

ELECTRO-BOILER

EZB-Eco[®]

INSTALLATION & OPERATING INSTRUCTIONS

Model: **EZB-T1-05-240-1**
 EZB-T1-07-240-1
 EZB-T1-10-240-1
 EZB-T1-12-240-1
 EZB-T1-15-240-1
 EZB-T1-17-240-1
 EZB-T1-20-240-1

APPLICATION:

The EZB-Eco is a packaged system complete with boiler vessel, expansion tank, air eliminator and circulating pump. It is designed to be used in a variety of radiant hydronic heating applications. These include radiant floor, baseboard or radiator heating. These applications can be single or multiple zones. If any single zone provides less than the minimum required GPM of the boiler, an Electro Industries' zone controller option is **highly recommended**.

This series is equipped for load management interrupt with backup boiler output.

ACCESSORIES: Electro Zone Controller models EB-ZEA-1 and EB-ZES8
 Electro Dual Fuel Control Module EB-S-SB

IMPORTANT: The included expansion tank is shipped loose within the EZB-Eco enclosure. The expansion tank must be installed prior to filling the system. See Mechanical Installation section.

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

Conforms to: UL STD.UL834
Certified to: CSA STD.C22.2#165

DO NOT DESTROY THIS MANUAL. PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE BY A SERVICE TECHNICIAN.
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INTRODUCTION

The EZB-Eco has been designed to be the complete system package for radiant heat applications. When properly sized, the EZB-Eco will provide the needed hot water to properly heat a space in a single zone or multiple zone application. With its unique WarmFlo technology, the EZB-Eco can easily modulate output based on the level of demand from a single or multi-zone system. Proper design of the radiant system is required to assure minimum required water flow (GPM) through the boiler.

BOILER CONTROL

The EZB-Eco can be operated with a single thermostat or multiple thermostats connected to the R-W terminal. It can also be controlled through an Electro zone control board or other brand zone controller. Do not jumper the R-W terminals for hot boiler application. This can cause unpredictable results and possible high limit lockout of the boiler elements resulting in no heat output.

The EZB-Eco can be used in dual heat/dual fuel applications. Existing components should be evaluated for removal as the EZB-Eco contains components that can be used by both systems. If you are considering adding an electric boiler to relatively new existing gas boiler system, contact the factory for additional information.

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 by approximately 25%. The installed transformer has a primary tap for 208-volt. Rewire the internal transformer so the boiler is using this primary tap for 208-volt applications.

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.

SYSTEM OR WATER FLOW

In order to prevent hi-limiting and assure full 20+ years parts life, the piping system/basic plumbing/circulator pump must be arranged to provide flow greater than minimum GPM shown in Table 1 below. If zoned system, this applies when the smallest zone is operating.

TABLE 1 - ELECTRO-BOILER SPECIFICATION

Model	Volts	Phase	Watts	Btu/h	Amps	CB	GPM
							MIN
EZB-T1-05-240-1	240/208	1-60 Hz	5,000/3,500	17,060/12,795	21.8A/18A	30A	1.0
EZB-T1-07-240-1	240/208	1-60 Hz	7,000/5,300	23,885/17,913	29A/25A	45A	1.0
EZB-T1-10-240-1	240/208	1-60 Hz	10,000/7,500	34,121/25,591	42A/36A	60A,	2.0
EZB-T1-12-240-1	240/208	1-60 Hz	11,500/8,600	39,239/29,429	48A/41.5A	60A,	2.0
EZB-T1-15-240-1	240/208	1-60 Hz	15,000/11,300	51,182/38,386	62.6A/54A	30A +60A,	2.0
EZB-T1-17-240-1	240/208	1-60 Hz	17,500/13,100	59,712/44,784	73A/63A	45A+60A	2.0
EZB-T1-20-240-1	240/208	1-60 Hz	20,000/15,000	68,242/51,182	83A/72A	60A+60A	2.0

Circulating Pump, all boiler models	120V 60 Hz	0.54 Amps	10A CB
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MULTIPLE ZONES AND RADIANT TEMPERATURES

Same water temperature all zones – in this case the system can be setup as one pump with the water circulated through the boiler and directly to a manifold containing the various zone valves. Although this model series has a built-in outlet sensing and controller mechanism for staging the elements, also consider the next section, Zone Controller. If not using zone controller, the end switches of all of the zone valves are paralleled and directly control R and W to turn on the boiler.

Electro Industries' Zone Controllers – the Electro Industries' zone controller priority zone has the ability to communicate with this EZB-Eco Series boiler and it will automatically switch to a high water temperature (150° F or 180° F) during zone 1, priority switch on, operation. With this feature the EZB-Eco boiler can automatically take care of two temperature requirements thus eliminating the need for the technique described in the paragraph above.

ZONE CONTROLLER

This EZB-Eco Series boiler controls the electric elements based upon water temperature independent of flow; therefore, in theory, a staging zone controller is not required; however, there are three suggestions or reasons why a zone controller can simplify the installation and enhance overall performance.

1. **Zone wiring and troubleshooting convenience** – the addition of the zone board allows for easy terminal block and point to point wiring for each zone thermostat and each zone valve. Also there are LED's associated with the thermostat action and the zone valve action. This greatly simplifies wiring and future troubleshooting with a neat terminal block wiring arrangement and the onboard LED's.
2. **Prevents over control or false staging up and down when the temperature sensors are attempting to regulate** – since Electro Industries' zone controllers have staging smarts, the addition of the zone controller will provide smoother boiler temperature control. The zone board has a dial switch for each zone and the installer selects one of four zone capacity sizes. When dialing in the size closest to the zone Btu/h capacity, the zone controller smarts only allows the appropriate boiler stage which can handle that capacity. Also this is additive if more than one zone calls at any one time.
3. **Two temperature system with unbalanced zones** – if the application includes zone one requiring high temperature (fin tube, air handler, etc.) and the remaining zones are radiant floor low temperature, this zone controller will automatically raise the output of the high temperature zone. This is a priority arrangement, zone 1 holds off the other zones while the high temperature output is heating. If at the end of the high temperature zone there is a call on any of the low temperature zones (up to three plus slave 4), there will be a pump only function until the outlet temperature drops below the front panel dial setting.

ZONE VALVES/CIRCULATORS

It is recommended to use zone valves in multi-zone applications with the EZB-Eco boiler.

ROOM THERMOSTAT PLACEMENT

Fin tube radiation, fan coil, etc. – heat only wall thermostat, connected to operate zone valves (see previous section) or for single zone the thermostat is connected directly to EZB-Eco R and W.

Floor radiant – comfort and proper space heating response is a direct relationship to the thermostat type and the placement of the thermostat sensing bulb. Typically an under floor heating system can be broken down into three categories.

- A. **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" PVC, minimum bend radius of 7 inches, and locate at approximately center (vertical) of the concrete slab. The thermostat sensing

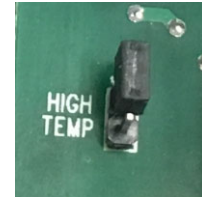
bulb can later be pushed down this PVC conduit. If the slab is already poured without conduit for slab stat, use electronic remote sensing thermostat.

B. Floor covering, medium to high insulation – use slab stat as described in paragraph A above.

C. 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.

TWO-TEMPERATURE OPERATION OR FEATURE

When using Electro's zone controller in priority mode, the boiler system can automatically raise the outlet temperature with zone 1 calling. This is setup for default of 150° F or pulling a jumper peg the high temperature value is 176° F. See appropriate zone controller installation manual for details.



Outdoor Reset Option

The EZB-Eco boiler comes equipped with an outdoor sensor (shipped loose). This sensor can be connected to the board to allow for outdoor reset function.

