

SAF-XT & SAFS Pillow Blocks Instruction Manual

These instructions must be read thoroughly before installation or operation. This instruction manual was accurate at the time of printing. Please see dodgeindustrial.com for updated instruction manuals.

WARNING: To ensure the drive is not unexpectedly started, turn off and lock-out or tag power source before proceeding. Failure to observe these precautions could result in bodily injury.

WARNING: All products over 25 kg (55 lbs) are noted on the shipping package. Proper lifting practices are required for these products.

INSPECTION

Inspect shaft to ensure that it is smooth, straight, clean, and within commercial tolerances.

Inspect bearing. Do not allow bearing to be exposed to any dirt or moisture. Do not remove preservative compound as it acts as both a protectant and lubricant and is also compatible with standard grease.

INSTALLATION

NOTE: Housing caps and bases are not interchangeable; they must be matched with the matching half. Install non-expansion bearing first.

1. Apply a coating of light oil or other rust inhibitor to the adapter area of the shaft.
2. Measure the internal clearance of the bearing before mounting. Place the bearing in an upright position as shown in Figure 1.

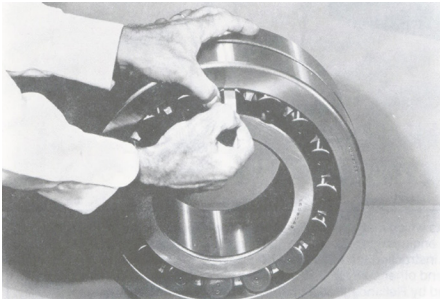


Figure 1 - Internal Clearance

WARNING: Because of the possible danger to person(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the instruction manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures as may be desirable or as may be specified in safety codes should be provided, and are neither provided by Dodge® nor are the responsibility of Dodge. This unit and its associated equipment must be installed, adjusted and maintained by qualified personnel who are familiar with the construction and operation of all equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a holding device must be an integral part of the driven equipment beyond the speed reducer output shaft.

Seat the inner ring and roller elements by pressing down firmly on the inner ring bore while rotating the inner ring a few times. Position the roller assemblies so that rollers are at the top-most positions on each side. For bore sizes above 6-1/2", press these top rollers inward insuring contact with center guide flange. Using a feeler gauge measure the clearance for each side by inserting feeler as far as possible and sliding over top of roller. Write down the measured clearance and compare with specifications (Table 1).

NOTE: Do not rotate bearing when moving feeler between roller and outer ring.

3. Install the bearing parts in the following sequence.

NOTE: Bearing can only be correctly installed one way. See Figure 2.

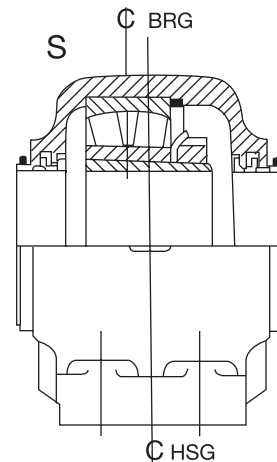


Figure 2 - Bearing Installation

- a. V-ring Seal — Slide one of the V-ring seals onto the shaft, making sure lip is toward the bearing.
NOTE: Do not install V-ring seal on seal ring until housing cap has been set in place and tightened.
- b. Seal Ring — Install a seal ring on shaft with largest O.D. toward bearing.
- c. Adapter — Slide adapter onto the shaft, threaded end outboard to the approximate location of the bearing. Apply a coating of light oil to sleeve O.D. Do not use grease.

- d. Bearing — Make sure the internal clearance has been written down. Install bearing on adapter sleeve, large end of tapered bore first. Locate bearing in proper position on shaft. Before tightening refer to Figure 2 and Table 4.
 - e. Lockwasher and Locknut — Install the lockwasher (8" and smaller sizes only) on the adapter with inner prong located in the slot and toward the bearing. Install locknut, chamfered face toward bearing.
4. Tighten locknut using a spanner wrench and hammer until clearance noted in step 2 is reduced by amount shown in Table 1. During this step shaft should be supported so all weight is off of the bearing.

