Instruction Manual for PTI Split Block Bearing Units
For SAF, SDAF, SN, SNG, SNHF, S3000K & SD Series Housings

Installation

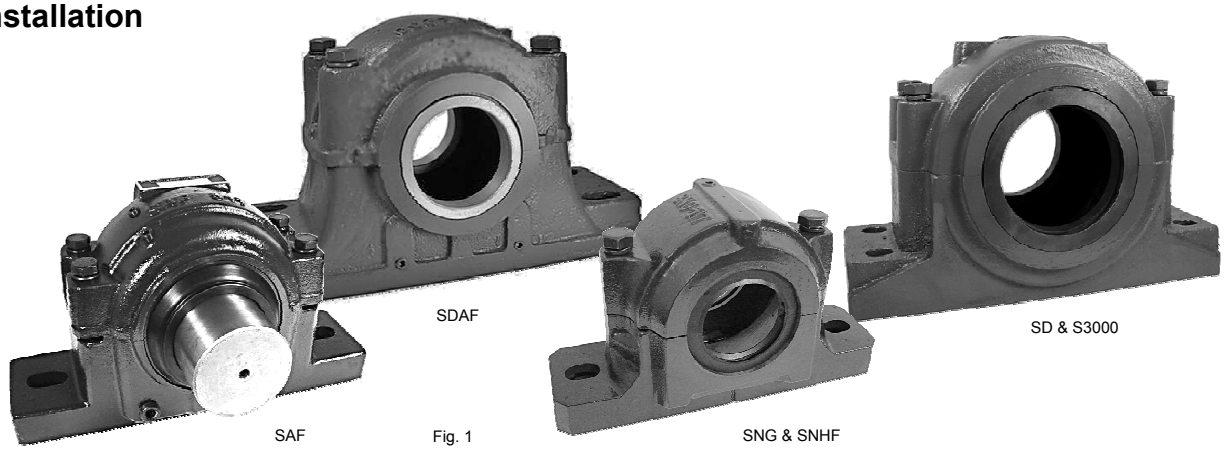


Fig. 1

Warning: To ensure that the drive is not unexpectedly started, turn off and lockout the power source before proceeding. Failure to observe these precautions could result in bodily injury.

1. Clean shaft and all bearing components thoroughly. Check basic dimensions to ensure adapters and shaft diameters are correct. A tapered bore bearing is mounted on a tapered adapter or a tapered shaft. A straight bore bearing is mounted directly onto the shaft.

2. Preparing the Housings and Seals for Assembly.

CAUTION: ***Read complete instructions through before beginning assembly. Housing cap and base must remain as a set. Inboard seals must be slipped onto the shaft prior to the bearing being tightened to the shaft.*** These include LER, LER-DC, PER, TER, TER-OS, TS, TAU and other non-split seals. Popular seal types are shown on Pg. 5. Most of the housing styles use an aluminum labyrinth or rubber seal rings that need to be positioned or located on the shaft prior to the bearing assembly. Lightly grease or oil the shaft and bore of inboard seal to protect the shaft and seal components. Carefully slide the inboard seal onto the shaft but clear of the bearing area. Taconite seals normally include felt strips packed into internal grooves of the seal. The felt strips should be soaked in oil prior to packing into the seal groove before slipping the seal onto the shaft.

Consider numbering or match marking housing caps and bases if multiple units are being assembled. Most applications require one fixed bearing and one expansion bearing per shaft. The fixed bearing requires a fixing ring to be installed next to the bearing helping to lock it into position. The expansion bearing does not require the fixing ring. If thrust loads are involved, it is best to select the bearing with the heaviest radial load to become the fixed bearing. Spherical bearings subject to thrust loads also require a radial load to operate properly. Verify the proper bearing position along the shaft and the required bolt centers for the housing base. Housings have lube drain holes at the base, consider this when orienting the housing base.

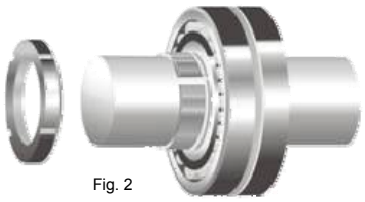


Fig. 2

Check the housing and remove any paint and burrs from the cap and base at the housing split and thoroughly clean the housing and bearing area. Ensure mounting surface is flat. If the housing base contains a drain hole at the bottom near the seal grooves, check to ensure the hole and or seal grooves are free of foreign matter. Set lower half of the housing on base and lightly oil the bearing seats. Prepare the cap in a similar manner, maintaining the orientation of cap and base. **Caps and bases are matched pairs and can only be used together.** Place these parts in a clean area until the bearing is installed.

CAUTION: Before proceeding, position inboard seals on the shaft prior to bearing mounting.

3. Mounting Bearings on a Tapered Adapter Sleeve

Remove oil or grease from the shaft where the adapter sleeve and bearing will be mounted. Position the adapter sleeve on shaft with the thread outboard as shown in Fig. 2 to the approximate location with respect to required bearing centerline. Light oil applied to the sleeve threads and tapered sleeve surface results in easier bearing mounting. Excess on sleeve must be wiped off. Slide bearing onto the tapered adapter sleeve (less lock washer) as shown above. See Fig 3 for general layout of components.

