

COC



COC INC.

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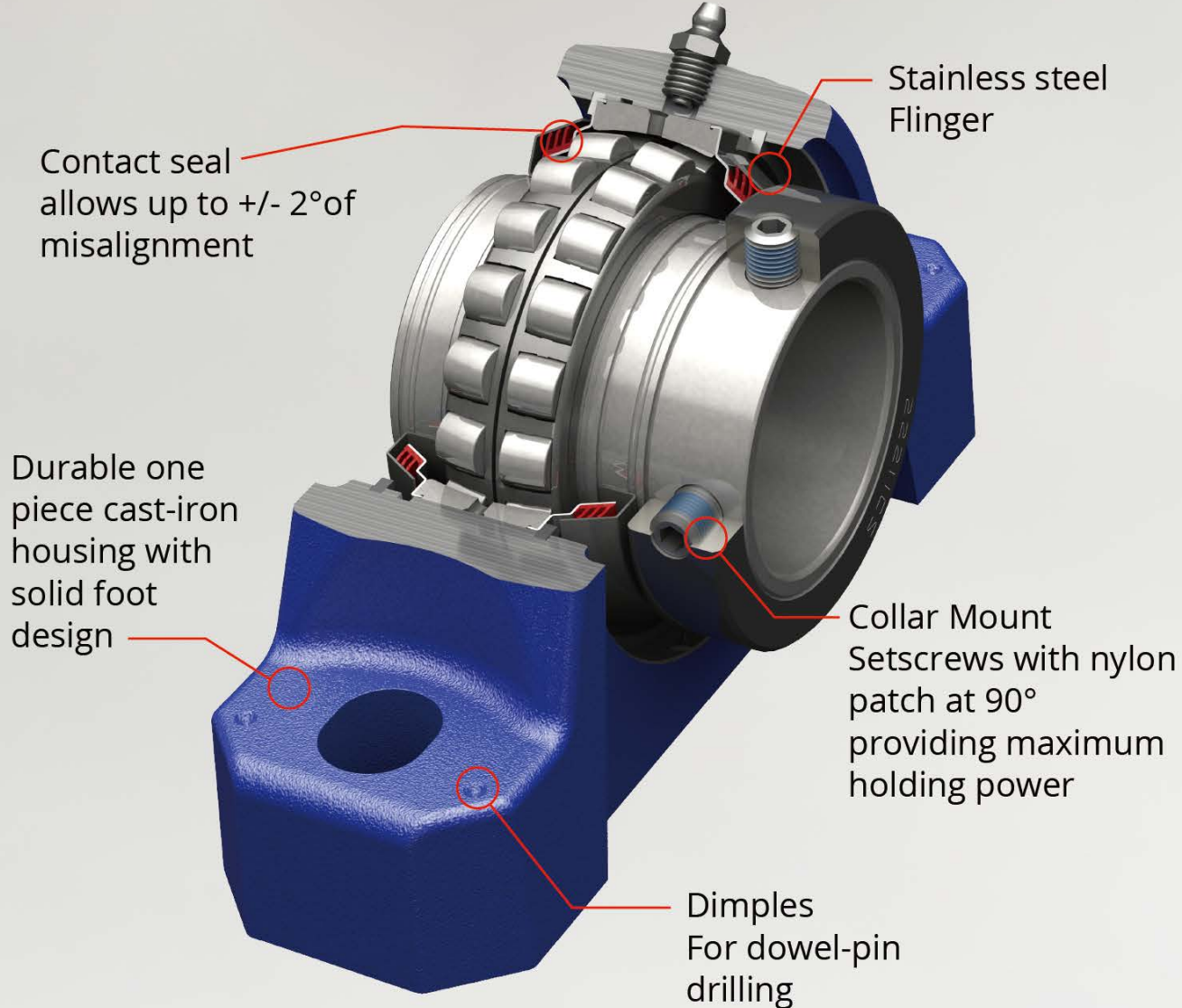
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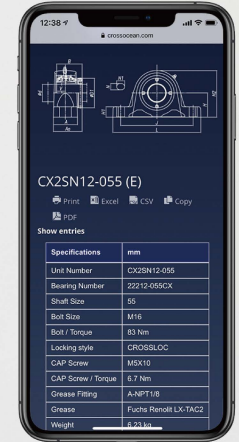
COC introduces new mounted bearing units. We are pleased to present spherical roller bearing units with innovative new designs and features to handle the world's power transmission needs.



Connect from anywhere.



QR CODE Label resists  
up to 600°C (1,112°F)



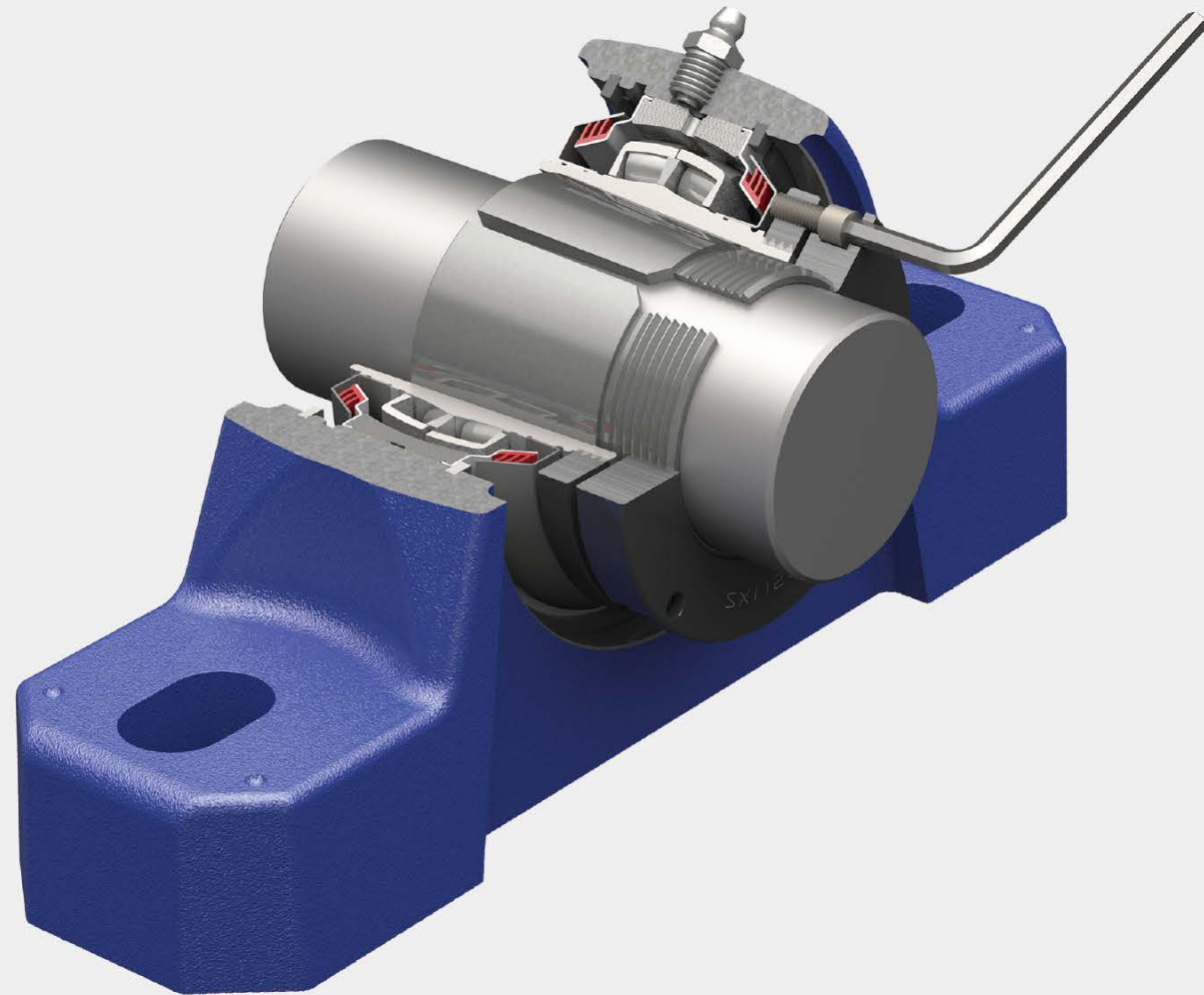
Scan QR code  
To connect the  
information below on site.

