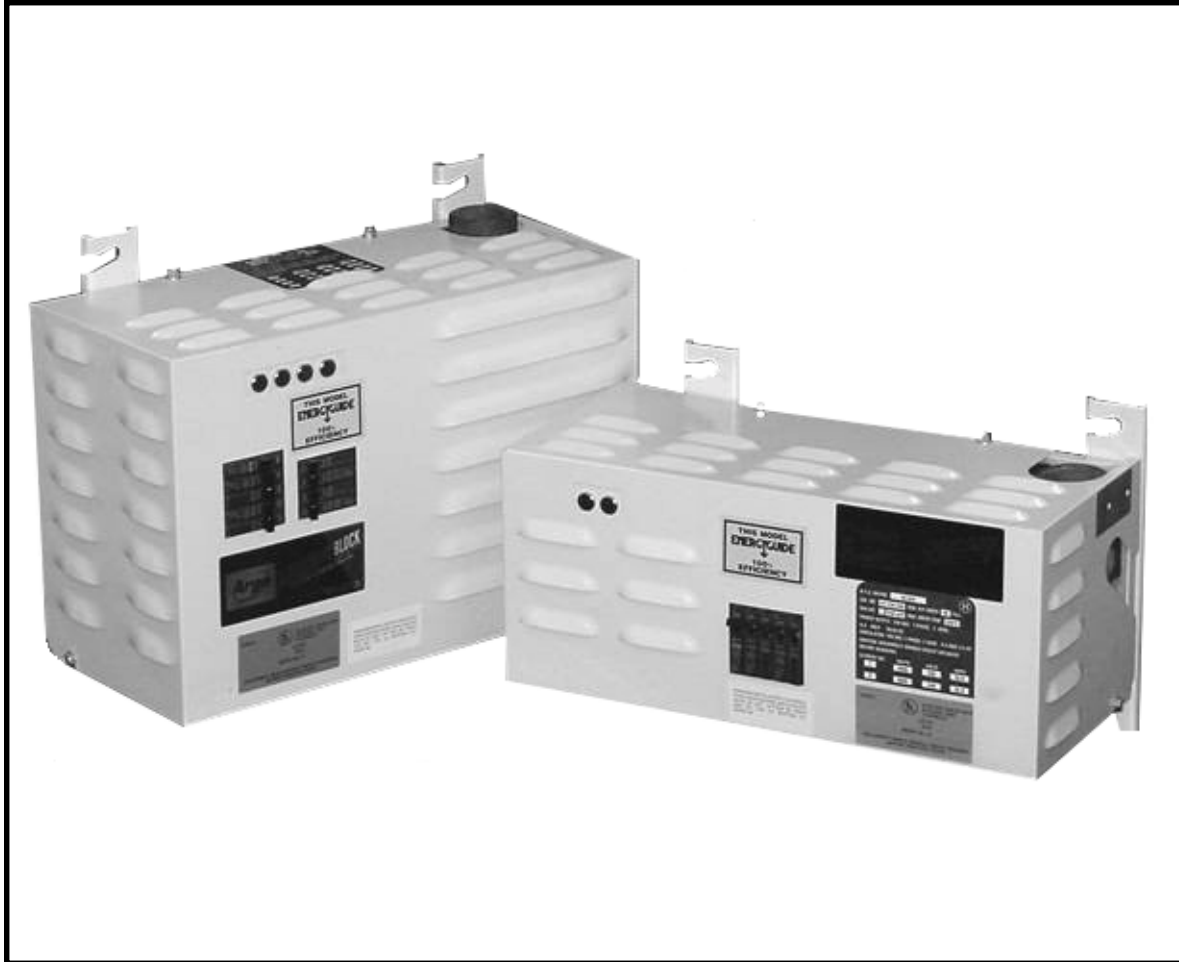


AI-B

ELECTRIC BOILERS
FOR FORCED HOT WATER



Argo
TECHNOLOGY, INC.

ARGO TECHNOLOGY, Inc. Berlin, CT 06037

INSTALLATION MANUAL AND OPERATING INSTRUCTIONS

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KEEP THIS MANUAL NEAR BOILER
RETAIN FOR FUTURE REFERENCE

ELECTRIC HYDRONIC BLOCK
ELECTRIC HOT WATER BOILER

INSTALLATION MANUAL AND
OPERATING INSTRUCTIONS

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INTRODUCTION

This manual is intended to familiarize the installer and user of the Electric Hydronic Block with its installation, operation and maintenance so as to assure its normal trouble free operation.

ARGO electric boilers are designed and manufactured with quality components for maximum life and durability and require minimum service. To insure a satisfactory installation it is imperative that the instructions be followed carefully before operating the heating system. Failure to do so may result in breach of warranty.

PRODUCT DESCRIPTION

The Electric Hydronic Block is a heating device that converts electrical energy to heat energy through the medium of water. The simplified theory of this conversion is as follows:

Electrical energy times a conversion factor equals heat energy

or

Kilo watts of electricity used per hour x 3412

= British Thermal Units(BTU'S) available per hour for heating

This information is the basis used to establish Electric Hydronic Block ratings, See Table 1, (A) (B). Since the conversion process requires no combustion, the boiler operates with the highest possible efficiency.

The Electric Hydronic Block is constructed with a cast iron boiler that conforms to the American Society of Mechanical Engineers Boiler & Pressure Vessel Code. The interior design allows just enough water to be present for proper heating element operation - no excess water is stored which would cause undesirable thermal losses and longer recovery times.

The control system is assembled in a modular package thus keeping the overall size and weight of the Electric Hydronic Block to a minimum. The construction of the entire Electric Hydronic Block conforms to CANADIAN STANDARDS ASSOCIATION for Safety for Electric Boilers.

The following important product information is located on the cabinet cover.

1. Model number
2. Manufacturers serial number
3. BTU Rating
4. Heating element ratings
5. Water pressure & temperature limits
6. C.S.A. listing
7. A.S.M.E. stamp
8. Total Amps

Safety Symbols

The following defined symbols are used throughout this manual to notify the reader of potential hazards of varying risk levels.

DANGER

DANGER - Indicates an imminently hazardous situation which, if not avoided, **WILL** result in death or serious injury.

WARNING

WARNING - Indicates a potentially hazardous situation which, if not avoided, **COULD** result in death or serious injury.

CAUTION

CAUTION - Indicates a potentially hazardous situation which, if not avoided, **MAY** result in minor or moderate injury. It may also be used to alert against unsafe practices.

IMPORTANT!

READ ALL INSTRUCTIONS BEFORE INSTALLING.

WARNING

1. **Boiler sizing is crucial. The maximum hourly heat loss for each heated space should be calculated in accordance with the procedures describes in The Hydronics Institute(I=B=R) manual H-22 (Heat Loss Calculation Guide), or by any other method, which is suitable for local conditions, provided the results are in substantial agreement. Select the appropriate boiler based on accurate heat loss calculation. Do not oversize the boiler, as sizing is critical for in-floor radiant heat applications.**
2. Keep boiler area clear and free from combustible materials, gasoline and other flammable vapors and liquids.
3. **DO NOT obstruct air openings to the boiler room.**
4. Modification, substitution or elimination of factory equipped, supplied or specified components may result in property damage, personal injury or the loss of life.
5. **To the owner:** Installation and service of this boiler must be performed by a qualified installer.
6. **To the installer:** Leave all instructions with the boiler for future reference.
7. When this product is installed in the Commonwealth of Massachusetts the installation must be performed by a Licensed Plumber or Licensed Gas Fitter.

WARNING:

ALL INSTALLATIONS OF BOILERS SHOULD BE DONE ONLY BY A QUALIFIED EXPERT AND IN ACCORDANCE WITH THE APPROPRIATE ARGO MANUAL. INSTALLING A BOILER OR ANY OTHER ELECTRIC APPLIANCE WITH IMPROPER METHODS OR MATERIALS MAY RESULT IN SERIOUS INJURY OR DEATH DUE TO FIRE

INSTALLATION PROCEDURE



WARNING:

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage.

