

# Sentinel® Boiler Feed Pumps

Form SCIOMA

## Installation, Operation and Maintenance Instructions



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# Introduction

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This form provides information necessary to install, operate and maintain Sentinel Boiler Feed Pumps. It flows from receiving to installation to maintenance. Our pumps have been tested and packaged for safe shipment. Sentinel Boiler Feed Pumps are complete assemblies which include motor driven centrifugal pumps, tanks and controls used for steam heating or processing by returning condensate in a system and making up for any water loss from that system. They are available in standard simplex and duplex configurations. The purpose of these instructions is not to provide a complete design procedure for a heating system but only to caution against some common misapplications. The instructions are general in nature and are for standard units.

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## Installation

- A. **Receiving Inspection** When the unit is delivered conduct a visual inspection of the unit and any accessories while the carrier is still present. If there are any signs of damage make a notation on delivery receipt or reject shipment. Shipping damages are the responsibility of the carrier and it is your responsibility to file a claim.
- B. **Unpacking** When unpacking be sure that all instructional tags remain attached and all temporary plugs are in their tapping and stay there until unit is installed on foundation and is ready for piping connections.
- C. **Placement** Place the pump on a solid concrete foundation extending 3 to 6 inches above floor and 3 foundation bolts may be used to secure pump to foundation. Shim pump to level before securing tightly to foundation.
- D. **Piping Connections** Units are provided with heavy steel threaded fittings on both the water inlet and outlet. All piping connections should be tight and properly supported by hangers and **not supported by pump connections**. See figures 1 and 2 for typical piping drawings.
  1. **Return Mains** Return mains should be sloped downward toward boiler feed pump tank. The return should have a gate valve and strainer. Lift connections should not be used on return mains unless the system has a condensate pump but only between the condensate pump and boiler feed pump.
  2. **Discharge Lines** The pipe size for the boiler feed pump discharge connection should be no smaller than the size of the pump fittings. If the discharge line from the boiler water feed pump is lengthy or above the boiler water line a second check valve should be installed at the boiler return header. Hartford connections must be used to prevent backflow in the return main or boiler feed pump.
  3. **Vent Connections** A vent should be installed that extends from the feed pump tank to a point near the ceiling but not less than twelve inches above boiler water line and it should terminate over a floor drain.
  4. **Water Tank Make-up** A water make-up line for the boiler pump tank should be connected from a city water line or other water source to the make-up solenoid valve. The line should have a gate and check valve installed as well.
- E. **Wiring** Check motor nameplate to verify motor voltage corresponds correctly with voltage of current supply. Connections should match the unit with a maximum variation of 10% of the nameplate. A fused disconnect switch must be installed to protect system against short circuiting and overload. Select proper wiring diagram from attached wiring drawing. All wiring should be done in compliance of local, state and federal electrical regulations. Check all wiring for damage and make sure all terminal connections are tight.

# Boiler Feed Pumps with Make-Up Water Valve

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The Sentinel Boiler Feed Pump is designed for installations where it is important to maintain the boiler water level within narrow parameters and to automatically supply make-up water from an outside source. Precision boiler water level control is done by governing the pump operation with a boiler water line controller installed at the boiler water line. When the boiler requires water the float operated switch in the controller starts the pump motor (s) through magnetic starters that can be supplied as an option adder. Water level is maintained in the pump receiver by an electric solenoid water make-up valve activated by a reverse acting float. The design of these style pump is similar to our standard condensate return units except that a water make-up circuit (solenoid valve and reverse acting float switch) is furnished in place of a float switch. An alternator is not furnished on a duplex unit.

