

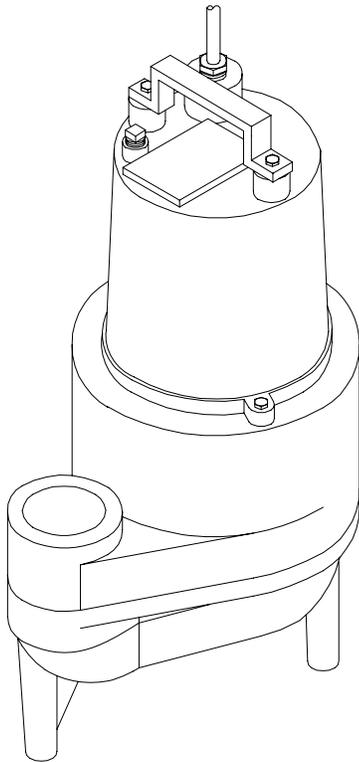
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**INSTALLATION, OPERATION AND  
MAINTENANCE INSTRUCTIONS**

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# **PACO INSTANT PUMPS**

**Submersible Effluent Pumps**



**Series: PIP702B**

**IMPORTANT!**

*Read all instructions in this manual before operating pump.  
As a result of constant product improvement program, product changes may occur.  
As such Grundfos CBS, Inc. reserves the right to change product without prior  
written notification.*

# SAFETY FIRST!

Please Read This Before Installing Or Operating Pump. This information is provided for **SAFETY** and to **PREVENT EQUIPMENT PROBLEMS**. To help recognize this information, observe the following symbols:



**IMPORTANT!** Warns about hazards that can result in personal injury or indicates factors concerned with assembly, installation, operation, or maintenance which could result in damage to the machine or equipment if ignored.

**CAUTION!** Warns about hazards that **can or will cause minor** personal injury or property damage if ignored. Used with symbols below.

**WARNING!** Warns about hazards that can or will cause serious personal injury, death, or major property damage if ignored. Used with symbols below.



Hazardous fluids can cause fire or explosions, burns or death could result.



Extremely hot - Severe burns can occur on contact.



Biohazard can cause serious personal injury.



Hazardous fluids can cause hazardous pressure, eruptions or explosions could cause personal injury or property damage.

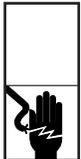


Rotating machinery Amputation or severe laceration can result.



Hazardous voltage can shock, burn or cause death.

Only qualified personnel should install, operate and repair pump. Any wiring of pumps should be performed by a qualified electrician.



**WARNING!** To reduce risk of electrical shock, pumps and control panels must be properly grounded in accordance with the National Electric Code (NEC) or the Canadian Electrical Code (CEC) and all applicable state, province, local codes and ordinances. Improper grounding voids warranty.



**WARNING!** To reduce risk of electrical shock, always disconnect the pump from the power source before handling or servicing. Lock out power and tag.



**WARNING!** Operation against a closed discharge valve will cause premature bearing and seal failure on any pump, and on end suction and self priming pump the heat build may cause the generation of steam with resulting dangerous pressures. It is recommended that a high case temperature switch or pressure relief valve be installed on the pump body.



**CAUTION!** Never operate a pump with a plug-in type power cord without a ground fault circuit interrupter.



**CAUTION!** Pumps build up heat and pressure during operation-allow time for pumps to cool before handling or servicing.



**WARNING!** Do not pump hazardous materials (flammable, caustic, etc.) unless the pump is specifically designed and designated to handle them.



**CAUTION!** Do not block or restrict discharge hose, as discharge hose may whip under pressure.



**WARNING!** Do not wear loose clothing that may become entangled in moving parts.



**WARNING!** Keep clear of suction and discharge openings. **DO NOT** insert fingers in pump with power connected.



Always wear eye protection when working on pumps.



Make sure lifting handles are securely fastened each time before lifting. **DO NOT** operate pump without safety devices in place. Always replace safety devices that have been removed during service or repair. Secure the pump in its operating position so it can not tip over, fall or slide.



**DO NOT** exceed manufacturers recommendation for maximum performance, as this could cause the motor to overheat.



**DO NOT** remove cord and strain relief. **DO NOT** connect conduit to pump.



**WARNING!** Cable should be protected at all times to avoid punctures, cut, bruises and abrasions. Inspect frequently. Never handle connected power cords with wet hands.



**WARNING!** To reduce risk of electrical shock, all wiring and junction connections should be made per the NEC or CEC and applicable state or province and local codes. Requirements may vary depending on usage and location.



**WARNING!** Submersible Pumps are not approved for use in swimming pools, recreational water installations decorative fountains or any installation where human contact with the pumped fluid is common.



**WARNING!** Products returned must be cleaned, sanitized, or decontaminated as necessary prior to shipment, to insure that employees will not be exposed to health hazards in handling said material. All Applicable Laws And Regulations Shall Apply.



Bronze/brass and bronze/brass fitted pumps may contain lead levels higher than considered safe for potable water systems. Lead is known to cause cancer and birth defects or other reproductive harm. Various government agencies have determined that leaded copper alloys should not be used in potable water applications. For non-leaded copper alloy materials of construction, please contact factory.



PACO® Pumps is not responsible for losses, injury, or death resulting from a failure to observe these safety precautions, misuse or abuse of pumps or equipment.

