

About National Engineering Industries Ltd. (NBC Bearings)

A symbol of dependability and flexible engineering solutions, NB Bearings is the brand of National Engineering Industries. Founded in 1946, National Engineering Industries Ltd (NEI) is India's leading bearings manufacturer and exporter, renowned for excellence in quality and delivery. In 2021, NBC bearings completed 75 years of its incorporation.

Headquartered in Jaipur, Having started with 30,000 bearings in 19 sizes in 1946, NBC has evolved to manufacture over 250 million bearings each year offering in 3100+ variants to serve a host of customers in India and over 30 other countries across five continents in automotive, railways and industrial segments. NBC also serves the Indian aftermarket through a countrywide network of 550+ authorized stockists and thousands of retailers.

Award & Recognitions :

NBC has been the recipient of several award and accolades for its quality consciousness and manufacturing prowess. Most prominent being the coveted Deming Grand Prize which is the highest honour in quality awarded to a company for excellence in Total Quality Management (TQM). NBC bearings is the only bearing manufacturer to win both - The Deming Application Award and The Deming Grand Prize Award.

The award is given by the Japanese Union of Scientists and Engineers (JUSE) to companies for demonstrating practicing TQM in the areas of production, customer service, safety, human resource, corporate social responsibility, environment, etc. NBC stands committed to an endless journey of continuous improvement through TQM.

Needle Roller Bearings



Needle Roller Bearing

17.1 Classification & Characteristics of Needle Bearing

Needle roller bearings are generally composed of needle rollers and cages. Several needle rollers placed between two hardened and smooth surfaces and cage prevent the needle rollers to contact each other to accommodate smooth rolling action. The diameter of rolling element in Needle roller bearing is relatively small and having relatively large length/diameter ratio, this allows for more load carrying capacity and ideal for oscillation motion.

In comparison to other roller bearings, needle roller bearings are having small radial section height and smaller mass, which allows for more compact design and suitable for application where low inertia force is required.

There are different types of Needle roller bearings depending upon customer applications requirements

1. Needle roller and cage assembly

A needle roller and cage assembly comprises of needle rollers and a cage that guides and hold the rollers on its position to accommodate smooth rolling action. As needle roller and cage, assembly has no inner and outer ring, uses shaft and housing as raceway surface. Needle roller and cage assembly demands a hardened and ground surface on the shaft and housing races, reduces the cross-sectional thickness. The assembly can be made in both single-row and double-row.



2. Needle roller and cage assembly for connecting rod bearings

A Needle roller and cage assembly for connecting rod bearings comprises of needle rollers and a cage that guides and hold the rollers on its position.

A connected rod bearing operated under extreme loading and operating conditions required a high rigidity bearing which is light-weight and have high load rating.

a) Needle roller and cage assembly for connecting rod large end

This product is design to withstand the crank motion involving the simultaneous rotation and revolution on the large end side of the connecting rod. The cage is made of special steel and heat treated. Cage is designed for outer diameter guided system so outer diameter is precision finished to avoid unwanted temperature rise during high speed and heavy shock loads.

Along with this, the cage can be surface treated using different non-ferrous metal to avoid friction due to poor lubrication.



b) Needle roller and cage assembly for small end

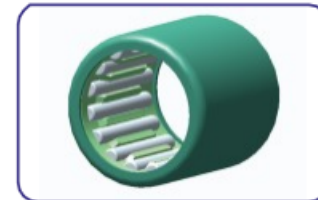
The small end bearing is designed to withstand high impact loads and high-speed oscillation. Cage is designed for inner diameter guide and guide surface is designed to minimize surface pressure.

To reduce the contact pressure on rollers, bearing is designed to incorporate with maximum possible length and small diameter of rollers.



3. Shell Type Needle Roller Bearing

Shell type needle roller bearing comprises of an outer shell ring made from special thin steel, needle rollers and cage. A hardened and ground inner ring/ shaft is used as the raceway. This bearing needs no axial clamping due to easy installation and a press-fit in the housing so it can also be used in application where shell face abutment with the housing is not possible. The outer ring of shell bearing is so thin that it gets deformed and take the shape of housing in which it is press fitted so dimensional accuracy of both shell bearing as well as housing is important for bearing performance.



4. Machined-ring needle roller

Machined ring type needle roller bearing comprises of an outer ring made by machining, needle rollers and cage to guide the rollers. The outer ring is having high rigidity and easy to install. Machined ring needle roller bearing is suitable for heavy loads and used where high bearing accuracy required.

5. Thrust roller bearing

Thrust roller bearing comprises of needle, a cage that guides and retains the rollers. This bearing can take load in axial direction. Also thrust needle roller and cage assembly has no inner and outer ring, heat treated and finished mounting surface can be used as raceway. These bearings are having high rigidity and high load capacity and best-suited to small spaces.

Needle Bearing Characteristics

1. Compact design:

Since needle roller bearings are having small radial section height which allows for more compact design for bearings.

2. Low inertial forces:

Because of needle roller bearing compact design, they have a smaller mass, which makes it suitable for application where lower inertial forces is required.

3. High Load Carrying Capacity:

Needle roller bearing is relatively small and having relatively large length/diameter ratio, this allows more rollers to incorporate in same boundary dimension relatively to other bearing type and hence more load carrying capacity

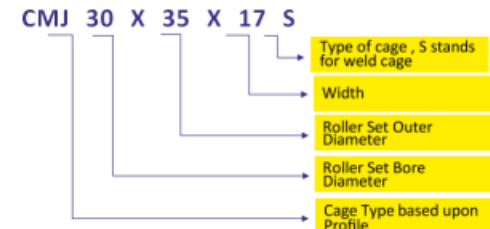
4. Suitable for oscillation motion application:

As diameter of rolling element is small so can be arranged in small spacing pitch, and this is ideal for oscillation motion


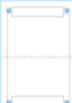





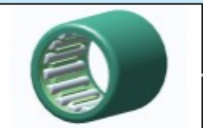
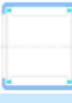

Needle Bearing Nomenclature

Bearing Type Code	Details
C I	Needle roller and machined cage assembly
CBC	Needle roller and machined cage assembly for piston pins
PC	Needle roller and machined cage assembly for crank pins
CJ • • S	Needle roller and weld cage assembly
CMJ • • S	Needle roller and weld cage assembly
CV • • S	Needle roller and weld cage assembly
HC	Drawn-cup needle roller bearing
HMC	Drawn-cup needle roller bearing for heavy loading
HC-F	Special Type Drawn-cup needle roller bearing
F	Flat end type roller

Suffix	Details
Cage	
Q	Soft Nitriding on cage
E	Carburizing + Hardening + Tempering HT on cage
D	Black Oxide on cage
C	Copper Plating on cage
S	Silver Plating on cage
Roller	
-	Through Hardened treatment on roller
AS	Carbonitriding Treatment on Roller
E1	Crowning (End drop) on roller
SF	Improved surface finish on roller OD

