How to Use This Manual

This manual provides detailed instructions on installation and maintenance of Alignment Free drives. 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 craftsman 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 regular lubrication. The details of this important job are the subject of this manual.

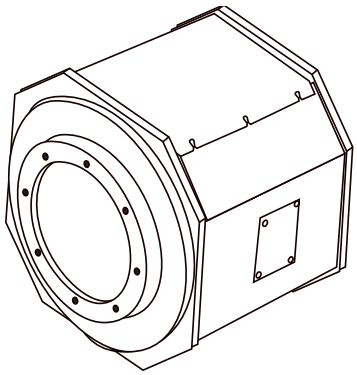
Nameplate — Operate Falk™ gear drives only at horsepower, speed and ratio shown on nameplate. Before changing any of these, submit complete nameplate data and new application conditions to the Factory for correct oil level, parts and application approval.

Disassembly and Assembly — Disassembly and assembly instructions and parts guides are available from the Factory or Falk Representatives. When requesting information, please give complete data from the nameplate on the gear drive; Model, M.O. Number, Date, RPM and Ratio.

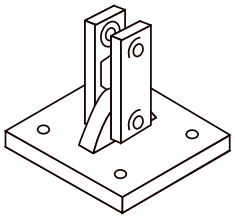
WARNING: Consult applicable local and national safety codes for proper guarding of rotating members. Lock out power source and remove all external loads from drive before servicing drive or accessories.

Warranty

Rexnord Industries (the "Company") warrants that, for a period of three years 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.



Flange Motor Adapter



Tie Rod

Installation Instructions

The following instructions apply to standard Falk™ Alignment Free drives. The Alignment Free drive is designed for shaft mounting. It is furnished with a standard torque arm and a flange motor adapter. The flange motor adapter may be either hydrokinetic or close coupled. The flange motor adapter provides an interface between the flange motor and the gear drive that eliminates the need for aligning the high speed coupling. If the drive is furnished with special features, refer to the supplemental instructions shipped with the drive.

WELDING — Do not weld on the gear drive or accessories without prior approval from Rexnord Industries, LLC. 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, a heat exchanger or other cooling device may be required to prevent the sump temperature from exceeding the allowable maximum.

HORIZONTAL MOUNTING — The Alignment Free drive is suitable for operation with horizontal input and output shafts. If it is necessary to mount the drive in a different position from that for which it was ordered, consult Rexnord for changes

necessary to provide proper lubrication.

NON-HORIZONTAL MOUNTING — For gear drives with non-horizontal mounting, refer to instructions provided with the drive for oil levels and lubrication.

WATER COOLED HEAT EXCHANGERS — Install a shut-off or control valve in the water line to the heat exchanger to regulate the water flow through the exchanger. Also install a water flow gauge between the control valve and the exchanger to determine actual flow rate. Discharge water to an OPEN DRAIN to prevent back pressure.

GEAR DRIVE ALIGNMENT — The Alignment Free drive flange motor adapter provides registration for all components between the motor and the gearbox. This eliminates the adjustments normally required for aligning the high speed coupling. Since the gearbox is shaft mounted, aligning the gear drive to the driven equipment occurs during mounting of the gear drive on the driven shaft.

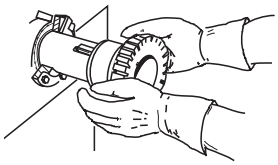
Shaft Connections

WARNING: Provide suitable guards in accordance with OSHA standards.

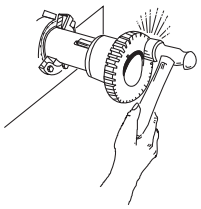
BACKSTOPS — To prevent damage to backstops due to incorrect motor shaft rotation at start up, remove backstop prior to connecting the motor. The backstop is retained on the intermediate shaft with a snap ring. After completing the electrical connection, check motor and gear drive shaft rotations. Then re-install backstop on intermediate shaft extension.

SHRINK DISC CONNECTIONS — Shrink disc assemblies used on hollow low speed shafts and some Type MCF coupling hubs, require special installation procedures. Refer to the supplementary instructions supplied with the shrink disc assembly or the MCF coupling.

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.



CORRECT METHOD
Heat interference fitted coupling hubs to a maximum of 275°F (135°C) and slide onto the gear drive shaft.

