SCOT MOTORPUMP™

VERTICAL SEALLESS
MODELS VAE, VFE, VWE

• INSTALLATION • OPERATION • MAINTENANCE
INCLUDES THROTTLE BUSHING AND LIP REPLACEMENT

INSPECTION

Check pump for shortage and damage immediately upon arrival. Note damage or shortage on freight bill (bill of lading); immediately file claim with carrier.

EXTERIOR — Pay particular attention to conduit box, external hardware and accessories. Touch up abrasions or scratches with approved paint.

INTERNAL — If extensive or serious external damage is noted, if impeller is damaged (look in ports), or if shaft binds or sticks, disassemble as required to permit internal inspection.

HANDLING

Handle with care. Dropping or jarring can seriously damage motor bearings or break pump parts. Lift with device having capacity for pump weight, and use lifting hooks or eye bolts (if provided) or rig double sling around motor frame and pump casing. Do not use sling through pump motor adapter nor around suction and discharge flanges.

INSTALLATION

Location — Pump location should provide the following:

1. **Pump must be completely submerged in liquid. Location should allow for liquid level to reach "min level" line that is cast on adapter.**
2. **NPSH must meet or exceed pump requirement.**
3. **Allow room for inspection and maintenance.**
4. **Correct power supply to motor; all wiring should meet National Electrical and Local Codes and Regulations.**
5. **If outdoors, protection from the elements, freezing and water damage due to flooding.**
6. **Tank or cabinet reservoir size must be large enough to allow for velocity/turbulence of liquid based on pump performance characteristics.**

Mounting Plate — Mount pump to cabinet or tank with Scot mounting plate Model MP11 or MP13 as follows:

MP11:

1. **Locate mounting plates around machined column on adapter.**
2. **Set pump case to proper height.**
3. **Tighten (2) bolts evenly to 50 ft. lbs. maximum torque. Over tightening will cause adapter to crack.**
4. **Install pump to cabinet or tank with (4) bolts.**

MP13:

1. **Attach mounting plate to adapter by inserting cap screw through plate, adapter and into motor C-face. Tighten alernately and evenly.**
2. **Install pump to cabinet or tank with (4) bolts.**

Piping — Suction and discharge gauges are useful to check pump operation and are excellent trouble indicators. Install gauges in the lines. Observe these precautions when installing piping:

1. **Support close to, but independently of pump.**
2. **Use the next larger pump size for suction (if used) and discharge.**
3. **Keep as straight as possible. Avoid bends and fittings.**
4. **Remove burrs, sharp edges, ream pipe cuts and make joints air-tight.**
5. **Don't spring pipe to make connections. Strain must not be transmitted to pump.**
6. **Allow for pipe expansion with hot fluids; expansion joints are not recommended.**

Suction — Pump does not require suction piping.

1. **A screen or filter is recommended to prevent large particles from entering suction. Screen or filter must not restrict pump suction.**
2. **Position pump in tank to allow adequate space (approx. 3") between pump suction and bottom of tank. This will prevent pump from being restricted by bottom of tank or cabinet.**

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Discharge — VAE and VFE Series pumps permit discharge port location at any of four positions, 90 degrees apart. VWE Series pumps permit port location at any eight positions, 45 degrees apart. Change by removing case bolts, rotate casing, and replace bolts. Ensure there is adequate clearance with selected position between wall or tank, motor conduit box, and grease fittings.

1. If discharge line is short; size may be same as discharge port; if long, use 1 or 2 sizes larger.
2. Long horizontal runs require a grade as even as possible. Avoid high spots and loops. Trapped air will throttle flow and may result in erratic pumping.
3. Install check and gate valves in discharge line if required.

