How to Use This Manual

This manual provides detailed instructions on installation and maintenance of gear drives and couplings. Use the table of contents below to locate required information.

CAREFULLY FOLLOW THE INSTRUCTIONS IN THIS MANUAL FOR OPTIMUM PERFORMANCE AND TROUBLE FREE SERVICE.

Table of Contents

Introduction

Credit for long service and dependable operation of a gear drive is often given to the engineers who designed it, or the craftsmen who constructed it, or the sales engineer who recommended the type and size. Ultimate credit belongs to the mechanic on the job who worked to make the foundation rigid and level, who accurately aligned the shafts and carefully installed the accessories, and who made sure that the drive received lubrication at prescribed intervals. The details of this important job are the subject of this manual.

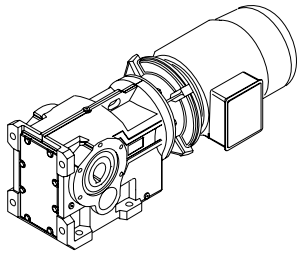
NAMEPLATE — Operate Falk gear drives only at horsepower, speed and ratio shown on nameplate and in the mounting position for which it was ordered. Before changing any one of these, submit complete nameplate data and new application conditions to the Factory for correct oil level, parts and application approval.

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.*

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.

TYPE UB



General Information

The following instructions apply to standard Falk Type UB drives shown above. If a drive is furnished with special features, refer to the supplementary instructions shipped with the drive.

WELDING — Do not weld on the gear drive 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 could void the warranty.

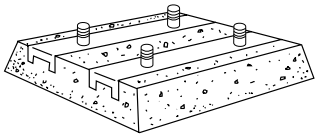
EFFECTS OF SOLAR ENERGY — If the gear drive operates in the sun at ambient temperatures over 100°F (38°C), then special measures should be taken to protect the drive from solar energy. This protection can consist of a canopy over the drive or reflective paint on the drive. If neither is possible, refer to Falk.

FOUNDATION GENERAL — To facilitate oil drainage, elevate the gear drive foundation above the surrounding floor level. If desired, replace the drive oil drain plug with a valve, but provide a guard to protect the valve from accidental opening or breakage.

FOUNDATION, STEEL — When mounting gear drive on structural steel, it is recommended that an engineered design be utilized for a pedestal, adapter base or bed to provide sufficient rigidity, to prevent induced loads from distorting the housing and causing gear misalignment. In the absence of an engineered design, it is recommended that a base plate, with thickness equal to or greater than the thickness of the drive feet, be securely bolted to steel supports and extend under the entire drive.

FOUNDATION, CONCRETE — If a concrete foundation is used, allow the concrete to set firmly before bolting down the gear drive. For the best type of mounting, grout structural steel mounting pads into the mounting base, as illustrated, rather than grouting the drive directly into the concrete.

Motors and other components mounted on motor plates may become misaligned during shipment. ALWAYS check alignment after installation.



GEAR DRIVE ALIGNMENT — Align drive with driven equipment by placing broad, flat shims under all mounting pads. Start at the low speed shaft end and level across the length and then the width of the drive. Check with a feeler gauge to make certain that all pads are supported to prevent distortion of housing when drive is bolted down. After drive is aligned with driven equipment and bolted down, align prime mover to drive input shaft. Refer to Pages 5 and 6 for coupling alignment.

Check high speed shaft coupling alignment. If the coupling is misaligned, the drive is shimmed incorrectly. Re-shim drive and recheck high speed coupling alignment. If necessary, realign motor.

Drive Assembly Instructions

Refer to Table 1 to determine the appropriate assembly procedure (G, G & R or G & H) for the type of drive/motor combination being assembled. Then refer to the appropriate assembly procedure.

Table 1 — Motor Adapter Fitting Prodecures

NEMA MOTORS
PROCEDURE G,G & R, OR G & H ARE USED FOR ALL DRIVE SIZES

SUMMARY OF MOTOR ADAPTER FITTING SEQUENCES

G — Fit motor adapter to basic housing and then attach motor.

G & R — Attach motor adapter to basic housing, then fit adapter ring to motor before attaching motor to assembly.

G & H — Attach motor adapter to basic housing, then fit adapter extension to motor before attaching motor to assembly.

PROCEDURE G — Figure 1

Important — The high speed motor adapters for drives requiring assembly procedure G will initially be assembled and sealed with Loctite at the Factory, unless otherwise specified. During assembly, *Do Not* break Loctite Seal.

1. Place basic housing on a workbench so that high speed end is facing up as illustrated in Figure 1. If necessary, block housing so that it is stable and level.
2. Remove high speed motor adapter from basic housing *ONLY* if replacing.
3. Clean mating surfaces of basic housing, high speed motor adapter, and electric motor (use Loctite 7070 Super Clean or equivalent). Check for and remove any burrs from mating surfaces.
4. Fill basic housing with quantity of oil specified in Table 9, Page 8 — Approximate Oil Quantities.
5. Apply Anti-fretting compound (Dow Corning G-n or equivalent) to bore of high speed motor adapter.
6. Depending upon motor shaft diameter, either a plastic key or motor bushing will be furnished. Refer to the appropriate instructions following:

   Plastic Key — If installed, remove the metal key from the motor shaft; this key will not be used.

   For motor shafts with a closed ended full depth keyway (IEC motors), shorten plastic key to fit keyway. **Note**: plastic key should be the same length as the metal key just removed.

   Motor Bushing — Install motor bushing into bore of high speed motor adapter. Fit metal key into keyway of motor shaft. This will assemble into the motor bushing and drive through it. Apply Anti-fretting compound (Dow Corning G-n or equivalent) to motor shaft.
7. Apply liquid gasket material (Loctite® 518, Falk Part # 2918376) furnished to flange face of basic housing as illustrated in Figure 3, Page 4. ***Caution:*** *This step must be followed to prevent leakage.*
8. Align mounting holes of high speed motor adapter with threaded holes of basic housing while assembling motor adapter to basic housing. Secure high speed motor adapter to basic housing using fasteners with copper washers (when provided). Torque fasteners to value specified in Table 4, Page 5 — Tightening Torques.
9. Determine appropriate position that motor conduit box must be in once motor is assembled to basic housing. Refer to Figure 4, Page 4. Slide motor shaft into high speed motor adapter, aligning key of shaft with keyway in motor adapter bore.
10. Align threaded mounting holes of high speed motor adapter with holes of electric motor. Secure motor to basic housing using fasteners with copper washers (when provided). Torque fasteners to the value specified in Table 4, Page 5 — Tightening Torques.

