

Electric Mini-Boiler™

Installation & Operating Instructions

Model EMB-5	4.5 kW	3 GPM (11.35 L/min) minimum flow
Model EMB-9	9 kW	4 GPM (15.14 L/min) minimum flow

Application - Low temperature, low pressure, radiant underfloor heating systems.

Comment - If this application is for traditional hydronics heating requiring temperatures greater than 140° F (60° C) and capacities larger than shown above, contact factory for other Electro-Boiler product series.

Accessories – Attached BL001 lists various accessory or option items which are not part of basic Electro-Boiler. Page 1 gives information on a zone control update which stages elements based upon zone capacity.

Note: This product meets the requirements of the ASME Boiler and Pressure Vessel Code.

Drawings: **BX301**
BH302
BS302
BL001



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GENERAL

As stated, this product series applies to underfloor hydronics heating. The basic **components** for an electric energy heating system typically includes:

1. Electric Mini-Boiler itself – covered by this manual
2. Thermostat control – covered by this manual
3. Plumbing kit or piping material at the boiler itself - Can be ordered as a kit, reference catalog number EMB-BK.
 - These items are shown on plumbing installation drawing BX301.
4. Circulating pump - Typically sized for head pressure and system flow requirement, typical catalog number EMB-P2.
5. The underfloor circulating tubes and manifolds - Provided and manufactured by others, not covered in this manual.

APPROVED TUBING/PIPING

When plumbing this boiler and its peripheral parts to the loop system, all plumbing parts and/or tubing must be sealed to prevent entrance of oxygen.

Use only tubing or polyethylene tubing with oxygen Diffusion Barrier (ie. Heating PEX).

SYSTEM OR WATER FLOW

In order to prevent hi-limiting and assure full 20 year parts life, the piping system/basic plumbing/circulator pump must be arranged to provide flow greater than minimum GPM (L/min) shown on the cover sheet.

If this is a zoned system, this applies when the smallest zone is operating. If the zoned system is under 600 feet (183 m) consider WarmFlo model (EMB-W-9).

ROOM THERMOSTAT PLACEMENT

Comfort and proper space heating response is a direct relationship to the room thermostat type and the placement of the thermostat sensing bulb. Typically an under floor heating system can be broken down into two categories.

- **Energy storage, water tubing is under the concrete or within the sand base** - The controlling thermostat must have a remote bulb, and this remote bulb must sense the concrete slab temperature (slab stat). Coordinated with the concrete pour, install a ¾" (19 mm) PVC, minimum bend radius of 7" (178 mm), and locate at approximately center (vertical) of the concrete slab. The thermostat sensing bulb can later be pushed down this PVC conduit. If the slab is already poured without conduit for slab stat, use electronic remote sensing thermostat such as Electro Industries' ES-24-SRO. This type of device only requires a ¼" (7 mm) hole drilled in the concrete at some center wall location.
- **Quick response, hydronic tubing just under the concrete surface, no flooring material over the concrete** - In this case, heated water can directly radiate into the room, a standard wall mount room thermostat is adequate. Mount room thermostat on an inside wall similar to most heating systems.
- **Radiant heat control systems, wall stat or slab stat, with added in-line aquastat** - These systems are typically made up by the tube/pipe manufacturer/representative and include system controlling features. The system controlling device is connected to "R" and "W" terminals and must be the main boiler control. If there is a mixture of zones, an optional aquastat can be used in case flow does not adequately maintain the loop temperature below approximate 100°. Also the thermostat terminals control the pump. The best connection for the optional aquastat is controlling the electric boiler element 2. Locate the white/blue jumper on the inside circuit board, cut and install the aquastat switch. Procedure BD002 provides additional information for strap-on aquastats.

ZONE CONTROLLER

If automatic zones and zoning thermostats are part of this system, suggest adding a zone controller which has the ability to shed stages when the system is operating with smaller zones. If not using a stage shedding zone controller, a strap-on aquastat may be required to keep the boiler at a reasonable upper temperature, see next section.

If you only have 2 to 3 zones, the original multi-zone interlock, EB-5415A is still available. This was recently updated to include 40VA transformer and additional wiring space. In a simple 2-zone arrangement, this controller will shed stage 2 if only 1 zone is calling (drawing BH013).

If the zoning system is more complex and you need a zone controller shown on the accessories sheet, select the appropriate model and when ordering specify Mini-Boiler application.

AVAILABLE, ELECTRO INDUSTRIES, INSTALL PARTS OR KITS

EMB-BK	MINI-BOILER PLUMBING KIT BASIC
EMB-P2	PUMP KIT 1/25HP BOILER
ES-24-SRO	STAT DIG SLAB/ROOM/ROOM 24VAC
5616	TRANSFORMER HTR 4X4 PLATE 40VA 24VAC
5576	AIR ELIMINATOR 3/4" ROLLAIRTROL
5456A	GAUGE PRES/TEMP 75 PSI/320DG F .25"
5453	VALVE RELIEF 30 PSIG .75" NPT MALE
5590	EXPANSION TANK 40K BTU 2.1 GAL.
EMB-PK	MINI-BOILER INSTALL KIT PREFERRED
EB-5415A	ZONE CONTROLLER

OPTIONAL AQUASTAT, TYPICAL STRAP-ON

If zones or reduced radiation require an external temperature control device to prevent boiler hi-limiting, there are two recommended electrical connections.