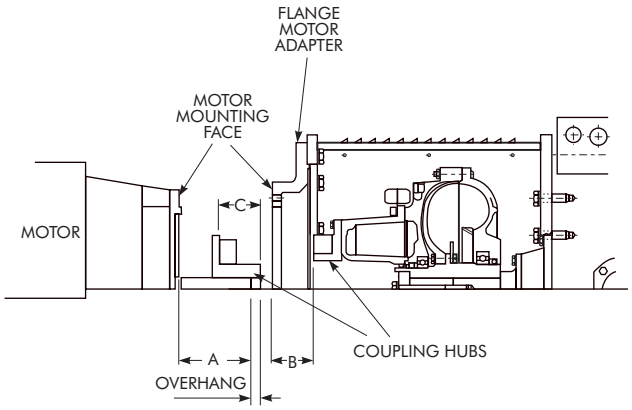


INCORRECT METHOD
DO NOT drive coupling hub onto the shaft. An endwise blow on the shaft/coupling may damage gears and bearings.

— CAUTION —
DO NOT HAMMER

High Speed Shaft Connections

MOUNTING FALK™ HUB ON MOTOR — Accurate axial positioning of the coupling hub on the motor shaft is required to ensure proper coupling gap. To establish the correct overhang on the motor shaft, measurements are required. Refer to the illustration in the next column. First measure the distance



from the motor mounting face of the motor to the end of the motor shaft (A). Then measure the distance from the motor mounting face of the flange motor adapter the face of the gear drive hub (B). Check for the desired coupling gap in the coupling installation and maintenance instructions. The coupling hub overhang is equal to the first measurement (A) plus the coupling gap less the second measurement (B). [Overhang = (A + Gap) - B]. If the calculated overhang is a positive value, the motor shaft extends beyond the hub by the amount.

NOTE: For couplings where the coupling gap does not occur at the end of the motor hub, an additional adjustment must be made. See dimension (C) in the illustration.

FALK FLUID COUPLINGS — Refer to the installation manual furnished with the Falk™ fluid coupling for installation and start up instructions. The flange motor adapter has two side inspection openings. On solid shaft gear drives, the opening opposite the low speed shaft extension has been marked to indicate the vertical midpoint of the adapter. On hollow shaft gear drives, the opening on the shrink disk side of the gear drive has been marked to indicate the vertical midpoint of the adapter. These marks are used to establish the proper fill angle for the fluid coupling.

The fluid coupling outside diameter has been marked with two separate match marks. The recommended fill can be obtained by lining up the correct match mark on the fluid coupling with the mark in the inspection opening and filling the fluid coupling until fluid appears at the lip of the fill hole. To determine the correct mark on the fluid coupling begin by aligning the fill hole with the match mark in the inspection opening. For fill angles less than 90°, rotate the fill plug upward till the match marks line up. For fill angles greater than 90°, rotate the fill plug downward till the match marks line up.

FALK STEELFLEX® COUPLINGS — Detailed installation manuals are available from the Factory, your Rexnord Account Executive or Distributor. For lubricant requirements and a list of typical lubricants meeting Rexnord specifications, refer to appropriate coupling service manual.

NON-FALK™ COUPLINGS — Refer to manufacturer's installation and maintenance instructions.

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Low Speed Shaft Connection

HOLLOW LOW SPEED SHAFT — The standard hollow shaft is connected to the driven shaft with a shrink disc connection. Shrink disc assemblies require special installation procedures. Refer to the supplementary instructions supplied with the shrink disc assembly.

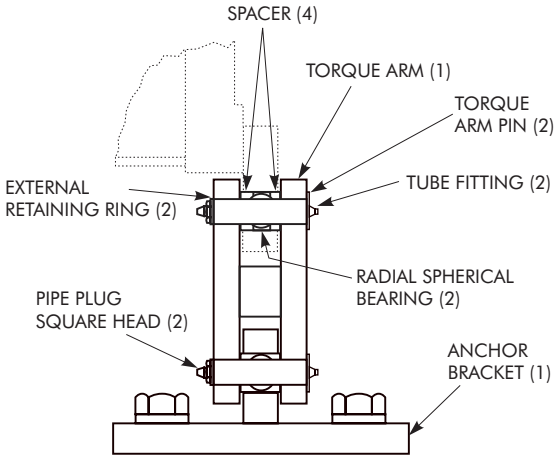
FALK™ LOW SPEED (TYPE MCF) COUPLING — Refer to the installation manual furnished with the MCF coupling for installation instructions.

