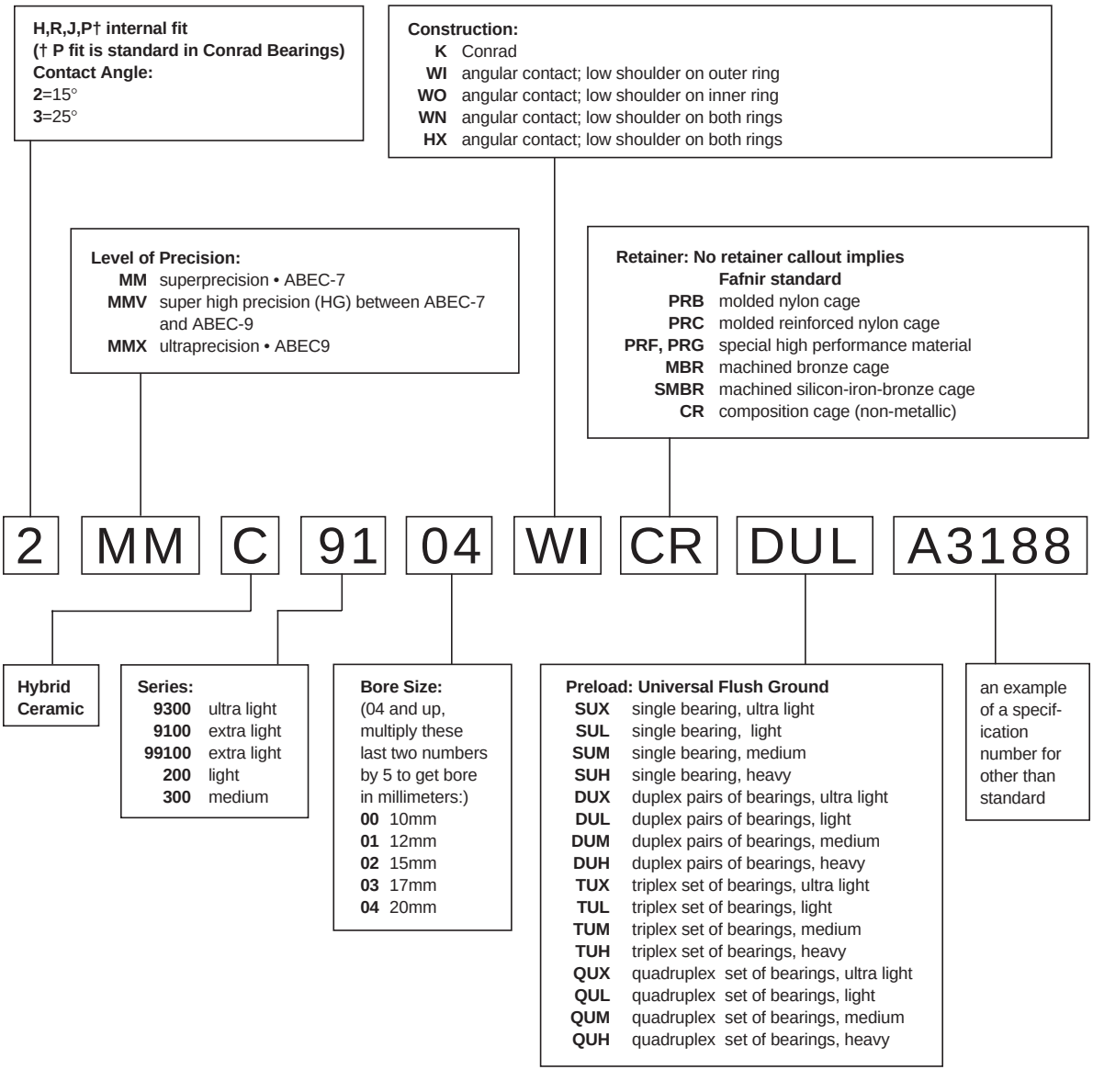
Superprecision Bearings

Nomenclature

Superprecision Ball Bearings



INTRODUCTION

MEANINGS OF PREFIXES AND SUFFIXES

In the Fafnir numbering system the basic number which denotes the size and series is always retained. When special variations are made as in the case of precision bearings, prefixes and suffixes are added which have definite meanings as follows:

PREFIXES

MM	• superprecision • ABEC-7
2MM	• superprecision • ABEC-7 •low contact angle-15°
3MM	• superprecision • ABEC-7 •high contact angle-25°
2MMV	• high grade (HG) between ABEC-7 and ABEC-9 • low contact angle-15°
3MMV	• high grade (HG) between ABEC-7 and ABEC-9 • high contact angle-25°
MMX	• ultraprecision • ABEC-9

SUFFIXES

K	• deep groove radial
WI	• angular contact-low shoulder on outer
WO	• angular contact-low shoulder on inner
WN	• angular contact-low shoulder on both inner and outer
HX	• angular contact-low shoulder on both inner and outer
CR	• composition cage (non-metallic)
MAR	• machined aluminum cage
MBR	• machined bronze cage
MSR	• machined steel cage
SMBR	• machined silicon-iron-bronze cage
PRB	• molded nylon cage
PRC	• molded nylon cage
PRF,PRG	• special high performance material
DUL	• flush-ground duplex bearings • light preload
DUM	• flush-ground duplex bearings • medium preload
DUH	• flush-ground duplex bearings • heavy preload
SUL	• flush-ground single bearing • light preload
SUM	• flush-ground single bearing • medium preload
SUH	• flush-ground single bearing • heavy preload

SUPERPRECISION MM (ABEC-7)

Superprecision bearings of the K or non-filling slot construction are generally used on woodworking spindles, aircraft accessory units and machine tool applications where duplex bearings are not a definite requirement. By virtue of the single row radial deep groove construction and superprecision tolerances, they are capable of carrying thrust loads in either direction and have relatively high-speed ability.

More popular on precision machine tool spindle applications are the WI angular-contact type bearing variations, namely 2MM-WI and 3MM-WI. Since this bearing type has a low shoulder on outer ring, it carries thrust in one direction.

SUPER HIGH PRECISION MMV (HG)

Superprecision bearings are manufactured to our new HG tolerance class, with running accuracy and performance meeting ABEC-9 (ISO P2) while maintaining noncritical features at ABEC-7 (ISO P4) level for cost-effectiveness. Bore and O.D. surfaces are coded in micron units for the convenience of the discriminating machine tool builder who is striving for optimum fitting of all spindle components.

The recent development of ceramic rolling elements in high performance bearings offers the customer the ultimate of speed capability, high stiffness, long life, low heat generation, and overall system reliability. The 99100 series is available with the option of ceramic ball selection.

ULTRAPRECISION MMX (ABEC-9)

Superprecision bearings with closer tolerances and running accuracies than ABEC-7 bearings are made to ABEC-9 tolerances. Bearings produced to these tolerances are generally made as WO and WN construction, and are use on ultra-high speed grinding spindles designed for tight dimensional tolerances and super-fine surface finishes. Consult our Engineering Department for availability.

BEARING TYPES

ANGULAR-CONTACT BEARINGS

2MM-WI types with 15° initial contact angle are designed to meet the needs of machine builders for precision bearings which will operate at as low a temperature as possible for a wide range of speeds and operating loads. In order for machines to produce more accurate work at a higher production rate, the bearings must provide a high degree of rigidity in both axial and radial directions while operating a minimum temperatures. For example, precision machining or cutting tools impose heavier loads on bearings than those encountered in precision grinding. In the former, speeds are slower and loads heavier than the latter, where speeds are high and loads light. The 2MM-WI type give the machine builder the flexibility required to meet such variations in applications.

3MM-WI types, manufactured with 25° contact angle, are for use on applications where the loading on the bearings is predominately thrust — and a high degree of axial rigidity is a definite requirement. Typical applications for these are large vertical rotary surface grinders, horizontal and vertical disc grinders, and thrust bearing applications for heavy duty lathes where the bearings must directly carry extremely high tail stock or chucking pressure.

2MM-WI &
3MM-WI Types

2MM-WO types with 15°-18° initial contact angle are designed for extremely high-speed applications where centrifugal force of the balls is the principal load on the bearing. Unlike the MM-WI type which has a low shoulder outer ring, the 2MM-WO type has full shoulders on both sides of the outer race and a low shoulder on one side of the inner ring. This design permits assembly with a maximum complement of balls and a one-piece cage which pilots against the precision-ground lands of the outer ring. Generally this bearing series is supplied with a separable inner ring and ball retaining cage along with special race geometry for extremely high speed operation.

2MM-WO Types

2MM-WN types with 15° initial contact angle are designed to meet the needs of machine manufacturers who require optimum oil flow through the bearings. This design incorporates a low shoulder on the non-thrust side of both the inner and outer rings. The maximum complement of balls is separated by a one-piece cage which pilots against the ground land of the outer ring. All problems involving high-speed bearing applications for which this type is being considered should be referred to our Engineering Department.

2MM-WN Types

2MMV and 3MMV 99100WN types are available with 15° or 25° contact angle variations and have been developed to operate under the demanding requirements of high speed machine tools. They incorporate design features which permit operation at higher speed than standard angular contact ball bearings. The bore, outside diameter, and width are the same as the MM9100 series.

This series is designed to operate at rotational speeds 20% greater than the MM9100 series, with no increase in operating temperature. The greatest advantage of these series is at speeds greater than 500,000 DN (Bore in mm x RPM). Silicon nitride balls (ceramic) and precision machined ball separators are available and, when used, the ultimate performance will be achieved.

2MMV99100 Types

HX – Types are dimensionally interchangeable with equivalent 9100, 99100 and ISO Series-10 bearings. These designs enable spindle heads to remove more material in less time while maintaining superior machining tolerances. HX bearings come with steel or ceramic ball complements with a 15 degree standard contact angle in a WN construction design.

Ballscrew Support Bearings

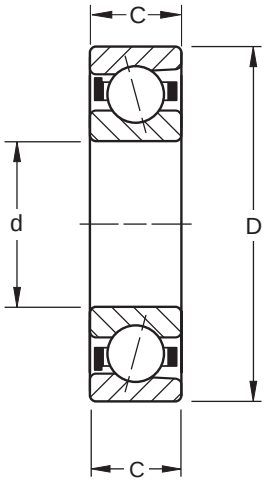
To meet the requirements of the servo-controlled machinery field, Torrington has developed a new series of ball bearings specially designed for ballscrew applications. Design criteria for these bearings with maximum axial rigidity, low drag torque, and extreme control of lateral eccentricity.

These bearings are manufactured to ABEC-7 tolerances and are of the nonseparable angular-contact type design with a 60° contact angle and maximum complement of balls.These bearings are supplied prelubricated with heavy duty grease NLGI #2 . Bearings are supplied packaged in DB arrangement. However, they can be mounted in duplexed pairs and in multiplexed sets in either Back-to-Back (DB), Face-to-Face (DF) or Tandem (DT) arrangements.

Standard sizes are available and are stocked and packaged as duplex pairs, triplex sets or quadruplex sets. These bearings are designed primarily for ballscrew applications and should not be considered in other areas such as spindles or gear-box shafting without approval by our Engineering Department. These bearings are offered in both standard inch and metric envelope dimensions. TDC (Thin Dense Chrome) plating is the recommended option for enhanced life, wear and corrosion resistance.

MM9300WI DUH (Inch)
MM…BS…DUH (Metric)

Ultra Light
2MM9300WI Series



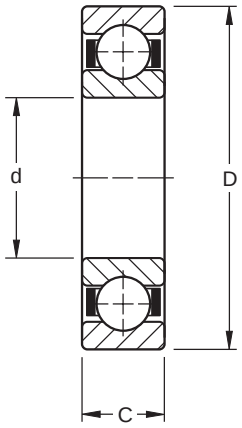
2MM9300WI Series

DIMENSIONS – TOLERANCES

Bearing Number	Bore d tolerance +0.0000" +0.000 mm to minus				Inner Ring eccen.		Outside Diameter D tolerance +0.0000" +0.000 mm to minus				Outer Ring eccen.		Width[2] C +0.000" -.005" +0.00 mm -.13 mm		Fillet Radius[1]		Wt.		Load Ratings Static Load Rating C_O		Load Ratings Extended Dynamic Load Rating C_E	
Contact Angle 15°	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	N	lbs.	N
2MM9300WI-CR	0.3937	10	0.00015	0.0038	0.0001	0.0025	0.8661	22	0.0002	0.005	0.0002	0.0051	0.2362	6	0.012	0.3	0.02	0.009	250	1100	670	3000
2MM9301WI-CR	0.4724	12	0.00015	0.0038	0.0001	0.0025	0.9449	24	0.0002	0.005	0.0002	0.0051	0.2362	6	0.012	0.3	0.03	0.014	290	1290	780	3450
2MM9302WI-CR	0.5906	15	0.00015	0.0038	0.0001	0.0025	1.1024	28	0.0002	0.005	0.0002	0.0051	0.2756	7	0.012	0.3	0.04	0.018	360	1600	865	3900
2MM9303WI-CR	0.6693	17	0.00015	0.0038	0.0001	0.0025	1.1811	30	0.0002	0.005	0.0002	0.0051	0.2756	7	0.012	0.3	0.04	0.018	425	1860	950	4250
2MM9304WI-CR	0.7874	20	0.00015	0.0038	0.00015	0.0038	1.4567	37	0.0002	0.005	0.0002	0.0051	0.3543	9	0.012	0.3	0.08	0.036	680	3050	1530	6800
2MM9305WI-CR	0.9843	25	0.00015	0.0038	0.00015	0.0038	1.6535	42	0.0002	0.005	0.0002	0.0051	0.3543	9	0.012	0.3	0.1	0.045	865	3800	1730	7650
2MM9306WI-CR	1.1811	30	0.00015	0.0038	0.00015	0.0038	1.8504	47	0.0002	0.005	0.0002	0.0051	0.3543	9	0.012	0.3	0.11	0.05	1000	4400	1800	8000
2MM9307WI-CR	1.3780	35	0.0002	0.0051	0.00015	0.0038	2.1654	55	0.0002	0.005	0.0002	0.0051	0.3937	10	0.024	0.6	0.17	0.077	1340	6000	2400	10600
2MM9308WI-CR	1.5748	40	0.0002	0.0051	0.00015	0.0038	2.4409	62	0.0002	0.005	0.0002	0.0051	0.4724	12	0.024	0.6	0.25	0.113	1760	7800	3050	13400
2MM9309WI-CR	1.7717	45	0.0002	0.0051	0.00015	0.0038	2.6772	68	0.0002	0.005	0.0002	0.0051	0.4724	12	0.024	0.6	0.28	0.127	2000	8800	3200	14300
2MM9310WI-CR	1.9685	50	0.0002	0.0051	0.00015	0.0038	2.8346	72	0.0002	0.005	0.0002	0.0051	0.4724	12	0.024	0.6	0.3	0.136	2200	9800	3350	15000
2MM9311WI-CR	2.1654	55	0.0002	0.0051	0.00015	0.0038	3.1496	80	0.0002	0.005	0.0002	0.0051	0.5118	13	0.039	1.0	0.41	0.186	2750	12200	4150	18300
2MM9312WI-CR	2.3622	60	0.0002	0.0051	0.00015	0.0038	3.3465	85	0.0003	0.008	0.0002	0.0051	0.5118	13	0.039	1.0	0.43	0.195	3050	13420	4300	19300
2MM9313WI-CR	2.5591	65	0.0002	0.0051	0.00015	0.0038	3.5433	90	0.0003	0.008	0.0002	0.0051	0.5118	13	0.039	1.0	0.47	0.213	3350	14600	4500	20000
2MM9314WI-CR	2.7559	70	0.0002	0.0051	0.00015	0.0038	3.9370	100	0.0003	0.008	0.0002	0.0051	0.6299	16	0.039	1.0	0.75	0.34	4300	19300	6100	27000
2MM9315WI-CR	2.9528	75	0.0002	0.0051	0.00015	0.0038	4.1339	105	0.0003	0.008	0.0002	0.0051	0.6299	16	0.039	1.0	0.8	0.363	4550	20400	6200	27500
2MM9316WI-CR	3.1496	80	0.0002	0.0051	0.00015	0.0038	4.3307	110	0.0003	0.008	0.0002	0.0051	0.6299	16	0.039	1.0	0.84	0.381	5000	22000	6400	28500
2MM9317WI-CR	3.3465	85	0.00025	0.0064	0.0002	0.0051	4.7244	120	0.0003	0.008	0.0002	0.0051	0.7087	18	0.039	1.0	1.21	0.549	5700	25000	7350	32500
2MM9318WI-CR	3.5433	90	0.00025	0.0064	0.0002	0.0051	4.9213	125	0.0004	0.010	0.0002	0.0051	0.7087	18	0.039	1.0	1.26	0.572	6700	29000	8500	38000
2MM9319WI-CR	3.7402	95	0.00025	0.0064	0.0002	0.0051	5.1181	130	0.0004	0.010	0.0003	0.0076	0.7087	18	0.039	1.0	1.33	0.604	7200	32000	8800	39000
2MM9320WI-CR	3.9370	100	0.00025	0.0064	0.0002	0.0051	5.5118	140	0.0004	0.010	0.0003	0.0076	0.7874	20	0.039	1.0	1.87	0.849	7500	33500	9000	40000
2MM9322WI-CR	4.3307	110	0.00025	0.0064	0.0002	0.0051	5.9055	150	0.0004	0.010	0.0003	0.0076	0.7874	20	0.039	1.0	2.02	0.917	8150	36000	9150	40500
2MM9324WI-CR	4.7244	120	0.00025	0.0064	0.0002	0.0051	6.4961	165	0.0004	0.010	0.0003	0.0076	0.8661	22	0.039	1.0	2.74	1.244	10400	46500	11800	52000
2MM9326WI-CR	5.1181	130	0.0003	0.0076	0.0003	0.0076	7.0866	180	0.0004	0.010	0.0003	0.0076	0.9449	24	0.059	1.5	3.62	1.643	13200	58500	15000	65500
2MM9328WI-CR	5.5118	140	0.0003	0.0076	0.0003	0.0076	7.4803	190	0.0004	0.010	0.0004	0.0120	0.9449	24	0.059	1.5	3.87	1.757	14300	63000	15300	68000
2MM9330WI-CR	5.9055	150	0.0003	0.0076	0.0003	0.0076	8.2677	210	0.0004	0.010	0.0004	0.0120	1.1024	28	0.079	2.0	5.89	2.674	21200	95000	23600	106000
2MM9334WI-CR	6.6929	170	0.0003	0.0076	0.0003	0.0076	9.0551	230	0.0004	0.010	0.0004	0.0120	1.1024	28	0.079	2.0	6.38	2.896	23200	104000	25500	112000

(1) Maximum shaft or housing fillet radius which bearing corners clear.
(2) See "Width Tolerances" page E63 for width tolerance of multiplex sets. One piece outer ring-piloted composition cage is standard.

