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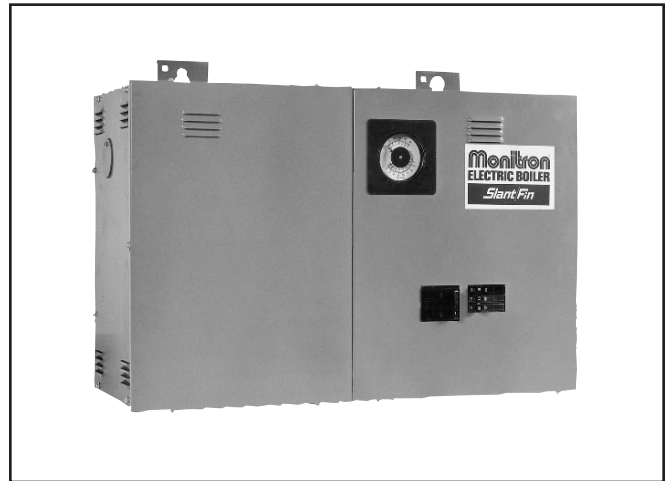
Monitron[™]

MODEL EH ELECTRIC BOILER

EH-08-135S through EH-40-135S 3 wire 120/208V, 120/240V single phase
EH-12-345S through EH-40-345S 4 wire 120/208V three phase WYE

OPERATION AND INSTALLATION INSTRUCTIONS

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IMPORTANT:

This manual must be left with owner and should be hung on or adjacent to the boiler for reference.



DESCRIPTION

The Monitron boiler is a low pressure hot water heating electric boiler. The heating elements are sheathed resistance type. The heat exchanger is cast-iron. The heat exchanger is constructed, inspected, and stamped in accordance with Section IV of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. In addition, the Monitron Boiler is equipped with a safety relief valve and an integral dual limit control, conforming to ASME requirements. The Monitron boiler is Underwriters' Laboratories, Inc. listed.

MOUNTING

The Monitron is intended for wall mounting, utilizing the wall brackets attached to the boiler (see Figure 1). Allow sufficient space for piping and service. The boiler may be installed in an enclosed space (see Figure 1). The boiler must be INSTALLED LEVEL.

PIPING

Air Separator and Expansion Tanks

The recommended piping arrangement is shown in Figures 2 through 4. Note that there is a built-in air eliminator in the heat exchanger (air vent, however, is by others). A 1/8" air vent may be used. Additional air vents should be installed at points just upstream from all drops in elevation of the piping system (high points).

Flow Switch

A FLOW SWITCH MUST BE INSTALLED. It is intended to prevent the burnout of heater elements should the circulator fail, or should air accumulate in the boiler due to faulty air elimination (see Table 3 for flow switch size required). FLOW SWITCH MUST BE INSTALLED IN HORIZONTAL POSITION.

Bypass

The bypass shown must be set so that a sufficient amount of water can circulate through the boiler when all zone valves are closed. See Figure 3.

Multi-zone Balancing

Raise all zone thermostat settings and verify that all zone valves are open (not bypassed). Close all electrical panels. Turn on 10 amp control circuit breaker ONLY. Pump should operate. Note the pressure reading on the pump discharge. Lower each zone thermostat setting to close corresponding zone valve. Adjust the corresponding balancing valve to maintain pump discharge pressure. The pump discharge pressure should remain the same when all zones are in bypass or when all zones are open or any combination of opened and closed. See Figure 4.

WIRING

To wire the electric boiler, perform the following procedures:

1. Wall Thermostat Flow Switch and Circulator

- All circuit breakers ahead of and at boiler must be OFF. Remove the Control Panel (left-hand front) Cover by removing 5 screws from top, bottom and side flanges.
- The right-hand compartment under the Control Panel Cover contains a terminal board marked, "TTF". Wire a 2-wire 24V heating thermostat or the auxiliary end switch terminals of zone valves (see Figure 5) to "TT" at this time. The "FF" terminals are for the flow switch. You may draw the wires between the flow switch and the compartment containing the "TTF" terminal board but the wires at the flow switch end may NOT be connected and the ends should be taped. The flow switch circuit is a low voltage circuit (see wiring diagram, Figure 5).
- Wire the circulator and connect wires and conduit through 1/2" K.O. provided on bottom left hand corner, to the terminal board marked, "Circulator". Wire zone valve transformer to terminals "A" and "B" of this terminal board (see Figure 6) if zone valves are used. Use 75°C. minimum wire, copper or aluminum.