- Dimensions of scanned part number
- Installation instructions with videos
- Maintenance information

QR code has both the Web link &  
Serial Number of the product.



# CROSSLOC™



Our new adapter locking system with SN dimension housing is a unitized replacement for standard SN split housing units. It's a great off-the-shelf solution you can save the time and money.

## SN PLUMMER BLOCK FOR A NEW ERA CROSSLOC™ & SN HOUSING

Patented adapter mount system, CROSSLOC™ utilizes cap screws that allows you to easily mount or dismount our bearing from one side. Tighten cap screws in a star pattern to mount and untighten to dismount. It requires only a hex key. It's great for the undersized commercial shafts and holds with total shaft contact.

We use the adapter sleeve on the market in this locking system for the easier replacements and 100% interchangeable with competitive SN products. Our SN are shaft ready units that are factory sealed, pre-lubricated, and assembled.

# Nomenclature

CS 2P 11 - 203 E L

**LOCKING STYLE**  
 CS - Concentric Set Screw  
 CX - CROSSLOC™

**HOUSING STYLE**  
 2P - 2-Bolt Pillow Block    2SN - SN-style 2-Bolt Pillow Block  
 4F - 4-Bolt Flange            4FC - 4-Bolt Flange Cartridge

**BEARING BORE**  
 222XX (e.g. 11 = 22211)

**SHAFT DIAMETER**  
 Number of 1/16 inches (e.g. 203 = 2 3/16")  
 Metric (e.g. 055 = 55mm)

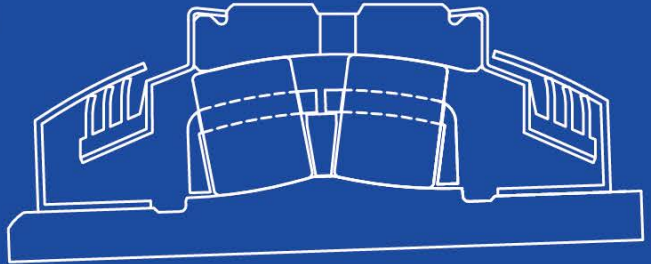
Non Expansion ( no suffix)  
 E - Expansion

Contact Seal ( no suffix)  
 L - Labyrinth Seal

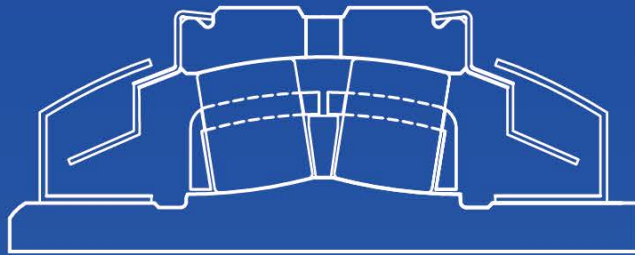


# Contact Seal Protection

Our original designed seal maintains positive contact with the flingers at virtually any angle of shaft mis-alignment up to +/- 2°. The stainless steel flinger shields the seals and bearing from contamination and damage.



Labyrinth seals without rubber lips are available for higher speeds and temperatures. Labyrinth seals reduce operating temperatures at higher speeds.



# Non-expansion to Expansion

When your application needs to be able to accommodate thermal expansion of the shafting, use only one fixed bearing on each shaft. By simply moving a snap ring on the back of the unit the bearing can easily be converted from non-expansion to expansion or vice versa.

# Lubricant

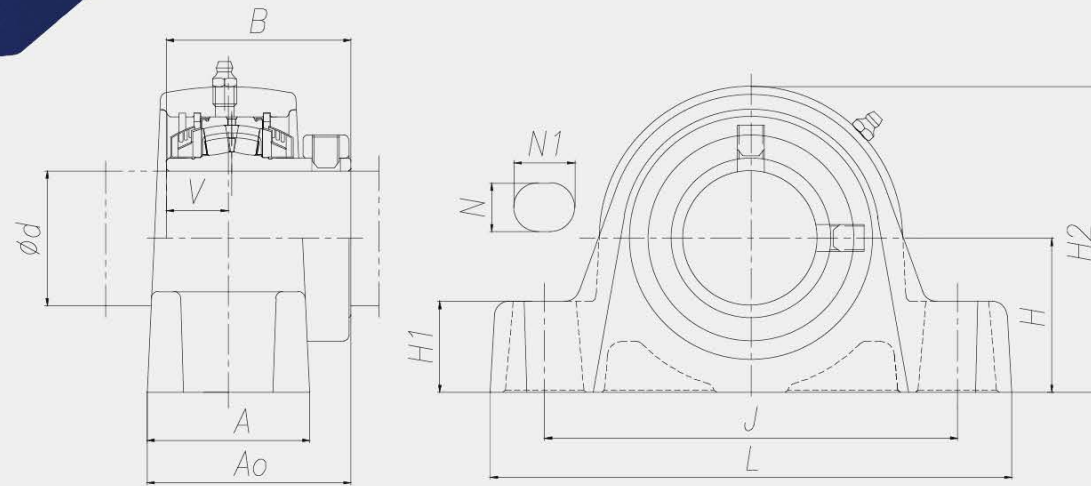
Our lithium complex grease has good EP & AW, water resistance and anti-oxidic properties. It has also good shear stability. It can be used for a wide temperature range from -20°C (-4°F) to +160°C (+320°F), and up to +200°C (+392°F) for short periods.