Bearings with a tapered bore are always mounted with a tight (interference) fit on the shaft. As the nut is tightened, the bearing is pressed onto the tapered sleeve, a reduction of internal clearance occurs within the bearing as the inner ring stretches slightly. This locks the bearing onto the shaft in a precise, concentric manner. The reduction in radial internal clearance or axial movement of the inner ring up the adapter taper can be used as a measure of the amount of interference. With spherical roller bearings, it is generally preferable to measure the reduction of internal clearance (beginning radial clearance less the final mounted clearance). These clearances can be measured simply with feeler gauges. Only in cases where the bearings are small, or where space is cramped, is the axial displacement considered a reasonable measurement reference when the radial clearance is not possible to measure.

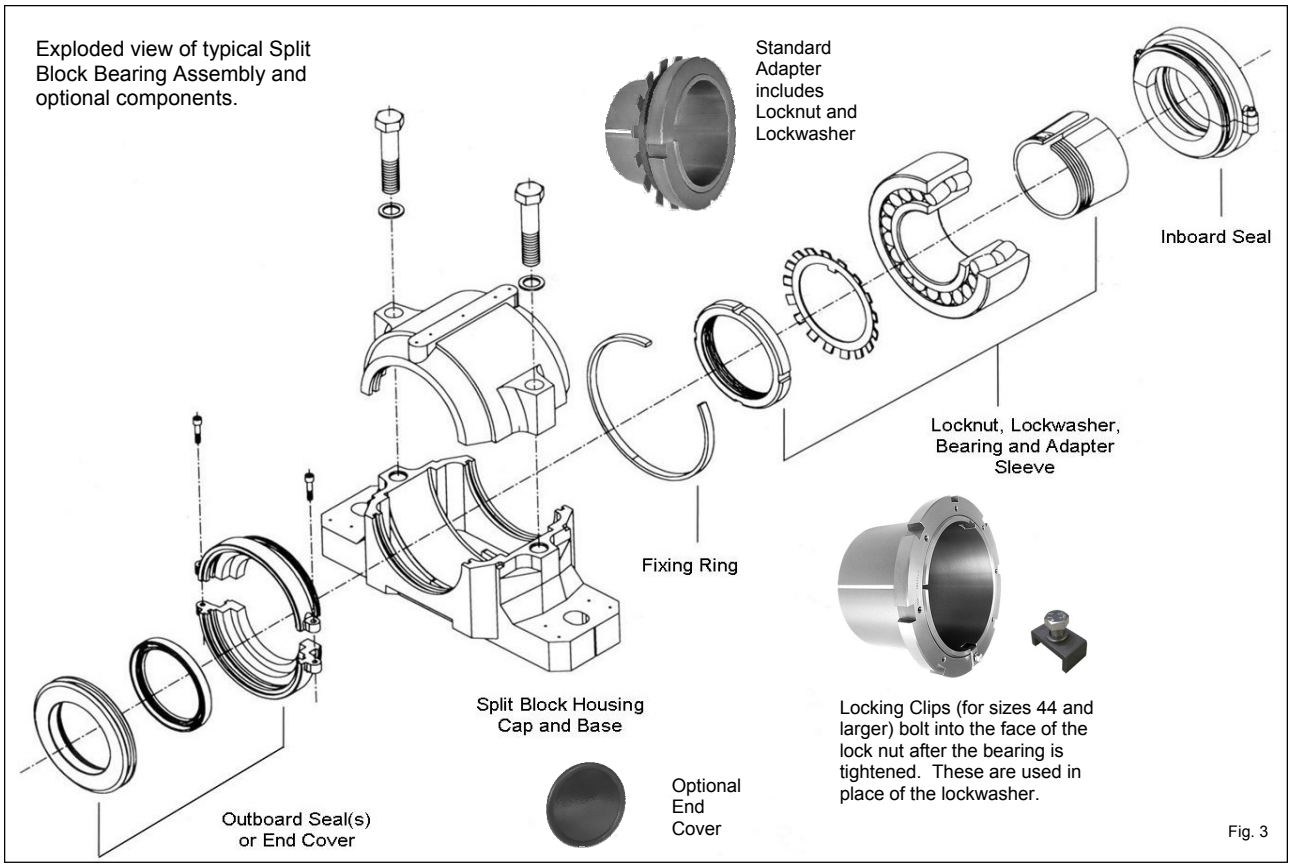


Fig. 3

4. Measuring the Internal Radial Clearance in the Bearing

Feeler gauges with a blade thickness of 0.001" inches (0.03 mm) are recommended to measure the internal radial clearance before, during and after bearing mounting. Always verify the starting internal clearance in the bearing. Before measuring, rotate the inner ring 1/4 of a turn to ensure the rollers are in their normal position. Since the rollers are matched sets, the radial internal clearance should be the same for both rows of rollers. Be sure the feeler gauge passes over the mid point of the roller. With the bearing setting vertical, measure the clearance between the top roller just beneath the outer ring (Fig. 4). Gently press the top roller inward toward the center to ensure the roller is loose. Slide the feeler gage across the top of the roller (a gentle sawing type action will help the feeler gage to pass when you reach the final, actual clearance). Record the measurement of the largest size blade that will slide through. This is the un-mounted radial internal clearance.

A bearing on a shaft (Fig. 5) will have the internal clearance at the top of the bottom roller. To measure clearance on the bottom, slide the feeler gauge under the lowest roller (i.e. between the roller and the outer ring). Gently press the bottom roller inward to ensure the roller is free. This will help the feeler gage to pass when measuring clearance in this manner. **See Tables 1, 2 and 3 to verify measured clearance.** It is advisable to measure the clearance several times to insure measuring consistency. Rotate the bearing 1/4 turn between measurements to insure the rollers are normally aligned. Do not roll the bearing over the feeler gages as this is not an accurate method of measurement. When measuring clearance at the bottom, the weight of the roller puts pressure on the feeler gauge. Heavier rollers influence this more. If possible, compare measurements using the top and bottom measuring methods. The clearances must be the same. During mounting, sling or lift the bearing outer race periodically during the mounting process, to compare top and bottom measurements if possible.

