

MRC Bearing Solutions for the Hydrocarbon Processing Industry



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Bearings for Centrifugal Pumps; Selection of the Proper Bearing Solution

The most common cause of pump bearing failure is not fatigue.

Thrust bearings for centrifugal pumps seldom achieve the theoretical life specified by API and ANSI standards. This is because pump bearings usually fail from causes other than fatigue.

Causes include:

- Contamination
- Inadequate Lubrication
- Overheating
- Ball Skidding
- Cage Damage

Users tend to ignore the fact that bearings are designed for specific operating conditions and use the same bearing for most pump applications. Consequently, the 40 degree angular contact bearing is applied in applications where it may not be the best choice.

High contact angle vs. low contact angle.

Bearings with low contact angles are designed primarily for radial loads. Bearings with high contact angles are most suitable for thrust (axial) loads. Neither bearing does both well and compromises are often required to achieve acceptable bearing performance. Pump applications are not consistent and loads may vary from high thrust to near zero thrust to thrust in the opposite direction. High contact angle bearings require substantial thrust load to overcome the centrifugal and gyroscopic forces on the ball, to prevent ball skidding. The higher the contact angle, the more thrust load is required. Low contact angle bearings require little or no thrust load to prevent ball skidding. It is important not to forget that only one bearing in a set, mounted back-to-back or face-to-face is thrust loaded. The unloaded bearing has the same minimum thrust load requirement as the loaded bearing, and axial preload must be applied to the set to be sure that both bearings have adequate thrust loads to overcome the centrifugal and gyroscopic forces.

Assuring minimum required thrust load.

Operating preload plus the external thrust on the primary bearing is additive and the load may be high enough to cause unacceptably high operating temperatures. In this publication, the



minimum required thrust load for all bearings is listed. **To select the proper bearing, the external loads, temperatures, shaft fits and speed must be considered.** Only with this information can an optimum bearing solution be selected. If the above conditions cannot be determined, reasonable assumptions must be made to make the initial bearing selection.

Reasonable assumptions are:

- Open impellers develop relatively high thrust load, usually toward the intake
- Closed impellers usually have low thrust loads
- Double suction pumps usually have little or no thrust load
- Thrust loads in a direction opposite the intake are usually low

These assumptions should be used only as a guide for tentative bearing selection. Once the bearings have operated, the loads can be more accurately determined by observing the location and width of the ball path on the raceways.

MRC offers the widest selection of bearings for pumps in the bearing industry.

A solution exists for nearly every combination of loads and speeds. **Start the selection process by referring to pages two and three.** The information on these pages will guide you to the proper bearings. Call MRC Bearing Services at 1-800-MRC-7000 for additional information regarding bearing selection.

MRC Solutions

Bearing Type		Cage	Contact Angle	Performance Level	Characteristic				
					Radial Stiffness	Axial Stiffness	Speed	Radial Capacity	Thrust Capacity
S-Type Single Row Deep Groove		two-piece steel	Radial Type	Extremely High					
				Very High					
				High					
				Moderate	Low	Low	High	Low	Low
5000 Series Double Row		one-piece steel	30°	Extremely High					
				Very High					
				High					
				Moderate	Low	Low	High	Low	Low
7000 Series Duplex		ball-guided two-piece steel	29°	Extremely High					
				Very High					
				High					
				Moderate	Low	Low	High	Low	Low
8000 Series PumPac Bearing Set		land-guided one-piece machined brass	40°/15°	Extremely High					
				Very High					
				High					
				Moderate	Low	Low	High	Low	Low
8000 AAB Series PumPac Bearing Set		land-guided one-piece machined brass	40°/15°	Extremely High					
				Very High					
				High					
				Moderate	Low	Low	High	Low	Low
8000 BB Series PumPac Diamond Bearing Set		land-guided one-piece machined brass	15°/15°	Extremely High					
				Very High					
				High					
				Moderate	Low	Low	High	Low	Low
7000P & 7000PJ Duplex		ball-guided one-piece machine or stamped-brass	40°	Extremely High					
				Very High					
				High					
				Moderate	Low	Low	High	Low	Low
97000U2 Duplex Tandem Pair Radial & Axial Looseness in Bearing System		land-guided one-piece machined brass	29°	Extremely High					
				Very High					
				High					
				Moderate	Low	Low	High	Low	Low
97000UP2 Duplex Tandem Pair Radial & Axial Looseness in Bearing System		land-guided one-piece machined brass	40°	Extremely High					
				Very High					
				High					
				Moderate	Low	Low	High	Low	Low

Applications	For Details
<p>Steady rest positions to accommodate radial load in centrifugal pumps. Most electric motors use this bearing to accommodate radial loads. Seldom used as a primary thrust bearing in centrifugal pumps.</p>	<p>See Page 6-9</p>
<p>Most often used in ANSI pumps with moderate thrust loads. 5000 series bearings can also be used in the radial position when the radial load is excessive for SRDG 200S and 300S series.</p>	<p>See Page 10-13</p>
<p>For high speed centrifugal pumps. This bearing can run at higher speeds than the 7000P series and requires less thrust load to maintain proper traction forces between the ball and raceway surfaces.</p>	<p>See Page 14-15</p>
<p>For centrifugal pumps with heavy thrust loads that are not reversing or reverse only momentarily. Very effective as a thrust bearing in high speed pumps when direction of thrust is known. Forgiving in an application when thrust loads and temperatures are not determined.</p>	<p>See Page 16-18</p>
<p>For pumps involving very heavy primary thrust loads consisting of a PumPac triplex set with two 40 degree bearings in tandem matched back-to-back with one 15 degree bearing.</p>	<p>See Page 19-21</p>
<p>Balanced pumps, operating with light or no thrust loads at high speeds. Example: Double suction impeller pumps between bearing applications. Pumps with closed impellers, balance holes and pump-out vanes that result in light thrust loads.</p>	<p>See Page 22-23</p>
<p>For moderate speed centrifugal pumps, used as thrust bearings where high thrust loads are expected. Temperatures, loads and shaft fits should be known to establish proper preload or clearance.</p>	<p>See Page 24-29</p>
<p>For vertical or other pumps when endplay is not a major concern. This bearing type will be specified for speeds higher than those accommodated by the 97000UP series. This product is often used in ethylene stirrer motor applications.</p>	<p>See Page 30-31</p>
<p>For vertical pumps, other types of pumps and electric motor applications. For use where extremely high thrust load is possible. Often used in ethylene reactors as well as deep water pumps.</p>	<p>See Page 30-31</p>

Why a Preload or Clearance?

Angular contact bearings need a minimum required thrust load to keep the balls tracking at the designed contact angle. With less than the minimum required thrust load, centrifugal force will cause the balls to track at different contact angles on the outer ring and inner ring raceways.

The thrust load is assured by providing an adequate operating preload. Operating preload is dependent upon:

- Manufactured preload/clearance
- Shaft and housing interference fit
- Temperature differential between the inner and outer rings

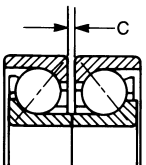
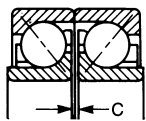
Angular contact bearings with high contact angles require a heavier minimum thrust load than a bearing with a low contact angle

For this fact bearings with low contact angles like the MRC BB series often work best in pumps where little or no thrust load is present and the loads are primarily radial in nature.

MRC offers a wide choice of angular contact bearings for the various load conditions. We offer 15, 29 and 40 degree bearings.

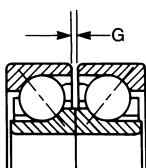
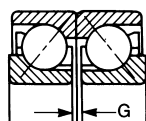
Call 1-800-MRC-7000 for assistance with selecting the proper bearing.

These charts show the manufactured preload or clearance standards for angular contact sets.



Bore diameter d over incl. mm		Axial Internal Clearance											
		Class											
		CA				CB				CC			
		.001 mm		.0001 in		.001 mm		.0001 in		.001 mm		.0001 in	
		min	max	min	max	min	max	min	max	min	max	min	max
-	10	4	12	1.5	5	14	22	6	9	22	30	9	12
10	18	5	13	2	5	15	23	6	9	24	32	9	13
18	30	7	15	3	6	18	26	7	10	32	40	13	16
30	50	9	17	4	7	22	30	9	12	40	48	16	19
50	80	11	23	4	9	26	38	10	15	48	60	19	24
80	120	14	26	5	10	32	44	13	17	55	67	22	26
120	180	17	29	7	11	35	47	14	19	62	74	24	29
180	250	21	37	8	15	45	61	18	24	74	90	29	35
250	315	26	42	10	17	52	68	21	27	90	106	35	42

MRC 7000 PJDE bearings are stocked with the "CB" execution.



Bore diameter d over incl. mm		Preload											
		Class											
		GA				GB				GC			
		N		lbf		N		lbf		N		lbf	
		min	max	min	max	min	max	min	max	min	max	min	max
10	18	0	80	0	18	30	330	7	74	230	660	52	150
18	30	0	120	0	27	40	480	9	110	340	970	76	220
30	50	0	160	0	36	60	630	13	140	450	1280	100	290
50	80	0	380	0	85	140	1500	31	340	1080	3050	240	690
80	120	0	410	0	92	150	1600	34	360	1150	3250	260	730
120	180	0	540	0	120	200	2150	45	480	1500	4300	340	970
180	250	0	940	0	210	330	3700	74	830	2650	7500	600	1690
250	315	0	1080	0	240	380	4250	85	960	3000	8600	670	1930

MRC 7000 PDU bearings are stocked with the "GA" execution

Handling and Maintenance

Contamination

A high percentage of ball and roller bearing problems can be attributed to foreign matter entering the system. Because bearings are highly sensitive to dirt and moisture, care must be taken to keep the bearings and pump cavity clean. Testing has shown that particles passing through a filter as fine as 5 microns may cause severe damage. Experience has shown that lubricating systems that pressurize the bearing cavity, such as air-oil-mist greatly reduce contamination and increase bearing life.

Lubrication

Generally, for ball bearings, it is a good rule to select an oil which will have a viscosity of at least 70 SUS (13 cSt) at the operating temperature. From the following chart, the operating viscosity of an ISO grade oil can be determined at the bearing operating temperature. The frequency of oil change depends upon the operating conditions and the quality of the lubricant. Mineral oils oxidize and should be replaced at three month intervals if operated at approximately 212° F (100° C). Longer intervals are possible at lower

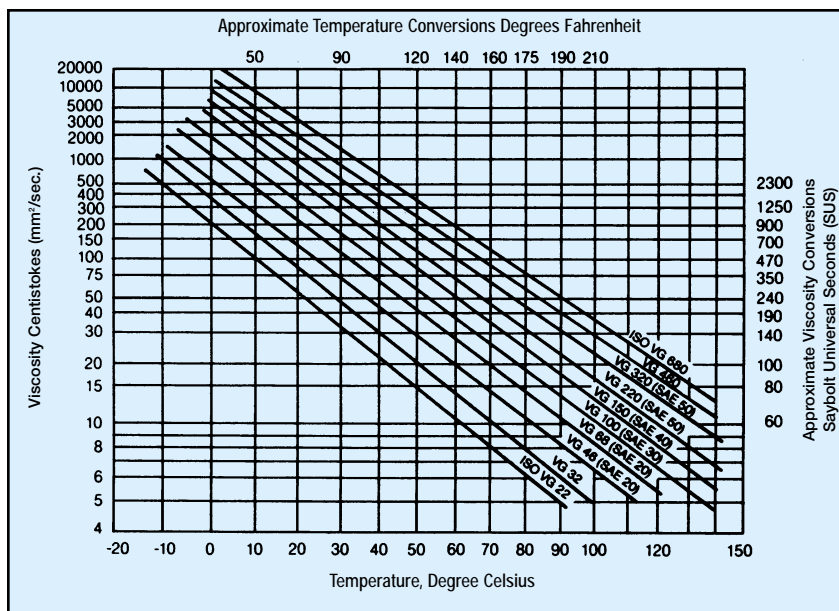
operating temperatures. Synthetic oils are more resistant to deterioration from exposure to high temperatures and may allow less frequent replacement. Early blackening of the oil strongly indicates a poor lubrication condition which can be from many sources. Multi-grade oils and lubricants with detergents and viscosity improvers are not recommended.

Shaft and Housing Fits

The standard recommended shaft and housing fit is included in the technical data section for each individual bearing. The tolerances are those recommended for bearings mounted on solid steel shafts. The interference fit between the bearing bore and the shaft journal causes a reduction of clearance in the bearings and an increase in operating preload. Excessive preload may result in a hot running condition. Bearings such as 7000 PDU that have "GA" preload in the unmounted condition usually employ a light interference fit such as an ISO h5 shaft fit. With bearings that have internal clearance "CB," heavier interference fits are usually acceptable. Each time a pump or motor

is rebuilt, both the shaft diameter and bearing bore should be measured to be absolutely sure that both meet specification and to eliminate the chance of creating excessive operating preload.

Stainless steel shafts have a higher coefficient of thermal expansion than carbon steel shafts. When bearings are installed on stainless steel shafts, it may be necessary to reduce the interference fit and/or select a bearing having greater clearance.

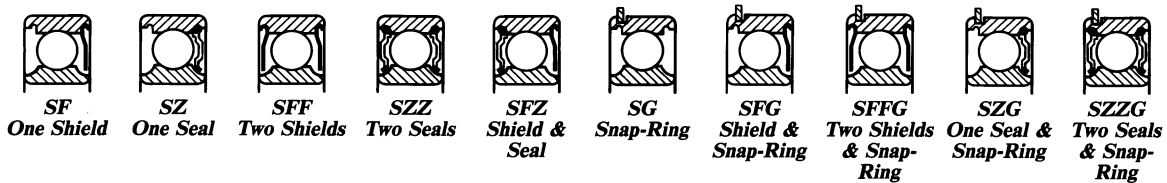
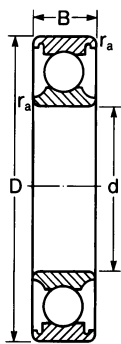


Operating Viscosity Chart

S-type, single-row, deep groove ball bearing (non-filling slot) 200 Series

S-type bearings are used in the radial position in nearly every centrifugal pump and are commonly used in electric motors and magnetic drive pumps.

