



**FEDERAL PUMP CORP**

1144 UTICA AVENUE, BROOKLYN, NY 11203



# INSTALLATION, OPERATION & MAINTENANCE MANUAL

## SUBMERSIBLE SEWAGE PUMPS

SERIES

.....

# BGP, JJM, MSC, VSS

SERIES

.....

## BGP & BGP(QD)



SERIES

.....

## MSC & MSC(QD)



SERIES

.....

## JJM & JJM(QD)



SERIES

.....

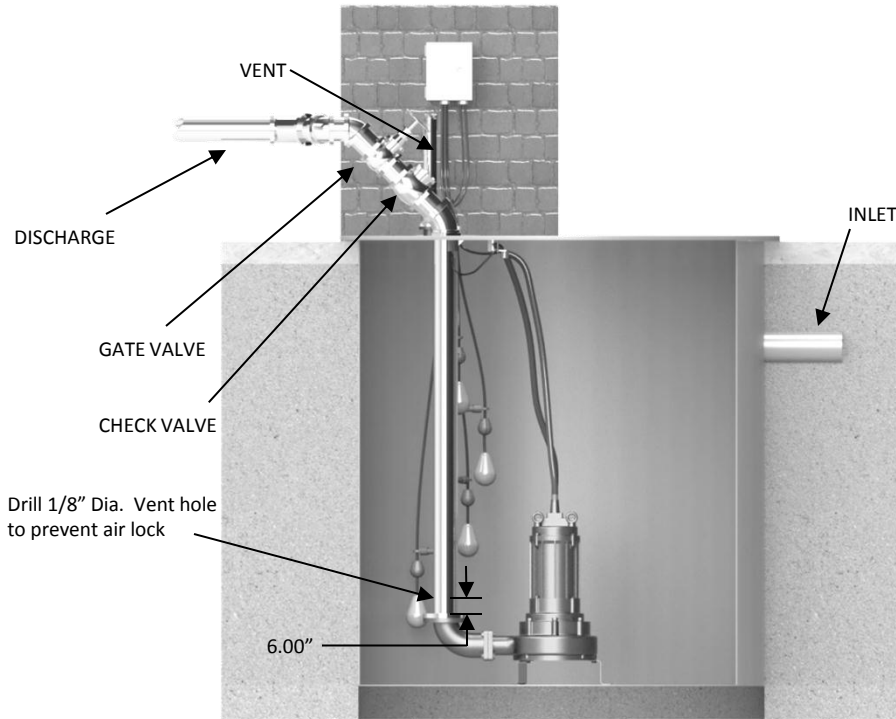
## VSS & VSS(QD)



### **IMPORTANT**

READ ALL INSTRUCTIONS IN THIS MANUAL BEFORE OPERATING AND SERVING A PUMP

## INTRODUCTION



TYPICAL PRE-PACKAGED DUPLEX  
SEWAGE SYSTEM SHOWN WITH  
FRAME, COVER AND BASIN.  
(VALVING AND NOT INCLUDED)

Sewage pumps provide for the lifting and disposal of sewage and sewage related fluids from retaining basins or concrete pits and are pumped to city water disposal lines where these fluids cannot drain under gravity conditions alone. Typically located below grade, sewage pumps provide building owners the ability to design and locate restroom or other facilities below ground that are serviced by these sewage lift stations.

Compatible with Federal Pump's OS, FSS, SBS, TCS, and NPC simplex, and duplex control system, these series can support 24/7 automatic operation for standard pump service in residential and commercial buildings.

Available in free standing and quick disconnect, the product offering are also conveniently pre-packaged in systems that provide the end user with trouble and maintenance free operation when designed, installed, and maintained properly.

## GENERAL SAFETY INFORMATION


Before installation, read the following instructions carefully. Failure to follow instruction and safety information could cause serious bodily injury, death and/or property damage. Each Federal Pump product is carefully inspected to insure proper performance. Closely following these instructions will eliminate potential operating problems, assuring years of trouble-free service.