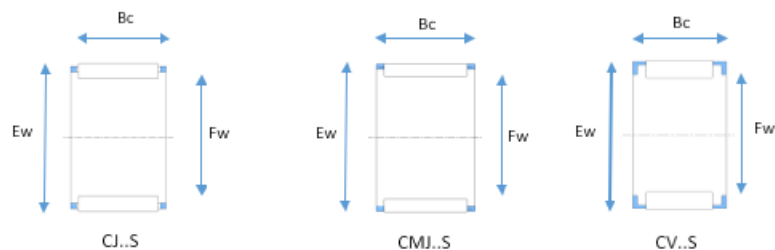


Needle Bearing Classification

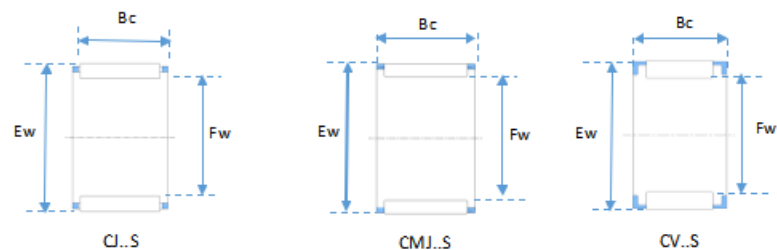
Weld Cage Assembly	 <p>Needle roller and cage assembly</p>	 CJ..S  CMJ..S  CV..S
Machine Cage Assembly	 <p>Needle Roller and Cage Assembly for Connecting Rod Bearings</p>	 C CBC  PC
Shell Type Bearing	 <p>Shell Type Needle Roller Bearings</p>	 HC  HMC

Needle Roller and Cage Assembly

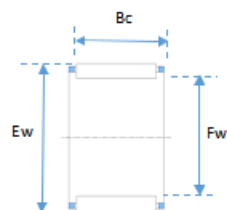




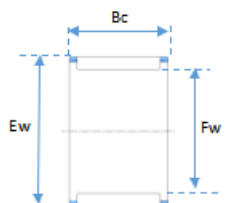
Boundary dimensions (mm)			Basic load rating				Bearing Number	Mass (Kg) Approx.
			Dynamic (N)	Static (N)	Dynamic (Kgf)	Static (Kgf)		
Fw	Ew	Bc	Cr	Cor	Cr	Cor		
			7 850	11 600	800	1 190	C15x18x14	0.006
			5 350	5 850			CV15x19x7.8XS	0.0033
			6 850	8 050		820	C15x19x10	0.0055
			8 250	10 200			C15x19x13	0.0067
			10 900	14 600		1 490	C15x19x17	0.009
			14 100	20 400		2 080	C15x19x24ZW	0.013
			10 100	11 500	1 030		C15x20x13	0.0088
			12 600	15 200	1 280	1 550	CMJ15X20X15.8XS	0.009
			11 900	12 500		1 280	C15x21x15	0.013
			14 900	16 800			CMJ15X21X16.8X15	0.012
			16 500	19 100	1 680	1 950	C15x21x21	
16	20	10	7 500	9 250	765	945	C16x20x10	0.0057
16	20	11	8 300	10 500	845	1 070	C16x20x11	0.0061
16	20	13	9 050	11 800	925	1 200	C16x20x13	0.0071
16	22	12	11 700	12 500	1 190	1 280	C16x22x12	0.01
16	22	13	12 600	13 900	1 290	1 410	CMJ16X22X13	0.011
16	22	16	13 600	15 200	1 380	1 550	C16x22x15.8X	0.014
16	22	17	14 400	16 400	1 470	1 670	C16x22x17	0.015
16	22	20	16 000	18 800	1 640	1 920	C16x22x20	0.017
17	21	15	10 400	14 400	1 060	1 460	C17x21x15	0.0089
17	21	17	11 800	16 900	1 210	1 720	C17x21x17	0.0095
17	22	20	14 700	19 200	1 500	1 960	C17x22x20	0.015
17	23	17	14 400	16 500	1 460	1 690	C17x23x17	0.016
18	22	10	7 400	9 400	755	955	C18x22x10	0.0061
18	22	13	8 900	11 900	910	1 210	C18x22x13	0.0077
18	22	17	11 700	17 000	1 200	1 730	C18x22x17	0.011



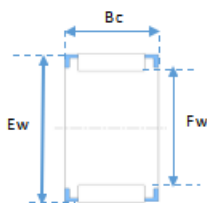
Boundary dimensions (mm)			Basic load rating				Bearing Number	Mass (Kg) Approx.
			Dynamic (N)	Static (N)	Dynamic (Kgf)	Static (Kgf)		
Fw	Ew	Bc	Cr	Cor	Cr	Cor		
18	24	12	12 300	13 800	1 250	1 410	C18x24x12	0.012
18	24	13	11 600	12 800	1 180	1 300	C18x24x13	0.013
18	24	17	16 000	19 300	1 630	1 970	CMJ18X24X17SV1	0.014
18	24	20	17 000	20 900	1 730	2 130	C18x24x20	0.019
18	25	17	18 000	20 400	1 830	2 080	C18x25x17	0.019
18	25	22	22 100	26 600	2 250	2 710	C18x25x22	0.024
19	23	13	9 650	13 500	985	1 370	C19x23x13	0.0082
19	23	17	12 700	19 200	1 300	1 960	C19x23x17	0.011
20	24	11	9 500	13 400	970	1 370	C20x24x11	0.0072
20	24	45	16 400	27 100	1 680	2 760	C20x24x45ZW	0.028
20	25	40	29 000	48 000	2 950	4 900	C20x25x40ZW	0.033
20	26	12	12 900	15 100	1 320	1 540	C20x26x12	0.013
20	26	13	14 000	16 700	1 420	1 700	CMJ20X26X13S	0.012
20	26	14	15 800	19 600	1 610	2 000	CMJ20X26X13.8X15	0.013
20	26	17	17 800	22 800	1 810	2 330	CMJ20x26x17S	0.016
20	26	20	20 600	27 600	2 100	2 820	CMJ20x26x20S	0.019
20	28	17	21 700	2 4600	2 210	2 510	CMJ20x28x17	0.022
20	28	20	24 600	2 8900	2 500	2 940	CMJ20x28x20	0.026
21	25	13	10 700	1 5900	1 090	1 620	CMJ21x25x12.8x15	0.0081
21	25	17	13 600	2 1500	1 380	2 200	C21x25x17	0.012
22	26	11	10 100	1 4900	1 030	1 520	C22X26X11	0.009
22	26	13	10 200	1 5200	1 040	1 550	C22x26x13	0.0094
22	27	20	17 500	2 5900	1 780	2 640	C22x27x20	0.02
22	27	28.5	24 200	3 9500	2 470	4 000	C22x27x28.3X	0.0276
22	27	40	50 500	10 3000	5 150	10 500	C22x27x40ZW	0.039
22	28	17	17 700	2 3300	1 810	2 380	C22x28x17V1	0.02
22	29	16	18 700	2 2700	1 910	2 310	C22x29x16	0.023
22	30	15	19 300	21 700	1 970	2 210	C22x30x15	0.022



