1. Angular Contact Ball Bearings

High-Accuracy Angular Contact Ball Bearings

Standard Series

Ultra High-Speed Angular Contact Ball Bearings

NSKROBUST Series

Spinshot™ Ⅱ

ROBUSTSHOT

NSKROBUST BSR Series

Part 4

Angular Contact Ball Bearings

1. Angular Contact Ball Bearings

Numbering System

Angular Contact Ball Bearings (Standard Series)

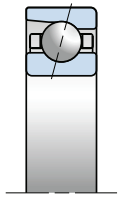
(Bearing number example) 7 | 0 | 10 | C | SN24 | TR | V1V | DB | EL | P4 | MTE | X

- ① Bearing type
- ② Dimension series
- ③ Bore number
- ④ Contact angle

Angular Contact Ball Bearings (NSKROBUST Series)

(Bearing number example) 50 | BNR | 10 | H | T | E34 | V1V | DB | EL | P4 | +Y3 | MTE | X

- ⑤ Nominal bore diameter
- ⑥ Bearing type
- ⑦ Dimension series
- ⑧ Material
- ⑨ Cage
- ⑩ Lubrication holes
- ⑪ Seal
- ⑫ Arrangement
- ⑬ Preload
- ⑭ Accuracy
- ⑮ Accessories
- ⑯ Grease brand
- ⑰ Grease quantity



①⑥ Bearing Type Page 20, 22-23

① 7: High-Accuracy Angular Contact Ball Bearings (Standard Series)

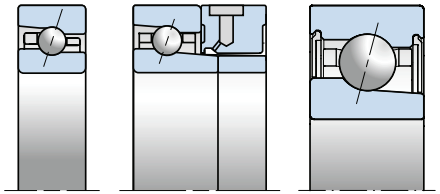
The high performance standard NSKHPS Series features a high basic dynamic load rating and is suitable for low to medium speed operation and high-load applications. NSK's original material evaluation technology ensures only high purity materials are used in their manufacture, which has the most influence on bearing life. Superior steel materials have led to a 15% extension of rolling fatigue life.

⑥ BNR, BER, BSR: High-Speed Angular Contact Ball Bearings (NSKROBUST Series)

High performance ACBBs with high rigidity and low heat generation. The results of temperature rise simulations undertaken to evaluate rolling element slip were used to optimize the design of this series.

NSKROBUST bearings are available as S, E, H or X type with different combinations of materials such as high-accuracy ceramic balls and heat-resistant high-speed SHX Steel, enabling our customers to choose the most suitable bearing for each application.

Sealed bearings are available mainly up to 120mm bore diameter. Optimization of the space between seal and cage and minimization of the seal labyrinth prevent grease leakage. The wide-width series (29, 20 series) has been designed to allow more grease to be held inside the bearing. This helps keep temperature rise down and prolongs grease life.



Available sizes

	BNR, BER	BSR
19 Series	30BxR19 ~ 200BxR19	10BSR19 ~ 25BSR19
10 Series	30BxR10 ~ 160BxR10	6BSR10 ~ 25BSR10
02 Series	—	10BSR02 ~ 25BSR02

The Spinshot type has been designed for noise reduction and greater reliability of oil-air lubrication during ultra high-speed operation.

The BSR series bearings retain high radial rigidity even in high-speed operation with constant pressure preload. This makes them ideal for grinders and similar applications.

BNR: 18° contact angle BER: 25° contact angle BSR: 15° contact angle

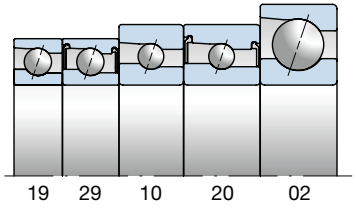
②⑦ Dimension series

② Standard Series

9: 19 Series, 0: 10 Series, 2: 02 Series

⑦ NSKROBUST Series

19: 19 Series, 29: 29 Series, 10: 10 Series, 20: 20 Series, 02: 02 Series



As shown in the figure above, for identical bore diameters, the bearings' outside diameter and width increase in the order 19– 29– 10– 20– 02 Series as expressed by the dimension series codes.

Please note the 29 and 20 Series are only available as NSKROBUST Series sealed ultra high-speed angular contact ball bearings.

③ Bore Number ⑤ Nominal Bore Diameter

③ Standard Series

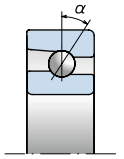
Up to 3: Bore diameter 00: 10mm, 01: 12mm, 02: 15mm, 03: 17mm

4 and above: Bore diameter = Bore number x 5 (mm)

⑤ NSKROBUST Series

Nominal bore diameter = Bore dimension (mm)

④ Contact Angle ⑥ Bearing Type Page 44-45



④ Standard Series

C: 15° A5: 25° A: 30°

⑥ NSKROBUST Series

BNR: 18° BER: 25° BSR: 15°

⑧ Material Page 14-17, 22

Standard Series

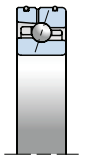
No symbol: steel ball SN24: ceramic ball

NSKROBUST Series

Type	Material	
	Inner and outer ring	Balls
S	Bearing steel (SUJ2)	Bearing steel (SUJ2)
E	Bearing steel (SUJ2)	Ultra long life rolling elements (EQTF)
H	Bearing steel (SUJ2)	Ceramic (Si_3N_4)
X	Heat resistant steel for high-speed operation (SHX)	Ceramic (Si_3N_4)
XE (Spinshot™Ⅱ)	Heat resistant steel for high-speed operation (SHX)	Ceramic (Si_3N_4)

⑩ Lubrication holes Page 22

No symbol: No lubrication holes E34: Direct lubricating bearing



⑩ NSKROBUST Series

E34: Direct lubricating bearing

Space-saving bearings designed specifically for oil-air lubrication, equipped with lubrication groove, lubrication holes and O-ring groove on outer ring.

Available for NSKROBUST Series only.

⑨ Cage Page 18

	Symbol	Material	Guiding	Features	Limiting Speed ($d_m n$ value)	Available for
	TYN	Polyamide resin	Ball guided	Excellent wear and noise characteristics, especially effective with grease lubrication	Oil: 1.4 million Grease: 1.2 million	· Standard Series · NSKROBUST Series (not available for 19 Series sealed type)
	T	Phenolic resin	Outer ring guided	Stable cage rotation in high-speed operation	2.8 million	TR: Standard Series T: NSKROBUST Series
	TS	PEEK resin	Outer ring guided	Reduction of non-repeatable run-out (NRRO). Low temperature rise in ultra high-speed operation due to unique design with enhanced oil drain	3.3 million	· NSKROBUST Series designed specifically for oil-air lubrication
	MY	Brass	Ball guided	Excellent noise and temperature rise characteristics. Extended grease life.	Oil: 0.8 million Grease: 0.7 million	· Standard Series · NSKROBUST Series only for large bearings that are not equipped with TYN cages

1. Angular Contact Ball Bearings

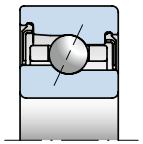
Numbering System

Angular Contact Ball Bearings (Standard Series)

(Bearing number example)	7	0	10	C	SN24	TR	V1V	DB	EL	P4	MTE	X
	① Bearing type											
	② Dimension series											
	③ Bore number											
	④ Contact angle											

Angular Contact Ball Bearings (NSKROBUST Series)

(Bearing number example)	50	BNR	10	H	T	E34	V1V	DB	EL	P4	+Y3	MTE	X
	⑤ Nominal bore diameter												⑰ Grease quantity
	⑥ Bearing type												⑯ Grease brand
	⑦ Dimension series												⑮ Accessories
	⑧ Material												⑭ Accuracy
	⑨ Cage												⑬ Preload
	⑩ Lubrication holes												⑫ Arrangement
													⑪ Seal



⑪ Seal
No symbol: Open type V1V: Non-contact rubber seal Page 23

Non-contact rubber seals on both sides of the bearing prevent entry of foreign matter and grease expulsion, thereby ensuring high reliability and longer grease life.

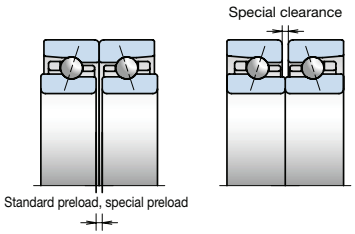
⑫ Arrangement
Page 205

Universal combination		Arrangement example		
SU	Single row			
DU	2 row	DB	DF	DT
DUD	3 row	DBD	DFD	DTD
QU	4 row	DBB	DFF	DTT
		DBT	DFT	

Universal combination bearings SU, DU, DUD and QU are controlled during production to ensure front face stand out is the same as back face stand out.

In addition, if the bearing number indicates two or more rows (DU, DUD and QU), the tolerance variation of bore and outer diameter is controlled within each set of bearings.

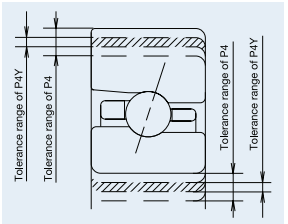
⑬ Preload
Page 206-212



EL: Extra Light Preload L: Light Preload
M: Medium Preload H: Heavy Preload

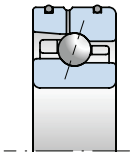
CP: Special preload CA: Special clearance

⑭ Accuracy
Page 222-225



P2: ISO Class 2 P4: ISO Class 4 P5: ISO Class 5
P3: special class (dimensional accuracy ISO Class 4, rotation accuracy ISO Class 2)
P4Y: special class (dimensional accuracy of bore and outer ring are exclusive for NSK, all others are ISO Class 4 – see figure on the left)

⑮ Accessories



+Y3: O-ring on bearing outside surface
Available for NSKROBUST direct lubricating bearings (E34) only.

⑯ Grease brand
Page 219

Grease typically used in machine tool spindles:
MTE: MTE grease MTS: MTS grease

⑰ Grease quantity
Page 256

X: 15% of internal space
K: 20% of internal space
L: 30% of internal space

Which specification is available for which bearing?

Standard Series

	① Bearing type	⑧ Material	⑨ Cage		⑪ Seal
	NSKHPS	SN24	TYN	TR	V1V
19 Series	7900 ~ 7952	7900 ~ 7948	7900 ~ 7928, 7932, 7938	7903 ~ 7960	7906 ~ 7920
10 Series	7000 ~ 7040	7000 ~ 7032	7000 ~ 7026	7000 ~ 7048	7006 ~ 7021
02 Series	7200 ~ 7230	7200 ~ 7219	7200 ~ 7224	7200 ~ 7230	–

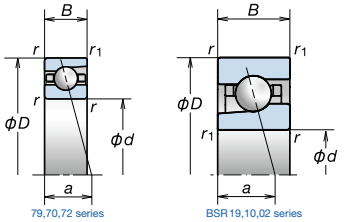
NSKROBUST Series

	⑧Material		⑨Cage		⑪Seal
	Ceramic balls	Ultra long life rolling elements	TYN	T	V1V
19 Series	10BxR19 ~ 200BxR19	55BxR19 ~ 140BxR19 (excluding 120mm bore diameter)	30BxR19 ~ 140BxR19 160BxR19, 190BxR19	10BxR19 ~ 160BxR19	10BxR19 ~ 100BxR19, 110BxR19
10 Series	6BxR10~160BxR10	45BxR10~140BxR10	30BxR10~160BxR10	6BxR10~160BxR10	6BxR10~100BxR10, 120BxR10
02 Series	10BSR02 ~ 25BSR02	–	–	10BSR02 ~ 25BSR02	10BSR02 ~ 25BSR02

For bearing numbers not listed in the tables, please contact NSK for details.

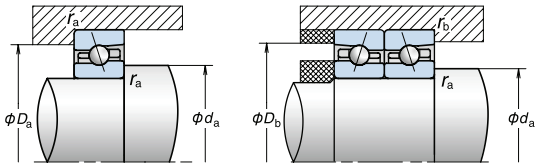
1. Angular Contact Ball Bearings

Bore Diameter 5 - 10 mm



Bearing Numbers (1)	Boundary Dimensions (mm)					Basic Load Ratings (2) (kN)		Permissible Axial Load (3) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (4) (min⁻¹)	
	d	D	B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
725C	5	16	5	0.3	0.15	1.70	0.660	0.545	15	12.6	3.9	110 000	167 000
725A	5	16	5	0.3	0.15	1.61	0.620	0.665	30	—	5.5	72 000	96 000
706C	6	17	6	0.3	0.15	2.15	0.845	0.765	15	12.4	4.5	100 000	153 000
706A	6	17	6	0.3	0.15	2.03	0.795	0.725	30	—	6.3	66 000	87 000
*6BSR10S	6	17	6	0.3	0.15	1.35	0.445	0.525	15	6.6	4.5	140 000	192 000
*6BSR10H	6	17	6	0.3	0.15	(1.35)	(0.445)	0.345	15	6.6	4.5	166 000	244 000
*6BSR10X	6	17	6	0.3	0.15	(1.35)	(0.445)	0.345	15	6.6	4.5	192 000	261 000
726C	6	19	6	0.3	0.15	2.39	1.00	0.835	15	12.8	4.7	92 000	140 000
726A	6	19	6	0.3	0.15	2.24	0.940	0.395	30	—	6.6	60 000	80 000
707C	7	19	6	0.3	0.15	2.39	1.00	0.835	15	12.8	4.7	89 000	135 000
707A	7	19	6	0.3	0.15	2.24	0.940	0.375	30	—	6.6	58 000	77 000
*7BSR10S	7	19	6	0.3	0.15	1.57	0.570	0.675	15	7.1	4.7	124 000	170 000
*7BSR10H	7	19	6	0.3	0.15	(1.57)	(0.570)	0.440	15	7.1	4.7	147 000	216 000
*7BSR10X	7	19	6	0.3	0.15	(1.57)	(0.570)	0.440	15	7.1	4.7	170 000	231 000
708C	8	22	7	0.3	0.15	3.55	1.54	1.30	15	12.7	5.5	77 000	117 000
708A	8	22	7	0.3	0.15	3.35	1.45	1.02	30	—	7.8	50 000	67 000
*8BSR10S	8	22	7	0.3	0.15	2.31	0.835	1.01	15	7.0	5.5	107 000	147 000
*8BSR10H	8	22	7	0.3	0.15	(2.31)	(0.835)	0.660	15	7.0	5.5	127 000	187 000
*8BSR10X	8	22	7	0.3	0.15	(2.31)	(0.835)	0.660	15	7.0	5.5	147 000	200 000
728C	8	24	8	0.3	0.15	3.60	1.58	1.33	15	13.1	6.1	72 000	110 000
728A	8	24	8	0.3	0.15	3.35	1.48	0.610	30	—	8.6	47 000	63 000
7900C	10	22	6	0.3	0.15	3.15	1.52	1.23	15	14.1	5.1	71 900	109 000
7900CSN24	10	22	6	0.3	0.15	(3.15)	(1.52)	1.42	15	14.1	5.1	93 800	143 000
7900A5	10	22	6	0.3	0.15	3.00	1.45	1.44	25	—	6.7	62 500	93 800
7900A5SN24	10	22	6	0.3	0.15	(3.00)	(1.45)	1.71	25	—	6.7	81 300	122 000
*10BSR19S	10	22	6	0.3	0.15	1.78	0.715	0.855	15	7.4	5.1	100 000	138 000
*10BSR19H	10	22	6	0.3	0.15	(1.78)	(0.715)	0.560	15	7.4	5.1	119 000	175 000
*10BSR19X	10	22	6	0.3	0.15	(1.78)	(0.715)	0.560	15	7.4	5.1	138 000	188 000
7000C	10	26	8	0.3	0.15	5.60	2.49	2.16	15	12.6	6.4	63 900	97 300
7000CSN24	10	26	8	0.3	0.15	(5.60)	(2.49)	2.36	15	12.6	6.4	83 400	127 000
7000A5	10	26	8	0.3	0.15	5.40	2.41	2.48	25	—	8.2	55 600	83 400
7000A5SN24	10	26	8	0.3	0.15	(5.40)	(2.41)	2.94	25	—	8.2	72 300	108 000
7000A	10	26	8	0.3	0.15	5.25	2.34	1.91	30	—	9.2	41 700	55 600
*10BSR10S	10	26	8	0.3	0.15	3.00	1.18	1.44	15	7.1	6.4	88 900	123 000
*10BSR10H	10	26	8	0.3	0.15	(3.00)	(1.18)	0.94	15	7.1	6.4	106 000	156 000
*10BSR10X	10	26	8	0.3	0.15	(3.00)	(1.18)	0.94	15	7.1	6.4	123 000	167 000
7200C	10	30	9	0.6	0.3	5.65	2.61	2.16	15	13.2	7.2	57 500	87 500
7200CSN24	10	30	9	0.6	0.3	(5.65)	(2.61)	2.48	15	13.2	7.2	75 000	114 000
7200A5	10	30	9	0.6	0.3	5.45	2.51	2.49	25	—	9.2	50 000	75 000
7200A5SN24	10	30	9	0.6	0.3	(5.45)	(2.51)	2.96	25	—	9.2	65 000	97 500
7200A	10	30	9	0.6	0.3	5.30	2.44	1.92	30	—	10.3	37 500	50 000
*10BSR02S	10	30	9	0.6	0.3	3.85	1.48	1.81	15	6.7	7.2	80 000	110 000
*10BSR02H	10	30	9	0.6	0.3	(3.85)	(1.48)	1.18	15	6.7	7.2	95 000	140 000
*10BSR02X	10	30	9	0.6	0.3	(3.85)	(1.48)	1.18	15	6.7	7.2	110 000	150 000

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available.
(2) Basic load rating values are reference values for ceramic ball bearings.
(3) For permissible axial load, please refer to Page 199.
(4) For application of limiting speeds, please refer to Page 216.



Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
7.5	13.5	—	0.3	—	1.2	5.5	12	25	4.0	7.3	10	14	10	7	4	0	0.005
7.5	13.5	—	0.3	—	5	10	25	53	19	24	33	43	3	2	0	− 3	0.005
8.5	14.5	—	0.3	—	1.5	7.9	15	32	4.3	8.3	11	15	10	6	3	− 2	0.006
8.5	14.5	—	0.3	—	4.9	17	25	53	19	29	33	42	3	1	0	− 3	0.006
8.5	14.5	—	0.3	—	3.4	6.7	16	—	5.7	7.5	11	—	9	7	3	—	0.007
8.5	14.5	—	0.3	—	2.1	5.4	15	—	5.4	7.6	11	—	9	7	3	—	0.006
8.5	14.5	—	0.3	—	2.1	5.4	15	—	5.4	7.6	11	—	9	7	3	—	0.006
8.5	16.5	—	0.3	—	1.8	9.2	18	37	5	10	13	28	9	5	2	− 3	0.008
8.5	16.5	—	0.3	—	3.7	16	34	69	18	31	40	52	3	1	− 1	− 4	0.008
9.5	16.5	—	0.3	—	1.8	9.2	18	37	5.1	10	13	18	9	5	2	− 3	0.007
9.5	16.5	—	0.3	—	3.7	16	34	69	18	31	40	52	3	1	− 1	− 4	0.007
9.5	16.5	—	0.3	—	5.2	9.5	18	—	7.7	9.7	12	—	7	5	2	—	0.009
9.5	16.5	—	0.3	—	3.8	8.2	17	—	7.6	10	14	—	7	5	2	—	0.008
9.5	16.5	—	0.3	—	3.8	8.2	17	—	7.6	10	14	—	7	5	2	—	0.008
10.5	19.5	—	0.3	—	4.2	14	29	59	7.5	12	17	23	7	3	− 1	− 7	0.012
10.5	19.5	—	0.3	—	8.1	25	46	88	26	39	49	63	2	0	− 2	− 5	0.012
10.5	19.5	—	0.3	—	7.3	12	21	—	8.7	11	13	—	6	4	1	—	0.013
10.5	19.5	—	0.3	—	5.9	11	21	—	9.0	11	15	—	6	4	1	—	0.012
10.5	19.5	—	0.3	—	5.9	11	21	—	9.0	11	15	—	6	4	1	—	0.012
10.5	21.5	—	0.3	—	4.2	14	29	59	7.5	12	17	23	7	3	− 1	− 7	0.016
10.5	21.5	—	0.3	—	8.1	25	46	88	26	39	49	63	2	0	− 2	− 5	0.016
12.5	19.5	20.8	0.3	0.15	7.0	16	29	58	10	15	19	27	5	2	− 1	− 6	0.009
12.5	19.5	20.8	0.3	0.15	5.7	16	30	62	11	16	21	30	5	2	− 1	− 6	0.008
12.5	19.5	20.8	0.3	0.15	9.8	17	55	94	24	29	46	58	2	1	− 3	− 6	0.009
12.5	19.5	20.8	0.3	0.15	8.5	16	59	103	26	32	53	66	2	1	− 3	− 6	0.008
12.5	19.5	20.8	0.3	0.15	5.9	14	21	—	8.9	12	15	—	6	3	1	—	0.011
12.5	19.5	20.8	0.3	0.15	4.5	13	20	—	9.0	13	16	—	6	3	1	—	0.010
12.5	19.5	20.8	0.3	0.15	4.5	13	20	—	9.0	13	16	—	6	3	1	—	0.010
12.5	23.5	24.8	0.3	0.15	13	25	49	96	13	17	23	31	3	0	− 5	− 12	0.019
12.5	23.5	24.8	0.3	0.15	12	25	52	106	14	19	26	36	3	0	− 5	− 12	0.017
12.5	23.5	24.8	0.3	0.15	17	43	78	153	29	41	52	68	1	− 2	− 5	− 10	0.019
12.5	23.5	24.8	0.3	0.15	16	46	86	172	32	47	59	78	1	− 2	− 5	− 10	0.017
12.5	23.5	24.8	0.3	0.15	25	97	202	333	44	72	94	115	0	− 5	− 10	− 15	0.019
12.5	23.5	24.8	0.3	0.15	8.4	17	37	—	10	13	18	—	5	2	− 3	—	0.021
12.5	23.5	24.8	0.3	0.15	7.1	17	39	—	11	15	21	—	5	2	− 3	—	0.019
12.5	23.5	24.8	0.3	0.15	7.1	17	39	—	11	15	21	—	5	2	− 3	—	0.019
15	25	27.5	0.6	0.3	13	29	68	150	13	18	26	39	3	− 1	− 8	− 18	0.032
15	25	27.5	0.6	0.3	12	29	73	167	14	20	30	45	3	− 1	− 8	− 18	0.030
15	25	27.5	0.6	0.3	17	43	106	188	29	41	58	74	1	− 2	− 7	− 12	0.031
15	25	27.5	0.6	0.3	16	46	117	213	32	47	67	86	1	− 2	− 7	− 12	0.029
15	25	27.5	0.6	0.3	25	97	202	—	44	72	95	—	0	− 5	− 10	—	0.032
15	25	27.5	0.6	0.3	11	25	51	—	11	15	20	—	4	0	− 6	—	0.032
15	25	27.5	0.6	0.3	10	25	54	—	12	17	23	—	4	0	− 6	—	0.030
15	25	27.5	0.6	0.3	10	25	54	—	12	17	23	—	4	0	− 6	—	0.030

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
25°	2.0			
30°	1.4			

Table B

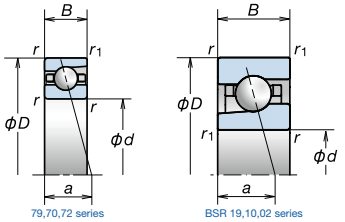
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

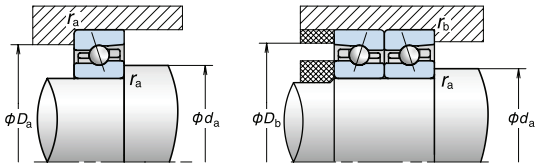
For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

Bore Diameter 12, 15mm





Bearing Numbers (1)	Boundary Dimensions (mm)					Basic Load Ratings (2) (kN)		Permissible Axial Load (3) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (4) (min^{-1})	
	d	D	B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
7901C	12	24	6	0.3	0.15	3.55	1.86	1.45	15	14.7	5.4	63 900	97 300
7901CSN24	12	24	6	0.3	0.15	(3.55)	(1.86)	1.72	15	14.7	5.4	83 300	127 000
7901A5	12	24	6	0.3	0.15	3.35	1.77	1.71	25	–	7.2	55 600	83 400
7901A5SN24	12	24	6	0.3	0.15	(3.35)	(1.77)	2.04	25	–	7.2	72 200	108 000
*12BSR19S	12	24	6	0.3	0.15	1.95	0.85	1.02	15	7.7	5.4	88 900	123 000
*12BSR19H	12	24	6	0.3	0.15	(1.95)	(0.85)	0.665	15	7.7	5.4	106 000	156 000
*12BSR19X	12	24	6	0.3	0.15	(1.95)	(0.85)	0.665	15	7.7	5.4	123 000	167 000
7001C	12	28	8	0.3	0.15	6.10	2.90	2.40	15	13.2	6.7	57 500	87 500
7001CSN24	12	28	8	0.3	0.15	(6.10)	(2.90)	2.75	15	13.2	6.7	75 000	114 000
7001A5	12	28	8	0.3	0.15	5.85	2.79	2.82	25	–	8.7	50 000	75 000
7001A5SN24	12	28	8	0.3	0.15	(5.85)	(2.79)	3.44	25	–	8.7	65 000	97 500
7001A	12	28	8	0.3	0.15	5.70	2.71	2.13	30	–	9.8	37 500	50 000
*12BSR10S	12	28	8	0.3	0.15	3.25	1.33	1.63	15	7.4	6.7	80 000	110 000
*12BSR10H	12	28	8	0.3	0.15	(3.25)	(1.33)	1.06	15	7.4	6.7	95 000	140 000
*12BSR10X	12	28	8	0.3	0.15	(3.25)	(1.33)	1.06	15	7.4	6.7	110 000	150 000
7201C	12	32	10	0.6	0.3	8.30	3.85	3.45	15	12.5	7.9	52 300	79 600
7201CSN24	12	32	10	0.6	0.3	(8.30)	(3.85)	3.75	15	12.5	7.9	68 200	104 000
7201A5	12	32	10	0.6	0.3	8.05	3.70	3.55	25	–	10.1	45 500	68 200
7201A5SN24	12	32	10	0.6	0.3	(8.05)	(3.70)	4.23	25	–	10.1	59 100	88 700
7201A	12	32	10	0.6	0.3	7.85	3.65	2.72	30	–	11.4	34 100	45 500
*12BSR02S	12	32	10	0.6	0.3	5.05	1.98	2.45	15	6.6	7.9	72 800	100 000
*12BSR02H	12	32	10	0.6	0.3	(5.05)	(1.98)	1.59	15	6.6	7.9	86 400	128 000
*12BSR02X	12	32	10	0.6	0.3	(5.05)	(1.98)	1.59	15	6.6	7.9	100 000	137 000
7902C	15	28	7	0.3	0.15	5.00	2.64	1.93	15	14.5	6.4	53 500	81 400
7902CSN24	15	28	7	0.3	0.15	(5.00)	(2.64)	2.30	15	14.5	6.4	69 800	106 000
7902A5	15	28	7	0.3	0.15	4.75	2.53	2.22	25	–	8.5	46 600	69 800
7902A5SN24	15	28	7	0.3	0.15	(4.75)	(2.53)	2.63	25	–	8.5	60 500	90 700
*15BSR19S	15	28	7	0.3	0.15	2.96	1.31	1.60	15	7.7	6.4	74 500	103 000
*15BSR19H	15	28	7	0.3	0.15	(2.96)	(1.31)	1.04	15	7.7	6.4	88 400	131 000
*15BSR19X	15	28	7	0.3	0.15	(2.96)	(1.31)	1.04	15	7.7	6.4	103 000	140 000
7002C	15	32	9	0.3	0.15	6.55	3.40	2.63	15	14.1	7.6	49 000	74 500
7002CSN24	15	32	9	0.3	0.15	(6.55)	(3.40)	3.12	15	14.1	7.6	63 900	97 100
7002A5	15	32	9	0.3	0.15	6.25	3.25	3.05	25	–	10	42 600	63 900
7002A5SN24	15	32	9	0.3	0.15	(6.25)	(3.25)	3.64	25	–	10	55 400	83 000
7002A	15	32	9	0.3	0.15	6.05	3.15	2.36	30	–	11.3	32 000	42 600
*15BSR10S	15	32	9	0.3	0.15	4.20	1.72	2.12	15	7.2	7.6	68 100	93 700
*15BSR10H	15	32	9	0.3	0.15	(4.20)	(1.72)	1.38	15	7.2	7.6	80 900	120 000
*15BSR10X	15	32	9	0.3	0.15	(4.20)	(1.72)	1.38	15	7.2	7.6	93 700	128 000
7202C	15	35	11	0.6	0.3	9.10	4.55	3.85	15	13.2	8.8	46 000	70 000
7202CSN24	15	35	11	0.6	0.3	(9.10)	(4.55)	4.55	15	13.2	8.8	60 000	91 200
7202A5	15	35	11	0.6	0.3	8.75	4.35	3.95	25	–	11.3	40 000	60 000
7202A5SN24	15	35	11	0.6	0.3	(8.75)	(4.35)	5.50	25	–	11.3	52 000	78 000
7202A	15	35	11	0.6	0.3	8.50	4.25	3.00	30	–	12.7	30 000	40 000
*15BSR02S	15	35	11	0.6	0.3	5.80	2.34	2.90	15	6.8	8.8	64 000	88 000
*15BSR02H	15	35	11	0.6	0.3	(5.80)	(2.34)	1.89	15	6.8	8.8	76 000	112 000
*15BSR02X	15	35	11	0.6	0.3	(5.80)	(2.34)	1.89	15	6.8	8.8	88 000	120 000

Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
14.5	21.5	22.8	0.3	0.15	8.6	16	41	77	12	16	25	34	4	2	− 3	− 8	0.011
14.5	21.5	22.8	0.3	0.15	7.3	15	43	84	13	17	27	38	4	2	− 3	− 8	0.010
14.5	21.5	22.8	0.3	0.15	16	25	59	120	32	38	53	70	1	0	− 3	− 7	0.011
14.5	21.5	22.8	0.3	0.15	15	25	63	134	35	43	60	81	1	0	− 3	− 7	0.010
14.5	21.5	22.8	0.3	0.15	4.7	13	25	–	9.0	13	17	–	6	3	0	–	0.012
14.5	21.5	22.8	0.3	0.15	3.3	12	25	–	8.8	14	19	–	6	3	0	–	0.011
14.5	21.5	22.8	0.3	0.15	3.3	12	25	–	8.8	14	19	–	6	3	0	–	0.011
14.5	25.5	26.8	0.3	0.15	13	25	57	120	14	18	26	37	3	0	− 6	− 14	0.021
14.5	25.5	26.8	0.3	0.15	12	25	61	133	15	20	29	42	3	0	− 6	− 14	0.019
14.5	25.5	26.8	0.3	0.15	16	45	97	203	31	45	60	81	1	− 2	− 6	− 12	0.021
14.5	25.5	26.8	0.3	0.15	15	47	108	230	34	51	69	94	1	− 2	− 6	− 12	0.019
14.5	25.5	26.8	0.3	0.15	25	104	218	363	48	78	104	127	0	− 5	− 10	− 15	0.021
14.5	25.5	26.8	0.3	0.15	10	21	43	–	12	15	20	–	4	1	− 4	–	0.023
14.5	25.5	26.8	0.3	0.15	9.2	20	45	–	12	17	23	–	4	1	− 4	–	0.021
14.5	25.5	26.8	0.3	0.15	9.2	20	45	–	12	17	23	–	4	1	− 4	–	0.021
17	27	29.5	0.6	0.3	20	39	99	197	16	21	32	46	1	− 3	− 12	− 22	0.036
17	27	29.5	0.6	0.3	20	41	109	221	18	24	37	52	1	− 3	− 12	− 22	0.031
17	27	29.5	0.6	0.3	34	56	146	287	40	49	70	92	− 1	− 3	− 9	− 16	0.036
17	27	29.5	0.6	0.3	35	61	164	329	46	56	81	107	− 1	− 3	− 9	− 16	0.031
17	27	29.5	0.6	0.3	25	104	218	361	48	78	103	126	0	− 5	− 10	− 15	0.030
17	27	29.5	0.6	0.3	14	33	63	–	13	18	23	–	3	− 2	− 8	–	0.039
17	27	29.5	0.6	0.3	13	34	68	–	14	20	26	–	3	− 2	− 8	–	0.035
17	27	29.5	0.6	0.3	13	34	68	–	14	20	26	–	3	− 2	− 8	–	0.035
17.5	25.5	26.8	0.3	0.15	12	25	47	104	14	20	26	39	3	0	− 4	− 11	0.016
17.5	25.5	26.8	0.3	0.15	11	25	50	114	15	22	29	44	3	0	− 4	− 11	0.014
17.5	25.5	26.8	0.3	0.15	16	35	74	141	33	44	59	76	1	− 1	− 4	− 8	0.016
17.5	25.5	26.8	0.3	0.15	15	36	80	158	36	50	67	88	1	− 1	− 4	− 8	0.014
17.5	25.5	26.8	0.3	0.15	9.8	20	39	–	12	16	21	–	4	1	− 3	–	0.017
17.5	25.5	26.8	0.3	0.15	8.5	20	40	–	13	18	23	–	4	1	− 3	–	0.015
17.5	25.5	26.8	0.3	0.15	8.5	20	40	–	13	18	23	–	4	1	− 3	–	0.015
17.5	29.5	30.8	0.3	0.15	12	29	66	147	14	20	29	43	3	− 1	− 7	− 16	0.030
17.5	29.5	30.8	0.3	0.15	11	30	72	164	15	23	33	50	3	− 1	− 7	− 16	0.027
17.5	29.5	30.8	0.3	0.15	16	35	103	197	33	43	65	84	1	− 1	− 6	− 11	0.030
17.5	29.5	30.8	0.3	0.15	15	36	114	223	36	49	75	98	1	− 1	− 6	− 11	0.027
17.5	29.5	30.8	0.3	0.15	25	110	234	392	51	85	113	139	0	− 5	− 10	− 15	0.030
17.5	29.5	30.8	0.3	0.15	14	25	53	–	13	16	22	–	3	0	− 6	–	0.030
17.5	29.5	30.8	0.3	0.15	13	25	56	–	14	18	25	–	3	0	− 6	–	0.027
17.5	29.5	30.8	0.3	0.15	13	25	56	–	14	18	25	–	3	0	− 6	–	0.027
20	30	32.5	0.6	0.3	20	40	97	199	17	23	34	48	1	− 3	− 11	− 21	0.045
20	30	32.5	0.6	0.3	20	42	106	224	19	26	39	56	1	− 3	− 11	− 21	0.040
20	30	32.5	0.6	0.3	35	73	197	392	44	57	84	112	− 1	− 4	− 11	− 19	0.044
20	30	32.5	0.6	0.3	36	79	223	452	49	66	98	131	− 1	− 4	− 11	− 19	0.039
20	30	32.5	0.6	0.3	25	111	236	394	51	86	114	139	0	− 5	− 10	− 15	0.045
20	30	32.5	0.6	0.3	21	38	76	–	15	19	25	–	1	− 3	− 10	–	0.045
20	30	32.5	0.6	0.3	20	39	83	–	16	21	29	–	1	− 3	− 10	–	0.040
20	30	32.5	0.6	0.3	20	39	83	–	16	21	29	–	1	− 3	− 10	–	0.040

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available.
(2) Basic load rating values are reference values for ceramic ball bearings.
(3) For permissible axial load, please refer to Page 199.
(4) For application of limiting speeds, please refer to Page 216.