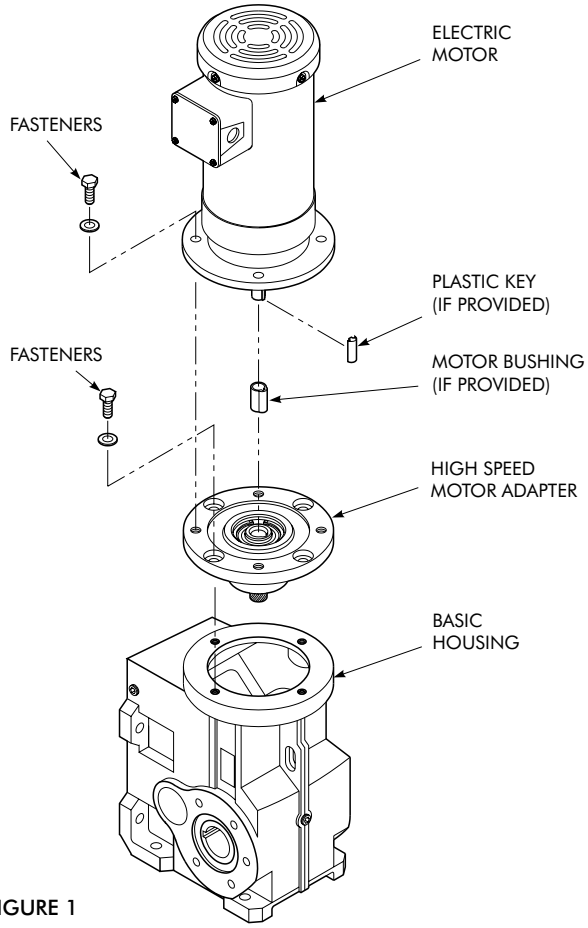


FIGURE 1

PROCEDURE G & H — Figure 2

Important — The high speed motor adapters for drives requiring assembly procedure G & H will initially be assembled and sealed with Loctite at the Factory, unless otherwise specified. During assembly, *Do Not* break Loctite Seal.

1. Place basic housing on a workbench so that high speed end is facing up as illustrated in Figure 2. If necessary, block housing so that it is stable and level.
2. Remove high speed motor adapter from basic housing *ONLY* if replacing.
3. Clean mating surfaces of basic housing, high speed

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motor adapter, and electric motor (use Loctite 7070 Super Clean or equivalent). Check for and remove any burrs from mating surfaces.

4. Fill basic housing with quantity of oil specified in Table 9, Page 8 — Approximate Oil Quantities.
5. Apply Anti-fretting compound (Dow Corning G-n or equivalent) to bore of high speed motor adapter.
6. Depending upon motor shaft diameter, either a plastic key or motor bushing will be furnished. Refer to the appropriate instructions following:

   Plastic Key — If installed, remove the metal key from the motor shaft; this key will not be used.

   For motor shafts with a closed ended full depth keyway (IEC motors), shorten plastic key to fit keyway. Note: plastic key should be the same length as the metal key just removed.

   Motor Bushing — Install motor bushing into bore of high speed motor adapter. Fit metal key into keyway of motor shaft. This will assemble into the motor bushing and drive through it. Apply Anti-fretting compound (Dow Corning G-n or equivalent) to motor shaft.
7. Apply liquid gasket material (Loctite® 518, Falk Part # 2918376) furnished to flange face of basic housing as illustrated in Figure 3, Page 4. ***Caution:*** *This step must be followed to prevent leakage.*
8. Align mounting holes of high speed motor adapter with threaded holes of basic housing while assembling motor adapter to basic housing. Secure high speed motor adapter to basic housing using fasteners with copper washers (when provided). Torque fasteners to value specified in Table 4, Page 5 — Tightening Torques.
9. Install studs provided into motor flange face.
10. Attach adapter extension to motor, aligning holes in adapter extension with studs mounted in motor.
11. Determine appropriate position that motor conduit box must be in once motor is assembled to basic housing. Refer to Figure 4, Page 4. Slide motor shaft into high speed motor adapter, aligning key of shaft with keyway in motor adapter bore.
12. Align mounting holes of high speed motor adapter with studs of motor. Secure motor to the basic housing assembly using fasteners with copper washers (when provided). Torque fasteners to the value specified in Table 4, Page 5 — Tightening Torques.

PROCEDURE G & R — Figure 2

Important — The high speed motor adapters for drives requiring assembly procedure G & R will initially be assembled and sealed with Loctite at the Factory, unless otherwise specified. During assembly, *Do Not* break Loctite Seal.

1. Place basic housing on a workbench so that high speed end is facing up as illustrated in Figure 2. If necessary, block housing so that it is stable and level.
2. Remove high speed motor adapter from basic housing *ONLY* if replacing.
3. Clean mating surfaces of basic housing, high speed motor adapter, and electric motor (use Loctite 7070 Super Clean or equivalent). Check for and remove any burrs from mating surfaces.
4. Fill basic housing with quantity of oil specified in Table 9, Page 8 — Approximate Oil Quantities.
5. Apply Anti-fretting compound (Dow Corning G-n or equivalent) to bore of high speed motor adapter.
6. Depending upon motor shaft diameter, either a plastic key or motor bushing will be furnished. Refer to the appropriate instructions following:

   Plastic Key — If installed, remove the metal key from the motor shaft; this key will not be used.

   For motor shafts with a closed ended full depth keyway (IEC motors), shorten plastic key to fit keyway. Note: plastic key should be the same length as the metal key just removed.

   Motor Bushing — Install motor bushing into bore of high speed motor adapter. Fit metal key into keyway of motor shaft. This will assemble into the motor bushing and drive through it. Apply Anti-fretting compound (Dow Corning G-n or equivalent) to motor shaft.