CI..S

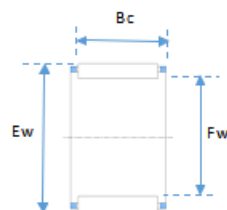


CMJ..S

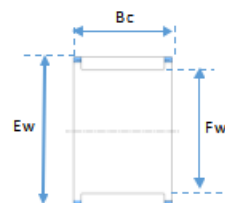


CV..S

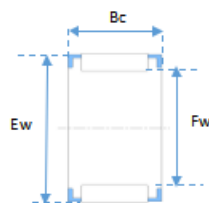
Boundary dimensions (mm)			Basic load rating				Bearing Number	Mass (Kg) Approx.
			Dynamic (N)	Static (N)	Dynamic (Kgf)	Static (Kgf)		
Fw	Ew	Bc	Cr	Cor	Cr	Cor		
22	30	17.5	23 200	2 7500	2 370	2 800	CMJ22X30X17.3X25	0.024
22	30	24	31 000	4 0000	3 150	4 100	CMJ22X30X23.8X35	0.0348
23	27	13	11 400	1 7700	1 160	1 800	CMJ23X27X12.8X15	0.0086
23	28	24	19 800	3 1000	2 020	3 150	C23x28x24	0.023
23	29	18	20 600	2 8800	2 100	2 930	CMJ23X29X17.8X25	0.019
24	28	10	9 000	1 3200	915	1 350	C24x28x10	0.008
24	28	13	10 800	16 800	1 100	1 710	C24x28x13	0.01
24	28	17	14 300	23 900	1 460	2 440	C24x28x17	0.013
24	29	13	12 300	16 900	1 250	1 720	C24x29x13	0.012
24	30	17	18 400	25 200	1 880	2 570	C24x30x17	0.022
24	30	31	27 900	43 000	2 840	4 350	C24x30x31ZW	0.039
25	29	10	8 950	13 300	910	1 350	C25x29x10	0.0083
25	29	13	10 800	16 900	1 100	1 720	C25x29x13	0.01
25	30	13	13 200	18 800	1 350	1 920	C25x30x13	0.013
25	30	22	22 300	3 7000	2 270	3 750	CMJ25X30X21.8X5	0.02
25	30	26	36 500	7 1500	3 750	7 300	C25x30x26ZW	0.027
25	30	39	29 800	5 3500	3 050	5 450	C25x30x39ZW	0.04
25	31	13	15 200	19 900	1 550	2 030	C25x31x13V3	0.018
25	31	14	16 500	22 100	1 680	2 250	C25x31x14	0.018
25	31	17	18 300	25 300	1 870	2 580	C25x31x17	0.022
25	31	18.5	21 000	30 000	2 140	3 050	CMJ25X31X18.3X15	0.021
25	31	21	22 500	33 000	2 290	3 350	C25x31x21V3	0.0283
25	32	16	19 500	24 700	1 990	2 520	C25x32x16	0.027
25	33	24	34 500	47 000	3 500	4 800	CMJ25X33X24S	0.04
26	30	13	11 800	19 200	1 200	1 960	C26x30x13	0.011
26	30	17	15 500	27 400	1 580	2 790	C26x30x17	0.015
26	31	24	21 400	35 500	2 180	3 600	C26X31X23.8X1ZW	0.029
26	34	22	24 200	30 000	2 470	3 050	C26x34x22	0.041



CI..S

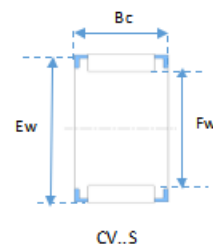
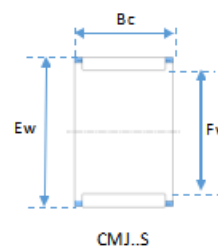
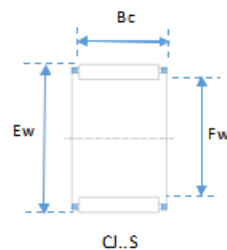
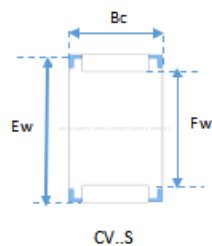
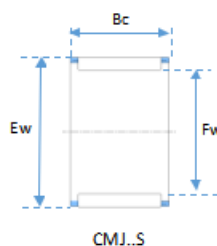
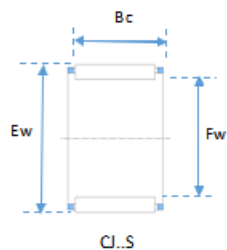


CMJ..S



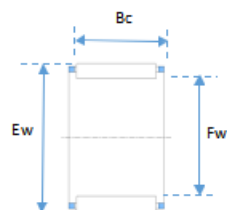
CV..S

Boundary dimensions (mm)			Basic load rating				Bearing Number	Mass (Kg) Approx.
			Dynamic (N)	Static (N)	Dynamic (Kgf)	Static (Kgf)		
Fw	Ew	Bc	Cr	Cor	Cr	Cor		
28	32	17	15 300	27 500	1 560	2 810	C28x32x17	0.017
28	32	21	18 700	35 500	1 910	3 650	C28x32x21	0.02
28	33	13	13 900	20 900	1 420	2 130	C28x33x13	0.015
28	33	26	23 900	42 000	2 430	4 250	C28x33x26ZW	0.033
28	33	27	28 300	52 000	2 890	5 300	C28x33x27	0.032
28	34	14	17 500	24 800	1 790	2 530	C28x34x14	0.02
28	34	17	18 100	25 800	1 850	2 630	C28x34x17V1	0.025
28	35	16	21 200	28 400	2 160	2 900	C28x35x16	0.029
28	35	18	21 500	28 900	2 190	2 950	C28x35x18	0.031
29	34	27	28 100	52 000	2 870	5 300	C29x34x27	0.033
30	34	14	12 400	21 500	1 260	2 190	CV30x34x13.8X5	0.014
30	35	13	14 700	22 900	1 500	2 340	CV30x35x13S	0.017
30	35	17	18 800	31 500	1 910	3 200	C30x35x17S	0.021
30	35	26	25 200	46 000	2 570	4 650	C30x35x26ZWV1	0.036
30	36	14	18 600	27 400	1 900	2 790	CMJ30X36X14S	0.021
30	37	16	21 900	30 500	2 230	3 100	C30x37x16	0.029
30	37	18	23 300	33 000	2 370	3 350	C30x37x18	0.034
30	37	20	26 200	38 000	2 670	3 850	CMJ30X37X20S	0.032
30	37	48	40 000	65 500	4 050	6 700	C30x37x48ZW	0.075
30	38	18	25 000	33 000	2 550	3 350	C30x38x18	0.036
31	35	24	21 200	43 500	2 160	4 400	CV31x35x23.8X5	0.022
31	36	14	15 800	25 400	1 610	2 590	CV31x36x13.8X5	0.017
32	37	13	14 500	23 000	1 480	2 350	C32x37x13	0.018
32	37	24	22 900	41 500	2 340	4 200	C32x37x24.8X2	0.018
32	37	26	24 900	46 000	2 540	4 700	C32x37x26ZWV3	0.032
32	37	27	29 600	57 500	3 000	5 850	C32x37x27	0.037
32	38	14	19 800	30 500	2 020	3 100	CMJ32x38x14	0.022