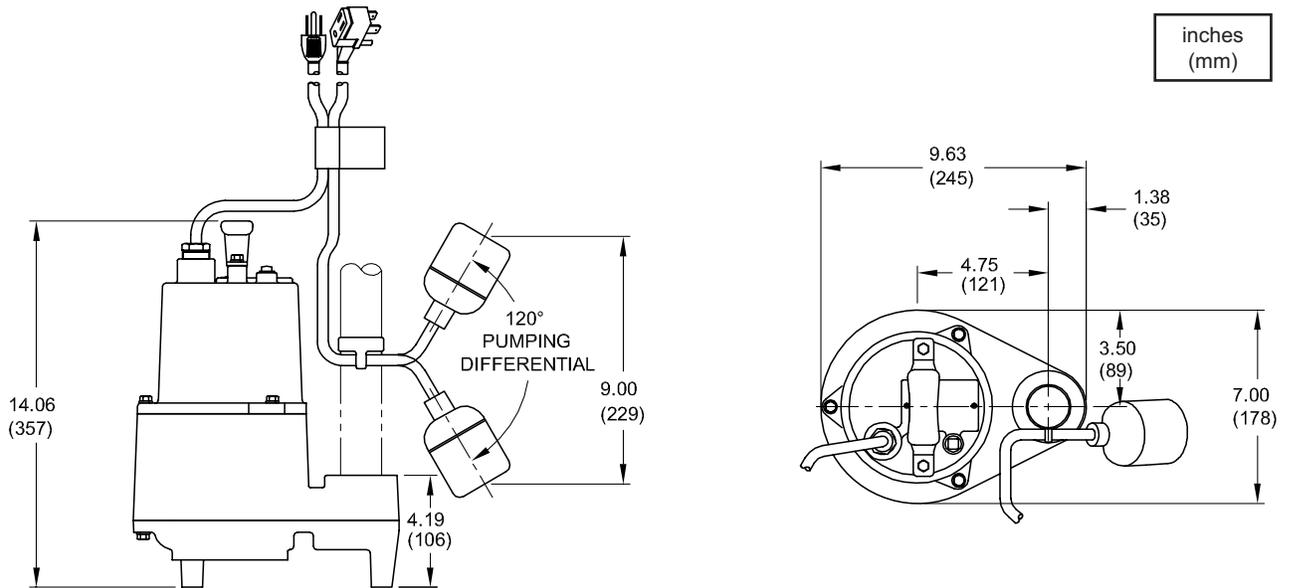
# PUMP SPECIFICATIONS:

**DISCHARGE** ..... 2" NPT, Female, Vertical  
**LIQUID TEMPERATURE** .... 77°F (25°C) Continuous  
**VOLUTE** ..... Cast Iron ASTM A-48, Class 30  
**MOTOR HOUSING** ..... Cast Iron ASTM A-48, Class 30  
**SEAL PLATE** ..... Cast Iron ASTM A-48, Class 30  
**IMPELLER:**  
     *Design* ..... 10 vane, vortex, with pump out vanes on back side. Balanced, ISO G6.3  
     *Material* ..... Cast Iron ASTM A-48, Class 30  
**SHAFT** ..... 420 Stainless Steel  
**O-RINGS** ..... Buna-N  
**HARDWARE** ..... 300 Series Stainless Steel  
**PAINT** ..... Air dry enamel  
**SEAL**     *Design* ..... Single Mechanical  
           *Material* ..... Rotating Face - Carbon  
                               Stationary Face - Ceramic  
                               Elastomer - Buna-N  
                               Hardware - 300 series stainless steel  
**CORD ENTRY** ..... 20 Ft. (6m) Cord with Plug on 115 Volt  
                               Pressure grommet for sealing and strain relief.

**SPEED** ..... 3450 RPM (Nominal)  
**UPPER BEARING:**  
     *Design* ..... Single Row, Ball, Oil Lubricated  
     *Load* ..... Radial  
**LOWER BEARING:**  
     *Design* ..... Single Row, Ball, Oil Lubricated  
     *Load* ..... Radial & Thrust  
**MOTOR:**     *Design* ..... NEMA L Torque Curve. Oil Filled Squirrel Cage Induction  
                               *Insulation* ..... Class B  
**SINGLE PHASE** ..... Permanent Split Capacitor (PSC)  
                               Includes Overload Protection in Motor  
**LEVEL CONTROL** ..... Wide Angle, PVC, Mechanical,  
                               20 Ft. (6m) Cord w/Piggy-Back Plug.  
                               Normally Open (N/O)

MODEL NO	HP	VOLT/PH	Hz	RPM (Nom)	NEMA START CODE	FULL LOAD AMPS	CORD LENGTH	CORD SIZE	CORD TYPE	WINDING RESISTANCE MAIN -- START
PIP702B	0.5	115/1	60	3450	H	6.4	20 ft. (6m)	14/3	SJTOW	3.5 -- 43

