Grease for Initial Installation

For a complete grease selection please contact our engineering department with the bearing number, operating speed (rpm) and surrounding temperature.

The initial charge of grease depends on the amount required for a full pack of the individual bearing and the operating speed. Speed in this case is expressed as dn (shaft diameter x RPM) and the amount of grease as a percentage of full pack.

Percentage of Full Pack

dn (inch)		dn (mm)		Percentage of full pack
over	to	over	to	
-	2,000	-	50,000	100
2,000	4,000	50,000	100,000	75
4,000	6,000	100,000	150,000	50
6,000	8,000	150,000	200,000	33
8,000	-	200,000	-	25

Caution: Do not mix different types of grease in the bearing.

Full Pack Grease Volumes

inches	mm	Group size	01 Series		02 Series		03 Series	
			oz/lb	Kg	oz/lb	Kg	oz/lb	Kg
1 3/16 to 1 1/2	30 to 40	108	2.0oz	0.06	-	-	-	-
1 11/16 to 2	45 to 50	200	3.0oz	0.09	5.5oz	0.15	-	-
2 3/16 to 2 1/2	55 to 65	208	5.3oz	0.15	7.5oz	0.21	-	-
2 11/16 to 3	70 to 75	300	6.3oz	0.18	10.5oz	0.30	-	-
3 3/16 to 3 1/2	80 to 90	308	10.5oz	0.30	1lb	0.45	-	-
3 11/16 to 4	95 to 105	400	12.7oz	0.36	1.5lbs	0.60	2.6lbs	1.20
4 3/16 to 4 1/2	110 to 115	408	1.1lbs	0.51	2.0lbs	0.90	3.1lbs	1.40
4 11/16 to 5	120 to 130	500	1.3lbs	0.60	2.6lbs	1.20	3.1lbs	1.40
5 3/16 to 5 1/2	135 to 140	508	1.7lbs	0.78	3.1lbs	1.40	4.4lbs	2.00
5 11/16 to 6 1/8	145 to 155	600	2.0lbs	0.90	3.1lbs	1.40	6.0lbs	2.70
6 1/4 to 6 1/2	160	608	2.2lbs	1.00	3.1lbs	1.40	8.0lbs	3.60
6 11/16 to 7	180	700	2.6lbs	1.20	4.4lbs	2.00	9.2lbs	4.20
7 1/2 to 8	190 to 200	800	3.1lbs	1.40	6.0lbs	2.70	12.0lbs	5.40
8 1/2 to 9 1/8	210 to 230	900	3.1lbs	1.40	8.0lbs	3.60	15.0lbs	6.90
9 1/2 to 10	240 to 250	1000	4.4lbs	2.00	9.0lbs	4.20	18.0lbs	8.10
10 1/2 to 11 1/8	275 to 280	1100	4.4lbs	2.00	10.5lbs	4.80	22.0lbs	10.00
11 1/2 to 12	300	1200	4.4lbs	2.00	12.0lbs	5.40	24.2lbs	11.00

Geometry Factors for Bore Sizes through 12”

