

# Heat Pump & Boiler System Design Guide

- Installation
- Startup



**⚠ WARNING**

This manual must only be used by a qualified heating installer/service technician. Read all instructions, including this manual and all other information shipped with the boiler, before installing. Perform steps in the order given. Failure to comply could result in severe personal injury, death or substantial property damage.



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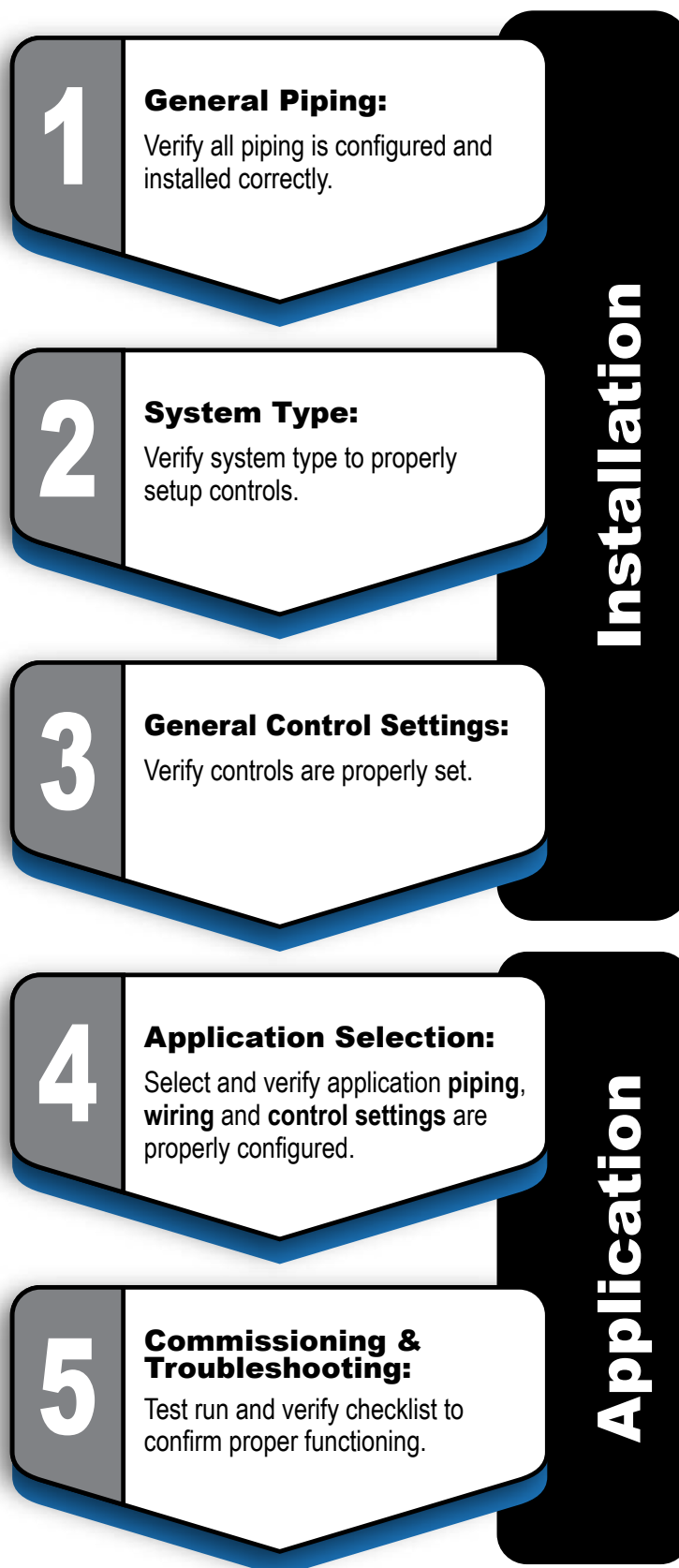
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## Overview Configuration Steps / Walk-Through

It is important to follow the below setup process to best configure your installation.





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# SECTION 1

## Safety

### Hazard Definitions

The following defined terms are used throughout this guide to bring attention to the presence of hazards of various risk levels or to important information concerning the life of the product.

#### **DANGER**

Indicates presence of hazards that **will result in** severe personal injury, death or substantial property damage.

#### **WARNING**

Indicates presence of hazards that **can result in** severe personal injury, death or substantial property damage.

#### **CAUTION**

Indicates presence of hazards that **will or can result in** minor personal injury or property damage.

#### **NOTICE**

Indicates special instructions on installation, operation or maintenance that are important but not related to personal injury or property damage.

## Please Read Before Proceeding

### **WARNING**

This guide provides system application information only. It must be used only as a supplement to the ECO®HP Heat Pump manual and applicable code requirements. Before using this guide, refer to and follow all instructions in the ECO®HP IDU and ODU Manuals for initial installation.

### **NOTICE**

This guide is meant to be used as a general guideline for piping and controlling ECO®HP heat pumps in a variety of applications. Some installations can be piped in numerous other ways that will work equally as well as the suggestions here.

Always follow recognized piping and control practices and all applicable codes. Provide and install all required controls on the boiler and system.

Review Section 3 (Applications) of this document to select the system closest to your needs. Refer to the boiler and heat pump manuals for details on expansion tank piping, relief valve piping and pipe sizing. Consider the maximum capacity of both the boiler and heat pump in the system for expansion tank sizing.

### **WARNING**

**Ensure water quality meets system water quality requirements detailed on page 59. Failure to comply may result in heat pump failure or unreliable operation.**

# SECTION 2

## Installation

2

### General Piping

#### General Piping Requirements

The ECO®HP must always be piped in an isolation loop off of system distribution piping. Additionally, a heat trap must be installed. **A Y-Strainer with 80 mesh screen MUST be installed before the inlet of the ECO®HP to prevent premature failure of the plate heat exchanger.**

The circulator supplied with the ECO®HP must be used only in the heat pump loop. System and Zone circulators and DHW circulators must be supplied by the installer.

If the WM Easy-Up Manifold (687-000-100) is not used, a manifold as described in the Fabricated Manifold Section (**Figure 2**) must be used. The ECO®HP water connections are 1" NPT. Header size is 1-1/4".

All piping must be sufficiently supported.

Boiler and heat pump placement should be configured according to operational need: (refer to **page 9**)

- It is recommended that systems with a heat pump and non-condensing boiler should be piped with the non-condensing boiler before the heat pump in the system flow.
- It is recommended that systems with a heat pump and condensing boiler should be piped with the condensing boiler after the heat pump in the system flow.

#### Required Accessory Box Components

| Description                       | Qty |
|-----------------------------------|-----|
| Drain Valve 3/4 NPT               | 1   |
| Lag Screws (for IDU hanging brkt) | 2   |
| Bracket, Wall-Hanging (IDU)       | 1   |
| Circulator (Taco 0018e-2F2, IFC)  | 1   |
| Relief Valve 3/4 NPT              | 1   |
| P & T Gauge 1/4 NPT               | 1   |
| HP & Boiler System Design Guide   | 1   |
| HP Service Manual                 | 1   |
| Wye-Strainer 1 NPT                | 1   |
| Inhibitor Test Kit                | 1   |
| Water Inhibitor (Sentinel X100)   | 1   |

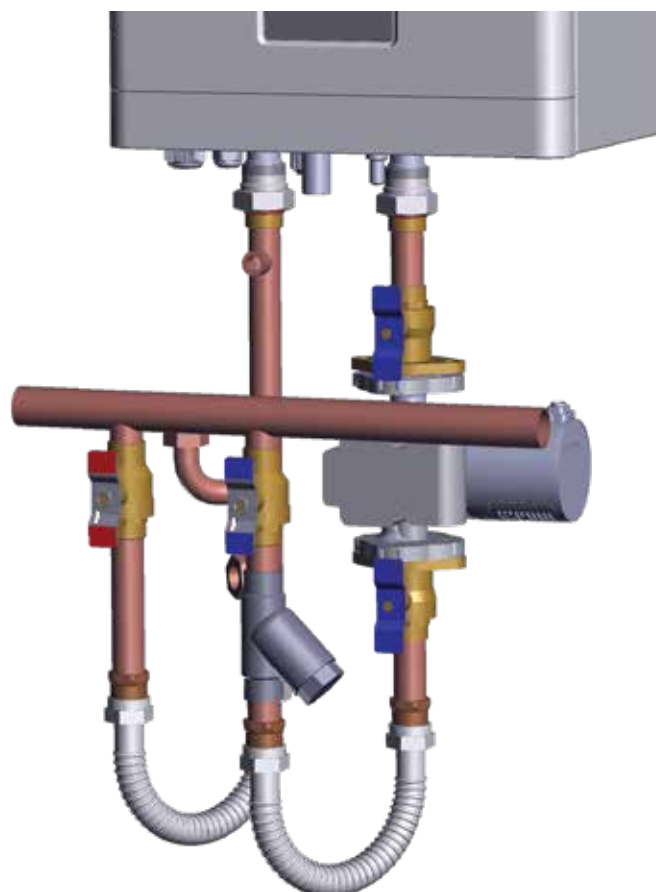
#### Optional Accessory Components

| Description                                | Part Number |
|--------------------------------------------|-------------|
| Easy-Up Manifold Kit                       | 687-000-100 |
| Floor Stand for IDU                        | 383-800-102 |
| TIU - Relay Switching 3 Zone Taco SR503-5  | 389-900-234 |
| TIU - Relay Switching 4 Zone Taco ZVC404-5 | 389-900-235 |

#### Easy Up Manifold

Weil-McLain offers an Easy-Up Manifold Kit that includes near ECO®HP piping and system connection. Refer to instructions included in the Easy-Up Manifold Kit.

**Figure 1** Easy Up Manifold



## General Piping (continued)

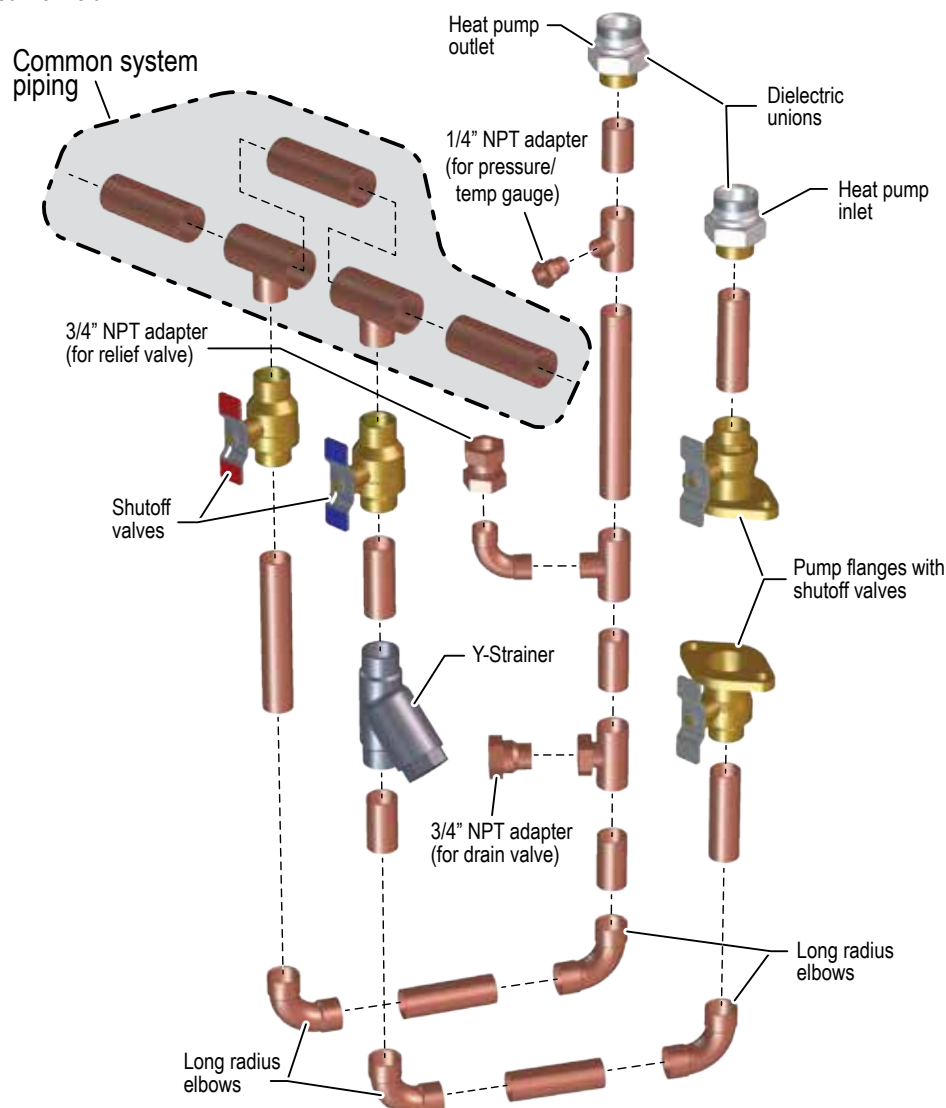
### Fabricated Manifold

If the WM Easy-Up Manifold is not used the following requirements must be met for an installer-built manifold:

- The vertical distance from the closely-spaced tees of the system piping to the first change of direction (elbow) of the heat pump inlet/outlet piping must be a minimum of 2 inches to create a heat trap for water in both the appliance and system flow.
- **CAUTION**  
A Y-strainer with an 80 mesh screen is provided as a **required** component found in the **required** Accessory Box shown on **page 7**. (The Y-strainer must be oriented where the flow direction is down or horizontal to properly filter out contamination and an 80 mesh screen is **required** to protect the heat exchanger of the heat pump.)
- A heat pump circulator is provided in the **required** Accessory Box shown on **page 7**. The provided circulator comes with a separate internal flow check valve that must be installed into the circulator before installing the circulator to avoid back flow into the heat pump appliance. The circulator installation must comply with the manufacturer's installation guidelines.
- The common system piping shown in **Figure 2** below must be 1 inch or greater piping.