- ABEC-1
- ABMA Class 3 clearance
- 30% full of polyurea grease in a bearing with double closures
- Two-piece riveted steel cage (no polyamide cages for petrochemical use)



MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS r _a mm in	BASIC RADIAL LOAD RATING		BALLS PER ROW	
					DYNAMIC C N lbf	STATIC C ₀ N lbf	NUMBER	DIAMETER mm in
206S	30 1.1811	62 2.4409	16 .6299	1.0 .04	19500 4380	11200 2520	9	9.525 .3750
207S	35 1.3780	72 2.8346	17 .6693	1.0 .04	25500 5730	15300 3440	9	11.113 .4375
208S	40 1.5748	80 3.1496	18 .7087	1.0 .04	30700 19000	19000 4270	9	12.304 .4844
209S	45 1.7717	85 3.3465	19 .7480	1.0 .04	33200 7460	21600 4860	10	12.304 .4844
210S	50 1.9685	90 3.5433	20 .7874	1.0 .04	35100 7890	23200 5220	10	12.700 .5000
211S	55 2.1654	100 3.9370	21 .8268	1.5 .06	43600 9800	29000 6520	10	14.288 .5625
212S	60 2.3622	110 4.3307	22 .8661	1.5 .06	47500 10700	32500 7310	10	15.083 .5938
213S	65 2.5591	120 4.7244	23 .9055	1.5 .06	55900 12600	40500 9110	11	15.875 .6250
214S	70 2.7559	125 4.9213	24 .9449	1.5 .06	60500 13600	45000 10100	11	16.670 .6563
215S	75 2.9528	130 5.1181	25 .9843	1.5 .06	66300 14900	49000 11000	11	17.463 .6875
216S	80 3.1496	140 5.5118	26 1.0236	2.0 .08	72800 16400	53000 11900	10	19.050 .7500
217S	85 3.3465	150 5.9055	28 1.1024	2.0 .08	83200 18700	64000 14400	10	20.638 .8125
218S	90 3.5433	160 6.2992	30 1.1811	2.0 .08	95600 21500	73500 16500	11	21.433 .8438

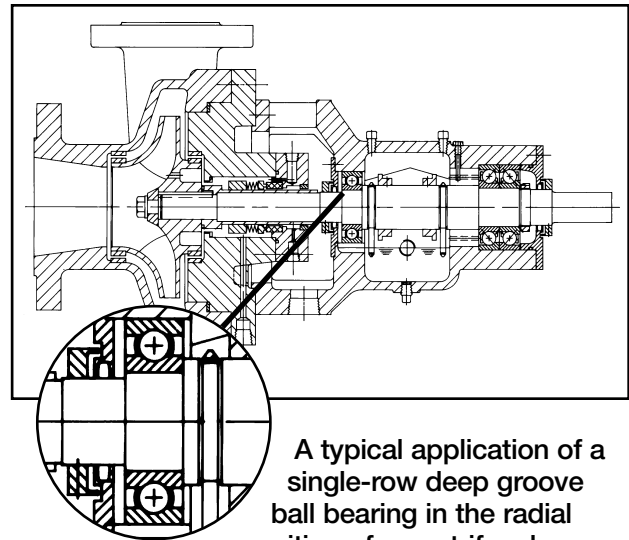
1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear
 2) Values have been determined through historical application and practice
 3) Rating for one million revolutions at 33 1/3 RPM

The API 610 standard recommends that bearings, other than angular contact bearings should have greater than Normal internal radial clearance. All MRC single-row, deep groove ball bearings, without filling slots, have greater than Normal clearance (C3) as standard.

MRC single-row, deep groove ball bearings are assembled with a two-piece, riveted steel ball cage. API 610 strongly recommends against the use of filling slot bearings. MRC product is API 610 compliant.

S-type bearings are available with a wide assortment of seals, shields and snap rings.

Sealed and shielded bearings are prepacked with a premium quality polyurea grease suitable for non-continuous operating temperatures as high as 300° F (150° C).



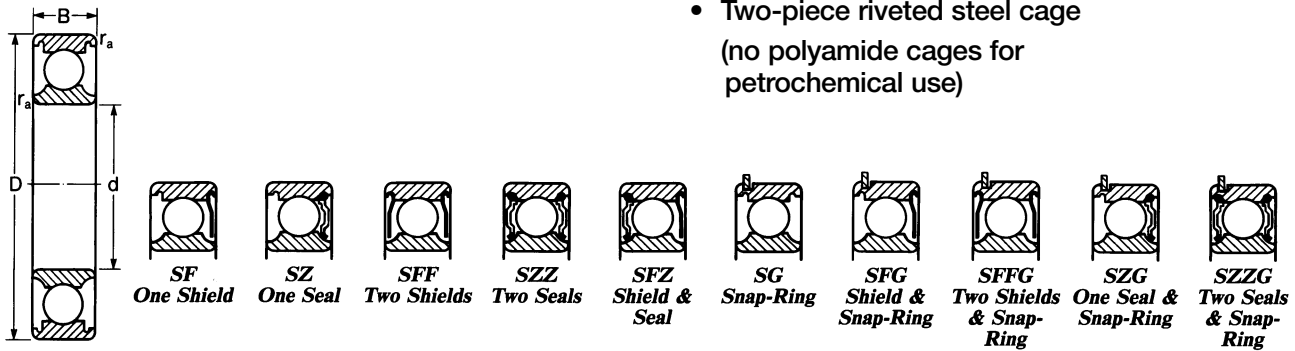
A typical application of a single-row deep groove ball bearing in the radial position of a centrifugal pump.

PITCH DIAMETER mm in	SPEED RATING ²⁾		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
	GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
46.0 1.8110	10000	13000	30.011 1.1815	30.002 1.1812	62.019 2.4416	62.000 2.4409
53.5 2.1063	9000	11000	35.013 1.3785	35.002 1.3781	72.019 2.8353	72.000 2.8346
60.0 2.3622	8500	10000	40.013 1.5753	40.002 1.5749	80.019 3.1503	80.000 3.1496
65.0 2.5591	7500	9000	45.013 1.7722	45.002 1.7718	85.022 3.3474	85.000 3.3465
70.0 2.7559	7000	8500	50.013 1.9690	50.002 1.9686	90.022 3.5442	90.000 3.5433
77.5 3.0512	6300	7500	55.015 2.1660	55.002 2.1655	100.022 3.9379	100.000 3.9370
84.5 3.3268	6000	7000	60.015 2.3628	60.002 2.3623	110.022 4.3316	110.000 4.3307
92.8 3.6535	5300	6300	65.015 2.5597	65.002 2.5592	120.022 4.7253	120.000 4.7244
97.5 3.8386	5000	6000	70.015 2.7565	70.002 2.7560	125.025 4.9223	125.000 4.9213
102.5 4.0354	4800	5600	75.015 2.9534	75.002 2.9529	130.025 5.1191	130.000 5.1181
110.0 4.3307	4500	5300	80.015 3.1502	80.002 3.1497	140.025 5.5128	140.000 5.5118
117.5 4.6260	4300	5000	85.018 3.3472	85.003 3.3466	150.025 5.9065	150.000 5.9055
125.0 4.9331	3800	4500	90.018 3.5440	90.003 3.5434	160.025 6.3002	160.000 6.2992

S-type, single-row, deep groove ball bearing (non-filling slot) 300 Series

S-type bearings are used in the radial position in nearly every centrifugal pump and are commonly used in electric motors and magnetic drives.

- ABEC-1
- ABMA Class 3 clearance
- 30% full of polyurea grease in a bearing with double closures
- Two-piece riveted steel cage (no polyamide cages for petrochemical use)



MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS r _a mm in	BASIC RADIAL LOAD RATING		BALLS PER ROW	
					DYNAMIC C N lbf	STATIC C ₀ N lbf	NUMBER	DIAMETER mm in
306S	30 1.1811	72 2.8346	19 .7480	1.0 .04	28100 6320	16000 3600	8	12.304 .4844
307S	35 1.3780	80 3.1496	21 .8268	1.5 .06	33200 7460	19000 4270	8	13.495 .5313
308S	40 1.5748	90 3.5433	23 .9055	1.5 .06	41000 9220	24000 5400	8	15.083 .5938
309S	45 1.7717	100 3.9370	25 .9843	1.5 .06	52700 11900	31500 7080	8	17.463 .6875
310S	50 1.9685	110 4.3307	27 1.0630	2.0 .08	61800 13900	38000 8540	8	19.050 .7500
311S	55 2.1654	120 4.7244	29 1.1417	2.0 .08	71500 16100	45000 10100	8	20.638 .8125
312S	60 2.3622	130 5.1181	31 1.2205	2.0 .08	81900 18400	52000 11700	8	22.225 .8750
313S	65 2.5591	140 5.5118	33 1.2992	2.0 .08	92300 20800	60000 13500	8	23.813 .9375
314S	70 2.7559	150 5.9055	35 1.3780	2.0 .08	104000 23400	68000 15300	8	25.400 1.0000
315S	75 2.9528	160 6.2992	37 1.4567	2.0 .08	114000 25600	76500 17200	8	26.988 1.0625
316S	80 3.1496	170 6.6929	39 1.5354	2.0 .08	124000 27900	86500 19400	8	28.575 1.1250
317S	85 3.3465	180 7.0866	41 1.6142	2.5 .10	133000 29900	96500 21700	8	30.163 1.1875
318S	90 3.5433	190 7.4803	43 1.6929	2.5 .10	143000 32100	108000 24300	8	31.750 1.2500

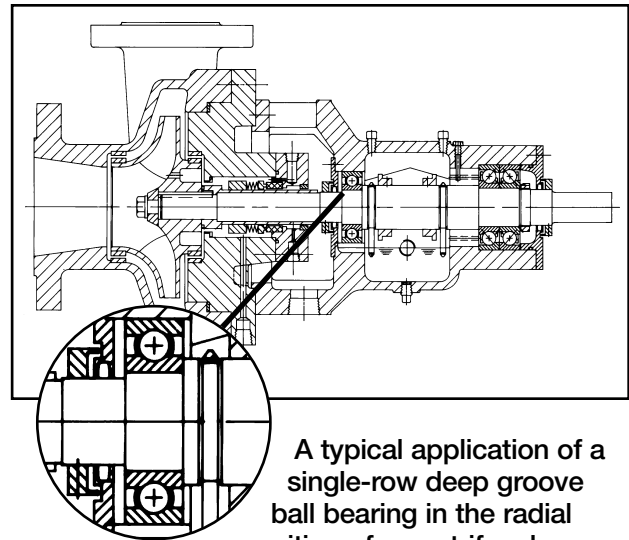
1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear
 2) Values have been determined through historical application and practice
 3) Rating for one million revolutions at 33 1/3 RPM

The API 610 standard recommends that bearings, other than angular contact bearings should have greater than Normal internal radial clearance. All MRC single-row, deep groove ball bearings, without filling slots, have greater than Normal clearance (C3) as standard.

MRC single-row, deep groove ball bearings are assembled with a two-piece, riveted steel ball cage. API 610 strongly recommends against the use of filling slot bearings. MRC product is API 610 compliant.

S-type bearings are available with a wide assortment of seals, shields and snap rings.

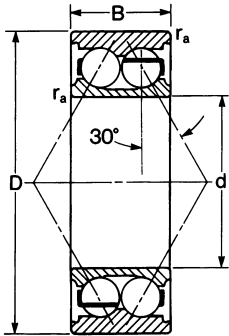
Sealed and shielded bearings are prepacked with a premium quality polyurea grease suitable for non-continuous operating temperatures as high as 300° F (150° C).



A typical application of a single-row deep groove ball bearing in the radial position of a centrifugal pump.

PITCH DIAMETER mm in	SPEED RATING ²⁾		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
	GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
52.0 2.0472	9000	11000	30.011 1.1815	30.002 1.1812	72.019 2.8353	72.000 2.8346
57.5 2.2638	8500	10000	35.013 1.3785	35.002 1.3781	80.019 3.1503	80.000 3.1496
65.0 2.5591	7500	9000	40.013 1.5753	40.002 1.5749	90.022 3.5442	90.000 3.5433
72.5 2.8543	6700	8000	45.013 1.7722	45.002 1.7718	100.022 3.9379	100.000 3.9370
80.0 3.1496	6300	7500	50.013 1.9690	50.002 1.9686	110.022 4.3316	110.000 4.3307
87.5 3.4449	5600	6700	55.015 2.1660	55.002 2.1655	120.022 4.7253	120.000 4.7254
95.0 3.7402	5000	6000	60.015 2.3628	60.002 2.3623	130.025 5.1191	130.000 5.1181
102.5 4.0354	4800	5600	65.015 2.5597	65.002 2.5592	140.025 5.5128	140.000 5.5118
110.0 4.3307	4500	5300	70.015 2.7565	70.002 2.7560	150.025 5.9065	150.000 5.9055
117.5 4.6260	4300	5000	75.015 2.9534	75.002 2.9529	160.025 6.3002	160.000 6.2992
125.0 4.9213	3800	4500	80.015 3.1502	80.002 3.1497	170.025 6.6939	170.000 6.6929
132.5 5.2165	3600	4300	85.018 3.3472	85.003 3.3466	180.025 7.0876	180.000 7.0866
140.0 5.5118	3400	4000	90.018 3.5440	90.003 3.5434	190.029 7.4814	190.000 7.4803

5200 C (non-filling slot) double row angular contact ball bearings



Double row angular contact ball bearings are used extensively in ANSI standard centrifugal pumps. In rare cases, it is used as a radial bearing in pumps and motors.

- ABEC-1
- 30° contact angle per row
- C3 internal radial clearance (many sizes available as Normal (C0))
- Contact angles converge outside the bearing
- One-piece steel cages (heat treated)
- Many sizes available with shields, seals and snap rings
- Double shielded and double sealed bearings packed 30% full of a high temperature polyurea grease

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS ¹⁾ r _a mm in	BASIC RADIAL LOAD RATING ²⁾		BALLS PER ROW	
					DYNAMIC ⁴⁾ C N lbf	STATIC C _o N lbf	NUMBER	DIAMETER mm in
5206C	30 1.1811	62 2.4409	23.81 .9375	1.0 .04	29600 6660	21200 4770	9	9.525 .3750
5207C	35 1.3780	72 2.8346	26.99 1.0625	1.0 .04	37700 8480	27500 6180	9	11.113 .4375
5208C	40 1.5748	80 3.1496	30.16 1.1875	1.0 .04	44900 10100	34000 7640	9	12.304 .4844
5209C	45 1.7717	85 3.3465	30.16 1.1875	1.0 .04	48800 11000	39000 8770	10	12.304 .4844
5210C	50 1.9685	90 3.5433	30.16 1.1875	1.0 .04	48800 11000	39000 8770	10	12.304 .4844
5211C	55 2.1654	100 3.9370	33.34 1.3125	1.5 .06	57200 12900	47500 10700	10	13.495 .5313
5212C	60 2.3622	110 4.3307	36.51 1.4375	1.5 .06	70200 15800	58500 13200	10	15.083 .5938
5213C	65 2.5591	120 4.7244	38.10 1.5000	1.5 .06	80600 18100	73500 16500	11	15.875 .6250
5214C	70 2.7559	125 4.9213	39.69 1.5625	1.5 .06	88400 19900	80000 18000	11	16.670 .6563
5215C	75 2.9528	130 5.1181	41.28 1.6250	1.5 .06	95600 21500	88000 19800	11	17.463 .6875
5216C	80 3.1496	140 5.5118	44.45 1.7500	2.0 .08	106000 23900	95000 21400	10	19.050 .7500
5217C	85 3.3465	150 5.9055	49.21 1.9375	2.0 .08	124000 27900	110000 24700	10	20.638 .8125
5218C	90 3.5433	160 6.2992	52.39 2.0625	2.0 .08	130000 29300	120000 27000	10	21.433 .8438

1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear

2) For thrust rating multiply C by 0.81 and Co by 0.66

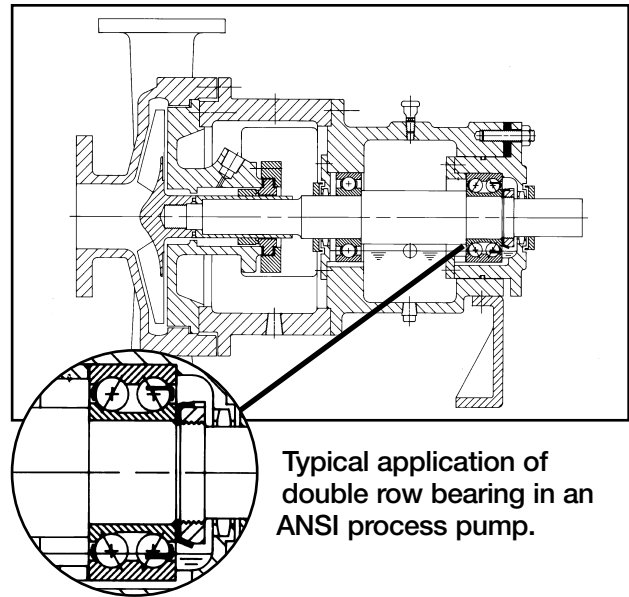
3) Values have been determined through historical application and practice

4) Rating for one million revolutions or 500 hours at 33 1/3 RPM

Most ANSI style pumps and some older API style pumps use the double row type bearing as the primary thrust bearing.

