

## How to Use This Manual

This manual provides detailed instructions on installation and maintenance of parallel shaft Types DHP, DHF, DHB, and right angle Types DBP, DBF, & DBB high torque 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 OF YOUR FALK DRIVE.**

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## 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 regular lubrication. The details of this important job are the subject of this manual.

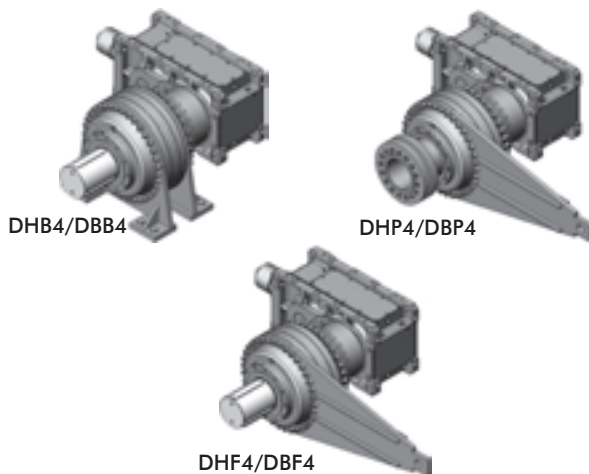
The Drive One High Torque Drive is created by connecting a single stage planetary final drive to the standard Drive One solid low speed shaft. A mounting adapter attaches the planetary housing to the Drive One housing. DHC3 (parallel shaft) and DBC3 (right angle/parallel shaft) triple reduction drives in Sizes M1160 through M1210 are combined with a single reduction planetary drive to create the following quad reduction configurations :

DRIVE TYPE	Mounting	Output Shaft	Torque Arm
DHB4/DBB4 DHP4/DBP4 DHF4/DBF4	Two Feet Shaft Shaft	Solid Hollow w/Shrink Disc Solid w/Moment Coupling	Single Sided Single Sided

**NAMEPLATE** — Operate Falk/Rexnord gear drives only at power, speed and ratio shown on the nameplate. Before changing any one of these, submit complete nameplate data and new application conditions to Factory for correct oil level, parts, and application approval.

**DISASSEMBLY AND ASSEMBLY** — Disassembly & assembly instructions and parts guides are available from Factory or Rexnord 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.



Drive has been carefully assembled and adjusted at the factory. Input and output shaft bearing clearances have been factory set and should not be disturbed.

## Warranty

Rexnord Industries, LLC (the "Company") warrants that Drive One gear drives (I) conform to Company's published specifications, and (II) are free from defects of material for three years from the date of shipment. Company does not warrant any non-Company branded products or components (manufacturer's warranty applies) or any defects in , damage to, or failure of products caused by: (I) dynamic vibrations imposed by the drive system in which such products are installed unless the nature of such vibrations has been defined and accepted in writing by Company as a condition of operation; (II) failure to provide suitable installation environment; (III) use for purposes other than those for which designed, or other abuse or misuse; (IV) unauthorized attachments, modifications or disassembly, or (V) mishandling during shipping.

## Installation Instructions

The following instructions apply to standard Falk Types DHP, DHF, DHB, DBP, DBF, & DBB high torque drives. 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 Factory. 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.

**NOTE:** Drives equipped with cooling fans may require removal of shroud when installing foundation fasteners.

**EFFECTS OF SOLAR ENERGY** — If the gear drive operates in the sun at ambient temperatures over 38°C (100°F), 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.

**MOUNTING POSITION** — Standard mounting positions for types DH & DB are with the input and output shafts horizontal.

Allowable mounting angles for standard oil levels are;

	Bridge Slope	Kiln Slope
DH & DB	0° Up & 4° Down	± 1.5°

Consult Factory for other angles.

If a gear drive is ordered for non-standard mounting positions, refer to the instructions provided with the drive for oil levels and bearing lubrication. If it is necessary to mount the gear drive in a different position from which it was ordered, refer to Factory for required changes to provide proper lubrication.