OPERATION

Pre-Start — Before initial start of the pump, check as follows:

1. The rotation must be checked upon installation. Close, then break the contacts quickly and observe the rotation of the exposed portion of rotating parts. Rotation must agree with the rotation arrow on the motor. For all pumps, the standard rotation is clockwise when viewed from the top of motor. Motor wiring is easily changed in the field. Observe the wiring diagram on the inside of the terminal box cover, or on the motor nameplate.
2. Check voltage, phase and frequency of line circuit with motor nameplate.
3. Check suction (if used) and discharge piping and pressure gauges for proper operation.
4. Assure that pump is completely submerged in liquid.

Priming — Pump requires no priming providing pump is completely submerged in liquid. Tank must be filled, and pump completely installed before operating pump. Do not start pump dry and then fill tank as serious damage from shaft defection can occur.
CAUTION - DO NOT RUN PUMP DRY. Pump requires liquid for throttle bushing and lip seal lubrication.

Starting — Proceed as follows to start pump:

1. Close drain valves and valve in discharge line.
2. Start the motor (pump).
3. When pump is operating at full speed, open discharge valve slowly.

Running — Periodically inspect pump while running, but especially after first start and following repair.

1. Record pressure gauge readings for future reference.
2. Record voltage, amperage per phase, and kW (if an indicating wattmeter is available).
3. Adjust pump output capacity with discharge valve. DO NOT throttle suction line.

Freezing Protection — Protect pumps shut down during freezing conditions by one of the following methods:

1. Drain tank; remove all liquid from the tank.
2. Keep fluid moving in pump and insulate or heat the pump to prevent freezing. If heated, do not let temperature go above 100 to 150 degrees F.
3. Fill pump completely with 50/50 antifreeze water solution.

MAINTENANCE

Cleaning — Remove oil , dust, dirt, water, chemicals from exterior of motor and pump. Keep motor air inlet and outlet open. Regularly drain moisture from TEFC motors.

Labeled Motors — It is imperative for repair of a motor with Underwriters' Laboratories label that original clearances be held; that all plugs, screws, other hardware be fastened securely, and that parts replacements be exact duplicates or approved equals. Violation of any of the above invalidates Underwriters' label.

Temperature — Total temperature, not the rise, is the measure of safe operation for a motor. If temperature by thermometer exceeds limits for insulation class, investigate and change operating conditions.

Lubrication (Pump) — Pumps should require no maintenance, other than the motor bearings, according to the following instructions:

TCV56 FRAME MOTOR, VAE MODELS

The bearings on the TCV56 motors are double shielded and prelubricated. No lubrication is required for the life of the bearings.

TCV140 FRAME MOTOR, VSE & VWE MODELS

Greasing motors every 9-12 months is acceptable for less aggressive applications. However, vertical motors under the following conditions should be regreased every three months:

1. Continuous high ambients
2. Dirty or moist locations
3. High vibration
4. Pumping high temperature liquids

Procedure — Overgreasing bearings can cause premature bearing failure. For motors equipped with a Alemite fitting, clean tip of fitting and apply grease gun. Use 1 to 2 strokes on 5HP motors or smaller, and 2 to 3 strokes on motors above 5HP. Keep grease clean, and lubricate motors at standstill. Do not mix petroleum grease and silicone grease in motor bearings.

Lubrication — Motors are pre-greased normally with Shell Oil Company's "Dolium R." Two equivalent greases which are compatible with the furnished grease are Chevron Oil's "SRI No. 2" and Texaco Inc.'s "Premium RB."

Motors that do not have Alemite fitting are equipped with double sealed prelubricated bearings, and do not require additional lubrication.