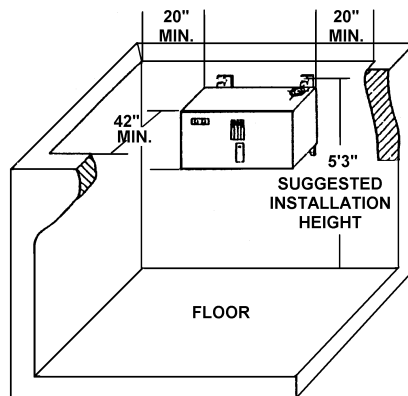
1. The installation must conform to the requirements of the authority having jurisdiction or, in absence of such requirements, to the latest revision of the Canadian Electrical Code, CSA C22.1 Part 1, and/or any local regulations in Canada, or the National Electrical Code, ANSI/NFPA to (Latest Edition) and/or any local regulations and codes in the U.S.A. Reference should also be made to local Electric utility regulations and other codes in effect in the area in which the installation is to be made.
2. Where required by the authority having jurisdiction, the installation must conform to American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME No. CSD-1.
3. Electric Hydronic Block units are provided with mounting brackets for easy wall mounting. The unit may be mounted directly on the wall by the use of lag screws or anchor bolts through holes provided, or on a 3/4" plywood panel. On uneven walls, it is suggested that a mounting surface be provided such as two 2 x 4's .
4. Any surface of the Electric Hydronic Block EXCEPT THE BACK shall be mounted no closer than 20 inches to the wall surface on the left and 20 inches minimum to wall surface on the right or more, depending on plumbing Allow sufficient room from the front of the unit to a door or wall to remove cover - at least 42 inches minimum. Install unit with a minimum clearance from top of unit to ceiling of 16". If minimum requirements of space are used, it is suggested that the enclosure be exposed to some means of ventilation. The electric Hydronic Block unit must be mounted level, using the top of the back plate as a leveling point.
5. When installed in utility room, the door should be wide enough to allow the largest boiler part to enter, or to permit replacement of another appliance such as a water heater.

Minimum clearances to combustible constructions are:

| | |
|------------------|--------|
| TOP | 16 IN. |
| FRONT | 42 IN. |
| LEFT SIDE | 20 IN. |
| RIGHT SIDE | 20 IN. |

NOTE: GREATER CLEARANCES FOR ACCESS SHOULD SUPERSEDE FIREROTECTION CLEARANCE.

BOILER LOCATION AND CLEARANCE DIMENSIONS



DESIGN OF WATER CIRCULATING SYSTEM

System should be designed as primary/secondary and to operate with a maximum output temperature of 180° F or lower and a temperature rise across the unit of 20° F or lower. Refer to tables below and Figures 2 & 3.

| B Series - 2 Element Boiler | |
|-----------------------------|-------------------------|
| KW Capacity | Minimum Flow Rate (GPM) |
| 12 | 4.1 |
| 10 | 3.4 |
| 8 | 2.7 |
| 6 | 2.0 |

| S Series - 4 Element Boiler | |
|-----------------------------|-------------------------|
| KW Capacity | Minimum Flow Rate (GPM) |
| 24 | 8.2 |
| 20 | 6.8 |
| 16 | 5.5 |
| 12 | 4.1 |

CONNECTING SUPPLY AND RETURN PIPING

1. Maintain a minimum clearance of one inch to hot water pipes.
2. Hot water boilers installed above radiation level must be provided with a low water device either as part of the boiler or at the time of boiler installation.
3. When a boiler is connected to a heating system that utilizes multiple zoned circulators, each circulator must be supplied with a flow control valve to prevent gravity circulation.

* Reduced pressure back flow provender must be present under provisions required by the Environmental Protection Agency, (EPA).
4. Suggested plumbing arrangements are illustrated in Figures 2 & 3. The inlet or return pipe is located at the bottom of the unit. Reverse flow will result in a noisy operation and cause very early element failure. The drain cock is to be located at the lowest point of piping.
5. The outlet or supply pipe line to the radiation is located at the top of unit. A combination temperature pressure (altitude) gauge is provided with each unit and should be installed close to the boiler outlet. It is important that the gauge sensor be completely immersed in the flowing water so as to assure correct temperature readings. Manual or automatic water make up supply may be located in this area below. The circulator pump should be install on the supply side.
6. Gate valves should be installed at the locations shown in Figures 2 & 3, so that any boiler servicing requiring removal of water can be done quickly and easily. Not illustrated but also highly recommended is the installation of air vents at the high points of the hydronic system. These devices will reduce initial start up time and help avoid element burnout during the entire life of the heating system.
7. A pressure relief valve is Supplied with each Electric Hydronic Block and should be installed at the location and discharge direction shown in Figure 1, using pipe nipple and elbow supplied. Piping should be added so that any water that may be discharged will not damage the boiler or other system components.
8. For further piping information refer to The Hydronics Institute (I=B=R) manual 200 (Installation Guide for Residential Hydronics).

FIGURE 1

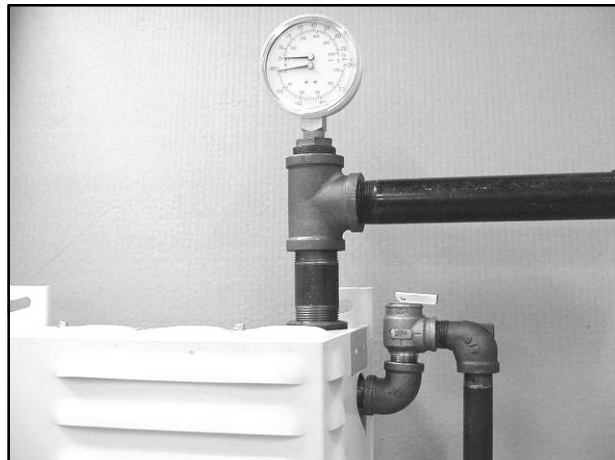
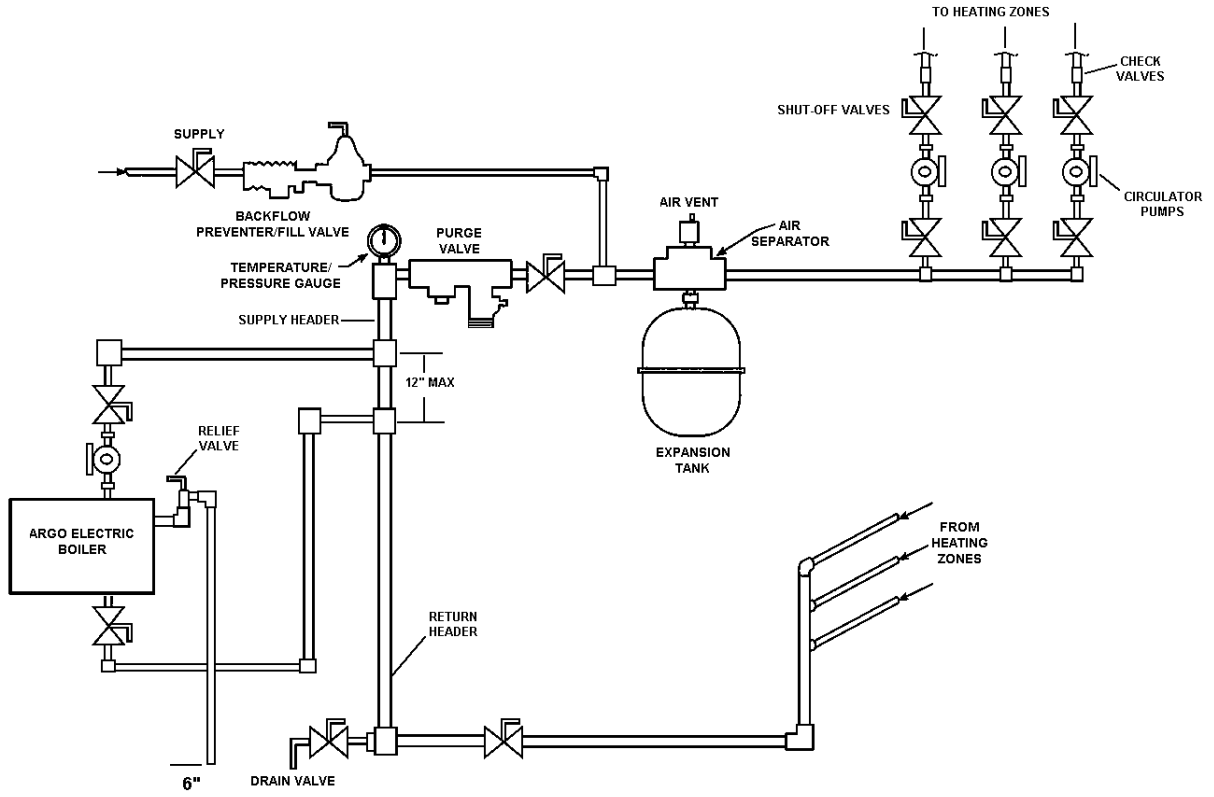
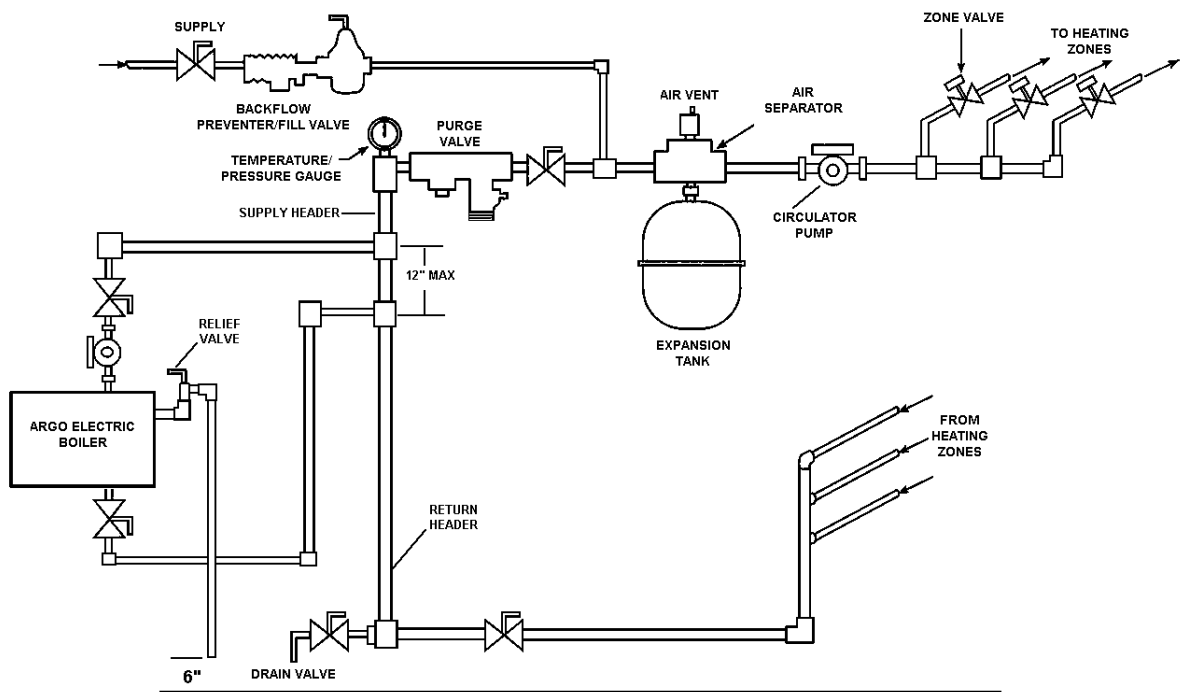


