Instruction Manual
for HSPA Take-Up Units

Installation

HSPA Take Up

Warning: To ensure 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. Prepare the Housings and Seals for Assembly

CAUTION: ***Read through complete instructions before beginning assembly. Inboard seals and seal flanges must be positioned onto the shaft prior to the bearing being tightened to the shaft. Identify the fixed and float take-up units. (Note: Fixed Take-Up housings restrict axial movement of the bearing in the housing while floating units allow axial movement of the spherical bearing within the housing to accommodate shaft growth or contraction due to temperature changes. One of each are recommended to be installed on the shaft.***

The section view in the Fig. 1 shows the fixed (top half view) unit and float (bottom half view) unit cross-section. When installed, the bearing centerline is also the centerline of the housing.

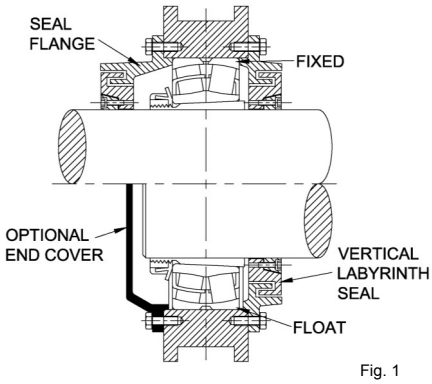


Fig. 1

General comments: HSPA housings utilize a face labyrinth seal. Seals are secured into place once the seal flanges have been bolted onto the housing. Split inboard seals are possible; however, due to generally limited shaft length, they are provided only on request. Outboards seals or solid end covers are also popular since shaft extensions are generally not required on Take-Ups. Carefully slide the inboard seal and seal flange onto the shaft but clear of the bearing area.

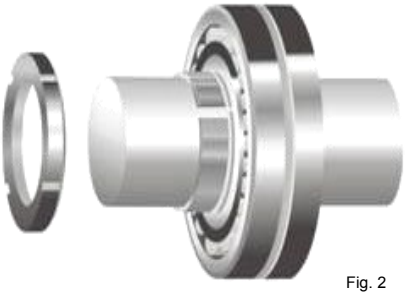


Fig. 2

Most applications require one fixed bearing and one floating (expansion) bearing per shaft. The seal flanges on a fixed bearing will have a longer pilot that fits into the housing and contacts the face of the outer ring of the bearing. The expansion bearing has seal flanges with a shorter pilot which fits into the housing bore. If thrust loads are expected, it is best to select the bearing with the heaviest expected radial load to become the fixed bearing. Spherical bearings subject to thrust loads require a significant radial load to operate properly. Verify the proper bearing position along the shaft to ensure the correct position for the housing guide slots. The seal flange should be assembled to allow easy access to the grease fitting.

Check the housing and remove any paint and burrs from the pilot areas which may restrict a proper fit after the bearing has been mounted. Prior to beginning installation, when possible, re-check the guides and the guide slots in the housing to insure the Take-Up will fit the guide frame.

CAUTION: Position inboard seals on the shaft prior to proceeding with 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. Remove excess on sleeve OD. Slide bearing onto the tapered adapter sleeve as shown above, and snug nut (less washer) so bearing position can be better determined.

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 resulting in a reduction of internal clearance 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 of the inner ring indicates the amount of interference fit the inner ring experiences on the shaft. The axial movement of the inner ring up the adapter can me monitored and typical movement of the bearing is indicated in table 5. 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 easily with feeler gauges. Only in cases where the bearings are small, or space is cramped is the axial displacement considered a reasonable measurement reference when the radial clearance is not possible to measure.

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 and record the starting internal clearance in the bearing. Before measuring, rotate the inner ring 1/4 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 sitting vertically, with inner race parallel to the outer race, measure the clearance between the top roller and the outer ring (Fig. 4). Gently press the top roller inward towards the center to ensure the roller is loose. Slide the feeler gage across the top of the highest 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. Several measurements will help verify the clearance and improve consistency in the measurement method.