Extra Light
MM9100K Series

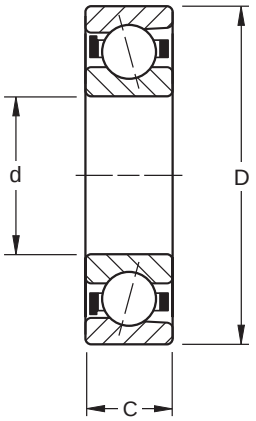


MM9100K

Bearing Number	Bore d tolerance +0.0000" +0.000 mm to minus				Outside Diameter D tolerance +0.0000" 0.000 mm to minus				Width C +0.000",-.005" +0.00 mm,-.13mm		Fillet Radius[1]		Wt.		Load Ratings: Static Load Rating C_O		Load Ratings: Extended Dynamic Load Rating C_E	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	N	lbs.	N
MM9101K-CR	0.4724	12	0.00015	0.0038	1.1024	28	0.0002	0.005	0.315	8	0.012	0.3	0.05	0.023	465	2080	1270	5700
MM9103K-CR	0.6693	17	0.00015	0.0038	1.3780	35	0.0002	0.005	0.3937	10	0.012	0.3	0.1	0.045	630	2800	1500	6700
MM9104K-CR	0.7874	20	0.00015	0.0038	1.6535	42	0.0002	0.005	0.4724	12	0.024	0.6	0.16	0.073	865	3900	2160	9650
MM9105K-CR	0.9843	25	0.00015	0.0038	1.8504	47	0.0002	0.005	0.4724	12	0.024	0.6	0.18	0.082	1140	5100	2500	11200
MM9106K-CR	1.1811	30	0.00015	0.0038	2.1654	55	0.0002	0.005	0.5118	13	0.039	1.0	0.26	0.118	1600	7200	3350	14600
MM9107K-CR	1.3780	35	0.0002	0.0051	2.4409	62	0.0002	0.005	0.5512	14	0.039	1.0	0.35	0.159	2000	9000	4000	17600
MM9108K-CR	1.5748	40	0.0002	0.0051	2.6772	68	0.0002	0.005	0.5906	15	0.039	1.0	0.43	0.195	2240	10000	4150	18600
MM9109K-CR	1.7717	45	0.0002	0.0051	2.9528	75	0.0002	0.005	0.6299	16	0.039	1.0	0.55	0.249	2900	13200	5200	23200
MM9110K-CR	1.9685	50	0.0002	0.0051	3.1496	80	0.0002	0.005	0.6299	16	0.039	1.0	0.6	0.272	3250	14300	5400	24000
MM9111K-CR	2.1654	55	0.0002	0.0051	3.5433	90	0.0003	0.008	0.7087	18	0.039	1.0	0.86	0.39	4150	18300	7100	31500
MM9115K-CR	2.9528	75	0.0002	0.0051	4.5276	115	0.0003	0.008	0.7874	20	0.039	1.0	1.5	0.68	6550	29000	9800	44000
MM9116K-CR	3.1496	80	0.0002	0.0051	4.4913	125	0.0004	0.010	0.8661	22	0.039	1.0	1.95	0.885	7800	34500	11800	53000
MM9117K-CR	3.3465	85	0.00025	0.0064	5.1181	130	0.0004	0.010	0.8661	22	0.039	1.0	2.13	0.966	8300	37500	12500	55000
MM9118K-CR	3.5433	90	0.00025	0.0064	5.5118	140	0.0004	0.010	0.9449	24	0.059	1.5	2.55	1.157	9650	43000	14600	64000
MM9120K-CR	3.9370	100	0.00025	0.0064	5.9055	150	0.0004	0.010	0.9449	24	0.059	1.5	2.9	1.315	10600	46900	15600	67000
MM9122K-CR	4.3307	110	0.00025	0.0064	6.6929	170	0.0004	0.010	1.1024	28	0.079	2.0	4.4	1.996	13200	58500	18600	83000
MM9124K-CR	4.7244	120	0.00025	0.0064	7.0866	180	0.0004	0.010	1.1024	28	0.079	2.0	4.85	2.2	14300	63000	19300	86500
MM9126K-CR	5.1181	130	0.0003	0.0076	7.8740	200	0.0004	0.010	1.2992	33	0.079	2.0	7.35	3.334	18300	81500	25500	112000

[1] Maximum shaft or housing fillet radius which bearing corners clear.
Two piece inner ring-piloted composition cage is standard.

Extra Light 2MM9100WI and 3MM9100WI Series



2MM9100WI and 3MM9100WI Series

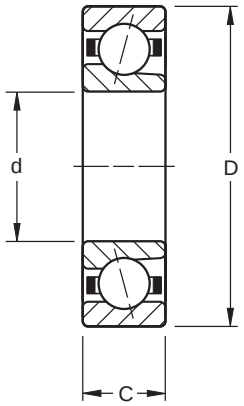
TO ORDER: Specify prefix 2MM for 15° contact angle. Example: 2MM9103WI Specify prefix 3MM for 25° contact angle. Example: 3MM9103WI

Bearing Number		Bore d				Outside Diameter D				Width[2] C		Fillet Radius[1]		Wt		Load Ratings					
																2MM9100WI Series				3MM9100WI Series	
Contact Angle 25°	Contact Angle 15°	tolerance +0.0000"		+0.000 mm to minus		tolerance +0.0000"		+0.000 mm to minus		+0.000",-0.005"		+0.00mm-.13mm				Static Load Rating C_O		Extended Dynamic Load Rating C_E		Static Load Rating C_O		Extended Dynamic Load Rating C_E	
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	N	lbs.	N	lbs.	N	lbs.	N
(3MM)	2MM9100WI	0.3937	10	0.00015	0.0038	1.0236	26	0.0002	0.005	0.3150	8	0.012	0.3	0.04	0.018	430	1900	1220	5500	415	1830	1180	5300
(3MM)	2MM9101WI	0.4724	12	0.00015	0.0038	1.1024	28	0.0002	0.005	0.3150	8	0.012	0.3	0.05	0.023	570	2550	1460	6400	550	2400	1400	6200
(3MM)	2MM9102WI-CR	0.5906	15	0.00015	0.0038	1.2598	32	0.0002	0.005	0.3543	9	0.012	0.3	0.08	0.036	655	2900	1560	6950	630	2800	1500	6550
(3MM)	2MM9103WI-CR	0.6693	17	0.00015	0.0038	1.3780	35	0.0002	0.005	0.3937	10	0.012	0.3	0.1	0.045	680	3000	1560	6950	640	2850	1500	6550
(3MM)	2MM9104WI	0.7874	20	0.00015	0.0038	1.6535	42	0.0002	0.005	0.4724	12	0.024	0.6	0.16	0.073	1160	5200	2600	11600	1120	4900	2500	11000
(3MM)	2MM9105WI	0.9843	25	0.00015	0.0038	1.8504	47	0.0002	0.005	0.4724	12	0.024	0.6	0.18	0.082	1430	6400	2900	12900	1370	6100	2800	12200
(3MM)	2MM9106WI	1.1811	30	0.00015	0.0038	2.1654	55	0.0002	0.005	0.5118	13	0.039	1.0	0.26	0.118	2000	8800	3750	16600	1900	8500	3600	16000
(3MM)	2MM9107WI	1.3780	35	0.0002	0.0051	2.4409	62	0.0002	0.005	0.5512	14	0.039	1.0	0.35	0.159	2650	11800	4750	21200	2500	11200	4550	20000
(3MM)	2MM9108WI	1.5748	40	0.0002	0.0051	2.6772	68	0.0002	0.005	0.5906	15	0.039	1.0	0.43	0.195	2900	12900	4900	22000	2750	12200	4650	20800
(3MM)	2MM9109WI	1.7717	45	0.0002	0.0051	2.9528	75	0.0002	0.005	0.6299	16	0.039	1.0	0.55	0.249	3750	16600	6100	27000	3550	16000	5700	25500
(3MM)	2MM9110WI	1.9685	50	0.0002	0.0051	3.1496	80	0.0002	0.005	0.6299	16	0.039	1.0	0.6	0.272	4050	18000	6300	28000	3800	17000	5850	26500
(3MM)	2MM9111WI	2.1654	55	0.0002	0.0051	3.5433	90	0.0003	0.008	0.7087	18	0.039	1.0	0.86	0.39	5600	25000	8500	38000	5300	23600	8000	36000
(3MM)	2MM9112WI	2.3622	60	0.0002	0.0051	3.7402	95	0.0003	0.008	0.7087	18	0.039	1.0	0.92	0.417	6000	26500	8800	39000	5700	25000	8300	36500
(3MM)	2MM9113WI	2.5591	65	0.0002	0.0051	3.9370	100	0.0003	0.008	0.7087	18	0.039	1.0	0.98	0.445	6300	28000	9000	40000	6000	27000	8500	37500
(3MM)	2MM9114WI	2.7559	70	0.0002	0.0051	4.3307	110	0.0003	0.008	0.7874	20	0.039	1.0	1.39	0.631	8000	35500	11400	50000	7500	33500	10800	48000
(3MM)	2MM9115WI	2.9528	75	0.0002	0.0051	4.5276	115	0.0003	0.008	0.7874	20	0.039	1.0	1.5	0.68	8500	37500	11600	52000	8000	35500	11000	49000
(3MM)	2MM9116WI	3.1496	80	0.0002	0.0051	4.9213	125	0.00035	0.009	0.8661	22	0.039	1.0	1.95	0.885	10800	48000	14600	65500	10200	45500	13700	62000
(3MM)	2MM9117WI	3.3465	85	0.00025	0.0065	5.1181	130	0.00035	0.009	0.8661	22	0.039	1.0	2.13	0.996	11400	51000	15000	67000	10800	48000	14000	63000
(3MM)	2MM9118WI	3.5433	90	0.00025	0.0065	5.5118	140	0.00035	0.009	0.9449	24	0.059	1.5	2.55	1.157	13400	60000	18000	80000	12700	57000	17000	75000
(3MM)	2MM9120WI	3.9370	100	0.00025	0.0065	5.9055	150	0.00035	0.009	0.9449	24	0.059	1.5	2.9	1.315	15000	67000	18600	83000	14300	63000	17600	80000
(3MM)	2MM9121WI-CR	4.1339	105	0.00025	0.0065	6.2992	160	0.0004	0.010	1.0236	26	0.079	2.0	3.22	1.461	17300	78000	22000	98000	16600	73500	20800	93000
(3MM)	2MM9122WI-CR	4.3307	110	0.00025	0.0065	6.6929	170	0.0004	0.010	1.1024	28	0.079	2.0	4.4	1.996	20000	90000	24500	110000	19000	85000	23200	104000
(3MM)	2MM9124WI	4.7244	120	0.00025	0.0065	7.0866	180	0.0004	0.010	1.1024	28	0.079	2.0	4.85	2.2	21200	95000	25000	112000	20000	90000	23600	106000
(3MM)	2MM9126WI	5.1181	130	0.0003	0.0076	7.8740	200	0.0004	0.010	1.2992	33	0.079	2.0	7.39	3.352	26500	118000	32000	143000	25500	112000	30500	134000
(3MM)	2MM9128WI-CR	5.5118	140	0.0003	0.0076	8.2677	210	0.0004	0.010	1.2992	33	0.079	2.0	7.9	3.583	28000	125000	32500	146000	26500	118000	31000	140000
(3MM)	2MM9130WI-CR	5.9055	150	0.0003	0.0076	8.8583	225	0.0004	0.010	1.3780	35	0.079	2.0	8.6	3.901	32500	146000	37500	166000	31000	137000	35500	160000
(3MM)	2MM9132WI-CR	6.2992	160	0.0003	0.0076	9.4488	240	0.0004	0.010	1.4961	38	0.079	2.0	10.7	4.854	37500	166000	42500	190000	36000	160000	40500	180000
(3MM)	2MM9134WI-CR	6.6929	170	0.0003	0.0076	10.2362	260	0.0004	0.010	1.6535	42	0.079	2.0	15.5	7.031	47500	212000	53000	236000	45000	200000	50000	220000
(3MM)	2MM9140WI-CR	7.8740	200	0.0004	0.0102	12.2047	310	0.0005	0.013	2.0079	51	0.079	2.0	25	11.34	65500	290000	67000	300000	62000	275000	63000	280000

[1] Maximum shaft or housing fillet radius which bearing corners clear.
[2] See “width tolerance” page E63 for width tolerance of multiple sets.

One piece molded nylon, glass fiber reinforced outer ring- piloted cage is standard except where designated CR which is an outer ring-piloted composition cage.

Extra Light 2MM9100WO Series Separable Design



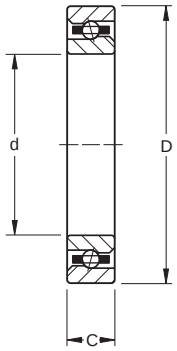
DIMENSIONS – TOLERANCES

Bearing Number	Bore d tolerance +0.0000" +0.000 mm to minus				Outside Diameter D tolerance +0.0000" +0.000 mm to minus				Width(2) C +.000",-.005" +00 mm,-.13mm		Fillet Radius(1)		Wt.		Load Ratings: Static Load Rating C_O		Load Ratings: Extended Dynamic Load Rating C_E	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	N	lbs.	N
2MM9100WO-CR	0.3937	10	0.00015	0.0038	1.0236	26	0.0002	0.005	0.3150	8	0.012	0.3	0.04	0.018	245	1100	865	3800
2MM9101WO-CR	0.4724	12	0.00015	0.0038	1.1024	28	0.0002	0.005	0.3150	8	0.012	0.3	0.05	0.023	325	1460	1020	4550
2MM9102WO-CR	0.5906	15	0.00015	0.0038	1.2598	32	0.0002	0.005	0.3543	9	0.012	0.3	0.08	0.036	340	1530	1020	4550
2MM9103WO-CR	0.6693	17	0.00015	0.0038	1.3780	35	0.0002	0.005	0.3937	10	0.012	0.3	0.1	0.045	390	1730	1100	4900
2MM9104WO-CR	0.7874	20	0.00015	0.0038	1.6535	42	0.0002	0.005	0.4724	12	0.024	0.6	0.16	0.073	670	3000	1830	8150
2MM9105WO-CR	0.9843	25	0.00015	0.0038	1.8504	47	0.0002	0.005	0.4724	12	0.024	0.6	0.18	0.082	830	3650	2040	9150
2MM9106WO-CR	1.1811	30	0.00015	0.0038	2.1654	55	0.0002	0.005	0.5118	13	0.039	1.0	0.26	0.118	1140	5100	2650	11800
2MM9107WO-CR	1.3780	35	0.00020	0.0051	2.4409	62	0.0002	0.005	0.5512	14	0.039	1.0	0.35	0.159	1500	6700	3550	15000
2MM9108WO-CR	1.5748	40	0.00020	0.0051	2.6772	68	0.0002	0.005	0.5906	15	0.039	1.0	0.43	0.195	1660	7350	3450	15300
2MM9110WO-CR	1.9685	50	0.00020	0.0051	3.1496	80	0.0002	0.005	0.6299	16	0.039	1.0	0.6	0.272	2280	10200	4400	19600
2MM9113WO-CR	2.5591	65	0.00020	0.0051	3.9370	100	0.0003	0.008	0.7087	18	0.039	1.0	0.98	0.445	3600	16000	6300	28000

(1) Maximum shaft or housing fillet radius which bearing corners clear.
(2) See width tolerances page E63 for width tolerance of multiplex sets.