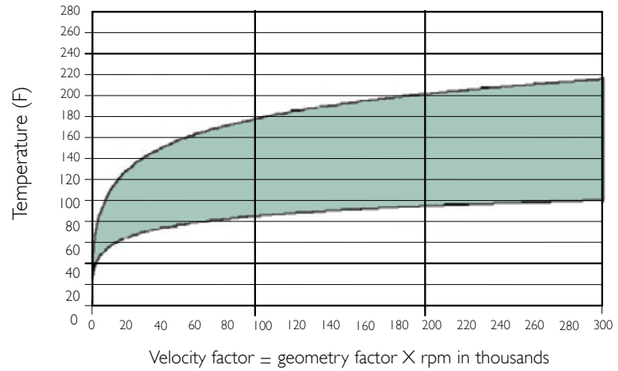
inches	mm	Group size	01 Series	02 Series	03 Series
1 3/16 to 1 1/2	30 to 40	108	27.35	-	-
1 11/16 to 2	45 to 50	200	37.62	38.96	-
2 3/16 to 2 1/2	55 to 65	208	48.83	53.24	-
2 11/16 to 3	70 to 75	300	62.34	67.14	76.98
3 3/16 to 3 1/2	80 to 90	308	78.59	83.67	97.66
3 11/16 to 4	95 to 105	400	94.10	101.26	112.28
4 3/16 to 4 1/2	110 to 115	408	112.34	119.81	127.49
4 11/16 to 5	120 to 130	500	129.39	139.28	143.27
5 3/16 to 5 1/2	135 to 140	508	147.30	157.51	159.59
5 11/16 to 6 1/8	145 to 155	600	163.75	176.43	180.71
6 1/4 to 6 1/2	160	608	182.85	198.17	211.57
6 11/16 to 7	180	700	200.37	216.10	232.14
7 1/2 to 8	190 to 200	800	236.79	258.09	277.45
8 1/2 to 9 1/8	210 to 230	900	277.45	279.23	327.65
9 1/2 to 10	240 to 250	1000	322.52	343.19	358.94
10 1/2 to 11 1/8	275 to 280	1100	364.24	385.66	1100E - 396.51 1100X - 412.95
11 1/2 to 12	300	1200	412.95	435.18	463.45

Selection of Lubricants

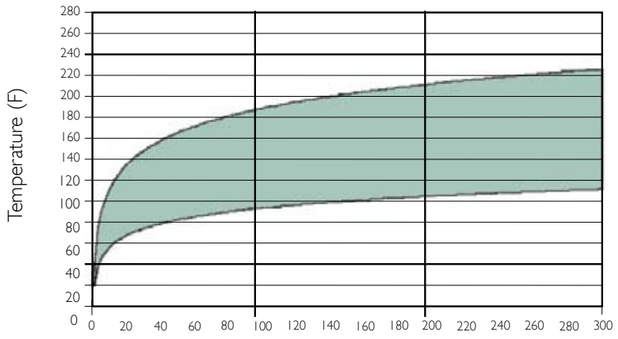
You must know the operating temperature and speed (RPM) of the Cooper bearing being evaluated. Select the appropriate bearing geometry factor from the table provided. Multiply the geometry factor by the shaft RPM to obtain the velocity factor.

On the graph below, draw a vertical line up from the calculated velocity factor and a horizontal line from the bearing operating temperature. If the lines meet in the shaded area, the listed viscosity grade is suitable. Please consult our engineering department with any questions.

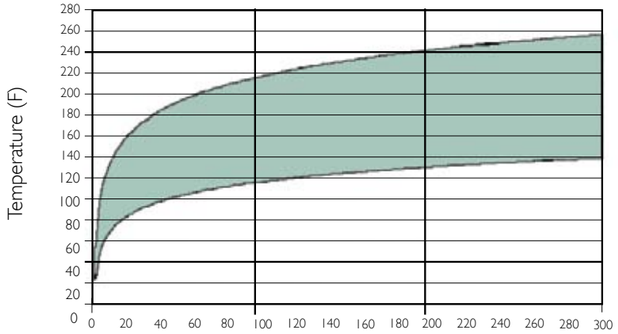
Cooper Bearing recommended speed and temperature range for ISO VG 150 grease and oils



Cooper Bearing recommended speed and temperature range for ISO VG 220 grease and oils



Cooper Bearing recommended speed and temperature range for ISO VG 460 grease and oils