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

### Shaft Mounted Drives – General

Shaft mounted drives should never be mounted in a manner that restricts natural movement of the drive. They should be allowed to move freely with shaft on which it is mounted. Shaft mounted drives should always be used in conjunction with a torque reaction arm attached to the planetary that can absorb the torque reaction created in either direction of rotation.

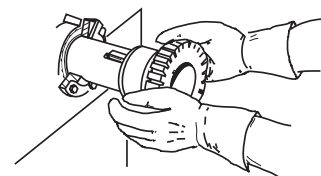
Shaft mounted drives are not to be used with swing base or torque arm attached to Drive One housing.

Remove rust inhibitor (oil soluble) from external machined surfaces as required.

### Shaft Connections

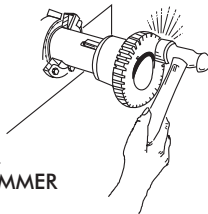
**WARNING:** Provide suitable guards in accordance with local and national standards.

**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 hubs, pinions, sprockets or pulleys to a maximum of 135°C (275°F) 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.

- CAUTION - DO NOT HAMMER

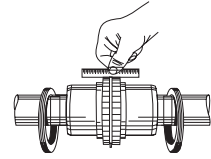
**FALK COUPLINGS** — (Except fluid type) Detailed installation manuals are available from Factory, your local Rexnord Representative or Distributor—just provide size and type designations stamped on the coupling. For lubricant requirements and a list of typical lubricants meeting Rexnord specifications,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

**FALK FLANGED TYPE RIGID COUPLINGS** — These are typically used on drives with vertical output shafts. The low speed shaft extension ends of the solid vertical shaft drives are

drilled and tapped to accommodate coupling keeper plates.

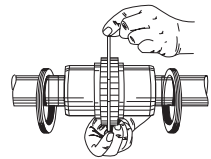
**FALK FLUID COUPLINGS** — Refer to the installation manual furnished with the Falk fluid coupling for installation and startup instructions.

**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 at right, 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 couplings hubs as shown to the right and also at 90° intervals. Tighten foundation bolts of the connected equipment and recheck alignment and gap.

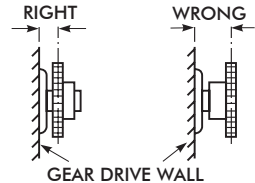


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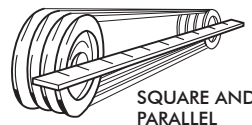
**SPROCKETS, PULLEYS OR SHEAVES** — Mount power take-offs as close to the gear drive housing as possible to avoid undue bearing load and shaft deflection.

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.

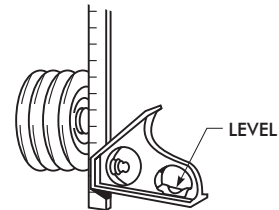
Check horizontal shaft alignment by placing one leg of a square against the face of the sheave or sprocket with the spirit level on the horizontal leg of the square.



GEAR DRIVE WALL



SQUARE AND PARALLEL



LEVEL

DO NOT over tighten belts or chains. Adjust chains to manufacturers’ 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-belt periodically; tighten the belts if they are slipping.

**OUTBOARD BEARING** — Mount the outboard bearing and gear drive on a common foundation so that they will shift as an assembly if settling should occur. Bring the outboard bearing to the correct horizontal position with broad flat shims under the mounting pad. Align accurately so that the load is equally divided between the two drive bearings and the outboard bearing. Mount a stop bar against the pillow block foot on the load side when large horizontal load components are exerted on the pillow block.

**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.

**NON FALK COUPLINGS** — Refer to manufacturers' installation and maintenance instructions.

**BACKSTOPS** — To prevent damage to backstops due to incorrect motor shaft rotation at start up, couplings are NOT assembled when gear drives are furnished with backstops.

After completing electrical connections, check motor and gear drive shaft rotations. If rotations are correct, complete alignment and assembly of coupling.