What is Outdoor Reset?

Outdoor reset is where the Electro Boiler DT (desired water temperature) shifts up and down based on the outdoor temperature. The water temperature coming out of the boiler will be higher when it's cold outside and lower when it's warmer outside. The idea is to have the boiler work with the building heat loss to maintain a more even BTU delivery to the space. This helps with overall system efficiency as well.

Outdoor Reset Activation

If it is determined that outdoor reset is required for this application, it needs to be activated.

Follow this sequence to activate outdoor reset:

Step 1: Power down the Electro-Boiler

Step 2: Connect the outdoor sensor

- Red wire to RED
- Black wire to OT
- White wire to COM

Step 3: Power up the Electro-Boiler

See: CONTROLLER SETUP for more information on outdoor reset.

BOILER/PIPING PLACEMENT

This model series is wall hung and the vessel must be vertical, drawing BX603.

Additional plumbing items are located below the boiler housing itself as shown on drawing BX603.

For future servicing, the unit itself **must be installed 18"** or more above the floor, the elements are screwed in from the bottom.

INFORMATION/WATER FLOW CALCULATIONS

Water flow, GPM, can easily be calculated if the temperature rise across the electric boiler can be measured.

The formula 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.

$$\text{GPM} = \frac{\text{Volts} \times \text{Amps} \times 3.4}{500 \times \text{Temp. rise}}$$

INSTALLATION REQUIREMENTS

1. All installation work should be performed by trained, qualified contractors or technicians. Anyone installing this boiler should carefully study this manual prior to installation to get familiar with and plan how the boiler will be installed.

WARNING

ALL ELECTRICAL WIRING MUST BE IN ACCORDANCE WITH NATIONAL ELECTRIC CODE AND LOCAL ELECTRIC CODES, ORDINANCES, AND REGULATIONS.

WARNING

OBSERVE ELECTRIC POLARITY AND WIRING COLORS. FAILURE TO OBSERVE COULD CAUSE ELECTRIC SHOCK AND/OR DAMAGE TO THE EQUIPMENT.

CAUTION

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 ETL/Intertek certification, and manufacturer product liability. Electro Industries, Inc., cannot be held responsible for field modifications, incorrect installations, and conditions which may bypass or compromise the built-in safety features and controls.

2. This installation manual and Electro-Boiler products relate only to the addition of the Electro-Boiler to the hydronic system. The owner/ installer assumes all responsibility and/or liability associated with any needed installation of the gas/oil boiler, pump, plumbing, system design, hydronic systems or backup gas/oil boiler, etc. Any instructions or comments made within this manual (or factory phone assistance) relating to the gas/oil furnace are provided as comments of assistance and helps only.

CAUTION

Hazards or unsafe practices could result in property damage, product damage, severe personal injury and/or death.

3. Remember, safety is the installer's responsibility and the installer must know this product well enough to instruct the end user on its safe use.

Safety is a matter of common sense - - a matter of thinking before acting. Professional installers have training and experienced practices for handling electrical, sheet metal, and material handling processes. Use them.

CLEARANCES

	MINIMUM CLEARANCE		SUGGESTED MINIMUM SERVICE CLEARANCE	
LEFT SIDE	1 INCH	26 MM	12 INCHES	305 MM
RIGHT SIDE	1 INCH	26 MM	12 INCHES	305 MM
BACK	REQUIRED CLEARANCE – 0 INCHES/0 MM			
FRONT	REQUIRED CLEARANCE – 6 INCHES/153 MM			
TOP	REQUIRED CLEARANCE – 14 INCHES/356 MM			
BOTTOM	REQUIRED CLEARANCE – 14 INCHES/356 MM			
SURROUNDING AMBIENT TEMPERATURE MUST NOT EXCEED 90° F/32° C.				

CAUTION

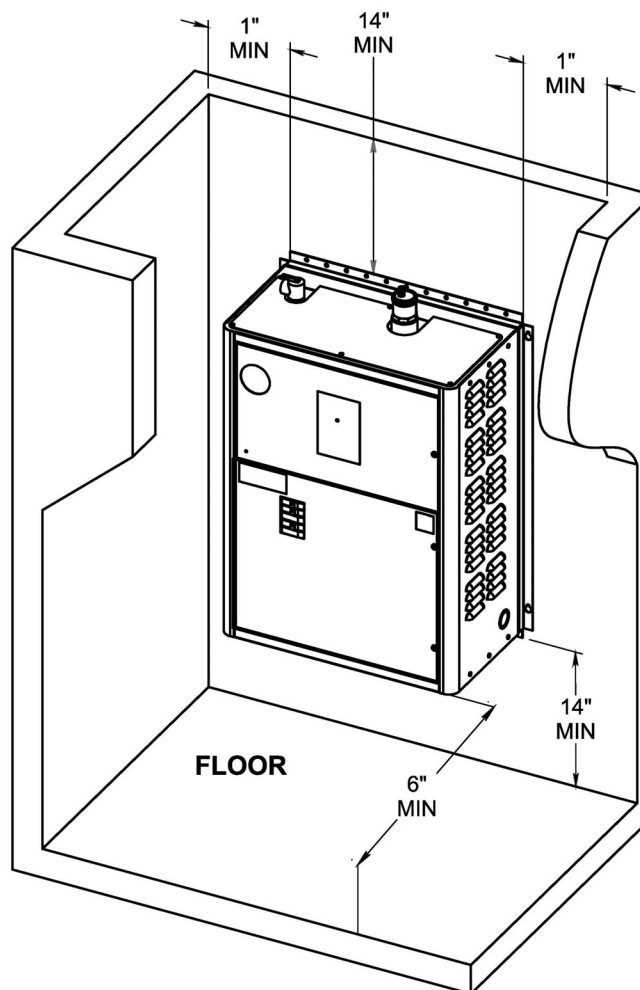
For all installations, whether in a room or enclosed space, adequate ventilation must be provided so this boiler's surrounding ambient temperature **does not** exceed 90° F/32° C.

WARNING

FOR SAFETY REASONS ALL COMBUSTIBLE AND NON-COMBUSTIBLE MATERIALS MUST BE KEPT AT LEAST ONE INCH AWAY FROM ANY SURFACE OF THIS BOILER.

CAUTION

This electric boiler is **ONLY** designed for indoor installation. It is **NOT** designed for outdoor installation.



MECHANICAL INSTALLATION – UNDER-FLOOR RADIATION

CAUTION

Electro Industries Inc. requires the use of dielectric isolation between the boiler 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 BX603

1. Unpack the EZB-Eco boiler. Shipped loose from the boiler are outdoor sensor, pump check valve and mounting assist bracket.
2. The mounting assist bracket is used to hold the boiler in place during installation. Locate where the bottom of the boiler will be on the wall. Securely fasten the mounting assist bracket to the wall with the bent flange sticking out. This will allow you to “rest” the boiler between the flange and the wall while the boiler is secured to the wall installing mounting bolts through side and top boiler flanges.
Do not remove the mounting assist bracket until you have securely bolted the boiler to the wall. The unit must be positioned with the vessel **vertical**. The unit will not function properly with the vessel in a horizontal position. **NOTE: Mount at least 18 inches above the floor** to allow element removal and service at the bottom.
3. **Expansion tank installation** – the expansion tank is included but shipped loose within the EZB-Eco, and must be installed prior to filling the boiler and system with fluid.

CAUTION

Use proper tools to install expansion tank. Attempting to tighten by hand will result in damage to the expansion tank.