One piece outer ring piloted composition cage is standard. Separable inner ring, balls and cage are retained with outer ring.

Extra Light 2MMV99100WN, 3MMV99100WN Series



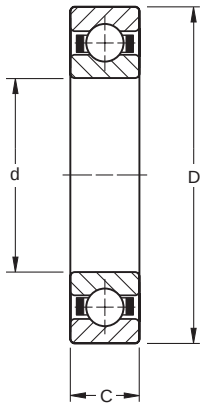
DIMENSIONS – TOLERANCES

All inch tolerance in .0001 units.
TO ORDER: Specify 2MM for 15° contact angle. Example: 2MM99103WN CR. Specify prefix 3MM for 25° contact angle. Example: 3MM99103WN CR

Bearing Number	Bore d tolerance +0.0000" +0.000 mm to minus				Outside Diameter D tolerance +0.0000" +0.000 mm to minus				Width[2] C tolerance +0.0000" +0.000 mm to minus				Fillet[1] Radius		Wt.		Static Load Rating C_O		Extended Dynamic Load Rating C_E	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	N	lbs.	N
2MMV99103WN-CR	0.6693	17	0.00014	0.0035	1.3780	35	0.00016	0.004	0.3937	10	0.0032	0.080	0.012	0.3	0.1	0.045	570	2550	1100	4900
2MMV99104WN-CR	0.7874	20	0.00014	0.0035	1.6535	42	0.00016	0.004	0.4724	12	0.0050	0.127	0.024	0.6	0.17	0.077	930	4150	1700	7600
2MMV99105WN-CR	0.9843	25	0.00014	0.0035	1.8504	47	0.00016	0.004	0.4724	12	0.0050	0.127	0.024	0.6	0.19	0.086	1160	5200	1900	8400
2MMV99106WN-CR	1.1811	30	0.00014	0.0035	2.1654	55	0.00016	0.004	0.5118	13	0.0050	0.127	0.039	1.0	0.27	0.12	1400	6200	2040	9000
2MMV99107WN-CR	1.3780	35	0.00016	0.004	2.4409	62	0.00016	0.004	0.5512	14	0.0050	0.127	0.039	1.0	0.37	0.17	1900	8500	2700	12000
2MMV99108WN-CR	1.5748	40	0.00016	0.004	2.6772	68	0.00016	0.004	0.5906	15	0.0050	0.127	0.039	1.0	0.45	0.2	2200	9800	2900	12800
2MMV99109WN-CR	1.7717	45	0.00016	0.004	2.9528	75	0.00016	0.004	0.6299	16	0.0050	0.127	0.039	1.0	0.58	0.26	2750	12200	3600	16000
2MMV99110WN-CR	1.9685	50	0.00016	0.004	3.1496	80	0.00016	0.004	0.6299	16	0.0050	0.127	0.039	1.0	0.63	0.29	3000	13400	3750	16600
2MMV99111WN-CR	2.1654	55	0.00018	0.0045	3.5433	90	0.0002	0.005	0.7087	18	0.0050	0.127	0.039	1.0	0.9	0.41	3800	17000	4600	20500
2MMV99112WN-CR	2.3622	60	0.00018	0.0045	3.7402	95	0.0002	0.005	0.7087	18	0.0050	0.127	0.039	1.0	0.97	0.44	4000	18000	4700	20800
2MMV99113WN-CR	2.5591	65	0.00018	0.0045	3.9370	100	0.0002	0.005	0.7087	18	0.0050	0.127	0.039	1.0	1.03	0.47	4400	19300	4900	21600
2MMV99114WN-CR	2.7559	70	0.00018	0.0045	4.3307	110	0.0002	0.005	0.7874	20	0.0050	0.127	0.039	1.0	1.25	0.57	5400	24000	5850	26200
2MMV99115WN-CR	2.9528	75	0.00018	0.0045	4.5276	115	0.0002	0.005	0.7874	20	0.0050	0.127	0.039	1.0	1.48	0.67	5750	25500	6100	27000
2MMV99116WN-CR	3.1496	80	0.00018	0.0045	4.9213	125	0.00024	0.006	0.8661	22	0.0050	0.127	0.039	1.0	1.99	0.9	6700	30000	7100	31500
2MMV99117WN-CR	3.3465	85	0.00024	0.006	5.1181	130	0.00024	0.006	0.8661	22	0.0050	0.127	0.039	1.0	2.24	1.02	7200	32000	7300	32500
2MMV99118WN-CR	3.5433	90	0.00024	0.006	5.5118	140	0.00024	0.006	0.9449	24	0.0050	0.127	0.059	1.5	2.68	1.21	9000	40000	9500	42000
2MMV99119WN-CR	3.7402	95	0.00024	0.006	5.7087	145	0.00024	0.006	0.9449	24	0.0050	0.127	0.059	1.5	2.9	1.31	9500	42000	9600	42500
2MMV99120WN-CR	3.9370	100	0.00024	0.006	5.9055	150	0.00024	0.006	0.9449	24	0.0050	0.127	0.059	1.5	3.04	1.38	10000	45000	9900	44000
2MMV99121WN-CR	4.1339	105	0.00024	0.006	6.2992	160	0.00028	0.007	1.0236	26	0.0050	0.127	0.079	2.0	3.38	1.53	11200	51000	11200	51000
2MMV99122WN-CR	4.3307	110	0.00024	0.006	6.6929	170	0.00028	0.007	1.1024	28	0.0050	0.127	0.079	2.0	4.62	2.09	12900	58000	12700	56500
2MMV99124WN-CR	4.7244	120	0.00024	0.006	7.0866	180	0.00028	0.007	1.1024	28	0.0050	0.127	0.079	2.0	5.09	2.31	13700	61000	13000	58000
2MMV99126WN-CR	5.1181	130	0.00028	0.007	7.8740	200	0.00032	0.008	1.2992	33	0.0100	0.254	0.079	2.0	7.76	3.52	18000	79000	16300	73000
2MMV99128WN-CR	5.5118	140	0.00028	0.007	8.2677	210	0.00032	0.008	1.2992	33	0.0100	0.254	0.079	2.0	8.3	3.76	18600	83000	17000	75000
2MMV99130WN-CR	5.9055	150	0.00028	0.007	8.8583	225	0.00032	0.008	1.3780	35	0.0100	0.254	0.079	2.0	9.03	4.09	23000	102000	20400	90000
3MMV99101WN-CR	0.4724	12	0.00014	0.0035	1.1024	28	0.00016	0.004	0.3150	8	0.0032	0.080	0.012	0.3	0.05	0.023	320	1430	670	3000
3MMV99102WN-CR	0.5906	15	0.00014	0.0035	1.2598	32	0.00016	0.004	0.3543	9	0.0032	0.080	0.012	0.3	0.08	0.036	500	2200	1020	4500
3MMV99103WN-CR	0.6693	17	0.00014	0.0035	1.3780	35	0.00016	0.004	0.3937	10	0.0032	0.080	0.012	0.3	0.1	0.045	550	2450	1040	4650
3MMV99104WN-CR	0.7874	20	0.00014	0.0035	1.6535	42	0.00016	0.004	0.4724	12	0.0050	0.127	0.024	0.6	0.17	0.077	900	4000	1600	7200
3MMV99105WN-CR	0.9843	25	0.00014	0.0035	1.8504	47	0.00016	0.004	0.4724	12	0.0050	0.127	0.024	0.6	0.19	0.086	1100	4900	1800	7800
3MMV99106WN-CR	1.1811	30	0.00014	0.0035	2.1654	55	0.00016	0.004	0.5118	13	0.0050	0.127	0.039	1.0	0.27	0.12	1320	6000	1900	8500
3MMV99107WN-CR	1.3780	35	0.00016	0.004	2.4409	62	0.00016	0.004	0.5512	14	0.0050	0.127	0.039	1.0	0.37	0.17	1800	8000	2550	11200
3MMV99108WN-CR	1.5748	40	0.00016	0.004	2.6772	68	0.00016	0.004	0.5906	15	0.0050	0.127	0.039	1.0	0.45	0.2	2080	9300	2700	12000
3MMV99109WN-CR	1.7717	45	0.00016	0.004	2.9528	75	0.00016	0.004	0.6299	16	0.0050	0.127	0.039	1.0	0.58	0.26	2600	11600	3400	15000
3MMV99110WN-CR	1.9685	50	0.00016	0.004	3.1496	80	0.00016	0.004	0.6299	16	0.0050	0.127	0.039	1.0	0.63	0.29	2850	12700	3500	15600
3MMV99111WN-CR	2.1654	55	0.00018	0.0045	3.5433	90	0.0002	0.005	0.7087	18	0.0050	0.127	0.039	1.0	0.9	0.41	3600	16000	4350	19400
3MMV99112WN-CR	2.3622	60	0.00018	0.0045	3.7402	95	0.0002	0.005	0.7087	18	0.0050	0.127	0.039	1.0	0.98	0.44	3750	16800	4400	19600
3MMV99113WN-CR	2.5591	65	0.00018	0.0045	3.9370	100	0.0002	0.005	0.7087	18	0.0050	0.127	0.039	1.0	1.04	0.47	4050	18300	4550	20400
3MMV99114WN-CR	2.7559	70	0.00018	0.0045	4.3307	110	0.0002	0.005	0.7874	20	0.0050	0.127	0.039	1.0	1.26	0.57	5000	22400	5500	25000
3MMV99115WN-CR	2.9528	75	0.00018	0.0045	4.5276	115	0.0002	0.005	0.7874	20	0.0050	0.127	0.039	1.0	1.49	0.67	5400	24000	5700	25500
3MMV99116WN-CR	3.1496	80	0.00018	0.0045	4.9213	125	0.00024	0.006	0.8661	22	0.0050	0.127	0.039	1.0	2	0.91	6300	28000	6700	30000
3MMV99117WN-CR	3.3465	85	0.00024	0.006	5.1181	130	0.00024	0.006	0.8661	22	0.0050	0.127	0.039	1.0	2.25	1.02	6700	30000	6900	30500
3MMV99118WN-CR	3.5433	90	0.00024	0.006	5.5118	140	0.00024	0.006	0.9449	24	0.0050	0.127	0.059	1.5	2.7	1.22	8500	38000	8900	40000
3MMV99119WN-CR	3.7402	95	0.00024	0.006	5.7087	145	0.00024	0.006	0.9449	24	0.0050	0.127	0.059	1.5	2.92	1.32	8800	39000	9000	40500
3MMV99120WN-CR	3.9370	100	0.00024	0.006	5.9055	150	0.00024	0.006	0.9449	24	0.0050	0.127	0.059	1.5	3.06	1.39	9300	41500	9300	41500
3MMV99121WN-CR	4.1339	105	0.00024	0.006	6.2992	160	0.00028	0.007	1.0236	26	0.0050	0.127	0.079	2.0	3.4	1.54	10500	47000	10500	47000
3MMV99122WN-CR	4.3307	110	0.00024	0.006	6.6929	170	0.00028	0.007	1.1024	28	0.0050	0.127	0.079	2.0	4.65	2.11	12100	54000	12000	53000
3MMV99124WN-CR	4.7244	120	0.00024	0.006	7.0866	180	0.00028	0.007	1.1024	28	0.0050	0.127	0.079	2.0	5.12	2.32	12900	57000	12200	54000
3MMV99126WN-CR	5.1181	130	0.00028	0.007	7.8740	200	0.00032	0.008	1.2992	33	0.0100	0.254	0.079	2.0	7.81	3.54	16500	73500	15400	68500
3MMV99128WN-CR	5.5118	140	0.00028	0.007	8.2677	210	0.00032	0.008	1.2992	33	0.0100	0.254	0.079	2.0	8.35	3.79	17400	77000	16000	70000
3MMV99130WN-CR	5.9055	150	0.00028	0.007	8.8583	225	0.00032	0.008	1.3780	35	0.0100	0.254	0.079	2.0	9.09	4.12	21200	95000	19000	85000

[1] Maximum shaft or housing fillet radius which bearing corners clear.
[2] See "Width tolerances" page E63 for width tolerance of multiple sets.

Light MM200K Series



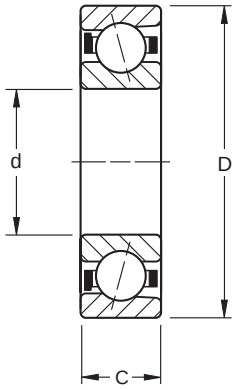
DIMENSIONS – TOLERANCES

Bearing Number	Bore d		tolerance +0.0000" +0.000 mm to minus		Outside Diameter D		tolerance +0.0000" +0.000 mm to minus		Width C +0.000",-0.005" +0.00 mm,-.13 mm		Fillet Radius(1)		Wt.		Load Ratings: Static Load Rating C_O		Load Ratings: Extended Dynamic Load Rating C_E	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	N	lbs.	N
MM201K-CR	0.4724	12	0.00015	0.0038	1.2598	32	0.0002	0.005	0.3937	10	0.024	0.6	0.1	0.045	600	2650	1700	7500
MM202K-CR	0.5906	15	0.00015	0.0038	1.3780	35	0.0002	0.005	0.4331	11	0.024	0.6	0.12	0.054	720	3200	1900	8500
MM203K-CR	0.6693	17	0.00015	0.0038	1.5748	40	0.0002	0.005	0.4724	12	0.024	0.6	0.15	0.068	930	4150	2400	10600
MM204K-CR	0.7874	20	0.00015	0.0038	1.8504	47	0.0002	0.005	0.5512	14	0.039	1.0	0.25	0.113	1290	5700	3200	14300
MM205K-CR	0.9843	25	0.00015	0.0038	2.0472	52	0.0002	0.005	0.5906	15	0.039	1.0	0.3	0.136	1500	6800	3450	15600
MM206K-CR	1.1811	30	0.00015	0.0038	2.4409	62	0.0002	0.005	0.6299	16	0.039	1.0	0.5	0.227	2200	9800	4900	21600
MM207K-CR	1.3780	35	0.00020	0.0051	2.8346	72	0.0002	0.005	0.6693	17	0.039	1.0	0.7	0.318	3000	13200	6400	28500
MM208K-CR	1.5748	40	0.00020	0.0051	3.1496	80	0.0003	0.008	0.7087	18	0.039	1.0	0.9	0.408	3900	17300	8150	36000
MM209K-CR	1.7717	45	0.00020	0.0051	3.3465	85	0.0003	0.008	0.7480	19	0.039	1.0	0.96	0.435	4000	17600	8150	36000
MM210K-CR	1.9685	50	0.00020	0.0051	3.5433	90	0.0003	0.008	0.7847	20	0.039	1.0	1.05	0.476	4500	20000	8800	39000
MM211K-CR	2.1654	55	0.00020	0.0051	3.9370	100	0.0003	0.008	0.8268	21	0.059	1.5	1.5	0.68	5700	25500	10800	48000
MM212K-CR	2.3622	60	0.00020	0.0051	4.3307	110	0.0003	0.008	0.8661	22	0.059	1.5	1.9	0.862	6300	28000	12200	54000
MM213K-CR	2.5591	65	0.00020	0.0051	4.7244	120	0.0003	0.008	0.9055	23	0.059	1.5	2.35	1.066	7800	34500	14300	64000
MM214K-CR	2.7559	70	0.00020	0.0051	4.9213	125	0.0004	0.010	0.9449	24	0.059	1.5	2.5	1.134	8500	37750	15600	69500
MM215K-CR	2.9528	75	0.00020	0.0051	5.1181	130	0.0004	0.010	0.9843	25	0.059	1.5	2.7	1.225	8650	38000	15600	69500
MM216K-CR	3.1496	80	0.00020	0.0051	5.5118	140	0.0004	0.010	1.0236	26	0.079	2.0	3.1	1.406	10200	45500	18000	80000

(1) Maximum shaft or housing fillet radius which bearing corners clear.
Two piece inner ring-piloted composition cage is standard.