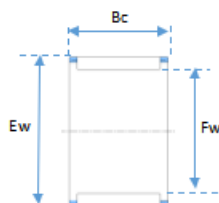


Boundary dimensions (mm)			Basic load rating					
			Dynamic (N)	Static (N)	Dynamic (Kgf)	Static (Kgf)	Bearing Number	Mass (Kg) Approx.
Fw	Ew	Bc	Cr	Cor	Cr	Cor		
32	38	20	25 100	41 000	2 560	4 150	CJ32x38x20S	0.031
32	38	26	31 500	54 000	3 200	5 550	C32x38x26	0.041
32	39	16	22 600	32 000	2 310	3 300	C32x39x16V1	0.033
32	39	18	24 000	35 000	2 450	3 550	C32x39x18	0.037
32	39	20	26 800	40 000	2 740	4 100	CJ32x39x20S	0.041
34	40	39.5	39 000	73 500	4 000	7 500	CV34x40x39.3X1ZW5	0.066
35	39	22.5	21 500	46 000	2 200	4 700	CV35x39x22.3XS	0.024
35	40	13	15 200	25 100	1 550	2 560	C35x40x13	0.019
35	40	17	20 000	36 000	2 040	3 650	C35x40x17	0.025
35	40	19	22 300	41 000	2 270	4 200	C35x40x19	0.029
35	40	26	44 000	100 000	4 450	10 200	C35x40x26ZW	0.037
35	40	27	32 000	65 000	3 250	6 600	CJ35x40x27S	0.039
35	40	30	26 100	50 000	2 660	5 100	C35x40x30ZW	0.043
35	41	14	19 400	30 500	1 980	3 100	C35x41x14	0.026
35	41	15	20 900	33 500	2 130	3 400	C35x41x15	0.027
35	41	24	31 000	55 500	3 200	5 650	C35x41x23.8X1	0.042
35	41	40	72 000	168 000	7 350	17 100	C35x41x40ZW	0.055
35	42	16	24 100	36 000	2 450	3 650	C35x42x16	0.035
35	42	18	24 700	37 000	2 510	3 750	C35x42x18	0.039
35	42	20	26 500	40 500	2 700	4 100	CV35x42x20SV2	0.04
35	42	30	39 500	68 000	4 050	6 950	C35x42x30	0.062
35	42	45	42 500	74 000	4 300	7 550	C35x42x45ZW	0.106
36	42	46	51 000	106 000	5 200	10 800	C36x42x46ZW	0.086
37	42	13	15 900	27 100	1 620	2 770	C37x42x13V4	0.021
37	42	17	21 000	38 500	2 140	3 950	C37x42x17V2	0.026
37	42	27	32 500	67 500	3 300	6 900	CJ37x42x27S	0.041
37	43	33.5	39 000	76 000	4 000	7 750	CV37x43x33.3XS	0.062
37	44	18	26 300	41 000	2 680	4 150	C37x44x18	0.042

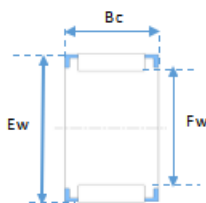
Boundary dimensions (mm)			Basic load rating					
			Dynamic (N)	Static (N)	Dynamic (Kgf)	Static (Kgf)	Bearing Number	Mass (Kg) Approx.
Fw	Ew	Bc	Cr	Cor	Cr	Cor		
38	43	17	20 900	38 500	2 130	3 950	C38X43X17	0.027
38	43	27	32 000	67 500	3 300	6 900	C38x43x27	0.043
38	43	29	32 500	68 000	3 300	6 950	C38x43x28.8X	0.047
38	46	20	34 000	52 000	3 450	5 350	CMJ38X46X20S	0.046
38	46	32	54 000	95 500	5 500	9 700	C38x46x32	0.073
40	45	13	16 500	29 200	1 680	2 980	C40x45x13V2	0.023
40	45	17	21 800	41 500	2 220	4 250	C40x45x17	0.027
40	45	21	26 700	54 000	2 720	5 500	C40x45x21V2	0.035
40	45	27	33 500	72 500	3 400	7 400	C40x45x27	0.044
40	46	17	24 600	43 000	2 500	4 350	C40x46x17	0.03
40	46	34	40 500	80 500	4 100	8 250	CV40x46x33.8XS	0.063
40	47	18	27 700	45 000	2 820	4 550	C40x47x18	0.045
40	47	20	31 000	51 500	3 150	5 250	C40x47x20	0.048
40	48	20	33 000	51 000	3 350	5 200	C40x48x20	0.052
40	48	25	41 000	68 000	4 200	6 900	CV40x48x25SV1	0.065
41	49	22	30 500	46 000	3 100	4 700	CV41X49X21.8XS	0.065
42	47	17	22 100	43 000	2 250	4 400	C42x47x17	0.028
42	47	27	34 000	75 500	3 450	7 700	C42x47x27	0.047
42	48	17	25 700	46 000	2 630	4 700	C42x48x17	0.036
42	50	20	34 000	53 500	3 450	5 500	C42x50x20	0.054
43	48	17	22 000	43 000	2 240	4 400	C43x48x17	0.029
43	48	27	34 000	75 500	3 450	7 700	C43x48x27	0.046
43	48	38	41 000	96 000	4 150	9 800	CV43x48x37.8XZW5	0.058
43	50	18	29 100	49 000	2 960	5 000	C43x50x18	0.049
44	50	31	43 500	91 500	4 400	9 300	CV44x50x30.8XS	0.067
45	49	19	22 100	52 000	2 260	5 300	C45x49x19	0.027
45	50	17	22 300	44 500	2 280	4 550	C45x50x17	0.033
45	50	25.8	30 500	66 500	3 100	6 750	CV45x50x25.8XS	0.045