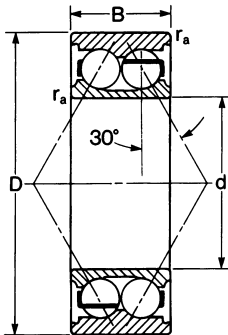
The 30° per row contact angle allows this bearing to carry moderately heavy thrust loads. To achieve optimum performance double row bearings require some radial load. In the chart below, the minimum radial load is listed.

MRC 5000 C Bearings are compliant with API 610 requirements. **Double row bearings with ball loading grooves are not recommended for pump applications.**



	PITCH DIAMETER mm in	MIN. REQD. RADIAL LOAD AT 3600 RPM N lbf	THRUST FOR 25000 HRS L10 AT 3600 RPM N lbf	SPEED RATING ³⁾		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	46.0 1.8110	842 189	1370 307	7000	9500	30.011 1.1815	30.002 1.1812	62.019 2.4416	62.000 2.4409
	52.5 2.0663	1100 247	1740 391	6000	8000	35.013 1.3785	35.002 1.3781	72.019 2.8353	72.000 2.8346
	58.7 2.3122	1370 308	2070 466	5600	7500	40.013 1.5753	40.002 1.5749	80.019 3.1503	80.000 3.1496
	65.0 2.5591	1680 378	2260 508	5000	6700	45.013 1.7722	45.002 1.7718	85.022 3.3474	85.000 3.3465
	68.9 2.7107	1890 425	2260 508	4800	6300	50.013 1.9690	50.002 1.9686	90.022 3.5442	90.000 3.5433
	75.4 2.9682	2260 508	2650 596	4300	5600	55.015 2.1660	55.002 2.1655	100.022 3.9379	100.000 3.9370
	82.5 3.2464	2710 609	3240 729	3800	5000	60.015 2.3628	60.002 2.3623	110.022 4.3316	110.000 4.3307
	93.5 3.6818	3480 782	3720 836	3600	4800	65.015 2.5597	65.002 2.5592	120.022 4.7253	120.000 4.7244
	97.5 3.8386	3780 850	4090 919	3200	4300	70.015 2.7565	70.002 2.7560	125.025 4.9223	125.000 4.9213
	101.5 3.9955	4100 922	4420 993	3200	4300	75.015 2.9534	75.002 2.9529	130.025 5.1191	130.000 5.1181
	108.4 4.2685	4680 1050	4890 1100	2800	3800	80.015 3.1502	80.002 3.1497	140.025 5.5128	140.000 5.5118
	115.6 4.5502	5320 1200	5740 1290	2600	3600	85.018 3.3472	85.003 3.3466	150.025 5.9065	150.000 5.9055
	123.5 4.8629	6070 1360	6010 1350	2400	3400	90.018 3.5440	90.003 3.5434	160.025 6.3002	160.000 6.2992

5300 C double row angular contact ball bearing



Double row angular contact ball bearings are used extensively in ANSI standard centrifugal pumps. In rare cases, it is used as a radial bearing in pumps and motors.

- ABEC-1
- 30° contact angle per row
- C3 internal radial clearance (many sizes available as Normal (C0))
- Contact angles converge outside the bearing
- One-piece steel cages (heat treated)
- Many sizes available with shields, seals and snap rings
- Double shielded and double sealed bearings packed 30% full of a high temperature polyurea grease

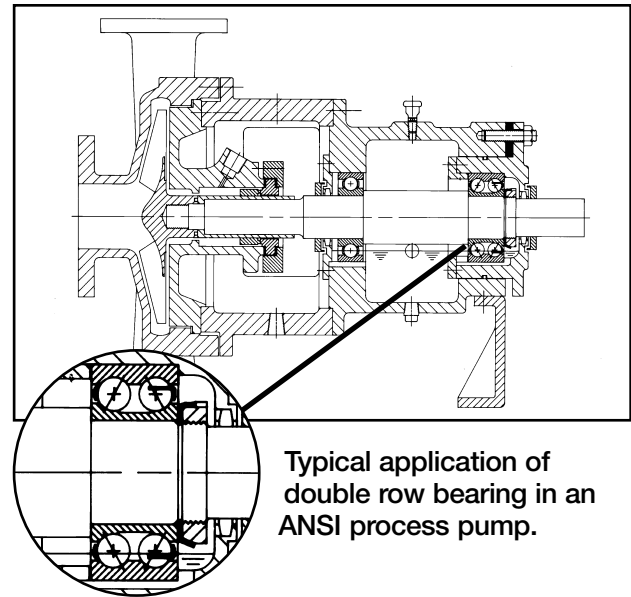
MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS ¹⁾ r _a mm in	BASIC RADIAL LOAD RATING ²⁾		BALLS PER ROW	
					DYNAMIC ⁴⁾ C N lbf	STATIC C ₀ N lbf	NUMBER	DIAMETER mm in
5306C	30 1.1811	72 2.8346	30.16 1.1875	1.0 .04	41600 9360	29000 6520	8	12.303 .4844
5307C	35 1.3780	80 3.1496	34.93 1.3750	1.5 .06	49400 11100	34500 7760	8	13.495 .5313
5308C	40 1.5748	90 3.5433	36.51 1.4375	1.5 .06	60500 13600	43000 9760	8	15.083 .5938
5309C	45 1.7717	100 3.9370	39.69 1.5625	1.5 .06	72800 16400	53000 11900	8	16.670 .6563
5310C	50 1.9685	110 4.3307	44.45 1.7500	2.0 .08	85200 19200	64000 14400	8	18.258 .7188
5311C	55 2.1654	120 4.7244	49.21 1.9375	2.0 .08	106000 23900	81500 18300	8	20.638 .8125
5312C	60 2.3622	130 5.1181	53.98 2.1250	2.0 .08	121000 27200	95000 21400	8	22.225 .8750
5313C	65 2.5591	140 5.5118	58.74 2.3125	2.0 .08	138000 31100	108000 24300	8	23.813 .9375
5314C	70 2.7559	150 5.9055	63.50 2.5000	2.0 .08	153000 34400	125000 28100	8	25.400 1.000
5315C	75 2.9528	160 6.2992	68.26 2.6875	2.0 .08	168000 37800	140000 31500	8	26.988 1.0625
5316C	80 3.1496	170 6.6929	68.26 2.6875	2.0 .08	182000 41000	156000 35100	8	28.575 1.1250
5317C	85 3.3465	180 7.0866	73.03 2.8750	2.5 .10	195000 43900	176000 39600	8	30.163 1.1875
5318C	90 3.5433	190 7.4803	73.03 2.8750	2.5 .10	212000 47700	196000 44100	8	31.750 1.2500

1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear
 2) For thrust rating multiply C by 0.81 and Co by 0.66
 3) Values have been determined through historical application and practice
 4) Rating for one million revolutions or 500 hours at 33 1/3 RPM
 5) Based on 1800 RPM for 5316C through 5318C

Most ANSI style pumps and some older API style pumps use the double row type bearing as the primary thrust bearing.

The 30° per row contact angle allows this bearing to carry moderately heavy thrust loads. To achieve optimum performance double row bearings require some radial load. In the chart below, the minimum radial load is listed.

MRC 5000 C Bearings are compliant with API 610 requirements. Double row bearings with ball loading grooves are not recommended for pump applications.



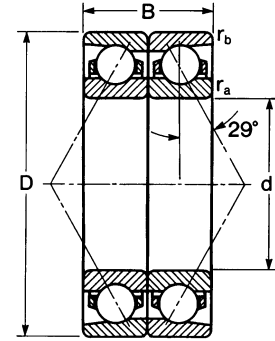
Typical application of double row bearing in an ANSI process pump.

	PITCH DIAMETER mm in	MIN. REQD. RADIAL LOAD AT 3600 RPM N lbf	THRUST FOR 25000 HRS L10 AT 3600 RPM N lbf	SPEED RATING ³⁾		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	51.3 2.0215	1220 274	1920 432	6300	8500	30.011 1.1815	30.002 1.1812	72.019 2.8353	72.000 2.8346
	56.2 2.2138	1470 330	2280 512	5600	7500	35.013 1.3785	35.002 1.3781	80.019 3.1503	80.000 3.1496
	63.0 2.4790	1840 414	2790 628	5000	6700	40.013 1.5753	40.002 1.5749	90.022 3.5442	90.000 3.5433
	70.0 2.7544	2270 510	3370 757	4500	6000	45.013 1.7722	45.002 1.7718	100.022 3.9379	100.000 3.9370
	77.5 3.0512	2790 627	3940 886	4000	5300	50.013 1.9690	50.002 1.9686	110.022 4.3316	110.000 4.3307
	86.2 3.3949	3450 776	4890 1100	3800	5000	55.015 2.1660	55.002 2.1655	120.022 4.7253	120.000 4.7244
	93.4 3.6777	4050 910	5600 1260	3400	4500	60.015 2.3628	60.002 2.3623	130.025 5.1191	130.000 5.1181
	101.0 3.9754	4740 1070	6410 1440	3200	4300	65.015 2.5597	65.002 2.5592	140.025 5.5128	140.000 5.5118
	109.1 4.2954	5530 1240	7070 1590	2800	3800	70.015 2.7565	70.002 2.7560	150.025 5.9065	150.000 5.9055
	114.0 4.4870	6030 1360	7740 1740	2600	3600	75.015 2.9534	75.002 2.9529	160.025 6.3002	160.000 6.2992
	124.0 4.8804	4500 ⁵⁾ 1010	10600 ⁵⁾ 2390	2400	3400	80.015 3.1502	80.002 3.1497	170.025 6.6939	170.000 6.6929
	131.4 5.1734	5040 ⁵⁾ 1130	11400 ⁵⁾ 2560	2200	3200	85.018 3.3472	85.003 3.3466	180.025 7.0876	180.000 7.0866
	138.8 5.4664	5630 ⁵⁾ 1270	12300 ⁵⁾ 2770	2000	3000	90.018 3.5440	90.003 3.5434	190.029 7.4814	190.000 7.4803

7000 DU series 29° angular contact ball bearings

The MRC 7000 DU series is a medium contact angle bearing. Similar in design to the MRC 7000 PDU series, the lower contact angle allows for higher speeds, lower thrust load requirements and greater radial loads.

- ABEC 1
- Heavy-stock, stamped steel cages
- 29° contact angle
- “GA” preload



MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1)		BASIC RADIAL LOAD RATING 2)		BALLS PER ROW	
				r _a mm in	r _b mm in	DYNAMIC C N lbf	STATIC Co N lbf	NUMBER	DIAMETER mm in
7218DU	90 3.5433	160 6.2992	60 2.3622	2.0 .08	1.0 .04	190000 42700	236000 53100	16	22.225 .8750
7220DU	100 3.9370	180 7.0866	68 2.6772	2.0 .08	1.0 .04	225000 50600	260000 58500	17	23.813 .9375
7222DU	110 4.3307	200 7.8740	76 2.9921	2.0 .08	1.0 .04	265000 59600	310000 69700	16	26.988 1.0625
7224DU	120 4.7244	215 8.4646	80 3.1496	2.0 .08	1.0 .04	281000 63200	355000 79800	16	28.575 1.1250
7307DU	35 1.3780	80 3.1496	42 1.6535	1.5 .06	1.0 .04	58500 13200	48000 10800	12	12.700 .5000
7308DU	40 1.5748	90 3.5433	46 1.8110	1.5 .06	1.0 .04	71500 16100	61000 13700	12	14.288 .5625
7309DU	45 1.7717	100 3.9370	50 1.9685	1.5 .06	1.0 .04	85200 19200	75000 16900	12	15.875 .6250
7310DU	50 1.9685	110 4.3307	54 2.1260	2.0 .08	1.0 .04	121000 27200	106000 23800	12	19.050 .7500
7311DU	55 2.1654	120 4.7244	58 2.2835	2.0 .08	1.0 .04	140000 31500	125000 28100	12	20.638 .8125
7312DU	60 2.3622	130 5.1181	62 2.4409	2.0 .08	1.0 .04	159000 35700	146000 32800	12	22.225 .8750
7313DU	65 2.5591	140 5.5118	66 2.5984	2.0 .08	1.0 .04	178000 40000	173000 38900	14	22.225 .8750
7314DU	70 2.7559	150 5.9055	70 2.7559	2.0 .08	1.0 .04	182000 40900	170000 38200	12	23.813 .9375
7315DU	75 2.9528	160 6.2992	74 2.9134	2.0 .08	1.0 .04	225000 50600	228000 51300	14	25.400 1.0000
7316DU	80 3.1496	170 6.6929	78 3.0709	2.0 .08	1.0 .04	234000 52600	240000 54000	13	26.988 1.0625
7317DU	85 3.3465	180 7.0866	82 3.2283	2.5 .10	1.0 .04	265000 59600	285000 64100	14	28.575 1.1250
7318DU	90 3.5433	190 7.4803	86 3.3858	2.5 .10	1.0 .04	276000 62000	300000 67400	13	30.163 1.1875
7319DU	95 3.7402	200 7.8740	90 3.5433	2.5 .10	1.0 .04	291000 65400	325000 73100	13	31.750 1.2500
7320DU	100 3.9370	215 8.4646	94 3.7008	2.5 .10	1.0 .04	312000 70100	365000 82100	13	33.338 1.3125
7321DU	105 4.1339	225 8.8583	98 3.8583	2.5 .10	1.0 .04	332000 74600	400000 89900	13	34.925 1.3750
7322DU	110 4.3307	240 9.4488	100 3.9370	2.5 .10	1.0 .04	371000 83400	475000 107000	13	38.100 1.5000
7324DU	120 4.7244	260 10.2362	110 4.3307	2.5 .10	1.0 .04	423000 95100	560000 126000	13	41.275 1.6250
7326DU	130 5.1181	280 11.0236	116 4.5669	3.0 .12	1.0 .04	468000 105000	640000 144000	13	44.450 1.7500
7328DU	140 5.5118	300 11.8110	124 4.8319	3.0 .12	1.0 .04	507000 114000	735000 165000	13	47.625 1.8750

1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear
 2) For thrust rating multiply C by 0.81 and Co by 1.47
 3) Listed values are for machined brass cages. Values have been determined through historical application and practice

Due to the 29° contact angle and smaller balls, this bearing can run with a relatively low thrust load. It also runs well with a combination of moderate thrust and radial load.