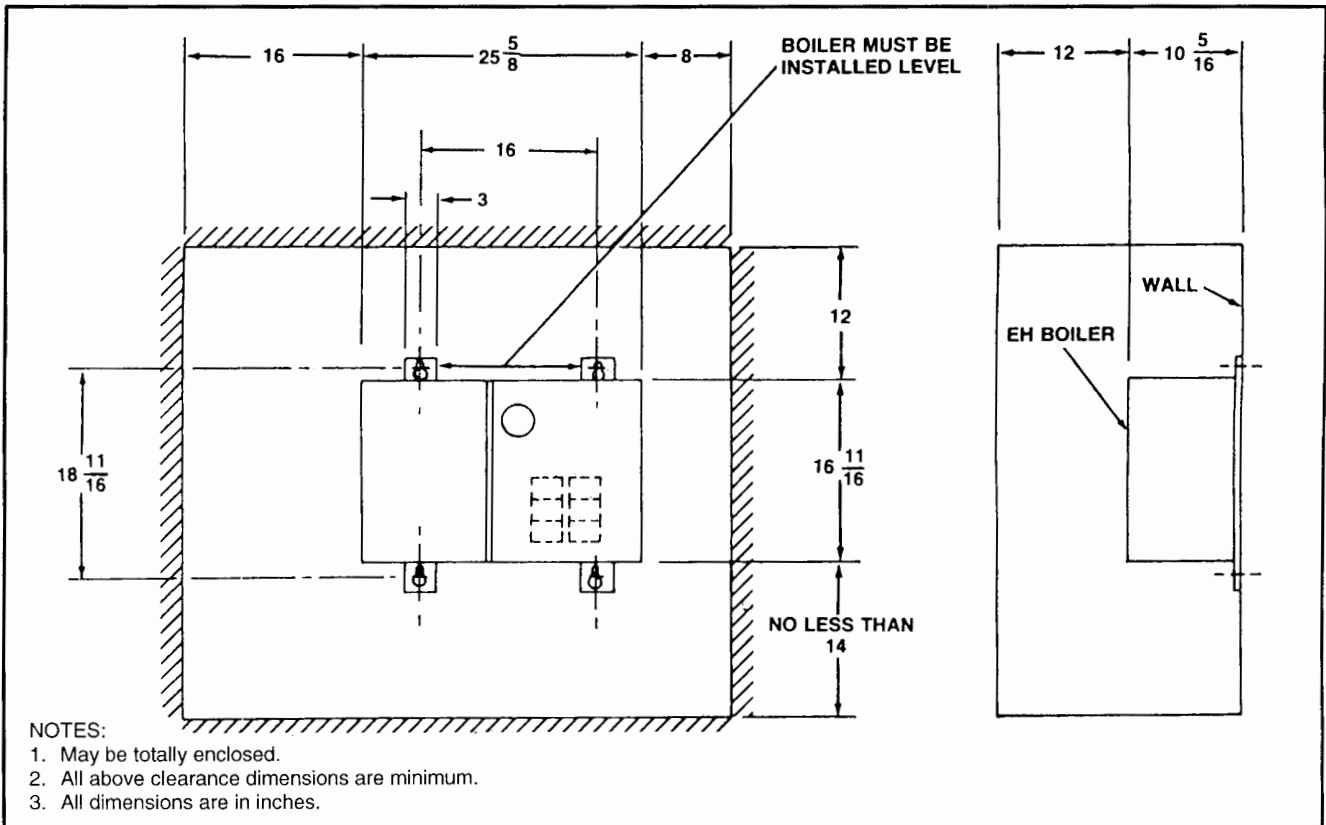


Figure 1. Boiler Mounting

2. Service Connections and Electrical Ratings

- A. All circuit breakers ahead of and at boiler must be OFF. Remove the Service Connection Panel (right hand front). Cover by removing 5 screws from the top, bottom and side flanges (see wiring diagram on back of the Service Connection Panel and Figure 5).
- B. Draw power feeder cable (75°C minimum) and conduit through service K.O. provided on side, top and bottom.
- C. Connect hot lines to main lugs on breaker base or to black and red or to black, red and blue leads provided in service

compartment. A ground lead should be drawn and wired to the ground lug in the service compartment. If rating plate indicates boiler is a single phase 3-wire or 3-phase 4-wire model, draw a neutral wire #12 AWG maximum, 75°C. minimum and connect to neutral lug or white wire lead provided in service compartment. See Tables 1 and 2 for lug sizes and current ratings.