See Tables 1, 2 and 3 for un-mounted clearance, reduction of radial internal clearance and permissible running clearance for spherical roller bearings with tapered bores. If these recommendations are followed, the degree of interference (fit to shaft) will be proper. The minimum clearance reduction values should generally be used for bearings that measure on the lower end of the standard clearance specification.

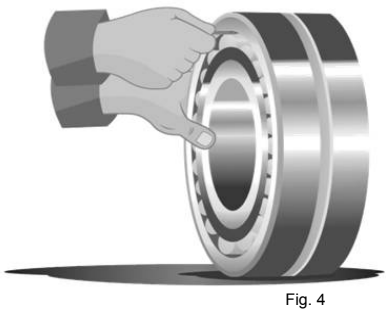


Fig. 4

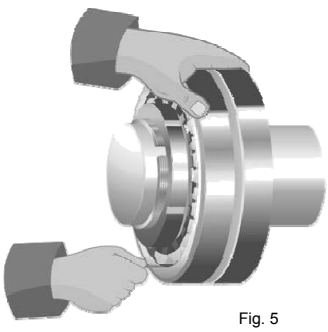


Fig. 5

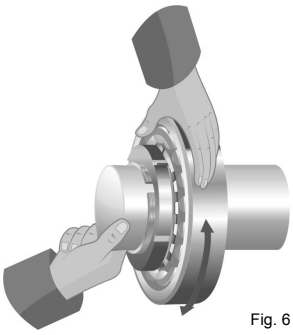


Fig. 6

Bearing Mounting Methods

5. There are three popular mounting methods for taper bore bearings and a direct mounting procedure for straight bore bearings: Spanner wrench and hammer (Fig. 7), Hydraulic Nut (Fig. 8) & portable Hydraulic Pump (Fig 9) and a Lock Nut with Mounting Screws (Fig 10). This last method is required for straight bore bearings (i.e. shrink fit). In large shaft sizes (6" and larger), it becomes increasingly more difficult to tighten the locknut with just a spanner wrench and hammer. Therefore, it is suggested to use either the Hydraulic Nut or Locknut with mounting screws. Either method makes large bearing installation easier.

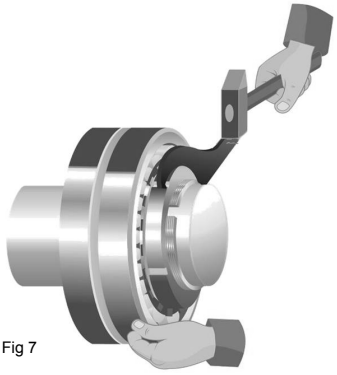


Fig 7


Fig 8

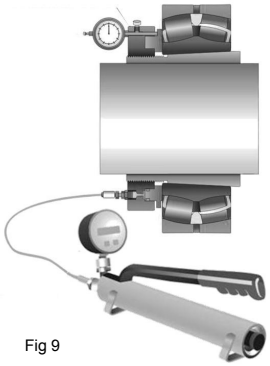


Fig 9

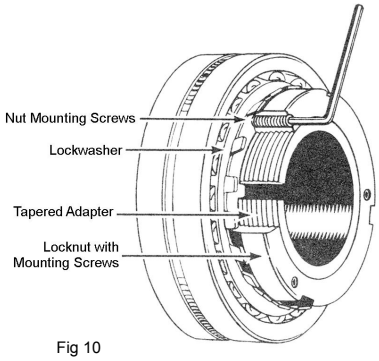


Fig 10

Positioning the Bearing on the Shaft

6. There is normally a ***Fixed*** (Non-Expansion) and ***Float*** (Expansion) bearing required to support each shaft. Install the **Fixed** bearing first. The **Fixed** bearing should also be placed next to a drive. The ***Fixed*** bearing requires a fixing ring next to the bearing housing to fill the bearing void and restrict axial movement of the bearing. The **Float** bearing does not require a fixing ring. The ***Float*** bearing should be installed so the roller bearing rests in the center of the bearing housing seat. This allows the bearing to "float axially" to accommodate any shaft expansion or contraction.

The final mounted position of the bearing must consider the width of the fixing ring in the physical placement of the bearing on the shaft. The fixing ring(s) should be placed on the lock nut (outboard) side of the bearing. If two fixing rings are required, one may be placed on either side to keep the bearing physically centered in the housing. Take the width of the fixing ring(s) into account when determining the position of housing and bearing center location. During mounting, axial travel of the bearing is usually less than 1/16" of an inch, and the base bolt hole clearance will normally accommodate this amount. SAF, SDAF, SN, SNG and S3000 Series housings typically have the bearing seat machined in the center of the housing. SD and other asymmetric housing designs have the bearing seat machined off-center in the housing. **Note: Positioning the bearing is a critical installation step before mounting can begin!**

Tightening the Bearing on the Shaft

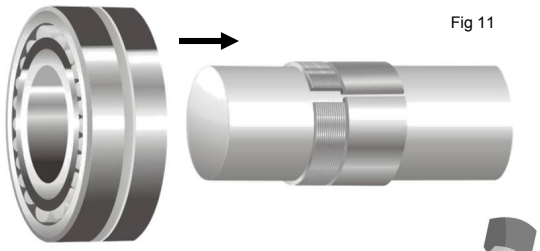


Fig 11

7. Place the bearing on the adapter sleeve starting with the large bore of the inner ring to match the taper of the adapter (Fig. 11). **Note: The lock washer should NOT be used during the tightening process. It should be installed only *after* the bearing is tightened with the recommended internal clearance.** Use the Lock Nut to snug the bearing onto the adapter. Position the bearing and adapter at the desired axial position on the shaft. Gently oil lubricate only the adapter threads and face of the nut that will contact the bearing inner ring.