A sample exploded view of a manifold using standard components is shown below:

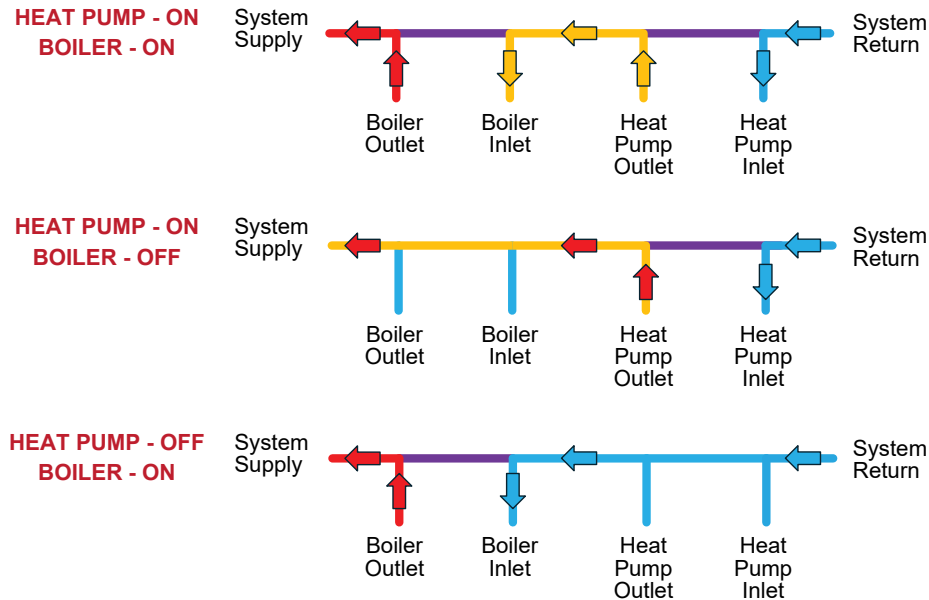
**Figure 2** Fabricated Manifold



# General Piping (continued)

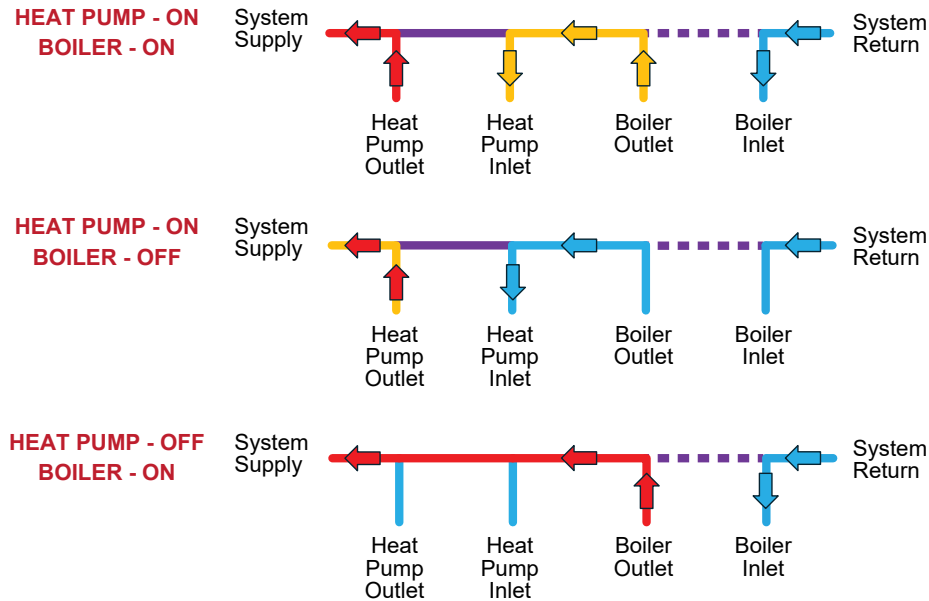
## Heat Pump/Boiler Piping Order

### Heat Pump Upstream of Boiler



Heat Pump experiences system return temperatures when boiler is running, allowing concurrent operation with boiler. This piping design most commonly used in systems with Heat Pump and condensing boiler.

### Heat Pump Downstream of Boiler



Heat Pump experiences high return temperatures when boiler is running, likely causing Heat Pump to shut down, preventing concurrent operation with boiler. This piping design most commonly used in systems with Heat Pump and non-condensing boiler.

■■■■ The dotted line represents either a direct or primary/secondary connection of the boiler to the system piping based on design intent



## WM ECO Calc

The WM ECOCalc tool will calculate the outdoor reset curves, switchover temperatures and other control parameters based on the following inputs:

- Manual J heat loss values
- Boiler type (Unity 2.0 controlled boiler OR other)
- Location

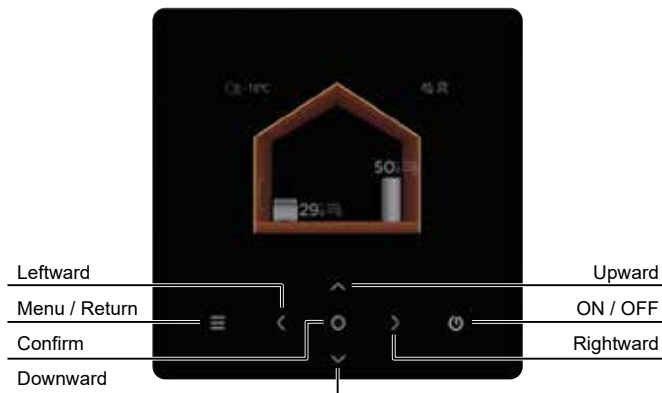
Contact Weil-McLain for sizing and application support.

### Notes:

- Be sure to record ECOCalc values in the provided form at the end of this guide for future reference.

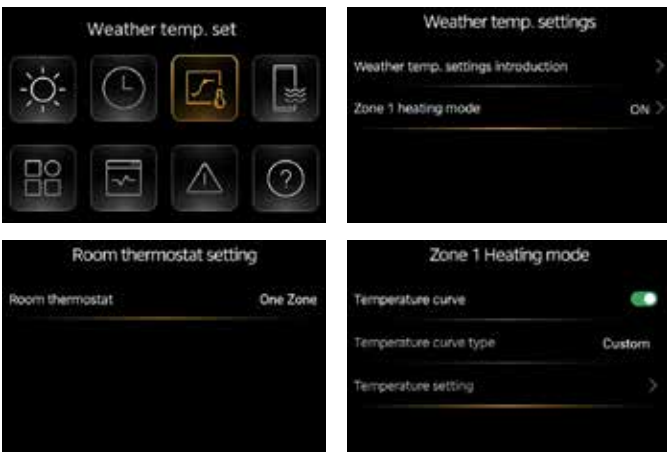
# General Control Settings (ECO®HP)

Figure 6 Home Screen



## Weather Temp Set (Outdoor Reset)

Figure 7 Temp. Settings



The target water temperature can be regulated automatically dependent on the outdoor ambient temperature. This function only applies to space heating, not DHW.

The **Temperature curve type** must be set to custom. The variables **T1SetH1** (Max Target Temp), **T1SetH2** (Min Target Temp), **T4H1** (Outdoor Temp for Max Target), and **T4H2** (Outdoor Temp for Min Target) must be set as determined by the ECOCalc Tool.

## FOR SERVICEMAN Mode

Figure 8 Entering serviceman menu

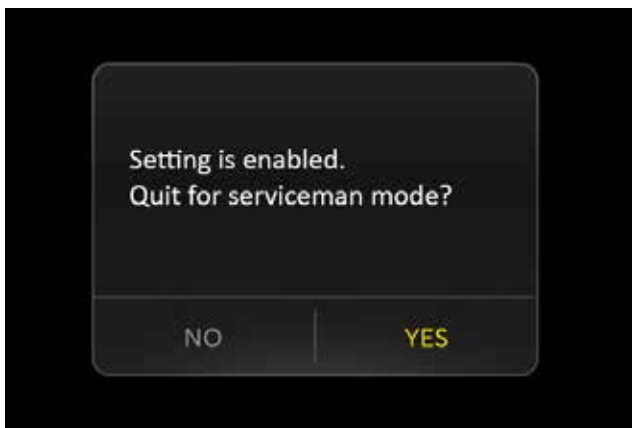


Press and hold 'Menu' (≡) and 'Rightward' (>) simultaneously for 3 seconds to enter the authorization page. Enter password **234** and press 'Confirm' (O) to confirm it. The display will then list the advanced settings of the unit.

Only qualified service personnel should adjust settings in the FOR SERVICEMAN mode

## Save Settings and Quit FOR SERVICEMAN Mode

Figure 9 Quitting for serviceman menu



After all settings are adjusted, press 'Menu' (≡), and select Yes to confirm settings and quit FOR SERVICEMAN mode. All settings are saved automatically after you quit FOR SERVICEMAN mode.

## General Control Settings (ECO®HP) (continued)

**Table 1** Heating Setting menu parameters

| Code                 | State                                                                                                             | Default | Minimum | Maximum | Set Interval | Unit |
|----------------------|-------------------------------------------------------------------------------------------------------------------|---------|---------|---------|--------------|------|
| Heating Mode*        | Enable or Disable the heating mode.<br>0=NO, 1=YES                                                                | 1       | 0       | 1       | 1            | /    |
| t_T4_Fresh_H         | The refresh time of climate related curves in heating mode                                                        | 0.5     | 0.5     | 6       | 0.5          | Hrs  |
| T4HMAX*              | The maximum ambient operating temperature in heating mode.                                                        | 77      | 68      | 95      | 1            | F    |
| T4HMIN*              | The minimum ambient operating temperature in heating mode.                                                        | 5       | -13     | 86      | 1            | F    |
| dT1SH (NOTE 1)       | The temperature difference for starting the unit (T1)                                                             | 9       | 4       | 36      | 1            | F    |
| dTSH                 | N/A                                                                                                               | 4       | 2       | 18      | 1            | F    |
| Zone 1<br>H-emission | The type of Zone 1 terminal for heating mode:<br>0=FLH (floor heating) 1=FCU (fan coil unit),<br>2=RAD (radiator) | 2       | 0       | 2       | 1            | /    |
| Force defrost        | Enable or disable the force defrost: 0=NO, 1=YES.                                                                 | 0       | 0       | 1       | 1            | /    |

\*settings must be applied per ECOCalc. Heating mode must be set to YES or heat pump will not operate. See Applications section starting on [page 16](#) for details.

**Note:** If Zone 1 H-emission is set to FCU or RAD, the selectable target temperature range will be between 95°F and 149°F. If set to FLH, the range will be between 77°F and 113°F.

### Heating Setting

**Figure 10** Heat Setting

|              |          |
|--------------|----------|
| Heating mode | YES      |
| t_T4_FRESH_H | 0.5hours |
| T4HMAX       | 77°F     |
| T4HMIN       | 5°F      |

**NOTE:**

dT1SH is the on and off temperature differential. If the target temp minus dT1SH is greater than 125.6°F, then the unit will switch on once supply temperature (Twout) has dropped below 125.6°F, NOT target temp – dT1SH.

Similarly, if the target temperature plus dT1SH is greater than T1STOPH†+1, then the unit will shut off when supply temperature (Twout) is greater than T1STOPH+1, not target temp + dT1SH.

† T1STOPH is the maximum high temperature limit, values may be between 113°F and 149°F, depending on outdoor temperature (T4)

### Temp Type Settings

**Figure 11** Temp. Type Setting

|                  |     |
|------------------|-----|
| Water flow temp. | YES |
| Room temp.       | NO  |
| Double zone      | NO  |

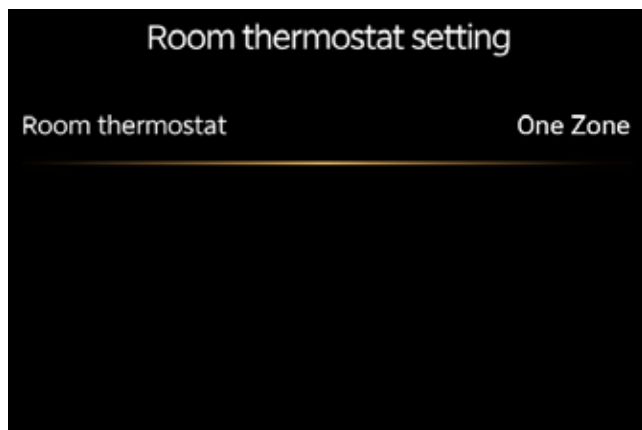
| Code             | State                                                 | Default | Minimum | Maximum | Set Interval | Unit |
|------------------|-------------------------------------------------------|---------|---------|---------|--------------|------|
| Water flow temp. | Enable or disable the water flow temp.<br>0=NO, 1=YES | 1       | 0       | 1       | 1            | /    |
| Room temp.       | Enable or disable the room temp.<br>0=NO, 1=YES       | 0       | 0       | 1       | 1            | /    |
| Double zone*     | Enable or disable the double zone.<br>0=NO, 1=YES     | 0       | 0       | 1       | 1            | /    |

\*Double zone should always be set to no. If Room thermostat is set to One Zone, then double zone will automatically be set to NO.

## General Control Settings (ECO®HP) (continued)

### Room Thermostat

**Figure 12** Room Thermostat Setting



Inputs may be paired with dry contacts only. 24Vac Thermostats require using the optional Thermostat Interface Unit or a control device with end switches rated for 12Vdc.

Room Thermostat connector (CN31) provides 12Vdc on the R terminal:

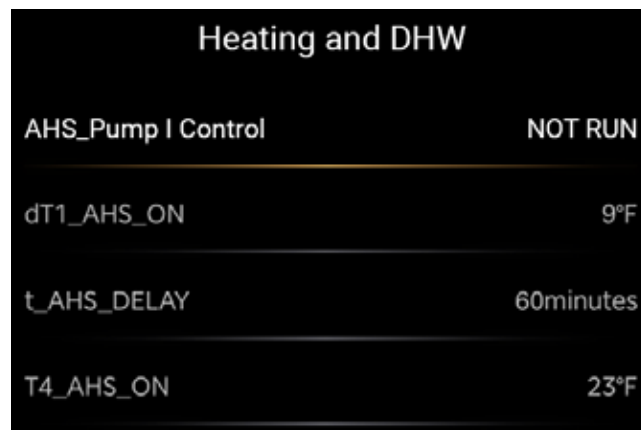
- When the circuit between W and R is closed, unit turns on.
- When the circuit between W and R is open, unit turns off.

| Code              | State                                                                     | Default | Minimum | Maximum | Set Interval | Unit |
|-------------------|---------------------------------------------------------------------------|---------|---------|---------|--------------|------|
| Room thermostat*  | The style of room thermostat: 0=NO, 1=Mode set, 2=One zone, 3=Double zone | 0       | 0       | 3       | 1            | /    |
| Mode set priority | Select the priority mode in room thermostat: 0=Heating, 1=Cooling         | 0       | 0       | 1       | 1            | /    |

\*must be set to One zone, all other options are not applicable.

### Other Heat Source

**Figure 13** Heating and DHW



| Code               | State                                                                                                                                                                              | Default | Minimum | Maximum | Set Interval | Unit    |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|--------------|---------|
| AHS function*      | Enable or disable the AHS (Auxiliary heating source) function: 0=NO, 1=Heating, 2=Heating and DHW                                                                                  | 0       | 0       | 2       | 1            | /       |
| AHS_PUMP_I Control | Select the pump operating status when only AHS runs: 0=RUN, 1=Not run                                                                                                              | 0       | 0       | 1       | 1            | /       |
| dT1_AHS_ON         | The temperature difference between T1S (Target Temp) and T1 (Supply Temp) for activating the AHS                                                                                   | 9       | 4       | 36      | 1            | F       |
| t_AHS_DELAY        | A time delay for activating AHS. When T4 (outdoor temp) is less than T4_AHS_ON, then the HP will continue to run for the time t_AHS_DELAY is set to before enabling the AHS output | 30      | 5       | 120     | 5            | Minutes |
| T4_AHS_ON*         | The ambient temperature below which the AHS will be activated                                                                                                                      | 23      | 5       | 86      | 1            | F       |

\*settings must be applied per ECOCalc. AHS function must be enabled for Type B (HP is master) installations.

### DHW Function

There are no adjustable DHW settings on the ECO®HP control. When the EVU contacts are closed, the ECO®HP will run in DHW mode. This mode targets the highest outlet water temperature the ECO®HP can attain and takes priority over a heating call. This call will run until satisfied and the call is removed. In type A systems, the Max On Time can be adjusted in the Unity 2.0 control and the DHW call will be limited to that time before allowing a heating priority to run. In type B and C systems, the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit, has a fixed 1 hour timer which when expired, will allow heating zones to run.

## General Control Settings (Unity 2.0)

### Unity 2.0 Additional Heat Demand (AHD)

The Weil-McLain Unity 2.0 control allows for multiple methods of hybrid heat pump and boiler operation. Staging order can be set based on either 1) always running the heat pump first or 2) have an assigned switchover temperature based on operating the heat pump or the boiler as the first appliance. Switchover temperature may be based on either outdoor or target water temperature.