Table 1. Lug Sizes

Model	Phase	Main * Lug Wire Size CU-AL†	Grounding Lug Wire Size		
			Small Holes CU-AL†	Large Holes CU AL†	
EH-40	1	2-250 MCM CU	DO NOT USE	6-2/0	
EH-28 thru 32	1	2-250 MCM	DO NOT USE	14-4	6-4
EH-8 thru 24	1	6-2/0	14-8	14-4	6-4
EH-8 thru 40	3	6-2/0	14-8	14-4	6-4

Neutral Lug Wire Size: For 3-wire single phase and 4-wire 3 phase models equipped with circuit breakers
 Small Holes: #14-12 Solid CU or AL † and #12 stranded CU or AL†
 Large Holes: #14-8 Solid CU, #10-4 Stranded CU and #6-4 AL †

The neutral tap is for the circulator and control transformer. The maximum wire size of the neutral should not exceed 12 AWG in that 2" conduit accommodate 2 incoming power feeders plus a neutral wire and a ground conductor for the large size models.

* For models with circuit breakers only.

† ALUMINUM conductors may be used, lug size, conduit size, ampacity and all applicable codes permitting. However, aluminum conductors may NOT be used for model EH-40 single phase.

Table 2. Current Ratings

SINGLE PHASE 3 WIRE 120/208V, 120/240V‡		THREE PHASE, 4 WIRE 120/208V-WYE CIRCUIT ONLY‡	
Basic Model No.	Heater Amperes* @240V	Basic Model No.	Heater Amperes† @208V
EH-8	33		
EH-10	42		
EH-12	50	EH-12	25
EH-16	67	EH-16	38†
EH-20	83	EH-20	48†
EH-24	100	EH-24	60†
EH-28	117	EH-28	60†
EH-32	133	EH-32	73†
EH-40	167	EH-40	95†

* For current values @ 208V, multiply current @ 240V by 0.867.

† Leg with the highest value of line current of an unbalanced 3-phase load.

‡ 125 VAC maximum rating of all hot conductors.

Table 3. Flow Switch Size Selection

Model No.	Flow Switch McDonnell & Miller No.	Pipe Size	Minimum Length of Flow Switch*
EH-40	FS8V	1-1/4"	8-1/2"
EH-8 thru EH-32	FS4-3T3-1	1"	6-1/2"