The 7000 DU series should be considered for applications where thrust is moderate and the pump has a history of running hot. Many older style API pumps were equipped with the 7000 DU bearing-type. When replaced with a 40°

angular contact bearing, these older pumps often run much hotter.

These bearings are stocked with flush ground faces ("GA" preload). When heavier than recommended shaft interferences are employed, a bearing with a clearance (CB) may be necessary. Special clearances can be obtained on a made-to-order basis.

	PITCH DIAMETER mm in	MIN. REQ. ⁵⁾ THRUST LOAD AT 3600 RPM N lbf	THRUST FOR ⁵⁾ 25000 HRS L10 AT 3600 RPM N lbf	SPEED RATING ³⁾		RECOMMENDED SHAFT DIAMETER (h5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	125.0 4.9212	1230 277	8790 1977	2900	3800	90.000 3.5433	89.985 3.5427	160.025 6.3002	160.000 6.2992
	132.5 5.2165	458 103 ⁵⁾	13100 2950 ⁵⁾	2600	3300	100.000 3.9370	99.985 3.9364	180.025 7.0876	180.000 7.0866
	155.0 6.1023	689 155 ⁵⁾	15500 3480 ⁵⁾	2300	3000	110.000 4.3307	109.985 4.3301	200.029 7.8751	200.000 7.8740
	166.7 6.5647	881 198 ⁵⁾	16400 3690 ⁵⁾	2200	2800	120.000 4.7244	119.985 4.7238	215.029 8.4647	215.000 8.4646
	57.8 2.2751	76 17	2720 611	6800	8800	35.000 1.3780	34.990 1.3776	80.019 3.1503	80.000 3.1496
	65.3 2.5719	120 27	3310 745	5800	7600	40.000 1.5748	39.990 1.5744	90.022 3.5442	90.000 3.5433
	72.9 2.8687	187 42	3950 889	5100	6600	45.000 1.7717	44.990 1.7713	100.022 3.9379	100.000 3.9370
	80.0 3.1496	342 77	5600 1260	4600	6000	50.000 1.9685	49.990 1.9681	110.022 4.3316	110.000 4.3307
	85.4 3.3610	476 107	6490 1460	4100	5300	55.000 2.1654	54.988 2.1649	120.022 4.7253	120.000 4.7244
	95.0 3.7401	649 146	7340 1650	3900	5100	60.000 2.3622	59.988 2.3617	130.025 5.1191	130.000 5.1181
	103.0 4.0557	841 189	8230 1850	3700	4800	65.000 2.5591	64.988 2.5586	140.025 5.5128	140.000 5.5118
	110.0 4.3307	947 213	8410 1890	3300	4200	70.000 2.7559	69.988 2.7554	150.025 5.9065	150.000 5.9055
	118.1 4.6491	1440 323	10400 2340	3100	4000	75.000 2.9528	74.988 2.9523	160.025 6.3002	160.000 6.2992
	125.0 4.9212	1700 383	10900 2440	2900	3800	80.000 3.1496	79.988 3.1491	170.025 6.6939	170.000 6.6929
	133.2 5.2427	2310 519	12300 2760	2800	3600	85.000 3.3465	84.985 3.3459	180.025 7.0876	180.000 7.0866
	140.0 5.5118	667 150	16100 3620	2600	3400	90.000 3.5433	89.985 3.5427	190.029 7.4814	190.000 7.4803
	147.5 5.8071	818 184	17000 3820	2500	3200	95.000 3.7402	94.985 3.7396	200.029 7.8751	200.000 7.8740
	157.5 6.2007	1020 229 ⁵⁾	18200 4090 ⁵⁾	2400	3100	100.000 3.9370	99.985 3.9364	215.029 8.4647	215.000 8.4646
	165.0 6.4960	1220 275 ⁵⁾	19300 4350 ⁵⁾	2300	3000	105.000 4.1339	104.985 4.1333	225.029 8.8594	225.000 8.8583
	175.9 6.9242	1670 376 ⁵⁾	21700 4870 ⁵⁾	2200	2800	110.000 4.3307	109.985 4.3301	240.029 9.4499	240.000 9.4488
	188.9 7.4351	2310 520 ⁵⁾	24700 5550 ⁵⁾	2000	2600	120.000 4.7244	119.985 4.7238	260.032 10.2375	260.000 10.2362
	203.8 8.0227	3120 701 ⁵⁾	27300 6130 ⁵⁾	1800	2400	130.000 5.1181	129.982 5.1174	280.032 11.0247	280.000 11.0236
	218.7 8.6104	4110 925 ⁵⁾	29600 6650 ⁵⁾	1800	2200	140.000 5.5118	139.982 5.5111	300.032 11.8123	300.000 11.8110

4) Rating for one million revolutions or 500 hours at 33 1/3 RPM

5) Based on 1800 RPM for 7220DU through 7224DU and 7318DU through 7328DU

PumPac 8000 Series

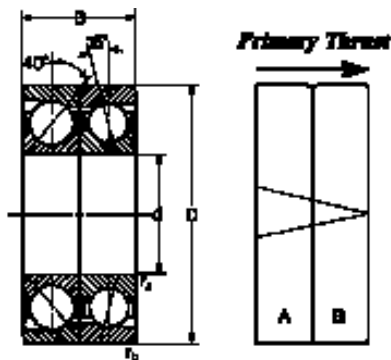
The PumPac series is a matched set consisting of 40° and 15° angular contact ball bearings with computer optimized internal design. The 8000 series has one 40° bearing mounted back-to-back with a 15° bearing. The 8000 AAB series has two tandem mounted 40° bearings mounted back-to-back with one 15° bearing.

- ABEC 3 Tolerances
- 40°/15° Contact Angles
- Land-riding machined brass cage
- “CB” Clearance
- Heat treated for dimensional stability
- “V” etched O.D.

The PumPac 8000 series is used in centrifugal pumps, large vertical electric motors, compressors, centrifuges, and other applications subject to thrust loads operating at relatively high speeds. The bearings are mounted so that the 40° bearing takes the primary thrust, or axial load.

Traditionally, matched sets of 40° angular contact bearings are used to obtain maximum theoretical fatigue life, but in most instances only a fraction of the calculated life is actually achieved. At the heart of these premature failures are phenomena known as “ball sliding” and “ball shuttling” in the unloaded or inactive bearing. Angular contact bearings used in high speed (i.e., 3600 RPM) pumps and other applications require a minimum axial load for proper operation. Without axial load, centrifugal and gyroscopic forces in the unloaded bearing can cause the balls to rotate at an angle to their true rolling axis and momentarily lose contact with the raceway. As a result, a microscopic wear or lapping process occurs, giving the appearance of a burnished or polished raceway. The oil film thickness separating the ball and raceway is reduced, producing friction and heat with lower oil viscosity, accelerating wear. This thermally unstable condition dramatically reduces bearing service life.

The main benefit of the PumPac bearing system is that the 15° bearing is designed with considerably less internal clearance than the 40 degree bearing, making it less susceptible to the centrifugal and gyroscopic forces which result in ball sliding or shuttling. This bearing also provides additional radial stiffness helping to maintain integrity of the shaft and mechanical seals. The 40 degree loaded bearing provides sufficient axial rigidity under the imposed thrust load.



MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS ¹⁾		40° (A) Bearing						
				r _a mm in	r _b mm in	BASIC RADIAL LOAD RATING ²⁾		BALLS PER ROW		PITCH DIAMETER mm in	MIN. REQD. THRUST AT 3600 RPM N lbf	THRUST FOR. 25000 HRS L10 @ 3600 RPM N lbf
						DYNAMIC ⁴⁾ C N lbf	STATIC Co N lbf	NUMBER	DIAMETER mm in			
8218	90 3.5433	160 6.2992	60 2.3622	2.0 .08	1.0 .04	133000 29900	143000 32100	15	23.020 .9063	125.0 4.9394	1925 433	13270 2980
8219	95 3.7402	170 6.6929	64 2.5197	2.0 .08	1.0 .04	151000 33900	163000 36600	15	24.608 .9688	133.0 5.2360	2487 559	15060 3380
8220	100 3.9370	180 7.0866	68 2.6772	2.0 .08	1.0 .04	159000 35700	173000 38900	15	25.400 1.0000	140.0 5.5318	2904 653	15900 3560
8222	110 4.3307	200 7.8770	76 2.9921	2.0 .08	1.0 .04	190000 42700	220000 49500	15	28.575 1.1250	155.0 6.1248	4563 1026	19000 4260
8224	120 4.7244	215 8.4646	80 3.1496	2.0 .08	1.0 .04	238000 53500	245000 55100	15	30.163 1.1875	167.5 6.6184	5838 1312	23700 5340
8238	190 7.4803	340 13.3858	110 4.3307	3.0 .12	1.0 .04	351000 78900	570000 128000	17	42.863 1.6875	265.0 10.4668	8097 ⁵⁾ 1820	44100 ⁵⁾ 9920
8308	40 1.5748	90 3.5433	46 1.8110	1.5 .06	1.0 .04	60500 13600	45500 10200	10	16.670 .6563	65.0 2.5591	224 50	6040 1360
8309	45 1.7717	100 3.9370	50 1.9685	1.5 .06	1.0 .04	76100 17100	61000 13700	11	18.258 .7188	72.5 2.8544	377 85	7590 1710
8310	50 1.9685	110 4.3307	54 2.1260	2.0 .08	1.0 .04	87100 19600	72000 16200	11	19.845 .7813	80.0 3.1496	470 106	8690 1950
8311	55 2.1654	120 4.7244	58 2.2845	2.0 .08	1.0 .04	101000 22700	85000 19100	11	21.433 .8438	87.5 3.4449	743 167	10100 2270
8312	60 2.3622	130 5.1181	62 2.4409	2.0 .08	1.0 .04	114000 25600	96500 21700	11	23.020 .9063	95.0 3.7402	1002 225	11400 2560
8313	65 2.5591	140 5.5118	66 2.5984	2.0 .08	1.0 .04	127000 28500	112000 25200	11	24.608 .9688	102.5 4.0355	1483 333	12700 2850
8314	70 2.7559	150 5.9055	70 2.7559	2.0 .08	1.0 .04	148000 33300	134000 31500	11	26.988 1.0625	110.0 4.3307	1874 421	14800 3320
8315	75 2.9528	160 6.2992	74 2.9134	2.0 .08	1.0 .04	159000 35700	150000 33700	11	28.575 1.1250	117.5 4.6260	2368 532	15900 3570
8316	80 3.1496	170 6.6929	78 3.0709	2.0 .08	1.0 .04	172000 38700	166000 37300	11	30.163 1.1875	125.0 4.9213	2797 629	17200 3860
8317	85 3.3465	180 7.0866	82 3.2283	2.5 .10	1.0 .04	186000 41800	186000 41800	11	31.750 1.2500	132.5 5.2166	3491 785	18600 4170
8318	90 3.5433	190 7.4803	86 3.3858	2.5 .10	1.0 .04	199000 44700	204000 45900	11	33.338 1.3125	130.0 5.5118	4307 968	19900 4460
8319	95 3.7402	200 7.8740	90 3.5433	2.5 .10	1.0 .04	212000 47600	228000 51300	11	34.925 1.3750	147.5 5.8071	5258 1182	21100 4750
8320	100 3.9370	215 8.4646	94 3.7008	2.5 .10	1.0 .04	238000 53500	270000 60700	12	36.513 1.4375	157.5 6.2008	8157 1834	23700 5340
8322	110 4.3307	240 9.4488	100 3.9370	2.5 .10	1.0 .04	265000 59600	320000 71900	12	39.688 1.5625	175.0 6.8898	2931 ⁵⁾ 659	33300 ⁵⁾ 7490
8326	130 5.1181	280 11.0236	116 4.5669	3.0 .12	1.0 .04	345000 77500	455000 102000	12	47.625 1.8750	205.0 8.0709	5284 ⁵⁾ 1188	43400 ⁵⁾ 9750
8330	150 5.9055	320 12.5984	130 5.1181	3.0 .12	1.0 .04	410000 92100	585000 132000	12	53.975 2.1250	235.0 9.2520	8848 ⁵⁾ 1989	51500 ⁵⁾ 11600
8336	180 7.0866	380 14.9606	150 5.9055	3.0 .12	1.0 .04	507000 114000	815000 183000	13	60.325 2.3750	280.0 11.0236	16219 ⁵⁾ 3646	63700 ⁵⁾ 14300

- 1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear
2) For thrust rating of bearing (A), multiply C by 1.75 and Co by 3.85
For thrust rating of bearing (B), multiply C by 0.83 and Co by 2.00

15° (B) Bearing							3)		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
BASIC RADIAL LOAD RATING 2)		BALLS PER ROW		PITCH DIAMETER mm in	MIN. REQD. 5) THRUST AT 3600 RPM N lbf	THRUST FOR 25000 HRS L10 @ 3600 RPM N lbf	SPEED RATING		MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
DYNAMIC 4) C N lbf	STATIC Co N lbf	NUMBER	DIAMETER mm in				GREASE RPM	OIL RPM				
124000 27900	108000 24300	15	22.225 .8750	125.4 4.9362	271 61	5560 1250	3400	4500	90.018 3.5440	90.003 3.5434	160.025 6.3002	160.000 6.2992
133000 29900	118000 26500	16	22.225 .8750	133.4 5.2516	311 70	5960 1340	3200	4300	95.018 3.7409	95.003 3.7403	170.025 6.6939	170.000 6.6929
146000 32800	134000 30100	16	23.813 .9375	141.7 5.5768	405 91	6490 1460	3000	4000	100.018 3.9377	100.003 3.9371	180.025 7.0876	180.000 7.0866
182000 40900	170000 38200	16	26.988 1.0625	156.9 6.1754	649 146	8100 1820	2600	3600	110.018 4.3314	110.003 4.3308	200.029 7.8751	200.000 7.8740
199000 44700	193000 29200	16	28.575 1.1250	167.9 6.6096	827 186	8810 1980	2200	3200	120.018 4.7251	120.003 4.7245	215.029 8.4647	215.000 8.4646
377000 84800	500000 112000	17	42.863 1.6875	265.4 10.4500	1183 5) 266	20900 5) 4690	1400	1900	190.024 7.4812	190.004 7.4805	340.036 13.3872	340.000 13.3858
48800 11000	33500 7530	12	14.288 .5625	65.3 2.5719	27 6	2220 500	6700	9000	40.013 1.5753	40.002 1.5749	90.022 3.5442	90.000 3.5433
58500 13200	40500 9100	12	15.875 .6250	72.9 2.8687	44 10	2670 600	6000	8000	45.013 1.7722	45.002 1.7718	100.022 3.9379	100.000 3.9370
76100 17100	52000 11700	11	19.050 .7500	78.8 3.1025	71 16	3430 770	5300	7000	50.013 1.9690	50.002 1.9686	110.022 4.3316	110.000 4.3307
88400 19900	61000 13700	11	20.638 .8125	85.4 3.3610	98 22	4000 900	4800	6300	55.015 2.1660	55.002 2.1655	120.022 4.7253	120.000 4.7244
101000 22700	71000 16000	11	22.225 .8750	95.0 3.7401	138 31	4540 1020	4500	6000	60.015 2.3628	60.002 2.3623	130.025 5.1191	130.000 5.1181
108000 24300	80000 18000	12	22.225 .8750	103.0 4.0557	165 37	4850 1090	4300	5600	65.015 2.5597	65.002 2.5592	140.025 5.5128	140.000 5.5118
121000 27200	93000 20900	12	23.813 .9375	110.5 4.3524	218 49	5430 1220	3800	5000	70.015 2.7565	70.002 2.7560	150.025 5.9065	150.000 5.9055
146000 32800	114000 25600	13	25.400 1.0000	118.0 4.6491	307 69	6540 1470	3600	4800	75.015 2.9534	75.002 2.9529	160.025 6.3002	160.000 6.2992
159000 35700	129000 42700	13	26.988 1.0625	125.6 4.9459	396 89	7120 1600	3400	4500	80.015 3.1502	80.002 3.1497	170.025 6.6939	170.000 6.6929
174000 39100	146000 32800	13	28.575 1.1250	133.2 5.2427	498 112	7780 1750	3200	4300	85.018 3.3472	85.003 3.3466	180.025 7.0876	180.000 7.0866
186000 41800	160000 36000	13	30.163 1.1875	140.0 5.5118	614 138	8270 1860	3000	4000	90.018 3.5440	90.003 3.5434	190.029 7.4814	190.000 7.4803
199000 44700	180000 40500	13	31.750 1.2500	148.2 5.8361	761 171	8760 1970	2800	3800	95.018 3.7409	95.003 3.7403	200.029 7.8751	200.000 7.8740
212000 47700	200000 45000	13	33.338 1.3125	158.3 6.2318	943 212	9340 2100	2600	3600	100.018 3.9377	100.003 3.9371	215.029 8.4647	215.000 8.4646
255000 57300	255000 57300	13	38.100 1.5000	175.9 6.9242	387 5) 87	14300 5) 3220	2200	3200	110.018 4.3314	110.003 4.3308	240.029 9.4499	240.000 9.4488
296000 66500	345000 77600	13	44.450 1.7500	203.8 8.0227	712 5) 160	16400 5) 3680	1800	2600	130.021 5.1189	130.003 5.1182	280.032 11.0247	280.000 11.0236
390000 87700	475000 107000	13	49.213 1.9375	233.6 9.1956	1121 5) 252	21500 5) 4840	1600	2200	150.021 5.9063	150.003 5.9056	320.036 12.5998	320.000 12.5984
475000 107000	640000 144000	14	57.150 2.2500	278.3 10.9561	2269 5) 510	25800 5) 5800	1300	1600	180.021 7.0874	180.003 7.0867	380.036 14.9620	380.000 14.9606

