

Slant/Fin[®]

Monitron[™] S2

MODEL EH ELECTRIC BOILER

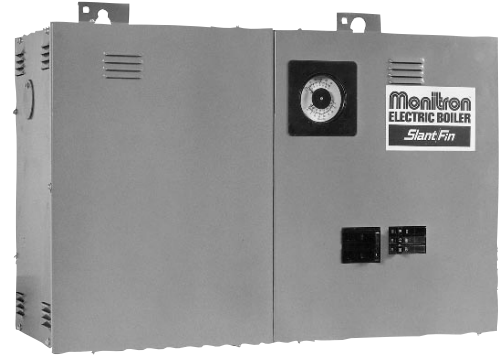
EH-08-135-S2 through EH-40-135-S2, single phase, 3 wire, 120/208V, 120/240V
EH-12-345-S2 through EH-40-345-S2, three phase, WYE, 4 wire, 120/208V

For three phase, 120/240V consult factory



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.

Wiring diagram located on inside front panel.

Heating Contractor

Address

Phone Number

Boiler Model Number

Boiler Serial Number

Installation Date

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, operating control and two high limit controls.

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 3 through 5. Note that there is a built-in air eliminator in the heat exchanger (air vent, however, is by others). The air vent tapping is 13mm (1/2"). A bushing (by others) to suit the size of the air vent thread is required. Additional air vents should be installed at points just upstream from all drops in elevation of the piping system (high points).

Relief Valve Discharge Piping

Use same size or larger piping than valve outlet. Must terminate 152mm (6") minimum from floor with a plain (no threads) end. Place a bucket under pressure relief valve discharge. Make sure discharge is always visible. DO NOT hard-pipe to drain piping.

Flow Switch

THE INSTALLATION OF A FLOW SWITCH IS STRONGLY RECOMMENDED. 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. IF A FLOW SWITCH IS NOT USED JUMPER THE "FF" TERMINALS (JUMPER NOT SUPPLIED.)

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 4.) A bypass is mandatory on a constant circulation system using zone valves if a wild loop is not part of the system. The bypass line will prevent circulator damage caused by a circulator running up on head.

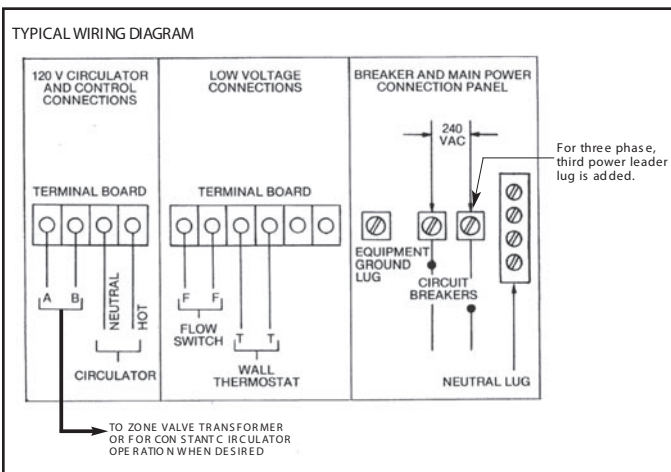


Figure 2. Typical Wiring Diagram for Models equipped with Circuit Breakers.

Multi-zone Balancing

Raise all zone thermostat settings and verify that all zone valves are open (bypass valve should be closed). Close all electrical panels. Turn on 15 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 & 5.)

WIRING

To wire the electric boiler, perform the following procedures:

1. Wall Thermostat Flow Switch and Circulator

All circuit breakers ahead of boiler must be OFF. Remove the Control Panel (left-hand front cover) by removing 5 screws from top, bottom and side flanges. The centre compartment contains a 24V control terminal board marked, "FF/TT" (see figure 2) Wire a 24V, two-wire heating thermostat or the auxiliary end switch terminals from zone valves (see Figure 7) to "TT". The "FF" terminals are for a flow switch. Do not connect the wires to the flow switch "FF" terminals until the by-pass flow adjustments are completed. Refer to "Bypass Flow Adjustment" (page 7) for wiring and adjustment procedures. The flow switch wires should be taped at the boiler until they are to be connected to "FF".