The chamfered side of the nut (Fig. 12) is designed to contact the bearing inner ring. Snug the nut to hand tighten, use a spanner wrench to tighten further (Fig. 13). Re-check the axial position of the bearing and consider the fixing ring width in the bearing position if this will be the fixed bearing. ***Note:*** **It is not recommended to use a hammer and drift as chips can fall into the bearing and the nut may be damaged (Fig 14).**

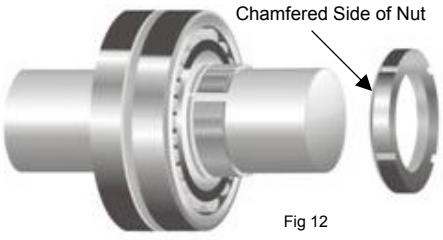


Fig 12

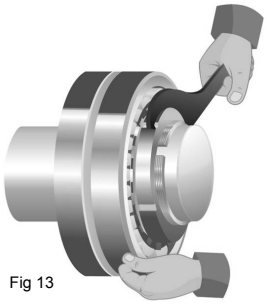


Fig 13

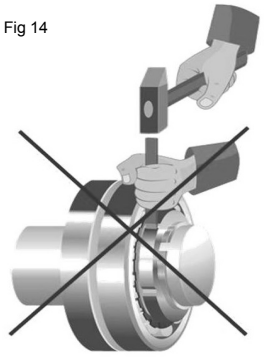


Fig 14

The typical shaft interference resulting from the tightening methods that follow in 7A, 7B or 7C will be approximately 0.0005" inch per inch of shaft diameter. This is the typical shaft interference created during the tightening procedure and is what locks the bearing onto the shaft. Radial clearance in the bearing should be measured before, during and after installation to ensure adequate running clearance remains in the mounted bearing. Tables 1, 2 and 3 provide all necessary clearance details.

CAUTION: A bearing that is not properly tightened may loosen and may eventually turn on the shaft. Additionally, to avoid over tightening, make certain the outer ring of the bearing rotates freely after installation.

7A. Spanner & Wrench Method: For smaller bearings, generally below 6-inch shaft diameter, a spanner wrench and hammer are normal and likely enough to properly mount the bearing (Fig. 15). For larger sizes, consider using a Hydraulic Nut or Locknut with Mounting Screws. Measure clearance frequently during the tightening process. Tighten the bearing to the recommended final internal clearance. (*As a guide, the Lock Nut will rotate approximately 1/3 of a turn further from the hand tight position. Recognize the "hand tightness feel" varies by installer. See Pg. 7 (Tables 4 & 5) concerning expected nut rotation during tightening).* Once the final recommended clearance is achieved, remove the Lock Nut and install the Lock Washer between the bearing and re-tighten the Lock Nut.

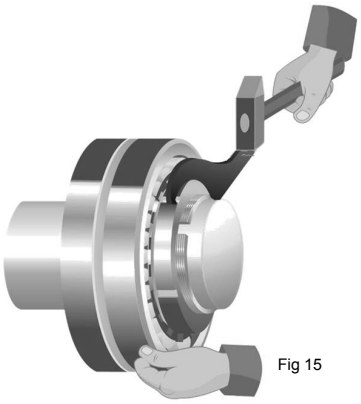


Fig 15

7B. **Hydraulic Nut Method:** Use of a Hydraulic Nut (See Fig. 7 & 8) is the preferred method for mounting bearings over 6" shaft diameter. Pressure from a portable hydraulic pump causes the piston in the face of the Hydraulic Nut to press on the bearing inner ring, forcing it further onto the tapered adapter. Follow the same internal clearance recommendations for mounting. (Follow pressure guidelines and axial drive-up measurements provided in the instructions included with the Hydraulic Nut.)

7C. Lock Nut with Mounting Screws Method: A Lock Nut with 8-12 oval point set screws (Fig. 10) will contact the bearing inner ring, forcing the bearing further onto the adapter. Apply an equal torque to each screw in a clockwise sequence. Increase the torque evenly at each pass to apply even mounting pressure on the bearing inner ring. This will gently press the inner ring onto the adapter. Measure the clearance reduction frequently during the tightening process to insure the bearing is being properly tightened.

7D. Mounting Spherical Roller Bearings with Cylindrical (Straight) Bores: A bearing with cylindrical (straight) bore ordinarily does not require as tight of a fit on the shaft as taper bore units. The shaft diameter is very important to control this mounting method (shrink fit) to ensure a proper interference fit. To install the bearing, heat the bearing in an oil bath or other safe suitable means. Several hundred degrees (250º to 300ºF) will be necessary to expand the bearing bore to allow adequate assembly clearance. To assist, the shaft may also be cooled. The inner ring of the bearing is secured to the shaft as the bearing cools and develops a shrink (interference) fit to the shaft.