Unity 2.0 Firmware Revision Minimum  
(for use with hybrid ECO<sup>®</sup>HP & boiler systems)

**Main Control:** u2 3.80

**Display:** 3.24

**Radio:** 2.22

### AHD Outdoor Temp Switchover Staging Order

A user-defined Switchover Outdoor Temp is used as switching point to operate the Additional Heat Demand as defined by the user settings for AHD Order Above Switchover and AHD Order Below Switchover.

The outdoor temperature is compared to the Switchover Outdoor Temp. If the outdoor temperature is colder than the Switchover Outdoor Temp, the Unity 2.0 control will determine which appliance responds first based on ACTIVE CONTACT BELOW SETPOINT settings and if outdoor temperature is warmer than Switchover Outdoor Temp, the Unity 2.0 control will determine which appliance responds first based on ACTIVE CONTACT ABOVE SETPOINT.

For systems pairing a heat pump and Unity 2.0 boiler, AHD Order Above Switchover should be set to 1ST and AHD Order Below Switchover should be set to OFF or EMERGENCY. This will ensure the boiler operates at colder outdoor temperatures and the heat pump operates at warmer outdoor temperatures.

### AHD Target Temp Switchover Staging Order

A user-defined Switchover Target Temp is used as a switching point to operate Additional Heat Demand as defined by the user settings for AHD Order Below Switchover and AHD Order Above Switchover. The priority's calculated Target Temp (based on that priority's Outdoor Reset Curve) is compared to the Switchover Target Temp. If Target Temp is colder than Switchover Target Temp, the Unity 2.0 control will determine which appliance responds first based on AHD Order Below Switchover, and if Target is hotter than Switchover Target Temp, the Unity 2.0 control will determine which appliance responds first based on AHD Order Above Switchover.

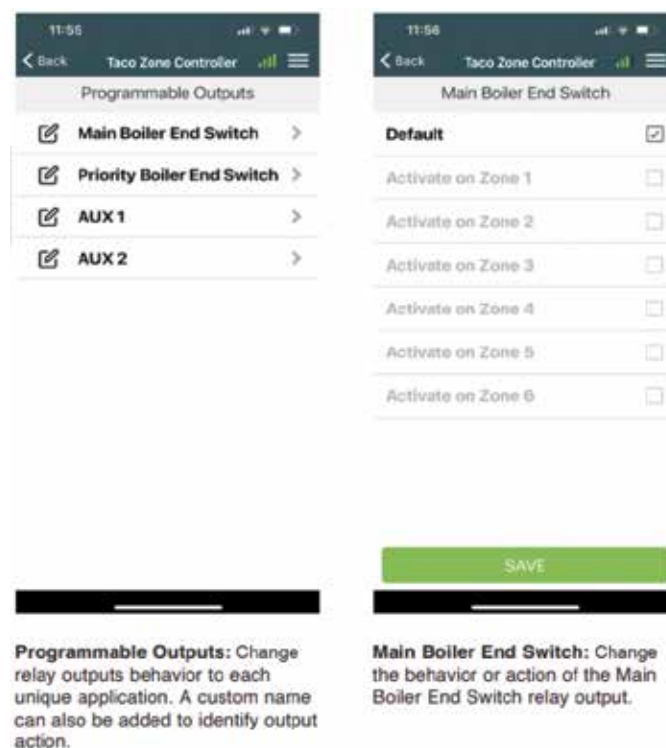
For hybrid systems, AHD Order Above Switchover should be set to OFF or EMERGENCY and AHD Order Below Switchover should be set to 1ST. This will ensure the boiler operates at higher target temperatures and the HP operates at lower target temperatures as determined by the outdoor reset curve.

### DHW-Priority Zone Panel (such as the Weil-McLain Thermostat Interface Unit Thermostat Interface Unit (TIU))

The Thermostat Interface Unit (TIU) is a zone panel that allows the usage of standard 24V thermostats with the WM ECO<sup>®</sup>HP. Weil-McLain offers a zone valve DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit (See "Optional Accessory Components" on page 7 in "General Piping") and a zone circulator DHW-priority zone panel.

By default, the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit, will operate the main end switch output and priority end switch output whenever there is a priority call. This can be changed in the Taco Control app. The Main Boiler End Switch should be changed from default to Activate on Zone 2 only. If not changed, the ECO<sup>®</sup>HP display will show a space heat call even when there is none during a DHW call. This will not affect proper operation, only the indication on the screen.

**Figure 14** DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit screens



# SECTION 3

## Applications

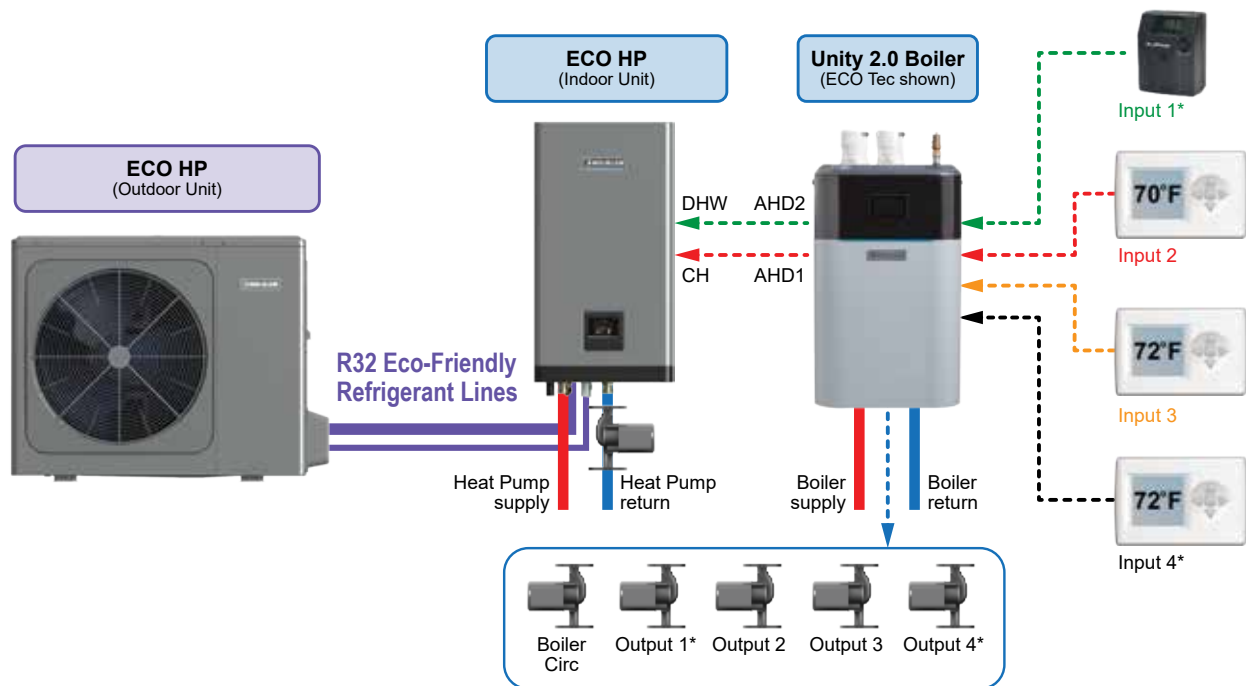
### System Type: Controls Connections

#### System Type A: WM Boiler w/ Unity 2.0 & WM Heat Pump

**Figure 3** System Type A - Boiler (Master); ECO®HP (Shadow)

### System Type A Boiler (Master); Heat Pump (Shadow)

Unity 2.0 boilers connect up to 4 zone inputs and 4 configurable outputs\*



**Type A Systems use a WM boiler equipped with Unity 2.0 controllers as master.** The boiler will determine when the heat pump will run and when the boiler will run. Up to 4 zones can be supported dependent on overall requirements of the system\* (refer to the boiler manual field wiring section to identify all input requirements that may reduce number of zones supported.) Additional zones can be used with an appropriate DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit detailed on [page 14](#).

The system call for heat will come from any of the zone thermostats into the associated WM boiler input. The heat pump will run when the boiler's Additional Heat Demand (AHD) contacts are closed and wired to the heat pump thermostat input; DHW calls are handled by the boiler's 2nd AHD contact.

#### Circulator Control:

- The ECO®HP will control its own circulator
- The WM Unity 2.0 boiler or additional zone board will control all other circulators.

\*Dependent on system design, Combi model boilers may not be best suited as the master due to Input/Output pairs 1 and 4 being used for 3-way valve operation and cannot be used for any other purpose.

## System Type A

### Application A1: Multi-zone space heating, DHW as zone

If boiler will run concurrently with the heat pump, boiler must be downstream from heat pump to prevent high water temperatures being delivered to the heat pump inlet.

#### Overview

- Three zones for space heating, zoned with circulators, through the WM Unity 2.0 controlled boiler.
- One zone for DHW, zoned with a circulator, through the WM Unity 2.0 controlled boiler.
- DHW Priority – space heating is disabled during call for heat from DHW indirect tank.

#### Unity 2.0 Control Settings

- See table on [page 20](#) for boiler control settings.
- Refer to the boiler manual for specific control navigation information.

#### ECO®HP Control Settings

- See table on [page 21](#) for heat pump control settings.
- Refer to [page 11](#) for heat pump control navigation information.

#### Circulators and piping

- Piping must be primary/secondary.
- For boilers with a Unity 2.0 control, the boiler must be downstream from the ECO®HP in the system.
- DHW circulator must be selected to handle the pressure drop through the indirect tank and piping.
- For some large indirect water heaters, the required flow rate may require piping the water heater differently.
- Zone circulators should be sized for required flow.
- Space heating zone circulators and DHW zone circulator provided by installer.
- For alternate wiring, use a zone panel like the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit.
- Note that ECO Tec boilers have an internally installed boiler circulator.
- Heat Pump circulator is installed in heat pump manifold and included in the heat pump accessory box.

## System Type A (continued)

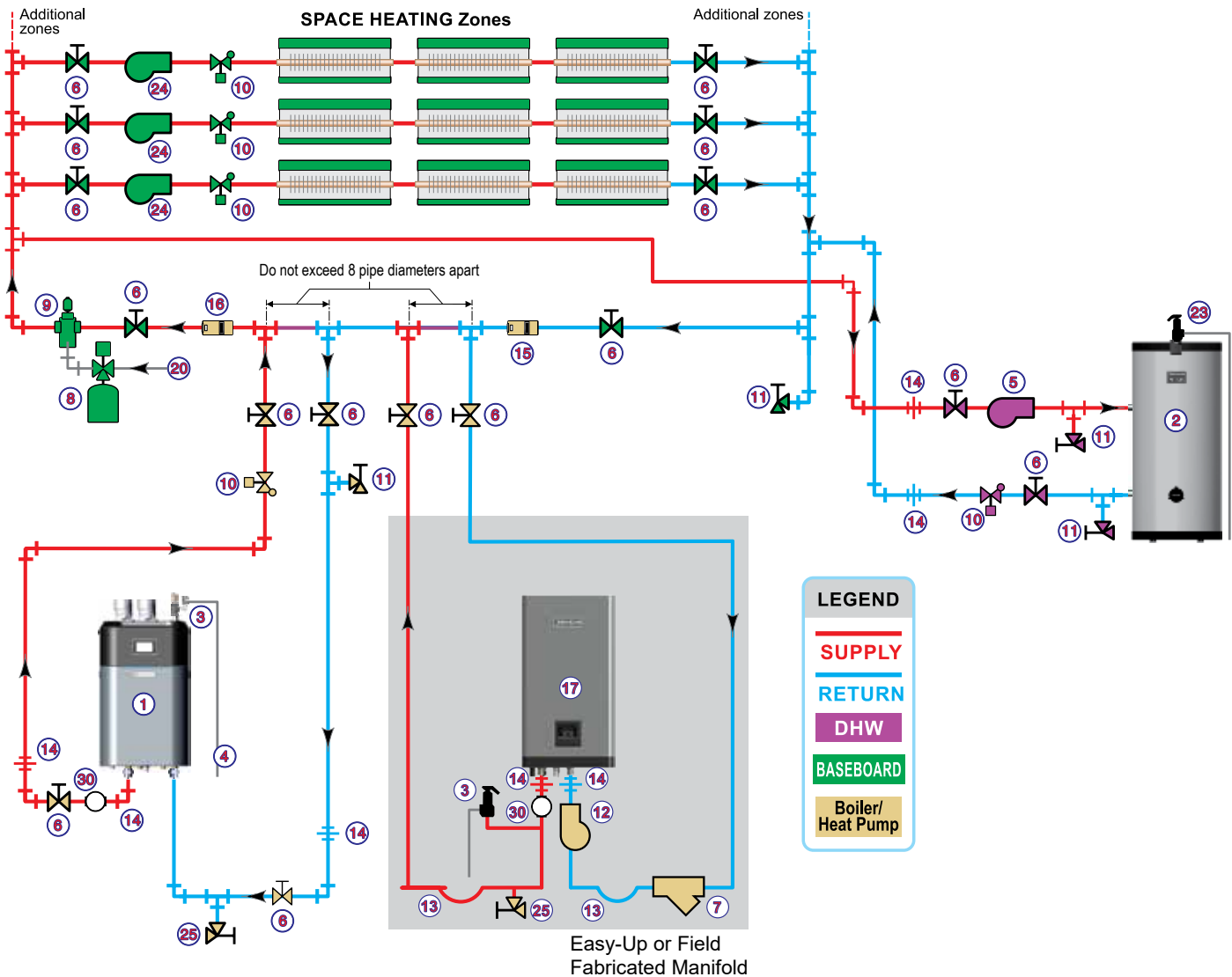
### Application A1: Multi-zone space heating, DHW as zone (continued)

#### Application Piping

##### Legend

- |                                                                      |                                                              |                                                                                        |                                                                                    |
|----------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| 1. ■ Boiler.                                                         | 7. ■ Y-Strainer with 80 mesh screen.                         | 15. Return temperature sensor.                                                         | 26. Zone Valves.                                                                   |
| 2. Indirect water heater, if used (domestic water piping not shown.) | 8. Expansion tank.                                           | 16. Supply temperature sensor.                                                         | 27. Bypass pressure regulator                                                      |
| 3. ■ Relief valve, supplied with boiler and heat pump, field piped.  | 9. Air separator.                                            | 17. ■ ECO®HP Indoor Unit                                                               | 30. ■ Pressure/temperature gauge, supplied with boiler and heat pump, field piped. |
| 4. Relief valve piping to drain.                                     | 10. Flow/check or spring check valves.                       | 20. Make-up water supply.                                                              |                                                                                    |
| 5. DHW circulator.                                                   | 11. Purge/drain valves.                                      | 23. DHW Temperature and Pressure relief valve                                          |                                                                                    |
| 6. Isolation valves.                                                 | 12. ■ Heat pump circulator (with internal flow check valve.) | 24. Zone circulators.                                                                  |                                                                                    |
|                                                                      | 13. Heat trap.                                               | 25. ■ Boiler or heat pump drain valve, supplied with boiler or heat pump, field piped. |                                                                                    |
|                                                                      | 14. Unions as needed for service.                            |                                                                                        |                                                                                    |
- = Items supplied with boiler or heat pump - all other Items supplied by installer.