**⚠DANGER:** "Danger" indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.

**⚠WARNING:** "Warning" indicates an imminently hazardous situation which, if not avoided, MAY result in death or serious injury.


**⚠CAUTION:** "Caution" indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.


**IMPORTANT!!!** – Federal Pump is not responsible for losses, injury or death resulting from failure to observe these safety precautions, misuse, abuse or misapplication of the pump(s) or equipment.



 **ALL RETURNED PRODUCTS MUST BE CLEANED, SANITIZED, OR DECONTAMINATED PRIOR TO SHIPMENT, TO INSURE EMPLOYEES WILL NOT BE EXPOSED TO HEALTH HAZARDS IN HANDLING SAID MATERIAL. ALL APPLICABLE LAWS AND REGULATIONS SHALL APPLY.**


**⚠WARNING:** Installation, wiring, and junction connections must be in accordance with the National Electric Code and all applicable state and local codes. Requirements may vary depending on usage and location.

**⚠WARNING:** Installation and servicing is to be conducted by qualified personnel only.

 Keep clear of suction and discharge openings. Do not insert fingers in pump suction with power connected; the rotating cutter and /or impeller can cause serious injury.

 Always wear eye protection when working on pumps. Do not wear loose clothing that may become entangled in moving parts.

  **⚠DANGER:** Pump build up heat and pressure during operation. Allow time for pumps to cool before handling or servicing the pump or any accessory items associated with or near the pump.

 This pump is not intended for use in swimming pools or water installations where there is human contact with pumped fluid. There is a risk of electric shock. To reduce risk of electric shock, always disconnect pump from power source before handling any aspect of the pumping system. **LOCK OUT POWER AND TAG.**

## GENERAL SAFETY INFORMATION

**⚠WARNING:** Do not use this pump in water over 104°F. Do not exceed manufacturer’s recommended maximum performance, as this could cause the motor to overheat.

**⚠DANGER:** Do not lift, carry or hang pump by the electrical cables. Damage to the electrical cables can cause shock, burns, or death. Never handle connected power cords with wet hands. Use appropriate lifting device.

**⚠WARNING:** Ground Fault Circuit Interrupter (GFCI) to be used with plug-in type power cord.

**⚠WARNING:** Sump and sewage pumps often handle materials which could cause illness or disease. Wear adequate protective clothing when working on a used pump or piping. Never enter a basin after it has been used.

**⚠DANGER:** Failure to permanently ground the pump, motor and controls before connecting to power can cause shock, burns, or death.

**⚠DANGER:** These pumps are not to be installed in locations classified as hazardous in accordance with the National Electric Code, ANSI/NFPA 70.

**⚠WARNING:** The Uniform Plumbing Code (UPC) states that sewage systems shall have an audio and visual alarm that signals a malfunction of the systems, that are required to reduce the potential for property damage.

**IMPORTANT!!!** – Prior to installation, record Performance(GPM,TDH), Model Number, Record Number, Full Load Amp, Voltage, Phase, and HP from the pump name plate for future reference. Also record the site voltage and current readings at equipment startup. Use the table below for record keeping. Refer to the pump series for performance data and dimension. The series can be found as the first group of letters in the “Model Number”. Contact the factory or local representative with Record Number for assistance if needed.

### NAME PLATE

GPM: \_\_\_\_\_ TDH: \_\_\_\_\_

Model Number: \_\_\_\_\_

Record Number: \_\_\_\_\_

Full Load Amp: \_\_\_\_\_

Voltage: \_\_\_\_\_ Phase: \_\_\_\_\_ HP: \_\_\_\_\_

- Oil Fill Motor Design
- Air Fill Motor Design

### STARTUP

Voltage: \_\_\_\_\_

Amp Draw:

1 Phase            L-N: \_\_\_\_\_

3 Phase            L 1-2: \_\_\_\_\_

L 2-3: \_\_\_\_\_

L 3-1: \_\_\_\_\_

## RECOMMENDATIONS

**RECEIVING:** Immediately upon receipt of the shipment, inspect and check with the packing list and report to the transportation company's local agent of any damage or shortage. Inspect carton and wrappings before discarding. Parts and accessories may sometimes be wrapped individually and packed in the carton. Should you find the plastic wrapping removed or damaged upon the arrival of the equipment, note the incident on the carrier's Bill of Lading.