A drive equipped with bell housing/motor adapter provides for alignment-free motor-to-drive installation. The bell housing/motor adapter register fits to Drive One housing and provides a motor register diameter for motor installation. Attachment of bell housing/motor adapter to Drive One housing is as follows:

DRIVE SIZE	Total Number of Bolts Required	Thread Size x Pitch	ISO Class	Tightening Torque			
				Nm		ft-lb	
				Min	Max	Min	Max
M1160	4	M24 x 3	10.9	920	1130	680	830
M1170 & M1180	4	M30 x 3.5	10.9	1840	2250	1360	1660
M1190 - M1210	4	M36 x 4	10.9	3230	3930	2380	2900

Install bell housing/motor adapter coupling guard plates.  
For electric fan installation see Appendix A.

## Installation – DHP/DBP – Shaft Mounted with Shrink Disc

The shrink disc is a keyless frictional locking device designed to mechanically compress or shrink the hollow output shaft onto a solid shaft stub integral with driven shaft. A mechanical interference fit is established between hollow shaft inside diameter and driven stub.

Shrink disc is supplied ready for installation. However, prior to installation it may be necessary to remove spacers used for shipping.

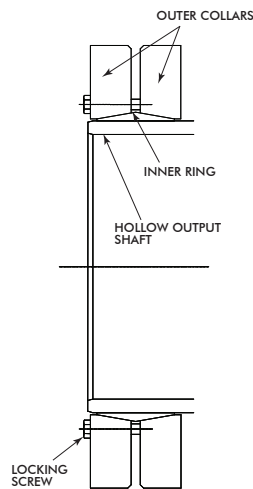
Verify lubrication of locking screw threads, screw head bearing area and tapers of inner ring. If necessary lubricate with molybdenum disulfide grease – Molykote Gn paste or equal.

Never tighten locking screws before shaft installation as shrink disc inner ring and/or hollow shaft can be permanently contracted (even at relatively low tightening torques).

Clean hollow shaft outside diameter and shrink disc bore. Lightly lubricate (light mineral oil) outside diameter before assembling shrink disc on hollow shaft.

Carefully clean driven shaft stub and hollow shaft bore of any lubricant prior to mounting hub onto shaft. **THIS STEP IS CRITICAL AS ANY LUBRICANT ON SHAFT/HUB BORE INTERFACE WILL GREATLY REDUCE TORQUE CAPACITY OF SHRINK DISC CONNECTION.**

Install shrink disc over hollow output shaft and install hollow shaft onto driven shaft stub and establish the correct position.



Hand tighten 3 or 4 equally spaced shrink disc locking screws and make sure outer collars of shrink disc are parallel. Hand tighten remaining locking screws. Disc outer collar faces need to be parallel to each other and perpendicular to shaft. The allowable gap deviation between the collars is 1.5 mm (.060”).

The number, size and tightening torque for shrink disc locking screws are as follows :

DRIVE SIZE	Number of Locking Screws	Thread Size	Tightening Torque	
			Nm	ft-lb
M1160 & M1170	16	M20	490	360
M1180 & M1190	24	M20	490	360
M1200 & M1210	21	M24	840	620

Set a torque wrench to approximately 5% higher than specified tightening torque. Tighten locking screws in either a clockwise or counterclockwise sequence. Use approximately ¼ turns (90°) for several passes (even if initially some locking screws require a very low torque to achieve ¼ turn). Continue until ¼ turns can no longer be achieved.

Continue to apply the overtorque for 1 or 2 more passes.

The above procedure compensates for system related relaxation of locking screws since tightening of a given screw will always relax adjacent screws. Without overtorquing an infinite number of passes would be needed to reach the specified tightening torque.

Reset torque wrench to specified tightening torque and check all locking screws. No screw should turn. If a screw turns reset torque wrench to 5% overtorque and apply for one or two more passes. Reset torque wrench to specified torque and recheck all locking screws. Continue this procedure until no screws turn at the specified torque.