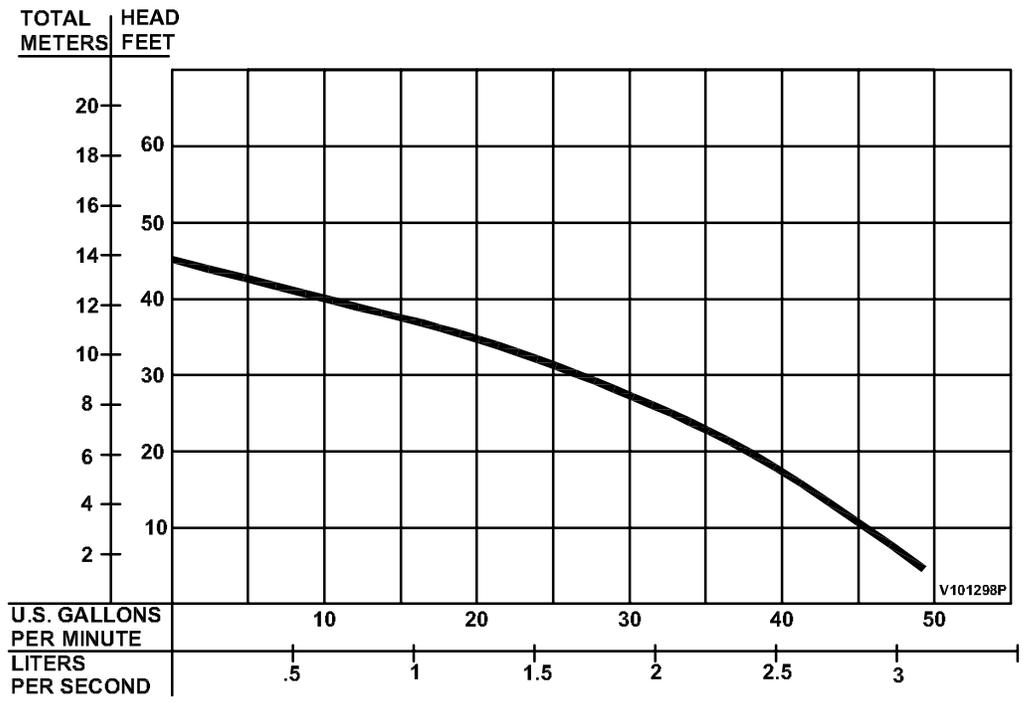
Winding Resistance ± 5%.                      Pump rated for operation at ± 10% voltage at motor.



**FIGURE 1**

**PUMP MODEL NO.** \_\_\_\_\_

**PUMP SERIAL NO.** \_\_\_\_\_



Testing is performed with water, specific gravity of 1.0 @ 68° F, other fluids may vary performance

**SECTION B: GENERAL INFORMATION**

**B-1) To The Purchaser:**

Your new Submersible Pump is constructed of the best available materials and is designed to give you many years of service with a minimum of attention.

This manual will provide helpful information concerning installation, maintenance, and proper service guidelines. Check local codes and requirements before installation. Servicing should be performed by knowledgeable pump service contractors or authorized service stations.

The pump is packaged ready for installation and no connections or adjustments are necessary except for attaching discharge piping and plugging in service cord.

**B-2) Receiving:**

Upon receiving the pump, it should be inspected for damage or shortages. If damage has occurred, file a claim immediately with the company that delivered the pump. If the manual is removed from the crating, do not lose or misplace.

**SECTION C: INSTALLATION**

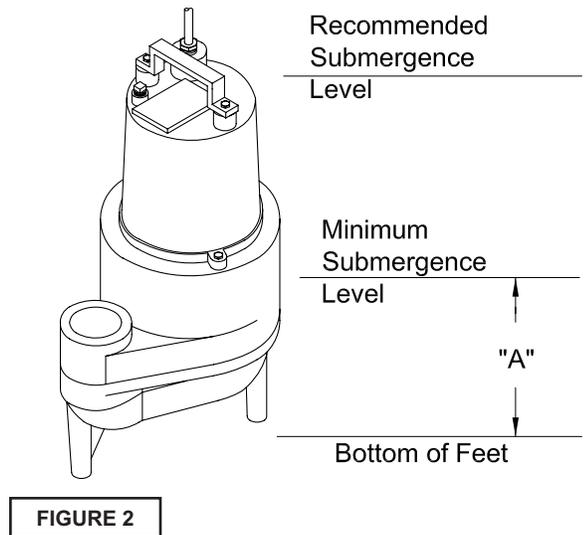
**C-1) Location:**

These pumping units are self-contained and are recommended for use in a sump or basin. **This pump is designed to pump effluent or wastewater, nonexplosive and noncorrosive liquids and shall NOT be installed in locations classified as hazardous in accordance with the National Electrical Code (NEC), ANSI/NFPA 70 or the Canadian Electrical Code (CEC).**

The sump or basin shall be vented in accordance with local plumbing codes. The float switch should not come in contact with side or bottom of sump. Make sure sump is free of string, cloth, nails, gravel, etc. before installing pump. Never install the pump in a trench, ditch, or hole with a dirt bottom where the suction will become plugged.

**C-1.1) Submergence:**

The pump should always be operated in the submerged condition. The minimum sump liquid level should never be less than 4.50 inches (114mm) above the pump bottom. The recommended level should not drop below the top of the motor housing (See Figure 2).



**FIGURE 2**

### C-2) Discharge:

Discharge piping should be as short as possible. The installation of a check valve in the discharge piping is recommended for each pump being used. The check valve is used to prevent backflow into the sump. Excessive backflow can cause flooding and/or damage to the pump.

### C-3) Liquid Level Controls:

Figure 3 shows a typical installation for a submersible pump using a piggy-back wide angle level control mounted to the discharge piping with a Piggy-Back plug.