Metric screw and wrench sizes 01 Series

Bearing Shaft Size (Inches)	Pillow block screw	K	Flange screw	K	Joint screw	K	Cartridge Radial Screw	K	Side Screw	K	Clamp ring screw	K
1 3/16 to 2	M8 x 45	6	M8 x 40	6	M4 x 25	3	-	-	M4 x 10	2	M4 x 20	3
2 3/16 to 2 1/2	M10 x 55	8	M10 x 45	8	M4 x 25	3	-	-	M4 x 10	2	M4 x 20	3
2 11/16 to 3	M12 x 65	10	M12 x 55	10	M4 x 25	3	-	-	M4 x 10	2	M4 x 20	3
3 3/16 to 3 1/2	M16 x 65	14	M12 x 55	10	M5 x 25	4	-	-	M4 x 10	2	M5 x 25	4
3 11/16 to 4	M16 x 65	14	M16 x 65	14	M6 x 25	5	-	-	M4 x 10	2	M6 x 25	5
4 3/16 to 4 1/2	M20 x 80	17	M16 x 65	14	M6 x 25	5	-	-	M6 x 10	3	M6 x 25	5
4 11/16 to 5	M20 x 80	17	M20 x 80	17	M6 x 25	5	-	-	M6 x 10	3	M6 x 25	5
5 3/16 to 5 1/2	M20 x 80	17	M20 x 80	17	M8 x 30	6	-	-	M6 x 10	3	M8 x 30	6
5 11/16 to 6	M20 x 100	17	M20 x 100	17	M8 x 30	6	-	-	M6 x 10	3	M8 x 30	6
6 7/16 to 6 1/2	M16 x 65	14	M20 x 100	17	M8 x 30	6	-	-	M6 x 10	3	M8 x 30	6
6 11/16 to 7	M16 x 65	14	M20 x 100	17	M8 x 30	6	-	-	M6 x 10	3	M8 x 30	6
7 1/4 to 8	M16 x 65	14	M24 x 100	19	M8 x 30	6	M10 x 20	8	M6 x 10	3	M8 x 30	6
8 1/2 to 9	M16 x 65	14	M24 x 100	19	M10 x 45	8	M10 x 20	8	M6 x 10	3	M10 x 45	8
9 1/2 to 10	M20 x 80	17	M24 x 100	19	M10 x 45	8	M10 x 20	8	M6 x 10	3	M10 x 45	8
10 1/2 to 11	M20 x 100	17	M24 x 120	19	M10 x 45	8	M10 x 25	8	M10 x 16	5	M10 x 45	8
11 1/2 to 12	M20 x 100	17	M24 x 120	19	M10 x 45	8	M10 x 25	8	M10 x 16	5	M10 x 45	8

Metric screw and wrench sizes 02 Series

Bearing Shaft Size (Inches)	Pillow block screw	K	Flange screw	K	Joint screw	K	Cartridge Radial Screw	K	Side Screw	K	Clamp ring screw	K
1 3/16 to 2	M10 x 55	8	M10 x 45	8	M5 x 25	4	-	-	M4 x 10	2	M5 x 25	4
2 3/16 to 2 1/2	M12 x 65	10	M12 x 55	10	M5 x 25	4	-	-	M4 x 10	2	M5 x 25	4
2 11/16 to 3	M16 x 65	14	M12 x 55	10	M6 x 25	5	-	-	M4 x 10	2	M6 x 25	5
3 3/16 to 3 1/2	M16 x 65	14	M16 x 65	14	M6 x 25	5	-	-	M4 x 10	2	M6 x 25	5
3 11/16 to 4	M20 x 80	17	M16 x 65	14	M6 x 25	5	-	-	M4 x 10	2	M6 x 25	5
4 3/16 to 4 1/2	M20 x 80	17	M20 x 80	17	M8 x 30	6	-	-	M6 x 10	3	M8 x 30	6
4 11/16 to 5	M20 x 100	17	M20 x 100	17	M8 x 30	6	-	-	M6 x 10	3	M8 x 30	6
5 3/16 to 5 1/2	M20 x 100	17	M24 x 100	19	M8 x 30	6	-	-	M6 x 10	3	M8 x 30	6
5 11/16 to 6	M20 x 100	17	M24 x 100	19	M8 x 30	6	-	-	M6 x 10	3	M8 x 30	6
6 7/16 to 6 1/2	M20 x 100	14	M24 x 120	19	M10 x 45	8	-	-	M6 x 10	3	M10 x 45	8
6 11/16 to 7	M20 x 100	14	M24 x 120	19	M10 x 45	8	M10 x 25	8	M6 x 10	3	M10 x 45	8
7 1/4 to 8	M20 x 100	14	M24 x 120	19	M12 x 55	10	M10 x 30	8	M6 x 10	3	M12 x 55	10
8 1/2 to 9	M20 x 100	14	M24 x 120	19	M12 x 55	10	M10 x 30	8	M6 x 10	3	M12 x 55	10
9 1/2 to 10	M20 x 100	17	M24 x 100	19	M12 x 55	10	M10 x 30	8	M10 x 16	5	M12 x 55	10
10 1/2 to 11	M20 x 100	17	M24 x 100	19	M16 x 75	14	M10 x 30	8	M10 x 16	5	M16 x 75	14
11 1/2 to 12	M20 x 100	17	M24 x 100	19	M16 x 75	14	M10 x 30	8	M10 x 16	5	M16 x 75	14