- **Two unbalanced zones, 1/2 of the 9 kW will carry the smallest zones** – in this case use the aquastat to “stage” the boiler or remove the second element when the temperature rises. Reference hookup diagram (BH302 P.1) note 5. Remove white/blue jumper and install an open with temperature rise aquastat contact in place of this jumper.
- **Two unbalanced zones, smallest zone requires less than 1/2 of the boiler capacity** – in this case the temperature controlling aquastat must turn off both elements. Cut one of the red/white wires going to the 160° F (71° C) screw-in hi-limit and electrically insert an open with temperature rise aquastat switch contact. Set the aquastat below the 160° F (71° C) limit value which allows the aquastat to turn off both elements.
- **Note:** Aquastat setting – suggest aquastat settings be approximately 5° F (2.7° C) higher than designed outlet temperature for the system.
- **Other options** – request procedure BD002.

TEMPERATURE CONTROL

The limits or temperature sensing components within this unit are for safety purposes only. The system installation must have a proper responding slab sensing thermostat (or zone controlling device) to properly turn the boiler on and off. If the water flow is greater than the minimum GPM (L/min) specified, this boiler should not reach hi-limit and the hydronics loop should continue to flow in the normal heating pattern until the operating thermostat is satisfied. If hi-limiting is experienced prior to satisfying the operating thermostat, there is possibly a water flow problem.

INFORMATION/WATER FLOW CALCULATIONS

Water flow, GPM (L/min), can easily be calculated if the temperature rise across the electric boiler can be measured.

The formulas below can only be used when the temperature rise is stable and the boiler is not hi-limiting. In other words, verify constant current draw and stable outlet temperatures for at least 15 minutes.

$$\text{GPM} = \frac{\text{Volts} \times \text{Amps} \times 3.4}{500 \times \text{Temp. rise } ^\circ \text{F}} \quad \text{Example: } \frac{240 \text{ volts} \times 36 \text{ amps} \times 3.4}{500 \times 12^\circ \text{ F rise}} = \frac{29376}{6000} = 4.9 \text{ gpm}$$

INFORMATION/WATER FLOW CALCULATIONS – METRIC

$$\text{L/min} = \frac{\text{Volts} \times \text{Amps} \times 3.587}{251.04 \times \text{Temp. rise } ^\circ \text{C}} \quad \text{Example: } \frac{240 \text{ volts} \times 36 \text{ amps} \times 3.587}{251.04 \times 6^\circ \text{ C rise}} = \frac{30991.68}{1506.24} = 20.57 \text{ L/min}$$

INSTALLATION REQUIREMENTS

1. All installation work must be performed by trained, qualified contractors or technicians. Electro Industries, Inc., sponsors installation and service schools to assist the installer. **Visit our web site at electromn.com for upcoming service schools.**
2. All electrical wiring must be in accordance with the national Electric Code and local electric codes, ordinances, and regulations.
3. Observe electric polarity and wiring colors. Failure to observe could cause electric shock and/or damage to the equipment.
4. This unit can only be used for its intended design as described in this manual. Any internal wiring changes, modifications to the circuit board, modifications or bypass of any controls, or installation practices not according to the details of this manual will void the product warranty, the product listing certification, and manufacturer product liability. Manufacturer cannot be held responsible for field modifications, incorrect installations, and conditions which may bypass or compromise the built-in safety features and controls.

MECHANICAL INSTALLATION

CAUTION

Electro Industries Inc. requires the use of dielectric isolation between the boiler vessel supply and return piping when the boiler is plumbed using copper or any other dissimilar metal. Damage to the vessel caused by galvanic corrosion voids Electro Industries' warranty.

Reference drawing BX301

The plumbing components and piping layout shown on drawing BX3Ø1 have been very carefully picked and should be plumbed as shown. When following this diagram, the water fill procedure becomes very simple and almost guarantees the removal of all air or prevents air locking problems. The arrangement of these components guarantees installation and initial operating success.

The key mechanical components required include:

- **Boiler/Plumbing Kit Placement** – This model series is wall hung and the vessel must be vertical.
 - The plumbing kit items are located adjacent to the boiler housing itself as shown on drawing BX3Ø1.
 - For future servicing, the unit itself must be installed a minimum of 18” (46 cm) above the floor. The elements are screwed in from the bottom.
 - Allow adequate space for cover removal and maintenance.
- **Expansion Tank** - As a closed loop hydronic heating system, a minimal expansion tank is required. This can be an air diaphragm tank as provided in the plumbing kit or a basic “empty” tank where air is compressed at the tank top.
- **Temperature/Pressure Gauge** - Recommended to observe the operation of the system. Actually a temperature gauge at the inlet and outlet is desirable.
- **Pressure Safety Valve** - This is required at the hot outlet and is furnished as a **loose** component with the boiler unit itself. Failure to install the provided, 30 PSI (1.72 kPa), pressure relief valve as shown void warranty and the CSA product listing.

Add the necessary pipe extension from the relief valve to the floor to prevent water damage on this unit or surrounding area.

- **Gate Valve/Drain Valve** - These are for servicing and easy fill purposes.
- **Circulating Pump** - Depending upon system loop resistance (feet of head or kPa), the proper circulating pump is required to guarantee the minimum GPM (L/min) flow as specified on the cover sheet.

Comment: Circulator pump can be in the outlet or inlet. Newer, higher quality pumps seem to work better in the supply line.

- **Air Vent Relief** - Whenever there is a plumbing point higher than any of the components shown or an adjacent line (any vertical “U” trap), an air vent valve should be provided.

- **Building Water Supply Connection** – The intent of this connection is temporary and for fill purposes only. The installer has the responsibility of complying with local building codes. Local codes may require a backflow preventor when the domestic water supply line is fixed to the boiler mechanical piping.