3) Values have been determined through historical application and practice

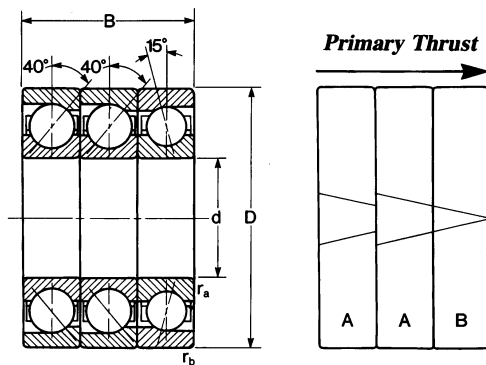
4) Rating for one million revolutions or 500 hours at 33 1/3 RPM calculated according to actual bearing geometry

5) Based on 1800 RPM for 8238 and 8322 through 8336

PumPac 8000 AAB Series

The PumPac 8000 AAB series consists of a triplex set with two 40° bearings matched back-to-back with one 15° bearing.

- ABEC 3 Tolerances
- 40°/15° Contact Angles
- Land-riding machined brass cage
- “CB” Clearance



MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS ¹⁾		40° (AA) Bearings						
				r _a mm in	r _b mm in	BASIC RADIAL LOAD RATING ²⁾		BALLS PER ROW		PITCH DIAMETER mm in	MIN. REQD. ⁵⁾ THRUST AT 3600 RPM N lbf	THRUST FOR. ⁵⁾ 25000 HRS L10 @ 3600 RPM N lbf
						DYNAMIC ⁴⁾ C N lbf	STATIC Co N lbf	NUMBER	DIAMETER mm in			
8218AAB	90 3.5433	160 6.2992	90 3.5433	2.0 .08	1.0 .04	216000 48500	285000 64100	15	23.020 .9063	125.0 4.9394	3850 866	21546 4838
8219AAB	95 3.7402	170 6.6929	96 3.7795	2.0 .08	1.0 .04	247000 55500	325000 73100	15	24.608 .9688	133.0 5.2360	4974 1118	24638 5536
8220AAB	100 3.9370	180 7.0866	102 4.0157	2.0 .08	1.0 .04	260000 58400	345000 78700	15	25.400 1.0000	140.0 5.5318	5808 1306	25935 5825
8222AAB	110 4.3307	200 7.8770	114 4.4882	2.0 .08	1.0 .04	307000 69000	440000 98900	15	28.575 1.1250	155.0 6.1248	9126 2052	30623 6883
8224AAB	120 4.7244	215 8.4646	120 4.7244	2.0 .08	1.0 .04	390000 87600	490000 110000	15	30.163 1.1875	167.5 6.6184	11676 2624	38903 8738
8238AAB	190 7.4803	340 13.3858	165 6.4961	3.0 .12	1.0 .04	572000 129000	1140000 256000	17	42.863 1.6875	265.0 10.4668	16194 ⁵⁾ 3640	71889 ⁵⁾ 16213
8308AAB	40 1.5748	90 3.5433	69 2.7165	1.5 .06	1.0 .04	97500 21900	91500 20600	10	16.670 .6563	65.0 2.5591	448 100	9726 2185
8309AAB	45 1.7717	100 3.9370	75 2.9528	1.5 .06	1.0 .04	124000 27900	122000 27400	11	18.258 .7188	72.5 2.8544	754 170	12369 2783
8310AAB	50 1.9685	110 4.3307	81 3.1890	2.0 .08	1.0 .04	143000 32100	143000 32100	11	19.845 .7813	80.0 3.1496	940 212	14264 3202
8311AAB	55 2.1654	120 4.7244	87 3.4252	2.0 .08	1.0 .04	165000 37100	170000 38200	11	21.433 .8438	87.5 3.4449	1486 334	16459 3701
8312AAB	60 2.3622	130 5.1181	93 3.6614	2.0 .08	1.0 .04	186000 41800	193000 43400	11	23.020 .9063	95.0 3.7402	2004 450	18554 4170
8313AAB	65 2.5591	140 5.5118	99 3.8976	2.0 .08	1.0 .04	208000 46700	224000 50400	11	24.608 .9688	102.5 4.0355	2966 666	20748 4658
8314AAB	70 2.7559	150 5.9055	105 4.1339	2.0 .08	1.0 .04	242000 54400	270000 60700	11	26.988 1.0625	110.0 4.3307	3748 842	24140 5426
8315AAB	75 2.9528	160 6.2992	111 4.3701	2.0 .08	1.0 .04	260000 58400	300000 67400	11	28.575 1.1250	117.5 4.6260	4736 1064	25935 5825
8316AAB	80 3.1496	170 6.6929	117 4.6063	2.0 .08	1.0 .04	281000 63100	335000 75300	11	30.163 1.1875	125.0 4.9213	5594 1258	28030 6294
8317AAB	85 3.3465	180 7.0866	123 4.8425	2.5 .10	1.0 .04	302000 67900	375000 84300	11	31.750 1.2500	132.5 5.2166	6982 1570	30125 6773
8318AAB	90 3.5433	190 7.4803	129 5.0787	2.5 .10	1.0 .04	325000 73000	405000 91000	11	33.338 1.3125	130.0 5.5118	8614 1936	32419 7282
8319AAB	95 3.7402	200 7.8740	135 5.3150	2.5 .10	1.0 .04	345000 77500	455000 102000	11	34.925 1.3750	147.5 5.8071	10516 2364	34414 7731
8320AAB	100 3.9370	215 8.4646	141 5.5512	2.5 .10	1.0 .04	390000 87600	540000 121000	12	36.513 1.4375	157.5 6.2008	16314 3668	38903 8738
8322AAB	110 4.3307	240 9.4488	150 5.9055	2.5 .10	1.0 .04	436000 98000	640000 144000	12	39.688 1.5625	175.0 6.8898	5862 ⁵⁾ 1318	54796 ⁵⁾ 12317
8326AAB	130 5.1181	280 11.0236	174 6.8504	3.0 .12	1.0 .04	559000 126000	915000 206000	12	47.625 1.8750	205.0 8.0709	10568 ⁵⁾ 2376	70255 ⁵⁾ 15836
8330AAB	150 5.9055	320 12.5984	195 7.6772	3.0 .12	1.0 .04	663000 149000	1180000 265000	12	53.975 2.1250	235.0 9.2520	17696 ⁵⁾ 3978	83326 ⁵⁾ 18726
8336AAB	180 7.0866	380 14.9606	225 8.8583	3.0 .12	1.0 .04	824000 185000	1630000 366000	13	60.325 2.3750	280.0 11.0236	32436 ⁵⁾ 7292	103560 ⁵⁾ 23251

1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear

2) For thrust rating of bearings (AA), multiply C by 1.75 and Co by 3.85
For thrust rating of bearing (B), multiply C by 0.83 and Co by 2.00

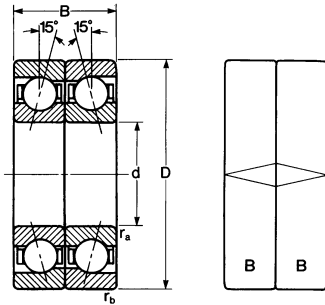
	15° (B) Bearing							3)		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
	BASIC RADIAL LOAD RATING 2)		BALLS PER ROW		PITCH DIAMETER mm in	MIN. REQD. 5) THRUST AT 3600 RPM N lbf	THRUST FOR 25000 HRS L10 @ 3600 RPM N lbf	SPEED RATING		MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	DYNAMIC 4) C N lbf	STATIC Co N lbf	NUMBER	DIAMETER mm in				GREASE RPM	OIL RPM				
	124000 27900	108000 24300	15	22.225 .8750	125.4 4.9362	271 61	5560 1250	3400	4500	90.018 3.5440	90.003 3.5434	160.025 6.3002	160.000 6.2992
	133000 29900	118000 26500	16	22.225 .8750	133.4 5.2516	311 70	5960 1340	3200	4300	95.018 3.7409	95.003 3.7403	170.025 6.6939	170.000 6.6929
	146000 32800	134000 30100	16	23.813 .9375	141.7 5.5768	405 91	6490 1460	3000	4000	100.018 3.9377	100.003 3.9371	180.025 7.0876	180.000 7.0866
	182000 40900	170000 38200	16	26.988 1.0625	156.9 6.1754	649 146	8100 1820	2600	3600	110.018 4.3314	110.003 4.3308	200.029 7.8751	200.000 7.8740
	199000 44700	193000 29200	16	28.575 1.1250	167.9 6.6096	827 186	8810 1980	2200	3200	120.018 4.7251	120.003 4.7245	215.029 8.4647	215.000 8.4646
	377000 84800	500000 112000	17	42.863 1.6875	265.4 10.4500	1183 5) 266	20900 5) 4690	1400	1900	190.024 7.4812	190.004 7.4805	340.036 13.3872	340.000 13.3858
	48800 11000	33500 7530	12	14.288 .5625	65.3 2.5719	27 6	2220 500	6700	9000	40.013 1.5753	40.002 1.5749	90.022 3.5442	90.000 3.5433
	58500 13200	40500 9100	12	15.875 .6250	72.9 2.8687	44 10	2670 600	6000	8000	45.013 1.7722	45.002 1.7718	100.022 3.9379	100.000 3.9370
	76100 17100	52000 11700	11	19.050 .7500	78.8 3.1025	71 16	3430 770	5300	7000	50.013 1.9690	50.002 1.9686	110.022 4.3316	110.000 4.3307
	88400 19900	61000 13700	11	20.638 .8125	85.4 3.3610	98 22	4000 900	4800	6300	55.015 2.1660	55.002 2.1655	120.022 4.7253	120.000 4.7244
	101000 22700	71000 16000	11	22.225 .8750	95.0 3.7401	138 31	4540 1020	4500	6000	60.015 2.3628	60.002 2.3623	130.025 5.1191	130.000 5.1181
	108000 24300	80000 18000	12	22.225 .8750	103.0 4.0557	165 37	4850 1090	4300	5600	65.015 2.5597	65.002 2.5592	140.025 5.5128	140.000 5.5118
	121000 27200	93000 20900	12	23.813 .9375	110.5 4.3524	218 49	5430 1220	3800	5000	70.015 2.7565	70.002 2.7560	150.025 5.9065	150.000 5.9055
	146000 32800	114000 25600	13	25.400 1.0000	118.0 4.6491	307 69	6540 1470	3600	4800	75.015 2.9534	75.002 2.9529	160.025 6.3002	160.000 6.2992
	159000 35700	129000 42700	13	26.988 1.0625	125.6 4.9459	396 89	7120 1600	3400	4500	80.015 3.1502	80.002 3.1497	170.025 6.6939	170.000 6.6929
	174000 39100	146000 32800	13	28.575 1.1250	133.2 5.2427	498 112	7780 1750	3200	4300	85.018 3.3472	85.003 3.3466	180.025 7.0876	180.000 7.0866
	186000 41800	160000 36000	13	30.163 1.1875	140.0 5.5118	614 138	8270 1860	3000	4000	90.018 3.5440	90.003 3.5434	190.029 7.4814	190.000 7.4803
	199000 44700	180000 40500	13	31.750 1.2500	148.2 5.8361	761 171	8760 1970	2800	3800	95.018 3.7409	95.003 3.7403	200.029 7.8751	200.000 7.8740
	212000 47700	200000 45000	13	33.338 1.3125	158.3 6.2318	943 212	9340 2100	2600	3600	100.018 3.9377	100.003 3.9371	215.029 8.4647	215.000 8.4646
	255000 57300	255000 57300	13	38.100 1.5000	175.9 6.9242	387 5) 87	14300 5) 3220	2200	3200	110.018 4.3314	110.003 4.3308	240.029 9.4499	240.000 9.4488
	296000 66500	345000 77600	13	44.450 1.7500	203.8 8.0227	712 5) 160	16400 5) 3680	1800	2600	130.021 5.1189	130.003 5.1182	280.032 11.0247	280.000 11.0236
	390000 87700	475000 107000	13	49.213 1.9375	233.6 9.1956	1121 5) 252	21500 5) 4840	1600	2200	150.021 5.9063	150.003 5.9056	320.036 12.5998	320.000 12.5984
	475000 107000	640000 144000	14	57.150 2.2500	278.3 10.9561	2269 5) 510	25800 5) 5800	1300	1600	180.021 7.0874	180.003 7.0867	380.036 14.9620	380.000 14.9606

3) Values have been determined through historical application and practice

4) Rating for one million revolutions or 500 hours at 33 1/3 RPM calculated according to actual bearing geometry

5) Based on 1800 RPM for 8238AA and 8322 through 8336

8000 BB PumPac Diamond — 15° angular contact ball bearing



The PumPac Diamond series consists of two “B” bearings from the regular PumPac series. These 15 degree angular contact ball bearings are placed back-to-back, so that the etching on the bearing outside diameters form a diamond. This bearing system is designed to carry primarily radial loads with light thrust loads in either direction. It incorporates all of the other PumPac features including the land-riding, machined brass cage and special heat treatment for optimum dimensional stability.