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
25°	2.0			
30°	1.4			

Table B

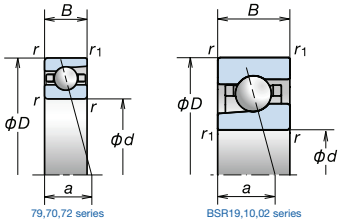
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

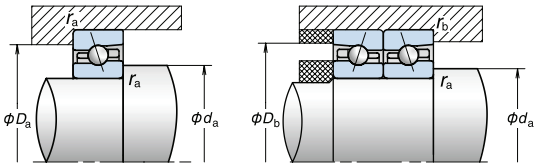
1. Angular Contact Ball Bearings

Bore Diameter 17, 20 mm



Bearing Numbers (1)	Boundary Dimensions (mm)					Basic Load Ratings (2) (kN)		Permissible Axial Load (3) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (4) (min⁻¹)	
	d	D	B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
7903C	17	30	7	0.3	0.15	5.25	2.94	2.09	15	14.8	6.6	49 000	74 500
7903CSN24	17	30	7	0.3	0.15	(5.25)	(2.94)	2.46	15	14.8	6.6	63 900	97 100
7903A5	17	30	7	0.3	0.15	5.00	2.80	2.21	25	–	9	42 600	63 900
7903A5SN24	17	30	7	0.3	0.15	(5.00)	(2.80)	2.63	25	–	9	55 400	83 000
*17BSR19S	17	30	7	0.3	0.15	3.25	1.53	1.76	15	7.8	6.6	68 100	93 700
*17BSR19H	17	30	7	0.3	0.15	(3.25)	(1.53)	1.22	15	7.8	6.6	80 900	120 000
*17BSR19X	17	30	7	0.3	0.15	(3.25)	(1.53)	1.22	15	7.8	6.6	93 700	128 000
7003C	17	35	10	0.3	0.15	6.95	3.80	2.85	15	14.5	8.5	44 300	67 400
7003CSN24	17	35	10	0.3	0.15	(6.95)	(3.80)	3.38	15	14.5	8.5	57 700	87 700
7003A5	17	35	10	0.3	0.15	6.60	3.65	3.35	25	–	11.1	38 500	57 700
7003A5SN24	17	35	10	0.3	0.15	(6.60)	(3.65)	4.00	25	–	11.1	50 000	75 000
7003A	17	35	10	0.3	0.15	6.40	3.50	2.59	30	–	12.5	28 900	38 500
*17BSR10S	17	35	10	0.3	0.15	4.45	1.93	2.39	15	7.4	8.5	61 600	84 700
*17BSR10H	17	35	10	0.3	0.15	(4.45)	(1.93)	1.56	15	7.4	8.5	73 100	108 000
*17BSR10X	17	35	10	0.3	0.15	(4.45)	(1.93)	1.56	15	7.4	8.5	84 700	116 000
7203C	17	40	12	0.6	0.3	11.4	5.85	4.85	15	13.3	9.8	40 400	61 500
7203CSN24	17	40	12	0.6	0.3	(11.4)	(5.85)	5.70	15	13.3	9.8	52 700	80 000
7203A5	17	40	12	0.6	0.3	11.0	5.60	5.30	25	–	12.6	35 100	52 700
7203A5SN24	17	40	12	0.6	0.3	(11.0)	(5.60)	6.28	25	–	12.6	45 700	68 500
7203A	17	40	12	0.6	0.3	10.7	5.45	4.05	30	–	14.2	26 400	35 100
*17BSR02S	17	40	12	0.6	0.3	7.25	2.98	3.65	15	6.8	9.8	56 200	77 200
*17BSR02H	17	40	12	0.6	0.3	(7.25)	(2.98)	2.39	15	6.8	9.8	66 700	98 300
*17BSR02X	17	40	12	0.6	0.3	(7.25)	(2.98)	2.39	15	6.8	9.8	77 200	106 000
7904C	20	37	9	0.3	0.15	7.30	4.25	3.20	15	14.9	8.3	40 400	61 500
7904CSN24	20	37	9	0.3	0.15	(7.30)	(4.25)	3.78	15	14.9	8.3	52 700	80 000
7904A5	20	37	9	0.3	0.15	6.95	4.05	3.55	25	–	11.1	35 100	52 700
7904A5SN24	20	37	9	0.3	0.15	(6.95)	(4.05)	4.20	25	–	11.1	45 700	68 500
*20BSR19S	20	37	9	0.3	0.15	4.70	2.15	2.66	15	7.7	8.3	56 200	77 200
*20BSR19H	20	37	9	0.3	0.15	(4.70)	(2.15)	1.73	15	7.7	8.3	66 700	98 300
*20BSR19X	20	37	9	0.3	0.15	(4.70)	(2.15)	1.73	15	7.7	8.3	77 200	106 000
7004C	20	42	12	0.6	0.3	11.7	6.55	4.80	15	14.0	10.1	37 100	56 500
7004CSN24	20	42	12	0.6	0.3	(11.7)	(6.55)	5.72	15	14.0	10.1	48 400	73 600
7004A5	20	42	12	0.6	0.3	11.2	6.25	5.45	25	–	13.2	32 300	48 400
7004A5SN24	20	42	12	0.6	0.3	(11.2)	(6.25)	6.48	25	–	13.2	42 000	63 000
7004A	20	42	12	0.6	0.3	10.8	6.10	4.20	30	–	14.9	24 200	32 300
*20BSR10S	20	42	12	0.6	0.3	7.45	3.35	4.10	15	7.2	10.1	51 700	71 000
*20BSR10H	20	42	12	0.6	0.3	(7.45)	(3.35)	2.67	15	7.2	10.1	61 300	90 400
*20BSR10X	20	42	12	0.6	0.3	(7.45)	(3.35)	2.67	15	7.2	10.1	71 000	96 800
7204C	20	47	14	1	0.6	15.3	8.05	6.30	15	13.3	11.5	34 400	52 300
7204CSN24	20	47	14	1	0.6	(15.3)	(8.05)	7.46	15	13.3	11.5	44 800	68 100
7204A5	20	47	14	1	0.6	14.7	7.75	7.40	25	–	14.8	29 900	44 800
7204A5SN24	20	47	14	1	0.6	(14.7)	(7.75)	8.88	25	–	14.8	38 900	58 300
7204A	20	47	14	1	0.6	14.3	7.55	5.75	30	–	16.7	22 400	29 900
*20BSR02S	20	47	14	1	0.6	9.70	4.10	5.10	15	6.8	11.5	47 800	65 700
*20BSR02H	20	47	14	1	0.6	(9.70)	(4.10)	3.30	15	6.8	11.5	56 800	83 600
*20BSR02X	20	47	14	1	0.6	(9.70)	(4.10)	3.30	15	6.8	11.5	65 700	89 600

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available.
(2) Basic load rating values are reference values for ceramic ball bearings.
(3) For permissible axial load, please refer to Page 199.
(4) For application of limiting speeds, please refer to Page 216.



Abutment and Fillet Dimensions (mm)						Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)		EL	L	M	H	EL	L	M	H	EL	L	M	H	
19.5	27.5	28.8	0.3	0.15		11	25	56	119	15	21	30	43	3	0	− 5	− 12	0.017
19.5	27.5	28.8	0.3	0.15		10	25	59	131	16	23	33	49	3	0	− 5	− 12	0.015
19.5	27.5	28.8	0.3	0.15		15	35	77	149	34	47	63	82	1	− 1	− 4	− 8	0.017
19.5	27.5	28.8	0.3	0.15		14	37	84	167	37	53	72	95	1	− 1	− 4	− 8	0.015
19.5	27.5	28.8	0.3	0.15		12	25	46	–	14	19	24	–	3	0	− 4	–	0.018
19.5	27.5	28.8	0.3	0.15		11	25	49	–	13	21	27	–	3	0	− 4	–	0.016
19.5	27.5	28.8	0.3	0.15		11	25	49	–	13	21	27	–	3	0	− 4	–	0.016
19.5	32.5	33.8	0.3	0.15		15	30	69	156	16	21	31	46	2	− 1	− 7	− 16	0.039
19.5	32.5	33.8	0.3	0.15		15	30	75	174	18	24	35	53	2	− 1	− 7	− 16	0.036
19.5	32.5	33.8	0.3	0.15		25	47	127	257	41	51	74	99	0	− 2	− 7	− 13	0.040
19.5	32.5	33.8	0.3	0.15		25	50	142	293	46	58	86	116	0	− 2	− 7	− 13	0.037
19.5	32.5	33.8	0.3	0.15		25	116	251	422	54	92	123	151	0	− 5	− 10	− 15	0.040
19.5	32.5	33.8	0.3	0.15		13	29	60	–	13	18	24	–	3	− 1	− 7	–	0.039
19.5	32.5	33.8	0.3	0.15		12	29	65	–	14	20	28	–	3	− 1	− 7	–	0.036
19.5	32.5	33.8	0.3	0.15		12	29	65	–	14	20	28	–	3	− 1	− 7	–	0.036
22	35	37.5	0.6	0.3		25	46	146	296	19	25	41	59	0	− 4	− 16	− 28	0.065
22	35	37.5	0.6	0.3		25	49	163	337	21	28	48	69	0	− 4	− 16	− 28	0.058
22	35	37.5	0.6	0.3		35	75	204	408	45	60	87	116	− 1	− 4	− 11	− 19	0.064
22	35	37.5	0.6	0.3		37	82	232	470	51	69	102	136	− 1	− 4	− 11	− 19	0.057
22	35	37.5	0.6	0.3		25	115	247	412	53	90	119	145	0	− 5	− 10	− 15	0.065
22	35	37.5	0.6	0.3		25	48	97	–	16	21	28	–	0	− 5	− 13	–	0.065
22	35	37.5	0.6	0.3		25	51	107	–	18	24	32	–	0	− 5	− 13	–	0.057
22	35	37.5	0.6	0.3		25	51	107	–	18	24	32	–	0	− 5	− 13	–	0.057
22.5	34.5	35.8	0.3	0.15		20	42	80	152	19	26	35	48	1	− 3	− 8	− 15	0.036
22.5	34.5	35.8	0.3	0.15		19	44	87	169	21	29	40	55	1	− 3	− 8	− 15	0.033
22.5	34.5	35.8	0.3	0.15		25	63	114	247	43	60	75	102	0	− 3	− 6	− 12	0.037
22.5	34.5	35.8	0.3	0.15		25	68	127	282	48	69	87	119	0	− 3	− 6	− 12	0.034
22.5	34.5	35.8	0.3	0.15		16	29	63	–	15	19	26	–	2	− 1	− 7	–	0.036
22.5	34.5	35.8	0.3	0.15		15	30	67	–	17	21	29	–	2	− 1	− 7	–	0.033
22.5	34.5	35.8	0.3	0.15		15	30	67	–	17	21	29	–	2	− 1	− 7	–	0.033
25	37	39.5	0.6	0.3		25	49	119	244	21	28	42	59	0	− 4	− 12	− 22	0.067
25	37	39.5	0.6	0.3		25	52	132	277	24	32	48	68	0	− 4	− 12	− 22	0.060
25	37	39.5	0.6	0.3		36	81	206	403	51	68	97	127	− 1	− 4	− 10	− 17	0.067
25	37	39.5	0.6	0.3		38	90	234	465	58	79	113	149	− 1	− 4	− 10	− 17	0.060
25	37	39.5	0.6	0.3		25	128	280	473	59	104	139	170	0	− 5	− 10	− 15	0.068
25	37	39.5	0.6	0.3		25	51	107	–	18	24	32	–	0	− 5	− 13	–	0.068
25	37	39.5	0.6	0.3		25	54	119	–	20	27	37	–	0	− 5	− 13	–	0.061
25	37	39.5	0.6	0.3		25	54	119	–	20	27	37	–	0	− 5	− 13	–	0.061
26	41	42	1	0.5		35	68	196	384	23	30	48	68	− 2	− 7	− 20	− 33	0.103
26	41	42	1	0.5		37	74	221	440	26	34	56	79	− 2	− 7	− 20	− 33	0.091
26	41	42	1	0.5		63	112	290	596	59	73	104	140	− 3	− 6	− 14	− 24	0.102
26	41	42	1	0.5		68	125	332	691	67	84	122	165	− 3	− 6	− 14	− 24	0.090
26	41	42	1	0.5		25	262	439	649	56	128	155	181	0	− 10	− 15	− 20	0.104
26	41	42	1	0.5		34	67	140	–	19	25	34	–	− 2	− 8	− 18	–	0.103
26	41	42	1	0.5		35	72	157	–	22	29	39	–	− 2	− 8	− 18	–	0.091
26	41	42	1	0.5		35	72	157	–	22	29	39	–	− 2	− 8	− 18	–	0.091

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
25°	2.0			
30°	1.4			

Table B

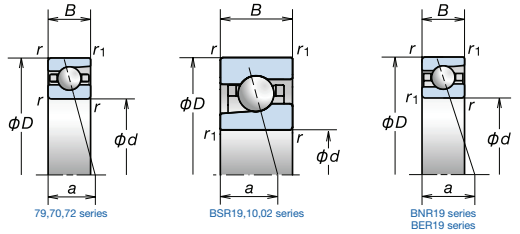
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

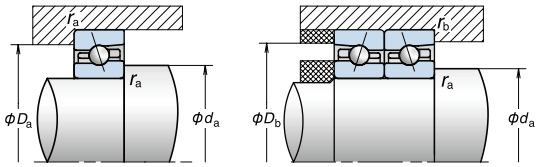
Bore Diameter 25mm



79,70,72 series | BSR19,10,02 series | BNR19 series BER19 series

Bearing Numbers (1)	Boundary Dimensions (mm)					Basic Load Ratings (2) (kN)		Permissible Axial Load (3) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (4) (min^{-1})	
	d	D	B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
7905C	25	42	9	0.3	0.15	8.25	5.40	3.90	15	15.5	9.0	34 400	52 300
7905CSN24	25	42	9	0.3	0.15	(8.25)	(5.40)	4.63	15	15.5	9.0	44 800	68 100
7905A5	25	42	9	0.3	0.15	7.80	5.15	4.40	25	—	12.3	29 900	44 800
7905A5SN24	25	42	9	0.3	0.15	(7.80)	(5.15)	5.20	25	—	12.3	38 900	58 300
***25BSR19S**	25	42	9	0.3	0.15	5.30	2.71	3.40	15	7.8	9.0	47 800	65 700
***25BSR19H**	25	42	9	0.3	0.15	(5.30)	(2.71)	2.22	15	7.8	9.0	56 800	83 600
***25BSR19X**	25	42	9	0.3	0.15	(5.30)	(2.71)	2.22	15	7.8	9.0	65 700	89 600
7005C	25	47	12	0.6	0.3	12.3	7.40	5.20	15	14.7	10.8	32 000	48 700
7005CSN24	25	47	12	0.6	0.3	(12.3)	(7.40)	6.16	15	14.7	10.8	41 700	63 400
7005A5	25	47	12	0.6	0.3	11.7	7.10	5.95	25	—	14.4	27 800	41 700
7005A5SN24	25	47	12	0.6	0.3	(11.7)	(7.10)	7.08	25	—	14.4	36 200	54 200
7005A	25	47	12	0.6	0.3	11.3	6.85	4.55	30	—	16.4	20 900	27 800
***25BSR10S**	25	47	12	0.6	0.3	7.90	3.75	4.65	15	7.6	10.8	44 500	61 200
***25BSR10H**	25	47	12	0.6	0.3	(7.90)	(3.75)	3.05	15	7.6	10.8	52 800	77 800
***25BSR10X**	25	47	12	0.6	0.3	(7.90)	(3.75)	3.05	15	7.6	10.8	61 200	83 400
7205C	25	52	15	1	0.6	17.4	10.2	7.50	15	14.0	12.7	29 900	45 500
7205CSN24	25	52	15	1	0.6	(17.4)	(10.2)	8.91	15	14.0	12.7	39 000	59 300
7205A5	25	52	15	1	0.6	16.7	9.80	9.05	25	—	16.5	26 000	39 000
7205A5SN24	25	52	15	1	0.6	(16.7)	(9.80)	10.7	25	—	16.5	33 800	50 700
7205A	25	52	15	1	0.6	16.1	9.45	6.95	30	—	18.6	19 500	26 000
***25BSR02S**	25	52	15	1	0.6	11.0	5.20	6.45	15	7.1	12.7	41 600	57 200
***25BSR02H**	25	52	15	1	0.6	(11.0)	(5.20)	4.20	15	7.1	12.7	49 400	72 800
***25BSR02X**	25	52	15	1	0.6	(11.0)	(5.20)	4.20	15	7.1	12.7	57 200	78 000

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available.
(2) Basic load rating values are reference values for ceramic ball bearings.
(3) For permissible axial load, please refer to Page 199.
(4) For application of limiting speeds, please refer to Page 216.



Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
27.5	39.5	40.8	0.3	0.15	19	37	99	203	21	28	43	61	1	− 2	− 9	− 17	0.043
27.5	39.5	40.8	0.3	0.15	18	39	109	229	23	31	49	70	1	− 2	− 9	− 17	0.039
27.5	39.5	40.8	0.3	0.15	38	70	153	290	57	71	96	124	− 1	− 3	− 7	− 12	0.043
27.5	39.5	40.8	0.3	0.15	39	76	172	332	64	81	111	144	− 1	− 3	− 7	− 12	0.039
27.5	39.5	40.8	0.3	0.15	20	41	76	—	18	25	32	—	1	− 3	− 8	—	0.043
27.5	39.5	40.8	0.3	0.15	19	43	83	—	20	28	36	—	1	− 3	− 8	—	0.039
27.5	39.5	40.8	0.3	0.15	19	43	83	—	20	28	36	—	1	− 3	− 8	—	0.039
30	42	44.5	0.6	0.3	30	58	148	292	24	32	48	67	− 1	− 5	− 14	− 24	0.078
30	42	44.5	0.6	0.3	31	62	165	332	27	36	55	78	− 1	− 5	− 14	− 24	0.070
30	42	44.5	0.6	0.3	52	104	193	397	61	79	100	133	− 2	− 5	− 9	− 16	0.077
30	42	44.5	0.6	0.3	55	116	220	458	70	91	116	156	− 2	− 5	− 9	− 16	0.069
30	42	44.5	0.6	0.3	25	135	299	507	63	112	149	183	0	− 5	− 10	− 15	0.079
30	42	44.5	0.6	0.3	25	52	112	—	20	25	35	—	0	− 5	− 13	—	0.078
30	42	44.5	0.6	0.3	25	56	125	—	22	29	40	—	0	− 5	− 13	—	0.070
30	42	44.5	0.6	0.3	25	56	125	—	22	29	40	—	0	− 5	− 13	—	0.070
31	46	47	1	0.5	42	82	193	402	27	36	53	76	1	− 4	− 14	− 27	0.127
31	46	47	1	0.5	41	86	212	452	30	41	61	88	1	− 4	− 14	− 27	0.112
31	46	47	1	0.5	82	143	330	691	73	89	123	166	− 2	− 5	− 12	− 22	0.130
31	46	47	1	0.5	87	156	372	793	83	103	143	194	− 2	− 5	− 12	− 22	0.115
31	46	47	1	0.5	49	357	578	839	80	161	193	223	0	− 10	− 15	− 20	0.129
31	46	47	1	0.5	37	84	163	—	22	31	40	—	2	− 5	− 14	—	0.127
31	46	47	1	0.5	36	88	179	—	25	35	46	—	2	− 5	− 14	—	0.112
31	46	47	1	0.5	36	88	179	—	25	35	46	—	2	− 5	− 14	—	0.112

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.
Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6,5	6,0	5,0	4,5
18°	4.5			
25°	2.0			
30°	1.4			

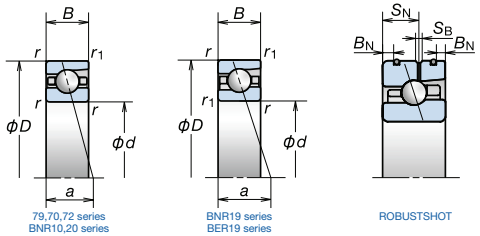
Table B

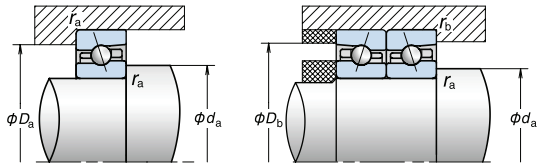
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:
- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

Bore Diameter 30 mm





Bearing Numbers (1)	Boundary Dimensions (2) (mm)								Basic Load Ratings (3) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min^{-1})	
	d	D	B	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
*7906C	30	47	9	–	–	–	0.3	0.15	8.70	6.25	4.40	15	15.9	9.7	29 900	45 500
*7906CSN24	30	47	9	–	–	–	0.3	0.15	(8.70)	(6.25)	5.20	15	15.9	9.7	39 000	59 300
*7906A5	30	47	9	–	–	–	0.3	0.15	8.25	5.95	4.95	25	–	13.5	26 000	39 000
*7906A5SN24	30	47	9	–	–	–	0.3	0.15	(8.25)	(5.95)	5.86	25	–	13.5	33 800	50 700
*30BN19BV1V	30	47	9	–	–	–	0.3	0.15	5.00	3.60	5.05	18	10.9	10.8	36 400	–
*30BN19BSN24V1V	30	47	9	–	–	–	0.3	0.15	(5.00)	(3.60)	3.30	18	10.9	10.8	46 800	–
*30BA19BV1V	30	47	9	–	–	–	0.3	0.15	4.80	3.45	5.90	25	–	13.5	31 200	–
*30BA19BSN24V1V	30	47	9	–	–	–	0.3	0.15	(4.80)	(3.45)	4.00	25	–	13.5	41 600	–
30BNR19S	30	47	9	–	–	–	0.3	0.15	6.30	4.05	5.75	18	10.5	10.8	36 400	52 000
30BNR19H	30	47	9	1.1	5.6	1.4	0.3	0.15	(6.30)	(4.05)	3.80	18	10.5	10.8	46 800	72 800
30BNR19X	30	47	9	1.1	5.6	1.4	0.3	0.15	(6.30)	(4.05)	3.80	18	10.5	10.8	54 600	85 800
30BER19S	30	47	9	–	–	–	0.3	0.15	6.00	3.90	6.80	25	–	13.5	31 200	44 200
30BER19H	30	47	9	1.1	5.6	1.4	0.3	0.15	(6.00)	(3.90)	4.60	25	–	13.5	41 600	65 000
30BER19X	30	47	9	1.1	5.6	1.4	0.3	0.15	(6.00)	(3.90)	4.60	25	–	13.5	49 400	78 000
*7006C	30	55	13	–	–	–	1	0.6	15.9	10.3	6.85	15	14.9	12.2	27 100	41 200
*7006CSN24	30	55	13	–	–	–	1	0.6	(15.9)	(10.3)	8.12	15	14.9	12.2	35 300	53 700
*7006A5	30	55	13	–	–	–	1	0.6	15.1	9.80	8.05	25	–	16.4	23 600	35 300
*7006A5SN24	30	55	13	–	–	–	1	0.6	(15.1)	(9.80)	9.56	25	–	16.4	30 600	45 900
*7006A	30	55	13	–	–	–	1	0.6	14.6	9.45	6.20	30	–	18.8	17 700	23 600
*30BNR10S	30	55	13	–	–	–	1	0.6	8.65	5.75	8.20	18	10.3	13.3	33 000	47 100
*30BNR10H	30	55	13	2.8	7.5	1.4	1	0.6	(8.65)	(5.75)	5.35	18	10.3	13.3	42 400	65 900
*30BNR10X	30	55	13	2.8	7.5	1.4	1	0.6	(8.65)	(5.75)	5.35	18	10.3	13.3	49 500	77 700
*30BER10S	30	55	13	–	–	–	1	0.6	8.30	5.50	9.65	25	–	16.3	28 300	40 000
*30BER10H	30	55	13	2.8	7.5	1.4	1	0.6	(8.30)	(5.50)	6.50	25	–	16.3	37 700	58 900
*30BER10X	30	55	13	2.8	7.5	1.4	1	0.6	(8.30)	(5.50)	6.50	25	–	16.3	44 800	70 600
*30BNR20SV1V	30	55	16	–	–	–	1	0.6	8.65	5.75	8.20	18	10.3	14.8	33 000	–
*30BNR20HV1V	30	55	16	–	–	–	1	0.6	(8.65)	(5.75)	5.35	18	10.3	14.8	42 400	–
*30BNR20XV1V	30	55	16	–	–	–	1	0.6	(8.65)	(5.75)	5.35	18	10.3	14.8	49 500	–
*30BER20SV1V	30	55	16	–	–	–	1	0.6	8.30	5.50	9.65	25	–	17.8	28 300	–
*30BER20HV1V	30	55	16	–	–	–	1	0.6	(8.30)	(5.50)	6.50	25	–	17.8	37 700	–
*30BER20XV1V	30	55	16	–	–	–	1	0.6	(8.30)	(5.50)	6.50	25	–	17.8	44 800	–
7206C	30	62	16	–	–	–	1	0.6	24.2	14.7	10.3	15	13.9	14.2	25 000	38 100
7206CSN24	30	62	16	–	–	–	1	0.6	(24.2)	(14.7)	12.2	15	13.9	14.2	32 700	49 600
7206A5	30	62	16	–	–	–	1	0.6	23.2	14.1	12.0	25	–	18.7	21 800	32 700
7206A5SN24	30	62	16	–	–	–	1	0.6	(23.2)	(14.1)	14.2	25	–	18.7	28 300	42 400
7206A	30	62	16	–	–	–	1	0.6	22.4	13.6	9.20	30	–	21.3	16 400	21 800

Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
32.5	44.5	45.8	0.3	0.15	25	46	95	204	25	33	45	65	0	– 3	– 8	– 16	0.049
32.5	44.5	45.8	0.3	0.15	25	49	104	230	28	37	51	75	0	– 3	– 8	– 16	0.044
32.5	44.5	45.8	0.3	0.15	39	74	141	285	62	78	99	131	– 1	– 3	– 6	– 11	0.050
32.5	44.5	45.8	0.3	0.15	41	81	158	326	70	90	115	154	– 1	– 3	– 6	– 11	0.045
32.5	44.5	45.8	0.3	0.15	25	109	218	–	30	53	71	–	0	– 8	– 15	–	0.050
32.5	44.5	45.8	0.3	0.15	25	121	248	–	34	62	83	–	0	– 8	– 15	–	0.047
32.5	44.5	45.8	0.3	0.15	25	178	352	–	50	100	131	–	0	– 8	– 14	–	0.050
32.5	44.5	45.8	0.3	0.15	25	202	405	–	56	117	153	–	0	– 8	– 14	–	0.047
32.5	44.5	45.8	0.3	0.15	25	101	197	–	28	48	63	–	0	– 8	– 15	–	0.048
32.5	44.5	45.8	0.3	0.15	25	112	224	–	31	55	73	–	0	– 8	– 15	–	0.043
32.5	44.5	45.8	0.3	0.15	25	112	224	–	31	55	73	–	0	– 8	– 15	–	0.043
32.5	44.5	45.8	0.3	0.15	25	164	318	–	47	90	116	–	0	– 8	– 14	–	0.048
32.5	44.5	45.8	0.3	0.15	25	185	366	–	52	105	136	–	0	– 8	– 14	–	0.043
32.5	44.5	45.8	0.3	0.15	25	185	366	–	52	105	136	–	0	– 8	– 14	–	0.043
36	49	50	1	0.5	41	75	195	386	30	38	58	81	1	– 3	– 13	– 24	0.114
36	49	50	1	0.5	41	78	214	434	33	42	66	94	1	– 3	– 13	– 24	0.102
36	49	50	1	0.5	66	129	294	590	73	93	127	169	– 1	– 4	– 10	– 18	0.114
36	49	50	1	0.5	68	139	331	676	82	106	148	197	– 1	– 4	– 10	– 18	0.102
36	49	50	1	0.5	49	191	390	638	87	138	180	217	0	– 5	– 10	– 15	0.116
36	49	50	1	0.5	49	106	229	–	39	52	71	–	0	– 5	– 13	–	0.124
36	49	50	1	0.5	49	113	254	–	44	59	82	–	0	– 5	– 13	–	0.116
36	49	50	1	0.5	49	113	254	–	44	59	82	–	0	– 5	– 13	–	0.116
36	49	50	1	0.5	49	224	443	–	64	109	141	–	0	– 8	– 15	–	0.124
36	49	50	1	0.5	49	250	505	–	72	126	165	–	0	– 8	– 15	–	0.116
36	49	50	1	0.5	49	250	505	–	72	126	165	–	0	– 8	– 15	–	0.116
36	49	50	1	0.5	49	106	229	–	39	52	71	–	0	– 5	– 13	–	0.150
36	49	50	1	0.5	49	113	254	–	44	59	82	–	0	– 5	– 13	–	0.142
36	49	50	1	0.5	49	113	254	–	44	59	82	–	0	– 5	– 13	–	0.142
36	49	50	1	0.5	49	224	443	–	64	109	141	–	0	– 8	– 15	–	0.150
36	49	50	1	0.5	49	250	505	–	72	126	165	–	0	– 8	– 15	–	0.142
36	49	50	1	0.5	49	250	505	–	72	126	165	–	0	– 8	– 15	–	0.142
36	56	57	1	0.5	57	114	292	591	33	43	66	94	– 1	– 7	– 20	– 35	0.194
36	56	57	1	0.5	58	122	326	673	36	49	76	109	– 1	– 7	– 20	– 35	0.169
36	56	57	1	0.5	105	202	457	881	85	108	147	192	– 3	– 7	– 15	– 25	0.194
36	56	57	1	0.5	113	224	521	1 018	97	124	172	225	– 3	– 7	– 15	– 25	0.169
36	56	57	1	0.5	49	384	625	908	86	175	210	243	0	– 10	– 15	– 20	0.197

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available. Series 20 is exclusively for sealed bearings.
(2) A bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

Table B

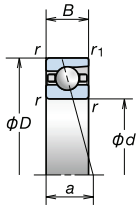
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

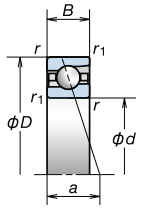
- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

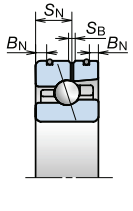
Bore Diameter 35mm



79,70,72 series
BNR10,20 series
BER10,20 series



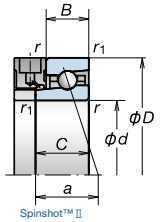
BNR19 series
BER19 series



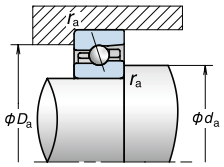
ROBUSTSHOT

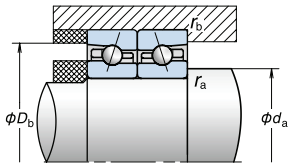
Bearing Numbers (1)	Boundary Dimensions (2) (mm)								Basic Load Ratings (3) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min⁻¹)	
	d	D	B	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
*7907C	35	55	10	–	–	–	0.6	0.3	12.7	9.15	6.60	15	15.7	11.0	25 600	38 900
*7907CSN24	35	55	10	–	–	–	0.6	0.3	(12.7)	(9.15)	7.82	15	15.7	11.0	33 400	50 700
*7907A5	35	55	10	–	–	–	0.6	0.3	12.0	8.70	7.20	25	–	15.5	22 300	33 400
*7907A5SN24	35	55	10	–	–	–	0.6	0.3	(12.0)	(8.70)	8.52	25	–	15.5	28 900	43 400
*35BN19AV1V	35	55	10	–	–	–	0.6	0.3	6.95	5.10	7.20	18	10.8	12.3	31 200	–
*35BN19ASN24V1V	35	55	10	–	–	–	0.6	0.3	(6.95)	(5.10)	4.75	18	10.8	12.3	40 000	–
*35BA19BV1V	35	55	10	–	–	–	0.6	0.3	6.65	4.90	8.50	25	–	15.5	26 700	–
*35BA19BSN24V1V	35	55	10	–	–	–	0.6	0.3	(6.65)	(4.90)	5.75	25	–	15.5	35 600	–
35BNR19S	35	55	10	–	–	–	0.6	0.3	9.20	6.00	8.55	18	10.4	12.3	31 200	44 500
35BNR19H	35	55	10	1.6	6.1	1.4	0.6	0.3	(9.20)	(6.00)	5.60	18	10.4	12.3	40 000	62 300
35BNR19X	35	55	10	1.6	6.1	1.4	0.6	0.3	(9.20)	(6.00)	5.60	18	10.4	12.3	46 700	73 400
35BER19S	35	55	10	–	–	–	0.6	0.3	8.80	5.75	10.0	25	–	15.5	26 700	37 800
35BER19H	35	55	10	1.6	6.1	1.4	0.6	0.3	(8.80)	(5.75)	6.80	25	–	15.5	35 600	55 600
35BER19X	35	55	10	1.6	6.1	1.4	0.6	0.3	(8.80)	(5.75)	6.80	25	–	15.5	42 300	66 700
*7007C	35	62	14	–	–	–	1	0.6	20.1	13.7	9.35	15	15.0	13.5	23 800	36 100
*7007CSN24	35	62	14	–	–	–	1	0.6	(20.1)	(13.7)	11.1	15	15.0	13.5	29 700	45 200
*7007A5	35	62	14	–	–	–	1	0.6	19.1	13.0	11.4	25	–	18.3	20 700	31 000
*7007A5SN24	35	62	14	–	–	–	1	0.6	(19.1)	(13.0)	13.5	25	–	18.3	25 800	38 800
*7007A	35	62	14	–	–	–	1	0.6	18.4	12.6	8.75	30	–	21.0	15 500	20 700
*35BNR10S	35	62	14	–	–	–	1	0.6	10.1	7.10	10.2	18	10.6	14.8	28 900	41 300
*35BNR10H	35	62	14	2.8	8.3	1.4	1	0.6	(10.1)	(7.10)	6.70	18	10.6	14.8	37 200	57 800
*35BNR10X	35	62	14	2.8	8.3	1.4	1	0.6	(10.1)	(7.10)	6.70	18	10.6	14.8	43 300	68 100
*35BER10S	35	62	14	–	–	–	1	0.6	9.70	6.85	12.0	25	–	18.2	24 800	35 100
*35BER10H	35	62	14	2.8	8.3	1.4	1	0.6	(9.70)	(6.85)	8.10	25	–	18.2	33 000	51 600
*35BER10X	35	62	14	2.8	8.3	1.4	1	0.6	(9.70)	(6.85)	8.10	25	–	18.2	39 200	61 900
*35BNR20SV1V	35	62	17	–	–	–	1	0.6	10.1	7.10	10.2	18	10.6	16.3	28 900	–
*35BNR20HV1V	35	62	17	–	–	–	1	0.6	(10.1)	(7.10)	6.70	18	10.6	16.3	37 200	–
*35BNR20XV1V	35	62	17	–	–	–	1	0.6	(10.1)	(7.10)	6.70	18	10.6	16.3	43 300	–
*35BER20SV1V	35	62	17	–	–	–	1	0.6	9.70	6.85	12.0	25	–	19.7	24 800	–
*35BER20HV1V	35	62	17	–	–	–	1	0.6	(9.70)	(6.85)	8.10	25	–	19.7	33 000	–
*35BER20XV1V	35	62	17	–	–	–	1	0.6	(9.70)	(6.85)	8.10	25	–	19.7	39 200	–
7207C	35	72	17	–	–	–	1.1	0.6	32.0	19.9	14.4	15	13.9	15.7	21 500	32 800
7207CSN24	35	72	17	–	–	–	1.1	0.6	(32.0)	(19.9)	17.1	15	13.9	15.7	28 100	42 700
7207A5	35	72	17	–	–	–	1.1	0.6	30.5	19.1	16.6	25	–	21.0	18 700	28 100
7207A5SN24	35	72	17	–	–	–	1.1	0.6	(30.5)	(19.1)	19.7	25	–	21.0	24 300	36 500
7207A	35	72	17	–	–	–	1.1	0.6	29.6	18.5	12.7	30	–	23.9	14 100	18 700

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available. Series 20 is exclusively for sealed bearings.
(2) A bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.