- a. Remove and unpack the expansion tank from within the EZB-Eco enclosure.
 - b. To prevent water leaks, apply Teflon tape or suitable thread sealant (not included) to the threaded nipple of the expansion tank.
 - c. Thread the expansion tank into the designated shutoff fitting located at the bottom of the air eliminator assembly. Use a 7/8” wrench to tighten the expansion tank at the designated fitting on the expansion tank. **DO NOT ATTEMPT TO TIGHTEN BY HAND.**
 - d. Open the shutoff valve between the expansion tank and air eliminator assembly. Failure to open the valve will create problems when pressurizing the system during fill procedures.
4. The key mechanical components included with the EZB-Eco are:
 - **Expansion Tank** – provides constant system pressure. The expansion tank is pre-charged to 12psi.
 - **Air Vent/Inline Air Separator** – provides a means to trap and remove air from the hydronic system. Loosen small cap on top of air eliminator to allow air to purge. Tighten cap to finger tight only after system has been sufficiently purged of all air. This can take several days.
 - **Pressure Safety Valve** – 30psi pressure relief valve will release water when system pressure exceeds 30psi. During purging there is a requirement to bleed out the initial air within this 1” pipe leg by manually holding open the relief valve. Add the necessary pipe extension to the relief valve to prevent water damage on this unit or surrounding area.
 - **Circulating Pump** – the included pump provides water flow throughout the hydronic system. This is a 3-speed pump, shipped from the factory set to high speed. The pump speed may be adjusted as needed for ideal system temperature rise. Electro recommends allowing your hydronic system to warm to desired temperature before adjusting pump speed. A pump check valve is shipped loose with the EZB-Eco. For single pump systems it is not required. If the EZB-Eco is piped in conjunction with a fossil fuel boiler with internal pump, the check valve may need to be installed. Contact the factory for more information.

5. Piping between the EZB-Eco and hydronic system manifolds is shown on drawing BX603. When following this diagram, the water fill procedure becomes very simple and almost guarantees the removal of all air or prevents air locking problems. Experienced hydronic heating installers may be able to eliminate some components but the inclusion of these components guarantees installation and initial operating success. Material used for piping between the EZB-Eco and the manifolds may include copper, black iron or oxygen barrier PEX tubing rated for hydronic heating.
6. When connecting pipe of dissimilar metal to the inlet and outlet of the boiler, dielectric unions must be used.
7. To ensure safe boiler operation, adequate system pressure must be maintained. Once all the air is purged from the system, adding additional water may be required to bring the system up to operating pressure, 12psi.
8. Depending upon water conditions, determine whether water additives are necessary.
9. Purge and fill water system. Do not allow the electric element to come on until the system is purged and you have verified proper water circulation. If the pump is needed, jumper the two orange wires in order to operate the pump directly from its own 120-volt source.
10. Purge each loop individually, one at a time.
11. Check for leaks.

ELECTRICAL HOOKUP

Reference drawing BH601

1. **240/208-Volt Heating Power** – route and install the proper current carrying conductors from service panel fuse or circuit breaker. See Specification Table and/or product nameplate for ratings. These models contain built-in circuit breakers and meet the requirement for local disconnect for appliances greater than 10 kW. Connection is at the circuit breaker terminals. If using single feed method, single feed bus – order part number 5701.
 - Only copper wire is allowed.
 - Circuit Breaker 1 is highest priority stage.
 2. **Grounding** – copper conductor is required, size per NEC code relating to the current of each feed.
 3. **120-Volt Circulating Pump Power** – route and install the proper current carrying conductors from service panel fuse or circuit breaker, 10-amp maximum. These models contain a built-in 10A circuit breaker. Wire connection is at the circuit breaker and neutral/ground terminals.
 - Only copper wire is allowed.
 4. **Operating Thermostat** – two types can be used. Connection is at the control board bottom.
 - **Standard Mechanical** – connect to R and W, bottom right. Set thermostat internal heat anticipator to 0.2.
 - **Floor Sensing Stat** – connect to R and W, bottom right. Place slab sensor in the slab.
 - If needed, can connect thermostat C to boiler C.
- NOTE:** Power robbing/power stealing thermostat – if you have a power robbing or power stealing thermostat, you must use the resistor included with the thermostat. Place this jumper between boiler W and boiler C. If resistor is not used, intermittent boiler operation can be expected.
5. **Load Management Interrupt Control (LMC)** – this Electro-Boiler series has been pre-wired and designed for an external utility load management receiver connection. The control board lower left terminal block marked BLU and BLU/WHT represent the two contact points, extend these wires to the utility 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 keep the blue jumper in place.
 - Optional – if the power company disconnects 240V for load control, contact factory for drawing BH029 for special wiring requirements.
 6. **Outdoor Sensor** – the loose OT sensor needs to sense true outdoor temperature. Mount on an outside wall position that will represent the most accurate outdoor temperature. If possible shade from direct sun rays. Maintain a distance of 3 feet from dryer or other exhaust vents. Sensor length is 25 feet. The sensor can be extended up to 50 feet by splicing on a 3 conductor wire. Secure wire connections should be made to prevent inaccurate or false sensor readings to the control board.
 7. **Zone Valves or Zone Pumps** – see Zone Controller section for options.

WARNING

THE END SWITCHES FROM THE ZONE VALVES **MUST BE** AN ISOLATED CONTACT WITH NO VOLTAGE PRESENT ON THESE WIRES OR SCREW TERMINALS. THIS IS VERY IMPORTANT TO MAKE SURE THERE ISN'T ANY INTERFERENCE OR FEEDBACK BETWEEN THE TRANSFORMER OPERATING THE ZONE VALVE SYSTEM AND THE TRANSFORMER WITHIN THIS ELECTRO-BOILER PRODUCT. ONCE THIS HAS BEEN DETERMINED, ALL END SWITCHES ARE SIMPLY PARALLELED WITH THE TWO WIRES GOING TO R AND W.

8. **Low Water Cutoff** – a low water cutoff is not included or factory required for the boiler. However, one can be added to the LMC circuit. Simply place the field provided flow switch in series with this circuit.

NOTE: The L/W (J3) jumper must be in the W position.

9. **Flow Switch**– a flow switch is **not** included or factory required for the boiler. However, one can be added to the LMC circuit. Simply place the field provided flow switch in series with this circuit.

NOTE: The L/W (J3) jumper must be in the W position.

WATER ADDITIVES/TREATMENT

Water treatment is strongly suggested to prevent scale deposits, corrosion from acids, oxygen, and other harmful elements within the specific water supply. It is the installer or user's responsibility to verify water quality and maintain acceptable water quality throughout the life of this product.

As a minimum the following water properties must be considered:

- Hardness (ppm): 0-10
- pH: 7.5-10
- Iron Content (ppm): 0-20
- Oxygen Content (ppm): 0
- Total Dissolved Solids: 0-5000

Up to a 50/50 propylene glycol mixture is acceptable for use in these boilers

WATER FILL PROCEDURE

The following procedure applies to non-glycol or antifreeze and prepackaged plumbing kit and/or when the system is plumbed exactly as shown on drawing BX603.

CAUTION

If the building supply pressure is connected directly to supply water ball valve without pressure reducing regulator, user needs to make sure the pressure within the boiler loop does not exceed 30 PSI. Careful control of the supply water ball valve opening can take care of this. Also at steps 6 and 10, use caution to make sure the building water supply pressure does not spike the system.