CR - Outer ring-piloted composition cage.

Light 2MM200WI and 3MM200WI Series

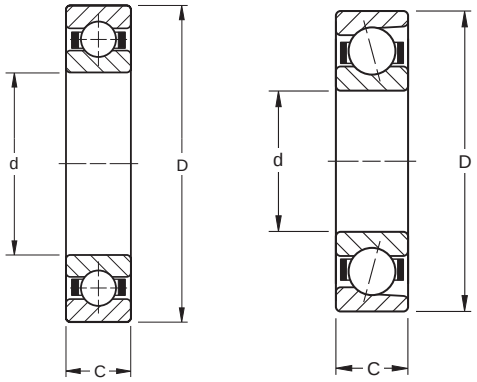


TO ORDER:
Specify prefix 2MM for 15° contact angle. Example: 2MM202WI
Specify prefix 3MM for 25° contact angle. Example: 3MM202WI

Bearing Number		Bore d				Outside Diameter D				Width C		Fillet Radius		Wt.		Load Ratings					
																2MM SERIES				3MM SERIES	
				tolerance +0.0000"	+0.000 mm to minus			tolerance +0.0000"	+0.000 mm to minus	+.000mm,-.005"	+.00mm,-.13mm					Static Load Rating C_O		Extended Dynamic Load Rating C_E		Static Load Rating C_O	Extended Dynamic Load Rating C_E
Contact Angle 25°	Contact Angle 15°	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	N	lbs.	N	lbs.	N	lbs.	N
(3MM)	2MM200WI-CR	0.3937	10	0.00015	0.0038	1.1811	30	0.0002	0.005	0.3543	9	0.024	0.6	0.07	0.032	570	2550	1600	7100	550	2450	1560	6900
(3MM)	2MM201WI-CR	0.4724	12	0.00015	0.0038	1.2598	32	0.0002	0.005	0.3937	10	0.024	0.6	0.1	0.045	750	3350	1960	8800	720	3200	1900	8500
(3MM)	2MM202WI	0.5906	15	0.00015	0.0038	1.3780	35	0.0002	0.005	0.4331	11	0.024	0.6	0.12	0.054	880	3900	2160	9650	850	3750	2080	9300
(3MM)	2MM203WI	0.6693	17	0.00015	0.0038	1.5748	40	0.0002	0.005	0.4724	12	0.024	0.6	0.15	0.068	1140	5000	2700	12000	1080	4800	2600	11600
(3MM)	2MM204WI	0.7874	20	0.00015	0.0038	1.8504	47	0.0002	0.005	0.5512	14	0.039	1.0	0.25	0.113	1560	6950	3650	16000	1500	6700	2600	11600
(3MM)	2MM205WI	0.9843	25	0.00015	0.0038	2.0472	52	0.0002	0.005	0.5906	15	0.039	1.0	0.3	0.136	2000	8800	4150	18300	1900	8500	4000	17600
(3MM)	2MM206WI	1.1811	30	0.00015	0.0038	2.4409	62	0.0002	0.005	0.6299	16	0.039	1.0	0.5	0.227	2850	12700	5600	25500	2700	12000	5500	24500
(3MM)	2MM207WI	1.3780	35	0.00020	0.0051	2.8346	72	0.0002	0.005	0.6693	17	0.039	1.0	0.7	0.318	3900	17300	7650	33500	3650	16300	7200	32500
(3MM)	2MM208WI	1.5748	40	0.00020	0.0051	3.1496	80	0.0002	0.005	0.7087	18	0.039	1.0	0.9	0.408	4650	20400	9150	40500	4400	19600	8650	39000
(3MM)	2MM209WI	1.7717	45	0.00020	0.0051	3.3465	85	0.0003	0.008	0.7480	19	0.039	1.0	0.96	0.435	5600	25000	10200	45500	5330	23600	9650	43000
(3MM)	2MM210WI	1.9685	50	0.00020	0.0051	3.5433	90	0.0003	0.008	0.7874	20	0.039	1.0	1.10	0.499	6200	27500	10600	47500	5850	26000	10200	45500
(3MM)	2MM211WI	2.1654	55	0.00020	0.0051	3.9370	100	0.0003	0.008	0.8268	21	0.059	1.5	1.5	0.68	7800	34500	13200	58500	7350	32500	12700	56500
(3MM)	2MM212WI	2.3622	60	0.00020	0.0051	4.3307	110	0.0003	0.008	0.8661	22	0.059	1.5	1.9	0.862	9500	42500	16000	71000	9150	40500	15300	68000
(3MM)	2MM213WI	2.5591	65	0.00020	0.0051	4.7244	120	0.0003	0.008	0.9055	23	0.059	1.5	2.4	1.089	10600	47500	17000	78000	10200	45500	16600	73500
(3MM)	2MM214WI	2.7559	70	0.00020	0.0051	4.9213	125	0.0004	0.010	0.9449	24	0.059	1.5	2.5	1.134	11600	52000	19000	85000	11200	50000	18000	80000
(3MM)	2MM215WI	2.9528	75	0.00020	0.0051	5.1181	130	0.0004	0.010	0.9843	25	0.059	1.5	2.7	1.225	12700	57000	19600	88000	12000	54000	19000	83000
(3MM)	2MM216WI	3.1496	80	0.00020	0.0051	5.5118	140	0.0004	0.010	1.0236	26	0.079	2.0	3.1	1.406	15000	67000	23200	104000	14300	64000	22000	98000
(3MM)	2MM217WI	3.3465	85	0.00025	0.0064	5.9055	150	0.0004	0.010	1.1024	28	0.079	2.0	4	1.814	17600	78000	27000	120000	16600	75000	25500	114000
(3MM)	2MM218WI	3.5433	90	0.00025	0.0064	6.2992	160	0.0004	0.010	1.1811	30	0.079	2.0	4.9	2.223	19000	85000	29000	132000	18000	80000	28000	125000
(3MM)	2MM219WI-CR	3.7402	95	0.00025	0.0064	6.6929	170	0.0004	0.010	1.2598	32	0.079	2.0	5.6	2.54	21600	96500	33500	146000	20800	91500	31500	140000
(3MM)	2MM220WI-CR	3.9370	100	0.00025	0.0064	7.0866	180	0.0004	0.010	1.3386	34	0.079	2.0	7.2	3.266	24500	110000	36500	166000	23600	104000	35500	156000
(3MM)	2MM222WI-CR	4.3307	110	0.00025	0.0064	7.8740	200	0.0004	0.010	1.4961	38	0.079	2.0	11.7	5.307	31000	140000	44000	196000	30000	132000	41500	186000
(3MM)	2MM224WI-3-CR	4.7244	120	0.00025	0.0064	8.4646	215	0.0004	0.010	1.5748	40	0.079	2.0	15	6.804	34500	156000	47500	212000	33500	146000	45000	200000
(3MM)	2MM226WI-3-MBR	5.1181	130	0.00030	0.0076	9.0551	230	0.0004	0.010	1.5748	40	0.098	2.5	16	7.258	43000	193000	54000	240000	41500	183000	51000	228000
(3MM)	2MM230WI-MBR	5.9055	150	0.00030	0.0076	10.6299	270	0.0005	0.013	1.7717	45	0.098	2.5	21	9.526	60000	265000	69500	305000	57000	250000	65500	290000

(1) Maximum shaft or housing fillet radius which bearing corners clear.
(2) See "width tolerance" page E63 for width tolerance of multiplex sets.
One piece molded nylon, glass fiber reinforced outer ring- piloted cage is standard except where designated CR or MBR.
CR - Outer ring-piloted composition cage.
MBR - Inner ring-piloted machined bronze cage.

Medium MM300K, 2MM300WI Series and 3MM300WI Series



MM300K

2MM300WI
3MM300WI

DIMENSIONS – TOLERANCES

Bearing Number	Bore d tolerance +0.0000" +0.000mm to minus				Outside Diameter D tolerance +0.000" +0.000mm to minus				Width C +0.000,-.005" +0.00mm, -.13mm to minus		Fillet Radius(1)		Wt.		Load Rainings: Static Load Rating C_O		Load Rainings: Extended Dynamic Load Rating C_E	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	N	lbs.	N
MM305K-CR	0.9843	25	0.00015	0.0038	2.4409	62	0.0002	0.005	0.6693	17	0.039	1.0	0.52	0.236	2360	10400	6000	26000
MM306K-CR	1.1811	30	0.00015	0.0038	2.8346	72	0.0002	0.005	0.7480	19	0.039	1.0	0.78	0.354	3100	13700	7500	33500
MM307K-CR	1.3780	35	0.0002	0.0051	3.1496	80	0.0002	0.005	0.8268	21	0.059	1.5	1.01	0.458	3550	16000	8300	37500
MM308K-CR	1.5748	40	0.0002	0.0051	3.5433	90	0.0003	0.008	0.9055	23	0.059	1.5	1.42	0.644	5100	22400	11000	49000
MM309K-CR	1.7717	45	0.0002	0.0051	3.9370	100	0.0003	0.008	0.9843	25	0.059	1.5	1.9	0.862	7100	31300	13200	58500
MM310K-CR	1.9685	50	0.0002	0.0051	4.3307	110	0.0003	0.008	1.0630	27	0.059	1.5	2.48	1.125	7350	32500	15300	68000
MM311K-CR	2.1654	55	0.0002	0.0051	4.7244	120	0.0003	0.008	1.1417	29	0.079	2.0	3.14	1.424	8650	39000	18000	80000
MM312K-CR	2.3622	60	0.0002	0.0051	5.1181	130	0.0004	0.010	1.2205	31	0.079	2.0	3.89	1.765	11600	51100	20400	90000
MM313K-CR	2.5591	65	0.0002	0.0051	5.5118	140	0.0004	0.010	1.2992	33	0.079	2.0	4.78	2.168	13400	59000	23200	102000
MM314K-CR	2.7559	70	0.0002	0.0051	5.9055	150	0.0004	0.010	1.3780	35	0.079	2.0	5.77	2.617	15300	67400	26000	116000

(1) Maximum shaft or housing fillet radius which bearing corners clear.
Two piece inner ring-piloted composition cage is standard.
CR - ring-piloted composition cage.

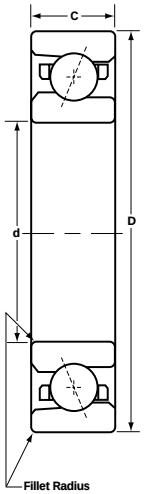
DIMENSIONS – TOLERANCES

TO ORDER: Specify prefix 2MM for 15° contact angle. Example: 2MM302WI Specify prefix 3MM for 25° contact angle. Example: 3MM302WI

Bearing Number: Contact Angle 25°	Bearing Number: Contact Angle 15°	Bore d tolerance +0.0000" +0.000 mm to minus				Outside Diameter D tolerance +0.0000" +0.000 mm to minus				Width(2) C +0.000", -.005" +0.00 mm, -0.13 mm		Fillet Radius(1)		Wt.		Load Ratings: 2MM SERIES: Static Load Rating C_o		Load Ratings: 2MM SERIES: Extended Dynamic Load Rating C_E		Load Ratings: 3MM SERIES: Static Load Rating C_O		Load Ratings: 3MM SERIES: Extended Dynamic Load Rating C_E	
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	N	lbs.	N	lbs.	N	lbs.	N
(3MM)	**2MM301WI-CR**	0.4724	12	0.00015	0.0038	1.4567	37	0.0002	0.005	0.4724	12	0.039	1.0	0.15	0.068	915	4050	2500	11000	880	3900	2400	10800
(3MM)	**2MM302WI**	0.5906	15	0.00015	0.0038	1.6535	42	0.0002	0.005	0.5118	13	0.039	1.0	0.2	0.091	1140	5000	2700	12000	1080	4800	2600	11600
(3MM)	**2MM303WI-CR**	0.6693	17	0.00015	0.0038	1.8504	47	0.0002	0.005	0.5512	14	0.039	1.0	0.25	0.113	1400	6200	3800	17000	1370	6000	3650	16300
(3MM)	**2MM304WI-CR**	0.7874	20	0.00015	0.0038	2.0472	52	0.0002	0.005	0.5906	15	0.039	1.0	0.35	0.159	1930	8650	4800	21600	1860	8300	4750	20800
(3MM)	**2MM305WI-CR**	0.9843	25	0.00015	0.0038	2.4409	62	0.0002	0.005	0.6693	17	0.039	1.0	0.52	0.236	3000	13200	6800	30500	2850	12700	6700	30000
(3MM)	**2MM306WI-CR**	1.1811	30	0.00015	0.0038	2.8346	72	0.0002	0.005	0.7480	19	0.039	1.0	0.78	0.354	3900	17300	8650	38000	3750	16600	8300	37500
(3MM)	**2MM307WI-CR**	1.3780	35	0.0002	0.0051	3.1496	80	0.0002	0.005	0.8268	21	0.059	1.5	1.01	0.458	5000	22000	10400	46500	4750	21200	10000	45000
(3MM)	**2MM308WI-CR**	1.5748	40	0.0002	0.0051	3.5433	90	0.0003	0.008	0.9055	23	0.059	1.5	1.42	0.644	6200	27500	12500	56000	6000	26500	12200	54000
(3MM)	**2MM309WI-CR**	1.7717	45	0.0002	0.0051	3.9370	100	0.0003	0.008	0.9843	25	0.059	1.5	1.9	0.862	7500	33500	15000	67000	7200	32000	14300	64000
(3MM)	**2MM310WI-CR**	1.9685	50	0.0002	0.0051	4.3307	110	0.0003	0.008	1.0630	27	0.059	1.5	2.48	1.125	9000	40000	17600	78000	8650	38000	17000	75000
(3MM)	**2MM311WI-CR**	2.1654	55	0.0002	0.0051	4.7244	120	0.0003	0.008	1.1417	29	0.079	2.0	3.14	1.424	10600	47500	20400	90000	10200	45000	19600	86500
(3MM)	**2MM312WI-CR**	2.3622	60	0.0002	0.0051	5.1181	130	0.0004	0.010	1.2205	31	0.079	2.0	3.89	1.765	12200	55000	23200	104000	11800	52000	22400	99000
(3MM)	**2MM313WI-CR**	2.5591	65	0.0002	0.0051	5.5118	140	0.0004	0.010	1.2992	33	0.079	2.0	4.78	2.168	15600	69500	28000	125000	15000	67000	27000	120000
(3MM)	**2MM314WI-CR**	2.7559	70	0.0002	0.0051	5.9055	150	0.0004	0.010	1.3780	35	0.079	2.0	5.77	2.617	18000	80000	31500	140000	17000	76500	30000	134000

(1) Maximum shaft or housing fillet radius which bearing corners clear.
(2) See "width tolerance" page E63 for width tolerance of multiplex sets.
One piece inner ring-piloted composition cage is standard.
One piece molded nylon, glass fiber reinforced outer ring- piloted cage is standard for 2MM302WI size.