WATER ADDITIVES

1. Unless the source water is unusually poor and/or rust elements, additives are not required. It is recommended the water source as shown on drawing BX3Ø1 comes through the household water softener.
2. Impurities within a closed loop hydronics boiler are considerably less damaging than the typical domestic water heater. In a closed loop electric boiler, the water impurities “boil out” and the system essentially reverts to pure water. As a closed system, this “pure water” becomes the operating mode. In the case of domestic water tank, there is always new water entering with new impurities.
3. However, if additives are required, use the recommendations and source from your local professional plumber, specializing in hydronics heating systems.

WATER FILL PROCEDURE

This procedure applies to the prepackaged plumbing kit, referred to as EMB-BK, and/or when the system is plumbed exactly as shown on drawing BX301, revision N. It is the installer’s responsibility to adhere to any local plumbing codes.

Caution: If the building supply pressure is connected directly to supply water ball valve without pressure reducing regulator (reference drawing page 2 example), user needs to make sure the pressure within the boiler loop does not exceed 30 PSI (206.8 kPa). Careful control of the supply water ball valve opening will take care of this. Also at step 8 use caution to make sure the building water supply pressure does not “spike” the system.

1. Connect drain hose to lower hose bib drain valve (open valve).
2. Adapt water supply line to ¾” female iron pipe at the supply water ball valve.
3. Close ball valve at the boiler inlet return piping.
4. Open ball valve at the boiler outlet supply piping.
5. Open “cold water supply” ball valve and allow the system to drain for 5 to 10 minutes.
6. The expansion tank comes factory set at 12 PSIG (82.7 kPa). If this pressure is not changed (make sure to check pressure at tank) the system pressure should match the expansion tank pressure at 12 PSIG (82.7 kPa).
7. Close the cold water supply ball valve.
8. Allow pressure to stabilize at 12 PSIG (82.7 kPa) and close hose bib drain valve.
9. Open ball valve at boiler inlet piping.
10. Disconnect “cold water supply line”.

ELECTRICAL HOOKUP

Reference hookup drawing (BH302).

1. **Panel breaker sizes** – 4.5 kW Mini-Boiler will require 30-amp breaker, copper wire. 9 kW Mini-Boiler will require 50-amp breaker, copper wire.
2. **24Ø Volt Power Source** – route and install the proper current carrying conductors, suggested by local codes, from service panel fuse or circuit breaker. Nameplate shows current & KW rating.

NOTE: This model series is designed and equipped for 240-volt residential single phase. If this unit is used on 208 volt, energy capacity is reduced and there is a possibility of intermittent relay operation. Call factory for 208-volt application.

The source is either from the standard service panel or may be part of an off-peak separately metered panel/CT metered enclosure. Consult with local utility if questions on off-peak installations.

Since this unit is less than 10 kW, no fusing or circuit breaker at the boiler itself is required. The 240-volt (L1, L2) is connected directly to the left bottom terminal block.

- **Only copper wire is allowed.**

3. **Circulating Pump** – the two screw terminals (orange wires) represent a switch closure (see drawing – 10-amp maximum) to operate the circulating pump motor. **Voltage for the pump must come from its own source.** Wiring entrance must be left KO, do not combine with thermostat cable or other control wiring.
4. **Operating Thermostat** – zone valve dry contact end switch is an operating contact, direct wired thermostats include:
 - **Standard Mechanical** – connect to control board “R” and “W”. **Important!** -Set thermostat internal heat anticipator to Ø.2.
 - **Electro-Stat** - (ES-24-SRO) 3 wire connection required. This is an electronic remote sensing device, remote sensor can be up to 50 feet (15.2 m), cut and splice as required. Use only stranded wire, shielded cable not required. The primary advantages include the capability for longer sensor and the sensor itself is less than ¼” (7 mm). This means it can be installed after the slab is complete by simply drilling a ¼” (7 mm) hole, 1/8” slot (4 mm), etc. slightly out from an inside wall.
 - * R to R, W to W, C to C, green to ground
5. **Load Management Interrupt Control** – this Mini-Boiler product has been pre-wired and designed for a power company load management receiver connection. This should not be altered in any manner!
 - A. Remove blue jumper wire
 - B. Extend or connect the two terminal screw points to the power company load control device.

As shipped, this unit is only equipped for off-peak =N.C. logic. If reversed logic is required, contact the factory for modification.
 - Optional – if load management is not used, simply leave the blue wire jumper connected as shipped from manufacturer.

WARNING: Voltage separation is required. The 24Ø power and pump wiring must remain left of the bottom pipe. The thermostat wires and load control wiring (blue & blue/wht) must exit and remain on the right side of the bottom pipe.

6. **Zone Valve** – see hookup page 2 showing suggested wiring for two zones. Other slab stats can be used, the slab stat simply operates its own motor. Do **not** power zone valves and external control devices from Mini-Boiler internal transformer. Contractor needs to install separate 24VAC transformer to operate zone valves.

Note: Two zones only are shown because this boiler does not have internal temperature control and the zone radiation must adequately handle the full boiler capacity. Do not use this simple two-zone scheme for unbalanced zones or more than two. The WarmFlo series product (EMB-W-9) is specifically designed for unbalanced or multi-zone applications. There is a WarmFlo field upgrade kit (EMB-W-KIT) or call factory for other zone controller/stage shedding possibilities (BH012, BH004).
7. **Inspection/final check** – Verify all electrical connections are tight (including factory connections), verify there is proper spacing between all power and electrical wire/terminals, and verify top high limit manual reset tab is pressed “in”. During shipping freight vibration there are times when the boiler vessel top manual reset high limit is “popped out”.