FIGURE 2



Multiple zoning with circulator

FIGURE 3



Multiple zoning with zone valves

CONNECTING ELECTRICAL POWER SUPPLY

WIRING THE BOILER

ARGO Electric Hydronic Boilers are pre-wired for use with 240-volt, 3 wire, single-phase, 50/60-hertz power. Refer to Table 1(B) for the reduction in boiler capacity when the line voltage is less than 240 volts.

An opening is provided in the jacket bottom panel for the field wiring, refer to the rating chart for recommended wire sizes.

For all Model Boilers, connect the circulator to the 120-volt terminals. See wiring diagram on page 8. All wiring must conform to the requirements of the Canadian Electrical Code (Canada) or National Electric Code (USA) and any additional National, State or Local code requirements having jurisdiction.

Do Not Use Aluminum Wire.

When a boiler is used in a zoned system, the zone valves must be powered from an independent source and have electrically isolated end switches or isolating relays wired in parallel to the boiler thermostat terminals. **DO NOT ATTEMPT TO POWER ZONE VALVES FROM THE TRANSFORMER IN THE BOILER CONTROL SYSTEM.**

CONTROL SYSTEM

The control system for the electric boiler has electronic time delays to sequence the elements on. The contacts used in the system disconnect all current from the heating elements.

The circulator control utilizes a single pole relay.

High limit functions are performed by a high limit aquastat control.

SEQUENCE OF OPERATION

(See wiring diagram on page 8)

Call for heat:

1. The thermostat contacts close, energizing the control- relay, and the first heating element power relay closes.
2. Electric time delays are activated and close remaining heating element power relays, according to adjusted time delay time.
3. This sequence continues until all connects are energized or until the call for heat ends.

End of call for heat:

1. The thermostat contacts open and immediately de- energize the control and power relays. The circulator and all heating elements are then instantly de-energized.

Limit control operation:

1. When the boiler water temperature exceeds the high limit setting on the aquastat, all heating element control relays are instantly de- energized. Circulator continues to operate until call for heat ends. When water temperature drops below aquastat re-set differential, heating element power relays close as per time delay sequence.

Adjustable time delays:

The parallel wired adjustable time delays allow optimum control of the heating elements being energized. Certain electric boiler applications including elevated outside temperatures, small heating zones, oversize boiler, radiant heat installations, and flow rates usually require maximum time energizing heating elements.

By increasing delay time in above cited applications, short cycling and excessive wear and tear on boiler components will be minimized, resulting in greater operating efficiencies and boiler reliability.

Time Delay Factory Setting:

MODEL B (2 Element) - One Time Delay factory set at 3 minutes.

1. Element 1 on Instantly
2. Element 2 on 3 minutes later

MODEL S (4 Element) - The time delays factory set at 2.5 and 8 minutes respectively.
Sequence (Thermostat Closes)

1. Element 1 on Instantly
2. Element 2 on 2 minute later
3. Element 3 on 5 minutes later
4. Element 4 on 8 minutes later

Note: "Last Element ON - should always be element 4 (Top Element).

WARNING:

1. Main Power Supply - Depending on model designation, the electric Hydronic Block may be energized by the following alternating current service entrances: 240 volt single phase 50 or 60 cycle 3 wire. The wire size required may be selected from Table 1. The sizes listed for various capacity units include total amperes necessary to operate elements, circulator and zone valves where used. Wire sizes specified conform to the Canadian Electrical Code (Canada) or National Electric Code (USA) and include derating for ampacity and temperature. Use copper wire only with installation rated for 75 ° C. Check state and local requirements.

NOTE: Read the data name plate before connecting unit so that you will become familiar with the specifications. All electrical connections to the unit are provided and located for ease of proper installation. USE ONLY COPPER WIRE of proper size and make sure all terminations are very tight. DO NOT USE ALUMINUM WIRE.

2. Transformer Power Supply - Each Electric Hydronic Block contains a 120/24 volt transformer rated at 20 VA. The 24 volt output may be used for zone valve power at terminals TR & TR. If zone valve power requirements exceed this transformers capacity, an additional external transformer will be required.

3. Circulator Power Supply - Terminals identified as N and HOT at the bottom of the control panel may be used to supply circulator pump power. The circulator motor shall not be larger than 1/4 horsepower with a maximum 6.0 amp rating. Wiring from the control panel to the pump should have insulation rated at 75° C. Circuit protection is provided by the 15 amp breaker on the control board or a circuit breaker or fuse supplied by the installer depending on the boiler model.