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## Operation

The function of the Sentinel Boiler Feed Pump is to return condensate from the system to the boiler and to maintain the level of water in the boiler. The water level in the boiler is sensed by a float switch located in the piping of the boiler. When the level is insufficient the switch will close and activate the centrifugal pump (s) located on the boiler feed pump. The pump (s) will run until the proper boiler water level is reached. As the water level in the receiver tank for the feed pump falls, a float switch in the tank senses the changes and activates a solenoid valve which is connected to a city water supply or similar source to fill the tank to a predetermined level. Sentinel Boiler Feed Pumps may be equipped with an optional low water cut-off switch to prevent the centrifugal pumps from operating when there is an extreme loss of water from the boiler.

Note: For a basic Boiler Feed Pump a single unit is adequate for each boiler but if you have a single boiler requirement for 100% stand by the boiler feed unit will need a secondary boiler water level controller to the boiler and a duplex boiler feed pump must be used. If you need this unit to alternate the operation of the pumps an electrical alternator must be supplied in conjunction with the duplex control panel. A duplex boiler feed pump can be used to feed two boiler if properly sized similar to the basic requirement where a single boiler feed pump is adequate for one boiler (this will not supply 100% stand-by or any pump alteration).

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## Trial Operation

1. **Caution:** Do not operate centrifugal pump (s) without water. They are equipped with a mechanical shaft seal and dry operation may damage it.
2. Open the make-up water supply gate valve to unit.
3. Be sure that the pump switches are off, then place master switch in the ON position. This activates the solenoid valve and will permit water to flow into the tank. When water reaches the proper level the float switch will open and shut down the solenoid valve.
4. Open the gate valve in the discharge line to the boiler.
5. On three phase units throw each centrifugal pump switch on momentarily to check to see if impeller rotation is in the correct direction. If the direction of any pump is incorrect change connections of any two wires supplying power to that pump.
6. After the correct direction of the centrifugal pump (s) is verified and completed throw the its switch on. The centrifugal pump (s) will turn on and operate and then stop automatically when the water in the boiler reaches it predetermined level.

# Maintenance

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There is very little maintenance required for a Sentinel Boiler Feed Pump. The pump motors are closed coupled and have pre-lubricated bearing and there are no other moving parts except for float switches. Weekly or monthly required maintenance is almost nonexistent for and under normal operating conditions of these pumps.