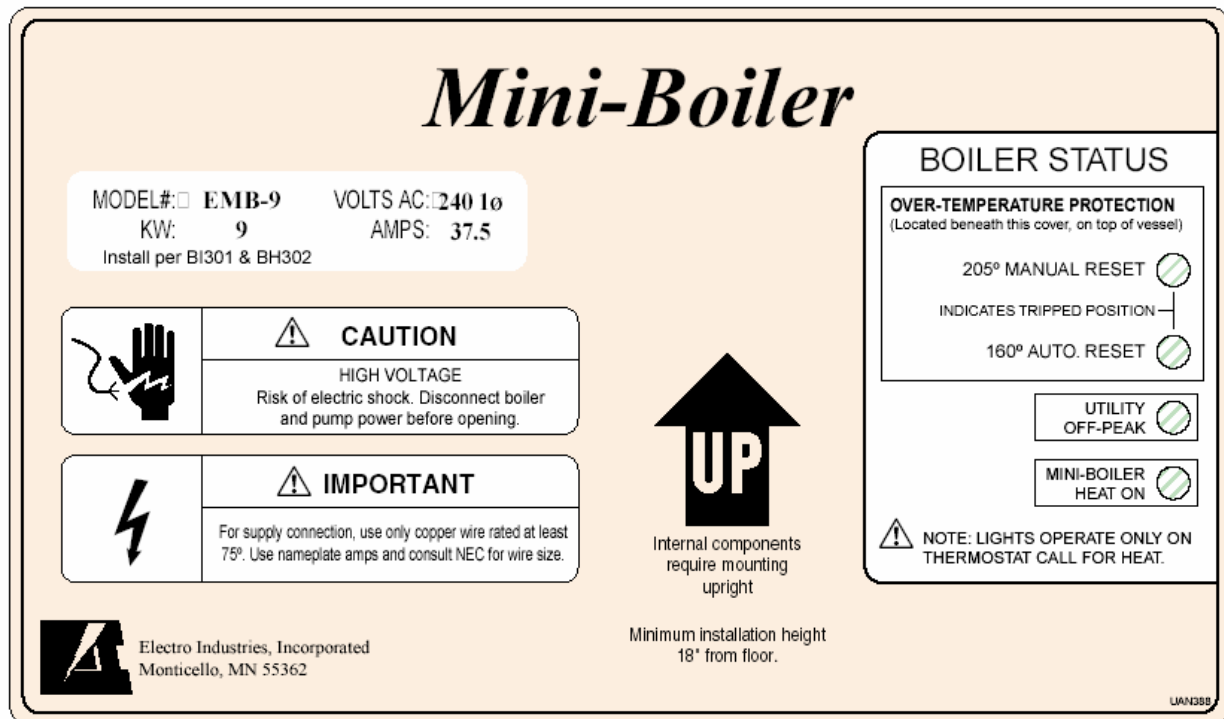


Figure 1

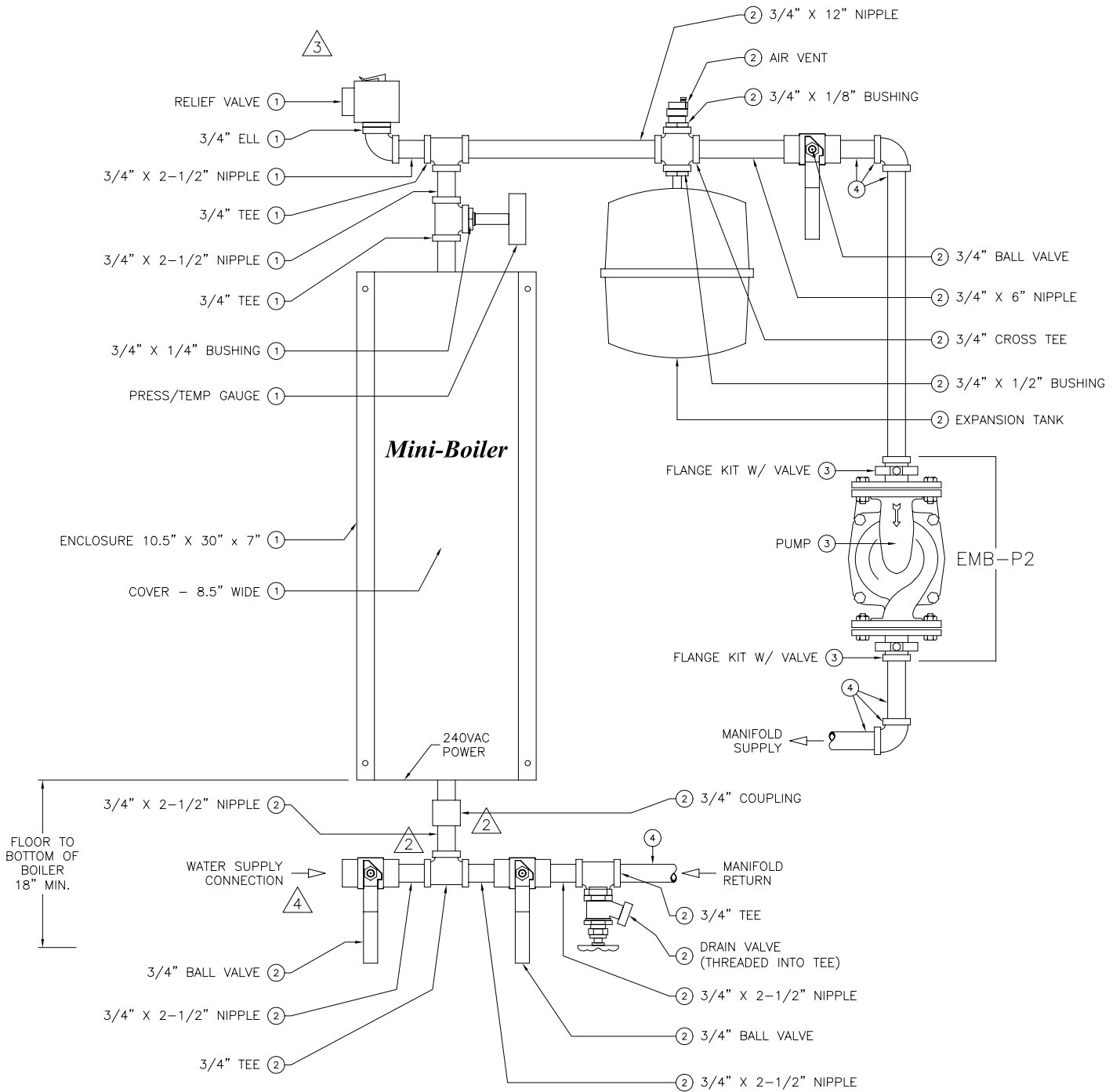
OPERATIONAL TIPS

- Indicator lights – there is a set of four indicator lights on the lower right corner of the front cover with an identical set of four indicator lights on the internal circuit board itself. Figure 1 is a reproduction of the front decal giving definition and information for using these indicator lights. Note the statement that there must be a call for heat before attempting to interpret the indicator lights.
- The 160° (71° C) hi-limit is automatic reset.
- The 205° (96° C) hi-limit is manual reset and under the cover, located on the vessel top, left.

Warning: This 205° (96° C) manual reset controls the 240 power to the elements. Therefore, open the boiler disconnect prior to removing cover and prior to attempting to reset this limit. Note: Reset tab is brass in color and located on the side of the hi-limit.
- Via a small pin jumper arrangement on the control board, the circulator pump can be a direct function of the “W” input **or** interrupted by the load control device (even though there is a W input). This