



GEI-100327

GE Industrial Systems

Vertical Motor

Data Information Pak

These instructions do not purport to cover all of the details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

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Vertical Motor Data Information Pak

I. RECEIVING AND STORAGE

The motor should be stored in a dry area with factory packaging intact, unless appearance of package indicates possibility of motor damage during shipment. Motor rating and identification data are furnished on label for checking purposes.

Just prior to actual use, unpack motor and rotate shaft by hand to see that it turns freely. (Pertains to vertical solid shaft motors only). Remove rust preventative paper or slushing compound from shaft extension.

NOTE: SEE SPECIAL PROCEDURES FOR OIL LUBRICATED BEARINGS – THRUST BEARINGS.

II. INSTALLATION

A. Mounting

Locate the motor in a place that is clean and well ventilated. The motor enclosure is such that dripping, wind blown, and splashing water will not damage the motor. Under conditions of extreme weather and moisture, additional protection, such as a pump house is recommended; however, the free flow of air around the motor must not be obstructed. The ambient air temperature should not exceed 40° C or 104° F, unless the motor has been specially designed or otherwise cleared for use in a higher ambient temperature.

Bolt the motor to the pump head or rigid foundation using bolts of the

largest size permitted by the holes in the motor bracket.

Accurate alignment between motor and pump is of extreme importance. Misalignment will result in bearing problems.

1. Vertical Hollow Shaft Motors (VHS)

When mounting VHS motors, remove the hood and coupling. Lower the motor onto the pump head with the pump shaft extending through the hollow shaft. The motor bracket should bolt home square with the pump head and at right angles with the pump head shaft. The pump head shaft should be centered within the motor hollow shaft. Fit the coupling onto the motor and key it to the pump shaft using the gib head key. Put on the adjusting nut supplied with the pump and draw up on the impellers. Lock the adjusting nut in place with a screw through the nut into a tapped hole in the coupling.

a. Thrust

The axial thrust load imposed upon the motor by the pump shaft and impellers plus the hydraulic load should not exceed the value for which the motor was ordered.

b. Ratchet Type VHS Motors

These motors are equipped with a non-reverse ratchet that permits rotation in the CCW direction (looking downward at the motor) only. The ratchet consists of a stationary plate with teeth cast into it, and a rotating drive hub or runner with pins operating in slots. When the motor starts in the forward or CCW direction, the inclined faces the ratchet track lift the pins where they are held in by centrifugal force. When the motor stops, the pins move down and prevent CW or reverse rotation by locking against the vertical faces of the teeth.

2. Vertical Solid Shaft Motors (VSS)

These motors are provided with a shaft extension suitable for coupled service, and are either straight or tapered as selected by the purchaser.

NOTE: COUPLING HALVES SHOULD HAVE A CLOSE SLIDING FIT ON THE SHAFT EXTENSION AND MUST BE SECURELY LOCKED TO AVOID HAMMERING OUT IN OPERATION. IF IT IS NECESSARY TO DRIVE

THE COUPLING IN POSITION, IT IS IMPORTANT THAT THE END OF THE SHAFT OPPOSITE THE EXTENSION BE BACKED UP SO THAT THE FORCE OF THE BLOW IS NOT TAKEN IN THE BEARINGS. USE A PIN OR PULLER FOR REMOVING TIGHT COUPLINGS.

B. Electrical Connections

Be sure the motor is connected as shown on the nameplate diagram, and that the power supply (voltage, frequency, and number of phases) corresponds with the nameplate data. Install all wiring, fusing and grounding in accordance with National Electrical Code and local requirements.

Carefully identify motor auxiliary devices before connecting. These might be space heaters, winding thermostats, thermocouples, thermistors, or other temperature sensors. Be sure they are connected only in circuits for which they are designed and that the connections are carefully insulated from the motor power cables.

Connect the power supply through a suitable switch and overload protection.

To change the direction of rotation on a three phase vertical solid shaft motor, interchange any two line leads.

1. Conduit Box

The conduit box may be rotated 360° in 90° steps.

2. Operation

Run the motor without load to check the connections and direction of rotation. The motor will operate satisfactorily with a 10% variation in voltage; a 5% variation in frequency; or a combined voltage and frequency variation of 10%, but not necessarily in accordance with the standard of performance for established operation at normal ratings.

of a “safety type” such as Stoddard solvent or similar materials available under various trade names. When a material is difficult to remove, carbon tetrachloride is more effective than petroleum solvents. Wear rubber gloves to prevent skin irritation when using either petroleum solvents or carbon tetrachloride.

