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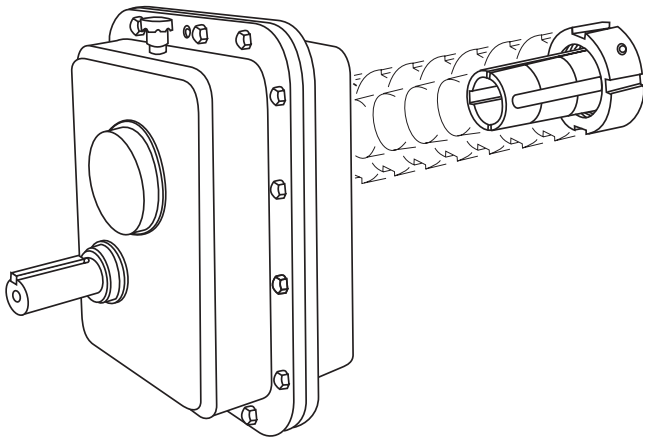

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(PN-2121096) **378-101**
February 2005
Supersedes 10-02
PRICE $2.00

Introduction

WARRANTY — The Falk Corporation (the "Company") warrants that, for a period of one year from the date of shipment, the product described herein will deliver successfully its rated output as indicated on the nameplate, provided, it is properly installed and maintained, correctly lubricated, and operated in the environment and within the limits of speed, torque or other load conditions for which it was sold. Such product is expressly not warranted against failure or unsatisfactory operation resulting from dynamic vibrations imposed upon it by the drive system in which it is installed unless the nature of such vibrations has been fully defined and expressly accepted in writing by the Company as a condition of operation.

WARNING: *Consult applicable local and national safety codes for proper guarding of rotating members.*
Lock out power source and remove all external loads from drive before servicing drive or accessories.

CAUTION: *Do not weld the drive housing or accessories without prior approval from The Falk Corporation. Welding on the drive may cause distortion of the housing or damage to the bearings and gear teeth. Welding without prior approval will void the warranty.*

DRIVE RATING — Operate the drive only within the horsepower and output speed for which it was selected and specified in Selection Guide 371-110 for the application. Refer to the nameplate for drive size, ratio and data.

FALK FACTORY REPAIR AND REBUILD — Falk wants to continue to be your primary supplier, and extend our service to you if your equipment is in need of repair or replacement.

We are able to furnish a fast turn-around on both the quotation and rebuild. Nobody can do the job better than Falk. If you need repair on Falk products . . . just ask.

Contact your local Falk Representative or Falk Distributor for more information.

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Drive Identification

M 4 107 J 25 C

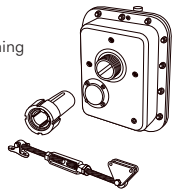
- M: Blank - Inch; M - Metric
- 4: Size (Series)
- 107: Maximum Bushing Bore (1 7/16")
- J: Drive Type
- 25: Ratio (Nominal 25:1)
- C: Model

J is the basic drive identification. It can be outfitted for use as a shaft mounted drive JR; a flange mounted drive JF; or a screw conveyor drive JSC, as illustrated below. These unique identifiers, JR, JF & JSC, are used throughout this manual to assist you in identifying the instructions which apply to your drive arrangement. The prefix "M" identifies a drive that features a nominal metric high speed shaft.

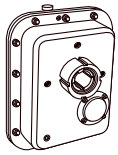
Basic "J"

(JR) Shaft Mounted Drive

1) Basic Drive
2) Torque Arm
3) TA Taper Bushing

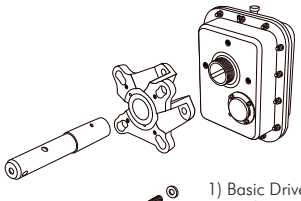


(JF) Flange Mounted Drive



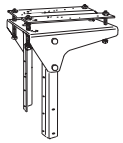
1) Basic Drive
TA Taper Bushing Optional

(JSC) Screw Conveyor Drive



1) Basic Drive
2) Seal Housing
3) Drive Shaft

+ Motor Mounts



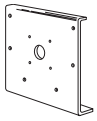
+ Backstops

+ Shaft Fans
(4215 thru 4315 only)

+ Electric Fans
(4307 & 4315 only)

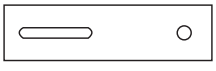
+ Vertical Standpipe

+ Trough Ends



+ Thrust Plate Kits

+ V-Belt Guards



+ TA Removal Tool

NOTE: Use a TA-Taper bushing when mounting these drives on a straight driven shaft. (Hollow shaft is taper bored).

Section I

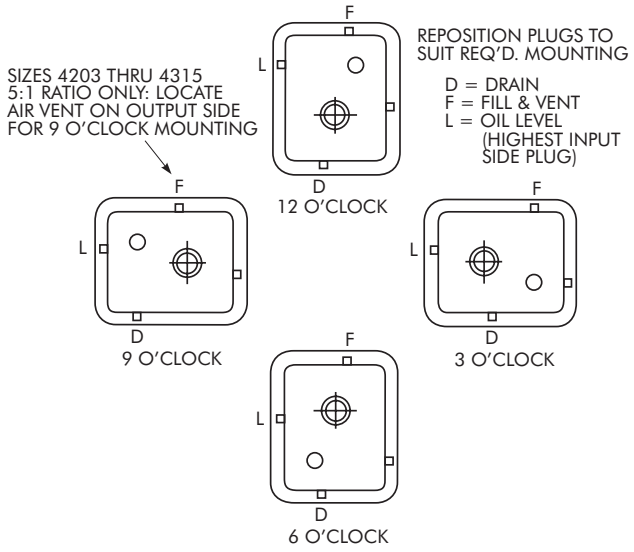
Drive Installation

Outfitting

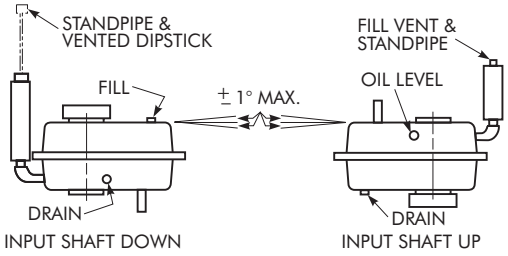
1. **JR, JF & JSC** — Find the desired mounting position in Figure 1 and install air vent and magnetic drain plug (packaged separately with basic drive). Also note and/or mark the oil level plug location OR in the case of a vertical mounting, refer to Appendix E, for installation of vertical stand pipe. If the mounting angle exceeds the limitations shown in Figure 1, refer to Appendix F, to determine modifications necessary within the limits illustrated therein. DO NOT fill drive with lubricant at this time. Oil plugs are located on input housing half.

Figure 1

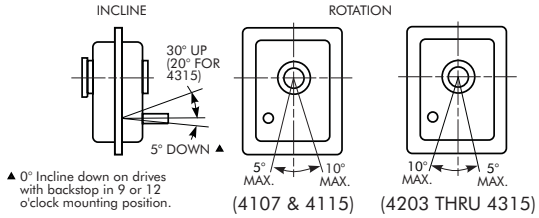
HORIZONTAL DRIVES



VERTICAL DRIVES



ANGULAR LIMITS FOR HORIZONTAL MOUNTING
(ALL CLOCK POSITIONS)



2. **JR** — Remove anchor brackets, housing flange fasteners and rod end fasteners from tie rod kit and assemble to drive as illustrated in Figure 2. Refer to Table 1 for tightening torque. (Original fasteners may be discarded).

Figure 2

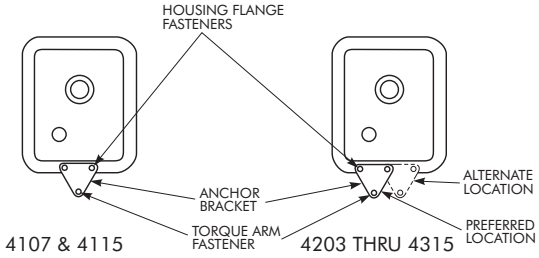


TABLE 1 — Housing Flange Fastener Size and Tightening Torque

(Non-Lubricated Fasteners)

DRIVE SIZE	Fastener Size	Tightening Torque lb-ft(Nm)
4107	.312-18	19 (26)
4115	.312-18	19 (26)
4203	.375-16	28 (37)
4207	.500-13	69 (94)
4215	.500-13	69 (94)
4307	.500-13	69 (94)
4315	.500-13	69 (94)

3. **JR** — The tapered bore hollow shaft is designed for use with a TA Taper bushing for mounting on a driven shaft with a straight outside diameter. Shaft tolerances for the driven shaft are given in Table 1A. The minimum and maximum driven shaft engagements, dimension "N" in Figure 3, are shown in Table 2. The minimum engagement is necessary for full bushing engagement; the maximum engagement is only required if a thrust plate will be employed to remove the drive from the driven shaft (See Appendix C for preferred removal method).

TABLE 1A — Driven Shaft Tolerances ★

Shaft Diameter - Inches	Maximum Undersize - Inches
Up to 1.500	.004
1.500 - 2.500 incl.	.005
2.500 - 4.000 incl.	.006

★ Millimeters = h10 tolerance.

Figure 3

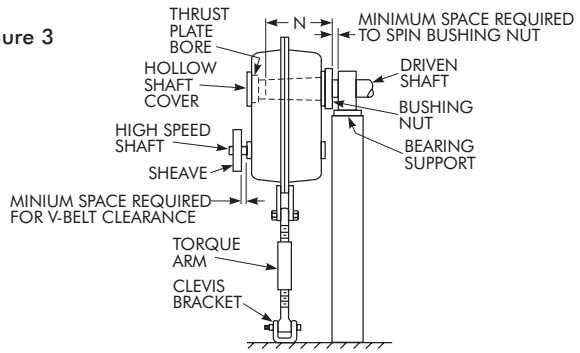


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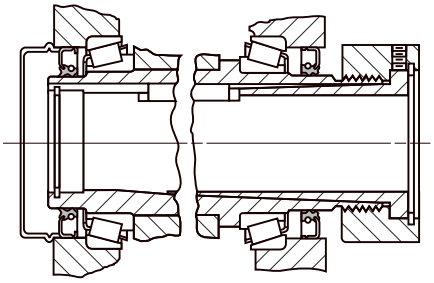
TABLE 2 — N Dimension Inches (mm) ★

DRIVE SIZE	Minimum	Maximum
4107	5.00 (127)	7.19 (183)
4115	5.55 (141)	8.05 (204)
4203	5.53 (140)	7.78 (198)
4207	6.11 (155)	8.72 (221)
4215	7.08 (180)	10.15 (258)
4307	7.39 (188)	10.69 (272)
4315	7.92 (201)	10.74 (273)

★ The minimum engagement is necessary for full bushing engagement; the maximum engagement is only required if a thrust plate will be employed to remove the drive from the driven shaft.

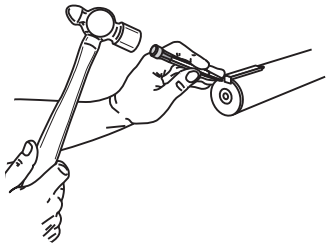
★ The minimum engagement is necessary for full bushing engagement; the maximum engagement is only required if a thrust plate will be employed to remove the drive from the driven shaft.

a. **THIN WALL BUSHING** (with keyway slot through the bushing wall) — With the driven shaft keyway at the 12 o'clock position, slide bushing assembly onto the driven shaft, nut end first, and position the keyway slot over the shaft keyway (the bushing may have to be pried open slightly). Insert the drive, key furnished with the bushing, into the shaft keyway. Proceed to Step 7.



b. **THICK WALL BUSHING** (with separate internal and external keyways) — Insert the driven shaft key into the driven shaft keyway. If the driven shaft has an open-ended keyway, stake the keyway, Figure 4, to prevent axial dislocation of the shaft key under operating conditions. Slide the bushing assembly onto the driven shaft (the bushing may have to be pried open slightly). Rotate the shaft so the external keyway in the bushing is at the 12 o'clock position. Then insert the drive key, furnished with the bushing, into the keyway. Proceed to Step 7.

Figure 4



4. **JSC — NOTE:** See Appendix K for non-tapered drive shafts. Remove the hollow shaft cover from the input side of the hollow shaft bore and save. Separate contents from the drive shaft kit. Install thrust plate and retaining ring in the hollow shaft, Figure 5. When the drive is a Size 4107 and will employ a 2.437"(61,9 mm) or 3.000" (76,2 mm) diameter drive shaft, place the (2) gaskets and trough end spacer, packaged separately, over the trough end surface of the seal housing, Figure 6. Continue outfitting based on the type of trough end seal to be installed: (a) Waste Packing Seal; (b) Lip Seal or; (c) Packing Gland Seal.

Figure 5

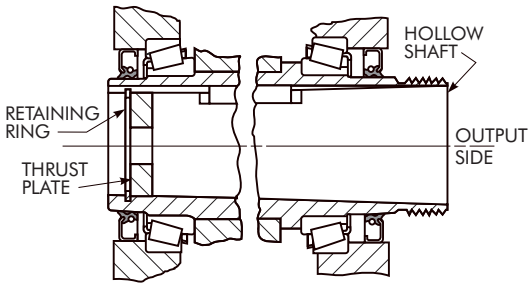
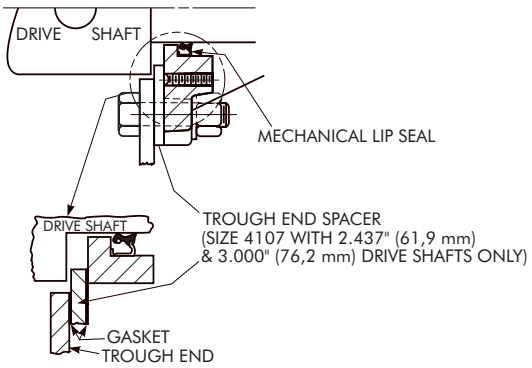


Figure 6



a. **WASTE PACKING SEAL** (Figure 7) — Slide drive shaft thru seal housing. Insert key into drive shaft and slide drive shaft into hollow shaft. The seal housing registers into the basic drive seal bore. Install the drive shaft thrust plate fastener thru thrust plate and torque to the value specified in Table 3. Use the seal housing fasteners to secure the seal housing to the basic drive housing. Refer to Table 4 for proper torque value. Reinstall hollow shaft cover. Pack seal housing with waste packing and proceed to Step 5.

TABLE 3 — JF & JSC Thrust Plate Fastener Data (Non-Lubricated Fasteners)

DRIVE SIZE	Fastener Size & Grade †	Torque lb-ft (Nm)	Min. Thread Depth Inches (mm)
4107	.500-13UNC x 3.25, GR. 8	92 (125)	2.00 (50,8)
4115	.500-13UNC x 3.25, GR. 8	92 (125)	2.00 (50,8)
4203	.625-11UNC x 3.50, GR. 8	183 (248)	2.00 (50,8)
4207	.625-11UNC x 3.50, GR. 8	183 (248)	2.00 (50,8)
4215	.875-9UNC x 3.50, GR. 8	533 (723)	2.50 (63,5)
4307	1.00-8UNC x 4.00. GR. 5 ‡	567 (769)	2.75 (69,8)
4315	1.00-8UNC x 4.00. GR. 8	792 (1074)	2.75 (69,8)

† Fastener lengths given are for applications using tapered drive shafts. Other lengths may be needed for applications using tapered bushings.

‡ 1.00-8UNC x 3.50, GR. 5 for 4307JF.

Figure 7

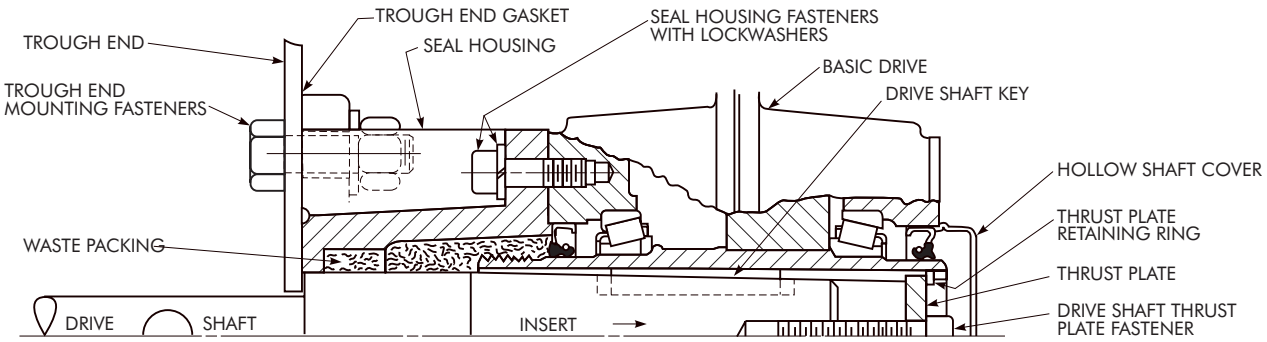
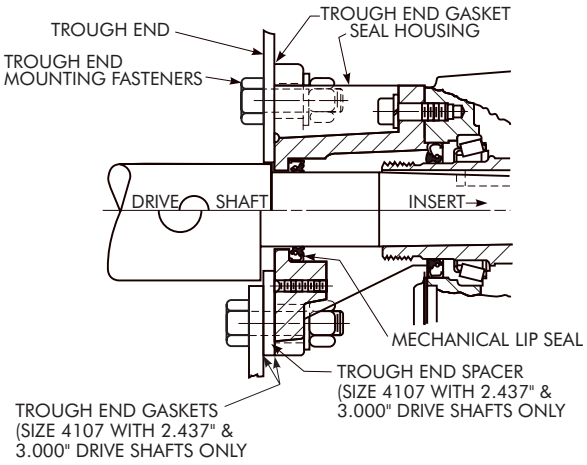


TABLE 4 — Seal Housing & Trough End Fastener Size – UNC & Tightening Torque – (Non-Lubricated Fasteners)

Fastener Location	DRIVE SIZE						
	4107	4115	4203	4207	4215	4307	4315
Seal Housing Fasteners lb-ft (Nm)	.500-13 69 (94)	.625-11 137 (186)	.750-10 245 (332)	.875-9 380 (515)	1.000-8 567 (769)	1.000-8 792 (1074)	1.000-8 792 (1074)
Trough End Fasteners lb-ft (Nm)	1.500" Diameter Drive Shaft .500-13 Fasteners 69 (94)						
	2.000" & 2.437" Diameter Drive Shafts .625-11 Fasteners with Nuts — 137 (186)						
	3.000" & 3.437" Diameter Drive Shafts .750-10 Fasteners with Nuts — 245 (332)						

Figure 8



b. **LIP SEAL** (Figure 8) — Coat outside diameter of seal with Permatex #3 or equivalent. Drive seal into seal housing with the spring loaded seal lip away from the driver. Wrap the keyway on tapered shank of drive shaft with masking tape or light weight Kraft paper to protect against damaging the seal lips. Coat the seal lips and straight portion of the drive shaft with bearing grease. Line up the keyway in the drive shaft with the hollow shaft keyway and insert the drive shaft into the seal housing. Remove the protective wrap and install the drive shaft key. Insert the drive shaft into the hollow shaft. The seal housing registers into the basic drive seal bore. Use the thrust plate fastener Figure 7, to secure the drive shaft. Refer to Table 3 for proper torque value. Install the seal housing fasteners to secure the seal housing to the basic drive. Refer to Table 4 for proper torque value. Reinstall hollow shaft cover and proceed to Step 5.

Figure 9

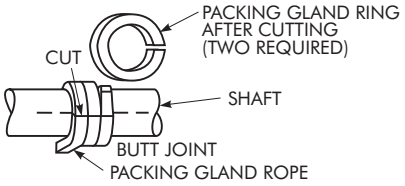
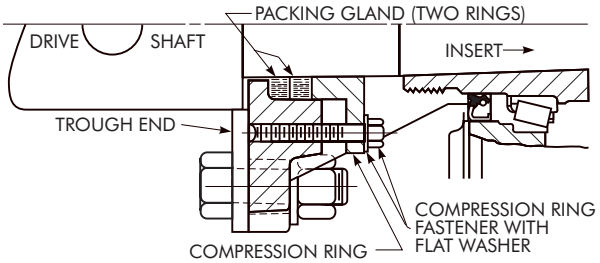


Figure 10



c. **PACKING GLAND SEAL** (Figure 10) — First, wrap the packing around the drive shaft adjacent to the tapered portion of the drive shaft as shown in Figure 9. Cut the packing to produce two complete split seal rings. ***CAUTION:*** *Do not mar the shaft's seal surface.*

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Remove packing rings from the drive shaft and slide the drive shaft through the seal housing. Install seal rings into the seal housing. Stagger the seal joints approximately 90° apart. Slip the compression ring into place. Use fasteners with flat washers to hold the ring but DO NOT tighten at this time. Install key in the drive shaft keyway and then install the drive shaft into the hollow shaft. Use the thrust plate fastener, Figure 7, to secure the drive shaft. Refer to Table 3 for torque value. Use the seal housing fasteners to secure the seal housing to the basic drive. Refer to Table 4 for the torque value. Reinstall the hollow shaft cover. To adjust packing seal, rotate input shaft to test the resistance. Tighten the compression ring fasteners evenly until an additional resistance can be detected when the high speed shaft is rotated. DO NOT OVERTIGHTEN - this can cause premature seal wear and possible overheating. Proceed to Step 5.

5. **JSC** — Fasten the trough end to the seal housing using the hex head cap screws included in the drive shaft kit. Refer to Table 4 for torque value. Proceed to Step 7.

6. **JF** — Install backstops prior to installation of the drive (Refer to Appendix B). If an adapter flange is provided, assemble it to the drive using fasteners provided with the flange. Refer to Table 5 for fastener selection and torque value. Remove the input side hollow shaft cover. The standard method for connecting a flange mounted drive to the driven shaft is to prepare the driven shaft per Appendix H and mount the drive to the tapered shaft using a thrust plate kit with fastener as shown in Table 3. An optional method of connection should be used when replacing existing drives with special shafts or when producing tapered shafts is impractical. This optional method uses a TA tapered bushing as outlined in Appendix J.

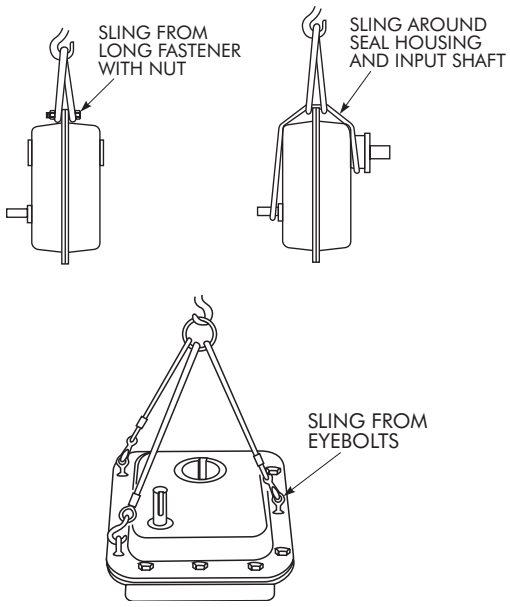
TABLE 5 — Flange Mounted Drive – Foundation Fastener Size & Tightening Torque
(Non-Lubricated Fasteners)

DRIVE SIZE	Fastener Size and Grade	Torque lb-ft (Nm)	Min Fastener Engagement Into Drive Housing Inches (mm)
4107	.500-13UNC, GR.5	69 (94)	.76 (19,3)
4115	.625-11UNC, GR.5	137 (186)	.94 (23,9)
4203	.750-10UNC, GR.5	245 (332)	.76 (19,3)
4207	.875-9UNC, GR.5	380 (515)	.88 (22,4)
4215	1.000-8UNC, GR.5	567 (769)	1.00 (25,4)
4307	1.000-8UNC, GR.8	792 (1074)	1.24 (31,5)
4315	1.000-8UNC, GR.8	792 (1074)	1.24 (31,5)

Installation

7. **JR, JF & JSC** — Refer to Figure 11 for recommended lifting method. In order to sling JR & JF as illustrated, remove a housing flange fastener and install a long fastener with nut. For vertical installation, use (3) eye bolts as illustrated. Eyebolt sizes are 5/16" for 4107 and 4115, 3/8" for 4203 and 1/2" for 4207 thru 4315. DO NOT remove sling until drive is secured to shaft. Before lifting the drive into position, rotate the high speed shaft until the hollow shaft keyway will be in position to line-up with the driven shaft key. JF proceed to Step 12; JSC to Step 13.

Figure 11



8. **JR** — If the drive was received with a backstop installed, the backstop must be temporarily removed to facilitate mounting.