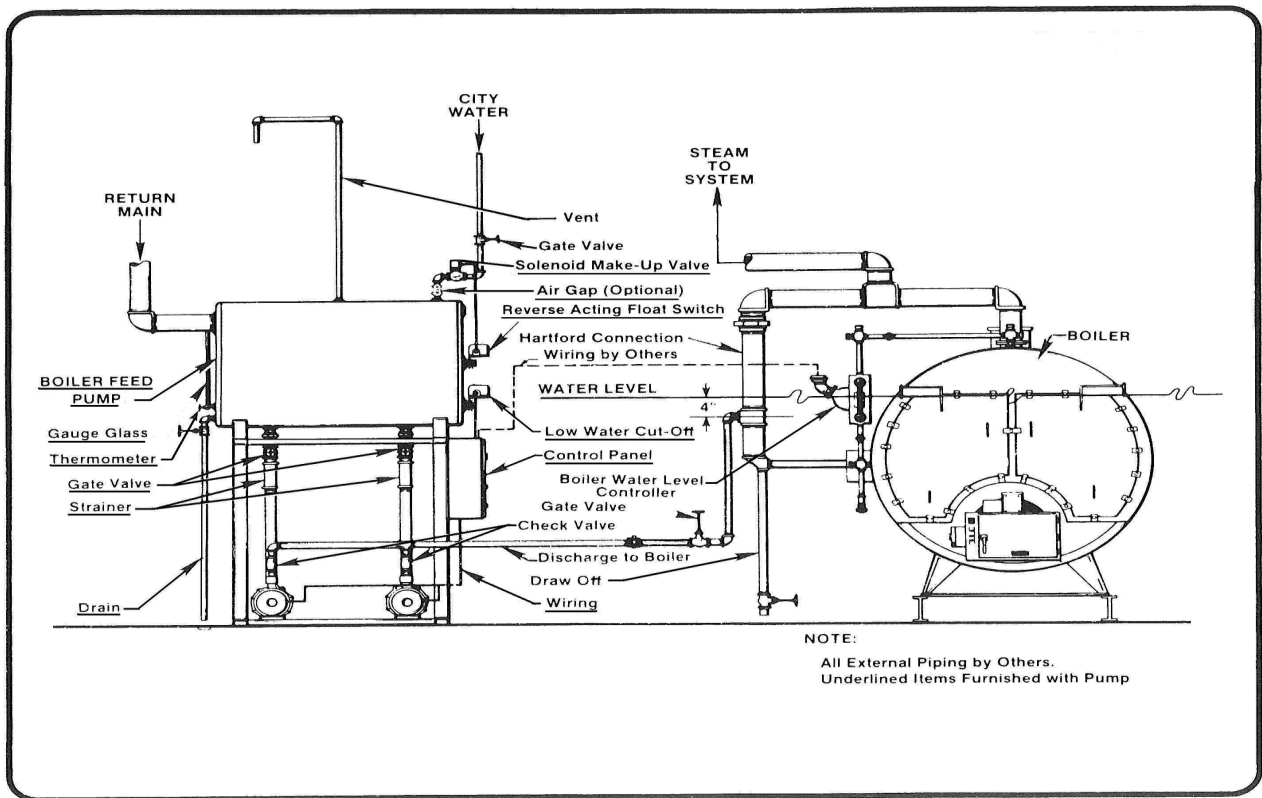
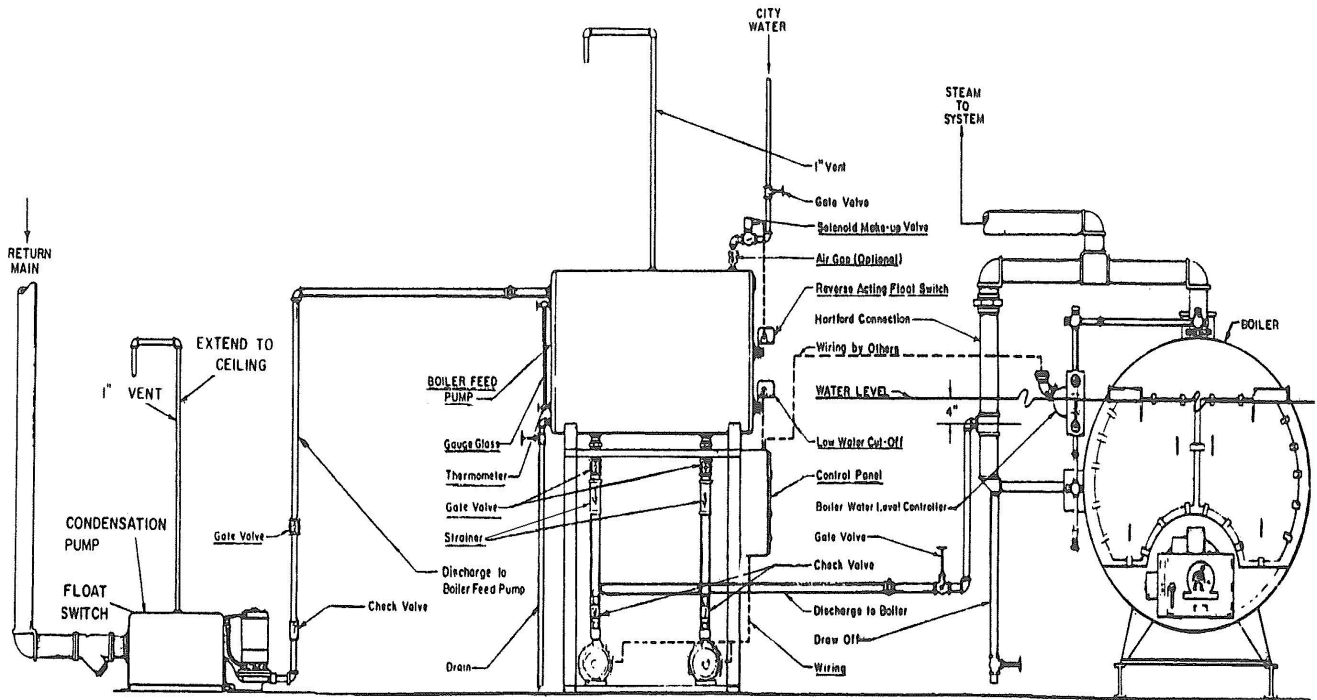
**Periodic Maintenance** Periodic maintenance should be performed annually at the least, depending on the source of water. During the annual maintenance all strainers in the system should be cleaned out and tanks flushed to prevent the accumulation of rust, minerals and other possible contaminants.