Spinshot™ II





Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
40	50	52.5	0.6	0.3	33	67	149	297	29	39	55	77	2	– 2	– 9	– 18	0.074
40	50	52.5	0.6	0.3	32	69	162	332	32	43	63	89	2	– 2	– 9	– 18	0.065
40	50	52.5	0.6	0.3	49	110	248	508	70	93	127	169	0	– 3	– 8	– 15	0.075
40	50	52.5	0.6	0.3	49	119	278	580	79	107	147	198	0	– 3	– 8	– 15	0.066
40	50	52.5	0.6	0.3	49	154	324	–	41	64	87	–	0	– 8	– 17	–	0.080
40	50	52.5	0.6	0.3	49	168	364	–	46	73	101	–	0	– 8	– 17	–	0.074
40	50	52.5	0.6	0.3	49	235	472	–	67	117	153	–	0	– 8	– 15	–	0.080
40	50	52.5	0.6	0.3	49	263	538	–	75	135	178	–	0	– 8	– 15	–	0.074
40	50	52.5	0.6	0.3	49	142	288	–	37	56	74	–	0	– 8	– 17	–	0.072
40	50	52.5	0.6	0.3	49	155	323	–	42	64	86	–	0	– 8	– 17	–	0.063
40	50	52.5	0.6	0.3	49	155	323	–	42	64	86	–	0	– 8	– 17	–	0.063
40	50	52.5	0.6	0.3	49	214	419	–	61	102	132	–	0	– 8	– 15	–	0.072
40	50	52.5	0.6	0.3	49	238	477	–	68	118	154	–	0	– 8	– 15	–	0.063
40	50	52.5	0.6	0.3	49	238	477	–	68	118	154	–	0	– 8	– 15	–	0.063
41	56	57	1	0.5	58	121	251	493	36	49	67	94	– 1	– 7	– 16	– 28	0.151
41	56	57	1	0.5	59	130	279	558	40	55	78	109	– 1	– 7	– 16	– 28	0.133
41	56	57	1	0.5	68	161	387	779	78	107	150	199	– 1	– 5	– 12	– 21	0.151
41	56	57	1	0.5	70	177	439	897	89	124	174	233	– 1	– 5	– 12	– 21	0.133
41	56	57	1	0.5	49	203	421	693	93	151	197	237	0	– 5	– 10	– 15	0.153
41	56	57	1	0.5	49	110	222	–	41	55	73	–	0	– 5	– 12	–	0.164
41	56	57	1	0.5	49	117	247	–	46	63	85	–	0	– 5	– 12	–	0.154
41	56	57	1	0.5	49	117	247	–	46	63	85	–	0	– 5	– 12	–	0.154
41	56	57	1	0.5	49	237	474	–	68	118	153	–	0	– 8	– 15	–	0.164
41	56	57	1	0.5	49	265	541	–	76	136	178	–	0	– 8	– 15	–	0.154
41	56	57	1	0.5	49	265	541	–	76	136	178	–	0	– 8	– 15	–	0.154
41	56	57	1	0.5	49	110	222	–	41	55	73	–	0	– 5	– 12	–	0.197
41	56	57	1	0.5	49	117	247	–	46	63	85	–	0	– 5	– 12	–	0.187
41	56	57	1	0.5	49	117	247	–	46	63	85	–	0	– 5	– 12	–	0.187
41	56	57	1	0.5	49	237	474	–	68	118	153	–	0	– 8	– 15	–	0.197
41	56	57	1	0.5	49	265	541	–	76	136	178	–	0	– 8	– 15	–	0.187
41	56	57	1	0.5	49	265	541	–	76	136	178	–	0	– 8	– 15	–	0.187
42	65	67	1	0.6	75	151	385	794	37	50	75	107	– 3	– 10	– 25	– 43	0.280
42	65	67	1	0.6	78	164	434	911	42	57	87	125	– 3	– 10	– 25	– 43	0.240
42	65	67	1	0.6	131	238	596	1 178	95	118	167	220	– 4	– 8	– 18	– 30	0.277
42	65	67	1	0.6	142	266	683	1 366	109	137	196	259	– 4	– 8	– 18	– 30	0.237
42	65	67	1	0.6	49	401	654	1 288	90	184	221	286	0	– 10	– 15	– 25	0.284

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

Table B

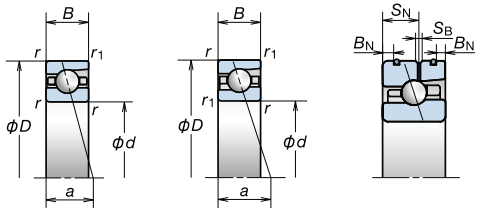
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

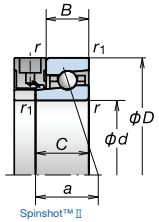
Bore Diameter 40 mm



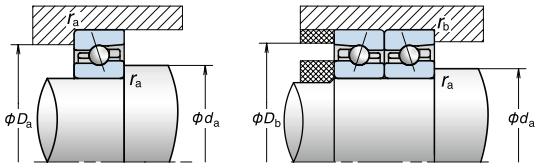
79,70,72 series
BNR10,20 series
BER10,20 series

BNR19,29 series
BER19,29 series

ROBUSTSHOT



Spinshot™ II



Bearing Numbers (1)	Boundary Dimensions (2) (mm)									Basic Load Ratings (3) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min^{-1})	
	d	D	B	C	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
*7908C	40	62	12	–	–	–	–	0.6	0.3	15.9	11.7	8.40	15	15.7	12.8	22 600	34 400
*7908CSN24	40	62	12	–	–	–	–	0.6	0.3	(15.9)	(11.7)	9.97	15	15.7	12.8	29 500	44 800
*7908A5	40	62	12	–	–	–	–	0.6	0.3	15.0	11.2	8.90	25	–	17.9	19 700	29 500
*7908A5SN24	40	62	12	–	–	–	–	0.6	0.3	(15.0)	(11.2)	10.5	25	–	17.9	25 500	38 300
*40BNR19S	40	62	12	–	–	–	–	0.6	0.3	11.5	7.65	10.8	18	10.4	14.3	27 500	39 300
*40BNR19H	40	62	12	–	2.2	7.0	1.4	0.6	0.3	(11.5)	(7.65)	7.10	18	10.4	14.3	35 300	55 000
*40BNR19X	40	62	12	17	2.2	7.0	1.4	0.6	0.3	(11.5)	(7.65)	7.10	18	10.4	14.3	41 200	64 800
*40BER19S	40	62	12	–	–	–	–	0.6	0.3	11.0	7.35	12.8	25	–	17.9	23 600	33 400
*40BER19H	40	62	12	–	2.2	7.0	1.4	0.6	0.3	(11.0)	(7.35)	8.65	25	–	17.9	31 400	49 100
*40BER19X	40	62	12	17	2.2	7.0	1.4	0.6	0.3	(11.0)	(7.35)	8.65	25	–	17.9	37 300	58 900
*40BNR29SV1V	40	62	14	–	–	–	–	0.6	0.3	11.5	7.65	10.8	18	10.4	15.3	27 500	–
*40BNR29HV1V	40	62	14	–	–	–	–	0.6	0.3	(11.5)	(7.65)	7.10	18	10.4	15.3	35 300	–
*40BNR29XV1V	40	62	14	–	–	–	–	0.6	0.3	(11.5)	(7.65)	7.10	18	10.4	15.3	41 200	–
*40BER29SV1V	40	62	14	–	–	–	–	0.6	0.3	11.0	7.35	12.8	25	–	18.9	23 600	–
*40BER29HV1V	40	62	14	–	–	–	–	0.6	0.3	(11.0)	(7.35)	8.65	25	–	18.9	31 400	–
*40BER29XV1V	40	62	14	–	–	–	–	0.6	0.3	(11.0)	(7.35)	8.65	25	–	18.9	37 300	–
*7008C	40	68	15	–	–	–	–	1	0.6	21.6	15.9	10.6	15	15.4	14.7	21 300	32 500
*7008CSN24	40	68	15	–	–	–	–	1	0.6	(21.6)	(15.9)	12.5	15	15.4	14.7	27 800	42 300
*7008A5	40	68	15	–	–	–	–	1	0.6	20.5	15.1	12.0	25	–	20.1	18 600	27 800
*7008A5SN24	40	68	15	–	–	–	–	1	0.6	(20.5)	(15.1)	14.2	25	–	20.1	24 100	36 200
*7008A	40	68	15	–	–	–	–	1	0.6	19.7	14.6	9.15	30	–	23.1	13 900	18 600
*40BNR10S	40	68	15	–	–	–	–	1	0.6	10.6	7.95	11.5	18	10.7	16.2	26 000	37 100
*40BNR10H	40	68	15	–	2.8	8.8	1.4	1	0.6	(10.6)	(7.95)	7.50	18	10.7	16.2	33 400	51 900
*40BNR10X	40	68	15	20	2.8	8.8	1.4	1	0.6	(10.6)	(7.95)	7.50	18	10.7	16.2	38 900	61 200
*40BER10S	40	68	15	–	–	–	–	1	0.6	10.1	7.65	13.5	25	–	19.9	22 300	31 500
*40BER10H	40	68	15	–	2.8	8.8	1.4	1	0.6	(10.1)	(7.65)	9.10	25	–	19.9	29 700	46 300
*40BER10X	40	68	15	20	2.8	8.8	1.4	1	0.6	(10.1)	(7.65)	9.10	25	–	19.9	35 200	55 600
*40BNR20SV1V	40	68	18	–	–	–	–	1	0.6	10.6	7.95	11.5	18	10.7	17.7	26 000	–
*40BNR20HV1V	40	68	18	–	–	–	–	1	0.6	(10.6)	(7.95)	7.50	18	10.7	17.7	33 400	–
*40BNR20XV1V	40	68	18	–	–	–	–	1	0.6	(10.6)	(7.95)	7.50	18	10.7	17.7	38 900	–
*40BER20SV1V	40	68	18	–	–	–	–	1	0.6	10.1	7.65	13.5	25	–	21.4	22 300	–
*40BER20HV1V	40	68	18	–	–	–	–	1	0.6	(10.1)	(7.65)	9.10	25	–	21.4	29 700	–
*40BER20XV1V	40	68	18	–	–	–	–	1	0.6	(10.1)	(7.65)	9.10	25	–	21.4	35 200	–
7208C	40	80	18	–	–	–	–	1.1	0.6	38.0	25.2	17.6	15	14.1	17.0	19 200	29 200
7208CSN24	40	80	18	–	–	–	–	1.1	0.6	(38.0)	(25.2)	20.9	15	14.1	17.0	25 000	38 000
7208A5	40	80	18	–	–	–	–	1.1	0.6	36.5	24.1	20.6	25	–	23.0	16 700	25 000
7208A5SN24	40	80	18	–	–	–	–	1.1	0.6	(36.5)	(24.1)	24.4	25	–	23.0	21 700	32 500
7208A	40	80	18	–	–	–	–	1.1	0.6	35.5	23.3	15.8	30	–	26.3	12 500	16 700

Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
45	57	59.5	0.6	0.3	41	78	196	384	32	42	63	88	1	– 3	– 12	– 22	0.109
45	57	59.5	0.6	0.3	40	81	215	432	35	47	72	101	1	– 3	– 12	– 22	0.096
45	57	59.5	0.6	0.3	68	113	291	572	81	97	139	182	– 1	– 3	– 9	– 16	0.110
45	57	59.5	0.6	0.3	71	121	327	655	92	111	161	213	– 1	– 3	– 9	– 16	0.097
45	57	59.5	0.6	0.3	49	145	277	–	38	57	74	–	0	– 8	– 16	–	0.105
45	57	59.5	0.6	0.3	49	158	310	–	43	66	86	–	0	– 8	– 16	–	0.092
45	57	59.5	0.6	0.3	49	158	310	–	43	66	86	–	0	– 8	– 16	–	0.092
45	57	59.5	0.6	0.3	49	221	434	–	63	106	137	–	0	– 8	– 15	–	0.105
45	57	59.5	0.6	0.3	49	246	494	–	71	123	160	–	0	– 8	– 15	–	0.092
45	57	59.5	0.6	0.3	49	246	494	–	71	123	160	–	0	– 8	– 15	–	0.092
45	57	59.5	0.6	0.3	49	145	277	–	38	57	74	–	0	– 8	– 16	–	0.120
45	57	59.5	0.6	0.3	49	158	310	–	43	66	86	–	0	– 8	– 16	–	0.107
45	57	59.5	0.6	0.3	49	158	310	–	43	66	86	–	0	– 8	– 16	–	0.107
45	57	59.5	0.6	0.3	49	221	434	–	63	106	137	–	0	– 8	– 15	–	0.120
45	57	59.5	0.6	0.3	49	246	494	–	71	123	160	–	0	– 8	– 15	–	0.107
45	57	59.5	0.6	0.3	49	246	494	–	71	123	160	–	0	– 8	– 15	–	0.107
46	62	63	1	0.5	58	114	291	594	39	51	77	110	– 1	– 6	– 17	– 30	0.189
46	62	63	1	0.5	59	123	325	676	43	58	89	128	– 1	– 6	– 17	– 30	0.168
46	62	63	1	0.5	92	203	424	864	95	127	167	223	– 2	– 6	– 12	– 21	0.188
46	62	63	1	0.5	98	225	483	998	108	147	195	262	– 2	– 6	– 12	– 21	0.167
46	62	63	1	0.5	49	219	463	768	101	168	221	267	0	– 5	– 10	– 15	0.191
46	62	63	1	0.5	49	114	216	–	44	60	77	–	0	– 5	– 11	–	0.204
46	62	63	1	0.5	49	122	240	–	49	68	89	–	0	– 5	– 11	–	0.193
46	62	63	1	0.5	49	122	240	–	49	68	89	–	0	– 5	– 11	–	0.193
46	62	63	1	0.5	49	252	510	–	72	128	167	–	0	– 8	– 15	–	0.204
46	62	63	1	0.5	49	282	583	–	81	148	195	–	0	– 8	– 15	–	0.193
46	62	63	1	0.5	49	282	583	–	81	148	195	–	0	– 8	– 15	–	0.193
46	62	63	1	0.5	49	114	216	–	44	60	77	–	0	– 5	– 11	–	0.242
46	62	63	1	0.5	49	122	240	–	49	68	89	–	0	– 5	– 11	–	0.231
46	62	63	1	0.5	49	122	240	–	49	68	89	–	0	– 5	– 11	–	0.231
46	62	63	1	0.5	49	252	510	–	72	128	167	–	0	– 8	– 15	–	0.242
46	62	63	1	0.5	49	282	583	–	81	148	195	–	0	– 8	– 15	–	0.231
46	62	63	1	0.5	49	282	583	–	81	148	195	–	0	– 8	– 15	–	0.231
47	73	75	1	0.6	98	202	501	985	44	60	90	125	– 5	– 13	– 29	– 47	0.366
47	73	75	1	0.6	104	223	570	1 133	50	69	104	147	– 5	– 13	– 29	– 47	0.313
47	73	75	1	0.6	138	290	750	1 490	105	137	196	259	– 4	– 9	– 20	– 33	0.362
47	73	75	1	0.6	151	326	864	1 734	121	159	230	305	– 4	– 9	– 20	– 33	0.309
47	73	75	1	0.6	49	438	721	1 428	97	205	246	318	0	– 10	– 15	– 25	0.370

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available. Series 20 and 29 are exclusively for sealed bearings.
(2) A bearing with C values at column indicate a bearing which Spinshot II are available, and a bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

Table B

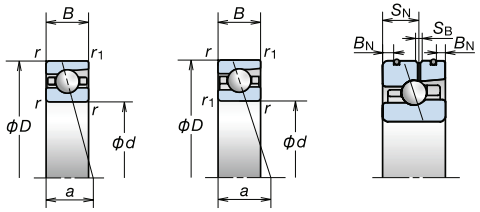
	DBD	DBC
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

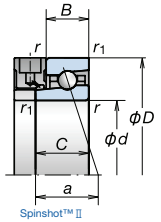
Bore Diameter 45mm



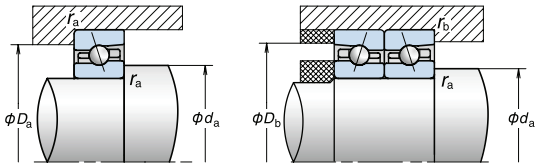
79,70,72 series
BNR10,20 series
BER10,20 series

BNR19,29 series
BER19,29 series

ROBUSTSHOT



Spinshot™ II



Bearing Numbers (1)	Boundary Dimensions (2) (mm)									Basic Load Ratings (3) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min^{-1})	
	d	D	B	C	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
*7909C	45	68	12	–	–	–	–	0.6	0.3	16.8	13.4	8.55	15	16.0	13.6	20 400	31 000
*7909CSN24	45	68	12	–	–	–	–	0.6	0.3	(16.8)	(13.4)	10.1	15	16.0	13.6	26 600	40 400
*7909A5	45	68	12	–	–	–	–	0.6	0.3	15.9	12.7	9.95	25	–	19.2	17 700	26 600
*7909A5SN24	45	68	12	–	–	–	–	0.6	0.3	(15.9)	(12.7)	11.8	25	–	19.2	23 100	34 600
*45BNR19S	45	68	12	–	–	–	–	0.6	0.3	12.1	8.70	12.4	18	10.6	15.2	24 800	35 400
*45BNR19H	45	68	12	–	2.2	7.0	1.4	0.6	0.3	(12.1)	(8.70)	8.10	18	10.6	15.2	31 900	49 600
*45BNR19X	45	68	12	17	2.2	7.0	1.4	0.6	0.3	(12.1)	(8.70)	8.10	18	10.6	15.2	37 200	58 500
*45BER19S	45	68	12	–	–	–	–	0.6	0.3	11.6	8.35	14.6	25	–	19.2	21 300	30 100
*45BER19H	45	68	12	–	2.2	7.0	1.4	0.6	0.3	(11.6)	(8.35)	9.85	25	–	19.2	28 400	44 300
*45BER19X	45	68	12	17	2.2	7.0	1.4	0.6	0.3	(11.6)	(8.35)	9.85	25	–	19.2	33 700	53 100
*45BNR29SV1V	45	68	14	–	–	–	–	0.6	0.3	12.1	8.70	12.4	18	10.6	16.2	24 800	–
*45BNR29HV1V	45	68	14	–	–	–	–	0.6	0.3	(12.1)	(8.70)	8.10	18	10.6	16.2	31 900	–
*45BNR29XV1V	45	68	14	–	–	–	–	0.6	0.3	(12.1)	(8.70)	8.10	18	10.6	16.2	37 200	–
*45BER29SV1V	45	68	14	–	–	–	–	0.6	0.3	11.6	8.35	14.6	25	–	20.2	21 300	–
*45BER29HV1V	45	68	14	–	–	–	–	0.6	0.3	(11.6)	(8.35)	9.85	25	–	20.2	28 400	–
*45BER29XV1V	45	68	14	–	–	–	–	0.6	0.3	(11.6)	(8.35)	9.85	25	–	20.2	33 700	–
*7009C	45	75	16	–	–	–	–	1	0.6	25.6	19.3	12.4	15	15.4	16.0	19 200	29 200
*7009CSN24	45	75	16	–	–	–	–	1	0.6	(25.6)	(19.3)	14.7	15	15.4	16.0	25 000	38 000
*7009A5	45	75	16	–	–	–	–	1	0.6	24.3	18.3	14.5	25	–	22.0	16 700	25 000
*7009A5SN24	45	75	16	–	–	–	–	1	0.6	(24.3)	(18.3)	17.2	25	–	22.0	21 700	32 500
*7009A	45	75	16	–	–	–	–	1	0.6	23.4	17.7	11.1	30	–	25.3	12 500	16 700
*45BNR10E	45	75	16	–	–	–	–	1	0.6	11.7	9.00	12.7	18	10.6	17.6	25 000	35 700
*45BNR10H	45	75	16	–	3.4	9.3	1.4	1	0.6	(11.7)	(9.00)	8.35	18	10.6	17.6	30 000	46 700
*45BNR10X	45	75	16	21	3.4	9.3	1.4	1	0.6	(11.7)	(9.00)	8.35	18	10.6	17.6	35 000	55 000
*45BER10E	45	75	16	–	–	–	–	1	0.6	11.2	8.60	15.0	25	–	21.8	21 500	30 400
*45BER10H	45	75	16	–	3.4	9.3	1.4	1	0.6	(11.2)	(8.60)	10.1	25	–	21.8	26 700	41 700
*45BER10X	45	75	16	21	3.4	9.3	1.4	1	0.6	(11.2)	(8.60)	10.1	25	–	21.8	31 700	50 000
*45BNR20EV1V	45	75	19	–	–	–	–	1	0.6	11.7	9.00	12.7	18	10.6	19.1	25 000	–
*45BNR20HV1V	45	75	19	–	–	–	–	1	0.6	(11.7)	(9.00)	8.35	18	10.6	19.1	30 000	–
*45BNR20XV1V	45	75	19	–	–	–	–	1	0.6	(11.7)	(9.00)	8.35	18	10.6	19.1	35 000	–
*45BER20EV1V	45	75	19	–	–	–	–	1	0.6	11.2	8.60	15.0	25	–	23.3	21 500	–
*45BER20HV1V	45	75	19	–	–	–	–	1	0.6	(11.2)	(8.60)	10.1	25	–	23.3	26 700	–
*45BER20XV1V	45	75	19	–	–	–	–	1	0.6	(11.2)	(8.60)	10.1	25	–	23.3	31 700	–
7209C	45	85	19	–	–	–	–	1.1	0.6	43.0	28.8	19.6	15	14.2	18.2	17 700	27 000
7209CSN24	45	85	19	–	–	–	–	1.1	0.6	(43.0)	(28.8)	23.3	15	14.2	18.2	23 100	35 100
7209A5	45	85	19	–	–	–	–	1.1	0.6	41.0	27.6	23.3	25	–	24.7	15 400	23 100
7209A5SN24	45	85	19	–	–	–	–	1.1	0.6	(41.0)	(27.6)	27.7	25	–	24.7	20 000	30 000
7209A	45	85	19	–	–	–	–	1.1	0.6	39.5	26.7	18.0	30	–	28.3	11 600	15 400

Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
50	63	65.5	0.6	0.3	49	104	192	391	37	51	66	93	0	– 5	– 11	– 21	0.129
50	63	65.5	0.6	0.3	49	111	211	440	41	57	76	108	0	– 5	– 11	– 21	0.115
50	63	65.5	0.6	0.3	70	146	353	676	88	115	160	208	– 1	– 4	– 10	– 17	0.130
50	63	65.5	0.6	0.3	72	159	399	776	99	132	187	243	– 1	– 4	– 10	– 17	0.116
50	63	65.5	0.6	0.3	49	153	298	–	41	63	82	–	0	– 8	– 16	–	0.125
50	63	65.5	0.6	0.3	49	168	335	–	46	72	95	–	0	– 8	– 16	–	0.111
50	63	65.5	0.6	0.3	49	168	335	–	46	72	95	–	0	– 8	– 16	–	0.111
50	63	65.5	0.6	0.3	49	237	473	–	68	117	151	–	0	– 8	– 15	–	0.125
50	63	65.5	0.6	0.3	49	265	539	–	76	136	177	–	0	– 8	– 15	–	0.111
50	63	65.5	0.6	0.3	49	265	539	–	76	136	177	–	0	– 8	– 15	–	0.111
50	63	65.5	0.6	0.3	49	153	298	–	41	63	82	–	0	– 8	– 16	–	0.143
50	63	65.5	0.6	0.3	49	168	335	–	46	72	95	–	0	– 8	– 16	–	0.128
50	63	65.5	0.6	0.3	49	168	335	–	46	72	95	–	0	– 8	– 16	–	0.128
50	63	65.5	0.6	0.3	49	237	473	–	68	117	151	–	0	– 8	– 15	–	0.143
50	63	65.5	0.6	0.3	49	265	539	–	76	136	177	–	0	– 8	– 15	–	0.128
50	63	65.5	0.6	0.3	49	265	539	–	76	136	177	–	0	– 8	– 15	–	0.128
51	69	70	1	0.5	80	144	338	695	45	57	84	120	– 3	– 8	– 19	– 33	0.238
51	69	70	1	0.5	84	156	380	794	51	66	97	140	– 3	– 8	– 19	– 33	0.211
51	69	70	1	0.5	94	210	485	958	99	132	181	238	– 2	– 6	– 13	– 22	0.250
51	69	70	1	0.5	99	233	553	1 107	113	153	212	280	– 2	– 6	– 13	– 22	0.223
51	69	70	1	0.5	49	227	482	1 178	105	176	231	324	0	– 5	– 10	– 20	0.241
51	69	70	1	0.5	49	114	218	–	44	60	77	–	0	– 5	– 11	–	0.259
51	69	70	1	0.5	49	123	242	–	50	69	89	–	0	– 5	– 11	–	0.246
51	69	70	1	0.5	49	123	242	–	50	69	89	–	0	– 5	– 11	–	0.246
51	69	70	1	0.5	49	255	516	–	73	129	168	–	0	– 8	– 15	–	0.259
51	69	70	1	0.5	49	285	590	–	82	150	197	–	0	– 8	– 15	–	0.246
51	69	70	1	0.5	49	285	590	–	82	150	197	–	0	– 8	– 15	–	0.246
51	69	70	1	0.5	49	114	218	–	44	60	77	–	0	– 5	– 11	–	0.305
51	69	70	1	0.5	49	123	242	–	50	69	89	–	0	– 5	– 11	–	0.291
51	69	70	1	0.5	49	123	242	–	50	69	89	–	0	– 5	– 11	–	0.291
51	69	70	1	0.5	49	255	516	–	73	129	168	–	0	– 8	– 15	–	0.305
51	69	70	1	0.5	49	285	590	–	82	150	197	–	0	– 8	– 15	–	0.291
51	69	70	1	0.5	49	285	590	–	82	150	197	–	0	– 8	– 15	–	0.291
52	78	80	1	0.6	123	254	534	1 067	49	67	94	131	– 7	– 16	– 30	– 49	0.406
52	78	80	1	0.6	132	283	608	1 230	56	77	109	154	– 7	– 16	– 30	– 49	0.341
52	78	80	1	0.6	169	333	875	1 738	115	147	212	281	– 5	– 10	– 22	– 36	0.402
52	78	80	1	0.6	186	377	1 011	2 026	133	171	249	330	– 5	– 10	– 22	– 36	0.337
52	78	80	1	0.6	49	450	1 084	1 905	100	212	292	363	0	– 10	– 20	– 30	0.410

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available. Series 20 and 29 are exclusively for sealed bearings.
(2) A bearing with C values at column indicate a bearing which Spinshot II are available, and a bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

Table B

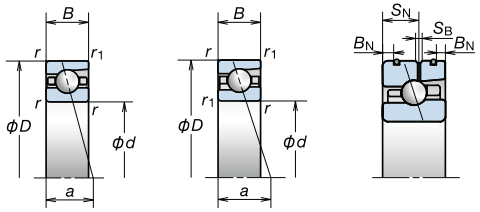
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

Bore Diameter 50 mm



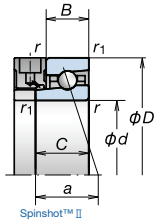
79,70,72 series
BNR10,20 series
BER10,20 series

BNR19,29 series
BER19,29 series

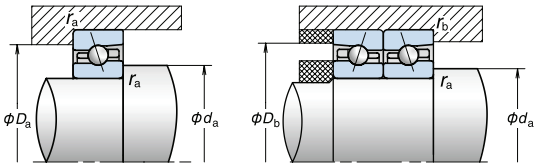
ROBUSTSHOT

Bearing Numbers (1)	Boundary Dimensions (2) (mm)									Basic Load Ratings (3) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min⁻¹)	
	d	D	B	C	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
*7910C	50	72	12	–	–	–	–	0.6	0.3	17.7	15.0	9.45	15	16.2	14.2	18 900	28 700
*7910CSN24	50	72	12	–	–	–	–	0.6	0.3	(17.7)	(15.0)	11.2	15	16.2	14.2	24 600	37 400
*7910A5	50	72	12	–	–	–	–	0.6	0.3	16.7	14.2	11.0	25	–	20.2	16 400	24 600
*7910A5SN24	50	72	12	–	–	–	–	0.6	0.3	(16.7)	(14.2)	13.1	25	–	20.2	21 400	32 000
*50BNR19S	50	72	12	–	–	–	–	0.6	0.3	12.8	9.75	13.9	18	10.7	15.9	23 000	32 800
*50BNR19H	50	72	12	–	2.2	7.0	1.4	0.6	0.3	(12.8)	(9.75)	9.10	18	10.7	15.9	29 600	46 000
*50BNR19X	50	72	12	17	2.2	7.0	1.4	0.6	0.3	(12.8)	(9.75)	9.10	18	10.7	15.9	34 500	54 100
*50BER19S	50	72	12	–	–	–	–	0.6	0.3	12.2	9.35	16.3	25	–	20.2	19 700	27 900
*50BER19H	50	72	12	–	2.2	7.0	1.4	0.6	0.3	(12.2)	(9.35)	11.0	25	–	20.2	26 300	41 000
*50BER19X	50	72	12	17	2.2	7.0	1.4	0.6	0.3	(12.2)	(9.35)	11.0	25	–	20.2	31 200	49 200
*50BNR29SV1V	50	72	14	–	–	–	–	0.6	0.3	12.8	9.75	13.9	18	10.7	16.9	23 000	–
*50BNR29HV1V	50	72	14	–	–	–	–	0.6	0.3	(12.8)	(9.75)	9.10	18	10.7	16.9	29 600	–
*50BNR29XV1V	50	72	14	–	–	–	–	0.6	0.3	(12.8)	(9.75)	9.10	18	10.7	16.9	34 500	–
*50BER29SV1V	50	72	14	–	–	–	–	0.6	0.3	12.2	9.35	16.3	25	–	21.2	19 700	–
*50BER29HV1V	50	72	14	–	–	–	–	0.6	0.3	(12.2)	(9.35)	11.0	25	–	21.2	26 300	–
*50BER29XV1V	50	72	14	–	–	–	–	0.6	0.3	(12.2)	(9.35)	11.0	25	–	21.2	31 200	–
*7010C	50	80	16	–	–	–	–	1	0.6	27.3	21.9	13.9	15	15.7	16.7	17 700	27 000
*7010CSN24	50	80	16	–	–	–	–	1	0.6	(27.3)	(21.9)	16.5	15	15.7	16.7	23 100	35 100
*7010A5	50	80	16	–	–	–	–	1	0.6	25.8	20.8	16.2	25	–	23.2	15 400	23 100
*7010A5SN24	50	80	16	–	–	–	–	1	0.6	(25.8)	(20.8)	19.3	25	–	23.2	20 000	30 000
*7010A	50	80	16	–	–	–	–	1	0.6	24.8	20.1	12.5	30	–	26.8	11 600	15 400
*50BNR10E	50	80	16	–	–	–	–	1	0.6	12.2	9.90	14.0	18	10.8	18.4	23 100	33 000
*50BNR10H	50	80	16	–	3.4	9.3	1.4	1	0.6	(12.2)	(9.90)	9.20	18	10.8	18.4	27 700	43 100
*50BNR10X	50	80	16	21	3.4	9.3	1.4	1	0.6	(12.2)	(9.90)	9.20	18	10.8	18.4	32 400	50 800
*50BER10E	50	80	16	–	–	–	–	1	0.6	11.6	9.50	16.5	25	–	23.0	19 900	28 000
*50BER10H	50	80	16	–	3.4	9.3	1.4	1	0.6	(11.6)	(9.50)	11.1	25	–	23.0	24 700	38 500
*50BER10X	50	80	16	21	3.4	9.3	1.4	1	0.6	(11.6)	(9.50)	11.1	25	–	23.0	29 300	46 200
*50BNR20EV1V	50	80	19	–	–	–	–	1	0.6	12.2	9.90	14.0	18	10.8	19.9	23 100	–
*50BNR20HV1V	50	80	19	–	–	–	–	1	0.6	(12.2)	(9.90)	9.20	18	10.8	19.9	27 700	–
*50BNR20XV1V	50	80	19	–	–	–	–	1	0.6	(12.2)	(9.90)	9.20	18	10.8	19.9	32 400	–
*50BER20EV1V	50	80	19	–	–	–	–	1	0.6	11.6	9.50	16.5	25	–	24.5	19 900	–
*50BER20HV1V	50	80	19	–	–	–	–	1	0.6	(11.6)	(9.50)	11.1	25	–	24.5	24 700	–
*50BER20XV1V	50	80	19	–	–	–	–	1	0.6	(11.6)	(9.50)	11.1	25	–	24.5	29 300	–
7210C	50	90	20	–	–	–	–	1.1	0.6	45.0	31.5	21.1	15	14.5	19.4	16 500	25 000
7210CSN24	50	90	20	–	–	–	–	1.1	0.6	(45.0)	(31.5)	25.0	15	14.5	19.4	20 600	31 300
7210A5	50	90	20	–	–	–	–	1.1	0.6	43.0	30.5	25.2	25	–	26.3	14 300	21 500
7210A5SN24	50	90	20	–	–	–	–	1.1	0.6	(43.0)	(30.5)	29.9	25	–	26.3	17 900	26 900
7210A	50	90	20	–	–	–	–	1.1	0.6	41.5	29.3	19.4	30	–	30.2	10 800	14 300

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available. Series 20 and 29 are exclusively for sealed bearings.
(2) A bearing with C values at column indicate a bearing which Spinshot Ⅱ are available, and a bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.



