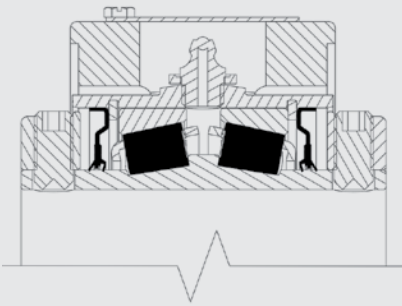


TIMKEN

TIMKEN® SELF-ALIGNING MOUNTED TAPERED ROLLER BEARING INSTALLATION AND LUBRICATION INSTRUCTIONS



PRODUCT NOTES

1. Self-aligning mounted tapered roller bearings are designed to be installed on the shaft without needing to disassemble the split housing. The unit is ready to install on the shaft out of the box.
2. The bearing is designed for maximum permissible static misalignment of +/-4 degrees. Going in excess of this may result in reduced bearing life.
3. All self-aligning mounted tapered roller bearings come pre-lubricated with factory grease. There is no need to add grease during installation.

INSTALLATION

1. Proper installation of the mounted bearing is necessary. This includes the use of shafts that are clean, free from nicks and burrs, straight and of proper diameter. Follow Table 1 for recommended shaft tolerances (those shown in the table are for normal loaded applications). Refer to catalog to verify the maximum allowable slip-fit radial load (Fmax) and to determine if a tighter fit is required. Do not mount the bearing on a worn section of the shaft. The use of shafts with hardness greater than HRC 45 will reduce the effectiveness of the locking collars.
2. If using an open-end cover on the inboard side, slide the open-end cover/seal combination into position on the shaft.
3. Apply a thin oil film to the shaft and bearing bore.
4. Slide the bearing onto the shaft into position starting with the fixed (non-expansion) bearing and then proceeding to the floating (expansion) bearings down the shaft.
 - a. It is necessary to make sure that the mounted bearings and shafts are in alignment (Fig. 1). The self-aligning units come with machined foot ends on the base of the housing to assist with alignment. Verify that the mounting surfaces are in the same flat plane to help make sure good alignment is achieved. If shimming is required to minimize misalignment, use full shims across the entire housing base (Fig. 2).
 - b. Position expansion (floating) bearing assemblies on the mounting surface, then align and tighten base mounting bolts. Do not tighten the housing cap bolts or locking collar set screws at this time. Housing mounting bolts need to be alternately torqued securely to their mounting supports. Flat washers should be used when installing any kind of mounted bearing (Fig. 2). Washers should be properly sized to the bolt diameter and should not be an SAE grade less than SAE grade 8 or equivalent.
 - c. Position non-expansion (fixed) bearing assemblies in correct relation to the shaft and mounting surface. Tighten base mounting bolts. Do not tighten the housing cap bolts or locking collar set screws at this time. Housing mounting bolts need to be alternately torqued securely to their mounting supports. Flat washers should be used when installing any kind of mounted bearing (Fig. 2). Washers should be properly sized to the bolt diameter and should not be an SAE grade less than SAE grade 8 or equivalent.

5. Verify the alignment of the fixed (non-expansion) unit. Rotating the bearing by hand without the cap bolts tightened down will help the bearing to accurately align. If it's not possible to rotate by hand - and it's safe to do so - run under power for a short time. Tighten the housing cap bolts to the torque specified in Table 3. Then ensure that the locking collars are lined up flush with the end of the cone (inner ring) face (Fig. 3). Set screws then need to be properly tightened per Table 2 using a cross pattern. Set screws in multiple units should be aligned to each other (Fig. 4).
6. Locate the first float (expansion) unit closest to fixed bearing and begin setting and locking expansion bearings from closest to fixed out. Locate the cartridge of the expansion unit in the center of its axial travel or at extreme if maximum expansion is required (do not preload anti-rotation washer/grease fitting against the access slot in the top of the housing). Verify the alignment of the unit. Rotating the bearing by hand without the cap bolts tightened down will help the bearing to accurately align. If it's not possible to rotate by hand - and it is safe to do so - run the unit for a short time. Tighten the cap bolts to the torque specified in Table 3. Then ensure that the locking collars are lined up flush with the end of the cone (inner ring) face (Fig. 3). Set screws then need to be properly tightened per Table 2 using a cross pattern. Set screws in multiple units should be aligned to each other (Fig. 4). Then move to the next float (expansion) bearing in line and repeat step 6.
7. If using covers, complete the inboard cover installation and any outboard cover installations per the installation guide provided with the covers.