1. Do not apply 240/208-volt heating power during water fill sequence.
2. Connect the temporary household water supply source (probably hose connection) to the water supply connection input.
NOTE: If water supply connection is permanent, some local building codes may require special anti-siphon check valve, RPZ check valve, or equivalent between the boiler fill regulator and the domestic water source or the city water connection.
3. Connect a drain hose to hose bib, drain valve.
4. **Open** drain valve and **close** ball valve (between drain valve and boiler). This will ensure water flushes in one direction through the system.
5. Verify any hydronic manifold valves are **open**.
6. **Open** water supply valve and **open** household water supply source.
7. Allow water to circulate, discharging through drain valve, for at least 15 minutes.
8. **Close** both the inlet and drain valves.
9. Slowly **open** the inlet valve unit the cold system pressure at the gauge reads 12 to 20 PSI, then **close** the valve.
10. Loosen the air bleed cap on top of the air eliminator.
11. Optional – to purge any remaining air in the system, energize the circulating pump by inserting a jumper across the R-W terminals on the boiler control board. Temporarily removing the blue jumper at the blue-blu/wht terminal will prevent elements from activating during this process. Run pump for 30 minutes. If a significant amount of air is removed and the boiler pressure drops below 10 PSI, slowly open the water inlet valve to build water pressure to 12 to 20 PSI.
12. Once the boiler pressure is stable, disconnect the water supply.

COMMENT: Purge one loop at a time.

CONTROLLER SETUP

Front Dial

Non-Outdoor Reset – simply set the knob to the desired outlet temperature on the front panel decal.

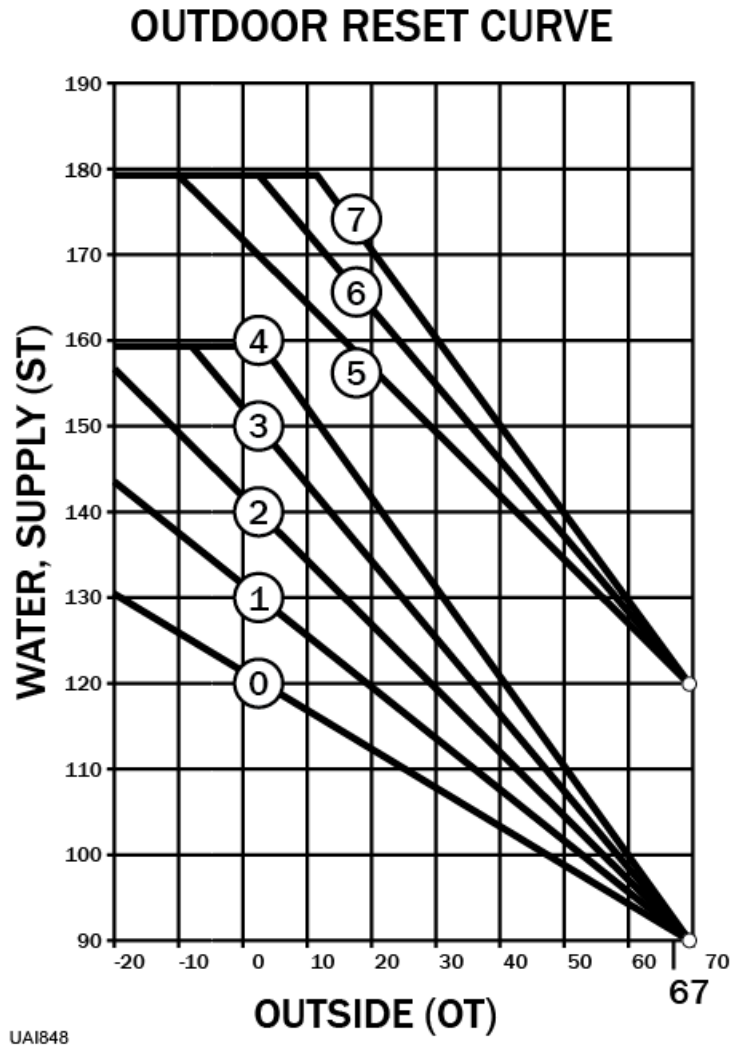
This control strategy is accomplished via disconnecting the outdoor sensor and performing a power reset to the boiler (low voltage power cycle).

Outdoor Reset – the temperature decal will relate to the OT 0° F set point and the knob numbers coincide with the curves below. High and low mass also relate to the ramp-up water temperature starting point, as shown. Select the high or low mass with the rate of temperature rise based on outdoor temp (OT).

Comment: The WF-ANZ* test set allows field change of the base temperature start point.

This control strategy is accomplished via connecting the outdoor sensor and performing a power reset to the boiler (low voltage power cycle).

The front panel temperature selection number coincides to the curves below. This temperature value shown on the front decal is actually the supply water at 0° F outside.



Staging/Modulating Jumper

The control board on the EZB-Eco boiler is a universal controller with the capability of interfacing with many different models of TS Electro-Boilers.

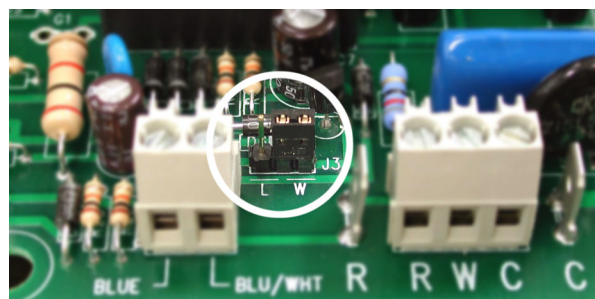
The correct setting of this jumper is determined on the model of the boiler you are working with.

For the EZB-Eco this should be set to MODULATE.



Circulator pump mode – as factory set, the circulator pump is controlled directly from the W input terminal. In this setup the circulator pump continues during load control interrupt (or optional remote standby switch). There is a provision within the controller board (inside) to allow the circulator pump to not operate during load control interrupt.

On the inside control board, just above the two bottom terminal blocks, is a small pin jumper arrangement. The black jumper sets up the pump mode. Just below this pin jumper arrangement are L and W lettering. When the two pin shorting device is in the W position, the pump is a direct function of R to W input. When the two pin jumper is in the L position, the pump is interrupted during a load control.



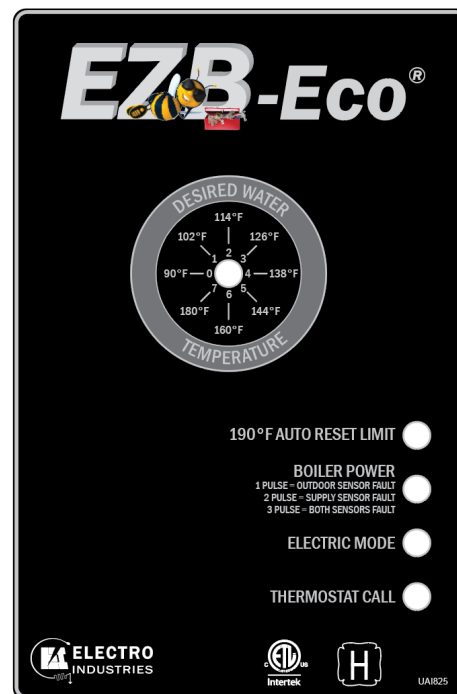
WARNING

THIS SHORTING DEVICE MUST BE IN ONE OF THE TWO POSITIONS FOR THE CIRCULATOR PUMP TO PROPERLY OPERATE.

OPERATIONAL TIPS

Front Panel Monitor Lights

- **190°F AUTO RESET LIMIT**, red – this will **only** illuminate when the vessel hi-limit opens due to excessive high water temperature. This hi-limit is self-resetting.
- **BOILER POWER**, green – basically this is illuminated at all times. It represents 24-volt power source, good fuse, controller logic is operational, and a good outlet sensor. If the outlet sensor is inoperative, incorrectly wired, or malfunctioning; this green monitor LED should be pulsing (see Troubleshooting section).
- **ELECTRIC MODE**, yellow – when illuminated the system is in the electric mode. If it is not illuminated the utility load control receiver is in the interrupt or on-peak mode. If there is an optional or remote standby switch, the status of the standby switch is also monitored by this yellow LED.
- **THERMOSTAT CALL**, red – indicates a remote switch closure (thermostat or zoning end switch) is closed between terminals R and W.