   Refer to Section II, Figure 19 and remove cover Ref. #16 and backstop Ref. #5A1.

9. **JR** — Lift the drive into position and slide onto the drive shaft taking care that the driven shaft key seats into the hollow shaft keyway. DO NOT hammer or use excessive force. Refer to Figure 12 for installation of the torque arm. The exact position of the tie rod may vary within the range shown. For torque arm mountings other than shown, refer to Falk. If it is necessary to shorten the torque arm, cut the excess from either threaded end.

   The support to which the clevis bracket is to be fastened must sustain the torque reaction shown in Table 8. The maximum load reaction through the torque arm occurs when the torque arm is located in the extreme (30°) off angle position. Use Grade 5 fasteners to anchor the clevis bracket; see Table 7 for the fastener diameter and tightening torque.

   Bolt the tie rod to both the clevis bracket and the drive anchor bracket and tighten the bolts until seated against the brackets. DO NOT bend the bracket as clearance between the clevis brackets and tie rod is necessary.

Figure 12

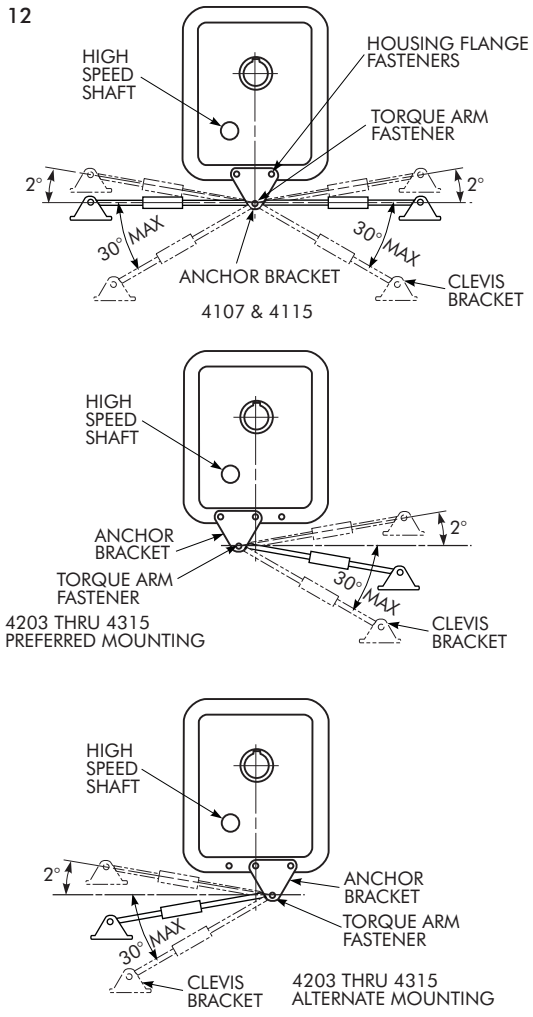


TABLE 6 — Spanner Wrench Type & Spanner Nut Tightening Torque

DRIVE SIZE	Adjustable Hook Spanner Wrench		Spanner Nut Tightening Torque lb-ft (Nm)
	Armstrong Tools	Williams	
4107	34-307 (2"-4 ¾")	474	83 (113)
4115	34-307 (2"-4 ¾")	474	83 (113)
4203	34-307 (2"-4 ¾")	474	167 (226)
4207	34-310 (4 ½"-6 ¼")	474A	167 (226)
4215	34-310 (4 ½"-6 ¼")	474A	250 (339)
4307	34-310 (4 ½"-6 ¼")	474A	250 (339)

TABLE 7 — Torque Arm Clevis Bracket Fastener Tightening Torque

DRIVE SIZE	Fastener ★ Size	Tightening Torque — lb-ft (Nm)	
		Steel Foundation	Concrete Foundation
4107	.375-16UNC	28 (38)	21 (28)
4115	.375-16UNC	28 (38)	21 (28)
4203	.500-13UNC	69 (94)	53 (72)
4207	.500-13UNC	69 (94)	53 (72)
4215	.625-11UNC	137 (186)	107 (145)
4307	.750-10UNC	245 (332)	191 (259)
4315	1.000-8UNC	567 (769)	467 (633)

★ Grade 5 fasteners required.

TABLE 8 — Load Reaction Through Torque Arm

DRIVE SIZE	4107	4115	4203	4207	4215	4307	4315
Load lb (N) t	2090 (9290)	3490 (15520)	4010 (17830)	6080 (27050)	7950 (35360)	11290 (50220)	15880 (70580)

10. **JR** — Thread the bushing nut onto the hollow shaft one to two turns. NOTE: The bushing nut threads have been coated with an anti-seize compound at the Factory. This compound should not be removed. Before re-installing a previously used nut, recoat the nut threads only with an anti-seize compound. KEEP THE TAPERED SURFACE OF THE BUSHING AND HOLLOW SHAFT BORE FREE FROM ALL ANTI-SEIZE OR LUBRICATING COMPOUNDS.

    WARNING: Overtightening can fail the internal retaining ring. (See Appendix G, for listing of retaining rings).

    a. **PREFERRED METHOD** — Use a spanner (Table 6), chain or pipe wrench to tighten the bushing nut to the torque value indicated in Table 6. NOTE: For applications where external vibratory or transient loads may act on drive and cause the setscrew to become loose, apply Loctite 243 or equivalent to threads of setscrew. Tighten the setscrew on the bushing nut.

    b. **ALTERNATE METHOD** — (To be used when torque cannot be measured.) Use a spanner (Table 6), chain or pipe wrench to tighten the bushing nut just until the drive can no longer be moved by hand axially on the driven shaft. Loosen nut ONLY until it can be turned by hand but do not unseat the taper. Retighten the nut hand tight. Now mark a spot on the top of the driven shaft. Next mark a spot on the bushing nut 180° from the driven shaft mark (90°CCW for Sizes 4107 & 4115). Use the spanner wrench to tighten the nut CW one half turn until the two marks are aligned (one quarter turn for Sizes 4107 & 4115). NOTE: For applications where external vibratory or transient loads may act on drive and cause the setscrew to become loose, apply Loctite 243 or equivalent to threads of setscrew. Tighten the setscrew on the bushing nut.

11. **JR** — Install backstop, motor mount, motor, sheaves (mount sheaves as close to the drive and motor housing as possible), belts and guard. Refer to Appendix D for motor mount installation instructions. Proceed to Step 14.

12. **JF (USING TAPERED DRIVE SHAFT)** — Put key into the driven shaft. Lift drive into position and slide onto the driven shaft taking care that the driven shaft key seats into the hollow shaft keyway. DO NOT hammer or use excessive force. Secure the drive to the shaft with the thrust plate fastener. Refer to Table 3 for torque value. Reinstall the hollow shaft cover. Install motor mount, motor, sheaves, belts and guard. Refer to Appendix D for motor mount installation instructions. Proceed to Step 15.

13. **JSC** — Assemble drive to trough and install drive shaft coupling bolts per screw conveyor manufacturer's instructions. Install motor mount, motor, sheaves, belts and guard. Refer to Appendix D for motor mount installation instructions. Proceed to Step 15.

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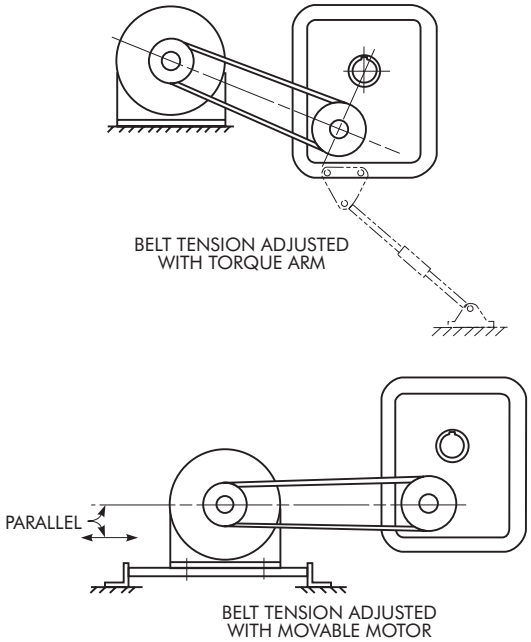
14. **JR** — When the torque arm turnbuckle is used for belt tension adjustment, position the motor so that the belt pull will be about 90° to a line through the drive high speed shaft and hollow shaft as shown in Figure 13. For drives where the motor is moved to adjust belt tension, mount the motor slide base so that the belt tension adjustment is approximately parallel to the belt centers. Refer to Appendix D, for instructions relative to alignment of sheaves and belts.

Figure 13



Lubrication

CAUTION: Drives shipped without oil.

15. **JR, JF & JSC** — Refer to Appendix A for selection of lubricant. Refer to Table 9 at right for approximate oil capacity of drives.

16. **JR, JF & JSC** — HORIZONTAL MOUNTING

Remove air vent and oil level plug (Refer to Step 1). Fill the drive until oil shows in the oil level hole. Coat the air vent and plug threads with #3 Permatex or equivalent thread sealant before replacing.

JRV, JFV & JSCV — (VERTICAL MOUNTING) - Refer to Figure 1, Step 1.

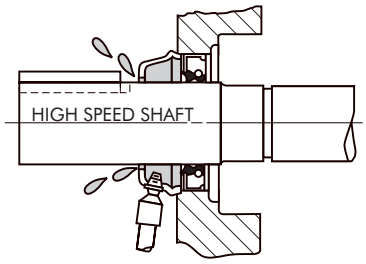
Input Shaft DOWN — Remove the fill plug and fill with oil to level marked on the dipstick.

Input Shaft UP — Remove the oil level and fill plugs and fill until oil shows in the oil level hole.

Coat the plug threads with #3 Permatex or equivalent thread sealant before replacing.

17. **JR, JF & JSC** — Where applicable, pump grease into the high speed shaft seal cover **WITH A HAND GREASE GUN**, Figure 14, until fresh grease flows out along the shaft. Wipe off excess grease from the shaft. DO NOT use grease where it could contaminate the product e.g. foods, drugs, etc.

Figure 14



Start Up

18. **JR, JF & JSC** — Before operating the drive, check any fasteners, pipe plugs, air vent, etc. which may have been loosened in the course of Outfitting, Installing and Lubricating the drive, to be sure that they have been properly retightened. If a long fastener was used to lift the drive into place, reinstall the housing flange fastener and torque to the value shown in Table 1. After one week of operation repeat check of all external fasteners and pipe plugs.

19. **AFTER ONE MONTH OF OPERATION:**

a. Operate the drive until the sump oil reaches normal operating temperature. Shut the drive down and drain immediately.

b. Immediately flush the drive with an oil of the same type and viscosity grade as the original charge (warmed to approximately 100°F[38°C] in cold weather). Rapidly pour or pump a charge equal to 25-100% of the initial fill thru the drive, or until clean oil flows thru the drain.

c. Close the drain and refill the drive to the correct level with new or reclaimed oil of the correct type and viscosity. If determined to be in good condition by the supplier, drain oil may be reused if it is filtered thru a 100 micron or finer filter.

TABLE 9 — Approximate Oil Capacity – Quarts (Liters) ★

DRIVE SIZE	JR, JF & JSC	JRV & JFV
4107	2 (1,9)	3 (2,8)
4115	3 (2,8)	4.5 (4,3)
4203	3.5 (3,3)	5 (4,7)
4207	5.5 (5,2)	7.5 (7,1)
4215	9 (8,5)	13 (12,3)
4307	13 (12,3)	18 (17)
4315	15 (14,2)	21 (19,9)

★ Quantities are approximate. Always fill drive to specified level.

Section II

Drive Service & Repair

Preventive Maintenance

PERIODICALLY — Carefully check the oil level of the drive when it is stopped and at ambient temperature, add oil if needed. If the oil level is above the specified level, have the oil analyzed for water content. Moisture in the oil may indicate seal leakage or condensation. If so, correct the defect immediately and change the oil. DO NOT overfill or oil leakage may result. If a drive is equipped with a fan, periodically clean accumulated foreign matter from the fan and fan guard to allow adequate air flow.

GREASE PURGED SEALS — Periodically (at least every six months), depending upon the frequency and degree of contamination, purge contaminated grease from seal by slowly pumping fresh bearing grease through the seal cage, **WITH A HAND GREASE GUN**, until fresh grease flows out along the shaft. Wipe off the purged grease. Refer to Appendix A.

PACKING GLAND SEAL — Section I, Step 4(C)

Oil Changes

PETROLEUM LUBRICANTS — For normal operating conditions, change gear oil every six months or 2500 operating hours, whichever occurs first. If the drive is operated in an area where temperatures vary with the seasons, change the oil viscosity grade to suit the temperature. Where applicable, grease seals when changing oil. Refer to Appendix A.

SYNTHETIC LUBRICANTS — Synthetic lube change intervals can be extended to 8000-10,000 hours depending on operating temperatures and lubricant contamination. Laboratory analysis is recommended for optimum lubricant life and drive performance. Change lube with changes in ambient temperature, if required. Refer to Appendix A.

Stored & Inactive Drives

NEW DRIVES WHICH HAVE NOT BEEN OPERATED — Each drive is spin tested with a rust preventive oil that will protect internal parts against rust for a period of 4 months in an outdoor shelter or 12 months in a dry building after shipment from the Factory.

If a drive is to be stored or inactive beyond the above periods, spray all internal parts with a rust preventive oil that is soluble in lubricating oil or add 1 ounce (23,35 grams) of "Motorstor ★" vapor phase rust inhibitor oil. Seal air vent immediately with pressure sensitive tape.

Before operating drives which have been stored or inactive, remove tape and fill to the proper level with oil meeting specifications given in the Lubrication Recommendation found in Appendix A.

★ Product of the Daubert Chemical Company, Chicago, Illinois.(Formerly known as "Nucel Oil.")

SHUTDOWN OF NEW OR EXISTING DRIVES WHICH HAVE BEEN OPERATED — If a drive is to be stored or inactive for more than 2 months after a period of operation, add 1 ounce (23,35 grams) of "Motorstor" to the oil sump and immediately seal the air vent with pressure sensitive tape. It is not necessary to drain the oil prior to storage if oil is still serviceable and not contaminated.

Before operating drive, remove tape and check oil level.

PERIODICALLY INSPECT STORED OR INACTIVE DRIVES AND SPRAY OR ADD RUST INHIBITOR EVERY SIX MONTHS, OR MORE OFTEN IF NECESSARY. INDOOR DRY STORAGE IS RECOMMENDED.

Drives Ordered for Extended Storage can be treated at the Factory with a special preservative and sealed to rust-proof parts for periods longer than those stated above, if specified on the order.

Repair & Replacement

WARNING: Consult applicable local and national safety codes for proper guarding of rotating members.Lock out power source and remove all external loads from drive before servicing drive or accessories.

NOTE: Only the seals on the input side of the drive can be replaced without removing the drive from the driven equipment. All other repairs require removal of the drive from the driven equipment. Proceed to Step 1 for drive removal. Proceed to Step 5 for replacement of seals.

Removal (See above note for seal replacement only)

1. JR, JF & JSC — Drain the lubricant at this time. Remove safety guards and belts (motor and motor mount, optional). Remove backstop (if so equipped). Refer to Section II, Step 10, for backstop removal instructions.

WARNING: Drive must be supported during removal process. Use a sling around the motor mount or as recommended in Section I, Step 7. Take up the slack in the sling before proceeding.

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2. **JR** — Refer to Appendix C for instructions on using the TA Torque Assist Removal Tool.

   ALTERNATE METHOD — Loosen the setscrew on the bushing nut which is located at the output end of the hollow shaft. Use a spanner, pipe or chain wrench to loosen the bushing nut (Section I, Table 6). Initially, the nut will freely rotate counter clockwise approximately 180° as the nut moves from the locked position to the removal position. At this point anticipate resistance which indicates unseating of the bushing. Continue to turn the nut until it is free from the hollow shaft. Prepare drive for lifting by disconnecting the torque arm at the drive end. Slide the drive from the bushing. The bushing can be left in place or removed, as required. If bushing will not slide off of the shaft, insert a small pry bar into the split of the bushing and pry the split open slightly to loosen the bushing and remove from the shaft. Proceed to Step 5 for replacement of seals or Step 9 for drive disassembly procedure.

3. **JF & JSC** — Remove the cover from the input end of the hollow shaft.

   JF — Remove the bolts which fasten the drive to the driven equipment.

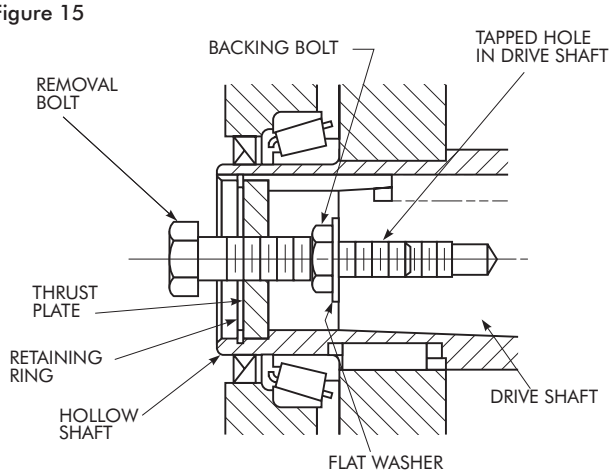
   JSC — (a) If the drive is to be removed from the drive shaft, remove the seal housing fasteners (Figure 7, Section I), or (b) if the drive is to be removed with the drive shaft attached, remove the trough end mounting fasteners and drive shaft coupling bolts. Remove the assembly from the trough.

   JF & JSC — Remove the thrust plate, fastener and retaining ring from the hollow shaft. Refer to Table 10 and select a backing bolt and flat washer and install them into the drive shaft as illustrated in Figure 15. The head of the backing bolt provides a working surface for the removal bolt. Reinsert the thrust plate and retaining ring into the hollow shaft and select a removal bolt from Table 10. Thread the removal bolt into the thrust plate until it contacts the backing bolt head. Torque the removal bolt to the value shown in Table 10. (If the thrust plate rotates in the shaft, align the slot in the plate with the hollow shaft keyway and insert a screwdriver or piece of key stock to prevent rotation of the plate). After torquing the bolt, as instructed, strike the bolt, sharply with a hammer and retorque the bolt if separation of the drive from the shaft did not occur. Repeat this procedure, retorquing the bolt after each blow, until separation occurs.

TABLE 10 — Removal & Backing Bolt Size & Length

DRIVE SIZE	Removal Bolt Size & Minimum Length - Inches	Maximum Tightening Torque lb-ft (Nm)	Backing Bolt Size & Maximum Length - Inches
4107	0.625-11UNC x 1.75	133 (180)	0.500-13UNC x 1.25
4115	0.625-11UNC x 1.75	133 (180)	0.500-13UNC x 1.25
4203	0.750-10UNC x 2.00	242 (328)	0.625-11UNC x 1.75
4207	0.750-10UNC x 2.00	242 (328)	0.625-11UNC x 1.75
4215	1.000-8UNC x 2.50	567 (769)	0.875-9UNC x 2.25
4307	1.125-7UNC x 3.00	742 (1006)	1.000-8UNC x 2.50
4315	1.125-7UNC x 3.00	742 (1006)	1.000-8UNC x 2.50

Figure 15



CAUTION: Failure to follow this procedure may result in the destruction of the threads in the thrust plate. (If the retaining ring becomes damaged, refer to Appendix G, for replacement information).

Proceed as follows:

JF to Step 5 for replacement of Quadrive seals only OR Step 9 for drive disassembly procedure.

4. **JSC** — If the drive was removed with the seal housing and the drive shaft attached, remove the seal housing fasteners to separate the seal housing and drive shaft from the drive. After separation of the drive and shaft has been achieved, determine the type of seal equipped in the seal housing. If it is a waste packing seal (Figure 7, Section I), a packing gland seal (Figure 10, Section I) or a lip seal (Figure 8, Section I), proceed as follows for removal of the drive shaft from the seal housing:

   a. **PACKING GLAND SEAL** — Remove the key from the drive shaft keyway. Loosen the compression ring fasteners. Remove the seal housing toward the tapered end of the drive shaft.

   b. **LIP SEAL** — Remove the key from the drive shaft keyway. Remove any burrs from the tapered end of the shaft and wrap the entire length with masking tape or a light weight Kraft paper to protect the seal lips during removal. Carefully remove the seal housing toward the tapered end of the drive shaft. For replacement of Quadrive seals only proceed to Step 5, otherwise to Step 9.

   c. **WASTE PACKING SEAL** — Remove the key from the drive shaft keyway. Remove the waste packing material and remove the seal housing toward the tapered end of the drive shaft.

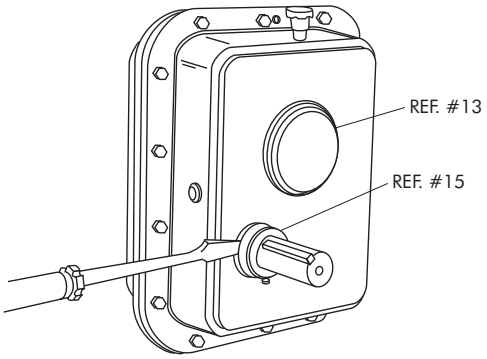
Drive Disassembly — (Refer To Parts Drawing Figure 19)

Prior to initiating any disassembly or repair, clean accumulated dirt and grime from the surface of the drive housing. Clean the exposed portion of the input and output shafts with a solvent and a non-abrasive cloth. If only the seals are being replaced, proceed to Step 5. If the drive will be disassembled for inspection or repair, remove input side seal covers, Ref. #13 & 15, as illustrated in Figure 16, then skip to Step 9.

CAUTION: Do not damage shaft. New seals will leak if seal contacting surface is marred. Do not use abrasive material on shaft seal contacting surface.

5. SEAL REMOVAL — The input side low speed and high speed shaft seals, Ref. #19 & 20, respectively, can be replaced without removing drive from the driven shaft. Remove input side seal covers, Ref. #13 & 15, as illustrated in Figure 16.

Figure 16

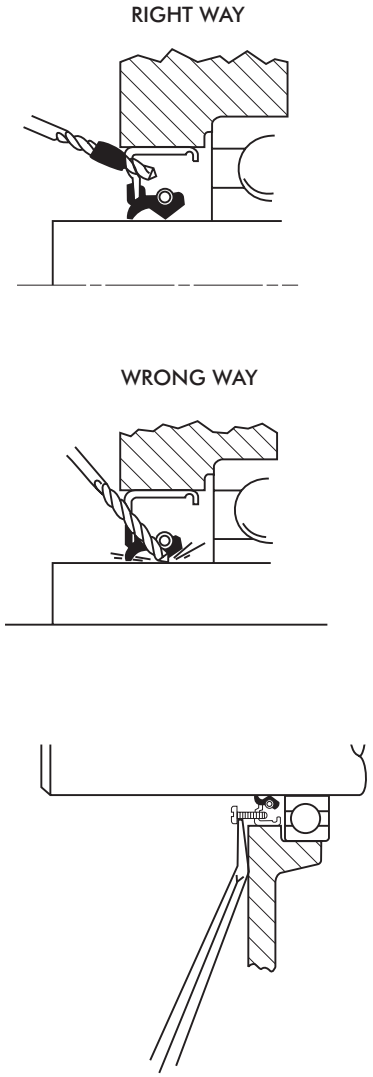


a. Remove all sharp edges from shaft extension. Use a sharp center punch to lightly punch the seal case as a guide for drill bit. NOTE: Seals are not axially restrained. DO NOT drive seal into bore too deep, or disassembly of drive may be required to extract seal.

b. Wrap several turns of tape around the drill bit approximately .250" (6 mm) from the drill point to prevent the drill bit from entering too deeply into the housing and damaging the bearing. Grease or magnetize the drill bit to help retain the chips. Drill two .125" (3 mm) diameter holes in the seal case 180° apart. Control the angle of the drill as illustrated in Figure 17 to prevent damage to the shaft.

c. Insert two #10-.750" (M5 x 20) sheet metal screws into the seal case leaving .5" (13 mm) of the screw protruding above the seal face. DO NOT drive the screw more than .25" (6 mm) beyond seal face or bearing damage may occur. Use a claw type pry bar under the screw head as shown in Figure 17 to lift seal out. Remove all metal chips. Use a magnet to remove the metal chips that fall into the bore. Flush the drive to remove chips from the bearing. Remove Permatex from the housing bore.

Figure 17



6. SEAL SURFACE CONDITION — Carefully inspect polished surface of shaft where the seal makes contact. If the seal surface shows any sign of a nick, scratch, spiral swirl or groove, the shaft should be replaced or refurbished to prevent leakage of the lubricant. (In many instances the seal surface can be restored by use of a thin wall wear sleeve. Check with your local seal supplier and follow the manufacturer's instructions for installing the wear sleeve).