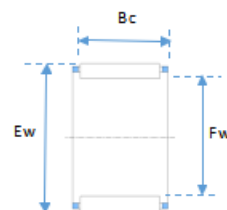
CI..S



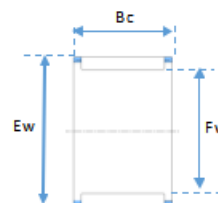
CMJ..S



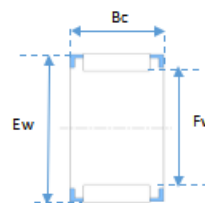
CV..S



CI..S



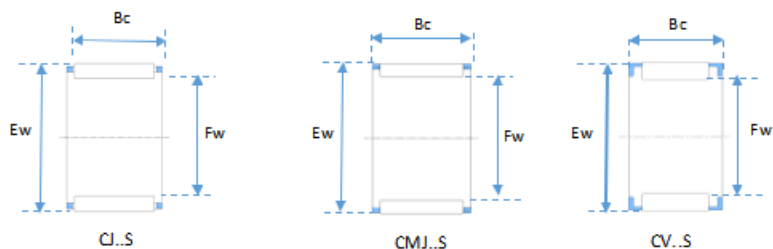
CMJ..S



CV..S

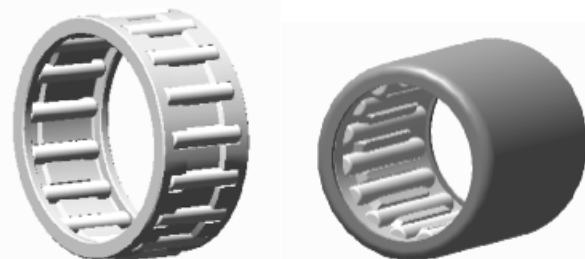
Boundary dimensions (mm)			Basic load rating				Bearing Number	Mass (Kg) Approx.
			Dynamic (N)	Static (N)	Dynamic (Kgf)	Static (Kgf)		
Fw	Ew	Bc	Cr	Cor	Cr	Cor		
45	50	27	34 500	78 000	3 500	7 950	C45x50x27	0.05
45	51	27	34 500	68 000	3 500	6 950	CV45x51x26.8XS	0.058
45	52	18	29 700	51 000	3 000	5 200	C45x52x18	0.051
45	52	21	32 000	56 500	3 300	5 750	C45x52x21	0.061
45	53	20	36 000	59 000	3 650	6 000	C45x53x20	0.062
45	53	25	46 500	82 000	4 700	8 400	C45x53x25	0.077
45	53	28	49 500	90 000	5 050	9 200	CJ45x53x28S	0.078
47	52	15.5	19 400	38 000	1 980	3 900	C47x52x15.3X2	0.031
47	52	17	23 200	47 500	2 360	4 850	C47x52x17	0.033
47	52	23	29 600	65 500	3 000	6 650	CV47x52x22.8XS	0.044
47	52	24	33 500	76 500	3 400	7 800	C47x52x23.8X	0.044
47	52	27	35 500	83 000	3 650	8 450	C47x52x27	0.051
47	52	33	38 000	90 500	3 900	9 250	CV47x52x32.8x2WS	0.064
48	53	22.5	31 000	69 500	3 150	7 050	CV48x53x22.3XS	0.042
48	53	30	36 500	85 500	3 700	8 750	C48x53x29.8X1	0.062
48	53	37	45 000	112 000	4 550	11 400	CV48x53x36.8X2WS	0.064
48	53	37.5	41 500	101 000	4 200	10 300	C48x53x37.5ZW	0.072
48	54	19	31 000	61 000	3 150	6 250	C48X54X19	0.044
48	55	24.5	39 000	73 500	4 000	7 600	CV48X55X24.3XS	0.07
50	55	13.5	18 100	35 500	1 850	3 600	C50X55X13.5	0.023
50	55	20	27 900	62 000	2 850	6 300	CV50X55X20S	0.04
50	55	27	37 000	88 500	3 750	9 000	C50X55X27	0.053
50	55	30	39 500	97 000	4 050	9 900	C50x55x30	0.059
50	57	18	31 500	57 000	3 200	5 800	C50x57x18	0.053
50	58	20	38 500	67 500	3 950	6 850	C50x58x20	0.065
50	58	25	48 500	90 000	4 950	9 150	C50x58x25	0.081
50	58	58	83 500	181 000	8 500	18 400	CV50x58x57.8X2WS	0.188

Boundary dimensions (mm)			Basic load rating				Bearing Number	Mass (Kg) Approx.
			Dynamic (N)	Static (N)	Dynamic (Kgf)	Static (Kgf)		
Fw	Ew	Bc	Cr	Cor	Cr	Cor		
52	57	18	22 800	48 000	2 320	4 900	CV52X57X17.8XS	0.037
52	57	23	30 500	69 500	3 100	7 100	CV52X57X22.8X1S	0.048
52	58	19	32 000	65 500	3 250	6 650	C52X58X19	0.048
54	59	23	31 500	73 500	3 200	7 500	CV54X59X22.8XS	0.049
55	60	17	25 800	58 000	2 630	5 900	C55x60x17	0.043
55	60	20	28 800	66 500	2 940	6 750	C55x60x20	0.045
55	60	30	42 000	108 000	4 300	11 000	CV55x60x30S	0.069
55	60	37	47 500	127 000	4 850	12 900	C55x60x36.8X	0.086
55	61	19	33 000	69 500	3 350	7 100	C55x61x19	0.051
55	61	20	33 000	69 500	3 350	7 100	C55x61x20	0.054
55	61	30	48 000	113 000	4 900	11 500	C55x61x30	0.081
55	62	18	33 500	63 000	3 400	6 450	C55x62x18	0.054
55	63	20	39 000	70 000	3 950	7 100	C55x63x20	0.073
55	63	25	50 500	97 500	5 150	9 950	C55x63x25	0.088
55	63	32	61 000	125 000	6 200	12 700	C55x63x32	0.117
57	65	40	66 000	140 000	6 750	14 300	CV57x65x39.8X2WS	0.145
58	64	19	34 000	73 500	3 450	7 500	C58x64x19	0.052



Boundary dimensions (mm)			Basic load rating				Bearing Number	Mass (Kg) Approx.
			Dynamic (N)	Static (N)	Dynamic (Kgf)	Static (Kgf)		
Fw	Ew	Bc	Cr	Cor	Cr	Cor		
60	68	30	46 500	91 000	4 750	9 300	C60x68x302W	0.119
61	66	20	29 700	71 500	3 050	7 300	C61x66x20	0.054
61	66	30	43 500	116 000	4 400	11 900	C61x66x30	0.073
63	70	21	44 500	95 500	4 500	9 700	C63x70x21	0.075
63	71	50.5	74 500	167 000	7 600	17 000	CV63x71x50.3XZWS	0.193
64	70	16	28 400	60 500	2 900	6 150	C64x70x16	0.053
65	70	20	30 500	75 000	3 100	7 650	C65x70x20	0.055
65	70	21.5	30 500	75 000	3 100	7 650	CV65x70x21.3X15	0.056
65	70	30	45 000	124 000	4 600	12 700	C65x70x30	0.083
65	73	23	47 000	94 000	4 800	9 600	C65x73x23	0.1
65	73	30	61 000	132 000	6 200	13 400	C65x73x30	0.126

Needle Bearings for Connecting Rod Applications



Radial Clearance Selection

Table 1 shows the recommended clearance values

The proper radial clearance can be got by proper selection and combination of roller diameter, connecting rod hole diameter and pin diameter. Table 2 shows the radial clearance values obtainable by various selection and combination

Table 1 Recommended clearance value

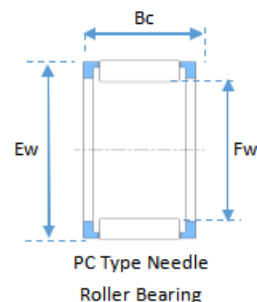
Pin diameter mm		Large end side	Small end side
Over	incl.		
6	10	9~23	5~17
10	18	10~24	5~17
18	30	10~24	5~17
30	40	18~33	-