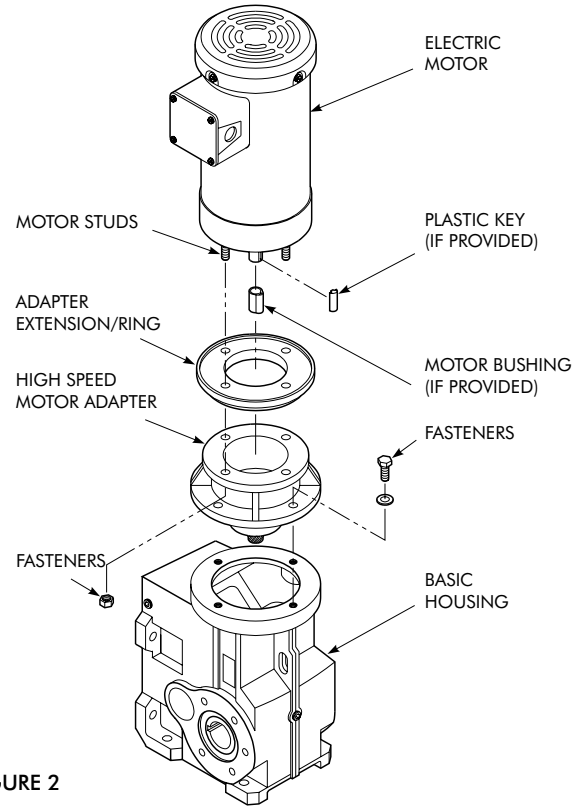

FIGURE 2

7. Apply liquid gasket material (Loctite® 518, Falk Part # 2918376) furnished to flange face of basic housing as illustrated in Figure 3, Page 4. ***Caution:*** *This step must be followed to prevent leakage.*
8. Align mounting holes of high speed motor adapter with threaded holes of basic housing while assembling motor adapter to basic housing. Secure high speed motor adapter to basic housing using fasteners with copper washers (when provided). Torque fasteners to value specified in Table 4, Page 5 — Tightening Torques.

9. Install studs provided into motor flange face.
10. Attach adapter ring to motor, aligning holes in adapter ring with studs mounted in motor.
11. Determine appropriate position that motor conduit box must be in once motor is assembled to basic housing. Refer to Figure 4 below. Slide motor shaft into high speed motor adapter, aligning key of shaft with keyway in motor adapter bore.
12. Align mounting holes of high speed motor adapter with studs of motor. Secure motor to the basic housing assembly using fasteners with copper washers (when provided). Torque fasteners to the value specified in Table 4, Page 5 — Tightening Torques.

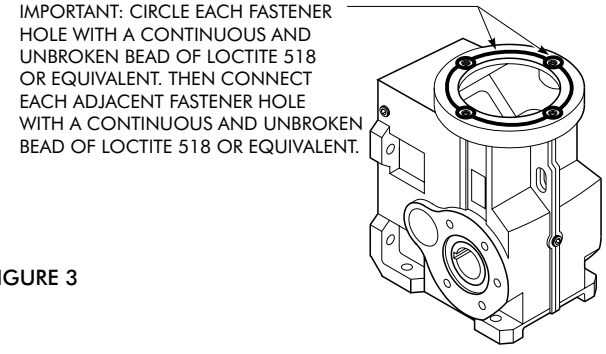

FIGURE 3

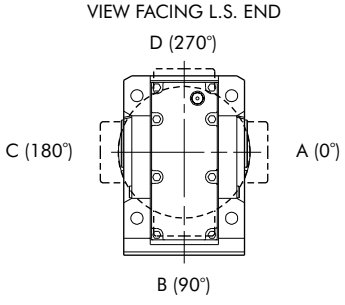

FIGURE 4

ASSEMBLE OUTPUT FLANGE TO DRIVE

1. Place drive on a workbench so that the side to which the output flange will be installed is facing up. If necessary, block drive so that it is stable and level.

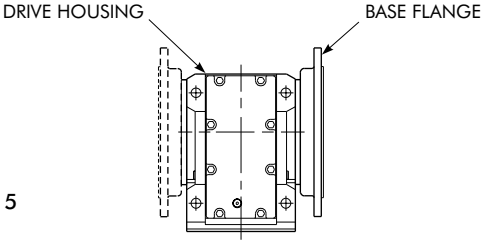

FIGURE 5

2. Clean mating surfaces of drive and output flange thoroughly using Loctite 7070 Super Clean or equivalent. Check for and remove any burrs from mating surfaces.
3. Assemble output flange to drive (see Figure 5)and secure using the fasteners furnished. Torque fasteners to the value shown in Table 4, Page 5 — Tightening Torques.

ASSEMBLE TORQUE ARM BRACKET TO DRIVE

1. Place drive on a workbench so that the side in which the torque arm bracket will be installed is easily accessible. If necessary, block drive so that it is stable and level.
2. Clean mating surfaces of drive and torque arm bracket thoroughly using Loctite 7070 Super Clean or equivalent. Check for and remove any burrs from mating surfaces.
3. Assemble torque arm bracket to drive in the required position (see Figure 6) and secure using the fasteners furnished. Torque fasteners to the value shown in Table 4, Page 5 — Tightening Torques.

The support to which the torque arm is to be fastened must sustain the torque reaction listed in Table 2 — Torque Arm Load Reaction. Use SAE grade 5 minimum fasteners for anchoring torque arm to support structure; refer to Table 3 — Torque Arm Anchoring Fasteners, for recommended fastener diameter. Fastener length is dependent on support structure.

Bolt the torque arm to supporting structure and tighten bolt (provided by others) until it is seated against brackets. Do not bend the support clevis bracket. Clearance between the clevis bracket and torque arm is required.

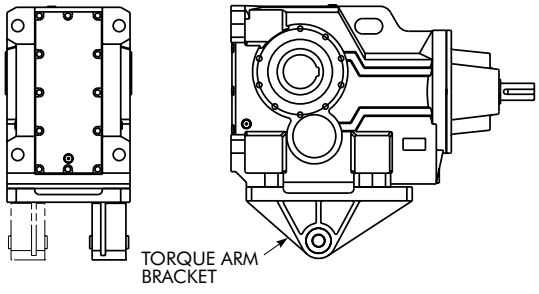

FIGURE 6

TABLE 2 — Torque Arm Load Reaction (lb) ★

DRIVE SIZE	Maximum Load (lb)
03UB	715
04UB	1215
05UB	1515
06UB	1810
07UB	2910
08UB	3985
09UB	5430
10UB	7160
12UB	10,010

★ Based on worst case loading conditions, consult Falk for loads based on specific application data.

TABLE 3 — Torque Arm Anchoring Fasteners

DRIVE SIZE	Metric Fastener †	Inch Fastener †
03UB	M10	.375-16 UNC
04UB	M10	.375-16 UNC
05UB	M16	.625-11 UNC
06UB	M16	.625-11 UNC
07UB	M24	.875-9 UNC
08UB	M24	.875-9 UNC
09UB	M24	.875-9 UNC
10UB	M24	.875-9 UNC
12UB	M36	1.375-6 UNC

† Standard fastener sizes are given. Use of a fitted pin is recommended.