MECHANICAL SEAL REPLACEMENT

TCV56 FRAME MOTOR, VAE MODELS

A.) Disassembly:

1. **Disconnect power**
2. **Close suction and discharge valves**
3. **Drain system.**
4. **Remove (4) bolts holding plate to tank.**
5. **Remove bolts holding adapter to pump case.**
6. **Remove motor and rotating element from pump case, leaving casing and piping undisturbed.**
7. **Insert a screwdriver in one of the impeller waterway passages and back off the impeller nut as shown in Figure 1.**

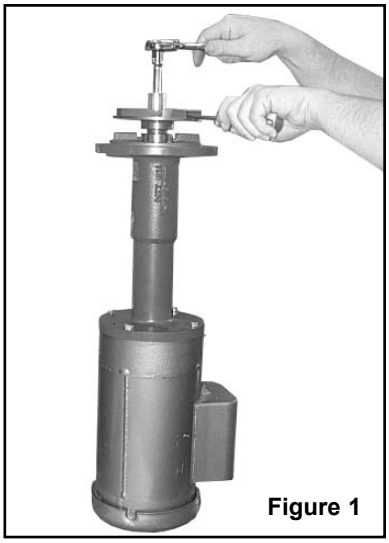

Figure 1

. **Remove motor shaft end cap. Insert a screwdriver in slot of motor shaft. While holding shaft against rotation, unscrew impeller from shaft by turning counterclockwise when facing impeller.**

9. **Remove bolts holding mounting plate to adapter and adapter to motor.**
10. **Remove lip seal from adapter as shown in Figure 2.**

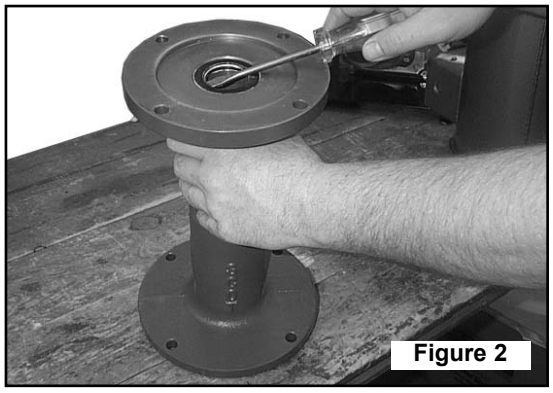

Figure 2

B.) Reassembly:

1. **Position lip seal in adapter bracket with rubber cup/spring facing pump case. See Figure 3.**

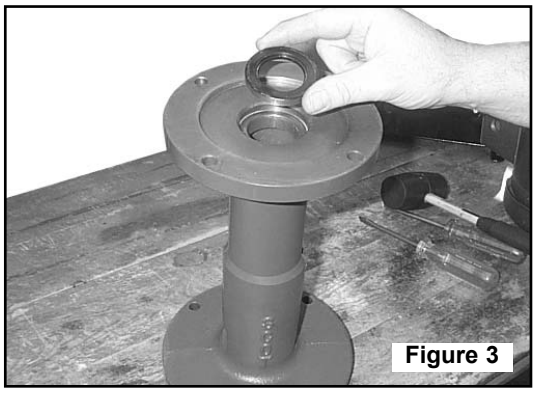

Figure 3

2. **Press lip seal in adapter bracket.**
3. **With motor preferably in the vertical position, remount the adapter on motor, making sure the motor shaft does not dislocate the lip seal. Position mounting plate on adapter and align holes with adapter holes. Tighten bolts to motor alternately and evenly.**
4. **Hold shaft against rotation as described in paragraph 8 of disassembly procedure, and thread impeller on shaft until it is tight against the shaft shoulder.**
5. **Replace D-washer and impeller nut holding impeller against rotation as indicated in paragraph 7 of disassembly procedure (2 & 3 HP 1PH, and all 3PH motors only).**
6. **Remove any burrs caused by screwdriver on the vane of impeller in waterway passage.**
7. **Replace motor and rotating element in casing.**
8. **Tighten casing bolts alternately and evenly.**
9. **Install pump mounting plate to cabinet or tank with (4) bolts.**

Do not start until until pump is completely filled with water.