# CS2P

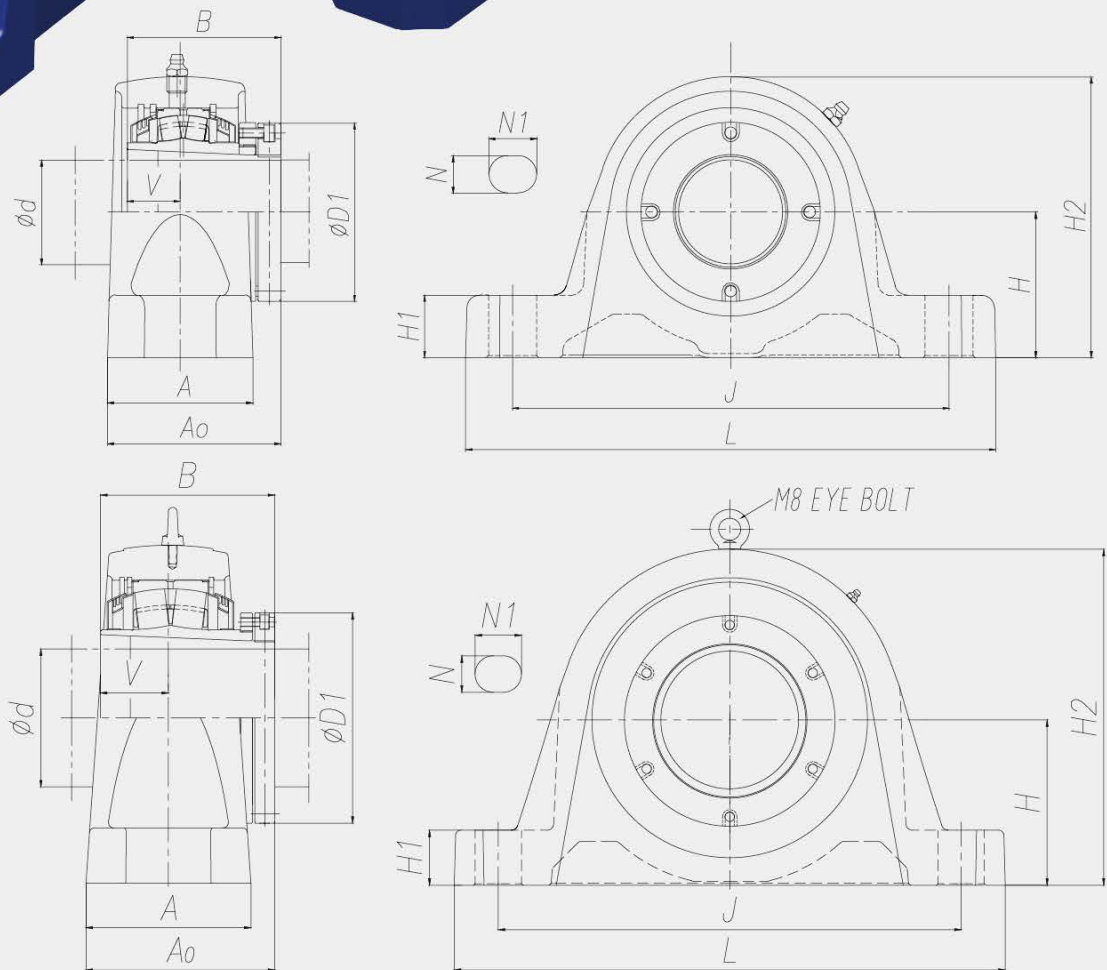
Set screw collar lock spherical roller bearing with two bolt pillow block housing.



Unit Number	Bearing Number	Shaft Dia. D	H	L	A	J	N	N1	H1	H2	V	A0	B	Bolt Size	Weight	
			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
CS2P08-107	22208-107CS	1 7/16 in.													5.37	2.44
CS2P08-108	22208-108CS	1 1/2 in.	1-7/8 47.6	6-5/8 168	2-1/8 54	5 127	19/32 15	31/32 25	1-1/8 28	3-27/32 98	7/8 22.35	2-57/64 73.5	2-45/64 68.89	1/2 M12	5.32	2.42
CS2P08-040	22208-040CS	40 mm													5.39	2.45
CS2P09-111	22209-111CS	1 11/16 in.													6.93	3.15
CS2P09-112	22209-112CS	1 3/4 in.	2-1/8 54	7-1/8 181	2-1/8 54	5-1/2 140	19/32 15	31/32 25	1-1/4 32	4-9/32 109	59/64 23.37	2-29/32 73.7	2-49/64 70.1	1/2 M12	6.82	3.1
CS2P09-045	22209-045CS	45 mm													6.77	3.08
CS2P10-115	22210-115CS	1 15/16 in.													8.18	3.72
CS2P10-050	22210-050CS	50 mm	2-1/4 57.2	8 203	2-1/8 54	6-1/4 159	25/32 20	31/32 25	1-5/16 33	4-1/2 114	57/64 22.61	3-1/64 76.5	2-27/32 72.14	5/8 M16	8.16	3.71
CS2P10-200	22210-200CS	2 in.													8.07	3.67
CS2P11-055	22211-055CS	55 mm													11.22	5.1
CS2P11-203	22211-203CS	2 3/16 in.	2-1/2 63.5	8-1/2 216	2-5/8 67	6-3/4 170	25/32 20	31/32 25	1-1/2 38	4-31/32 126	1 25.45	3-5/16 84.1	3 76	5/8 M16	11.22	5.1
CS2P11-204	22211-204CS	2 1/4 in.													11.04	5.02
CS2P13-060	22213-060CS	60 mm													15.22	6.92
CS2P13-207	22213-207CS	2 7/16 in.	2-3/4 69.8	8-7/8 225	2-13/16 72	7-1/8 181	25/32 20	31/32 25	1-5/8 41	5-19/32 142	1-1/8 28.7	3-27/32 97.47	3-35/64 90.17	5/8 M16	14.98	6.81
CS2P13-208	22213-208CS	2 1/2 in.													14.69	6.68
CS2P13-065	22213-065CS	65 mm													14.52	6.60
CS2P15-211	22215-211CS	2 11/16 in.													20.02	9.1
CS2P15-212	22215-212CS	2 3/4 in.													20.32	9.24
CS2P15-070	22215-070CS	70 mm	3-1/4 82.6	10-5/16 262	3 76	8-1/8 206	15/16 24	1-11/32 34	1-29/32 48	3-13/16 162	1-11/64 29.72	3-31/32 101.0	3-21/32 92.71	3/4 M20	19.84	9.02
CS2P15-215	22215-215CS	2 15/16 in.													19.20	8.73
CS2P15-075	22215-075CS	75 mm													19.16	8.71
CS2P15-300	22215-300CS	3 in.													18.92	8.6
CS2P18-080	22218-080CS	80 mm													33.72	15.33
CS2P18-304	22218-304CS	3 1/4 in.													33.19	15.09
CS2P18-085	22218-085CS	85 mm	3-3/4 95.2	12-5/8 321	3-3/8 86	10 254	1-1/16 27	1-21/32 42	2-1/4 57	7-15/32 190	1-13/32 35.81	4-13/32 111.8	4-1/8 104.74	7/8 M22	32.78	14.9
CS2P18-307	22218-307CS	3 7/16 in.													32.60	14.82
CS2P18-308	22218-308CS	3 1/2 in.													31.98	14.54
CS2P18-090	22218-090CS	90 mm													31.57	14.35
CS2P20-095	22220-095CS	95 mm													31.02	20.74
CS2P20-100	22220-100CS	100 mm	4-1/4 108	15-1/8 384	3-3/4 95	11-3/4 298	1-5/32 29	2-5/16 59	2-7/16 62	8-11/32 212	1-19/32 40.39	4-59/64 125.0	4-41/64 117.73	1 M24	45.16	20.53
CS2P20-315	22220-315CS	3 15/16 in.													45.16	20.53
CS2P20-400	22220-400CS	4 in.													44.72	20.33

# CX2SN

CROSSLOC™ lock spherical roller bearing with two bolt SN dimension pillow block housing.