Find a lockwasher tab that aligns with a locknut slot and bend tab into slot. If slot is past tab then tighten, not loosen, locknut to meet a washer tab. Sizes larger than 8" require a lockplate bolted to the locknut with the inner prong of the plate located in the slot of the adapter sleeve. If necessary, tighten, not loosen, locknut to allow prong to fit in adapter slot. Lock plates for only the 9" must be hand fitted on site.

Table 1 – Internal Clearance Reduction	
Shaft Diameter (inches)	Reduction in Internal Clearance (inches)*
1-15/16, 2-3/16 2-7/16, 2-1/2, 2-11/16, 2-3/4 2-15/16, 3, 3-3/16, 3-7/16, 3-1/2	.0012/.0015 .0015/.0020 .0018/.0025
3-15/16, 4, 4-3/16 4-7/16, 4-1/2, 4-15/16, 5 5-3/16, 5-7/16, 5-1/2	.0020/.0028 .0025/.0035 .0030/.0040
5-15/16, 6, 6-7/16, 6-1/2 6-15/16, 7 7-1/2, 7-15/16, 8	.0030/.0045 .0035/.0050 .0040/.0055
8-7/16, 8-1/2, 8-15/16, 9 9-7/16–10-1/2	.0045/.0060 .0045/.0065
*Amount of clearance to be removed from clearance measured in Step 2.	

- a. Seal Ring — Install second seal ring with large O.D. toward locknut.
- b. V-ring Seal — Slide second V-ring seal onto shaft, making certain lip is toward bearing.

NOTE: Do not install V-ring seal on seal ring until housing cap has been set in place and tightened.

5. Remove any paint, dirt or burrs from the mating surfaces of the housing halves. Thoroughly clean seal grooves on each side. Set lower half of housing on base with all four cap bolts in place and apply light oil to bearing seats. Apply grease to seal grooves in the lower housing.

NOTE: Be sure the housing is positioned as shown in Figure 2 view relative to adapter nut.

6. Apply grease to the bearing and seal rings. The lubricant should be smeared between the rolling elements (see Grease Lubrication section).
7. Place shaft with bearing into lower half while carefully guiding the seal rings into the housing grooves.
8. Bolt lower half of the non-expansion bearing to the base. Move shaft endwise so stabilizing ring can be inserted between the bearing outer ring and the lower half shoulder on same side as the locknut. Make all other bearings on same shaft expansion by centering bearing in the middle of the housing seat. Bolt expansion housings to base.

NOTE: Only one bearing per shaft is non-expansion, other bearings should be expansion.

9. When closed end is required, the end plug supplied should be fit into the center seal ring groove of the housing.
10. Grease the bearing seal grooves in the housing cap and place over the bearing after wiping the mating surfaces. The two dowel pins will align the cap with the lower housing half.

NOTE: Each cap must be matched with its mating lower half as these parts are not interchangeable. Tighten cap bolts to the recommended torque in Table 2.

11. Assure there is seal running clearance then install V-ring seals onto the seal rings. Coat V-ring seals with grease.
12. Misalignment of pillow blocks must not exceed values shown in Table 3.

Table 2 – Recommended Mounting Bolt Torque Values (ft-lbs)

Size	7/16–14	1/2–13	5/8–11	3/4–10	7/8–9	1–8	1-1/4–7
SAF-XT Series Housing	511 513	515 516 517 518	520 526	522 524 528 530 532	—	530 534 536	056L 048 544S 544 052 056
Grade 5	40-50	60-75	120-150	208-260	344-430	512-640	896-1120
Stainless Steel (316)	25-30	35-45	75-90	105-130	165-200	240-290	435-540

Size	7/16–14	1/2–13	5/8–11	3/4–10	7/8–9	1–8	1-1/4–7
SAFS Series Housing	—	515 516	517 518 520 522 524	526	528 530 532	534 536	538 544
Grade 8	56-70	88-110	168-210	304-380	480-600	728-910	1456-1820