**STORAGE:** The plastic wrapping is not meant as mean to protect the equipment from the environment during storage. If the pump is received sometime in advance of when it can be put into use, it should be inspected, rewrapped or re-boxed and stored in a dry location. If the pump is to be stored for a long period of time, rotate the pump shaft periodically to protect the bearings. Units should not be stored where temperatures will be below 20°F or above 100°F.

**CONTROLS:** 3 Phase, pump only, and non-115Volt pump models require a separate approved pump control device or panel for automatic operation. Be sure that the electrical specification of the control selected properly match the electrical specifications of the pump.

**SUBMERGENCE:** The pump should always be operated in the submerged condition. The minimum liquid level should never be less than above the pump's volute. The recommended liquid level would be the height of the pump to assist with motor cooling.

**VENT HOLE:** The discharge piping of the pump should always be drilled with a vent hole( $\frac{1}{8}''\varnothing$ ) at a height of 6" above the pump discharge to prevent air locking.

## INSTALLATION

**⚠WARNING:** Under no circumstances should power or sensing cable be pulled while the pump is being transported or installed. Attach a chain or rope to the grip or lugging bolt to install the pump. (certain models of pump will be provided with stainless steel lift cable)

- 1. This pump must not be installed on its side or operated in a dry condition. Ensure that it is installed upright on a secure base.**
- 2. Install the pump at a location in the tank where there is the least turbulence.**
- 3. If there is a flow of liquid inside the tank, support the piping where appropriate. Install piping so that air will not be entrapped. If piping must be installed in such a way that air pockets are unavoidable, install an air release valve wherever such air pockets are most likely to develop.**

**INSTALLATION:** These pumps are recommended for use in a concrete pit or basin. The basin or lift station shall be sealed and vented in accordance with local plumbing codes. This pump is designed to pump grey water, non-explosive and non-corrosive liquids, and shall NOT be installed in locations classified as hazardous in accordance with the National Electrical Code (NEC) ANSI/NFPA 70 or Canadian Electric Code (CEC). The minimum depth should be at least 42". Check the pump catalog for minimum basin diameter. These are the minimum requirements. The pump should never be installed in a trench, ditch, or hole with a dirt bottom. The legs will into the dirt and the suction will become plugged.

- adequate working space. A minimum of 8" diametrical clearance around the tank is recommended. Never place basin directly in contact with rocks or other sharp objects. Prepare the bottom of the excavated hole with at least 6" of back fill material or concrete pad. Place only fine 1/8" to 3/4" pea gravel or 1/8" to 1/2" washed, crushed stone as back fill material. Do not use sand or native soil as backfill. Properly compact underneath the basin to provide a solid level base that can support the weight of the filled basin. Check base to insure it is level. Anchor if necessary.
- 2. INLET CONNECTION & INITIAL BACKFILL:** Only fine pea gravel or washed, crushed stone should be used around the bottom of the basin to hold it in place. Concrete may be poured around basin bottom if ballast is required for buoyancy. Do not use sand or native soil as backfill. Make the inlet connection as required for your basin. Do not install more than 1 inlet connection per basin.
  - 3. FINAL BACKFILL:** Fill basin with water before backfilling. Only fine pea gravel or washed, crushed stone is recommended. Do not use sand or native soil as backfill. Back fill to 4" to 6" around the entire periphery of the basin. Compact back fill material in 12" lifts.