Petroleum solvents are flammable, but comparatively non-toxic.

Carbon tetrachloride is non-flammable, but is highly toxic. Suitable ventilation should be provided to avoid breathing vapors. When ventilation is not sufficient to prevent a distinct odor of carbon tetrachloride, a chemical cartridge respirator or gas mask must be used.

II. MAINTENANCE

A. Inspection

Motors should be inspected at regular intervals to check for 1) dirt, 2) moisture, 3) friction, and 4) vibration, which account for 90% of all motor failures.

B. Guard Against Dirt

Keep the insulation and mechanical parts of the motor clean. Dust that is free from oil or grease may be removed by wiping with a clean, dry cloth, or preferably, by suction. Dust may be blown from inaccessible parts with clean, dry air, using not more than 30 pounds pressure. Use care to prevent personal injury from the air hoses; use goggles to avoid eye injury from flying particles.

Before blowing motor windings out with air, make sure the air line is free of condensation and debris.

When grease or oil is present, wipe with a cloth moistened (but not dripping) with a petroleum solvent

C. Guard Against Moisture

The motor should not be subject to extreme moisture conditions such as high humidity during shut down periods, exposure to water under pressure such as hosing down, or severe weather conditions.

During prolonged periods of storage, the motor should be run at least once a week, or should be provided with heaters to guard against moisture condensation.

The insulation resistance of motors not in regular use should be checked with a megger, and, if necessary, their windings should be dried by appropriate means before energizing.

D. Guard Against Friction and Vibration

Excessive friction or overheating of bearings is usually traced to one of the following causes:

1. Poor alignment causing excessive vibration or binding.
2. Bent shaft.
3. Excessive thrust.
4. Overgreasing.
5. Wrong oil and/or oil viscosity.

To avoid failures due to vibration, a few simple checks should be made regularly:

1. Check misalignment such as may be caused or foundation settling.
2. Check to see if any pump vibration is being transmitted to the motor.
3. Check the motor mounting bolts and bracket holes to be sure they are tight.
4. Check transmission from adjacent machinery or to flexible motor support structure, as well as by motor unbalance itself.

NOTE: IF VIBRATION OF 5 MILS OR MORE IS EXPERIENCED UNDER RUNNING CONDITIONS AFTER

ABOVE CHECKS HAVE BEEN MADE, THEN IT IS HIGHLY PROBABLY THAT THERE IS SOME RESONANCE IN THE SYSTEM.

E. Coils

Revarnishing the windings when motors are overhauled will lengthen their life.

F. Guide Bearing

The guide bearings are vacuum degaussed single row width conrad type greasable ball bearings.

 Caution	<p><i>The thrust capacity of these bearings vary with supplier and care should be taken to insure that replacement bearings are equivalent to the original.</i></p>
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IV. LUBRICATION

A. Frequency of Regreasing

The following table suggests relubrication intervals for motors on normal, steady running, in a relatively clean atmosphere at 40° C ambient (104°) temperature or less.

Enclosure	Ins	210-320 Frame	360-440 Frame
WP-I	F	1 year	9 months
Enclosed Fan Cooled	F	9 months	6 months

NOTE: FOR MOTORS OVER 1800 RPM, USE 1/2 OF TABLE PERIOD.

For heavy duty, dusty locations, use 1/2 of table period.

B. Type of Grease

For maximum bearing life, use only the grease shown on the lubrication decal on the motor. For most applications, this will be grease. Some of the equivalent greases are:

For Class F Insulated Motors:

Chevron BRB-2 Standard Oil of California

AeroShell #5 – Shell Oil Company; Hi Temp-Texaco, Inc.

Alvania #3

C. Procedure for Regreasing

When regreasing, stop the motor, remove the grease outlet plug, and add grease with a hand-lever operated gun only.

Discontinue at once if grease appears at outlet plug.

Run motor for about ten minutes before replacing outlet plug.

Reference Table for Guide Thrust Bearings	
Shaft Diameter (at face of bracket)	Amount of Grease to Add*
3/4 to 1-1/4	1/8 cu-in or 0.1 oz
1-1/4 to 1-7/8 (Guide)	1/4 cu-in or 0.2 oz
1-7/8 to 2-3/8 (Bearings)	3/4 cu-in or 0.6 oz
2-3/8 to 3-3/8	2 cu-in or 1.6 oz

* 1 oz = 1.3 cu-in by weight

 Caution	<p><i>Overgreasing is a major cause of bearing and motor failure. Make sure dirt and contaminants are not introduced when adding grease.</i></p>
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D. Thrust Bearing

The thrust bearings are either angular contact ball bearings or spherical roller thrust bearings depending on the motor's thrust rating. The angular contact bearings are mounted singularly, tandem, or back-to-back. The bearing is grease or oil lubricated and the oil reservoir is cooled by means of the motor cooling air passing over the outside of the reservoir.