Inside Control Board Monitor Lights

STAGES, red – these four LED's indicate which electric element stages are on and active.

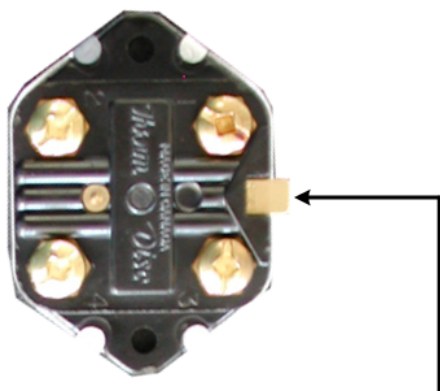
Manual Reset Hi-Limit

At the top of the vessel there will be either two or three surface mount hi-limits preset at 205° F. There is no light indicator associated with these safety hi-limits. Also these 205° F safety limits break the L2 current carrying 240/208-volt wire going to the elements. Reset involves locating a small shiny lever or metal tab protruding on the side of the black safety limit base. This small tab is pressed inward approximately 1/8" to snap in the contacts.

CAUTION

The wires and screws have 240/208-volt potential and can be dangerous. Turn off circuit breakers before investigating or attempting to reset the 205° F safety limits.

205°F Manual Reset



Press this to reset

WARNING – HIGH VOLTAGE

MUST SHUT OFF HIGH VOLTAGE BEFORE ATTEMPTING TO RESET.

Internal Fuse

The fuse on the controller board protects the transformer secondary, external items connected to R, and the circuit board itself. Replace with 2-amp, fast blow fuse or equivalent.

System Pressure

The side press/temperature gauge should be at approximately 10 to 14 PSI at room temperature water and should not rise more than approximately 4 PSI at the operating or hot water temperature. If the pressure change is more than approximately 4 PSI, the expansion tank is too small or there is a problem with the expansion tank piping, expansion tank itself.

Cold slab, outdoor reset and temperature sensing prevent full boiler on – by adding a **temporary** jumper between the lower W screw terminal and the upper left E tab, all temperature sensing functions are bypassed and the control board will step in all the stages.

CAUTION

This jumper shall not be a permanent function, jumper needs to be removed after slab is approaching normal temperature.

Standby Switchover, SOT Timer

This plug-in option device allows a selection from 40 to 80 minute thermostat operating time for automatic switchover to standby boiler. Order part number SOT-1.

Replacement Parts

WFS2	Water sensor (ST), 5 ft.
WFS25F	Outdoor sensor (OT), 25 ft.
EB5623	Control board
UFUSE0443	2-amp, fast blow fuse
4038KIT	Triac switch module
5128C	Heating relay
5535	Safety hi-limit, manual reset, 205° F
5537G	Safety hi-limit, auto reset, 190° F
5453	Relief valve, 30 PSIG
5456	Pressure/temperature gauge
5652	60A SQ D circuit breaker
5651	45A SQ D circuit breaker
5650	30A SQ D circuit breaker
5680	10A SQ D circuit breaker
EB5526	Electric element, 240V, 5 kW
EB5520	Electric element, 240V, 4.5 kW
EB5524	Electric element, 240V, 2.5 kW
5541	Transformer, 24V, 40VA
5585T	Circulating Pump, 120V
5590	Expansion tank, 2.1 gal.
5596	Air eliminator

TROUBLESHOOTING/REPAIR HELPS

1. This WarmFlo controller contains several interference suppression components, but as an electronic logic product, unpredictable and unusual transients or interference may sometimes cause strange results. If the WarmFlo controller is acting strange, one immediate step would be power down reset. Simply turn off boiler power or breaker number 1, when the green LED goes out, count to 10, and re-energize power supply.
2. Inoperative temperature sensor, if the internal program can detect a bad sensor (shorted, open wire, etc. – not necessarily bad value) the front panel green LED will be pulsing. By checking the pulsing pattern, the appropriate sensor can be identified.
 - OT sensor – 1 blink every second
 - ST sensor – 2 blinks every second
 - Both bad – 3 blinks every second

The temperature sensor can be further evaluated with diagnostic tool WF-ANZ7 WarmFlo Analyzer. This Analyzer includes the ability to fool the sensor or set in an offset for various troubleshooting purposes.

3. The terminal blocks for control wire hook-up are designed for a wire insertion and screw clamp down. If there is no wire connected and the screw is loose, the screw may not necessarily make a good electrical contact to the inside components. Example – if you are jumpering the thermostat terminals without thermostat wire connection or if you are attempting to measure voltage on the screw head, you may get erroneous or unpredictable results if the screw is not tightened down.
4. The outdoor sensor (OT) must be sensing the actual outside temperature for this controller to correctly operate (if you're using the outdoor reset configuration). Do not simply leave the outdoor sensor hang in the room and attempt to run this system.
5. Temperature sensing bypass – the inside control board, left side, contains a E tab which can be used to directly step in the heating stages and in essence bypass the temperature sensing and control functions. The E tab has the highest priority and overrides all temperature sensor functions. In other words, when jumpering from W to E all four stages are hard on. **Note:** Verify pump is operating prior to using the E terminal. Since activating this E terminal causes full electric element output, this function should only be used to verify all stages or troubleshoot proper 240 current at each element.
6. Use general heating system logic information and basic understanding of the terminal block wiring functions measure various voltage points to determine proper operation.

Sensor Temperature Calibration - Both remote sensors are digital electronic and factory calibrated. Normally these do not require field calibration or verification. However, if sensor temperature error is determined, there are two field calibration techniques. Proceed with extreme caution.

1. The outdoor sensor (OT) can be calibrated with ice (32°F). This is not a checking temperature situation. If you proceed with this function, the sensor automatically goes to 32°F. Notice a small push button next to the sensor terminal block, with the sensor at 32°F, push and hold for approximately ten seconds. When the green LED next to the fuse blinks at you, release and now the outdoor sensor is set at 32°F.

OPERATIONAL INFORMATION

Normal heating operation – when there is a heat call from the thermostat (24VAC present on the control board W-C terminals) the boiler pump will start and three indicator lights will illuminate on the front of the EZB-Eco:

- Boiler Power, steady green
- Electric Mode, steady yellow
- Thermostat Call, steady red

After a short delay of one minute or less, the EZB-Eco will begin to stage up elements (as indicated by the four red staging LED's on the inside control board) in order to reach the desired supply water temperature. The desired water temperature is set on the front dial or is determined using the front dial and the outdoor reset curve when the outdoor sensor is connected.

As the EZB-Eco reaches its set point water temperature you may see the boiler stage lights stage off and quite often you will see stage 1 LED pulse on and off or modulate. This is normal operation for the built-in WarmFlo controller as it works to maintain constant water temperature as efficiently as possible.

Note: Some model sizes will not require all four stages to control elements; however, the control board LED's may show those unused stages active.

190° auto reset high limit – under normal operating conditions the 190° auto reset LED should not come on. The built-in WarmFlo control of the EZB-Eco should prevent this. However, on a system with very low water flow or trapped air you will see the 190° auto reset activate. The water within the boiler vessel must cool by 30° F before the high limit will self-reset.