Table 2 Radial clearance values obtainable by selection and combination

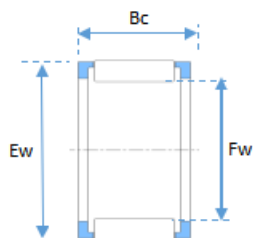
Hole diameter tolerance range	0~ + 4	+ 4~ + 8	+ 8~ + 13
Tolerance range of needle roller used	- 4~- 6	- 2~- 4	0~- 2
Pin diameter tolerance range			
0~- 3	10~ 17	10~ 17	10~ 18
- 3~- 6	13~ 20	13~ 20	13~ 21
- 6~- 8	16~ 22	16~ 22	16~ 23

Recommended accuracy of Connecting rod and pin specifications

Parts	Characteristics	Pin diameter classification mm				
		~14	14~18	18~25	25~30	30~40
Connecting rod	Roundness (max)	3	4	4	5	5
	Cylindricity (max)	2	3	3	4	4
Pin	Roundness (max)	2	2	3	3	4
	Cylindricity (max)	1	1	2	2	3

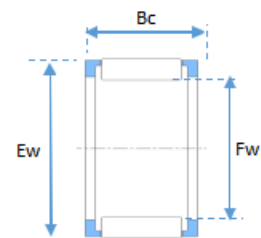


Boundary dimensions (mm)			Basic load rating				Bearing Number	Mass (Kg) Approx.
			Dynamic (N)	Static (N)	Dynamic (Kgf)	Static (Kgf)		
Fw	Ew	Bc	Cr	Cor	Cr	Cor		
10	14	9.8	5 050	4 900	515	500	PC10x14x9.8X14	0.0037
12	16	10	5 450	5 600	555	570	PC12x16x10.2	0.0044
12	17	9.8	6 800	6 550	695	670	PC12x17x9.8X15	0.0053
14	19	9.7	7 300	7 400	745	755	PC14x19x 9.7X1	0.0065
14	19	11.8	8 200	8 600	840	880	PC14x19x11.8X1	0.007
14	20	11.8	19 100	10 000	1 030	1 020	PC14x20x11.8X3	0.0091
15	20	9.8	7 250	7 450	740	760	PC15x20x 9.8X	0.0067
15	21	11.8	10 000	10 200	1 020	1 040	PC15x21x11.8X8	0.0095
16	22	11.8	10 000	10 300	1 020	1 050	PC16x22x11.8X2	0.0097
16	22	13.2	10 900	11 500	1 110	1 170	PC16x22x13.2X	0.011
18	24	11.8	11 300	12 400	1 150	1 260	PC18x24x11.8X3	0.011
18	24	13.3	13 300	15 300	1 360	1 560	PC18x24x13.3X1	0.012
19	24	13.9	11 900	15 200	1 220	1 550	PC19x24x13.9X	0.011
19	25	15.8	14 300	17 000	1 460	1 730	PC19x25x15.8X1	0.015
20	26	13.8	14 000	16 700	1 420	1 700	PC20x26x13.8X6	0.014
22	28	15.8	15 900	20 200	1 620	2 060	PC22x28x15.8X1	0.017
22	29	17.8	18 800	22 800	1 920	2 320	PC22x29x17.8X7	0.024
22	30	14.7	16 900	18 200	1 720	1 860	PC22x30x14.7X2	0.024
22	30	17.8	21 900	25 400	2 230	2 590	PC22x30x17.8X2	0.027
24	31	16.8	20 800	26 600	2 120	2 710	PC24x31x16.8X7	0.024
24	32	19.8	22 900	27 500	2 340	2 810	PC24x32x19.8X6	0.033
26	31	13.8	14 200	20 900	1 450	2 130	PC26x31x13.8X31	0.0139
26	32	13.8	16 400	22 200	1 670	2 260	PC26x32x13.8X	0.018
26	34	16.8	21 600	26 100	2 200	2 660	PC26x34x16.8X7	0.032



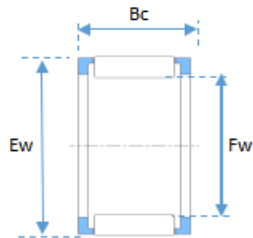
PC Type Needle
Roller Bearing

Boundary dimensions (mm)			Basic load rating				Bearing Number	Mass (Kg) Approx.
			Dynamic (N)	Static (N)	Dynamic (Kgf)	Static (Kgf)		
Fw	Ew	Bc	Cr	Cor	Cr	Cor		
27	36	20.8	30 500	38 500	3 150	3 950	PC27x36x20.8X1	0.044
28	35	14	18 400	23 700	1 880	2 420	PC28x35x13.8X1	0.0226
28	36	14	20 600	25 100	2 100	2 560	PC28x36x13.8X4	0.025
28	36	15.8	23 700	30 000	2 410	3 050	PC28x36x15.8X6	0.031
28	37	20.8	32 500	41 500	3 300	4 250	PC28x37x20.8X	0.048
29	39	21.4	32 500	39 500	3 300	4 000	PC29x39x21.4X2	0.055
30	37	15.9	21 900	30 500	2 230	3 100	PC30x37x15.9X	0.028
30	38	13.8	21 400	26 900	2 180	2 750	PC30x38x13.8X1	0.0294
30	38	15.8	24 600	32 000	2 510	3 300	PC30x38x15.8X	0.032
30	38	17.8	27 700	37 500	2 820	3 800	PC30x38x17.8X1	0.037
31	41	21.4	34 000	43 000	3 500	4 350	PC31x41x21.4X	0.057
32	43	22.4	40 000	49 500	4 100	5 050	PC32x43x22.4X	0.069
34	42	19.8	31 500	45 500	3 200	4 650	PC34x42x19.8X	0.046
38	47	19.8	35 500	51 000	3 600	5 200	PC38x47x19.8X1	0.056