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7. SEAL INSTALLATION

   CAUTION: Protect seal lips from sharp edges of the keyway by wrapping thin strong paper around the shaft and coating the paper and seal lips with grease before sliding the seal on or off the shaft. Do not expand the seal lips more than .030" (0,75 mm) diameter.

   a. Coat O.D. of seal with #3 Permatex or equivalent sealant. Position seal squarely in seal bore with the garter spring toward bearing. Place a square ended cylindrical tool against seal and press or lightly tap tool (not seal) until seal outer wall is seated .14" (3,5 mm) inside the seal bore outer wall.

      CAUTION: A shaft shoulder is NOT provided for stopping seal. DO NOT seat seal against bearing.

   b. Measure seal axial runout with a dial indicator mounted on the shaft. If the seal axial runout is more than .010" (0,25 mm), tap high side of seal with installation tool until seal axial runout is .010" (0,25 mm) or less.

   c. Remove shaft wrapping and reinstall the input side seal covers, Ref. #13 and 15.

8. DRIVE REPAIR IS COMPLETE — Review instructions in Section I for reassembly of drive onto driven shaft.

9. When seals, Ref. #19 & #20, are to be reused (replacement is recommended), wrap the input shaft keyway and output shaft threads with masking tape or light weight Kraft paper to protect seal lips during disassembly. Cover wrapping with a light coat of grease.

10. If drive is equipped with a backstop, remove output side end cover Ref. #16, gasket Ref. #23, backstop Ref. #5A1, and key Ref. #5A4 from output housing Ref. #11. (Note the direction of rotation of the input shaft for proper reassembly).

11. Lay drive on bench with input shaft down. Remove housing flange fasteners, Ref. #25. Tap out dowel pins.

    SIZES 4107 AND 4115 — Carefully lift off output housing, Ref. #11. NOTE: Record the amount of joint flange shim-gaskets and their thickness, if possible, for future reference on reassembly.

    SIZE 4115J05 — Remove fasteners from retaining plate, Ref. #3A6.

    SIZES 4203 THRU 4315 — Use one of the housing flange fasteners as a jackbolt to separate input and output housing halves using the tapped hole on input housing flange provided for this purpose. Carefully lift off output housing, Ref. #11.

12. Remove the shaft assemblies (J05 - 3A & 4A; J09, J14 or J25 -1A, 2A, & 4A) from input housing, Ref. #10.

13. Drive seals out from input and output housing bores if replacement is indicated. Remove gasket material, seal compound and any accumulated foreign matter from seal joints, bores and adjacent sealing surfaces. Use a solvent to clean housing and shaft assemblies.

    CAUTION: On Sizes 4203 thru 4315 tapered roller bearing cups are assembled in input housing with a slight clearance fit. In addition, metal shims for adjusting bearing preload and axial float are installed behind bearing cups in housing. When handling input housing be careful that bearing cups and shims do not fall out of input housing.

14. If drive is equipped with a backstop, check the shaft surface and backstop sprags (inside diameter) for signs of wear. If either component shows evidence of wear, both should be replaced (Ref. #1A and 5A or Ref. #3A and 5A assemblies). Also refer to Step 6 for inspection of seal surfaces.

15. Inspect gear teeth for wear or indications of fatigue e.g. hairline cracks at root of tooth. If one element has undergone severe wear or broken teeth, replace the mating element also.

16. Clean and inspect bearings for wear. Lubricate with light oil before spinning to avoid scoring of working surfaces. Remove any worn bearings with a wheel puller. When replacing tapered roller bearings, replace both cups and cones. DO NOT use new cone assemblies with worn (old) cups.

17. Use a wheel puller or press to remove gears Ref. #1A4 or 4A4 from the shaft. Exercise caution to avoid scoring shaft seal diameter with the keyway of gear.

18. Inspect all fasteners for damage or wear and replace with fasteners of equal grade. Grade 5 fasteners have three (3) radial lines on the head. Fasteners are available in kit form, Ref. #80.

19. If the shaft assemblies can be reused intact (no new parts required), refer to Section III, Steps 6 thru 9, for reassembly procedure. Replace all shim-gaskets with new parts, Kit Ref. #100. On Sizes 4107 and 4115, use the same thicknesses as removed during disassembly.

Identifying & Ordering Parts

1. Refer to the drive component diagram, Figure 18 and exploded parts diagram, Figure 19, and make a list of the parts required by part reference number. For example, Ref. #15, 20 100, 1A, 2A1, and 2A2. When a gasketed joint is separated, always replace with new shim-gaskets. Order Ref. #100 shim-gasket kit.
2. Now refer to the parts list, Table 11, and determine the part description and Falk part number using the part reference number (Step 1) and the drive identification (e.g. 4107J25) in the column headers of the parts list.
3. Use the part description and Falk part number to order the required parts. In the examples in steps 1 and 2, Ref. #15, 20, 100, 1A, 2A1 and 2A2 for a 4107J25 would be ordered as follows:

   Seal cover 4723094

   Seal 0912868

   Shim-gasket kit 0754740

   Shaft assembly with gear 4729003

   Bearing 0919636

   Bearing 0919636

4. Table 12 and 13 convert Falk part numbers to bearing and seal manufacturer's part numbers. Tooth combinations are listed in Appendix G.
5. Place your order with your local Falk Distributor. If you need to locate a distributor, phone (414)342-3131 in the United States or Canada.

Recommended Spare Parts

1. For non-critical drive applications a complete set of bearings, seals and shim-gaskets is recommended. If stored in their original packaging in a dry, cool location, these parts have a minimum shelf life of 5 years.
2. For critical drive applications (where an outage would create a major production loss), a complete drive is recommended.

Figure 18

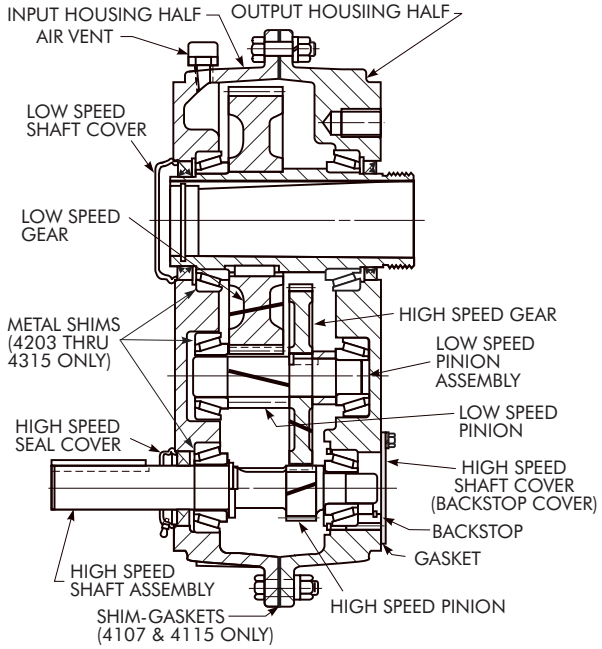

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Figure 19

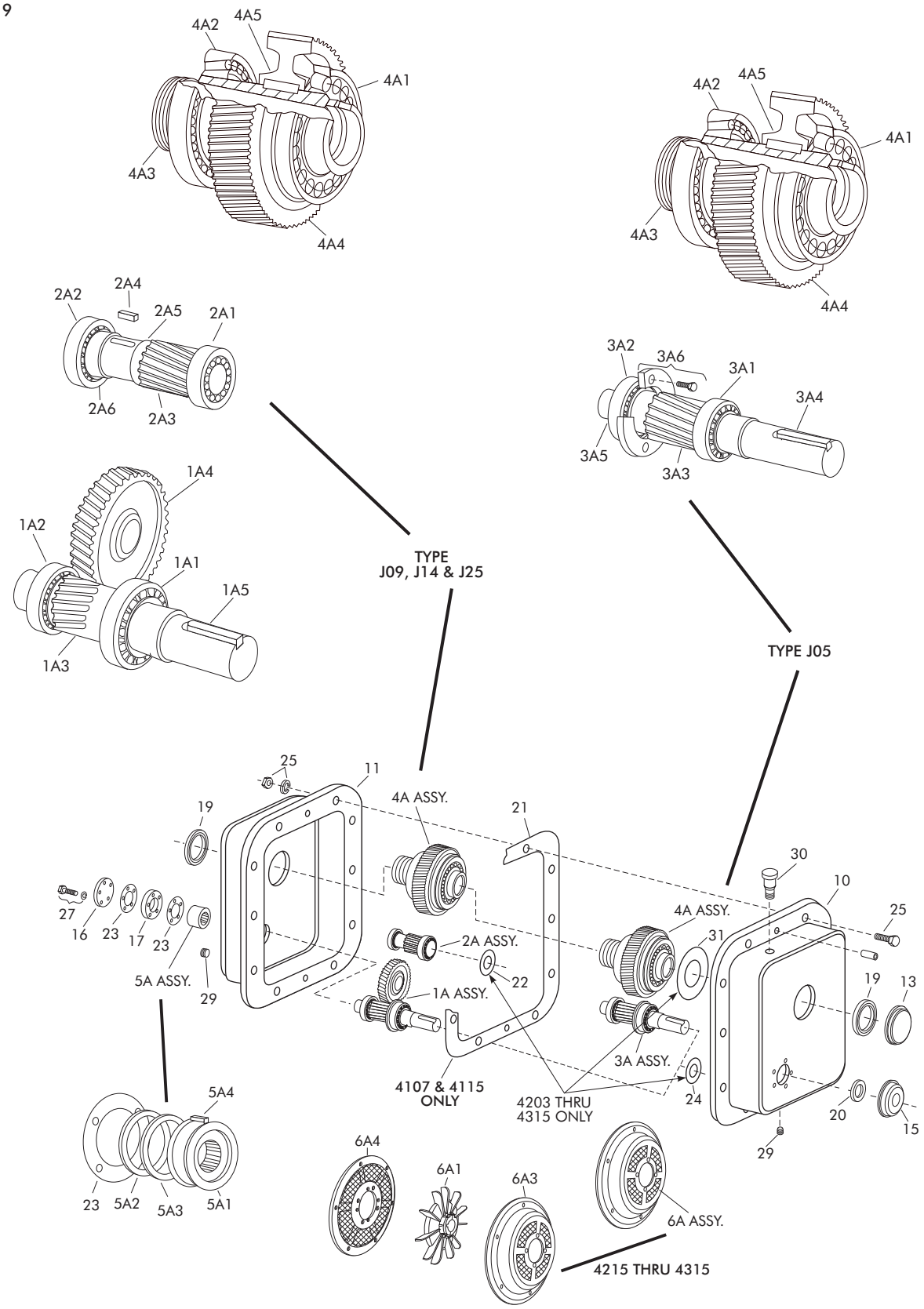
4A2
4A5
4A1
4A3
4A4
2A2
2A4
2A5
2A1
2A6
2A3
3A2
3A6
3A1
3A4
3A5
3A3
1A4
1A2
1A1
1A5
1A3
TYPE
J09, J14 & J25
TYPE J05
25
11
19
4A ASSY.
21
27
16
23
17
23
5A ASSY.
29
2A ASSY.
22
1A ASSY.
4107 & 4115
ONLY
4203 THRU
4315 ONLY
30
10
4A ASSY.
31
25
19
13
3A ASSY.
24
20
15
29
5A4
23
5A2
5A3
5A1
6A4
6A1
6A3
6A ASSY.
4215 THRU 4315

TABLE 11 — Parts List of Falk Part Numbers

Ref. No.	Part Description	DRIVE SIZE													
		4107	M4107	4115	M4115	4203	M4203	4207	M4207	4215	M4215	4307	M4307	4315	M4315
Housing Components — J05, J09, J14 & J25															
13	Shaft Cover	2109906	2109906	4723091	4723091	4723092	4723092	2110134	2110134	4723093	4723093	2110504	2110504	2110779	2110779
15	Seal Cover	4723094	4723094	4723095	4723095	4723096	4723096	4723097	4723097	4723098	4723098	4723099	4723099	4723109	4723109
16	Shaft Cover	1161865	1161865	1161866	1161866	1238030	1238030	2119130	2119130	1161870	1161870	1161870	1161870	1161870	1161870
16	Shaft Cover With Backstop	. . .	. . .	. . .	. . .	1238019	1238019	. . .	. . .	1219342	1219342	1237944	1237944	1219342	1219342
17	Cover Spacer-Backstop	. . .	. . .	. . .	. . .	. . .	. . .	2119132	2119132	. . .	. . .	. . .	. . .	. . .	. . .
19	Seal	0912775	0912775	2911607	2911607	2911840	2911840	2911675	2911675	0912791	0912791	2911955	2911955	2912179	2912179
20	Seal	0912868	0912868	0912647	0912647	0912746	0912746	0912747	0912747	0912869	0912869	0912775	0912775	2919203	2919203
30	Air Vent	0914088	0914088	0914088	0914088	0914088	0914088	0914088	0914088	0914088	0914088	0914088	0914088	0914088	0914088
80	Fastener Kit - Incl. Ref. #25, 27 & 29	4829000	4829000	4729017	4729017	4729032	4729032	4729049	4729049	4729079	4729079	4729082	4729082	4729117	4729117
100	Shim-Gasket Kit - Incl. Ref. #21, 22, 23, 24 & 31	0754740	0754740	0754741	0754741	0786836	0786836	0786837	0786837	0786838	0786838	0786839	0786839	0786840	0786840
Rotating Elements — J05															
3A	Shaft Assembly - Incl. Ref. #3A1 - 3A6	4729012	4729238	4729029	4729249	4729045	4729260	4729061	4729271	4729076	4729281	4729094	4729291	4729112	4729301
3A1	Bearing	0919015	0919015	0919000	0919000	2919339	2919339	2918700	2918700	2919359	2919359	0921354	0921354	2919215	2919215
3A2	Bearing	0919015	0919015	0919609	0919609	2919340	2919340	0921521	0921521	2919360	2919360	2916263	2916263	0921853	0921853
3A3	Pinion & Shaft - Incl. Ref. # 3A4 & 3A5	4729013	4729239	4729031	4729250	4729046	4729261	4729062	4729272	4729077	4729282	4729095	4729292	4729113	4729302
3A6	Thrust Plate	. . .	. . .	4729030	4729030	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
4A	Shaft Assembly - Ref. #4A1 - 4A5	4729015	4729015	4729033	4729033	4729047	4729047	4729063	4729063	4729078	4729078	4729096	4729096	4729114	4729114
4A1	Bearing	4729014	4729014	4720891	4720891	2911822	2911822	2905191	2905191	0921778	0921778	0921727	0921727	0921366	0921366
4A2	Bearing	4729014	4729014	4720891	4720891	2911822	2911822	2905191	2905191	0921778	0921778	0921727	0921727	0921366	0921366
4A3	Hollow Shaft - Incl. Ref. #4A5	4729016	4729016	4723015	4723015	4723028	4723028	4723039	4723039	4723050	4723050	4723061	4723061	4723073	4723073
4A4	Gear	1238091	1238091	1238105	1238105	1238018	1238018	1237897	1237897	1238053	1238053	1237941	1237941	1237763	1237763
5A	Backstop Assy. - Incl. Ref. #5A1 - 5A4 & 23	0738495	0738495	0738484	0738484	0785596	0785596	0783905	0783905	0785610	0785610	. . .	. . .	. . .	. . .
6A	Fan Assembly - Incl. Ref. #6A1 - 6A4	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	0785911	0785911	0785530	0785530	0785432	0785432
6A1	Fan	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4729079	4729079	4729097	4729097	4729116	4729116
6A3	Guard	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4729080	4729080	4729098	4729098	4729117	4729117
6A4	Backplate	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4729081	4729081	4729099	4729099	4729118	4729118
Rotating Elements — J09															
1A	Shaft Assembly Without 1A4 Gear	4729004	4729240	4729021	4729251	4729037	4729262	4729053	4729273	4729068	4729283	4729086	4729293	4729104	4729303
1A	Shaft Assembly With 1A4 Gear	4729001	4729241	4729018	4729252	4729034	4729263	4729050	4729274	4729065	4729284	4729083	4729294	4729101	4729304
1A1	Bearing	0919015	0919015	0919670	0919670	2919339	2919339	2918700	2918700	2919359	2919359	0921354	0921354	2919215	2919215
1A2	Bearing	0919015	0919015	0919606	0919606	2919340	2919340	0921521	0921521	2919360	2919360	2916263	2916263	0921851	0921851
1A3	Pinion & Shaft - Incl. Ref. #1A5	4729007	4729242	4729024	4729253	4729041	4729264	4729056	4729275	4729071	4729285	4729089	4729295	4729107	4729305
1A4	Gear	1238087	1238087	1238108	1238108	1238015	1238015	1237895	1237895	1238055	1238055	1237967	1237967	1237889	1237889
5A	Backstop	0738495	0738495	0738484	0738484	0785596	0785596	0783905	0783905	0785610	0785610	0785529	0785529	0757183	0757183
Rotating Elements — J14															
1A	Shaft Assembly Without 1A4 Gear	4729005	4729243	4729022	4729254	4729038	4729265	4729054	4729276	4729069	4729286	4729087	4729296	4729105	4729306
1A	Shaft Assembly With 1A4 Gear	4729002	4729244	4729019	4729255	4729035	4729266	4729051	4729277	4729066	4729287	4729084	4729297	4729102	4729307
1A1	Bearing	0919015	0919015	0919670	0919670	2919339	2919339	2918700	2918700	2919359	2919359	0921354	0921354	2919215	2919215
1A2	Bearing	0919015	0919015	0919606	0919606	2919340	2919340	0921521	0921521	2919360	2919360	2916263	2916263	0921851	0921851
1A3	Pinion & Shaft - Incl. Ref. #1A5	4729008	4729245	4729025	4729256	4729042	4729267	4729057	4729278	4729072	4729288	4729090	4729298	4729108	4729308
1A4	Gear	1238088	1238088	1238107	1238107	1238016	1238016	1237896	1237896	1238057	1238057	1237942	1237942	1237856	1237856
5A	Backstop	0738495	0738495	0738484	0738484	0785596	0785596	0783905	0783905	0785610	0785610	0785529	0785529	0757183	0757183
Rotating Elements — J25															
1A	Shaft Assembly Without 1A4 Gear	4729006	4729246	4729023	4729257	4729039	4729268	4729055	4729279	4729070	4729289	4729088	4729299	4729106	4729309
1A	Shaft Assembly With 1A4 Gear	4729003	4729247	4729020	4729259	4729036	4729269	4729052	4729314	4729067	4729315	4729085	4729316	4729103	4729317
1A1	Bearing	0919015	0919015	0919670	0919670	2919339	2919339	2918700	2918700	2919359	919359	0921354	0921354	2919215	2919215
1A2	Bearing	0919645	0919645	0919636	0919636	2919340	2919340	0921521	0921521	2919360	2919360	2916263	2916263	0921853	0921853
1A3	Pinion & Shaft - Incl. Ref. #1A5 & 1A6	4729009	4729248	4729026	4729258	4729043	4729270	4729058	4729280	4729073	4729290	4729091	4729300	4729109	4729310
1A4	Gear	1238089	1238089	1238106	1238106	1238017	1238017	1237223	1237223	1238059	1238059	1237943	1237943	1237764	1237764
5A	Backstop	0738496	0738496	0738506	0738506	0785596	0785596	0783905	0783905	0785610	0785610	0738529	0738529	0757183	0757183
6A	Shaft Fan Assembly - Incl. Ref. #6A1 - 6A4	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	0785611	0785611	0785530	0785530	0785432	0785432
6A1	Fan	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4729079	4729079	4729097	4729097	4729116	4729116
6A3	Guard	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4729080	4729080	4729098	4729098	4729117	4729117
6A4	Backplate	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4729081	4729081	4729099	4729099	4729118	4729118

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TABLE 11 — Parts List of Falk Part Numbers (Continued)

Ref No.	Part Description	DRIVE SIZE													
		4107	M4107	4115	M4115	4203	M4203	4207	M4207	4215	M4215	4307	M4307	4315	M4315
Rotating Elements — J09, J14 & J25															
2A	Shaft Assembly - Incl. Ref. #2A1 - 2A6	4729010	4729010	4729027	4729027	4729040	4729040	4729059	4729059	4729074	4729074	4729092	4729092	4729110	4729110
2A1	Bearing	0919636	0919636	0919002	0919002	2919338	2919338	2918700	2918700	0921350	0921350	0921793	0921793	0921850	0921850
2A2	Bearing	0919636	0919636	0919633	0919633	2919338	2919338	2918701	2918701	2916288	2916288	0921793	0921793	0921850	0921850
2A3	Pinion & Shaft - Incl. Ref. #2A4	4729011	4729011	4729028	4729028	4729044	4729044	4729060	4729060	4729075	4729075	4729093	4729093	4729111	4729111
2A5	Spacer	1179876	1179876	1179877	1179877	...	...	...	...	...	...	...	...	...	...
2A6	Spacer	1161925	1161925	1163034	1163034	1161889	1161889	1163762	1163762	2120246	2120246	...	...	...	...
4A	Shaft Assembly - Incl. Ref. #4A1 - 4A5	4729015	4729015	4729033	4729033	4729047	4729047	4729063	4729063	4729078	4729078	4729096	4729096	4729114	4729114
4A1	Bearing	4729014	4729014	4720891	4720891	2911822	2911822	2905191	2905191	0921778	0921778	0921727	0921727	0921366	0921366
4A2	Bearing	4729014	4729014	4720891	4720891	2911822	2911822	2905191	2905191	0921778	0921778	0921727	0921727	0921366	0921366
4A3	Hollow Shaft - Incl. Ref. #4A5	4729016	4729016	4723015	4723015	4723028	4723028	4723039	4723039	4723050	4723050	4723061	4723061	4729115	4729115
4A4	Gear	1238091	1238091	1238105	1238105	1238018	1238018	1237897	1237897	1238053	1238053	1237941	1237941	1237763	1237763
6A	Fan Assembly - Incl. Ref. #6A1 - 6A4	...	...	...	...	...	...	...	...	0785611	0787329	0785530	0787255	0785432	0787256
6A1	Fan	...	...	...	...	...	...	...	...	4729079	4729311	4729097	4729312	4729116	4729313
6A3	Guard	...	...	...	...	...	...	...	...	4729080	4729080	4729098	4729098	4729117	4729117
6A4	Grill	...	...	...	...	...	...	...	...	4729081	4729081	4729099	4729099	4729118	4729118

TABLE 12 — Bearing Cross Reference Numbers

Falk Part Number	Manufacturers Number
Ball Bearings ★	
0919000	SKF 206
0919002	SKF 305
0919015	SKF 6205/C3
0919606	SKF 6206NR/C3
0919609	SKF 6305NR/C3
0919633	SKF 6305/C3
0919636	SKF 6304/C3
0919645	SKF 6303/C3
0919670	SKF 6206/C3
Tapered Roller Bearings †	
0921350	HM804843/HM804810
0921354	475/472
0921366	48393/48320
0921521	19138/19283-B
0921727	68462/68712
0921778	JM822049/JM822010
0921793	HM803149/HM803110
0921850	JHM807045/HM807010
0921851	46176/46368
0921853	46162/46368
2905191	497/492A
2911822	34478/34300
2916263	418/414
2916288	3879/3820
2918700	350A/352
2918701	339/332
2919215	HM813841A/HM813810
2919338	26112/26283-S
2919339	LM48548A/LM48510
2919340	17098/17244-B
2919359	386A/382A
2919360	3379/3320-B
4720891	29675/29620
4729014	JLM506810/JLM506849

★ Other Falk suppliers of bearings that are considered equal to those listed are: TRW, Fafnir, FAG and BCA.

† Falk suppliers of Tapered Roller Bearings are: Timken, Bower and Tyson.

TABLE 13 — Seal Cross Reference Numbers

Falk Part Number	Manufacturers Number ‡	
	Chicago Rawhide	National
0912647	11209	...
0912746	13650	...
0912747	15142	...
0912752	19279	
0912775	...	470898
0912791	42419	...
0912868	8700	...
0912869	18580	
2911607	...	415984
2911675	33701	...
2911840	29907	...
2911955	...	416156
2912179	52492	...
2919203	23839	

‡ Subject to substitution of equivalent seals without notice.

Section III

Drive Reassembly

Refer to Parts Drawing Figure 19.

1. GENERAL

   a. Clean all parts to be reassembled and coat all tapered roller bearing cups and pinion teeth with an SAE 20 (or heavier) oil. DO NOT lubricate gear teeth prior to assembly on shaft.

   b. Heat all ball bearings and tapered roller bearing cones in an oven to 275°F(135°C).