Screw sizes shown as diameter and length. Wrench sizes shown as K

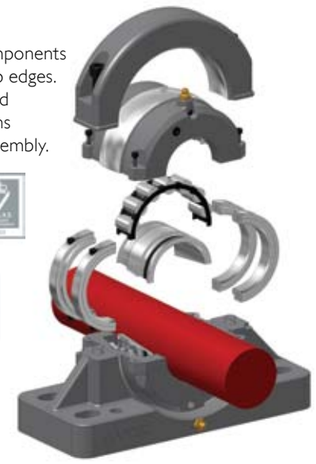
Metric screw and wrench sizes 03 Series

Bearing Shaft Size (Inches)	Pillow block screw	K	Flange screw	K	Joint screw	K	Cartridge Radial Screw	K	Side Screw	K	Clamp ring screw	K
3 3/4 to 4	M16 x 75	14	-	-	M10 x 45	8	M10 x 25	8	M6 x 10	3	M10 x 45	8
4 7/16 to 4 1/2	M16 x 75	14	-	-	M10 x 45	8	M10 x 30	8	M6 x 10	3	M10 x 45	8
4 15/16 to 5	M16 x 75	14	M24 x 120	19	M10 x 45	8	M10 x 25	8	M10 x 16	5	M10 x 45	8
5 7/16 to 5 1/2	M20 x 100	17	-	-	M10 x 45	8	M10 x 25	8	M10 x 16	5	M10 x 45	8
5 11/16 to 6	M20 x 100	17	M24 x 120	19	M10 x 45	8	M10 x 30	8	M10 x 16	5	M10 x 45	8
6 7/16 to 6 1/2	M20 x 100	17	-	-	M12 x 55	10	M12 x 35	10	M10 x 16	5	M12 x 55	10
6 15/16 to 7	M20 x 100	17	M24 x 120	19	M12 x 55	10	M12 x 35	10	M10 x 16	5	M12 x 55	10
7 1/2 to 8	M24 x 100	19	-	-	M12 x 55	10	M12 x 40	10	M10 x 16	5	M12 x 55	10
9	M20 x 100	17	-	-	M16 x 75	14	M12 x 40	10	M10 x 16	5	M16 x 65	14
10	M20 x 100	17	M24 x 120	19	M16 x 75	14	M12 x 40	10	M10 x 16	5	M16 x 65	14
11	M20 x 100	17	-	-	M20 x 100	17	M12 x 35	10	M10 x 16	5	M20 x 80	17
12	M20 x 100	17	-	-	M20 x 100	17	M12 x 55	10	M10 x 16	5	M20 x 80	17
13	M24 x 100	19	-	-	M20 x 100	17	M12 x 55	10	M10 x 16	5	M20 x 80	17
14	M24 x 100	19	-	-	M20 x 100	17	M12 x 40	10	M10 x 16	5	M24 x 100	19
15	M24 x 120	19	-	-	M20 x 100	17	M12 x 55	10	M10 x 16	5	M24 x 100	19
17	M24 x 120	19	-	-	M20 x 100	17	M12 x 40	10	M16 x 25	8	M24 x 100	19
18	M24 x 120	19	-	-	M20 x 100	17	M12 x 55	10	M16 x 25	8	M24 x 100	19
20	M24 x 120	19	-	-	M20 x 100	17	M16 x 65	14	M10 x 16	5	M24 x 100	19
22 and 23	M24 x 120	19	-	-	M20 x 100	17	M12 x 55	10	M16 x 25	8	M24 x 100	19

Screw sizes shown as diameter and length. Wrench sizes shown as K

Installation Guide

Caution
Some components have sharp edges. Please read instructions before assembly.