diagram illustrates this pin jumper arrangement. This unit is factory setup in the “W” position meaning the pump will always run as a direct function of “R” to “W” operating thermostat. By simply moving this black 2-position jumper to the “L” the pump will be turned off during load control interrupt.
- At outlet temperatures of approximately 120° F (53° C), the maximum system pressure should be approximately 18 PSI (124 kPa). If the PSI (or kPa) increase from cold water to operating hot water is more than approximately 3 to 4 PSI (20.6 to 27.5 kPa), the expansion tank is too small.
- Check for water leaks and repair as required.
- If flow seems to be a concern, determine both inlet and outlet water temperature and apply GPM (L/min) formula detailed in previous section “Information/Water Flow Calculations”.



"BASIC" MECHANICAL PIPING DIAGRAM



LEGEND

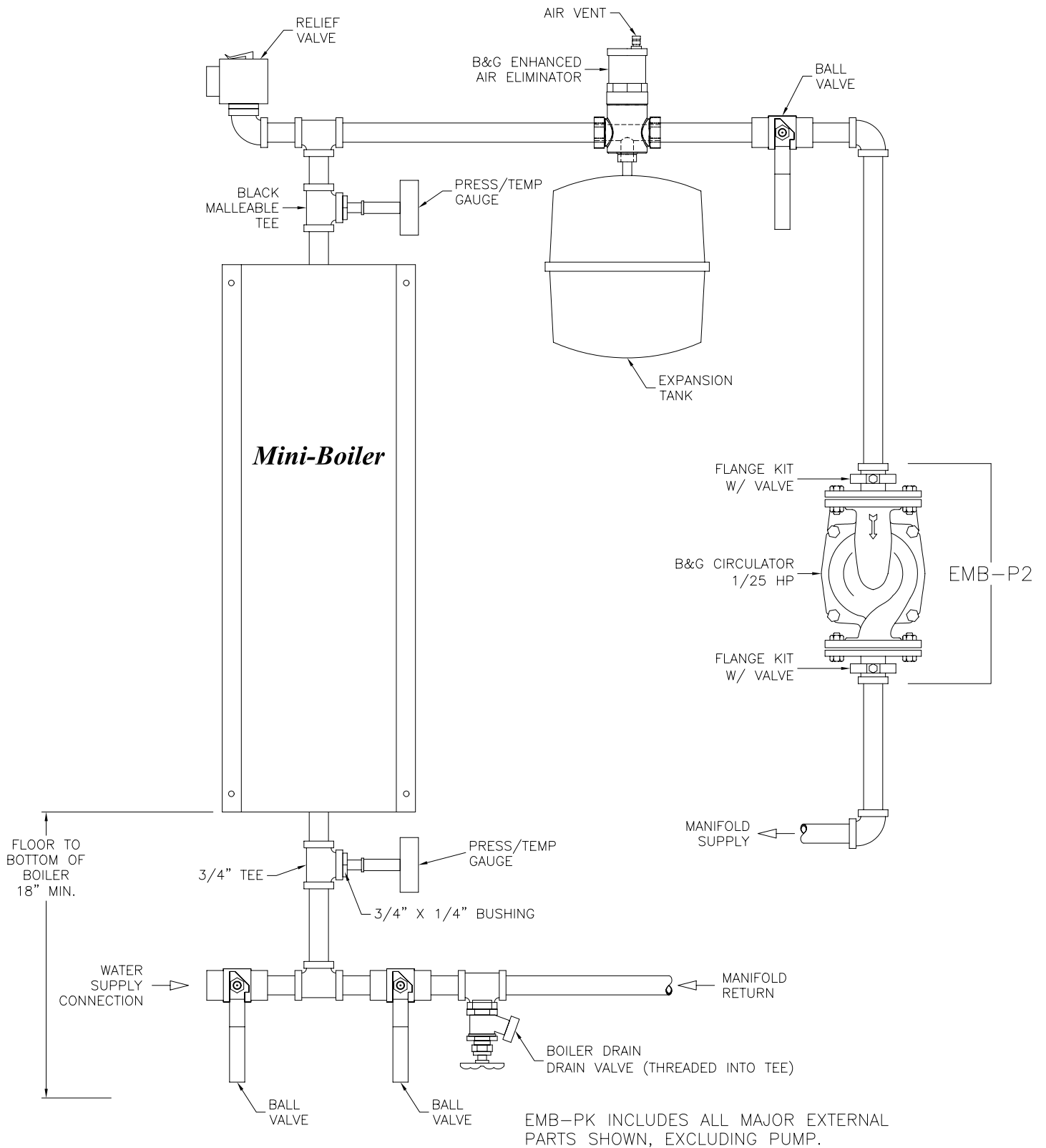
- ① COMPONENTS INCLUDED WITH EMB-1, EMB-2, EMB-4, EMB-5, EMB-9, EMB-45 AND EMB-90
- ② COMPONENTS INCLUDED WITH EMB-BK KIT
- ③ COMPONENTS INCLUDED WITH EMB-P2 (PUMP) KIT
- ④ COMPONENTS NOT INCLUDED, SHOWN FOR REFERENCE ONLY