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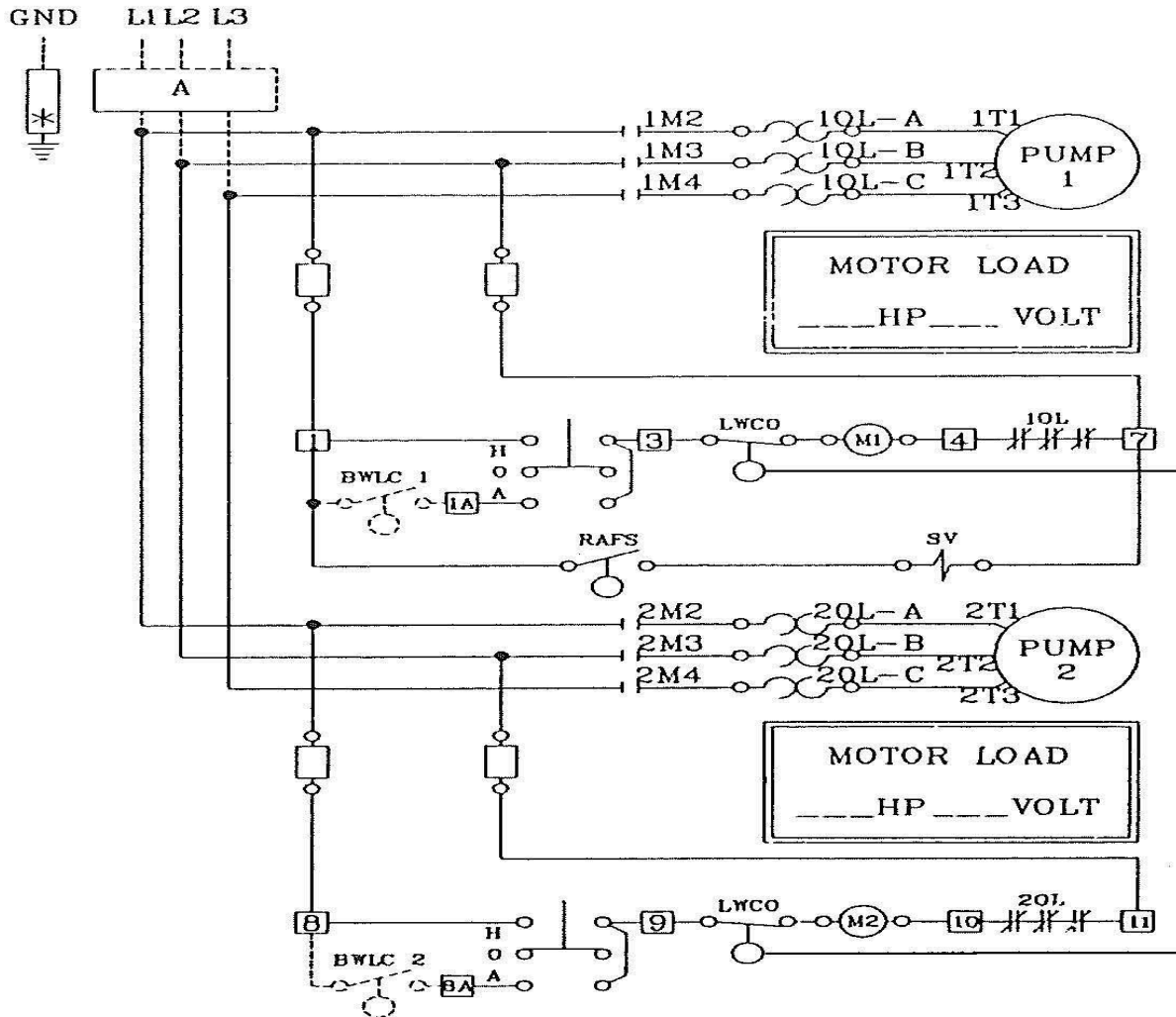
## Trouble Shooting