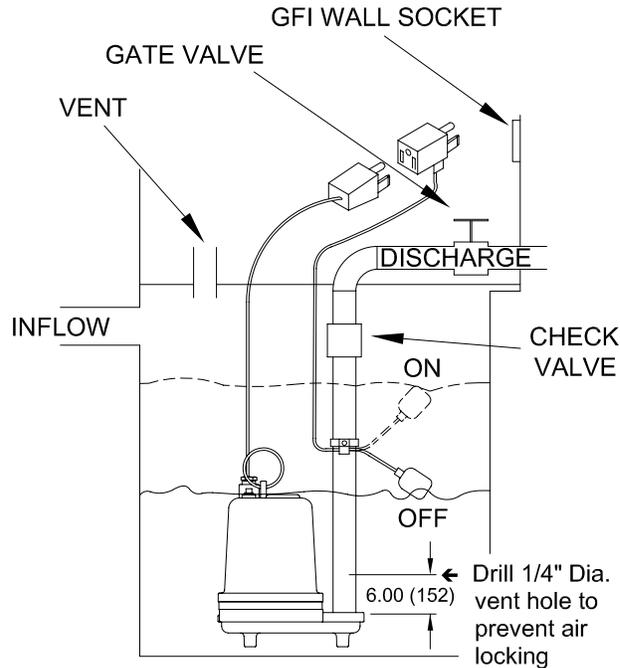


FIGURE 3

#### General Comments:

- 1) Never work in the sump with the power on.
- 2) Level controls are factory set for a pumping differential of 9 inches (228.6mm). If that is the cycle desired, simply circle the discharge pipe with the pipe mounting strap, feed the end through the worm drive, and tighten with a screwdriver. Be certain that the level control cannot hang up or foul in its swing. Also, make certain the pump impeller is still submerged when the level control is in the 'off' mode.
- 3) If a higher pump differential is needed, grip the cord near the neck of the float, then using the other hand, exert a steady force on the lower edge of the cable clamp. The cable clamp should slide up to the new pivot point. Attach the level control to the discharge hose in the manner described above.
- 4) Plug the level control plug into a GFI receptacle, then plug the pump into the piggyback plug. One cycle of operation should be observed, so that any potential problems can be corrected.

5) It is recommended that the float should be set to insure that the sump well liquid level never drops below the top of the motor housing or a minimum level of 4.50 inches above the pump bottom.

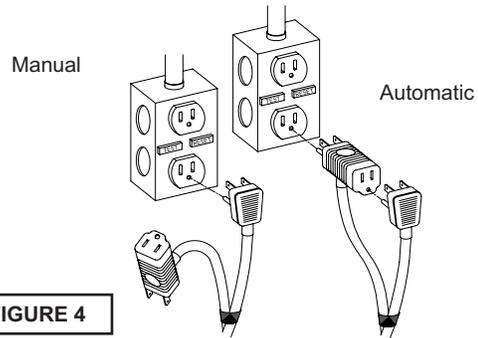


FIGURE 4

Figure 4 shows a typical connection for pumps with the piggy-back plug, for manual and automatic operations.

**Automatic** - Plug float cord into GFI outlet, then plug pump cord into float cord.

**Manual** - Plug pump cord directly into GFI outlet.

### C-4) Electrical Connections:

#### C-4.1) Power Cable:

The cord assembly mounted to the pump must not be modified in any way. This pump comes complete with a 3 wire cord and 3 prong grounded plug that must be connected into a 3 wire grounded Ground Fault receptacle. **DO NOT** remove ground pin from electrical plug. It is **NOT** recommended to use an extension cord with these pumps. **DO NOT USE THE POWER CABLE TO LIFT PUMP.**



**WARNING! - THE WHITE WIRE IS NOT A NEUTRAL OR GROUND LEAD, BUT A POWER CARRYING CONDUCTOR.**

#### C-4.2) Overload Protection:

Automatic thermal overload protects the sealed-in-oil motor. Running dry may overheat the motor and trip the overload. The type of in-winding overload protector used is referred to as an inherent overheating protector and operates on the combined effect of temperature and current. This means that the overload protector will trip out and shut the pump off if the windings become too hot, or the load current passing through them becomes too high. It will then automatically reset and start the pump up after the motor cools to a safe temperature. In the event of an overload, the source of this condition should be determined and rectified immediately. **DO NOT LET THE PUMP CYCLE OR RUN IF AN OVERLOAD CONDITION OCCURS !**

If current through the temperature sensor exceeds the values listed, an intermediate control circuit relay must be used to reduce the current or the sensor will not work properly.

TEMPERATURE SENSOR ELECTRICAL RATINGS		
Volts	Continuous Amperes	Inrush Amperes
110-120	3.00	30.0

**Wire Size:**

Consult a qualified electrician for proper wire size if additional power cable length is required. See table for electrical information.

**SECTION: D START-UP OPERATION**

**D-1) Check Voltage and Phase:**

Before operating pump check to make sure that the voltage and phase information stamped on the pump's identification plate matches the available power.

**D-2) Check Pump Rotation:**

Before putting pump into service for the first time, the motor rotation must be checked. Improper motor rotation can result in poor pump performance and can damage the motor and/or pump. To check the rotation, suspend the pump freely, momentarily apply power and observe the "kickback". "Kickback" should always be in a counter-clockwise direction as viewed from the top of the pump ("kickback" is always opposite to impeller rotation). "Rotation" and "kickback" direction is noted on the pump motor housing.