NOTES:

1. INSTALLATION KIT (PART NUMBER EMB-BK) INCLUDES ALL PIPING PARTS (LESS PUMP & FLANGES) EXTERNAL TO THE 9.5" X 30" X 7" ENCLOSURE.
2. 3/4" COUPLING AND 2-1/2" X 3/4" NIPPLE VERY IMPORTANT. BOTTOM KNOCKOUT ACCESS REQUIRED FOR ELECTRICIAN.
3. ADD NECESSARY DRAIN PIPE.
4. SEE INSTRUCTION MANUAL FOR PRESSURE CONCERNS AND MAY NEED BACKFLOW PREVENTER.
5. SLAB STAT, ORDER NUMBER: ES-24-SRO.

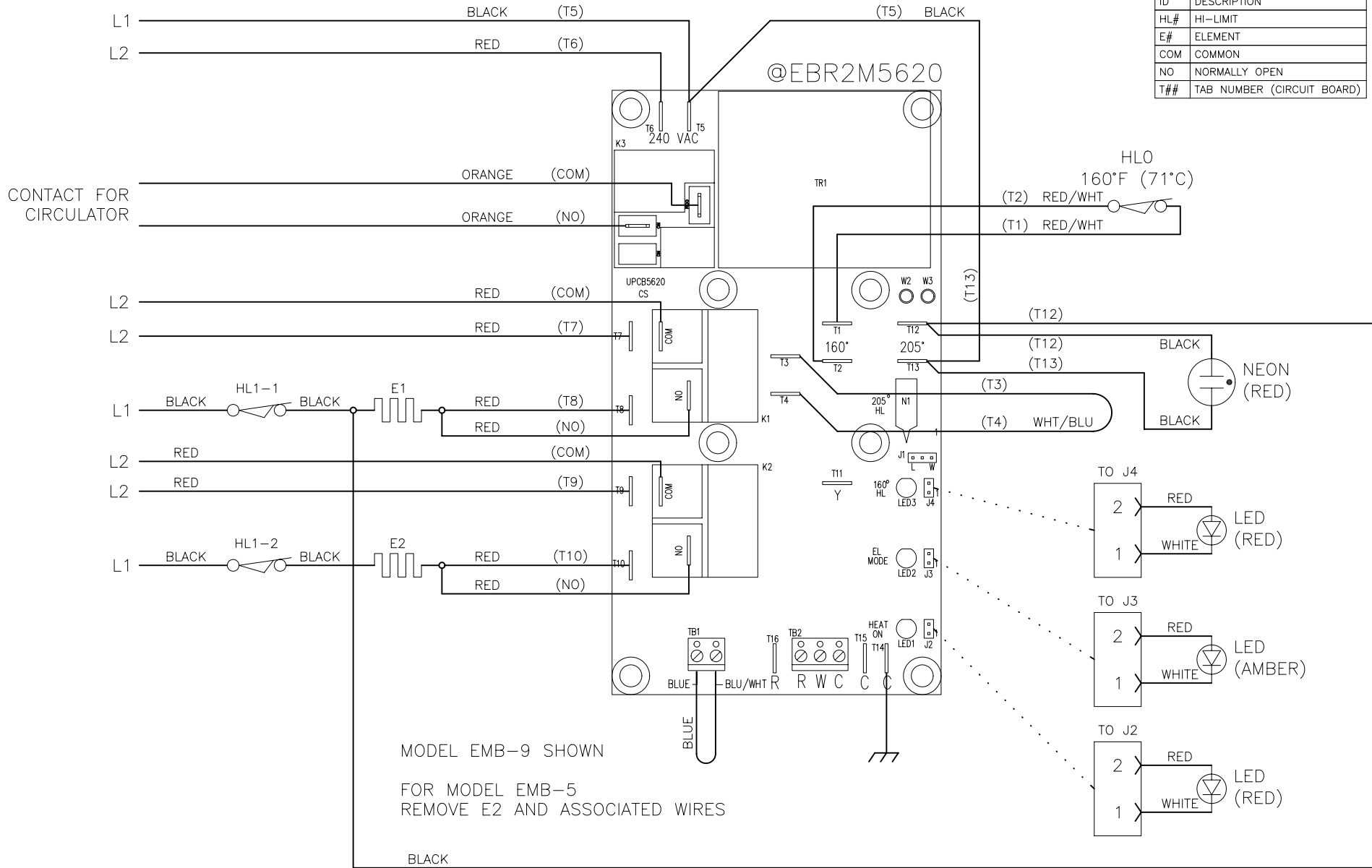


"PREFERRED" MECHANICAL PIPING DIAGRAM



MINI-BOILER (EMB-5, EMB-9) WIRING SCHEMATIC

ID	DESCRIPTION
HL#	HI-LIMIT
E#	ELEMENT
COM	COMMON
NO	NORMALLY OPEN
T##	TAB NUMBER (CIRCUIT BOARD)



BOILER ACCESSORIES

ZONE CONTROLLER

This will simplify your wiring and make zoning applications much easier. In addition, enhanced communicating features have the ability to stage the electric boiler based upon the connected zone capacity.

Standard Features

- **Utility load control**
- Terminal block wiring, visual wiring layout
- Indicator lights showing zone operation
- 24-volt, 40VA transformer 120/208/240 connection
- Fuse protection
- Priority option
- Dual temperature operation
- Applies to digital or standard thermostats
- Dial switch, select each zone capacity



Pumps, Actuators, Valves

- EB-ZTA-1 - install within boiler cabinet
- EB-ZEA-1 - with enclosure and 40VA transformer
- EB-ZEA-2 - add additional 4, enclosure and 40VA

Pumps

- EB-Z2P - two pumps with priority and dual temp.

Zone Valves

- EB-ZTS-1 - install within boiler cabinet, encl. option
- EB-ZTS-2 - add additional 4, enclosure and 40VA

All Others

- EB-ZXA-1 - universal, pumps or valves, non-communicating, for any boiler
- EB-ZS-4 - automatic staging system for Brand X boilers or dual EB-R, -L, -E Series
- EB-ZC-4 - wiring and convenience interface, isolated boiler end switch
- EB-5415A - low cost, 2 or 3 zones, sheds one boiler stage (Mini-Boiler enhancement)

SLAB STAT

Sensing and controlling the system based upon radiant floor surface temperature or the concrete mass has very positive benefits. Radiant floor air stat in the same area as a forced air roomstat presents serious control problems. A remote sensing slab stat for the radiant floor removes this issue.

Remote sensing slab stat is required for storage applications.



ES-24-BR

SWITCHING RELAY - EE-5051

This DPDT 24-volt switching relay provides a convenient solution to any AC or DC application.



- **Ideal for zone pumps**