Figure 15 Application A1: Piping

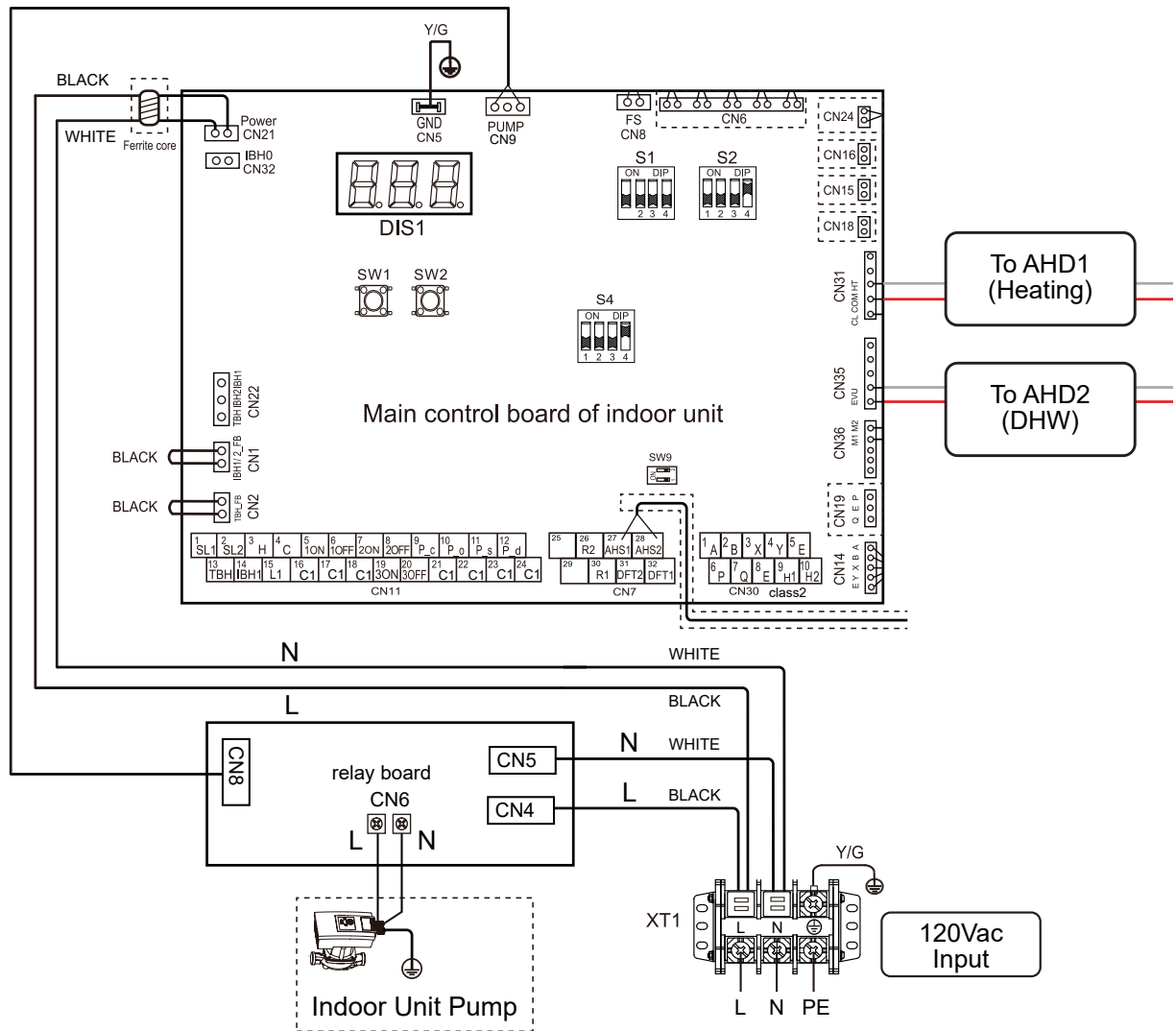


## System Type A (continued)

### Application A1: Multi-zone space heating, DHW as zone (continued)

#### Application Wiring

**Figure 16** Application A1: Heat Pump Indoor Unit Wiring

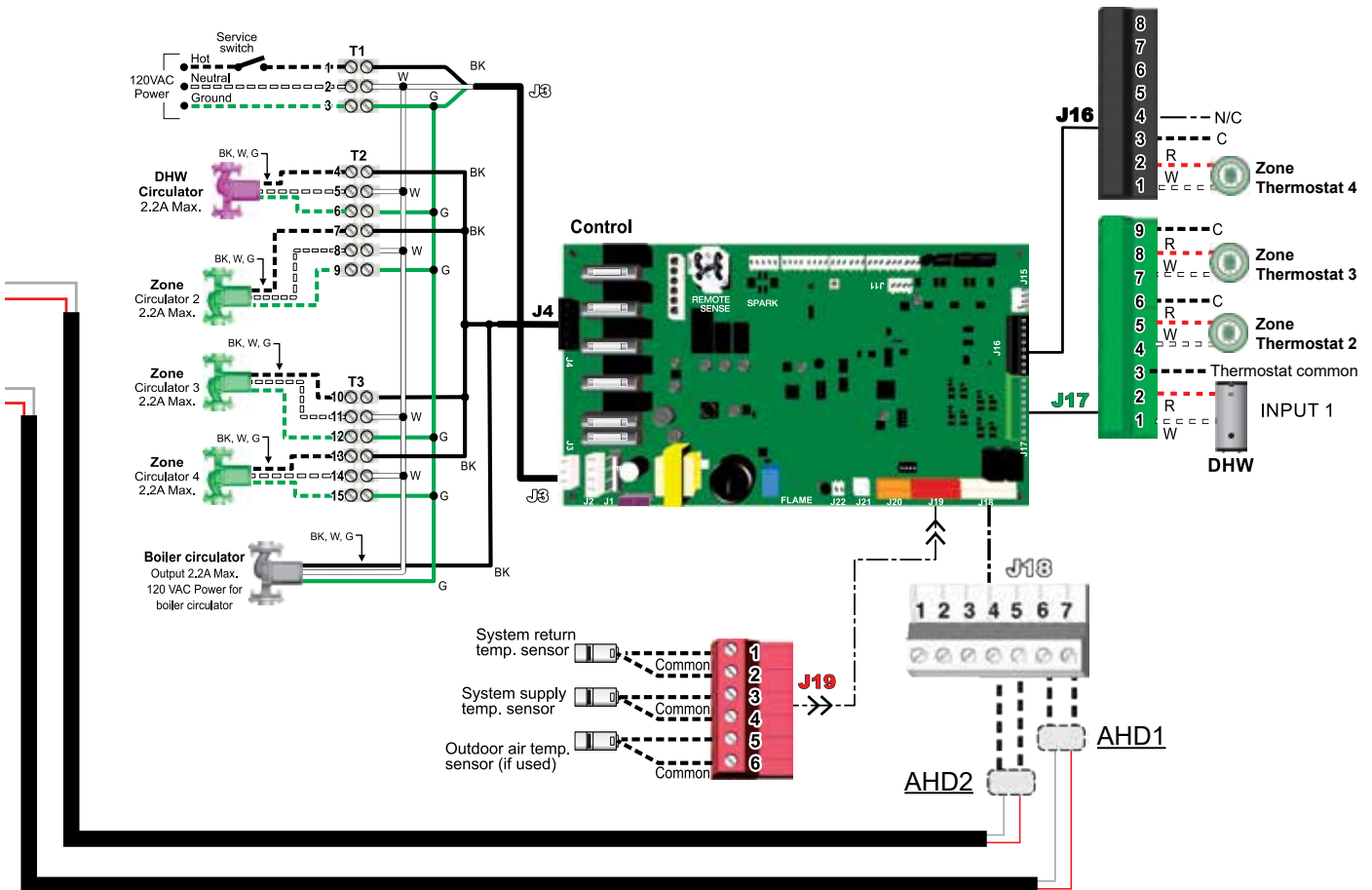


## System Type A (continued)

### Application A1: Multi-zone space heating, DHW as zone (continued)

#### Application Wiring (continued)

Figure 17 Application A1: Unity 2.0 Control Wiring



## System Type A (continued)

### Application A1: Multi-zone space heating, DHW as zone (continued)

#### Control Settings

#### Boiler (Master) Configuration

After entering the contractor menu, ensure the settings in the following sub-menus are set as noted.

#### System Settings

| INPUT/OUTPUT 1                                                                                                                                                                                                                                                       |                                      | INPUT/OUTPUT 2                                                                                                                  |                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| Name                                                                                                                                                                                                                                                                 | "Default name for DHW" or as desired | Name                                                                                                                            | "Default name for Space Heat" or as desired |
| Usage                                                                                                                                                                                                                                                                | Heat Demand                          | Usage                                                                                                                           | Heat Demand                                 |
| Priority                                                                                                                                                                                                                                                             | Priority 1                           | Priority                                                                                                                        | Priority 2                                  |
| Priority 1                                                                                                                                                                                                                                                           |                                      | Priority 2                                                                                                                      |                                             |
| System Type                                                                                                                                                                                                                                                          | Domestic Hot Water                   | System Type                                                                                                                     | Fin Base                                    |
| Target Modulation Sensor                                                                                                                                                                                                                                             | System Supply                        | Target Modulation Sensor                                                                                                        | System Supply                               |
| Target Adjust                                                                                                                                                                                                                                                        | N/A                                  | Target Adjust                                                                                                                   | Outdoor Temp                                |
| Max Target Temp                                                                                                                                                                                                                                                      | Per ECOCalc                          | Max Target Temp                                                                                                                 | Per ECOCalc                                 |
| Min Target Temp                                                                                                                                                                                                                                                      | N/A                                  | Min Target Temp                                                                                                                 | Per ECOCalc                                 |
| Outdoor Temp for Max Target                                                                                                                                                                                                                                          | N/A                                  | Outdoor Temp for Max Target                                                                                                     | Per ECOCalc                                 |
| Outdoor Temp for Min Target                                                                                                                                                                                                                                          | N/A                                  | Outdoor Temp for Min Target                                                                                                     | Per ECOCalc                                 |
| Max On Time                                                                                                                                                                                                                                                          | Default                              | Max On Time                                                                                                                     | N/A                                         |
| Min On Time                                                                                                                                                                                                                                                          | N/A                                  | Min On Time                                                                                                                     | Default                                     |
| Run Boiler Pump                                                                                                                                                                                                                                                      | Yes                                  | Run Boiler Pump                                                                                                                 | Yes                                         |
| AHD Assign Contact                                                                                                                                                                                                                                                   | 2                                    | AHD Assign Contact                                                                                                              | 1                                           |
| AHD Priority                                                                                                                                                                                                                                                         | Outdoor Temp                         | AHD Priority                                                                                                                    | Outdoor Temp                                |
| System Temp Dependent                                                                                                                                                                                                                                                | Yes                                  | System Temp Dependent                                                                                                           | Yes                                         |
| Switchover Outdoor Temp                                                                                                                                                                                                                                              | 5°F                                  | Switchover Outdoor Temp                                                                                                         | Per ECOCalc                                 |
| AHD Order Above Switchover                                                                                                                                                                                                                                           | 1ST                                  | AHD Order Above Switchover                                                                                                      | 1ST                                         |
| AHD Order Below Switchover                                                                                                                                                                                                                                           | 1ST                                  | AHD Order Below Switchover                                                                                                      | OFF                                         |
| INPUT/OUTPUT 3                                                                                                                                                                                                                                                       |                                      | INPUT/OUTPUT 4                                                                                                                  |                                             |
| If Priority 2 is assigned, no further steps are required. If Priority 3 is assigned, repeat the steps from Input/output 2 above. Please contact Weil-McLain for use of a third priority as the system dynamics with the heat pump may not give the intended results. |                                      | If Priority 2 is assigned, no further steps are required. If Priority 3 is assigned, repeat the steps from Input/output 2 above |                                             |



**System Type A** (continued)

**Application A1: Multi-zone space heating, DHW as zone** (continued)

**Control Settings** (continued)

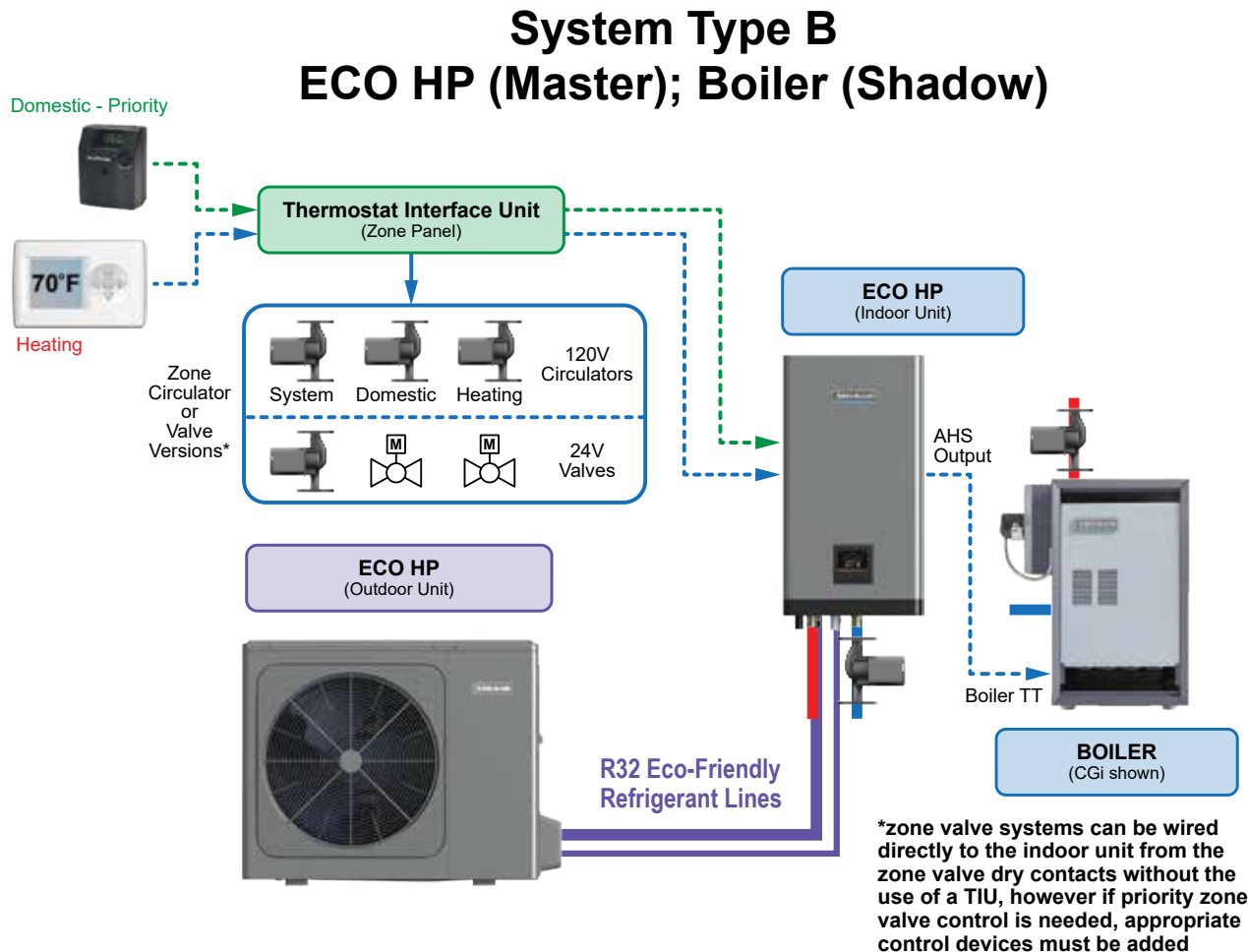
HP (Shadow) Configuration  
See pg 4-16 for basic settings and navigation

| Weather Temp. Settings |             |
|------------------------|-------------|
| T1SetH1                | Per ECOCalc |
| T1SetH2                | Per ECOCalc |
| T4H1                   | Per ECOCalc |
| T4H2                   | Per ECOCalc |
| Heating Settings       |             |
| T4HMAX                 | Per ECOCalc |
| T4HMIN                 | Per ECOCalc |

## System Type: Controls Connections (continued)

### System Type B: WM Heat Pump & any Boiler with a Thermostat Input

**Figure 4** System Type B - ECO®HP (Master); Boiler (Shadow)



Type B systems use the ECO®HP as master. The ECO®HP will determine when the heat pump will run and when the boiler will run. Only 1 zone circulator is supported natively, but additional zone circulators can be used with an appropriate DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit (TIU) detailed on [page 14](#).