SYMPTON	POSSIBLE CAUSE	REMEDY
1. Pump (s) runs continuously	1a. Boiler water level controller	1a. Control float has lost buoyancy. Watch the water level in the boiler and if it continues to rise above the cut-off point replace the float.
2. Pump (s) runs continuously or too often and boiler level drops	2a. Leaks	2a. Check system for leaks.
	2b. Discharge check valve leaks	2b. Watch level in the boiler feed pump. If it fills too quickly pump discharge check valve is leaking and should be replaced.
3. Lack of capacity	3a. Centrifugal pump rotating in wrong direction	3a. Check rotation and if incorrect reverse any two wires.
	3b. Loose electrical connections	3b. Tighten all connections.
	3c. Pump impeller passageways clogged with foreign material	3c. Disassemble and clean out passageways.
4. Water level in the tank remains lower than fill valve shut-off point	4a. Make-up water valve faulty	4a. Replace valve.
	4b. Float switch faulty	4b. Replace float switch.
5. Water is continuously overflowing from the tank	5a. Make-up water valve faulty	5a. Replace valve.
	5b. Float switch faulty	5b. Replace float switch.

# Typical Connections



# Wiring Diagrams



DWG. SCALE: 1 = 1

## ELECTRICAL LEGEND

ALT-MECHANICAL ALTERNATOR  
 ALTA-SEPERATE ACUMULATOR ALT.  
 B1/B2-BOILER #1/BOILER #2 SWITCH  
 BWLC-BOILER WATER LEVEL CONTROLLER  
 DPC-DIFFERENTIAL PRESS CONTROLLER  
 FLT-FLOAT SWITCH  
 FS-FLOW SWITCH  
 FSA-SEP ACCUMULATOR FLOAT SWITCH  
 HOA-HAND-OFF-AUTO-SWITCH  
 HTLS-HIGH TEMP. LIMIT SWITCH

HWAS-HIGH WATER ALARM SWITCH  
 LWAS-LOW WATER ALARM SWITCH  
 LWCO-LOW WATER CUTOFF  
 OL-OVERLOADS  
 PS-PRESSURE SWITCH  
 RAFS-REVERSE ACTING FLOAT SWITCH  
 SV-SOLENOID VALVE  
 TDR-TIME DELAY RELAY  
 VS-VACUUM SWITCH

NOTES  
 1. DASHED ITEMS BY OTHERS  
 2. DOTTED ITEMS DENOTE MECH CONNECTIONS  
 3. IF CIRCUIT BREAKERS OR DISCONNECTS ARE NOT ORDERED THEY MUST BE SUPPLIED BY OTHERS  
 4. "\*" GROUNDING FOR MOTORS AND EXTERIOR MECHANICAL COMPONENTS  
 5. A DISCONNECT AND SINGLE PROTECTIVE DEVICE OR SINGLE SET OF FUSES IS TO BE PROVIDED BY THE INSTALLER AT POSITION "A"