- 24V coil
- 120V, 10A, contact sets
- Easy to wire and nicely packaged

MULTI-BOILER - EB-C-STG5

Electrically connects between 2nd and 3rd, 3rd and 4th, etc.

OTHER OPTIONS

- SOT-1 Switchover to standby, total run time
- 5701 Single feed bus for 2 CB's (SQ-D CB)
- 5702 Single feed bus for 3 CB's (SQ-D CB)
- EB-S-SB Dual boiler option for EB-S Series
- WF-ANZ5 WarmFlo Analyzer, now applicable to WO and WA Series

Specifications subject to change without notice, all rights reserved.



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TWO SUPPLY WATER TEMPERATURE REQUIREMENT

- Handled as the priority zone on multi-zone (EB-ZEA-1) or two pump (EB-Z2P) controllers
- Priority switch on, zone 1 active - TS boiler automatically changes to 150° (or selection 176°) supply water setting
- All other zones are held off
- With zone 1 satisfied or 60-minute timeout, the boiler automatically returns to the preset temperature and reacts to the other zones

Low Temp	High Temp
Radiant, slab	Radiant, staple up
Radiant, slab	Baseboard
Radiant, slab	Fan coil
Radiant, slab	Water heater, side arm
Radiant, slab	Hanging unit heater (garage, shop, etc.)

INSTALLATION PLUMBING KITS

These installation kits provide the critical plumbing components needed for easy installation of the Electro-Boiler. **In addition** to the items shown in the matrix below, each kit includes all necessary ball valves, drain valve, tees, elbows, nipples, bushings, couplings, etc. for direct connection to circulator pump and/or manifold.

Electro Industries' boilers come standard equipped with outlet temperature/pressure gauge, pressure relief safety valve, and when applicable, the WarmFlo™ electronic control sensors. These kits provide the additional components for easy installation:

Model	Application	Return Gauge	Expansion Tank	Air Vent
EMB-BK	All EMB Series		2.1 gal. (7.9 L), 40,000 Btu/h	Basic float type
EMB-PK	All EMB Series	✓	2.1 gal. (7.9 L), 40,000 Btu/h	Enhanced air separator, EAS
EB-PK-M	EB-MS, -MA, -MO Series	✓	4.5 gal. (17 L), 135,000 Btu/h	Enhanced air separator, EAS
EB-BK-TS	EB-S, -WA, -WO Series		4.5 gal. (17 L), 135,000 Btu/h	Basic float type
EB-PK-TS	EB-S, -WA, -WO Series	✓	4.5 gal. (17 L), 135,000 Btu/h	Enhanced air separator, EAS

CIRCULATING PUMPS



5585 - Mini-Boiler & 10 kW TS Series

- 120V, 1/25 HP, maintenance-free wet rotor circulator
- Pump curve example - 5 GPM (19 L) @ 11 ft. of head (32.9 kPa)



