-P4S-XL	–	0,69	105	145	20	1,1	0,6	3,4	3,4	12	2,2	25	112	138	
VCM71921-C-T-P4S-XL	–	0,69	105	145	20	1,1	0,6	3,4	3,4	12	2,2	17	112	138	
VCM71921-E-T-P4S-XL	–	0,69	105	145	20	1,1	0,6	3,4	3,4	12	2,2	25	112	138	
–	M7021-C-T-P4S-XL	1,6	105	160	26	2	1	–	–	–	–	17	116	150	
–	M7021-E-T-P4S-XL	1,6	105	160	26	2	1	–	–	–	–	25	116	150	
–	HCM7021-C-T-P4S-XL	1,5	105	160	26	2	1	4,2	4,2	15,5	2,2	17	116	150	
–	HCM7021-E-T-P4S-XL	1,5	105	160	26	2	1	4,2	4,2	15,5	2,2	25	116	150	
–	VCM7021-C-T-P4S-XL	1,5	105	160	26	2	1	4,2	4,2	15,5	2,2	17	116	150	
–	VCM7021-E-T-P4S-XL	1,5	105	160	26	2	1	4,2	4,2	15,5	2,2	25	116	150	
M71922-C-T-P4S-XL	–	0,82	110	150	20	1,1	0,6	–	–	–	–	17	117	143	
M71922-E-T-P4S-XL	–	0,82	110	150	20	1,1	0,6	–	–	–	–	25	117	143	
HCM71922-C-T-P4S-XL	–	0,72	110	150	20	1,1	0,6	3,4	3,4	12	2,2	17	117	143	
HCM71922-E-T-P4S-XL	–	0,72	110	150	20	1,1	0,6	3,4	3,4	12	2,2	25	117	143	
VCM71922-C-T-P4S-XL	–	0,72	110	150	20	1,1	0,6	3,4	3,4	12	2,2	17	117	143	
VCM71922-E-T-P4S-XL	–	0,72	110	150	20	1,1	0,6	3,4	3,4	12	2,2	25	117	143	
–	M7022-C-T-P4S-XL	2,1	110	170	28	2	1	–	–	–	–	17	121	159	
–	M7022-E-T-P4S-XL	2,1	110	170	28	2	1	–	–	–	–	25	121	159	
–	HCM7022-C-T-P4S-XL	1,9	110	170	28	2	1	5,2	5,2	16,2	2,2	17	121	159	
–	HCM7022-E-T-P4S-XL	1,9	110	170	28	2	1	5,2	5,2	16,2	2,2	25	121	159	
–	VCM7022-C-T-P4S-XL	2,09	110	170	28	2	1	5,2	5,2	16,2	2,2	17	121	159	
–	VCM7022-E-T-P4S-XL	2,09	110	170	28	2	1	5,2	5,2	16,2	2,2	25	121	159	

1) The ordering designation must always include data on the bearing arrangement and preload.

Further information on design variants, Figure 11.

Ordering example: HCM7014-E-T-P4S-DUL-XL.

The bearings are also available by agreement with gap seals (suffix 2RSD).

Ordering example: HCM7014-E-2RSD-T-P4S-UL-XL.

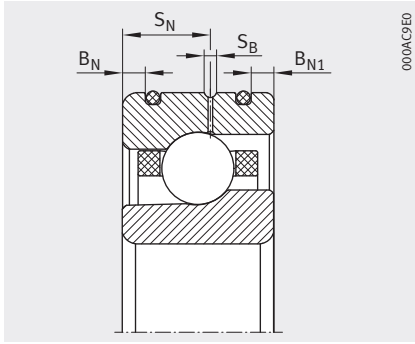
2) The limiting speeds are based on elastically preloaded single bearings.

3) Minimal quantity oil lubrication.

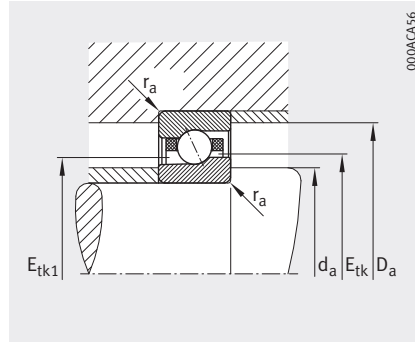
4) Ordering examples for Direct Lube design: HCM7014-EDLR-T-P4S-UL-XL.

DLR only available up to bore code 22.

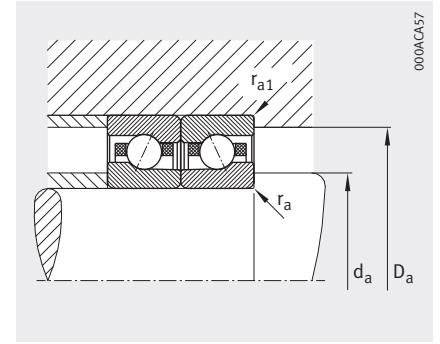
5) The chamfer radii of the adjacent construction must be smaller than r or r<sub>1</sub>.