Spinshot™ Ⅱ



Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
55	67	69.5	0.6	0.3	49	95	240	499	40	51	78	111	0	– 4	– 13	– 24	0.130
55	67	69.5	0.6	0.3	49	100	266	565	44	58	89	129	0	– 4	– 13	– 24	0.114
55	67	69.5	0.6	0.3	71	154	379	791	94	124	175	235	– 1	– 4	– 10	– 18	0.132
55	67	69.5	0.6	0.3	74	168	430	911	107	143	204	276	– 1	– 4	– 10	– 18	0.116
55	67	69.5	0.6	0.3	49	162	319	–	44	68	89	–	0	– 8	– 16	–	0.127
55	67	69.5	0.6	0.3	49	177	359	–	49	78	103	–	0	– 8	– 16	–	0.111
55	67	69.5	0.6	0.3	49	177	359	–	49	78	103	–	0	– 8	– 16	–	0.111
55	67	69.5	0.6	0.3	49	253	511	–	73	128	166	–	0	– 8	– 15	–	0.127
55	67	69.5	0.6	0.3	49	283	584	–	81	149	194	–	0	– 8	– 15	–	0.111
55	67	69.5	0.6	0.3	49	283	584	–	81	149	194	–	0	– 8	– 15	–	0.111
55	67	69.5	0.6	0.3	49	162	319	–	44	68	89	–	0	– 8	– 16	–	0.144
55	67	69.5	0.6	0.3	49	177	359	–	49	78	103	–	0	– 8	– 16	–	0.128
55	67	69.5	0.6	0.3	49	177	359	–	49	78	103	–	0	– 8	– 16	–	0.128
55	67	69.5	0.6	0.3	49	253	511	–	73	128	166	–	0	– 8	– 15	–	0.144
55	67	69.5	0.6	0.3	49	283	584	–	81	149	194	–	0	– 8	– 15	–	0.128
55	67	69.5	0.6	0.3	49	283	584	–	81	149	194	–	0	– 8	– 15	–	0.128
56	74	75	1	0.5	70	152	388	791	46	63	95	135	– 2	– 8	– 20	– 34	0.259
56	74	75	1	0.5	73	165	438	906	51	72	110	158	– 2	– 8	– 20	– 34	0.228
56	74	75	1	0.5	125	262	580	1 189	118	154	208	278	– 3	– 7	– 14	– 24	0.270
56	74	75	1	0.5	136	293	664	1 379	135	179	244	327	– 3	– 7	– 14	– 24	0.239
56	74	75	1	0.5	49	243	525	1 299	113	194	256	360	0	– 5	– 10	– 20	0.262
56	74	75	1	0.5	49	119	250	–	47	64	86	–	0	– 5	– 12	–	0.281
56	74	75	1	0.5	49	128	280	–	52	74	100	–	0	– 5	– 12	–	0.266
56	74	75	1	0.5	49	128	280	–	52	74	100	–	0	– 5	– 12	–	0.266
56	74	75	1	0.5	49	270	552	–	78	140	182	–	0	– 8	– 15	–	0.281
56	74	75	1	0.5	49	303	633	–	87	162	213	–	0	– 8	– 15	–	0.266
56	74	75	1	0.5	49	303	633	–	87	162	213	–	0	– 8	– 15	–	0.266
56	74	75	1	0.5	49	119	250	–	47	64	86	–	0	– 5	– 12	–	0.330
56	74	75	1	0.5	49	128	280	–	52	74	100	–	0	– 5	– 12	–	0.315
56	74	75	1	0.5	49	128	280	–	52	74	100	–	0	– 5	– 12	–	0.315
56	74	75	1	0.5	49	270	552	–	78	140	182	–	0	– 8	– 15	–	0.330
56	74	75	1	0.5	49	303	633	–	87	162	213	–	0	– 8	– 15	–	0.315
56	74	75	1	0.5	49	303	633	–	87	162	213	–	0	– 8	– 15	–	0.315
57	83	85	1	0.6	127	248	590	1 171	52	69	102	143	– 7	– 15	– 31	– 50	0.457
57	83	85	1	0.6	137	277	674	1 351	60	80	119	167	– 7	– 15	– 31	– 50	0.387
57	83	85	1	0.6	208	391	989	1 934	130	164	233	306	– 6	– 11	– 23	– 37	0.453
57	83	85	1	0.6	231	445	1 145	2 257	150	191	274	361	– 6	– 11	– 23	– 37	0.383
57	83	85	1	0.6	49	477	1 156	2 038	105	227	314	390	0	– 10	– 20	– 30	0.462

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

Table B

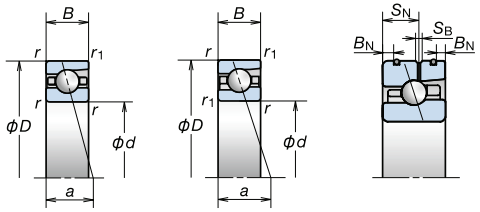
	DBD	DBC
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

Bore Diameter 55mm



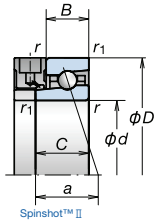
79,70,72 series
BNR10,20 series
BER10,20 series

BNR19,29 series
BER19,29 series

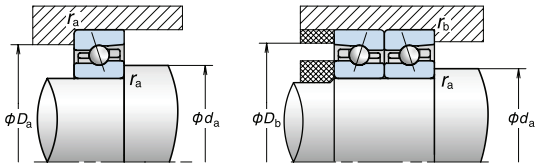
ROBUSTSHOT

Bearing Numbers (1)	Boundary Dimensions (2) (mm)									Basic Load Ratings (3) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min⁻¹)	
	d	D	B	C	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
*7911C	55	80	13	–	–	–	–	1	0.6	20.1	17.7	11.0	15	16.3	15.5	17 100	26 000
*7911CSN24	55	80	13	–	–	–	–	1	0.6	(20.1)	(17.7)	13.0	15	16.3	15.5	22 300	33 800
*7911A5	55	80	13	–	–	–	–	1	0.6	19.0	16.8	12.5	25	–	22.2	14 900	22 300
*7911A5SN24	55	80	13	–	–	–	–	1	0.6	(19.0)	(16.8)	14.8	25	–	22.2	19 300	28 900
*55BNR19E	55	80	13	–	–	–	–	1	0.6	14.4	11.4	16.2	18	10.7	17.5	22 300	31 800
*55BNR19H	55	80	13	–	2.8	7.5	1.4	1	0.6	(14.4)	(11.4)	10.6	18	10.7	17.5	26 700	41 500
*55BNR19X	55	80	13	18	2.8	7.5	1.4	1	0.6	(14.4)	(11.4)	10.6	18	10.7	17.5	31 200	48 900
*55BER19E	55	80	13	–	–	–	–	1	0.6	13.8	10.9	16.1	25	–	22.2	19 200	27 000
*55BER19H	55	80	13	–	2.8	7.5	1.4	1	0.6	(13.8)	(10.9)	12.9	25	–	22.2	23 800	37 100
*55BER19X	55	80	13	18	2.8	7.5	1.4	1	0.6	(13.8)	(10.9)	12.9	25	–	22.2	28 200	44 500
*55BNR29EV1V	55	80	16	–	–	–	–	1	0.6	14.4	11.4	16.2	18	10.7	19.0	22 300	–
*55BNR29HV1V	55	80	16	–	–	–	–	1	0.6	(14.4)	(11.4)	10.6	18	10.7	19.0	26 700	–
*55BNR29XV1V	55	80	16	–	–	–	–	1	0.6	(14.4)	(11.4)	10.6	18	10.7	19.0	31 200	–
*55BER29EV1V	55	80	16	–	–	–	–	1	0.6	13.8	10.9	16.1	25	–	23.7	19 200	–
*55BER29HV1V	55	80	16	–	–	–	–	1	0.6	(13.8)	(10.9)	12.9	25	–	23.7	23 800	–
*55BER29XV1V	55	80	16	–	–	–	–	1	0.6	(13.8)	(10.9)	12.9	25	–	23.7	28 200	–
*7011C	55	90	18	–	–	–	–	1.1	0.6	36.0	28.6	18.9	15	15.5	18.7	15 900	24 200
*7011CSN24	55	90	18	–	–	–	–	1.1	0.6	(36.0)	(28.6)	22.4	15	15.5	18.7	20 700	31 500
*7011A5	55	90	18	–	–	–	–	1.1	0.6	34.0	27.2	21.8	25	–	25.9	13 800	20 700
*7011A5SN24	55	90	18	–	–	–	–	1.1	0.6	(34.0)	(27.2)	25.8	25	–	25.9	18 000	26 900
*7011A	55	90	18	–	–	–	–	1.1	0.6	32.5	26.3	16.6	30	–	29.9	10 400	13 800
*55BNR10E	55	90	18	–	–	–	–	1.1	0.6	15.1	12.5	17.8	18	10.8	20.6	20 700	29 600
*55BNR10H	55	90	18	–	4.3	10.0	1.4	1.1	0.6	(15.1)	(12.5)	11.7	18	10.8	20.6	24 900	38 700
*55BNR10X	55	90	18	23	4.3	10.0	1.4	1.1	0.6	(15.1)	(12.5)	11.7	18	10.8	20.6	29 000	45 600
*55BER10E	55	90	18	–	–	–	–	1.1	0.6	14.4	12.0	21.0	25	–	25.7	17 800	25 200
*55BER10H	55	90	18	–	4.3	10.0	1.4	1.1	0.6	(14.4)	(12.0)	14.1	25	–	25.7	22 100	34 500
*55BER10X	55	90	18	23	4.3	10.0	1.4	1.1	0.6	(14.4)	(12.0)	14.1	25	–	25.7	26 300	41 400
*55BNR20EV1V	55	90	22	–	–	–	–	1.1	0.6	15.1	12.5	17.8	18	10.8	22.6	20 700	–
*55BNR20HV1V	55	90	22	–	–	–	–	1.1	0.6	(15.1)	(12.5)	11.7	18	10.8	22.6	24 900	–
*55BNR20XV1V	55	90	22	–	–	–	–	1.1	0.6	(15.1)	(12.5)	11.7	18	10.8	22.6	29 000	–
*55BER20EV1V	55	90	22	–	–	–	–	1.1	0.6	14.4	12.0	21.0	25	–	27.7	17 800	–
*55BER20HV1V	55	90	22	–	–	–	–	1.1	0.6	(14.4)	(12.0)	14.1	25	–	27.7	22 100	–
*55BER20XV1V	55	90	22	–	–	–	–	1.1	0.6	(14.4)	(12.0)	14.1	25	–	27.7	26 300	–
7211C	55	100	21	–	–	–	–	1.5	1	55.5	40.0	27.6	15	14.5	20.9	14 900	22 600
7211CSN24	55	100	21	–	–	–	–	1.5	1	(55.5)	(40.0)	32.8	15	14.5	20.9	19 400	29 500
7211A5	55	100	21	–	–	–	–	1.5	1	53.0	38.0	32.5	25	–	28.6	13 000	19 400
7211A5SN24	55	100	21	–	–	–	–	1.5	1	(53.0)	(38.0)	38.6	25	–	28.6	16 800	25 200
7211A	55	100	21	–	–	–	–	1.5	1	51.0	37.0	25.0	30	–	32.9	9 700	13 000

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available. Series 20 and 29 are exclusively for sealed bearings.
(2) A bearing with C values at column indicate a bearing which Spinshot Ⅱ are available, and a bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.



Spinshot™ Ⅱ



Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
61	74	75	1	0.5	60	111	296	593	45	58	90	126	– 1	– 5	– 15	– 26	0.182
61	74	75	1	0.5	61	119	331	675	50	66	104	147	– 1	– 5	– 15	– 26	0.163
61	74	75	1	0.5	99	196	454	917	113	144	198	264	– 2	– 5	– 11	– 19	0.184
61	74	75	1	0.5	106	217	517	1 059	129	167	232	309	– 2	– 5	– 11	– 19	0.165
61	74	75	1	0.5	49	167	333	–	46	72	94	–	0	– 8	– 16	–	0.178
61	74	75	1	0.5	49	184	375	–	51	82	109	–	0	– 8	– 16	–	0.158
61	74	75	1	0.5	49	184	375	–	51	82	109	–	0	– 8	– 16	–	0.158
61	74	75	1	0.5	49	264	538	–	76	136	176	–	0	– 8	– 15	–	0.178
61	74	75	1	0.5	49	296	615	–	85	158	206	–	0	– 8	– 15	–	0.158
61	74	75	1	0.5	49	296	615	–	85	158	206	–	0	– 8	– 15	–	0.158
61	74	75	1	0.5	49	167	333	–	46	72	94	–	0	– 8	– 16	–	0.213
61	74	75	1	0.5	49	184	375	–	51	82	109	–	0	– 8	– 16	–	0.194
61	74	75	1	0.5	49	184	375	–	51	82	109	–	0	– 8	– 16	–	0.194
61	74	75	1	0.5	49	264	538	–	76	136	176	–	0	– 8	– 15	–	0.213
61	74	75	1	0.5	49	296	615	–	85	158	206	–	0	– 8	– 15	–	0.194
61	74	75	1	0.5	49	296	615	–	85	158	206	–	0	– 8	– 15	–	0.194
62	83	85	1	0.6	95	200	479	971	51	69	102	144	– 4	– 11	– 24	– 40	0.380
62	83	85	1	0.6	100	221	544	1 118	58	80	119	169	– 4	– 11	– 24	– 40	0.332
62	83	85	1	0.6	157	345	804	1 552	129	171	236	307	– 4	– 9	– 18	– 29	0.383
62	83	85	1	0.6	172	391	928	1 807	148	199	277	362	– 4	– 9	– 18	– 29	0.335
62	83	85	1	0.6	49	246	887	1 307	115	196	311	360	0	– 5	– 15	– 20	0.385
62	83	85	1	0.6	49	121	305	–	49	67	95	–	0	– 5	– 14	–	0.414
62	83	85	1	0.6	49	131	343	–	54	77	111	–	0	– 5	– 14	–	0.393
62	83	85	1	0.6	49	131	343	–	54	77	111	–	0	– 5	– 14	–	0.393
62	83	85	1	0.6	49	356	725	–	81	160	208	–	0	– 10	– 18	–	0.414
62	83	85	1	0.6	49	404	836	–	90	186	244	–	0	– 10	– 18	–	0.393
62	83	85	1	0.6	49	404	836	–	90	186	244	–	0	– 10	– 18	–	0.393
62	83	85	1	0.6	49	121	305	–	49	67	95	–	0	– 5	– 14	–	0.501
62	83	85	1	0.6	49	131	343	–	54	77	111	–	0	– 5	– 14	–	0.480
62	83	85	1	0.6	49	131	343	–	54	77	111	–	0	– 5	– 14	–	0.480
62	83	85	1	0.6	49	356	725	–	81	160	208	–	0	– 10	– 18	–	0.501
62	83	85	1	0.6	49	404	836	–	90	186	244	–	0	– 10	– 18	–	0.480
62	83	85	1	0.6	49	404	836	–	90	186	244	–	0	– 10	– 18	–	0.480
64	91	94	1.5	0.8	142	289	788	1 554	56	74	116	163	– 8	– 17	– 38	– 60	0.601
64	91	94	1.5	0.8	155	323	906	1 802	64	86	136	191	– 8	– 17	– 38	– 60	0.502
64	91	94	1.5	0.8	248	491	1 206	2 397	142	182	256	338	– 7	– 13	– 26	– 42	0.596
64	91	94	1.5	0.8	277	562	1 401	2 804	165	213	301	399	– 7	– 13	– 26	– 42	0.497
64	91	94	1.5	0.8	49	494	1 722	2 635	108	236	372	438	0	– 10	– 26	– 35	0.609

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

Table B

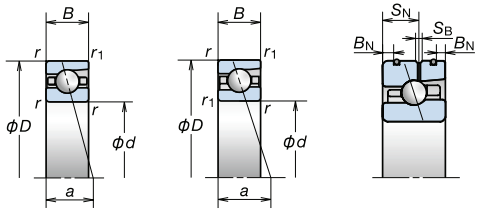
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

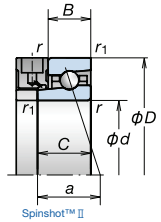
Bore Diameter 60 mm



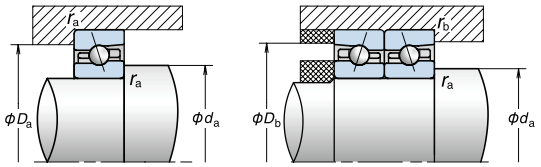
79,70,72 series
BNR10,20 series
BER10,20 series

BNR19,29 series
BER19,29 series

ROBUSTSHOT



Spinshot™ II



Bearing Numbers (1)	Boundary Dimensions (2) (mm)									Basic Load Ratings (3) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min⁻¹)	
	d	D	B	C	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
*7912C	60	85	13	–	–	–	–	1	0.6	20.4	18.7	11.5	15	16.5	16.2	15 900	24 200
*7912CSN24	60	85	13	–	–	–	–	1	0.6	(20.4)	(18.7)	13.6	15	16.5	16.2	20 700	31 500
*7912A5	60	85	13	–	–	–	–	1	0.6	19.2	17.7	13.0	25	–	23.4	13 800	20 700
*7912A5SN24	60	85	13	–	–	–	–	1	0.6	(19.2)	(17.7)	15.5	25	–	23.4	18 000	26 900
*60BNR19E	60	85	13	–	–	–	–	1	0.6	14.6	12.0	17.1	18	10.7	18.3	20 700	29 600
*60BNR19H	60	85	13	–	2.8	7.5	1.4	1	0.6	(14.6)	(12.0)	11.2	18	10.7	18.3	24 900	38 700
*60BNR19X	60	85	13	18	2.8	7.5	1.4	1	0.6	(14.6)	(12.0)	11.2	18	10.7	18.3	29 000	45 600
*60BER19E	60	85	13	–	–	–	–	1	0.6	14.0	11.5	20.1	25	–	23.4	17 800	25 200
*60BER19H	60	85	13	–	2.8	7.5	1.4	1	0.6	(14.0)	(11.5)	13.6	25	–	23.4	22 100	34 500
*60BER19X	60	85	13	18	2.8	7.5	1.4	1	0.6	(14.0)	(11.5)	13.6	25	–	23.4	26 300	41 400
*60BNR29EV1V	60	85	16	–	–	–	–	1	0.6	14.6	12.0	17.1	18	10.7	19.8	20 700	–
*60BNR29HV1V	60	85	16	–	–	–	–	1	0.6	(14.6)	(12.0)	11.2	18	10.7	19.8	24 900	–
*60BNR29XV1V	60	85	16	–	–	–	–	1	0.6	(14.6)	(12.0)	11.2	18	10.7	19.8	29 000	–
*60BER29EV1V	60	85	16	–	–	–	–	1	0.6	14.0	11.5	20.1	25	–	24.9	17 800	–
*60BER29HV1V	60	85	16	–	–	–	–	1	0.6	(14.0)	(11.5)	13.6	25	–	24.9	22 100	–
*60BER29XV1V	60	85	16	–	–	–	–	1	0.6	(14.0)	(11.5)	13.6	25	–	24.9	26 300	–
*7012C	60	95	18	–	–	–	–	1.1	0.6	37.0	30.5	19.9	15	15.7	19.4	14 900	22 600
*7012CSN24	60	95	18	–	–	–	–	1.1	0.6	(37.0)	(30.5)	23.6	15	15.7	19.4	19 400	29 500
*7012A5	60	95	18	–	–	–	–	1.1	0.6	35.0	29.1	23.0	25	–	27.1	13 000	19 400
*7012A5SN24	60	95	18	–	–	–	–	1.1	0.6	(35.0)	(29.1)	27.3	25	–	27.1	16 800	25 200
*7012A	60	95	18	–	–	–	–	1.1	0.6	33.5	28.1	17.6	30	–	31.4	9 700	13 000
*60BNR10E	60	95	18	–	–	–	–	1.1	0.6	15.6	13.7	19.5	18	10.8	21.5	19 400	27 700
*60BNR10H	60	95	18	–	4.3	10	1.4	1.1	0.6	(15.6)	(13.7)	12.8	18	10.8	21.5	23 300	36 200
*60BNR10X	60	95	18	23	4.3	10	1.4	1.1	0.6	(15.6)	(13.7)	12.8	18	10.8	21.5	27 100	42 600
*60BER10E	60	95	18	–	–	–	–	1.1	0.6	15.0	13.1	22.9	25	–	26.9	16 700	23 500
*60BER10H	60	95	18	–	4.3	10	1.4	1.1	0.6	(15.0)	(13.1)	15.5	25	–	26.9	20 700	32 300
*60BER10X	60	95	18	23	4.3	10	1.4	1.1	0.6	(15.0)	(13.1)	15.5	25	–	26.9	24 600	38 800
*60BNR20EV1V	60	95	22	–	–	–	–	1.1	0.6	15.6	13.7	19.5	18	10.8	23.5	19 400	–
*60BNR20HV1V	60	95	22	–	–	–	–	1.1	0.6	(15.6)	(13.7)	12.8	18	10.8	23.5	23 300	–
*60BNR20XV1V	60	95	22	–	–	–	–	1.1	0.6	(15.6)	(13.7)	12.8	18	10.8	23.5	27 100	–
*60BER20EV1V	60	95	22	–	–	–	–	1.1	0.6	15.0	13.1	22.9	25	–	28.9	16 700	–
*60BER20HV1V	60	95	22	–	–	–	–	1.1	0.6	(15.0)	(13.1)	15.5	25	–	28.9	20 700	–
*60BER20XV1V	60	95	22	–	–	–	–	1.1	0.6	(15.0)	(13.1)	15.5	25	–	28.9	24 600	–
7212C	60	110	22	–	–	–	–	1.5	1	67.5	49.0	34.0	15	14.4	22.4	13 600	20 600
7212CSN24	60	110	22	–	–	–	–	1.5	1	(67.5)	(49.0)	40.6	15	14.4	22.4	17 700	26 900
7212A5	60	110	22	–	–	–	–	1.5	1	64.0	47.0	40.0	25	–	30.8	11 800	17 700
7212A5SN24	60	110	22	–	–	–	–	1.5	1	(64.0)	(47.0)	47.3	25	–	30.8	15 300	23 000
7212A	60	110	22	–	–	–	–	1.5	1	62.0	45.5	30.5	30	–	35.5	8 900	11 800

Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
66	79	80	1	0.5	60	113	305	581	46	60	93	128	– 1	– 5	– 15	– 25	0.195
66	79	80	1	0.5	61	122	341	661	52	68	108	149	– 1	– 5	– 15	– 25	0.175
66	79	80	1	0.5	101	201	419	884	117	150	198	267	– 2	– 5	– 10	– 18	0.198
66	79	80	1	0.5	108	223	477	1 021	133	173	231	313	– 2	– 5	– 10	– 18	0.175
66	79	80	1	0.5	49	171	343	–	47	74	97	–	0	– 8	– 16	–	0.190
66	79	80	1	0.5	49	189	388	–	53	86	113	–	0	– 8	– 16	–	0.170
66	79	80	1	0.5	49	189	388	–	53	86	113	–	0	– 8	– 16	–	0.170
66	79	80	1	0.5	49	272	557	–	78	141	183	–	0	– 8	– 15	–	0.190
66	79	80	1	0.5	49	306	638	–	88	164	215	–	0	– 8	– 15	–	0.170
66	79	80	1	0.5	49	306	638	–	88	164	215	–	0	– 8	– 15	–	0.170
66	79	80	1	0.5	49	171	343	–	47	74	97	–	0	– 8	– 16	–	0.228
66	79	80	1	0.5	49	189	388	–	53	86	113	–	0	– 8	– 16	–	0.208
66	79	80	1	0.5	49	189	388	–	53	86	113	–	0	– 8	– 16	–	0.208
66	79	80	1	0.5	49	272	557	–	78	141	183	–	0	– 8	– 15	–	0.228
66	79	80	1	0.5	49	306	638	–	88	164	215	–	0	– 8	– 15	–	0.208
66	79	80	1	0.5	49	306	638	–	88	164	215	–	0	– 8	– 15	–	0.208
67	88	90	1	0.6	96	189	526	1 092	53	70	110	157	– 4	– 10	– 25	– 42	0.405
67	88	90	1	0.6	102	208	598	1 259	60	80	128	184	– 4	– 10	– 25	– 42	0.354
67	88	90	1	0.6	162	359	780	1 549	134	179	241	317	– 4	– 9	– 17	– 28	0.408
67	88	90	1	0.6	178	407	900	1 803	155	209	283	373	– 4	– 9	– 17	– 28	0.357
67	88	90	1	0.6	49	255	929	1 371	119	206	328	379	0	– 5	– 15	– 20	0.410
67	88	90	1	0.6	49	126	348	–	51	71	105	–	0	– 5	– 15	–	0.443
67	88	90	1	0.6	49	136	393	–	57	82	123	–	0	– 5	– 15	–	0.419
67	88	90	1	0.6	49	136	393	–	57	82	123	–	0	– 5	– 15	–	0.419
67	88	90	1	0.6	49	378	775	–	85	172	224	–	0	– 10	– 18	–	0.443
67	88	90	1	0.6	49	429	894	–	95	200	263	–	0	– 10	– 18	–	0.419
67	88	90	1	0.6	49	429	894	–	95	200	263	–	0	– 10	– 18	–	0.419
67	88	90	1	0.6	49	126	348	–	51	71	105	–	0	– 5	– 15	–	0.535
67	88	90	1	0.6	49	136	393	–	57	82	123	–	0	– 5	– 15	–	0.512
67	88	90	1	0.6	49	136	393	–	57	82	123	–	0	– 5	– 15	–	0.512
67	88	90	1	0.6	49	378	775	–	85	172	224	–	0	– 10	– 18	–	0.535
67	88	90	1	0.6	49	429	894	–	95	200	263	–	0	– 10	– 18	–	0.512
67	88	90	1	0.6	49	429	894	–	95	200	263	–	0	– 10	– 18	–	0.512
69	101	104	1.5	0.8	190	397	928	1 878	64	86	126	178	– 11	– 22	– 42	– 67	0.780
69	101	104	1.5	0.8	210	449	1 069	2 183	73	100	148	209	– 11	– 22	– 42	– 67	0.644
69	101	104	1.5	0.8	293	607	1 458	2 937	155	202	282	374	– 8	– 15	– 29	– 47	0.773
69	101	104	1.5	0.8	331	698	1 697	3 441	181	237	332	441	– 8	– 15	– 29	– 47	0.637
69	101	104	1.5	0.8	49	513	1 697	2 743	112	246	380	456	0	– 10	– 25	– 35	0.789

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available. Series 20 and 29 are exclusively for sealed bearings.
(2) A bearing with C values at column indicate a bearing which Spinshot II are available, and a bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

Table B

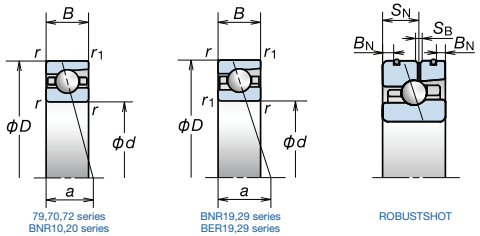
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

Bore Diameter 65mm



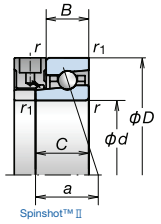
79,70,72 series
BNR10,20 series
BER10,20 series

BNR19,29 series
BER19,29 series

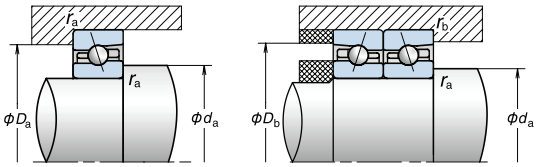
ROBUSTSHOT

Bearing Numbers (1)	Boundary Dimensions (2) (mm)									Basic Load Ratings (3) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min⁻¹)	
	d	D	B	C	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
*7913C	65	90	13	–	–	–	–	1	0.6	21.2	20.5	12.5	15	16.7	16.9	14 900	22 600
*7913CSN24	65	90	13	–	–	–	–	1	0.6	(21.2)	(20.5)	14.8	15	16.7	16.9	19 400	29 500
*7913A5	65	90	13	–	–	–	–	1	0.6	20.0	19.4	14.2	25	–	24.6	13 000	19 400
*7913A5SN24	65	90	13	–	–	–	–	1	0.6	(20.0)	(19.4)	16.8	25	–	24.6	16 800	25 200
*65BNR19E	65	90	13	–	–	–	–	1	0.6	15.2	13.2	18.7	18	10.8	19.1	19 400	27 700
*65BNR19H	65	90	13	–	2.8	7.5	1.4	1	0.6	(15.2)	(13.2)	12.3	18	10.8	19.1	23 300	36 200
*65BNR19X	65	90	13	18	2.8	7.5	1.4	1	0.6	(15.2)	(13.2)	12.3	18	10.8	19.1	27 100	42 600
*65BER19E	65	90	13	–	–	–	–	1	0.6	14.5	12.6	22.1	25	–	24.6	16 700	23 500
*65BER19H	65	90	13	–	2.8	7.5	1.4	1	0.6	(14.5)	(12.6)	14.9	25	–	24.6	20 700	32 300
*65BER19X	65	90	13	18	2.8	7.5	1.4	1	0.6	(14.5)	(12.6)	14.9	25	–	24.6	24 600	38 800
*65BNR29EV1V	65	90	16	–	–	–	–	1	0.6	15.2	13.2	18.7	18	10.8	20.6	19 400	–
*65BNR29HV1V	65	90	16	–	–	–	–	1	0.6	(15.2)	(13.2)	12.3	18	10.8	20.6	23 300	–
*65BNR29XV1V	65	90	16	–	–	–	–	1	0.6	(15.2)	(13.2)	12.3	18	10.8	20.6	27 100	–
*65BER29EV1V	65	90	16	–	–	–	–	1	0.6	14.5	12.6	22.1	25	–	26.1	16 700	–
*65BER29HV1V	65	90	16	–	–	–	–	1	0.6	(14.5)	(12.6)	14.9	25	–	26.1	20 700	–
*65BER29XV1V	65	90	16	–	–	–	–	1	0.6	(14.5)	(12.6)	14.9	25	–	26.1	24 600	–
*7013C	65	100	18	–	–	–	–	1.1	0.6	39.0	34.5	22.0	15	15.9	20.0	14 000	21 300
*7013CSN24	65	100	18	–	–	–	–	1.1	0.6	(39.0)	(34.5)	26.1	15	15.9	20.0	18 200	27 700
*7013A5	65	100	18	–	–	–	–	1.1	0.6	37.0	32.5	25.4	25	–	28.2	12 200	18 200
*7013A5SN24	65	100	18	–	–	–	–	1.1	0.6	(37.0)	(32.5)	30.2	25	–	28.2	15 800	23 700
*7013A	65	100	18	–	–	–	–	1.1	0.6	35.5	31.5	19.5	30	–	32.8	9 100	12 200
*65BNR10E	65	100	18	–	–	–	–	1.1	0.6	16.2	14.8	21.1	18	10.9	22.3	18 200	26 000
*65BNR10H	65	100	18	–	4.0	10.4	1.4	1.1	0.6	(16.2)	(14.8)	13.9	18	10.9	22.3	21 900	34 000
*65BNR10X	65	100	18	23	4.0	10.4	1.4	1.1	0.6	(16.2)	(14.8)	13.9	18	10.9	22.3	25 500	40 000
*65BER10E	65	100	18	–	–	–	–	1.1	0.6	15.5	14.2	24.9	25	–	28.0	15 700	22 100
*65BER10H	65	100	18	–	4.0	10.4	1.4	1.1	0.6	(15.5)	(14.2)	16.8	25	–	28.0	19 400	30 400
*65BER10X	65	100	18	23	4.0	10.4	1.4	1.1	0.6	(15.5)	(14.2)	16.8	25	–	28.0	23 100	36 400
*65BNR20EV1V	65	100	22	–	–	–	–	1.1	0.6	16.2	14.8	21.1	18	10.9	24.3	18 200	–
*65BNR20HV1V	65	100	22	–	–	–	–	1.1	0.6	(16.2)	(14.8)	13.9	18	10.9	24.3	21 900	–
*65BNR20XV1V	65	100	22	–	–	–	–	1.1	0.6	(16.2)	(14.8)	13.9	18	10.9	24.3	25 500	–
*65BER20EV1V	65	100	22	–	–	–	–	1.1	0.6	15.5	14.2	24.9	25	–	30.0	15 700	–
*65BER20HV1V	65	100	22	–	–	–	–	1.1	0.6	(15.5)	(14.2)	16.8	25	–	30.0	19 400	–
*65BER20XV1V	65	100	22	–	–	–	–	1.1	0.6	(15.5)	(14.2)	16.8	25	–	30.0	23 100	–
7213C	65	120	23	–	–	–	–	1.5	1	77.0	58.5	40.0	15	14.6	23.9	12 500	19 000
7213CSN24	65	120	23	–	–	–	–	1.5	1	(77.0)	(58.5)	47.5	15	14.6	23.9	16 300	24 700
7213A5	65	120	23	–	–	–	–	1.5	1	73.0	56.0	46.5	25	–	33.1	10 900	16 300
7213A5SN24	65	120	23	–	–	–	–	1.5	1	(73.0)	(56.0)	55.4	25	–	33.1	14 100	21 100
7213A	65	120	23	–	–	–	–	1.5	1	70.5	54.0	36.0	30	–	38.2	8 200	10 900

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available. Series 20 and 29 are exclusively for sealed bearings.
(2) A bearing with C values at column indicate a bearing which Spinshot Ⅱ are available, and a bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.



Spinshot™ Ⅱ



Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
71	84	85	1	0.5	74	151	348	690	53	71	104	145	– 2	– 7	– 16	– 27	0.208
71	84	85	1	0.5	76	164	391	787	59	81	120	169	– 2	– 7	– 16	– 27	0.186
71	84	85	1	0.5	104	212	500	948	124	161	223	288	– 2	– 5	– 11	– 18	0.211
71	84	85	1	0.5	112	235	572	1 096	142	186	261	338	– 2	– 5	– 11	– 18	0.189
71	84	85	1	0.5	49	179	364	–	50	80	105	–	0	– 8	– 16	–	0.204
71	84	85	1	0.5	49	198	412	–	56	92	122	–	0	– 8	– 16	–	0.181
71	84	85	1	0.5	49	198	412	–	56	92	122	–	0	– 8	– 16	–	0.181
71	84	85	1	0.5	49	288	595	–	83	152	198	–	0	– 8	– 15	–	0.204
71	84	85	1	0.5	49	324	683	–	93	177	232	–	0	– 8	– 15	–	0.181
71	84	85	1	0.5	49	324	683	–	93	177	232	–	0	– 8	– 15	–	0.181
71	84	85	1	0.5	49	179	364	–	50	80	105	–	0	– 8	– 16	–	0.245
71	84	85	1	0.5	49	198	412	–	56	92	122	–	0	– 8	– 16	–	0.223
71	84	85	1	0.5	49	198	412	–	56	92	122	–	0	– 8	– 16	–	0.223
71	84	85	1	0.5	49	288	595	–	83	152	198	–	0	– 8	– 15	–	0.245
71	84	85	1	0.5	49	324	683	–	93	177	232	–	0	– 8	– 15	–	0.223
71	84	85	1	0.5	49	324	683	–	93	177	232	–	0	– 8	– 15	–	0.223
72	93	95	1	0.6	130	260	537	1 062	64	85	117	163	– 6	– 13	– 24	– 39	0.435
72	93	95	1	0.6	141	290	612	1 224	73	98	136	191	– 6	– 13	– 24	– 39	0.379
72	93	95	1	0.6	209	386	915	1 781	157	196	272	356	– 5	– 9	– 18	– 29	0.455
72	93	95	1	0.6	232	439	1 059	2 077	182	229	320	420	– 5	– 9	– 18	– 29	0.399
72	93	95	1	0.6	49	272	1 012	1 498	127	225	360	418	0	– 5	– 15	– 20	0.441
72	93	95	1	0.6	49	130	367	–	54	76	113	–	0	– 5	– 15	–	0.472
72	93	95	1	0.6	49	141	415	–	60	87	131	–	0	– 5	– 15	–	0.447
72	93	95	1	0.6	49	141	415	–	60	87	131	–	0	– 5	– 15	–	0.447
72	93	95	1	0.6	49	399	824	–	89	184	240	–	0	– 10	– 18	–	0.472
72	93	95	1	0.6	49	454	952	–	100	215	282	–	0	– 10	– 18	–	0.447
72	93	95	1	0.6	49	454	952	–	100	215	282	–	0	– 10	– 18	–	0.447
72	93	95	1	0.6	49	130	367	–	54	76	113	–	0	– 5	– 15	–	0.570
72	93	95	1	0.6	49	141	415	–	60	87	131	–	0	– 5	– 15	–	0.545
72	93	95	1	0.6	49	141	415	–	60	87	131	–	0	– 5	– 15	–	0.545
72	93	95	1	0.6	49	399	824	–	89	184	240	–	0	– 10	– 18	–	0.570
72	93	95	1	0.6	49	454	952	–	100	215	282	–	0	– 10	– 18	–	0.545
72	93	95	1	0.6	49	454	952	–	100	215	282	–	0	– 10	– 18	–	0.545
74	111	114	1.5	0.8	219	448	1 069	2 175	71	95	141	200	– 12	– 23	– 44	– 70	1.01
74	111	114	1.5	0.8	243	509	1 235	2 533	82	111	165	235	– 12	– 23	– 44	– 70	0.842
74	111	114	1.5	0.8	357	657	1 664	3 307	177	221	314	414	– 9	– 15	– 30	– 48	1.00
74	111	114	1.5	0.8	405	755	1 941	3 877	207	259	370	489	– 9	– 15	– 30	– 48	0.832
74	111	114	1.5	0.8	49	553	1 851	2 998	120	269	416	499	0	– 10	– 25	– 35	1.02

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

Table B

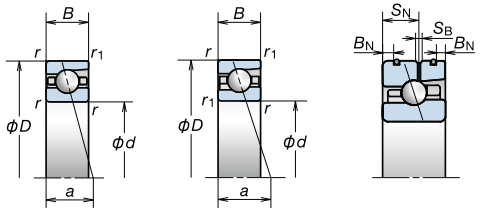
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

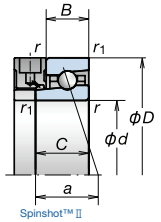
Bore Diameter 70mm



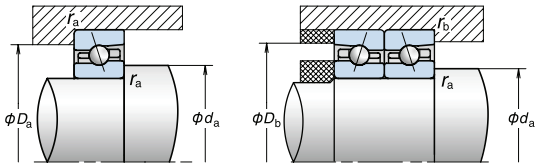
79,70,72 series
BNR10,20 series
BER10,20 series