The system call for heat or DHW will pass through a DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit (TIU.) This call is transferred via the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit, and switches to the appropriate HP inputs. The ECO®HP can only connect directly to dry contacts that are rated for 12Vdc. The boiler will receive its call for heat or DHW when the heat pump's Additional Heat Source (AHS) dry contacts are closed.

**NOTE:** If priority operation of either circulators or zone valves is desired, a DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit with priority functionality must be used.

#### Circulator Control:

- The ECO®HP will control its own circulator and may control one space heat zone circulator. (The ECO®HP can also control a DHW circulator with the addition of an isolated relay.)
- If additional circulators are required in the system a DHW-priority zone panel, such as the Weil-McLain thermostat interface unit (TIU), will control all other circulators.

## System Type B

### Application B1: Multi-zone space heating DHW as zone, boiler direct piped

#### Overview

- Two zones for space heating, zoned with circulators, through the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit.
- One zone for DHW, zoned with circulators, through the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit.

#### Boiler Settings

- See table on [page 28](#) for boiler control settings.
- Refer to the boiler manual for specific control navigation information.

#### ECO®HP Control Settings

- See table on [page 28](#) for heat pump control settings.
- Refer to [page 11](#) for heat pump control navigation information.

#### Circulators and piping

- Piping must be primary/secondary for the ECO® heat pump.
- If boiler will run concurrently with the ECO®HP, the boiler must be downstream from ECO®HP to prevent high return temperatures from shutting down the heat pump.
- Zone circulators should be sized for required flow.
- Space heating zone circulators and DHW zone circulator provided by installer.
- Additional zones can be added with additional zone panels.
- Heat Pump circulator is installed in heat pump manifold and included in the heat pump accessory box.

A DHW call will be served until satisfied, or for 1 hour if other zone calls are present. After 1 hour, the system will satisfy the zone calls, however, the Target Temperature on the heat pump will remain at T1STOPH (max temperature) until the DHW call is satisfied.

All zones should either run properly and safely at supply temperatures up to 149°F or using mixing valves to supply proper temperatures to zones.

Boiler is limited to one priority/reset curve. If reset curve is enabled, DHW supply temperatures will vary based on the curve. Ensure curve is sufficient for DHW operation. A single boiler target temperature can be used in place of the boiler reset curve. (Use ECO Calc to identify if this recommendation is best for each specific hydronic system.)



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## System Type B (continued)

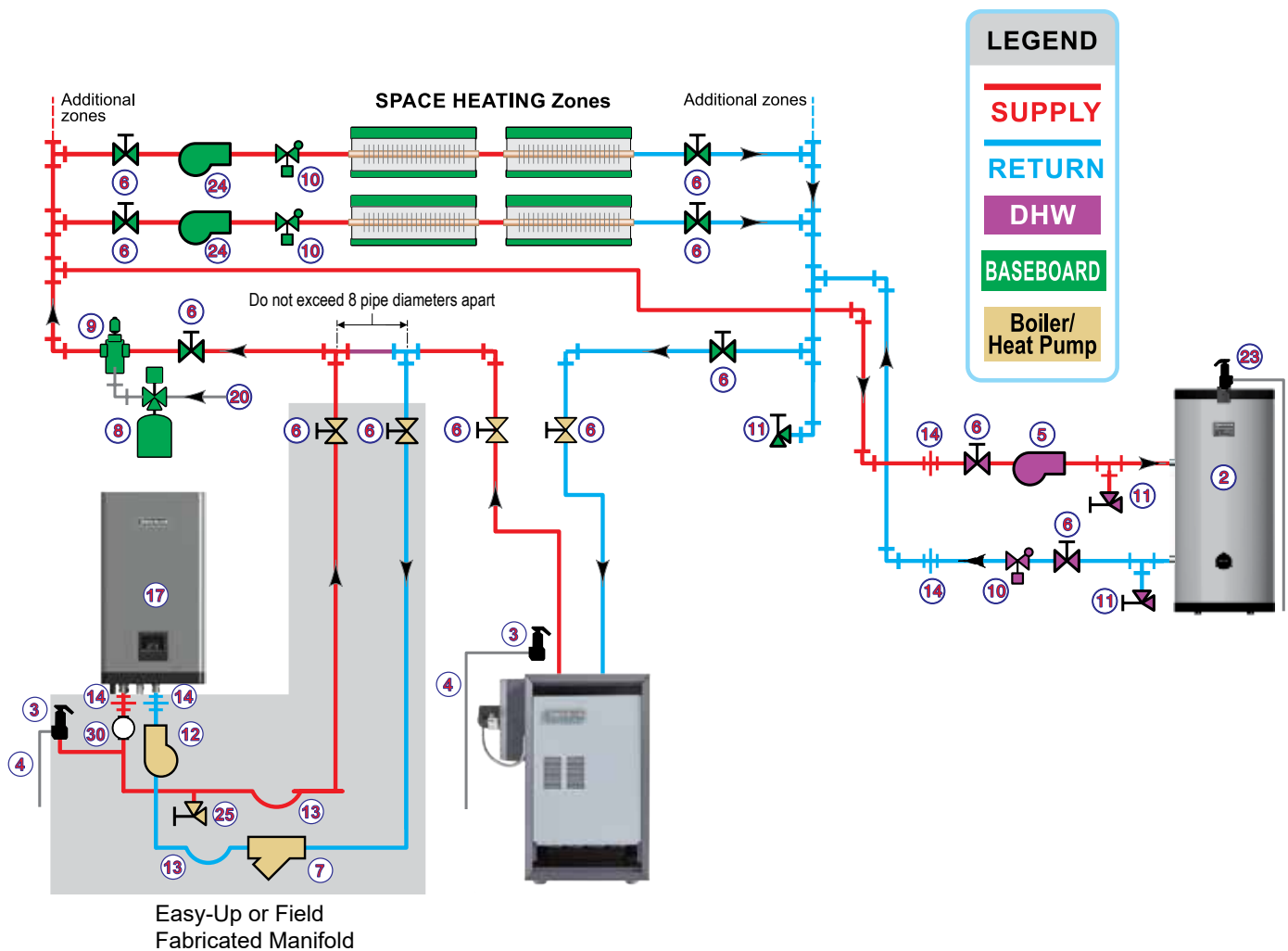
### Application B1: Multi-zone space heating DHW as zone, boiler direct piped (continued)

#### Application Piping

##### Legend

- |                                                                      |                                                              |                                                                                        |                                                                                    |
|----------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| 1. ■ Boiler.                                                         | 7. ■ Y-Strainer with 80 mesh screen.                         | 14. Unions as needed for service.                                                      | 26. Zone Valves.                                                                   |
| 2. Indirect water heater, if used (domestic water piping not shown.) | 8. Expansion tank.                                           | 17. ■ ECO®HP Heat Pump                                                                 | 27. Bypass pressure regulator                                                      |
| 3. ■ Relief valve, supplied with boiler and heat pump, field piped.  | 9. Air separator.                                            | 20. Make-up water supply.                                                              | 30. ■ Pressure/temperature gauge, supplied with boiler and heat pump, field piped. |
| 4. Relief valve piping to drain.                                     | 10. Flow/check or spring check valves.                       | 23. DHW Temperature and Pressure relief valve                                          |                                                                                    |
| 5. DHW circulator.                                                   | 11. Purge/drain valves.                                      | 24. Zone circulators.                                                                  |                                                                                    |
| 6. Isolation valves.                                                 | 12. ■ Heat pump circulator (with internal flow check valve.) | 25. ■ Boiler or heat pump drain valve, supplied with boiler or heat pump, field piped. |                                                                                    |
|                                                                      | 13. Heat trap.                                               |                                                                                        |                                                                                    |
- = Items supplied with boiler or heat pump - all other Items supplied by installer.

**Figure 18** Application B1: Application Piping

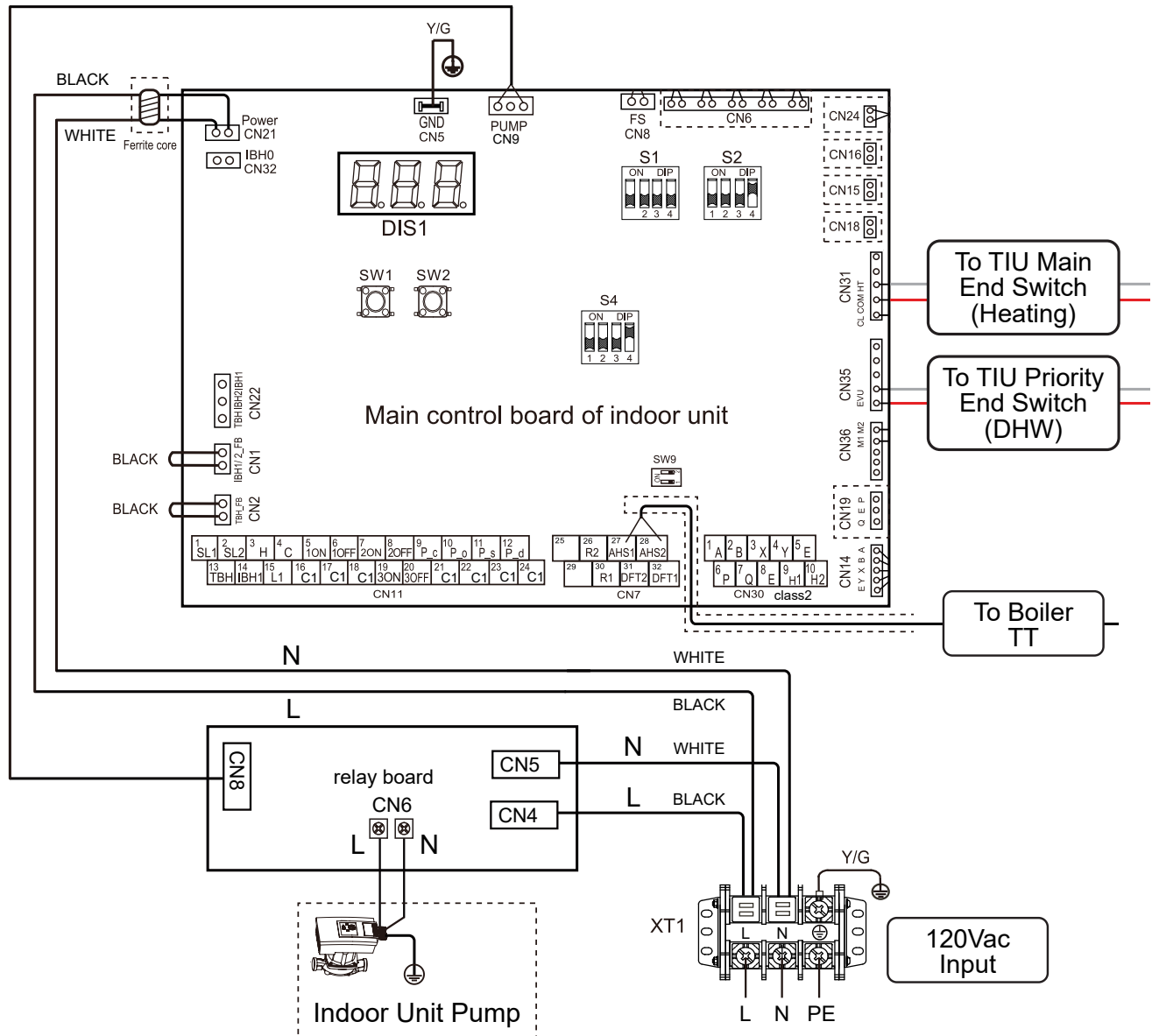


## System Type B (continued)

### Application B1: Multi-zone space heating DHW as zone, boiler direct piped (continued)

#### Application Wiring

**Figure 19** Application B1: Heat Pump Indoor Unit Wiring

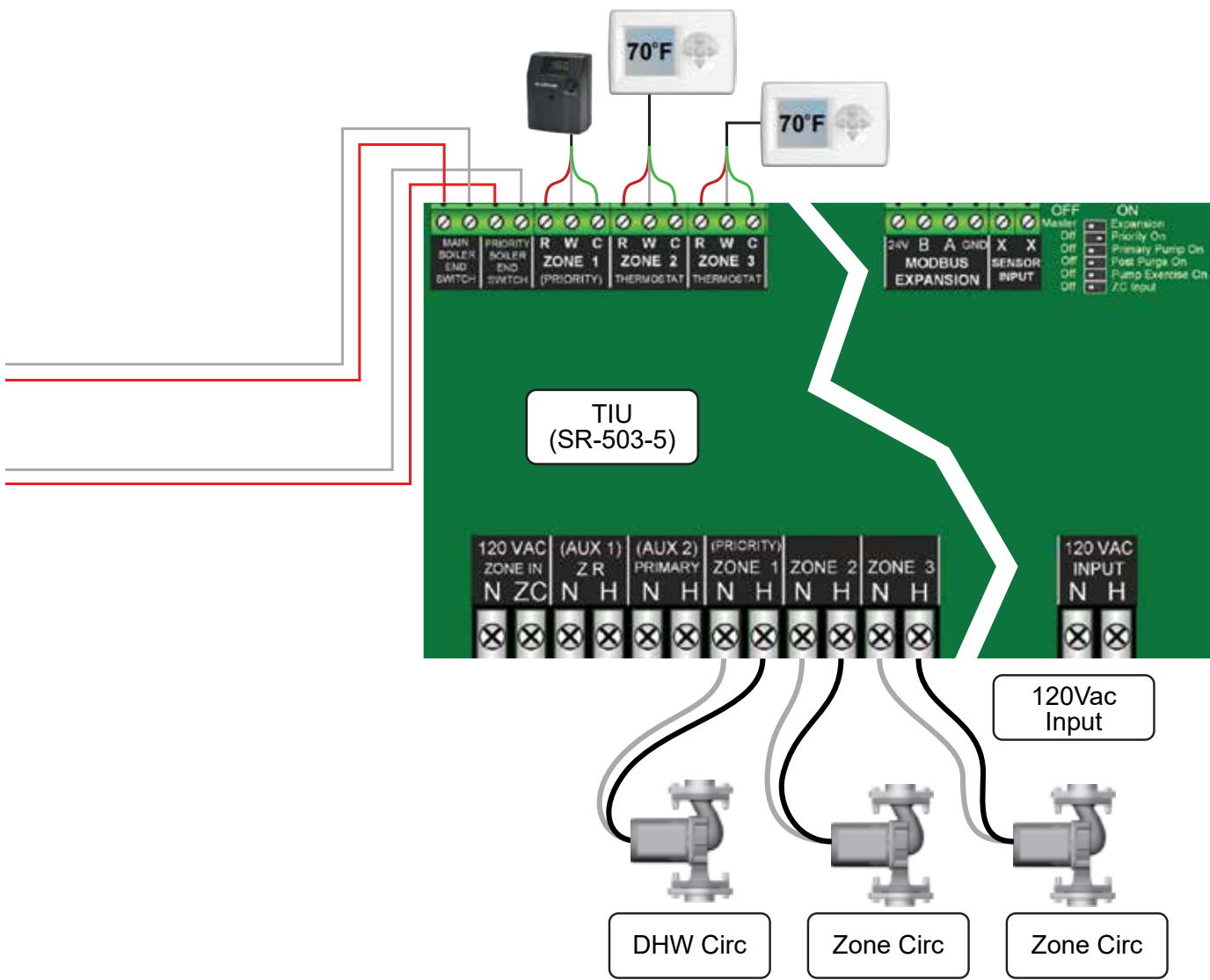


# System Type B (continued)

## Application B1: Multi-zone space heating DHW as zone, boiler direct piped (continued)

### Application Wiring (continued)

Figure 20 Application B1: Thermostat Interface Unit Wiring



## System Type B (continued)

### Application B1: Multi-zone space heating DHW as zone, boiler direct piped (continued)

#### Control Settings

HP (Master) Configuration  
See pg 4-16 for basic settings and navigation

#### Weather Temp. Settings

|         |             |
|---------|-------------|
| T1SetH1 | Per ECOCalc |
| T1SetH2 | Per ECOCalc |
| T4H1    | Per ECOCalc |
| T4H2    | Per ECOCalc |