**⚠CAUTION:** If burial depth is greater than basin height, consult factory representative to assure structural integrity is not compromised. Reinforcement may be required

**⚠CAUTION:** In freezing conditions, back fill material must be dry and free of ice.

## INSTALLATION

**DISCHARGE PIPING:** Discharge piping should be as short as possible and sized no smaller than the pump's discharge size. **Do not reduce the discharge pipe size below that which is provided on the pump.** Both check valves and a shut-off valve are recommended for each pump. The check valve is used to prevent backflow into the pit. If a swing check valve is used, it is recommended to be installed at a 45° angle with the pivot pin on top. The shut-off valve is used to manually stop system flow during pump testing and servicing.

### ELECTRICAL CONNECTIONS:

**1. POWER CABLE:** The power cable mounted to the pump must not be modified in any way except for shortening or splicing to a specific application. 1 Phase pumps are provided with a 3 wire power cord, and 3 Phase pumps are provided with a 4 wire power cord. Connect the green wire to ground. Under no circumstances should the green wire be connected to the power supply. Every pump **must** be grounded. **DO NOT USE THE POWER CABLE TO LIFE PUMP.** Do not use an extension cord for 1 Phase pump(s). Always wire the pump as indicated on the wiring diagram inside the control panel

**2. OVERLOAD PROTECTION:** On submersible motors, an in-panel overload protector is needed to act as an 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. (**IMPORTANT!!!** – The overload in the panel should NOT automatically reset and start the pump up after the motor cools.) In the event of an overload, the source of this condition should be determined and corrected immediately.

**⚠WARNING:** Never let the end of the cable contact water

**⚠WARNING:** If the cable is extended, do not immerse the splice in water

**⚠CAUTION:** Fasten the cable to the discharge piping with zip tie

**⚠CAUTION:** Install the power cable so that it will not overheat. Overheating is typically caused by coiling the cable and exposing it to direct sunlight.

**IMPORTANT!!!** Always rely on a Certified Electrician for installation

## INSTALLATION

### LIQUID LEVEL CONTROL (1Ph/230V & 3Ph):

Refer to the figure 1 which shows a typical installation of (2) 1 phase 230 volt and 3 Phase pump at all voltage using (3) level control switches (SW1, SW2, SW3) and (1) high water alarm switch (SW4) mounted to the style 1 pilot device with a duplex control panel. The level control and high water alarm float should have adequate clearance so they cannot hang up in their swing and that the pump is completely submerged when the level controls are in the "OFF" mode. By adjusting the cord tether the control levels can be changed.

### Duplex Panels

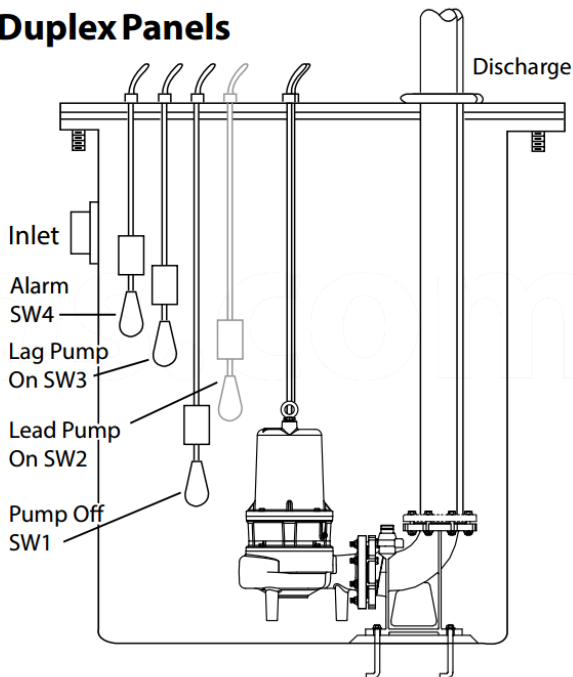


Figure 1



## OPERATION

**PRE-OPERATION:** After completing installation, perform the following prior to contacting Federal Pump's local representative for equipment start up:

- 1. CHECK VOLTAGE AND PHASE:** Compare the voltage and phase information stamped on the pump name plate.
- 2. CHECK PUMP ROTATION:** Improper motor rotation can result in poor pump performance and can damage the motor and/or pump. Incorrect rotation for 1Phase pumps is unlikely. If the rotation is incorrect contact factory.
- 3. NAME PLATE:** Record the information from the pump name plate for future reference.
- 4. INSULTATION TEST:** An insulation (megger) test should be performance on the motor before the pump is put into service. The resistance values, voltage, and current should be recorded.
- 5. PUMP-DOWN TEST:** Be sure pump has been properly wired, lowered into the basin or lift station. Check the system by filling the pit with liquid and allowing the pump to operate through its pumping cycle if control system is ready. Otherwise, test the pump on "HAND" or manual position (make sure the liquid level does not get pump below the top of the pump volute. The time needed to empty the system (pump-down time) along with the volume of water, should be recorded. Pump are typically designed to operate up to 20 cycles an hour.

Since Federal Pump offers a multitude of liquid level controls, please refer to their (OS, FSS, SBS, TCS, NPC) corresponding IOM manual for sequence of operation

## OPERATION

**TROUBLESHOOTING CHART:** Always disconnect the pump from the power source before handling inspections or repairs .

**⚠ CAUTION:** Risk of electric shock

**⚠ DANGER:** Keep clear of suction and discharge openings. Do not insert fingers in pump with power connected; the rotating cutter and /or impeller can cause serious injury.

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Pump will not run	<ol style="list-style-type: none"> <li>1. Poor electrical connection, blown fuse(s), tripped breaker or other interruption of power; improper power supply</li> <li>2. Motor or switch inoperative (go to manual operation)               <ol style="list-style-type: none"> <li>2a. Float movement restricted</li> <li>2b. Switch will not activate pump or is defective</li> <li>2c. Defective or damaged motor</li> </ol> </li> <li>3. Insufficient liquid level</li> <li>16. Liquid temperature exceeding pump operation range</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 on a single phase pump. Remove power, allow pump to cool, then re-check 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 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.</li> <li>2c. Check winding insulation and winding resistance. If check is outside of range, dry and re-check. If still defective, replace per maintenance instruction for the pump series.</li> <li>3. Mark sure liquid level is above the pump</li> <li>4. Re-check all sizing calculations to determine proper pump sizing</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 impeller for free of operation, security and condition. Clean impeller cavity and inlet of any obstruction</li> <li>9. Loosen flange or union slightly to allow trapped air to escape at the discharge piping slowing while the pump is on "HAND". Clean vent hole</li> <li>10. Check rotation. If power supply is three phase, reverse any (2) of (3) power supply leads on the motor end of the starter or VFD to ensure proper impeller rotation</li> <li>11. Repair fixtures as required to eliminate leakage</li> <li>12. Check pump temperature limits and fluid temperature</li> <li>13. Replace portion of discharge pipe with flexible connector or tighten existing piping</li> <li>14. Turn to automatic position</li> <li>15. Check for leaks around basin inlet and outlets</li> <li>16. Check temperature of the liquid inside the pit. Quench the basin with a hose to 70°F, and let it cool down before turning the pump on. Add a dedicated quench line to the system to keep the pump from overheating</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 air locked causing pump not to flow</li> <li>14. H-O-A switch on panel is in "HAND" position</li> </ol>	
Pump hums but doesn't run	<ol style="list-style-type: none"> <li>1. Incorrect low voltage</li> <li>8. Impeller jammed or loose on shaft, or inlet plugged</li> </ol>	
Pump delivers insufficient capacity	<ol style="list-style-type: none"> <li>1. Incorrect low voltage</li> <li>4. Excessive inflow or pump not properly sized for application</li> <li>5. Discharge restricted</li> <li>6. Check valve partially closed or installed backwards</li> <li>7. Shut-off valve closed</li> <li>8. Impeller jammed or loose on shaft, or inlet plugged</li> <li>9. Pump may be air locked causing pump not to flow</li> <li>10. Piping fixtures leaking or discharge before the nozzle</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 partially closed or installed backwards</li> <li>11. Fixtures are leaking</li> <li>15. Ground water entering basin</li> </ol>	
Pump shuts off and turns on independent of switch, (trips thermal overload protector). CAUTION! Pump may start unexpectedly. Disconnect power supply.	<ol style="list-style-type: none"> <li>1. Incorrect low voltage</li> <li>4. Excessive inflow or pump not properly sized for application</li> <li>8. Impeller jammed or loose on shaft, or inlet plugged</li> <li>12. Excessive water temperature (internal protection only)</li> </ol>	
Pump operates noisily or vibrates excessively	<ol style="list-style-type: none"> <li>2c. Worn bearings, motor shaft bent</li> <li>5. Debris in impeller cavity or broken impeller</li> <li>10. Pump running backwards</li> <li>13. Piping attachments to building structure too loose or rigid.</li> </ol>	