**D-3) Identification Plate:**

Record the numbers off the pump's identification plate onto manual for future reference.

**D-4) Pump-Down Test:**

After the pump has been properly wired and lowered into the basin, sump, or lift station, it is advisable to check the system by filling with liquid and allowing the pump to operate through it's pumping cycle. The time needed to empty the system, or pump-down time, should be recorded.

**SECTION E: PREVENTATIVE MAINTENANCE**

As the motor is oil filled, no lubrication or other maintenance is required, and generally will give very reliable service and can be expected to operate for years on normal sewage pumping without failure. However, as with any mechanical piece of equipment a preventive maintenance program is recommended and suggested to include the following checks:

- 1) Inspect motor chamber for oil level and contamination
- 2) Inspect impeller and body for excessive build-up or clogging.

**E-1) Lubrication:**

Anytime the pump is removed from operation and at least every twelve (12) months, the cooling oil in the motor housing (11) must be checked visually for oil level and contamination.

**E-1.1) Checking Oil:**

To check oil, set unit upright. Remove pipe plug. With a flashlight, visually inspect the oil in the motor housing to make sure it is clean, clear and that the oil level is above all internal componentry. If oil appears satisfactory, replace pipe plug. If oil is low or appears contaminated, test oil as per section E-1.2

**E-1.2) Testing Oil:**

1. Place pump on it's side, remove pipe plug and drain oil into a clean, dry container.
2. Check oil for contamination using an oil tester with a range to 30 kilovolts breakdown.
3. If oil is found to be clean and uncontaminated (measures above 15 KV. breakdown), refill the motor housing as per section E-1.3.
4. If oil is found to be dirty or contaminated (or measures below 15KV. breakdown), then the pump must be carefully inspected for leaks at the shaft seal (1), cord inlet (2), square ring and pipe plug before refilling with oil. After leak is repaired, refill with new oil as per section E-1.3.

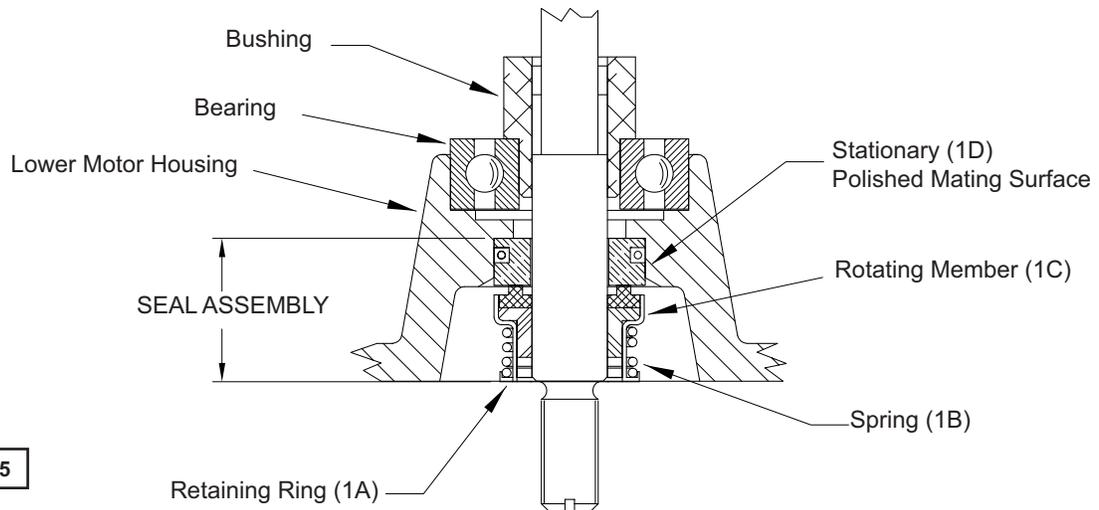
**F-1.3 Replacing Oil in Motor Housing:**

Drain all oil from motor housing and dispose of properly. Refill with 32 ounces (.9 liters) of new cooling oil as per Table 1. An air space must remain in the top of the motor housing to compensate for air expansion. Set unit upright and fill only until oil level from top of pipe plug boss is 3" ± 1/4" (76.2mm ± 6.35mm).



**WARNING ! - DO NOT overfill oil. Overfilling of motor housing with oil can create excessive and dangerous hydraulic pressure which can destroy the pump and create a hazard. Overfilling oil voids warranty.**

TABLE 1 - COOLING OIL - Dielectric	
SUPPLIER	GRADE
BP	Enerpar SE100
Conoco	Pale Paraffin 22
Mobile	D.T.E. Oil Light
G & G Oil	Circulating 22
Imperial Oil	Voltesso-35
Shell Canada	Transformer-10
Texaco	Diala-Oil-AX
Woco	Premium 100



**FIGURE 5**

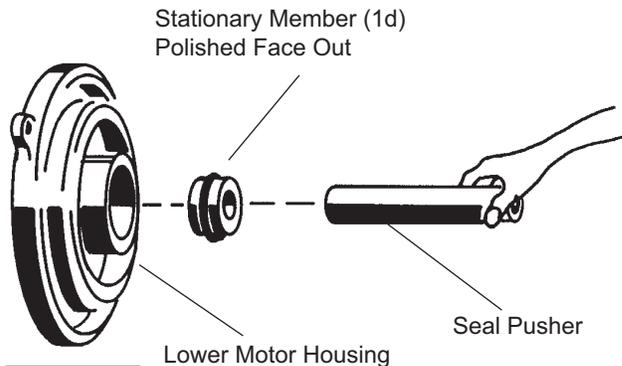
**G-1 SHAFT SEAL SERVICE**

Disconnect power, remove screws and lockwashers, and vertically lift motor assembly from body. Clean out body if necessary. Clean and examine impeller for pitting or wear. The impeller is threaded onto the shaft and to remove, unscrew impeller, holding shaft with a large screwdriver.