COUPLING GUARD (TYPE MCF) — The MCF coupling guard is secured to the gear drive and encloses the MCF coupling. The coupling guard is suitable for installation after the gear drive has been mounted to the driven shaft.

Torque Arm

TORQUE ARM LOADING — The torque arm connects a shaft mounted gearbox to the foundation. In the static condition, it helps to support the weight of the gearbox and the motor. In the dynamic condition it supports weight and also transmits the torque reaction to the foundation. The torque arm may be loaded either in tension or compression. Maximum torque arm loads for the standard torque arm are provided in the Alignment Free Selection Guide, 231-210. These loads should be considered by the customer while designing the foundation for the torque arm anchor.

TORQUE ARM ASSEMBLY — The torque arm components are to be assembled according to the following illustration. A plain spherical bearing is fitted into the gearbox housing. A pin engages the spherical bearing and connects it to the torque arm. Spacers fitted into the gearbox, center the bearing on the pin. The pin is retained in assembly via a snap ring and shoulder on the pin. A similar connection is made between the opposite end of the torque arm and the anchor bracket. In operation, the torque arm is to be vertical and perpendicular to the edge of the gear drive. The anchor bracket is to be secured to the foundation.



TORQUE ARM MOVEMENT— It is possible to have visual movement of the Alignment Free drive while operating. The movement is due to shaft and coupling runout. The standard torque arm is designed to accommodate movement due to runout. It allows the gearbox to move slightly with the driven shaft. This prevents transmitting unnecessary additional loads to the driven shaft through the gearbox. DO NOT restrain this movement; to do so will adversely load the drive low speed shaft and the connected shaft, and may result in shaft or hub failure.

Fastener Tightening Torques

Use the tightening torque values specified in Table 1 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. For inch fasteners, use Grade 5 for diameters through 1.50", for larger diameters, use ASTM A-354 Grade BC. Use ISO grade 8.8 for metric fasteners.

TABLE 1 — Tightening Torques (lb-in.) ± 5% — DO NOT Lubricate Fasteners

Thread Dia-UNC	Metal to Metal		Metal to Concrete	
	lb–in	Nm	lb–in	Nm
	INCH FASTENERS			
.250-20	90	10	70	8
.3125-18	185	21	145	16
.375-16	330	37	255	29
.500-13	825	93	640	072
.625-11	1640	185	1280	145
.750-10	2940	332	2290	259
.875-9	4560	515	3750	424
1.000-8	6800	768	5600	633
1.125-7	8900	1006	7000	791
1.250-7	12600	1424	10000	1130
1.375-6	18500	2090	13000	1469
1.500-6	22100	2497	17500	1977
1.750-5	23700	2678	18700	2113
2.000-4.5	37000	4180	29000	3277
2.250-4.5	52000	5875	41000	4632
2.500-4	72000	8135	56000	6327
2.750-4	98000	11073	77000	8700
3.000-4	125000	14123	99000	11185
Nominal Dia & Pitch	METRIC FASTENERS			
M4x.7	26	230	21	182
M5x.8	53	469	42	371
M6x1.0	89	788	70	622
M8x1.25	221	1956	175	1545
M10x1.5	434	3841	343	3035
M12x1.75	761	6735	601	5321
M16x2	1859	16454	1469	12998
M20x2.5	3629	32119	2867	25374
M24x3	6284	55618	4964	43938
M30x3.5	12834	113590	10139	89736
M36x4	22393	198195	17690	156574
M42x4.5	36024	318839	28459	251883
M48x5	54345	480994	42933	379985
M56x5.5	89094	770847	68804	608969

Lubrication Recommendations

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

Lubricants listed in this manual are typical ONLY and should not be construed as exclusive recommendations. Industrial type petroleum based rust and oxidation inhibited (R & O) gear lubricants or industrial type sulphur-phosphorus 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, Page 4. Synthetic lubricants can also be used in normal climates.

VISCOSITY (IMPORTANT) — The proper grade for R & O and EP lubricants is found in Table 2. For cold climate conditions refer to Table 4, Page 5 and the "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 application conditions are known.

If a gear drive operates in a typical indoor environment where the ambient temperature is within 70°F to 125°F (21°C to 52°C), the oil viscosity should be increased one AGMA grade above that shown for the 50°F to 125°F (10°C to 52°C) range. That is, an AGMA Number 6 or 7 should be substituted for a 5 or 6 respectively, under these ambient conditions.