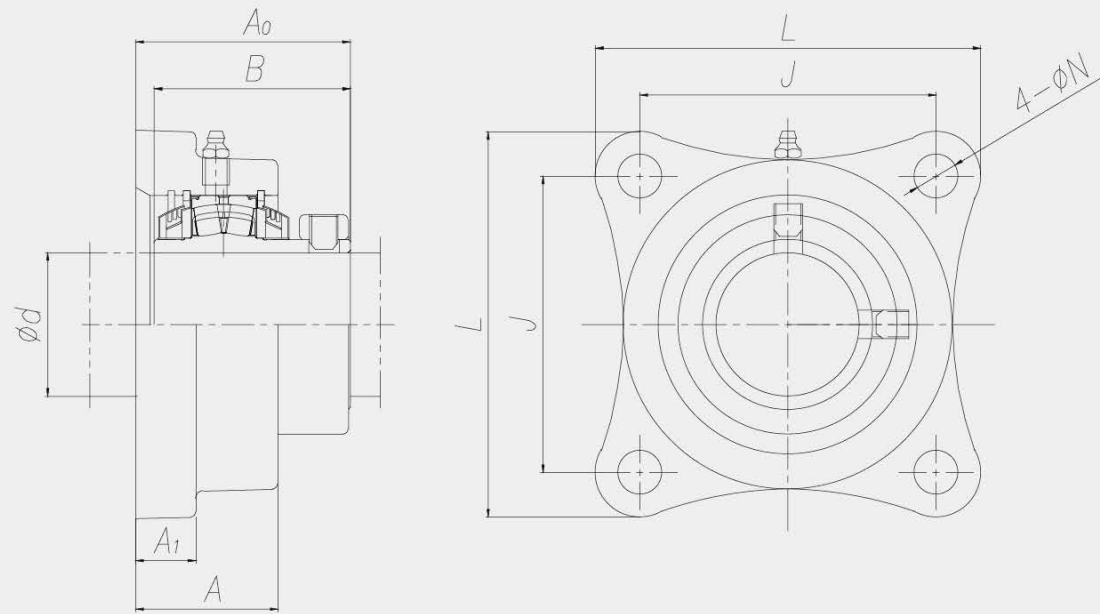
CX2SN28-125 - CX2SN32-140

Unit Number	Bearing Number	Shaft Dia. D	H	L	A	J	N	N1	H1	H2	D1	V	A0	B	Bolt Size	Weight
			mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
CX2SN11-050	22211-050CX	50 mm	70	255	70	210	18	23	30	135	86	25.45	83.45	73.90	M16	6.44
CX2SN12-055	22212-055CX	55 mm	70	255	70	210	18	23	30	135	90	29.00	87	81.00	M16	6.23
CX2SN13-060	22213-060CX	60 mm	80	275	80	230	18	23	30	155	96	30.35	95.35	85.70	M16	8.46
CX2SN15-065	22215-065CX	65 mm	80	275	80	230	18	23	30	155	105	31.56	96.56	88.12	M16	8.34
CX2SN16-070	22216-070CX	70 mm	95	320	90	260	22	27	32	185	115	32.50	105.50	93.00	M20	13.58
CX2SN17-075	22217-075CX	75 mm	95	320	90	260	22	27	32	185	120	35.50	108.50	99.00	M20	13.32
CX2SN18-080	22218-080CX	80 mm	100	345	100	290	22	27	42	195	127	37.51	115.51	103.02	M20	16.22
CX2SN19-085	22219-085CX	85 mm	112	345	100	290	22	27	42	210	132	40.80	118.8	109.60	M20	18.00
CX2SN20-090	22220-090CX	90 mm	112	380	110	320	26	32	42	218	144	42.08	131.08	118.16	M24	22.48
CX2SN22-100	22222-100CX	100 mm	125	410	120	350	26	32	45	240	156	50.00	143.00	133.00	M24	29.07
CX2SN24-110	22224-110CX	110 mm	140	410	120	350	26	32	45	270	170	53.60	148.60	142.20	M24	37.64
CX2SN26-115	22226-115CX	115 mm	150	445	130	380	28	36	50	290	189	58.20	158.20	151.40	M24	47.89
CX2SN28-125	22228-125CX	125 mm	150	500	150	420	33	42	50	305	191	61.50	171.50	158.00	M30	58.49
CX2SN30-135	22230-135CX	135 mm	160	530	160	450	33	42	60	325	206	63.00	182.00	165.00	M30	71.68
CX2SN32-140	22232-140CX	140 mm	170	550	160	470	33	42	60	345	220	67.50	187.50	175.00	M30	85.76

Inch shaft sizes (using inch size adapter sleeves) available

# CS4F

Set screw collar lock spherical roller bearing with four bolt flange housing.

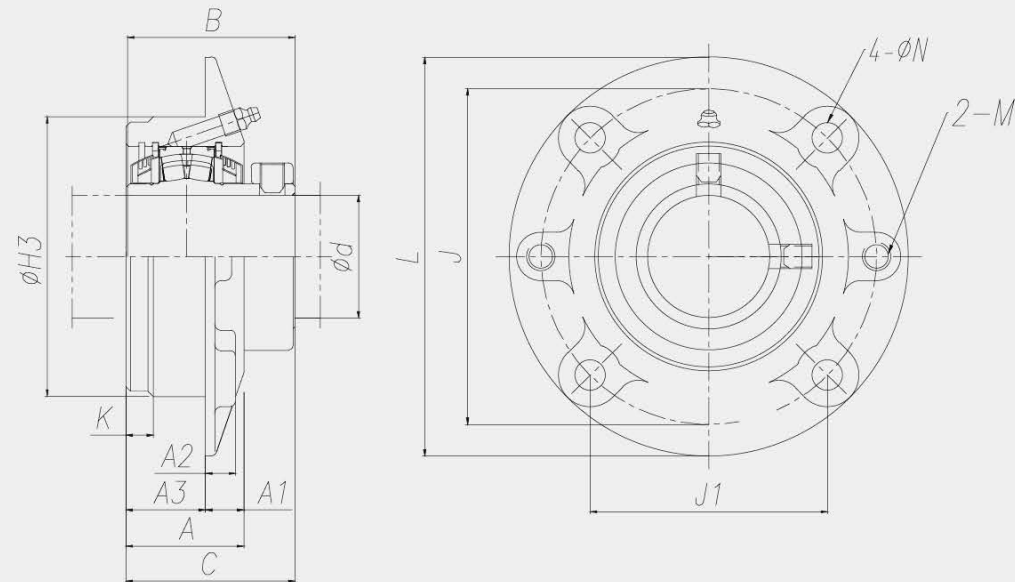


Unit Number	Bearing Number	Shaft Dia. D	L	A	J	N	A1	A0	B	Bolt Size	Weight	
			in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm		in. mm	lbs
CS4F08-107	22208-107CS	1 7/16 in.	4-25/32 121	1-31/32 50	3-17/32 89.7	9/16 14.5	3/4 19	2-29/32 73.7	2-45/64 68.89	1/2 M12	5.30	2.41
CS4F08-108	22208-108CS	1 1/2 in.									5.25	2.39
CS4F08-040	22208-040CS	40 mm									5.32	2.42
CS4F09-111	22209-111CS	1 11/16 in.	5-1/8 130	2 51	2-57/64 98.8	9/16 14.5	3/4 19	2-15/16 74.7	2-49/64 70.1	1/2 M12	6.09	2.77
CS4F09-112	22209-112CS	1 3/4 in.									6.02	2.74
CS4F09-045	22209-045CS	45 mm									5.94	2.7
CS4F10-115	22210-115CS	1 15/16 in.	5-5/16 135	2-3/32 53	4-1/16 103.2	9/16 14.5	3/4 19	3-7/64 79	2-27/32 72.14	1/2 M12	7.26	3.3
CS4F10-050	22210-050CS	50 mm									7.26	3.3
CS4F10-200	22210-200CS	2 in.									7.23	3.29
CS4F11-055	22211-055CS	55 mm	5-27/32 149	2-5/32 55	4-33/64 114.7	11/16 18	29/32 23	3-17/64 83	3 76	5/8 M16	9.02	4.1
CS4F11-203	22211-203CS	2 3/16 in.									8.95	4.07
CS4F11-204	22211-204CS	2 1/4 in.									8.8	4
CS4F13-060	22213-060CS	60 mm	6-1/8 156	2-9/16 65	4-25/32 121.4	11/16 18	1-1/32 26	3-13/16 97	3-35/64 90.17	5/8 M16	11.66	5.3
CS4F13-207	22213-207CS	2 7/16 in.									11.39	5.18
CS4F13-208	22213-208CS	2 1/2 in.									11.06	5.03
CS4F13-065	22213-065CS	65 mm	7-7/32 183	2-5/8 67	5-9/16 141.3	7/8 22	1-1/32 26	3-15/16 100	3-21/32 92.71	3/4 M20	11	5
CS4F15-211	22215-211CS	2 11/16 in.									16.96	7.71
CS4F15-212	22215-212CS	2 3/4 in.									17.33	7.88
CS4F15-070	22215-070CS	70 mm	8-9/32 210	3-5/32 80	6-23/32 170.7	7/8 22	1-5/32 29	4-31/64 114	4-1/8 104.74	3/4 M20	16.80	7.64
CS4F15-215	22215-215CS	2 15/16 in.									16.34	7.43
CS4F15-075	22215-075CS	75 mm									16.28	7.4
CS4F15-300	22215-300CS	3 in.	16.06	7.3								
CS4F18-080	22218-080CS	80 mm	9-1/4 235	3-7/16 87	7-39/64 193.3	31/32 25	1-3/16 30	4-15/16 125.3	4-41/64 117.73	7/8 M22	27.5	12.50
CS4F18-304	22218-304CS	3 1/4 in.									27.06	12.3
CS4F18-085	22218-085CS	85 mm									26.62	12.1
CS4F18-307	22218-307CS	3 7/16 in.	25.74	11.7								
CS4F18-308	22218-308CS	3 1/2 in.	25.52	11.6								
CS4F18-090	22218-090CS	90 mm	24.86	11.3								
CS4F20-095	22220-095CS	95 mm	9-1/4 235	3-7/16 87	7-39/64 193.3	31/32 25	1-3/16 30	4-15/16 125.3	4-41/64 117.73	7/8 M22	36.74	16.7
CS4F20-100	22220-100CS	100 mm									36.52	16.6
CS4F20-315	22220-315CS	3 15/16 in.									36.3	16.5
CS4F20-400	22220-400CS	4 in.	36.08	16.4								



