Zone Controller Add-On
TS Series Boiler
EB-ZTS-1 & EB-ZES-1

Application
Special automatic or built-in **shift** to higher water temperature for **priority** zone 1. In many combination temperature installations this feature eliminates mixing valve or injection pump temperature control.

Built-in automatic stage shedding based upon the capacity of each active zone. This compensates for any mixture of large and small zones. **Note: Capacity and SIZE dial switches must be set during installation.**

Convenience of an attractive wiring center, all connections at easily accessed terminal blocks, simplified zone system installation.

Features

Dual Control Temperature, Priority Zone
Digital or Standard Thermostat Compatible
4 or 3 Wire Zone Valve Compatible
Fuse Protected, Control Board and Zone Valve Connections
Nine LED Onboard Lights, each Stat and Zone Valve End Switch, and basic power
Control Board only, installed within TS Boiler
Remote Data Communication to Boiler Control Board
Extra Priority Relay Contact

Configuration
Electro Industries **EB-S, EB-WO, or EB-WA** model series boilers.

- This is a control board only, mounts within the boiler cabinet.
- Installation and hookup drawing between boards (BH015, page 1) shows this unit within the boiler cabinet.

Model **EB-C-** or EB-M*-**** do not have space within the enclosure, zone controller EB-ZES-1 is the same board with an enclosure for external mounting and its own 24-volt transformer.

- The self-contained transformer will require external power at the primary. There are various voltage taps for 120, 208, or 240.
- Drawing BH015, page 2 represents this hookup which only includes a wire between the two commons and the W-OUT wire. The 4-wire remote bus cable is required in all installations.

Also all software program chips must be version 5.3*, 6.2*, and 3.2* or higher.

Applications Requiring More Than 4 Active Zone Inputs
Order and add a second controller (referred to as slave) to this system. Model EB-ZTS-2 is mounted external to the boiler cabinet (has its own 24-volt transformer) and is interconnected to this controller board. This combination now allows up to 8 active inputs.

Note: This zone controller is not compatible with power robbing thermostats.

Drawings: **BH015, XX017**

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Unique Zone Controller Dual Temp. Feature

The switch-able priority has the normal function of allowing zone 1 to override or hold off all other zones so that the boiler can produce full capacity energy for zone 1 capacity requirement. **In addition**, this zone controller with the TS boiler also automatically raises the outlet temperature for low mass, high supply temperature zone.

- Example – zone #1-baseboard fin tube, air handler coil, staple-up, etc.

With this feature zone 1 is always the high temperature requirement, the priority switch must be on, and all remaining zones are connected to under floor radiant tubing with the outlet temperature for the radiant zones controlled at the front panel red knob set point.

Installation/Hookup – Controller - Internal

Reference: Drawing BH015 page 1

1. Since this zone controller board is installed within the Electro-Boiler TS Series cabinet, it is assumed you have EB-W* Series.
2. Depending upon the factory order, this control board may have been installed prior to shipment.
3. This control board mounts on the inside chassis, above the element power relays. Mount horizontally, zone valve terminal blocks are at the top.
4. Connect a 4-wire thermostat cable between the terminal block marked REMOTE and the same terminal block on the boiler control board. This must be point to point, V+ to V+, etc.
5. This zone controller board 24V source is tapped from Electro-Boiler transformer. Parallel wire 24VAC tab and COM tab. **WARNING:** If the yellow and gray wires from the EB-Z**-1 are crossed when connected to the control board and power is turned on, damage will result to the boiler transformer, EB-Z**-1, and boiler control board.
6. The zone controller board turns on the boiler with the W OUT tab. On the right side of the zone board route a wire from the W OUT to the boiler W stat terminal. The above COM wire is the return for this W OUT.

Installation/Hookup – Controller – External

Reference: Drawing BH020, page 2

1. This model has its own enclosure with 40VA transformer.
2. The transformer will need an appropriate primary source. Decal on the transformer shows 120/208/240 wire colors.
3. A common connection or wire is required between a main boiler C tab and the C tab on the zone controller board.
4. Connect a 4-wire thermostat cable between the terminal block marked REMOTE and the same terminal block on the boiler control board. This must be point to point, V+ to V+, etc.