TABLE 1. RECOMMENDED SHAFT TOLERANCE

Shaft Size	Tolerance
mm in.	mm in.
35	+0.000 to -0.013
Up to 1 1/2	+0.0000 to -0.0005
40 thru 100	+0.000 to -0.025
1 3/8 thru 4	+0.0000 to -0.0010
110 thru 125	+0.000 to -0.038
4 7/16 thru 5	+0.0000 to -0.0015
135 thru 150	+0.000 to -0.038
5 7/16 thru 6	+0.0000 to -0.0015
170 thru 180	+0.000 to -0.051
6 7/16 thru 8	+0.0000 to -0.0020

TABLE 2. RECOMMENDED SET SCREW TIGHTENING TORQUE

Shaft Size	Set Screw Size	Tightening Torque
in. mm	in.	in. - lbs. N-m
1 3/16 thru 1 1/16	5/16 - 18	155
35 thru 40 mm		17.5
1 3/4 thru 2 1/2	3/8 - 16	275
45 thru 65 mm		31.7
2 1/16 thru 3 1/2	1/2 - 13	615
70 thru 90 mm		69.4
3 15/16 thru 5	5/8 - 11	1315
100 thru 125 mm		148.6
5 7/16 thru 6	3/4 - 10	2150
135 thru 150 mm		242.9
6 7/16 thru 8	7/8 - 9	5130
170 thru 180 mm		579.6

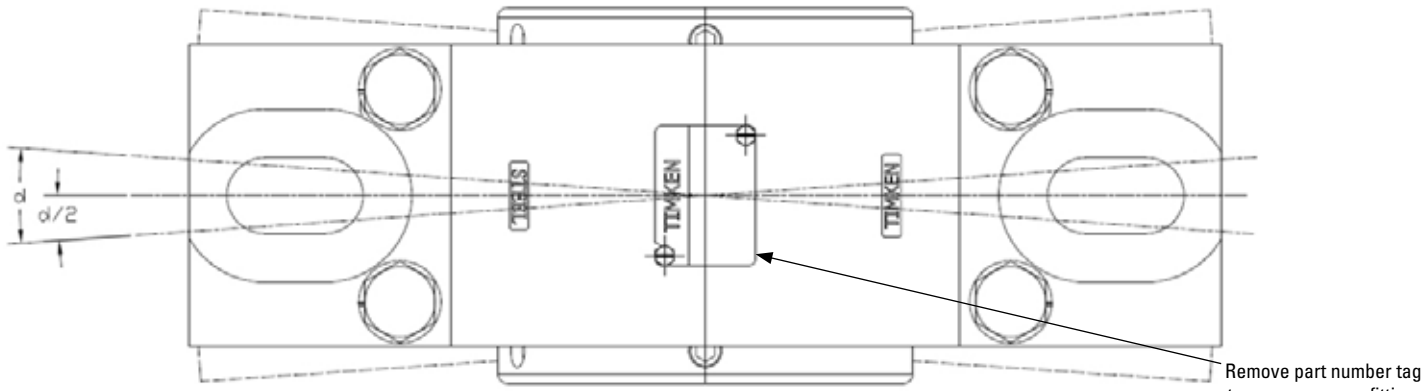


Fig. 1. Align housing to 1/2 total angular movement.