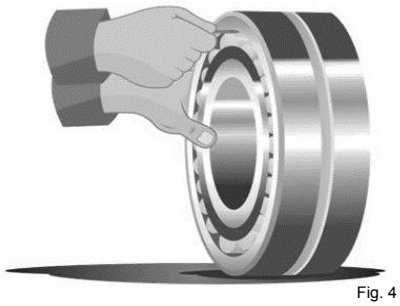


Fig. 4

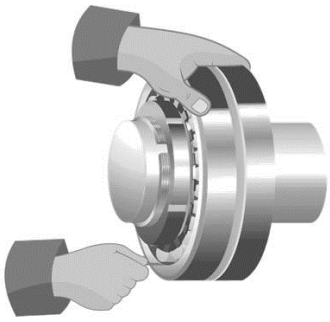


Fig. 5

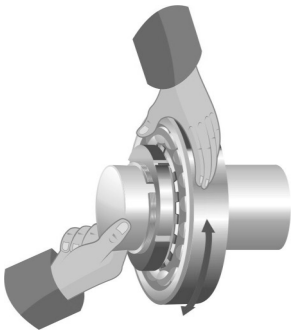


Fig. 6

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 loose. 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 ensure measuring consistency. Rotate the bearing 1/4 turn between measurements (Fig. 6) to ensure the rollers are normally aligned. During measurements use a straight edge to align the inner ring with the outer ring. **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. Heavy rollers make this measurement more difficult. When 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.

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.

5. Bearing Mounting Methods

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). With larger shaft sizes (6" and larger), it becomes increasingly more difficult to tighten the Lock Nut with a spanner wrench and hammer. Therefore, we recommend using either the Hydraulic Nut or Lock Nut with mounting screws. Either method makes large bearing installation easier.

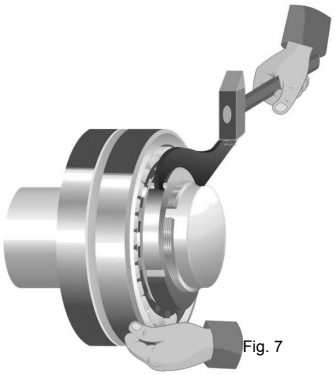


Fig. 7

Lock Nut tightening with Spanner


Fig. 8

Hydraulic Nut

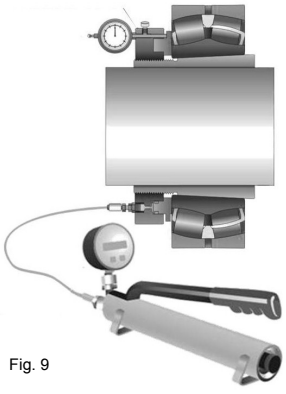


Fig. 9

Hydraulic Nut & Hand Pump


Fig. 10

Lock Nut with Mounting Screws

6. Positioning the Bearing on the Shaft

There is normally a ***Fixed*** (Non-Expansion) and ***Float*** (Expansion) bearing required to support each shaft. Install the ***Fixed*** bearing first. The ***Float*** bearing is designed to "float axially" within the housing to accommodate any shaft expansion or contraction due to temperature changes of the shaft or support frame.

During mounting, axial travel of the bearing onto the tapered adapter is usually less than 1/16 of an inch. See Table 5 as a guide for axial movement of the bearing. Recognize and plan for this minor movement in the pre-positioning of the bearing on the shaft. The bearing in the Float housing allows for some axial adjustment of the housing to help align with the take-up guides which support the housing. The axial position of the Float bearing will help accommodate the final position of the housing.

7. Tightening the Bearing to the Shaft.

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.

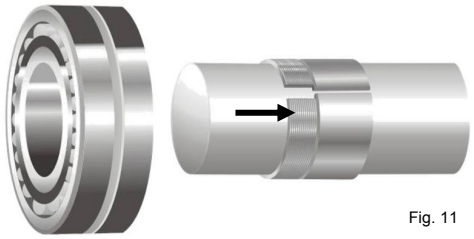


Fig. 11

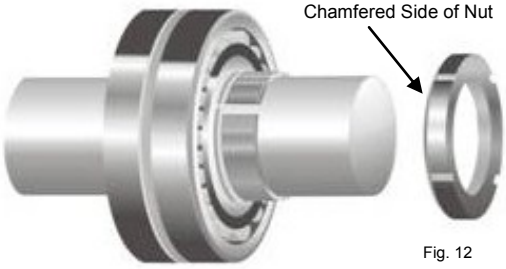


Fig. 12

The chamfered side of the nut (Fig. 12) is designed to contact the bearing inner ring. Snug the nut to hand tighten and 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 .13