The left compartment contains a 120V terminal board marked "A-B/Circulator". Wire the circulator and connect wires and conduit through the 13 mm (1/2") knockout (provided on the bottom left hand corner of the cabinet) to the terminal board "Circulator" terminals. These terminals supply 120 volts to the circulator only when there is a call for heat.

Wire an external zone valve transformer to the "A-B" terminals if zone valves are used. These terminals provide a constant 120 volts and can alternately be used to power the circulator if constant circulation is desirable. Use 90°C minimum wire, copper or aluminum.

2. Service Connections and Electrical Ratings

- A. All circuit breakers ahead of 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 2).
- B. Draw power feeder cable (75°C minimum) and conduit through service K.O. provided on side, top or bottom.
- C. Connect hot lines to main lugs on breaker base 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 provided in service compartment. See Tables 1 and 2 for lug sizes and current ratings.

Table 1. Lug Sizes

Model	Phase	Distribution Block Wire Size CU-AL†	Grounding Lug Wire Size CU	Neutral Lug Wire Size CU
EH-24 thru EH-40S2	1	1-250 CU 2/0-250 AL	6-2/0	6-2/0
EH-8 thru 20S2	1	6-2/0 CU-AL	6-2/0	6-2/0
EH-12 thru 40S2	3	6-2/0 CU-AL	6-2/0	6-2/0

The maximum wire size of the neutral should not exceed 12 AWG in order for 51 mm (2") conduit to accommodate incoming power feeder, plus the neutral wire and a ground conductor for the larger 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 models over 32 Kw.

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 Ampres* @240V	FLA @240V	Basic Model No.	Heater Ampres* @208V	FLA @208V
EH-8	33	45			
EH-9	38	49			
EH-10	42	54			
EH-12	50	62	EH-12	29†	41†
EH-15	63	74	EH-15	36†	48†
EH-16	67	79	EH-16	43†	55†
EH-18	75	87	EH-18	51†	63†
EH-20	83	95	EH-20	54†	66†
EH-24	100	112	EH-24	69†	69†
EH-25	104	116	EH-25	72†	72†
EH-28	117	129	EH-28	69†	81†
EH-30	125	137	EH-30	72†	84†
EH-32	133	145	EH-32	83†	83†
EH-35	146	158	EH-35	90†	90†
EH-38	158	170	–	–	–
EH-40	167	179	EH-40	108†	108†

* 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 Straight Pipe*	
		mm	inch	mm	inch
EH-40	FS8V	32	1-1/4	216	8-1/2
EH-8 thru EH-35	FS4-3T3-1	25	1	165	6-1/2

* Both upstream and downstream of flow switch.