C Type
CBC Type

Boundary dimensions (mm)			Basic load rating				Bearing Number	Mass (Kg) Approx.
			Dynamic (N)	Static (N)	Dynamic (Kgf)	Static (Kgf)		
Fw	Ew	Bc	Cr	Cor	Cr	Cor		
7	10	9.8	3 050	2 780	310	284	CBC 7x10x9.8x	0.0022
8	11	11.8	4 100	4 200	415	430	CBC 8x11x11.8x1	0.0028
9	12	11.5	4 400	4 750	450	485	CBC9x12x11.7V2	0.003
10	14	9.8	4 500	4 200	460	430	CBC10x14x9.8x	0.0042
10	14	12.5	6 100	6 200	620	635	CBC10x14x12.5x1	0.0053
10	14	14.8	6 100	6 200	620	635	CBC10x14x14.8x	0.0064
11	14	13.5	5 850	7 250	595	740	CBC11x14x13.5x1	0.0044
11	15	12.3	7 050	7 700	720	785	CBC11x15x12.3x5	0.0049
11	15	15.8	7 050	7 650	720	780	CBC11x15x15.8x2	0.0069
12	15	16.4	7 500	10200	765	1040	CBC12x15x16.6V	0.0056
12	16	14.8	7 600	8 600	775	875	CBC12x16x14.8x1	0.0062
12	16	15.4	7 000	7 800	715	795	CBC12x16x15.6	0.0079
12	16	15.8	8 100	9 350	825	955	CBC12x16x16	0.0073
12	17	14.8	8 400	8 550	855	875	CBC12x17x14.8x	0.0094
14	18	16.8	9 750	12 400	995	1 260	CBC14x18x17	0.0089
14	18	19.8	9 150	11 300	930	1 160	CBC14x18x20	0.013
14	19	17.1	11 100	12 700	1 130	1 300	CBC14x19x17.1x	0.012
15	19	17.3	10 900	14 600	1 110	1 490	CBC15x19x17.3x	0.01
16	20	16.8	10 800	14 700	1 100	1 500	CBC16x20x17	0.01
16	20	19.6	10 200	13 600	1 040	1 390	CBC16x20x19.8	0.013
16	20	23.8	13 600	19 700	1 390	2 010	CBC16x20x23.8x	0.015
16	21	19.6	13 900	17 600	1 420	1 790	CBC16x21x19.6x	0.016
17	21	23	13 200	19 400	1 340	1 980	CBC17x21x23.2	0.016
17	21	25	13 100	19 200	1 340	1 960	CBC17x21x25x	0.017
17	22	22	16 900	22 900	1 720	2 340	CBC17x22x22x1	0.017
18	22	21.8	12 500	18 300	1 270	1 870	CBC18x22x21.8x3	0.015
18	22	23.8	13 000	19 300	1 330	1 970	CBC18x22x23.8x1	0.016



C Type

CBC Type

Boundary dimensions (mm)			Basic load rating				Bearing Number	Mass (Kg) Approx.
			Dynamic (N)	Static (N)	Dynamic (Kgf)	Static (Kgf)		
Fw	Ew	Bc	Cr	Cor	Cr	Cor		
20	25	27.9	20 800	31 500	2 120	3 200	CBC20 × 25 × 27.9x	0.027
22	28	29.9	26 000	38 000	2 650	3 900	CBC22 × 28 × 29.9x4	0.038

Shell Type Needle Roller Bearing



Bearing Fits

Shell type needle bearing is press-fitted in a housing by interference fit so post press-fit inscribed circle diameter (Fw) comes to ISO Tolerance Rang Class F8.

The post press-fit inscribed circle diameter (Fw) depends on the housing material and rigidity. It is therefore desirable to decide the interference based on the data measured in pre-testing.

Recommended data of bearing fit in housing and on shaft as shown in Table-3.

The outer ring of shell bearing is so thin that it gets deformed and take the shape of housing in which it is press fitted so dimensional accuracy of both shell bearing as well as housing is important for bearing performance. Recommended values of accuracy of housing and shaft as shown in table 4.

Table 3 Bearing fit in housing and on shaft (recommended)

Bearing type	Housing				Shaft	
	Iron series		Light alloy		Without inner ring	With inner ring
HC	N6	(N7)	R6	(R7)	h5 (h6)	k5 (j6)
HMC	J6	(J7)	M6	(M7)		

Table 4 Accuracy of housing bore (recommended)

Property	Tolerance
Roundness (Max)	IT4 or less
Cylindricity (Max)	IT4 or less
Surface roughness (Max)	1.6a

Bearing Tolerances and Measuring Methods

As stated above the accuracy of housing is equally important as bearing. Hence, it is meaningless to measure the dimensional accuracy of bearing itself before being press-fitted. So, the following measuring method is used; a bearing to be measured is press-fitted in a linkage of specific dimension and thereafter the inscribed circle diameter (Fw) is measured using a plug gauge or a taper gauge to evaluate the bearing accuracy.

Table 5 Dimensional tolerance for inscribed circle diameter

(Type HC)

Units: mm

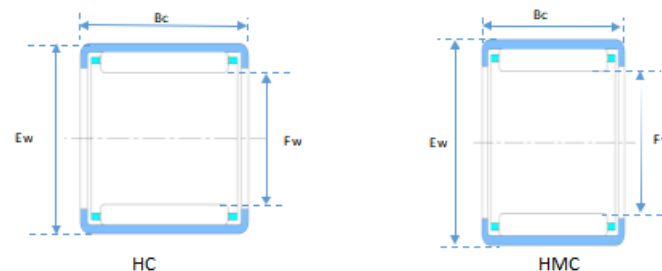
Nominal inscribed circle dia.	Nominal outer ring outer dia.	Ring gauge bore dia.	Tolerance for inscribed circle diameter	
			High	Low
Fw	D			
3	6.5	6.484	3.016	3.006
4	8	7.984	4.022	4.01
5	9	8.984	5.022	5.01
6	10	9.984	6.022	6.01
7	11	10.98	7.028	7.013
8	12	11.98	8.028	8.013
9	13	12.98	9.028	9.013
10	14	13.98	10.028	10.013
12	16	15.98	12.034	12.016
12	18	17.98	12.034	12.016
13	19	18.976	13.034	13.016
14	20	19.976	14.034	14.016
15	21	20.976	15.034	15.016
16	22	21.976	16.034	16.016
17	23	22.976	17.034	17.016
18	24	23.976	18.034	18.016
20	26	25.976	20.041	20.02
22	28	27.976	22.041	22.02
25	32	31.972	25.041	25.02
28	35	34.972	28.041	28.02
30	37	36.972	30.041	30.02
35	42	41.972	35.05	35.025
40	47	46.972	40.05	40.025
45	52	51.967	45.05	45.025
50	58	57.967	50.05	50.025

Table 6 Dimensional tolerance for inscribed circle diameter

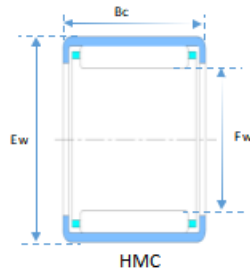
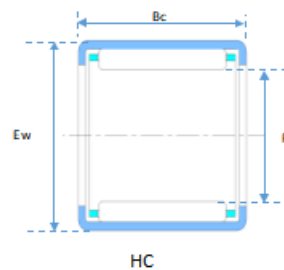
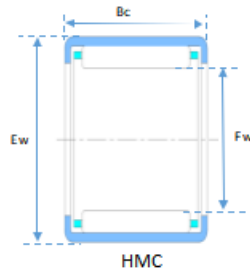
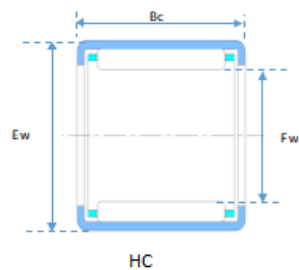
(Type HMC)