Drive should never be mounted in a manner that restricts natural movement of the drive. Drive should be allowed to move freely with shaft on which it is mounted. To absorb driving torque reaction the shaft mounted drive is equipped with a torque reaction arm. The anchor of the torque arm must transmit the torque reaction force to a suitable structure but at the same accommodate both translational ( $\pm 5$  mm,  $\pm .20$  in) and rotational ( $\pm 5$  deg) motion of the anchor end.

For removal of drive from shaft loosen shrink disc locking screws ½ turn at a time progressing around outer collar in either direction until shrink disc is loose on hollow shaft.

**DO NOT** remove shrink disc locking screws until outer collars are disengaged from inner ring to prevent sudden release of collars.

**DO NOT** completely remove locking screws. Support drive assembly and slide drive off of driven shaft.

Clean and lubricate shrink disc components per preceding instructions for reinstallation.

## Installation – DHF/DBF – Shaft Mounted With Moment Coupling

Drive is to be connected to the driven shaft using a rigid moment coupling. For Falk Type MCF follow the installation instructions in Manual 458-862. For non-Falk coupling, follow manufacturer's instructions.

Drive should never be mounted in a manner that restricts natural movement of the drive. Drive should be allowed to move freely with shaft on which it is mounted. To absorb

driving torque reaction the shaft mounted drive is equipped with a torque reaction arm. The anchor of the torque arm must transmit the torque reaction force to a suitable structure but at the same time accommodate both translational ( $\pm 5$  mm,  $\pm .20$ " ) and rotational ( $\pm 5^\circ$ ) motion of anchor end.

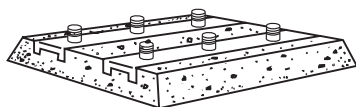
### Installation – DHB/DBB – Foot Mounted

**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.

When an outboard bearing is used, mount drive and outboard bearing on a continuous foundation or bedplate, and dowel both in place.

**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 planetary drive foot mounting outline.

**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.



### Gear Drive Alignment

**FOOT MOUNTED DRIVES** – Align drive with driven equipment by placing broad, flat shims under all mounting pads. Jack screw holes are provided by mounting feet to facilitate alignment. 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. Foot mounting bolt requirements are as follows:

DRIVE SIZE	Total Number of Bolts Required	Thread Size x Pitch	ISO Class	Tightening Torque			
				Nm		ft-lb	
				Min	Max	Min	Max
M1160 & M1170	8	M30	8.8	1300	1570	960	1160
M1180 & M1190	8	M42	8.8	3660	4470	2700	3300
M1200 - M1210	8	M48	8.8	5490	6710	4050	4950

If equipment is received from the Factory mounted on a bedplate, the components were accurately aligned at the Factory with the bedplate mounted on a large, flat assembly plate. Shim under the bedplate foot pads until the gear drive is level and all feet are in the same plane.

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

### Lubrication

Drives are shipped without lubrication. **DO NOT OPERATE WITHOUT LUBRICATION**

Industrial type petroleum extreme pressure (EP, sulfur-phosphorus type) lubricants are recommended as follows :

Ambient Temperature Range		EP Lubricant Grade	
°C	°F	ISO VG	AGMA
-9 to +16	+15 to +60	150	4
+10 to +52	+50 to +125	320	6

When an extended temperature range (all season) or lubricant change interval is desired a synthetic lubricant (polyalphaolefin type, sulfur-phosphorous EP) may be used. A ISO/AGMA VG320EP synthetic can be used over the -9 to +52°C (+15 to +125°F) temperature range.

Approximate oil capacity is shown on nameplate. Oil filling and level checking should be done statically (no drive operation) with oil temperature between +10 to +52°C (+50 to +125°F). Never remove dipstick with drive operating.

Fill the drive through the DH or DB oil fill hole or inspection cover to level indicated on the DH or DB dipstick. Allow sufficient time for oil to flow into planetary section. The DH or DB and planetary share the same oil sump and operate at the same oil level. The DH or DB dipstick oil level may be slightly below the oil sight on the side of the planetary. Do not overfill as overheating and leakage may result.

When replacing inspection cover, run a bead of non-hardening chemical gasket eliminator around perimeter of inspection opening, making sure to circle fastener holes. Use Saf-T-Eze Flange Seal (Saf-T-Lok International Corp., Lombard, IL) or equivalent.

