

## Installation, Operation & Service Instructions

Protector Condensate and Boiler Feed Pumps

**KEEP THESE INSTRUCTIONS NEAR THE PUMP FOR USE OF OPERATOR**



### **INSTALLATION INSTRUCTIONS**

**Locating Pump:** Install the pump in a clean, dry, well ventilated and drained location. The top of the pump receiver should be below the lowest return since it is best to keep the return lines dry. If receiver inlet is above the lowest return line, the returns will be wet and the system will not free itself of air.

**Piping:** Connect returns to inlet of receiver with a gate valve in each return and a union or flange joint next to receiver. Connect discharge of pump to boiler using a union, swing check valve and gate valve; with the swing check valve as close to pump as possible. If discharge line is longer than 50 feet, use pipe one size larger. Piping must be of proper length and size to prevent any strain upon the unit.

**Wiring:** The electrical connections between the motor, float switch and automatic starter (if furnished) are made at the factory. Connect the electric service to the float switch or automatic starter using conduit and wire sizes as required by state/local codes. Provide a fused main line switch in motor circuit. **CAUTION:** The motor is wired at the factory to operate at the voltage specified. If voltage is other than originally specified, consult motor manufacturer's instructions accompanying unit for proper wiring. Where a polyphase motor is furnished with only a float switch, **IT WILL BE NECESSARY TO INSTALL A SUITABLE PHASE PROTECTOR SWITCH IN THE MOTOR CIRCUIT TO PREVENT MOTOR BURNOUTS SHOULD A SINGLE-PHASE CONDITION OCCUR.**

**Fuses:** Be sure fuses are installed which comply in size with National Electrical Code recommendations. When a fuse blows out, it indicates that something is wrong either in the motor, pump, switch, fuse rating or electric service. Do not replace fuse until the cause for its blowing out has been determined.

### **OPERATING INSTRUCTIONS**

**CAUTION:** New or repaired heating systems should be operated several days with the returns open to sewer until water appears clear, in order to thoroughly flush and clean the lines and prevent clogging of the pump when it is put in operation. This may take from a few days to two weeks. This pump is equipped with a mechanical seal instead of packing. **BE SURE that pump receiver is filled with condensate before starting because the mechanical seal will be damaged if ran dry.**

**LUBRICATION:** Motors that do not have regrease capability are factory lubricated for the life of the bearings. If a motor does have regrease capability, please see the manufacturer's recommended schedule for lubrication instructions.

### **INSPECTION BEFORE STARTING UNIT FOR THE FIRST TIME**

1. Check motor shaft and be sure it rotates freely. If shaft is tight, inspect pump end and motor for foreign matter clogging pump or lodging in motor.
2. Check voltage supply and be sure it is same as motor on pump, or same as wiring connections made at factory.
3. Be sure piping connections to pump have been made as per instructions and that air vent pipe from receiver is open to atmosphere.
4. Be ready to promptly prime the volute casing per the instruction tag supplied with the unit. Failure to do so could lead to premature mechanical seal failure.
5. Be sure that the float in the receiver is free to operate float switch.

Starting: Open valves in discharge and return lines, close valves in drain lines and close fused knife switch. If an automatic starter with selector switch is installed, be sure selector switch is in 'Auto" position.

### **INSPECTION AFTER STARTING**

1. With vent pipe open to atmosphere, air and water vapor can escape as fast as condensation flows into receiver. If vent is not open, or restricted, receiver will not fill.
2. Be sure pump and motor rotate in proper direction. Correct direction of rotation is CLOCKWISE when looking at top of motor. (If rotation is reversed, refer to motor instruction card and change proper leads.)
3. Check float switch to see that it starts and stops motor as receiver fills and empties.
4. Check all piping connections for leaks.
5. Observe operation of unit closely for several days. A new unit is frequently stiff and bearings are tight and therefore should be watched to check performance.