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Step 1: Checking the Shaft

The shaft diameter at the bearing seat should be within tolerance as shown in our Product Catalog. As a general guide, +0.000", - 0.002" is adequate. Any taper or out of roundness in the shaft at the bearing should be less than 0.001".
Shaft surface finish should be 63 to 125 micro-inch.

To check the shaft for taper, it must be measured at two or three points, usually the left side, right side and center of the inner race position. The diameter should not vary by more than 0.001" from side to side or 0.0005" from side to center. To check the shaft for roundness, the diameter should be checked at three places around the clock; vertically (12 o'clock), 60° away from top center (2 o'clock) and 120° away from top center (4 o'clock). These measurements should not vary by more than 0.001".

Step 2: Aluminum Triple Labryrinth Seals

Disassemble the supplied components and remove the ATL seals. Separate the seal halves by driving out the two joining pins. Lubricate the "O" rings in the bore with grease.

Assemble the halves on the shaft. Ensure that 'COOPER ' and the shaft size are stamped on the same face of the seal. A hose clamp can be used to compress the seal on the shaft while the pins are reinserted.

Channel-locks can be used to push the pins back into the seal. Push the assembled seals sideways to be out of the way when assembling the inner race.

Step 3: Pedestal Base and Lower Half Flange

Position the lower half pedestal or flange and engage the hold down bolts with flat washers under the bolt heads. You may wish to leave the bolts slightly loose until final alignment is achieved. If shims are used, make sure that the whole base is supported with a full shim.

Step 4: Inner Race

Separate the roller and cage assembly by removing the 'U' clips from the joints or separating the joint plates with a flat head screwdriver. For the 01E Series (with steel cage), separate both sides of the cage halves as shown in step 5. Disengage both joints before removing the roller cage from the inner race. Peel off the protective tape from the inner racetrack.

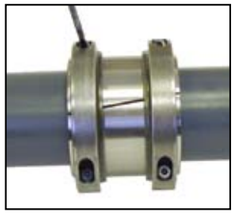
Make sure the shaft is clean and dry.
SOLVENT CLEAN THE PACKING GREASE OR PRESERVATIVE OFF ALL BEARING PARTS. Disassemble the inner race and clamp rings keeping matched halves together. The side face of the two clamp rings and inner race will have match numbers near the joint.

Position the two inner race halves on the shaft centered on the spherical seat of the pedestal. Joints of the race should be vertical (at 12 o'clock and 6 o'clock positions).

Put a 0.015" thick feeler gauge in the bottom joint to keep the joint from closing up. There should be a gap in the inner race joints, usually between 0.015" and 0.022" per side.

Put one half of one clamp ring in one of the inner race grooves with the guide lip toward the roller path, off-setting the clamp ring joint from the inner race joint. The off-set can be as little as 20° or up to 90°.

The clamp ring half should hold the inner race on the shaft. It is best to arrange the clamp rings so that the half with the through holes is on top and the half with the threaded holes is on the bottom. This will keep the heads of the clamp ring screws pointed upwards allowing tool access.



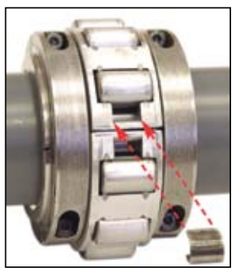
Tap down the clamp rings all around to seat them, then tighten the screws with an allen wrench.
DO NOT FULLY TIGHTEN THE CLAMP RING SCREWS UNTIL THE INNER RACE IS POSITIONED ON THE SHAFT.

Positioning of GR Inner Race
Remove the feeler gauge from the bottom inner race joint. Rotate the lower half cartridge with GR outer race into position. Place one half of the roller and cage assembly in position on top of the inner race. Slide or tap the inner race sideways until the roller/cage assembly will rotate freely into the lower half outer race. This ensures the inner and outer races are properly aligned. Tighten the clamp ring screws to secure the inner race in place. Remove the lower half cartridge and half roller/cage assembly.