Model EB-S-** Comment

1. This zone controller board requires a main boiler control board with remote communication capability. Units factory manufactured after approximately January 10, 2004 have the updated control board with REMOTE. Also must be program chip version 5.20 and above. For older unit updates call factory, also see cover page.

Installation/Hookup – Thermostat and Zone Valves

Reference: Drawing BH015 page 3

1. Connect slab stat or temperature sensing **thermostat** to the bottom terminal block "R and W". If using Electro-Stat, a common is required at each Electro-Stat. Common is available at the lower right terminal block. Drawing shows typical hookups for various thermostats. Connect per your selected thermostat, typically will be one type not all 3.
2. **Zone valves** are connected at the top terminal block. Terminals 1 and 2 represent the zone valve motor and terminals 3 and 4 represent the zone valve end switch contact. The

drawing shows three zone valve types, hookup per your selected type. Notice drawing Note 3, if you're using priority you must use a zone valve component with separate end switch contact.

3. If using priority high temperature/low mass feature, zone 1 and connected stat 1 must be the high temperature zone.

Thermostat Heat Anticipator Setting

The two thermostat screw terminal contacts pass through to the zone valve motor terminals. Therefore, the thermostat loading is the zone valve motor. Set the anticipator to match the zone valve motor current. If Honeywell V8043-**** zone valve, set to 0.4.

Power robbing thermostat comment: This zone controller is not compatible with power robbing thermostats.

Boiler Circulator Pump Information

The main pump must be wired and operated associated with the boiler itself. This zone controller has no direct provision for the connecting circulator pump.

If you have a zoning arrangement where there is more than pump and various sets of zone valves tied to each pump, you can wire the pump for this zone controller branch from the pump relay on this controller board. Drawing BH015 shows pump connected to the pump relay on this board.

Options

1. ZONE PUMPS – add switching relay EE-5051 to each zone valve terminal block, request drawing BH012.
2. PRIORITY AUX – form C relay contact from zone valve 1, if priority switch is "on".

Setup – Zone Sizes and Boiler Stage Sizes

On the zone valve controller board there are five dial switches. Four relate to each zone and one relates to boiler information. If all four zones are not present or used, set the unused dials to 15.

From building design information and/or zone capacity calculations, installer must know the approximate BTUH capacity of each zone. Dial in this capacity for each zone:

- 0 = 15,000 BTUH
- 1 = 30,000 BTUH
- 2 = 45,000 BTUH
- 3 = 60,000 BTUH

The 5th dial switch must be set to the boiler **size**.

Model	Boiler Size	Size Dial Switch Position	Zone Dial Switch Multiplier②
EB-*-10	10 kW	A	1
EB-*-13	13 kW	A	1
EB-*-15	15 kW	B	1
EB-*-18	18 kW	B	1
EB-*-20	20 kW	C	1
EB-*-23	22.5 kW	C	1
EB-*-27	27 kW	D	1
EB-C-27-*	27 kW	D	1
EB-C-40-*	40.5 kW	D	1
EB-C-31 & -36	31 or 36 kW	D	2
EB-C-18-48	18 kW	C	1.4
EB-C-36-48	36 kW	D	1.4
EB-C-54-48	54 kW	D	1.4

Notes

1. When in priority, all stages of the boiler come on and the above is bypassed.
2. When using this to switch the EB-C-** boiler, the Btu settings next to the stat input dial switch may need to relate a different value. This column represents a multiplier times the dial switch setting Btu value. Example – for the 54 kW boiler the 0 position dial switch (15,000) now really represents 15,000 x 1.4 = 21,000.
3. Position E is not used. F, G, and H relate to multiple boilers.

Multiple Boilers, Using EB-C-STG5 Staging Relay

It is assumed the zoning arrangement has one or two small zones which can be handled by the first boiler and primarily large zones which will require stepping up to the next boilers. There are three boiler **size** settings and the first decision relates to proper zone connection and discerning the large zones wired into this zone controller. In this case the term "large zone" would mean the capacity of the complete boiler system (multi-boilers) is required to satisfy the capacity of "large" zone(s). Set the large zone dial switch to position 3, but in this position it is assumed more than the **master** boiler is required and all element stages will be activated, based upon boiler outlet temperature sensing. For zone 1 and including a slave zone controller (-2 model), the dial setting needs to be related to the zone Btu capacity which is communicated and related back to element stage zoning for the first or master boiler.