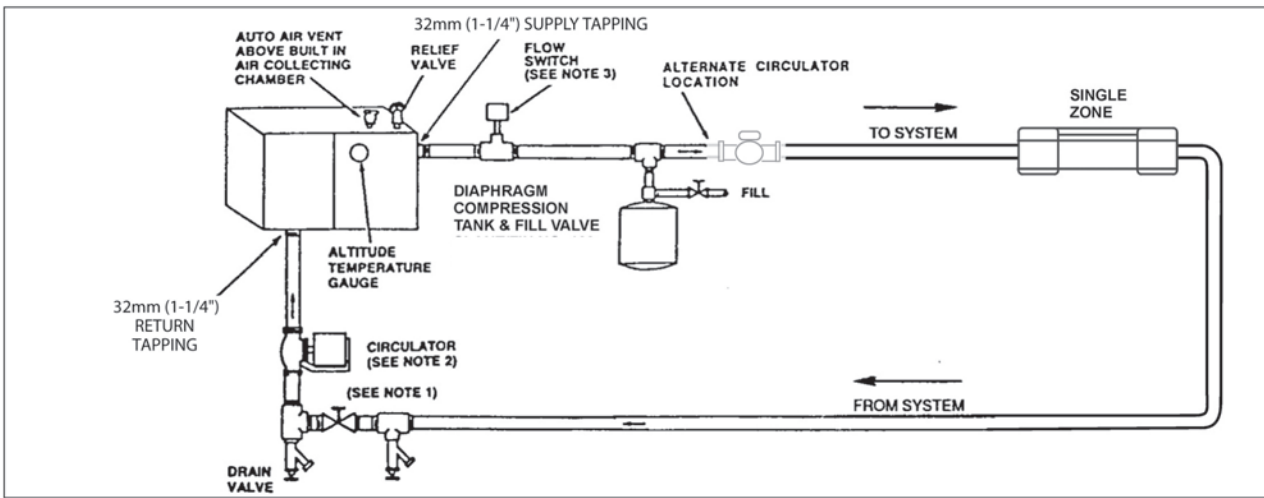


Figure 3. Typical Single Zone Piping

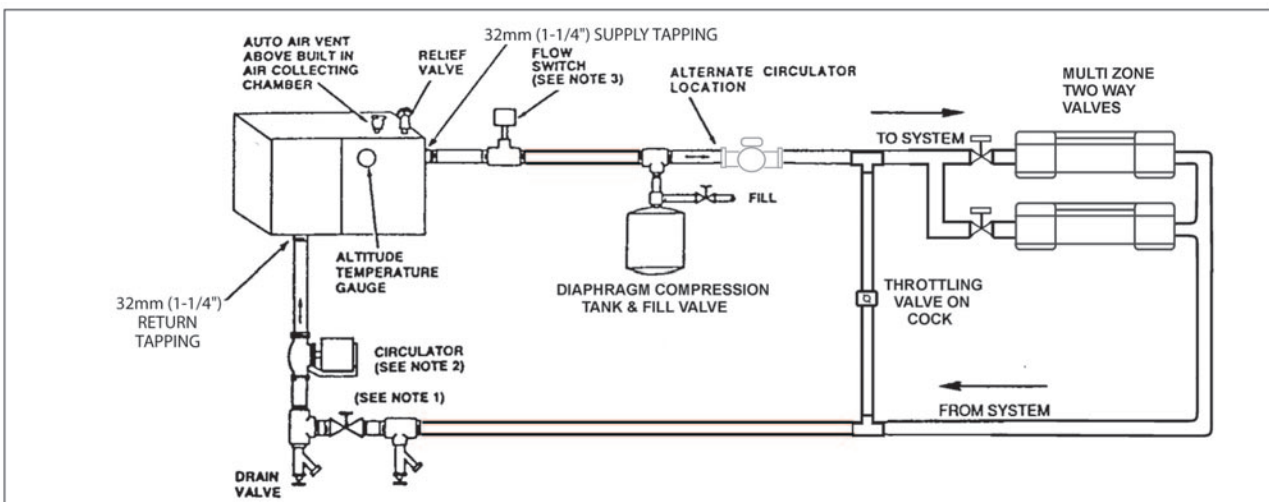


Figure 4. Typical Multi-Zone using 2-Way Valves

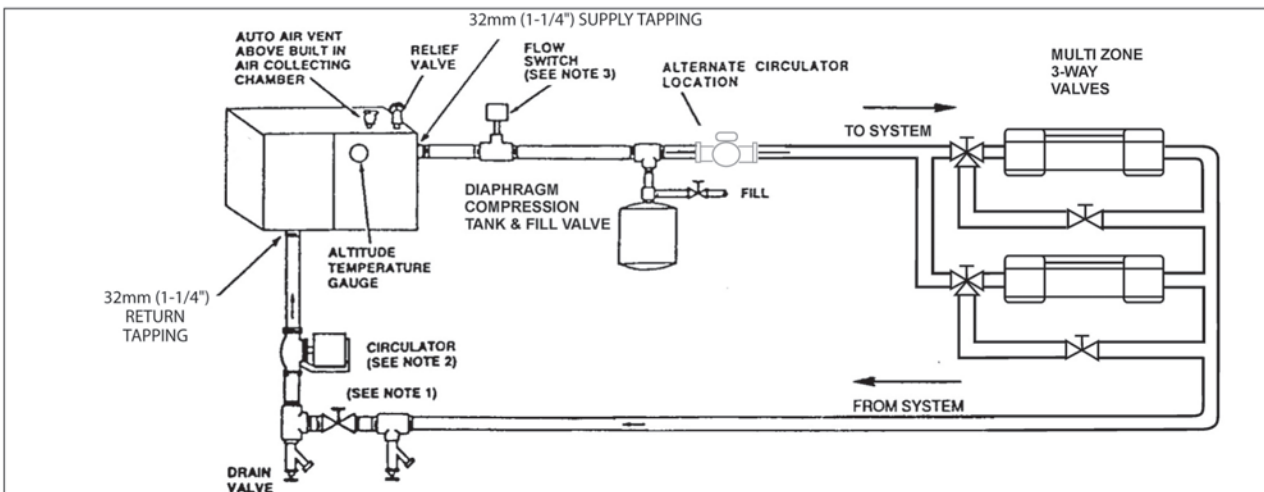


Figure 5. Typical Multi-Zone Using 3-Way Valves

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.