Positioning of the EX Inner Race
Remove the feeler gauge from the bottom inner race joint. Slide or tap the inner race sideways to center it on the pedestal base. Rotate the lower half cartridge with EX outer race into position. Place one half of the roller and cage assembly in position on top of the inner race. Rotate the roller and cage into the bottom half outer race. Check to ensure the rollers are centered on the outer race. Tap or slide the inner race if adjustments are needed for centering. Tighten the clamp ring screws to secure the inner race in place. Remove the lower half cartridge and half roller/cage assembly.

Seating and Torquing Clamp Rings
Use a wood or plastic mallet to seat the clamp rings down into the clamp ring grooves. There should be a gap at both joints for each clamp ring. The screws should be tightened in such a manner to keep the gaps approximately equal. Torque both screws on one of the rings to the torque value shown on the attached charts. Seat the clamp rings down hard a second time with the mallet and re-torque. Torque the screws on the other clamp ring, tap down hard and retorque. Check to ensure there are gaps at the inner race joints and that they are approximately equal. Lightly grease the roller path of the inner race.

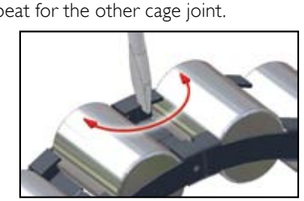
Step 5: Roller and Cage Assembly



Lightly grease the rollers, rotating them to force some grease into the cage pockets. One side of the cage will have circular impressions, use this as the match mark for the cage halves.

Aluminum Cages
Assemble the halves around the inner race and push in the 'U' clips or joint plates at the joints to hold the halves together.

01E Series with Steel Cages
Engage the tabs on one half with the cage body of the other half. Press together until the joint snaps closed. Repeat for the other cage joint.



Step 6: Fitting of the Outer Race into Cartridge

The following procedure should be used only when mounting a new bearing (inner race, clamp rings, roller & cage, and outer race) in an existing cartridge housing:

1. Clean the outer race seat of the cartridge to ensure it is dry and free of contamination.

2. Clean the outer race and place in the cartridge halves so that the match marks coincide and the outer race half with the lubrication hole is in the top half housing.

3. Enter the radial securing screws (D)
(01 Series 71/2" and up, 02 Series 611/16" and up, and all 03 Series), finger tight only - it is important to fit the washers.

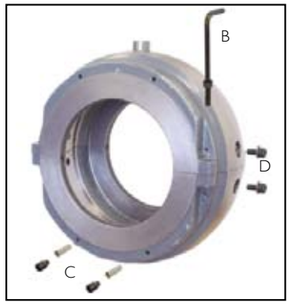
4. Fit the side rods and screws (C) where provided (GR cartridges only), and tighten these against the side face of the outer race very lightly. (Note: some designs have only side screws and no side rods.)

5. Assemble the two halves of the cartridge together and fully tighten the joint screws (B). Ease the pressure on these screws, then fully tighten the radial securing screws (D) and/or the side screws (C).

(In some larger sizes, two cartridge joint screws must be removed to finally tighten the side screws).

6. Re-tighten the cartridge joint screws and check the joints of the outer race track for a smooth transition.

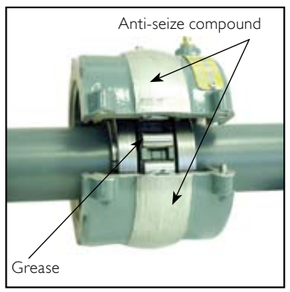
7. Ensure that all grease passages are full by applying a grease gun to the grease fitting and noting fresh grease discharging through the lubrication hole in the top half outer race. Disassemble the cartridge and proceed with the bearing installation.



Step 7: Lower Half Cartridge

Coat the outer race roller path and fill the center grooves of the seal labyrinths with grease. Coat the spherical OD with an anti-seize compound or similar. Slide the ATL seals into position to engage the labyrinths in the cartridge.

The grease boss is located on one end of the cartridge. Decide which end you prefer to have the grease boss on before putting the lower half cartridge in place. Raise the shaft sufficiently (typically 0.010") to roll the lower half cartridge into the pedestal base.