# CS4FC

Set screw collar lock spherical roller bearing with piloted flange cartridge housing.



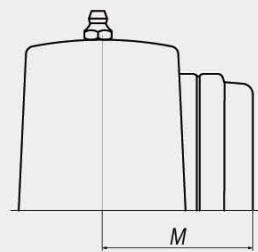
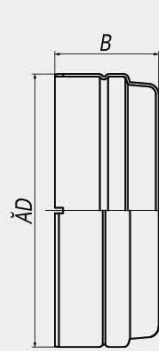
Unit Number	Bearing Number	Shaft Dia. D	L	H3	J	J1	N	A	A1	A2	A3	C	K	M	B	Bolt Size	Weight	
			in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	lbs
CS4FC08-107	22208-107CS	1 7/16 in.	5-1/4	3-5/8	4-3/8	3-3/32	15/16	1-25/32	19/32	1/2	1-3/16	2-23/32	13/32		2-45/64	3/8	4.70	2.14
CS4FC08-108	22208-108CS	1 1/2 in.	133	92.1	111.1	78.6	12	45.5	15.5	13	30	69	10	3/8-16UNC	68.89	M10	4.70	2.14
CS4FC08-040	22208-040CS	40 mm															4.73	2.15
CS4FC09-111	22209-111CS	1 11/16 in.	6-5/32	4-1/4	5-1/8	3-5/8	9/16	1-7/8	5/8	1/2	1-1/4	2-49/64	13/32		2-49/64	1/2	5.85	2.66
CS4FC09-112	22209-112CS	1 3/4 in.	156	107.8	130.2	92.1	14.5	48	16	13	32	70.4	10	7/16-14UNC	70.1	M12	5.61	2.55
CS4FC09-045	22209-045CS	45 mm															5.41	2.46
CS4FC10-115	22210-115CS	1 15/16 in.	6-3/8	4-1/2	5-3/8	3-51/64	9/16	1-15/16	21/32	9/16	1-1/4	2-55/64	13/32		2-27/32	1/2	7.06	3.21
CS4FC10-050	22210-050CS	50 mm	162	114.3	136.5	96.5	14.5	49	17	14	32	72.6	10	7/16-14UNC	72.14	M12	7.04	3.20
CS4FC10-200	22210-200CS	2 in.															6.97	3.17
CS4FC11-055	22211-055CS	55 mm	7-1/8	5	6	4-1/4	9/16	2-3/32	21/32	17/32	1-13/32	3-1/32	15/32		3	1/2	9.35	4.25
CS4FC11-203	22211-203CS	2 3/16 in.	181	127	152.4	107.8	14.5	53.5	17.5	13.7	36	77	12	1/2-13UNC	76	M12	9.30	4.23
CS4FC11-204	22211-204CS	2 1/4 in.															8.93	4.06
CS4FC13-060	22213-060CS	60 mm	7-5/8	5-1/2	6-1/2	4-19/32	9/16	2-11/32	25/32	5/8	1-9/16	3-35/64	15/32		3-35/64	1/2	12.52	5.71
CS4FC13-207	22213-207CS	2 7/16 in.	194	139.7	165.1	116.7	14.5	59.7	20	16	39.7	90.2	12	1/2-13UNC	90.17	M12	12.32	5.60
CS4FC13-208	22213-208CS	2 1/2 in.															11.99	5.45
CS4FC13-065	22213-065CS	65 mm															11.90	5.41
CS4FC15-211	22215-211CS	2 11/16 in.	8-3/4	6-3/8	7-1/2	5-19/64	23/32	2-5/8	1	3/4	1-5/8	3-23/32	15/32		3-21/32	5/8	18.37	8.35
CS4FC15-212	22215-212CS	2 3/4 in.															18.39	8.36
CS4FC15-070	22215-070CS	70 mm	222	161.9	190.5	134.7	18	66.7	25.4	19	41.3	94.5	12	5/8-11UNC	92.71	M16	18.89	8.59
CS4FC15-215	22215-215CS	2 15/16 in.															18.30	8.32
CS4FC15-075	22215-075CS	75 mm															18.26	8.30
CS4FC15-300	22215-300CS	3 in.															17.51	7.96
CS4FC18-080	22218-080CS	80 mm	10-1/4	7-3/8	8-5/8	6-3/32	7/8	3	1-15/32	15/16	1-17/32	4-1/8	17/32		4-1/8	3/4	28.24	12.84
CS4FC18-304	22218-304CS	3 1/4 in.															27.83	12.65
CS4FC18-085	22218-085CS	85 mm	260	187.3	219.1	154.9	22	75.9	37.4	24	38.5	105	13	3/4-10UNC	104.74	M20	27.36	12.44
CS4FC18-307	22218-307CS	3 7/16 in.															26.53	12.06
CS4FC18-308	22218-308CS	3 1/2 in.															26.18	11.9
CS4FC18-090	22218-090CS	90 mm															25.65	11.66
CS4FC20-095	22220-095CS	95 mm	10-7/8	8-1/8	9-3/8	6-5/8	7/8	3-5/32	1-13/32	1-1/8	1-3/4	4-41/64	9/16		4-41/64	3/4	37.64	17.11
CS4FC20-100	22220-100CS	100 mm															35.70	16.23
CS4FC20-315	22220-315CS	3 15/16 in.	276	206.4	238.1	168.4	22	80.5	36	29	44.5	118	14	3/4-10UNC	117.73	M20	35.68	16.22
CS4FC20-400	22220-400CS	4 in.															35.28	16.04

# Steel end cover

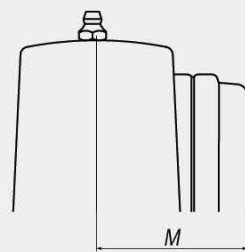
protects against shaft damage and gives the safety at high running speeds.



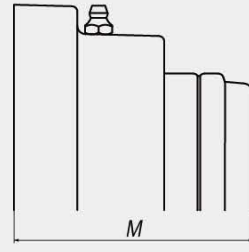
Hit gently with a rubber hammer to press in a star pattern as seen above.