NOTE: Federal Pump assumes no responsibility for damage or injury due to disassembly in the field. Disassembly of the pumps or supplied accessories other than at Federal Pump or its authorized service centers, automatically void warranty on the equipment

## MAINTENANCE

**INSPECTION:** Schedule to check pressure, output, voltage, current, and other specifications on a bi-annual basis. If unusual readings are found, and correct as soon as possible.

- 1. DAILY INSPECTIONS:** Check current daily. If the amp draw fluctuation is great, even though its within the limits of pump rating, foreign objects may be clogging the pump. If the amount of liquid discharged falls suddenly, said objects may block the suction inlet.
- 2. MONTHLY INSPECTIONS:** Measure the insulation resistance. The value should be more than 1M ohm. If resistance starts to fall rapidly even with an initial indication of over 1M ohm, this may be an indication of damage or defect and repair work would be required.
- 3. ANNUAL INSPECTIONS:** To extend the service life of the mechanical seal, replace the oil in the mechanical seal chamber (for applicable SERIES) once a year. Water mixed with the oil or cloudy textures are indications of a defective mechanical seal requiring replacement. When replacing the oil, lay the pump on its side with filler plug on top. Inject suitable amount of oil. Not every pump has an oil chamber. Refer to sectional view for details.
- 4. 3-5 YEAR INSPECTIONS:** Conduct an overhaul on the pump. These intervals will preclude the possibility of future trouble.
- 5. COOLING OIL INSPECTION:** Anytime the pump removed from operation, the cooling oil in the motor housing should be checked visually for oil level and contamination. To check oil, set unit upright, remove pipe plug from housing, and inspect the oil in the housing to make

sure it is clean and clear (light amber in color and free from suspended particles). Milky white oil indicates the presence of water. Oil level should be just above the motor when pump is in vertical position.

**SERVICE:** No periodic lubrication is required. Perform the following checks every time a pump is removed from operation or when pump performance deteriorates:

1. Inspect motor chamber for oil level and contamination
2. Inspect impeller and body for excessive build-up of clogging
3. Inspect motor, bearings, and shaft seal for wear or leakage

**OIL TESTING:** Test the cooling oil using the following steps

1. Drain oil into a clean, dry container by placing pump on its side, and removing pipe plug from housing.
2. Check oil for contamination using an oil tester with a range to 30kV breakdown.
3. If oil is found to be clean and uncontaminated (measuring above 15kV), refill the housing with the same oil
4. If oil is found to be contaminated (measuring 15kV or below), the pump must be carefully inspected for leaks at the shaft seal, cable assembly, gaskets, and pipe plug. To help locate the leak(s), perform a "soap bubble" leak test
5. After leak is repaired, dispose of old oil properly, and refill with new oil.

