



**PRECISION BOILERS**

**BOILER FEED SYSTEM**

**OPERATION AND  
MAINTENANCE MANUAL**

**IMPORTANT**

**These instructions are intended as a guide for the Installing Contractor  
and as a reference for the Operator, Owner and Serviceman.**

**RETAIN THIS BOOKLET NEAR THE EQUIPMENT FOR READY REFERENCE**

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# **I. INSTALLATION**

## **A. UNCRATING**

IMPORTANT: The Boiler Feed System was carefully packed for shipment and left the Precision Factory complete and in perfect condition. Refer all damages promptly to carrier. Precision is not responsible for shipping damage or shortages.

1. Care must be taken not to damage the unit during uncrating.
2. When using pry bars or forklifts, support the Feed System weight on its channel base only.
3. Storage: Electrical equipment can be damaged if exposed to adverse weather. The Feed System must be stored inside. The electrical panel and controls must be covered in plastic throughout all construction to avoid accumulation of dust and moisture.

## **B. PLACEMENT**

1. Installation must comply with all Federal, State and local codes.
2. Locate unit to provide easy access for inspection and maintenance.
3. Provide a firm, level foundation for the feed system, preferably a raised, concrete "housekeeping" pad.
4. Leave a permanent access space of 30 inches opposite the float level control, the sparge tube/temperature control valve (where applicable) and the pump(s) location. Leave a 36-inch access space opposite the control panel.
5. Once the feed system is in place, level it using shims as required and secure with foundation bolts. If desired, the unit may be grouted in place.
6. Under no circumstances should anyone climb on the feed system. Climbing may result in damage to the unit or may result in a fall, resulting in serious injury or even death.

## **C. PIPING CONNECTIONS**

1. Boiler piping connections and valves MUST comply with State and local codes and, where required, ANSI and ASME Boiler and Pressure Vessel Code piping requirements.
2. Pipe the vent connection full size to outdoors. Make provisions to prevent entry of rain and/or snow.

3. Pipe the feedwater supply line to the boiler. Be sure to include a manual isolation valve and check valve in this line. The check valve should be closest to the feedpump.
4. Pipe the make-up water supply line to the the float-feeder connection. Be sure to include a manual isolation valve in this line and verify that the line pressure does not exceed the allowable shutoff pressure of the make-up valve.
5. (On units with steam sparge preheater) Plumb the steam line to the steam temperature control valve. Be sure to include a manual isolation valve in this line.
6. Pipe the overflow line to a safe drain.
7. Pipe the system condensate return line to the marked connection on the tank.
8. Pipe the drain line from the drain valve mounted on the unit to a safe drain.

#### **D. ELECTRICAL CONNECTIONS**

1. Power Feed Wiring – Recommended wire sizes are listed on the Feed System Parts List. The full load amperage is listed on both the Parts List and the Nameplate. Feed wires must be rated for voltage and full load amperage as specified in the current edition of the National Electrical Code.
2. Equipment Grounding Conductors – The Feed System is equipped with ground lug(s) inside the control panel. Grounding conductor(s), properly sized in accordance with the current edition of the National Electrical Code, must be installed.

#### **E. FLUSHING AND FILLING THE SYSTEM**

1. The Feed System and associated piping must be thoroughly flushed before the final fill.
2. Consult a local water treatment company for recommendations on proper flushing procedures and ongoing water treatment. The extent to which the Feed System needs cleaning before operation depends upon the nature of the process using the steam.
3. Before filling the unit, remove and examine each pump inlet strainer and any other strainers installed on the feed system. Clean strainers and replace.
4. Fill the unit with water using the automatic water level control. Once the level control reaches its close-off point, verify the level in the water level gauge glass. Adjust float height if necessary (see Item IV.C below).

## II. PRE-STARTUP INSPECTION

### A. MECHANICAL SYSTEM

1. Are all plumbing connections complete and correct?
2. Have piping leak tests been completed and necessary repairs finished?

### B. ELECTRICAL SYSTEM

1. With all power turned off; inspect all internal and external electrical components to assure that there has been no damage during shipment or installation. Check tightness of all wire connections.
2. Are correctly sized fuses, circuit breakers and/or thermal overloads properly installed?

### C. PUMP(S)

1. With power turned off, rotate each pump by hand to insure that pump and motor are not bound up.
2. On each coupled pump, check alignment of coupling between pump and motor in accordance with pump manufacturer's instructions.
3. Run each motor momentarily to be sure pump rotation matches arrow on pump casing.

**Caution: Do not run pump dry, as damage will occur to seal and internals.**

## III. START-UP INSTRUCTIONS

### A. STARTUP

1. Open all valves on suction, discharge and makeup water lines.
2. Verify that the receiver contains water and that the float level control is operating properly.
3. For vertical pumps with seal bleed connection, verify that bleed line manual valve is open.
4. If bypass/recirculation lines are provided, make sure any stop valves in those lines are open.
5. Switch "HAND-OFF-AUTO" switch to the "HAND" position. Pump should run, feeding water the boiler.
6. Switch "HAND-OFF-AUTO" switch to "AUTO" position. System will now feed water on demand from the boiler pump control.

## **B. SPARGE SYSTEM (WHERE INSTALLED)**

1. Verify that steam is available for the sparge assembly.
2. Adjust the temperature control setting to 200 deg F minimum. Oxygen content in water is zero at 210F and sea-level atmospheric pressure.
3. Open the manual shut off valve to allow steam to reach the sparge assembly. Steam will be injected into the water in the receiver and the water temperature will rise. As the water temperature reaches the set point, the automatic steam valve will close.