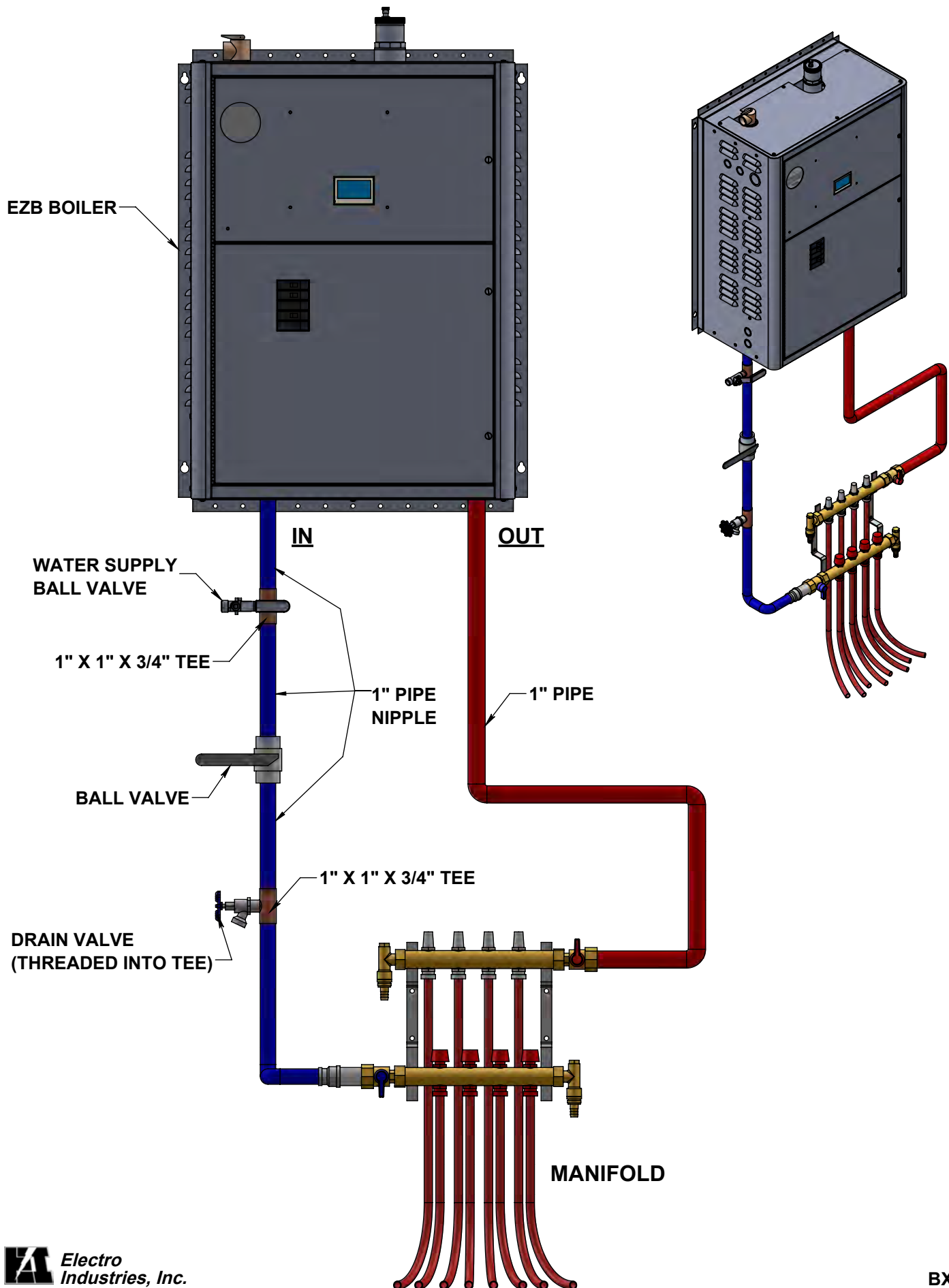
If you experience auto reset limit trips at initial startup of the EZB-Eco the following items should be checked:

- System pressure 12 to 20 PSI on boiler gauge
- All ball valves and manifold valves are in the “on” position
- Boiler and system are purged of any trapped air. Loosen air bleed cap on the top of the air eliminator.

Boiler water temperature – with a thermostat heat call, the EZB-Eco will try and achieve a temperature set point. The time it takes to reach set point will vary depending on conditions of the system. When operating at the recommended flow rate (GPM per kW) you should see an approximate 20° difference between return water and supply water temperature. On a cold start up with return water temps below 60° F, it could take a few hours for the boiler to reach a set point above 80° F. Adjusting the set point dial to a higher temperature during a cold startup will have little or no effect since the boiler cannot exceed a 20° increase in temperature from return to discharge.

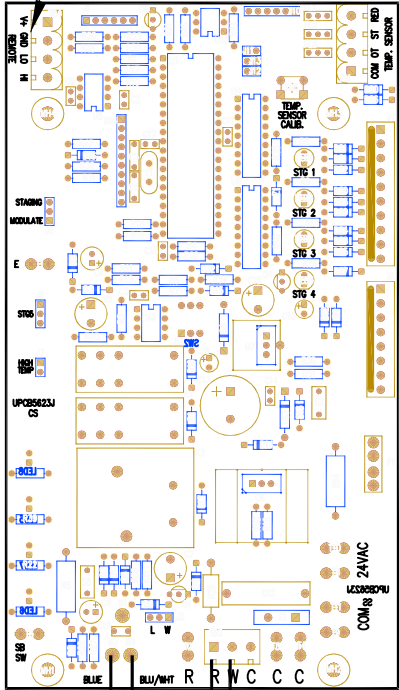
Once the return water temperature starts to increase you will start to see an increase in outlet temperature. This will continue until the outlet temperature reaches the desired set point, at which point the WarmFlo control will stage and modulate elements to hold that temperature.

EZB MECHANICAL PIPING SCHEMATIC

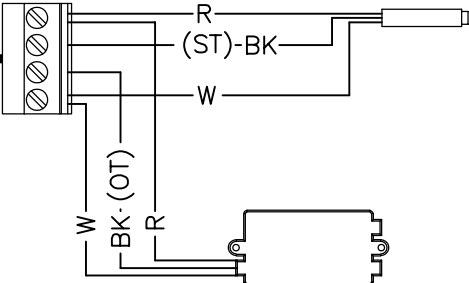


EZB-ECO LOW VOLTAGE HOOKUP

OPTIONAL ELECTRO ZONE CONTROL / INTERFACE

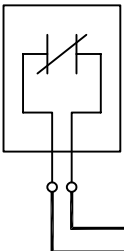


WATER SENSOR
(FACTORY CONNECTED)



OUTDOOR SENSOR
(FIELD CONNECTED)

OFF PEAK
RECEIVER
(IF APPLICABLE)