THROTTLE BUSHING & LIP SEAL REPLACEMENT

TCV140 FRAME MOTOR, VSE & VWE MODELS

The throttle bushing is a normal wear component and requires inspection and possible replacement. Common signs of a worn throttle bushing may include:

1. **Water spraying up shaft.**
2. **Audible noise.**
3. **Excessive vibration**

A.) Disassembly:

1. **Disconnect power.**
2. **Close suction and discharge valves.**
3. **Drain system.**
4. **Loosen (2) nuts holding mounting plate to adapter.**
5. **Remove (4) bolts holding plate to tank.**
6. **Remove bolts holding adapter to pump case.**
7. **Remove motor and rotating element from pump case, leaving casing and piping undisturbed.**
8. **Insert a screwdriver in one of the impeller waterway passages and back off the impeller nut as shown in Figure 4.**

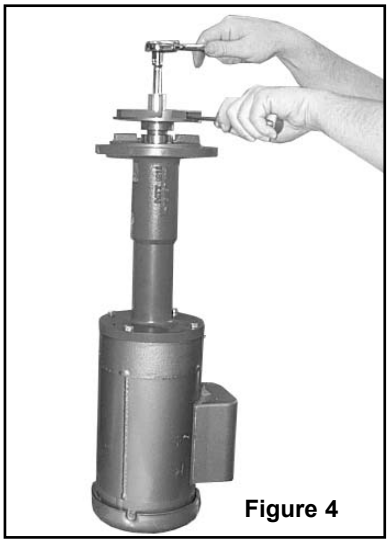

Figure 4

9. **Remove impeller from shaft, being careful not to lose the impeller key. If impeller is difficult to remove, it may be necessary to use a bearing puller to remove.**
10. **Remove throttle bushing.**
11. **For lip seal replacement, remove bolts holding adapter to motor.**
12. **Remove lip seal from adapter as shown in Figure 2.**

B.) Reassembly:

Lip Seal

1. **Position lip seal in adapter bracket with rubber cup/spring facing pump case. See Figure 3**
2. **Press lip seal in adapter bracket.**
3. **With motor preferably in the vertical position, remount the adapter on motor, making sure the motor shaft does not dislocate the lip seal. Tighten bolts to motor alternately and evenly.**

Throttle Bushing

4. **Install throttle bushing by sliding thin side of bushing toward motor until bushing bottoms. See Figure 5.**

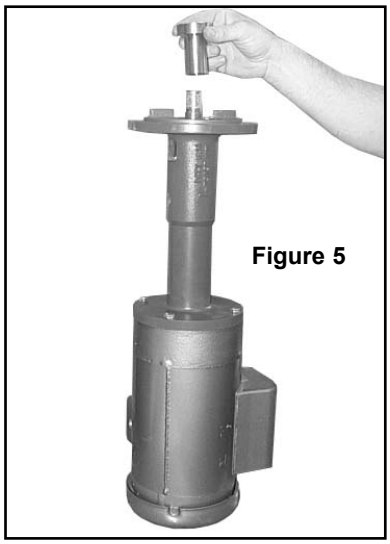

Figure 5

5. **Place key in key seat. Line up keyway in impeller with key in motor shaft, and slide impeller on the motor shaft. Be certain that the key is positioned in the keyway of the motor and impeller.**
6. **Insert a screwdriver in a waterway passage of the impeller holding it against rotation and tighten retaining assembly as described in paragraph 8 of disassembly instructions. See Figure 4.**
7. **Remove any burrs caused by screwdriver on the vane of impeller in waterway passage.**
8. **Slide motor and rotating element in pump case.**
9. **Tighten casing bolts alternately and evenly.**
10. **Locate mounting plates around machined column on adapter.**
11. **Set pump case to proper height.**
12. **Tighten (2) bolts evenly to 50 ft. lbs. maximum torque. Over tightening will cause adapter to crack.**
13. **Install pump to cabinet or tank with (4) bolts.**

Do not start until until pump is completely filled with water.

WE RECOMMEND STOCKING A SPARE THROTTLE BUSHING AND LIP SEAL (OR REPAIR KIT) TO MINIMIZE DOWN TIME.