**CAUTION:** - Handle seal parts with extreme care. **DO NOT** scratch or mar lapped surfaces.

To expose shaft seal (1) disassemble volute and impeller as outlined in above paragraph. Remove rotating member (1b) from shaft (See Fig. 5). Examine all seal parts and especially contact faces. Inspect seal for signs of wear such as uneven wear pattern on stationary members, chips and scratches on either seal face. **DO NOT** interchange seal components, replace the entire shaft seal (1). If replacing seal, remove stationary (1a) by prying out with flat screw driver.

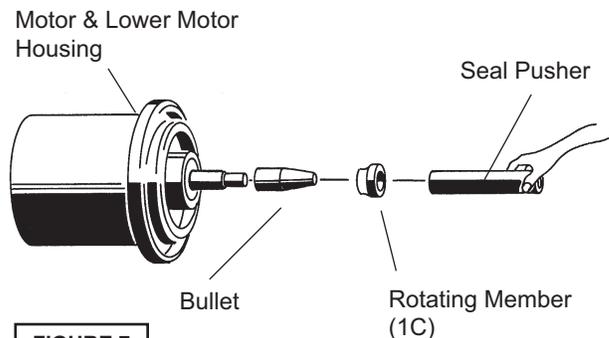
Clean and oil seal cavities in lower motor housing. Lightly oil (**DO NOT use grease**) outer surface of stationary member (1a). Press stationary member (1a) firmly into lower motor housing, using a seal pusher, nothing but the seal pusher is to come in contact with seal face (See Fig. 6).



**FIGURE 6**

**IMPORTANT!** - **DO NOT** hammer on the seal pusher- it will damage the seal face.

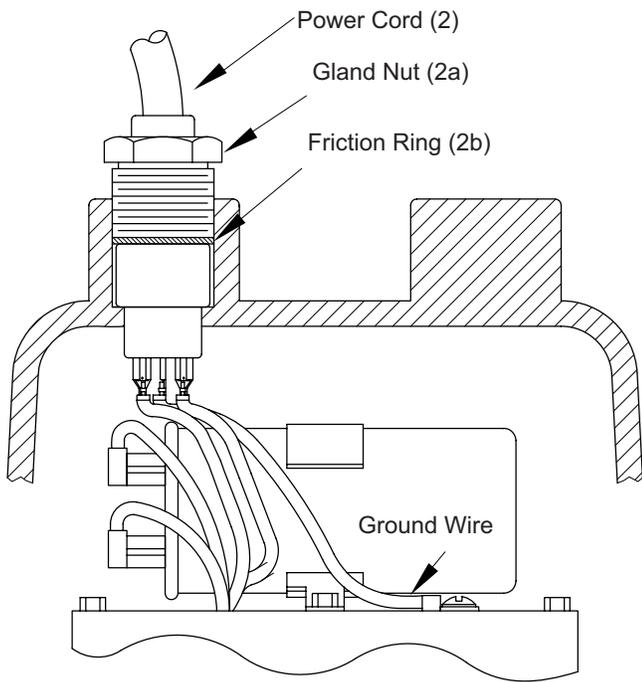
Make sure the stationary member is in straight. Slide a bullet over motor shaft. Lightly oil (**DO NOT use grease**) shaft, bullet and inner surface of bellows on rotating member (1b) See Fig. 7. With lapped surface of rotating member (1b) facing inward toward stationary member (1a), slide rotating member (1b) over bullet and onto shaft, using seal pusher, until lapped faces of (1a) and (1b) are together (See Fig. 5).



**FIGURE 7**

It is extremely important to keep seal faces clean during assembly. Dirt particles lodged between these faces will cause the seal to leak. Place spring (1b) over shaft and in place on rotating member (1c), making sure it is seated. Slide retaining ring (1a) over shaft and let rest on spring (1b).

Before installing impeller, inspect threads on shaft and impeller to assure that they are clean. Apply a thread locking compound to shaft threads and screw impeller onto shaft and tighten. Rotate impeller to check for binding. Install motor housing assembly on pump body. Apply thread locking compound to each cap screw, thread into body with lockwashers, and torque to 11 ft. lbs. Check for free rotation of impeller. Assemble impeller and volute, replace oil.