HX Series



DIMENSIONS – TOLERANCES

Bearing Number	Bore d	D Outside Diameter	Width C	Fillet Radius	Preload	Limiting speed[1]		Load Ratings Per Single Bearing	
					DUL	Max RPM		Static Capacity C_O	Extended Capacity C_e
						Grease	Oil		
	in. mm	in. mm	in. mm	in. mm	lbs N			lbs. N	lbs. N
2MMV9103HX	0.6693	1.3780	0.3937	0.012	5	58900	100130	1100	2200
	17	35	10	0.30	22			4900	9800
2MMV9104HX	0.7874	1.6535	0.4724	0.024	10	48900	83130	1460	2850
	20	42	12	0.61	44.5			6500	12700
2MMV9105HX	0.9843	1.8504	0.4724	0.024	10	41800	71060	2040	3650
	25	47	12	0.61	44.5			9100	16200
2MMV9106HX	1.1811	2.1654	0.5118	0.039	15	34900	59330	2550	4500
	30	55	13	0.99	66.7			11300	20000
2MMV9107HX	1.3780	2.4409	0.5512	0.039	15	29800	50660	3050	4900
	35	62	14	0.99	66.7			13600	21800
2MMV9108HX	1.5748	2.6772	0.5906	0.039	15	26200	44540	3350	5000
	40	68	15	0.99	66.7			14900	22200
2MMV9109HX	1.7717	2.9528	0.6299	0.039	20	23900	40630	4500	6800
	45	75	16	0.99	89			20000	30200
2MMV9110HX	1.9685	3.1496	0.6299	0.039	20	21800	37060	4800	6950
	50	80	16	0.99	89			21400	30900
2MMV9111HX	2.1654	3.5433	0.7087	0.043	25	18700	31790	5300	6300
	55	90	18	1.09	111			23600	28000
2MMV9112HX	2.3622	3.7402	0.7087	0.043	25	17400	29580	5600	6400
	60	95	18	1.09	111			24900	28500
2MMV9113HX	2.5591	3.9370	0.7087	0.043	30	16400	27880	6800	7650
	65	100	18	1.09	133			30200	34000
2MMV9114HX	2.7559	4.3307	0.7874	0.043	35	15000	25500	8000	9000
	70	110	20	1.09	155			35600	40000
2MMV9115HX	2.9528	4.5276	0.7874	0.043	35	14200	24140	8300	9000
	75	115	20	1.09	155			36900	40000
2MMV9116HX	3.1496	4.9213	0.8661	0.043	45	13200	22440	10800	11800
	80	125	22	1.09	200			48000	52500
2MMV9117HX	3.3465	5.1181	0.8661	0.043	50	12600	21420	11400	12000
	85	130	22	1.09	222			50700	53400
2MMV9118HX	3.5433	5.5118	0.9449	0.059	50	11700	19890	12200	12500
	90	140	24	1.50	222			54300	55600
2MMV9119HX	3.7402	5.7087	0.9449	0.059	60	11300	19210	15000	15300
	95	145	24	1.50	267			66700	68100
2MMV9120HX	3.9370	5.9055	0.9449	0.059	60	10800	18360	15600	15600
	100	150	24	1.50	267			69400	69400
2MMV9121HX	4.1339	6.2992	1.0236	0.079	60	10100	17170	16000	16000
	105	160	26	2.01	267			71200	71200
2MMV9122HX	4.3307	6.6929	1.1024	0.079	65	9500	16150	17300	16000
	110	170	28	2.01	289			77000	71200
2MMV9124HX	4.7244	7.0866	1.1024	0.079	80	8900	15130	21200	20000
	120	180	28	2.01	356			94300	89000

[1] Limits shown are for single bearings, lightly spring preloaded with inner ring rotation.

Ceramic Hybrid Bearings

A ceramic hybrid bearing is a combination of ceramic balls with standard steel rings and retainer material appropriate for the application

CERAMIC BEARING BENEFITS

• High Speed
Up to three million DN with reduced skidding, wear and heat generation; grease-lubricated hybrids up to one million DN.

• Extended Fatigue Life
Three to five times greater than steel when properly applied.

• Marginal Lubrication
Unique tribological features enhance operation under low lubrication conditions and extend life and speed capabilities of lubricants.

• Corrosion resistance
Virtually inert silicone nitride resists corrosion and galling while thin-dense-chrome coating may be used to enhance hybrid results.

• High Stiffness
Modulus of elasticity 50 percent greater than steel increases bearing rigidity.

• Low Torque
Low friction, even under marginal lubrication, with extremely fine surface finishes of .1 to .2 micro-inch AA.

• Long Wear Life
High hardness of Rc78 greatly extends bearing wear characteristics.

• Light Weight
60 percent lighter than steel, reducing centrifugal forces and overall system weight.

• Special Properties
All silicon nitride components are:
- – non-magnetic
- – electrically insulative

APPLICATIONS

• Aerospace
- – gas and air turbines
- – gearboxes
- – auxiliary power units/ generators
- – valves and nozzles

• Machine Tools
- – ultra and high-speed milling spindles
- – ultra and high-speed grinding spindles
- – extended life units

• Instruments
- – gyro, gimbal and platform
- – spectroscopy

• Biotechnology
- – rotating anode
- – medical centrifuge

• Defense
- – space
- – radar
- – missiles

• Automotive
- – turbochargers

• General Industry
- – pumps and compressors
- – reactors and mixers
- – chemical processing
- – cryogenic

Industry's present day applications place demands on machinery that could not be imagined as little as a decade ago.

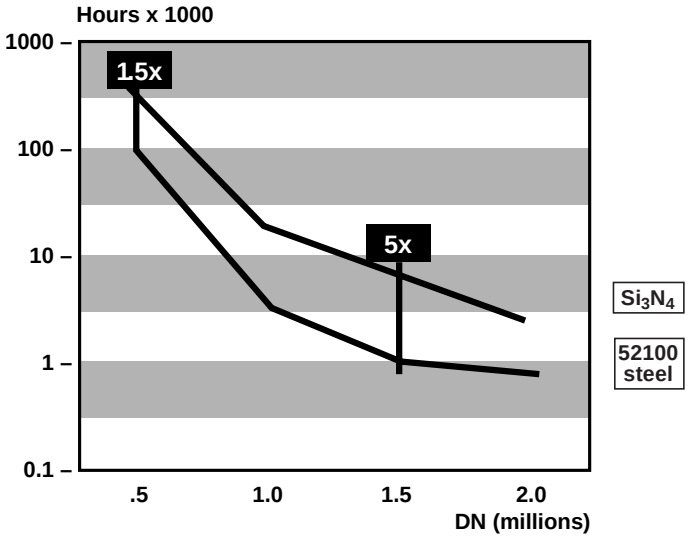
Machinery is expected to be more efficient, reliable, faster and last longer with less maintenance. In the future, even the great reliability and wide versatility of the standard Torrington steel bearing may be challenged.

By incorporating ceramic and state-of-the-art bearing technology, The Torrington Company has developed the hybrid ceramic bearing. Designed with increased speed capabilities, the hybrid ceramic bearing features a higher elastic modulus for greater stiffness. Its lower friction characteristics result in less skidding than the all-steel bearing.

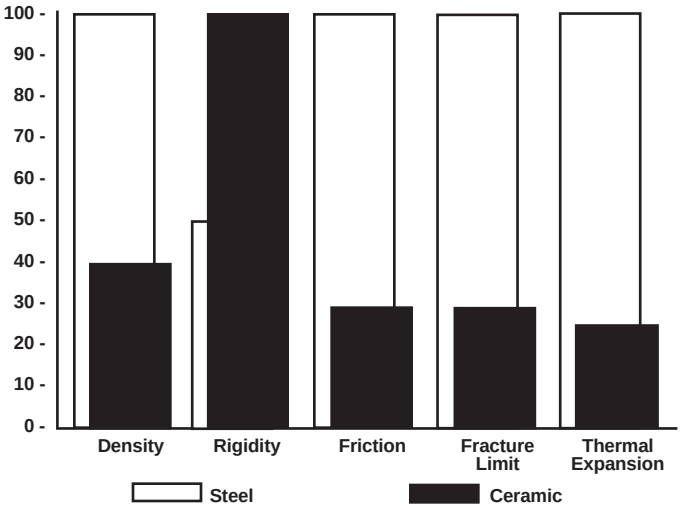
The Torrington Company Sales Engineering professional in your area can assist you in determining if the hybrid ceramic bearing is suitable for your application.

When ordering a ceramic hybrid bearing add "C" to the part number after the prefix that specifies precision type, i.e. 2MMVC99110.

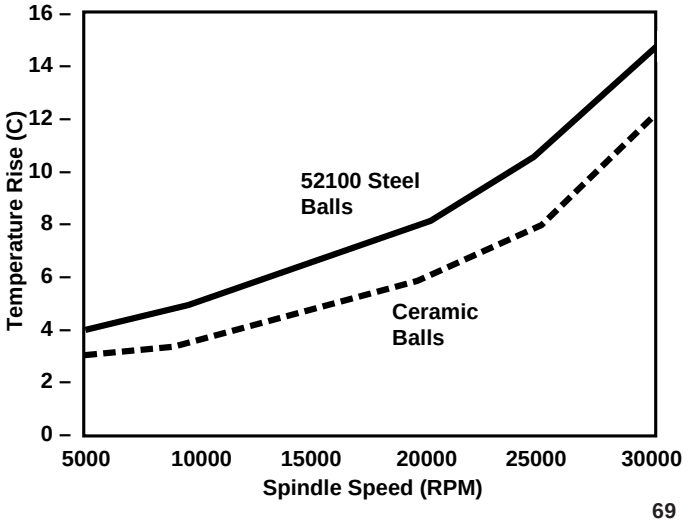
LIFE vs BALL MATERIAL
2MMV99110WN DUL (DB Mounting)



MATERIAL PROPERTIES



TEMPERATURE vs SPEED
2MMV99110WN (50 mm bore). Grease lubrication.

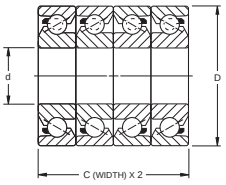


Ball Screw Support Bearings

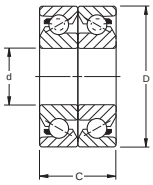
To meet the requirements of the servo-controlled machinery field, Torrington has developed a new series of ball bearings specially designed for ball screw applications. Design criteria for these bearings with maximum axial rigidity, low drag torque, and extreme control of lateral eccentricity.

These bearings are manufactured to ABEC-7 tolerances and are of the nonseparable angular-contact type design with a 60° contact angle and maximum complement of balls.These bearings are supplied prelubricated with heavy duty grease NLGI #2 . Bearings are supplied packaged in DB arrangement. However, they can be mounted in duplexed pairs and in multiplexed sets in either Back-to-Back (DB), Face-to-Face (DF) or Tandem (DT) arrangements.

Standard sizes are available and are stocked and packaged as duplex pairs, triplex sets or quadruplex sets. These bearings are designed primarily for ball screw applications and should not be considered in other areas such as spindles or gearbox shafting without approval by our Engineering Department. These bearings are offered in both standard inch and metric envelope dimensions. TDC (Thin Dense Chrome) plating is the recommended option for enhanced life, wear and corrosion resistance.



Quadruplex Mounting



Duplex Mounting

DIMENSIONS – TOLERANCES (INCH SERIES)

Bearing Number	Bore d		tolerance +0.0000" +0.000 mm to minus		Outside Diameter D		tolerance +0.0000" +0.000 mm to minus		Width (BRG. SET) C		Fillet Radius(1)		Wt.	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg
DUPLEX														
MM9306WI 2H DU	0.7874	20.000	0.00150	0.0038	1.8504	47.000	0.0002	0.005	1.2500	31.750	0.031	0.8	0.6	0.272
MM9308WI 2H DU	0.9385	23.838	0.00150	0.0038	2.4409	62.000	0.0002	0.005	1.2500	31.750	0.031	0.8	1.16	0.527
MM9310WI 2H DU	1.5000	38.100	0.00020	0.0050	2.8346	72.000	0.0002	0.005	1.2500	31.750	0.031	0.8	1.3	0.59
MM9311WI 3H DU	1.7510	44.475	0.00020	0.0050	3.0000	76.200	0.0002	0.005	1.2500	31.750	0.031	0.8	1.3	0.59
MM9313WI 5H DU	2.2500	57.150	0.00020	0.0050	3.5433	90.000	0.0003	0.008	1.2500	31.750	0.031	0.8	1.88	0.859
MM9316WI 3H DU	3.0000	76.200	0.00020	0.0050	4.3307	110.000	0.0003	0.008	1.2500	31.750	0.031	0.8	2.16	0.98
MM9321WI 3 DU	4.0000	101.600	0.00025	0.0064	5.7087	145.001	0.0003	0.008	1.7500	44.450	0.039	1.0	4.76	2.16
MM9326WI 6H DU	5.0000	127.000	0.00030	0.0075	7.0866	180.000	0.0004	0.010	1.7500	44.450	0.039	1.0	8.5	3.86
QUADRUPLEX														
MM9306WI 2H QU	0.7874	20.000	0.00150	0.0038	1.8504	47.000	0.0002	0.005	2.5000	63.500	0.031	0.8	1.2	0.545
MM9308WI 2H QU	0.9385	23.838	0.00150	0.0038	2.4409	62.000	0.0002	0.005	2.5000	63.500	0.031	0.8	2.32	1.053
MM9310WI 2H QU	1.5000	38.100	0.00020	0.0050	2.8346	72.000	0.0002	0.005	2.5000	63.500	0.031	0.8	2.6	1.18
MM9311WI 3H QU	1.7510	44.475	0.00020	0.0050	3.0000	76.200	0.0002	0.005	2.5000	63.500	0.031	0.8	2.6	1.18
MM9313WI 5H QU	2.2500	57.150	0.00020	0.0050	3.5433	90.000	0.0003	0.008	2.5000	63.500	0.031	0.8	3.76	1.707
MM9316WI 3H QU	3.0000	76.200	0.00020	0.0050	4.3307	110.000	0.0003	0.008	2.5000	63.500	0.031	0.8	4.32	1.961
MM9321WI 3 QU	4.0000	101.600	0.00025	0.0064	5.7087	145.001	0.0004	0.010	3.5000	88.900	0.039	1.0	9.52	4.32
MM9326WI 6H QU	5.0000	127.000	0.00030	0.0075	7.0866	180.000	0.0004	0.010	3.5000	88.900	0.039	1.0	17	7.72

(1) Maximum shaft or housing fillet radius which bearing corners clear.

DIMENSIONS – TOLERANCES (METRIC SERIES)

Bearing Number	Bore d		tolerance +0.0000" +0.000 mm to minus		Outside Diameter D		tolerance +0.0000" +0.000 mm to minus		Width (BRG. SET) C		Fillet Radius(1)		Wt.	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg
DUPLEX														
MM17BS47 DUH	0.6693	17	0.00016	0.004	1.8504	47	0.0002	0.005	1.1811	30	0.031	0.8	0.573	0.26
MM20BS47 DUH	0.7874	20	0.00016	0.004	1.8504	47	0.0002	0.005	1.1811	30	0.031	0.8	0.617	0.28
MM25BS62 DUH	0.9843	25	0.00016	0.004	2.4409	62	0.0002	0.005	1.1811	30	0.031	0.8	1.191	0.54
MM30BS62 DUH	1.1811	30	0.00016	0.004	2.4409	62	0.0002	0.005	1.1811	30	0.031	0.8	1.102	0.5
MM30BS72 DUH	1.1811	30	0.00016	0.004	2.8346	72	0.0002	0.005	1.1811	30	0.031	0.8	1.411	0.64
MM35BS72 DUH	1.3780	35	0.0002	0.005	2.8346	72	0.0002	0.005	1.1811	30	0.031	0.8	1.279	0.58
MM40BS72 DUH	1.5748	40	0.0002	0.005	2.8346	72	0.0002	0.005	1.1811	30	0.031	0.8	1.235	0.56
MM45BS75 DUH	1.7717	45	0.0002	0.005	2.9528	75	0.0002	0.005	1.1811	30	0.039	1.0	1.279	0.58
MM40BS90 DUH	1.5748	40	0.0002	0.005	3.5433	90	0.0003	0.008	1.1811	30	0.031	0.8	2.426	1.1
MM50BS90 DUH	1.9685	50	0.0002	0.005	3.5433	90	0.0003	0.008	1.1811	30	0.039	1.0	2.073	0.94
MM55BS90 DUH	2.1654	55	0.0002	0.005	3.5433	90	0.0003	0.008	1.1811	30	0.039	1.0	1.852	0.84
MM35BS100 DUH	1.3780	35	0.0002	0.005	3.9370	100	0.0003	0.008	1.5748	40	0.031	0.8	4.631	2.1
MM40BS100 DUH	1.5748	40	0.0002	0.005	3.9370	100	0.0003	0.008	1.5748	40	0.031	0.8	4.41	2
MM45BS100 DUH	1.7717	45	0.0002	0.005	3.9370	100	0.0003	0.008	1.5748	40	0.039	1.0	4.19	1.9
MM50BS100 DUH	1.9685	50	0.0002	0.005	3.9370	100	0.0003	0.008	1.5748	40	0.039	1.0	3.925	1.78
MM75BS110 DUH	2.9528	75	0.0002	0.005	4.3307	110	0.0003	0.008	1.1811	30	0.039	1.0	2.117	0.96
MM55BS120 DUH	2.1654	55	0.0002	0.005	4.7244	120	0.0003	0.008	1.5748	40	0.039	1.0	6.306	2.86
MM60BS120 DUH	2.3622	60	0.0002	0.005	4.7244	120	0.0003	0.008	1.5748	40	0.039	1.0	5.997	2.72
MM100BS150 DUH	3.9370	100	0.00024	0.006	5.9055	150	0.0004	0.010	1.7717	45	0.039	1.0	4.41	2

(1) Maximum shaft or housing fillet radius which bearing corners clear.

Ball Screw Support Series

The recommended maximum limitations on ball screw bearing speed limits are based on 50% active duty cycle and a ten minute total cycle period. Speed limitations may be increased somewhat with lighter duty cycles. Please consult our Engineering Department regarding bearing speeds and duty cycles.