- "F" – one large zone which needs to be tied into #4. Zones 1, 2, and 3 require setting the dial switch representing the Btu's for this zone and can be related to the Btu numbers in the above chart.
- "G" – two large zones which need to be tied into #3 and #4. Zones 1 and 2 require setting the dial switch representing the Btu's for each zone and can be related to the Btu numbers in the above chart.
- "H" – three large zones which need to be tied into #2, #3, and #4. Zone 1 requires setting the dial switch representing the Btu's for each zone and can be related to the Btu numbers in the above chart.

Priority High Temperature Zone Function

Application – one zone requires higher supply temperature (typically low mass) and the remaining zones require low temperature (typically high mass).

Note: When zone 1 is activated with the priority switch on, the zone size dial setting for zone 1 is bypassed. In this arrangement, the zone control board allows the master boiler to regulate the staging and temperature requirements needed for zone 1. In other words, it is possible that the full capacity of the boiler or boilers will be on during the priority call.

1. The stat relating to priority **must be stats 1, R and W**.
2. The zone valve or pump relating to priority must be zone 1.
3. Priority switch must be in "ON" position.
4. With priority on and stat 1 "W" terminal at 24 volts, zone valve 2, 3, and 4 terminal 1 is interrupted (zone valve motor does not activate).
5. The LED associated with the stat inputs is active and shows the stat status. The LED's associated with the zone valve will be off because the zone valve end switch (terminals 3 and 4) is open. **Note:** If there is no end switch and you are simply jumpering terminals 3 and 4, the zone valve LED's will give a false indication.
6. With stat 1 input and priority switch on, the boiler outlet temperature will regulate at one of two preset values: 150° F or 176° F. At the boiler main control board (hinged door) approximate center left side is a 2-pin jumper associated with the markings **J7**.
    a. 150° F – as factory shipped, the 2-pin header is installed as a jumper.
    b. 176° F – remove the 2-pin shorting block header.
7. "Priority AUX" is a dry contact terminal block, which is a direct function of zone 1 end switch terminal (3 to 4).

8. After a 60-minute timeout, zones 2, 3, and 4 are released to respond to stat inputs. Zone 1 could remain active, but any other zones that are calling will respond as if the system is not in priority. Zone 1 also returns to a normal stat input. The supply temperature drops to front panel setting. An interruption of zone 1 "W" terminal or turning priority switch off/on resets this 60-minute timer.

Note: All elements (stage LED's) may be off until supply temperature drops to front panel red knob set point.

Monitor LED's

- Power on – green LED represents good fuse and 24-volt transformer source.
- Slab stat or temperature sensing thermostat inputs – illuminates with voltage at "W".
- Zone valve – illuminates with appropriate stat heat call **and** an end switch contact between 3 and 4.

Fuse

Protects this board and all external field connections/wiring. Replace with 2-amp, fast blow, AGC2.

Staging

The actual boiler stages are controlled within the boiler main board from the information calculated within the zone controller board and communicated to the boiler main board. The sum of the various zone input dial switches determines which boiler stages are active. The zone dial switches calculation has priority over the temperature sensing. However, if the temperature sensing indicates the vessel is suddenly rising, it will override and turn off stages.