* Straight pipe upstream and downstream

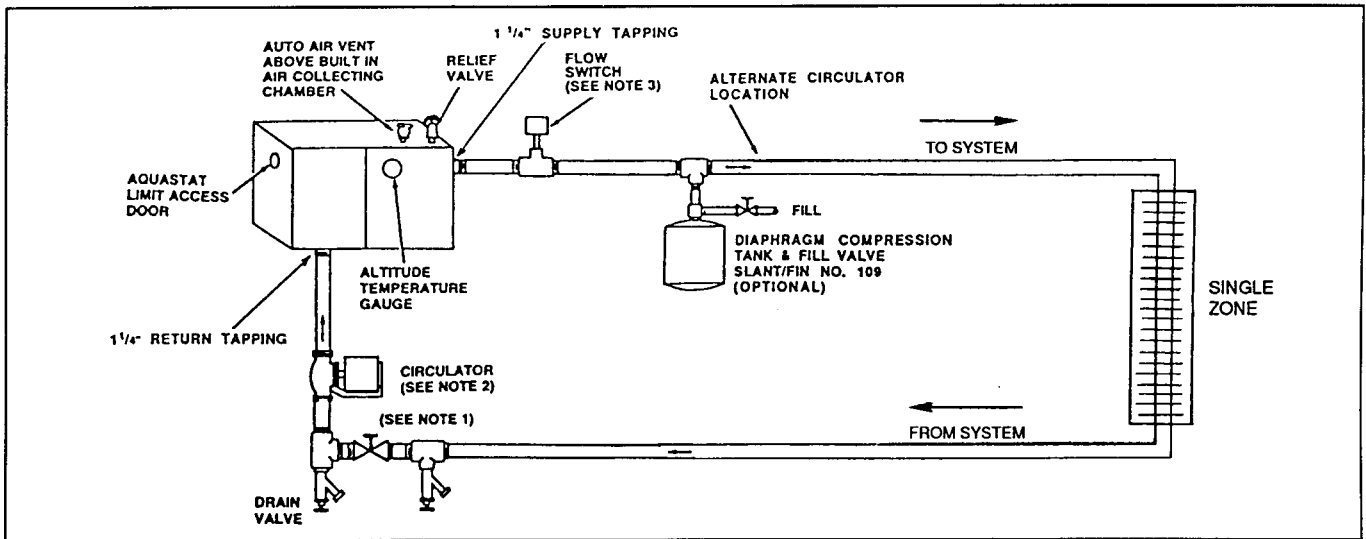


Figure 2. Typical Single Zone Piping

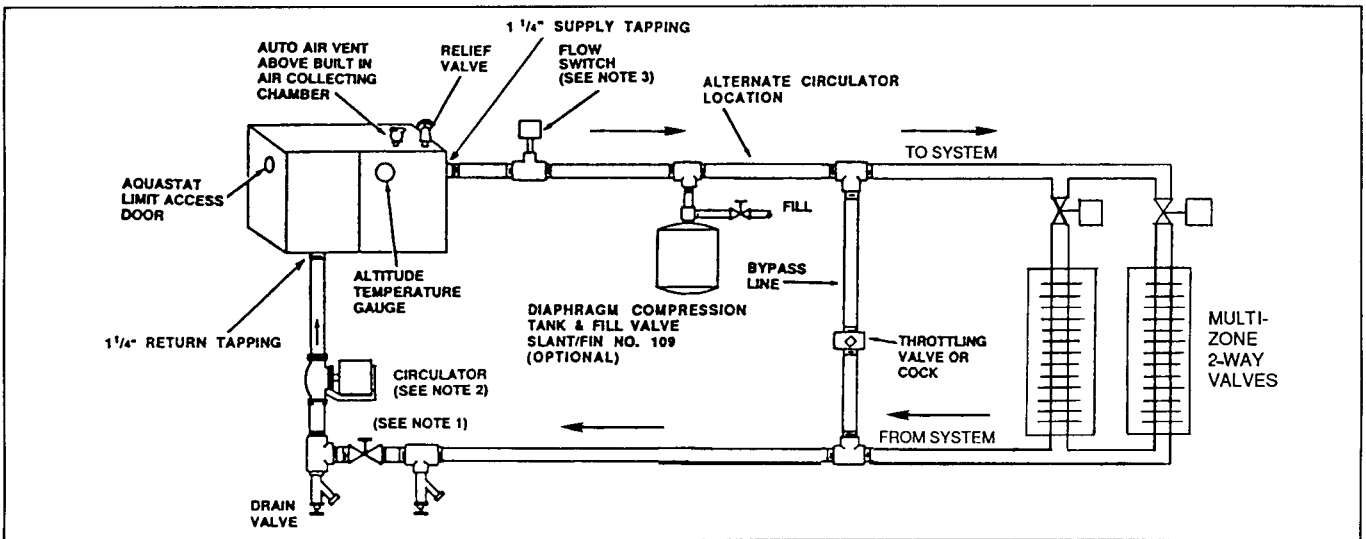


Figure 3. Typical Multi-Zone Using 2-Way Valves

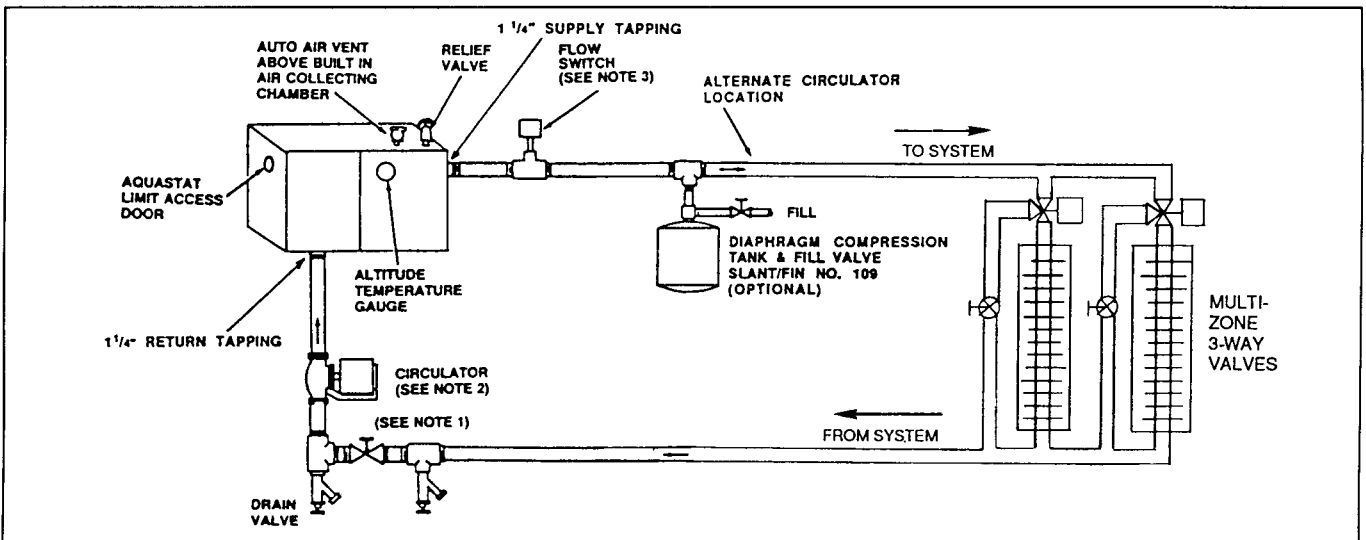


Figure 4. Typical Multi-Zone Using 3-Way Valves

NOTES:

1. Optional blocking gate valve and hose end valve used (with drain valve) for fast fill and purge of system.
IMPORTANT: Close bypass line valve (if used) during purging.
2. Circulator should not be installed at lowest point of piping.
3. There should be no elbows, tees, or change of pipe size for at least 5 diameters of pipe size (see Table 3) upstream and downstream of flow switch. Flow switch should always be mounted in the horizontal position. See Table 3.