Design DLR<sup>4)</sup>



Mounting dimensions<sup>5)</sup>



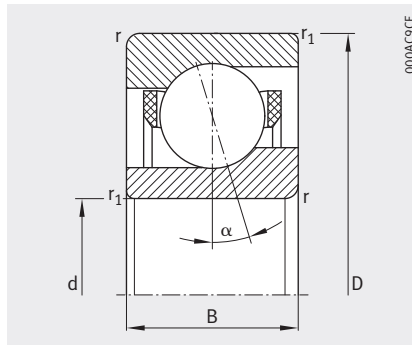
Mounting dimensions

			Basic load ratings		Limiting speeds <sup>2)</sup>		Preload force $F_V$			Lift-off force $K_{aE}$			Axial rigidity $C_a$		
$E_{tk}$	$E_{tk1}$	$E_{tk}$ $E_{tk1}$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N	$n_G$ grease $\text{min}^{-1}$	$n_G$ oil <sup>3)</sup> $\text{min}^{-1}$	L	M	H	L	M	H	L	M	H
min.	min.						N	N	N	N	N	N	N/ $\mu\text{m}$	N/ $\mu\text{m}$	N/ $\mu\text{m}$
118,3	114,1	121,6	39 000	27 000	13 200	20 000	281	745	1 569	827	2 265	4 962	94	137	188
118,3	114,1	121,6	37 000	25 500	12 400	18 400	403	1 058	2 207	1 161	3 092	6 571	188	266	351
118,3	114,1	121,6	39 000	25 500	16 400	24 000	198	521	1 093	575	1 553	3 354	93	134	180
118,3	114,1	121,6	37 000	24 400	15 600	22 400	285	745	1 549	815	2 157	4 546	189	265	346
118,3	114,1	121,6	94 000	36 000	16 800	24 700	177	467	979	515	1 385	2 981	92	132	177
118,3	114,1	121,6	89 000	34 000	16 000	24 000	256	669	1 390	732	1 933	4 065	188	263	343
124,9	120,1	129	53 000	39 500	12 500	18 900	419	1 114	2 356	1 244	3 445	7 626	115	171	238
124,9	120,1	129	51 000	38 000	11 700	17 400	599	1 574	3 292	1 731	4 636	9 916	229	326	433
124,9	120,1	129	53 000	38 000	15 500	22 700	294	778	1 638	861	2 347	5 116	113	165	225
124,9	120,1	129	51 000	36 000	14 800	21 200	422	1 107	2 306	1 213	3 222	6 827	229	323	424
124,9	120,1	129	128 000	53 000	15 900	23 400	264	697	1 465	770	2 090	4 537	112	163	220
124,9	120,1	129	122 000	51 000	15 100	22 700	379	994	2 069	1 088	2 885	6 097	228	320	420
123,3	119,1	126,5	39 500	28 000	12 700	19 300	292	775	1 633	861	2 357	5 165	97	142	195
123,3	119,1	126,5	37 500	26 500	12 000	17 700	419	1 101	2 296	1 208	3 217	6 837	195	276	365
123,3	119,1	126,5	39 500	26 500	15 800	23 000	206	542	1 138	598	1 616	3 491	96	139	187
123,3	119,1	126,5	38 000	25 500	15 000	21 600	296	775	1 612	848	2 244	4 730	196	275	359
123,3	119,1	126,5	95 000	37 500	16 200	23 000	185	486	1 019	536	1 442	3 103	96	137	184
123,3	119,1	126,5	91 000	35 500	15 400	23 000	266	696	1 446	761	2 010	4 230	195	273	356
132,4	127,6	136,4	54 000	41 500	11 800	17 900	437	1 164	2 461	1 300	3 600	7 970	120	178	248
132,4	127,6	136,4	51 000	39 500	11 100	16 500	625	1 644	3 437	1 807	4 841	10 356	238	339	451
132,4	127,6	136,4	54 000	39 500	14 700	21 500	307	813	1 711	900	2 452	5 346	118	171	234
132,4	127,6	136,4	51 000	37 500	14 000	20 000	441	1 156	2 408	1 266	3 365	7 129	238	335	441
132,4	127,6	136,4	129 000	55 000	15 000	21 500	276	728	1 530	805	2 184	4 742	117	169	229
132,4	127,6	136,4	123 000	52 000	14 300	21 500	396	1 038	2 160	1 136	3 012	6 367	237	333	436