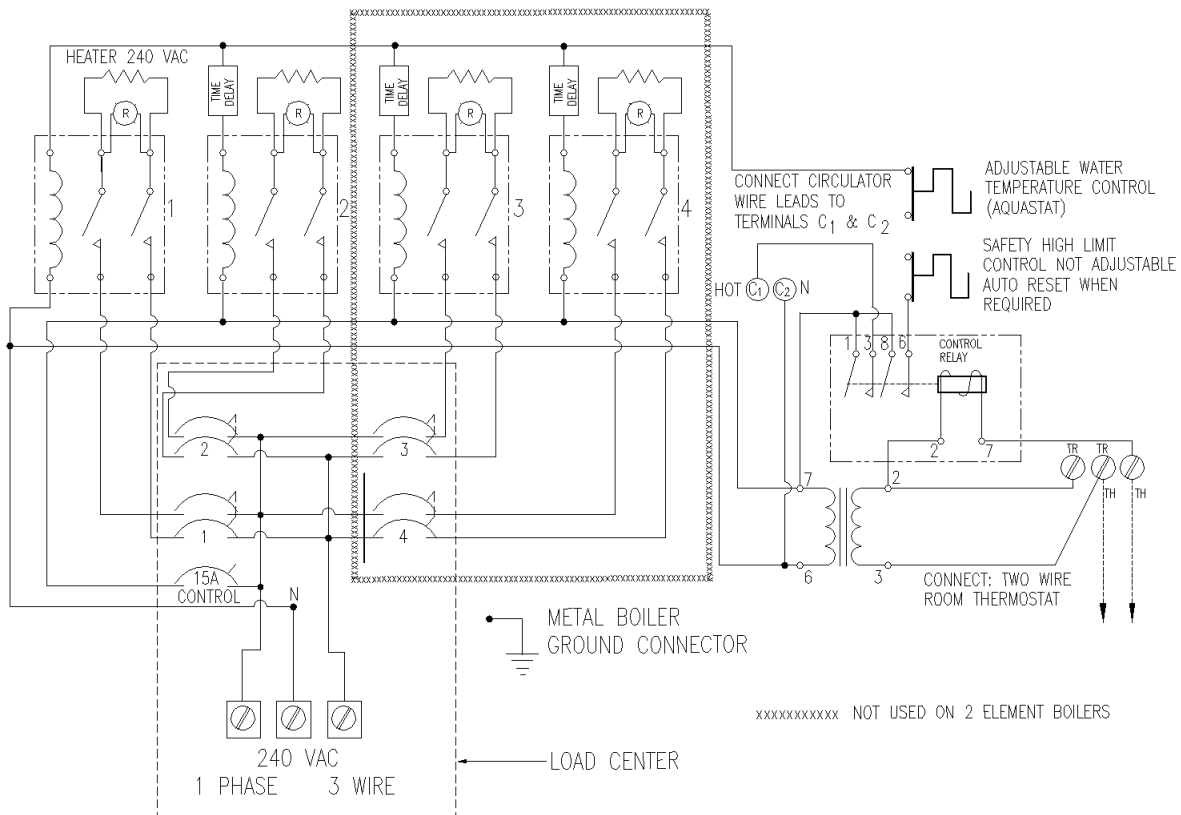
If the circulator pump is larger than the maximum size listed above, then a separate circulator pump relay must be provided with separate overload protection. Where more than one circulator is used for zoning, it must be installed and protected according to approved electrical codes.

4. Control Circuit - The following control system components operate on 120 VAC: control relay contacts, aquastat, high limit safety switch, sequencers, power relay coils and transformer primary. The following components operate on 24 VAC: transformer secondary and control relay coil. The 24 VAC supply is used for thermostat or zone valve actuation of the boiler at terminals TH & TH with less than 20 VA demand.

The control circuit is supplied from a power source within the control cabinet. All internal wiring within the control cabinet has been installed according to approved electrical codes and thoroughly tested and inspected before leaving the manufacturers plant.

5. Heating elements are sequenced from bottom to top (#1 through #4 or #1 and #2). Pilot Lights are sequenced left to right #1 through #4 or #1 and #2.

The aquastat should be adjusted no higher than 180°F for 24 KW units and 190°F for all other lower output models. The high limit safety switch is set to open at 210°F and is not adjustable.



THERMOSTAT INSTALLATION

1. Thermostat should be installed on an inside wall about four feet above the floor.
2. NEVER install a thermostat on an outside wall.
3. Do not install a thermostat where it will be affected by:
 - A. Drafts
 - B. Hot or cold pipes
 - C. Sun light
 - D. Lighting fixtures
 - E. Television
 - F. Near a fireplace or chimney
4. Instructions for the final adjustment of the thermostat are packaged with the thermostat (adjusting heating anticipator, calibration, etc.).

GENERAL INSTRUCTIONS FOR START UP AND SEASONAL MAINTENANCE

It is suggested that a qualified service agency be employed to make an annual inspection of the boiler and the heating system. They are experienced in making the inspection outlined below. In the event repairs or corrections are necessary they can make the proper changes for safe operation of the boiler.

⚠ CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

Verify proper operation after service.

1. If the circulator has oil cups, lubricate venter motor once a month during the heating season with a few drops of non-detergent motor oil (SAE 20 or 30). Replace the rubber plugs when finished.

⚠ CAUTION: DO NOT OVER OIL.

2. START UP AND BEGINNING OF EACH HEATING SEASON

After all the procedures have been carefully followed and completed, the Electric Hydronic Block Unit is now ready to be put into service.

- (1.) Check hydronic block circuit breaker or switch at the service entrance and the hydronic block circuit breakers within the unit to assure that they are in the OFF position.
- (2.) Fill the heating system with water until the pressure reaches 10-15 PSI. Check for leaks, repair if necessary and purge all air from system.

⚠ WARNING: ONLY PROPYLENE GLYCOL CAN BE USED IN HEATING SYSTEM TO PREVENT FREEZING. RECOMMENDATION IS A MAXIMUM 40%, OR LESS, PROPYLENE GLYCOL MIXTURE TO ENSURE PROPER OPERATION OF ELECTRIC BOILER.

- (3.) Turn on the hydronic block circuit breaker or switch at the service entrance and the 15 amp circuit breaker on the hydronic block. LEAVE THE 40 AMP CIRCUIT BREAKERS OFF.
- (4.) Set one thermostat above room temperature. The circulator pump will now operate.
- (5.) Check system again for leaks. Allow circulator pump to run until all air has been vented from the system. A gurgling or rushing sound indicates the presence of air.

⚠ CAUTION: FAILURE TO VENT AND KEEP AIR OUT OF THE HEATING

SYSTEM WILL RESULT IN DAMAGE TO HEATING ELEMENTS IN THE HYDRONIC BLOCK DAMAGE OF THIS TYPE IS NOT COVERED BY MANUFACTURERS WARRANTY.

- (6.) After thirty minutes, switch on all hydronic block 40 Amp circuit breakers in order starting with No. 1. The hydronic block will now start to produce heat. As the water temperature increases, listen for air passing through the system. Water pressure will rise somewhat as temperature increases - this is normal as long as the pressure remains less than 25 PSI.

⚠ CAUTION: IF AIR IS DETECTED, SHUT OFF ALL HEATING ELEMENT (40AMP) BREAKERS AND REPEAT STEPS 2.5-2.6.

TROUBLE SHOOTING

No Heat at all - Circulator does not run:

- 1) Check 15 amp control circuit breaker.
- 2) Check for power to the boiler.
- 3) Check for faulty thermostat (room control).

Momentarily place a jumper across terminals TH-TH. If circulator starts and boiler comes on, trouble is in thermostat or its wiring.

No Heat - Circulator does run:

- 1) Check Aquastat.
- 2) Check secondary high limit control (top-center of control panel)
- 3) Check all 40 amp circuit breakers. Should be "ON".
- 4) If pilot lights are "ON" Check all heating elements.
- 5) Check the power relays.

Insufficient Heat:

- 1) Check for faulty room thermostat.
- 2) Check to make sure all 40 amp circuit breakers are "ON"
- 3) If all pilot lights are "ON" , check heating elements.
- 4) Check Aquastat setting making sure that it is performing properly.
(Boiler should shut off when temperature reaches aquastat setting)

Noisy Boiler:

- 1) Check water pressure of Boiler. It should be between 15-25 PSI.
- 2) Check for the direction of flow of the circulator pump. The direction of flow (arrow on pump) must be toward the lower right side of boiler.
- 3) Check for air within the system.
- 4) Check for too high a setting on Aquastat.

Pilot Lamp Fails to Glow:

- 1) Check associated circuit breaker. (Make sure breaker tabs are in the "ON" position). If in doubt, push to the reset position and return to "ON"
- 2) Check associated relay.
- 3) Check pilot light itself.

TROUBLE SHOOTING

CAUTION:

- 1) Extreme care must taken when the boiler cover is removed. Turn “OFF” all service to the boiler. “Power On” checks should be made by a qualified electrician.
- 2) In the event it becomes necessary to change any heating element, use the following procedure:
 - a. Turn off hydronic unit circuit breaker or switch at service entrance.
 - b. Close gate valves near inlet and outlet of hydronic block.
 - c. Close feed line valve if using automatic fill.
 - d. Open drain valve & allow water to drain from the boiler. Manual operation of the relief valve will assist drainage by allowing air to enter.
 - e. Remove cabinet cover & disconnect the 2 wires attached to the effected heating element.
 - f. Remove the 4 bolts that secure the heating element to the casting and pry the element loose. Take note of the markings on the element flange to assure proper reinstallation.
 - g. After the element has been removed, carefully clean any remaining gasket material from the casting surface. Take care not to scratch or score this surface.
 - h. Install new gasket and heating element while assuring that the element is correctly positioned.
 - i. Close relief valve. Open feed line valve and check for leaks. Open gate valves. Install heating element wires and cabinet cover.
 - j. Refer to General instructions for Start Up and Seasonal Maintenance for proper purging of air prior to energizing the heating elements.