   CAUTION: Do not apply flame directly to bearings or rest bearings directly on a heated surface.

   c. Slide or press all ball bearings and bearing cones tight against the shoulder.

   CAUTION: Do not apply force to the bearing outer race. Apply force against the inner race only.

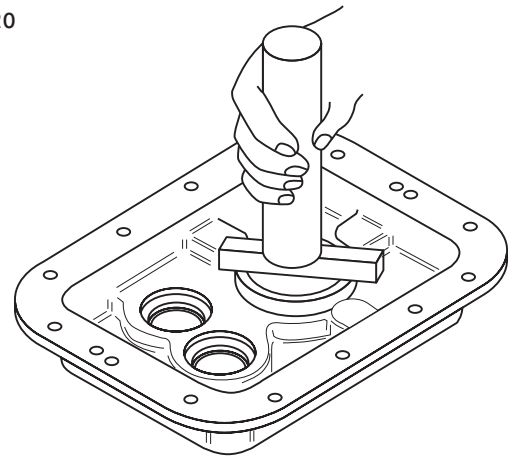
2. ASSEMBLY OF TAPERED ROLLER BEARING CUPS

   a. **SIZE 4107 AND 4115**, Ref. #4A1 and 4A2 Hollow Shaft Bearings — Heat the housing covers to 200°-275°F (93°-135°C) in an oven. Drive or press bearing cup squarely into housing bore until fully seated as shown in Figure 20.

   CAUTION: Take care not to allow bearing cups to cock as this could result in permanent damage to housing. Allow housing to cool before further assembly.

   b. **SIZE 4203 THRU 4315** — Drive high speed bearing cup, Ref. #1A2 or 3A2, squarely into high speed shaft bearing bore of output housing, Ref. #11, with a press or steel bar as shown in Figure 20.

Figure 20



On drives with an intermediate shaft assembly, Ref. #2A, install bearing cup, Ref. #2A2, into intermediate shaft bearing bore of output housing, Ref. #11.

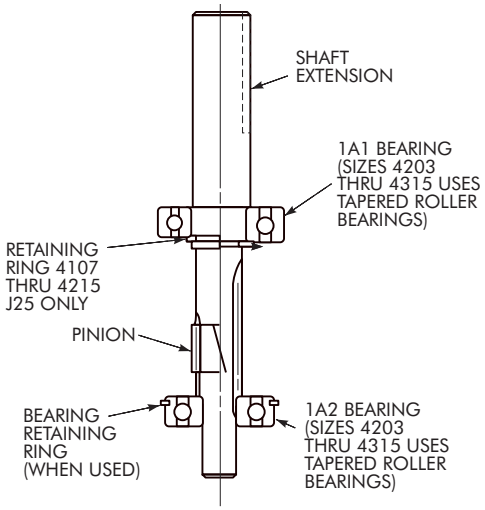
NOTE: With the exception of Sizes 4207 and 4215, there is a small clearance fit between the intermediate shaft bearing cup and bearing bore of output housing. In an effort to inhibit tendency of bearing cup to fall out when housing is subsequently turned over for final assembly to input housing, coat output housing bearing bore with a NLGI #2 bearing grease prior to installing bearing cup. On Sizes 4207 and 4215 there is an interference fit between the intermediate shaft bearing cup and bearing bore of output housing. For these drives, assemble bearing cup into bearing bore of output housing with a press or steel bar as shown in Figure 20.

Similarly, coat low speed shaft bearing bore of output housing, Ref. #11, with a NLGI #2 bearing grease. Install low speed shaft bearing cup, Ref. #4A2, into low speed shaft bearing bore of output housing.

3. **HIGH SPEED SHAFT ASSEMBLY** — Ref. #1A or 3A Assembly – Prepare bearings per Steps 1b and 1c.

   a. **SIZE 4107 & 4115**, Ref. #1A assembly, Type J25 only, Figure 21 — Install retaining ring in shaft groove in vicinity of input end bearing. Seat heated input end bearing, Ref. #1A1, on shaft using retaining ring as bearing shoulder.

Figure 21



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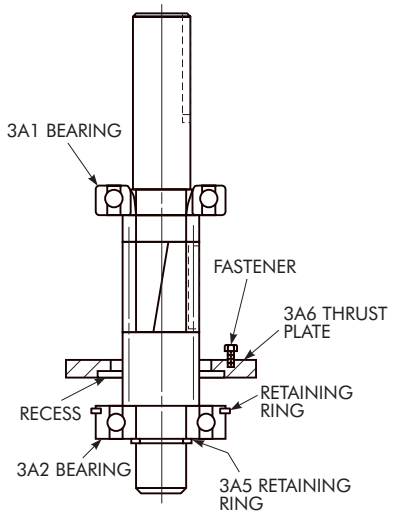
b. **SIZE 4115,** Ref. #3A assembly, Type J05 only, Figure 22 — Seat heated input end bearing, Ref. #3A1, tight against shaft shoulder. Slip thrust plate, Ref. #3A6, over output end of shaft with recess facing toward output end bearing, Ref. #3A2. Seat output end bearing tight against shaft shoulder.

NOTE: Mount output end bearing with external retaining ring on bearing outer race toward thrust plate as illustrated in Figure 22. Secure output end bearing on shaft with retaining ring, Ref. #3A5.

Figure 22

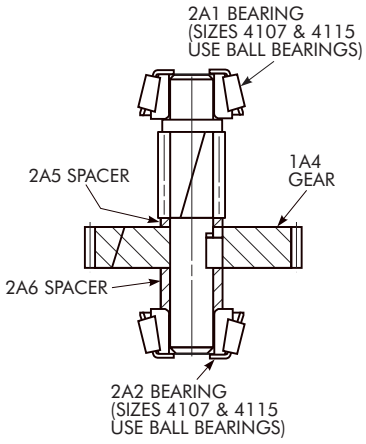


c. **ALL OTHER SIZES** — Seat heated bearings or cones, Ref. #1A1, 1A2 or 3A1 & 3A2, firmly against shaft shoulder or retaining ring.

CAUTION: Allow bearings to cool. Apply a coat of oil to the cooled bearings to lubricate and avoid scoring of working surfaces.

4. **INTERMEDIATE SHAFT ASSEMBLY** — Ref. #2A Assembly - Type J09, J14 and J25 - Figure 23. Prepare bearings per Steps 1b and c on Page 18.

Figure 23



a. **SIZE 4107 & 4115** — Assemble spacer Ref. #2A5, with chamfer toward pinion, onto intermediate shaft, Ref. #2A3.

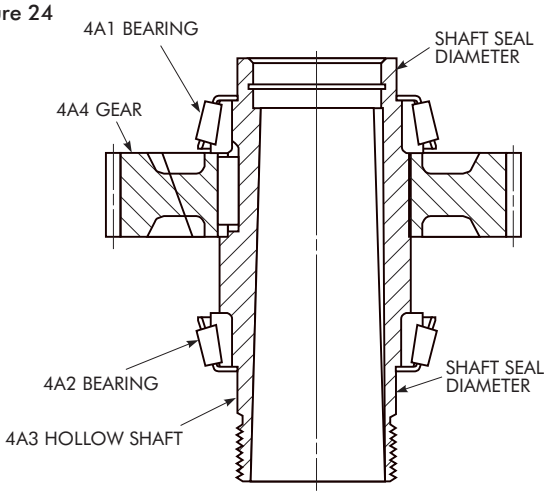
b. **ALL SIZES** — Heat gear Ref. #1A4 to 325° (163°C) in an oven. Insert key, Ref. #2A4, in shaft keyway. Assemble gear onto shaft, with the chamfer toward pinion, using a press to ensure a tight fit. Allow gear to cool before proceeding.

c. Assemble spacer, Ref. #2A6, onto intermediate shaft (except Sizes 4307 and 4315). Seat bearings or cones, Ref. #2A1 & 2A2, on shaft. Seat all components firmly so spacers do not rotate on shaft.

CAUTION: Allow assembly to cool. Apply a coat of oil to the cooled bearings to lubricate and avoid scoring of the working surfaces.

5. **LOW SPEED SHAFT ASSEMBLY** — Ref. #4A Assembly - ALL TYPES - Figure 24. Prepare bearing cones per Steps 1b and c.

Figure 24



a. Heat gear, Ref. #4A4, to 325°F (163°C) in an oven. Insert gear key, Ref. #4A5, into hollow shaft keyway. Assemble the gear with the chamfer toward the shoulder on the shaft using a press to ensure a tight fit.

WARNING: Exercise care so that the gear keyway does not contact the shaft seal diameter(s) as scoring could occur.

b. Seat bearing cones, Ref. #4A1 & 4A2, firmly against gear and shoulder.

CAUTION: Allow assembly to cool before proceeding. Apply oil to the cooled bearing rollers and gear teeth to lubricate and avoid scoring of the working surfaces.

6. BEARING ADJUSTMENT

a. **SIZES 4107 & 4115** — Bearing adjustment is made by adjusting the thickness of shim-gaskets, Ref. #21, between input and output housing flanges, Ref. #10 & 11, respectively.

(1) Support input housing, Ref. #10, such that when high speed shaft assembly, Ref. #1A or 3A, is lowered into place, there is clearance for shaft extension end.

(2) Lower low speed shaft assembly, Ref. #4A, into input housing, Ref. #10, with threaded end facing up. (DO NOT install Ref. #1A [or 3A], or 2A shaft assemblies at this time). Tap dowel pins into input housing with solid pin nearest high speed shaft bore. Position a .063" (1,60 mm) shim pack (consisting of one .015" (0,38 mm), three .009" (0,23 mm), and three .007" (0,18 mm) thick shim gaskets) on the flange of the input housing. Assemble output housing, Ref. #11, to input housing. Install housing flange fasteners, Ref. #25, with heads of cap screws against input housing. Cross tighten fasteners to torque specified in Table 14.

TABLE 14 — Housing Flange Fastener Size & Tightening Torque ±5%

(Non-Lubricated Fasteners)

DRIVE SIZE	Fastener Size	Tightening Torque lb-ft (Nm)
4107	.312-18	19 (26)
4115	.312-18	19 (26)
4203	.375-16	27 (37)
4207	.500-13	67 (91)
4215	.500-13	67 (91)
4307	.500-13	67 (91)
4315	.500-13	67 (91)

(3) For drives equipped with TA Taper Bushing, carefully thread bushing nut onto hollow low speed shaft threads. Rotate shaft to seat cone assemblies in bearing cups. Set up a dial indicator on output housing as illustrated in Figure 25. Dial indicator tip must rest on low speed shaft and not on nut surface.

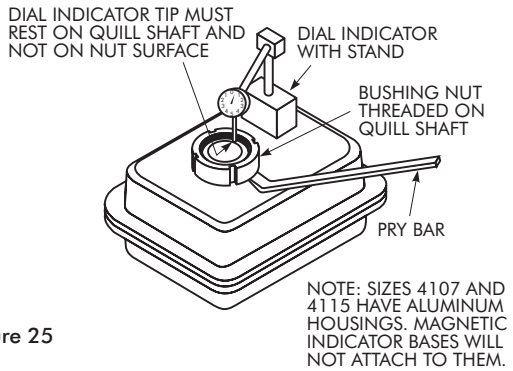


Figure 25

Rotate and oscillate shaft with axial force applied in both directions to obtain shaft axial float measurement. If no float is measured, add shim-gaskets, Ref. #21, between housing flanges until float is measurable. Refer to Table 17 for shim thickness.

(4) For drives without the TA Taper bushing, insert hollow shaft thrust plate and secure with retaining ring as illustrated in Section 1, Figure 5. Thread a bolt into thrust plate. Set up a dial indicator on output housing as illustrated in Figure 25, with the indicator tip on end of hollow shaft.

Rotate and oscillate shaft with axial force applied in both directions to obtain axial float measurement. (Upward force can be applied by applying upward force on head of thrust plate bolt.) If no float is measured, add shim-gaskets, Ref. #21, between housing flanges until float is measurable. Refer to Table 17 for shim thickness.

(5) If the axial float measured in 6a3 or 4 is greater than .010" (0,25 mm), subtract sufficient shims from between the housing flanges to obtain .001" to .010" (0,03 mm to 0,25 mm) float. Reassemble and repeat Step 6a3 or 4 until float is within above limits, then proceed to Step 6a6.

(6) Refer to Table 15 and note preload specified for bearings 4A1 and 4A2. Add to upper and lower limits shown, the axial float measured in Step 6a5. This will indicate thickness of shim(s) to be removed from between cover flanges to obtain the specified preload. Table 17 provides shim thickness for each shim pack to assist in obtaining the desired results.

TABLE 15 — Preload & Axial Float Settings

DRIVE SIZE	Ref. #4A1 & 4A2 Bearing Preload Inches (mm)	Ref. #2A3 Assy. Intermediate Shaft Axial Float	Ref. #1A3 or 3A3 Assy. High Speed Shaft Axial Float Inches (mm)
4107	.005-.007(0,13-0,18)	Non-Adjustable	Non-Adjustable .010-.070(0,25-1,78)
4115			

For example, from Table 15 the desired bearing preload for the Size 4115 low speed shaft is .005" to .007" (0,13 mm to 0,18 mm) tight. If the measured axial float was .008" (0,20 mm), removal of shims with a total thickness of .013" to .015" (0,33 mm to 0,38 mm) will produce the desired preload.

(7) With drive resting on input housing, Ref. #10, tap dowel pins out of housing. Remove flange fasteners and set output housing cover, Ref. #11, aside. Remove shim-gasket(s) as determined in Step 6a6. Install the remaining shaft assemblies into input housing. For some ratios, the shaft assemblies must be installed simultaneously.

SIZE 4115J05 — Assemble thrust plate, Ref. #3A6, to output housing cover using Loctite® 242 on fasteners and cross tighten to 7 lb-ft (9,5 Nm) torque.

CAUTION: Be careful not to get Loctite 242 on bearings or gearing.

(8) Reinstall dowels, shims and output housing cover & torque housing flange fasteners, Ref. #25, to value in Table 14. Proceed to Step 7.

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b. **SIZES 4203 THRU 4315** — Bearing adjustment is made by adjusting thickness of metal shims, Ref. #24, behind bearing cups in input housing, Ref. #10.

NOTE: The thickest shim should be located adjacent to the bearing cup. The thinnest shims should be located in the center of the shim pack.

(1) Support input housing, such that when high speed shaft assembly, Ref. #1A or 3A, is lowered into place there is clearance for shaft extension end. Install bearing cups in input housing without any metal shims. Tap dowel pins into input housing with solid pin nearest high speed shaft bore.

(2) Lower low speed shaft assembly, Ref. #4A, into input housing, Ref. #10, with threaded end facing up. (DO NOT install Ref. #1A [or 3A] or 2A shaft assemblies at this time.)

(3) Assemble output housing, Ref. #11, to input housing. Install housing flange fasteners, Ref. #25, with heads of cap screws against input housing. Cross tighten fasteners to torque specified in Table 14.

(4) Measure low speed shaft axial float with a dial indicator, in accordance with method described below.

(5) Low Speed Shaft Axial Float Measurement — Ref. #4A Assembly – For drives equipped with TA Taper bushing, carefully thread bushing nut onto hollow low speed shaft threads. Rotate shaft to seat cone assemblies in bearing cups. Set up a dial indicator on output housing as illustrated in Figure 25. Indicator tip must rest on low speed shaft and not on nut surface. Rotate and oscillate shaft with axial force applied in both directions to obtain axial float measurement.

For drives without the TA Taper bushing, insert hollow shaft thrust plate and secure with retaining ring as illustrated in Section I, Figure 5. Thread a bolt into the thrust plate. Set up a dial indicator on output housing, as illustrated in Figure 25, with the indicator tip on end of hollow shaft. Rotate and oscillate shaft with axial force applied in both directions to obtain axial float measurement. (Upward force can be applied by applying upward force on head of thrust plate bolt.)

Refer to Table 16 and note the preload specified for bearings 4A1 and 4A2. Add to upper and lower limits shown, the axial float measured. This will indicate thickness of metal shim(s), Ref. #31, to be added behind input housing bearing cup to obtain the specified preload. Table 17 provides shim thickness for each shim pack to assist in obtaining the desired results.

TABLE 16 — Preload & Axial Float Settings

DRIVE SIZE	Ref. #4A1 & 4A2 Bearing Preload Inches (mm)	Ref. #2A3 Assembly Intermediate Shaft Axial Float Inches (mm)	Ref. #1A3 or 3A3 Assembly High Speed Shaft Axial Float Inches (mm)
4203	.002-.004 (0,05-0,10)	.001-.003 (0,03-0,08)	.001-.003 (0,03-0,08)
4207	.003-.005 (0,08-0,13)	.001-.003 (0,03-0,08)	.001-.003 (0,03-0,08)
4215	.003-.005 (0,08-0,13)	.001-.003 (0,03-0,08)	.001-.003 (0,03-0,08)
4307	.004-.006 (0,10-0,15)	.001-.003 (0,03-0,08)	.001-.003 (0,03-0,08)
4315	.006-.008 (0,15-0,20)	.001-.003 (0,03-0,08)	.001-.003 (0,03-0,08)

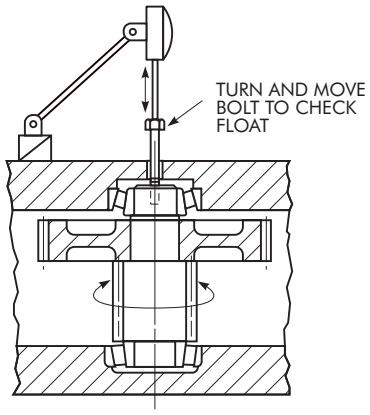
For example, from Table 16 the desired bearing preload for the Size 4203 low speed shaft bearings, Ref. #4A1 & 4A2, is .002" to .004" (0,05 mm to 0,10 mm) tight. If the measured axial float is .039" (0,99mm) then addition of metal shims with a total thickness between .041" to .043" (1,04 mm to 1,09 mm) behind the low speed input housing bearing cup will produce the desired preload.

(6) With drive resting on input housing cover, Ref. #10, tap the dowel pins out of the housing, remove flange fasteners and set output housing aside. Remove low speed shaft assembly and bearing cups. Install metal shim(s), as determined in Step 6b5, behind bearing cup in input housing.

(7) Lower low speed, Ref. #4A, high speed, Ref. #1A (or 3A), and intermediate, Ref. #2A shaft assemblies into input housing. Reinstall dowels and output housing and torque flange fasteners to value listed in Table 14. Recheck low speed shaft with dial indicator to ensure that no float is present. Measure intermediate and high speed shaft float with a dial indicator in accordance with methods described below.

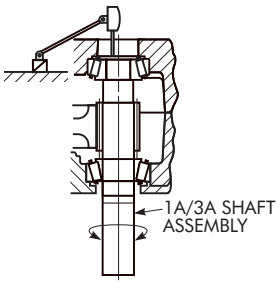
(8) **INTERMEDIATE SHAFT AXIAL FLOAT MEASUREMENT** — Ref. #2A Assembly – Figure 26. Remove pipe plug from output housing cover. Install a .375-16 x 2" size bolt through hole in housing and turn by hand until snug. Set up a dial indicator on output housing with the indicator tip on bolt head as illustrated in Figure 26. While turning bolt in a clockwise direction, lift upward to measure axial float. Subtract from this reading the axial float for the Ref. #2A shaft assembly shown in Table 16. This indicates the thickness of metal shim(s), Ref. #22 to be added behind the input housing bearing cup to obtain the specified axial float.

Figure 26



For example, from Table 16 the desired axial float for the Size 4307 intermediate shaft assembly, Ref. #2A, is .001" to .003" (0,03 mm to 0,08 mm). If the measured axial float is .039" (0,99 mm) then addition of metal shims with a total thickness between .036" to .038" (0,91 mm to 0,96 mm) behind the intermediate speed input housing bearing cup will produce the desired axial float.

Figure 27



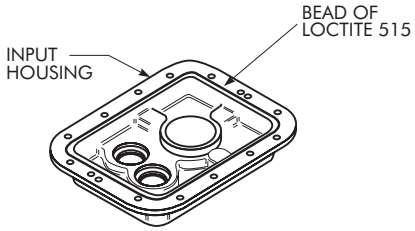
(9) **High Speed Shaft Axial Float Measurement** — Ref. #1A or 3A Assembly – Figure 27. Set up a dial indicator as illustrated in Figure 27 to measure axial float of output end of shaft. Push upward on shaft extension end with a twisting motion to obtain reading. Subtract from this reading the axial float for the Ref. #1A (or 3A) shaft assembly shown in Table 16. This indicates the thickness of metal shim(s), Ref. #24, to be added behind the input housing bearing cup to obtain the specified axial float.

WARNING: Cover shaft extension end keyway with tape to avoid lacerations to the hand.

(10) Disassemble drive once more to add metal shim(s) behind input intermediate and high speed housing bearing cups to obtain the specified axial float shown in Table 16.

(11) Apply a bead of Loctite 515 to input housing flange as shown in Figure 28. Assemble output housing to input housing and install dowels. Install and cross tighten flange fasteners to torque specified in Table 14.

Figure 28



(12) Check intermediate and high speed shaft axial floats with dial indicator to ensure they are within specified limits. If necessary, disassemble drive. Clean Loctite 515 from housing flanges. Readjust metal shims behind input housing bearing cups, reapply Loctite 515, and reassemble. Repeat until specified float is achieved.

7. BACKSTOP INSTALLATION

If drive will be installed on the driven equipment using a TA tapered bushing, do not install backstop at this time. If not, refer to Appendix B, for installation instructions.

8. SHAFT COVER INSTALLATION

Assemble output side high speed shaft cover, Ref. #16, and gasket, Ref. #23 (Table 17). Cross tighten fasteners to 3.5 lb-ft (4,7 Nm) torque.

9. SEAL INSTALLATION

Refer to Section II, Step 7. Position input end low speed and high speed shaft covers, Ref. #13 & 15, respectively, over housing bore and tap lightly until cover is fully seated into bore.

DRIVE IS READY TO INSTALL — Refer To Section I.

TABLE 17 — Individual Shim-Gasket Part Numbers

Ref. No.	Shim Thickness Inch (mm)	DRIVE SIZE						
		4107	4115	4203	4207	4215	4307	4315
100	. . .	0754740	0754741	0786836	0786837	0786838	0786839	0786840
21	.007 (0,18) .009 (0,23) .015 (0,38)	1161877 0728228 0728229	1161878 0728235 0728236	. . . .	. . . .	. . . .	. . . .	. . . .
22	.002 (0,05) .005 (0,13) .010 (0,25) .030 (0,76)	. . . .	. . . .	0787097 0787098 1238022 0787099	0781116 0781117 1237213 0781118	0787109 0787110 1238062 0787111	0787080 0787081 1237946 0787082	0785034 0785035 1237766 0785036
23 (w/o backstop) 23 (with backstop)	.031 (0,79) .031 (0,79)	1161871 1161871	1161872 1161872	2120198 1238020	2119131 2119131	1161876 1189882	1161876 2120077	1161876 1189882
24	.002 (0,05) .005 (0,13) .010 (0,25) .030 (0,76)	. . . .	. . . .	0787100 0787101 1238023 0787102	0781116 0781117 1237213 0781118	0787106 0787107 1238061 0787108	0787083 0787084 1237947 0787085	0785037 0785038 1237767 0785039
31	.002 (0,05) .005 (0,13) .010 (0,25) .030 (0,76)	. . . .	. . . .	0787094 0787095 1238021 0787096	0781113 0781114 1237212 0781115	0787112 0787113 1238063 0787114	0787077 0787078 1237945 0787079	0785031 0785032 1237765 0785033

Falk Shim-Gasket Compressibility — Inches (mm)

Thickness									
	New	.002 (0,05)	.005 (0,13)	.007 (0,18)	.009 (0,23)	.010 (0.25)	.015 (0,38)	.030 (0,76)	.031 (0,79)
	Compressed	.002 (0,05)	.005 (0,13)	.006 (0,15)	.008 (0,20)	.010 (0.25)	.013 (0,33)	.030 (0,76)	.028 (0,71)

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Lubrication

Introduction

Lubricants listed in this manual are typical products ONLY and should not be construed as exclusive recommendations. Industrial type petroleum based rust and oxidation inhibited (R & O) gear lubricants or industrial type sulfur-phosphorus extreme pressure (EP) gear lubricants are the recommended lubricants for ambient temperatures of 30°F to 125°F (-1°C to 52°C).

For drives operating outside the above temperature range, refer to the "Synthetic Lubricants" paragraph. Synthetic lubricants can also be used in normal climates.

Carefully follow instructions on the drive nameplate, warning tags and installation manuals furnished with the drive.