PHYSICAL CHARACTERISTICS – LOAD RATINGS

Bearing Number	Std. System Preload (P_L)		Axial Spring Constant		Drag Torque of Preloaded Set		Extended Thrust (C_{AE}) Dynamic Load Rating		Limiting Thrust Capacity (T_L)	
	lbs.	N	$X10^6$lbs/in.	N/m	lbs./in.	Nm	lbs.	N	lbs.	N
DUPLEX										
MM9306WI2H DUH MM17BS47 DUH MM20BS47 DUH	700	3110	4.3	750	3	0.034	5600	25000	5600	25000
MM9308WI2H DUH MM25BS62 DUH MM30BS62 DUH	1000	4450	6.0	1100	4	0.045	6550	29000	8000	35500
MM9310WI2H DUH MM30BS72 DUH MM35BS72 DUH MM40BS72 DUH	1400	6320	7.9	1390	5	0.056	8000	36000	10200	45500
MM35BS100 DUH MM40BS100 DUH MM45BS100 DUH MM50BS100 DUH	2900	12,900	10.0	1760	2	0.28	21500	96000	15700	70500
MM9311WI3H DUH	1500	6670	7.9	1390	5	0.56	8500	38000	11400	51000
MM9313WI5H DUH MM40BS90 DUH MM50BS90 DUH MM55BS90 DUH	1800	8010	9.4	1655	7	0.79	9150	40500	13700	61000
MM9316WI3H DUH MM75BS110 DUH	2200	9790	11.9	2100	9	1.02	10000	44000	17300	76500
MM9321WI3 DUH	4800	21350	14	2455	12	1.36	19000	85000	34000	150000
MM9326WI6H DUH	6000	26690	18.0	3150	23	2.27	20600	91600	42000	186000
MM55BS120DUH MM60BS120 DUH	3500	15570	12.0	2150	6	0.68	18000	80800	26400	117800
MM100BS150 DUH	4800	21350	16.4	2900	10	1.09	19400	86400	33800	151300
QUADRUPLEX										
MM9306WI2H QUH MM17BS47 QUH MM20BS47 QUH	1400	6230	8.6	1500	6	0.068	11200	50000	11200	50000
MM9308WI2H QUH MM25BS62H QUH MM30BS62H QUH	2000	8900	12	2200	8	0.9	13100	58000	16000	71000
MM9310WI2H QUH MM30BS72 QUH MM35BS72 QUH MM40BS72 QUH	2800	12450	15.8	2780	10	1.12	16000	72000	20400	91000
MM35BS100 QUH MM40BS100 QUH MM45BS100 QUH MM50BS100 QUH	5800	25800	20.0	3520	4	0.56	43000	192000	31400	141000
MM9311WI3H QUH	3000	13340	15.8	2780	10	1.12	17000	76000	22800	102000
MM9313WI5H QUH MM40BS90 QUH MM50BS90 QUH MM55BS90 QUH	3600	16010	18.8	3310	14	1.58	18300	81000	27400	122000
MM9316WI3H QUH MM75BS110 QUH	4400	19570	23.8	4200	18	2.04	20000	88000	34600	153000
MM9321WI3 QUH	9600	42700	28.4	4910	24	2.72	38000	170000	68000	300000
MM9326WI6H QUH	12000	53380	36.0	6300	40	4.5	41200	183200	84000	372000
MM55BS120 QUH MM60BS120 QUH	7000	31140	24.0	4300	12	1.36	36000	161600	52800	235600
MM100BS150 QUH	9600	42700	32.8	6720	20	2.18	38800	172800	67600	302600

Ball Screw Support Series

SHAFT AND HOUSING DIAMETERS
INCH SERIES

Bearing Number	Bearing Bore		Shaft		Bearing O.D.		Housing	
	in.	mm	in.	mm	in.	mm	in.	mm
MM9306WI 2H	0.7874	20	0.7873	19.997	1.8504	47	1.8507	47.008
	0.78725	19.996	0.7871	19.992	1.8502	46.995	1.8504	47.000
MM9308WI 2H	0.9385	23.8379	0.9384	23.835	2.4409	62	2.4412	62.008
	0.93835	23.6341	0.9382	28.830	2.4407	61.995	2.4409	62.000
MM9310WI 2H	1.5000	38.100	1.4998	38.095	2.8346	72	2.8349	72.008
	1.4998	38.095	1.4996	38.090	2.8344	71.995	2.8346	72.000
MM9311WI 3H	1.7510	44.475	1.7508	44.470	3.0000	76.2	3.0003	76.208
	1.7508	44.470	1.7506	44.465	2.9998	76.195	3.0000	76.200
MM9313WI 5H	2.2500	57.150	2.2498	57.145	3.5433	90	3.5436	90.008
	2.2498	57.145	2.2496	57.140	3.5431	89.995	3.5433	90.000
MM9316WI 3H	3.0000	76.200	2.9998	76.195	4.3307	110	4.3311	110.010
	2.9998	76.195	2.9995	76.187	4.3304	109.992	4.3307	110.000
MM9321WI 3	4.0000	101.600	3.9998	101.595	5.7091	145	5.7087	145.010
	3.99975	101.5936	3.9995	101.587	5.7030	145.99	5.7084	145.000
MM9326WI 6H	5.0000	127.000	4.9997	126.985	7.0866	179.986	7.0870	179.996
	4.9997	126.985	4.9994	126.975	7.0862	179.976	7.0866	179.986

SHAFT AND HOUSING DIAMETERS
METRIC SERIES

Bearing Number	Bearing Bore		Shaft		Bearing O.D.		Housing		Bearing Number	Bearing Bore		Shaft		Bearing O.D.		Housing	
	in.	mm	in.	mm	in.	mm	in.	mm		in.	mm	in.	mm	in.	mm	in.	mm
MM17BS 47	0.66929	17.000	0.66917	16.991	1.8504	47.000	1.8507	47.008	**MM45BS 75**	1.7716	45.000	1.7714	44.995	2.9527	75.000	2.9531	75.008
	0.66913	16.996	0.66897	16.992	1.8502	46.995	1.8504	47.000		1.7714	44.995	1.7712	44.990	2.9525	74.995	2.9527	75.000
MM20BS 47	0.7874	20.000	0.78728	19.997	1.8504	47.000	1.8507	47.008	**MM45BS 100**	1.7716	45.000	1.7714	44.995	3.937	100.000	3.9374	100.010
	0.78725	19.996	0.78708	19.992	1.8502	46.995	1.8504	47.000		1.7714	44.995	1.7712	44.990	3.9366	99.992	3.937	100.000
MM25BS 62	0.98425	25.000	0.98413	24.997	2.4409	62.000	2.4412	62.008	**MM50BS 90**	1.9685	50.000	1.9683	49.995	3.5433	90.000	3.5436	90.008
	0.98409	24.996	0.98393	24.992	2.4407	61.995	2.4409	62.000		1.9683	49.995	1.9681	49.990	3.5429	89.992	3.5433	90.000
MM30BS 62	1.1811	30.000	1.1809	29.997	2.4409	62.000	2.4412	62.008	**MM50BS 100**	1.9685	50.000	1.9683	49.995	3.937	100.000	3.9374	100.010
	1.1809	29.996	1.1807	29.992	2.4407	61.995	2.4409	62.000		1.9683	49.995	1.9681	44.990	3.9366	99.992	3.937	100.000
MM30BS 72	1.1811	30.000	1.1809	29.997	2.8346	72.000	2.8349	72.008	**MM55BS 90**	2.1653	55.000	2.1651	54.995	3.5433	90.000	3.5436	90.008
	1.1809	29.996	1.1807	29.992	2.8344	71.995	2.8346	72.000		2.1651	54.995	2.1649	54.990	3.5429	89.992	3.5433	90.000
MM35BS 72	1.3779	35.000	1.3777	34.995	2.8346	72.000	2.8349	72.008	**MM55BS 120**	2.1653	55.000	2.1651	54.995	4.7244	120.000	4.7248	120.010
	1.3777	34.995	1.3775	34.990	2.8344	71.995	2.8346	72.000		2.1651	54.995	2.1649	54.990	4.7241	119.992	4.7244	120.000
MM35BS 100	1.3779	35.000	1.3777	34.995	3.9370	100.000	3.9374	100.010	**MM60BS 120**	2.3622	60.000	2.3620	59.995	4.7244	120.000	4.7248	120.010
	1.3777	34.995	1.3775	34.990	3.9366	99.992	3.9370	100.000		2.3620	59.995	2.3618	59.990	4.7241	119.992	4.7244	120.000
MM40BS 72	1.5748	40.000	1.5746	39.995	2.8346	72.000	2.8349	72.008	**MM75BS 110**	2.9527	75.000	2.9525	74.995	4.3307	110.000	4.3311	110.010
	1.5746	39.995	1.5744	39.990	2.8344	71.995	2.8346	72.000		2.9525	74.995	2.9522	74.987	4.3304	109.992	4.3307	110.000
MM40BS 90	1.5748	40.000	1.5746	39.995	3.5433	90.000	3.5436	90.008	**MM100BS 150**	3.9370	100.000	3.9368	99.995	5.9055	150.000	5.9059	150.010
	1.5746	39.995	1.5744	39.990	3.5429	89.992	3.5433	90.000		3.9367	99.940	3.9364	99.987	5.9051	149.990	5.9055	150.000
MM40BS 100	1.5748	40.000	1.5746	39.995	3.9370	100.000	3.9374	100.010									
	1.5746	39.995	1.5744	39.990	3.9366	99.992	3.9370	100.000									

Ball Screw Support Series

SHAFT AND HOUSING SHOULDER DIMENSIONS INCH SERIES

Bearing Size	Shaft ±.005" ±.13mm		Housing ±.005" ±.13mm		Fillet Radius (max.)	
	in.	mm	in.	mm	in.	mm
MM9306WI 2H	1.059	26.90	1.613	40.90	0.031	0.8
MM9308WI 2H	1.631	41.40	2.185	55.50	0.031	0.8
MM9310WI 2H	1.857	47.20	2.475	62.90	0.031	0.8
MM9311WI 2H	2.052	52.10	2.670	67.80	0.031	0.8
MM9313WI 5H	2.574	65.40	3.192	81.10	0.031	0.8
MM9316WI 3H	3.377	85.80	3.995	101.50	0.031	0.8
MM9321WI 3	4.512	114.60	5.191	131.90	0.039	1.0
MM9326WI 6H	5.664	143.90	6.602	167.70	0.039	1.0

SHAFT AND HOUSING SHOULDER DIMENSIONS METRIC SERIES

Bearing Size	Shaft ±.005" ±.13mm		Housing ±.005" ±.13mm		Fillet Radius (max.)		Bearing Size	Shaft ±.005" ±.13mm		Housing ±.005" ±.13mm		Fillet Radius (max.)	
	in.	mm	in.	mm	in.	mm		in.	mm	in.	mm	in.	mm
MM17BS 47	0.905	23.00	1.634	41.5	0.031	0.8	**MM45BS 75**	2.047	52.00	2.717	69.00	0.03	1.0
MM20BS 47	1.024	26.00	1.634	41.5	0.031	0.8	**MM45BS 100**	2.126	54.00	3.543	90.00	0.03	1.0
MM25BS 62	1.378	35.00	2.205	56.0	0.031	0.8	**MM50BS 90**	2.323	59.00	3.228	82.00	0.03	1.0
MM30BS 62	1.575	40.00	2.205	56.0	0.031	0.8	**MM50BS 100**	2.323	59.00	3.543	90.00	0.03	1.0
MM30BS 72	1.575	40.00	2.205	56.0	0.031	0.8	**MM55BS 90**	2.48	63.00	3.228	82.00	0.03	1.0
MM35BS 72	1.653	42.00	2.520	64.0	0.031	0.8	**MM55BS 120**	2.559	65.00	4.331	110.00	0.03	1.0
MM35BS 100	1.653	42.00	3.543	90.0	0.031	0.8	**MM60BS 120**	2.756	70.00	4.331	110.00	0.03	1.0
MM40BS 72	1.850	47.00	2.520	64.0	0.031	0.8	**MM75BS 110**	3.307	84.00	4.016	102.00	0.03	1.0
MM40BS 90	1.850	47.00	3.228	82.0	0.031	0.8	**MM100BS 150**	4.331	110.00	5.433	138.00	0.03	1.0
MM40BS 100	1.850	47.00	3.543	90.0	0.031	0.8							

BSBU D

Standard and
Heavy Duty Bearings

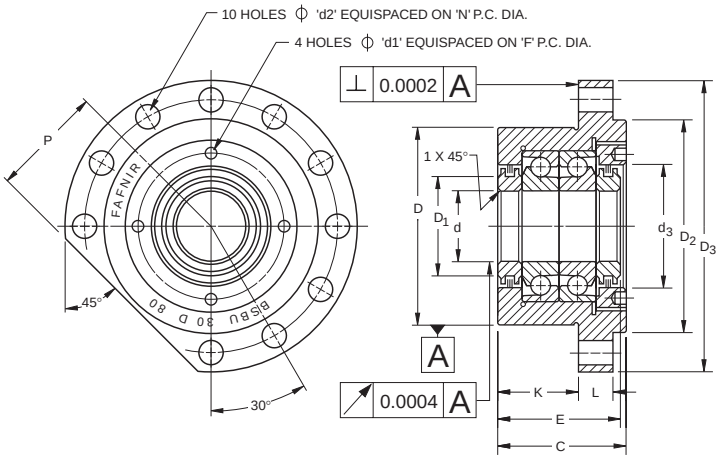
The BSBU D series of bearing cartridge units were designed and developed to give the machine manufacturer a ready made unit providing excellent stiffness and accuracy in ball screw applications. The unit incorporates a flange enabling it to be bolted to a flat surface perpendicular to the ball screw axis.

These units combine the features of MM-BS-DU (Duplex) ball screw bearings with an accurately manufactured housing and laminar ring seals.

Each unit is prepacked with a measured quantity of high quality bearing grease and requires no further lubrication.

Units are supplied with the bearings in pairs or quad sets mounted in the “DB” (“O”) arrangement. Other bearing arrangements can be accommodated if required and in these cases please contact us with details of your requirements.

Consult our Engineering Department for recommended shaft and housing fits.



STANDARD SERIES – Dimensional Tolerances ± 0.005" (±.13 mm) unless otherwise stated.

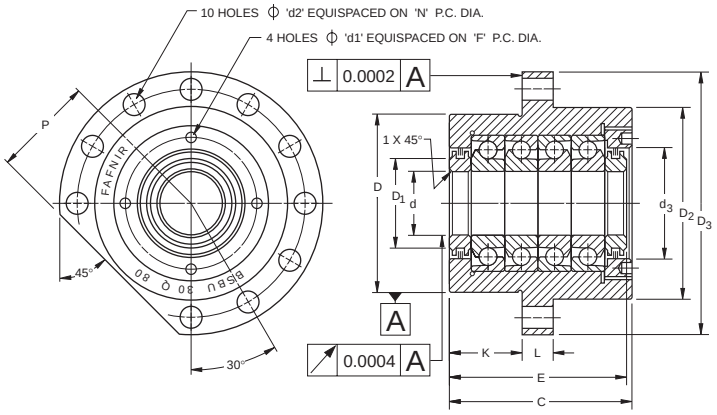
Shaft Diam.	Unit Number	C	d	d_1	d_2	d_3	D	D_1	D_2	D_3	E	F	K	L	N	P	Wt.
mm		in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	lbs. kg
17	**BSBU17D60**	1.85 47.0	0.6693 0.6691 17.000 16.996	0.17 4.3	0.26 6.6	1.42 36.0	2.3622 2.3617 60.000 59.987	1.02 26.0	2.52 64.0	3.54 90.0	1.742 1.702 44.26 43.24	1.67 42.5	1.26 32.0	0.51 13.0	2.99 76.0	1.26 32.0	2.42 1.1
20	**BSBU20D60**	1.85 47.0	0.7874 0.7872 20.000 19.996	0.17 4.3	0.26 6.6	1.42 36.0	2.3622 2.3617 60.000 59.987	1.02 26.0	2.52 64.0	3.54 90.0	1.742 1.702 44.26 43.24	1.67 42.5	1.26 32.0	0.51 13.0	2.99 76.0	1.26 32.0	2.42 1.1
25	**BSBU25D80**	2.05 52.0	0.9842 0.9841 25.000 24.996	0.17 4.3	0.36 9.2	1.97 50.0	3.1496 3.1491 80.000 79.987	1.57 40.0	3.46 88.0	4.72 120.0	1.979 1.938 50.26 49.24	2.34 59.5	1.26 32.0	0.59 15.0	4.02 102.0	1.73 44.0	5.06 2.3
30	**BSBU30D80**	2.05 52.0	1.1811 1.1809 30.000 29.996	0.17 4.3	0.36 9.2	1.97 50.0	3.1496 3.1491 80.000 79.987	1.57 40.0	3.46 88.0	4.72 120.0	1.979 1.938 50.26 49.24	2.34 59.5	1.26 32.0	0.59 15.0	4.02 102.0	1.73 44.0	4.84 2.2
35	**BSBU35D90**	2.05 52.0	1.378 1.3778 35.000 34.995	0.17 4.3	0.36 9.2	2.36 60	3.5433 3.5427 90.000 89.985	1.81 46	3.86 98	5.12 130	1.979 1.938 50.26 49.24	2.62 66.5	1.26 32.0	0.59 15.0	4.45 113.0	1.93 49	7.04 3.2
40	**BSBU40D90**	2.05 52.0	1.5748 1.5746 40.000 39.995	0.17 4.3	0.36 9.2	2.36 60.0	3.5433 3.5427 90.000 89.985	1.81 46.0	3.86 98	5.12 130.0	1.979 1.938 50.26 49.24	2.62 66.5	1.26 32.0	0.59 15.0	4.45 113.0	1.93 49	6.82 3.1
HEAVY DUTY SERIES																	
35	**BSBU35D124**	2.6 66.0	1.3780 1.3778 35.000 34.995	0.21 5.3	0.45 11.4	2.99 76.0	4.8819 4.8812 124.000 123.982	2.6 66.0	5.04 128	6.5 165.0	2.530 2.490 64.26 63.24	3.54 90.0	1.71 43.5	0.67 17.0	5.75 146.0	2.52 64.0	13.86 6.3
40	**BSBU40D124**	2.6 66.0	1.5748 1.5746 40.000 39.995	0.21 5.3	0.45 11.4	2.99 76.0	4.8819 4.8812 124.000 123.982	2.6 66.0	5.04 128	6.5 165.0	2.530 2.490 64.26 63.24	3.54 90.0	1.71 43.5	0.67 17.0	5.75 146.0	2.52 64.0	13.42 6.1
45	**BSBU45D124**	2.6 66.0	1.7716 1.7714 45.000 44.995	0.21 5.3	0.45 11.4	2.99 76.0	4.8819 4.8812 124.000 123.982	2.6 66.0	5.04 128	6.5 165.0	2.530 2.490 64.26 63.24	3.54 90.0	1.71 43.5	0.67 17.0	5.75 146.0	2.52 64.0	13.2 6.0
50	**BSBU50D124**	2.6 66.0	1.9685 1.9683 50.000 49.995	0.21 5.3	0.45 11.4	2.99 76.0	4.8819 4.8812 124.000 123.982	2.6 66.0	5.04 128	6.5 165.0	2.530 2.490 64.26 63.24	3.54 90.0	1.71 43.5	0.67 17.0	5.75 146.0	2.52 64.0	12.898 5.9