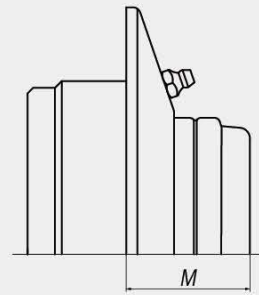
2P  
Pillow Block



2SN  
Pillow Block



4F  
4 Bolt Flange



4FC  
Pilot Flange



NUMBER	D	B	M			
			2P Pillow Block	2SN Pillow Block	4F 4-Bolt Flange	4FC Pilot Flange
			inch	inch	inch	inch
	mm	mm	mm	mm	mm	mm
SSD08	3 5/32 80	1 13/32 36	2 3/32 53.2	- -	3 5/32 80.4	1 13/16 45.7
SSD09	3 11/32 85	1 3/8 35	2 1/16 52.4	- -	3 5/32 80.3	1 23/32 44
SSD10	3 17/32 90	1 19/32 40	2 9/32 57.7	- -	3 7/16 87.2	1 29/32 48.8
SSD11	3 15/16 100	1 1/2 38	2 3/16 55	2 3/16 55	3 7/16 87.5	1 25/32 45.5
SSD12	4 11/32 110	1 23/32 44	- -	2 15/32 62.6	- -	- -
SSD13	4 23/32 120	1 31/32 50	2 29/32 73.4	2 13/16 71.6	4 9/32 108.8	2 15/32 62.3
SSD15	5 1/8 130	1 15/16 49	2 27/32 72.4	2 25/32 70.6	4 5/16 109.5	2 15/32 62.7
SSD16	5 1/2 140	2 1/16 52	- -	2 15/16 74.6	- -	- -
SSD17	5 29/32 150	2 1/16 52	- -	3 76.3	- -	- -
SSD18	6 5/16 160	1 31/32 50	3 1/16 78	3 76.3	4 27/32 123	2 31/32 75.6
SSD19	6 11/16 170	2 3/32 53	- -	3 3/16 80.8	- -	- -
SSD20	7 3/32 180	2 3/16 55	3 3/8 86	3 5/16 84.3	5 9/32 134	3 1/4 82.2
SSD22	7 7/8 200	2 3/8 60	- -	3 21/32 92.5	- -	- -
SSD24	8 15/32 215	2 17/32 64	- -	3 15/16 100	- -	- -
SSD26	9 1/16 230	2 19/32 66	- -	4 1/8 105	- -	- -
SSD28	9 27/32 250	2 3/4 70	- -	4 3/8 111.2	- -	- -
SSD30	10 5/8 270	2 3/4 70	- -	4 9/16 115.7	- -	- -
SSD32	11 13/32 290	2 7/8 73	- -	4 13/16 122.2	- -	- -

## Spherical Roller Bearing Life Calculations



The relationship between the basic rating life, the basic dynamic load rating, and the dynamic equivalent load of the spherical roller bearing is indicated in Formulas below :

$$L_{10} = \left( \frac{C_r}{P_r} \right)^{\frac{10}{3}}$$

$$L_{10h} = \frac{10^6 L_{10}}{60n} = \frac{10^6}{60n} \left( \frac{C_r}{P_r} \right)^{\frac{10}{3}}$$

$$\frac{C_r}{P_r} = \left( \frac{60n L_{10}}{10^6} \right)^{\frac{3}{10}}$$

Symbols for formulas:

$L_{10}$  : Basic Rating life (10<sup>6</sup> rotations)

$L_{10h}$  : Rated Life (hr)

$C_r$  : Basic Dynamic Load Rating (lbs or newtons)

$P_r$  : Dynamic equivalent Load (lbs or newtons)

$n$  : Speed (min<sup>-1</sup>)

The relationship of  $\left( \frac{C_r}{P_r} \right)$  to rating life ( $L_{10h}$ ) and speed ( $n$ )

Bearing Life Hours ( $L_{10h}$ )	Speed(rpm)										
	50	100	150	300	500	750	1000	1500	2000	2500	3000
2500	1.83	2.25	2.54	3.13	3.65	4.12	4.50	5.08	5.54	5.92	6.25
5000	2.25	2.77	3.13	3.86	4.50	5.08	5.54	6.25	6.81	7.29	7.70
7500	2.54	3.13	3.54	4.36	5.08	5.73	6.25	7.06	7.70	8.23	8.69
10000	2.77	3.42	3.86	4.75	5.54	6.25	6.81	7.70	8.39	8.97	9.48
15000	3.13	3.86	4.36	5.36	6.25	7.06	7.70	8.69	9.48	10.13	10.70
20000	3.42	4.20	4.75	5.85	6.81	7.70	8.39	9.48	10.33	11.04	11.67
30000	3.86	4.75	5.36	6.60	7.70	8.69	9.48	10.70	11.67	12.47	13.17
40000	4.20	5.18	5.85	7.20	8.39	9.48	10.33	11.67	12.72	13.60	14.36
50000	4.50	5.54	6.25	7.70	8.97	10.13	11.04	12.47	13.60	14.54	15.36
60000	4.75	5.85	6.60	8.13	9.48	10.70	11.67	13.17	14.36	15.36	16.22
70000	4.97	6.12	6.92	8.51	9.92	11.21	12.22	13.80	15.04	16.08	16.99
80000	5.18	6.37	7.20	8.86	10.33	11.67	12.72	14.36	15.66	16.74	17.68
100000	5.54	6.81	7.70	9.48	11.04	12.47	13.60	15.36	16.74	17.90	18.91
150000	6.25	7.70	8.69	10.70	12.47	14.09	15.36	17.34	18.91	20.21	21.35

## Dynamic Equivalent Load

In many cases, a bearing is exposed to the combined vector load of both radial and axial load components. It may also be used under more severe conditions such as vibration and shock load. In this case, a direct comparison to the dynamic load rating is not appropriate. In such a case, find the load equivalent to a direct radial load only and compare this with the basic dynamic load rating. The converted virtual load is called dynamic equivalent load ( $P_r$ ).

### Calculation of dynamic equivalent load

The dynamic equivalent radial load ( $P_r$ ) of a bearing that bears radial and axial loads as well as vibration and impact is found by the following formula.

$$P_r = XFr + YFa$$

Whereas,

$P_r$ : Dynamic equivalent radial load, N

$Fr$ : Radial load, N

$Fa$ : Axial load, N

$X$ : Radial load factor (see Table 1.1)

$Y$ : Axial load factor (see Table 1.1)

Table 1.1

Bearing Size Code	Dynamic $C_r$		Static $C_{or}$		$e$	$Fa/Fr < e$		$Fa/Fr > e$	
	lbs	kN	lbs	kN		X	Y	X	Y
22208	20408	90.7	21623	96.1	0.28	1	2.41	0.67	3.59
22209	21150	94	23625	105	0.26		2.57		3.82
22210	22095	98.2	25313	112.5	0.24		2.77		4.12
22211	27450	122	32625	145	0.24		2.93		4.21
22212	34200	152	39375	175	0.25		2.71		4.03
22213	40050	178	47700	212	0.25		2.71		4.03
22215	42075	187	51300	228	0.22		3		4.47
22216	50175	223	60525	269	0.22		3		4.47
22217	59175	263	71325	317	0.24		2.86		4.25
22218	67950	302	83925	373	0.24		2.86		4.25
22219	74025	329	92700	412	0.24		2.86		4.25
22220	83475	371	105975	471	0.24		2.78		4.14
22222	136350	606	164475	731	0.23		2.7		4.17
22224	153000	680	193275	859	0.25		2.92		4.15
22226	182250	810	260550	1158	0.25		2.88		4.08
22228	204975	911	279675	1243	0.27		2.76		4.11
22230	241425	1073	312075	1387	0.27	2.74	4.15		
22232	270000	1200	393300	1748	0.24	2.86	4.21		

$e$  is the Thrust load to radial load factor.