The number of stages will depend upon capacity calculations from the settings. The capacity dial switch position has an assigned value:

15,000 Btu/h = 0
30,000 Btu/h = 1
45,000 Btu/h = 2
60,000 Btu/h = 3

As the zone stats turn on and off these are added for a boiler staging sum. This sum value controls stage per:

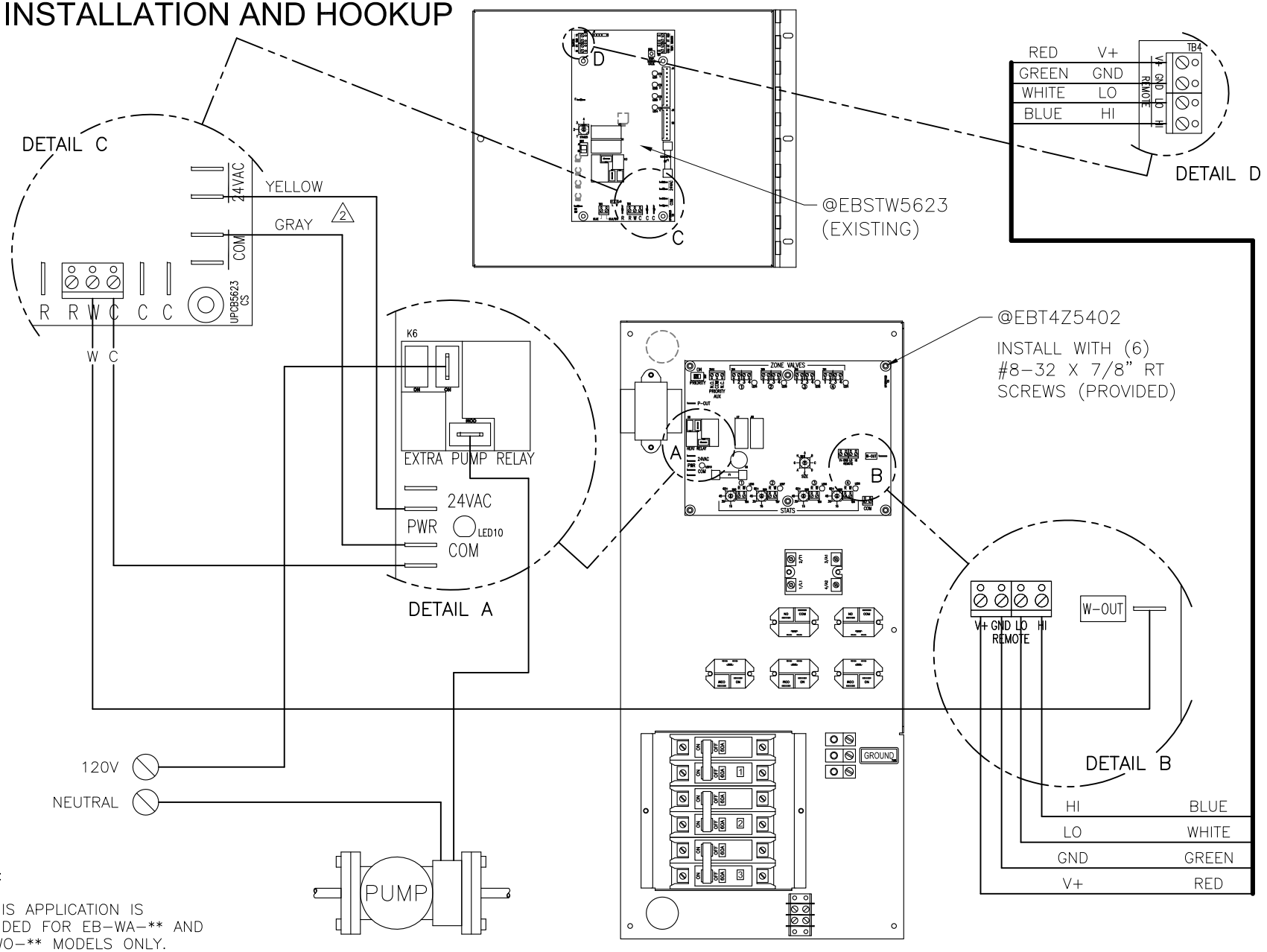
1 = Stage 1
2 = Stage 2
3 = Stage 3
4 = Stage 4

There is an approximate 6 to 60-second delay between stage-up turn on and less than 4-second delay on stage-down.

Troubleshooting

1. The LED's on this zone control board should provide adequate indication of inputs and outputs. The LED's at the zone valve terminal blocks represent the closure of end switch.
2. End switch terminal blocks 1 and 3 are the same point.
3. See previous description on priority, AUX boiler relay, and dual temp arrangement.
4. If troubleshooting the complete boiler system indicates the desire to unplug the remote bus connector to verify whether or not the zone controller is interacting with the main boiler board, the main boiler must be reset (power off and on) whenever the remote bus cable is unplugged or plugged back in.