8. Securing the Lock Nut

After installing the bearing to the recommended internal clearance indicated in Table 3, loosen and remove the Lock Nut, and install the Lock Washer between the Lock Nut and bearing. (Adapters for 8-inch shaft size and above do not use washers, but rather locking clips or plates). The outer tabs on the washer should fit against the mating beveled edge of the Lock Nut. Fit the ID washer tab into the corresponding slot on the adapter and re-tighten the Lock Nut. Find the Lock Washer OD tab that aligns nearest to slot on the OD of the Lock Nut, and bend this corresponding lock washer tab into the slot as shown (Fig 16). If a slot on the nut does not line up with a washer tab, and the nut cannot be tightened further without heavy force, back the Lock Nut off slightly until the nearest tab and slot align. Bend this tab into the OD slot of the nut to secure the Lock Nut. Check the internal radial clearance to ensure nothing has changed. ***If a Locking Clip is used instead of a Lock Washer, locate the nearest locking slot so the clip fits into the notch in the adapter sleeve. This will secures the Locking Clip***.

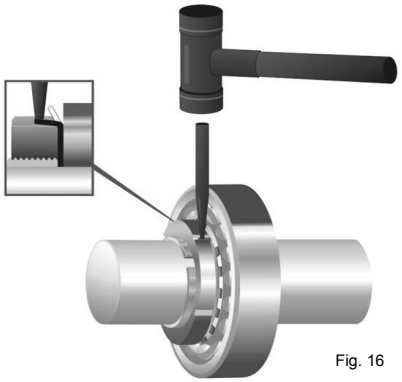


Fig. 16

Lower Mounted Bearing into Housing

9. Seals & Fixing Rings Installation, Assembling the Bearing into Housing Base

Ensure the housing base is clean, and apply a generous amount of grease to the housing seal grooves. Lower the shaft with installed bearing into the base of housing while carefully guiding seals into the grooves in the housing base. If rubber split seals are used, prepare to insert the lower half of the seal as the shaft nears the housing. If felt type seals are specified, standard taconite seals or metric blocks - soak the felt seal strips in oil prior to inserting them in the seal grooves, trim the felt strip to length to fit within the seal groove. Move the shaft with bearing (or block) axially so that the fixing ring can be inserted between the ***Fixed*** bearing outer ring and housing shoulder on the locknut side of the bearing. The fixing ring may be installed on the opposite side of the bearing if necessary.

NOTE: Some split blocks include 2 fixing rings. All axial space beside the spherical roller bearing filled for the fixed bearing.

Slotted base hold-down bolt holes can be used to adjust the housing location slightly. Check and align bearing housing with the shaft. Bolt the ***Fixed*** housing securely in place, using washers under bolt heads. If shimming the base becomes necessary for proper alignment, only shims which cover the full mounting surface of the pillow block base are recommended.

The ***Float*** bearing must be centered within the housing seat when mounted. This will allow the bearing to float axially as the shaft expands or contracts to accommodate temperature changes of the equipment or surroundings. Secure the ***Float*** housing and insure the spherical roller bearing rests centered within the housing bearing seat.

NOTE: Only 1 Fixed bearing is required per shaft. Other bearing(s) on the shaft must be Float (Expansion) types.

10. Lubrication

If grease is used as a lubricant, it should be applied before the upper housing half is secured and in accordance with the lubrication notes given in the Initial Grease Fill Guidelines in Table 8 on Pg. 8. Hand-pack the bearing between all rollers and fill the base approximately 1/2 full of grease. For oil lubrication, the oil level should be at the center of the lowest roller. If oil lube is recommended, consult with equipment manufacturer as to oil type and other lubrication requirements. External oil sight glasses (also available) should be installed to monitor the oil level.

11. Installing Housing Cap (Upper Half)

The bearing seat in the upper half of the housing (cap) should be checked for burrs, thoroughly cleaned, lightly oiled and carefully placed over the bearing and ensure proper alignment of the dowel pins at the joint. For oil-lubricated units, apply a thin coat of sealing compound (such as Permatex 2) at the outer edges of the split surfaces. Sealing compound must be applied sparingly. Excessive amounts may be forced between the housing bore and bearing O.D., pinching the outer ring. Careful to align and match the dowel pins between the cap and base of every housing. Tighten Cap bolts according to Table 9. Use Grade 5 base bolts for Cast Iron and Ductile Iron housing and Grade 8 base bolts with steel housings. Torque base bolts according to Table 9.

NOTE: CAPS AND BASES ARE MACHINED AS A SET AND ARE NOT INTERCHANGEABLE.

11. Start up Considerations

As the system is started, monitor the bearing temperature and for grease that may appear at the seals. A bearing that contains too much grease may run warm to the touch until it purges unwanted grease. A light showing of grease at the seals is most desirable and normal. If no grease purges at start up, add a small amount of grease while the bearing is running until some appears at the seals. This will ensure adequately lubricated bearings. Bearings will purge excess grease. A grease barrier at the seal also restricts contaminants from entering the bearing. If excess grease purges from seals and the bearing housing is hot to the touch (140ºF+), remove a lube or drain plug to assist excess grease purge. The bearing will seek its desired level of grease and cool down to a normal running temperature. Re-install the plugs once all excess grease has purged.