## Load factor

Even if the static radial load and the axial load can be accurately calculated, the actual loads are generally greater than the calculated figures. This is due to the presence of vibration and shock load during actual machine operation.

To find the loads actually applied to a bearing, multiply the values determined for the static load by the following load factors.

$$F = f_w \cdot F_c$$

Whereas,

F: Load actually applied to bearing, N

F<sub>c</sub>: Theoretically calculated load, N

f<sub>w</sub>: Load factor (see Table 1.2)

Table 1.2 Load factor f<sub>w</sub>

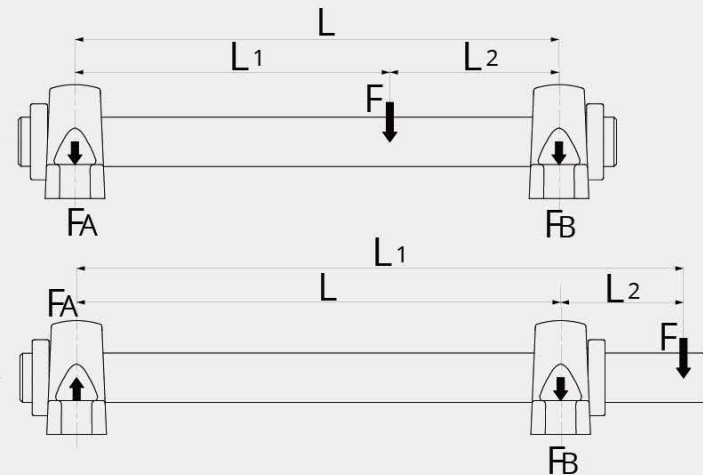
Operating conditions	Operating conditions	f <sub>w</sub>
Virtually no vibration or impact	Electric machines and instruments	1 - 1.2
Ordinary operation (light impact)	Agricultural machines and blower	1.2 - 2
Great vibration and impact	Construction machines and grinders	2 - 3

## Distribution of Bearing Load

In order to determine the radial load distribution to each bearing attached to a shaft, use the procedure shown below.

$$F_A = \frac{L_2}{L} \cdot F$$

$$F_B = \frac{L_1}{L} \cdot F$$



## RECOMMENDED SHAFT TOLERANCES

Shaft Dia.	Set Screw Collar Mount	CROSSLOC™ Mount
1-7/16 - 2 in. 40 - 50 mm	- 0.0015 in. - 0.038 mm	- 0.003 in. - 0.076 mm
2-3/16 - 4 60 - 100 mm	- 0.002 in. - 0.051 mm	- 0.004 in. - 0.102 mm
4-7/16 - 5-1/2 110 - 140 mm	- 0.003 in. - 0.076 mm	- 0.005 in. - 0.127 mm

## CS SET SCREW TORQUE TABLE

Shaft Dia.	Bearing No.	Set screw	Torque
1-7/16 - 2 in. 40 - 50 mm	22208 - 22210	3/8-24UNF M8 X 1.25	197 in-lbs 22.3 Nm
2-3/16, 2 1/4 55 mm	22211	7/16-20UNF M10 X 1.25	269 in-lbs 30.5 Nm
2-7/16 - 3-1/2 60 - 90 mm	22213- 22218	1/2-20UNF M12 X 1.75	440 in-lbs 49.8 Nm
3-15/16 - 4-1/2 100 - 130 mm	22220 - 22222	5/8-18UNF M16 X 2	920 in-lbs 102.8Nm

## MOUNTING BOLTS TORQUE TABLE

Bolt Size	Torque
3/8 in. / M10	168 in-lbs / 19 Nm
1/2 in. / M12	292 in-lbs / 33 Nm
5/8 in. / M16	735 in-lbs / 83 Nm
3/4 in. / M20	1460 in-lbs / 165 Nm
7/8 in. / M22	2018 in-lbs / 228 Nm
1 in. / M24	2398 in-lbs / 271 Nm
1-1/8 in. / M30	5036 in-lbs / 569 Nm



# BEARING SELECTION CHART

Radial Load Ratings in Pounds at Various RPM for L10 Life Hours

Unit lbs

Bearing Number	L10 life (Hr)	Allowable Radial Load (lbs) at Various RPM															
		50	100	150	300	500	750	1000	1500	2000	2500	3000	3600	4200	4800	5400	6000
22208	10000	7356	5975	5291	4297	3687	3265	2995	2652	2432	2275	2154	2039	1947	1871	1806	1749
	25000	5588	4539	4019	3265	2801	2480	2275	2014	1848	1728	1636	1549	1479	1421	1372	1329
	50000	4539	3687	3265	2652	2275	2014	1848	1636	1501	1404	1329	1258	1201	1154	1114	1079
	70000	4103	3333	2951	2397	2056	1821	1670	1479	1357	1269	1201	1137	1086	1043	1007	976
	100000	3687	2995	2652	2154	1848	1636	1501	1329	1219	1140	1079	1022	976	938	905	877
22209	10000	7624	6192	5483	4454	3821	3383	3104	2748	2521	2358	2232	2113	2018	1939	1871	
	25000	5792	4704	4165	3383	2903	2570	2358	2088	1915	1791	1696	1605	1533	1473	1422	
	50000	4704	3821	3383	2748	2358	2088	1915	1696	1555	1455	1377	1304	1245	1196	1155	
	70000	4253	3454	3058	2484	2131	1887	1731	1533	1406	1315	1245	1179	1126	1081	1044	
	100000	3821	3104	2748	2232	1915	1696	1555	1377	1263	1182	1119	1059	1011	972	938	
22210	10000	7964	6469	5728	4653	3992	3535	3242	2871	2634	2463	2332	2208	2108	2025	1955	
	25000	6050	4914	4352	3535	3032	2685	2463	2181	2001	1871	1771	1677	1601	1538	1485	
	50000	4914	3992	3535	2871	2463	2181	2001	1771	1625	1520	1439	1362	1301	1250	1206	
	70000	4443	3608	3195	2595	2227	1972	1809	1601	1469	1374	1301	1231	1176	1130	1090	
	100000	3992	3242	2871	2332	2001	1771	1625	1439	1320	1234	1169	1107	1057	1015	980	
22211	10000	9895	8037	7117	5780	4959	4391	4028	3567	3272	3060	2897	2743	2619	2516	2429	
	25000	7517	6105	5406	4391	3767	3336	3060	2709	2485	2325	2201	2084	1989	1911	1845	
	50000	6105	4959	4391	3567	3060	2709	2485	2201	2019	1888	1788	1692	1616	1553	1499	
	70000	5519	4483	3970	3224	2766	2449	2247	1989	1825	1707	1616	1530	1461	1403	1355	
	100000	4959	4028	3567	2897	2485	2201	2019	1788	1640	1534	1452	1375	1313	1261	1217	
22212	10000	12328	10013	8867	7202	6179	5471	5019	4444	4076	3812	3609	3417	3263	3135		
	25000	9365	7607	6736	5471	4694	4156	3812	3376	3097	2896	2742	2596	2479	2381		
	50000	7607	6179	5471	4444	3812	3376	3097	2742	2515	2352	2227	2109	2013	1934		
	70000	6876	5585	4946	4017	3446	3052	2799	2479	2274	2127	2013	1906	1820	1749		
	100000	6179	5019	4444	3609	3097	2742	2515	2227	2043	1911	1809	1713	1635	1571		
22213	10000	14437	11726	10383	8434	7235	6407	5877	5204	4774	4465	4227	4002				
	25000	10967	8908	7888	6407	5496	4867	4465	3953	3626	3392	3211	3040				
	50000	8908	7235	6407	5204	4465	3953	3626	3211	2945	2755	2608	2469				
	70000	8053	6541	5792	4704	4036	3574	3278	2903	2663	2490	2358	2232				
	100000	7235	5877	5204	4227	3626	3211	2945	2608	2392	2238	2118	2006				
22215	10000	15167	12319	10908	8860	7601	6731	6174	5467	5015	4690	4441	4204				
	25000	11521	9358	8286	6731	5774	5113	4690	4153	3810	3563	3373	3194				
	50000	9358	7601	6731	5467	4690	4153	3810	3373	3094	2894	2740	2594				
	70000	8460	6871	6084	4942	4240	3754	3444	3049	2797	2616	2477	2345				
	100000	7601	6174	5467	4441	3810	3373	3094	2740	2513	2351	2226	2107				
22216	10000	18086	14691	13008	10566	9065	8026	7363	6520	5980	5593	5295					
	25000	13739	11160	9882	8026	6886	6097	5593	4953	4543	4249	4023					
	50000	11160	9065	8026	6520	5593	4953	4543	4023	3690	3451	3267					
	70000	10088	8194	7256	5894	5056	4477	4107	3637	3336	3120	2954					
	100000	9065	7363	6520	5295	4543	4023	3690	3267	2997	2803	2654					
22217	10000	21331	17326	15341	12461	10691	9466	8683	7689	7053	6596	6245					
	25000	16204	13162	11654	9466	8121	7191	6596	5841	5358	5011	4744					
	50000	13162	10691	9466	7689	6596	5841	5358	4744	4352	4070	3854					
	70000	11898	9664	8557	6951	5963	5280	4844	4289	3934	3679	3484					
	100000	10691	8683	7689	6245	5358	4744	4352	3854	3535	3306	3130					