#### Heating Settings

|        |                            |
|--------|----------------------------|
| T4HMAX | Per ECOCalc or as required |
| T4HMIN | Per ECOCalc                |

#### Other Heat Source

|                    |                                |
|--------------------|--------------------------------|
| AHS function       | Set to "Heating and DHW"       |
| AHS_Pump_I Control | Set to "Not Run"               |
| dT1_AHS_ON         | Default (9F) or as required    |
| t_AHS_Delay        | Default (30min) or as required |
| T4_AHS_ON          | Per ECOCalc                    |

Boiler (Shadow) Configuration  
If boiler has any outdoor reset functionality, ensure settings align with ECOCalc output



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## System Type B (continued)

### Application B2: Multi-zone space heating DHW as zone - Primary/Secondary (Use application B3 if using the Ultra easy-up manifold)

#### Overview

- Two zones for space heating, zoned with circulators, through the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit.
- One zone for DHW, zoned with circulators, through the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit.

#### U-Control Settings

- See table on [page 34](#) for boiler control settings.
- Refer to the boiler manual for specific control navigation information.

#### ECO®HP Control Settings

- See table on [page 34](#) for heat pump control settings.
- Refer to [page 11](#) for heat pump control navigation information.

#### Circulators and piping

- Piping must be primary/secondary.
- If boiler will run concurrently with the ECO®HP, the boiler must be downstream from ECO®HP to prevent high return temperatures from shutting down the heat pump.
- Zone circulators should be sized for required flow.
- Space heating zone circulators and DHW zone circulator provided by installer.
- Additional zones can be added with additional zone panels.
- Boiler circulator is shipped loose with the boiler.
- Heat Pump circulator is installed in heat pump manifold and included in the heat pump accessory box.

A DHW call will be served until satisfied, or for 1 hour if other zone calls are present. After 1 hour, the system will satisfy the zone calls, however, the Target Temperature on the heat pump will remain at T1STOPH (max temperature) until the DHW call is satisfied.

All zones should either run properly and safely at supply temperatures up to 149°F or using mixing valves to supply proper temperatures to zones.

The boiler can have three different priorities and reset curves, but due to the AHS being a single output, the boiler is limited to one priority/reset curve for this installation type. If reset curve is enabled, DHW supply temperatures will vary based on the curve. Ensure curve is sufficient for DHW operation. A single boiler target temperature can be used in place of the boiler reset curve. (Use ECO Calc to identify if this recommendation is best for each specific hydronic system.)

## System Type B (continued)

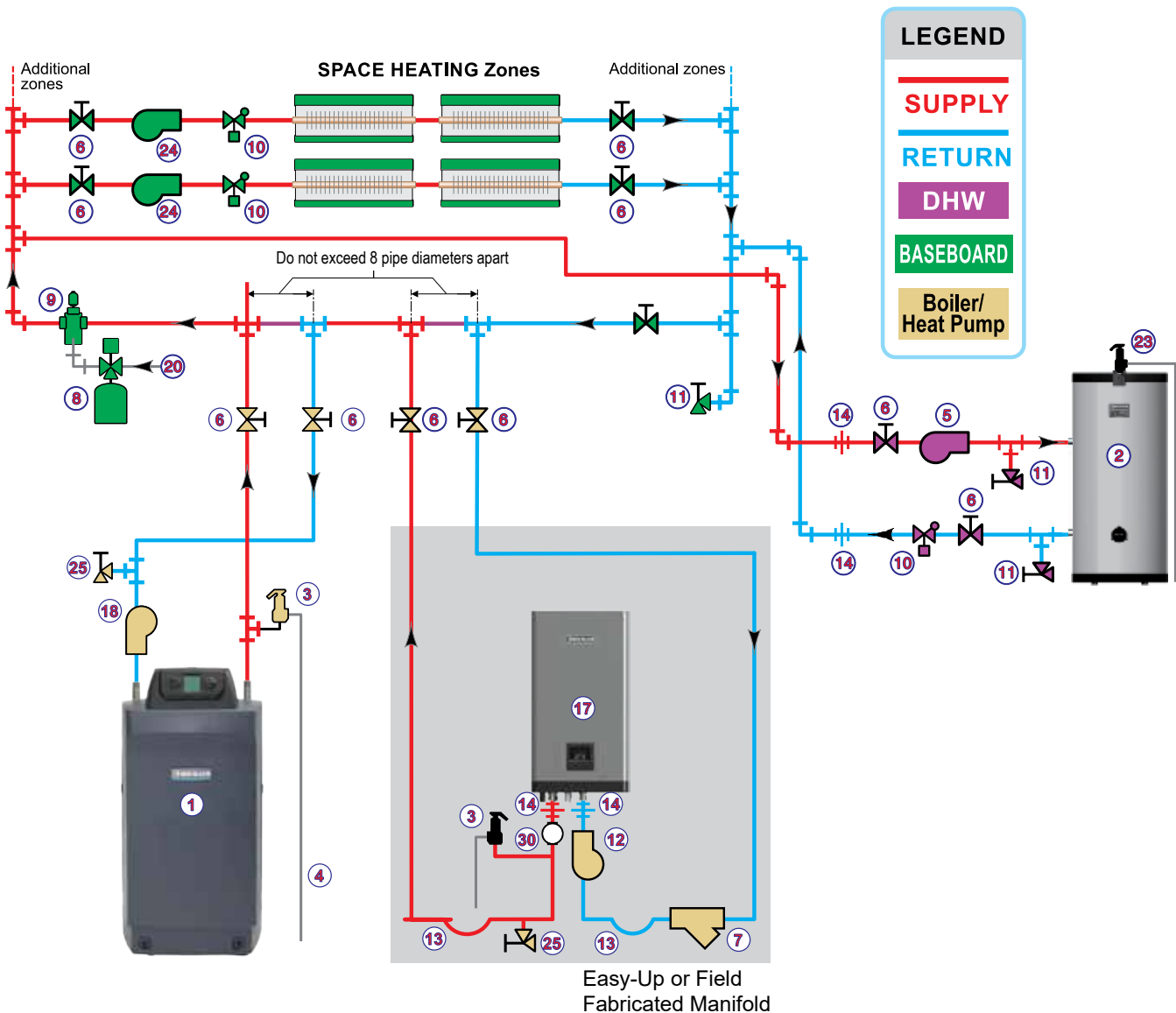
### Application B2: Multi-zone space heating DHW as zone - Primary/Secondary (continued)

#### Application Piping

##### Legend

- |                                                                      |                                                              |                                                                                        |                                                                                    |
|----------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| 1. ■ Boiler.                                                         | 7. ■ Y-Strainer with 80 mesh screen.                         | 14. Unions as needed for service.                                                      | 26. Zone Valves.                                                                   |
| 2. Indirect water heater, if used (domestic water piping not shown.) | 8. Expansion tank.                                           | 17. ■ ECO®HP Heat Pump                                                                 | 27. Bypass pressure regulator                                                      |
| 3. ■ Relief valve, supplied with boiler and heat pump, field piped.  | 9. Air separator.                                            | 18. ■ Boiler Circulator                                                                | 30. ■ Pressure/temperature gauge, supplied with boiler and heat pump, field piped. |
| 4. Relief valve piping to drain.                                     | 10. Flow/check or spring check valves.                       | 20. Make-up water supply.                                                              |                                                                                    |
| 5. DHW circulator.                                                   | 11. Purge/drain valves.                                      | 23. DHW Temperature and Pressure relief valve                                          |                                                                                    |
| 6. Isolation valves.                                                 | 12. ■ Heat pump circulator (with internal flow check valve.) | 24. Zone circulators.                                                                  |                                                                                    |
|                                                                      | 13. Heat trap.                                               | 25. ■ Boiler or heat pump drain valve, supplied with boiler or heat pump, field piped. |                                                                                    |
- = Items supplied with boiler or heat pump - all other items supplied by installer.