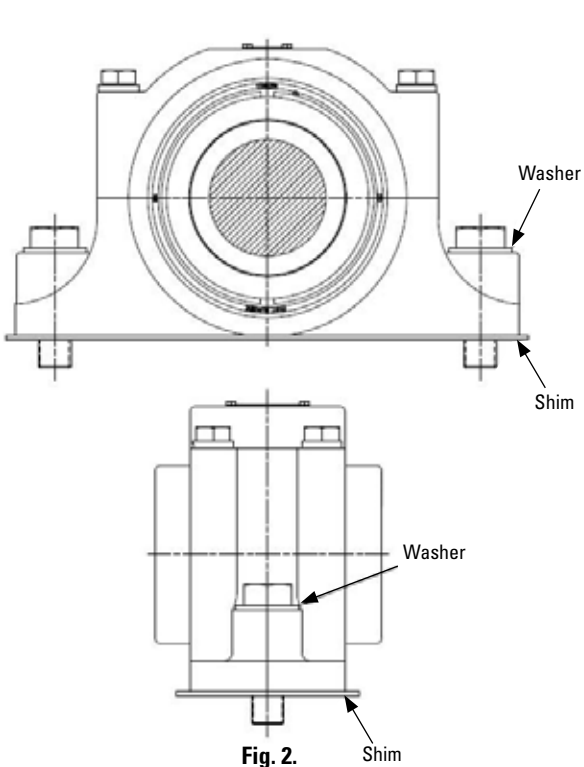


Fig. 2.

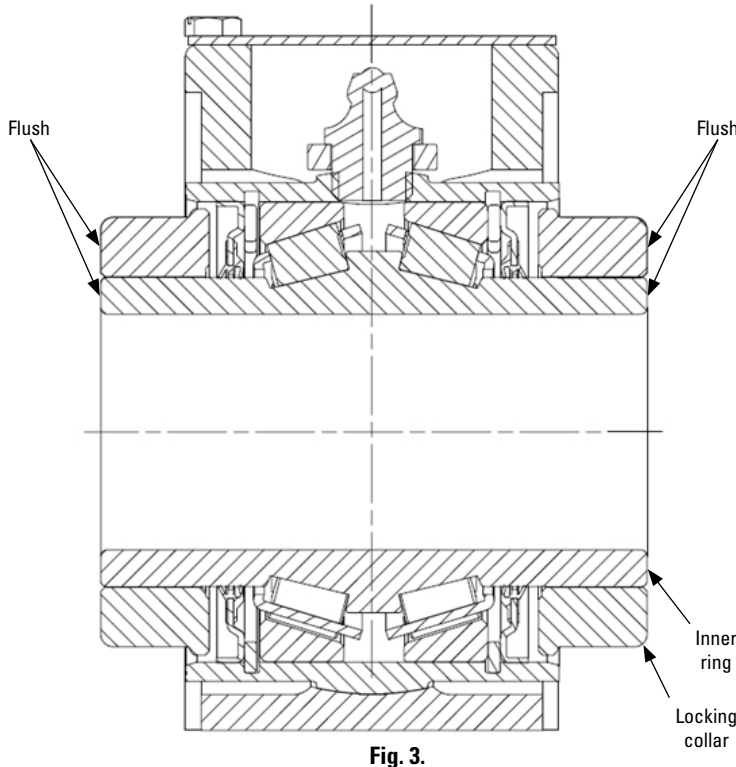


Fig. 3.