BNR19,29 series
BER19,29 series

ROBUSTSHOT



Spinshot™ II



Bearing Numbers (1)	Boundary Dimensions (2) (mm)									Basic Load Ratings (3) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min⁻¹)	
	d	D	B	C	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
*7914C	70	100	16	–	–	–	–	1	0.6	29.5	27.8	17.3	15	16.4	19.4	13 600	20 600
*7914CSN24	70	100	16	–	–	–	–	1	0.6	(29.5)	(27.8)	20.5	15	16.4	19.4	17 700	26 900
*7914A5	70	100	16	–	–	–	–	1	0.6	27.9	26.3	20.3	25	–	27.8	11 800	17 700
*7914A5SN24	70	100	16	–	–	–	–	1	0.6	(27.9)	(26.3)	24.1	25	–	27.8	15 300	23 000
*70BNR19E	70	100	16	–	–	–	–	1	0.6	21.3	18.1	26.1	18	10.8	21.8	17 700	25 200
*70BNR19H	70	100	16	–	3.1	9.3	1.4	1	0.6	(21.3)	(18.1)	17.1	18	10.8	21.8	21 200	33 000
*70BNR19X	70	100	16	21	3.1	9.3	1.4	1	0.6	(21.3)	(18.1)	17.1	18	10.8	21.8	24 800	38 900
*70BER19E	70	100	16	–	–	–	–	1	0.6	20.4	17.3	30.5	25	–	27.8	15 200	21 500
*70BER19H	70	100	16	–	3.1	9.3	1.4	1	0.6	(20.4)	(17.3)	20.7	25	–	27.8	18 900	29 500
*70BER19X	70	100	16	21	3.1	9.3	1.4	1	0.6	(20.4)	(17.3)	20.7	25	–	27.8	22 400	35 300
*70BNR29EV1V	70	100	19	–	–	–	–	1	0.6	21.3	18.1	26.1	18	10.8	23.3	17 700	–
*70BNR29HV1V	70	100	19	–	–	–	–	1	0.6	(21.3)	(18.1)	17.1	18	10.8	23.3	21 200	–
*70BNR29XV1V	70	100	19	–	–	–	–	1	0.6	(21.3)	(18.1)	17.1	18	10.8	23.3	24 800	–
*70BER29EV1V	70	100	19	–	–	–	–	1	0.6	20.4	17.3	30.5	25	–	29.3	15 200	–
*70BER29HV1V	70	100	19	–	–	–	–	1	0.6	(20.4)	(17.3)	20.7	25	–	29.3	18 900	–
*70BER29XV1V	70	100	19	–	–	–	–	1	0.6	(20.4)	(17.3)	20.7	25	–	29.3	22 400	–
*7014C	70	110	20	–	–	–	–	1.1	0.6	49.0	43.0	26.8	15	15.7	22.1	12 800	19 500
*7014CSN24	70	110	20	–	–	–	–	1.1	0.6	(49.0)	(43.0)	31.8	15	15.7	22.1	16 700	25 400
*7014A5	70	110	20	–	–	–	–	1.1	0.6	46.5	41.0	32.0	25	–	31.0	11 200	16 700
*7014A5SN24	70	110	20	–	–	–	–	1.1	0.6	(46.5)	(41.0)	38.0	25	–	31.0	14 500	21 700
*7014A	70	110	20	–	–	–	–	1.1	0.6	45.0	39.5	24.6	30	–	36.0	8 400	11 200
*70BNR10E	70	110	20	–	–	–	–	1.1	0.6	22.3	19.8	28.6	18	10.9	24.5	16 700	23 800
*70BNR10H	70	110	20	–	4.0	11.6	1.4	1.1	0.6	(22.3)	(19.8)	18.8	18	10.9	24.5	20 000	31 200
*70BNR10X	70	110	20	25	4.0	11.6	1.4	1.1	0.6	(22.3)	(19.8)	18.8	18	10.9	24.5	23 400	36 700
*70BER10E	70	110	20	–	–	–	–	1.1	0.6	21.3	18.9	33.5	25	–	30.8	14 400	20 300
*70BER10H	70	110	20	–	4.0	11.6	1.4	1.1	0.6	(21.3)	(18.9)	22.6	25	–	30.8	17 800	27 800
*70BER10X	70	110	20	25	4.0	11.6	1.4	1.1	0.6	(21.3)	(18.9)	22.6	25	–	30.8	21 200	33 400
*70BNR20EV1V	70	110	24	–	–	–	–	1.1	0.6	22.3	19.8	28.6	18	10.9	26.5	16 700	–
*70BNR20HV1V	70	110	24	–	–	–	–	1.1	0.6	(22.3)	(19.8)	18.8	18	10.9	26.5	20 000	–
*70BNR20XV1V	70	110	24	–	–	–	–	1.1	0.6	(22.3)	(19.8)	18.8	18	10.9	26.5	23 400	–
*70BER20EV1V	70	110	24	–	–	–	–	1.1	0.6	21.3	18.9	33.5	25	–	32.8	14 400	–
*70BER20HV1V	70	110	24	–	–	–	–	1.1	0.6	(21.3)	(18.9)	22.6	25	–	32.8	17 800	–
*70BER20XV1V	70	110	24	–	–	–	–	1.1	0.6	(21.3)	(18.9)	22.6	25	–	32.8	21 200	–
7214C	70	125	24	–	–	–	–	1.5	1	83.5	64.5	43.0	15	14.6	25.1	11 800	18 000
7214CSN24	70	125	24	–	–	–	–	1.5	1	(83.5)	(64.5)	51.3	15	14.6	25.1	15 400	23 400
7214A5	70	125	24	–	–	–	–	1.5	1	79.5	61.5	49.5	25	–	34.7	10 300	15 400
7214A5SN24	70	125	24	–	–	–	–	1.5	1	(79.5)	(61.5)	59.0	25	–	34.7	13 400	20 000
7214A	70	125	24	–	–	–	–	1.5	1	77.0	59.5	38.0	30	–	40.1	7 700	10 300

Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
76	94	95	1	0.5	101	205	503	1 004	59	79	119	168	– 4	– 10	– 22	– 36	0.338
76	94	95	1	0.5	108	227	571	1 155	67	91	138	196	– 4	– 10	– 22	– 36	0.301
76	94	95	1	0.5	137	298	676	1 404	138	182	248	334	– 3	– 7	– 14	– 24	0.341
76	94	95	1	0.5	150	336	777	1 633	158	212	291	392	– 3	– 7	– 14	– 24	0.304
76	94	95	1	0.5	49	181	367	–	51	80	105	–	0	– 8	– 16	–	0.328
76	94	95	1	0.5	49	200	415	–	57	93	122	–	0	– 8	– 16	–	0.292
76	94	95	1	0.5	49	200	415	–	57	93	122	–	0	– 8	– 16	–	0.292
76	94	95	1	0.5	49	292	604	–	84	154	201	–	0	– 8	– 15	–	0.328
76	94	95	1	0.5	49	329	693	–	94	180	235	–	0	– 8	– 15	–	0.292
76	94	95	1	0.5	49	329	693	–	94	180	235	–	0	– 8	– 15	–	0.292
76	94	95	1	0.5	49	181	367	–	51	80	105	–	0	– 8	– 16	–	0.381
76	94	95	1	0.5	49	200	415	–	57	93	122	–	0	– 8	– 16	–	0.344
76	94	95	1	0.5	49	200	415	–	57	93	122	–	0	– 8	– 16	–	0.344
76	94	95	1	0.5	49	292	604	–	84	154	201	–	0	– 8	– 15	–	0.381
76	94	95	1	0.5	49	329	693	–	94	180	235	–	0	– 8	– 15	–	0.344
76	94	95	1	0.5	49	329	693	–	94	180	235	–	0	– 8	– 15	–	0.344
77	103	105	1	0.6	148	285	732	1 460	68	89	135	190	– 7	– 14	– 30	– 48	0.606
77	103	105	1	0.6	161	319	839	1 692	78	103	158	222	– 7	– 14	– 30	– 48	0.525
77	103	105	1	0.6	255	500	1 080	2 196	172	220	294	391	– 6	– 11	– 20	– 33	0.625
77	103	105	1	0.6	285	572	1 252	2 566	200	257	346	461	– 6	– 11	– 20	– 33	0.544
77	103	105	1	0.6	49	278	1 038	2 106	130	231	370	482	0	– 5	– 15	– 25	0.613
77	103	105	1	0.6	49	235	509	–	53	93	126	–	0	– 10	– 20	–	0.645
77	103	105	1	0.6	49	262	582	–	60	108	147	–	0	– 10	– 20	–	0.605
77	103	105	1	0.6	49	262	582	–	60	108	147	–	0	– 10	– 20	–	0.605
77	103	105	1	0.6	49	396	815	–	89	181	236	–	0	– 10	– 18	–	0.645
77	103	105	1	0.6	49	451	942	–	100	212	278	–	0	– 10	– 18	–	0.605
77	103	105	1	0.6	49	451	942	–	100	212	278	–	0	– 10	– 18	–	0.605
77	103	105	1	0.6	49	235	509	–	53	93	126	–	0	– 10	– 20	–	0.764
77	103	105	1	0.6	49	262	582	–	60	108	147	–	0	– 10	– 20	–	0.724
77	103	105	1	0.6	49	262	582	–	60	108	147	–	0	– 10	– 20	–	0.724
77	103	105	1	0.6	49	396	815	–	89	181	236	–	0	– 10	– 18	–	0.764
77	103	105	1	0.6	49	451	942	–	100	212	278	–	0	– 10	– 18	–	0.724
77	103	105	1	0.6	49	451	942	–	100	212	278	–	0	– 10	– 18	–	0.724
79	116	119	1.5	0.8	243	484	1 164	2 368	75	100	148	209	– 9	– 20	– 42	– 69	1.09
79	116	119	1.5	0.8	262	539	1 329	2 734	86	115	172	245	– 9	– 20	– 42	– 69	0.898
79	116	119	1.5	0.8	406	781	1 856	3 690	188	239	332	438	– 8	– 15	– 30	– 49	1.08
79	116	119	1.5	0.8	451	887	2 147	4 304	218	279	390	517	– 8	– 15	– 30	– 49	0.888
79	116	119	1.5	0.8	98	1 067	2 626	3 932	153	346	481	562	0	– 15	– 30	– 40	1.10

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available. Series 20 and 29 are exclusively for sealed bearings.
(2) A bearing with C values at column indicate a bearing which Spinshot II are available, and a bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

Table B

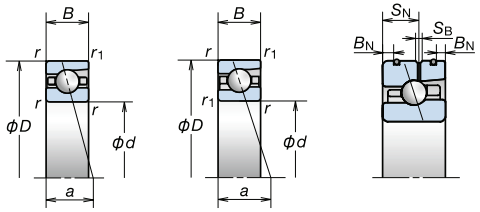
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

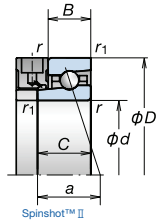
Bore Diameter 75mm



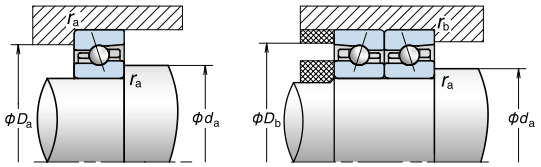
79,70,72 series
BNR10,20 series
BER10,20 series

BNR19,29 series
BER19,29 series

ROBUSTSHOT



Spinshot™ II



Bearing Numbers (1)	Boundary Dimensions (2) (mm)									Basic Load Ratings (3) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min⁻¹)	
	d	D	B	C	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
*7915C	75	105	16	–	–	–	–	1	0.6	30.0	29.3	18.0	15	16.6	20.1	12 800	19 500
*7915CSN24	75	105	16	–	–	–	–	1	0.6	(30.0)	(29.3)	21.3	15	16.6	20.1	16 700	25 400
*7915A5	75	105	16	–	–	–	–	1	0.6	28.3	27.7	21.2	25	–	29.0	11 200	16 700
*7915A5SN24	75	105	16	–	–	–	–	1	0.6	(28.3)	(27.7)	25.1	25	–	29.0	14 500	21 700
*75BNR19E	75	105	16	–	–	–	–	1	0.6	21.6	19.0	27.5	18	10.9	22.6	16 700	23 800
*75BNR19H	75	105	16	–	3.1	9.3	1.4	1	0.6	(21.6)	(19.0)	18.0	18	10.9	22.6	20 000	31 200
*75BNR19X	75	105	16	21	3.1	9.3	1.4	1	0.6	(21.6)	(19.0)	18.0	18	10.9	22.6	23 400	36 700
*75BER19E	75	105	16	–	–	–	–	1	0.6	20.7	18.2	32.5	25	–	29.0	14 400	20 300
*75BER19H	75	105	16	–	3.1	9.3	1.4	1	0.6	(20.7)	(18.2)	21.7	25	–	29.0	17 800	27 800
*75BER19X	75	105	16	21	3.1	9.3	1.4	1	0.6	(20.7)	(18.2)	21.7	25	–	29.0	21 200	33 400
*75BNR29EV1V	75	105	19	–	–	–	–	1	0.6	21.6	19.0	27.5	18	10.9	24.1	16 700	–
*75BNR29HV1V	75	105	19	–	–	–	–	1	0.6	(21.6)	(19.0)	18.0	18	10.9	24.1	20 000	–
*75BNR29XV1V	75	105	19	–	–	–	–	1	0.6	(21.6)	(19.0)	18.0	18	10.9	24.1	23 400	–
*75BER29EV1V	75	105	19	–	–	–	–	1	0.6	20.7	18.2	32.5	25	–	30.5	14 400	–
*75BER29HV1V	75	105	19	–	–	–	–	1	0.6	(20.7)	(18.2)	21.7	25	–	30.5	17 800	–
*75BER29XV1V	75	105	19	–	–	–	–	1	0.6	(20.7)	(18.2)	21.7	25	–	30.5	21 200	–
*7015C	75	115	20	–	–	–	–	1.1	0.6	50.5	45.5	28.1	15	15.9	22.7	12 200	18 500
*7015CSN24	75	115	20	–	–	–	–	1.1	0.6	(50.5)	(45.5)	33.3	15	15.9	22.7	15 800	24 000
*7015A5	75	115	20	–	–	–	–	1.1	0.6	47.5	43.5	33.5	25	–	32.1	10 600	15 800
*7015A5SN24	75	115	20	–	–	–	–	1.1	0.6	(47.5)	(43.5)	40.0	25	–	32.1	13 700	20 600
*7015A	75	115	20	–	–	–	–	1.1	0.6	46.0	41.5	25.9	30	–	37.4	7 900	10 600
*75BNR10E	75	115	20	–	–	–	–	1.1	0.6	22.6	20.7	30.0	18	11.0	25.3	15 800	22 600
*75BNR10H	75	115	20	–	4.0	11.6	1.4	1.1	0.6	(22.6)	(20.7)	19.7	18	11.0	25.3	19 000	29 500
*75BNR10X	75	115	20	27	4.0	11.6	1.4	1.1	0.6	(22.6)	(20.7)	19.7	18	11.0	25.3	22 200	34 800
*75BER10E	75	115	20	–	–	–	–	1.1	0.6	21.6	19.8	35.0	25	–	31.9	13 600	19 200
*75BER10H	75	115	20	–	4.0	11.6	1.4	1.1	0.6	(21.6)	(19.8)	23.7	25	–	31.9	16 900	26 400
*75BER10X	75	115	20	27	4.0	11.6	1.4	1.1	0.6	(21.6)	(19.8)	23.7	25	–	31.9	20 000	31 600
*75BNR20EV1V	75	115	24	–	–	–	–	1.1	0.6	22.6	20.7	30.0	18	11.0	27.3	15 800	–
*75BNR20HV1V	75	115	24	–	–	–	–	1.1	0.6	(22.6)	(20.7)	19.7	18	11.0	27.3	19 000	–
*75BNR20XV1V	75	115	24	–	–	–	–	1.1	0.6	(22.6)	(20.7)	19.7	18	11.0	27.3	22 200	–
*75BER20EV1V	75	115	24	–	–	–	–	1.1	0.6	21.6	19.8	35.0	25	–	33.9	13 600	–
*75BER20HV1V	75	115	24	–	–	–	–	1.1	0.6	(21.6)	(19.8)	23.7	25	–	33.9	16 900	–
*75BER20XV1V	75	115	24	–	–	–	–	1.1	0.6	(21.6)	(19.8)	23.7	25	–	33.9	20 000	–
7215C	75	130	25	–	–	–	–	1.5	1	87.0	70.0	46.0	15	14.8	26.2	11 300	17 100
7215CSN24	75	130	25	–	–	–	–	1.5	1	(87.0)	(70.0)	54.9	15	14.8	26.2	14 700	22 300
7215A5	75	130	25	–	–	–	–	1.5	1	82.5	66.5	53.0	25	–	36.4	9 800	14 700
7215A5SN24	75	130	25	–	–	–	–	1.5	1	(82.5)	(66.5)	62.7	25	–	36.4	12 700	19 100
7215A	75	130	25	–	–	–	–	1.5	1	80.0	64.5	40.5	30	–	42.1	7 400	9 800

Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
81	99	100	1	0.5	103	190	489	997	61	79	120	171	– 4	– 9	– 21	– 35	0.358
81	99	100	1	0.5	109	210	555	1 147	70	91	140	199	– 4	– 9	– 21	– 35	0.319
81	99	100	1	0.5	140	307	765	1 458	142	189	268	347	– 3	– 7	– 15	– 24	0.355
81	99	100	1	0.5	153	346	882	1 696	164	220	314	409	– 3	– 7	– 15	– 24	0.316
81	99	100	1	0.5	49	185	464	–	52	83	118	–	0	– 8	– 19	–	0.348
81	99	100	1	0.5	49	205	528	–	58	96	138	–	0	– 8	– 19	–	0.310
81	99	100	1	0.5	49	205	528	–	58	96	138	–	0	– 8	– 19	–	0.310
81	99	100	1	0.5	49	301	625	–	87	160	209	–	0	– 8	– 15	–	0.348
81	99	100	1	0.5	49	339	718	–	97	187	245	–	0	– 8	– 15	–	0.310
81	99	100	1	0.5	49	339	718	–	97	187	245	–	0	– 8	– 15	–	0.310
81	99	100	1	0.5	49	185	464	–	52	83	118	–	0	– 8	– 19	–	0.403
81	99	100	1	0.5	49	205	528	–	58	96	138	–	0	– 8	– 19	–	0.365
81	99	100	1	0.5	49	205	528	–	58	96	138	–	0	– 8	– 19	–	0.365
81	99	100	1	0.5	49	301	625	–	87	160	209	–	0	– 8	– 15	–	0.403
81	99	100	1	0.5	49	339	718	–	97	187	245	–	0	– 8	– 15	–	0.365
81	99	100	1	0.5	49	339	718	–	97	187	245	–	0	– 8	– 15	–	0.365
82	108	110	1	0.6	151	294	796	1 573	70	92	144	202	– 7	– 14	– 31	– 49	0.643
82	108	110	1	0.6	165	330	915	1 824	81	107	168	236	– 7	– 14	– 31	– 49	0.557
82	108	110	1	0.6	263	519	1 204	2 399	179	230	316	418	– 6	– 11	– 21	– 34	0.652
82	108	110	1	0.6	295	594	1 398	2 806	209	269	372	493	– 6	– 11	– 21	– 34	0.566
82	108	110	1	0.6	49	288	1 083	2 202	135	241	387	506	0	– 5	– 15	– 25	0.650
82	108	110	1	0.6	49	240	525	–	55	96	131	–	0	– 10	– 20	–	0.679
82	108	110	1	0.6	49	269	600	–	61	112	153	–	0	– 10	– 20	–	0.638
82	108	110	1	0.6	49	269	600	–	61	112	153	–	0	– 10	– 20	–	0.638
82	108	110	1	0.6	49	506	1 034	–	91	203	265	–	0	– 12	– 21	–	0.679
82	108	110	1	0.6	49	579	1 199	–	103	238	311	–	0	– 12	– 21	–	0.638
82	108	110	1	0.6	49	579	1 199	–	103	238	311	–	0	– 12	– 21	–	0.638
82	108	110	1	0.6	49	240	525	–	55	96	131	–	0	– 10	– 20	–	0.806
82	108	110	1	0.6	49	269	600	–	61	112	153	–	0	– 10	– 20	–	0.764
82	108	110	1	0.6	49	269	600	–	61	112	153	–	0	– 10	– 20	–	0.764
82	108	110	1	0.6	49	506	1 034	–	91	203	265	–	0	– 12	– 21	–	0.806
82	108	110	1	0.6	49	579	1 199	–	103	238	311	–	0	– 12	– 21	–	0.764
82	108	110	1	0.6	49	579	1 199	–	103	238	311	–	0	– 12	– 21	–	0.764
84	121	124	1.5	0.8	270	530	1 224	2 445	81	108	157	220	– 10	– 21	– 42	– 68	1.19
84	121	124	1.5	0.8	293	593	1 398	2 825	93	124	182	257	– 10	– 21	– 42	– 68	0.983
84	121	124	1.5	0.8	422	819	1 961	3 911	199	253	353	467	– 8	– 15	– 30	– 49	1.18
84	121	124	1.5	0.8	469	932	2 270	4 565	231	296	415	550	– 8	– 15	– 30	– 49	0.973
84	121	124	1.5	0.8	98	1 123	2 780	4 170	159	367	512	598	0	– 15	– 30	– 40	1.20

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available. Series 20 and 29 are exclusively for sealed bearings.
(2) A bearing with C values at column indicate a bearing which Spinshot II are available, and a bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

Table B

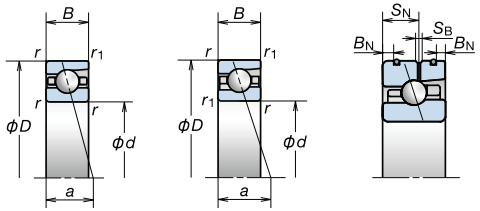
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

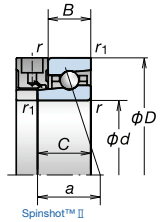
Bore Diameter 80 mm



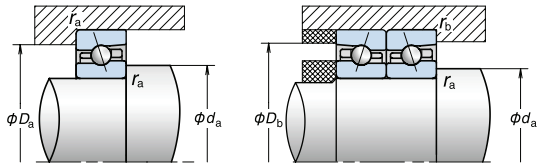
79,70,72 series
BNR10,20 series
BER10,20 series

BNR19,29 series
BER19,29 series

ROBUSTSHOT



Spinshot™ II



Bearing Numbers (1)	Boundary Dimensions (mm)									Basic Load Ratings (2) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min⁻¹)	
	d	D	B	C	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
*7916C	80	110	16	–	–	–	–	1	0.6	30.5	30.5	18.7	15	16.7	20.7	12 200	18 500
*7916CSN24	80	110	16	–	–	–	–	1	0.6	(30.5)	(30.5)	22.2	15	16.7	20.7	15 800	24 000
*7916A5	80	110	16	–	–	–	–	1	0.6	28.7	29.0	22.1	25	–	30.2	10 600	15 800
*7916A5SN24	80	110	16	–	–	–	–	1	0.6	(28.7)	(29.0)	26.2	25	–	30.2	13 700	20 600
*80BNR19E	80	110	16	–	–	–	–	1	0.6	22.0	19.9	28.9	18	11.0	23.4	15 800	22 600
*80BNR19H	80	110	16	–	3.1	9.3	1.4	1	0.6	(22.0)	(19.9)	18.9	18	11.0	23.4	19 000	29 500
*80BNR19X	80	110	16	21	3.1	9.3	1.4	1	0.6	(22.0)	(19.9)	18.9	18	11.0	23.4	22 200	34 800
*80BER19E	80	110	16	–	–	–	–	1	0.6	21.0	19.1	34.0	25	–	30.2	13 600	19 200
*80BER19H	80	110	16	–	3.1	9.3	1.4	1	0.6	(21.0)	(19.1)	22.8	25	–	30.2	16 900	26 400
*80BER19X	80	110	16	21	3.1	9.3	1.4	1	0.6	(21.0)	(19.1)	22.8	25	–	30.2	20 000	31 600
*80BNR29EV1V	80	110	19	–	–	–	–	1	0.6	22.0	19.9	28.9	18	11.0	24.9	15 800	–
*80BNR29HV1V	80	110	19	–	–	–	–	1	0.6	(22.0)	(19.9)	18.9	18	11.0	24.9	19 000	–
*80BNR29XV1V	80	110	19	–	–	–	–	1	0.6	(22.0)	(19.9)	18.9	18	11.0	24.9	22 200	–
*80BER29EV1V	80	110	19	–	–	–	–	1	0.6	21.0	19.1	34.0	25	–	31.7	13 600	–
*80BER29HV1V	80	110	19	–	–	–	–	1	0.6	(21.0)	(19.1)	22.8	25	–	31.7	16 900	–
*80BER29XV1V	80	110	19	–	–	–	–	1	0.6	(21.0)	(19.1)	22.8	25	–	31.7	20 000	–
*7016C	80	125	22	–	–	–	–	1.1	0.6	61.5	55.5	34.5	15	15.7	24.7	11 300	17 100
*7016CSN24	80	125	22	–	–	–	–	1.1	0.6	(61.5)	(55.5)	40.9	15	15.7	24.7	14 700	22 300
*7016A5	80	125	22	–	–	–	–	1.1	0.6	58.5	52.5	41.0	25	–	34.9	9 800	14 700
*7016A5SN24	80	125	22	–	–	–	–	1.1	0.6	(58.5)	(52.5)	48.3	25	–	34.9	12 700	19 100
*7016A	80	125	22	–	–	–	–	1.1	0.6	56.0	50.5	31.5	30	–	40.6	7 400	9 800
*80BNR10E	80	125	22	–	–	–	–	1.1	0.6	26.5	24.5	35.5	18	10.9	27.5	14 700	20 900
*80BNR10H	80	125	22	–	4.7	12.2	2.2	1.1	0.6	(26.5)	(24.5)	23.4	18	10.9	27.5	17 600	27 400
*80BNR10X	80	125	22	27	4.7	12.2	2.2	1.1	0.6	(26.5)	(24.5)	23.4	18	10.9	27.5	20 500	32 200
*80BER10E	80	125	22	–	–	–	–	1.1	0.6	25.3	23.5	42.0	25	–	34.6	12 600	17 800
*80BER10H	80	125	22	–	4.7	12.2	2.2	1.1	0.6	(25.3)	(23.5)	28.2	25	–	34.6	15 700	24 400
*80BER10X	80	125	22	27	4.7	12.2	2.2	1.1	0.6	(25.3)	(23.5)	28.2	25	–	34.6	18 600	29 300
*80BNR20EV1V	80	125	27	–	–	–	–	1.1	0.6	26.5	24.5	35.5	18	10.9	30.0	14 700	–
*80BNR20HV1V	80	125	27	–	–	–	–	1.1	0.6	(26.5)	(24.5)	23.4	18	10.9	30.0	17 600	–
*80BNR20XV1V	80	125	27	–	–	–	–	1.1	0.6	(26.5)	(24.5)	23.4	18	10.9	30.0	20 500	–
*80BER20EV1V	80	125	27	–	–	–	–	1.1	0.6	25.3	23.5	42.0	25	–	37.1	12 600	–
*80BER20HV1V	80	125	27	–	–	–	–	1.1	0.6	(25.3)	(23.5)	28.2	25	–	37.1	15 700	–
*80BER20XV1V	80	125	27	–	–	–	–	1.1	0.6	(25.3)	(23.5)	28.2	25	–	37.1	18 600	–
7216C	80	140	26	–	–	–	–	2	1	97.5	77.5	54.5	15	14.7	27.7	10 500	16 000
7216CSN24	80	140	26	–	–	–	–	2	1	(97.5)	(77.5)	64.5	15	14.7	27.7	13 700	20 800
7216A5	80	140	26	–	–	–	–	2	1	93.0	74.0	62.0	25	–	38.6	9 100	13 700
7216A5SN24	80	140	26	–	–	–	–	2	1	(93.0)	(74.0)	73.5	25	–	38.6	11 900	17 800
7216A	80	140	26	–	–	–	–	2	1	89.5	71.5	47.5	30	–	44.8	6 900	9 100

Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
86	104	105	1	0.5	104	195	503	986	63	81	125	173	– 4	– 9	– 21	– 34	0.377
86	104	105	1	0.5	111	215	573	1 136	72	94	145	202	– 4	– 9	– 21	– 34	0.337
86	104	105	1	0.5	182	366	792	1 603	160	207	278	370	– 4	– 8	– 15	– 25	0.381
86	104	105	1	0.5	201	415	913	1 867	186	242	326	436	– 4	– 8	– 15	– 25	0.341
86	104	105	1	0.5	49	190	478	–	53	86	123	–	0	– 8	– 19	–	0.366
86	104	105	1	0.5	49	210	545	–	60	99	143	–	0	– 8	– 19	–	0.326
86	104	105	1	0.5	49	210	545	–	60	99	143	–	0	– 8	– 19	–	0.326
86	104	105	1	0.5	49	309	646	–	89	166	217	–	0	– 8	– 15	–	0.366
86	104	105	1	0.5	49	349	743	–	100	194	254	–	0	– 8	– 15	–	0.326
86	104	105	1	0.5	49	349	743	–	100	194	254	–	0	– 8	– 15	–	0.326
86	104	105	1	0.5	49	190	478	–	53	86	123	–	0	– 8	– 19	–	0.425
86	104	105	1	0.5	49	210	545	–	60	99	143	–	0	– 8	– 19	–	0.385
86	104	105	1	0.5	49	210	545	–	60	99	143	–	0	– 8	– 19	–	0.385
86	104	105	1	0.5	49	309	646	–	89	166	217	–	0	– 8	– 15	–	0.425
86	104	105	1	0.5	49	349	743	–	100	194	254	–	0	– 8	– 15	–	0.385
86	104	105	1	0.5	49	349	743	–	100	194	254	–	0	– 8	– 15	–	0.385
87	118	120	1	0.6	202	382	921	1 880	78	102	151	215	– 6	– 14	– 31	– 52	0.855
87	118	120	1	0.6	215	422	1 045	2 162	89	118	176	251	– 6	– 14	– 31	– 52	0.736
87	118	120	1	0.6	345	624	1 513	2 903	198	246	345	448	– 6	– 11	– 23	– 37	0.880
87	118	120	1	0.6	381	704	1 744	3 377	229	286	404	528	– 6	– 11	– 23	– 37	0.761
87	118	120	1	0.6	98	752	1 762	3 060	170	340	464	573	0	– 10	– 20	– 30	0.864
87	118	120	1	0.6	98	327	611	–	72	111	141	–	0	– 10	– 19	–	0.921
87	118	120	1	0.6	98	359	688	–	80	127	164	–	0	– 10	– 19	–	0.867
87	118	120	1	0.6	98	359	688	–	80	127	164	–	0	– 10	– 19	–	0.867
87	118	120	1	0.6	98	623	1 272	–	118	225	292	–	0	– 12	– 22	–	0.921
87	118	120	1	0.6	98	704	1 461	–	133	262	343	–	0	– 12	– 22	–	0.867
87	118	120	1	0.6	98	704	1 461	–	133	262	343	–	0	– 12	– 22	–	0.867
87	118	120	1	0.6	98	327	611	–	72	111	141	–	0	– 10	– 19	–	1.12
87	118	120	1	0.6	98	359	688	–	80	127	164	–	0	– 10	– 19	–	1.06
87	118	120	1	0.6	98	359	688	–	80	127	164	–	0	– 10	– 19	–	1.06
87	118	120	1	0.6	98	623	1 272	–	118	225	292	–	0	– 12	– 22	–	1.12
87	118	120	1	0.6	98	704	1 461	–	133	262	343	–	0	– 12	– 22	–	1.06
87	118	120	1	0.6	98	704	1 461	–	133	262	343	–	0	– 12	– 22	–	1.06
90	130	134	2	1	305	595	1 367	2 752	83	110	159	224	– 12	– 24	– 47	– 76	1.43
90	130	134	2	1	333	667	1 566	3 185	96	127	186	262	– 12	– 24	– 47	– 76	1.18
90	130	134	2	1	463	925	2 161	4 345	201	259	357	473	– 9	– 17	– 33	– 54	1.42
90	130	134	2	1	517	1 056	2 507	5 078	234	303	420	558	– 9	– 17	– 33	– 54	1.17
90	130	134	2	1	98	1 095	2 696	4 035	156	356	494	576	0	– 15	– 30	– 40	1.45

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available. Series 20 and 29 are exclusively for sealed bearings.
(2) A bearing with C values at column indicate a bearing which Spinshot II are available, and a bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6,5	6,0	5,0	4,5
18°	4,5			
25°	2,0			
30°	1,4			

Table B

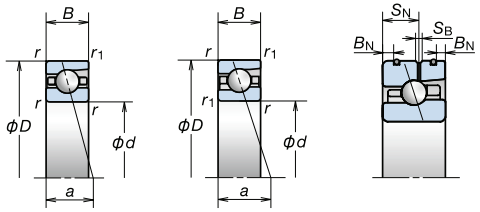
	DBD	DBC
Preload factor	1,36	2
Axial rigidity	1,48	2
Radial rigidity	1,54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

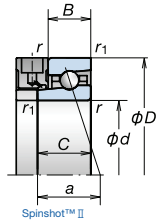
Bore Diameter 85mm



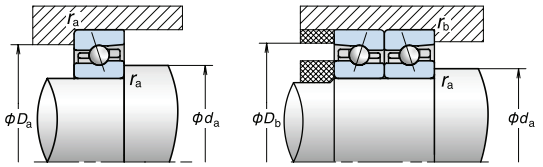
79,70,72 series
BNR10,20 series
BER10,20 series

BNR19,29 series
BER19,29 series

ROBUSTSHOT



Spinshot™ II



Bearing Numbers (1)	Boundary Dimensions (mm)									Basic Load Ratings (2) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min⁻¹)	
	d	D	B	C	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
*7917C	85	120	18	–	–	–	–	1.1	0.6	41.0	40.5	25.9	15	16.5	22.7	11 300	17 100
*7917CSN24	85	120	18	–	–	–	–	1.1	0.6	(41.0)	(40.5)	30.7	15	16.5	22.7	14 700	22 300
*7917A5	85	120	18	–	–	–	–	1.1	0.6	38.5	38.5	30.0	25	–	32.9	9 800	14 700
*7917A5SN24	85	120	18	–	–	–	–	1.1	0.6	(38.5)	(38.5)	35.6	25	–	32.9	12 700	19 100
*85BNR19E	85	120	18	–	–	–	–	1.1	0.6	29.4	26.3	38.0	18	10.8	25.7	14 700	20 900
*85BNR19H	85	120	18	–	4.0	10.4	2.2	1.1	0.6	(29.4)	(26.3)	24.8	18	10.8	25.7	17 600	27 400
*85BNR19X	85	120	18	23	4.0	10.4	2.2	1.1	0.6	(29.4)	(26.3)	24.8	18	10.8	25.7	20 500	32 200
*85BER19E	85	120	18	–	–	–	–	1.1	0.6	28.1	25.2	35.5	25	–	32.9	12 600	17 800
*85BER19H	85	120	18	–	4.0	10.4	2.2	1.1	0.6	(28.1)	(25.2)	30.0	25	–	32.9	15 700	24 400
*85BER19X	85	120	18	23	4.0	10.4	2.2	1.1	0.6	(28.1)	(25.2)	30.0	25	–	32.9	18 600	29 300
*85BNR29EV1V	85	120	22	–	–	–	–	1.1	0.6	29.4	26.3	38.0	18	10.8	27.7	14 700	–
*85BNR29HV1V	85	120	22	–	–	–	–	1.1	0.6	(29.4)	(26.3)	24.8	18	10.8	27.7	17 600	–
*85BNR29XV1V	85	120	22	–	–	–	–	1.1	0.6	(29.4)	(26.3)	24.8	18	10.8	27.7	20 500	–
*85BER29EV1V	85	120	22	–	–	–	–	1.1	0.6	28.1	25.2	35.5	25	–	34.9	12 600	–
*85BER29HV1V	85	120	22	–	–	–	–	1.1	0.6	(28.1)	(25.2)	30.0	25	–	34.9	15 700	–
*85BER29XV1V	85	120	22	–	–	–	–	1.1	0.6	(28.1)	(25.2)	30.0	25	–	34.9	18 600	–
*7017C	85	130	22	–	–	–	–	1.1	0.6	63.0	58.5	38.0	15	15.9	25.4	10 700	16 300
*7017CSN24	85	130	22	–	–	–	–	1.1	0.6	(63.0)	(58.5)	45.0	15	15.9	25.4	14 000	21 300
*7017A5	85	130	22	–	–	–	–	1.1	0.6	60.0	55.5	43.0	25	–	36.1	9 400	14 000
*7017A5SN24	85	130	22	–	–	–	–	1.1	0.6	(60.0)	(55.5)	50.9	25	–	36.1	12 100	18 200
*7017A	85	130	22	–	–	–	–	1.1	0.6	57.5	53.5	33.0	30	–	42.0	7 000	9 400
*85BNR10E	85	130	22	–	–	–	–	1.1	0.6	26.8	25.7	37.5	18	11.0	28.5	14 000	20 000
*85BNR10H	85	130	22	–	4.7	12.2	2.2	1.1	0.6	(26.8)	(25.7)	24.5	18	11.0	28.5	16 800	26 100
*85BNR10X	85	130	22	27	4.7	12.2	2.2	1.1	0.6	(26.8)	(25.7)	24.5	18	11.0	28.5	19 600	30 700
*85BER10E	85	130	22	–	–	–	–	1.1	0.6	25.6	24.6	43.5	25	–	36.1	12 000	17 000
*85BER10H	85	130	22	–	4.7	12.2	2.2	1.1	0.6	(25.6)	(24.6)	29.5	25	–	36.1	14 900	23 300
*85BER10X	85	130	22	27	4.7	12.2	2.2	1.1	0.6	(25.6)	(24.6)	29.5	25	–	36.1	17 700	28 000
*85BNR20EV1V	85	130	27	–	–	–	–	1.1	0.6	26.8	25.7	37.5	18	11.0	31.0	14 000	–
*85BNR20HV1V	85	130	27	–	–	–	–	1.1	0.6	(26.8)	(25.7)	24.5	18	11.0	31.0	16 800	–
*85BNR20XV1V	85	130	27	–	–	–	–	1.1	0.6	(26.8)	(25.7)	24.5	18	11.0	31.0	19 600	–
*85BER20EV1V	85	130	27	–	–	–	–	1.1	0.6	25.6	24.6	43.5	25	–	38.6	12 000	–
*85BER20HV1V	85	130	27	–	–	–	–	1.1	0.6	(25.6)	(24.6)	29.5	25	–	38.6	14 900	–
*85BER20XV1V	85	130	27	–	–	–	–	1.1	0.6	(25.6)	(24.6)	29.5	25	–	38.6	17 700	–
7217C	85	150	28	–	–	–	–	2	1	113	90.5	60.5	15	14.7	29.7	9 800	14 900
7217CSN24	85	150	28	–	–	–	–	2	1	(113)	(90.5)	71.9	15	14.7	29.7	12 800	19 500
7217A5	85	150	28	–	–	–	–	2	1	107	86.5	70.0	25	–	41.4	8 600	12 800
7217A5SN24	85	150	28	–	–	–	–	2	1	(107)	(86.5)	83.1	25	–	41.4	11 100	16 600
7217A	85	150	28	–	–	–	–	2	1	104	83.5	53.5	30	–	47.9	6 400	8 600

Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
92	113	115	1	0.6	138	307	629	1 281	71	98	135	191	– 6	– 14	– 25	– 41	0.534
92	113	115	1	0.6	150	345	719	1 481	81	114	158	224	– 6	– 14	– 25	– 41	0.470
92	113	115	1	0.6	227	427	950	1 909	176	222	300	396	– 5	– 9	– 17	– 28	0.541
92	113	115	1	0.6	253	486	1 099	2 228	205	259	352	467	– 5	– 9	– 17	– 28	0.477
92	113	115	1	0.6	49	193	652	–	55	88	140	–	0	– 8	– 24	–	0.527
92	113	115	1	0.6	49	214	749	–	61	102	164	–	0	– 8	– 24	–	0.456
92	113	115	1	0.6	49	214	749	–	61	102	164	–	0	– 8	– 24	–	0.456
92	113	115	1	0.6	49	317	898	–	91	171	248	–	0	– 8	– 19	–	0.527
92	113	115	1	0.6	49	358	1 039	–	102	199	292	–	0	– 8	– 19	–	0.456
92	113	115	1	0.6	49	358	1 039	–	102	199	292	–	0	– 8	– 19	–	0.456
92	113	115	1	0.6	49	193	652	–	55	88	140	–	0	– 8	– 24	–	0.617
92	113	115	1	0.6	49	214	749	–	61	102	164	–	0	– 8	– 24	–	0.554
92	113	115	1	0.6	49	214	749	–	61	102	164	–	0	– 8	– 24	–	0.554
92	113	115	1	0.6	49	317	898	–	91	171	248	–	0	– 8	– 19	–	0.617
92	113	115	1	0.6	49	358	1 039	–	102	199	292	–	0	– 8	– 19	–	0.554
92	113	115	1	0.6	49	358	1 039	–	102	199	292	–	0	– 8	– 19	–	0.554
92	123	125	1	0.6	205	393	995	1 956	81	106	161	224	– 6	– 14	– 32	– 52	0.898
92	123	125	1	0.6	219	434	1 130	2 252	93	122	187	262	– 6	– 14	– 32	– 52	0.773
92	123	125	1	0.6	305	646	1 487	2 915	196	257	353	462	– 5	– 11	– 22	– 36	0.904
92	123	125	1	0.6	334	729	1 713	3 390	226	299	413	544	– 5	– 11	– 22	– 36	0.779
92	123	125	1	0.6	98	780	1 837	3 196	176	355	486	600	0	– 10	– 20	– 30	0.907
92	123	125	1	0.6	98	334	627	–	73	114	146	–	0	– 10	– 19	–	0.962
92	123	125	1	0.6	98	367	707	–	82	132	170	–	0	– 10	– 19	–	0.906
92	123	125	1	0.6	98	367	707	–	82	132	170	–	0	– 10	– 19	–	0.906
92	123	125	1	0.6	98	640	1 311	–	122	232	303	–	0	– 12	– 22	–	0.962
92	123	125	1	0.6	98	723	1 508	–	136	271	355	–	0	– 12	– 22	–	0.906
92	123	125	1	0.6	98	723	1 508	–	136	271	355	–	0	– 12	– 22	–	0.906
92	123	125	1	0.6	98	334	627	–	73	114	146	–	0	– 10	– 19	–	1.16
92	123	125	1	0.6	98	367	707	–	82	132	170	–	0	– 10	– 19	–	1.11
92	123	125	1	0.6	98	367	707	–	82	132	170	–	0	– 10	– 19	–	1.11
92	123	125	1	0.6	98	640	1 311	–	122	232	303	–	0	– 12	– 22	–	1.16
92	123	125	1	0.6	98	723	1 508	–	136	271	355	–	0	– 12	– 22	–	1.11
92	123	125	1	0.6	98	723	1 508	–	136	271	355	–	0	– 12	– 22	–	1.11
95	140	144	2	1	355	697	1 658	3 358	90	119	176	250	– 14	– 27	– 53	– 85	1.79
95	140	144	2	1	391	786	1 907	3 898	104	139	206	290	– 14	– 27	– 53	– 85	1.47
95	140	144	2	1	530	1 095	2 431	4 882	217	283	383	507	– 10	– 19	– 35	– 57	1.79
95	140	144	2	1	595	1 255	2 823	5 711	253	331	450	598	– 10	– 19	– 35	– 57	1.47
95	140	144	2	1	98	1 135	3 473	5 794	161	370	558	679	0	– 15	– 35	– 50	1.80

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available. Series 20 and 29 are exclusively for sealed bearings.
(2) A bearing with C values at column indicate a bearing which Spinshot II are available, and a bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6,5	6,0	5,0	4,5
18°	4,5			
25°	2,0			
30°	1,4			

Table B

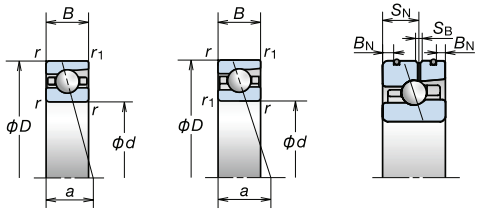
	DBD	DBB
Preload factor	1,36	2
Axial rigidity	1,48	2
Radial rigidity	1,54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

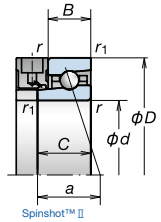
Bore Diameter 90 mm



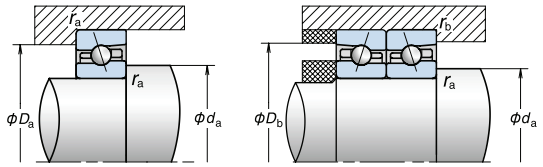
79,70,72 series
BNR10,20 series
BER10,20 series

BNR19,29 series
BER19,29 series

ROBUSTSHOT



Spinshot™ II



Bearing Numbers (1)	Boundary Dimensions (2) (mm)									Basic Load Ratings (3) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min⁻¹)	
	d	D	B	C	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
*7918C	90	125	18	–	–	–	–	1.1	0.6	44.0	46.0	29.1	15	16.6	23.4	10 700	16 300
*7918CSN24	90	125	18	–	–	–	–	1.1	0.6	(44.0)	(46.0)	34.6	15	16.6	23.4	14 000	21 300
*7918A5	90	125	18	–	–	–	–	1.1	0.6	41.0	43.5	33.5	25	–	34.1	9 400	14 000
*7918A5SN24	90	125	18	–	–	–	–	1.1	0.6	(41.0)	(43.5)	40.0	25	–	34.1	12 100	18 200
*90BNR19E	90	125	18	–	–	–	–	1.1	0.6	31.5	29.7	43.0	18	10.9	26.5	14 000	20 000
*90BNR19H	90	125	18	–	4.0	10.4	2.2	1.1	0.6	(31.5)	(29.7)	28.1	18	10.9	26.5	16 800	26 100
*90BNR19X	90	125	18	23	4.0	10.4	2.2	1.1	0.6	(31.5)	(29.7)	28.1	18	10.9	26.5	19 600	30 700
*90BER19E	90	125	18	–	–	–	–	1.1	0.6	30.0	28.5	50.5	25	–	34.1	12 000	17 000
*90BER19H	90	125	18	–	4.0	10.4	2.2	1.1	0.6	(30.0)	(28.5)	34.0	25	–	34.1	14 900	23 300
*90BER19X	90	125	18	23	4.0	10.4	2.2	1.1	0.6	(30.0)	(28.5)	34.0	25	–	34.1	17 700	28 000
*90BNR29EV1V	90	125	22	–	–	–	–	1.1	0.6	31.5	29.7	43.0	18	10.9	28.5	14 000	–
*90BNR29HV1V	90	125	22	–	–	–	–	1.1	0.6	(31.5)	(29.7)	28.1	18	10.9	28.5	16 800	–
*90BNR29XV1V	90	125	22	–	–	–	–	1.1	0.6	(31.5)	(29.7)	28.1	18	10.9	28.5	19 600	–
*90BER29EV1V	90	125	22	–	–	–	–	1.1	0.6	30.0	28.5	50.5	25	–	36.1	12 000	–
*90BER29HV1V	90	125	22	–	–	–	–	1.1	0.6	(30.0)	(28.5)	34.0	25	–	36.1	14 900	–
*90BER29XV1V	90	125	22	–	–	–	–	1.1	0.6	(30.0)	(28.5)	34.0	25	–	36.1	17 700	–
*7018C	90	140	24	–	–	–	–	1.5	1	75.5	69.0	44.5	15	15.7	27.4	10 000	15 300
*7018CSN24	90	140	24	–	–	–	–	1.5	1	(75.5)	(69.0)	53.2	15	15.7	27.4	13 100	19 900
*7018A5	90	140	24	–	–	–	–	1.5	1	71.0	65.5	52.0	25	–	38.8	8 700	13 100
*7018A5SN24	90	140	24	–	–	–	–	1.5	1	(71.0)	(65.5)	62.1	25	–	38.8	11 400	17 000
*7018A	90	140	24	–	–	–	–	1.5	1	68.5	63.5	40.5	30	–	45.2	6 600	8 700
*90BNR10E	90	140	24	–	–	–	–	1.5	1	35.0	33.0	48.0	18	10.9	30.7	13 100	18 700
*90BNR10H	90	140	24	–	5.5	14.5	2.2	1.5	1	(35.0)	(33.0)	31.5	18	10.9	30.7	15 700	24 400
*90BNR10X	90	140	24	29	5.5	14.5	2.2	1.5	1	(35.0)	(33.0)	31.5	18	10.9	30.7	18 300	28 700
*90BER10E	90	140	24	–	–	–	–	1.5	1	33.5	31.5	56.0	25	–	38.8	11 300	15 900
*90BER10H	90	140	24	–	5.5	14.5	2.2	1.5	1	(33.5)	(31.5)	38.0	25	–	38.8	14 000	21 800
*90BER10X	90	140	24	29	5.5	14.5	2.2	1.5	1	(33.5)	(31.5)	38.0	25	–	38.8	16 600	26 100
*90BNR20EV1V	90	140	30	–	–	–	–	1.5	1	35.0	33.0	48.0	18	10.9	33.7	13 100	–
*90BNR20HV1V	90	140	30	–	–	–	–	1.5	1	(35.0)	(33.0)	31.5	18	10.9	33.7	15 700	–
*90BNR20XV1V	90	140	30	–	–	–	–	1.5	1	(35.0)	(33.0)	31.5	18	10.9	33.7	18 300	–
*90BER20EV1V	90	140	30	–	–	–	–	1.5	1	33.5	31.5	56.0	25	–	41.8	11 300	–
*90BER20HV1V	90	140	30	–	–	–	–	1.5	1	(33.5)	(31.5)	38.0	25	–	41.8	14 000	–
*90BER20XV1V	90	140	30	–	–	–	–	1.5	1	(33.5)	(31.5)	38.0	25	–	41.8	16 600	–
7218C	90	160	30	–	–	–	–	2	1	129	105	72.0	15	14.6	31.7	9 200	14 000
7218CSN24	90	160	30	–	–	–	–	2	1	(129)	(105)	85.5	15	14.6	31.7	12 000	18 300
7218A5	90	160	30	–	–	–	–	2	1	123	100	83.5	25	–	44.1	8 000	12 000
7218A5SN24	90	160	30	–	–	–	–	2	1	(123)	(100)	99.2	25	–	44.1	10 400	15 600
7218A	90	160	30	–	–	–	–	2	1	118	96.5	64.5	30	–	51.1	6 000	8 000

Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
97	118	120	1	0.6	153	289	740	1 488	79	102	156	219	– 3	– 9	– 23	– 39	0.568
97	118	120	1	0.6	159	314	834	1 703	89	117	180	255	– 3	– 9	– 23	– 39	0.496
97	118	120	1	0.6	272	500	1 096	2 184	203	253	341	449	– 4	– 8	– 16	– 27	0.560
97	118	120	1	0.6	296	560	1 255	2 531	233	294	399	528	– 4	– 8	– 16	– 27	0.488
97	118	120	1	0.6	98	282	711	–	75	109	156	–	0	– 8	– 21	–	0.552
97	118	120	1	0.6	98	308	804	–	84	125	181	–	0	– 8	– 21	–	0.480
97	118	120	1	0.6	98	308	804	–	84	125	181	–	0	– 8	– 21	–	0.480
97	118	120	1	0.6	98	432	977	–	124	206	276	–	0	– 8	– 17	–	0.552
97	118	120	1	0.6	98	482	1 117	–	139	239	323	–	0	– 8	– 17	–	0.480
97	118	120	1	0.6	98	482	1 117	–	139	239	323	–	0	– 8	– 17	–	0.480
97	118	120	1	0.6	98	282	711	–	75	109	156	–	0	– 8	– 21	–	0.653
97	118	120	1	0.6	98	308	804	–	84	125	181	–	0	– 8	– 21	–	0.582
97	118	120	1	0.6	98	308	804	–	84	125	181	–	0	– 8	– 21	–	0.582
97	118	120	1	0.6	98	432	977	–	124	206	276	–	0	– 8	– 17	–	0.653
97	118	120	1	0.6	98	482	1 117	–	139	239	323	–	0	– 8	– 17	–	0.582
97	118	120	1	0.6	98	482	1 117	–	139	239	323	–	0	– 8	– 17	–	0.582
99	131	134	1.5	0.8	247	502	1 187	2 373	87	117	172	241	– 8	– 18	– 37	– 60	1.16
99	131	134	1.5	0.8	266	560	1 355	2 741	99	135	200	282	– 8	– 18	– 37	– 60	0.994
99	131	134	1.5	0.8	409	779	1 758	3 498	218	275	374	494	– 7	– 13	– 25	– 41	1.17
99	131	134	1.5	0.8	454	886	2 031	4 079	252	321	440	582	– 7	– 13	– 25	– 41	1.00
99	131	134	1.5	0.8	98	782	2 483	3 977	176	356	543	650	0	– 10	– 25	– 35	1.18
99	131	134	1.5	0.8	98	338	830	–	75	116	164	–	0	– 10	– 24	–	1.24
99	131	134	1.5	0.8	98	372	943	–	83	134	191	–	0	– 10	– 24	–	1.16
99	131	134	1.5	0.8	98	372	943	–	83	134	191	–	0	– 10	– 24	–	1.16
99	131	134	1.5	0.8	98	653	1 339	–	124	238	309	–	0	– 12	– 22	–	1.24
99	131	134	1.5	0.8	98	739	1 541	–	139	277	362	–	0	– 12	– 22	–	1.16
99	131	134	1.5	0.8	98	739	1 541	–	139	277	362	–	0	– 12	– 22	–	1.16
99	131	134	1.5	0.8	98	338	830	–	75	116	164	–	0	– 10	– 24	–	1.52
99	131	134	1.5	0.8	98	372	943	–	83	134	191	–	0	– 10	– 24	–	1.44
99	131	134	1.5	0.8	98	372	943	–	83	134	191	–	0	– 10	– 24	–	1.44
99	131	134	1.5	0.8	98	653	1 339	–	124	238	309	–	0	– 12	– 22	–	1.52
99	131	134	1.5	0.8	98	739	1 541	–	139	277	362	–	0	– 12	– 22	–	1.44
99	131	134	1.5	0.8	98	739	1 541	–	139	277	362	–	0	– 12	– 22	–	1.44
100	150	154	2	1	384	771	1 865	3 713	95	126	187	262	– 15	– 29	– 57	– 90	2.20
100	150	154	2	1	425	872	2 150	4 316	109	146	219	308	– 15	– 29	– 57	– 90	1.80
100	150	154	2	1	658	1 272	2 899	5 945	240	304	416	556	– 12	– 21	– 39	– 64	2.31
100	150	154	2	1	744	1 462	3 375	6 965	279	357	490	657	– 12	– 21	– 39	– 64	1.91
100	150	154	2	1	98	1 676	4 314	5 954	165	434	616	697	0	– 20	– 40	– 50	2.23

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available. Series 20 and 29 are exclusively for sealed bearings.
(2) A bearing with C values at column indicate a bearing which Spinshot II are available, and a bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6,5	6,0	5,0	4,5
18°	4,5			
25°	2,0			
30°	1,4			

Table B

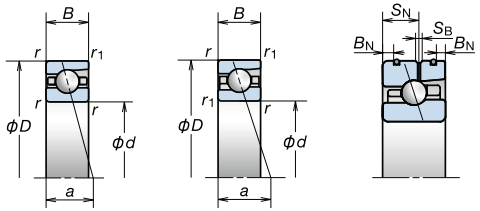
	DBD	DBC
Preload factor	1,36	2
Axial rigidity	1,48	2
Radial rigidity	1,54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

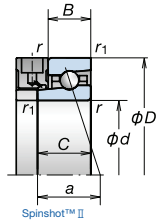
Bore Diameter 95mm



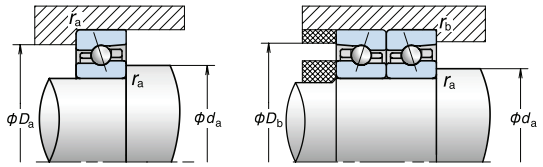
79,70,72 series
BNR10,20 series
BER10,20 series

BNR19,29 series
BER19,29 series

ROBUSTSHOT



Spinshot™ II



Bearing Numbers (1)	Boundary Dimensions (2) (mm)									Basic Load Ratings (3) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min⁻¹)	
	d	D	B	C	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
*7919C	95	130	18	–	–	–	–	1.1	0.6	44.5	48.0	30.0	15	16.7	24.1	10 300	15 600
*7919CSN24	95	130	18	–	–	–	–	1.1	0.6	(44.5)	(48.0)	35.8	15	16.7	24.1	13 400	20 300
*7919A5	95	130	18	–	–	–	–	1.1	0.6	42.0	45.5	35.0	25	–	35.2	8 900	13 400
*7919A5SN24	95	130	18	–	–	–	–	1.1	0.6	(42.0)	(45.5)	41.5	25	–	35.2	11 600	17 400
*95BNR19E	95	130	18	–	–	–	–	1.1	0.6	32.0	31.0	50.0	18	10.9	27.3	13 400	19 100
*95BNR19H	95	130	18	–	4.0	10.4	2.2	1.1	0.6	(32.0)	(31.0)	32.5	18	10.9	27.3	16 000	24 900
*95BNR19X	95	130	18	23	4.0	10.4	2.2	1.1	0.6	(32.0)	(31.0)	32.5	18	10.9	27.3	18 700	29 400
*95BER19E	95	130	18	–	–	–	–	1.1	0.6	30.5	29.7	58.5	25	–	35.2	11 500	16 200
*95BER19H	95	130	18	–	4.0	10.4	2.2	1.1	0.6	(30.5)	(29.7)	39.5	25	–	35.2	14 300	22 300
*95BER19X	95	130	18	23	4.0	10.4	2.2	1.1	0.6	(30.5)	(29.7)	39.5	25	–	35.2	16 900	26 700
*95BNR29EV1V	95	130	22	–	–	–	–	1.1	0.6	32.0	31.0	50.0	18	10.9	29.3	13 400	–
*95BNR29HV1V	95	130	22	–	–	–	–	1.1	0.6	(32.0)	(31.0)	32.5	18	10.9	29.3	16 000	–
*95BNR29XV1V	95	130	22	–	–	–	–	1.1	0.6	(32.0)	(31.0)	32.5	18	10.9	29.3	18 700	–
*95BER29EV1V	95	130	22	–	–	–	–	1.1	0.6	30.5	29.7	58.5	25	–	37.2	11 500	–
*95BER29HV1V	95	130	22	–	–	–	–	1.1	0.6	(30.5)	(29.7)	39.5	25	–	37.2	14 300	–
*95BER29XV1V	95	130	22	–	–	–	–	1.1	0.6	(30.5)	(29.7)	39.5	25	–	37.2	16 900	–
*7019C	95	145	24	–	–	–	–	1.5	1	77.0	73.0	47.0	15	15.9	28.1	9 600	14 600
*7019CSN24	95	145	24	–	–	–	–	1.5	1	(77.0)	(73.0)	55.8	15	15.9	28.1	12 500	19 000
*7019A5	95	145	24	–	–	–	–	1.5	1	73.0	69.5	52.5	25	–	40.0	8 400	12 500
*7019A5SN24	95	145	24	–	–	–	–	1.5	1	(73.0)	(69.5)	62.7	25	–	40.0	10 900	16 300
*7019A	95	145	24	–	–	–	–	1.5	1	70.0	67.0	40.5	30	–	46.6	6 300	8 400
*95BNR10E	95	145	24	–	–	–	–	1.5	1	35.5	34.5	50.0	18	10.8	31.3	12 500	17 900
*95BNR10H	95	145	24	–	5.5	14.5	2.2	1.5	1	(35.5)	(34.5)	32.5	18	10.8	31.3	15 000	23 400
*95BNR10X	95	145	24	29	5.5	14.5	2.2	1.5	1	(35.5)	(34.5)	32.5	18	10.8	31.3	17 500	27 500
*95BER10E	95	145	24	–	–	–	–	1.5	1	34.0	33.0	58.5	25	–	39.7	10 800	15 200
*95BER10H	95	145	24	–	5.5	14.5	2.2	1.5	1	(34.0)	(33.0)	39.5	25	–	39.7	13 400	20 900
*95BER10X	95	145	24	29	5.5	14.5	2.2	1.5	1	(34.0)	(33.0)	39.5	25	–	39.7	15 900	25 000
*95BNR20EV1V	95	145	30	–	–	–	–	1.5	1	35.5	34.5	50.0	18	10.8	34.3	12 500	–
*95BNR20HV1V	95	145	30	–	–	–	–	1.5	1	(35.5)	(34.5)	32.5	18	10.8	34.3	15 000	–
*95BNR20XV1V	95	145	30	–	–	–	–	1.5	1	(35.5)	(34.5)	32.5	18	10.8	34.3	17 500	–
*95BER20EV1V	95	145	30	–	–	–	–	1.5	1	34.0	33.0	58.5	25	–	42.7	10 800	–
*95BER20HV1V	95	145	30	–	–	–	–	1.5	1	(34.0)	(33.0)	39.5	25	–	42.7	13 400	–
*95BER20XV1V	95	145	30	–	–	–	–	1.5	1	(34.0)	(33.0)	39.5	25	–	42.7	15 900	–
7219C	95	170	32	–	–	–	–	2.1	1.1	139	112	76.0	15	14.6	33.7	8 700	13 300
7219CSN24	95	170	32	–	–	–	–	2.1	1.1	(139)	(112)	90.0	15	14.6	33.7	11 400	17 300
7219A5	95	170	32	–	–	–	–	2.1	1.1	133	107	87.0	25	–	46.9	7 600	11 400
7219A5SN24	95	170	32	–	–	–	–	2.1	1.1	(133)	(107)	103	25	–	46.9	9 900	14 800
7219A	95	170	32	–	–	–	–	2.1	1.1	128	103	67.0	30	–	54.2	5 700	7 600

Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
102	123	125	1	0.6	154	294	800	1 588	81	105	164	230	– 3	– 9	– 24	– 40	0.597
102	123	125	1	0.6	161	320	903	1 819	91	121	191	268	– 3	– 9	– 24	– 40	0.522
102	123	125	1	0.6	226	512	1 218	2 371	195	261	363	475	– 3	– 8	– 17	– 28	0.603
102	123	125	1	0.6	244	574	1 397	2 751	223	304	425	558	– 3	– 8	– 17	– 28	0.528
102	123	125	1	0.6	98	288	775	–	77	112	164	–	0	– 8	– 22	–	0.571
102	123	125	1	0.6	98	314	878	–	86	129	191	–	0	– 8	– 22	–	0.497
102	123	125	1	0.6	98	314	878	–	86	129	191	–	0	– 8	– 22	–	0.497
102	123	125	1	0.6	98	442	1 005	–	127	212	286	–	0	– 8	– 17	–	0.571
102	123	125	1	0.6	98	493	1 150	–	143	247	334	–	0	– 8	– 17	–	0.497
102	123	125	1	0.6	98	493	1 150	–	143	247	334	–	0	– 8	– 17	–	0.497
102	123	125	1	0.6	98	288	775	–	77	112	164	–	0	– 8	– 22	–	0.758
102	123	125	1	0.6	98	314	878	–	86	129	191	–	0	– 8	– 22	–	0.684
102	123	125	1	0.6	98	314	878	–	86	129	191	–	0	– 8	– 22	–	0.684
102	123	125	1	0.6	98	442	1 005	–	127	212	286	–	0	– 8	– 17	–	0.758
102	123	125	1	0.6	98	493	1 150	–	143	247	334	–	0	– 8	– 17	–	0.684
102	123	125	1	0.6	98	493	1 150	–	143	247	334	–	0	– 8	– 17	–	0.684
104	136	139	1.5	0.8	275	549	1 188	2 348	94	125	176	246	– 9	– 19	– 36	– 58	1.21
104	136	139	1.5	0.8	299	614	1 357	2 712	107	144	205	288	– 9	– 19	– 36	– 58	1.04
104	136	139	1.5	0.8	421	808	1 832	3 786	227	287	392	525	– 7	– 13	– 25	– 42	1.21
104	136	139	1.5	0.8	469	919	2 119	4 417	263	336	460	619	– 7	– 13	– 25	– 42	1.04
104	136	139	1.5	0.8	98	811	2 592	4 157	182	372	569	682	0	– 10	– 25	– 35	1.23
104	136	139	1.5	0.8	98	345	854	–	77	120	170	–	0	– 10	– 24	–	1.30
104	136	139	1.5	0.8	98	380	971	–	86	138	198	–	0	– 10	– 24	–	1.21
104	136	139	1.5	0.8	98	380	971	–	86	138	198	–	0	– 10	– 24	–	1.21
104	136	139	1.5	0.8	98	671	1 381	–	127	246	320	–	0	– 12	– 22	–	1.30
104	136	139	1.5	0.8	98	760	1 590	–	143	287	375	–	0	– 12	– 22	–	1.21
104	136	139	1.5	0.8	98	760	1 590	–	143	287	375	–	0	– 12	– 22	–	1.21
104	136	139	1.5	0.8	98	345	854	–	77	120	170	–	0	– 10	– 24	–	1.60
104	136	139	1.5	0.8	98	380	971	–	86	138	198	–	0	– 10	– 24	–	1.51
104	136	139	1.5	0.8	98	380	971	–	86	138	198	–	0	– 10	– 24	–	1.51
104	136	139	1.5	0.8	98	671	1 381	–	127	246	320	–	0	– 12	– 22	–	1.60
104	136	139	1.5	0.8	98	760	1 590	–	143	287	375	–	0	– 12	– 22	–	1.51
104	136	139	1.5	0.8	98	760	1 590	–	143	287	375	–	0	– 12	– 22	–	1.51
107	158	163	2	1	448	876	2 081	4 153	98	130	192	270	– 18	– 33	– 63	– 99	2.64
107	158	163	2	1	498	995	2 404	4 834	114	151	225	317	– 18	– 33	– 63	– 99	2.18
107	158	163	2	1	703	1 390	3 124	6 301	240	308	419	557	– 13	– 23	– 42	– 68	2.63
107	158	163	2	1	796	1 601	3 639	7 386	280	361	494	657	– 13	– 23	– 42	– 68	2.17
107	158	163	2	1	356	1 633	4 191	6 644	248	422	596	711	– 5	– 20	– 40	– 55	2.67

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available. Series 20 and 29 are exclusively for sealed bearings.
(2) A bearing with C values at column indicate a bearing which Spinshot II are available, and a bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6,5	6,0	5,0	4,5
18°	4,5			
25°	2,0			
30°	1,4			

Table B

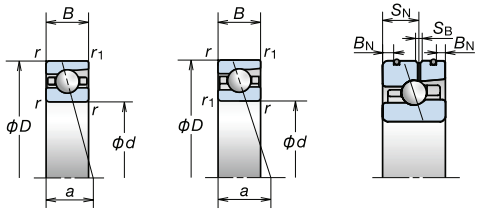
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

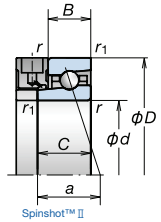
Bore Diameter 100 mm



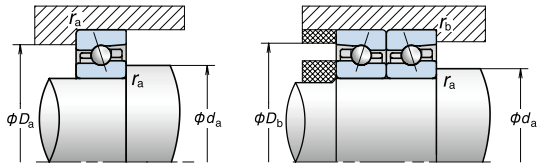
79,70,72 series
BNR10,20 series
BER10,20 series

BNR19,29 series
BER19,29 series

ROBUSTSHOT



Spinshot™ II



Bearing Numbers (1)	Boundary Dimensions (2) (mm)									Basic Load Ratings (3) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min⁻¹)	
	d	D	B	C	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
*7920C	100	140	20	–	–	–	–	1.1	0.6	52.5	54.0	33.0	15	16.5	26.1	9 600	14 600
*7920CSN24	100	140	20	–	–	–	–	1.1	0.6	(52.5)	(54.0)	39.2	15	16.5	26.1	12 500	19 000
*7920A5	100	140	20	–	–	–	–	1.1	0.6	49.5	51.5	39.5	25	–	38.0	8 400	12 500
*7920A5SN24	100	140	20	–	–	–	–	1.1	0.6	(49.5)	(51.5)	46.8	25	–	38.0	10 900	16 300
*100BNR19E	100	140	20	–	–	–	–	1.1	0.6	38.0	35.0	50.5	18	10.8	29.5	12 500	17 900
*100BNR19H	100	140	20	–	4.0	12.0	2.2	1.1	0.6	(38.0)	(35.0)	33.0	18	10.8	29.5	15 000	23 400
*100BNR19X	100	140	20	25	4.0	12.0	2.2	1.1	0.6	(38.0)	(35.0)	33.0	18	10.8	29.5	17 500	27 500
*100BER19E	100	140	20	–	–	–	–	1.1	0.6	36.0	33.5	59.5	25	–	38.0	10 800	15 200
*100BER19H	100	140	20	–	4.0	12.0	2.2	1.1	0.6	(36.0)	(33.5)	40.0	25	–	38.0	13 400	20 900
*100BER19X	100	140	20	25	4.0	12.0	2.2	1.1	0.6	(36.0)	(33.5)	40.0	25	–	38.0	15 900	25 000
*100BNR29EV1V	100	140	24	–	–	–	–	1.1	0.6	38.0	35.0	50.5	18	10.8	31.5	12 500	–
*100BNR29HV1V	100	140	24	–	–	–	–	1.1	0.6	(38.0)	(35.0)	33.0	18	10.8	31.5	15 000	–
*100BNR29XV1V	100	140	24	–	–	–	–	1.1	0.6	(38.0)	(35.0)	33.0	18	10.8	31.5	17 500	–
*100BER29EV1V	100	140	24	–	–	–	–	1.1	0.6	36.0	33.5	59.5	25	–	40.0	10 800	–
*100BER29HV1V	100	140	24	–	–	–	–	1.1	0.6	(36.0)	(33.5)	40.0	25	–	40.0	13 400	–
*100BER29XV1V	100	140	24	–	–	–	–	1.1	0.6	(36.0)	(33.5)	40.0	25	–	40.0	15 900	–
*7020C	100	150	24	–	–	–	–	1.5	1	79.0	77.0	49.0	15	16.0	28.7	9 200	14 000
*7020CSN24	100	150	24	–	–	–	–	1.5	1	(79.0)	(77.0)	58.4	15	16.0	28.7	12 000	18 300
*7020A5	100	150	24	–	–	–	–	1.5	1	75.0	73.5	57.5	25	–	41.1	8 000	12 000
*7020A5SN24	100	150	24	–	–	–	–	1.5	1	(75.0)	(73.5)	68.3	25	–	41.1	10 400	15 600
*7020A	100	150	24	–	–	–	–	1.5	1	72.0	70.5	44.5	30	–	48.1	6 000	8 000
*100BNR10E	100	150	24	–	–	–	–	1.5	1	36.0	36.0	52.0	18	10.9	32.3	12 000	17 200
*100BNR10H	100	150	24	–	5.5	14.5	2.2	1.5	1	(36.0)	(36.0)	34.0	18	10.9	32.3	14 400	22 400
*100BNR10X	100	150	24	29	5.5	14.5	2.2	1.5	1	(36.0)	(36.0)	34.0	18	10.9	32.3	16 800	26 400
*100BER10E	100	150	24	–	–	–	–	1.5	1	34.5	34.5	61.0	25	–	41.2	10 400	14 600
*100BER10H	100	150	24	–	5.5	14.5	2.2	1.5	1	(34.5)	(34.5)	41.0	25	–	41.2	12 800	20 000
*100BER10X	100	150	24	29	5.5	14.5	2.2	1.5	1	(34.5)	(34.5)	41.0	25	–	41.2	15 200	24 000
*100BNR20EV1V	100	150	30	–	–	–	–	1.5	1	36.0	36.0	52.0	18	10.9	35.3	12 000	–
*100BNR20HV1V	100	150	30	–	–	–	–	1.5	1	(36.0)	(36.0)	34.0	18	10.9	35.3	14 400	–
*100BNR20XV1V	100	150	30	–	–	–	–	1.5	1	(36.0)	(36.0)	34.0	18	10.9	35.3	16 800	–
*100BER20EV1V	100	150	30	–	–	–	–	1.5	1	34.5	34.5	61.0	25	–	44.2	10 400	–
*100BER20HV1V	100	150	30	–	–	–	–	1.5	1	(34.5)	(34.5)	41.0	25	–	44.2	12 800	–
*100BER20XV1V	100	150	30	–	–	–	–	1.5	1	(34.5)	(34.5)	41.0	25	–	44.2	15 200	–
7220C	100	180	34	–	–	–	–	2.1	1.1	157	127	88.5	15	14.5	35.7	8 300	12 500
7220A5	100	180	34	–	–	–	–	2.1	1.1	149	121	103	25	–	49.6	7 200	10 800
7220A	100	180	34	–	–	–	–	2.1	1.1	144	117	79.5	30	–	57.4	5 400	7 200

Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
107	133	135	1	0.6	191	387	905	1 790	84	112	164	230	– 5	– 13	– 28	– 46	0.800
107	133	135	1	0.6	203	427	1 026	2 057	95	129	191	268	– 5	– 13	– 28	– 46	0.702
107	133	135	1	0.6	318	615	1 229	2 546	209	266	346	463	– 5	– 10	– 18	– 31	0.808
107	133	135	1	0.6	348	694	1 410	2 956	241	310	405	545	– 5	– 10	– 18	– 31	0.710
107	133	135	1	0.6	98	329	879	–	72	111	162	–	0	– 10	– 26	–	0.770
107	133	135	1	0.6	98	362	1 000	–	81	128	189	–	0	– 10	– 26	–	0.673
107	133	135	1	0.6	98	362	1 000	–	81	128	189	–	0	– 10	– 26	–	0.673
107	133	135	1	0.6	98	522	1 142	–	120	213	282	–	0	– 10	– 20	–	0.770
107	133	135	1	0.6	98	585	1 311	–	135	247	330	–	0	– 10	– 20	–	0.673
107	133	135	1	0.6	98	585	1 311	–	135	247	330	–	0	– 10	– 20	–	0.673
107	133	135	1	0.6	98	329	879	–	72	111	162	–	0	– 10	– 26	–	0.902
107	133	135	1	0.6	98	362	1 000	–	81	128	189	–	0	– 10	– 26	–	0.805
107	133	135	1	0.6	98	362	1 000	–	81	128	189	–	0	– 10	– 26	–	0.805
107	133	135	1	0.6	98	522	1 142	–	120	213	282	–	0	– 10	– 20	–	0.902
107	133	135	1	0.6	98	585	1 311	–	135	247	330	–	0	– 10	– 20	–	0.805
107	133	135	1	0.6	98	585	1 311	–	135	247	330	–	0	– 10	– 20	–	0.805
109	141	144	1.5	0.8	282	534	1 278	2 572	97	126	187	264	– 9	– 18	– 37	– 60	1.27
109	141	144	1.5	0.8	306	596	1 462	2 974	111	146	218	309	– 9	– 18	– 37	– 60	1.09
109	141	144	1.5	0.8	434	837	2 009	3 948	236	300	418	549	– 7	– 13	– 26	– 42	1.45
109	141	144	1.5	0.8	483	953	2 327	4 609	274	350	491	647	– 7	– 13	– 26	– 42	1.27
109	141	144	1.5	0.8	98	840	2 701	4 338	188	388	595	713	0	– 10	– 25	– 35	1.28
109	141	144	1.5	0.8	98	352	877	–	78	123	175	–	0	– 10	– 24	–	1.34
109	141	144	1.5	0.8	98	389	999	–	88	142	205	–	0	– 10	– 24	–	1.25
109	141	144	1.5	0.8	98	389	999	–	88	142	205	–	0	– 10	– 24	–	1.25
109	141	144	1.5	0.8	98	689	1 423	–	130	254	331	–	0	– 12	– 22	–	1.34
109	141	144	1.5	0.8	98	780	1 639	–	146	296	388	–	0	– 12	– 22	–	1.25
109	141	144	1.5	0.8	98	780	1 639	–	146	296	388	–	0	– 12	– 22	–	1.25
109	141	144	1.5	0.8	98	352	877	–	78	123	175	–	0	– 10	– 24	–	1.65
109	141	144	1.5	0.8	98	389	999	–	88	142	205	–	0	– 10	– 24	–	1.56
109	141	144	1.5	0.8	98	389	999	–	88	142	205	–	0	– 10	– 24	–	1.56
109	141	144	1.5	0.8	98	689	1 423	–	130	254	331	–	0	– 12	– 22	–	1.65
109	141	144	1.5	0.8	98	780	1 639	–	146	296	388	–	0	– 12	– 22	–	1.56
109	141	144	1.5	0.8	98	780	1 639	–	146	296	388	–	0	– 12	– 22	–	1.56
112	168	173	2	1	503	984	2 337	4 700	104	137	202	284	– 20	– 36	– 68	–107	3.18
112	168	173	2	1	776	1 574	3 500	7 110	252	327	442	588	– 14	– 25	– 45	– 73	3.16
112	168	173	2	1	361	1 664	5 052	7 687	253	430	646	758	– 5	– 20	– 45	– 60	3.21

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available. Series 20 and 29 are exclusively for sealed bearings.
(2) A bearing with C values at column indicate a bearing which Spinshot II are available, and a bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

Table B

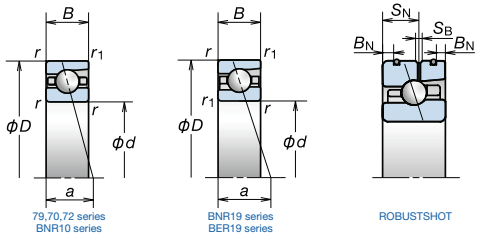
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

Bore Diameter 105mm



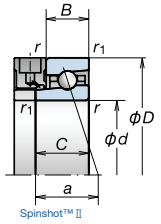
79,70,72 series
BNR10 series
BER10 series

BNR19 series
BER19 series

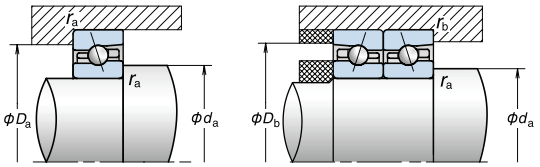
ROBUSTSHOT

Bearing Numbers (1)	Boundary Dimensions (2) (mm)									Basic Load Ratings (3) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min⁻¹)	
	d	D	B	C	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
7921C	**105**	**145**	**20**	–	–	–	–	1.1	0.6	53.5	57.0	34.5	15	16.6	26.7	9 200	14 000
7921CSN24	**105**	**145**	**20**	–	–	–	–	1.1	0.6	(53.5)	(57.0)	40.8	15	16.6	26.7	12 000	18 300
7921A5	**105**	**145**	**20**	–	–	–	–	1.1	0.6	50.5	54.0	41.0	25	–	39.2	8 000	12 000
7921A5SN24	**105**	**145**	**20**	–	–	–	–	1.1	0.6	(50.5)	(54.0)	48.7	25	–	39.2	10 400	15 600
105BNR19E	**105**	**145**	**20**	–	–	–	–	1.1	0.6	38.5	36.5	53.0	18	10.8	30.3	12 000	17 200
105BNR19H	**105**	**145**	**20**	–	–	–	–	1.1	0.6	(38.5)	(36.5)	39.0	18	10.8	30.3	14 400	22 400
105BNR19X	**105**	**145**	**20**	25	–	–	–	1.1	0.6	(38.5)	(36.5)	39.0	18	10.8	30.3	16 800	26 400
105BER19E	**105**	**145**	**20**	–	–	–	–	1.1	0.6	37.0	35.0	62.0	25	–	39.2	10 400	14 600
105BER19H	**105**	**145**	**20**	–	–	–	–	1.1	0.6	(37.0)	(35.0)	42.0	25	–	39.2	12 800	20 000
105BER19X	**105**	**145**	**20**	25	–	–	–	1.1	0.6	(37.0)	(35.0)	42.0	25	–	39.2	15 200	24 000
7021C	**105**	**160**	**26**	–	–	–	–	2	1	92.5	89.5	57.0	15	15.9	30.7	8 700	13 300
7021CSN24	**105**	**160**	**26**	–	–	–	–	2	1	(92.5)	(89.5)	68.1	15	15.9	30.7	11 400	17 300
7021A5	**105**	**160**	**26**	–	–	–	–	2	1	87.5	85.0	66.5	25	–	43.9	7 600	11 400
7021A5SN24	**105**	**160**	**26**	–	–	–	–	2	1	(87.5)	(85.0)	79.0	25	–	43.9	9 900	14 800
7021A	**105**	**160**	**26**	–	–	–	–	2	1	84.0	81.5	51.0	30	–	51.2	5 700	7 600
105BNR10E	**105**	**160**	**26**	–	–	–	–	2	1	41.0	41.0	59.5	18	10.9	34.5	11 400	16 200
105BNR10H	**105**	**160**	**26**	–	6.0	15.2	2.2	2	1	(41.0)	(41.0)	39.0	18	10.9	34.5	13 600	21 200
105BNR10X	**105**	**160**	**26**	31	6.0	15.2	2.2	2	1	(41.0)	(41.0)	39.0	18	10.9	34.5	15 900	25 000
105BER10E	**105**	**160**	**26**	–	–	–	–	2	1	39.0	39.5	70.0	25	–	43.9	9 800	13 800
105BER10H	**105**	**160**	**26**	–	6.0	15.2	2.2	2	1	(39.0)	(39.5)	47.5	25	–	43.9	12 100	18 900
105BER10X	**105**	**160**	**26**	31	6.0	15.2	2.2	2	1	(39.0)	(39.5)	47.5	25	–	43.9	14 400	22 700
7221C	**105**	**190**	**36**	–	–	–	–	2.1	1.1	171	143	97.5	15	14.5	37.7	7 800	11 900
7221A5	**105**	**190**	**36**	–	–	–	–	2.1	1.1	163	137	111	25	–	52.4	6 800	10 200
7221A	**105**	**190**	**36**	–	–	–	–	2.1	1.1	157	132	85.0	30	–	60.6	5 100	6 800

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available.
(2) A bearing with C values at column indicate a bearing which Spinshot Ⅱ are available, and a bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.



Spinshot™ Ⅱ



Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
112	138	140	1	0.6	194	396	890	1 791	86	116	167	235	– 5	– 13	– 27	– 45	0.831
112	138	140	1	0.6	206	437	1 009	2 058	98	133	193	274	– 5	– 13	– 27	– 45	0.729
112	138	140	1	0.6	272	565	1 361	2 760	203	265	369	491	– 4	– 9	– 19	– 32	0.820
112	138	140	1	0.6	296	636	1 565	3 208	234	308	432	577	– 4	– 9	– 19	– 32	0.718
112	138	140	1	0.6	98	336	906	–	74	115	168	–	0	– 10	– 26	–	0.795
112	138	140	1	0.6	98	370	1 032	–	83	133	196	–	0	– 10	– 26	–	0.693
112	138	140	1	0.6	98	370	1 032	–	83	133	196	–	0	– 10	– 26	–	0.693
112	138	140	1	0.6	98	536	1 180	–	124	220	293	–	0	– 10	– 20	–	0.795
112	138	140	1	0.6	98	602	1 355	–	139	256	343	–	0	– 10	– 20	–	0.693
112	138	140	1	0.6	98	602	1 355	–	139	256	343	–	0	– 10	– 20	–	0.693
115	150	154	2	1	330	625	1 494	2 973	103	134	197	276	– 11	– 21	– 42	– 67	1.58
115	150	154	2	1	362	703	1 715	3 446	118	155	230	324	– 11	– 21	– 42	– 67	1.34
115	150	154	2	1	493	989	2 211	4 473	247	318	431	572	– 8	– 15	– 28	– 46	1.82
115	150	154	2	1	553	1 131	2 564	5 228	287	372	507	674	– 8	– 15	– 28	– 46	1.58
115	150	154	2	1	98	840	2 693	4 318	188	388	591	707	0	– 10	– 25	– 35	1.60
115	150	154	2	1	98	424	1 034	–	80	135	190	–	0	– 12	– 27	–	1.70
115	150	154	2	1	98	471	1 182	–	89	156	222	–	0	– 12	– 27	–	1.59
115	150	154	2	1	98	471	1 182	–	89	156	222	–	0	– 12	– 27	–	1.59
115	150	154	2	1	98	911	1 815	–	133	286	369	–	0	– 15	– 26	–	1.70
115	150	154	2	1	98	1 039	2 100	–	149	335	434	–	0	– 15	– 26	–	1.59
115	150	154	2	1	98	1 039	2 100	–	149	335	434	–	0	– 15	– 26	–	1.59
117	178	183	2	1	540	1 077	2 651	5 311	108	144	216	304	– 21	– 38	– 73	–114	3.78
117	178	183	2	1	862	1 790	3 950	7 929	268	348	471	625	– 15	– 27	– 48	– 77	3.77
117	178	183	2	1	368	2 298	5 208	8 924	260	493	666	818	– 5	– 25	– 45	– 65	3.82

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

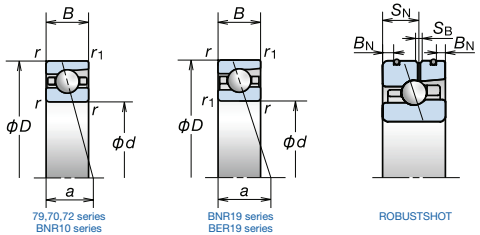
Table B

	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:
- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

Bore Diameter 110mm



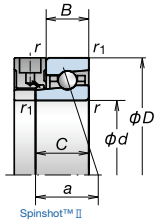
79,70,72 series
BNR10 series
BER10 series

BNR19 series
BER19 series

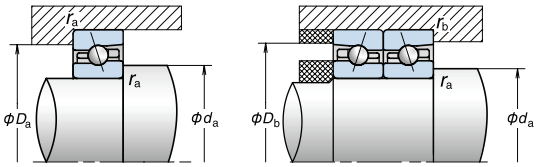
ROBUSTSHOT

Bearing Numbers (1)	Boundary Dimensions (2) (mm)									Basic Load Ratings (3) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min⁻¹)	
	d	D	B	C	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
7922C	110	150	20	—	—	—	—	1.1	0.6	54.5	59.5	35.5	15	16.7	27.4	8 900	13 500
7922CSN24	110	150	20	—	—	—	—	1.1	0.6	(54.5)	(59.5)	42.4	15	16.7	27.4	11 600	17 600
7922A5	110	150	20	—	—	—	—	1.1	0.6	51.5	56.0	43.0	25	—	40.3	7 700	11 600
7922A5SN24	110	150	20	—	—	—	—	1.1	0.6	(51.5)	(56.0)	50.7	25	—	40.3	10 000	15 000
*110BNR19E	110	150	20	—	—	—	—	1.1	0.6	39.0	38.0	55.5	18	10.9	31.1	11 600	16 500
*110BNR19H	110	150	20	—	4.0	12.0	2.2	1.1	0.6	(39.0)	(38.0)	42.0	18	10.9	31.1	13 900	21 600
*110BNR19X	110	150	20	25	4.0	12.0	2.2	1.1	0.6	(39.0)	(38.0)	42.0	18	10.9	31.1	16 200	25 400
*110BER19E	110	150	20	—	—	—	—	1.1	0.6	37.5	36.5	65.0	25	—	40.3	10 000	14 000
*110BER19H	110	150	20	—	4.0	12.0	2.2	1.1	0.6	(37.5)	(36.5)	44.0	25	—	40.3	12 400	19 300
*110BER19X	110	150	20	25	4.0	12.0	2.2	1.1	0.6	(37.5)	(36.5)	44.0	25	—	40.3	14 700	23 100
7022C	110	170	28	—	—	—	—	2	1	111	104	68.5	15	15.6	32.7	8 300	12 500
7022CSN24	110	170	28	—	—	—	—	2	1	(111)	(104)	81.0	15	15.6	32.7	10 800	16 300
7022A5	110	170	28	—	—	—	—	2	1	105	99.0	79.5	25	—	46.6	7 200	10 800
7022A5SN24	110	170	28	—	—	—	—	2	1	(105)	(99.0)	94.1	25	—	46.6	9 300	14 000
7022A	110	170	28	—	—	—	—	2	1	101	95.5	61.0	30	—	54.4	5 400	7 200
110BNR10E	110	170	28	—	—	—	—	2	1	46.0	47.0	68.0	18	10.9	36.7	10 800	15 300
110BNR10H	110	170	28	—	6.0	16.2	2.2	2	1	(46.0)	(47.0)	44.5	18	10.9	36.7	12 900	20 000
110BNR10X	110	170	28	33	6.0	16.2	2.2	2	1	(46.0)	(47.0)	44.5	18	10.9	36.7	15 000	23 600
110BER10E	110	170	28	—	—	—	—	2	1	44.0	45.0	79.5	25	—	46.7	9 300	13 000
110BER10H	110	170	28	—	6.0	16.2	2.2	2	1	(44.0)	(45.0)	54.0	25	—	46.7	11 500	17 900
110BER10X	110	170	28	33	6.0	16.2	2.2	2	1	(44.0)	(45.0)	54.0	25	—	46.7	13 600	21 500
7222C	110	200	38	—	—	—	—	2.1	1.1	185	160	108	15	14.5	39.8	7 500	11 300
7222A5	110	200	38	—	—	—	—	2.1	1.1	176	153	126	25	—	55.1	6 500	9 700
7222A	110	200	38	—	—	—	—	2.1	1.1	170	148	97.0	30	—	63.7	4 900	6 500

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available.
(2) A bearing with C values at column indicate a bearing which Spinshot Ⅱ are available, and a bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.



Spinshot™ Ⅱ



Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
117	143	145	1	0.6	196	405	916	1 849	89	120	173	243	− 5	− 13	− 27	− 45	0.867
117	143	145	1	0.6	209	447	1 039	2 126	101	138	200	284	− 5	− 13	− 27	− 45	0.761
117	143	145	1	0.6	332	651	1 502	2 985	224	286	393	519	− 5	− 10	− 20	− 33	0.877
117	143	145	1	0.6	365	735	1 731	3 474	258	333	461	610	− 5	− 10	− 20	− 33	0.771
117	143	145	1	0.6	98	405	933	—	76	126	174	—	0	− 12	− 26	—	0.838
117	143	145	1	0.6	98	450	1 064	—	85	146	204	—	0	− 12	− 26	—	0.733
117	143	145	1	0.6	98	450	1 064	—	85	146	204	—	0	− 12	− 26	—	0.733
117	143	145	1	0.6	98	550	1 218	—	127	228	304	—	0	− 10	− 20	—	0.838
117	143	145	1	0.6	98	619	1 400	—	142	266	356	—	0	− 10	− 20	—	0.733
117	143	145	1	0.6	98	619	1 400	—	142	266	356	—	0	− 10	− 20	—	0.733
120	160	164	2	1	371	733	1 752	3 516	104	137	203	285	− 13	− 25	− 49	− 78	1.97
120	160	164	2	1	409	829	2 018	4 085	120	160	237	334	− 13	− 25	− 49	− 78	1.65
120	160	164	2	1	604	1 194	2 657	5 250	258	330	447	588	− 10	− 18	− 33	− 53	1.97
120	160	164	2	1	682	1 371	3 090	6 146	300	387	527	694	− 10	− 18	− 33	− 53	1.65
120	160	164	2	1	98	1 325	3 331	5 949	183	443	620	774	0	− 15	− 30	− 45	1.97
120	160	164	2	1	98	539	1 154	—	82	150	201	—	0	− 15	− 29	—	2.13
120	160	164	2	1	98	605	1 323	—	91	174	235	—	0	− 15	− 29	—	2.00
120	160	164	2	1	98	605	1 323	—	91	174	235	—	0	− 15	− 29	—	2.00
120	160	164	2	1	98	932	1 860	—	136	294	379	—	0	− 15	− 26	—	2.13
120	160	164	2	1	98	1 065	2 153	—	153	344	445	—	0	− 15	− 26	—	2.00
120	160	164	2	1	98	1 065	2 153	—	153	344	445	—	0	− 15	− 26	—	2.00
122	188	193	2	1	632	1 281	2 962	5 901	117	156	228	320	− 24	− 43	− 78	−121	4.45
122	188	193	2	1	948	2 009	4 400	9 396	281	369	497	676	− 16	− 29	− 51	− 85	4.45
122	188	193	2	1	374	2 350	6 201	10 187	266	505	721	872	-5	− 25	− 50	− 70	4.49

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

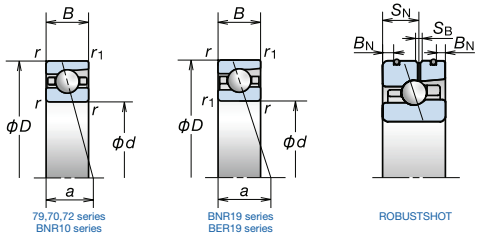
Table B

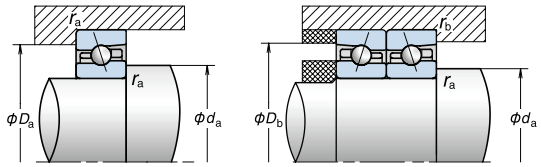
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:
- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

Bore Diameter 120 mm





Bearing Numbers (1)	Boundary Dimensions (2) (mm)								Basic Load Ratings (3) (kN)		Permissible Axial Load (4) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (5) (min^{-1})	
	d	D	B	B_N	S_N	S_B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
7924C	**120**	**165**	**22**	–	–	–	1.1	0.6	75.5	81.0	50.5	15	16.5	30.1	8 100	12 300
7924CSN24	**120**	**165**	**22**	–	–	–	1.1	0.6	(75.5)	(81.0)	59.8	15	16.5	30.1	10 600	16 000
7924A5	**120**	**165**	**22**	–	–	–	1.1	0.6	71.0	77.0	59.5	25	–	44.2	7 100	10 600
7924A5SN24	**120**	**165**	**22**	–	–	–	1.1	0.6	(71.0)	(77.0)	70.8	25	–	44.2	9 200	13 700
120BNR19S	**120**	**165**	**22**	–	–	–	1.1	0.6	54.0	52.0	75.0	18	10.8	34.2	9 900	14 100
120BNR19H	**120**	**165**	**22**	–	–	–	1.1	0.6	(54.0)	(52.0)	49.0	18	10.8	34.2	12 700	19 700
120BNR19X	**120**	**165**	**22**	–	–	–	1.1	0.6	(54.0)	(52.0)	49.0	18	10.8	34.2	14 800	23 200
120BER19S	**120**	**165**	**22**	–	–	–	1.1	0.6	51.5	50.0	88.0	25	–	44.2	8 500	12 000
120BER19H	**120**	**165**	**22**	–	–	–	1.1	0.6	(51.5)	(50.0)	59.5	25	–	44.2	11 300	17 600
120BER19X	**120**	**165**	**22**	–	–	–	1.1	0.6	(51.5)	(50.0)	59.5	25	–	44.2	13 400	21 100
7024C	**120**	**180**	**28**	–	–	–	2	1	118	117	75.5	15	15.8	34.1	7 700	11 700
7024CSN24	**120**	**180**	**28**	–	–	–	2	1	(118)	(117)	89.4	15	15.8	34.1	10 000	15 200
7024A5	**120**	**180**	**28**	–	–	–	2	1	111	111	87.5	25	–	49.0	6 700	10 000
7024A5SN24	**120**	**180**	**28**	–	–	–	2	1	(111)	(111)	104	25	–	49.0	8 700	13 000
7024A	**120**	**180**	**28**	–	–	–	2	1	107	107	67.5	30	–	57.3	5 000	6 700
***120BNR10E**	**120**	**180**	**28**	–	–	–	2	1	47.5	50.5	73.5	18	11.0	38.4	9 400	13 400
***120BNR10H**	**120**	**180**	**28**	6.0	16.2	2.2	2	1	(47.5)	(50.5)	48.0	18	11.0	38.4	12 000	18 700
***120BNR10X**	**120**	**180**	**28**	6.0	16.2	2.2	2	1	(47.5)	(50.5)	48.0	18	11.0	38.4	14 000	22 000
***120BER10E**	**120**	**180**	**28**	–	–	–	2	1	45.5	48.5	86.0	25	–	49.0	8 000	11 400
***120BER10H**	**120**	**180**	**28**	6.0	16.2	2.2	2	1	(45.5)	(48.5)	58.0	25	–	49.0	10 700	16 700
***120BER10X**	**120**	**180**	**28**	6.0	16.2	2.2	2	1	(45.5)	(48.5)	58.0	25	–	49.0	12 700	20 000
7224C	**120**	**215**	**40**	–	–	–	2.1	1.1	209	192	132	15	14.6	42.4	6 900	10 500
7224A5	**120**	**215**	**40**	–	–	–	2.1	1.1	199	184	150	25	–	59.1	6 000	9 000
7224A	**120**	**215**	**40**	–	–	–	2.1	1.1	192	177	116	30	–	68.3	4 500	6 000

Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
127	158	160	1	0.6	270	536	1 288	2 539	102	135	199	278	– 8	– 17	– 35	– 56	1.16
127	158	160	1	0.6	293	600	1 474	2 935	116	156	232	325	– 8	– 17	– 35	– 56	0.983
127	158	160	1	0.6	461	902	1 964	3 884	257	328	441	580	– 7	– 13	– 24	– 39	1.15
127	158	160	1	0.6	515	1 029	2 275	4 533	299	384	518	684	– 7	– 13	– 24	– 39	0.973
127	158	160	1	0.6	98	414	1 287	–	78	130	200	–	0	– 12	– 33	–	1.12
127	158	160	1	0.6	98	460	1 477	–	88	150	234	–	0	– 12	– 33	–	0.949
127	158	160	1	0.6	98	460	1 477	–	88	150	234	–	0	– 12	– 33	–	0.949
127	158	160	1	0.6	98	689	1 761	–	131	253	355	–	0	– 12	– 26	–	1.12
127	158	160	1	0.6	98	781	2 037	–	147	296	417	–	0	– 12	– 26	–	0.949
127	158	160	1	0.6	98	781	2 037	–	147	296	417	–	0	– 12	– 26	–	0.949
130	170	174	2	1	422	825	1 959	3 918	116	153	225	316	– 14	– 26	– 50	– 79	2.09
130	170	174	2	1	468	936	2 260	4 557	134	178	264	371	– 14	– 26	– 50	– 79	1.74
130	170	174	2	1	648	1 295	2 903	5 921	282	363	492	656	– 10	– 18	– 33	– 54	2.43
130	170	174	2	1	733	1 489	3 380	6 939	329	425	580	774	– 10	– 18	– 33	– 54	2.08
130	170	174	2	1	98	1 439	3 645	6 531	196	487	683	853	0	– 15	– 30	– 45	2.12
130	170	174	2	1	98	565	1 220	–	85	159	214	–	0	– 15	– 29	–	2.29
130	170	174	2	1	98	634	1 399	–	96	185	251	–	0	– 15	– 29	–	2.14
130	170	174	2	1	98	634	1 399	–	96	185	251	–	0	– 15	– 29	–	2.14
130	170	174	2	1	98	983	1 973	–	143	313	404	–	0	– 15	– 26	–	2.29
130	170	174	2	1	98	1 125	2 286	–	160	367	475	–	0	– 15	– 26	–	2.14
130	170	174	2	1	98	1 125	2 286	–	160	367	475	–	0	– 15	– 26	–	2.14
132	203	208	2	1	690	1 395	3 212	6371	127	170	246	343	– 19	– 38	– 73	–116	5.42
132	203	208	2	1	1 137	2 327	5 259	1 0296	318	412	562	736	– 15	– 28	– 52	– 83	5.42
132	203	208	2	1	542	2 817	8 158	1 1550	321	570	844	964	– 5	– 25	– 55	– 70	5.45

(1) The bearings denoted by an asterisk (*) indicates the bearings which sealed bearings are available.
(2) A bearing with BN,SN,SB values at column indicate a bearing which ROBUSTSHOT are available.
(3) Basic load rating values are reference values for ceramic ball bearings.
(4) For permissible axial load, please refer to Page 199.
(5) For application of limiting speeds, please refer to Page 216.

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

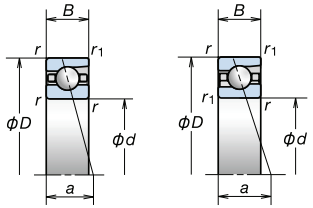
Table B

	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:
- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

Bore Diameter 130 mm

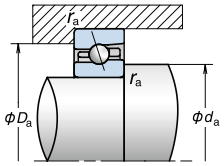


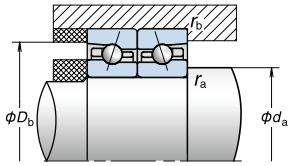
79,70,72 series
BNR10 series
BER10 series

BNR19 series
BER19 series

Bearing Numbers	Boundary Dimensions (mm)					Basic Load Ratings (1) (kN)		Permissible Axial Load (2) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (3) (min^{-1})	
	d	D	B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
7926C	**130**	**180**	**24**	1.5	1	82.5	91.0	55.0	15	16.5	32.8	7 500	11 300
7926CSN24	**130**	**180**	**24**	1.5	1	(82.5)	(91.0)	65.6	15	16.5	32.8	9 700	14 800
7926A5	**130**	**180**	**24**	1.5	1	78.0	86.0	63.5	25	—	48.1	6 500	9 700
7926A5SN24	**130**	**180**	**24**	1.5	1	(78.0)	(86.0)	75.6	25	—	48.1	8 400	12 600
130BNR19E	**130**	**180**	**24**	1.5	1	59.5	58.5	85.0	18	10.9	37.2	9 700	13 900
130BNR19H	**130**	**180**	**24**	1.5	1	(59.5)	(58.5)	56.0	18	10.9	37.2	11 700	18 100
130BER19E	**130**	**180**	**24**	1.5	1	57.0	56.5	100	25	—	48.1	8 400	11 800
130BER19H	**130**	**180**	**24**	1.5	1	(57.0)	(56.5)	67.5	25	—	48.1	10 400	16 200
7026C	**130**	**200**	**33**	2	1	136	137	86.0	15	15.9	38.6	7 000	10 700
7026CSN24	**130**	**200**	**33**	2	1	(136)	(137)	102	15	15.9	38.6	9 100	13 900
7026A5	**130**	**200**	**33**	2	1	128	130	99.5	25	—	55.0	6 100	9 100
7026A5SN24	**130**	**200**	**33**	2	1	(128)	(130)	118	25	—	55.0	7 900	11 900
7026A	**130**	**200**	**33**	2	1	123	125	76.5	30	—	64.1	4 600	6 100
130BNR10E	**130**	**200**	**33**	2	1	60.0	61.5	89.5	18	11.0	43.0	9 100	13 000
130BNR10H	**130**	**200**	**33**	2	1	(60.0)	(61.5)	58.5	18	11.0	43.0	11 000	17 000
130BER10E	**130**	**200**	**33**	2	1	57.5	59.0	105	25	—	55.0	7 900	11 100
130BER10H	**130**	**200**	**33**	2	1	(57.5)	(59.0)	70.5	25	—	55.0	9 700	15 200
7226C	**130**	**230**	**40**	3	1.1	217	209	144	15	14.9	44.1	6 400	9 800
7226A5	**130**	**230**	**40**	3	1.1	206	199	163	25	—	62.0	5 600	8 400
7226A	**130**	**230**	**40**	3	1.1	199	193	127	30	—	72.0	4 200	5 600

(1) Basic load rating values are reference values for ceramic ball bearings.
(2) For permissible axial load, please refer to Page 199.
(3) For application of limiting speeds, please refer to Page 216.





Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
139	171	174	1.5	0.8	327	652	1 466	2 943	111	148	213	301	− 10	− 20	− 38	− 61	1.50
139	171	174	1.5	0.8	358	734	1 682	3 410	128	172	249	352	− 10	− 20	− 38	− 61	1.29
139	171	174	1.5	0.8	470	1 008	2 126	4 280	264	348	462	612	− 7	− 14	− 25	− 41	1.54
139	171	174	1.5	0.8	525	1 153	2 465	5 001	307	408	543	722	− 7	− 14	− 25	− 41	1.33
139	171	174	1.5	0.8	98	718	1 420	—	80	162	212	—	0	− 20	− 35	—	1.48
139	171	174	1.5	0.8	98	813	1 635	—	89	189	248	—	0	− 20	− 35	—	1.27
139	171	174	1.5	0.8	98	982	1 899	—	134	293	372	—	0	− 16	− 27	—	1.48
139	171	174	1.5	0.8	98	1 123	2 199	—	150	343	437	—	0	− 16	− 27	—	1.27
140	190	194	2	1	493	970	2 252	4 518	126	167	244	343	− 16	− 29	− 54	− 85	3.22
140	190	194	2	1	551	1 105	2 605	5 265	146	195	285	403	− 16	− 29	− 54	− 85	2.77
140	190	194	2	1	821	1 535	3 407	6 842	316	396	537	710	− 12	− 20	− 36	− 58	3.66
140	190	194	2	1	935	1 772	3 974	8 025	369	466	632	839	− 12	− 20	− 36	− 58	3.21
140	190	194	2	1	98	1 494	4 721	7 942	202	508	772	943	0	− 15	− 35	− 50	3.26
140	190	194	2	1	98	739	1 522	—	82	168	223	—	0	− 20	− 36	—	3.41
140	190	194	2	1	98	837	1 754	—	92	196	261	—	0	− 20	− 36	—	3.19
140	190	194	2	1	98	1 013	1 964	—	137	304	386	—	0	− 16	− 27	—	3.41
140	190	194	2	1	98	1 159	2 276	—	154	356	454	—	0	− 16	− 27	—	3.19
144	216	223	2.5	1	749	1 506	3 386	6 740	136	182	261	364	− 20	− 39	− 73	−116	6.23
144	216	223	2.5	1	1 189	2 452	5 569	10 929	337	438	597	783	− 15	− 28	− 52	− 83	6.22
144	216	223	2.5	1	559	3 764	9 804	13 576	339	660	942	1 068	− 5	− 30	− 60	− 75	6.28

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

Table B

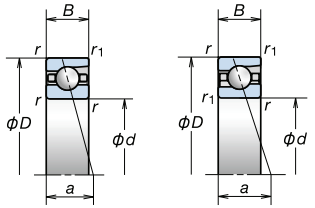
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

Bore Diameter **140-150** mm

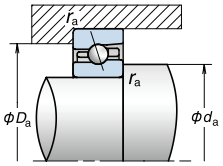


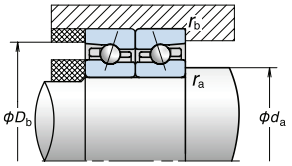
79,70,72 series
BNR10 series
BER10 series

BNR19 series
BER19 series

Bearing Numbers	Boundary Dimensions (mm)					Basic Load Ratings (1) (kN)		Permissible Axial Load (2) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (3) (min⁻¹)	
	d	D	B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
7928C	140	190	24	1.5	1	83.5	95.5	58.0	15	16.7	34.1	7 000	10 700
7928CSN24	140	190	24	1.5	1	(83.5)	(95.5)	69.1	15	16.7	34.1	9 100	13 900
7928A5	140	190	24	1.5	1	78.5	90.0	68.0	25	–	50.5	6 100	9 100
7928A5SN24	140	190	24	1.5	1	(78.5)	(90.0)	80.7	25	–	50.5	7 900	11 900
140BNR19E	140	190	24	1.5	1	60.0	61.5	89.5	18	11.0	38.8	9 100	13 000
140BNR19H	140	190	24	1.5	1	(60.0)	(61.5)	58.5	18	11.0	38.8	11 000	17 000
140BER19E	140	190	24	1.5	1	57.5	59.0	105	25	–	50.5	7 900	11 100
140BER19H	140	190	24	1.5	1	(57.5)	(59.0)	70.5	25	–	50.5	9 700	15 200
7028C	140	210	33	2	1	139	145	90.0	15	16.0	39.9	6 600	10 000
7028CSN24	140	210	33	2	1	(139)	(145)	107	15	16.0	39.9	8 600	13 100
7028A5	140	210	33	2	1	131	138	104	25	–	57.3	5 800	8 600
7028A5SN24	140	210	33	2	1	(131)	(138)	124	25	–	57.3	7 500	11 200
7028A	140	210	33	2	1	126	133	80.5	30	–	67.0	4 300	5 800
140BNR10E	140	210	33	2	1	62.5	66.5	97.0	18	11.0	44.9	8 600	12 300
140BNR10H	140	210	33	2	1	(62.5)	(66.5)	63.5	18	11.0	44.9	10 300	16 000
140BER10E	140	210	33	2	1	59.5	64.0	113	25	–	57.3	7 400	10 400
140BER10H	140	210	33	2	1	(59.5)	(64.0)	76.5	25	–	57.3	9 200	14 300
7228C	140	250	42	3	1.1	250	254	172	15	14.8	47.1	5 900	9 000
7228A5	140	250	42	3	1.1	238	242	194	25	–	66.5	5 200	7 700
7228A	140	250	42	3	1.1	229	234	150	30	–	77.3	3 900	5 200
7930C	150	210	28	2	1	107	122	74.0	15	16.6	38.1	6 400	9 800
7930CSN24	150	210	28	2	1	(107)	(122)	87.9	15	16.6	38.1	8 400	12 700
7930A5	150	210	28	2	1	101	115	84.5	25	–	56.0	5 600	8 400
7930A5SN24	150	210	28	2	1	(101)	(115)	103	25	–	56.0	7 300	10 900
150BNR19S	150	210	28	2	1	77.0	78.5	114	18	10.8	43.2	7 800	11 200
150BNR19H	150	210	28	2	1	(77.0)	(78.5)	75.0	18	10.8	43.2	10 000	15 600
150BER19S	150	210	28	2	1	73.5	75.5	134	25	–	55.9	6 700	9 500
150BER19H	150	210	28	2	1	(73.5)	(75.5)	90.5	25	–	55.9	8 900	13 900
7030C	150	225	35	2.1	1.1	158	168	105	15	16.0	42.6	6 200	9 400
7030CSN24	150	225	35	2.1	1.1	(158)	(168)	125	15	16.0	42.6	8 000	12 200
7030A5	150	225	35	2.1	1.1	150	160	123	25	–	61.2	5 400	8 000
7030A5SN24	150	225	35	2.1	1.1	(150)	(160)	146	25	–	61.2	7 000	10 400
7030A	150	225	35	2.1	1.1	144	154	95.0	30	–	71.6	4 000	5 400
150BNR10S	150	225	35	2.1	1.1	73.5	78.0	114	18	11.0	48.0	7 500	10 700
150BNR10H	150	225	35	2.1	1.1	(73.5)	(78.0)	74.5	18	11.0	48.0	9 600	15 000
150BER10S	150	225	35	2.1	1.1	70.0	75.0	99.5	25	–	61.2	6 400	9 100
150BER10H	150	225	35	2.1	1.1	(70.0)	(75.0)	90.0	25	–	61.2	8 600	13 400
7230C	150	270	45	3	1.1	284	305	205	15	14.7	50.6	5 500	8 400
7230A5	150	270	45	3	1.1	270	290	231	25	–	71.5	4 800	7 200
7230A	150	270	45	3	1.1	261	280	179	30	–	83.1	3 600	4 800

(1) Basic load rating values are reference values for ceramic ball bearings.
(2) For permissible axial load, please refer to Page 199.
(3) For application of limiting speeds, please refer to Page 216.





Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
149	181	184	1.5	0.8	334	632	1 459	2 967	115	150	217	308	− 10	− 19	− 37	− 60	1.63
149	181	184	1.5	0.8	366	711	1 673	3 438	132	174	254	361	− 10	− 19	− 37	− 60	1.41
149	181	184	1.5	0.8	482	950	2 200	4 436	273	349	480	636	− 7	− 13	− 25	− 41	1.63
149	181	184	1.5	0.8	539	1 086	2 552	5 185	317	409	564	749	− 7	− 13	− 25	− 41	1.41
149	181	184	1.5	0.8	98	739	1 522	–	82	168	223	–	0	− 20	− 36	–	1.57
149	181	184	1.5	0.8	98	837	1 754	–	92	196	261	–	0	− 20	− 36	–	1.35
149	181	184	1.5	0.8	98	1 013	1 964	–	137	304	386	–	0	− 16	− 27	–	1.57
149	181	184	1.5	0.8	98	1 159	2 276	–	154	356	454	–	0	− 16	− 27	–	1.35
150	200	204	2	1	503	998	2 332	4 785	131	174	254	361	− 11	− 24	− 49	− 81	3.41
150	200	204	2	1	543	1 113	2 662	5 527	150	201	296	422	− 11	− 24	− 49	− 81	2.94
150	200	204	2	1	787	1 516	3 444	6 817	320	406	554	729	− 9	− 17	− 33	− 54	3.87
150	200	204	2	1	873	1 721	3 979	7 947	371	474	651	859	− 9	− 17	− 33	− 54	3.40
150	200	204	2	1	196	1 782	5 273	8 717	262	557	829	1 006	0	− 15	− 35	− 50	3.44
150	200	204	2	1	196	766	1 642	–	114	186	250	–	0	− 15	− 31	–	3.65
150	200	204	2	1	196	848	1 865	–	128	215	292	–	0	− 15	− 31	–	3.42
150	200	204	2	1	196	1 075	2 257	–	190	340	445	–	0	− 13	− 25	–	3.65
150	200	204	2	1	196	1 208	2 589	–	213	396	521	–	0	− 13	− 25	–	3.42
154	236	243	2.5	1	910	1 832	4 081	8 296	150	200	286	404	− 24	− 45	− 82	−131	7.91
154	236	243	2.5	1	1 499	3 010	6 731	13 407	376	484	657	867	− 18	− 32	− 58	− 93	7.91
154	236	243	2.5	1	573	4 992	11 447	15 522	352	751	1 022	1 149	− 5	− 36	− 65	− 80	7.97
160	200	204	2	1	387	825	1 969	3 990	123	168	248	351	− 7	− 19	− 41	− 68	2.96
160	200	204	2	1	411	912	2 238	4 593	140	193	288	410	− 7	− 19	− 41	− 68	2.64
160	200	204	2	1	651	1 269	2 914	5 914	310	395	541	720	− 7	− 14	− 28	− 47	2.97
160	200	204	2	1	715	1 433	3 355	6 881	358	460	634	847	− 7	− 14	− 28	− 47	2.65
160	200	204	2	1	196	937	1 910	–	106	186	245	–	0	− 20	− 38	–	2.46
160	200	204	2	1	196	1 046	2 179	–	119	216	286	–	0	− 20	− 38	–	2.14
160	200	204	2	1	196	1 321	2 580	–	177	340	433	–	0	− 17	− 30	–	2.46
160	200	204	2	1	196	1 494	2 967	–	198	396	508	–	0	− 17	− 30	–	2.14
162	213	218	2	1	577	1 149	2 764	5 487	140	186	276	386	− 13	− 27	− 55	− 88	4.15
162	213	218	2	1	629	1 288	3 167	6 352	161	215	322	452	− 13	− 27	− 55	− 88	3.56
162	213	218	2	1	973	1 877	4 118	8 340	353	448	603	802	− 11	− 20	− 37	− 61	4.69
162	213	218	2	1	1089	2 142	4 771	9 741	410	524	709	945	− 11	− 20	− 37	− 61	4.10
162	213	218	2	1	196	1 828	5 852	11 679	268	574	877	1 145	0	− 15	− 37	− 60	4.19
162	213	218	2	1	196	916	1 908	–	115	200	266	–	0	− 18	− 35	–	4.41
162	213	218	2	1	196	1 021	2 177	–	129	232	310	–	0	− 18	− 35	–	4.13
162	213	218	2	1	196	1 262	2 624	–	192	363	473	–	0	− 15	− 28	–	4.41
162	213	218	2	1	196	1 425	3 019	–	215	423	554	–	0	− 15	− 28	–	4.13
164	256	263	2.5	1	1 093	2 203	4 952	9 979	165	220	316	444	− 28	− 51	− 92	−145	11.10
164	256	263	2.5	1	1 854	3 642	8 044	16 467	417	533	720	961	− 21	− 36	− 64	−104	11.10
164	256	263	2.5	1	587	5 000	11 917	16 154	366	772	1 063	1 194	− 5	− 35	− 65	− 80	11.20

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

Table B

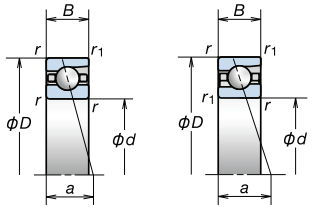
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

Bore Diameter **160-180** mm

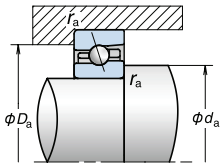


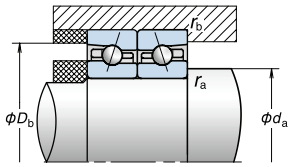
79,70,72 series
BNR10 series
BER10 series

BNR19 series
BER19 series

Bearing Numbers	Boundary Dimensions (mm)					Basic Load Ratings (1) (kN)		Permissible Axial Load (2) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (3) (min^{-1})	
	d	D	B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
7932C	160	220	28	2	1	112	133	80.0	15	16.7	39.4	5 600	8 700
7932CSN24	160	220	28	2	1	(112)	(133)	94.8	15	16.7	39.4	7 400	11 500
7932A5	160	220	28	2	1	105	125	93.5	25	–	58.3	4 800	7 400
7932A5SN24	160	220	28	2	1	(105)	(125)	111	25	–	58.3	6 400	9 800
160BNR19S	160	220	28	2	1	80.0	85.5	124	18	10.9	44.9	6 900	10 000
160BNR19H	160	220	28	2	1	(80.0)	(85.5)	81.5	18	10.9	44.9	9 000	14 300
160BER19S	160	220	28	2	1	76.5	82.0	146	25	–	58.3	5 800	8 500
160BER19H	160	220	28	2	1	(76.5)	(82.0)	98.5	25	–	58.3	7 900	12 700
7032C	160	240	38	2.1	1.1	180	193	118	15	16.0	45.8	5 300	8 300
7032CSN24	160	240	38	2.1	1.1	(180)	(193)	140	15	16.0	45.8	7 000	10 900
7032A5	160	240	38	2.1	1.1	170	183	138	25	–	65.6	4 500	7 000
7032A5SN24	160	240	38	2.1	1.1	(170)	(183)	168	25	–	65.6	6 000	9 300
7032A	160	240	38	2.1	1.1	163	176	106	30	–	76.7	3 300	4 500
160BNR10S	160	240	38	2.1	1.1	83.0	92.5	134	18	11.0	51.5	6 500	9 500
160BNR10H	160	240	38	2.1	1.1	(83.0)	(92.5)	88.0	18	11.0	51.5	8 500	13 500
160BER10S	160	240	38	2.1	1.1	79.5	88.5	158	25	–	65.6	5 500	8 000
160BER10H	160	240	38	2.1	1.1	(79.5)	(88.5)	106	25	–	65.6	7 500	12 000
7232A	160	290	48	3	1.1	263	305	195	30	–	89	3 400	4 500
7934C	170	230	28	2	1	118	148	88.5	15	16.8	40.8	5 300	8 300
7934CSN24	170	230	28	2	1	(118)	(148)	105	15	16.8	40.8	7 000	10 900
7934A5	170	230	28	2	1	112	140	103	25	–	60.6	4 500	7 000
7934A5SN24	170	230	28	2	1	(112)	(140)	124	25	–	60.6	6 000	9 300
170BNR19S	170	230	28	2	1	85.0	95.5	104	18	11.0	46.5	6 500	9 500
170BNR19H	170	230	28	2	1	(85.0)	(95.5)	91.0	18	11.0	46.5	8 500	13 500
170BER19S	170	230	28	2	1	81.0	91.5	163	25	–	60.6	5 500	8 000
170BER19H	170	230	28	2	1	(81.0)	(91.5)	110	25	–	60.6	7 500	12 000
7034C	170	260	42	2.1	1.1	215	234	149	15	15.9	49.8	4 900	7 700
7034A5	170	260	42	2.1	1.1	203	223	168	25	–	71.1	4 200	6 600
7034A	170	260	42	2.1	1.1	195	214	129	30	–	83.1	3 100	4 200
7234C	170	310	52	4	1.5	320	390	265	15	14.7	58.2	4 400	6 900
7234A	170	310	52	4	1.5	295	360	231	30	–	95.3	2 800	3 800
7936C	180	250	33	2	1	152	184	111	15	16.6	45.3	4 900	7 700
7936CSN24	180	250	33	2	1	(152)	(184)	132	15	16.6	45.3	6 600	10 200
7936A5	180	250	33	2	1	144	174	128	25	–	66.6	4 200	6 600
7936A5SN24	180	250	33	2	1	(144)	(174)	152	25	–	66.6	5 600	8 700
180BNR19S	180	250	33	2	1	110	119	173	18	10.9	51.4	6 100	8 900
180BNR19H	180	250	33	2	1	(110)	(119)	114	18	10.9	51.4	8 000	12 600
180BER19S	180	250	33	2	1	105	114	203	25	–	66.6	5 200	7 500
180BER19H	180	250	33	2	1	(105)	(114)	137	25	–	66.6	7 000	11 200
7036C	180	280	46	2.1	1.1	240	276	175	15	15.8	53.8	4 600	7 200
7036A5	180	280	46	2.1	1.1	227	262	195	25	–	76.6	4 000	6 100
7036A	180	280	46	2.1	1.1	218	252	151	30	–	89.4	2 900	4 000
7236A	180	320	52	4	1.5	305	385	246	30	–	98.2	2 600	3 600

(1) Basic load rating values are reference values for ceramic ball bearings.
(2) For permissible axial load, please refer to Page 199.
(3) For application of limiting speeds, please refer to Page 216.





Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
170	210	214	2	1	431	863	1 954	3 882	134	179	258	360	− 8	− 19	− 39	− 64	3.10
170	210	214	2	1	461	956	2 222	4 469	153	206	299	420	− 8	− 19	− 39	− 64	2.75
170	210	214	2	1	678	1 340	3 252	6 333	330	423	592	774	− 7	− 14	− 29	− 47	3.12
170	210	214	2	1	747	1 516	3 753	7 375	382	493	695	912	− 7	− 14	− 29	− 47	2.77
170	210	214	2	1	196	1 035	2 093	–	112	203	266	–	0	− 21	− 39	–	2.65
170	210	214	2	1	196	1 159	2 392	–	125	235	311	–	0	− 21	− 39	–	2.31
170	210	214	2	1	196	1 396	2 747	–	186	364	465	–	0	− 17	− 30	–	2.65
170	210	214	2	1	196	1 581	3 163	–	208	425	546	–	0	− 17	− 30	–	2.31
172	228	233	2	1	623	1 270	2 968	5 798	147	197	288	399	− 14	− 29	− 57	− 90	5.11
172	228	233	2	1	681	1 429	3 407	6 718	169	229	336	468	− 14	− 29	− 57	− 90	4.29
172	228	233	2	1	1 090	2 168	4 725	9 446	376	483	649	858	− 12	− 22	− 40	− 65	5.71
172	228	233	2	1	1 225	2 484	5 485	11 045	438	566	764	1 012	− 12	− 22	− 40	− 65	4.99
172	228	233	2	1	196	1 883	5 601	12 072	276	594	882	1 183	0	− 15	− 35	− 60	5.16
172	228	233	2	1	196	1 085	2 284	–	117	216	288	–	0	− 21	− 40	–	5.50
172	228	233	2	1	196	1 217	2 616	–	131	251	337	–	0	− 21	− 40	–	5.20
172	228	233	2	1	196	1 470	3 039	–	195	388	505	–	0	− 17	− 31	–	5.50
172	228	233	2	1	196	1 668	3 506	–	218	453	593	–	0	− 17	− 31	–	5.20
174	276	283	2.5	1	1 120	4 154	15 301	23 729	464	733	1 185	1 405	− 10	− 30	− 76	−102	14.1
180	220	224	2	1	486	968	2 186	4 334	150	200	287	400	− 9	− 20	− 40	− 65	3.36
180	220	224	2	1	524	1 079	2 492	4 998	172	231	334	468	− 9	− 20	− 40	− 65	2.97
180	220	224	2	1	812	1 564	3 553	7 173	377	478	653	867	− 8	− 15	− 29	− 48	3.36
180	220	224	2	1	902	1 777	4 106	8 365	437	558	767	1 021	− 8	− 15	− 29	− 48	2.97
180	220	224	2	1	196	1 166	2 346	–	120	226	297	–	0	− 22	− 40	–	2.86
180	220	224	2	1	196	1 311	2 689	–	134	263	346	–	0	− 22	− 40	–	2.47
180	220	224	2	1	196	1 507	3 126	–	199	400	521	–	0	− 17	− 31	–	2.86
180	220	224	2	1	196	1 712	3 609	–	223	468	612	–	0	− 17	− 31	–	2.47
182	248	253	2	1	777	1 572	3 598	7 104	160	214	309	431	− 18	− 35	− 66	−104	6.88
182	248	253	2	1	1 292	2 555	5 927	11 666	401	514	708	930	− 14	− 25	− 47	− 75	7.83
182	248	253	2	1	196	2 697	6 086	12 116	278	678	910	1 181	0	− 20	− 37	− 60	6.94
188	292	301	3	1.5	1 493	3 005	6 205	12 460	192	256	354	496	− 36	− 63	−105	−164	19.4
188	292	301	3	1.5	1 394	6 746	17 921	28 082	512	890	1 278	1 522	− 12	− 42	− 83	−112	17.3
190	240	244	2	1	591	1 138	2 659	5 370	158	206	301	423	− 12	− 24	− 48	− 78	4.90
190	240	244	2	1	645	1 276	3 047	6 217	181	239	351	496	− 12	− 24	− 48	− 78	4.33
190	240	244	2	1	990	2 017	4 440	8 876	397	514	694	917	− 10	− 19	− 35	− 57	4.94
190	240	244	2	1	1 108	2 307	5 150	10 373	461	602	816	1 081	− 10	− 19	− 35	− 57	4.37
190	240	244	2	1	196	1 427	2 958	–	118	239	317	–	0	− 27	− 49	–	4.17
190	240	244	2	1	196	1 617	3 408	–	132	278	371	–	0	− 27	− 49	–	3.60
190	240	244	2	1	196	1 887	3 847	–	196	426	551	–	0	− 21	− 37	–	4.17
190	240	244	2	1	196	2 156	4 456	–	220	498	648	–	0	− 21	− 37	–	3.60
192	268	273	2	1	938	1 880	4 201	8 277	179	239	342	475	− 21	− 39	− 71	−111	10.4
192	268	273	2	1	1 580	3 130	6 880	13 679	451	579	781	1 030	− 16	− 28	− 50	− 80	10.4
192	268	273	2	1	196	3 618	7 232	14 216	292	788	1 013	1 309	0	− 24	− 40	− 64	9.27
198	302	311	3	1.5	1 458	7 364	18 983	29 769	541	955	1 357	1 616	− 12	− 43	− 83	−112	18.1

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
18°	4.5			
25°	2.0			
30°	1.4			

Table B

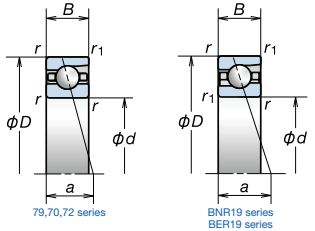
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

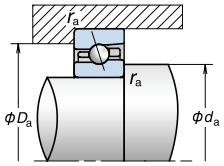
1. Angular Contact Ball Bearings

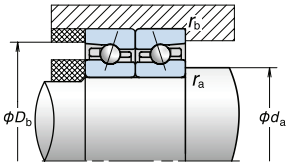
Bore Diameter **190-260** mm



79,70,72 series

BNR19 series
BER19 series





Bearing Numbers	Boundary Dimensions (mm)					Basic Load Ratings (1) (kN)		Permissible Axial Load (2) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm) a	Limiting Speeds (3) (min⁻¹)	
	d	D	B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)					Grease	Oil
7938C	**190**	**260**	**33**	2	1	155	192	115	15	16.7	46.6	4 700	7 400
7938CSN24	**190**	**260**	**33**	2	1	(155)	(192)	137	15	16.7	46.6	6 300	9 700
7938A5	**190**	**260**	**33**	2	1	146	182	131	25	–	69.0	4 000	6 300
7938A5SN24	**190**	**260**	**33**	2	1	(146)	(182)	158	25	–	69.0	5 400	8 300
190BNR19S	**190**	**260**	**33**	2	1	111	124	181	18	10.9	53.1	5 800	8 500
190BNR19H	**190**	**260**	**33**	2	1	(111)	(124)	119	18	10.9	53.1	7 600	12 000
190BER19S	**190**	**260**	**33**	2	1	106	119	212	25	–	69.0	4 900	7 200
190BER19H	**190**	**260**	**33**	2	1	(106)	(119)	143	25	–	69.0	6 700	10 700
7038C	**190**	**290**	**46**	2.1	1.1	259	305	192	15	15.9	55.2	4 400	6 900
7038A5	**190**	**290**	**46**	2.1	1.1	245	291	222	25	–	79.0	3 800	5 900
7038A	**190**	**290**	**46**	2.1	1.1	235	280	172	30	–	92.3	2 800	3 800
7238C	**190**	**340**	**55**	4	1.5	345	450	293	15	15.2	63.0	4 000	6 300
7238A	**190**	**340**	**55**	4	1.5	315	410	261	30	–	104.0	2 500	3 400
7940C	**200**	**280**	**38**	2.1	1.1	199	244	144	15	16.5	51.2	4 400	6 900
7940CSN24	**200**	**280**	**38**	2.1	1.1	(199)	(244)	171	15	16.5	51.2	5 900	9 100
7940A5	**200**	**280**	**38**	2.1	1.1	187	231	170	25	–	75.0	3 800	5 900
7940A5SN24	**200**	**280**	**38**	2.1	1.1	(187)	(231)	202	25	–	75.0	5 000	7 800
200BNR19S	**200**	**280**	**38**	2.1	1.1	142	157	229	18	10.8	58.0	5 500	8 000
200BNR19H	**200**	**280**	**38**	2.1	1.1	(142)	(157)	150	18	10.8	58.0	7 100	11 300
200BER19S	**200**	**280**	**38**	2.1	1.1	136	151	269	25	–	75.0	4 600	6 700
200BER19H	**200**	**280**	**38**	2.1	1.1	(136)	(151)	181	25	–	75.0	6 300	10 000
7040C	**200**	**310**	**51**	2.1	1.1	278	340	213	15	15.9	59.7	4 200	6 500
7040A5	**200**	**310**	**51**	2.1	1.1	263	325	245	25	–	85.0	3 600	5 500
7040A	**200**	**310**	**51**	2.1	1.1	252	310	190	30	–	99.1	2 600	3 600
7240C	**200**	**360**	**58**	4	1.5	370	490	320	15	15.1	66.5	3 800	5 900
7240A	**200**	**360**	**58**	4	1.5	335	450	281	30	–	109.8	2 400	3 300
7944C	**220**	**300**	**38**	2.1	1.1	200	256	150	15	16.7	53.8	4 100	6 400
7944CSN24	**220**	**300**	**38**	2.1	1.1	(200)	(256)	178	15	16.7	53.8	5 400	8 400
7944A5	**220**	**300**	**38**	2.1	1.1	188	242	176	25	–	79.6	3 500	5 400
7944A5SN24	**220**	**300**	**38**	2.1	1.1	(188)	(242)	117	25	–	79.6	4 700	7 200
7044C	**220**	**340**	**56**	3	1.1	310	430	266	15	15.9	65.5	3 800	5 900
7044A	**220**	**340**	**56**	3	1.1	283	395	235	30	–	108.8	2 400	3 300
7244A	**220**	**400**	**65**	4	1.5	410	585	385	30	–	122.0	2 100	3 000
7948C	**240**	**320**	**38**	2.1	1.1	210	286	166	15	16.8	56.5	3 800	5 900
7948CSN24	**240**	**320**	**38**	2.1	1.1	(210)	(286)	197	15	16.8	56.5	5 000	7 800
7948A5	**240**	**320**	**38**	2.1	1.1	198	270	195	25	–	84.3	3 300	5 000
7948A5SN24	**240**	**320**	**38**	2.1	1.1	(198)	(270)	231	25	–	84.3	4 300	6 700
7048C	**240**	**360**	**56**	3	1.1	330	475	292	15	15.9	68.2	3 500	5 500
7048A	**240**	**360**	**56**	3	1.1	300	430	265	30	–	114.6	2 200	3 000
7952C	**260**	**360**	**46**	2.1	1.1	268	365	350	15	16.6	64.5	3 400	5 400
7952A5	**260**	**360**	**46**	2.1	1.1	253	345	255	25	–	95.3	3 000	4 600
7052A5	**260**	**400**	**65**	4	1.5	360	545	420	25	–	109.4	2 800	4 300
7052A	**260**	**400**	**65**	4	1.5	345	525	325	30	–	127.8	2 000	2 800
7252A	**260**	**480**	**80**	5	2	480	750	475	30	–	146.8	1 800	2 500

(1) Basic load rating values are reference values for ceramic ball bearings.
(2) For permissible axial load, please refer to Page 199.
(3) For application of limiting speeds, please refer to Page 216.

Bearing Numbers	Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
	d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
	200	250	254	2	1	602	1 219	2 815	5 649	163	217	315	442	− 12	− 25	− 49	− 79	4.98
	200	250	254	2	1	657	1 370	3 228	6 543	187	252	368	518	− 12	− 25	− 49	− 79	4.38
	200	250	254	2	1	1 013	2 075	4 582	9 175	410	531	718	950	− 10	− 19	− 35	− 57	5.12
	200	250	254	2	1	1 136	2 375	5 318	10 726	476	622	845	1 120	− 10	− 19	− 35	− 57	4.52
	200	250	254	2	1	196	1 466	3 049	–	120	247	328	–	0	− 27	− 49	–	4.38
	200	250	254	2	1	196	1 661	3 512	–	135	288	384	–	0	− 27	− 49	–	3.78
	200	250	254	2	1	196	2 052	4 112	–	201	449	578	–	0	− 22	− 38	–	4.38
	200	250	254	2	1	196	2 349	4 768	–	226	526	679	–	0	− 22	− 38	–	3.78
	202	278	283	2	1	1 042	2 087	4 682	9 306	189	251	360	502	− 23	− 42	− 76	−119	11.2
	202	278	283	2	1	1 723	3 640	7 610	15 239	472	619	820	1 084	− 17	− 31	− 53	− 85	11.2
	202	278	283	2	1	196	3 890	8 161	16 183	287	819	1 073	1 390	0	− 25	− 43	− 69	11.3
	208	322	331	3	1.5	1 680	3 382	6 984	14 023	216	288	398	558	− 37	− 64	−106	−165	22.2
	208	322	331	3	1.5	1 520	7 758	20 405	31 456	570	1 009	1 445	1 710	− 12	− 43	− 84	−112	22.4
	212	268	273	2	1	784	1 584	3 592	7 168	183	244	351	492	− 16	− 31	− 58	− 92	5.95
	212	268	273	2	1	867	1 794	4 138	8 330	211	284	411	577	− 16	− 31	− 58	− 92	5.07
	212	268	273	2	1	1 256	2 554	5 855	11 667	451	584	800	1 056	− 12	− 22	− 41	− 66	5.95
	212	268	273	2	1	1 418	2 938	6 817	13 669	526	685	942	1 247	− 12	− 22	− 41	− 66	5.07
	212	268	273	2	1	196	1 888	3 887	–	123	275	364	–	0	− 33	− 58	–	5.95
	212	268	273	2	1	196	2 156	4 499	–	138	321	427	–	0	− 33	− 58	–	5.07
	212	268	273	2	1	196	2 581	5 136	–	206	496	636	–	0	− 26	− 44	–	5.95
	212	268	273	2	1	196	2 970	5 974	–	230	582	749	–	0	− 26	− 44	–	5.07
	212	298	303	2	1	1 153	2 310	5 202	10 293	198	264	379	527	− 25	− 45	− 81	−126	13.6
	212	298	303	2	1	1 876	3 710	8 392	16 917	493	632	861	1 141	− 18	− 31	− 56	− 90	13.7
	212	298	303	2	1	196	5 065	13 451	26 693	302	913	1 310	1 711	0	− 30	− 60	− 95	13.7
	218	342	351	3	1.5	1 811	3 665	7 583	15 074	219	292	404	564	− 40	− 69	−114	−176	26.3
	218	342	351	3	1.5	1 641	8 371	22 145	34 607	577	1 023	1 467	1 746	− 13	− 46	− 90	−121	26.5
	232	288	293	2	1	848	1 690	3 793	7 530	193	256	367	513	− 17	− 32	− 59	− 93	7.50
	232	288	293	2	1	941	1 918	4 374	8 755	222	297	430	603	− 17	− 32	− 59	− 93	6.58
	232	288	293	2	1	1 288	2 631	6 047	12 067	465	604	828	1 094	− 12	− 22	− 41	− 66	7.50
	232	288	293	2	1	1 456	3 028	7 044	14 142	544	709	976	1 292	− 12	− 22	− 41	− 66	6.58
	234	326	333	2.5	1	1 443	2 907	6 509	13 026	228	304	435	609	− 29	− 51	− 90	−140	18.5
	234	326	333	2.5	1	1 402	7 065	18 373	29 052	618	1 091	1 555	1 858	− 10	− 36	− 70	− 95	18.5
	238	382	391	3	1.5	2 187	11 037	28 837	44 290	661	1 167	1 666	1 967	–	–	–	–	36.5
	252	308	313	2	1	902	1 822	4 129	8 237	210	280	403	565	− 17	− 32	− 59	− 93	8.30
	252	308	313	2	1	1 004	2 072	4 769	9 589	243	326	473	664	− 17	− 32	− 59	− 93	7.29
	252	308	313	2	1	1 385	2 860	6 622	13 265	511	664	913	1 208	− 12	− 22	− 41	− 66	8.30
	252	308	313	2	1	1 569	3 296	7 721	15 556	596	780	1 076	1 426	− 12	− 22	− 41	− 66	7.29
	254	346	353	2.5	1	1 699	3 337	7 134	14 212	244	324	455	636	− 33	− 56	−95	−147	19.3
	254	346	353	2.5	1	1 584	7 755	20 305	31 460	653	1 141	1 631	1 934	− 11	− 38	− 74	− 99	19.3
	272	348	353	2	1	1 187	2 376	5 327	10 728	215	285	409	575	− 24	− 43	− 77	−121	14.3
	272	348	353	2	1	1 901	3 888	8 783	17 498	531	688	937	1 237	− 17	− 30	− 54	− 86	14.3
	278	382	391	3	1.5	3 144	6 469	12 677	25 109	640	832	1 073	1 409	–	–	–	–	28.7
	278	382	391	3	1.5	1 834	9 135	24 886	38 387	693	1 217	1 765	2 089	–	–	–	–	28.7
	282	458	470	4	2	2 688	13 626	35 981	56 494	739	1 305	1 870	2 228	–	–	–	–	65.3

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6,5	6,0	5,0	4,5
18°	4.5			
25°	2.0			
30°	1.4			

Table B

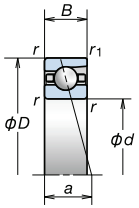
	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257

1. Angular Contact Ball Bearings

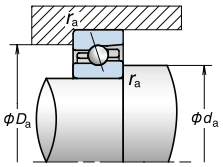
Bore Diameter **280-420** mm

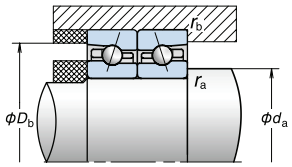


79,70,72 series

Bearing Numbers	Boundary Dimensions (mm)					Basic Load Ratings (kN)		Permissible Axial Load (1) (kN)	Contact angle (Degree)	Factor f_o	Effective Load Center (mm)	Limiting Speeds (2) (min⁻¹)	
	d	D	B	r (min.)	r_1 (min.)	C_r (Dynamic)	C_{or} (Static)				a	Grease	Oil
7956C	**280**	**380**	**46**	2.1	1.1	272	410	390	15	16.7	67.2	3 200	5 000
7956A5	**280**	**380**	**46**	2.1	1.1	256	390	286	25	–	99.9	2 800	4 300
7056A	**280**	**420**	**65**	4	1.5	345	530	325	30	–	133.5	1 900	2 600
7960C	**300**	**420**	**56**	3	1.1	345	550	530	15	16.4	76.2	3 000	4 600
7960A5	**300**	**420**	**56**	3	1.1	325	520	395	25	–	111.9	2 500	3 900
7960A	**300**	**420**	**56**	3	1.1	315	500	300	30	–	131.9	1 900	2 500
7060C	**300**	**460**	**74**	4	1.5	425	660	415	15	15.9	87.9	2 800	4 400
7060A	**300**	**460**	**74**	4	1.5	385	605	365	30	–	146.7	1 800	2 400
7964C	**320**	**440**	**56**	3	1.5	350	575	350	15	16.6	78.9	2 800	4 400
7964A5	**320**	**440**	**56**	3	1.5	330	545	405	25	–	116.6	2 400	3 700
7964A	**320**	**440**	**56**	3	1.5	315	525	310	30	–	137.7	1 800	2 400
7064A	**320**	**480**	**74**	4	1.5	465	795	500	30	–	152.5	1 700	2 300
7264A	**320**	**580**	**92**	5	2	665	1 120	655	30	–	175.9	1 500	2 000
7968C	**340**	**460**	**56**	3	1.1	365	625	375	15	16.7	81.6	2 700	4 200
7968A5	**340**	**460**	**56**	3	1.1	340	590	435	25	–	121.3	2 300	3 500
7968A	**340**	**460**	**56**	3	1.1	330	565	335	30	–	143.5	1 700	2 300
7068A	**340**	**520**	**82**	5	2	520	905	560	30	–	165.1	1 600	2 100
7268A	**340**	**620**	**92**	6	3	675	1 260	780	30	–	184.6	1 400	1 900
7972A5	**360**	**480**	**56**	3	1.1	345	615	450	25	–	125.9	2 200	3 400
7072A5	**360**	**540**	**82**	5	2	555	995	750	25	–	145.9	2 000	3 200
7072A	**360**	**540**	**82**	5	2	530	960	575	30	–	170.9	1 500	2 000
7976A	**380**	**520**	**56**	4	1.5	390	725	430	30	–	157.9	1 500	2 000
7980A	**400**	**540**	**65**	4	1.5	395	750	445	30	–	168.2	1 400	2 000
7080A	**400**	**600**	**90**	5	2	555	1 010	612	30	–	189.3	1 300	1 800
7984C	**420**	**560**	**65**	4	1.5	450	890	525	15	16.9	98.1	2 200	3 400
7984A	**420**	**560**	**65**	4	1.5	410	805	475	30	–	174.0	1 400	1 900
7084A	**420**	**620**	**90**	5	2	610	1 190	725	30	–	195.1	1 300	1 800

(1) For permissible axial load, please refer to Page 199.
(2) For application of limiting speeds, please refer to Page 216.





Abutment and Fillet Dimensions (mm)					Preload (DB and DF Arrangement) (N)				Axial Rigidity (DB and DF Arrangement) (N/μm)				Measured Axial Clearance. (μm)				Mass (kg) (approx.)
d_a (min.)	D_a (max.)	D_b (max.)	r_a (max.)	r_b (max.)	EL	L	M	H	EL	L	M	H	EL	L	M	H	
292	368	373	2	1	1 334	2 668	5 977	12 032	241	321	459	645	–	–	–	–	15.0
292	368	373	2	1	2 147	4 379	9 870	18 954	589	766	1 046	1 372	–	–	–	–	15.0
298	402	411	3	1.5	1 834	9 136	19 408	38 390	693	1 217	1 603	2 089	–	–	–	–	31.2
314	406	413	2.5	1	1 931	3 880	7 832	15 388	278	371	507	703	–	–	–	–	24.4
314	406	413	2.5	1	2 821	5 674	12 747	25 563	669	859	1 164	1 538	–	–	–	–	24.4
314	406	413	2.5	1	1 670	8 238	16 993	35 209	721	1 262	1 646	2 178	–	–	–	–	24.4
318	442	451	3	1.5	2 320	4 610	9 591	19 107	262	348	482	673	–	–	–	–	44.9
318	442	451	3	1.5	2 039	10 839	21 816	44 468	685	1 231	1 593	2 096	–	–	–	–	44.9
334	426	431	2.5	1.5	1 863	3 839	8 134	16 349	280	377	527	739	–	–	–	–	25.7
334	426	431	2.5	1.5	3 281	6 117	12 940	24 591	717	899	1 194	1 543	–	–	–	–	25.9
334	426	431	2.5	1.5	1 735	8 555	17 647	36 566	749	1 310	1 709	2 262	–	–	–	–	25.9
338	462	471	3	1.5	2 832	14 291	37 339	57 347	856	1 511	2 157	2 547	–	–	–	–	47.2
342	558	570	4	2	3 839	20 397	53 741	83 944	893	1 604	2 298	2 733	–	–	–	–	110
354	446	453	2.5	1	2 002	4 123	8 736	17 561	301	405	566	793	–	–	–	–	27.2
354	446	453	2.5	1	3 147	5 631	13 580	26 414	739	912	1 271	1 657	–	–	–	–	27.2
354	446	453	2.5	1	1 863	9 190	18 955	39 276	804	1 407	1 836	2 429	–	–	–	–	27.2
362	498	510	4	2	3 163	16 035	42 344	66 484	869	1 536	2 201	2 622	–	–	–	–	60.5
368	592	606	5	2.5	4 293	22 810	61 387	95 407	998	1 793	2 590	3 075	–	–	–	–	128
374	466	473	2.5	1	3 256	6 797	14 379	27 326	765	999	1 326	1 714	–	–	–	–	27.9
382	518	530	4	2	5 851	11 710	23 743	46 950	851	1 095	1 431	1 878	–	–	–	–	62.4
382	518	530	4	2	3 321	15 254	43 314	68 443	913	1 556	2 288	2 732	–	–	–	–	62.4
398	502	511	3	1.5	2 419	12 046	25 063	50 619	914	1 605	2 101	2 754	–	–	–	–	39.8
418	522	531	3	1.5	2 502	12 461	25 928	52 366	946	1 661	2 174	2 850	–	–	–	–	42.1
422	578	590	4	2	3 649	18 229	36 022	74 336	883	1 553	1 995	2 637	–	–	–	–	85.9
438	542	551	3	1.5	1 102	2 153	12 382	24 643	262	337	707	987	–	–	–	–	44.0
438	542	551	3	1.5	2 669	10 733	27 658	55 859	1 009	1 640	2 319	3 040	–	–	–	–	44.0
442	598	610	4	2	4 003	21 269	42 028	86 731	1 008	1 812	2 328	3 077	–	–	–	–	90.3

Calculation of radial rigidity
Multiply axial rigidity by factors in table A.

Calculation of preload and axial rigidity for combination bearings
Multiply by factors in table B.
For radial rigidity, multiply the value obtained in table A with factors in table B.

Table A

	EL	L	M	H
15°	6.5	6.0	5.0	4.5
25°	2.0			
30°	1.4			

Table B

	DBD	DBB
Preload factor	1.36	2
Axial rigidity	1.48	2
Radial rigidity	1.54	2

For additional information:

- Dynamic equivalent load ····· P191
- Static equivalent load ····· P198
- Spacer Dimensions and Nozzle Position ·· P237
- Recommended Grease Quantities ·· P257