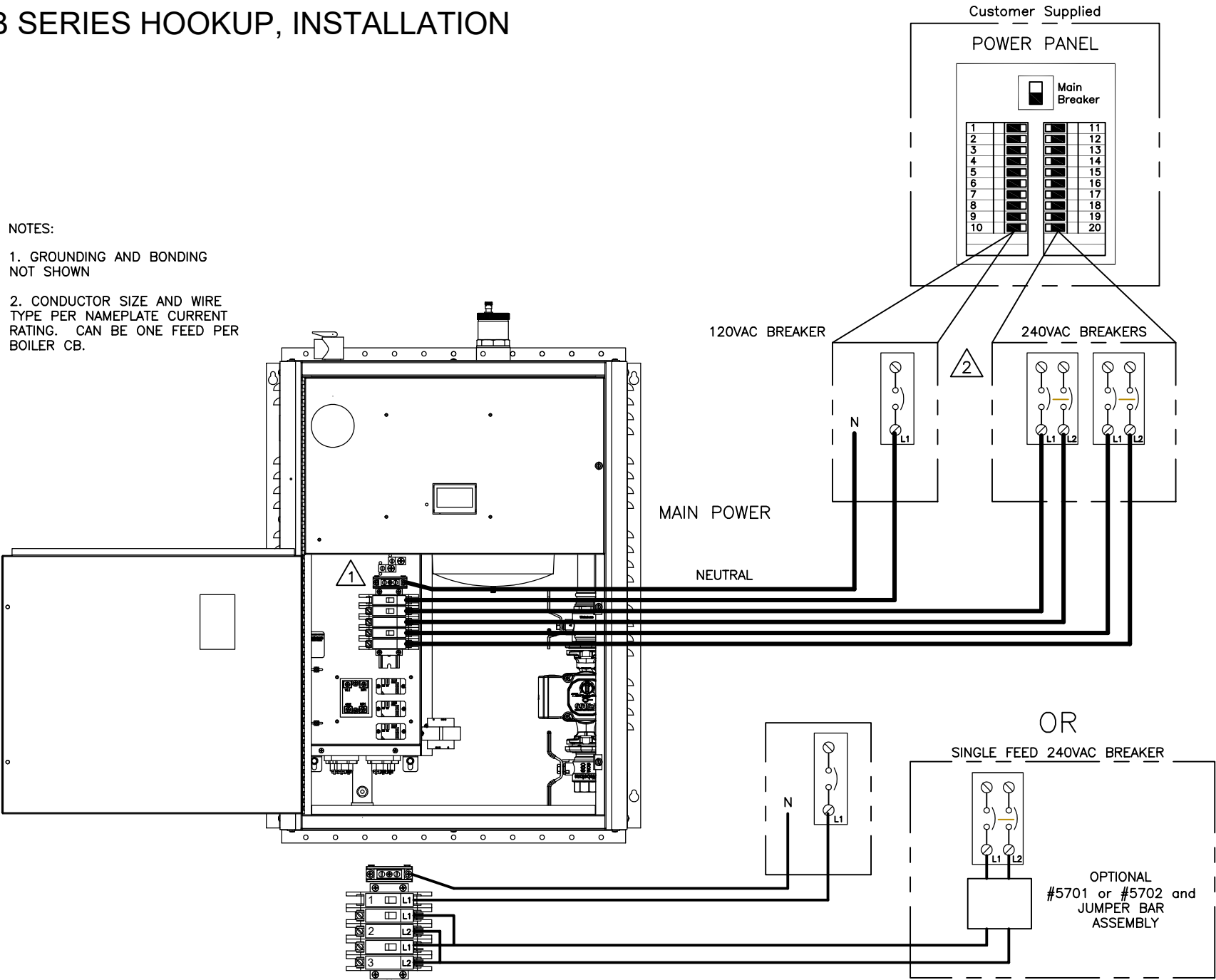


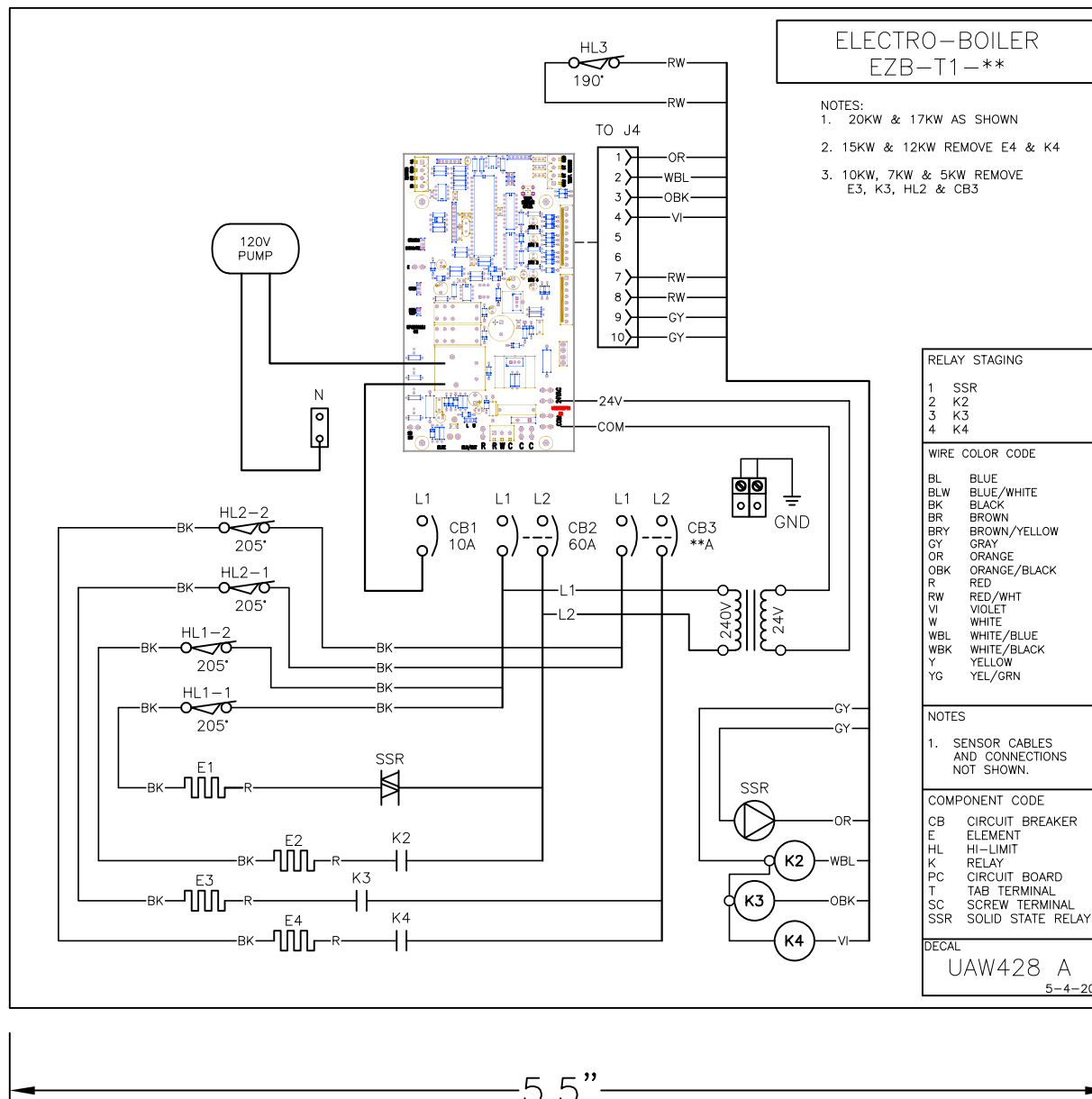
THERMOSTAT

UAW429
Rev. A

EZB SERIES HOOKUP, INSTALLATION

- NOTES:
- 1. GROUNDING AND BONDING NOT SHOWN
 - 2. CONDUCTOR SIZE AND WIRE TYPE PER NAMEPLATE CURRENT RATING. CAN BE ONE FEED PER BOILER CB.





- NOTES:
1. SIZE = 5.5" X 5"
 2. COLOR = BLACK ON WHITE
 3. MATERIAL = POLY WITH ADHESIVE AND LAMINATE.