Step 8: Upper Half Cartridge

The top half outer race has a lubrication entry hole at top center. Make sure the race half with the hole is in the top half cartridge. Coat the outer race roller path and fill the center grooves of the seal labyrinths with grease.

Coat the spherical OD with an anti-seize compound. Assemble the top half cartridge onto the lower half checking for the match marks stamped into the joint faces of the halves.

Torque the four cartridge joint screws to the torque values shown in the attached charts. The same wrench used for the clamp ring screws will fit the cartridge joint screws.

NOTE: For the fixed (GR) unit only, the side fixing screws on the cartridge face opposite the lube boss are to be tightened AFTER completely tightening the joint screws.

If supplied, the radial screws on the OD of the cartridge (illustrated in step 6) should also be checked to ensure they are tight.

Step: 9 Pedestal Cap and Top Half Flange

Assemble the pedestal cap or top half flange onto the bottom half checking for match marks stamped into the joint faces. Finger tighten the two screws.

IMPORTANT: Slowly roll the shaft to ensure nothing is binding in the bearings and to allow the cartridge to swivel in the ball and socket joint with the pedestal or flange to align itself.

Tighten the bolts using an allen wrench and an extension.

Torque values can be seen in the charts below.

Tightening torques for cartridge radial screws are 50% of tightening torques for clamping ring screws with the same thread size.

Tightening torques for side screws are as follows:
M4: 1.5 lb ft, M6: 5.8 lb ft, M10: 22 lb ft

Screw Torques (lb ft) 01 Series

Shaft Size (inches)	Clamp ring*	Cartridge	Pillow Block	Flange
13/16 to 2	3.5	2.5	20	20
2 3/16 to 2 1/2	3.5	2.5	39	39
2 11/16 to 3	3.5	2.5	66	66
3 3/16 to 3 1/2	6.5	5.0	165	66
3 11/16 to 4	11	8.3	165	165
4 3/16 to 4 1/2	11	8.3	311	165
4 11/16 to 5	11	8.3	311	311
5 3/16 to 6	26	20	311	311
6 7/16 to 7	26	20	165	311
7 1/4 to 8	26	20	165	525
8 1/2 to 9	52	39	165	525
9 1/2 to 12	52	39	311	525
12 1/2 to 19	88	66	311	-
20 to 24	220	165	311	-

* For vertical shaft or high thrust applications, this value can be increased by up to 20%

Screw Torques (lb ft) 02 Series

Shaft Size (inches)	Clamp ring*	Cartridge	Pillow Block	Flange
1 11/16 to 2	6.5	5.0	39	39
2 3/16 to 2 1/2	6.5	5.0	66	66
2 11/16 to 3	11	8.3	165	66
3 3/16 to 3 1/2	11	8.3	165	165
3 11/16 to 4	11	8.3	311	165
4 3/16 to 5	26	20	311	311
5 3/16 to 6	26	20	311	525
6 7/16 to 7	52	39	311	525
7 1/2 to 10	88	66	311	525
10 1/2 to 18	220	165	311	525
19 to 24	415	311	525	-

* For vertical shaft or high thrust applications, this value can be increased by up to 20%

Screw Torques (lb ft) 03 Series

Shaft Size (inches)	Clamp ring*	Cartridge	Pillow Block	Flange
3 3/4 to 4	52	39	165	-
4 7/16 to 4 1/2	52	39	165	-
4 15/16 to 5	52	39	165	525
5 7/16 to 5 1/2	52	39	311	-
5 11/16 to 6	52	39	311	525
6 7/16 to 6 1/2	88	66	311	-
6 15/16 to 7	88	66	311	525
7 1/2 to 8	88	66	525	-
9	220	165	311	-
10	220	165	311	525

Shaft Size (inches)	Clamp ring*	Cartridge	Pillow Block	Flange
11	415	311	311	-
12	415	311	311	-
13	415	311	525	-
14	700	311	525	-
15	700	311	525	-
17	700	311	525	-
18	700	311	525	-
20	700	311	525	-
22 and 23	700	311	525	-

* For vertical shaft or high thrust applications, this value can be increased by up to 20%