OIL PUMPS — When selecting a lubricant for a gear drive equipped with an oil pump, cold temperature viscosity is important. Lubricant viscosity at start up generally should not exceed 1725 cSt (8,000 SSU). When exceeding this viscosity, pump cavitation is possible, preventing oil circulation. A sump heater may be required or it may be possible to use a lower viscosity oil to minimize pump cavitation, consult the Factory.

TABLE 2 — Viscosity Grade Recommendations for R & O or EP Lubricants

Output RPM	Normal Climates			
	15° to 60°F (-9° to +16°C)		50° to 125°F (10° to 52°C)	
	ISO-VG	AGMA	ISO-VG	AGMA
Output RPM Below 80	150	4	320	6
Output RPM 80 & Above	150	4	220	5

Petroleum Based Lubricants

R & O GEAR LUBRICANTS (Table 5) — 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 gear drives or drives loaded in excess of original estimates, industrial type petroleum extreme pressure lubricants are preferred. The EP lubricants currently recommended are of the sulphur-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 manufacturers' 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.

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

Oil Level

Fill the drive with oil to the level indicated on the oil dipstick. Approximate oil capacities are given on the drive nameplate and in Table 7, Page 7.

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. Viscosity changes more than 15%.

PETROLEUM LUBRICANTS — For normal operating conditions, change gear oil every 6 months or 2,500 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 2. Lubricant suppliers can test oil from the drive periodically and recommend economic change schedules.

SYNTHETIC LUBRICANTS — Synthetic lube change intervals can be extended to 8,000–10,000 hours depending upon operating temperatures and lubricant contamination. Laboratory analysis is recommended for optimum lubricant life and gear drive performance. Change lube with change in ambient temperature, if required. Refer to Table 4.

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TABLE 3 — Extreme Pressure Lubricants

Maximum Operating Temperature
200°F (93°C)

Manufacturer	Lubricant
Amoco Oil Co. BP Oil Co. Chevron U.S.A. Inc. Citgo Petroleum Corp.	Permagear/Amogear EP Energear EP Gear Compounds EP Citgo EP Compound
Conoco Inc. Exxon Co. U.S.A. E.F. Houghton & Co. Imperial Oil Ltd.	Gear Oil Spartan EP MP Gear Oil Spartan EP
Kendall Refining Co. Keystone Div. Pennwalt Corp. Lyondell Petrochemical (ARCO) Mobil Oil Corp. Petro–Canada Products	Kendall NS-MP Keygear Pennant NL Mobilgear Ultima EP
Phillips 66 Co. Shell Oil Co. Shell Canada Limited Sun Oil Co. Texaco Lubricants	Philgear Omala Oil Omala Oil Sunep Meropa
Unocal 76 (East & West) Valvoline Oil Co.	Extra Duty NL Gear Lube AGMA EP

TABLE 4 — Polyalphaolefin Type Synthetic Lubricants ★

AGMA Viscosity Grade		...	2	4	5	6
ISO Viscosity Grade		32	68	150	220	320
Viscosity at 104°F (40°C)	SSU	135–164	284–347	626–765	918–1122	1335–1632
	cSt	28.8–35.2	61.2–74.8	135–165	198–242	288–352
Ambient Temperature Range † °F		– 30 to +10	– 15 to + 50	0 to + 80	+10 to +125	+ 20 to +125
Manufacturer		Lubricant				
Chevron USA, Inc.		...	...	...	Syn. Gear Lube Tegra 220	...
Conoco, Inc.		Syncon 32	Syncon 68	...	...	...
CPI Engineering Services, Inc.		CP–4620–32	CP–4620–68	CP–4620–150	CP–4620–220	...
		CP–4630–32	CP–4630–68	CP–4630–150	CP–4630–220	...
Exxon Co. USA		...	...	Spartan Synthetic EP 150	Spartan Synthetic EP 220	Spartan Synthetic EP 320
Mobil Oil Corp.		SHC 624	SHC 626	SHC 629	SHC 630	SHC 632
		...	...	Mobilgear SHC 150	Mobilgear SHC 220	Mobilgear SHC 320

★ Minimum viscosity index of 130. Consult lubricant supplier/manufacturer for maximum operating temperature.