BSBU Q

Standard and
Heavy Duty Bearings

The BSBU Q series are similar in design and features to the BSBU D series except MM-BS-QU Quadruplex bearings are used.

Consult our Engineering Department for recommended shaft and housing fits.



STANDARD SERIES – Dimensional Tolerances ± 0.005" (±.13 mm) unless otherwise stated

Shaft Diam.	Unit Number	C	d	d_1	d_2	d_3	D	D_1	D_2	D_3	E	F	K	L	N	P	Wt.
		in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	lbs.
mm		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
17	**BSBU17Q60**	3.03	0.6693	0.17	0.26	1.42	2.3622	1.02	2.52	3.54	2.924	1.67	1.26	0.51	2.99	1.26	3.74
			0.6690				2.3617				2.864						
		77.0	17.000	4.3	6.6	36.0	60.000	26.0	64.0	90.0	74.26	42.5	32.0	13.0	76.0	32.0	1.7
			16.993				59.987				72.74						
20	**BSBU20Q60**	3.03	0.7874	0.17	0.26	1.42	2.3622	1.02	2.52	3.54	2.924	1.67	1.26	0.51	2.99	1.26	3.74
			0.7872				2.3617				2.864						
		77.0	20.000	4.3	6.6	36.0	60.000	26.0	64.0	90.0	74.26	42.5	32.0	13.0	76.0	32.0	1.7
			19.996				59.987				72.74						
25	**BSBU25Q80**	3.23	0.9842	0.17	0.36	1.97	3.1496	1.57	3.46	4.72	3.160	2.34	1.26	0.59	4.02	1.73	7.7
			0.9841				3.1491				3.100						
		82.0	25.000	4.3	9.2	50.0	80.000	40.0	88.0	120.0	80.26	59.5	32.0	15.0	102.0	44.0	3.5
			24.996				79.987				78.74						
30	**BSBU30Q80**	3.23	1.1811	0.17	0.36	1.97	3.1496	1.57	3.46	4.72	3.160	2.34	1.26	0.59	4.02	1.73	7.48
			1.1809				3.1491				3.100						
		82.0	30.000	4.3	9.2	50.0	80	40.0	88.0	120.0	80.26	59.5	32.0	15.0	102.0	44.0	3.4
			29.995				79.987				78.74						
35	**BSBU35Q90**	3.23	1.3780	0.17	0.36	2.36	3.5433	1.81	3.86	5.12	3.160	2.62	1.26	0.59	4.45	1.93	10.12
			1.3778				3.5427				3.100						
		82.0	40.000	4.3	9.2	60	90.000	46	98	130	80.26	66.5	32.0	15.0	113.0	49	4.6
			39.000				89.985				78.74						
40	**BSBU40Q90**	3.23	1.5748	0.17	0.36	2.36	3.5433	1.81	3.86	5.12	3.160	2.62	1.26	0.59	4.45	1.93	9.9
			1.5746				3.5427				3.100						
		82.0	40.000	4.3	9.2	60.0	90.000	46.0	98	130.0	80.26	66.5	32.0	15.0	113.0	49	4.5
			39.995				89.985				78.74						
HEAVY DUTY SERIES																	
35	**BSBU35Q124**	4.17	1.3780	0.21	0.45	2.99	4.8819	2.6	5.04	6.5	4.105	3.54	1.71	0.67	5.75	2.52	22.22
			1.3778				4.8812				4.045						
		106.0	35.000	5.3	11.4	76.0	124.000	66.0	128	165.0	104.26	90.0	43.5	17.0	146.0	64.0	10.1
			34.995				123.982				102.74						
40	**BSBU40Q124**	4.17	1.5748	0.21	0.45	2.99	4.8819	2.6	5.04	6.5	4.105	3.54	1.71	0.67	5.75	2.52	21.34
			1.5746				4.8812				4.045						
		106.0	40.000	5.3	11.4	76.0	124.000	66.0	128	165.0	104.26	90.0	43.5	17.0	146.0	64.0	9.7
			39.995				123.982				102.74						
45	**BSBU45Q124**	4.17	1.7716	0.21	0.45	2.99	4.8819	2.6	5.04	6.5	4.105	3.54	1.71	0.67	5.75	2.52	20.9
			1.7714				4.8812				4.045						
		106.0	45.000	5.3	11.4	76.0	124.000	66.0	128	165.0	104.26	90.0	43.5	17.0	146.0	64.0	9.5
			44.995				123.982				102.74						
50	**BSBU50Q124**	4.17	1.9685	0.21	0.45	2.99	4.8819	2.6	5.04	6.5	4.105	3.54	1.71	0.67	5.75	2.52	20.46
			1.9683				4.8812				4.045						
		106.0	50.000	5.3	11.4	76.0	124.000	66.0	128	165.0	104.26	90.0	43.5	17.0	146.0	64.0	9.3
			49.995				123.982				102.74						

BSPB D

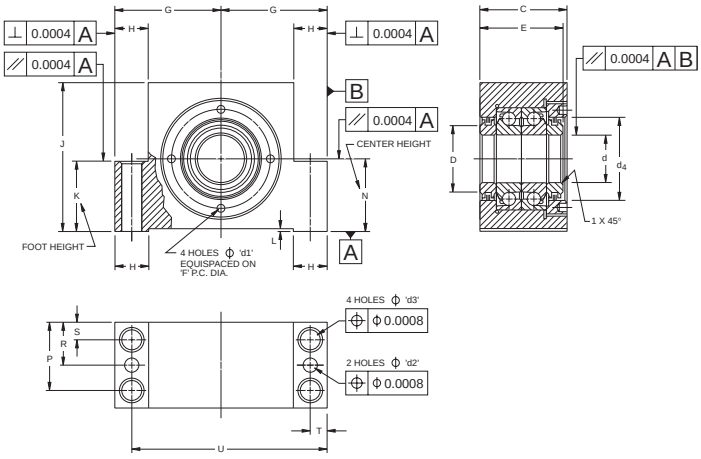
Standard and
Heavy Duty Bearings

The BSPB D series is a design of bearing pillow block unit for ball screw applications.

The unit incorporates similar features to the BSBU D series but is designed to bolt down onto a flat surface, parallel to the ball screw axis.

In the standard unit, pilot holes for dowels are provided. Units with finished holes for dowels can be supplied by special order if required.

Consult our Engineering Department for recommended shaft and housing fits.



STANDARD SERIES – Dimensional Tolerances ± 0.005" (±.13mm) unless otherwise stated.

Shaft Diam.	Unit Number	C	d	d_1	d_2	d_3	d_4	D	E	F	G	H	J	K	L	N	P	R	S	T	U	Wt.
		in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	lbs.
mm		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
17	**BSPB17D32**	1.850	0.6693	0.17	0.31	0.35	1.42	1.02	1.742	1.67	1.8504	0.67	2.44	1.26	0.04	1.2598	1.50	0.87	0.35	0.33	3.37	3.3
		1.848	0.6691						1.702		1.8499					1.2593						
		47.000	17.000	4.3	7.8	9.0	36.0	26.0	44.26	42.5	47.000	17	62	32.0	1.0	32.000	38.0	22.0	9.0	8.5	85.5	1.5
		46.950	16.996						43.24		46.987					31.987						
20	**BSPB20D32**	1.850	0.7874	0.17	0.31	0.35	1.42	1.02	1.742	1.67	1.8504	0.67	2.44	1.65	0.04	1.2598	1.50	0.87	0.35	0.33	3.37	3.3
		1.848	0.7872						1.702		1.8499					1.2593						
		47.000	20.000	4.3	7.8	9.0	36.0	26.0	44.26	42.5	47.000	17	62	42.0	1.0	32.000	38.0	22.0	9.0	8.5	85.5	1.5
		46.950	19.996						43.24		46.987					31.987						
25	**BSPB25D42**	2.047	0.9842	0.17	0.39	0.43	1.97	1.57	1.979	2.34	2.4606	0.79	3.35	1.65	0.04	1.6535	1.65	0.98	0.39	0.39	4.53	6.16
		2.045	0.9841						1.938		2.4601					1.6530						
		52.000	25.000	4.3	9.8	11.0	50.0	40.0	50.26	59.5	62.500	20	85	42.0	1.0	42.000	42.0	25.0	10.0	10.0	115.0	2.8
		51.950	24.996						49.24		62.487					41.987						
30	**BSPB30D42**	2.047	1.1811	0.17	0.39	0.43	1.97	1.57	1.979	2.34	2.4606	0.79	3.35	1.97	0.04	1.6535	1.65	0.98	0.39	0.39	4.53	5.94
		2.045	1.1809						1.938		2.4601					1.6530						
		52.000	30.000	4.3	9.8	11.0	50.0	40.0	50.26	59.5	62.500	20	85	50.0	1.0	42.000	42.0	25.0	10.0	10.0	115.0	2.7
		51.920	29.996						49.24		62.487					41.987						
35	**BSPB35D50**	2.047	1.378	0.17	0.51	0.51	2.36	1.81	1.979	2.62	2.6772	0.81	3.74	1.97	0.04	1.9685	1.65	0.98	0.39	0.39	4.96	8.36
		2.045	1.3778						1.938		2.6767					1.9680						
		52.000	35.000	4.3	13.0	13.0	60.0	46.0	50.26	66.5	68.000	20.5	95	50.0	1.0	50.000	42.0	25.0	10.0	10.0	126.0	3.8
		51.950	34.995						49.24		67.987					49.987						
40	**BSPB40D50**	2.047	1.5748	0.17	0.51	0.51	2.36	1.81	1.979	2.62	2.6772	0.81	3.74	1.26	0.04	1.9685	1.65	0.98	0.39	0.39	4.96	8.14
		2.045	1.5746						1.938		2.6767					1.9680						
		52.000	40.000	4.3	13.0	13.0	60.0	46.0	50.26	66.5	68.000	20.5	95	32.0	1.0	50.000	42.0	25.0	10.0	10.0	126.0	3.7
		51.950	39.995						49.24		67.987					49.987						

HEAVY DUTY SERIES

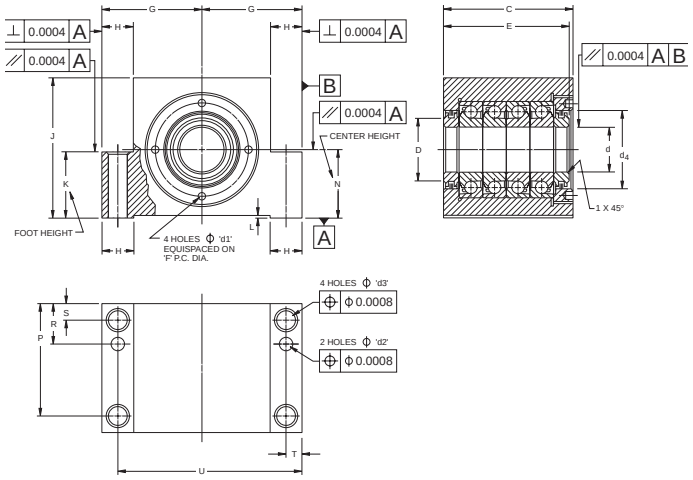
35	**BSPB35D65**	2.598	1.3780	0.21	0.46	0.71	2.99	2.6	2.530	3.54	3.7402	1.18	5.12	2.56	0.04	2.5590	2.09	1.26	0.51	0.59	6.89	21.34
		2.596	1.3778						2.490		3.7396					2.5585						
		66.000	35.000	5.3	11.8	18.0	76.0	66.0	64.26	90.0	95.000	30.0	130.0	65	1.0	65.000	53.0	32.0	13.0	15.0	175.0	9.7
		65.950	34.995						63.24		94.987					64.987						
40	**BSPB40D65**	2.598	1.5748	0.21	0.46	0.71	2.99	2.6	2.530	3.54	3.7402	1.18	5.12	2.56	0.04	2.5590	2.09	1.26	0.51	0.59	6.89	20.9
		2.596	1.5746						2.490		3.7396					2.5585						
		66.000	40.000	5.3	11.8	18.0	76.0	66.0	64.26	90.0	95.000	30.0	130.0	65	1.0	65.000	53.0	32.0	13.0	15.0	175.0	9.5
		65.950	39.995						63.24		94.987					64.987						
45	**BSPB45D65**	2.598	1.7716	0.21	0.46	0.71	2.99	2.6	2.530	3.54	3.7402	1.18	5.12	2.56	0.04	2.5590	2.09	1.26	0.51	0.59	6.89	20.46
		2.596	1.7714						2.490		3.7396					2.5585						
		66.000	45.000	5.3	11.8	18.0	76.0	66.0	64.26	90.0	95.000	30.0	130.0	65	1.0	65.000	53.0	32.0	13.0	15.0	175.0	9.3
		65.950	44.995						63.24		94.987					64.987						
50	**BSPB50D65**	2.598	1.9685	0.21	0.46	0.71	2.99	2.6	2.530	3.54	3.7402	1.18	5.12	2.56	0.04	2.5590	2.09	1.26	0.51	0.59	6.89	20.02
		2.596	1.9683						2.490		3.7396					2.5585						
		66.000	50.000	5.3	11.8	18.0	76.0	66.0	64.26	90.0	95.000	30.0	130.0	65	1.0	65.000	53.0	32.0	13.0	15.0	175.0	9.1
		65.950	49.995						63.24		94.987					64.987						

BSPB Q Series

Standard and
Heavy Duty Bearings

The BSPB Q series is similar in design and features to the BSPB D series except MM-BS-QU Quadruplex bearings are used.

Consult our Engineering Department for recommended shaft and housing fits.