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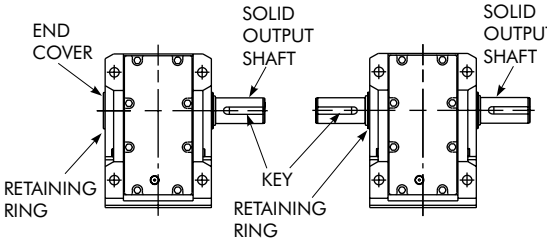
INSTALL SOLID OUTPUT SHAFT

1. Place drive on a workbench so that the hollow shaft is horizontal. If necessary, block drive so that it is stable and level.
2. Clean surfaces of hollow shaft and solid output shaft thoroughly using Loctite 7070 Super Clean or equivalent. Check for and remove any burrs from mating surfaces.
3. Install key into keyway of solid output shaft. Apply Anti-fretting compound (Dow Corning G-n or equivalent) to bore of low speed shaft.
4. Slide solid output shaft into bore of low speed shaft, aligning key with keyway in bore of low speed shaft. Note: For single extension solid output shaft (viewing from low speed end of drive), confirm right or left hand extension. Refer to Figure 7.
5. Install retaining ring into groove of solid output shaft. Install end cover (single ended solid output shaft applications only).
6. Install extension key into extension keyway in solid output shaft.



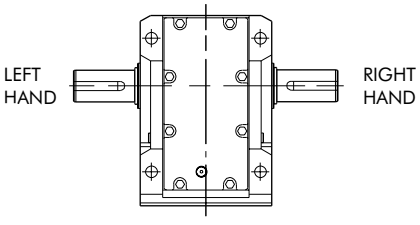


FIGURE 7

Fastener Tightening Torques

Use the tightening torque values specified in Table 4, for fastening Falk gear drives, motors, and accessories to their mounting surfaces with non-lubricated fasteners. DO NOT use these values for "torque locking" fasteners or for fastening components with aluminum feet or with soft gaskets or vibration dampers on the mounting surface. If the tightening torque exceeds the capacity of the torque wrench, use a torque multiplier. Use Grade 5 fasteners for diameters through 1.50".

For assembling motors, high speed adapters, output flanges or torque arm brackets to drives, refer to the tightening torque values listed in Table 4 for metric fasteners. Use ISO grade 8.8 minimum fasteners for securing output flanges and/or torque arms to drives.

TABLE 4 — Tightening Torques – lb-in (Nm) ±5%

DO NOT Lubricate Fasteners

Thread Dia – UNC	Metal to Metal	Metal to Concrete
.250-20	90 (10)	70 (7)
.3125-18	185 (20)	145 (16)
.375-16	330 (37)	255 (28)
.500-13	825 (93)	640 (72)
.625-11	1640 (185)	1280 (144)
.750-10	2940 (332)	2290 (258)

Metric Fasteners	Output Flange, Feet and Torque Arm Bracket	Electric Motor and High Speed Motor Adapter
M6	88 (7.3)	88 (7.3)
M8	220 (18.3)	160 (13.0)
M10	450 (37.5)	325 (27.0)
M12	750 (62.5)	570 (47.0)
M16	1770 (147.5)	1330 (110.0)
M20	3100 (258.3)	2300 (190.0)
M24	5400 (450)	. . .
M30	10800 (900)	. . .
M36	19000 (1585)	. . .

Shaft Connections

WARNING: *Provide suitable guards in accordance with OSHA standards.*

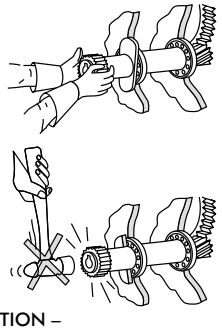
Input and output shaft extension diameter tolerance is +.0000" to –.0005" for shafts up to 1.750" diameter and +.0000" to –.0010" for shafts larger than 1.750" diameter. The fitted component must be machined to ensure proper fit.

DO NOT drive coupling hub, pinion, sprocket or pulley on the shaft. An endwise blow on the shaft may damage gears and bearings. Coupling hubs, pinions, sprockets or pulleys must be installed onto the shaft using a screw jack device fitted into the threaded hole provided in the end of the shaft; refer to Table 5.

TABLE 5 — Shaft End Threaded Holes – Inches

DRIVE SIZE	Input Shaft	Output Shaft
03UB	.250 x .63 UNF	.375 x .75 UNF
04UB	.250 x .63 UNF	.500 x 1.13 UNF
05UB	.250 x .63 UNF	.625 x 1.50 UNF
06UB	.250 x .63 UNF	.625 x 1.50 UNF
07UB	.385 x .63 UNF	.625 x 1.50 UNF
08UB	.375 x .87 UNF	.750 x 1.65 UNF
09UB	.500 x 1.10 UNF	.750 x 1.65 UNF
10UB	.625 x 1.42 UNF	.750 x 1.65 UNF
12UB	.750 x 1.65 UNF	1.00 x 2.17 UNF

COUPLING CONNECTIONS — The performance and life of any coupling depends largely upon how well the coupling is installed and serviced. Refer to the coupling manufacturer's manual for specific instructions.



– CAUTION –
DO NOT HAMMER

CORRECT METHOD

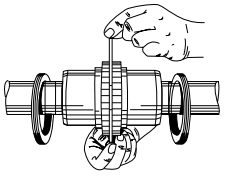
Heat interference fitted coupling hubs, pinions, sprockets or pulleys to a maximum of 212°F (100°C) and slide onto gear drive shaft.

INCORRECT METHOD

DO NOT drive coupling hub, pinion, sprocket or pulley onto the shaft. An endwise blow on the shaft/coupling may damage gears and bearings.

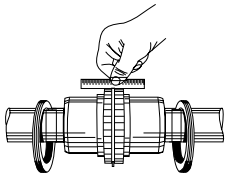
FALK COUPLINGS — (Except fluid type) Detailed installation manuals are available from Falk, your local Falk Representative or Distributor; just provide size and type designations stamped on the coupling. For lubricant requirements and a list of typical lubricants meeting Falk specifications, refer to appropriate coupling service manual.

GAP AND ANGULAR ALIGNMENT — If possible, after mounting coupling hubs, position the driving and driven equipment so that the distance between shaft ends is equal to the coupling gap. Align the shafts by placing a spacer block, equal in thickness to required gap, between hub faces, as shown, and also at 90° intervals around the hub. Check with feelers.



STEELFLEX® ILLUSTRATED

OFFSET ALIGNMENT — Align driving and driven shafts so that a straight edge will rest squarely on both coupling hubs as shown to the right and also at 90° intervals. Tighten foundation bolts of the connected equipment and recheck alignment and gap.