† With complete application information, temperature range can sometimes be extended, consult Factory.

TABLE 5 — Petroleum Based R & O Gear Oils (Maximum operating temperature of lubricants 200°F (93°C)

AGMA Viscosity Grade		3	4	5	6	7
ISO Viscosity Grade		100	150	220	320	460
Viscosity at 104°F (40°C)	SSU	417-510	626-765	918-1122	1335-1632	1919-2346
	cSt	90-110	135-165	198-242	288-352	414-506
Manufacturer		Lubricant	Lubricant	Lubricant	Lubricant	Lubricant
Amoco Oil Co. BP Oil Co. Chevron U.S.A., Inc. Citgo Petroleum Corp.		Amer.Ind. Oil 100 Turbinol T–100 Machine Oil AW 100 Citgo Pacemaker 100	Amer.Ind. Oil 150 Turbinol T–150 Machine Oil AW 150 Citgo Pacemaker 150	Amer.Ind. Oil 220 Energol HLP-HD 220 Machine Oil AW 220 Citgo Pacemaker 220	Amer. Ind. Oil 320 . . . . . Machine Oil AW 320 Citgo Pacemaker 320	Amer. Ind. Oil 460 . . . . Citgo Pacemaker 460
Conoco Inc. Exxon Company, U.S.A. Houghton International, Inc. Imperial Oil Ltd.		Dectol R&O Oil 100 Teresstic 100 Hydro–Drive HP 500 Teresso 100	Dectol R&O Oil 150 Teresstic 150 Hydro–Drive HP 750 Teresso 150	Dectol R&O Oil 220 Teresstic 220 Hydro–Drive HP 1000 Teresso 220	Dectol R&O Oil 320 Teresstic 320 . . . . . Teresso 320	Dectol R&O Oil 460 Teresstic 460 . . . .
Kendall Refining Co. Keystone Lubricants Lyondell Petrochemical (ARCO) Mobil Oil Corp. Petro–Canada Products		Kenoil R&O AW 100 KLC–30 Duro 100 DTE Oil Heavy Harmony 100	Four Seasons AW 150 KLC–40 Duro 150 DTE Oil Extra Heavy Harmony 150 or 150D	. . . . . KLC-50 Duro 220 DTE Oil BB Harmony 220	. . . . Duro 320 DTE Oil AA Harmony 320	. . . . DTE Oil HH . . . . .
Phillips 66 Co. Shell Oil Co. Shell Canada Limited Texaco Lubricants		Magnus Oil 100 Morlina 100 Tellus 100 Regal Oil R&O 100	Magnus Oil 150 Morlina 150 Tellus 150 Regal Oil R&O 150	Magnus Oil 220 Morlina 220 Tellus 220 Regal Oil R&O 220	Magnus Oil 320 Morlina 320 Tellus 320 Regal Oil R&O 320	. . . . . Morlina 460 . . . . . Regal Oil R&O 460
Unocal 76 (East) Unocal 76 (West) Valvoline Oil Co		Unax RX 100 Turbine Oil 100 Valvoline AW ISO 100	Unax RX 150 Turbine Oil 150 Valvoline AW ISO 150	Unax RX 220 Turbine Oil 220 Valvoline AW ISO 220	Unax AW320 Turbine Oil 320 Valvoline AW ISO 320	Turbine Oil 460 Turbine Oil 460 . . . . .

TABLE 6 — Greases for Grease Lubricated Bearings & Grease Purged Seals

(0° to 200°F(-18° 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. E.F. Houghton & Co. Imperial Oil Ltd.	EP Conolith Grease No. 2 Unirex N2 Cosmolube 2 Unirex N2L
Kendall Refining Co. Keystone Div. Pennwalt Corp. Lyondell Petrochemical (ARCO) Mobil Oil Corp. Mobil Oil Corp Petro–Canada Products	Multi–Purpose Lithium Grease L421 Zeniplex 2 Litholine H EP 2 Grease Mobilith 22 Mobilith SHC 460★ Multipurpose EP2
Phillips 66 Co. Shell Oil Co. Shell Canada Limited Sun Oil Co. Texaco Lubricants	Philube Blue EP Alvania Grease 2 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.

Lubrication Systems

SPLASH LUBRICATED GEAR DRIVES — The standard Alignment Free drive is splash lubricated. The lubricant is picked up by the revolving elements and distributed to all bearings and gear meshes.