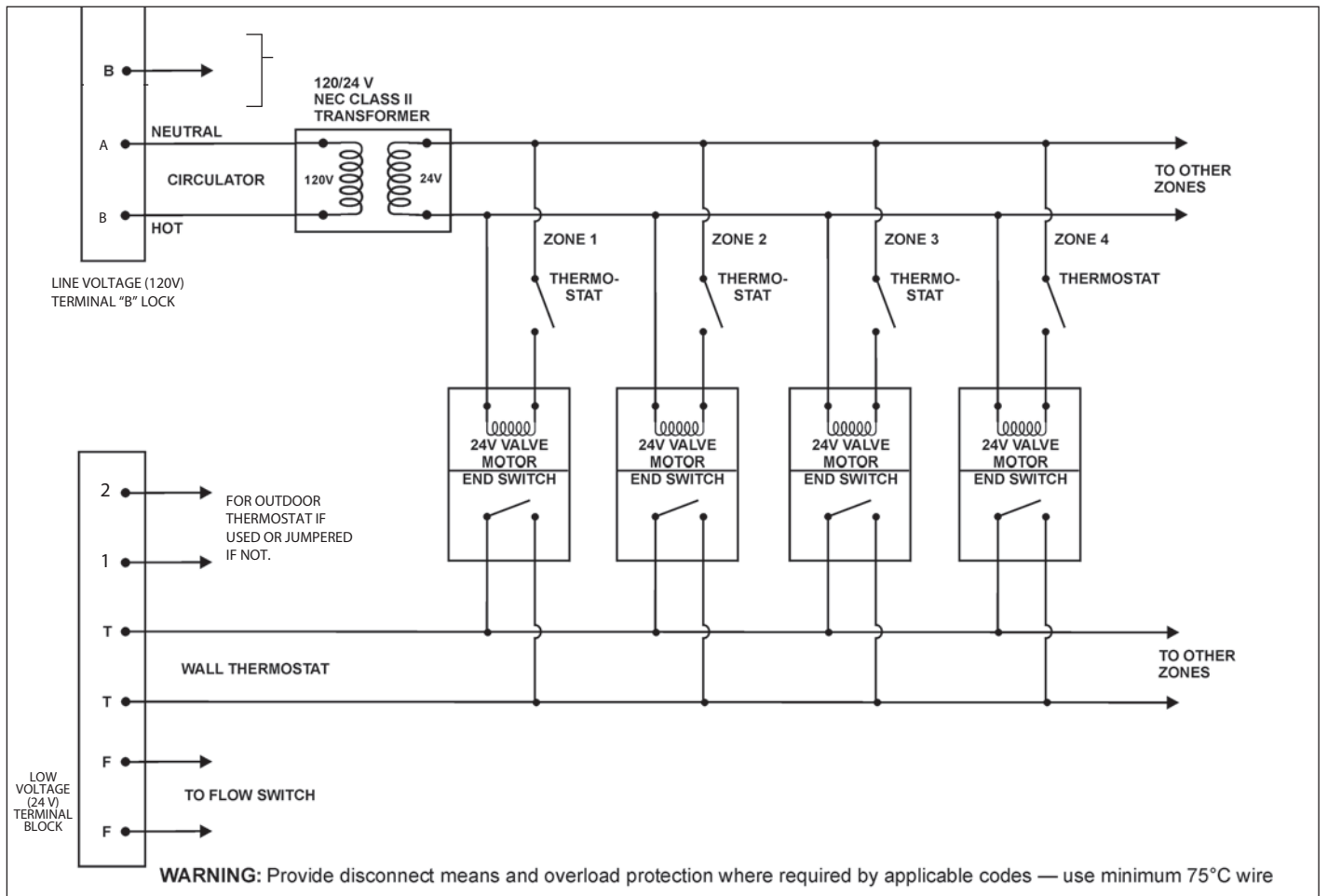


Figure 6. Typical Zoning Valve Wiring

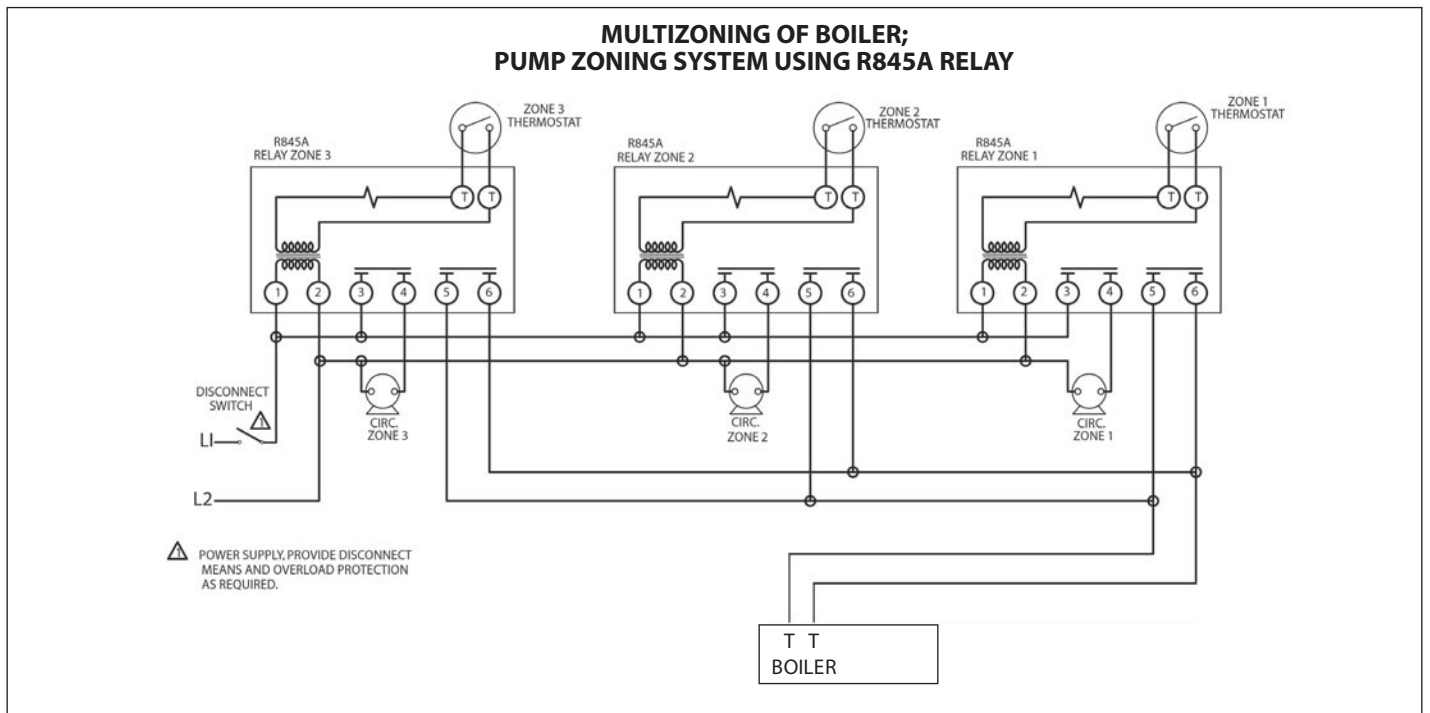


Figure 7. Multi-Zoning of boiler; pump zoning system using R845A relay.

START-UP

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

Fill System

See Figures 3 through 5 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 83 kPa (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 207 or 345 kPa (30 or 50 psi) (see rating plate). Suddenly applied main pressure can exceed 690 kPa (100 psi).

WATER CONTENT OF BOILER

All models EH-8 through EH-40 14.2 litres (3.75 U.S. Gallons)

Air Elimination

Diaphragm tank and air vent valve are recommended, see Figures 3 through 5. 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 4)

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 valve 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 zone valve end switches (in parallel) to thermostat "TT" terminals. See figure 7 and wiring diagram on boiler. Connect flow switch wire to flow switch common and N.O. terminals and to the "FF" terminals in the boiler. Replace CONTROL PANEL COVER.