SAF & SDAF Seals

LER Seal (Standard)

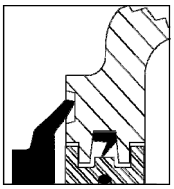
PER Seal with O-ring

TER-OS Taconite Seal with Oil Seal

TER Taconite Seal with V-ring Seal

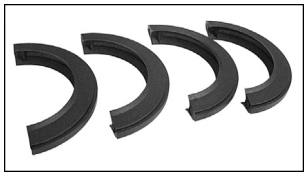
EPR End Cover

LER-DC Dust Wiper Seal



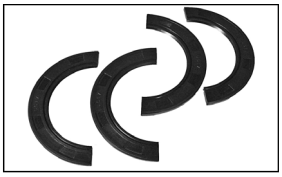
LER-DC, PER & PTV Lip Seal

SNG, S3000 & SD Metric Split Block Seals



TSNA-G Split Rubber Seal

TS Aluminum Labyrinth Seal



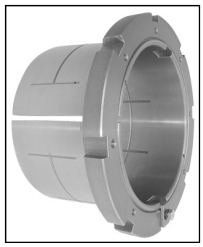
U-Seal - Split Rubber Steel Reinforced

TSNC Felt Strip in Split Steel Seal

TAU Taconite Seal

Adapter Options

SNW & H-Series Standard Adapter



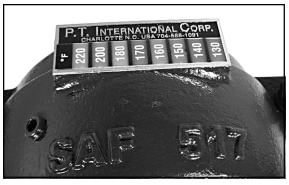
OH Hydraulic Adapter

Accessories

Spanner Wrenches

Oil Level Site Glass

Vibration & Thermal Sensors



Optional Thermal Sensors on the name plate allow a quick visual of the operating temperatures. Sensors can be fitted to the name plate.

Spherical Bearing Internal Clearance and Recommended Reductions

Table 1 - Unmounted Radial Internal Clearance of Tapered Bore Spherical Roller Bearings

Bore Dia. d (mm)		Normal C0 (in.)		C3 (in.)		C4 (in.)	
Over	Incl.	Min.	Max.	Min.	Max.	Min.	Max.
24	30	0.0012	0.0016	0.0016	0.0022	0.0022	0.0030
30	40	0.0014	0.0020	0.0020	0.0026	0.0026	0.0033
40	50	0.0018	0.0024	0.0024	0.0031	0.0031	0.0039
50	65	0.0022	0.0030	0.0030	0.0037	0.0037	0.0047
65	80	0.0028	0.0037	0.0037	0.0047	0.0047	0.0059
80	100	0.0031	0.0043	0.0043	0.0055	0.0055	0.0071
100	120	0.0039	0.0053	0.0053	0.0067	0.0067	0.0087
120	140	0.0047	0.0063	0.0063	0.0079	0.0079	0.0102
140	160	0.0051	0.0071	0.0071	0.0091	0.0091	0.0118
160	180	0.0055	0.0079	0.0079	0.0102	0.0102	0.0134
180	200	0.0063	0.0087	0.0087	0.0114	0.0114	0.0146
200	225	0.0071	0.0098	0.0098	0.0126	0.0126	0.0161
225	250	0.0079	0.0106	0.0106	0.0138	0.0138	0.0177
250	280	0.0087	0.0118	0.0118	0.0154	0.0154	0.0193
280	315	0.0094	0.0130	0.0130	0.0169	0.0169	0.0213
315	355	0.0106	0.0142	0.0142	0.0185	0.0185	0.0232
355	400	0.0118	0.0157	0.0157	0.0205	0.0205	0.0256
400	450	0.0130	0.0173	0.0173	0.0224	0.0224	0.0283
450	500	0.0146	0.0193	0.0193	0.0248	0.0248	0.0311
500	560	0.0161	0.0213	0.0213	0.0268	0.0268	0.0343
560	630	0.0181	0.0236	0.0236	0.0299	0.0299	0.0386
630	710	0.0201	0.0264	0.0264	0.0335	0.0335	0.0429

Table 2 - Recommended Clearance Reduction

Bore Diameter d (mm)		Reduction in Radial Internal Clearance (in.)	
Over	Incl.	Min.	Max.
24	30	0.0006	0.0008
30	40	0.0008	0.0010
40	50	0.0010	0.0012
50	65	0.0012	0.0015
65	80	0.0015	0.0020
80	100	0.0018	0.0025
100	120	0.0020	0.0028
120	140	0.0025	0.0035
140	160	0.0030	0.0040
160	180	0.0030	0.0045
180	200	0.0035	0.0050
200	225	0.0040	0.0055
225	250	0.0045	0.0060
250	280	0.0045	0.0065
280	315	0.0050	0.0075
315	355	0.0060	0.0085
355	400	0.0065	0.0090
400	450	0.0080	0.0105
450	500	0.0085	0.0110
500	560	0.0095	0.0125
560	630	0.0100	0.0135
630	710	0.0120	0.0155