 Caution	<p><i>Motors with oil lubricated ball or roller bearings (320-440 frame) that are going to be stored for any period of time should have the oil reservoir filled to the center of the sight gauge with a good grade of rust inhibiting oil.</i></p>
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1. Mounting

Oil lubricated ball or roller bearing machines must be mounted on a level surface to prevent leakage of oil and so level indication will be correct.

2. Prior to Initial Start

For oil lubricated ball or roller bearing motors, drain oil from reservoir that was put in at the time of receipt of motor or during storage, by removing drain plug located at the bottom of the oil sump in the bottom of the casting.

Do not run motor until bearing housings have been filled to proper level with oil as indicated on oil lubrication plate (see Lubrication) and allowed to stand one (1) hour with oil in the bearings.

3. Lubrication

With motor at standstill, fill top bearing reservoir with a good grade of lubricating oil having a viscosity equivalent to S.A.E. #10W; 150 SUS (ISO 32) @ 100°F for ball bearings and S.A.E. #40W; 600 SUS @ 100°F for roller bearings.

Before starting the motor, replace filler plug. Refer to the lubrication nameplate on motor.

Every six (6) months, the oil should be drained. To drain oil, remove the drain plug located below the site gage.

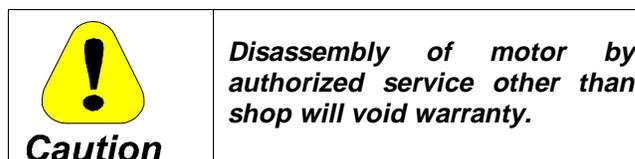
Too heavy an oil could cause the following:

- a. Increased fluid friction losses resulting in higher operating temperatures. Higher temperatures will cause the oil to oxidize or break down at an accelerated rate.

- b. A heavy oil tends to churn or foam more than a lighter weight oil.
- c. Bearings may run warmer because of reduced oil circulation through and around bearings.

Too light an oil may allow the oil film to wipe or break down.

For standard applications, the oil viscosity called for on the lube nameplate should be used. Do not use E.P. oil.



4. To Disassemble Motor

To service or inspect the thrust bearing, the parts should be removed in the following order: hood, drive nut from pump shaft, coupling, ratchet pins, locknut and washer, ratchet plate, bearing runner and bearing.

When the thrust bearing is removed, the upper bracket can be lifted off the frame after removing bracket bolts. If required, the rotor and shaft can be lifted out with the upper bracket removing the lower bearing cap bolts

V. ADJUST SHAFT END PLAY

On the standard vertical high-thrust motors, the lower guide ring is restrained to take momentary up thrust. On spherical bearing motors, the restrained lower bearing also maintains spring tension on the thrust bearing during any periods the motor is running without external load.

When reassembling the motor, it is important a preload stress is not left on the guide and thrust bearing. The following assembly procedure should be used.

- A. Leave the locknut holding the runner on shaft loose.
- B. Tighten lower bearing cap bolts.
- C. Tighten down on shaft locknut until bearings are just starting to preload.

When slight preloading is experienced, there is no end play and the rotor will not turn as freely by hand.

- D. After slightly preloading the bearings, back off the locknut approximately 1/4 turn for angular contact bearing motors and 1/2 turn for spherical roller bearing motors.

Solid shaft motors will not have a pump shaft nut, coupling or ratchet pins. This does not apply for special units with DB thrust bearings for

- E. Shaft end play for angular contact bearing motors should be .005" to .020".
- F. If the equipment is available, it is desirable that shaft end play be checked using a dial indicator to measure movement as rotor and shaft is raised and lowered.
- G. When end play is established, lock the nut in place with the lock washer.

NOTE: THE BEARING STYLE NUMBER IS ON THE MOTOR NAMEPLATE. GREASE TYPE IS ALSO IDENTIFIED ON THE MOTOR NAMEPLATE.

VI. REPAIR AND RENEWAL PARTS

Repair and renewal parts information may be obtained from the nearest GE Industrial Systems representative. Be sure to describe the part or parts required and give the complete nameplate reading on the motor for positive identification.