Table 3 – Static or Dynamic Allowable Misalignment Degrees Spherical Roller Bearings				
Shaft Size	Block Size	TRIPLE-TECT Seals	LER Seal	Auxiliary Seal
1-15/16	511	1°08'	0°52'	0°35'
2-3/16	513	1°01'	0°55'	0°32'
2-7/16–2-1/2	515	0°59'	0°50'	0°28'
2-11/16–2-3/4	516	0°52'	0°52'	0°26'
2-15/16–3	517	0°48'	0°52'	0°25'
3-3/16	518	1°06'	0°51'	0°32'
3-7/16–3-1/2	520	1°03'	0°46'	0°30'
3-15/16–4	522	0°55'	0°42'	0°28'
4-3/16	524	0°49'	0°41'	0°27'
4-7/16–4-1/2	526	0°56'	0°44'	0°26'
4-15/16–5	528	0°55'	0°40'	0°24'
5-3/16	530	0°48'	0°35'	0°22'
5-7/16–5-1/2	532	0°47'	0°34'	0°22'
5-15/16–6	534	0°43'	0°32'	0°22'
6-7/16–6-1/2	536	0°33'	0°23'	0°26'
6-15/16–7	538	0°37'	0°27'	0°25'
7-1/2, 7-15/16, 8	544	0°31'	0°24'	0°22'
8-7/16–9	048	0°36'	0°25'	0°22'
9-7/16–9-1/2	052	0°26'	0°23'	0°33'
9-15/16–10-1/2	056	0°28'	0°16'	0°30'

Table 4 – Bearing CL to Housing CL Offset “S” Dimension (Expansion bearing located at center of expansion)				
Shaft Size	SAF-XT		SAFS	
	Non-Expansion	Expansion	Non-Expansion	Expansion
1-15/16	19/64	3/16	—	0
2-3/16	25/64	1/4	—	0
2-7/16–2-1/2	17/64	5/32	1/8	0
2-11/16–2-3/4	3/8	3/16	3/16	0
2-15/16–3	3/8	3/16	3/16	0
3-3/16	31/64	19/64	3/16	0
3-7/16–3-1/2	9/16	3/8	3/16	0
3-15/16–4	35/64	3/8	3/16	0
4-3/16	39/64	27/64	3/16	0
4-7/16–4-1/2	41/64	29/64	3/16	0
4-15/16–5	11/16	1/2	3/16	0
5-3/16	3/4	9/16	3/16	0
5-7/16–5-1/2	49/64	37/64	3/16	0
5-15/16–6	25/32	37/64	3/16	0
6-7/16–6-1/2	3/4	35/64	3/16	0
6-15/16–7	13/16	5/8	3/16	0
7-1/2	29/32	23/32	3/16	0
7-15/16–8	29/32	23/32	3/16	0
8-7/16–9	25/32 *	25/32	—	0
9-7/16–9-1/2	45/64 *	45/64	—	0
9-15/16–10-1/2	7/8 *	7/8	—	0

* One spacer on each side of bearing.

MAINTENANCE

WARNING: To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding. Failure to observe these precautions could result in bodily injury.

Remove housing cap in order to inspect bearing and grease.

Before reassembly it is important that the V-ring seals be removed. This will ensure the seal lip will not be damaged while setting cap in place. Reassemble per installation steps 9 through 11.

Seal Replacement — When removing bearing it is recommended that V-ring seals and seal rings be replaced.

Auxiliary Seals — Install per seal instruction manual.

GREASE LUBRICATION

WARNING: Regreasing requires rotating parts to be exposed. Exercise extreme care during such operations. Failure to observe these precautions could result in bodily injury.

SAF-XT and SAFS bearings are specifically designed for dirty, dusty or wet environments. In order to properly protect bearings during installation pack the bearing insert 100% full immediately after having properly mounted bearing on the shaft. If the RPM of the application falls between 20% and 80% of maximum RPM (Table 7), pack the lower half of the housing one-third to one half full. If the RPM of the application is less than 20% of maximum RPM, pack bearing housing cavity 100% full. If the RPM exceeds 80% of maximum RPM, pack 1/3 of the lower half of the housing.