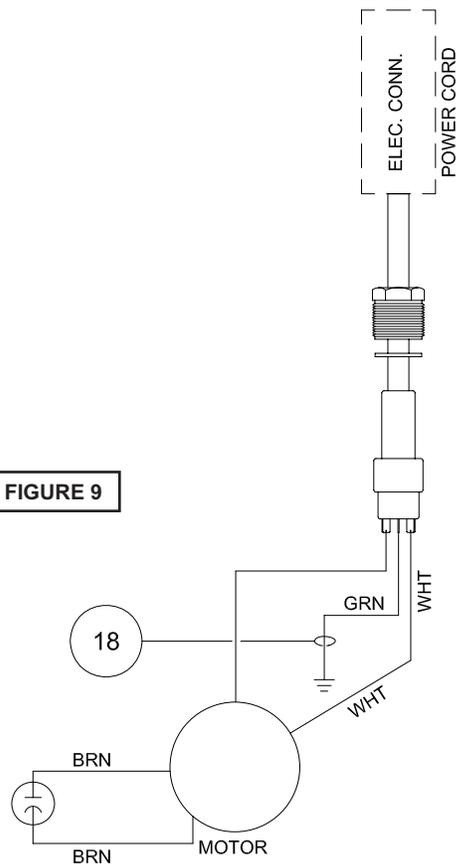
**FIGURE 8**

**SECTION: H CORD SET SERVICE:**

To replace cord set (2) remove gland nut (2a) and friction ring (2b) from motor housing. Pull cord through opening and disconnect the motor wires from terminals on cord (2), See Figure 8 .

Connect motor wires to cord set (2) as per Figure 9. Place friction ring (2b) and gland nut (2a) into motor housing and tighten gland nut (2a) to 17.5 ft. lbs.

**FIGURE 9**



**SINGLE PHASE - 115 VOLTS  
MANUAL & MANUAL/AUTOMATIC**

**SECTION: I REPLACEMENT PARTS**

**I-1) ORDERING REPLACEMENT PARTS:**

When ordering replacement parts, ALWAYS furnish the following information:

1. Pump serial number and date code
2. Pump model number

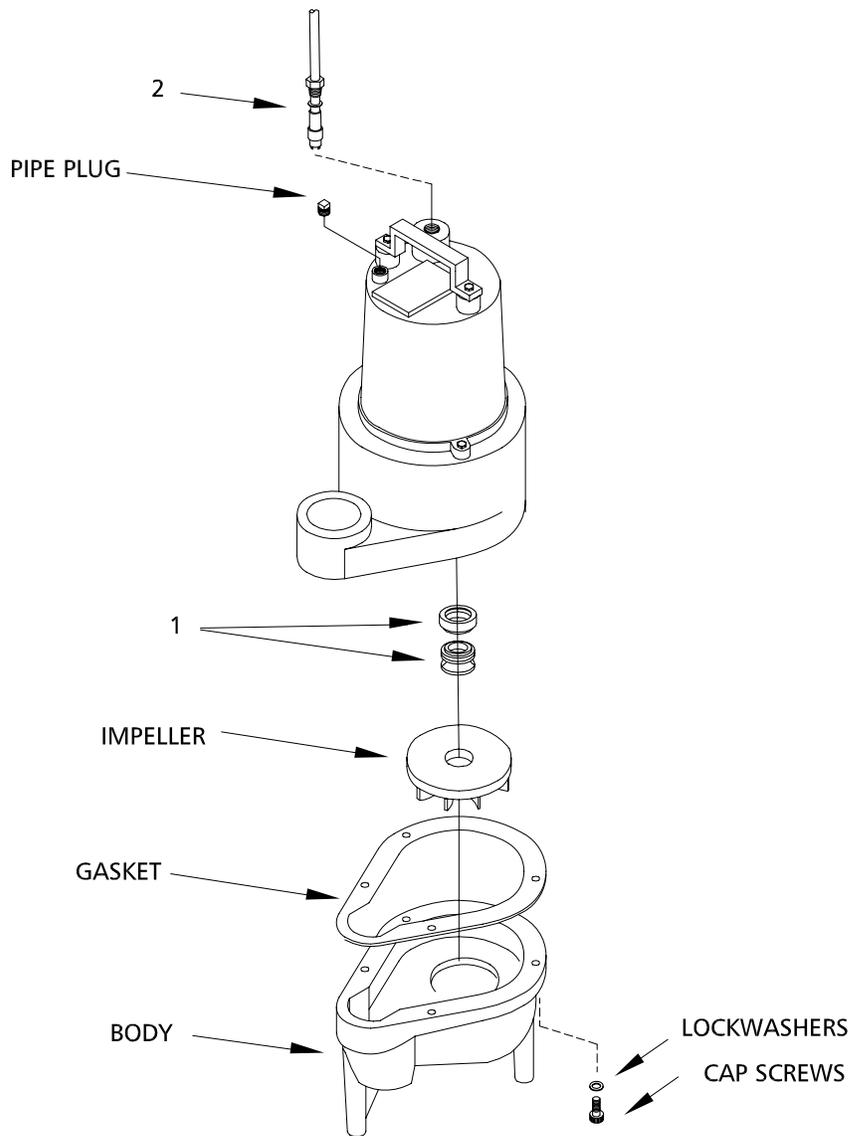


## TROUBLE SHOOTING

**CAUTION !** Always disconnect the pump from the electrical power source before handling. If the system fails to operate properly, carefully read instructions and perform maintenance recommendations. If operating problems persist, the following chart may be of assistance in identifying and correcting them:  
**MATCH "CAUSE" NUMBER WITH CORRELATING "CORRECTION" NUMBER.**