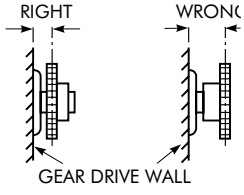


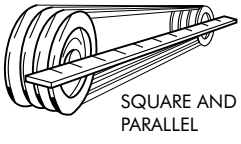
STEELFLEX ILLUSTRATED

SPROCKETS, PULLEYS OR SHEAVES — Mount power take-offs as close to the gear drive housing as possible to avoid undue bearing load and shaft deflection.

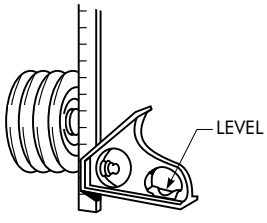
Align the output shaft of the gear drive square and parallel with the driven shaft by placing a straightedge across the face of the sprockets or sheaves as illustrated.

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.





SQUARE AND PARALLEL



DO NOT over tighten belts or chains. Adjust chains to manufacturer's specifications. Adjust belts as follows:

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

PINION MOUNTING — Mount pinion as close to the drive as possible to avoid undue bearing load and shaft deflection. Refer to the Factory for pinion alignment instructions.

Retaining Methods for Shaft Mounted Drives

The following illustrates methods for retaining shaft mounted drives.

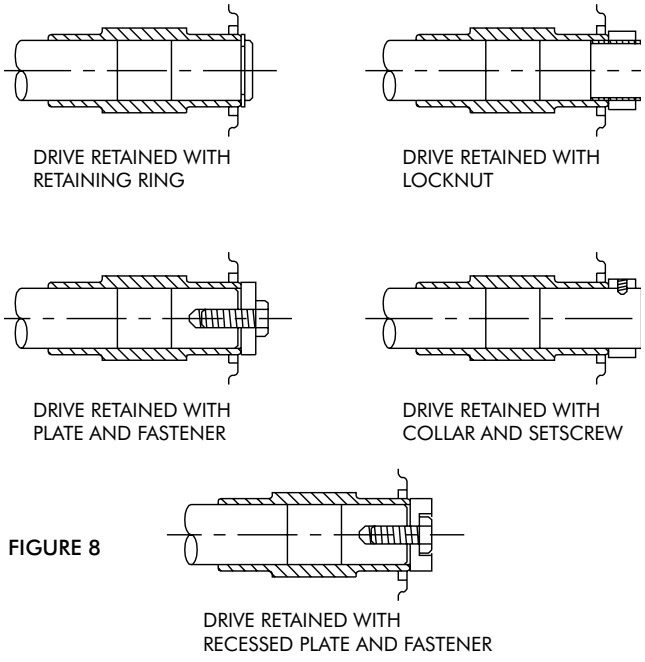


FIGURE 8

INSTALLATION AND REMOVAL OF TYPE TA TAPER® BUSHING

Installation

1. The tapered bore hollow output shaft is designed for use with a tapered bushing for mounting on a driven shaft with a straight outside diameter. Refer to Table 6 for driven shaft tolerances.

TABLE 6 — Driven Shaft Tolerances ★

Shaft Diameter — Inches	Maximum Undersize — Inches
Up to 1.500	.004
1.500 - 2.500 incl.	.005
2.500 - 3.000 incl.	.006

★ Millimeters = h 10 tolerance.

2. Rotate driven shaft so that keyway is in the 12 o'clock position.

   THIN WALL BUSHING (with keyway slot through bushing wall) — With driven shaft keyway at the 12 o'clock position, slide bushing assembly onto driven shaft, nut end first, and position keyway slot over shaft keyway (bushing may have to be pried open slightly). Insert drive key furnished with bushing into shaft keyway. Proceed to Step 3.

   THICK WALL BUSHING (with separate internal and external keyways) — Insert driven shaft key into driven shaft keyway. If driven shaft has an open-ended keyway, stake keyway as illustrated in Figure 9 to prevent axial dislocation of shaft key under operating conditions. Slide bushing assembly onto driven shaft (bushing may have to

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be pried open slightly). Rotate shaft so that external keyway in bushing is at the 12 o'clock position. Insert drive key furnished with bushing into bushing keyway.

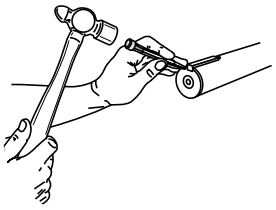

FIGURE 9

Proceed to Step 3.

3. Using a sling, safely lift gear drive so that hollow output shaft is in the horizontal position. Rotate hollow shaft so that keyway is aligned with driven shaft/bushing key. Position and slide drive onto driven shaft taking care that driven shaft key seats into hollow shaft keyway. DO NOT hammer or use excessive force.
4. Thread bushing nut onto 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 TAPERED SURFACE OF BUSHING AND HOLLOW SHAFT BORE FREE FROM ALL ANTI-SEIZE OR LUBRICATING COMPOUNDS.
5. Tighten nut as instructed in one of the following methods.

   PREFERRED METHOD — Using a spanner (Table 7) chain or pipe wrench, tighten bushing nut to the torque value specified in Table 7. Note: For applications where external vibratory or transient loads may act on drive and cause setscrews to become loose, apply Loctite 243 or equivalent to threads of setscrew. Tighten setscrew on bushing nut.

   ALTERNATE METHOD — (Use this method when torque cannot be measured.) Using a spanner (Table 7), chain or pipe wrench, tighten bushing nut just until 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 nut hand tight. Mark a spot on top of driven shaft. Mark a spot on bushing nut 180° from the driven shaft mark (90° CCW for Sizes 05UB & 06UB). Using a spanner wrench, tighten nut CW one half turn until the two marks are aligned (one quarter turn for Sizes 05UB & 06UB). Note: For applications where external vibratory or transient loads may act on drive and cause setscrew to become loose, apply Loctite 243 or equivalent to threads of setscrew. Tighten setscrew on bushing nut.

TABLE 7 — Spanner Wrench Type & Spanner Nut Tightening Torque

DRIVE SIZE	Adjustable Hook Spanner Wrench		Spanner Nut Tightening Torque lb-ft (Nm)
	Armstrong Tools	Williams	
05UB	34-307 (2.00" - 4.75")	474	83 (113)
06UB	34-307 (2.00" - 4.75")	474	83 (113)
07UB	34-307 (2.00" - 4.75")	474	167 (226)
08UB	34-310 (4.50" - 6.25")	474A	167 (226)
09UB	34-310 (4.50" - 6.25")	474A	250 (339)
10UB	34-310 (4.50" - 6.25")	474A	250 (339)
12UB	34-313 (6.125" - 8.75")	474B	250 (339)

Removal

WARNING: Drive must be supported during removal process. Use a sling around the gear drive and take up slack before proceeding.