When changing oil there are two oil drain plugs ; one in Drive One housing (either input or output end) and one in planetary stage (planetary housing on Drive One side, 180° from air vent).

## Startup

When starting up initially, operate drive at no load or light load for sufficient time to allow operating temperatures to level off. During this run, check for any undue or sudden temperature rise.

With drive operating under load, suggested oil sump temperature limits are 80°C (180°F) alarm and 95°C (200°F) shutdown.

## Periodic Maintenance

For Type DHB/DBB foot mounted, retighten foundation bolts and check alignment of total system after first week of operation.

Best practice dictates that drive oil be changed after first 250 hours of operation. Alternatively, an oil sample should be taken and analyzed after the first 250 hours of operation. If a petroleum based lubricant is being used change oil every 2500 hours or 6 months, whichever occurs first. This should be done even if oil condition is acceptable. If a synthetic lubricant is being used change oil after 8000 hours or 1.5 years, whichever occurs first. This should be done even if oil condition is acceptable.

It is recommended that oil be sampled every 1000 to 1500 hours of operation. In the absence of more specific limits the following guidelines may be used to indicate when to change oil:

1. Water content is greater than 500 ppm (.05%)
2. Iron content exceeds 150 ppm
3. Silicon content exceeds 25 ppm (dust/dirt)
4. Viscosity changes more than 15%
5. ISO 4406 Cleanliness Code 25/22/18 exceeded

If an unacceptable oil condition is found change oil immediately even if hours are less than the allowable oil change interval.

Input shaft seal should be regreased every 6 months with NLGI #2 grease with lithium thickener and EP additive. Use hand operated grease gun only and apply grease until fresh grease flows out along shaft. Wipe off purged grease. Regreasing should be done with shaft stationary but near normal operating temperature.

Output shaft seal should be regreased every 6 months. Clean grease fitting prior to greasing. Charge seal assembly with hand operated grease gun. Approximately 140 grams (5 ounces) of grease will be required. Do not exceed this amount. The recommended grease is NLGI #2 with lithium thickener and EP additive. Regreasing should be done with shaft stationary but near normal operating temperature.

Relube input and/or output shaft couplings per manufacturer's instructions.

Periodically check oil level. Add oil if needed. If oil level has increased have oil analyzed for water content.

Periodically check coupling alignment.

Periodically clean shaft or electric fan and check for free movement of torque arm if drive so equipped.

## Stored & Inactive Gear Drives

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 drive is to be stored or is inactive after installation beyond the above stated times see Manual 128-014 for procedures for extending these periods and startup after storage instructions. With drive drained of oil the amount of vapor-phase rust inhibitor Motorstor (referenced in 128-014) required is as follows:

DRIVE SIZE	Motorstor	
	Milliliters Per Drive	Ounces Per Drive
M1160 & M1170	180	6
M1180 & M1190	355	12
M1200 & M1210	590	20

The storage procedures in 128-010 call for the air vents to be sealed. The drive has two air vents ; one integral with Drive One DH or DB dipstick and one on top of single stage planetary. If sealed by removing and installing plugs the required sizes are 3/4 inch BSPT for M1160 dipstick, 1 inch BSPT for M1170 through M1210 dipstick and 3/4 inch GAS for planetary air vent (all sizes).



## Electric Fan Installation & Maintenance

### Installation

The installation and troubleshooting of electric cooling fans are to be carried out by a qualified electrician according to the applicable local, state, province and federal codes. Inspect for any damage that may have occurred during transit. Check all bolts, screws, set screws, etc. Retighten as required. Before installing, rotate the blade to be sure it does not rub. Adjust if necessary. Before installation, read the entire manual carefully.

This guide is pertinent only to electric fans furnished by the Factory and manufactured by Multifan Inc. (can be verified from nameplate on the electric fan). In the event the electric fan furnished by the Factory is of a special nature (manufactured by an alternate fan manufacturer), please contact the Factory for appropriate electric fan installation and maintenance instructions.