Units: mm

Nominal inscribed circle dia.	Nominal outer ring outer dia.	Ring gauge bore dia.	Tolerance for inscribed circle diameter	
Fw	D		High	Low
8	15	14.995	8.028	8.013
9	16	15.995	9.028	9.013
10	17	16.995	10.028	10.013
12	19	18.995	12.034	12.016
14	22	21.995	14.034	14.016
15	22	21.995	15.034	15.016
16	24	23.995	16.034	16.016
17	24	23.995	17.034	17.016
18	25	24.995	18.034	18.016
19	27	26.995	19.041	19.02
20	27	26.995	20.041	20.02
21	29	28.995	21.041	21.02
22	29	28.995	22.041	22.02
24	31	30.994	24.041	24.02
25	33	32.994	25.041	25.02
26	34	33.994	26.041	26.02
28	37	36.994	28.041	28.02
29	38	37.994	29.041	29.02
30	40	39.994	30.041	30.02
32	42	41.994	32.05	32.025
35	45	44.994	35.05	35.025
37	47	46.994	37.05	37.025
38	48	47.994	38.05	38.025
40	50	49.994	40.05	40.025
45	55	54.994	45.05	45.025
50	62	61.994	50.05	50.025



Boundary dimensions (mm)			Basic load rating					
			Dynamic (N)	Static (N)	Dynamic (Kgf)	Static (Kgf)	Bearing Number	Mass (Kg) Approx.
Fw	Ew	Bc	Cr	Cor	Cr	Cor		
10	14	12	5 650	6 800	575	695	HC1012F	0.0045
10	14	15	7 250	9 400	740	955	HC1015F	0.0056
10	17	10	4 250	3 450	435	350	HMC1010	0.0079
10	17	12	5 600	4 850	570	495	HMC1012	0.0094
10	17	15	7 400	6 950	755	710	HMC1015	0.012
10	17	20	10 200	10 500	1 040	1 070	HMC1020	0.016
12	19	12	7 100	6 900	725	705	HMC1212	0.011
12	19	15	9 400	9 900	955	1 010	HMC1215	0.014
12	19	20	12 300	14 000	1 260	1 430	HMC1220	0.018
12	19	25	15 300	18 600	1 560	1 890	HMC1225	0.023
14	20	16	10 300	13 400	1 050	1 370	HC1416F	0.015
14	22	16	11 500	12 000	1 180	1 220	HMC1416C	0.019
14	22	20	14 600	16 200	1 490	1 650	HMC1420C	0.024
15	21	16	10 700	14 400	1 090	1 470	HC1516F	0.015
15	21	22	12 900	18 200	1 310	1 860	HC1522ZWF	0.02
15	22	10	6 100	6 000	620	610	HMC1510	0.011
15	22	12	7 950	8 450	810	860	HMC1512	0.013
15	22	15	10 500	12 100	1 070	1 240	HMC1515C	0.016
15	22	20	14 900	18 900	1 510	1 920	HMC1520	0.022
15	22	25	18 500	25 000	1 880	2 550	HMC1525	0.027
16	22	16	11 100	15 300	1 130	1 560	HC1616F	0.016
16	22	22	13 300	19 400	1 360	1 980	HC1622ZWF	0.022
16	24	16	12 400	13 500	1 260	1 370	HMC1616	0.021
17	24	15	12 100	15 000	1 230	1 530	HMC1715	0.018



Boundary dimensions (mm)			Basic load rating				Bearing Number	Mass (Kg) Approx.
			Dynamic (N)	Static (N)	Dynamic (Kgf)	Static (Kgf)		
Fw	Ew	Bc	Cr	Cor	Cr	Cor		
18	24	16	11 800	17 300	1 210	1 760	HC1816F	0.018
18	25	13	10 200	12 200	1 040	1 240	HMC1813	0.016
18	25	15	12 000	15 100	1 220	1 540	HMC1815	0.019
18	25	17	13 300	17 200	1 360	1 760	HMC1817C	0.021
18	25	19	15 500	20 900	1 580	2 130	HMC1819	0.024
18	25	20	16 300	22 300	1 660	2 280	HMC1820	0.025
18	25	25	20 300	29 600	2 070	3 000	HMC1825	0.031
19	27	16	13 900	16 300	1 410	1 660	HMC1916	0.025
19	27	20	17 500	22 100	1 790	2 250	HMC1920	0.031
20	26	16	12 500	19 200	1 280	1 960	HC2016F	0.019
20	26	20	16 000	26 200	1 630	2 670	HC2020F	0.024
20	26	30	21 500	38 500	2 190	3 900	HC2030ZWFD	0.035
20	27	15	13 000	17 300	1 330	1 760	HMC2015	0.021
20	27	20	17 700	25 600	1 800	2 610	HMC2020	0.027
20	27	25	22 000	34 000	2 240	3 450	HMC2025	0.034
20	27	30	26 100	42 000	2 660	4 300	HMC2030	0.041
21	29	16	15 300	19 100	1 560	1 940	HMC2116	0.027
21	29	20	19 400	25 800	1 970	2 630	HMC2120	0.033
22	28	16	13 200	21 100	1 340	2 150	HC2216F	0.021
22	28	20	16 800	28 800	1 710	2 940	HC2220F	0.026
22	29	10	8 400	10 100	855	1 030	HMC2210	0.015
22	29	15	13 400	18 500	1 370	1 890	HMC2215	0.022
22	29	20	18 200	27 400	1 860	2 790	HMC2220	0.03
22	29	25	23 600	38 500	2 410	3 900	HMC2225	0.037
22	29	30	26 900	45 000	2 740	4 600	HMC2230	0.045

Boundary dimensions (mm)			Basic load rating				Bearing Number	Mass (Kg) Approx.
			Dynamic (N)	Static (N)	Dynamic (Kgf)	Static (Kgf)		
Fw	Ew	Bc	Cr	Cor	Cr	Cor		
24	31	28	26 000	44 500	2 650	4 500	HMC2428	0.045
25	32	12	11 100	15 200	1 140	1 550	HC2512F	0.021
25	32	16	15 900	24 000	1 620	2 450	HC2516F	0.027
25	32	20	20 300	33 000	2 070	3 350	HC2520	0.034
25	32	26	26 400	46 000	2 690	4 700	HC2526	0.045
25	32	38	35 000	65 500	3 550	6 700	HC2538ZWD	0.065
25	33	10	9 150	10 400	935	1 060	HMC2510	0.019
25	33	20	21 800	31 500	2 220	3 200	HMC2520	0.039
25	33	25	26 700	41 000	2 720	4 200	HMC2525	0.048
25	33	30	32 500	53 000	3 300	5 400	HMC2530	0.058
26	34	16	17 100	23 400	1 740	2 390	HMC2616	0.032
28	35	16	16 700	26 400	1 700	2 690	HC2816C	0.03
28	35	20	21 300	36 000	2 170	3 700	HC2820	0.038
28	37	20	23 600	32 500	2 410	3 350	HMC2820	0.049
28	37	30	35 000	54 500	3 600	5 550	HMC2830	0.073
29	38	20	24 600	35 000	2 510	3 550	HMC2920	0.05
29	38	30	34 500	54 000	3 550	5 550	HMC2930	0.075
30	40	25	31 000	47 000	3 150	4 800	HMC3025	0.073
30	40	30	36 000	57 500	3 700	5 850	HMC3030	0.087