Viscosity (Important)

The proper viscosity grade for R & O and EP lubricants is found in Table 3. For synthetic lubricant viscosity grades, refer to Table 4 and the "Synthetic Lubricants" paragraphs. Petroleum based lubricant selections must have a pour point at least 10°F (5.5°C) below the expected minimum ambient starting temperature.

Petroleum Based Lubricants

R & O GEAR LUBRICANTS (TABLE 3) — Industrial type petroleum based rust and oxidation inhibited (R & O) gear lubricants are the most common and readily available general purpose gear lubricants.

EXTREME PRESSURE (EP) LUBRICANTS (TABLE 3) — For highly loaded drives or for drives loaded in excess of original estimates, industrial-type petroleum extreme pressure lubricants are preferred. The EP lubricants currently recommended are of the sulfur–phosphorus type.

CAUTION: PETROLEUM BASED LUBRICANTS & INTERNAL BACKSTOPS — Do not use EP lubricants or lubricants with anti–wear additives or lubricant formulations including sulfur, phosphorus, chlorine, lead derivatives, graphite or molybdenum disulfides in drives equipped with internal cartridge type backstops. Some lubricants in Table 3 may contain anti–wear additives. EP lubricants in Table 3 do contain several of these additives.

WARNING: EP LUBRICANTS IN FOOD PROCESSING INDUSTRY — EP lubricants may contain toxic substances and should not be used in the food processing industry without the lubricant manufacturer's approval. Lubricants which meet USDA "H1" classification are suitable for food processing applications.

Synthetic Lubricants

Synthetic lubricants of the polyalphaolefin type are recommended for cold climate operation, high temperature applications, extended temperature range (all season) operation and/or extended lubricant change intervals. The proper viscosity grade of synthetic lubricant is given in Table 4. Usable temperature ranges can sometimes be widened if specific application conditions are known.

NOTE: SYNTHETIC LUBRICANTS & INTERNAL BACKSTOPS – Synthetic lubricants of the polyalphaolefin type may be used in drives with internal backstops. Select proper lubricant grade from Table 4.

NORMAL CLIMATE CONDITIONS — For temperatures of 30°F (–1°C) and above, use viscosity grades as recommended in Table 3 for petroleum based lubricants, or see Table 4 for synthetic lubricants.

WARNING: SYNTHETIC LUBRICANTS IN FOOD PROCESSING INDUSTRY – Synthetic lubricants may contain toxic substances such as sulfur, phosphorus, chlorine, lead derivatives, graphite or molybdenum disulfides and should not be used in the food processing industry without the lubricant manufacturer's approval. Lubricants which meet USDA "H1" classification are suitable for food processing applications.

Lubricant Changes

OIL ANALYSIS REPORT — Checking oil condition at regular intervals is recommended. In the absence of more specific limits, the guidelines listed below may be used to indicate when to change oil:

1. Water content is greater than 0.05% (500 ppm).
2. Iron content exceeds 150 ppm.
3. Silicon (dust/dirt) exceeds 25 ppm.
4. Calcium content 50 ppm above normal lubricant amount.
5. Viscosity changes more than 15%.

PETROLEUM LUBRICANTS — For normal operating conditions, change gear oils every six months or 2500 operating hours, whichever occurs first. If the drive is operated in an area where temperatures vary with the seasons, change the oil viscosity grade to suit the temperature, refer to Table 3. Lubricant suppliers can test oil from the drive periodically and recommend economical change schedules.

SYNTHETIC LUBRICANTS — Synthetic lube change intervals can be extended to 8000 hours depending upon operating temperatures and lubricant contamination. Laboratory analysis is recommended for optimum lubricant life and drive performance. Change lube with change in ambient temperature, if required. Refer to Table 4.

TABLE 1 — Approximate Oil Capacity – Quarts (Liters) ★

DRIVE SIZE	JR, JF & JSC	JRV & JFV
4107	2 (1,9)	3 (2,8)
4115	3 (2,8)	4.5 (4,3)
4203	3.5 (3,3)	5 (4,7)
4207	5.5 (5,2)	7.5 (7,1)
4215	9 (8,5)	13 (12,3)
4307	13 (12,3)	18 (17)
4315	15 (14,2)	21 (19,9)

★ Quantities are approximate. Always fill drive to specified level.

Grease Lubricated Seals

All drives are furnished with grease purged seals which minimize the entry of contaminants and abrasive dusts into the drive. Drives are shipped with NLGI #2 grease in the seal housing cavities unless otherwise specified.

Whenever changing oil in the drive, purge the seals with one of the NLGI #2 greases listed in Table 2.

TABLE 2 — Greases for Grease Purged Seals

[0°F to 200°F (-18°C to 93°C)]

Manufacturer	Lubricant
Amoco Oil Co. BP Oil Co. Chevron U.S.A., Inc. Citgo Petroleum Corp.	Amolith Grease No. 2 Energrease LS-EP2 Industrial Grease Medium Premium Lithium Grease No. 2
Conoco Inc. Exxon Company, U.S.A. Houghton Int., Inc. Imperial Oil Ltd.	EP Conolith Grease No. 2 Unirex N2 Cosmolube 2 Unirex N2L
Kendall Refining Co. Keystone Lubricants Lyondell Petrochemical (ARCO) Mobil Oil Corp.	Multi-Purpose Lithium Grease L421 Zeniplex 2 Litholine H EP 2 Grease Mobilith 22
Mobil OIl Corp. Petro-Canada Products Phillips 66 CO Shell Oil Co.	Mobilith SHC 460 † Multipurpose EP2 Philube Blue EP Alvania Grease 2
Shell Canada Limited Sun Oil Co. Texaco Lubricants	Alvania Grease 2 Ultra Prestige EP2 Premium RB Grease
Unocal 76 (East & West) Valvoline Oil Co.	Unoba EP2 Multilube Lithium EP Grease

† High performance synthetic alternate.

Some of these greases are of the EP type and may contain toxic substances not allowed in the food processing industry. If grease could contaminate the product, as in the food and drug industries, the grease should be removed. A grease that meets the USDA "H1" classification is suitable for food processing applications.

Periodically (at least every six months) depending upon the frequency and degree of contamination, purge contaminated grease from seals by slowly pumping fresh bearing grease through the seal, **WITH HAND GREASE GUN**, until fresh grease flows out along the shaft. Wipe off purged grease.

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Table 3 — Petroleum Based Gear Lubricants ★

Ambient Temperature Range		+30 to +90°F	+70 to +125°F
		-01 to +32°C	+21 to +52C
AGMA Viscosity Grade		5	6
ISO Viscosity Grade		220	320
Viscosity	cSt @ 40°C	198 - 242	288-352
	SSU @ 100°F	918 - 1122	1335-1632
Manufacturer		**Lubricant**	
Amoco Oil Co.		Amer. Ind. Oil 220 Permogear/Amogear EP 220 •	Amer. Ind. Oil 320 Permogear/Amogear EP 320 •
BP Oil Co.		Energol HLP-HD 220 Energear EP 220 •	. . . . . Energear EP 320
Chevron U.S.A., Inc.		Machine Oil AW 220 Gear Compounds EP 220 •	Machine Oil AW 320 Gear Compounds EP 320 •
Citgo Petroleum Corp.		Citgo Pacemaker 220 Citgo EP Compound 220 •	Citgo Pacemaker 320 Citgo EP Compound 320 •
Conoco Inc.		Dectol R&O Oil 220 Gear Oil 220 •	Dectol R&O Oil 320 Gear Oil 320 •
Exxon Company, U.S.A.		Teresstic 220 Spartan EP 220 •	Teresstic 320 Spartan EP 320 •
Houghton International, Inc.		Hydro - Drive HP 1000 MP Gear OIl 220 •	. . . . . MP Gear OIl 320 •
Imperial Oil Ltd.		Teresso 220 Spartan EP 220 •	Teresso 320 Spartan EP 320 •
Keystone Lubricants		KLC-50 Keygear 220 •	. . . . . Keygear 320 •
Lyondell Petrochemical (ARCO)		Duro 220 Pennant NL 220 •	Duro 320 Pennant NL 320 •
Mobil Oil Corp.		DTE Oil BB Mobilgear 220 •	DTE Oil AA Mobilgear 320 •
Petro-Canada Products		Harmony 220 Ultima EP 220 •	Harmony 320 Ultima EP 320 •
Phillips 66 Co.		Magnus Oil 220 Philgear 220 •	Magnus Oil 320 Philgear 320 •
Shell Oil Co.		Morlina 220 Omala Oil 220 •	Morlina 320 Omala Oil 320 •
Shell Canada Limited		Tellus 220 Omala Oil 220 •	Tellus 320 Omala Oil 320 •
Texaco Lubricants		Regal Oil R&O 220 Meropa 220 •	Regal Oil R&O 320 Meropa 320 •
Unocal 76 (East)		Unax RX 220 Extra Duty NG Gear Lube 220 •	Unax AW 320 Extra Duty NG Gear Lube 320 •
Unocal 76 (West)		Turbine Oil 220 Extra Duty NG Gear Lube 220 •	Turbine Oil 320 Extra Duty NG Gear Lube 320 •
Valvoline Oil Co.		Valvoline AW ISO 220 AGMA EP 220 •	Valvoline AW ISO 320 AGMA EP 320 •

★ Minimum viscosity index of 90. Maximum operating temperature of lubricants is 200°F (93°C)
● Extreme Pressure Lubricant (contains sulfur-phosphorus). **DO NO**T use in drives equipped with internal backstop.

TABLE 4 — Synthetic Lubricants – Polyalphaolefin Type ‡

Ambient Temp. Range	–30 to +10°F (–34 to –12°C)	–15 to +50°F (–26 to +10°C)	0 to +80°F (–18 to +27°C)	+10 to +125°F (–12 to +52°C) ★	+20 to +125°F (–7 to +52°C)
AGMA Viscosity Grade	**0S**	**2S**	**4S**	**5S**	**6S**
ISO Viscosity Grade	**32**	**68**	**150**	**220**	**320**
Viscosity cSt @ 40°C	**28.8-35.2**	**61.2-74.8**	**135-165**	**198-242**	**288-352**
Viscosity SSU @ 100°F	**134-164**	**284-347**	**626-765**	**918-1122**	**1335-1632**
Manufacturer	**Lubricant**				
Chevron U.S.A., Inc.	. . .	. . .	. . .	Clarity Synthetic PM Oil 220 Syn. Gear Lube Tegra 220 ■	. . .
Conoco Inc.	Syncon R & O 32	Syncon R & O 68 Syncon EP 68 ■	Syncon EP 150 ●■	Syncon R & O 220 ● Syncon EP 220 ●■	Syncon EP 320 ●■
Dryden Oil Co.	Dryden SHL Lubricant 32	Dryden SHL Lubricant 68	Dryden SHL Lubricant 150	Dryden SHL Lubricant 220	Dryden SHL Lubricant 320
Exxon Company, U.S.A.	Teresstic SHP 32	Teresstic SHP 68	Teresstic SHP 150 Spartan Synthetic EP 150 ■	Teresstic SHP 220 Spartan Synthetic EP 220 ■	Teresstic SHP 320 Spartan Synthetic EP 320 ■
Mobil Oil Corp.	SHC 624	SHC 626	SHC 629 Mobilgear SHC 150 ■	SHC 630 Mobilgear SHC 220 ■	SHC 632 Mobilgear SHC 320 ■
Pennzoil Products Co.	Pennzgear SHD 32	Pennzgear SHD 68 Super Maxol "S" 68 ■	Pennzgear SHD 150 Super Maxol "S" 150 ■	Pennzgear SHD 220 Super Maxol "S" 220 ■	Pennzgear SHD 320 Super Maxol "S" 320 ■
Petro-Canada Products	. . .	. . .	Super Gear Fluid 150EP ■	Super Gear Fluid 220EP ■	Super Gear Fluid 320EP ■
Shell Oil Co.	. . .	. . .	. . .	Hyperia 220 Hyperia S 220 ■	Hyperia 320 Hyperia S 320 ■
Sun Co.	. . .	. . .	. . .	Sunoco Challenge 220 Sunoco challenge eP 220 ■	Sunoco Challenge 320 Sunoco Challenge EP 320 ■
Texaco Lubricants Co.	Pinnacle 32	Pinnacle 68	Pinnacle 150 Pinnacle EP 150 ■	Pinnacle 220 Pinnacle EP 220 ■	Pinnacle 320
Whitmore Manufacturing Co.	. . .	. . .	Decathlon 4EP ■	Decathlon 5EP ■	Decathlon 6EP ■

‡ Minimum viscosity index of 130. Consult lubricant supplier/manufacturer for maximum operating temperature.
● Minimum viscosity index of 120.
■ Extreme pressure EP lubricant (contains sulphur-phosphorus). **DO NOT** use in drive equipped with internal backstop.
★ Drives **NOT** equipped with internal backstop may widen the ambient temperature range to -25 to +125°F (-32 to 52°C).

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Backstop Installation

Introduction

The following instructions apply to INSTALLATION ONLY of internal backstops in horizontal drives, Sizes 4107 thru 4215 single and double reduction and Size 4307 & 4315 double reduction.

CAUTION: If backstop is to be replaced, the high speed shaft must also be replaced. Refer to instructions regarding high speed shaft replacement, Section III.

Remove all external loads from system before servicing drive or accessories, and lock out starting switch of prime mover.

Lubricant

PETROLEUM BASED LUBRICANTS — Use R & O type lubricants which do not contain anti-wear(AW) additives if the drive is equipped with an internal backstop.

CAUTION: Do not use EP lubricants, lubricants with anti-wear additives or lubricant formulations including sulfur, phosphorus, chlorine, lead derivatives, graphite or molybdenum disulfides in drives equipped with internal backstops. Refer to Appendix A for proper selection of petroleum based lubricants. Use of an improper lubricant will contribute to premature wear or malfunction of the backstop.

SYNTHETIC LUBRICANTS — Synthetic lubricants of the polyalphaolefin type may be used in drives with internal backstops.

Before installing backstop, check direction of free rotation (overrunning) indicated by the arrow etched on each side of the backstop.

Backstop Application

Backstops are designed to prevent reverse rotation or backrun without backlash in applications such as conveyors, bucket elevators, fans, rotary pumps and kilns. Backstops are not approved for use on systems that are designed for handling of people such as elevators, manlifts, ski tows and ski lifts. DO NOT use a backstop as a substitute for a brake.

Indexing

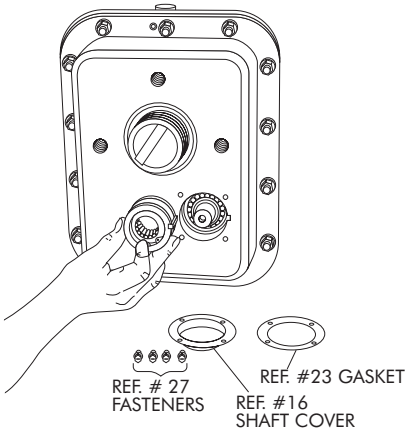
DO NOT use the backstop for indexing applications. The backstop is designed to prevent reverse rotation five times or less in eight hours, with one minute or more in overrunning direction between backstopping load applications. If backstopping operations are more frequent, or the time between operations is less than one minute, the backstop is classified as an indexing device and must be referred to the Factory.

Installation

1. Drain oil from drive.

   If a backstop is being added to an existing drive, remove fasteners Ref. #27, gasket Ref. #23 and end cover Ref. #16, Figure 1.

Figure 1

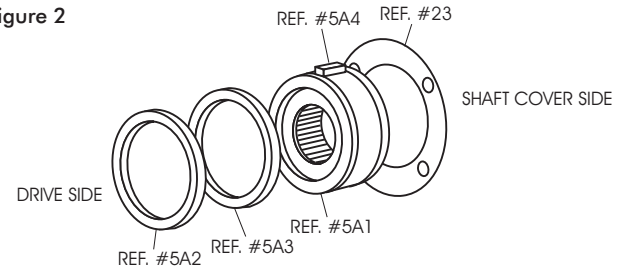


   If a backstop is being replaced, for Sizes 4107 and 4115, remove fasteners Ref. #27, end cover Ref. #16, gasket Ref. #23, backstop Ref. #5A1 and spacer Ref. #5A3 (where necessary). For Sizes 4203 thru 4315, remove fasteners Ref. #27, end cover Ref. #16, gasket(s) Ref. #23, backstop Ref. #5A1, spacer Ref. #35A3 (all sizes) and cover spacer Ref. #17 (Size 4207 only). See Section II for complete parts list.

2. Remove backstop Ref. #5A1 from the kit and wipe off any excess lubricant.

3. **SIZE 4107** — Assemble retaining ring 5A2 into one of the grooves on the backstop O.D., Figure 2.

Figure 2



4. **SIZE 4115J25** — Assemble retaining ring 5A2 into one of the grooves on the backstop O.D. and slide spacer Ref. #5A3 into position as illustrated in Figure 2.

5. **SIZES 4203 THRU 4315** — Insert spacer Ref. #5A3 into exposed housing bore. This spacer will fit between bearing cup and backstop. (Retaining ring supplied with backstop kit is used as spacer for Size 4207.)

Backstop Installation

6. **ALL SIZES** — Apply oil to the O.D. of the high speed shaft backstop journal and the sprags inside of the backstop. Insert key Ref. #5A4 into backstop keyway Figure 2. Align the key with the keyway in the exposed housing bore and carefully slide the backstop into the bore while slowly rotating the high speed shaft. The shaft will only rotate in one direction. DO NOT FORCE OR HAMMER; this may damage the shaft or misalign the sprags.

   Check operation of backstop by turning high speed shaft in required direction of rotation by hand. If the shaft does not rotate in the required direction, remove backstop, reverse it, reposition the retaining ring and spacer (where required) and reinsert it into the bore as instructed above.

   Rotate high speed shaft in the required direction of rotation and then reverse the rotation to lock up the backstop. Observe the position of the sprags. All sprags must be engaged and lay in the same relative position around the shaft. If the sprags are not uniformly positioned, lightly tap the backstop cage to centralize all the sprags around the shaft and cage. If sprags cannot be uniformly positioned in this manner, remove the backstop and run a finger around the sprags in the overrunning direction. Reinstall backstop as instructed in preceding steps.

   Check the position of the sprags several times by overrunning and locking the sprags. If all sprags move uniformly, hold the backstop in the locked position and proceed to the next assembly step.

7. **SIZES 4107 THRU 4115** — Reinstall the cover Ref. #16 and spacer Ref. #17 (where applicable) using a new gasket Ref. #23 from the backstop kit of shim-gasket kit Ref. #100, Section III, Table 17. Cross tighten fasteners to 3 lb-ft (4 Nm) torque.

8. **SIZES 4203 & 4215 THRU 4315** — If the backstop is being added to an existing drive, discard the original end cover Ref. #16 and fasteners Ref. #27 and replace with the end cover, fasteners and gasket included with the backstop kit. When a backstop is being replaced, use a new gasket Ref. #23 from the shim-gasket kit Ref. #100.

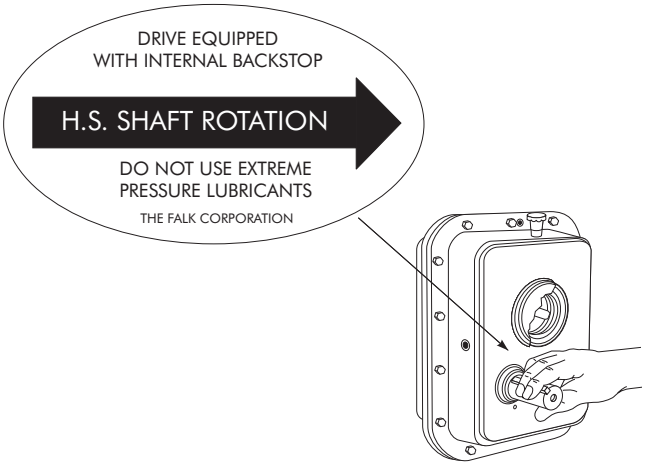
   NOTE: Position gasket and spacer so that the drain back hole is open. Blocking the drainback hole will not allow oil to lubricate backstop sufficiently and could lead to premature wear, resulting in backstop or drive failure. Cross tighten the fasteners to 8 lb-ft (11 Nm) torque.

9. **SIZE 4207** — If the backstop is being added to an existing drive, install spacer Ref. #17 (spacer with drain back hole) between housing and original end cover Ref. #16, using gaskets Ref. #23 supplied with backstop kit. A gasket must be installed on both sides of spacer. When a backstop is being replaced, use two new gaskets, Ref. #23 from the shim-gasket kit Ref. #100.

   NOTE: Position gasket and spacer so that the drain back hole is open. Blocking the drainback hole will not allow oil to lubricate backstop sufficiently and could lead to premature wear, resulting in backstop or drive failure. Cross tighten the fasteners to 8 lb-ft (11 Nm) torque.

10. Clean housing surface for rotation and WARNING labels. Affix the rotation indicator next to high speed shaft extension to indicate the free direction of rotation (Figure 3). Fill to oil level specified in Section I with oil specified in Appendix A. Check motor for correct rotation before completing connection to drive.

Figure 3



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TA Removal Tool

Introduction

The patented TA removal tool offers a positive method for removing a TA Taper equipped Quadrive from the driven shaft. This method uses the torque multiplying characteristic of the drive to separate the drive from the bushing and driven shaft.

The removal tool is available in kit form suitable for use with Sizes 4107 thru 4315. The kit can be ordered from your Falk distributor by specifying "TA Removal Kit - Part 0769406". NOTE: Use of this tool requires a minimum axial clearance "M" shown in Figure 1 and Table 1.

CAUTION: DO NOT modify the tool in any way OR use it in another manner except to loosen the bushing nut as instructed herein.

Figure 1

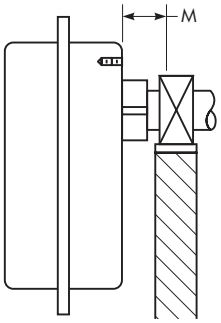


TABLE 1 — Minimum Tool Clearance – Inches (mm)

DRIVE SIZE	M Dimension
4107	2.62 (67)
4115	2.62 (67)
4203	2.62 (67)
4207	2.62 (67)
4215	3.18 (81)
4307	3.18 (81)
4315	3.18 (81)

Preparation For Removal

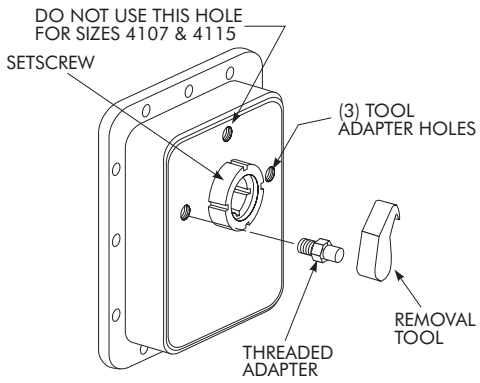
WARNING: Always "lock out" prime mover before working on the Quadrive.

1. Quadrive shafts, input and output, must be free to rotate.
   a) Remove any external load on the driven shaft.
   b) Remove belts from input shaft sheave.
   c) Remove the backstop (if so equipped). Refer to Section II — Step 10, for backstop removal instructions.

   CAUTION: DO NOT disconnect the drive from its torque arm until the removal process is completed. In addition, the drive must be supported during removal process. Use a sling around the motor mount or as recommended in SECTION I, Step 7. Be sure to take up the slack in the sling before proceeding.

2. Loosen the setscrew on the O.D. of the bushing nut and select the most convenient of the tapped holes in the housing face for the threaded adapter. Figure 2.
3. Select the proper adapter from the tool kit. (Adapters are marked with the Quadrive Size and part number.) Make sure the tapped hole in the housing face is clean before inserting the adapter. Apply tightening torque from Table 2.

Figure 2



4. Mount the removal tool as illustrated in Figure 3 or 4. It is generally preferable to install the tool in a position where its weight will tend to keep it engaged into the nut. Then rotate the input shaft until the tool hook engages one of the slots in the nut.