### General Safety Information

Warning: To reduce the risk of fire, electric shock, or personal injury, observe the following:

1. Use this electric fan only in the manner intended by the manufacture. If you have any questions, contact Factory.
2. Before servicing or cleaning the fan, switch the power off at the service panel and lock out to prevent the power from being switched on accidentally.
3. Follow all local electrical and safety codes, as well as the National Electrical Code (NEC) and Occupational Safety and Health Act (OSHA).
4. Fan motor must be securely and adequately grounded.
5. All working parts should be grounded.
6. When cleaning electrical equipment always use an approved cleaning agent. See CLEANING in NOTES section, Page 7.
7. For general ventilation and cooling use only. Do not use if hazardous or explosive materials and vapors are present.

### Guidelines For Installation

Before connecting the electric fan, check if the information on the fan motor name plate is in accordance with the actual main supply voltage, phase and frequency.

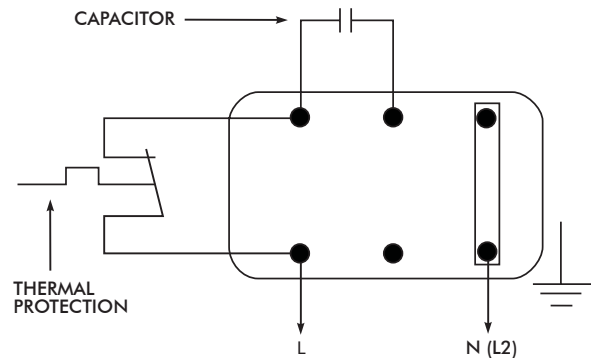
Warning: To reduce the risk of fire, electric shock, or personal injury, observe the following:

1. Switch off the main power supply and lock out before installing, servicing or making connections to the fan.
2. Installation work and electrical wiring must be done by a qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction.
3. The fan should be securely mounted. Recheck the mounting hardware and tighten as necessary.
4. The fan motor must always be grounded. The installation of a motor protection switch is recommended. See Figure 1 for wiring diagrams.
5. Mount the motor guard if removed. The motor guard must be installed at all times during operation to prevent injury to personnel by rotating fan blade.
6. Use liquid tight electrical fittings and conduit.