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 transformer

Pumps

- EB-ZEA8 - with enclosure and 40VA transformer for 8 zone pumps

Zone Valves

- EB-ZTS-1 - install within boiler cabinet, encl. option
- EB-ZTS-2 - add additional 4, enclosure and 40VA transformer
- EB-ZES8 - with enclosure, no transformer, for 8 zone valves

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-ANZ7 | WarmFlo Analyzer, now applicable to WO and WA Series |



**ELECTRO
INDUSTRIES**

Monticello, Minnesota
800.922.4138
www.electromn.com

TWO SUPPLY WATER TEMPERATURE REQUIREMENT

- Handled as the priority zone on multi-zone (EB-ZEA-1)
- 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

Electro Industries, Inc. Residential Limited Product Warranty

Effective November 1, 2009

Electro Industries, Inc. warrants to the original owner, at the original installation site, for a period of two (2) years from date of original purchase, that the product and product parts manufactured by Electro Industries, Inc. are free from manufacturing defects in materials and workmanship, when used under normal conditions and when such product has not been modified or changed in any manner after leaving the plant of Electro Industries, Inc. If any product or product parts manufactured by Electro Industries, Inc. are found to have manufacturing defects in materials or workmanship, such will be repaired or replaced by Electro Industries, Inc. Electro Industries, Inc., shall have the opportunity to directly, or through its authorized representative, examine and inspect the alleged defective product or product parts. Electro Industries, Inc. may request that the materials be returned to Electro Industries, Inc. at owner's expense for factory inspection. The determination as to whether product or product parts shall be repaired, or in the alternative, replaced, shall be made by Electro Industries, Inc. or its authorized representative.

Electro Industries, Inc. will cover labor costs according to the Repair / Replacement Labor Allowance Schedule for a period of ninety (90) days from the date of original purchase, to the original owner, at the original installation site. The Repair / Replacement Labor Allowance is designed to reduce the cost of repairs. This Repair / Replacement Labor Allowance may not cover the entire labor fee charged by your dealer / contractor.

TWENTY YEAR (20) LIMITED WARRANTY ON BOILER ELEMENTS AND VESSELS

Electro Industries, Inc. warrants that the boiler elements and vessels of its products are free from defects in materials and workmanship through the twentieth year following date of original purchase. If any boiler elements or vessels are found to have a manufacturing defect in materials or workmanship, Electro Industries, Inc. will replace them.

TWENTY YEAR (20) LIMITED WARRANTY ON SPIN FIN ELEMENTS

Electro Industries, Inc. warrants that the spin fin elements of its products are free from defects in materials and workmanship through the twentieth year following date of original purchase. If any spin fin elements are found to have a manufacturing defect in materials or workmanship, Electro Industries, Inc. will replace them.

FIVE YEAR (5) LIMITED WARRANTY ON OPEN WIRE ELEMENTS

Electro Industries, Inc. warrants that the open wire elements of its products are free from defects in materials and workmanship through the fifth year following date of original purchase. If any open wire elements are found to have a manufacturing defect in materials or workmanship, Electro Industries, Inc. will replace them.



CONDITIONS AND LIMITATIONS:

1. This warranty is limited to residential, single family dwelling installations only. Any commercial or multi-unit dwelling installations fall under the Electro Industries Commercial Limited Product Warranty.
2. Electro Industries, Inc. shall not be liable for performance related issues resulting from improper installation, improper sizing, improper duct or distribution system, or any other installation deficiencies.
3. If at the time of a request for service the original owner cannot provide an original sales receipt or a warranty card registration then the warranty period for the product will have deemed to begin the date the product is shipped from the factory and **NOT** the date of original purchase.
4. The product must have been sold and installed by a licensed electrician, plumbing, or heating contractor.
5. The application and installation of the product must be in compliance with Electro Industries, Inc. specifications, as stated in the installation and instruction manual, and all state, provincial and federal codes and statutes. If not, the warranty will be null and void.
6. The purchaser shall have maintained the product in accordance with the manual that accompanies the unit. Annually, a qualified and licensed contractor must inspect the product to assure it is in proper working condition.
7. All related heating components must be maintained in good operating condition.
8. All lines must be checked to confirm that all condensation drains properly from the unit.
9. Replacement of a product or product part under this limited warranty does not extend the warranty term or period.
10. Replacement product parts are warranted to be free from defects in material and workmanship for ninety (90) days from the date of installation. All exclusions, conditions, and limitations expressed in this warranty apply.
11. Before warranty claims will be honored, Electro Industries, Inc. shall have the opportunity to directly, or through its authorized representative, examine and inspect the alleged defective product or product parts. Remedies under this warranty are limited to repairing or replacing alleged defective product or product parts. The decision whether to repair or, in the alternative, replace products or product parts shall be made by Electro Industries, Inc. or its authorized representative.

THIS WARRANTY DOES NOT COVER:

1. Costs for labor for diagnosis, removal or reinstallation of an alleged defective product or product part, transportation to Electro Industries, Inc., and any other materials necessary to perform the exchange, except as stated in this warranty. Replacement material will be invoiced to the distributor in the usual manner and will be subject to adjustment upon verification of defect.
2. Any product or product part that has been damaged as a result of being improperly serviced or operated, including, but not limited to, the following: operated during construction phase, with insufficient water or air flow; allowed to freeze; subjected to flood conditions; subjected to improper voltages or power supplies; operated with air flow or water conditions and/or fuels or additives which cause unusual deposits or corrosion in or on the product; chemical or galvanic erosion; improper maintenance or subject to any other abuse or negligence.
3. Any product or product part that has been damaged as a result of natural disasters, including, but not limited to, lightning, fire, earthquake, hurricanes, tornadoes or floods.
4. Any product or product part that has been damaged as a result of shipment or handling by the freight carrier. It is the receiver's responsibility to claim and process freight damage with the carrier.
5. Any product or product part that has been defaced, abused or suffered unusual wear and tear as determined by Electro Industries, Inc. or its authorized representative.
6. Workmanship of any installer of the product or product part. This warranty does not assume any liability of any nature for unsatisfactory performance caused by improper installation.
7. Transportation charges for any replacement product, product part or component, service calls, normal maintenance; replacement of fuses, filters, refrigerant, etc.

THESE WARRANTIES DO NOT EXTEND TO ANYONE EXCEPT THE ORIGINAL PURCHASER AT RETAIL AND ONLY WHEN THE PRODUCT IS IN THE ORIGINAL INSTALLATION SITE. THE REMEDIES SET FORTH HEREIN ARE EXCLUSIVE.

ALL IMPLIED WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY DISCLAIMED WITH RESPECT TO ALL PURCHASERS OR OWNERS. ELECTRO INDUSTRIES, INC. IS NOT BOUND BY PROMISES MADE BY OTHERS BEYOND THE TERMS OF THESE WARRANTIES. FAILURE TO RETURN THE WARRANTY CARD SHALL HAVE NO EFFECT ON THE DISCLAIMER OF THESE IMPLIED WARRANTIES.

ALL EXPRESS WARRANTIES SHALL BE LIMITED TO THE DURATION OF THIS EXPRESS LIMITED WARRANTIES SET FORTH HEREIN AND EXCLUDE ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES RESULTING FROM THE BREACH THEREOF. SOME STATES OR PROVINCES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY. PRODUCTS OR PARTS OF OTHER MANUFACTURERS ATTACHED ARE SPECIFICALLY EXCLUDED FROM THE WARRANTY.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY HAVE OTHER RIGHTS WHICH VARY UNDER THE LAWS OF EACH STATE. IF ANY PROVISION OF THIS WARRANTY IS PROHIBITED OR INVALID UNDER APPLICABLE STATE OR PROVINCIAL LAW, THAT PROVISION SHALL BE INEFFECTIVE TO THE EXTENT OF THE PROHIBITION OR INVALIDITY WITHOUT INVALIDATING THE REMAINDER OF THE AFFECTED PROVISION OR THE OTHER PROVISIONS OF THIS WARRANTY.