Bearing Number	L10 life (Hr)	Allowable Radial Load (lbs) at Various RPM										
		50	100	150	300	500	750	1000	1500	2000	2500	3000
22218	10000	24494	19895	17616	14309	12276	10870	9971	8829	8099	7575	7171
	25000	18607	15113	13382	10870	9325	8257	7575	6707	6153	5754	5448
	50000	15113	12276	10870	8829	7575	6707	6153	5448	4997	4674	4425
	70000	13662	11097	9826	7981	6847	6063	5562	4925	4518	4225	4000
	100000	12276	9971	8829	7171	6153	5448	4997	4425	4059	3796	3594
22219	10000	26683	21674	19191	15588	13373	11842	10863	9618	8823	8252	7813
	25000	20270	16465	14579	11842	10159	8996	8252	7307	6703	6269	5935
	50000	16465	13373	11842	9618	8252	7307	6703	5935	5444	5092	4821
	70000	14884	12089	10705	8695	7460	6605	6059	5365	4921	4603	4358
	100000	13373	10863	9618	7813	6703	5935	5444	4821	4422	4136	3916
22220	10000	30090	24441	21641	17578	15081	13353	12249	10846	9950	9305	
	25000	22858	18566	16440	13353	11456	10144	9305	8240	7558	7069	
	50000	18566	15081	13353	10846	9305	8240	7558	6693	6139	5742	
	70000	16784	13633	12071	9805	8412	7448	6833	6050	5550	5190	
	100000	15081	12249	10846	8810	7558	6693	6139	5436	4987	4664	
22222	10000	49149	39922	35349	28713	24633	21812	20008	17717	16252	15199	
	25000	37337	30327	26853	21812	18713	16569	15199	13459	12346	11546	
	50000	30327	24633	21812	17717	15199	13459	12346	10932	10028	9379	
	70000	27415	22268	19718	16016	13740	12166	11160	9882	9065	8478	
	100000	24633	20008	17717	14390	12346	10932	10028	8879	8145	7618	
22224	10000	55151	44797	39666	32219	27641	24475	22452	19880	18236		
	25000	41896	34030	30133	24475	20998	18593	17055	15102	13853		
	50000	34030	27641	24475	19880	17055	15102	13853	12267	11252		
	70000	30763	24987	22125	17971	15418	13652	12523	11089	10172		
	100000	27641	22452	19880	16148	13853	12267	11252	9964	9140		
22226	10000	65695	53361	47249	38378	32925	29154	26744	23681	21723		
	25000	49906	40536	35893	29154	25012	22147	20316	17989	16502		
	50000	40536	32925	29154	23681	20316	17989	16502	14612	13404		
	70000	36644	29764	26355	21407	18365	16262	14917	13209	12117		
	100000	32925	26744	23681	19235	16502	14612	13404	11868	10887		
22228	10000	73886	60014	53141	43164	37031	32790	30078	26633	24431		
	25000	56128	45590	40369	32790	28131	24909	22849	20232	18559		
	50000	45590	37031	32790	26633	22849	20232	18559	16434	15075		
	70000	41213	33475	29641	24076	20655	18290	16777	14856	13628		
	100000	37031	30078	26633	21633	18559	16434	15075	13348	12245		
22230	10000	87025	70687	62591	50839	43616	38621	35427	31370	28776		
	25000	66109	53698	47547	38621	33133	29338	26913	23830	21860		
	50000	53698	43616	38621	31370	26913	23830	21860	19356	17756		
	70000	48542	39428	34912	28358	24329	21542	19761	17498	16051		
	100000	43616	35427	31370	25480	21860	19356	17756	15722	14422		
22232	10000	97326	79053	69999	56857	48778	43192	39620	35083			
	25000	73934	60053	53175	43192	37055	32811	30098	26651			
	50000	60053	48778	43192	35083	30098	26651	24447	21647			



### HOW TO LOCK CROSSLOC™

- Step 1: All cap screws are loose.
- Step 2: Tighten cap screws in a star pattern as seen left and repeat several times.
- Step 3: When using a torque wrench, tighten each screw to the appropriate torque value on the left.

### HOW TO UNLOCK CROSSLOC™

- Step 1: Loosen all cap screws until they are freed.
- Step 2: Turn cap screws counterclockwise in a star pattern and repeat until dismantled.

### CROSSLOC™ CAP SCREW TORQUE TABLE

Shaft Dia.	Bearing No.	Cap Screw	Torque	Cap Screw#
50 - 65 mm	22211 - 22215	M5 X 10	6.7 Nm	4
70 - 85 mm	22216 - 22219	M6 X 14	9.5 Nm	4
90 - 115 mm	22220 - 22226	M8 X 16	18.2 Nm	4
125 - 140 mm	22228 - 22232	M8 X 16	18.2 Nm	6

### RELUBRICATION RECOMMENDATIONS

Bearing No.	Grease Wt. g/oz	Recommended Number of Months Between Relubrication (Based on Operating Speed (rpm) and Continuous Operations)					
		10 months	8 months	6 months	4 months	2 months	1 month
22208	8.4 / 0.3	400	620	950	1460	2250	3470
22209	9.3 / 0.3	360	560	850	1340	2050	3120
22210	10.8 / 0.4	320	510	770	1240	1860	2810
22211	14.8 / 0.5	290	460	690	1140	1700	2530
22212	19.8 / 0.7	260	420	620	1050	1540	2270
22213	26.2 / 0.9	240	380	560	960	1400	2050
22215	32 / 1.1	210	350	500	890	1280	1840
22216	40.1 / 1.4	190	320	450	820	1160	1660
22217	52.9 / 1.9	170	290	410	750	1060	1490
22218	62 / 2.2	160	260	370	690	960	1340
22219	75.4 / 2.7	140	240	330	640	880	1210
22220	88.7 / 3.1	130	220	300	580	800	1090
22222	124.5 / 4.4	110	200	270	540	730	980
22224	152.1 / 5.4	100	180	240	500	660	880
22226	181.9 / 6.4	90	160	220	460	600	790
22228	244.4 / 8.6	80	150	200	420	550	710
22230	300.3 / 10.6	70	140	180	390	500	640
22232	372.9 / 13.2	70	120	160	350	450	580