**NOTE:** Not all problems and corrections will apply to each pump model.

PROBLEM	CAUSE	CORRECTION
Pump will not run	<ol style="list-style-type: none"> <li>1. Poor electrical connection, blown fuse, tripped breaker or other interruption of power, improper power supply.</li> <li>2. Motor or switch inoperative (to isolate cause, go to manual operation of pump).                             <ol style="list-style-type: none"> <li>2a. Float movement restricted.</li> <li>2b. Switch will not activate pump or is defective.</li> </ol> </li> <li>3. Insufficient liquid level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check all electrical connections for security. Have electrician measure current in motor leads, if current is within <math>\pm 20\%</math> of locked rotor Amps, impeller is probably locked. If current is 0, overload may be tripped. Remove power, allow pump to cool, then recheck current.</li> <li>2a. Reposition pump or clean basin as required to provide adequate clearance for float.</li> <li>2b. Disconnect level control. Set ohmmeter for a low range, such as 100 ohms full scale and connect to level control leads. Actuate level control manually and check to see that ohmmeter shows zero ohms for closed switch and full scale for open switch. (Float Switch).</li> <li>3. Make sure liquid level is at least equal to suggested turn-on point.</li> </ol>
Pump will not turn off	<ol style="list-style-type: none"> <li>2a. Float movement restricted.</li> <li>2b. Switch will not activate pump or is defective.</li> <li>4. Excessive inflow or pump not properly sized for application.</li> <li>9. Pump may be airlocked.</li> <li>14. H-O-A switch on panel is in "HAND" position</li> </ol>	<ol style="list-style-type: none"> <li>4. Recheck all sizing calculations to determine proper pump size.</li> <li>5. Check discharge line for restrictions, including ice if line passes through or into cold areas.</li> <li>6. Remove and examine check valve for proper installation and freedom of operation.</li> <li>7. Open valve.</li> <li>8. Check cutter for freedom of operation, security and condition. Clean cutter and inlet of any obstruction.</li> <li>9. Loosen union slightly to allow trapped air to escape. Verify that turn-off level of switch is set so that the suction is always flooded. Clean vent hole.</li> </ol>
Pump hums but does not run	<ol style="list-style-type: none"> <li>1. Incorrect voltage</li> <li>8. Cutter jammed or loose on shaft, worn or damaged, inlet plugged.</li> </ol>	<ol style="list-style-type: none"> <li>4. Recheck all sizing calculations to determine proper pump size.</li> <li>5. Check discharge line for restrictions, including ice if line passes through or into cold areas.</li> </ol>
Pump delivers insufficient capacity	<ol style="list-style-type: none"> <li>1. Incorrect voltage.</li> <li>4. Excessive inflow or pump not properly sized for application.</li> <li>5. Discharge restricted.</li> <li>6. Check valve stuck closed or installed backwards.</li> <li>7. Shut-off valve closed.</li> <li>8. Cutter jammed or loose on shaft, worn or damaged, inlet plugged.</li> <li>9. Pump may be airlocked.</li> <li>10. Pump stator damaged/torn.</li> </ol>	<ol style="list-style-type: none"> <li>6. Remove and examine check valve for proper installation and freedom of operation.</li> <li>7. Open valve.</li> <li>8. Check cutter for freedom of operation, security and condition. Clean cutter and inlet of any obstruction.</li> <li>9. Loosen union slightly to allow trapped air to escape. Verify that turn-off level of switch is set so that the suction is always flooded. Clean vent hole.</li> <li>10. Remove &amp; examine for damage. Replace pump stator if required.</li> <li>11. Repair fixtures as required to eliminate leakage.</li> </ol>
Pump cycles too frequently or runs periodically when fixtures are not in use	<ol style="list-style-type: none"> <li>6. Check valve stuck closed or installed backwards.</li> <li>11. Fixtures are leaking.</li> <li>15. Ground water entering basin.</li> </ol>	<ol style="list-style-type: none"> <li>10. Remove &amp; examine for damage. Replace pump stator if required.</li> <li>11. Repair fixtures as required to eliminate leakage.</li> </ol>
Pump shuts off and turns on independent of switch, (trips thermal overload protector). <b>CAUTION!</b> Pump may start unexpectedly. Disconnect power supply.	<ol style="list-style-type: none"> <li>1. Incorrect voltage.</li> <li>4. Excessive inflow or pump not properly sized for application.</li> <li>8. Cutter jammed, loose on shaft, worn or damaged, inlet plugged.</li> <li>12. Excessive water temperature.</li> </ol>	<ol style="list-style-type: none"> <li>12. Check pump temperature limits &amp; fluid temperature.</li> <li>13. Replace portion of discharge pipe with flexible connector.</li> <li>14. Turn to automatic position.</li> <li>15. Check for leaks around basin inlet and outlets.</li> </ol>
Pump operates noisily or vibrates excessively	<ol style="list-style-type: none"> <li>4. Operating at too high a pressure.</li> <li>5. Discharge restricted.</li> <li>8. Cutter broken.</li> <li>13. Piping attachments to building structure too rigid or too loose.</li> </ol>	



**FIGURE 10**

### PARTS LIST

ITEM	QTY.	PART No.	DESCRIPTION
1	1	102074	Shaft Seal
2	1	099260XA	Cord Set Assy, 20Ft
3	1	106923XA	Wide Angle Float, w/Piggy-Back Plug (Not Shown)

D8d.2b  
4/06  
Supersedes 7/05

**PACO**®  
**PUMPS**

Check our worldwide offices at  
[www.paco-pumps.com](http://www.paco-pumps.com)