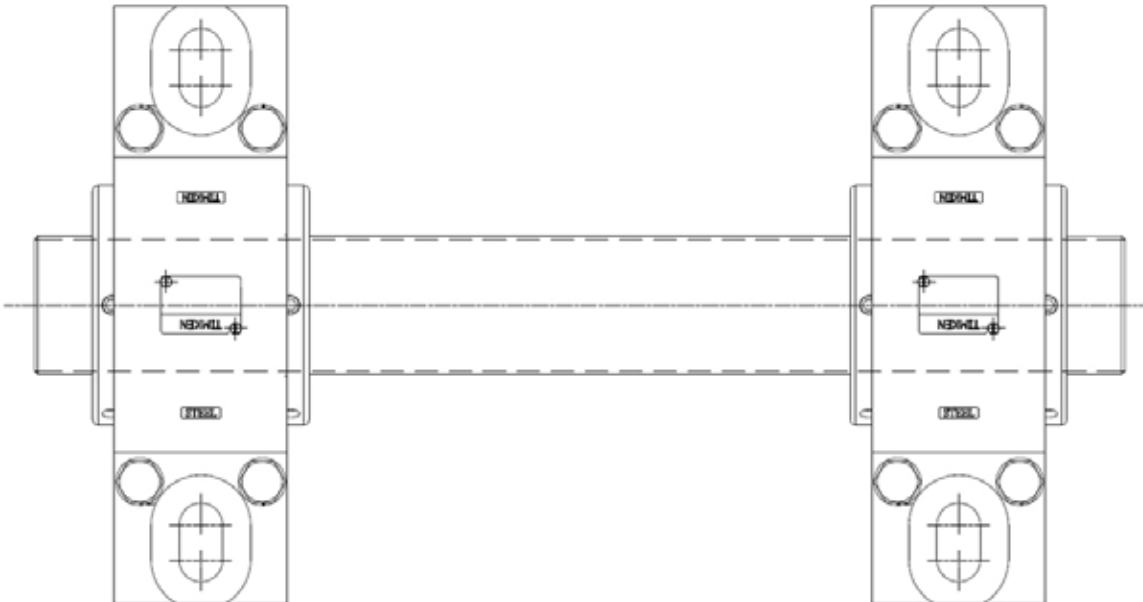


Fig. 4. Line up set screws in multiple units.

REPLACING CARTRIDGE ASSEMBLY IN SELF-ALIGNING MOUNTED BEARING ASSEMBLY

1. The self-aligning housings are serialized as matched sets (caps and bases). When reassembling the cap and base, ensure that the serial numbers match.
2. Remove old cartridge bearing assembly. Then clean and inspect the cap and base housing bore for any damage. Installing replacement cartridge assemblies into a damaged housing may result in reduced bearing life.
3. Apply a film of anti-seize compound to the spherical bore of the cap and base of the housing.
4. Insert the cartridge assembly to the bolted base:
 - a. For non-expansion (fixed), drop the cartridge assembly into the base with the grease fitting facing towards the top of the housing.
 - b. For expansion (float), place the cartridge assembly into the base with the grease fitting facing towards the top of the housing. If the float required is centered, then there will be 6.6 mm (0.26 in.) float available on each side, and the cartridge should be installed at the center of the housing. If the float required is more than 6.6 mm (0.26 in.) toward the one end, the cartridge would be placed in the opposite side with additional expansion from the center of housing.
5. Install the pre-matched cap lining up the dowels with the dowel holes in the base. Then loosely tighten the cap bolts.
6. Then follow the mounted bearing installation instructions on page 2 for final installation.

TABLE 3. RECOMMENDED CAP BOLT TIGHTENING TORQUE

Shaft Size	Cap Bolt Size (Cap Grade 8)	Tightening Torque
in.	in.	ft. - lbs.
1 3/16 - 1 1/4	5/16 UNC	25
1 3/8 - 1 11/16	3/8 UNC	44
1 3/4 - 2 3/16	7/16 UNC	70
2 1/4 - 3	1/2 UNC	107
3 3/16 - 4	5/8 UNC	212
4 7/16 - 5	3/4 UNC	376
5 7/16 - 7	1 UNC	909
7 7/16 - 8	1 1/8 UNC	1287

Shaft Size	Cap Bolt Size (Class 10.9)	Tightening Torque
mm	mm	Nm
35 - 40	M10 x 1.5	61
45 - 55	M12 x 1.75	107
60 - 75	M14 x 2	171
80 - 100	M16 x 2	266
110 - 125	M20 x 2.5	518
135 - 180	M24 x 3	895

LUBRICATION

This information is to aid in the proper lubrication of Timken mounted tapered roller bearings for the majority of applications.

Bearings have been factory prelubricated with Timken® Premium All Purpose Industrial Grease, which is an NLGI No. 2 lithium complex based grease. This is suitable for normal operating conditions. Units should be relubricated with the Timken grease or one that is compatible and made for roller bearings. **It is vital that the greases used are compatible. Please consult with a Timken representative for the grease specifications if the use of a grease other than the Timken grease mentioned above is needed.**

Normal service is considered as operation in a clean, dry environment at temperatures between -34° C to +82° C (-30° F and +180° F). If service is beyond normal conditions due to speed, temperature, or exposure to moisture, dirt or corrosive chemicals, periodic relubrication may be advisable. For extreme conditions or conditions in which special chemicals are used, a Timken representative should be consulted.

After extended storage or periods when the unit is not in operation, fresh grease should be added.

For units operating in dirty or wet environments, the bearing should contain as much grease as possible, based on the shaft speed, to help protect against contamination. For slower applications, with shaft speeds typically less than 200 RPM, the unit should have grease added at start-up to fill the bearing.