MAINTENANCE

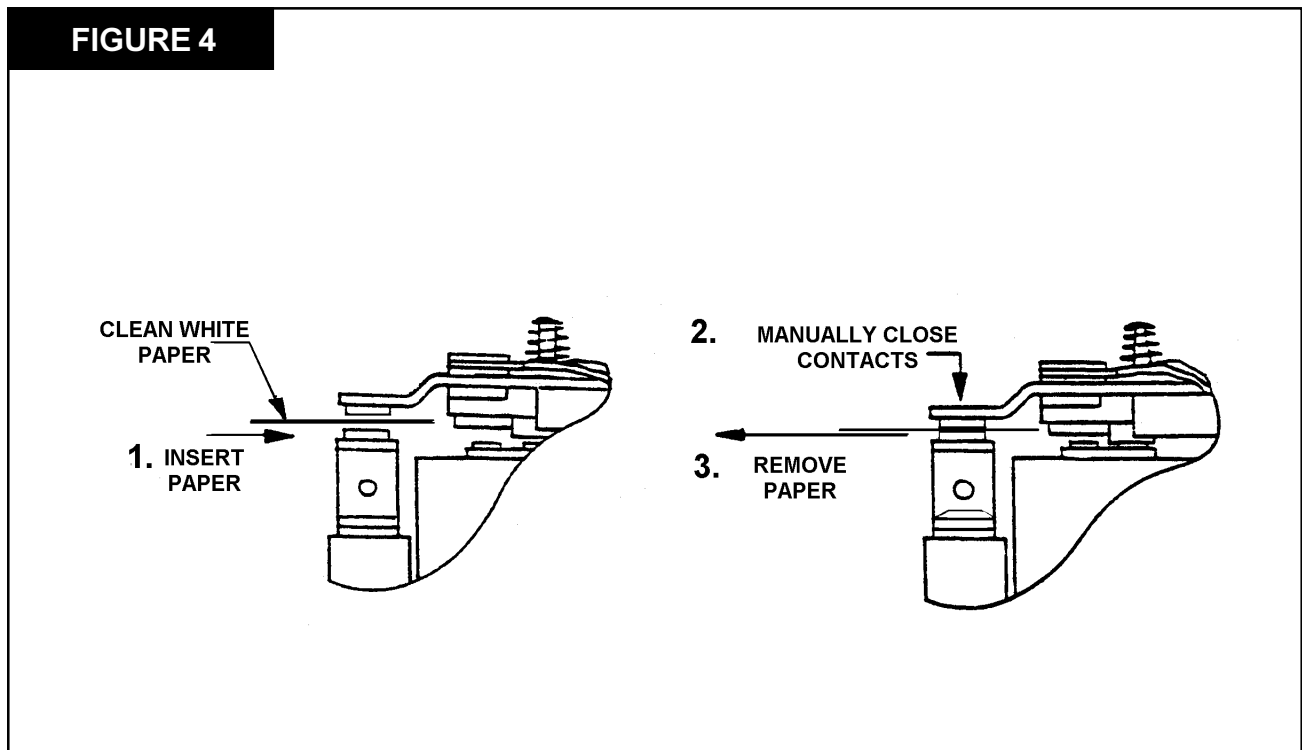
Because of its basic design, the Electric Hydronic Block requires only a minimum of periodic maintenance. The preventive maintenance tasks described below are not difficult and when done a yearly basis, will aid the unit to continue its trouble free operation.

! CAUTION:

FOR SAFETY REASONS, THE MAIN POWER SWITCH TO THE BLOCK SHOULD BE TURNED OFF AT THE MAIN SERVICE ENTRANCE BEFORE ANY WORK IS DONE REQUIRING REMOVAL OF THE COVER. ALL WORK SHOULD BE PERFORMED BY A QUALIFIED PERSON WHO IS FAMILIAR WITH THE UNITS CONTROL SYSTEM OPERATION.

1. General Cleanliness - The control system components should be examined for accumulations of foreign material. Removal of dust or dirt should be done with a dry rag, brush or vacuum cleaner.
2. Cleaning Open Style Power Relays - Place a clean white sheet of paper between the contacts, manually close the contacts and remove the paper (refer to Fig. 4). Repeat this process with clean paper each time until the paper comes out clean.

FIGURE 4

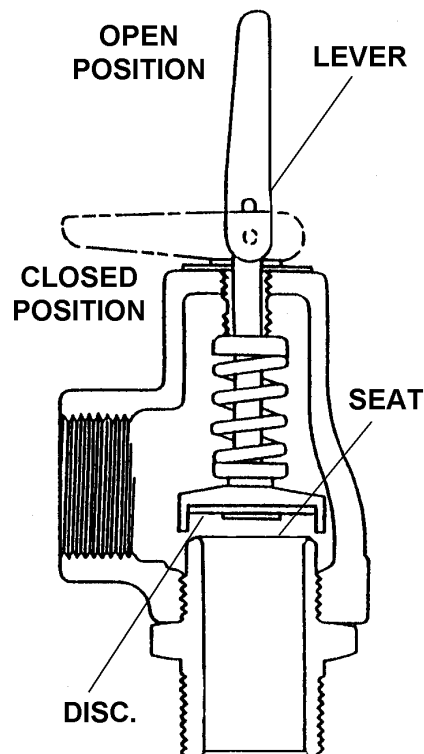


MAINTENANCE

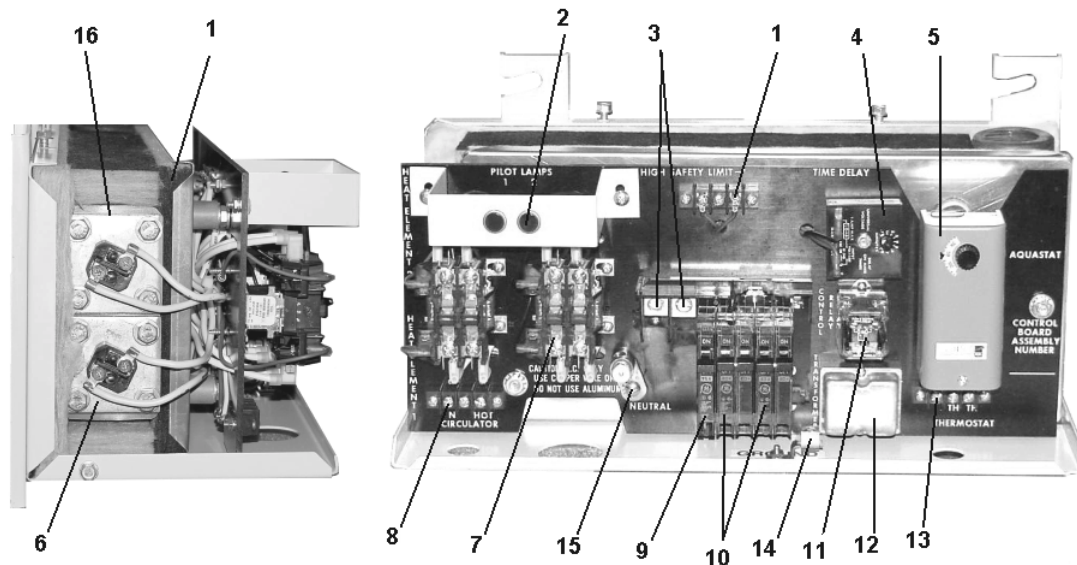
3. Pressure Relief Valve - Check pressure relief discharge piping to assure that any discharged water will be properly routed to a suitable container or drain. Manually operate the pressure relief valve by pulling the lever at the end of the valve until the lever is in line with the centerline of the valve (Refer to Fig. 5). Quickly close the valve to avoid losing an excessive amount of water. Repeat this procedure several times on a quick cycling basis to release any sediment that could block the relief valve pressure sensing mechanism. On heating system that use a manual water make-up or feed mechanism, be sure not to allow the system pressure to drop to zero p.s.i. when cycling the relief valve. Allowing this condition to occur could cause air to enter the system thus requiring a purging procedures described in, "GENERAL INSTRUCTIONS FOR START-UP AND SEASONAL MAINTENANCE".

If the relief valve fails to completely close after cycling, it will be necessary to remove it for cleaning or replacement. Isolate the Hydronic Block by shutting off the inlet and outlet gate valves. Reduce the water pressure to zero by opening the relief valve. Remove the relief valve and inspect the valve disc and seat. Cleaning these parts with a clean lint free cloth may be all that is necessary. If this procedure fails then replace the valve with a new one of equal pressure and discharge rating. After installing the cleaned or new relief valve, open the gate valves and follow the procedure described in "GENERAL INSTRUCTIONS FOR START-UP AND SEASONAL MAINTENANCE".