STANDARD SERIES – Dimensional Tolerances ± 0.005" (±.13 mm) unless otherwise stated

Shaft Diam.	Unit Number	C	d	d_1	d_2	d_3	d_4	D	E	F	G	H	J	K	L	N	P	R	S	T	U	Wt.
mm		in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	lbs. kg
17	**BSPB17Q32**	3.031 3.030 77.000 76.950	0.6693 0.6691 17.000 16.996	0.17 4.3	0.31 7.8	0.35 9.0	1.42 36.0	1.02 26.0	2.924 2.864 74.26 72.74	1.67 42.5	1.8504 1.8499 47.000 46.987	0.67 17	2.44 62	1.26 32.0	0.04 1.0	1.2598 1.2593 32.000 31.987	2.68 68.0	0.87 22.0	0.35 9.0	0.33 8.5	3.37 85.5	5.72 2.6
20	**BSPB20Q32**	3.031 3.030 77.000 76.950	0.7874 0.7872 20.000 19.996	0.17 4.3	0.31 7.8	0.35 9.0	1.42 36.0	1.02 26.0	2.924 2.864 74.26 72.74	1.67 42.5	1.8504 1.8499 47.000 46.987	0.67 17	2.44 62	1.26 32.0	0.04 1.0	1.2598 1.2593 32.000 31.987	2.68 68.0	0.87 22.0	0.35 9.0	0.33 8.5	3.37 85.5	5.5 2.5
25	**BSPB25Q42**	3.228 3.226 82.000 81.950	0.9842 0.9841 25.000 24.995	0.17 4.3	0.39 9.8	0.43 11.0	1.97 50.0	1.57 40.0	3.160 3.100 80.26 78.74	2.34 59.5	2.4606 2.4601 62.500 62.487	0.79 20	3.35 85	1.65 42.0	0.04 1.0	1.6535 1.6530 42.000 41.987	2.83 72.0	0.98 25.0	0.39 10.0	0.39 10.0	4.53 115.0	10.12 4.6
30	**BSPB30Q42**	3.228 3.226 82.000 81.950	1.1811 1.1809 30.000 29.996	0.17 4.3	0.39 9.8	0.43 11.0	1.97 50.0	1.57 40.0	3.160 3.100 80.26 78.74	2.34 59.5	2.4606 2.4601 62.500 62.487	0.79 20	3.35 85	1.65 42.0	0.04 1.0	1.6535 1.6530 42.000 41.987	2.83 72.0	0.98 25.0	0.39 10.0	0.39 10.0	4.53 115.0	9.9 4.5
35	**BSPB35Q50**	3.228 3.226 82.000 81.950	1.378 1.3778 35.000 34.995	0.17 4.3	0.51 13.0	0.51 13.0	2.36 60.0	1.81 46.0	3.160 3.100 80.26 78.74	2.62 66.5	2.6772 2.6767 68.000 67.987	0.81 20.5	3.74 95	1.97 50.0	0.04 1.0	1.9685 1.9680 50.000 49.987	2.83 72.0	0.98 25.0	0.39 10.0	0.39 10.0	4.96 126.0	13.64 6.2
40	**BSPB40Q50**	3.228 3.226 82.000 81.950	1.5748 1.5746 40.000 39.995	0.17 4.3	0.51 13.0	0.51 13.0	2.36 60.0	1.81 46.0	3.160 3.100 80.26 78.74	2.62 66.5	2.6772 2.6767 68.000 67.987	0.81 20.5	3.74 95	1.97 50.0	0.04 1.0	1.9685 1.9680 50.000 49.987	2.83 72.0	0.98 25.0	0.39 10.0	0.39 10.0	4.96 126.0	13.2 6
HEAVY DUTY SERIES																						
35	**BSPB35Q65**	4.173 4.171 106.000 105.950	1.3780 1.3778 35.000 34.995	0.21 5.3	0.46 11.8	0.71 18.0	2.99 76.0	2.6 66.0	4.105 4.045 104.26 102.74	3.54 90.0	3.7402 3.7396 95.000 94.987	1.18 30.0	5.12 130.0	2.56 65.0	0.04 1.0	2.5590 2.5585 65.000 65.987	3.66 93.0	1.26 32.0	0.51 13.0	0.59 15.0	6.89 175.0	34.98 15.9
40	**BSPB40Q65**	4.173 4.171 106.000 105.950	1.5748 1.5746 40.000 39.995	0.21 5.3	0.46 11.8	0.71 18.0	2.99 76.0	2.6 66.0	4.105 4.045 104.26 102.74	3.54 90.0	3.7402 3.7396 95.000 94.987	1.18 30.0	5.12 130.0	2.56 65.0	0.04 1.0	2.5590 2.5585 65.000 65.987	3.66 93.0	1.26 32.0	0.51 13.0	0.59 15.0	6.89 175.0	34.54 15.7
45	**BSPB45Q65**	4.173 4.171 106.000 105.950	1.7716 1.7714 45.000 44.995	0.21 5.3	0.46 11.8	0.71 18.0	2.99 76.0	2.6 66.0	4.105 4.045 104.26 102.74	3.54 90.0	3.7402 3.7396 95.000 94.987	1.18 30.0	5.12 130.0	2.56 65.0	0.04 1.0	2.5590 2.5585 65.000 65.987	3.66 93.0	1.26 32.0	0.51 13.0	0.59 15.0	6.89 175.0	33.88 15.4
50	**BSPB50Q65**	4.173 4.171 106.000 105.950	1.9685 1.9683 50.000 49.995	0.21 5.3	0.46 11.8	0.71 18.0	2.99 76.0	2.6 66.0	4.105 4.045 104.26 102.74	3.54 90.0	3.7402 3.7396 95.000 94.987	1.18 30.0	5.12 130.0	2.56 65.0	0.04 1.0	2.5590 2.5585 65.000 65.987	3.66 93.0	1.26 32.0	0.51 13.0	0.59 15.0	6.89 175.0	33.22 15.1

Ex-Cell-O Spindle Bearings

The original bearing design developed by Ex-Cell-O for use in their spindles incorporated inch dimensions and had bore and O.D. tolerances which were nominal to plus. The “EX” series of bearings are designed to meet Ex-Cell-O replacement requirements. These bearings are Fafnir WI construction.

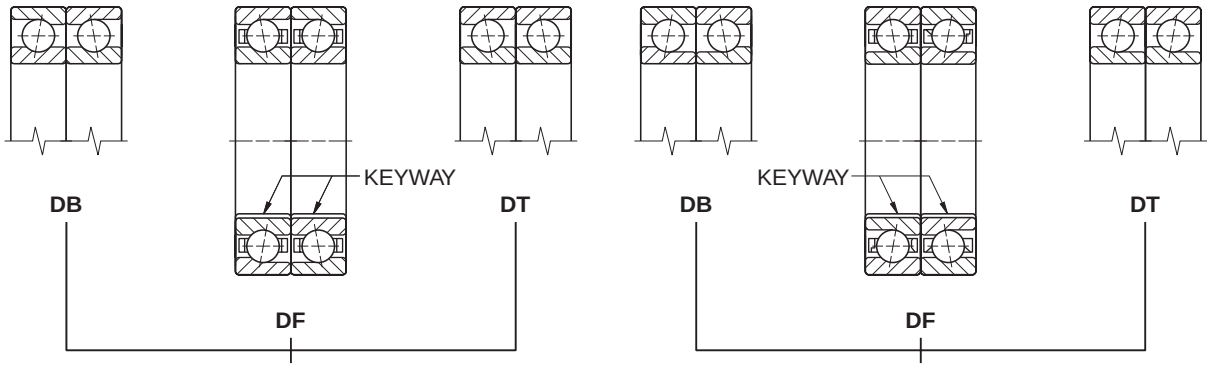
More recently, Ex-Cell-O established a bearing design with the same inch boundary dimensions, but with bore and O.D. tolerances nominal to minus. These bearings are our WO separable construction and the series is designated “XWO.”

Spindle shaft and housing diameters were toleranced by Ex-Cell-O to properly fit each of their bearing series.

Repairing older spindles with the new style bearing, or newer spindles with the old style bearing without reworking of shafts and housings can result in improper shaft and housing fits. Measurement of shafts and housings or reconditioning of parts should determine what style bearing is proper replacement.

The charts which follow show the physical dimensions and part number interchange of Ex-Cell-O bearings. The preload section should be based on the operating speed and the lubrication system of the spindle.

FAFNIR MM-EX AND MM-XWO BEARINGS FOR REPLACEMENT ON EX-CELL-O SPINDLES



Old design, MM-EX
Bore and O.D. Tolerance
Nominal + Tolerance
“WI” Construction

New Design, MM-XWO
Bore and O.D. Tolerance
Nominal - Tolerance
“WO” Construction

MM-EX Replacement Bearings For Ex-Cell-O Spindles

Fafnir Bearing Number	Ex-Cell-O Part No.	Preload lbs.	Bore	O.D.	Width of Pair	Maximum Speed (RPM)
MM20EXCR DU FS223	20	0	0.3752/.3750	1.1252/1.1250	0.6875/.6775	65000
MM30EXCR DU FS223	30	0	0.6252/.6250	1.5002/1.5000	1.0000/9900	35000
MM30EXCR DU 5 #	30	5	0.6252/.6250	1.5002/1.5000	1.0000/9900	25000
MM50EXCR DU FS223	50	0	0.8127/.8125	2.0002/2.0000	1.0000/9900	30000
MM50EXCR DU 10 #	50	10	0.8127/.8125	2.0002/2.0000	1.0000/9900	18000
MM50EXCR DU 50 #	50	50	0.8127/.8125	2.0002/2.0000	1.0000/9900	5000
***MM55EXCR DU 10 #**	55	10	0.8127/.8125	2.0002/2.0000	1.0000/9900	22000
MM57EXCR DU FS223	57	0	1.0627/1.0625	2.2502/2.2500	1.0000/9900	30000
MM57EXCR DU 10 #	57	10	1.0627/1.0625	2.2502/2.2500	1.0000/9900	15000
MM57EXCR DU 50 #	57	50	1.0627/1.0625	2.2502/2.2500	1.0000/9900	5000
MM67EXCR DU FS223	67	0	1.2502/1.2500	2.4377/2.4375	1.2500/1.2400	30000
MM67EXCR DU 10 #	67	10	1.2502/1.2500	2.4377/2.4375	1.2500/1.2400	12500
MM67EXCR DU 30 #	67	30	1.2502/1.2500	2.4377/2.4375	1.2500/1.2400	7500
MM67EXCR DU 75 #	67	75	1.2502/1.2500	2.4377/2.4375	1.2500/1.2400	4500
MM90EXCR DU 20 #	90	20	1.6252/1.6250	3.4377/3.4375	1.6250/1.6150	10000
MM90EXCR DU 100 #	90	100	1.6252/1.6250	3.4377/3.4375	1.6250/1.6150	4500
MM90EXCR DU 150 #	90	150	1.6252/1.6250	3.4377/3.4375	1.6250/1.6150	2700
MM90EXCR DU 250 #	90	250	1.6252/1.6250	3.4377/3.4375	1.6250/1.6150	900
****MM92EXCR DU 20 #**	92	20	1.7502/1.7500	3.4377/3.4375	1.6250/1.6150	12000
****MM92EXCR DU 100 #**	92	100	1.7502/1.7500	3.4377/3.4375	1.6250/1.6150	4500
****MM92EXCR DU 150 #**	92	150	1.7502/1.7500	3.4377/3.4375	1.6250/1.6150	2700
****MM92EXCR DU 250 #**	92	250	1.7502/1.7500	3.4377/3.4375	1.6250/1.6150	900
MM115EXCR DU 30 #	115	30	2.2502/2.2500	4.7502/4.7500	2.2500/2.2400	5000
MM115EXCR DU 250 #	115	250	2.2502/2.2500	4.7502/4.7500	2.2500/2.2400	3600
MM115EXCR DU 350 #	115	350	2.2502/2.2500	4.7502/4.7500	2.2500/2.2400	1800
MM135EXCR DU 20 #	135	20	1.2502/1.2500	2.6877/2.6875	1.2500/1.2400	8000
MM135EXCR DU 75 #	135	75	1.2502/1.2500	2.6877/2.6875	1.2500/1.2400	4000
MM155EXCR DU 150 #	155	150	2.7502/2.7500	4.7502/4.7500	2.2500/2.2400	4000
MM155EXCR DU 300 #	155	300	2.7502/2.7500	4.7502/4.7500	2.2500/2.2400	1800
MM165EXCR DU 200 #	165	200	3.5002/3.5000	6.3127/6.3125	3.0000/2.9900	2800
MM165EXCR DU 400 #	165	400	3.5002/3.5000	6.3127/6.3125	3.0000/2.9900	1200

* Four slots in outer ring faces.

** No keyway in bore.

FS-223-Zero to negative preload

Do not interchange with MM-XWO.

MM-XWO produced to nominal minus tolerance.

MM-EX produced to nominal plus tolerance.

MM-XWO Replacement Bearings For Ex-Cell-O Spindles

Fafnir Bearing Number	Ex-Cell-O Part No.	Preload lbs.	Bore	O.D.	Width of Pair	Maximum Speed		
						Grease	Oil	Mist
MM20 XWOCRDU E9103A	XLO 20-107	0	0.37500/.37485	1.1250/1.1248	0.6875/.6675	40000	65000	80000
MM30XWOCRDU E9103C	XLO 30-57	10	0.62500/.62485	1.5000/1.4998	1.000/.980	27000	30000	35000
MM30XWOCRDU E9103A	XLO 30-107	0	0.62500/.62485	1.5000/1.4998	1.000/.980	35000	40000	60000
MM55XWOCRDU E9103E	XLO 55-27	50	0.81250/.81235	2.0000/1.9998	1.000/.980	5000	8000	12000
MM55XWOCRDU E9103C	XLO 55-57	20	0.81250/.81235	2.0000/1.9998	1.000/.980	20000	22000	24000
MM55XWOCRDU E9103A	XLO 55-107	0	0.81250/.81235	2.0000/1.9998	1.000/.980	24000	27000	45000
MM57XWOCRDU E9103F	XLO 57-17	100	1.06250/1.06235	2.2500/2.2498	1.000/.980	2000	4000	6000
MM57XWOCRDU E9103C	XLO 57-57	20	1.06250/1.06235	2.2500/2.2498	1.000/.980	18000	20000	22000
MM57XWOCRDU E9103A	XLO 57-107	0	1.06250/1.06235	2.2500/2.2498	1.000/.980	22000	25000	35000
MM67XWOCRDU E9103F	XLO 67-17	90	1.2500/1.2498	2.4375/2.4373	1.250/1.230	3600	4500	6000
MM67XWOCRDU E9103C	XLO 67-57	20	1.2500/1.2498	2.4375/2.4373	1.250/1.230	12500	15000	20000
MM67XWOCRDU E9103A	XLO 67-107	0	1.2500/1.2498	2.4375/2.4373	1.250/1.230	16000	20000	30000
MM90XWOCRDU E9103F	XLO 90-17	250	1.6250/1.6248	3.4375/3.4372	1.625/1.605	1000	2000	4000
MM90XWOCRDU E9103D	XLO 90-47	175	1.6250/1.6248	3.4375/3.4372	1.625/1.605	3000	5000	8000
MM90XWOCRDU E9103C	XLO 90-57	100	1.6250/1.6248	3.4375/3.4372	1.625/1.605	5000	7000	11000
MM90XWOCRDU E9103A	XLO 90-77	20	1.6250/1.6248	3.4375/3.4372	1.625/1.605	10000	14000	20000
MM115XWOCRDU E9103E	XLO 115-27	300	2.2500/2.2498	4.7500/4.7496	2.250/2.230	1000	2000	3000
MM115XWOCRDU E9103C	XLO 115-47	150	2.2500/2.2498	4.7500/4.7496	2.250/2.230	3000	4500	7000
MM115XWOCRDU E9103A	XLO 115-77	30	2.2500/2.2498	4.7500/4.7496	2.250/2.230	6000	8000	15000
MM135XWOCRDU E9103C	XLO 135-67	50	1.2500/1.2498	2.6875/2.6873	1.250/1.230	6000	7000	12000
MM135XWOCRDU E9103A	XLO 135-107	0	1.2500/1.2498	2.6875/2.6873	1.250/1.230	15000	19000	28000
MM155XWOCRDU E9103D	XLO 155-37	300	2.7500/2.7498	4.7500/4.7496	2.250/2.230	1000	2000	3000
MM155XWOCRDU E9103B	XLO 155-67	150	2.7500/2.7498	4.7500/4.7496	2.250/2.230	4000	5000	6500
MM155XWOCRDU E9103A	XLO 155-87	50	2.7500/2.7498	4.7500/4.7496	2.250/2.230	6000	7000	10000
MM165XWOCRDU E9103E	XLO 165-27	800	3.50000/3.49975	6.3125/6.3121	3.000/2.980	500	1000	2000
MM165XWOCRDU E9103C	XLO 165-57	250	3.50000/3.49975	6.3125/6.3121	3.000/2.980	2000	3000	5000
MM165XWOCRDU E9103A	XLO 165-87	50	3.50000/3.49975	6.3125/6.3121	3.000/2.980	5000	6500	9000

Do not interchange with MM-EX.

MM-XWO produced to nominal minus tolerance.

MM-EX produced to nominal plus tolerance.

* Standard preload levels are shown. Other preload variations are attainable by spacer adjustment.