OIL PUMPS — Occasionally gear drives are equipped with oil pumps, either for special lubrication considerations or for external cooling. When so equipped, run the lubrication system for several minutes to fill the system components. Verify that the pump is circulating oil properly then recheck the oil level.

Before starting the gear drive, rotate the input shaft by hand to check for obstructions. Then start the drive and allow it to run without a load for several minutes. Shut down and recheck oil level. If necessary, add oil to compensate for cooler and/or filter. If everything is satisfactory, the drive is ready for operation.

CAUTION: Consult the Factory for drives that use pumps to distribute lubricants with temperatures below 30°F (-1°C).

Bearing & Seal Greases

GREASE LUBRICATED SEALS — The standard Alignment Free drive has grease purged seals which minimize the entry of contaminants and abrasive dusts into the drive. Whenever changing oil in the drive, grease purge the seals with one of the NLGI #2 greases listed in Table 6.

Gear drives are shipped with NLGI #2 grease in the seal housing cavities unless otherwise specified. If grease could contaminate the product, as in the food and drug industries, it should be removed. Some of the greases shown in Table 6 are of the EP type and may contain toxic substances not allowed in the food processing industry. 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 grease into the seal cage grease fitting, WITH A HAND GREASE GUN, until fresh grease flows out along the shaft. Wipe off purged grease.

CAUTION: Rapid regreasing with a power grease gun can force grease inward past the seals and plug the oil drain back system causing seal leaks.

BACKSTOP EQUIPPED DRIVES — The Alignment Free drive uses a self contained sprag type backstop externally mounted on an intermediate shaft. The backstop is furnished filled with grease suitable for operation in an ambient temperature range of -20°F to +125°F (-29°C to 52°C). Relubricate the backstop every 3 months (2 weeks in severe operating condition). To relubricate, select and clean one grease fitting and pump grease into the backstop until fresh grease appears at both seals. Refer to backstop manufacturer's service manual (supplied with the drive) for detailed maintenance instructions and recommended greases. DO NOT use greases with molybdenum disulfide or other EP additives.

Preventive Maintenance

AFTER FIRST WEEK — Check and tighten all external bolts and plugs where necessary. DO NOT readjust the internal gear or bearing settings in the drive, these were permanently set at the Factory.

AFTER FIRST MONTH'S SERVICE — Proceed as follows:

1. Operate drive until old sump oil reaches normal operating temperature. Shut the drive down and drain immediately.
2. Immediately flush 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 volume through the drive or until clean oil flows through the drain.
3. 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, reclaimed oil may be reused if it is filtered through a 40 micron or finer filter.

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 high level mark on the dipstick, have the oil analyzed for water content. Moisture in the oil may indicate that the heat exchanger or a seal is leaking. If so, replace the defective part immediately and change the oil. DO NOT fill above mark indicated as leakage or undue heating may result. If drive is equipped with a fan, periodically clean accumulated foreign matter from the fan, fan guard and deflector to allow adequate air flow.

TABLE 7 — Approximate Oil Capacities ★

Drive Size	Gallons	Liters
405	14	53
425	19	72
445	35	132
465	40	151
485	55	208

★ Oil Capacities are approximate. Always fill drive to level indicated on the dipstick.

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LUBRICANT CHANGES — Refer to Page 4.
BEARING & SEAL GREASES — Refer to Page 5.

Stored & Inactive Gear Drives

Each gear drive is protected with a rust preventative that will protect 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 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 preventative oil that is soluble in lubricating oil or add "Motorstor"™ vapor phase rust inhibitor at the rate of one ounce per cubic foot (1.05 liters per cubic meter) of internal drive space (5% of sump capacity). Refer to Table 8 for Motorstor™ quantities. 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 the Factory with a special preservative and sealed to rust-proof parts for periods longer than those cited previously.

The vented dipstick should be replaced with a plug (vented dipstick should be attached to gear drive for future use) so that the protective rust inhibiting atmosphere is sealed inside the drive. Install vented dipstick when preparing drive for operation.

TABLE 8 — Motorstor™ /VCI–10

(Add to Stored or Inactive Drives) ★

Drive Size	Ounces	Liters
405	2	0.059
425	2	0.059
445	6	0.177
465	6	0.177
485	6	0.177

★ Motorstor is a product of Daubert Chemical Company, Chicago, IL.