TABLE 2 — Adapter Tightening Torque

DRIVE SIZE	Adapter Part Number	Torque lb-ft (Nm)
4107	2111955	35 (47)
4115	2111956	70 (95)
4203	9111957	108 (146)
4207	2111958	120 (163)
4215	2111959	180 (244)
4307	2111959	180 (244)
4315	2111959	180 (244)

TA Removal Tool

Figure 3

SIZES 4107, 4115, 4203, & 4207

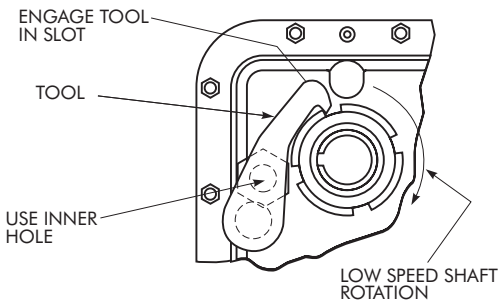
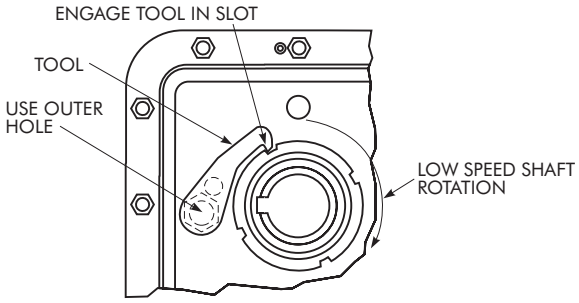


Figure 4

SIZES 4215, 4307 & 4315



Removal of Quadrive

5. Use a spanner wrench to apply torque through the input shaft keyway (Type J05 clockwise; Types J09, J14 or J25 counter-clockwise) to loosen the bushing nut.

   CAUTION: Never use the prime mover to produce the torque needed. This could result in severe personal injury or damage to the equipment.

   To avoid damage to the drive or the removal tool, DO NOT exceed the H.S. shaft torque values listed in Table 3. NOTE: The nut will rotate freely for approximately 180° as it moves from the locked to the removal position. Resistance will indicate that unseating is occurring. Turn until the nut and bushing are completely free. Now, prepare the drive for lifting by disconnecting the torque arm at the drive end.

6. ALTERNATE METHOD — Torque may be applied to the sheave or sprocket mounted on the input shaft.

TABLE 3 — Maximum Torque – H.S. Shaft lb-ft (Nm)

DRIVE SIZE	Drive Reduction			
	J05	J09	J14	J25
4107	164 (223)	88 (120)	58 (78)	33 (44)
4115	248 (336)	133 (181)	90 (121)	50 (68)
4203	406 (550)	224 (304)	143 (193)	79 (107)
4207	493 (668)	263 (357)	173 (234)	100 (136)
4215	677 (917)	371(503)	245 (332)	133 (181)
4307	762 (1033)	405 (549)	278 (377)	150 (203)
4315	813 (1102)	432 (585)	283 (384)	160 (217)

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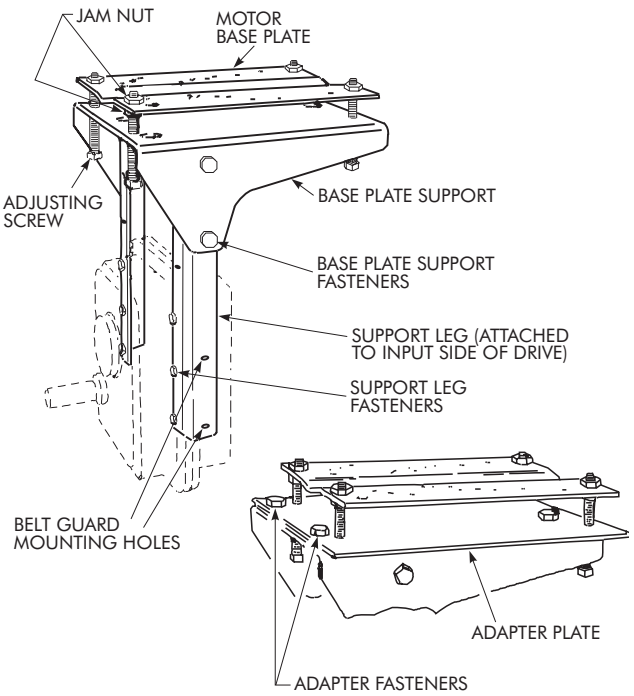
Motor Mount Installation

Introduction

The Falk Equi-Poised motor mount is an all steel weldment that bolts directly to the drive housing of Falk Shaft Mounted (Type JR), Flange Mounted (Type JF) and Screw Conveyor (Type JSC) Drives, as shown in Figure 1.

This modern design provides a simple means of tensioning V-belts or chains with adjusting screws. Motor baseplates are available from Factory predrilled for NEMA and IEC standard foot-mounted motors within the rated capacity of the drive.

Figure 1

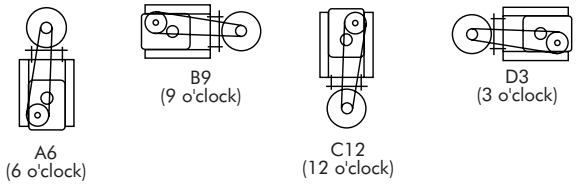


Assembly Instructions

From Figure 2, determine which assembly is required. For minimum bearing loads on driven machine, minimum shaft deflection and the most economical belt selections, use the 6 o'clock mounting position, high speed shaft relative to the low speed shaft, illustrated in Figure 1. The motor/drive assembly can also be mounted in positions shown in Figure 2. Always locate air vent at the top of horizontal drives.

STANDARD ASSEMBLIES

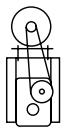
Figure 2



Letter = Motor Mount Position
Clock = Drive High Speed Shaft Position

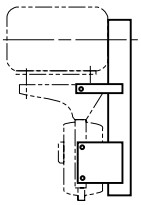
OPTIONAL ASSEMBLY

The motor mount may be mounted on the high speed shaft end of FLANGE MOUNTED DRIVES – JF (also SCREW CONVEYOR DRIVES – JSC) if clearance over the trough end permits) when increased motor mount clearance is required at the driven machine. Consult Factory for SHAFT MOUNTED DRIVES – JR.



Guards

CAUTION: Consult applicable local and national safety codes for proper guarding of rotating members.



OSHA type guard when specified. Dimensions to suit components.

Mounting holes located on the motor mount supports are provided for installing a belt guard. Refer to Appendix L for installation of Falk V-Belt guards.

WARNING: Remove all external loads from system before servicing drive or accessories.

1. **ASSEMBLE MOTOR MOUNT** — Loosely assemble support legs to the base plate support as shown in Figure 1.

   NOTE: Nuts on inside for Sizes 4107 thru 4115. Nuts on outside for Sizes 4203 thru 4315.

   For NEMA motor frames 254 and larger or IEC motor frames 160 & larger, fasten adapter plate to base plate support and tighten adapter fasteners to the torque specified in Table 1. Assemble adjusting screws to base plate support (or adapter plate when used). Assemble motor base plate to adjusting screws with a jam nut above and below the motor base plate.

TABLE 1 — Motor Mount Fasteners & Torques ★ lb-ft (Nm)

DRIVE SIZE	Support Leg to Baseplate Support		Support Leg to Housing		Adapter Plate to Baseplate Support		Adjusting Screws (W/O Adapter)		Adjusting Screws (With Adapter)	
	Fastener Size	Tightening Torque	Fastener Size	Tightening Torque	Fastener Size	Tightening Torque	Fastener Size	Tightening Torque	Fastener Size	Tightening Torque
4107	.375-16UNC x 1.00	28 (38)	.312-18UNC x 1.50	20 (26)	. . .	. . .	.625-11UNC x 5.00	60 (81)	. . .	. . .
4115	.375-16UNC x 1.00	28 (38)	.312-18UNC x 1.50	20 (26)	.625-11UNC x 1.00	60 (81)	.625-11UNC x 5.00	60 (81)	.750-10UNC x 6.00	108 (146)
4203	.500-13UNC x 1.25	69 (94)	.375-16UNC x 2.00	28 (38)	.625-11UNC x 1.00	60 (81)	.625-11UNC x 5.00	60 (81)	1.000-8UNC x 6.00	180 (244)
4207	.500-13UNC x 1.25	69 (94)	.500-13UNC x 2.25	69 (94)	.625-11UNC x 1.00	60 (81)	.625-11UNC x 5.00	60 (81)	1.250-7UNC x 7.00	362 (491)
4215	.625-11UNC x 1.50	137 (186)	.500-13UNC x 2.25	69 (94)	.625-11UNC x 1.00	60 (81)	.625-11UNC x 5.00	60 (81)	1.250-7UNC x 7.00	362 (491)
4307	.750-10UNC x 1.75	245 (332)	.500-13UNC x 2.50	69 (94)	.625-11UNC x 1.00	60 (81)	.625-11UNC x 5.00	60 (81)	1.250-7UNC x 7.00	362 (491)
4315	.750-10UNC x 1.75	245 (332)	.500-13UNC x 2.50	69 (94)	.625-11UNC x 1.00	60 (81)	.625-11UNC x 5.00	60 (81)	1.250-7UNC x 7.00	362 (491)

★ All fasteners are Grade 5.

Motor Mount Installation

2. ATTACH MOTOR MOUNT TO DRIVE — To determine the number of housing flange fasteners to be removed for a given shaft center and drive size, refer to Table 2. Remove and discard appropriate number of housing flange fasteners, and replace them with the longer support leg fasteners provided. Attach support legs to the input side of drive with the hex nuts on output side of drive. Tighten support leg and base plate support fasteners to torque values specified in Table 1.

SHAFT CENTERS FOR HORIZONTAL & VERTICAL DRIVES

Figure 3

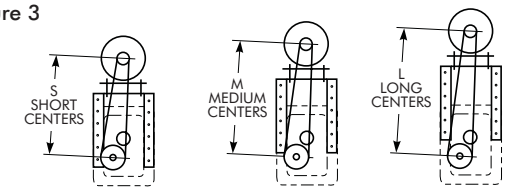


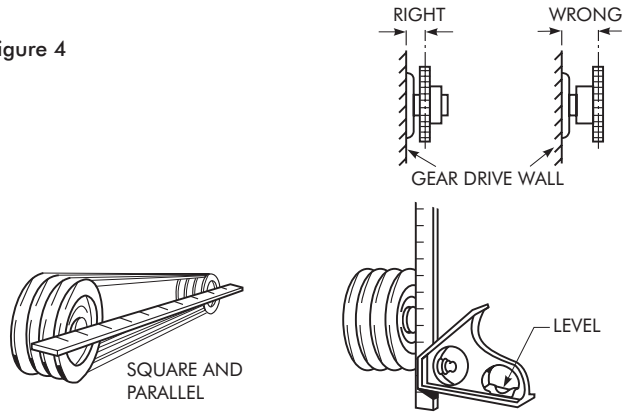
TABLE 2 — Support Leg Fastener Quantity (Each Side)

Shaft Centers	DRIVE SIZE					
	4107	4115	4203	4207	4215	4307 4315
Short	NA	NA	4	4	4	6
Medium	3	3	3	3	3	5
Long	2	2	2	2	2	4

3. MOUNT MOTOR — Position motor on motor base plate so that all mounting holes are in alignment. Install and tighten motor fasteners.

4. SPROCKET, PULLEY OR SHEAVE CONNECTION — Mount power take-offs as close to drive and motor housing as possible to avoid undue bearing load and shaft deflection. Align the high speed shaft of drive square and parallel with motor shaft by placing a straightedge across the face of the sprockets or sheaves as illustrated in Figure 4. Check horizontal shaft alignment by placing one leg of a square against the face of the sheave or sprocket with the spirit level on the horizontal leg of the square.

Figure 4



Adjustment of the belt or chain is accomplished by turning adjusting screws evenly. DO NOT over tighten belts or chains. Over tightening belts or chains reduces belt/chain and bearing life. When the required tension is reached, tighten adjusting screw jam nuts to torques listed in Table 1. Adjust chain tension to manufacturer's specifications. Adjust belts as follows:

The ideal belt tension is the lowest tension at which the belt will not slip under peak load conditions. Check belt tension frequently during the first 24 to 48 hours of run-in operation. Keep belts free from foreign material which may cause slippage. Inspect the V-belt drive periodically; re-tighten belts if they are slipping.

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Vertical Standpipe Installation

Introduction

The following instructions apply to the installation of standpipe kits to standard drives mounted for vertical operation (high speed shaft up or down). Drawings are representative of this series of drives and may not agree in exact detail with all drive sizes.

High Speed Shaft Down — Figure 1.

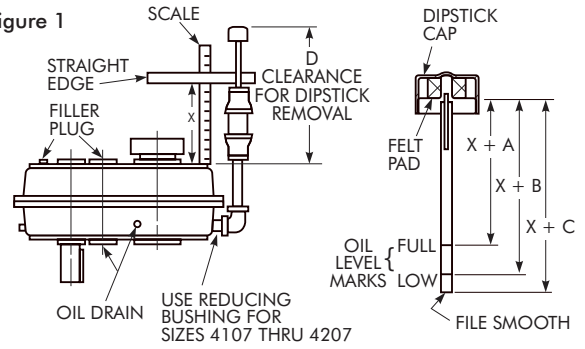
1. After installing the drive per the Owners Manual installation instructions, determine which of the lower side plug locations on the drive will provide the best location for the standpipe, observing clearance required to remove dipstick (Dimension D, Table 1). Discard the air vent. When the air vent location is not used for the standpipe, relocate the pipe plug from the selected standpipe location to the air vent location. Recoat pipe plug threads with Permatex #3 or equivalent sealant before reinstalling.

TABLE 1 — Dimensions - Inches (mm)

DRIVE SIZE	A	B	C	D
4107	0.90 (23)	1.10 (28)	1.60 (41)	19.2 (488)
4115	0.90 (23)	1.10 (28)	1.60 (41)	18.3 (465)
4203	1.08 (27)	1.28 (33)	1.78 (45)	18.2 (462)
4207	1.14 (29)	1.34 (34)	1.84 (47)	20.4 (518)
4215	1.54 (39)	1.74 (44)	2.24 (57)	22.1 (561)
4307	1.54 (39)	1.84 (47)	2.34 (59)	23.7 (602)
4315	1.70 (43)	2.20 (56)	2.70 (69)	23.1 (587)

2. Coat all pipe threads of kitted parts with Permatex #3 or equivalent sealant.
3. Assemble kitted parts to the drive as illustrated in Figure 1 and then secure the standpipe with an external support to maintain its vertical position.

Figure 1



4. Carefully measure Dimension "X" as illustrated in Figure 1.
5. From Table 1:

   X + A equals oil level "Full" mark.

   X + B equals oil level "Low" mark.

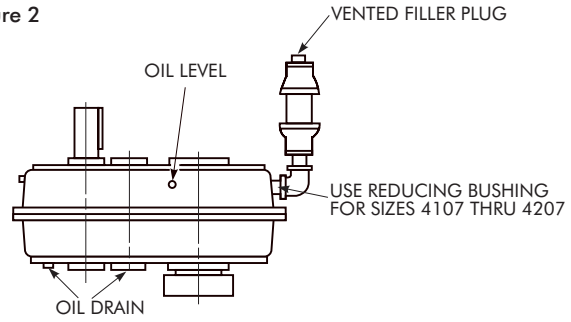
   X + C equals dipstick length.

6. Scribe Dimensions X + A and X + B on the dipstick as illustrated in Figure 1. Make measurements from the felt pad in the dipstick cap.
7. Lightly chisel permanent oil level marks on the scribed lines and cut the dipstick to the length marked. File end of dipstick smooth.
8. Install magnetic drain plug furnished in oil drain location.
9. Remove the oil filler plug. Add oil until the oil level reaches the "Full" mark on the dipstick. Coat the filler plug (not vented) with Permatex #3 or equivalent sealant and replace it.
10. Filler plug must always be removed to relieve entrapped air before checking oil level.

High Speed Shaft Up — Figure 2.

1. After installing the drive per the Owners Manual installation instructions, determine which of the upper four side plug locations on the drive will provide the best location for the standpipe, observing clearance required to remove dipstick (Dimension D, Table 1). Discard the air vent. When the air vent location is not used for the standpipe, relocate the pipe plug from the selected standpipe location to the air vent location. Recoat pipe plug threads with Permatex #3 or equivalent sealant before reinstalling.

Figure 2



2. Coat all pipe threads of kitted parts with Permatex #3 or equivalent sealant.
3. Assemble kitted parts to drive as illustrated in Figure 2 and then secure the standpipe with an external support to maintain its vertical position.
4. See Figure 1 and follow steps 4 thru 7 at left.
5. Install magnetic drain plug furnished in oil drain location.
6. Remove one of the three oil level plugs. Add oil through the standpipe until the oil level reaches the plug hole. Coat the plug with Permatex #3 or equivalent sealant and replace it. Be sure to use only the vented filler plug in the standpipe.

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Modifications for Non-Standard Mounting Positions

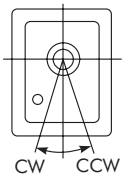
Instructions

For non-standard mountings, modify drives as illustrated below and on Page 38 to assure satisfactory lubrication. For applications that exceed the limits shown, drives that are both rotated AND tilted and drives with backstops, consult Falk.

CAUTION: Inadequate lubrication will cause damage.

When replacing a pipe plug (P) with a street elbow (E), insert the plug in the elbow (E/P). When replacing a pipe plug (P) with a street elbow (E), pipe nipple (N) and a pipe cap (C), discard the pipe plug. Kits consist of parts for an oil expansion chamber. Pipe fittings and kits tabulated on Page 38 are available from Falk. Pipe fittings may also be purchased locally. Use galvanized pipe fittings.

Remove all pipe plugs and coat them and the added parts, with Permatex #3 or equivalent to prevent leakage. Install parts as illustrated to suit the mounting position. The air vent must be in the top of the drive or in the kit standpipe. Fill drives with oil to the level indicated by the letter "L" in the following drawings.



Standard Drive Mounting Limits

The standard drive rotation limits from the basic 3, 6, 9 & 12 o'clock mounting positions are given in Section I, Page 4. For higher limits, follow the instructions at the left and the drawings below. (6 o'clock illustrated)

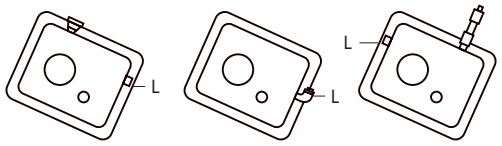
CODE

B — Bushing
C — Cap
E — Street Elbow
L — Oil Level
N — Nipple
P — Pipe Plug
STD — No Modifications

Horizontal Drive Modifications 20° Max. Drive Rotation

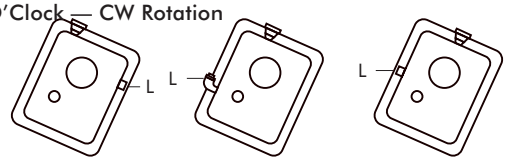
5 to 20° CW Rotation – Sizes 4107 & 4115
10 to 20° CW Rotation – Sizes 4203 thru 4315

3 O'Clock — CW Rotation



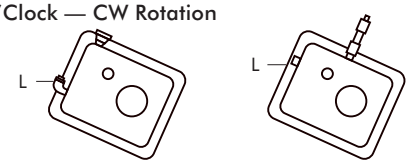
4107 = STD
4115 = .375 E/P
4203 & 4207 = KIT 0786775
4215 thru 4315 = KIT 0786776

6 O'Clock — CW Rotation



4107 = STD
4115 = .375 E/P
4203 thru 4315 = STD

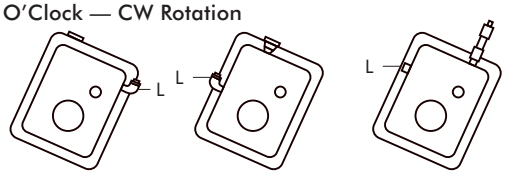
9 O'Clock — CW Rotation



4107 = 5-12° STD
4107 = 13-20° .375 E/P
4115 = .375 E/P

4203 & 4207 = KIT 0786775
4215 thru 4315 = KIT 0786776

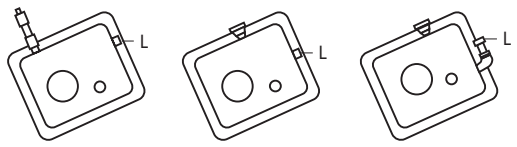
12 O'Clock — CW Rotation



4107 = .375 E/P
4115 = .375 E/P
4203 & 4207 = KIT 0786775
4215 thru 4315 = KIT 0786776

5 to 20° CCW Rotation – Sizes 4203 thru 4315
10 to 20° CCW Rotation – Sizes 4107 & 4115

3 O'Clock — CCW Rotation



4107 = KIT 0738540
4115 = STD

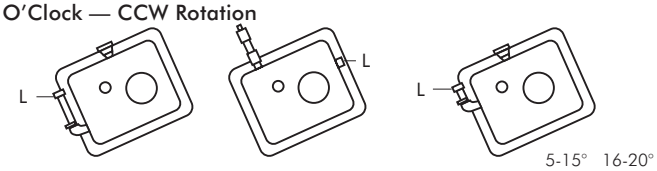
4203 = .375 E/C & .375 X 1.00N
4207 = .375 E/C & .375 X 2.00N
4215 = .500 E/C & .500 X 2.00N
4307 = .500 E/C & .500 X 2.50N
4315 = .500 E/C & .500 X 2.50N

6 O'Clock — CCW Rotation

4107 & 4115 = STD

4203 = .375 E/C & .375 X 1.00N
4207 = .375 E/C & .375 X 1.50N
4215 = .500 E/C & .500 X 1.12N
4307 & 4315 = .500 E/C & .500 X 2.00N

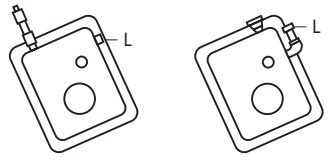
9 O'Clock — CCW Rotation



4107 = .375 E/C & .375 X 3.00N
4115 = KIT 0786775

	5-15°	16-20°
4203 = .375 E/C & .375 X 1.00N	1.50N	
4207 = .375 E/C & .375 X 1.00N	1.50N	
4215 = .500 E/C & .500 X 1.12N	1.50N	
4307 = .500 E/C & .500 X 1.50N	2.00N	
4315 = .500 E/C & .500 X 1.50N	2.00N	

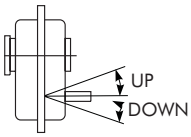
12 O'Clock — CCW Rotation



4107 & 4115 = KIT 0738540

4203 = .375 E/C & .375 X 1.50N
4207 = .375 E/C & .375 X 2.00N
4215 = .500 E/C & .500 X 2.00N
4307 = .500 E/C & .500 X 2.50N
4315 = .500 E/C & .500 X 2.50N

Modifications for Non-Standard Mounting Positions



Standard Drive Mounting Limits

The standard drive incline limits from the basic 3, 6, 9 & 12 o'clock mounting positions are given in Section I, Page 4. For higher limits, follow the instructions on Page 37 and the drawings below. (6 o'clock illustrated)

CODE

C — Cap N — Nipple
E — Street Elbow P — Pipe Plug
L — Oil Level STD — No Modifications

Standard Pipe Fittings ★ — Inches

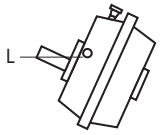
.375-18 NPT	Falk No.	.500-14 NPT	Falk No.
.375 Street Elbow	0915252	.500 Street Elbow	0915251
.375 Cap	0914802	.500 Cap	0914803
.375 x 1 Nipple	0915724	.500 x 1.12 Nipple	0915734
.375 x 1.5 Nipple	0915725	.500 x 1.5 Nipple	0915735
.375 x 2 Nipple	0915722	.500 x 2 Nipple	0915736
.375 x 3 Nipple	0915727	.500 x 2.5 Nipple	0915723
		.500 x 3 Nipple	0915737
		.500 x 4 Nipple	0915739

★ Kits: Falk Nos. 0786775 & 0786776 . . . Oil expansion chamber parts. All pipe fittings are galvanized.

Horizontal Drive Modifications for Inclined H.S. Shaft

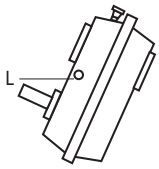
H.S. Shaft Inclined 20 to 30° Up

3 O'Clock H.S.S. Up



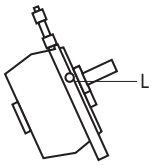
4107 THRU 4315 =

6 O'Clock H.S.S. Up



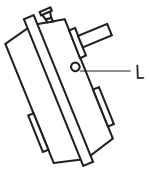
4107 THRU 4315 =

9 O'Clock H.S.S. Up



4107 THRU 4307 = STD

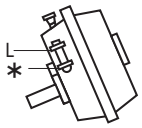
12 O'Clock H.S.S. Up



4107 THRU 4315 =

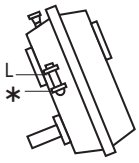
H.S. Shaft Inclined 5 to 30° Down

3 O'Clock H.S.S. Down



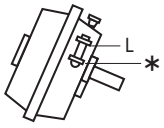
4107 = 5-25° .375 E/P
4107 = 26-30° .375 E/C, .375 X 1.00N & KIT 0786775
4115 = 5-20° .375 E/C & .375 X 1.00N
4115 = 21-30° .375 E/C, .375 X 2.00N & KIT 0786775

6 O'Clock H.S.S. Down



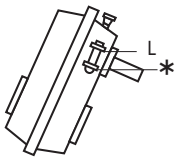
4107 = .375 E/P
4115 = .375 E/C & .375 X 2.00N
4203 = .375 E/C & .375 X 1.50N
4207 = .375 E/C & .375 X 2.00N

9 O'Clock H.S.S. Down



4107 = 5-15° STD
4107 = 16-30° .375 E/P & KIT 0786775
4115 = 5-15° .375 E/P
4115 = 16-30° .375 E/C, .375 X 2.00N & KIT 0786775
4203 = 5-20° .375 E/P
4203 = 21-30° .375 E/C, .375 X

12 O'Clock H.S.S. Down



4107 = 5-15° .375 E/P
4107 = 16-30° .375 E/C, .375 X 1.00N & KIT 0786775
4115 = 5-15° .375 E/P
4115 = 16-30° .375 E/C, .375 X

✱ This oil level applies when only a street elbow with a pipe plug is used.