- ABEC 3 tolerances
- Land-riding machined brass cage
- “CB” clearance
- Specially heat treated for dimensional stability
- Diamond etched O.D.

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1)		BASIC RADIAL LOAD RATING 2)		BALLS PER ROW	
				r _a mm in	r _b mm in	DYNAMIC 4) C N lbf	STATIC C ₀ N lbf	NUMBER	DIAMETER mm in
8218BB	90 3.5433	160 6.2992	60 2.3622	2.0 .08	1.0 .04	203000 45600	216000 48600	15	22.225 .8750
8219BB	95 3.7402	170 6.6929	64 2.5197	2.0 .08	1.0 .04	216000 48600	236000 53100	16	22.225 .8750
8220BB	100 3.9370	180 7.0866	68 2.6772	2.0 .08	1.0 .04	238000 53500	270000 60700	16	23.813 .9375
8222BB	110 4.3307	200 7.8770	76 2.9921	2.0 .08	1.0 .04	296000 66500	340000 76400	16	26.988 1.0625
8224BB	120 4.7244	215 8.4646	80 3.1496	2.0 .08	1.0 .04	319000 71800	390000 87700	16	28.575 1.1250
8238BB	190 7.4803	340 13.3858	110 4.3307	3.0 .12	1.0 .04	605000 136000	1000000 225000	17	42.863 1.6875
8308BB	40 1.5748	90 3.5433	46 1.8110	1.5 .06	1.0 .04	79300 17800	67000 15100	12	14.288 .5625
8309BB	45 1.7717	100 3.9370	50 1.9685	1.5 .06	1.0 .04	95600 21500	81500 18300	12	15.875 .6250
8310BB	50 1.9685	110 4.3307	54 2.1260	2.0 .08	1.0 .04	124000 27900	104000 23400	11	19.050 .7500
8311BB	55 2.1654	120 4.7244	58 2.2845	2.0 .08	1.0 .04	143000 32100	122000 27400	11	20.638 .8125
8312BB	60 2.3622	130 5.1181	62 2.4409	2.0 .08	1.0 .04	165000 37100	143000 32100	11	22.225 .8750
8313BB	65 2.5591	140 5.5118	66 2.5984	2.0 .08	1.0 .04	174000 39100	160000 36000	11	22.225 .8750
8314BB	70 2.7559	150 5.9055	70 2.7559	2.0 .08	1.0 .04	199000 44700	190000 42700	12	23.813 .9375
8315BB	75 2.9528	160 6.2992	74 2.9134	2.0 .08	1.0 .04	238000 53500	228000 51300	13	25.400 1.0000
8316BB	80 3.1496	170 6.6929	78 3.0709	2.0 .08	1.0 .04	255000 57300	260000 58500	13	26.988 1.0625
8317BB	85 3.3465	180 7.0866	82 3.2283	2.5 .10	1.0 .04	281000 63200	260000 58500	13	28.575 1.1250
8318BB	90 3.5433	190 7.4803	86 3.3858	2.5 .10	1.0 .04	302000 67900	325000 73100	13	30.163 1.1875
8319BB	95 3.7402	200 7.8740	90 3.5433	2.5 .10	1.0 .04	325000 73100	360000 80900	13	31.750 1.2500
8320BB	100 3.9370	215 8.4646	94 3.7008	2.5 .10	1.0 .04	345000 77600	400000 89900	13	33.338 1.3125
8322BB	110 4.3307	240 9.4488	100 3.9370	2.5 .10	1.0 .04	416000 93500	510000 115000	13	38.100 1.5000
8326BB	130 5.1181	280 11.0236	116 4.5669	3.0 .12	1.0 .04	475000 107000	695000 156000	13	44.450 1.7500
8330BB	150 5.9055	320 12.5984	130 5.1181	3.0 .12	1.0 .04	624000 140000	950000 214000	13	49.213 1.9375
8336BB	180 7.0866	380 14.9606	150 5.9055	3.0 .12	1.0 .04	780000 175000	1270000 286000	14	57.150 2.2500

1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear

2) For thrust rating multiply C by 0.51 and C₀ by 1.00

The PumPac Diamond is used in centrifugal pumps and motors where the thrust loads are light and radial loads predominate. Double suction pumps with between bearing designs and pumps with closed impellers usually benefit from this bearing solution. The 15 degree contact angle causes the bearings to run cooler in these types of pumps. Vibration is also substantially reduced. Even though the calculated life of the PumPac diamond may be less than that for a 40 degree bearing solution, longer service life in low thrust load application can be expected. PumPac Diamond bearing

sets are supplied in pairs, strapped together, ready for assembly. PumPac Diamond can not be installed backwards, because both bearings are identical. In high temperature applications, it may be necessary to provide extra clearance in the set to avoid radial preload. Call 1-800-MRC-7000 for assistance in determining the correct clearance.

To determine when an application's thrust load warrants using PumPac Diamond, see the tabulations below.

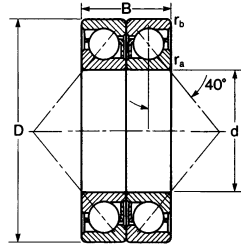
	PITCH DIAMETER mm in	MIN. REQD. ⁵⁾ THRUST LOAD AT 3600 RPM N lbf	THRUST FOR ⁵⁾ 25000 HRS L10 AT 3600 RPM N lbf	SPEED RATING ³⁾		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	125.4 4.9362	271 61	5560 1250	3800	5400	90.018 3.5440	90.003 3.5434	160.025 6.3002	160.000 6.2992
	133.4 5.2516	311 70	5960 1340	3600	5100	95.018 3.7409	95.003 3.7403	170.025 6.6939	170.000 6.6929
	141.7 5.5768	405 91	6490 1460	3400	4800	100.018 3.9377	100.003 3.9371	180.025 7.0876	180.000 7.0866
	156.9 6.1754	649 146	8100 1820	3000	4400	110.018 4.3314	110.003 4.3308	200.029 7.8751	200.000 7.8740
	167.9 6.6096	827 186	8810 1980	2800	4100	120.018 4.7251	120.003 4.7245	215.029 8.4647	215.000 8.4646
	265.4 10.4500	1183 266 ⁵⁾	20900 4690 ⁵⁾	1800	2600	190.024 7.4812	190.004 7.4805	340.036 13.3872	340.000 13.3858
	65.3 2.5719	27 6	2220 500	7500	11000	40.013 1.5753	40.002 1.5749	90.022 3.5442	90.000 3.5433
	72.9 2.8687	44 10	2670 600	6800	9600	45.013 1.7722	45.002 1.7718	100.022 3.9379	100.000 3.9370
	78.8 3.1025	71 16	3430 770	6300	9000	50.013 1.9690	50.002 1.9686	110.022 4.3316	110.000 4.3307
	85.4 3.3610	98 22	4000 900	5600	8100	55.013 2.1660	55.002 2.1655	120.022 4.7253	120.000 4.7244
	95.0 3.7401	138 31	4540 1020	5000	7200	60.015 2.3628	60.002 2.3623	130.025 5.1191	130.000 5.1181
	103.0 4.0557	165 37	4850 1090	4800	6800	65.015 2.5597	65.002 2.5592	140.025 5.5128	140.000 5.5118
	110.5 4.3524	218 49	5430 1220	4500	6300	70.015 2.7565	70.002 2.7560	150.025 5.9065	150.000 5.9055
	118.0 4.6491	307 69	6540 1470	4300	6000	75.015 2.9534	75.002 2.9529	160.025 6.3002	160.000 6.2992
	125.6 4.9459	396 89	7120 1600	3800	5400	80.015 3.1502	80.002 3.1497	170.025 6.6939	170.000 6.6929
	133.2 5.2427	498 112	7780 1750	3600	5100	85.018 3.3472	85.003 3.3466	180.025 7.0876	180.000 7.0866
	140.0 5.5118	614 138	8270 1860	3400	4800	90.018 3.5440	90.003 3.5434	190.029 7.4814	190.000 7.4803
	148.2 5.8361	761 171	8760 1970	3300	4500	95.018 3.7409	95.003 3.7403	200.029 7.8751	200.000 7.8740
	158.3 6.2318	943 212	9340 2100	3000	4400	100.018 3.9377	100.003 3.9371	215.029 8.4647	215.000 8.4646
	175.9 6.9242	1557 350	19100 4300	2600	3900	110.018 4.3314	110.003 4.3308	240.029 9.4499	240.000 9.4488
	203.8 8.0227	712 160 ⁵⁾	16400 3680 ⁵⁾	2300	3300	130.021 5.1189	130.003 5.1182	280.032 11.0247	280.000 11.0236
	233.6 9.1956	1121 252 ⁵⁾	21500 4840 ⁵⁾	2000	2900	150.021 5.9063	150.003 5.9056	320.036 12.5998	320.000 12.5984
	278.3 10.9561	2269 510 ⁵⁾	25800 5800 ⁵⁾	1600	2400	180.021 7.0874	180.003 7.0867	380.036 14.9620	380.000 14.9606

3) Values have been determined through historical application and practice

4) Rating for one million revolutions or 500 hours at 33 1/3 RPM calculated according to actual bearing geometry

5) Based on 1800 RPM for 8238BB and 8326BB through 8336BB

7000 PJDE — 40° angular contact bearing with machined brass, ball centered cage; CB clearance



The 7000 PJDE bearing is supplied with a ball centered machined brass cage with a “CB” clearance.

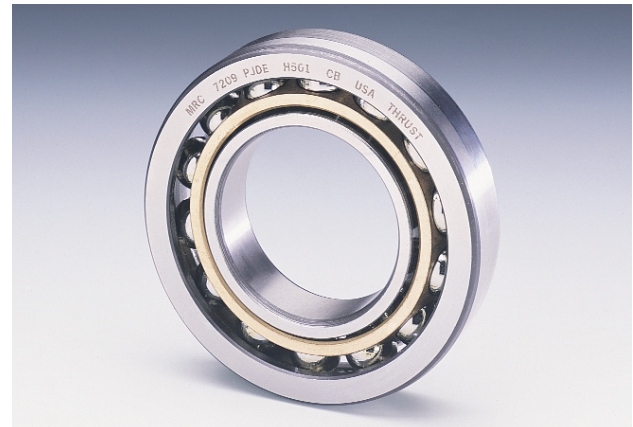
Call 1-800-MRC-7000 for availability and other clearance/preload executions.

- ABEC 3
- Ball guided machined brass cage
- Special clearance, available on a made-to order basis.
- Stocked as half pairs universal duplex
- 40° contact angle

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS ¹⁾		BASIC RADIAL LOAD RATING ²⁾		BALLS PER ROW	
				r _a mm in	r _b mm in	DYNAMIC ⁴⁾ C N lbf	STATIC Co N lbf	NUMBER	DIAMETER mm in
7218PJDE	90 3.5433	160 6.2992	60 2.3622	2.0 .08	1.0 .04	178000 40000	190000 42700	16	22.500 0.8858
7220PJDE	100 3.9370	180 7.0866	68 2.6772	2.0 .08	1.0 .04	221000 49700	245000 55100	16	25.400 1.0000
7222PJDE	110 4.3307	200 7.8740	76 2.9921	2.0 .08	1.0 .04	260000 58500	290000 65200	15	28.575 1.1250
7224PJDE	120 4.7244	215 8.4646	80 3.1496	2.0 .08	1.0 .04	270000 60700	325000 73100	15	30.163 1.1875
7307PJDE	35 1.3780	80 3.1496	42 1.6535	1.5 .06	1.0 .04	62400 14000	49000 11000	11	14.288 0.5625
7308PJDE	40 1.5748	90 3.5433	46 1.8110	1.5 .06	1.0 .04	74100 16800	61000 13700	11	15.875 0.6250
7309PJDE	45 1.7717	100 3.9370	50 1.9685	1.5 .06	1.0 .04	92300 20800	75000 16900	11	17.700 0.6968
7310PJDE	50 1.9685	110 4.3307	54 2.1260	2.0 .08	1.0 .04	112000 25200	95000 21400	11	19.844 0.7813
7311PJDE	55 2.1654	120 4.7244	58 2.2835	2.0 .08	1.0 .04	130000 29200	110000 24700	11	21.431 0.8438
7312PJDE	60 2.3622	130 5.1181	62 2.4409	2.0 .08	1.0 .04	156000 35100	140000 31500	12	23.019 0.9063
7313PJDE	65 2.5591	140 5.5118	66 2.5984	2.0 .08	1.0 .04	174000 39100	160000 36000	12	24.606 0.9688
7314PJDE	70 2.7559	150 5.9055	70 2.7559	2.0 .08	1.0 .04	195000 43800	180000 40500	12	26.194 1.0313
7315PJDE	75 2.9528	160 6.2992	74 2.9134	2.0 .08	1.0 .04	203000 45600	193000 43400	12	26.988 1.0625
7316PJDE	80 3.1496	170 6.6929	78 3.0709	2.0 .08	1.0 .04	221000 49700	220000 49500	12	28.575 1.1250
7317PJDE	85 3.3465	180 7.0866	82 3.2283	2.5 .10	1.0 .04	238000 53500	245000 55100	12	30.162 1.1875
7318PJDE	90 3.5433	190 7.4803	86 3.3858	2.5 .10	1.0 .04	255000 57300	270000 60700	12	31.750 1.2500
7319PJDE	95 3.7402	200 7.8740	90 3.5433	2.5 .10	1.0 .04	270000 60700	300000 67400	12	33.338 1.3125
7320PJDE	100 3.9370	215 8.4646	94 3.7008	2.5 .10	1.0 .04	325000 73100	380000 85400	12	37.980 1.5000
7321PJDE	105 4.1339	225 8.8583	98 3.8583	2.5 .10	1.0 .04	325000 73100	380000 85400	12	37.980 1.5000
7322PJDE	110 4.3307	240 9.4488	100 3.9370	2.5 .10	1.0 .04	364000 81800	450000 101000	12	41.275 1.6250
7324PJDE	120 4.7244	260 10.2362	110 4.3307	2.5 .10	1.0 .04	410000 92200	520000 117000	12	44.450 1.7500
7326PJDE	130 5.1181	280 11.0236	116 4.5669	3.0 .12	1.0 .04	449000 101000	600000 135000	12	47.625 1.8750
7328PJDE	140 5.5118	300 11.8110	124 4.8319	3.0 .12	1.0 .04	495000 111000	680000 153000	12	50.800 2.0000

1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear
 2) For thrust rating multiply C by 1.08 and Co by 1.93
 3) Listed values are for machined brass cage. Values have been determined through historical application and practice

The MRC 7000 PJDU type bearing with a stamped brass cage is the most popular pump thrust bearing in service today. Recent trends in the petrochemical industry indicate a change to the 7000 PJDE execution with a machined brass cage. With the machined cage, and the “CB” clearance, the 7000 PJDE series offers an economical solution for a wide range of applications. Most pump users have found the machined cage to be more “forgiving” when skidding and cavitation are likely to occur.