1. Loosen setscrew on bushing nut located at output end of hollow shaft.
2. Use a spanner (Table 7) pipe or chain wrench to loosen bushing nut. Initially, bushing 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 bushing nut until it is free from the hollow shaft.
3. Prepare drive for lifting by disconnecting torque arm at drive end. Slide drive from bushing. Note: Bushing can be left in place or removed, as required. If bushing will not slide off of shaft, insert a small pry bar into split of bushing and pry split open slightly to loosen bushing and remove from shaft.

SHAFT MOUNTED DRIVES USING A SHRINK DISC DEVICE

Installation

Shrink discs can be supplied with shaft mounted drives. The following procedures should be followed when fitting or removing drives from the driven shaft.

1. Release locking screws gradually and in succession. Initially a quarter of a turn on each screw will avoid tilting and jamming – do not remove locking bolts completely.
2. Remove shrink disc from gear drive hollow shaft.

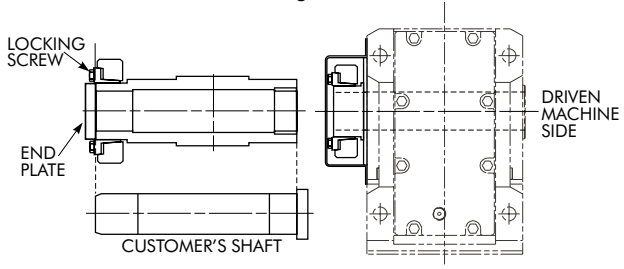

FIGURE 10

NOTE: ONLY AVAILABLE AS STANDARD IN THIS HANDING, CONTACT FALK FOR OPPOSITE HANDING.

3. Clean and degrease locating diameters of gear drive hollow shaft, driven shaft and shrink disc locating diameter on hollow shaft extension.
4. Draw the gear drive onto the driven shaft (See Figure 10).
5. Grease tapered surfaces of outer ring and inner ring with Molykote 321R or similar.

Table 8 — Tightening Torque – lb-in.

SIZE	Locking Screws Torque (lb-in.)
03	257
04	275
05	257
06	257
07	310
08	515
09	515
10	885
12	1415

6. Fit shrink disc on gear drive hollow shaft to position shown on in Figure 10 on Page 7.
7. Tighten all locking screws gradually and in succession. Do not tighten in a diametrically opposite sequence. Several passes are required until all screws are tightened. Ensure that all inner and outer ring faces are in-line and the torque values show in Table 8 on Page 7 are achieved.
8. Fit protective cover.

   Note: When the hollow output shaft is to operate in a vertical position it is essential that the shaft of the driven machine is provided with a shoulder. When the thrust load is not taken by the shoulder on the driven shaft, an end plate, a shown in Figure 10, must be fitted.

   It is recommended that customers' shafts at the non-clamped end of the sleeve should be coated with Molykote 321R or equivalent.

Removal

1. Removal procedure is similar to the reverse of installation.

   Note: Do not remove shrink disc locking screws completely.
2. Remove any rust and dirt from gear drive hollow shaft.
3. Withdraw gear drive from driven shaft.

   Note: Shrink disc should be removed and cleaned thoroughly, and Molykote 321R or similar applied to the tapered surfaces of inner ring and locking collar before re-use.

   Note: Protective covers are supplied with all shrink discs. Assembly or removal kits and thrust plates are not provided by the Falk Corporation.

Lubrication Recommendations

Carefully follow lubrication instructions on warning tags and installation manuals furnished with the gear drive. Nameplates are stamped with a designation for recommended lubricant; standard is 6E for triple reduction ratios of 0-45:1, 7E for all other triple and quintuple ratio drives.

For selection of oil grade based on actual operating conditions, refer to Table 11, Page 9 — Series UB Oil Grades.

Lubricants listed in this manual are typical ONLY and should not be construed as exclusive recommendations. Refer to your lubricant supplier for additional lubricants meeting the indicated specifications. Industrial type extreme pressure (EP) gear lubricants are the recommended lubricants for ambient temperatures of 15°F to 125°F (-9°C to +52°C).

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

VISCOSITY (IMPORTANT) — The proper grades of EP Mineral and EP synthetic lubricants are found in Table 12, Page 9 — Typical Lubricants. For cold climates refer to "EP Synthetic Lubricant" paragraphs. Select a lubricant which has a pour point at least 10°F (5.5°C) below the expected minimum ambient starting temperature. Usable temperature ranges can sometimes be widened if specific applications are known.

Extreme Pressure (EP) Mineral Lubricants

Mineral (EP) Lubricants (Table 12) — Industrial type petroleum based extreme pressure lubricants are preferred. The EP lubricants currently recommended are of the sulfur-phosphorus type.

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.

Extreme Pressure (EP) Synthetic Lubricants

Synthetic (EP) Lubricants (Table 12) — Polyalphaolefin type extreme pressure lubricants are recommended for cold climate operation, high temperature applications, extended temperature range (all season) operation and/or extended lubricant change intervals.

WARNING: *SYNTHETIC LUBRICANTS IN FOOD PROCESSING INDUSTRY — Synthetic 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.*

Table 9 — Approximate Oil Quantities – Liters ★

Mounting Position	DRIVE SIZE								
	Triple Reduction								
	03UB3	04UB3	05UB3	06UB3	07UB3	08UB3	09UB3	10UB3	12UB3
1	0.8	1.0	1.5	1.7	3.5	4.5	8.8	14	22
2	1.0	1.3	1.85	2.8	5.8	8.0	15	24	36
3	1.0	1.3	1.85	2.8	5.8	8.0	15	24	36
4	1.3	1.7	2.4	3.3	6.8	9.1	17.5	28.6	41
5	1.7	2.2	3.1	4.2	8.7	10.4	20.9	33	49
6	1.0	1.3	1.9	2.9	5.8	9.1	16.3	25.6	35.9

Obtain Quantities for Primary Stage Quintuple Reduction Drives (Separate Oil Sumps)