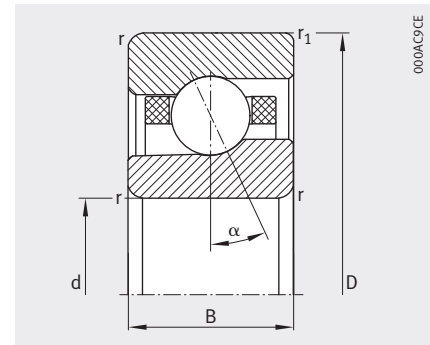
# High-speed spindle bearings

Steel or ceramic balls  
Rings made from steel or Vacrodur  
Open or sealed

**X-life**



M719, HCM719, VCM719



M70, HCM70, VCM70

**Dimension table** (continued) · Dimensions in mm

Designation <sup>1)</sup>		Mass m ≈ kg	Dimensions					Contact angle α °	Mounting dimensions	
Series 719	Series 70		d	D	B	r min.	r <sub>1</sub> min.		d <sub>a</sub> h12	D <sub>a</sub> H12
M71924-C-T-P4S-XL	–	1,1	120	165	22	1,1	0,6	17	128	157
M71924-E-T-P4S-XL	–	1,1	120	165	22	1,1	0,6	25	128	157
HCM71924-C-T-P4S-XL	–	0,97	120	165	22	1,1	0,6	17	128	157
HCM71924-E-T-P4S-XL	–	0,97	120	165	22	1,1	0,6	25	128	157
VCM71924-C-T-P4S-XL	–	1,11	120	165	22	1,1	0,6	17	128	157
VCM71924-E-T-P4S-XL	–	1,11	120	165	22	1,1	0,6	25	128	157
–	M7024-C-T-P4S-XL	2,2	120	180	28	2	1	17	131	169
–	M7024-E-T-P4S-XL	2,2	120	180	28	2	1	25	131	169
–	HCM7024-C-T-P4S-XL	2,1	120	180	28	2	1	17	131	169
–	HCM7024-E-T-P4S-XL	2,1	120	180	28	2	1	25	131	169
–	VCM7024-C-T-P4S-XL	2,23	120	180	28	2	1	17	131	169
–	VCM7024-E-T-P4S-XL	2,23	120	180	28	2	1	25	131	169
M71926-C-T-P4S-XL	–	1,5	130	180	24	1,5	1	17	139	171
M71926-E-T-P4S-XL	–	1,5	130	180	24	1,5	1	25	139	171
HCM71926-C-T-P4S-XL	–	1,4	130	180	24	1,5	1	17	139	171
HCM71926-E-T-P4S-XL	–	1,4	130	180	24	1,5	1	25	139	171
VCM71926-C-T-P4S-XL	–	1,53	130	180	24	1,5	1	17	139	171
VCM71926-E-T-P4S-XL	–	1,53	130	180	24	1,5	1	25	139	171
–	M7026-C-T-P4S-XL	3,6	130	200	33	2	1	17	142	189
–	M7026-E-T-P4S-XL	3,6	130	200	33	2	1	25	142	189
–	HCM7026-C-T-P4S-XL	3,4	130	200	33	2	1	17	142	189
–	HCM7026-E-T-P4S-XL	3,4	130	200	33	2	1	25	142	189
–	VCM7026-C-T-P4S-XL	3,56	130	200	33	2	1	17	142	189
–	VCM7026-E-T-P4S-XL	3,56	130	200	33	2	1	25	142	189

<sup>1)</sup> The ordering designation must always include data on the bearing arrangement and preload.

Further information on design variants, Figure 11.

Ordering example: HCM7014-E-T-P4S-DUL-XL.

The bearings are also available by agreement with gap seals (suffix 2RSD).

Ordering example: HCM7014-E-2RSD-T-P4S-UL-XL.

<sup>2)</sup> The limiting speeds are based on elastically preloaded single bearings.

<sup>3)</sup> Minimal quantity oil lubrication.

<sup>4)</sup> The chamfer radii of the adjacent construction must be smaller than r or r<sub>1</sub>.



**Schaeffler Technologies AG & Co. KG**

Georg-Schäfer-Straße 30  
97421 Schweinfurt  
Germany  
Internet [www.schaeffler.de/en](http://www.schaeffler.de/en)  
E-mail [info.de@schaeffler.com](mailto:info.de@schaeffler.com)

**In Germany:**

Phone 0180 5003872  
Fax 0180 5003873

**From other countries:**

Phone +49 9721 91-0  
Fax +49 9721 91-3435

Every care has been taken to ensure the correctness of the information contained in this publication but no liability can be accepted for any errors or omissions. We reserve the right to make technical changes.

© Schaeffler Technologies AG & Co. KG  
Issued: 2019, October

This publication or parts thereof may not be reproduced without our permission.

SSD 40 GB-D