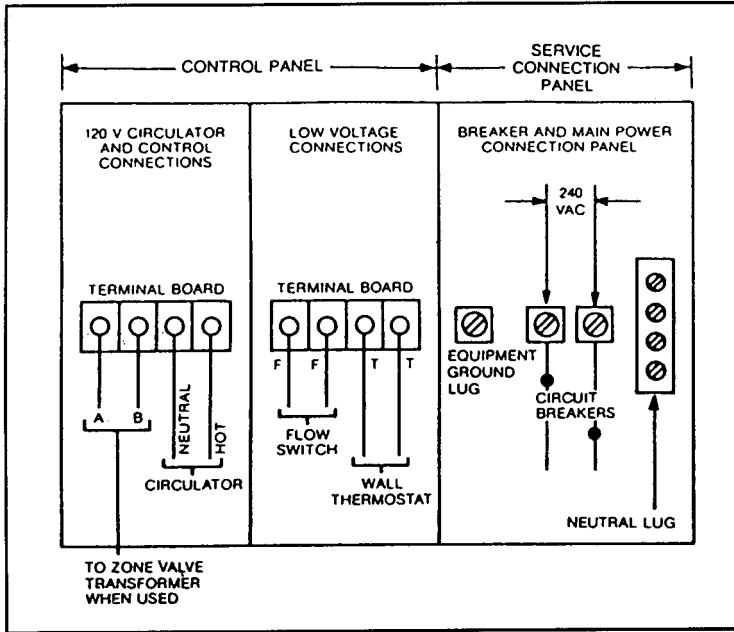


Figure 5. Electrical Connections

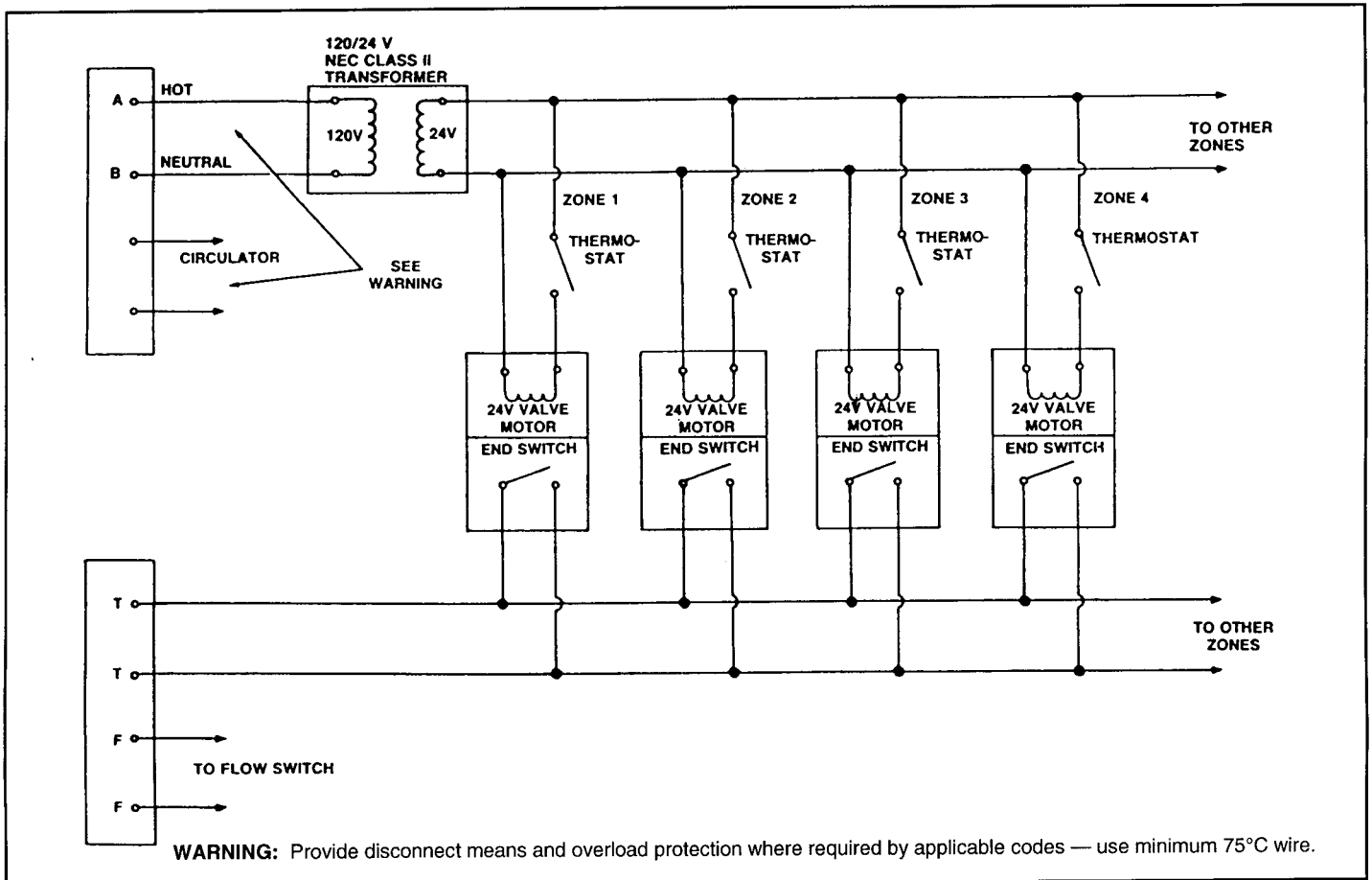


Figure 6. Typical Zone Valve Wiring

START-UP

NOTE: Make sure that all circuit breakers ahead of and at the boiler are OFF.

Fill System

See Figures 2 through 4 for suggested purge valve and blocking valve. If system is filled but not purged, radiators must be vented individually, to prevent air blocking of water flow. Fill approximately 12 psi (cold water), whether automatic or manual fill is used. DO NOT apply full line pressure to system; boiler and relief valve are rated at 30 or 50 psi (see rating plate). Suddenly applied main pressure can exceed 100 psi.