## MAINTENANCE

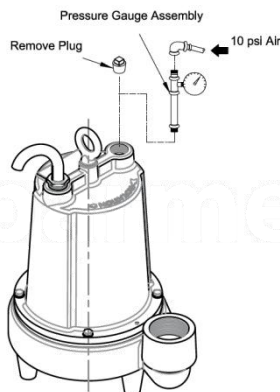
### PRESSURE TEST (IF OIL HAS BEEN DRAINED):

Remove pipe plug from housing. Apply pipe sealant to pressure gauge assembly and tighten into hole. Pressurize motor housing to 10 PSI. Use soap solution around the sealed areas and inspect joints for air bubbles

If, after five minutes, the pressure is still holding contact, and no bubbles are observed, slowly bleed the pressure and remove the gauge assembly, and replace oil. All leak(s) must be located and repaired if pressure does not hold.

### PRESSURE TEST (IF OIL HAS NOT BEEN DRAINED):

Oil should be at normal level. Remove pipe plug from housing. Apply pipe sealant to pressure gauge assembly and tighten into hold. Pressurize motor housing to 10 PSI. Use soap solution around the sealed areas above the oil level and inspect joints for air bubbles. For sealed areas below oil level, leaks will seep oil. If, after five minutes, the pressure is still holding constant, and no bubbles, oil seepage is observed, slowly bleed the pressure and remove the gauge assembly, and replace oil. All leak(s) must be located and repaired if pressure does not hold.



### PRESSURE TEST (AIR FILL MOTOR)

Remove pipe plug from housing. Apply pipe sealant to pressure gauge assembly and tighten into hold. Pressurize housing to 10 PSI. Use soap solution around the sealed areas to inspect joints for air bubbles. If, after five minutes, the pressure is still holding constant, and no bubbles, slowly bleed the pressure and remove the gauge assembly, and replace pipe plug. All leak(s) must be located and repaired if pressure does not hold.

**CAUTION:** Pressure builds up extremely quickly due to the limited space inside the pump housing. Too much pressure will damage mechanical seal.

**DO NOT exceed 10 PSI**

**OIL REPLACEMENT:** Set unit upright and refill with new cooling oil as per table below. Fill to just above motor, but below capacitor (1Phase motor) as an air must remain in the top of the housing to compensate for oil's thermal expansion. Apply pipe thread compound to threads of pipe plug then assemble it to housing.



**DANGER:** DO NOT overfill oil.

Overfilling of housing with oil will create excessive and dangerous hydraulic pressure which can destroy the pump and create a hazard. Overfilling oil voids equipment warranty

Cooling Oil Recommended Supplier/Grade	
BP	Enerpar SE100
Conoco	Pale Parafin 22
Mobile	D.T.E Oil Light
Shell	Transformer-10
Texaco	Diala-Oil-AX

## MAINTENANCE

**DISASSEMBLY:** When disassembling pump, have a piece of cardboard or wooden board ready to place the different parts on as you work. Do not pile parts on top of each other. They should be laid out neatly in rows. The O-ring and gasket cannot be reused once they are removed. Have replacement parts ready prior to disassembly. Disassemble in the order shown below, while referring to the sectional view in the equipment catalog. Always disconnect power prior to dissembling the pump.

### 1. IMPELLER & VOLUTE:

- a) Remove cap screws, volute and gasket.
- b) Clean and examine impeller for cracks or chips, and replace if required. To remove impeller, place a flathead screwdriver in the slot at the end of the shaft to hold the shaft stationary while unscrewing.
- c) Where applicable, check v-ring and remove if damaged.

### 2. POWER CORD & MOTOR:

- a) Place pump upright on blocks to avoid resting unit on shaft.
- b) Remove pipe plug and drain oil from housing.
- c) Remove gland nut and washer from the motor housing, and slide power cord up along with washers and grommet.
- d) Pull cord through and disconnect the wires from the terminals on power cord. Be sure to note wire connections for reassembly.
- e) Disconnect cable leads from motor

leads and remove motor housing and O-ring. Always replace O-ring and gasket once removed.