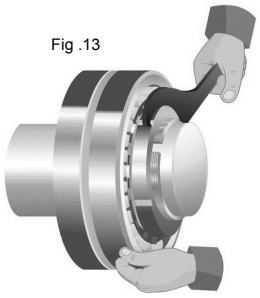
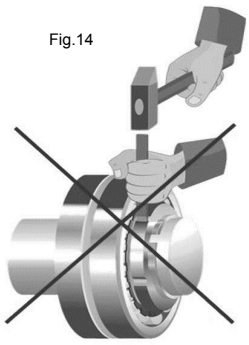


Fig.14



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 (below 6-inch shaft diameter) a spanner wrench and hammer are usually enough to properly mount the bearing (See 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 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.

7B. **Hydraulic Nut Method:** Use of a Hydraulic Nut (See Fig. 8 & 9) 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 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 ensure the bearing is being properly tightened.

7D. Mounting Spherical Roller Bearings with Cylindrical (Straight) Bores: A bearing with a 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

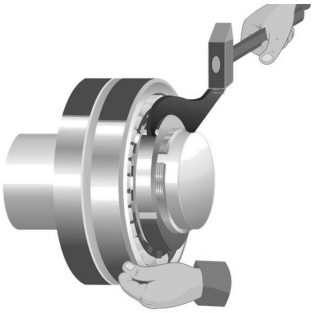


Fig .15

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 (200mm) shaft size and above do not use washers, but rather locking clips or plates). Re-tighten the Lock Nut to the bearing (Fig. 15). 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, tighten the nut slightly until one of the tabs on the washer can be bent into the nearest nut slot. Check the internal radial clearance to ensure nothing has changed. ***If a Locking Clip (Fig 17) 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 secure the Locking Clip.***

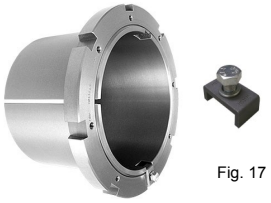


Fig. 17

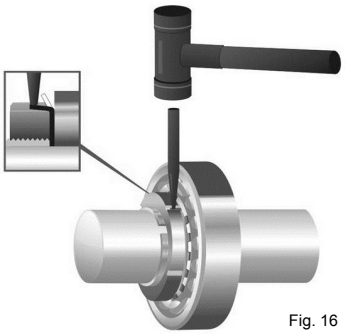


Fig. 16

9. Positioning the Take-Up Housing on the Installed Bearing

The bearing fit in the Take-Up housing is a clearance fit. The housing will slip over the bearing when carefully align. The housing can be supported with a sling then carefully aligned the housing onto the bearing. It will be necessary to tap the housing onto the spherical bearing. ***Do not hit the housing directly; cushion the strike location with a block of wood.*** Carefully inspect the housing to ensure it is clean and lightly oiled to allow the bearing easy movement into the housing. Be sure the bearing aligns squarely with the housing bore. Monitoring this alignment throughout the process as the housing is tapped onto the bearing. Once the housing is centered on the bearing, re-secure the seal flange and position the grease fitting when they can be easily accessed. Align the housing perpendicular with the shaft and position the tapered shaft seal ring into the seal flange. ***Grease the bearing on the inboard side before the seal flange is installed.***

10. Adding Lubrication During Assembly

If grease is used as a lubricant, it should be applied to the inboard side of the bearing before the seal flange is bolted to the take-up housing. Fill all of the voids between both sets of rollers with grease.

11. Installing Inboard Seal Flanges to the Housing

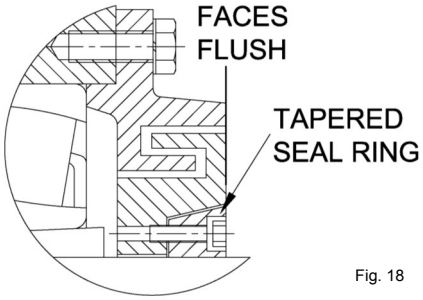


Fig. 18

Position the inboard seal flange into the housing and locate the grease plug where it will allow easily maintenance access. Tighten flange bolts to the housing. See Table 8 for recommended bolt torques. Apply a generous amount of grease to the seal grooves in the seal flange. Slide the inboard labyrinth seal into these seal grooves until the seal is flush with the seal flange (See Fig. 18), then tighten the tapered seal ring to fix the seal on the shaft. The seal will turn with the shaft and the seal flange will be stationery when installed. Similarly, install the outboard seal or end cover.