## **IV. MAINTENANCE**

### **A. GENERAL**

1. Most “wear and tear” damage occurring to feed systems and their components is caused by corrosion resulting from leaking external pipe joints. Look over the system frequently and repair any piping leaks and resultant corrosion damage **immediately**.

### **B. PUMP**

1. Refer to the pump manufacturer’s instruction manual for detailed maintenance procedures. Generally, the only maintenance work required is occasional bearing lubrication or seal replacement. For more extensive repairs, pump replacement may be required. In some cases, service exchange pumps are available from the pump manufacturer.

### **C. FLOAT LEVEL CONTROL**

1. Periodically (use caution – the water in the receiver tank is generally scalding hot!) check float level control operation to ensure that float moves freely and shuts off make-up water at the correct level. Should it be necessary to reset the shutoff level, this can be achieved as follows. Access to this adjustment is through the handhole in the side of the tank.
  - a. Loosen the knurled knob on the serrated “elbow” join on the float valve.
  - b. Adjust float height.
  - c. Tighten the knurled knob, clamping the float arm in its new position.

### **D. SPARGE SYSTEM (WHERE INSTALLED)**

1. Sparge system components do not require maintenance unless there is a loss of performance. Refer to “Troubleshooting” section below.

## **V. TROUBLESHOOTING**

### **A. FAILURE TO PUMP**

1. Pump not running at rated speed – assure proper voltage and wiring connections. Use tachometer to check pump speed.
2. Pump not primed – check that suction pipe is flooded and that receiver contains water.
3. Discharge head too high – check discharge pressure against design value.
4. Wrong direction of rotation – compare pump rotation with arrow on pump.
5. Clogged suction line or inlet strainer – Inspect, clean if necessary.

### **B. INADEQUATE CAPACITY OR PRESSURE**

1. Mechanical wear or damage – rotate the pump by hand to check for tight spots. If wear or damage is suspected, remove pump for inspection/repair/replacement.
2. Insufficient net positive suction head (NPSH)
  - throttle pump discharge
  - increase size of suction piping.
  - elevate receiver tank.
3. Pump not running at rated speed – Check voltage and wiring connections. Use tachometer to check pump speed.
4. Clogged suction line or inlet strainer – Inspect, clean if necessary.
5. Air leak in suction line – test suction line for leaks and repair as necessary.
6. Discharge head too high
  - Check discharge pressure against design value.
  - Check for obstruction in feedwater line.
  - Check for proper operation of check valve(s).

### **C. PUMP LOSES PRIME AFTER STARTING**

1. Insufficient net positive suction head (NPSH)
  - Throttle pump discharge.
  - Increase size of suction piping.
  - Elevate receiver tank.
2. Air leak in suction line – test suction line for leaks and repair as necessary.
3. Air entering pump through inlet seal or “O” rings – hydrostatically test pump and repair leaks.

#### **D. EXCESSIVE POWER CONSUMPTION**

1. Pump not completely “broken in” – it is normal for new pumps to consumer higher than normal power levels during the break in period. If high power consumption persists beyond a few weeks, look for alternate causes.
2. Verify that water flow rate is not too high. This is the most common cause of excessive power consumption.
3. Mechanical wear or damage – rotate the pump by hand to check for tight spots. If wear or damage is suspected, remove pump for inspection/repair/replacement.
4. Pump and motor misaligned – follow pump manufacturers instructions to realign pump.

#### **E. PUMP VIBRATES OR IS NOISY**

1. Pump and motor misaligned – follow pump manufacturers instructions to realign pump.
2. Pump not properly bolted to mounting base/foundation.
3. Piping load on pump – check piping to ensure there is no strain on pump housing. Install piping supports and/or flexible couplings as required.
4. Mechanical wear or damage – rotate the pump by hand to check for tight spots. If wear or damage is suspected, remove pump for inspection/repair/replacement. Check alignment.
5. Pump cavitating
  - Insufficient net positive suction head (NPSH):
    - Throttle pump discharge.
    - Increase size of suction piping.
    - Elevate receiver tank.
  - Air leak in suction line:
    - Test suction line for leaks and repair as necessary.

#### **F. SEAL LEAKAGE**

1. Seal leaks
  - Worn seal or rotating member – replace seal.
  - Improperly installed seal or rotating member – replace seal.
  - Broken parts – replace seal.
  - Shaft pitted under seal – replace shaft and seal.



**G. RECEIVER TANK OVERFLOWS**

1. Water level set too high, insufficient capacity for surge loads – reset level control lower to allow more reserve capacity.
2. Float leaking – repair or replace float.
3. Float mechanism sticking – repair or replace.

**VI. WARRANTY**

**PRECISION BOILERS  
LIMITED WARRANTY**

**PRECISION warrants all electrical components (except pilot lights and fuses), tank and mechanical controls, if found defective in workmanship or material while under normal use and service, within the first year of operation or until 18 months after shipment from PRECISION'S factory, whichever occurs first, after authorized return by purchaser to PRECISION (at purchaser's expense) and after examination discloses to PRECISION'S reasonable satisfaction to be defective. The repair or replacement of defective parts will be made by PRECISION without charge. PRECISION will not be held responsible for any field charges in connection with the removal or replacement of allegedly defective parts nor for incidental or consequential damages. This guarantee does not include damage resulting from unsuitable water.**