Table 3 - Permissible Mounted Running Clearance

Bore Diameter d (mm)		Permissible Mounted Running Clearance (in.)		
Over	Incl.	C0	C3	C4 min
24	30	0.0006 - 0.0008	0.0010 - 0.0014	0.0016 - 0.0022
30	40	0.0006 - 0.0010	0.0012 - 0.0016	0.0018 - 0.0023
40	50	0.0008 - 0.0012	0.0014 - 0.0019	0.0021- 0.0027
50	65	0.0010 - 0.0015	0.0018 - 0.0022	0.0025 - 0.0032
65	80	0.0013 - 0.0017	0.0022 - 0.0027	0.0032 - 0.0039
80	100	0.0013 - 0.0018	0.0025 - 0.0030	0.0037 - 0.0046
100	120	0.0019 - 0.0025	0.0033 - 0.0039	0.0047 - 0.0059
120	140	0.0022 - 0.0028	0.0038 - 0.0044	0.0054 - 0.0067
140	160	0.0021- 0.0031	0.0041- 0.0051	0.0061- 0.0078
160	180	0.0025 - 0.0034	0.0049 - 0.0057	0.0072 - 0.0089
180	200	0.0028 - 0.0037	0.0052 - 0.0064	0.0079 - 0.0096
200	225	0.0031- 0.0043	0.0058 - 0.0071	0.0086 - 0.0106
225	250	0.0034 - 0.0046	0.0061 - 0.0078	0.0093 - 0.0117
250	280	0.0042 - 0.0053	0.0073 - 0.0089	0.0109 - 0.0128
280	315	0.0044 - 0.0055	0.0080 - 0.0094	0.0119 - 0.0138
315	355	0.0046 - 0.0057	0.0082 - 0.0100	0.0125 - 0.0147
355	400	0.0053 - 0.0067	0.0092 - 0.0115	0.0140 - 0.0166
400	450	0.0050 - 0.0068	0.0093 - 0.0119	0.0144 - 0.0178
450	500	0.0061 - 0.0083	0.0108 - 0.0138	0.0163 - 0.0201
500	560	0.0066 - 0.0088	0.0118 - 0.0143	0.0173 - 0.0218
560	630	0.0081 - 0.0101	0.0136 - 0.0164	0.0199 - 0.0251
630	710	0.0081 - 0.0109	0.0144 - 0.0180	0.0215 - 0.0274

Spherical Bearing Clearance Data. **Table 1** provides the internal radial clearance that can be measured out of the box to verify product. Each bearing should be checked prior to installation. Record the measurements. **Table 2** is the reduction of internal clearance recommended for each bearing size base on normal operating conditions. **Table 3** is the Permissible Running Clearance for a properly mounted Spherical Roller Bearing. Details for C0 (Normal), C3 and C4 clearance designations are provided.

All Clearance Dimensions in Inches

Nut Rotation & Drive-up Data

Table 4 & Table 5 provides Axial Drive-up and Nut Rotation guidelines for Ball Bearings and smaller Spherical Roller Bearings. Data is based on a "hand-tight-with-spanner-wrench" starting point for the nut. Nut Rotation for Ball Bearings may be used as it reflects a consistent mounting procedure and radial clearance is rather difficult to measure. For Spherical Roller Bearings, the nut rotations should be used only as a guide since clearances can be easily measured and verified.

Drive-up for Spherical Roller Bearing Table 4

Bearing Size	Bore d (mm)	Axial Drive-up x (in)	Inch Nut Part No.	Nut Rotation Deg.	Metric Nut Part No.	Nut Rotation Deg.
222 Series						
22206 K	30	0.018	N 6	115	KM 6	110
22207 K	35	0.019	N 7	120	KM 7	115
22208 K	40	0.020	N 8	135	KM 8	125
22209 K	45	0.021	N 9	140	KM 9	130
22210 K	50	0.023	N 10	150	KM 10	140
22211 K	55	0.024	N 11	155	KM 11	110
22212 K	60	0.026	N 12	165	KM 12	115
22213 K	65	0.026	N 13	170	KM 13	120
22214 K	70	0.027	N 14	175	KM 14	125
22215 K	75	0.028	AN 15	120	KM 15	130
22216 K	80	0.030	AN 16	130	KM 16	140
22217 K	85	0.031	AN 17	135	KM 17	145
22218 K	90	0.033	AN 18	145	KM 18	150
22219 K	95	0.033	AN 19	145	KM 19	150
22220 K	100	0.034	AN 20	150	KM 20	155
22221 K	105	0.037	AN 21	160	KM 21	170
22222 K	110	0.037	AN 22	160	KM 22	170
22224 K	120	0.040	AN 24	170	KM 24	180
223 Series						
22306 K	30	0.018	N 6	115	KM 6	110
22307 K	35	0.019	N 7	120	KM 7	115
22308 K	40	0.020	N 8	135	KM 8	125
22309 K	45	0.021	N 9	140	KM 9	130
22310 K	50	0.023	N 10	150	KM 10	140
22311 K	55	0.023	N 11	150	KM 11	105
22312 K	60	0.026	N 12	165	KM 12	115
22313 K	65	0.028	N 13	180	KM 13	125
22314 K	70	0.028	N 14	185	KM 14	130
22315 K	75	0.030	AN 15	130	KM 15	135
22316 K	80	0.031	AN 16	135	KM 16	140
22317 K	85	0.032	AN 17	140	KM 17	145
22318 K	90	0.034	AN 19	145	KM 18	155
22319 K	95	0.034	AN 19	150	KM 19	155
22320 K	100	0.035	AN 20	155	KM 20	160
22321 K	105	0.037	AN 21	160	KM 21	170
22322 K	110	0.039	AN 22	170	KM 22	180
22324 K	120	0.041	AN 24	175	KM 24	185