EB-ZTS-1 INSTALLATION AND HOOKUP



NOTE:

1. THIS APPLICATION IS INTENDED FOR EB-WA-** AND EB-WO-** MODELS ONLY.

2 WARNING - IF THE YELLOW AND GRAY WIRES FROM THE EB-Z**-1 ARE CROSSED WHEN CONNECTED TO THE CONTROL BOARD AND POWER IS TURNED ON, DAMAGE WILL RESULT TO THE BOILER TRANSFORMER, EB-Z**-1 AND BOILER CONTROL BOARD.

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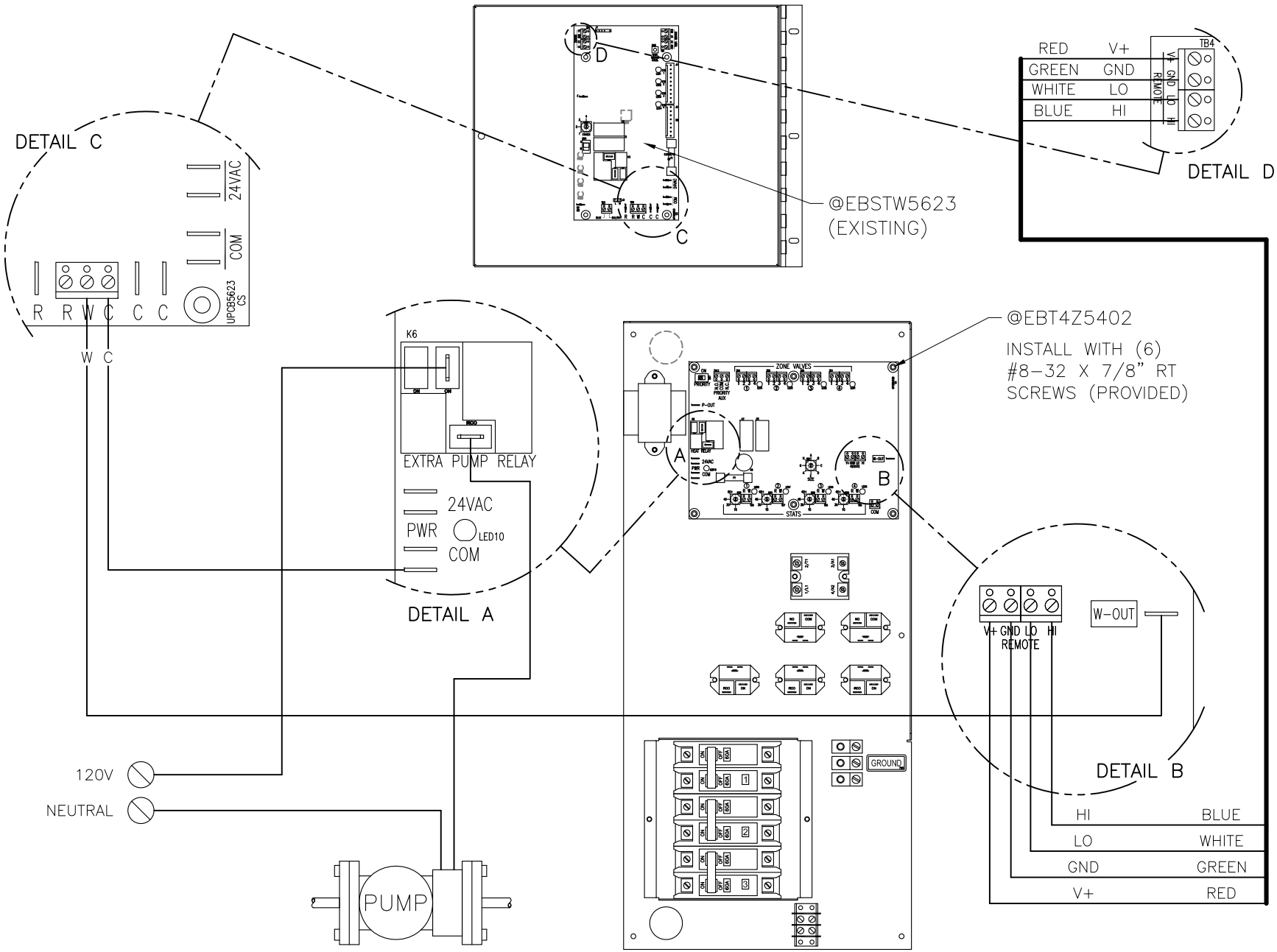
EB-ZES-1 SAME EXCEPT ENCLOSURE AND TRANSFORMER