Note: 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 ensure the spherical roller bearing rests centered within the housing bearing seat.

12. Lubrication After Assembly

It is recommended that grease be added to the bearing after final assembly. There is a center grease access port in the seals. The void in a closed-end cover becomes a grease reservoir. Adding grease to fill or partially fill this void will ensure the unit has adequate lube for start up. A light purge of grease at the seals is normal and provides an ideal barrier for contaminants. Bearings will purge excess grease during operation.

13. 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.

Installation Checklist

Clean shaft and all bearing components thoroughly
Check basic dimensions of parts to ensure adapters and shaft diameters are correct
Slide the inboard seal and seal flange onto the shaft clear of bearing area
Slide the adapter sleeve onto the shaft with the thread outboard
Position the adapter sleeve in the approximate location with respect to the bearing centerline
Apply a very light coat of oil to the OD of the tapered adapter sleeve for easier bearing mounting
Slide the bearing onto the adapter sleeve and snug the nut (less washer) so the bearing position can be better determined
Measure the un-mounted radial internal clearance according to the procedure outlined in the instruction manual
Record the measured un-mounted radial internal clearance in the table below

Un-Mounted Radial Internal Bearing Clearance

First measurement	Second measurement	Third measurement	Fourth measurement

Ensure the bearing is positioned correctly on the shaft (axial travel of bearing during mounting is less than 1/16")
Tighten the bearing onto the shaft using the appropriate mounting method
See Methods: spanner wrench, hydraulic nut, lock nut with mounting screws)
Record the measured mounted radial internal clearance in the table below at each stage in the tightening process
Continue tightening the bearing until the recommended permissible mounted internal running clearance is reached
See Table 2 and 3 in the instruction manual.
Record the final mounted internal running clearance in the table below

Mounted Radial Internal Bearing Clearance

Measurement	Value (inches)	**Notes**
1		
2		
3		
4		
5		
6		
7		
8		
Final Mounted		

Loosen and remove the Lock Nut (or hydraulic nut)
Install the Lock Washer and then re-install the Lock Nut (8" shaft sizes and above use locking plates or clips instead of washers)
Re-tighten the Lock Nut and bend one of the tabs on the washer into the nearest slot on the OD of the lock nut
If a slot on the nut does not line up with a washer tab, tighten the nut slightly until this is possible.
Verify that the internal bearing clearance has not changed
Install the Take-Up housing over the bearing
Grease the inboard seal and both sides of the bearing rollers before bolting up the seal flanges
Position the inboard seal flange so that the grease port will be easily accessed and tighten the seal flange bolts to the housing
Apply a generous amount of grease to the seal grooves in the seal flange
Slide the inboard vertical labyrinth seal into the seal grooves until the seal is flush with the seal flange
Tighten the tapered seal ring to fix the seal on the shaft
Install the outboard seal or end cover in the same manner
Add grease to the bearing via the grease ports in the seals until a light purge of grease is showing at the seals

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-tighten-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

CAP Bolt & Base Bolt Tightening Torque*

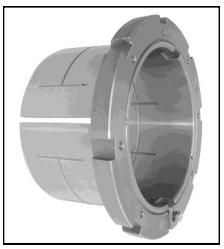
Table 8

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

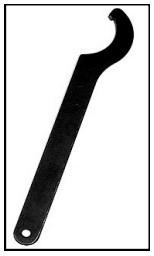
Bolt Size (mm)	Grade 8.8 (Ft Lbs)	Grade 10.9 (Ft Lbs)
M12	65	93
M14	104	148
M16	161	230
M18	222	318
M20	314	449
M22	428	613
M24	543	776
M30	1079	1543

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

Adapter Options & Accessories

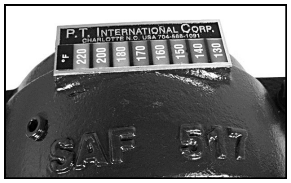


OH Hydraulic Adapters are available and recommended for units above 8” shaft size to facilitate bearing removal even or for repositioning during installation.



Spanner Wrenches

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.

ISO-9001:2008 Certified

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