FIGURE 1

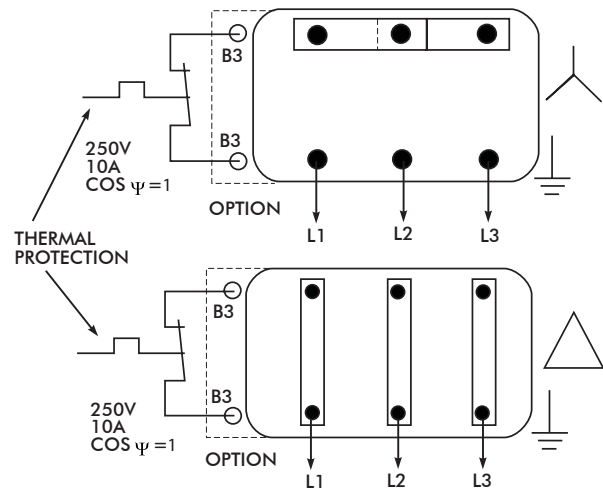
#### SINGLE PHASE TYPE - E

1 PHASE 220V - 50Hz  
1 PHASE 240V - 50Hz  
1 PHASE 110V - 60Hz  
1 PHASE 220V - 60Hz  
1 PHASE 240V - 60Hz



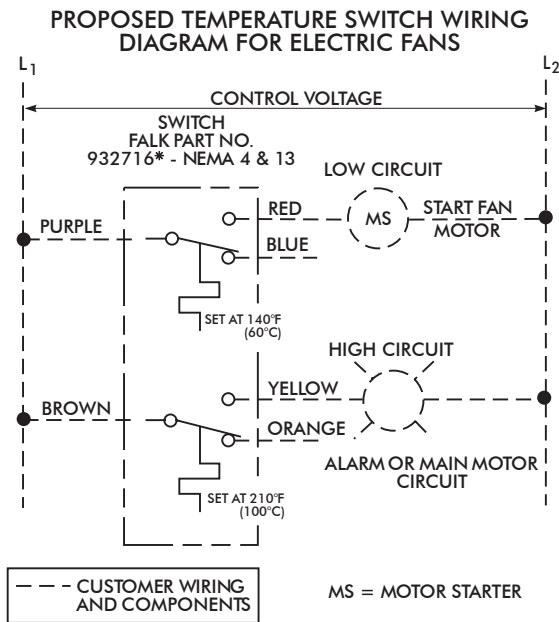
#### SINGLE PHASE TYPE - D

3 PHASE  $\Delta$  /  $\text{Y}$   
3 PHASE 220/380V - 50Hz  
3 PHASE 230/400V - 50Hz  
3 PHASE 240/415V - 50Hz  
3 PHASE 220/380V - 60Hz  
3 PHASE 208/360V - 60Hz  
3 PHASE 265/460V - 60Hz



7. A temperature switch is provided to control oil sump temperature. See Figure 2 for proposed wiring. There are two separate circuits in the temperature switch. The low circuit is to operate the electric fan. It is recommended the fan motor be operated by the temperature switch through a motor starter relay (consult applicable local and national electrical codes). The high circuit is provided to operate either a high temperature alarm or main motor shutdown.

FIGURE 2



\* AC RATING - INDUCTIVE LOAD - 50% PF  
DC RATING - INDUCTIVE LOAD - L/R = 0.26

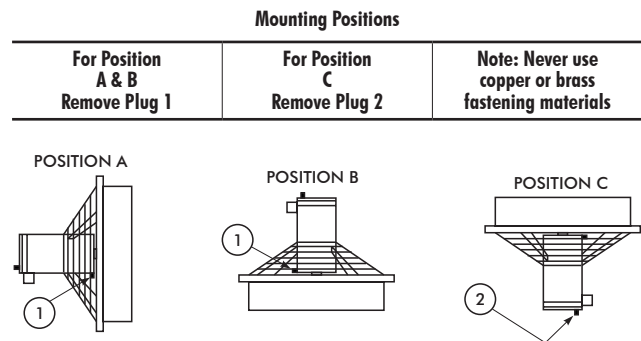
AC VOLTS	AMP	DC VOLTS	AMP
125	15	6-12**	15
250	15	24**	5
480	15	125	0.05
		250	0.03

\* MAXIMUM CONTINUOUS CURRENT  
\*\*Reference only.

8. Connect power to the motor using an approved wiring method. See Figure 1 for connection diagrams.
9. Before starting the fan, double-check to ensure there are no obstructions that could interfere with proper fan operation and airflow. Verify proper fan rotation, resulting in air flow directed at the adjacent face of the gear drive.

10. Remove proper condensation plug. See Figure 3 below. Do not discard. Plug is to be used during cleaning.

FIGURE 3



**NOTES:**

**AIR SUPPLY AND TEMPERATURE** — Sufficient air supply over the motor must be assured in all circumstances. Limits of operating ambient temperature are 14°F to 113°F (-10°C to 45°C).

**RESTRICTION ON USE** — Fan blade material is Polypropylene which is unsuitable and/or not recommended for certain chemicals. The following is a partial list of unsuitable chemicals for guideline purposes.

Chloro-Sulphonic Acid	Nitric Acid	Chloroform
Mixture of HNO3-HCL	Esters	1:2 Dichloroethylene
Mixture of HNO3-H2SO4	Benzene	Trichloroethylene
Sulfuric Acid, fuming	Gasoline	Diethyl Ether
Carbon Tetrachloride	Toluene	Chlorine, Liquid
Chlorobenzene	Xylene	

**CLEANING** — When cleaning fan, both condensation holes (Figure 3, Items 1 and 2) are to be temporarily plugged. If this is not done, guarantee is void. When cleaning electrical equipment, always use an approved cleaning agent.