### **SERVICE AND CARE OF UNIT**

1. Inspection: To ensure best operation of unit, make a systematic inspection at least once a week.
2. Cleanliness: Keep the interior and exterior of motor and automatic switches free from moisture, oil and dirt. Occasionally drain and flush pump receiver to remove sediment and pipe scale.
3. Motor Bearings: Lubrication or replacement may be required depending on the service requirements. When service is required, consult the motor manufacturer's service center or our factory for further details.
4. Automatic Switches: Occasionally examine contacts of automatic switches and see that they make a full firm contact and break the circuit quickly. Be sure all terminal connections are tight and not corroded.
5. Mechanical Shaft Seal: Occasionally examine unit for mechanical seal leakage on No. 32 seal plate. Leakage indicates that the seal surfaces are worn and part No. 17 will need replacing. (For proper procedure in replacing these parts, refer to instructions under Disassembly of Pump.)  
CAUTION: NEVER OPERATE PUMP WHEN RECEIVER IS EMPTY, BECAUSE THE SEAL WILL BE DAMAGED IF RAN DRY.
6. Shutting Down: At end of heating season, open main line switch, close valves in return line and discharge piping. Drain receiver and pump. If necessary, cover electric motor and automatic switches to protect from environment.
7. Caution: Never operate pump when the receiver is empty. Never expose unit to freezing temperatures when water is present.

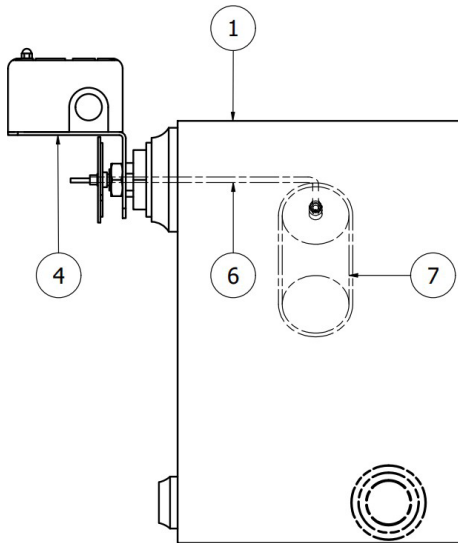


Figure 1. Side Mount Float Switch Detail.

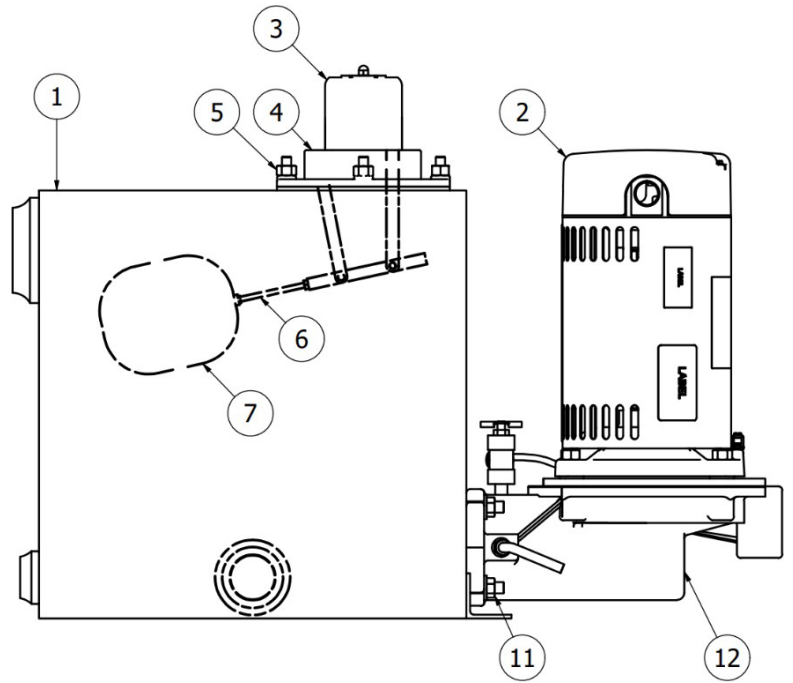


Figure 2. Detail of Tank Assembly with Pump and Float Switch.