At each regreasing cycle, for applications up to 80% of maximum RPM, slowly add grease until fresh grease is seen purging at the seals.

Regreasing should be done while running. Remote regreasing lines should be added to avoid endangering personnel.

If the RPM is greater than 80% of maximum RPM add 4 strokes of a grease gun at each regreasing cycle for bores up to 2". For bores greater than 2" up to 5" add 8 strokes of a handgun at each regreasing cycle. For bores greater than 5" up to 10 1/2" add 16 strokes of a grease gun at each regreasing cycle. For units running above 80% of maximum RPM, running temperature should be monitored. If a drastic change in running temperature is noted, it is recommended to remove the used grease completely and recharge with fresh grease per above instructions.

Select a grease with a viscosity at operating temperature which will provide full film lubrication (Table 5). Assume 50°-100°F increase in bearing temperature above the ambient, depending on RPM and load.

Table 5 – Viscosity of Oil in the Grease			
DN Δ	Viscosity for Loads Up to 18% of Dynamic Capacity (SUS @ Operating Temp)*	DN Δ	Viscosity for Loads Up to 18% of Dynamic Capacity (SUS @ Operating Temp)*
100	3500	1400	625
200	3150	1800	450
300	2750	2000	400
400	2375	3000	300
500	2000	4000	200
600	1750	5000	150
700	1500	6000	130
800	1300	7000	110
900	1075	8000	100
1000	900		

Δ DN = Bore Diameter (in.) x RPM

* For loads above 18% of dynamic capacity an EP grease with the above viscosity oil is recommended.

Use Table 6 as a general guide for regreasing the bearings. A small amount of grease at frequent intervals is preferable to a large amount of grease at infrequent intervals.

For special applications involving high speeds, high temperatures or oil lubrication, consult the factory.

Table 6 – Regreasing Intervals (Months) (Based on 12 hours per Day 150°F Max.)										
Shaft Size	RPM									
	250	500	750	1000	1250	1500	2000	2500	3000	3500
1-15/16	8	6	4	3	2	1	.5	.5	.25	.25
2-3/16	7	5	3	2	1	1	.5	.25	.25	
2-7/16-3	6	4	3	2	1	.5	.25	.25		
3-3/16-3-1/2	5	3	2	1	.5	.5	.25			
3-15/16-4-1/2	4	3	2	1	.5	.25				
4-15/16-5-1/2	3	2	1	.5	.25					
5-15/16-7	2	1	1	.5						
7-1/2-9	1	1	.5							
9-7/16-10-1/2	1	.5								

Table 7 – Maximum RPM (Grease Lubrication)		
Shaft Size	Basic Bearing Description	Maximum RPM
1-15/16	22211K	4500
2-3/16	22213K	3600
2-7/16, 2-1/8	22215K	3400
2-11/16, 2-3/4	22216K	3200
2-15/16, 3	22217K	3000
3-3/16	22218K	2600
3-7/16, 3-1/2	22220K	2200
3-15/16, 4	22222K	2000
4-1/16	22224K	1800
4-7/16, 4-1/2	22226K	1700
4-15/16, 5	22228K	1600
5-3/16	22280K	1500
5-7/16, 5-1/2	22282K	1400
5-15/16, 6	22284K	1300
6-7/16, 6-1/2	22236K	1200
6-15/16, 7	22288K	950
7-1/2, 7-15/16, 8	22244K	800
8-7/16, 8-1/2 8-15/16, 9	23048K	800
9-7/16, 9-1/2	23052K	750
9-15/16, 10, 10-7/16, 10-1/2	23056K	700

LONG-TERM STORAGE OF PRE-ASSEMBLED BEARINGS

Applications such as conveyor pulleys and fans are shipped to a job site with bearings already mounted to the shafts. Since these units may be stored for long periods of time in unprotected areas subject to rain, dust, etc., bearings should be packed 100% full and so tagged at bearing assembly to prevent contamination or corrosion of the bearings.

Prior to installation on the structure, if the application RPM is greater than 20% of catalog maximum speed, excess grease must be removed to the levels outlined previously. Removal of excess grease must be done in a clean, protected environment.

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