Air Elimination

Diaphragm tank and air vent valve are recommended, see Figures 2 through 4. Air remaining in system will vent from the automatic vent valve during system operation. Valve cap must be loose or removed to allow automatic venting. Open relief valve briefly after filling to pressure, to make sure boiler is free of air.

Bypass flow adjustment (Figure 3)

Close bypass valve. Turn down all zone thermostats. Inspect all zone valves to be sure all are closed. Put a jumper on TT terminals. Close ALL panels and turn on the 15 AMP control circuit breaker ONLY. Be certain that the flow switch wires are not connected to the flow switch terminals and the ends of the wires are taped. Connect the ohmmeter or other continuity tester across the common terminal and the terminal that is normally open during NO FLOW. Slowly open bypass valve until continuity tester lights or ohmmeter kicks to zero: flow switch now has closed contacts, indicating required minimum bypass flow rate when piping circuits are shut off. Bypass valves should be locked at this position. Shut OFF ALL circuit breakers ahead of and at boiler and open CONTROL PANEL (left hand FRONT) COVER. Remove jumper on TT terminals. Connect flow switch wire to flow switch terminals. Replace CONTROL PANEL COVER. Connect zone valve end switches (in parallel) to thermostat. See Figure 5 and wiring diagram on boiler.

Check for Proper Boiler and System Operation

To check for proper boiler and system operation, perform the following procedure:

1. Turn up all room thermostats.
2. On boiler models with a "Monitron" control system (model number on rating plate contains a "M"), there will be a delay of approximately 1 minute before the first indicator light on the control panel goes on and an additional 1 minute between each additional stage.
3. On boilers with a standard control system (model number on rating plate contains a "S"), there might be a delay of 5 minutes before all circuits are energized.
4. Current may be checked by a qualified electrician at the feeder panel and compared to the values shown in Table 2.
5. Water flow through the boiler should be sufficient to keep the flow switch closed. The limit thermostat should also remain closed. The LOW LIMIT of the dual limit aquastat is factory set at a normal temperature of 180°F or 82°C; it may be increased for the purpose of check-out if the load is very low. The aquastat is located on the left end of the boiler behind a round cover plate. Loosen screw and rotate cover to view aquastat.

OPERATION

(Models equipped with Sequential Control System)

These models contain a "S" in the model number which is located on the rating plate on the top surface of the boiler.

IMPORTANT:

DO NOT operate boiler until the following criteria have been met:

1. **Must be installed by qualified heating and electrical contractors in accordance with instructions in this manual.**
2. **Must be installed in compliance with local codes.**
3. **Must be inspected and approved by installing contractors and any local authority having jurisdiction, and be approved for operation by them.**

- Ask the installer to explain operation of the entire heating system.
- Turn on all circuit breakers for boiler and circulator.
- Adjust wall thermostat to required temperature. If room temperature is lower than the thermostat setting, the first heater stage will go on immediately and the balance of the heater stages will go on one at a time with a delay of between several seconds and 1-1/2 minutes between stages.
- In mild weather you may wish to reduce the total output of heat. You may do this by turning off one or more of the circuit breakers on the boiler.

IMPORTANT

You must turn on the circuit breaker marked "15" in order to operate the boiler control system. You then may turn on any one or more of the other circuit breakers (those marked 25, 30,35 or 50), depending on the amount of heat required.

PERIODIC INSPECTION

The hot water system, which includes the Monitron boiler, the radiators and water control devices, should remain filled with water at all times. DO NOT drain except to make repairs or to prevent freeze-up during extended cold weather shutdown.

The pressure/temperature gauge on the Monitron should be checked frequently: at the highest operating temperature, pressure should be the same throughout the heating season. If pressure (at a constant temperature) consistently rises or falls over a period of time, a fill valve leak, a system leak or compression tank malfunction is indicated. Leaks anywhere in the system must be repaired without delay. Regular addition of fresh water to replenish leaks adds oxygen and lime. Oxygen corrosion will cause further leaks and parts failure, lime buildup on heating elements will cause element failure due to overheating. If any leaks are found, or if pressure changes, call for service immediately.

IMPORTANT

Under no circumstances should any electrical wiring or internal controls be touched, except by an authorized electrician (wiring and controls) or heating system service expert (system service, repair, shutdown). Any mechanical adjustments to the heating equipment and system must be made by a qualified heating serviceperson.



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