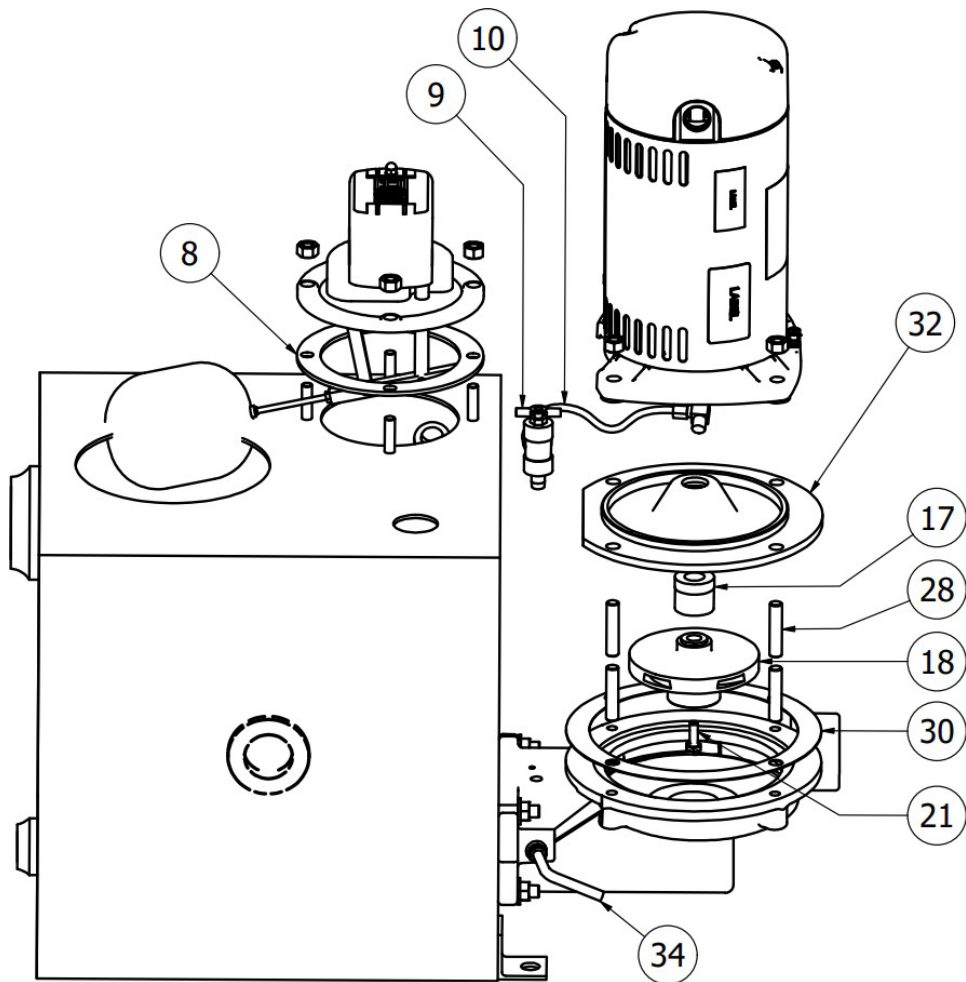


Figure 3. Detail of Tank Assembly with Pump and Float Switch Internals.

## PARTS LIST

1	Tank	18	Impeller
2	Electric Motor	19	Impeller Shaft Washer
3	Float Switch Only	20	Impeller Lock Washer
4	Float Switch & Linkage Assembly	21	Impeller Shaft Bolt
5	Float Switch Nut	22	Volute Plug
6	Float Rod	23	Volute O-Ring
7	Float Ball	24	Extension Shaft
8	Float Switch Gasket	25	Extension Shaft Set Screw
9	Vent	26	Impeller Key
10	Vent Line	27	Washer
11	Volute Nut	28	Volute Stud
12	Volute	29	Suction Adapter
13	Bolt – Motor Bracket to Volute	30	Volute Gasket
14	Bolt – Motor Bracket to Motor	31	Bolt – Suction Adapter
15	Water Slinger	32	Seal Plate
16	Motor Bracket	33	Stand-Off Bracket
17	Seal	34	Isolation Valve

RECOMMENDED SPARE PARTS LIST – For 120 or 180 day period.		
PART NO.	DESCRIPTION	QUANTITY
17	Mechanical Seal	1
23	Volute O-Ring	2
30	Volute Gasket	2
3	Float Switch	1
7	Float Ball	1

NOTE: When ordering parts, give Part Number and Description, also Pump Type number and Serial number appearing on pump nameplate.