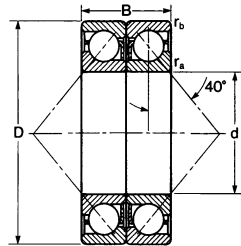


	PITCH DIAMETER mm in	MIN. REQD. THRUST LOAD AT 3600 RPM N lbf	THRUST FOR 25000 HRS L10 AT 3600 RPM N lbf	SPEED RATING ³⁾		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	125.0 4.9213	1930 433	10900 2455	2600	3600	90.018 3.5440	90.003 3.5434	160.025 6.3002	160.000 6.2992
	140.0 5.5118	2900 653	13600 3050	2200	3200	100.018 3.9377	100.003 3.9371	180.025 7.0876	180.000 7.0866
	155.0 6.1024	4560 1026	16000 3590	1900	2800	110.018 4.3314	110.003 4.3308	200.029 7.8751	200.000 7.8740
	167.7 6.6039	5840 1312	16600 3730	1700	2400	120.018 4.7251	120.003 4.7245	215.029 8.4647	215.000 8.4646
	57.5 2.2638	147 33	3830 860	6000	8000	35.013 1.3785	35.002 1.3781	80.019 3.1503	80.000 3.1496
	65.0 2.5591	245 55	4580 1030	5300	7000	40.013 1.5753	40.002 1.5749	90.022 3.5442	90.000 3.5433
	72.5 2.8543	378 85	5690 1280	4800	6300	45.013 1.7722	45.002 1.7718	100.022 3.9379	100.000 3.9370
	80.5 3.1693	592 133	6890 1550	4300	5600	50.013 1.9690	50.002 1.9686	110.022 4.3316	110.000 4.3307
	87.6 3.4488	810 182	7960 1790	3800	5000	55.015 2.1660	55.002 2.1655	120.022 4.7253	120.000 4.7244
	95.1 3.7441	1090 246	9560 2150	3600	4800	60.015 2.3628	60.002 2.3622	130.025 5.1191	130.000 5.1181
	102.5 4.0354	1450 325	10700 2400	3200	4300	65.015 2.5597	65.002 2.5592	140.025 5.5128	140.000 5.5118
	110.0 4.3307	1870 421	12000 2690	3000	4000	70.015 2.7565	70.002 2.7560	150.025 5.9065	150.000 5.9055
	117.5 4.6260	2400 539	12500 2800	2800	3800	75.015 2.9534	75.002 2.9529	160.025 6.3002	160.000 6.2992
	125.0 4.9213	3030 681	13600 3050	2600	3600	80.015 3.1502	80.002 3.1497	170.025 6.6939	170.000 6.6929
	132.5 5.2165	947 213	18400 4140	2400	3400	85.018 3.3472	85.003 3.3466	180.025 7.0876	180.000 7.0866
	140.0 5.5118	1170 262	19700 4430	2200	3200	90.018 3.5440	90.003 3.5434	190.029 7.4814	190.000 7.4803
	147.5 5.8071	1420 320	20900 4690	2000	3000	95.018 3.7409	95.003 3.7403	200.029 7.8751	200.000 7.8740
	157.6 6.2047	2040 458	25100 5650	1900	2800	100.018 3.9377	100.003 3.9371	215.029 8.4647	215.000 8.4646
	165.0 6.4961	2180 490	25100 5650	1800	2600	105.018 4.1346	105.003 4.1340	225.029 8.8594	225.000 8.8583
	175.3 6.9031	2930 659	28200 6330	1700	2400	110.018 4.3314	110.003 4.3308	240.029 9.4499	240.000 9.4488
	190.0 7.4803	3970 893	31700 7130	1600	2200	120.018 4.7251	120.003 4.7245	260.032 10.2375	260.000 10.2362
	205.0 8.0709	5290 1190	34700 7810	1500	2000	130.021 5.1189	130.003 5.1182	280.032 11.0247	280.000 11.0236
	220.0 8.6614	6890 1550	38200 8580	1400	1900	140.021 5.5126	140.003 5.5119	300.032 11.8123	300.000 11.8110

4) Rating for one million revolutions or 500 hours at 33 1/3 RPM

5) Based on 1800 RPM for 7220 PJDE through 7224 PJDE and 7317 PJDE through 7328 PJDE

7000 PJDU — 40° angular contact bearing with stamped brass, ball centered cage; GA preload



The MRC PJDU series is supplied with a stamped brass, ball-centered cage. 7000 PJDU bearings are supplied with “GA” preload. The “GA” preload results in a nominal flush condition.

Call 1-800-MRC-7000 for availability and other clearance/preload executions.

- ABEC 3
- Ball guided cages; stamped brass
- Special clearance, available on a made-to-order basis.
- “GA” preload
- Stocked as half pairs universal duplex
- 40° contact angle

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS 1)		BASIC RADIAL LOAD RATING 2)		BALLS PER ROW	
				r _a mm in	r _b mm in	DYNAMIC 4) C N lbf	STATIC C ₀ N lbf	NUMBER	DIAMETER mm in
7218PJDU	90 3.5433	160 6.2992	60 2.3622	2.0 .08	1.0 .04	178000 40000	190000 42700	16	22.500 0.8858
7220PJDU	100 3.9370	180 7.0866	68 2.6772	2.0 .08	1.0 .04	221000 49700	245000 55100	16	25.400 1.0000
7222PJDU	110 4.3307	200 7.8740	76 2.9921	2.0 .08	1.0 .04	270000 60700	335000 75300	16	28.575 1.1250
7224PJDU	120 4.7244	215 8.4646	80 3.1496	2.0 .08	1.0 .04	281000 63200	365000 82100	16	30.163 1.1875
7307PJDU	35 1.3780	80 3.1496	42 1.6535	1.5 .06	1.0 .04	62400 14000	49000 11000	11	14.288 0.5625
7308PJDU	40 1.5748	90 3.5433	46 1.8110	1.5 .06	1.0 .04	88400 19900	64000 14400	12	15.875 0.6250
7309PJDU	45 1.7717	100 3.9370	50 1.9685	1.5 .06	1.0 .04	108000 24300	80000 18000	12	17.700 0.6968
7310PJDU	50 1.9685	110 4.3307	54 2.1260	2.0 .08	1.0 .04	133000 29900	100000 22500	12	19.844 0.7813
7311PJDU	55 2.1654	120 4.7244	58 2.2835	2.0 .08	1.0 .04	153000 34400	116000 26100	12	21.431 0.8438
7312PJDU	60 2.3622	130 5.1181	62 2.4409	2.0 .08	1.0 .04	156000 35100	140000 31500	12	23.019 0.9063
7313PJDU	65 2.5591	140 5.5118	66 2.5984	2.0 .08	1.0 .04	174000 39100	160000 36000	12	24.606 0.9688
7314PJDU	70 2.7559	150 5.9055	70 2.7559	2.0 .08	1.0 .04	195000 43800	180000 40500	12	26.194 1.0313
7315PJDU	75 2.9528	160 6.2992	74 2.9134	2.0 .08	1.0 .04	216000 48600	228000 51300	13	26.988 1.0625
7316PJDU	80 3.1496	170 6.6929	78 3.0709	2.0 .08	1.0 .04	234000 52600	260000 58500	13	28.575 1.1250
7317PJDU	85 3.3465	180 7.0866	82 3.2283	2.5 .10	1.0 .04	251000 56400	290000 65200	13	30.162 1.1875
7318PJDU	90 3.5433	190 7.4803	86 3.3858	2.5 .10	1.0 .04	270000 60700	315000 70800	13	31.750 1.2500
7319PJDU	95 3.7402	200 7.8740	90 3.5433	2.5 .10	1.0 .04	286000 64300	355000 79800	13	33.338 1.3125
7320PJDU	100 3.9370	215 8.4646	94 3.7008	2.5 .10	1.0 .04	345000 77600	450000 101000	13	37.980 1.5000
7321PJDU	105 4.1339	225 8.8583	98 3.8583	2.5 .10	1.0 .04	345000 77600	450000 101000	13	37.980 1.5000
7322PJDU	110 4.3307	240 9.4488	100 3.9370	2.5 .10	1.0 .04	364000 81800	450000 101000	12	41.275 1.6250
7324PJDU	120 4.7244	260 10.2362	110 4.3307	2.5 .10	1.0 .04	410000 92200	520000 117000	12	44.450 1.750
7326PJDU	130 5.1181	280 11.0236	116 4.5669	3.0 .12	1.0 .04	449000 101000	600000 135000	12	47.625 1.8750
7328PJDU	140 5.5118	300 11.8110	124 4.8319	3.0 .12	1.0 .04	495000 111000	680000 153000	12	50.800 2.0000

1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear

2) For thrust rating multiply C by 1.08 and C₀ by 1.93

3) Listed values are for machined brass cage. Values have been determined through historical application and practice

The MRC 7000 PJDU type bearing with a stamped brass cage is the most popular pump thrust bearing in service today. Recent trends in the petrochemical industry indicate a change to the 7000 PJDE execution with a machined brass cage. With the machined cage, and the “CB” clearance, the 7000 PJDE series offers an economical solution for a wide range of applications. Most pump users have found the machined cage to be more “forgiving” when skidding and cavitation are likely to occur.

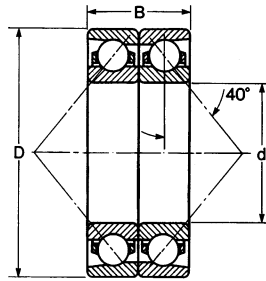


	PITCH DIAMETER mm in	MIN. REQ. ⁵⁾ THRUST LOAD AT 3600 RPM N lbf	THRUST FOR 25000 HRS ⁵⁾ L10 AT 3600 RPM N lbf	SPEED RATING ³⁾		RECOMMENDED SHAFT DIAMETER (h5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	125.0 4.9213	1930 433	10900 2455	2600	3600	90.000 3.5433	89.985 3.5427	160.025 6.3002	160.000 6.2992
	140.0 5.5118	2900 653	13600 3050	2200	3200	100.000 3.9370	99.985 3.9364	180.025 7.0876	180.000 7.0866
	155.0 6.1024	4860 1094	16600 3730	1900	2800	110.000 4.3307	109.985 4.3301	200.029 7.8751	200.000 7.8740
	167.7 6.6039	6230 1400	17300 3880	1700	2400	120.000 4.7244	119.985 4.7238	215.029 8.4647	215.000 8.4646
	57.5 2.2638	147 33	3830 860	6000	8000	35.000 1.3780	34.990 1.3776	80.019 3.1503	80.000 3.1496
	65 2.5591	267 60	5430 1220	5300	7000	40.000 1.5748	39.990 1.5744	90.022 3.5442	90.000 3.5433
	72.5 2.8543	413 93	6630 1490	4800	6300	45.000 1.7717	44.990 1.7713	100.022 3.9379	100.000 3.9370
	80.5 3.1693	645 145	8180 1840	4300	5600	50.000 1.9685	49.990 1.9681	110.022 4.3316	110.000 4.3307
	87.6 3.4488	885 199	9390 2110	3800	5000	55.000 2.1654	54.988 2.1649	120.022 4.7253	120.000 4.7244
	95.1 3.7441	1090 246	9560 2150	3600	4800	60.000 2.3622	59.988 2.3617	130.025 5.1191	130.000 5.1181
	102.5 4.0354	1450 325	10700 2400	3200	4300	65.000 2.5591	64.988 2.5586	140.025 5.5128	140.000 5.5118
	110.0 4.3307	1870 421	12000 2690	3000	4000	70.000 2.7559	69.988 2.7554	150.025 5.9065	150.000 5.9055
	117.5 4.6260	2600 584	13300 2980	2800	3800	75.000 2.9528	74.988 2.9523	160.025 6.3002	160.000 6.2992
	125.0 4.9213	3280 738	14400 3230	2600	3600	80.000 3.1496	79.988 3.1491	170.025 6.6939	170.000 6.6929
	132.5 5.2165	1030 231	19400 4360	2400	3400	85.000 3.3465	84.985 3.3459	180.025 7.0876	180.000 7.0866
	140.0 5.5118	1260 284	20900 4700	2200	3200	90.000 3.5433	89.985 3.5427	190.029 7.4814	190.000 7.4803
	147.5 5.8071	1540 347	22100 4970	2000	3000	95.000 3.7402	94.985 3.7396	200.029 7.8751	200.000 7.8740
	157.6 6.2047	2210 496	26700 6000	1900	2800	100.000 3.9370	99.985 3.9364	215.029 8.4647	215.000 8.4646
	165.0 6.4961	2360 531	26700 6000	1800	2600	105.000 4.1339	104.985 4.1333	225.029 8.8594	225.000 8.8583
	175.3 6.9031	2930 659	28200 6330	1700	2400	110.000 4.3307	109.985 4.3301	240.029 9.4499	240.000 9.4488
	190.0 7.4803	3970 893	31700 7130	1600	2200	120.000 4.7244	119.985 4.7238	260.032 10.2375	260.000 10.2362
	205.0 8.0709	5290 1190	34700 7810	1500	2000	130.000 5.1181	129.982 5.1174	280.032 11.0247	280.000 11.0236
	220.0 8.6614	6890 1550	38200 8580	1400	1900	140.000 5.5118	139.982 5.5111	300.032 11.8123	300.000 11.8110

4) Rating for one million revolutions or 500 hours at 33 1/3 RPM

5) Based on 1800 RPM for 7220 PJDU through 7224 PJDU and 7317 PJDU through 7328 PJDU

7000 PDU 40° angular contact ball bearing – land-guided, machined bronze cage



The 7000 PDU angular contact ball bearing has been traditionally supplied with the faces ground flush (GA) and used with an h5 shaft fit. When heavier interference fits are employed, a bearing with clearance (CB) may be needed. Call 1-800-MRC-7000 for assistance in selecting special clearances. Experience has shown that this bearing, with a land guided, machined cage is very “forgiving” when ball skidding occurs. With oil lubrication, this cage type runs cooler than most other executions.