Drive-up for Self-aligning Ball Bearing Table 5

Bearing Size	Bore d (mm)	Axial Drive-up x (in)	Inch Nut Part No.	Nut Rotation Deg.	Metric Nut Part No.	Nut Rotation Deg.
1200 Series						
1205 K	25	0.009	N 05	100	KM 5	55
1206 K	30	0.009	N 06	55	KM 6	55
1207 K	35	0.012	N 07	75	KM 7	70
1208 K	40	0.012	N 08	75	KM 8	70
1209 K	45	0.012	N 09	80	KM 9	75
1210 K	50	0.012	N 10	80	KM 10	75
1211 K	55	0.016	N 11	100	KM 11	70
1212 K	60	0.016	N 12	100	KM 12	70
1213 K	65	0.016	N 13	100	KM 13	70
1214 K	70	0.016	N 14	100	KM 14	70
1215 K	75	0.018	AN 15	75	KM 15	80
1216 K	80	0.018	AN 16	75	KM 16	80
1217 K	85	0.023	AN 17	100	KM 17	105
1218 K	90	0.023	AN 18	100	KM 18	105
1219 K	95	0.023	AN 19	100	KM 19	105
1220 K	100	0.023	AN 20	100	KM 20	105
1221 K	105	0.026	AN 21	115	KM 21	120
1222 K	110	0.026	AN 22	115	KM 22	120
1224 K	120	0.026	AN 24	115	KM 24	120
2200 Series						
2205 K	25	0.009	N 05	100	KM 5	55
2206 K	30	0.009	N 06	55	KM 6	55
2207 K	35	0.012	N 07	75	KM 7	70
2208 K	40	0.012	N 08	75	KM 8	70
2209 K	45	0.012	N 09	80	KM 9	75
2210 K	50	0.012	. N 10	80	KM 10	75
2211 K	55	0.012	N 11	80	KM 11	55
2212 K	60	0.015	N 12	100	KM 12	70
2213 K	65	0.015	N 13	100	KM 13	70
2214 K	70	0.017	N 14	110	KM 14	75
2215 K	75	0.017	AN 15	75	KM 15	75
2216 K	80	0.017	AN 16	75	KM 16	75
2217 K	85	0.021	AN 17	90	KM 17	95
2218 K	90	0.021	AN 18	90	KM 18	95
2219 K	95	0.021	AN 19	90	KM 19	95
2220 K	100	0.021	AN 20	90	KM 20	95
2221 K	105	0.026	AN 21	110	KM 21	120
2222 K	110	0.026	AN 22	110	KM 22	120

Re-Lubrication Guidelines

Lubrication Guide by Bearing Speed

Suggested Re-Lube Periods in Weeks — Table 6

Hours Run per Day	1 to 250 RPM	250-500 RPM	500-750 RPM	750-1000 RPM	1000-1500 RPM	1500-2000 RPM	2000-3000 RPM
8	12	12	10	7	5	4	3
16	12	7	5	4	2	2	1
24	10	5	3	2	1	1	1

Lubrication Guide by Temperature and Conditions — Table 7

Operating Conditions	Bearing Temperatures	Grease Interval
Clean	32°F – 120°F	6-10 months
	120°F - 150°F	1-3 months
	150°F – 200°F	1-4 weeks
Dirty	32°F – 150°F	1-4 weeks
	150°F – 200°F	Daily to 1 week
Moisture	32°F – 200°F	Daily to 1 week

Initial Grease Fill Guidelines

Table 8

SAF 500 Series		SAF 000 Series		SDAF 230 Series		SAF 231 Series		SDAF 232 Series	
Brg Size	Grease	Brg Size	Grease	Brg Size	Grease	Brg Size	Grease	Brg Size	Grease
509	5 oz	23024	2 lbs	23060	22 lbs	23152	15 lbs	23248	15 lbs
510	6 oz	23026	3 lbs	23064	22 lbs	23156	22 lbs	23252	22 lbs
511	8 oz	23028	4 lbs	23068	25 lbs	23160	22 lbs	23256	22 lbs
513	11oz	23030	5 lbs	23072	27 lbs	23164	27 lbs	23258	30 lbs
515	13 oz	23032	5 lbs	23076	30 lbs	23168	33 lbs	23264	33 lbs
516	20 oz	23034	5 lbs	23080	37 lbs	23172	37 lbs	23268	40 lbs
517	20 oz	23036	6.5 lbs	23084	31 lbs	23176	37 lbs	23272	48 lbs
518	21 oz	23038	6.5 lbs	23088	40 lbs	23180	40 lbs	23276	48 lbs
520	32 oz	23040	8 lbs	23092	48 lbs	23184	60 lbs	23280	66 lbs
522	42 oz	23044	11 lbs	23096	60 lbs	23188	60 lbs	23284	68 lbs
524	60 oz	23048	13 lbs			23192	69 lbs	23288	70 lbs
526	4.8 lbs	23052	17 lbs			23196	70 lbs	23292	90 lbs
528	4.8 lbs	23056	23 lbs					23296	90 lbs
530	5.6 lbs								
532	6.4 lbs								
534	7.8 lbs								
536	9 lbs								
538	11 lbs								
540	13 lbs								
544	18 lbs								

CAP Bolt & Base Bolt Tightening Torque*

Table 9

Bolt Size (Inch)	Grade 5 (Ft Lbs)	Grade 8 (Ft Lbs)
3/8”	31	44
1/2”	75	107
5/8”	150	210
3/4”	265	375
1”	640	900
1-1/8”	790	1280
1-1/4”	1120	1875
1-1/2	1950	3161

Bolt Size (mm)	Grade 8.8 (Ft Lbs)	Grade 10.9 (Ft Lbs)
M12	65	93
M14	104	148
M16	161	230
M18	222	318
M20	314	449
M22	428	613
M24	543	776
M30	1079	1543

* Torque in Ft-Lbs for clean dry threads only.

ISO-9001 Certified

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