### DISASSEMBLY OF PUMP

#### TO REMOVE PUMP AND MOTOR ASSEMBLY

1. Remove top fitting on pump vent line No. 9.
2. Disconnect wires and flexible conduit at motor terminal box or at float switch, whichever is more convenient.
3. Remove motor flange nuts No. 14.
4. Lift motor & pump unit from No. 12 Volute.

#### DISMANTLING PUMP AND MOTOR UNIT

1. Remove drip cover from top end of motor. Note slot or two (2) flat spots on motor shaft. Use a 7/16" open end wrench or screwdriver to hold motor shaft securely.
2. Remove No. 21 by turning CLOCKWISE. This only applies to three-phase models, omit this operation on single phase model.
3. Remove No. 18 Impeller by turning COUNTERCLOCKWISE. Impeller hub is threaded and screws onto motor shaft.
4. Remove No. 17 mechanical seal assembly by sliding along motor shaft.

## **REPLACING MECHANICAL SHAFT SEAL AND REASSEMBLING PUMP**

1. Pump and motor unit must be completely dismantled as indicated in *Dismantling Pump and Motor Unit*.
2. Remove ceramic stationary seat and sealing cup from No. 32 seal plate.
3. Be sure counter-bore in plate No. 32 is perfectly clean before inserting new ceramic seal and sealing cup. NOTE: A water-based lubricant should be used here to aid the assembly process.
4. Assemble No. 32 Seal plate to motor.
5. Apply a water-based lubricant to the carbon rotating member of the No. 17 mechanical seal assembly and slide the carbon ring portion squarely up to the ceramic stationary seat surface. Use caution not to scratch or mar lapped surfaces of the carbon ring or ceramic stationary seat.
6. Secure motor shaft with an open end wrench or screwdriver and screw impeller No. 18 CLOCKWISE onto motor shaft until tight.
7. Replace impeller bolt No. 19 and turn COUNTERCLOCKWISE until tight.
8. Replace gasket No. 30 and set pump and motor assembly over studs and onto pump housing No. 12. Tighten stud nuts No. 11.
9. Reconnect wiring and flexible conduit from motor to switch.
10. NEVER RUN PUMP WITH RECEIVER EMPTY, BECAUSE BOTH ELEMENTS OF MECHANICAL SHAFT SEAL WILL BE DAMAGED

## **TROUBLE CHART**

Should trouble develop with the unit, the information given below may enable the operator to locate it and correct it without a service call.

### **INSUFFICIENT OR NO CONDENSATE DISCHARGE**

1. Not enough condensate in tank to prime pump.
2. Pump not properly primed.
3. Discharge head too high.
4. Impeller loose on shaft, plugged or worn.
5. Incorrect pump rotation (ref. arrow).
6. Plugged vent line.

### **EXCESSIVE POWER CONSUMPTION**

1. Pump operating beyond design point.
2. Loose wiring connections.
3. Mechanical defects:
  - a. Motor shaft bent.
  - b. Rotating element binds.
  - c. Foreign elements between impeller and volute.

### **PUMP DOES NOT START**

1. Motor lead connections may be wired wrong.
2. Blown fuses in disconnect switch.
3. Bad coil in starter.
4. Loose connection in disconnect switch, starter, float switch or motor leads.
5. Overload protection in starter not reset.
6. Rotating assembly is bound. Try turning motor shaft from top side of motor with an open end wrench.
7. Motor Damaged.

## **PUMP IS NOISY**

1. Bearings are bad (these are sealed ball bearings in motor).
2. Pump may be operating at a low enough head to be in cavitation range. Cavitation sounds like pebbles rattling in a pail. Throttle discharge valve to correct pressure and lock. (If cavitation noise disappears it may be wise to install a smaller diameter impeller, or install a restriction orifice in the discharge line.
3. Pump is operating too near shut-off head. Check discharge piping downstream to determine whether improvements can be implemented. If this cannot be accomplished, consult factory.
4. Internal parts rubbing.
5. Motor has magnetic hum or high windage noises. Check with motor manufacturer.

## **LOSS OF SUCTIONS FOLLOWING PERIOD OF SATISFACTORY OPERATION**

1. Air leak at mechanical shaft seal or pump gasket.
2. Pump vent line plugged.
3. Air or gasses in condensate or condensate too hot.
4. Excessive wear on impeller hub.

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