Figure 21 Application B2: Application Piping

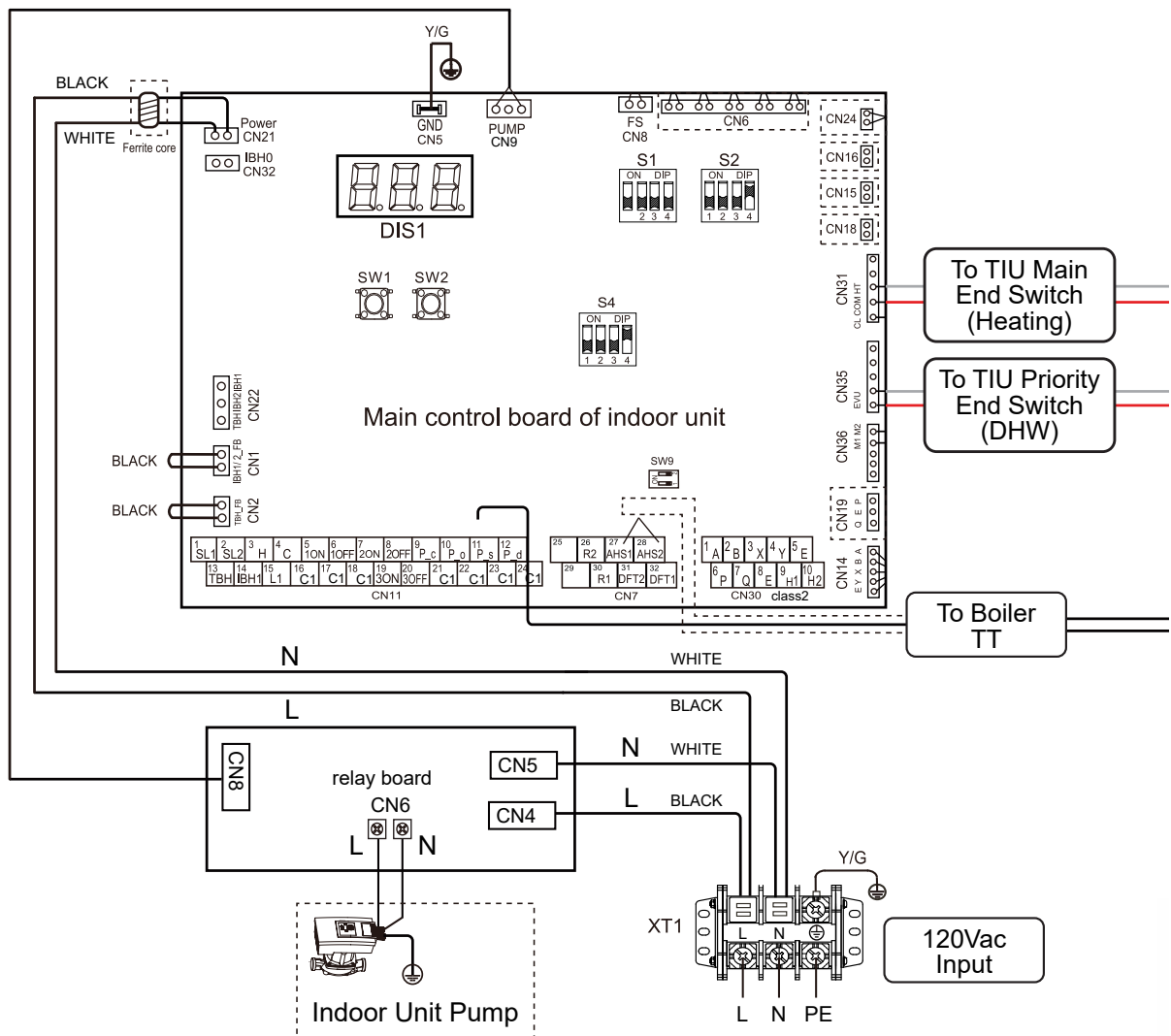


## System Type B (continued)

### Application B2: Multi-zone space heating DHW as zone - Primary/Secondary (continued)

#### Application Wiring

**Figure 22** Application B2: Heat Pump Indoor Unit Wiring

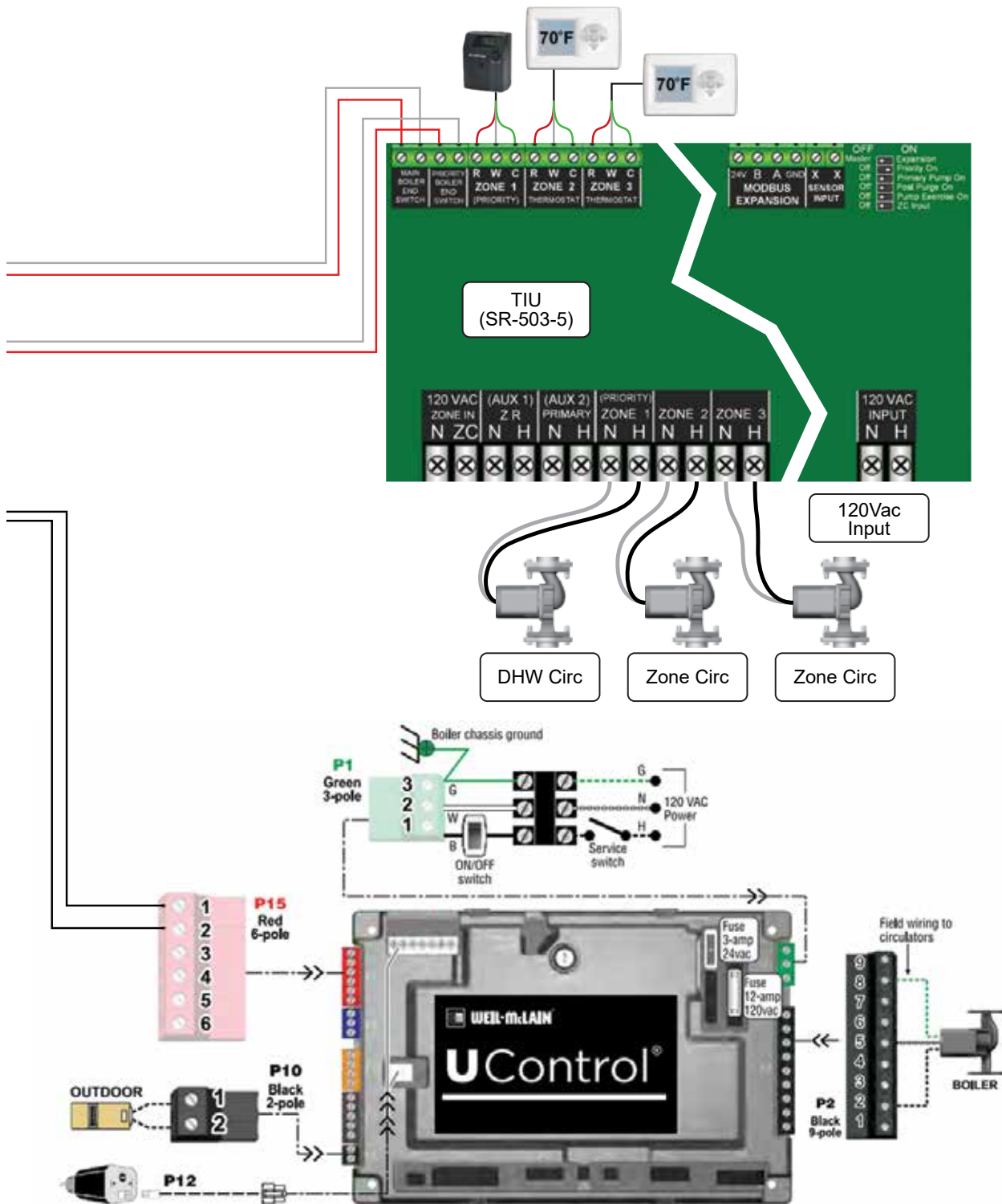


## System Type B (continued)

### Application B2: Multi-zone space heating DHW as zone - Primary/Secondary (continued)

#### Application Wiring (continued)

**Figure 23** Application B2: Thermostat Interface Unit and U-Control Wiring



## System Type B (continued)

### Application B2: Multi-zone space heating DHW as zone - Primary/Secondary (continued)

#### Control Settings

##### Boiler (Shadow) Configuration

After entering the contractor menu, ensure the settings in the following sub-menus are set as noted.

##### System Settings

##### PRIORITY 2

|             |          |
|-------------|----------|
| System Type | FIN BASE |
|-------------|----------|

##### TEMPERATURES

|              |             |
|--------------|-------------|
| Max Supply   | Per ECOCalc |
| Min Supply   | Per ECOCalc |
| Max OD Reset | Per ECOCalc |
| Min OD Reset | Per ECOCalc |

##### TIMES

|             |         |
|-------------|---------|
| Max On Time | Default |
| Min On Time | Default |

##### CIRCULATORS

|              |     |
|--------------|-----|
| Circulator 1 | OFF |
| Circulator 2 | ON  |
| Circulator 3 | OFF |

##### HP (Master) Configuration

See pg 4-16 for basic settings and navigation

##### Weather Temp. Settings

|         |             |
|---------|-------------|
| T1SetH1 | Per ECOCalc |
| T1SetH2 | Per ECOCalc |
| T4H1    | Per ECOCalc |
| T4H2    | Per ECOCalc |

##### Heating Settings

|        |                            |
|--------|----------------------------|
| T4HMAX | Per ECOCalc or as required |
| T4HMIN | Per ECOCalc                |

##### Other Heat Source

|                    |                                |
|--------------------|--------------------------------|
| AHS function       | Set to "Heating and DHW"       |
| AHS_Pump_I Control | Set to "Not Run"               |
| dT1_AHS_ON         | Default (9F) or as required    |
| t_AHS_Delay        | Default (30min) or as required |
| T4_AHS_ON          | Per ECOCalc                    |



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## System Type B

### Application B3: Multi-zone Space Heating boiler only DHW (Use application B3 if using the Ultra easy-up manifold)

#### Overview

- Three zones for space heating, zoned with circulators, through the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit (A DHW Priority zone panel is not required if the DHW is handled locally by the U-Control of the boiler.)
- One zone for DHW, direct piped with circulator, through boiler.

#### U-Control Settings

- See table on [page 40](#) for boiler control settings.
- Refer to the boiler manual for specific control navigation information.

#### ECO®HP Control Settings

- See table on [page 41](#) for heat pump control settings.
- Refer to [page 11](#) for heat pump control navigation information.

#### Circulators and piping

- Piping must be primary/secondary.
- If boiler will run concurrently with the ECO®HP, the boiler must be downstream from ECO®HP to prevent high return temperatures from shutting down the heat pump.
- A mixing valve should be used to ensure supplied DHW temperatures are properly limited.
- Zone circulators should be sized for required flow.
- Space heating zone circulators and DHW zone circulator provided by installer.
- Additional zones can be added with additional zone panels.
- Boiler circulator is shipped loose with the boiler.
- Heat Pump circulator is installed in heat pump manifold and included in the heat pump accessory box.

This system will run a DHW call until the boiler Priority 1 Max On Time has elapsed. The heat pump may run space heat calls in parallel with the boiler during a DHW calls. If the boiler receives a space heat call (from the heat pump AHS output), the timer for Max On Time will start.

## System Type B

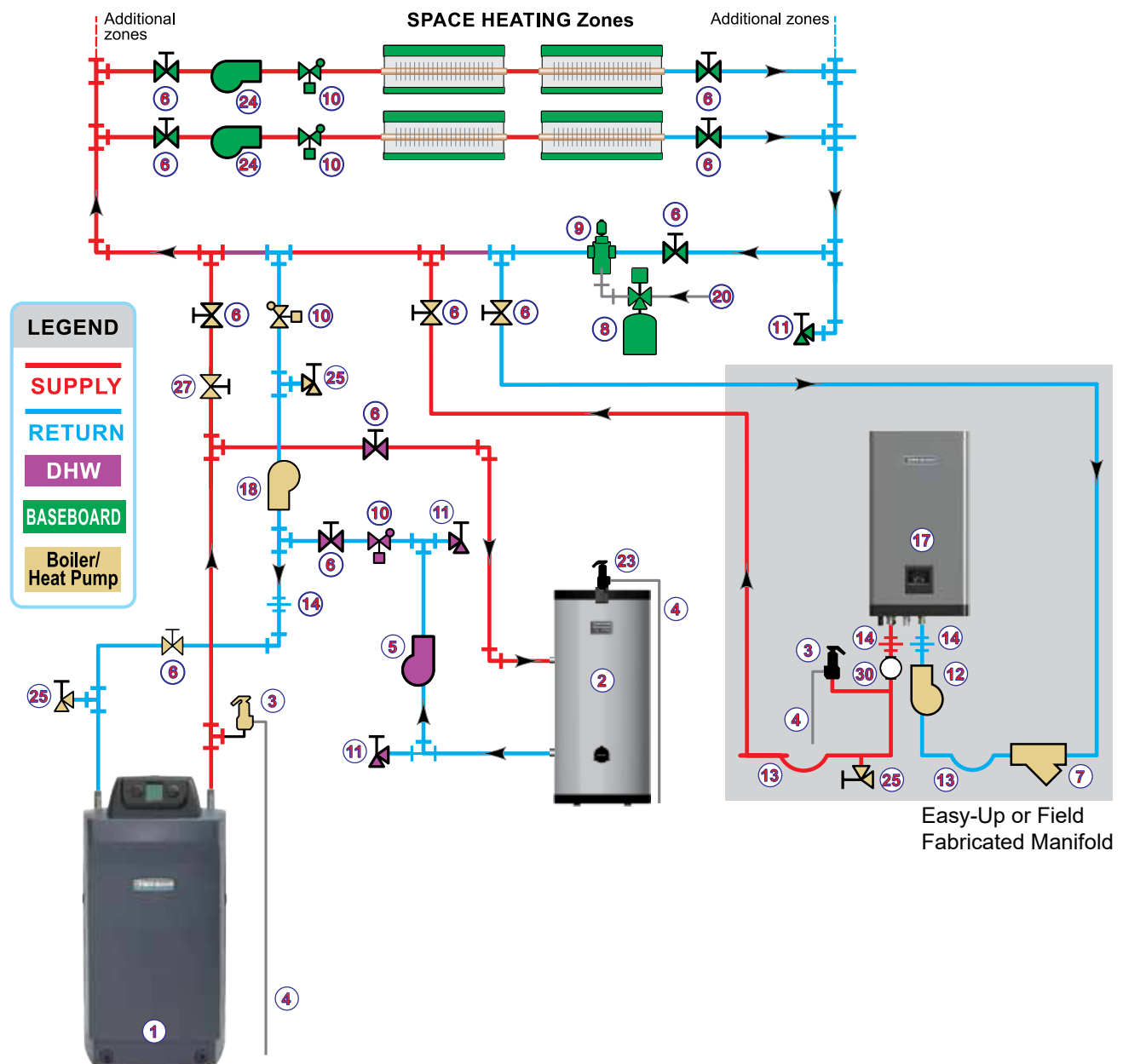
### Application B3: Multi-zone Space Heating boiler only DHW (continued)

#### Application Piping

##### Legend

- |                                                                      |                                                              |                                                                                        |                                                                                    |
|----------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| 1. ■ Boiler.                                                         | 7. ■ Y-Strainer with 80 mesh screen.                         | 14. Unions as needed for service.                                                      | 26. Zone Valves.                                                                   |
| 2. Indirect water heater, if used (domestic water piping not shown.) | 8. Expansion tank.                                           | 17. ■ ECO®HP Heat Pump                                                                 | 27. Bypass pressure regulator                                                      |
| 3. ■ Relief valve, supplied with boiler and heat pump, field piped.  | 9. Air separator.                                            | 18. ■ Boiler Circulator                                                                | 30. ■ Pressure/temperature gauge, supplied with boiler and heat pump, field piped. |
| 4. Relief valve piping to drain.                                     | 10. Flow/check or spring check valves.                       | 20. Make-up water supply.                                                              |                                                                                    |
| 5. DHW circulator.                                                   | 11. Purge/drain valves.                                      | 23. DHW Temperature and Pressure relief valve                                          |                                                                                    |
| 6. Isolation valves.                                                 | 12. ■ Heat pump circulator (with internal flow check valve.) | 24. Zone circulators.                                                                  |                                                                                    |
|                                                                      | 13. Heat trap.                                               | 25. ■ Boiler or heat pump drain valve, supplied with boiler or heat pump, field piped. |                                                                                    |
- = Items supplied with boiler or heat pump - all other Items supplied by installer.