5586 - TS Series, Standard

- 120V, 1/6 HP, maintenance-free oil lubricated circulator
- Pump curve example - 10 GPM (37.8 L) @ 20 ft. of head (50.8 kPa)



**5578 - 3/4" Pipe
5582 - 1" Pipe
5579 - 1-1/4" Pipe**

- Two flanges, with isolation valve

LIMITED WARRANTY STATEMENT

Electro Industries, Inc., expressly warrants its products to the original purchaser of this product, except as noted and listed below, to be free of defects in material and/or workmanship for a period of three (3) years from manufacturing date code or two (2) years from date of installation, whichever occurs first. Except for this express warranty, the purchaser accepts product(s) AS IS. Remedies under this warranty are limited to repairing or replacing, at Electro Industries option, any malfunctioning part or component which shall, within the above stated warranty, be returned to Electro Industries at the address listed below, freight prepaid.

Certain products also have an extended period on specific components or parts. If this applies to this product, they are listed below under the paragraph entitled Key Component Extended Warranty.

Special **labor** allowance – if there is a part or component failure within the first ninety days of installation and this repair diagnosis/part replacement is handled by a certified contractor, reasonable labor allowance can be requested. Also the product involved with this failure must have been purchased by the certified contractor direct from Electro Industries or through a distributor channel to the certified contractor. Request approval of the labor allowance at the time of replacement part ordering or if the replacement part is from an installing contractor's stock, the return tag must include all pertinent information and the request for labor allowance.

This limited warranty **does not** cover – normal maintenance; replacement of fuses, filters, refrigerant, etc.; transportation and installation charges for the replacement part or component (except special allowance above); or any other service calls or labor repairs.

Exclusions or conditions that would nullify/void warranty:

1. Application and installation that is in violation of state and federal codes or statutes.
2. Product has been altered, adjusted, misused, replaced, or repaired from original manufactured condition.
3. Product failure, breakage, or other loss, is the result of any negligence, misuse, or fault on the part of any operator or other person not under our supervision or control.
4. In the case of goods not manufactured or supplied by the manufacturer, manufacturer shall only be liable to the same extent that our supplier is to manufacturer, not to exceed any liability manufacturer would have for warranty.
5. Damage resulting from improper voltages or power supply source.
6. Installation in an area where atmosphere contained chemical erosion.
7. If components are damaged due to freezing or water chemistry erosion.
8. If components are damaged due to galvanic corrosion caused by improper or failure to isolate two dissimilar metals.
9. Incorrect product/sizing installed for application.
10. If unit is not installed according to manufacturer's specifications and installation instruction manual.
11. If product has modifications to internal wiring, removal or bypass of parts, bypassing of safety circuits, modification of parts or circuit boards, or mechanical airflow changes not authorized in writing by the factory.
12. Buyer has not paid in full any invoices submitted to Buyer, which are due for payment.
13. Unusual wear and tear of product.
14. If the invoice is marked "AS IS".
15. If the nameplate decal and the certification label (including serial number) are (either) defaced or destroyed.
16. Damages resulting in shipment or handling by the freight carrier. It is the receiver's responsibility to claim and process freight damage.

The returned part or component must contain a warranty tag or information clearly stating serial number, installation date, and nature of failure.

Replacement of a part or component under this limited warranty does not extend the warranty term or period.

(over)

There are no other express warranties. Specification sheets and descriptions of this product are only to identify it, and are not a warranty claim that the unit fits the description. We do not warranty this product suitable for the specific installation or application. It is the owner's (or installer's) responsibility for proper application.

Electro Industries is not bound by representatives, installers, warranties, or promises made by others beyond the terms of this express warranty. In no event shall Electro Industries be responsible for any installation incidental or consequential damages.

Any action for breach of this limited warranty must be commenced within one year from the date of the breach.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. For example, some states do not allow the exclusion or limitation of incidental or consequential damages. So the above limitation may not apply to you.

Freight/In Transit Claims

The owner of the shipment, according to the F.O.B. terms of the Purchase Order, must make claims for damage or storage in transit against the carrier. Buyer has the responsibility to inspect shipments before or during unloading to identify any such damage or shortage and see that appropriate notation is made on delivery bill of material or inspection report in order to support claim. All damages must be reported to Electro Industries, Inc. within two business days of receipt/refusal of product.

Returns

Typically stocked products, as defined by Electro, shall be accepted for credit only in original saleable condition and only with Electro's prior authorization (RMA#). Product/parts must be returned within 30 days after authorization. Electro will assess charges for freight both ways and a restocking charge to restore such goods to the regular plant inventory. If Electro receives product/part, which are not, in Electro's opinion, in acceptable condition, credit allowance will not be made. Credit will be issued on the basis of purchase or current price; whichever is lower. Non-stock products made specifically to order are not subject to return for credit.

Extended Limited Warranty

Certain products have components that qualify for possible extended warranty from Electro's standard limited warranty. The extended warranty is for part(s) replacement and must meet the following conditions:

1. Original installation certification sheet/card must be completed and returned to factory at time of installation.
2. Original purchaser.
3. Original installation/application must meet original product installation guidelines.

Extended Limited Warranty Parts – 15-year

5620	Electro-Mate/WarmFlo/Air Make-Up Element
5621	Electro-Mate/Air Make-Up Element
5520	Boiler Element, 240
5521	Boiler Element, 208
5550	Boiler Vessel – Large
5555	Boiler Vessel – Small
5578	Boiler Vessel – Large (TS Series)
5591	Boiler Vessel – XL
3802	Boiler Vessel - Midsize



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