L — Always locate at high side plug.
KIT — Install at standard air vent location.

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Retaining Rings for Bushing Nuts & Thrust Plates

JR — Retaining Rings for Bushing Nuts

DRIVE SIZE	Manufacturer Part Number
4107	Truarc N5000-237
4115	Truarc N5000-312
4203	Truarc N5000-334
4207	Eaton IN375
4215	Truarc N5000-462
4307	Eaton IN500
4315	Truarc N5000-575

JF & JSC — Retaining Rings for Thrust Plate Kits

DRIVE SIZE	Manufacturer Part Number
4107	Truarc N5000-165
4115	Eaton IN225
4203	Eaton IN244
4207	Eaton IN281
4215	Eaton IN334
4307	Eaton IN375
4315	Eaton IN433

Tooth Combinations for Vibration Analysis

Type J05 — Tooth Combinations

DRIVE SIZE	Exact Ratio	Pinion Ref. #3A3	Gear Ref. #4A4
4107	5.077	13	66
4115	5.053	19	96
4203	4.923	13	64
4207	5.077	13	66
4215	4.923	13	64
4307	4.857	14	68
4315	4.857	14	68

Type J09 — Tooth Combinations

DRIVE SIZE	Exact Ratio	Input		Output	
		Pinion Ref. #1A3	Gear Ref. #1A4	Pinion Ref. #2A3	Gear Ref. #4A4
4107	9.462	22	41	13	66
4115	9.357	27	50	19	96
4203	8.908	21	38	13	64
4207	9.492	23	43	13	66
4215	8.997	29	53	13	64
4307	9.131	25	47	14	68
4315	9.131	25	47	14	68

Type J14 — Tooth Combinations

DRIVE SIZE	Exact Ratio	Input		Output	
		Pinion Ref. #1A3	Gear Ref. #1A4	Pinion Ref. #2A3	Gear Ref. #4A4
4107	14.43	19	54	13	66
4115	13.95	21	58	19	96
4203	14.03	20	57	13	64
4207	14.47	20	57	13	66
4215	13.60	21	58	13	64
4307	14.03	18	52	14	68
4315	13.91	22	63	14	68

Type J25 — Tooth Combinations

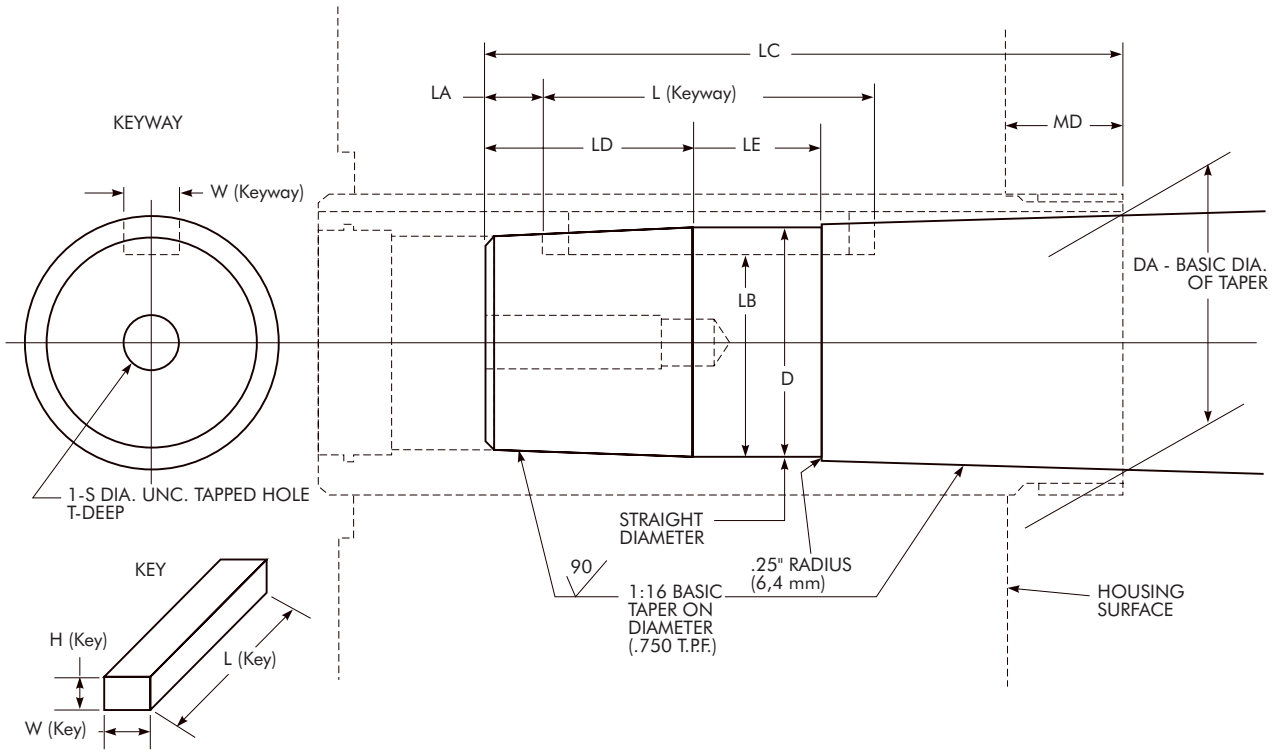
DRIVE SIZE	Exact Ratio	Input		Output	
		Pinion Ref. #1A3	Gear Ref. #1A4	Pinion Ref. #2A3	Gear Ref. #4A4
4107	25.81	12	61	13	66
4115	24.87	13	64	19	96
4203	26.15	16	85	13	64
4207	24.99	13	64	13	66
4215	24.94	15	76	13	64
4307	25.26	15	78	14	68
4315	25.26	15	78	14	68

Seal Housing Lip Seals for Type JSC

Type JSC — Seal Housing Lip Seals Accessory

DRIVE SIZE	Falk Part No.	Manufacturer's Part No.
4107	2905318	Chicago Rawhide 17271
4115	0912859	National 470565
4203	2911847	Chicago Rawhide 26153
4207	0912835	Chicago Rawhide 29865
4215	2911957	Chicago Rawhide 34861
4307	0912741	Chicago Rawhide 34886
4315	0912741	Chicago Rawhide 34886

Drive Shaft Recommendations for Tapered Drive Shafts



Dimensions – Inches (mm) ★

DRIVE SIZE	Keyway W ‡	Keyway L ±.010 (±0,25)	D ● +.000, –.005 (+0,00, – 0,13)	DA	LA ±.030 (±0,76)	LB +.000, –.010 (+0,00, – 0,25)	LC +.040, –.000 (+1,02, – 0,00)	LD	LE	MD ■	S	T Min.	Key W	Key H	Key L
4107	.375 (9,53)	2.875 (73,02)	1.614 (40,996)	1.825 (46,36)	.437 (11,10)	1.329 (33,76)	5.140 (130,56)	1.80 (45,7)	1.75 (44,5)	1.02 (25,9)	.500-13	2.00 (50,8)	.375	.375	2.50
4115	.500 (12,70)	3.250 (82,55)	2.173 (55,194)	2.357 (59,87)	.500 (12,70)	1.902 (48,31)	5.920 (150,37)	2.98 (57,7)	1.50 (38,1)	1.11 (28,2)	.500-13	2.00 (50,8)	.500	.375	2.75
4203	.500 (12,70)	3.750 (95,25)	2.425 (61,595)	2.620 (66,55)	.500 (12,70)	2.153 (54,69)	5.550 (140,97)	2.39 (60,7)	1.50 (38,1)	1.10 (27,9)	.625-11	2.00 (50,8)	.500	.375	3.25
4207	.625 (15,88)	4.875 (123,82)	2.725 (69,215)	2.920 (74,17)	.625 (15,88)	2.416 (61,37)	6.490 (164,85)	3.37 (85,6)	2.00 (50,8)	1.11 (28,2)	.625-11	2.00 (50,8)	.625	.438	4.25
4215	.750 (19,05)	4.250 (107,95)	3.258 (82,753)	3.500 (88,90)	.750 (19,05)	2.923 (74,24)	7.795 (197,99)	3.93 (99,8)	2.00 (50,8)	1.19 (30,2)	.875-9	2.50 (63,5)	.750	.500	3.50
4307	.875 (22,23)	5.875 (149,22)	3.878 (98,501)	4.100 (104,14)	.875 (22,22)	3.413 (86,69)	8.320 (211,33)	4.77 (121,2)	2.04 (51,8)	1.27 (32,2)	1.000-8	2.75 (69,8)	.875	.625	5.00
4315	1.000 (25,40)	6.000 (152,40)	4.433 (112,598)	4.664 (118,47)	1.000 (25,40)	3.871 (98,32)	8.710 (221,23)	5.06 (128,5)	2.00 (50,8)	1.27 (32,2)	1.000-8	2.75 (69,8)	1.000	.750	5.00

★ Dimensions are for reference only and are subject to change without notice unless certified.

‡ Inch keyway width tolerances are as follows: over .312" (7,92) to & including .500" (12,70) = +.0025" (+0,064), –.0000" (–0,000), over .500" (12,70) to & including 1.000" (25,40) = +.0030"(+0,076), –.0000"(–0,000). Keyway depth tolerance is +.010"(+0,25), –.000"(–0,00).

● Straight diameter is used to aid in measurement and manufacture of the keyway.

■ Dimension "MD" will vary slightly depending on degree of axial compression during installation and manufacturing tolerances.

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Drive Shaft Recommendations Using TA Taper Bushing

INTRODUCTION — These instructions are for use when a flange mounted 4107-4315JF drive is to be used and the manufacture of a tapered drive shaft is not feasible. For JF tapered drive shaft recommendations, see Appendix H. Use this appendix to retrofit existing applications or for outfitting new installations. Parts required are the Basic drive, TA Taper bushing and a thrust plate kit.

This appendix will allow the use of a straight drive shaft with the tapered bushing (without spanner nut) on flange mounted applications. Provided are dimensions (Table 4) for shaft recommendations and instructions for the installation and removal of the assembly. All bushing bore sizes, which are available in the standard Quadrive, are possible with this setup.

Drives are provided with tapped holes in the output face of the housing along with a female register to allow mounting to the driven equipment. JF drives are mounted to the equipment without the use of an adapter flange. Optional adapter flanges are available, consult Falk.

FIGURE 2 — The hollow shaft of the drive has a tapered bore which accepts the tapered bushing. When the bushing is drawn into the taper a clamping force is applied to the drive shaft. The drive shaft is drawn into the hollow shaft via a fastener in the thrust plate. The bushing seats against a shoulder on the driven shaft and is drawn into the drive with the shaft. Removal is accomplished by using a jackscrew in the thrust plate and forcing the drive shaft out of the drive. The retaining ring in the drive shaft assures that the bushing will be removed along with the shaft.

DRIVE SHAFT RECOMMENDATIONS — The recommendations for the drive shaft consist of two major features. The first is the shoulder which must be provided in the location shown in Figure 2. This shoulder provides the backing necessary to draw the bushing into the taper. A permanently fixed shoulder must be provided in order for this design to be effective. The shoulder may be a welded collar or an integral step. SET COLLARS ARE NOT ACCEPTABLE. A retaining ring may be used, in the driven shaft, to provide the shoulder, but stress concentrations occur at the groove and therefore shaft stresses must be checked. The second major feature on the shaft is the retaining ring groove in the shaft end. This feature is recommended to ensure positive removal of the bushing when the drive shaft is removed from the drive. The threaded hole in the end of the drive shaft accepts the thrust plate fastener.

WARNING: Lock out power source and remove all external loads from system before servicing drive or accessories.

INSTALLATION PROCEDURE — With the drive shaft manufactured per the recommendations shown, and the bushing selected for the proper shaft diameter, remove and discard the retaining ring and spanner nut from the bushing assembly.

Slide the bushing (flange end first) onto the drive shaft until it contacts the shoulder on the shaft. Insert the key through the bushing and into the drive shaft keyway. Install the retaining ring into the groove in the drive shaft. Bring the drive into position, line up the hollow shaft keyway with the key and slide the bushing and drive shaft into the hollow shaft bore.

Attach the drive to the mounting surface with fasteners (not provided). Refer to Table 1 for fastener size and tightening torque. Assemble the thrust plate and retaining ring into the counterbore in the hollow shaft. Insert the thrust plate fastener through the thrust plate and thread into the drive shaft end. Tighten to the torque given in Table 2. Install all covers and guards.

REMOVAL PROCEDURE — Remove low speed shaft input end cover. Remove the thrust plate fastener, retaining ring and thrust plate from the hollow shaft. Refer to Table 3 and select a backing bolt and flat washer and install them into the drive shaft as illustrated in Figure 1. The head of the backing bolt provides a working surface for the removal bolt. Reinsert the thrust plate and retaining ring into the hollow shaft and select a removal bolt from Table 3. Thread the removal bolt into the thrust plate until it contacts the backing bolt head. Tighten the removal bolt to the torque indicated in Table 3. (If the thrust plate rotates in the shaft, align the slot in the plate with the hollow shaft keyway and insert a screw driver or piece of key stock to prevent rotation of the plate.) After torquing the bolt, as instructed, strike the bolt sharply with a hammer and retorque the bolt if separation of the drive from the shaft did not occur. Repeat this procedure, retorquing the bolt after each blow, until separation occurs.

Figure 1

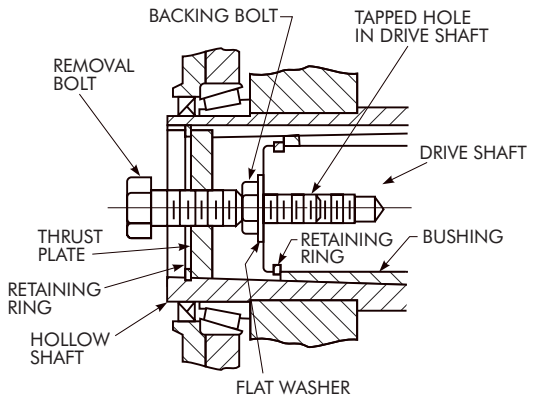


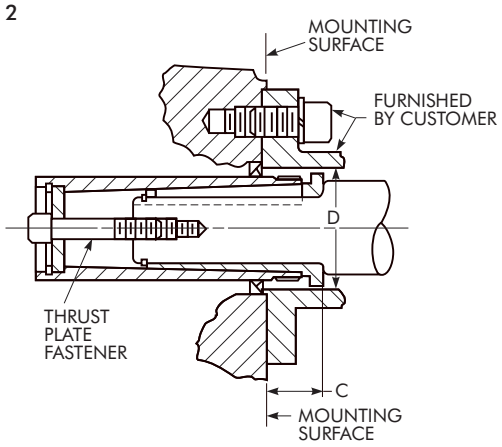
TABLE 1 — JF Drive – Foundation Fastener & Tightening Torque

(Non-Lubricated Fasteners)

DRIVE SIZE	Fastener Size & Grade	Max. Tightening Torque lb-ft (Nm)	Min. Fastener Engagement Into Drive Housing Inch (mm)
4107	.500-13UNC, GR. 5	69 (94)	.76 (19,3)
4115	.625-11UNC, GR. 5	137 (186)	.94 (23,9)
4203	.750-10UNC, GR. 5	245 (332)	.76 (19,3)
4207	.875- 9UNC, GR. 5	380 (515)	.88 (22,4)
4215	1.000- 8UNC, GR. 5	567 (769)	1.00 (25,4)
4307	1.000- 8UNC, GR. 8	792 (1074)	1.24 (31,5)
4315	1.000- 8UNC, GR. 8	792 (1074)	1.24 (31,5)

Drive Shaft Recommendations Using TA Taper Bushing

Figure 2



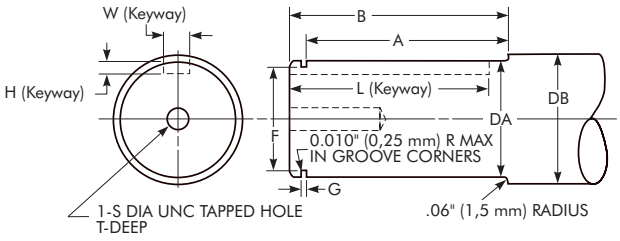


TABLE 2 — Thrust Plate Fastener Data ▲

(Non-Lubricated Fasteners)

DRIVE SIZE	Fastener Size & Grade	Max. Tightening Torque lb-ft (Nm)	Min Thread Depth Inches (mm)
4107	.500-13UNC x 3.50, GR.8	92 (125)	2.00 (50,8)
4115	.500-13UNC x 4.00, GR.8	92 (125)	2.00 (50,8)
4203	.625-11UNC x 3.50, GR.8	183 (248)	2.00 (50,8)
4207	.625-11UNC x 3.50, GR.8	183 (248)	2.00 (50,8)
4215	.875- 9UNC x 5.00, GR.8	533 (723)	2.50 (63,5)
4307	1.000- 8UNC x 5.00, GR.5	567 (769)	2.50 (63,5)
4315	1.000- 8UNC x 5.00, GR.8	792 (1074)	2.50 (63,5)

▲ Fasteners may be hex socket head or hex head except for Size 4307, which must be a hex head to clear input end cover.

TABLE 3 — Removal & Backing Bolt Size and Tightening Torque

DRIVE SIZE	Removal Bolt Size & Min Length – Inches	Max Tightening Torque lb-ft (Nm)	Backing Bolt Size & Max Length – Inches
4107	.625-11UNC x 1.75	133 (180)	.500-13UNC x 1.25
4115	.625-11UNC x 1.75	133 (180)	.500-13UNC x 1.25
4203	.750-10UNC x 2.00	242 (328)	.625-11UNC x 1.75
4207	.750-10UNC x 2.00	242 (328)	.625-11UNC x 1.75
4215	1.000- 8UNC x 2.50	567 (769)	.875- 9UNC x 2.25
4307	1.125- 7UNC x 3.00	742 (1006)	1.000- 8UNC x 2.50
4315	1.125- 7UNC x 3.00	742 (1006)	1.000- 8UNC x 2.50

TABLE 4 — Dimensions For Largest Bore Bushing – Inches (mm) ★

DRIVE SIZE	Thrust Plate Kit †	Thrust Plate Part No.	A ± 0.010 (±0.250)	B ± 0.030 (±0.75)	C ‡	D ●	DA ■	DB Min	Retaining Ring ♦				Keyway ✱			S	T Min
									Groove		Spir O Lox		W	H	L Min		
									F	G	Mfg. No.	Max O.D.					
4107	TP4107JF	0778773	4.780 (121,41)	5.000 (127,00)	-1.356 (-34,4) -1.606 (-40,8)	2.500 (63,50)	1.4375	1.750 (44,45)	1.295 1.287	0.056 0.060	RSN-137	1.500	0.375	0.1875	3.563 (90,50)	0.500-13	2.00 (50,8)
4115	TP4115JF	0778774	5.330 (135,38)	5.500 (139,70)	-1.528 (-38,8) -1.794 (-45,6)	3.250 (82,55)	1.9375	2.250 (57,15)	1.735 1.725	0.068 0.072	RST-181	2.000	0.500	0.2500	4.000 (101,60)	0.500-13	2.00 (50,8)
4203	TP4203JF	0778775	5.310 (134,87)	5.625 (142,88)	-1.634 (-41,5) -1.921 (-48,8)	3.500 (88,90)	2.1875	2.500 (63,50)	1.952 1.940	0.086 0.091	RSN-206	2.250	0.500	0.2500	4.625 (117,48)	0.625-11	2.00 (50,8)
4207	TP4207JF	0778776	5.890 (149,61)	6.250 (158,75)	-1.557 (-39,6) -1.885 (-47,9)	4.000 (101,60)	2.4375	2.750 (69,85)	2.290 2.278	0.056 0.060	RS-236	2.500	0.625	0.3125	5.625 (142,88)	0.625-11	2.00 (50,8)
4215	TP4215JF	0778777	6.860 (174,24)	7.125 (180,98)	-1.755 (-44,6) -2.082 (-52,9)	4.750 (120,65)	2.9375	3.250 (82,55)	2.728 2.716	0.056 0.060	RS-281	3.062	0.750	0.3750	5.875 (149,22)	0.875-9	2.50 (63,5)
4307	TP4307JF	0778778	7.170 (182,12)	7.500 (190,50)	-1.843 (-46,8) -2.175 (-55,2)	5.125 (130,18)	3.4375	3.750 (95,25)	3.172 3.160	0.103 0.108	RSN-334	3.625	0.875	0.4375	6.750 (171,45)	1.000-8	2.50 (63,5)
4315	TP4315JF	0778779	7.700 (195,58)	8.000 (203,20)	-1.840 (-46,7) -2.175 (-55,2)	6.000 (152,40)	3.9375	4.250 (107,95)	3.701 3.690	0.120 0.125	RST-387	4.125	1.000	0.5000	7.062 (179,37)	1.000-8	2.50 (63,5)

★ For metric drive shafts or bushing bores smaller than the maximum, provide the retaining ring groove per manufacturers' recommendations, keyway appropriate for the shaft diameter, and DB minimum of 0.300" (7.62 mm) larger than the bushing bore to provide adequate backing.

† Kit consists of: thrust plate, thrust plate fastener, hollow shaft retaining ring and drive shaft retaining ring.

‡ The range for C dimensions is the variation which may occur due to axial compression and manufacturing tolerances. Negative C dimensions indicate that the bushing protrudes beyond the mounting surface.

● The D dimension is the recommended minimum bore which clears the TA Taper bushing flange.

■ Shaft diameter tolerances are per AGMA as follows: to 1.50" = +.000", -.004"; over 1.50" to & including 2.50" = +.000", -.005"; over 2.50" to & including 4.00" = +.000", - .006". Metric drive shafts are to be based on h10 tolerances.

♦ Smalley retaining rings may be used instead of Spir O Lox by substituting WS for RS, WST for RST or WSM for RSN.

✱ Inch keyway width tolerances are as follows: over .312" to & including .500" = +.0025", -.0000"; over .500" to & including 1.000" = +.0030", -.0000". Metric keyway widths are based on class N9 tolerances. Inch keyway depth tolerance is +.010", -.000". Refer to ISO 773 or DIN 6885 sheet 1 for metric keyway depth tolerances.

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Drive Shaft Recommendations Using (TCB) Kit

INTRODUCTION — These instructions are for use when a screw conveyor 4107 - 4315JSC drive is to be used and the following conditions exist: Falk standard or 316 stainless steel JSC tapered drive shafts can not be used due to special extension dimensions or materials; or manufacturing a special tapered drive shaft is not feasible. Use this appendix to retrofit existing applications or for outfitting new installations where the above conditions warrant. For tapered shaft recommendations, see Appendix H.

This appendix will allow the use of a straight (non tapered) drive shaft with a special bushing conversion kit on screw conveyor applications. This kit provides one bushing bore per drive size as shown in Table 4. Provided in this appendix are dimensions for drive shaft recommendations and instructions for the installation and removal of the assembly.

FIGURE 2 — The hollow shaft of the drive has a tapered bore which accepts the tapered bushing. When the bushing is drawn into the taper a clamping force is applied to the drive shaft. The drive shaft is drawn into the hollow shaft via a fastener in the thrust plate. The bushing seats against a shoulder on the drive shaft and is drawn into the drive with the shaft. Removal is accomplished by using a jackscrew in the thrust plate and forcing the drive shaft out of the drive. The retaining ring in the drive shaft assures that the bushing will be removed along with the shaft.

The packing gland sealing option (Sizes 4107-4315) is usable with the bushing kit, but the clamp ring must be assembled from the extension end of the drive shaft on Sizes 4307 and 4315.