FIGURE 5

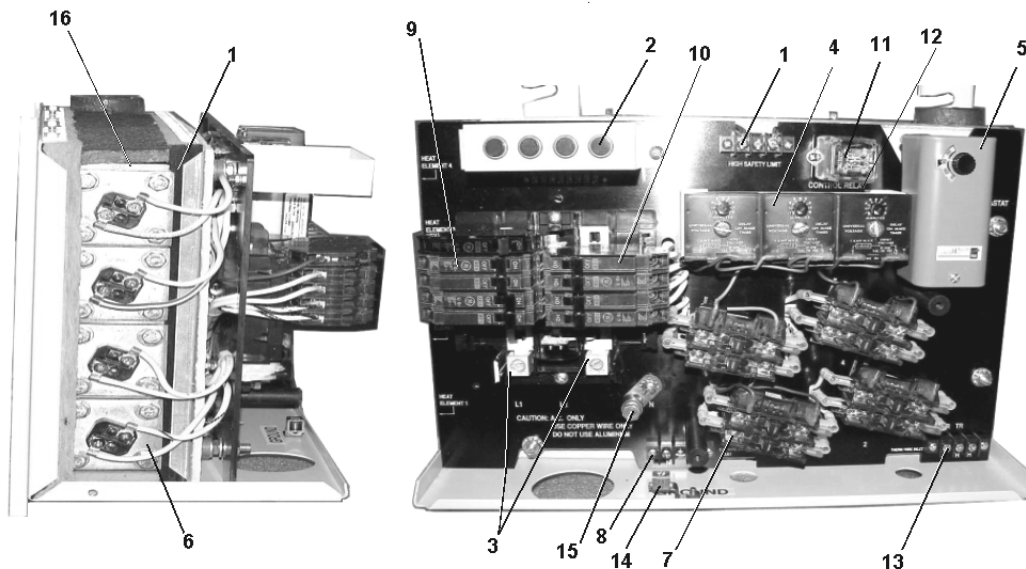


MAJOR COMPONENTS - 2 ELEMENT ELECTRIC BOILER



| 2 ELEMENT ELECTRIC HYDRONIC BLOCK | | |
|--|----------|---|
| MAJOR PARTS LIST | | |
| # | PART NO. | Item |
| 1 | S-46 | Safety Limit Control (High Limit - fixed temp) |
| 2 | L-8 | Indicating Pilot Lights |
| 3 | I-30 | Panel Assembly - Circuit Breakers G. E. TL 412 C |
| 4 | R-38 | Time Delay - Solid State |
| 5 | A-1 | Aquastat (Regulating Limit Control) |
| 6 | E-13 | Heating Element - 3 KW/240 Volt |
| 6 | E-14 | Heating Element - 4 KW/240 Volt |
| 6 | E-15 | Heating Element - 5 KW/240 Volt |
| 6 | E-16 | Heating Element - 6 KW/240 Volt |
| 7 | R-12 | Power Relay - 120 VAC Coil - 240 VAC 40A Contacts |
| 8 | T-12 | Terminal Block - Circulator Pump & Thermostat |
| 9 | B-28 | Circuit Breaker 15 A - 1 Pole - G.E. THQP 115 |
| 10 | B-27 | Circuit Breaker 40 A - 2 Pole - G.E. THQP 240 |
| 11 | R-3 | Control Relay 24 VAC Coil, 120 VAC 10A contacts |
| - | S-45 | Socket - Control Relay |
| 12 | T-9 | Transformer - 120/24 Volt, 20 VA |
| 13 | T-12 | Terminal Block - Circulator Pump & Thermostat |
| - | V-1 | Relief Valve - 30 P.S.I. |
| - | T-16 | Pressure/Temperature Gauge |
| - | C-57 | Pressure Vessel - Cast Iron, 2 Element |
| - | Z-272 | Control Board Assembly, 2 Element |
| 14 | L-9 | Ground Connection Lug |
| 15 | L-13 | Neutral Terminal Lug |
| 16 | G-12 | Gasket - Heating Element |

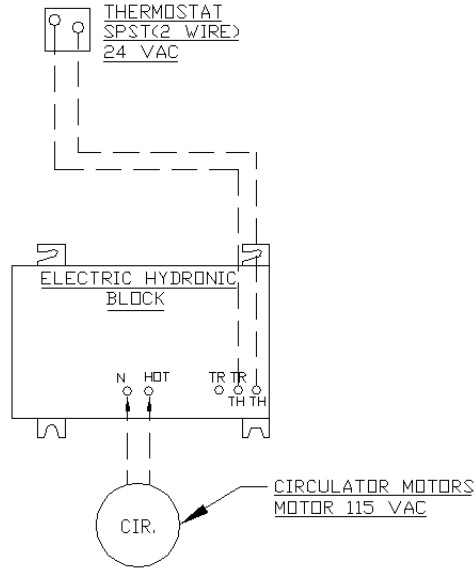
MAJOR COMPONENTS - 4 ELEMENT ELECTRIC BOILER



| 4 ELEMENT ELECTRIC HYDRONIC BLOCK | | |
|-----------------------------------|----------|---|
| MAJOR PARTS LIST | | |
| # | PART NO. | Item |
| 1 | S-46 | Safety Limit Control (High Limit - fixed temp) |
| 2 | L-8 | Indicating Pilot Lights |
| 3 | I-25 | Panel Assembly - Circuit Breakers G. E. TLM812U2 |
| 4 | R-38 | Time Delay - Solid State |
| 5 | A-1 | Aquastat (Regulating Limit Control) |
| 6 | E-13 | Heating Element - 3 KW/240 Volt |
| 6 | E-14 | Heating Element - 4 KW/240 Volt |
| 6 | E-15 | Heating Element - 5 KW/240 Volt |
| 6 | E-16 | Heating Element - 6 KW/240 Volt |
| 7 | R-12 | Power Relay - 120 VAC Coil - 240 VAC 40A Contacts |
| 8 | T-12 | Terminal Block - Circulator Pump & Thermostat |
| 9 | B-28 | Circuit Breaker 15 A - 1 Pole - G.E. THQP 115 |
| 10 | B-27 | Circuit Breaker 40 A - 2 Pole - G.E. THQP 240 |
| 11 | R-3 | Control Relay 24 VAC Coil, 120 VAC 10A contacts |
| - | S-45 | Socket - Control Relay |
| 12 | T-9 | Transformer - 120/24 Volt, 20 VA |
| 13 | T-12 | Terminal Block - Circulator Pump & Thermostat |
| - | V-1 | Relief Valve - 30 P.S.I. |
| - | T-16 | Pressure/Temperature Gauge |
| - | C-32 | Pressure Vessel - Cast Iron, 4 Element |
| - | Z-201 | Control Board Assembly, 4 Element |
| 14 | L-9 | Ground Connection Lug |
| 15 | L-13 | Neutral Terminal Lug |
| 16 | G-12 | Gasket - Heating Element |