- f) For single phase motors, check motor capacitor with an Ohmmeter by first grounding the capacitor by placing a screwdriver across both terminals. If the Ohmmeter reading moves to infinity then drifts back, the capacitor is in working condition. Otherwise, replace the capacitor.
- g) Inspect motor winding for shorts, and check resistance valves. Check rotor for wear and damages. If rotor or the stator windings are defective or damaged, the complete motor must be replaced.

### 3. MECHANICAL SEAL:

- a) Where applicable, remove seal plate.
- b) Carefully remove mechanical seal without scratching sliding surface
- c) Inspect for signs of uneven wear pattern on stationary members, chips and scratches on either seal faces. Replace the complete seal if any part is damaged. DO NOT interchange seal components. Replace the entire shaft seal.

### 4. BEARING:

- a) Examine bearing and replace if worn. Remove bearing from shaft using a wheel puller, if replacement is required.

## MAINTENANCE

**ASSEMBLY:** All parts must be clean before reassembly. Handle seal parts with extreme care. DO NOT damage lapped surfaces. Reassemble in reverse order of disassembly. Be careful of the following:

1. During reassembly, periodically rotate the impeller by hand and check for smooth rotation. If rotation is not smooth, check for alignments in the bearing, and scratches on the seal faces.
2. Upon completion of reassembly, rotate the impeller by hand from the pump suction, and check that it rotates smoothly without touching the suction plate before operating the pump.

O-rings, shaft seals, gaskets, and other pump components are available as kits from the factory and representatives.



## ***Federal Pump Corporation Factory Warranty***

Equipment or parts manufactured by Federal Pump Corporation ("Seller") which fail to function properly because of defects in material or workmanship and which are returned to Seller with shipping charges prepaid, within one year from date of shipment (invoice date) will be repaired or replaced by Seller, FOB the factory, at Seller's expense. Equipment or parts furnished by Seller, but manufactured by others (such as motors, switches, control panels, etc.) are the responsibility of the manufacturer under its warranty, if any, and Buyer's sole recourse will be to such manufacturer. If Seller determines that the failure to function properly (of equipment or parts returned) is not due to defective material or workmanship but rather to misapplication or mishandling after receipt by Buyer, Seller will repair or replace the equipment or parts upon Buyer's authorization, and bill Buyer for material and labor required for the repair or replacement. The forgoing sets forth Seller's only warranty with respect to, and Seller's entire liability, for any claim or damages whatsoever arising out of the supplying of the equipment hereunder or its use. The foregoing warranty is made by Seller and accepted by the person to whom Seller's applicable invoice is directed ("Buyer") in lieu of all other warranties, express or implied, of Seller and in lieu of all other obligations or liabilities of Seller. No other representation or warranty on the part of seller, express or implied, shall apply to the equipment supplied hereunder or referred to herein, or to its performance, all such other warranties (including any warranty of merchantability or fitness for any purpose) being hereby disclaimed. In no event will Seller be responsible for loss of business or profits or any other similar or dissimilar consequential or incidental damages or losses. If warranty repairs or replacements of parts are to be accomplished locally in lieu at Seller's factory, they must be agreed to in writing, by Seller in advance of the work being done, and with the exact cost of the work stated in a letter of authorization from Seller. No expenses incurred will be paid by Seller unless so agreed to in advance. Seller's standard warranty extends for twelve months from date of shipment. If the standard warranty is to be extended to eighteen months from date of shipment, add 6% to the purchase price of the equipment. If the standard warranty is to be extended to twenty-four months from the date of shipment, add 12% to the purchase price of the equipment. If the standard warranty is to be extended to thirty months from date of shipment, add 18% to the purchase price of the equipment. If the standard warranty is to be extended to thirty-six months from date of shipment, add 24% to the purchase price of the equipment. Extended warranties are effective only if the equipment is properly stored and adequately protected from weather, excessive condensation, atmospheric conditions and physical damage, and only if the equipment has been properly installed and not misused or mishandled.

If you have a claim under the provision of the warranty, contact Federal Pump Corporation or your local authorized representative.