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EB-Z*S-* INSTALLATION AND HOOKUP

NOTES:

1. SHOWN IS HOOK–UP FOR 3 DIFFERENT ZONE VALVE TYPES. TYPICALLY ALL ZONE VALVES ON AN INSTALLATION WILL BE THE SAME TYPE.

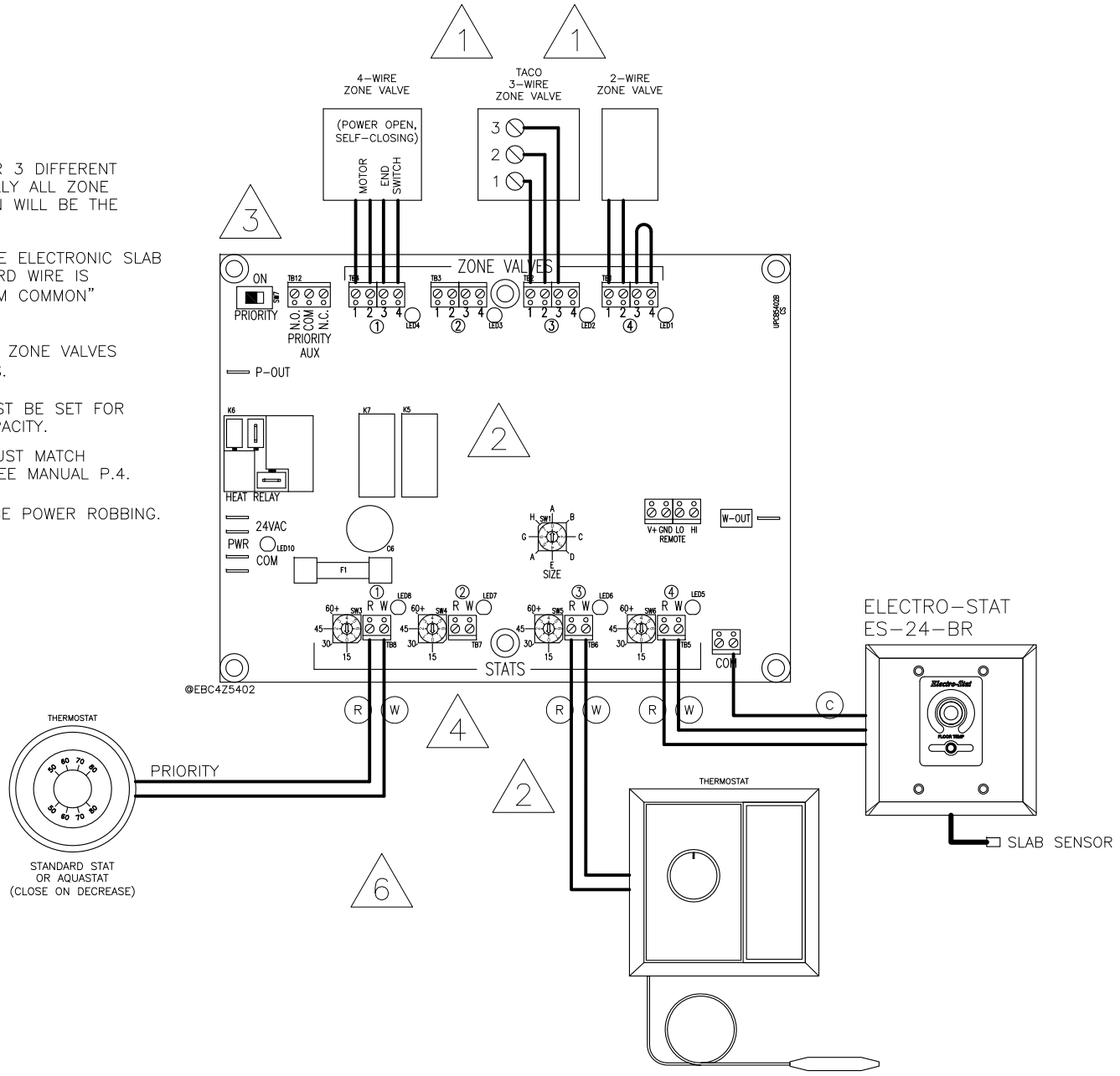
2. BASIC STAT SHOWN, SOME ELECTRONIC SLAB STATS MAY BE 3–WIRE. THIRD WIRE IS CONNECTED TO THE "SYSTEM COMMON" TERMINAL BLOCK.