Mounting Position	DRIVE SIZE									
	Quintuple Reduction									
	03UB5		04UB5		05UB5		06UB5		07UB5	
	Primary†	Secondary	Primary†	Secondary	Primary†	Secondary	Primary†	Secondary	Primary†	Secondary
	201UC2	03UB3	201UC2	04UB3	203UC2	05UB3	203UC2	06UB3	203UC2	07UB3
1	0.7	0.8	0.7	1.0	0.8	1.5	0.8	1.7	0.8	3.5
2	0.7	1.0	0.7	1.3	0.8	1.85	0.8	2.8	0.8	5.8
3	0.7	1.0	0.7	1.3	0.8	1.85	0.8	2.8	0.8	5.8
4	0.7	1.3	0.7	1.7	0.8	2.4	0.8	3.3	0.8	9.1
5	1.0	1.7	1.0	2.1	1.4	3.1	1.4	4.2	1.4	10.4
6	1.1	1.0	1.1	1.3	1.5	1.9	1.5	2.9	1.5	9.1

Mounting Position	DRIVE SIZE							
	Quintuple Reduction							
	08UB5		09UB5		10UB5		12UB5	
	Primary†	Secondary	Primary†	Secondary	Primary†	Secondary	Primary†	Secondary
	205UC2	08UB3	205UC2	09UB3	207UC2	10UB3	207UC2	12UB3
1	1.6	4.5	1.6	8.8	2.8	14.0	2.8	22.0
2	1.6	9.3	1.6	15.0	2.8	24.0	2.8	36.0
3	1.6	6.2	1.6	15.0	2.8	24.0	2.8	36.0
4	1.6	9.1	1.6	17.5	2.8	28.6	2.8	41.0
5	1.9	10.4	1.9	20.9	3.2	33.0	3.2	49.0
6	2.5	9.1	2.5	16.3	4.9	25.6	4.9	35.9

★ Convert quantities using the following: Liters to US Gallons = Liters x 0.26, Liters to Imperial Gallons = Liters x 0.22, Liters to US Quarts = Liters x 1.057.

† Primary drives filled with Grade 6E lubricant suitable for all ambient temperatures between 32°C and 95°F (0°C and 35°C).

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TABLE 10 — Oil Change Intervals Based on Operating Temperature

Operating Temperature	Oil Change Intervals	
	Mineral Oil	Synthetic Oil
150°F (66°C) or less	17000 Hours or 3 Years	26000 Hours or 3 Years
158°F (70°C)	12000 Hours or 3 Years	26000 Hours or 3 Years
167°F (75°C)	8500 Hours or 3 Years	21000 Hours or 3 Years
176°F (80°C)	6000 Hours or 2 Years	15000 Hours or 3 Years
185°F (85°C)	4200 Hours or 17 Months	10500 Hours or 3 Years
194°F (90°C)	3000 Hours or 12 Months	7500 Hours or 2-1/2 Years
203°F (95°C)	2100 Hours or 8 Months	6200 Hours or 2 Years
212°F (100°C)	1500 Hours or 6 Months	5200 Hours or 18 Months

TABLE 11 — Series UB Oil Grades

DRIVE TYPE	Ratio Range ●	Ambient Temperature Range ‡			
		23°F to 68°F (-5°C to 20°C)	-22°F to 68°F (-30°C to 20°C)	32°F to 95°F (-0°C to 35°C)	68°F to 122°F (20°C to 50°C)
Triple	0 - 45 50 - 160	5E 6E	5H 5H	6E (5H) 7E (6H)	7E (6H) 8E (7H)
Quintuple	All	6E	5H	7E (6H)	8E (7H)

‡ Consult Falk representative for other ambient temperatures.
● Consult Falk representative for input speeds below 500 rpm.

TABLE 12 — Typical Lubricants Recommendations & Specifications

Mineral Lubricants Extreme Pressure		AGMA Vixcosity Grade			
		5EP	6EP	7EP	8EP
		ISO Viscosity Grade			
		220	320	460	680
		Nameplate Designation			
		5E	6E	7E	8E
		Ambient Temperature Range °F			
Manufacturer	Lubricant	+23 to +77	+32 to +104	+50 to +122	+68 to +122
Chevron USA, Inc.	Gear Compound EP	220	320	460	680
Exxon Co. USA	Spartan EP	220	320	460	680
Mobil Oil Corp.	Mobilgear	630	632	634	. . .
Shell Oil Co.	Omala Oil	220	320	460	680

Synthetic Lubricants ‡ Extreme Pressure (Except where noted) †		AGMA Viscosity Grade			
		5S	6S	7S	8S
		ISO Viscosity Grade			
		220	320	460	680
		Nameplate Designation			
		5H	6H	7H	8H
		Ambient Temperature Range °F			
Manufacturer	Lubricant	+14 to +86	+32 to +113	+50 to +122	+68 to +122
Conoco Inc.	Syncon R & O	220	. . .	460	. . .
Exxon Co. USA	Teresstic SHP	220	320	460	680
	Spartan Synthetic EP SHC	220	320	460	680
Mobil Oil Corp.	Mobil SHC	630	632	634	636
	Mobilgear SHC	220	320	460	680
Pennzoil Products Co.	Pennzgear SHD	220	320	460	680
	Super Maxol "S"	220	320	460	. . .

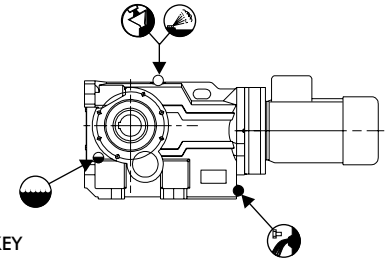
† Consult lubricant supplier/manufacturer for maximum operating temperature.
‡ Lubricant does not contain EP (extreme pressure) additives. Consult your lubricant supplier for additional lubricant recommendations.

Oil Levels

Drives Sizes 03-07 are furnished filled with oil determined by the Drive Mounting Position. Refer to Table 12 for a list of typical lubricants meeting Falk specifications. Refer to Table 9 for appropriate quantities of oil based on mounting position shown below.

MOUNTING (CAUTION) — Mount drive unit only in the position for which it was ordered. See below for the placement of the vent, drain and oil level plugs based on drive size and mounting position. If it is necessary to mount the drive in a special orientation not shown below, including rotated and tilted drives, consult the Falk Corporation for changes necessary to provide proper lubrication. Refer to Table 9 for approximate quantities of oil by the drive mounting position.