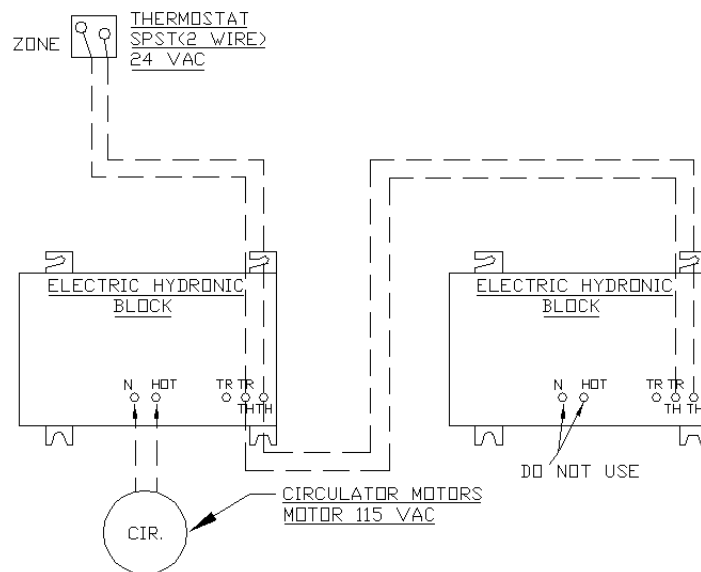
WIRING DIAGRAMS

ONE SINGLE ZONE



REV. 1

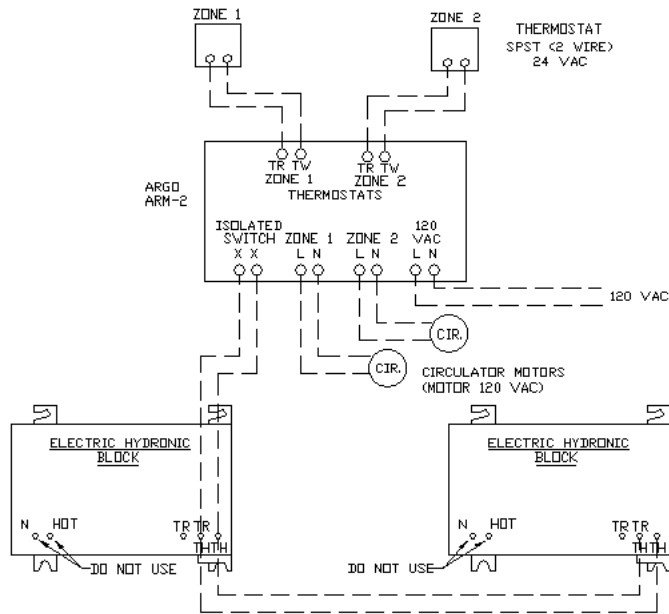
SINGLE ZONE WITH CIRCULATOR 2 BOILERS



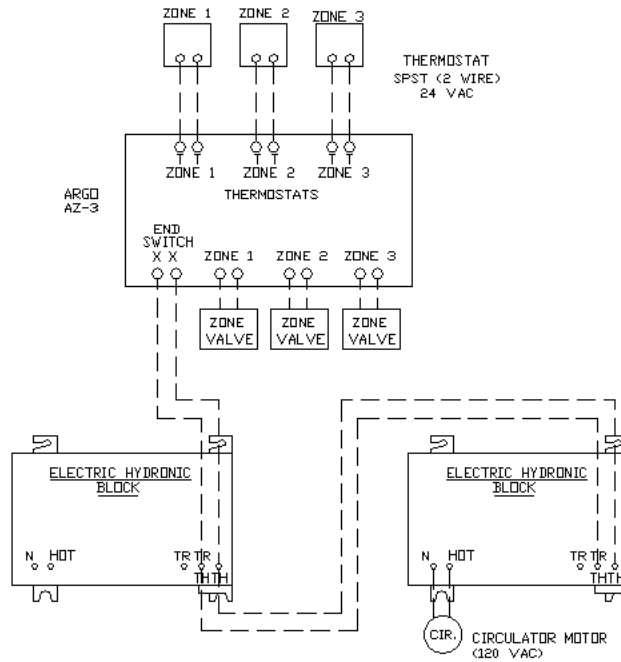
REV. 1

WIRING DIAGRAMS

TWO ZONES WITH CIRCULATORS 2 BOILERS

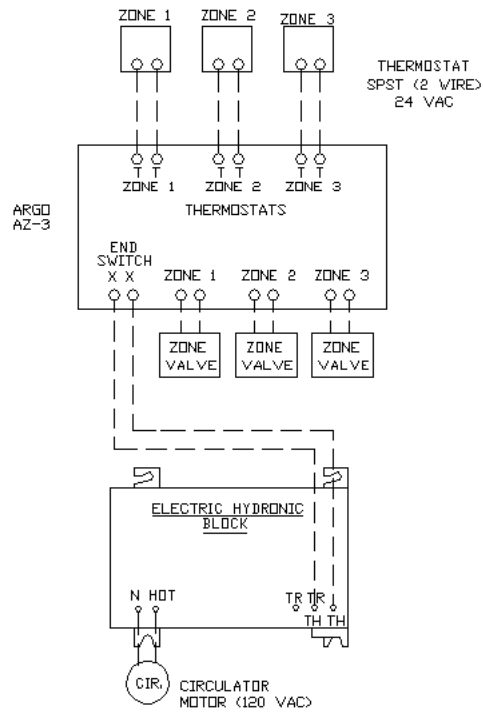


THREE ZONES WITH ZONE CONTROL VALVES 2 BOILERS

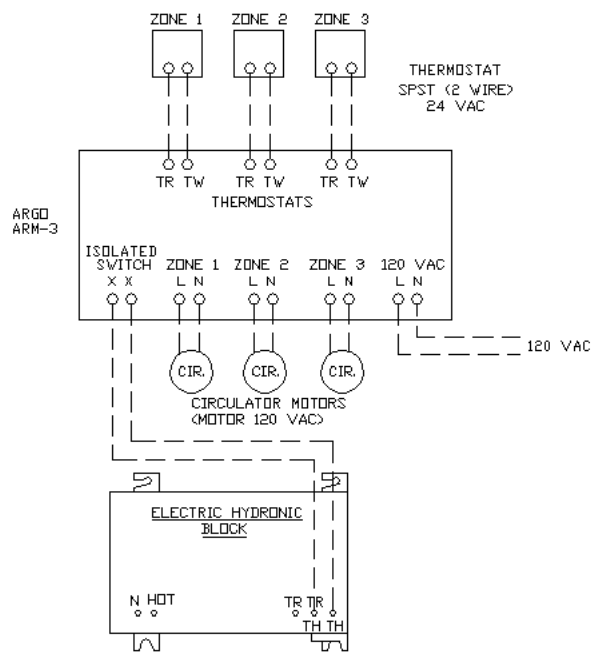


WIRING DIAGRAMS

THREE ZONES WITH CONTROL VALVES 2 BOILERS



THREE ZONES WITH CIRCULATORS



MODULAR BOILER PIPING

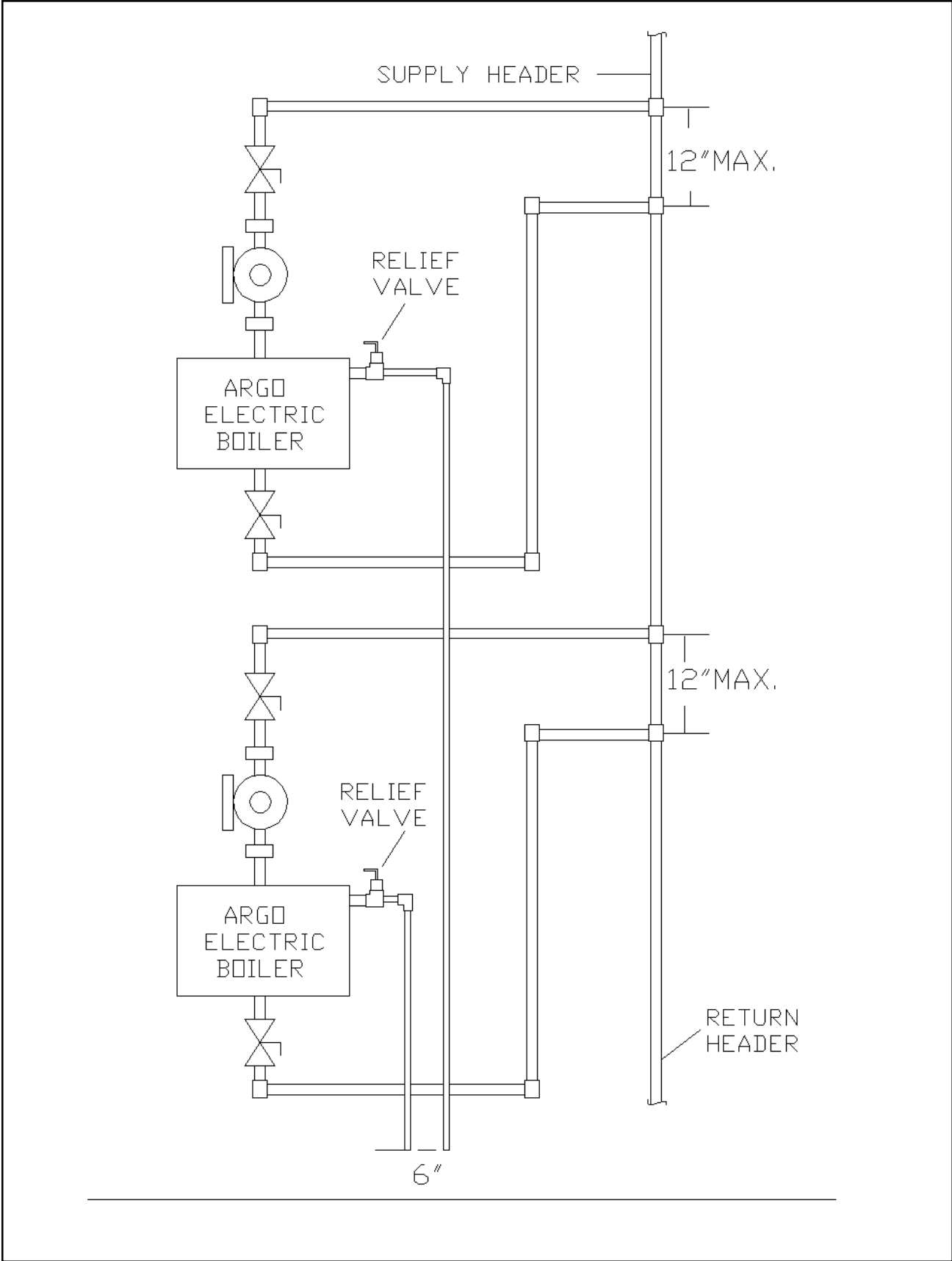


TABLE 1A**STANDARD 240 V RATINGS**

| ELECTRIC HYDRONIC BLOCK RATINGS SPECIFICATIONS - Single Phase Units | | | | | | | | | | |
|---|--------------------------|-------------------------|-------------------|--------------------------------|------------------|------------------|------------------|------------------|------------------------------|----------------------------------|
| "AI - B" Series - 2 Element Boiler | | | | | | | | | | |
| BOILER SIZE NOMINAL KW | OPERATING VOLTAGE (A.C.) | NET HEAT OUTPUT BTU/HR. | POWER INPUT WATTS | TOTAL HEATING ELEMENT AMPERAGE | ELEMENT #1 WATTS | ELEMENT #2 WATTS | ELEMENT #3 WATTS | ELEMENT #4 WATTS | MAXIMUM AMPERAGE PER LEG (1) | SUGGESTED WIRE SIZE (A.W.G.) (2) |
| 6 | 240 | 20472 | 6000 | 25.0 | 3000 | 3000 | ----- | ----- | 40.0 | 6 |
| 8 | 240 | 27296 | 8000 | 33.3 | 4000 | 4000 | ----- | ----- | 48.3 | 6 |
| 10 | 240 | 34120 | 10000 | 41.7 | 5000 | 5000 | ----- | ----- | 56.7 | 4 |
| 12 | 240 | 40944 | 12000 | 50.0 | 6000 | 6000 | ----- | ----- | 65.0 | 4 |
| "AI - S" Series - 4 Element Boiler | | | | | | | | | | |
| 12 | 240 | 40944 | 12000 | 50.0 | 3000 | 3000 | 3000 | 3000 | 65.0 | 4 |
| 16 | 240 | 54592 | 16000 | 66.7 | 5000 | 4000 | 4000 | 4000 | 81.7 | 2 |
| 20 | 240 | 68240 | 20000 | 83.3 | 5000 | 5000 | 5000 | 5000 | 98.3 | 1 |
| 24 | 240 | 81888 | 24000 | 100.0 | 6000 | 6000 | 6000 | 6000 | 115.0 | 1/0 |

(1) Allows for 15A control and accessory load in addition to heat load

(2) Type "THW" wire, copper only, check local codes.

Sizes taken from C.E.C Table 2 & N.E.C. Table 310-16 (.8 correction factor applied).

TABLE 1B**DE-RATED 208 V RATINGS**

| ELECTRIC HYDRONIC BLOCK RATINGS SPECIFICATIONS - Single Phase Units | | | | | | | | | | |