VII. WARRANTY

Contact your nearest GE Industrial Systems Service Center for details of warranty coverage. Generally, GE Industrial Systems will correct by repair or replacement any defect in workmanship or material which develops in this motor, when properly used, for two (2) years after installation or 30 months after shipment, whichever comes first.

Coupling Kit Instruction Diagram

Note:
For motor model numbers
SK__DBB

Figure 1
Non-Reverse

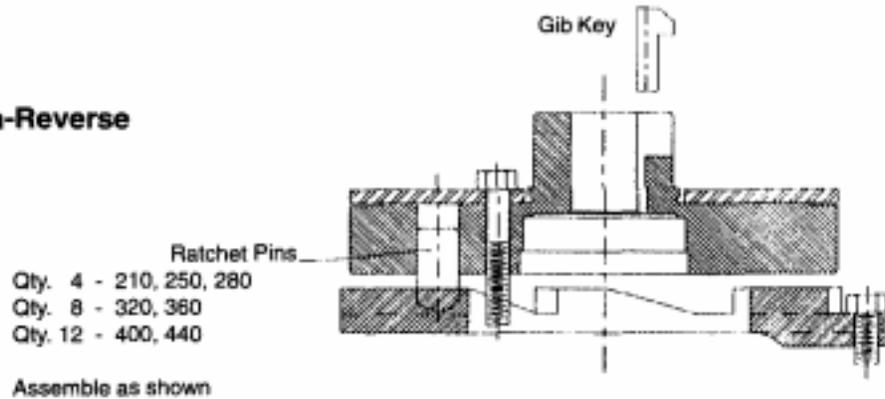


Figure 2
Solid

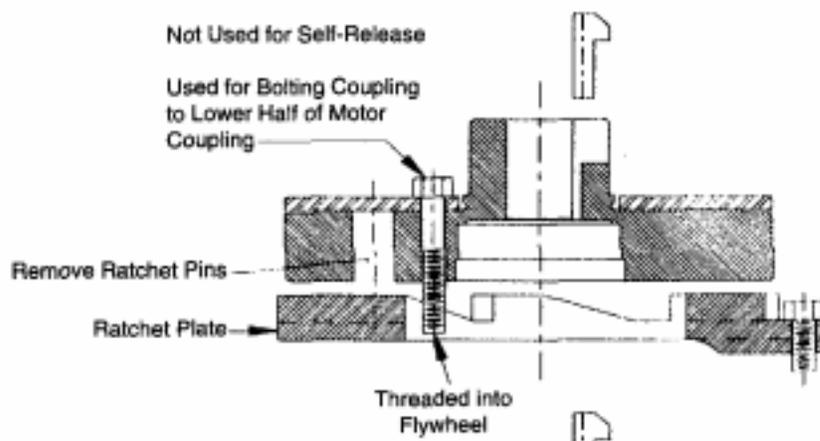
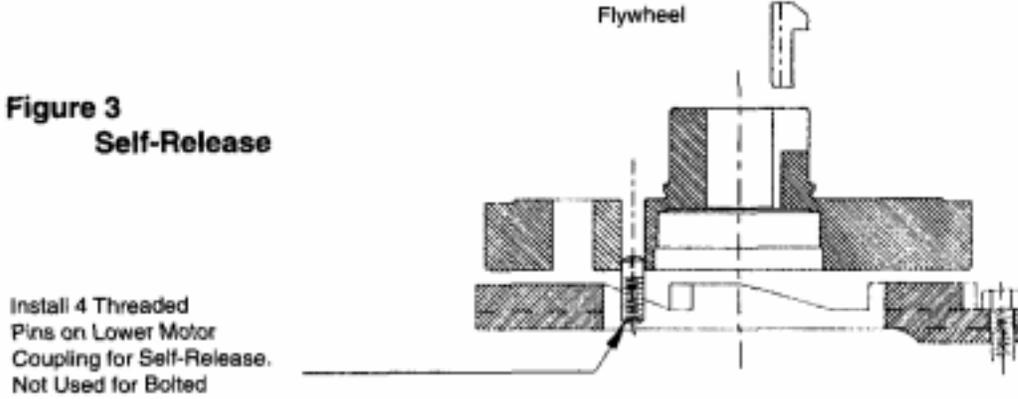


Figure 3
Self-Release



Notes:

1. Do not lubricate or use rust inhibiting compounds on ratchet plate or coupling parts.
2. Coupling keyway and flywheel keyway must be lined up.



Reader Comments

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Specific Suggestions (Corrections, information that could be expanded on, and such.)

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