- ABEC 1
- Stocked with “GA” preload (other preloads available on request)
- Land-riding, machined brass cage
- Stocked as universally ground half pairs

MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS ¹⁾		BASIC RADIAL LOAD RATING ²⁾		BALLS PER ROW	
				r _a mm in	r _b mm in	DYNAMIC ⁴⁾ C N lbf	STATIC Co N lbf	NUMBER	DIAMETER mm in
7218PDU	90 3.5433	160 6.2992	60 2.3622	2.0 .08	1.0 .04	178000 40000	190000 42700	15	23.020 .9063
7220PDU	100 3.9370	180 7.0866	68 2.6772	2.0 .08	1.0 .04	212000 47700	250000 56200	16	25.400 1.0000
7222PDU	110 4.3307	200 7.8740	76 2.9921	2.0 .08	1.0 .04	251000 56400	310000 69700	15	28.575 1.1250
7224PDU	120 4.7244	215 8.4646	80 3.1496	2.0 .08	1.0 .04	270000 60700	325000 73100	15	30.163 1.1875
7307PDU	35 1.3780	80 3.1496	42 1.6535	1.5 .06	1.0 .04	63700 14300	49000 11000	10	15.083 .5938
7308PDU	40 1.5748	90 3.5433	46 1.8110	1.5 .06	1.0 .04	76100 17100	61000 13700	11	15.875 .6250
7309PDU	45 1.7717	100 3.9370	50 1.9685	1.5 .06	1.0 .04	97500 21900	80000 18000	11	18.258 .7188
7310PDU	50 1.9685	110 4.3307	54 2.1260	2.0 .08	1.0 .04	112000 25200	104000 23400	12	19.845 .7813
7311PDU	55 2.1654	120 4.7244	58 2.2835	2.0 .08	1.0 .04	130000 29200	112000 25200	11	21.433 .8438
7312PDU	60 2.3622	130 5.1181	62 2.4409	2.0 .08	1.0 .04	148000 33300	129000 29000	11	23.020 .9063
7313PDU	65 2.5591	140 5.5118	66 2.5984	2.0 .08	1.0 .04	165000 37100	160000 36000	12	24.608 .9688
7314PDU	70 2.7559	150 5.9055	70 2.7559	2.0 .08	1.0 .04	190000 42700	186000 41800	12	26.195 1.0313
7315PDU	75 2.9528	160 6.2992	74 2.9134	2.0 .08	1.0 .04	208000 46800	200000 45000	11	28.575 1.1250
7316PDU	80 3.1496	170 6.6929	78 3.0709	2.0 .08	1.0 .04	225000 50600	220000 49500	12	28.575 1.1250
7317PDU	85 3.3465	180 7.0866	82 3.2283	2.5 .10	1.0 .04	238000 53500	245000 55100	12	30.163 1.1875
7318PDU	90 3.5433	190 7.4803	86 3.3858	2.5 .10	1.0 .04	255000 57300	270000 60700	12	31.750 1.2500
7319PDU	95 3.7402	200 7.8740	90 3.5433	2.5 .10	1.0 .04	276000 62000	300000 67400	12	33.338 1.3125
7320PDU	100 3.9370	215 8.4646	94 3.7008	2.5 .10	1.0 .04	307000 69000	380000 85400	12	37.981 1.4953
7321PDU	105 4.1339	225 8.8583	98 3.8583	2.5 .10	1.0 .04	325000 73100	390000 87700	12	38.100 1.5000
7322PDU	110 4.3307	240 9.4488	100 3.9370	2.5 .10	1.0 .04	345000 77600	455000 102000	12	41.275 1.6250
7324PDU	120 4.7244	260 10.2362	110 4.3307	2.5 .10	1.0 .04	390000 87700	530000 119000	12	44.450 1.7500
7326PDU	130 5.1181	280 11.0236	116 4.5669	3.0 .12	1.0 .04	449000 101000	160000 137000	12	47.625 1.8750
7328PDU	140 5.5118	300 11.8110	124 4.8319	3.0 .12	1.0 .04	488000 110000	695000 156000	12	50.800 2.0000

1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear
 2) For thrust rating multiply C by 1.08 and Co by 1.93
 3) Listed values are for machined brass cage. Values have been determined through historical application and practice

MRC 7000 PDU bearings are especially recommended for pumps, motors and other devices that generate heavy axial loads at high speeds. 7000 PDU bearings are not intended to run in pumps that generate only small or no thrust loads. See the table below for minimum thrust loads. The bearing with an aircraft-style machined bronze cage runs particularly well in applications where thrust loads vary greatly during operation and periods of ball skidding are unavoidable. Similarly, this bearing type resists destructive vibration forces when cavitation occurs.

	PITCH DIAMETER mm in	MIN. REQ. ⁵⁾ THRUST LOAD AT 3600 RPM N lbf	THRUST FOR ⁵⁾ 25000 HRS L10 AT 3600 RPM N lbf	SPEED RATING ³⁾		RECOMMENDED SHAFT DIAMETER (h5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	125.0 4.9213	1930 433	10900 2455	2600	3600	90.000 3.5433	89.985 3.5427	160.025 6.3002	160.000 6.2992
	140.0 5.5118	725 163	16400 3690	2200	3200	100.000 3.9370	99.985 3.9364	180.025 7.0876	180.000 7.0866
	155.0 6.1024	1140 256	19400 4360	1900	2800	110.000 4.3307	109.985 4.3301	200.029 7.8751	200.000 7.8740
	167.7 6.6039	1460 328	20900 4690	1700	2400	120.000 4.7244	119.985 4.7238	215.029 8.4647	215.000 8.4646
	57.5 2.2638	151 34	3910 878	6000	8000	35.000 1.3780	34.990 1.3776	80.019 3.1503	80.000 3.1496
	65.0 2.5591	222 50	4670 1050	5300	7000	40.000 1.5748	39.990 1.5744	90.022 3.5442	90.000 3.5433
	72.5 2.8544	378 85	5960 1340	4800	6300	45.000 1.7717	44.990 1.7713	100.022 3.9379	100.000 3.9370
	80.5 3.1693	472 106	6890 1550	4300	5600	50.000 1.9685	49.990 1.9681	110.022 4.3316	110.000 4.3307
	87.6 3.4488	743 167	7960 1790	3800	5000	55.000 2.1654	54.988 2.1649	120.022 4.7253	120.000 4.7244
	95.0 3.7402	1000 225	9070 2040	3600	4800	60.000 2.3622	59.988 2.3617	130.025 5.1191	130.000 5.1181
	102.5 4.0355	1450 325	10100 2280	3200	4300	65.000 2.5591	64.988 2.5586	140.025 5.5128	140.000 5.5118
	110.0 4.3307	1870 421	11700 2620	3000	4000	70.000 2.7559	69.988 2.7554	150.025 5.9065	150.000 5.9055
	117.5 4.6260	2370 532	12800 2870	2800	3800	75.000 2.9528	74.988 2.9523	160.025 6.3002	160.000 6.2992
	125.0 4.9212	2800 629	13800 3110	2600	3600	80.000 3.1496	79.988 3.1491	170.025 6.6939	170.000 6.6929
	132.5 5.2165	871 196	18400 4140	2400	3400	85.000 3.3465	84.985 3.3459	180.025 7.0876	180.000 7.0866
	140.0 5.5118	1080 242	19700 4430	2200	3200	90.000 3.5433	89.985 3.5427	190.029 7.4814	190.000 7.4803
	147.5 5.8071	1310 295	21300 4790	2000	3000	95.000 3.7402	94.985 3.7396	200.029 7.8751	200.000 7.8740
	157.6 6.2047	2040 458	23800 5340	1900	2800	100.000 3.9370	99.985 3.9364	215.029 8.4647	215.000 8.4646
	165.0 6.4961	2180 490	25100 5650	1800	2600	105.000 4.1339	104.985 4.1333	225.029 8.8594	225.000 8.8583
	175.3 6.9031	2930 659	26700 6000	1700	2400	110.000 4.3307	109.985 4.3301	240.029 9.4499	240.000 9.4488
	190.0 7.4803	3980 894	30200 6780	1600	2200	120.000 4.7244	119.985 4.7238	260.032 10.2375	260.000 10.2362
	205.0 8.0709	5280 1188	34700 7810	1500	2000	130.000 5.1181	129.982 5.1174	280.032 11.0247	280.000 11.0236
	220.0 8.6614	6890 1550	37900 8510	1400	1900	140.000 5.5118	139.982 5.5111	300.032 11.8123	300.000 11.8110

4) Rating for one million revolutions or 500 hours at 33 1/3 RPM

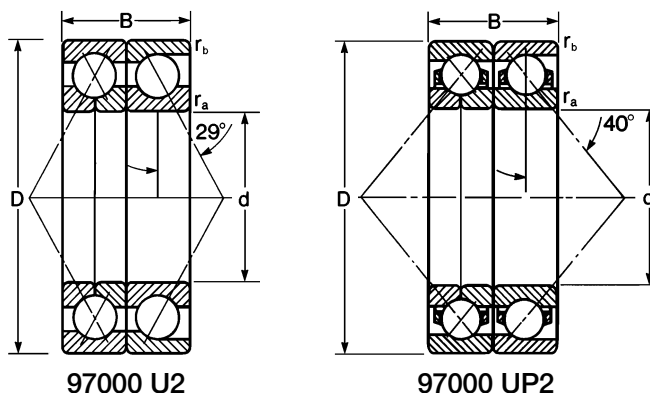
5) Based on 1800 RPM for 7220 PDU through 7224 PDU and 7317 PDU through 7328 PDU

9000 U and 97000 U2 series — 29° angular contact ball bearing/ split inner ring

9000 UP and 97000 UP2 series — 40° angular contact ball bearing/ split inner ring

The feature of the MRC 9000U and 9000UP series angular contact ball bearings is the split inner ring that allows the assembly of an optimum ball complement while accommodating thrust in either direction. The thrust capacity in either direction is equal to the equivalent size 7000 DU or 7000 PDU bearing.

- ABEC 1
- Split inner rings
- 9000U – 29° contact angle
- 9000UP – 40° contact angle
- Land-guided machined brass cage



MRC BEARING NUMBER	BORE d mm in	OUTSIDE DIAMETER D mm in	WIDTH B mm in	FILLET RADIUS ¹⁾		BASIC RADIAL LOAD RATING ²⁾		BALLS PER ROW	
				r _a mm in	r _b mm in	DYNAMIC ⁴⁾ C N lbf	STATIC Co N lbf	NUMBER	DIAMETER mm in
97218U2	90 3.5433	160 6.2992	60 2.3622	2.0 .08	1.0 .04	190000 42700	236000 53100	16	22.225 .8750
97313U2	65 2.5591	140 5.5118	66 2.5984	2.0 .08	1.0 .04	178000 40000	173000 38900	14	22.225 .8570
97315U2	75 2.9528	160 6.2992	74 2.9134	2.0 .08	1.0 .04	225000 50600	228000 51300	14	25.400 1.0000
97317U2	85 3.3465	180 7.0866	82 3.2283	2.5 .10	1.0 .04	265000 59600	285000 64100	14	28.575 1.1250
97222UP2	110 4.3307	200 7.8740	76 2.9921	2.0 .08	1.0 .04	251000 56400	310000 69700	15	28.575 1.1250
97224UP2	120 4.7244	215 8.4646	80 3.1496	2.0 .08	1.0 .04	270000 60700	325000 73100	15	30.163 1.1875
97230UP2	150 5.9055	270 10.6299	90 3.5433	2.5 .10	1.0 .04	351000 78900	520000 117000	16	36.513 1.4375
97314UP2	70 2.7559	150 5.9055	70 2.7559	2.0 .08	1.0 .04	190000 42700	186000 41800	12	26.195 1.0313
97318UP2	90 3.5433	190 7.4803	86 3.3858	2.5 .10	1.0 .04	255000 57300	270000 60700	12	31.750 1.2500
97320UP2	100 3.9370	215 8.4646	94 3.7008	2.5 .10	1.0 .04	307000 69000	380000 85400	12	37.981 1.4953

1) Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear

2) For thrust rating of 97000 U2 series, multiply C by 1.32 and Co by 2.94
 For thrust rating of 97000 UP2 series, multiply C by 1.76 and Co by 3.86
 For thrust rating of 9000 U and 9000 UP, multiply C by 0.62 and Co by 0.50

The split inner ring bearing can be matched in tandem with a single 7000 or 7000P series type bearing with the same contact angle. This configuration yields two bearing shared thrust capacity in one direction and one bearing thrust capacity in the opposite direction.

The split inner ring bearing is usually paired with a 7000 series bearing for use in pumps or motors as a 97000U2 or 97000UP2 set. The letter “P” identifies the bearing or set as having a 40° contact angle.

This bearing set is commonly used in vertical motors or pumps to handle the primary thrust load. Because two bearings acting in tandem share the thrust load, this solution offers extremely high thrust carrying capacity.

Reversing thrust load can be accommodated on the back side of the split inner ring bearing.

- 97000 U2 – (29° set) consists of 1 – 9000UDT and 1 – 7000 DT
- 97000 UP2 – (40° set) consists of 1 – 9000UPDT and 1 – 7000 PDT

Another common application of this bearing system is stirrer motors for ethylene reactors. In this application, the bearing depends upon the reactor’s plasma for lubrication. MRC offers a variety of materials and cage designs to provide optimum service life with marginal lubrication.

For proper mounting orientation, refer to stuffer provided in bearing box

See appropriate 7000 & 7000P sections for performance data.

	PITCH DIAMETER mm in	MIN. REQD. THRUST LOAD AT 3600 RPM N lbf	THRUST FOR 25000 HRS L10 AT 3600 RPM N lbf	SPEED RATING ³⁾		RECOMMENDED SHAFT DIAMETER (k5)		RECOMMENDED HOUSING DIAMETER (H6)	
				GREASE RPM	OIL RPM	MAXIMUM mm in	MINIMUM mm in	MAXIMUM mm in	MINIMUM mm in
	125.0 4.9212	2460 554	14300 3210	2900	3800	90.018 3.5440	90.003 3.5434	160.025 6.3002	160.000 6.2992
	103.0 4.0557	1680 378	13400 3010	3700	4800	65.015 2.5597	65.002 2.5592	140.025 5.5128	140.000 5.5118
	118.1 4.6491	2870 646	16900 3800	3100	4000	75.015 2.9534	75.002 2.9529	160.025 6.3002	160.000 6.2992
	133.2 5.2427	4630 1040	19900 4480	2800	3600	85.018 3.3472	85.003 3.3466	180.025 7.0876	180.000 7.0866
	155.0 6.1024	2280 ⁵⁾ 512	31500 ⁵⁾ 7080	1900	2800	110.018 4.3314	110.003 4.3308	200.029 7.8751	200.000 7.8740
	167.7 6.6039	2920 ⁵⁾ 656	33900 ⁵⁾ 7620	1700	2400	120.018 4.7251	120.003 4.7245	215.029 8.4657	215.000 8.4646
	210.0 8.2677	6980 ⁵⁾ 1570	48900 ⁵⁾ 11000	1500	2000	150.021 5.9063	150.003 5.9056	270.033 10.6312	270.000 10.6299
	110.0 4.3307	3750 842	18900 4260	3000	4000	70.015 2.7565	70.002 2.7560	150.025 5.9065	150.000 5.9055
	140.0 5.5118	2150 ⁵⁾ 484	32000 ⁵⁾ 7200	2200	3200	90.018 3.5440	90.003 3.5434	190.029 7.4814	190.000 7.4803
	157.6 6.2047	4070 ⁵⁾ 916	38600 ⁵⁾ 8670	1900	2800	100.018 3.9377	100.003 3.9371	215.029 8.4657	215.000 8.4646

3) Listed values are for machined brass cage.

Values have been determined through historical application and practice

4) Rating for one million revolutions or 500 hours at 33 1/3 RPM

5) Based on 1800 RPM for 97222 UP2 through 97230 UP2 and 97318 UP2 through 97320 UP2

Notes

Notes

Notes





MRC Bearing Services
315 North Main Street
Jamestown, NY 14701

1-800-MRC-7000

Warehouse Locations

MRC Hebron (Cincinnati)

Central Warehouse
2030 Meridian Place
Hebron, KY 41048

Atlanta, GA 30336

680-A Wharton Circle SW

Bellmawr, NJ 08031

130-B Benigno Boulevard

(Chicago) Schaumburg, IL 60173

710 East State Parkway

Dallas, TX 75228

12656 International Parkway

(Los Angeles) Compton, CA 90224

700 West Artesia Boulevard

Reno, NV 89502

300 Edison Way