|---|--------------------------|-------------------------|-------------------|--------------------------------|------------------|------------------|------------------|------------------|------------------------------|----------------------------------|
| "AI - B" Series - 2 Element Boiler | | | | | | | | | | |
| BOILER SIZE NOMINAL KW | OPERATING VOLTAGE (A.C.) | NET HEAT OUTPUT BTU/HR. | POWER INPUT WATTS | TOTAL HEATING ELEMENT AMPERAGE | ELEMENT #1 WATTS | ELEMENT #2 WATTS | ELEMENT #3 WATTS | ELEMENT #4 WATTS | MAXIMUM AMPERAGE PER LEG (1) | SUGGESTED WIRE SIZE (A.W.G.) (2) |
| 6 | 208 | 15377 | 4507 | 21.7 | 3000 | 3000 | ----- | ----- | 36.7 | 6 |
| 8 | 208 | 20502 | 6009 | 28.9 | 4000 | 4000 | ----- | ----- | 43.9 | 6 |
| 10 | 208 | 25628 | 7511 | 36.1 | 5000 | 5000 | ----- | ----- | 51.1 | 6 |
| 12 | 208 | 30753 | 9013 | 43.3 | 6000 | 6000 | ----- | ----- | 58.3 | 4 |
| "AI - S" Series - 4 Element Boiler | | | | | | | | | | |
| 12 | 208 | 30753 | 9013 | 43.3 | 3000 | 3000 | 3000 | 3000 | 58.3 | 4 |
| 16 | 208 | 41005 | 12018 | 57.8 | 5000 | 4000 | 4000 | 4000 | 72.8 | 3 |
| 20 | 208 | 51256 | 15022 | 72.2 | 5000 | 5000 | 5000 | 5000 | 87.2 | 2 |
| 24 | 208 | 61507 | 18027 | 86.7 | 6000 | 6000 | 6000 | 6000 | 101.7 | 1 |

(1) Allows for 15A control and accessory load in addition to heat load

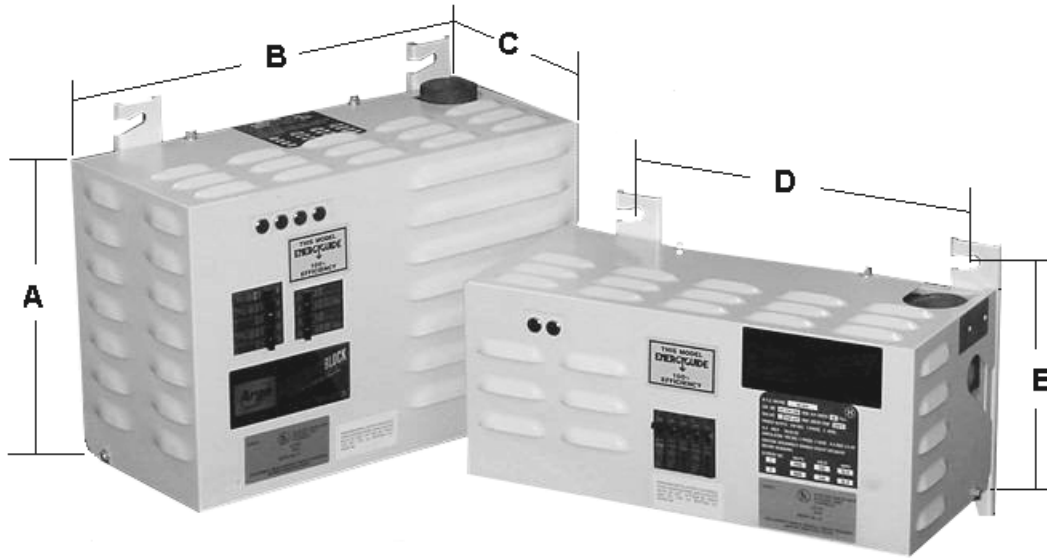
(2) Type "THW" wire, copper only, check local codes.

Sizes taken from C.E.C Table 2 & N.E.C. Table 310-16 (.8 correction factor applied).

AI-SERIES

Cast Iron, Electric, Hot Water Boiler Dimensions

| BOILER NO. | ELECTRIC BOILER | Dimensions | | | | | Pump Size Sup. & Ret. TAPPINGS |
|-------------|------------------|------------|----------|---------|---------|-----------|--------------------------------|
| | | A | B | C | D | E | |
| AI-B Series | 2 Element Boiler | 8" | 18 5/8 " | 9 1/32" | 14 3/8" | 9 7/8" | 1 1/4" |
| AI-S Series | 4 Element Boiler | 12 3/16" | 18 5/8 " | 9 1/32" | 14 3/8" | 13 31/32" | 1 1/4" |



4 ELEMENT BOILER

2 ELEMENT BOILER

NOTES

HOMEOWNERS'S REFERENCE TABLE

| | |
|-----------------|--|
| Model No. | |
| Serial No. | |
| Date Installed | |
| Contractor | |
| Contact | |
| Address | |
| Zip Code | |
| Telephone No. | |
| After Hours No. | |
| | |
| | |

If different from Installation Contractor:

| | |
|-----------------|--|
| Service Tech. | |
| Telephone No. | |
| After Hours No. | |

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