3. IF PRIORITY IS "ON", ALL ZONE VALVES MUST HAVE "END" SWITCHES.

4. ZONE DIAL SWITCHES MUST BE SET FOR EACH ZONE BTUH LOAD CAPACITY.

5. SIZE OF DIAL SWITCH MUST MATCH BOILER MODEL AND kW. SEE MANUAL P.4.

6. THERMOSTATS CAN NOT BE POWER ROBBING.



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Electro Industries, Inc.

Limited Product Warranty

Effective February 5, 2009

Electro Industries, Inc. warrants to the original owner, at the original installation site, for a period of two (2) years from date of installation, that the product and product parts manufactured by Electro Industries 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. If any product or product parts manufactured by Electro Industries are found to have manufacturing defects in materials or workmanship, such will be repaired or replaced by Electro Industries. Electro Industries shall have the opportunity to directly, or through its authorized representative, examine and inspect the alleged defective product or product parts. Electro Industries may request that the materials be returned to Electro Industries at the 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 or its authorized representative. Electro Industries will cover reasonable labor costs to repair defective product or product parts for ninety (90) days after installation.

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 installation. If any boiler elements or vessels are found to have a manufacturing defect in materials or workmanship, Electro Industries 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 installation. If any spin fin elements are found to have a manufacturing defect in materials or workmanship, Electro Industries 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 installation. If any open wire elements are found to have a manufacturing defect in materials or workmanship, Electro Industries will replace them.

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THESE WARRANTIES DO NOT COVER:

1. Costs for labor for removal and reinstallation of an alleged defective product or product parts, transportation to Electro Industries, 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 that has been damaged as a result of being improperly serviced or operated, including, but not limited to, the following: operated with insufficient water or airflow, allowed to freeze, subjected to flood conditions, subjected to improper voltages or power supplies, operated with airflow 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 that has been damaged as a result of natural disasters, including, but not limited to, the following: lightning, fire, earthquake, hurricanes, tornadoes or floods.
4. Any product 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 that has been defaced, abused, or suffered unusual wear and tear as determined by Electro Industries or its authorized representative.
6. Workmanship of any installer of the product. This warranty does not assume any liability of any nature for unsatisfactory performance caused by improper installation.
7. Transportation charges for any replacement part or component, service calls, normal maintenance; replacement of fuses, filters, refrigerant, etc.

CONDITIONS AND LIMITATIONS:

1. 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 thirty (30) days after the date of manufacture and **NOT** the date of installation.
2. The product must have been sold and installed by a licensed electrical contractor, a licensed plumbing contractor, or a licensed heating contractor.
3. The application and installation of the product must be in compliance with Electro Industries' specifications as stated in the installation and instruction manual, and all state and federal codes and statutes. If not, the warranty will be null and void.
4. 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.
5. All related heating components must be maintained in good operating condition.
6. All lines must be checked to confirm that all condensation drains properly from the unit.
7. Replacement of a product or product part under this limited warranty does not extend the warranty term or period.
8. 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.
9. Before warranty claims will be honored, Electro Industries 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 or its authorized representative.

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.

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