Lubrication affects the bearing operating temperature as well. If the bearing does not have enough grease, this could lead to higher temperature operation due to inadequate lubrication film thickness. Excessive grease will lead to higher operating temperatures due to grease churning. This can cause bearing overheating. To avoid this, it may be necessary to remove some of the grease inside the unit. The grease fitting may be removed briefly in this circumstance to allow excess grease to purge (the grease fitting must be replaced). It is best to observe the bearing and its temperature and adjust the lubrication as needed.

RELUBRICATION

Grease fitting for relubrication is located under the part number tag (Fig. 1).

Adequate lubrication is an essential element to the bearing life. Table 5, shown below, can be used as a suggested initial point of reference. Relubrication frequency and quantity intervals are best developed through experience for each application, based on types of service, which may differ from the suggestions in the table. When the bearing is not in operation for an extended period of time, grease should be added to prevent corrosion.

The recommended shaft tolerances in Table 1, shown on page 2, are for normal loaded applications. Please refer to the engineering section in the Timken Mounted Tapered Roller Bearing Catalog (Order no. 10481) to verify the maximum allowable slip fit radial load and to determine if a tighter fit is required. Table 5 shows general lubrication suggested starting points only. Please read the entire installation instructions prior to using these tables. Applications should be regularly reviewed and lubrication amounts and intervals modified as needed to assure best results.

TABLE 4. MAX. RPM OF BEARING

Max RPM of Bearing	Shaft Size
RPM	mm in.
4490	1 3/16 - 1 1/4
3820	35 1 3/8 - 1 7/16
3320	40 1 1/2 - 1 11/16
3050	45 - 50 1 3/4 - 2
2730	55 3 3/16
2420	60 - 65 2 1/4 - 2 1/2
2060	70 - 75 2 11/16 - 3
1640	80 - 90 3 3/16 - 3 1/2
1530	100 3 15/16 - 4
1360	110 - 115 4 7/16 - 4 1/2
1200	125 4 15/16 - 5
1000	135 - 150 5 7/16 - 6
750	170 - 180 6 7/16 - 7
600	7 7/16 - 8

TABLE 5. SUGGESTED RELUBRICATION INTERVALS
(BASED ON 8 HOURS/DAY OPERATION)

	Environment								
	Clean: Un-Exposed			Moderate: Exposed			Extreme: Harsh		
Application Speed ⁽¹⁾	Low	Med	High	Low	Med	High	Low	Med	High
Greasing Interval	1 year	2 months	2 weeks	1 month	2 weeks	(2)	1 week	1 week	(2)

⁽¹⁾ (Low < 25% max. RPM; 25% < Med < 75%; 75% < High) - See Table 4 for max. RPM values.

⁽²⁾ Use extra caution due to heat generation.

Relubrication frequency and quantity are best developed through experience. And at all times, follow the Original Equipment Manufacturer's maintenance instructions.



WARNING

Failure to observe the following warnings could create a risk of death or serious injury.

Proper maintenance and handling practices are critical. Always follow installation instructions and maintain proper lubrication.

Overheated bearings can ignite explosive atmospheres. Special care must be taken to properly select, install, maintain and lubricate mounted bearings that are used in or near atmospheres that may contain explosive levels of combustible gases or accumulations of dust such as grain, coal, or other combustible materials. Consult your equipment designer or supplier for installation and maintenance instructions.

If hammer and bar are used for installation or removal of a part, use a mild steel bar (e.g., 1010 or 1020 grade). Mild steel bars are less likely to cause release of high speed fragments from the hammer or bar or the part being installed or removed.

CAUTION

Failure to follow these cautions may result in property damage.

Do not use damaged mounted bearings.

NOTE

Do not use excessive force when mounting or dismounting the unit. Follow all tolerance, fit, and torque recommendations.

Always follow the Original Equipment Manufacturer's installation and maintenance guidelines.

Ensure proper alignment.

Never weld mounted bearings.

Do not heat components with an open flame.

Do not operate at bearing temperatures above 250° F (121° C).

TIMKEN

The Timken team applies their know-how to improve the reliability and performance of machinery in diverse markets worldwide. The company designs, makes and markets bearings, gear drives, automated lubrication systems, belts, brakes, clutches, chain, couplings, linear motion products and related power transmission rebuild and repair services.