



# POWER PLUS

## INTERNATIONAL, INC.

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**KEEP THESE INSTRUCTIONS NEAR THE PUMP FOR USE OF MAINTENANCE PERSONNEL**

### **INSTALLATION INSTRUCTIONS**

**\*\*\*Stainless steel units must use brass as first connection to receiver\*\*\***

**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 return will be wet and the system will not free itself of air, as well as noises will occur.

**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, spring loaded check valve and gate valve; with the spring loaded 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 local power companies. Provide a fused main line switch in motor circuit. **CAUTION:** The motor is wired and connected at the factory to operate on 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 PROTECTORSWITCH 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 blow out has been determined. If thermal cut-out is used, and element with a maximum tripping current rating 50% greater than a motor nameplate Amps. may be selected. Condensate boiler feed pumps are only operating intermittently and therefore it is permissible.

### **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 a few days to two weeks. This pump is equipped with a mechanical seal instead of the conventional type of packing. BE sure that pump receiver is filled with condensate before starting because the mechanical seal will be damaged in run dry.

**LUBRICATION:** None required from pump proper. However the vertical motor is ball bearing type with pre-sealed and lubricated bearing, and no immediate lubrication is necessary. Required lubrication depends upon what service pump is subjected to and cleanliness of location. When motor bearings become noisy, lubrication or replacement of ball bearing becomes necessary.

### **BEFORE YOU START, MAKE SURE**

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 the 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 sure that the engineering characteristics of the complete pump are identical to the capacity discharge pressure and other requirement of the system.

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 button is in "Auto" position.

### **INSPECTION AFTER STARTING**

1. With vent pipe open to atmosphere, air and 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 motor bearing for overheating.

4. Check float switch to see that it starts and stops motor as receiver fills and empties.

5. Check all piping connections for leaks.

6. Observe operation of unit closely for several hours after first starting and at regular intervals 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 insure 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. If necessary, use compressed air for blowing out dirt. Occasionally drain and flush pump receiver to remove sediment and pipe scale.
3. 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.
4. Mechanical Shaft Seal: Occasionally examine water slinger on motor shaft and look for water leakage. Any leakage will also be

visibly on seal plate. Leakage indicates that the seal surfaces are worn and need replacement. (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 RUN DRY.

5. Shutting Down: At end of heating season open main switch, close valves in return line and discharge piping and drain receiver and pump. If necessary, cover electric motor and automatic switches to protect them against dirt, oil and moisture.
6. Caution: Never operate pump when receiver is empty or expose it to freezing temperature when filled with water.

### **DISASSEMBLY OF PUMP**

#### **TO REMOVE PUMP AND MOTOR ASSEMBLY:**

- 1 - Remove top fitting on pump vent line.
- 2 - Disconnect wires and flexible conduit at motor terminal box or at float switch, whichever is more convenient.
- 3 - Remove motor bracket nuts.

- 4 - Lift motor & pump unit from pump housing.

#### **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 screwdriver to open end wrench to hold motor shaft securely.
- 2 - Remove Impeller lock screw (on 3 phase model only), turning lock screw CLOCKWISE. Omit the operation on a single phase model.
- 3 - Remove Impeller by turning COUNTER-CLOCKWISE. Impeller hub is threaded and screws into motor shaft.
- 4 - Remove Rotating 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 on page 3 in steps 1 to 4 inclusive.
- 2 - Remove ceramic stationary seal seat and vibration ring plate.
- 3 - Be sure to counter-bore in plate is perfectly clean before inserting new ceramic seat and ring.
- 4 - Attach plate to motor.
- 5 - Use a light oil on the entire diameter of vibration ring and press it together with the ceramic seat into the machined bore of plate. Press as far as it will go and be sure it is in proper place with the seat surface at a perfect 90o angle with respect to respect to motor shaft. Use caution so as NOT to SCRATCH or MAR lapped surfaces of ceramic seat.
- 6 - Oil lower end of motor shaft and slip rotating seal assembly on motor shaft as far as it will go. Again use caution so as not to SCRATCH or MAR lapped surface of carbon ring.
- 7 - Hold top end of motor shaft with screwdriver or open end wrench and screw Impeller CLOCKWISE onto motor shaft until tight.
- 8 - Replace lock screw (on 3 phase model only) and turn COUNTER-CLOCKWISE until tight.
- 9 - Replace gasket and set pump and motor assembly over studs and onto pump housing. Tighten stud nuts.
- 10 -Reconnect wiring and flexible conduit from motor to switch.
- 11 -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 the aid of a factory service man.

##### **NO CONDENSATE DISCHARGE**

- 1 - Not enough condensate in tank to prime pump.
- 2 - Speed too low.
- 3 - Discharge head too high.
- 4 - Impeller loose on shaft, plugged or worn.
- 5 - Wrong direction of rotation.

##### **EXCESSIVE POWER CONSUMPTION**

- 1 - Speed too high.
- 2 - Loose wiring connections.
- 3 - Mechanical defects:
  - (a) Motor shaft bent.
  - (b) Rotating element binds.
  - (c) Foreign elements between impeller and wearing ring.

#### INSUFFICIENT CONDENSATE DISCHARGE

- 1 - Air or water leak at Mech. shaft seal or gasket.
- 2 - Plugged pump vent line.
- 3 - Speed too low.
- 4 - Discharge head higher than anticipated.
- 5 - Impeller loose on shaft, plugged or worn.
- 6 - Wearing Rings worn.
- 7 - Wrong direction to rotation.

#### 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 or motor damaged or not Re-set.
- 6 - Rotating assembly bound. Try turning motor shaft from top side of motor with screw driver or open end wrench.

#### 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, reduce speed, or install an orifice or venturi on discharge).
- 3 - Pump is operating too near shut-off head. Check discharge piping to lower the head. If this cannot be accomplished, contact factory.
- 4 - Internal parts rubbing.
- 5 - Motor has magnetic hum or high windage noises. Check with motor manufacturer.

#### LOSS OF SUCTION 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.