Check for Proper Boiler and System Operation

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

1. Open boiler water supply valve. Boiler will not operate properly for approximately 15 minutes, until all air is purged from water lines.
2. Turn up all room thermostats.
3. Turn "ON" Control (15 Amp, 120 Volt) single circuit breaker only. Make sure that all Double (208/240 Volt) circuit breakers are "OFF".
4. Water flow through the boiler should be sufficient to keep the flow switch closed. The two limit switches should be closed.
5. There will be a delay of up to 5 minutes before all circuits are energized.
6. Check aquastat settings against aquastat control manual. The aquastat is located under the left front control panel. **CAUTION:** The aquastat control has line voltage in it. Care should be taken to avoid touching any "LIVE" electricity carrying components.
7. Turn "OFF" Control (15 Amp, 120 Volt) single circuit breaker.
8. Replace all Control Panel Covers.
9. Turn "ON" all Double (208/240 Volt) circuit breakers.
10. Turn "ON" Control (15 Amp, 120 Volt) single circuit breaker.
11. The current may be checked by a qualified electrician at the feeder panel and compared to the values shown in Table 2.

OPERATION

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. Do not turn off the 15 AMP control circuit breaker.

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.

Appendix A

Thermostat Heat Anticipator Settings

Fixed anticipator thermostats are not adjustable. Adjustable anticipator thermostats, depending on thermostat model, may be adjustable from a .18 to a .9 setting by moving a pointer on the anticipator.

The higher the anticipator setting (towards .9) the longer it will take for the thermostat to respond to a change in room temperature. Too high a setting and the boiler will be slow to respond to a temperature change in the room. This can cause the room temperature to drop to an uncomfortable level before the boiler starts. This may generate homeowner complaints.

The lower the anticipator setting (toward .18) the faster the thermostat will respond to a change in room temperature. Too low a setting and the boiler will short cycle. Boiler short cycling will cause unnecessary wear on the equipment and in the case of oil boilers it can lead to poor combustion and more frequent cleaning of the combustion area.

It is important to understand what the thermostat is controlling and then determine the amp rating of that relay, gas valve, zone valve or control. This information is usually stamped somewhere on the component. A properly set anticipator will allow the system to operate at its maximum effectiveness.

Appendix B

Accumulation of foreign deposits in heat exchanger

Recent investigations of boilers which were installed in hard water areas, revealed that mineral deposits had accumulated in the heat exchanger. In addition, sludge, scale and other solid contaminants were present in boilers installed in older systems or where the water was supplied from a well. This accumulation creates an insulating layer that drastically may affect boiler efficiency.

THE TERMS OF THE BOILER WARRANTY WILL NOT APPLY TO FAILURES ENCOUNTERED UNDER THESE CIRCUMSTANCES.

RECOMMENDATIONS:

On all installations in hard water areas:

1. The system should be thoroughly inspected for leaks which must be repaired however minor they may be.
2. The initial water charge of the system must be treated to reduce its hardness to an acceptable level.

In addition to the aforementioned, older systems and those supplied from wells may require that a filter or strainer be incorporated in the circuit at some point on the return line closest to the boiler. Suitable water treatment filters are commercially available for this purpose.

WE STRONGLY RECOMMEND THAT YOU CONVEY THIS VITAL INFORMATION TO ALL PARTIES CONCERNED.

Water Treatment

A good water treatment program will not only extend the useful life of this boiler but it will also save much of the time and expense of repairs made necessary by preventable occurrences. A reputable water treatment company should be consulted to evaluate and determine the best overall treatment program for your boiler equipment.

Appendix C

Replacement of Electric Heaters and gaskets

When replacing heating elements replace the gasket at the same time. It is not recommended to re-use an old gasket as it may have become damaged or brittle. To prevent binding and leaks when installing a new gasket wet the gasket with water or coat it with talcum powder to allow it to move into position properly without binding.

Appendix D

Use of Non-oxygen Diffusion Barrier Underfloor Tubing

The boiler warranty does not cover leaks resulting from corrosion caused by the use of underfloor plastic tubing without an oxygen diffusion barrier. Systems must have the non-oxygen diffusion barrier tubing separated from the boiler with a heat exchanger. Slant/Fin recommends the use of underfloor plastic tubing with an oxygen diffusion barrier. Other systems components may also require protection from oxygen permeation.



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