DRIVE SHAFT RECOMMENDATIONS — The recommendations for the drive shaft consist of two major features. The first is the shoulder which must be provided in the location shown in Figure 2. This shoulder provides the backing necessary to draw the bushing into the taper. A permanently fixed shoulder must be provided in order for this design to be effective. The shoulder may be a welded collar or an integral step. SET COLLARS ARE NOT ACCEPTABLE. A retaining ring may be used in the drive shaft, to provide the shoulder, but stress concentrations can occur at the groove and therefore shaft stresses must be checked. The second major feature on the shaft is the retaining ring groove in the shaft end. This feature is recommended to ensure positive removal of the bushing when the drive shaft is removed from the drive. The threaded hole in the end of the drive shaft accepts the thrust plate fastener.

WARNING: Lock out power source and remove all external loads from system before servicing drive or accessories.

INSTALLATION PROCEDURE — With the shaft manufactured per the recommendations shown, proceed as follows:

4107-4215JSC — The seal housing may be assembled to the drive before or after the drive shaft is installed into the drive, depending on the shaft extension diameter.

4307-4315JSC — The seal housing must be assembled over the drive shaft from the extension end of the shaft, or the shaft shoulder must be fixed in position after the seal housing is assembled over the drive shaft (see Figure 2).

ALL JSC DRIVES — Slide the bushing (large end first) onto the drive shaft until it contacts the shoulder on the shaft. Insert the key through the bushing and into the drive shaft keyway. Install the retaining ring into the groove in the drive shaft. Line up the keyway in the drive hollow shaft with the key in the drive shaft and slide shaft/bushing assembly into the hollow shaft. Attach the seal housing to the drive with the fasteners provided. Tighten fasteners to torque given in Table 1. Assemble the thrust plate and retaining ring into the counterbore in the hollow shaft. Insert the thrust plate fastener through the thrust plate and thread into the drive shaft end. Tighten to the torque given in Table 2. Install all covers and guards.

REMOVAL PROCEDURE — Remove low speed shaft input end cover. Remove the thrust plate fastener, retaining ring and thrust plate from the hollow shaft. Refer to Table 3 and select a backing bolt and flat washer and install them into the drive shaft as illustrated in Figure 1. The head of the backing bolt provides a working surface for the removal bolt. Reinsert the thrust plate and retaining ring into the hollow shaft and select a removal bolt from Table 3. Thread the removal bolt into the thrust plate until it contacts the backing bolt head. Tighten the removal bolt to the torque indicated in Table 3. (If the thrust plate rotates in the shaft, align the slot in the plate with the hollow shaft keyway and insert a screwdriver or piece of key stock to prevent rotation of the plate.) After torquing the bolt, as instructed, strike the bolt sharply with a hammer and retorque the bolt if separation of the drive from the shaft did not occur. Repeat this procedure, retorquing the bolt after each blow, until separation occurs.

Figure 1

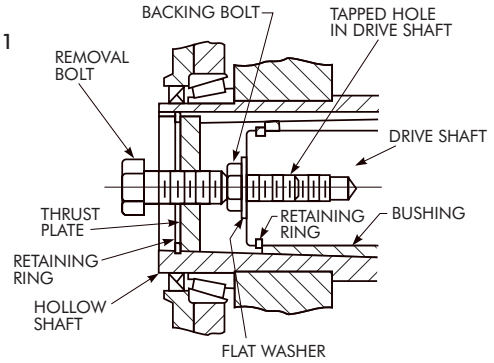

TABLE 1 — Seal Housing Fastener Tightening Torque (Non-Lubricated Fasteners)

DRIVE SIZE	Fastener Size	Max Tightening Torque lb-ft (Nm)
4107	.500-13UNC	69 (94)
4115	.625-11UNC	137 (186)
4203	.750-10UNC	245 (332)
4207	.875- 9UNC	380 (515)
4215	1.000- 8UNC	567 (769)
4307	1.000- 8UNC	792 (1074)
4315	1.000- 8UNC	792 (1074)

TABLE 2 — Thrust Plate Fastener Data ▲ (Non-Lubricated Fasteners)

DRIVE SIZE	Fastener Size & Grade	Max. Tightening Torque lb-ft (Nm)	Min Thread Depth Inches (mm)
4107	.500-13UNC x 3.50, GR.8	92 (125)	2.00 (50,8)
4115	.500-13UNC x 4.00, GR.8	92 (125)	2.00 (50,8)
4203	.625-11UNC x 3.50, GR.8	183 (248)	2.00 (50,8)
4207	.625-11UNC x 3.50, GR.8	183 (248)	2.00 (50,8)
4215	.875- 9UNC x 5.00, GR.8	533 (723)	2.50 (63,5)
4307	1.000- 8UNC x 5.00, GR.5	567 (769)	2.50 (63,5)
4315	1.000- 8UNC x 5.00, GR.8	792 (1074)	2.50 (63,5)

▲ Fasteners may be hex socket head or hex head except for Size 4307, which must be a hex head to clear input end cover.

Drive Shaft Recommendations Using (TCB) Kit

Figure 2

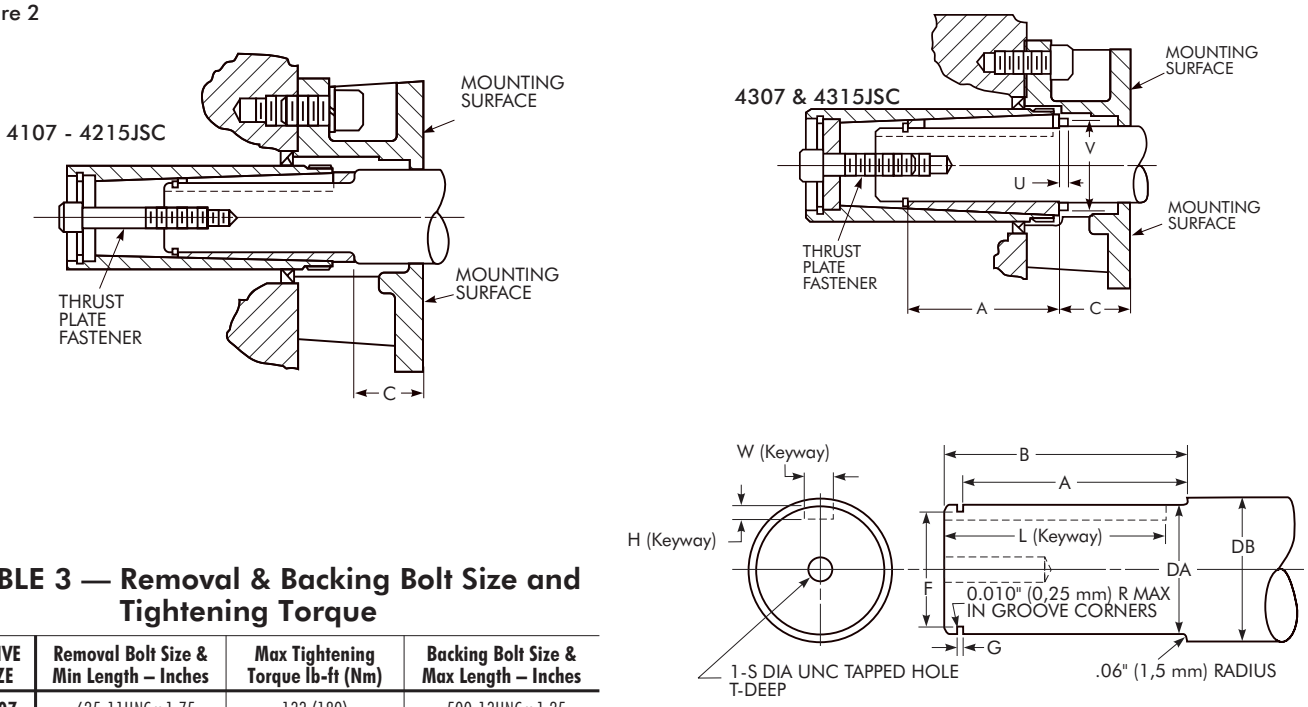

TABLE 3 — Removal & Backing Bolt Size and Tightening Torque

DRIVE SIZE	Removal Bolt Size & Min Length – Inches	Max Tightening Torque lb-ft (Nm)	Backing Bolt Size & Max Length – Inches
4107	.625-11UNC x 1.75	133 (180)	.500-13UNC x 1.25
4115	.625-11UNC x 1.75	133 (180)	.500-13UNC x 1.25
4203	.750-10UNC x 2.00	242 (328)	.625-11UNC x 1.75
4207	.750-10UNC x 2.00	242 (328)	.625-11UNC x 1.75
4215	1.000- 8UNC x 2.50	567 (769)	.875- 9UNC x 2.25
4307	1.125- 7UNC x 3.00	742 (1006)	1.000- 8UNC x 2.50
4315	1.125- 7UNC x 3.00	742 (1006)	1.000- 8UNC x 2.50

TABLE 4 — Dimensions – Inches (mm)

Taper Conversion Bushing Kit †	(TCB) Kit Part No.	A ± 0.010 (± 0.25)	B ± 0.030 (± 0.75)	C ‡	DA ●	DB ■ +0.000, - 0.003 (+0.00, - 0.08)	Retaining Ring ♦ Groove F	Retaining Ring ♦ Groove G	Retaining Ring ♦ Mfg. No.	Retaining Ring ♦ Max O.D.	Keyway ✱ W	Keyway ✱ H	Keyway ✱ L Min	S	T Min	Weld/Integral Flange U	Weld/Integral Flange V
TCB4107J-1.438	0766041	4.780 (121,41)	5.000 (127,00)	2.625 (66,68) 2.414 (61,32)	1.4375	1.750 (44,45)	1.295 1.287	0.056 0.060	Spir O Lox RSN-137	1.500	0.375	0.1875	3.563 (90,50)	0.500-13	2.00 (50,8)	. . .	. . .
TCB4115J-1.938	0766042	5.330 (135,38)	5.500 (139,70)	2.452 (62,28) 2.226 (56,54)	1.9375	2.375 (60,33)	1.735 1.725	0.068 0.072	Spir O Lox RST-181	2.000	0.500	0.2500	4.000 (101,60)	0.500-13	2.00 (50,8)	. . .	. . .
TCB4203J-2.188	0766043	5.310 (134,87)	5.625 (142,88)	2.346 (59,59) 2.099 (53,31)	2.1875	2.625 (66,68)	1.952 1.940	0.086 0.091	Spir O Lox RSN-206	2.250	0.500	0.2500	4.625 (117,48)	0.625-11	2.00 (50,8)	. . .	. . .
TCB4207J-2.438	0766044	5.890 (149,61)	6.250 (158,75)	2.548 (64,72) 2.260 (57,40)	2.4375	3.000 (76,20)	2.290 2.278	0.056 0.060	Spir O Lox RS-236	2.500	0.625	0.3125	5.625 (142,88)	0.625-11	2.00 (50,8)	. . .	. . .
TCB4215J-2.938	0766045	6.860 (174,24)	7.125 (180,98)	2.475 (62,87) 2.188 (55,58)	2.9375	3.500 (88,90)	2.728 2.716	0.056 0.060	Spir O Lox RS-281	3.062	0.750	0.3750	5.875 (149,22)	0.875-9	2.50 (63,5)	. . .	. . .
TCB4307J-3.438	0766046	6.530 (165,86)	6.860 (174,24)	3.527 (89,59) 3.235 (82,17)	3.4375	3.500 (88,90)	3.172 3.160	0.103 0.108	Spir O Lox RSN-334	3.625	0.875	0.4375	6.750 (171,45)	1.000-8	2.50 (63,5)	0.375 ▲ (9,52)	4.250 (107,95)
TCB4315J-3.438	0785785	7.030 (178,56)	8.500 (215,90)	3.560 (90,42) 3.266 (82,96)	3.4375	3.500 (88,90)	3.263 3.251	0.103 0.108	Spir O Lox RSN-343	. . .	0.875	0.4375	8.250 (209,55)	1.000-8	2.50 (63,5)	0.375 ▲ (9,52)	4.250 (107,95)

† Kit consists of: Bushing, thrust plate, fastener, key, retaining ring, and hardware.

‡ The range of C dimension is the variation which may occur due to axial compression and manufacturing tolerances.

● Shaft diameter tolerances are per AGMA as follows: to 1.50" = +.000", -.004"; over 1.50" to & including 2.50" = +.000", -.005"; over 2.50" to & including 4.00" = +.000", - .006".

■ If a lip type seal is used, a 32rms finish is recommended.

♦ Smalley retaining rings may be used instead of Spir O Lox by substituting WS for RS, WST for RST or WSM for RSN.

✱ Inch keyway width tolerances are as follows: over .312" to & including .500" = +.0025", -.0000"; over .500" to & including 1.000" = +.0030", -.0000"; 1.000". Inch keyway depth tolerance is +.010", -.000".

▲ Maximum for use with packing gland seal.

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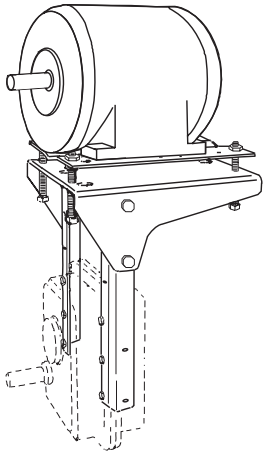
OSHA V-Belt Guard Installation for Drives without Shaft Fan

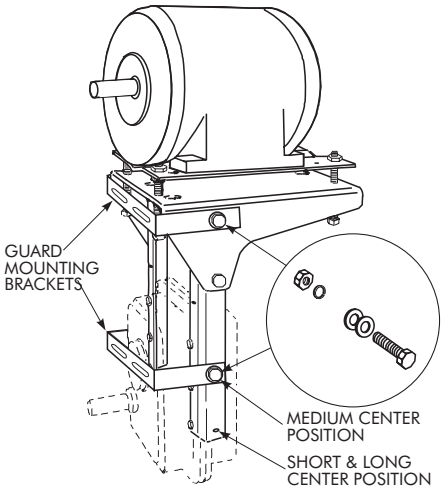
WARNING: Consult applicable local and national safety codes for proper guarding of rotating members.

WARNING: Lock out power source and remove all external loads from drive before servicing drive or accessories.

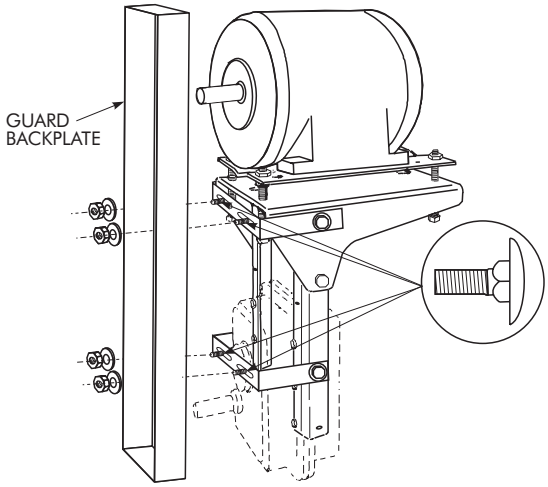
1. ASSEMBLE MOTOR MOUNT AND MOTOR TO DRIVE AS INSTRUCTED IN APPENDIX D



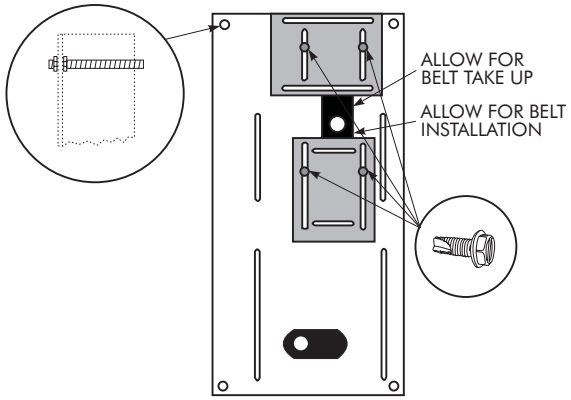
2. ASSEMBLE BELT GUARD BRACKETS TO MOTOR MOUNT



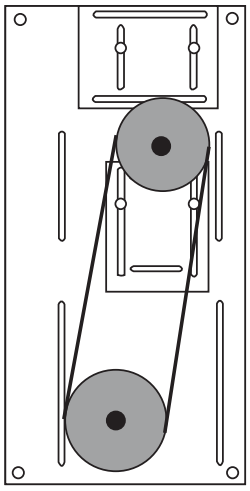
3. ASSEMBLE BACKPLATE TO BRACKETS



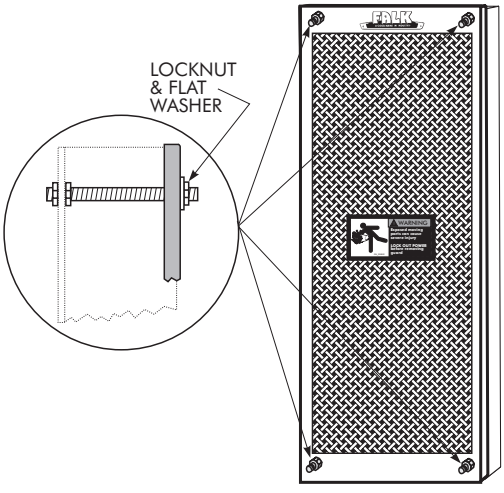
4. ASSEMBLE THREADED RODS TO BACKPLATE & MOUNT SLOT COVER(S) AS REQUIRED



5. MOUNT BELT DRIVE AS INSTRUCTED IN APPENDIX D



6. MOUNT COVER AND APPLY WARNING LABEL

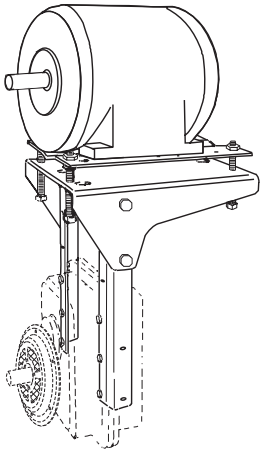


OSHA V-Belt Guard Installation for Drives with Shaft Fan

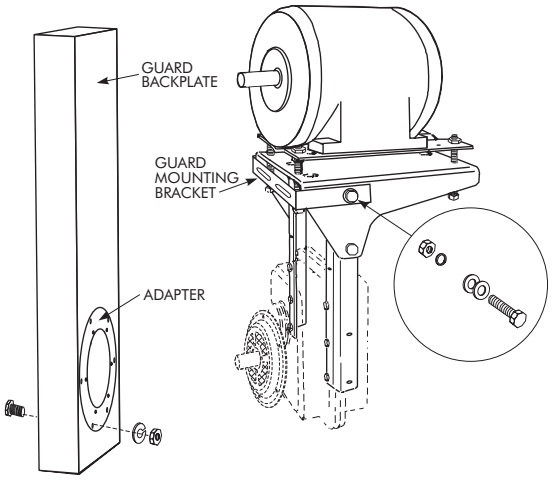
WARNING: Consult applicable local and national safety codes for proper guarding of rotating members.

WARNING: Lock out power source and remove all external loads from drive before servicing drive or accessories.

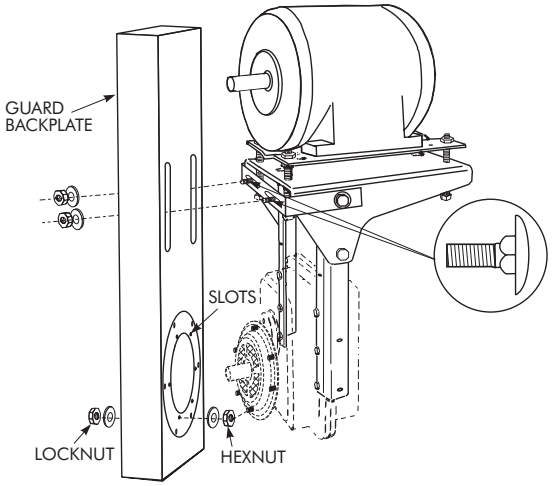
1. ASSEMBLE MOTOR MOUNT AND MOTOR TO DRIVE AS INSTRUCTED IN APPENDIX D



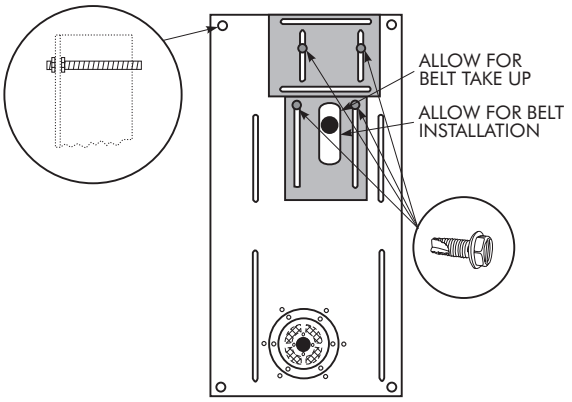
2. ASSEMBLE GUARD MOUNTING BRACKET & ADAPTER



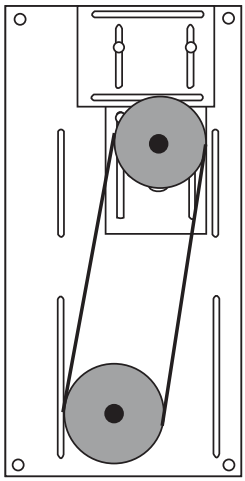
3. ASSEMBLE BACKPLATE TO BRACKET & FAN



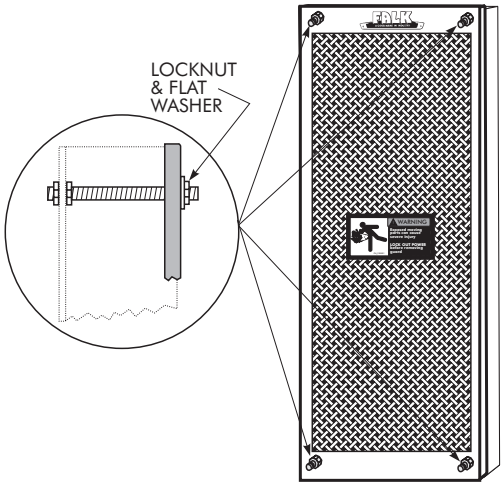
4. ASSEMBLE THREADED RODS TO BACKPLATE & MOUNT SLOT COVER(S) AS REQUIRED



5. MOUNT BELT DRIVE AS INSTRUCTED IN APPENDIX D



6. MOUNT COVER AND APPLY WARNING LABEL



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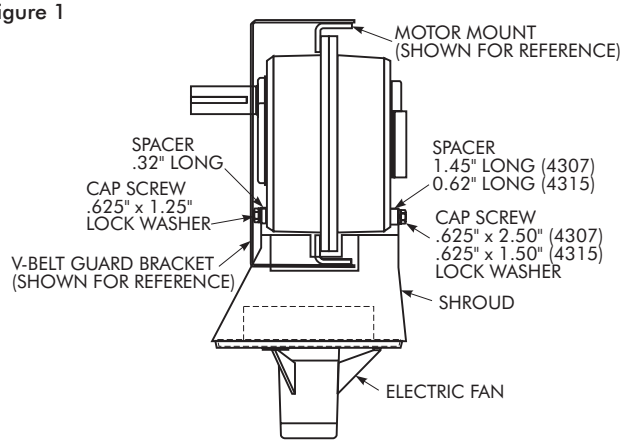
Electric Fan Installation

Introduction

The following instructions apply to the installation of electric fans. Refer to Figure 1 for fan mounting location.

Figure 1

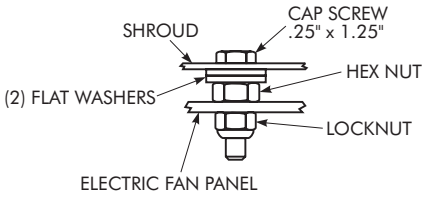


Assembly Instructions

WARNING: Consult applicable local and national safety codes for proper guarding of rotating members.
Lock out power source and remove all external loads from drive before servicing drive or accessories.

1. Remove V-belt guard assembly.
2. Insert four 1.25" (32 mm) long cap screws through fan mounting holes in shroud with threaded portion of cap screw away from drive. Secure cap screws to shroud with flat washers and hex nut, see Figure 2.
3. Mount shroud to drive using spacers and hardware, see Figure 1.

Figure 2



4. Assemble V-belt guard bracket.
5. Position the electric fan panel on the remaining threaded portion of the cap screws and secure it to the shroud with four locknuts, see Figure 2.
6. Remove the condensation plug from bottom of the fan.
7. Finish installing V-belt guard assembly per installation instruction in Appendix L.
8. Connect electric fan to power source per local and national electrical codes.

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