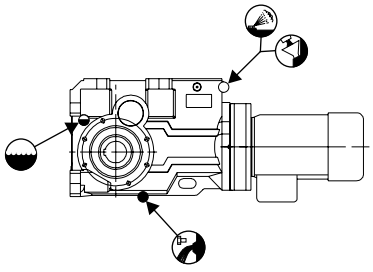
MOUNTING 1



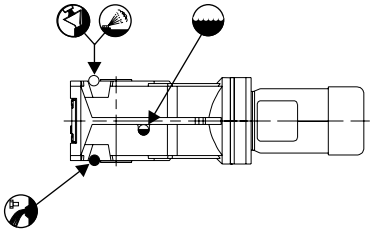
SYMBOL KEY

- AIR VENT
- OIL FILL
- OIL LEVEL
- OIL DRAIN

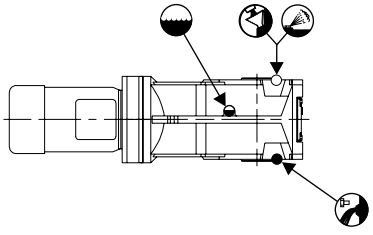
MOUNTING 2



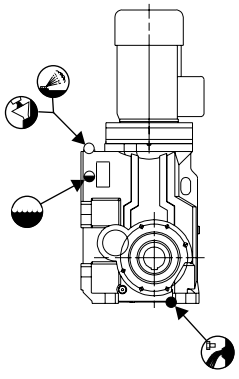
MOUNTING 3



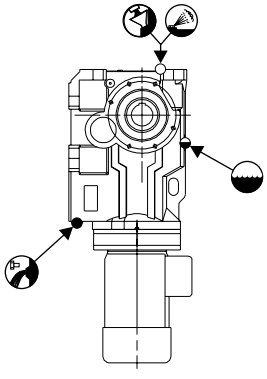
MOUNTING 4



MOUNTING 5



MOUNTING 6



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Lubricant Changes

All drive sizes require regular oil changes as instructed in this manual.

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. Viscosity changes more than 15%.
5. Oil temperature; drive operating under load.
6. Lubricant type.
7. Operating conditions; shock, loading, etc.
8. Mineral oil content exceeds 10% of oil fill quantity.

The effective life of an oil is greatly reduced at elevated temperatures. This is most pronounced with oils containing fatty and EP additives. To prevent damage to the drive through lubricant breakdown, the oil should be changed at the intervals shown in Table 10 — Oil Change Intervals. Intervals shown are for oil temperatures when the drive has attained normal running temperature when operating under load. These intervals are based on normal running. Where conditions are particularly severe, it may be necessary to change the oil more frequently. When changing oil, if the same oil is not used, flush drive and fill with only one type of oil.

The initial oil should be changed in a new gear drive after 1000 hours of operation or one year or half the above life, whichever occurs first.

Preventive Maintenance

AFTER FIRST WEEK — Check alignment of the total system and realign where necessary. Also, tighten all external bolts and plugs where necessary.

DO NOT readjust the internal gear or bearing settings in the drive, these were permanently set Falk.

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 oil level plug, have the oil analyzed for water content. If moisture content exceeds 500 ppm, change the oil. DO NOT fill above the oil level plug as leakage or undue heating may result. Grease drives with grease lubricated bearings monthly; refer to Table 13 — Typical Greases Recommendations & Specifications. Check coupling alignment to make certain that foundation settling has not caused excessive misalignment.

Bearing Greases

Some Ultramite gear drives have one or more grease lubricated bearings. Whenever changing oil in the drive, grease the bearings with one of the greases listed in Table 13 — Typical Grease Recommendations & Specifications. Regrease these bearings as part of the standard maintenance program. Before installing a drive, note the location of all of the bearing grease fittings and grease labels for future maintenance reference. Note that some fittings may be above the oil level line and others below. If a grease fitting will become inaccessible after drive is installed, replace the fitting with a pipe extension (and the fitting) so that the grease fitting will be in an accessible location after the drive is installed.

Always remove the purge plug (when provided) when greasing bearings so that the old grease can escape. Wipe off purged grease and replace the plug after greasing bearings.

Some of the greases listed in Table 13 may contain toxic substances and should not be used in the food processing industry without the grease manufacturer's approval. A grease that meets the USDA "H1" classification is suitable for food processing applications.

TABLE 13 — Typical Grease Recommendations & Specifications

Manufacturer	Grease ★ †	Allowable Operating Temperature Range	
		Above	To
Applied Chemicals LTD	4020-220-2	32°F (0°C)	248°F (120°C)
BP Oil LTD	LS EP2	-22°F (-30°C)	266°F (130°C)
Century Oils LTD	Lupus A3	-22°F (-30°C)	257°F (125°C)
Esso Petroleum Co. LTD/Exxon	Beacon EP2	-13°F (-25°C)	257°F (125°C)
Chevron Gulf Oil (GB) LTD	Crown EP	-22°F (-30°C)	248°F (120°C)
Kluber Lubrication	Centoplex 2	-4°F (-20°C)	266°F (130°C)
Koolex International	Q8 Rembrandt EP2	-22°F (-30°C)	248°F (-120°C)
Lubrication Engineering	Almaplex 1275	-22°F (-30°C)	320°F (-160°C)
Mobil Oil Co. LTD	Mobilux EP2	-4 (-20°C)	266°F (130°C)
Shell Oils	Albida R2	-4 (-20°C)	302°F (150°C)
Texaco LTD	Multifax EP2	32°F (0°C)	248°F (120°C)

★ Greases are suitable for use with lubricant oil Types M, A and H. Type G lubricant is also suitable, however, the oil must be changed when the amount of grease re-lubrication exceeds 10% of the drive's oil fill quantity.

† Consult Falk Application Engineering Department if:
1. Drive has grease lubricated bearings and Type G oil is to be used.
2. Drive operates in ambient temperatures outside of range -22°F to 122°F (-30°C to 50°C).

Stored & Inactive Gear Drives

Each gear drive is protected with rust preventive that will protect parts against rust for a period of 6 months in an indoor dry shelter.

If a gear drive is to be stored, or is inactive after installation beyond the above periods, drain oil from housing and spray all internal parts with a rust preventive oil that is soluble in lubricating oil or add "Motorstor™" vapor phase rust inhibitor at the rate of one ounce per cubic foot of internal drive space (or 5% of sump capacity) and rotate the shafts several times by hand. Before operating, drives which have been stored or inactive must be filled to the proper level with oil meeting the specifications given in this manual. Refer to Manual 128-014 for "Start-up after Storage" instructions.

Periodically inspect stored or inactive gear drives and spray or add rust inhibitor every six months, or more often if necessary. Indoor dry storage is recommended.

Gear drives ordered for extended storage can be treated at Falk with a special preservative and sealed to rust-proof parts for periods longer than those cited previously.

Material Safety Data

For material safety data sheets pertaining to products used in the manufacture of the Falk Ultramite, contact:

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