**Figure 24** Application B3: Multi-zone Space Heating boiler only DHW Application Piping

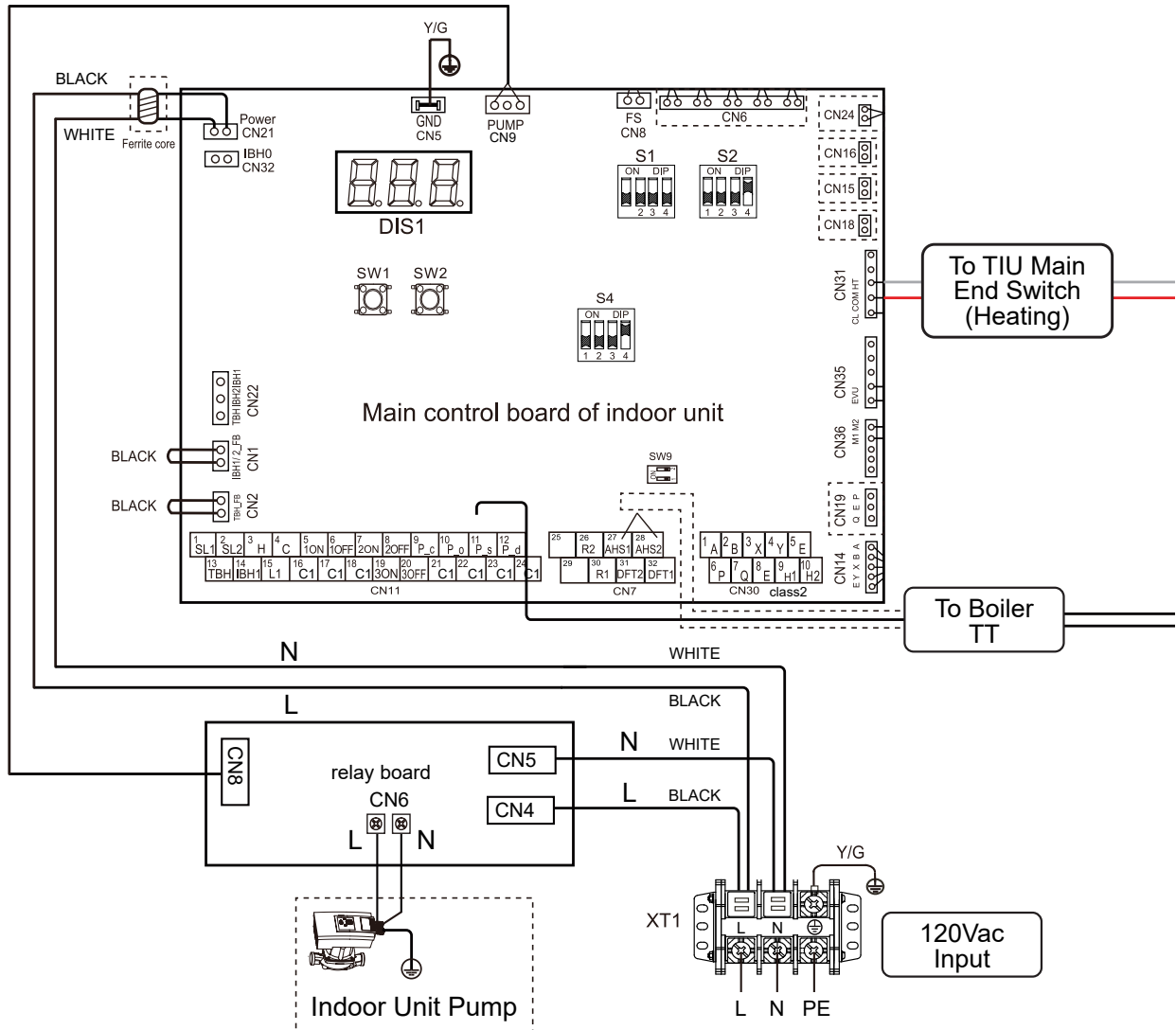


## System Type B (continued)

### Application B3: Multi-zone Space Heating boiler only DHW (continued)

#### Application Wiring

**Figure 25** Application B3: Multi-zone Space Heating boiler only DHW Application Wiring

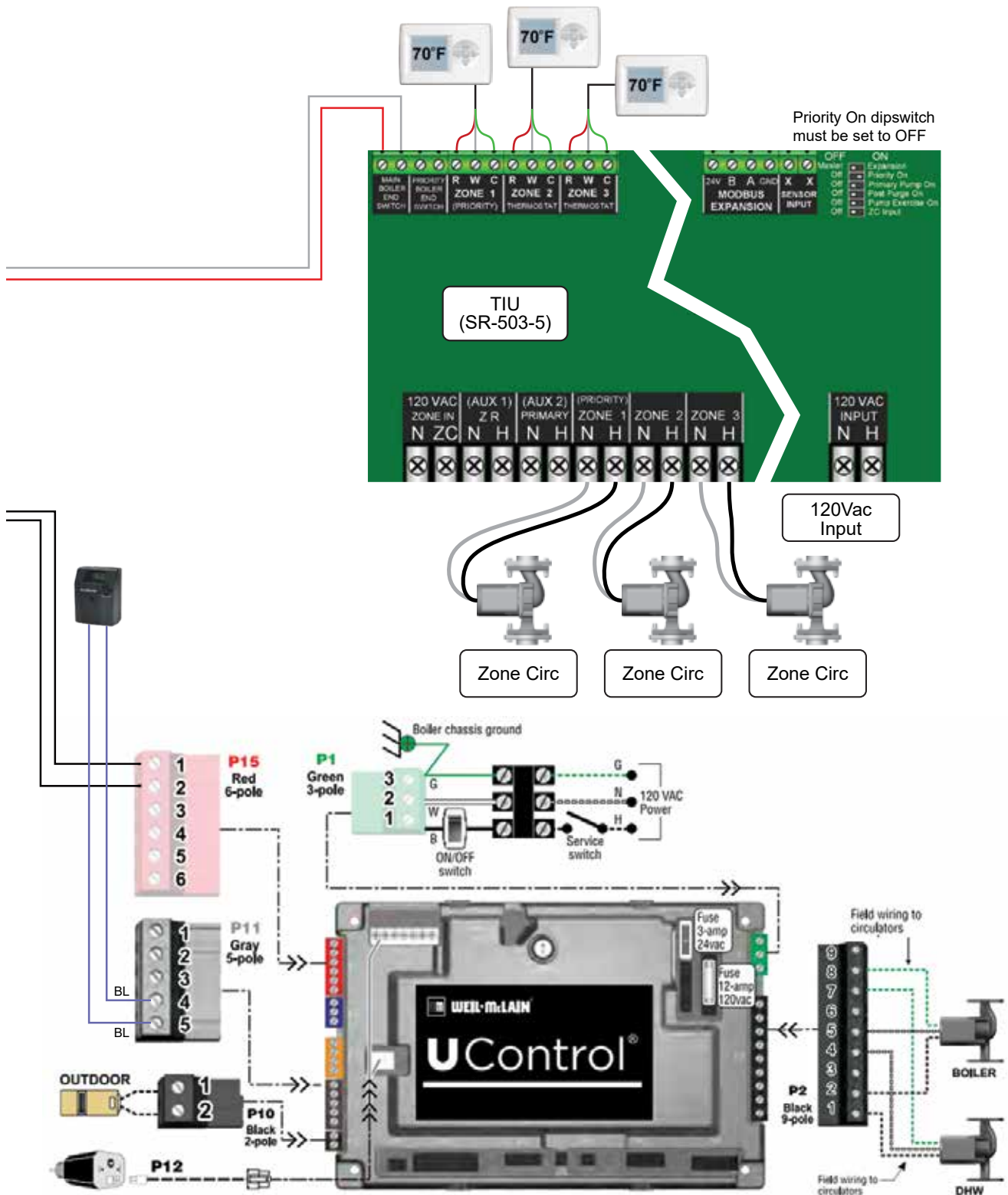


## System Type B (continued)

### Application B3: Multi-zone Space Heating boiler only DHW (continued)

#### Application Wiring (continued)

**Figure 26** Application B3: Multi-zone Space Heating boiler only DHW Application Wiring





## System Type B (continued)

### Application B3: Multi-zone Space Heating boiler only DHW (continued)

#### Control Settings

#### Ultra Boiler (Shadow) Configuration

After entering the contractor menu, ensure the settings in the following sub-menus are set as noted.

| System Settings |             |
|-----------------|-------------|
| PRIORITY 1      |             |
| System Type     | DHW DIRECT  |
| TEMPERATURES    |             |
| Max Supply      | 190 F       |
| Min Supply      | N/A         |
| Max OD Reset    | N/A         |
| Min OD Reset    | N/A         |
| TIMES           |             |
| Max On Time     | Default     |
| CIRCULATORS     |             |
| Circulator 1    | ON          |
| Circulator 2    | OFF         |
| Circulator 3    | OFF         |
| PRIORITY 2      |             |
| System Type     | FIN BASE    |
| TEMPERATURES    |             |
| Max Supply      | Per ECOCalc |
| Min Supply      | Per ECOCalc |
| Max OD Reset    | Per ECOCalc |
| Min OD Reset    | Per ECOCalc |
| TIMES           |             |
| Max On Time     | Default     |
| Min On Time     | Default     |
| CIRCULATORS     |             |
| Circulator 1    | OFF         |
| Circulator 2    | ON          |
| Circulator 3    | OFF         |

## System Type B (continued)

### Application B3: Multi-zone Space Heating boiler only DHW (continued)

#### Control Settings (continued)

HP (Master) Configuration  
See pg 13-16 for basic settings and navigation

#### Weather Temp. Settings

|         |             |
|---------|-------------|
| T1SetH1 | Per ECOCalc |
| T1SetH2 | Per ECOCalc |
| T4H1    | Per ECOCalc |
| T4H2    | Per ECOCalc |

#### Heating Settings

|        |                            |
|--------|----------------------------|
| T4HMAX | Per ECOCalc or as required |
| T4HMIN | Per ECOCalc                |

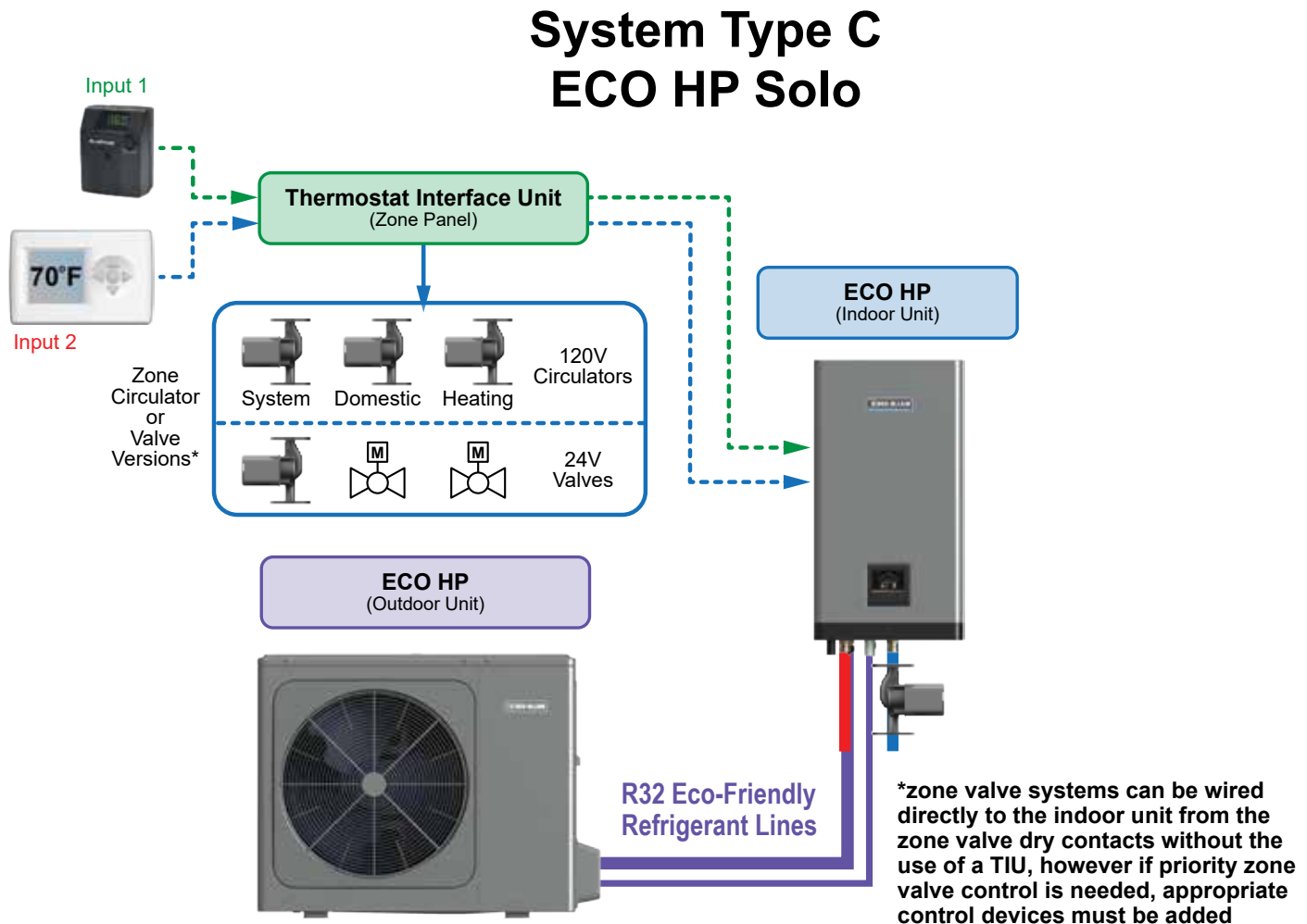
#### Other Heat Source

|                    |                                |
|--------------------|--------------------------------|
| AHS function       | Set to "Heating"               |
| AHS_Pump_I Control | Set to "Not Run"               |
| dT1_AHS_ON         | Default (9F) or as required    |
| t_AHS_Delay        | Default (30min) or as required |
| T4_AHS_ON          | Per ECOCalc                    |

## System Type: Controls Connections (continued)

### System Type C: HP Only and Multi-HP

**Figure 5** System Type C - ECO®HP Solo



Type C Systems use only the ECO®HP, without any other additional heat sources. Only 1 zone circulator is supported natively, but additional zone circulators can be used with an appropriate DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit (TIU) detailed on [page 14](#)

The system call for heat or DHW will pass through a DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit (TIU.) This call is transferred via the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit end switches, to the appropriate HP inputs. The ECO®HP can only connect directly to dry contacts that are rated for 12Vdc.

**NOTE:** If priority operation of either circulators or zone valves is desired, a DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit with priority functionality must be used.

#### Circulator Control:

- The ECO®HP will control its own circulator and may control one space heat zone circulator. (The ECO®HP can also control a DHW circulator with the addition of an isolation relay.)
- If additional circulators are required in the system a DHW-priority zone panel, such as the Weil-McLain thermostat interface unit (TIU), will control all other circulators.

## System Type C

### Application C1: Multi-zone Space Heating

#### Overview

- Three zones for space heating, zoned with circulators, through the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit.

#### ECO®HP Control Settings

- See table on [page 48](#) for heat pump control settings.
- Refer to [page 11](#) for heat pump control navigation information.
- **Note:** For proper three zone operation with the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit, Priority On dipswitch must be set to OFF.

#### Circulators and piping

- Piping must be primary/secondary.
- Zone circulators should be sized for required flow.
- Space heating zone circulators provided by installer.
- Additional zones can be added with additional zone panels.
- Heat Pump circulator is installed in heat pump manifold and included in the heat pump accessory box.



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## System Type C (continued)

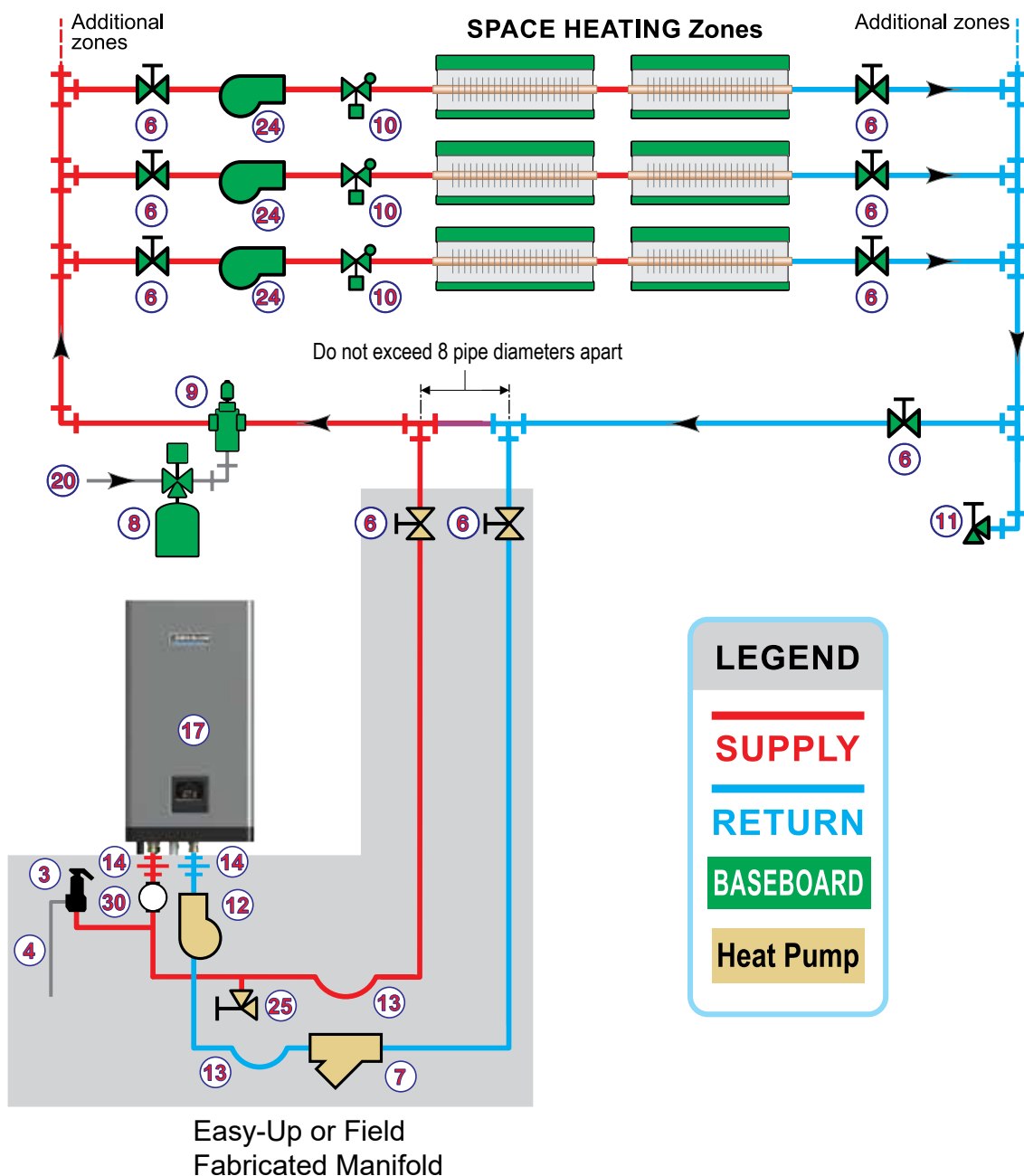
### Application C1: Multi-zone Space Heating (continued)

#### Application Piping

##### Legend

- |                                                                     |                                                              |                                                                                        |                                                                                      |
|---------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 3. ■ Relief valve, supplied with boiler and heat pump, field piped. | 9. Air separator.                                            | 17. ■ ECO®HP Heat Pump                                                                 | 27. Bypass pressure regulator                                                        |
| 4. Relief valve piping to drain.                                    | 10. Flow/check or spring check valves.                       | 20. Make-up water supply.                                                              | 30. ■ Pressure/temperature gauge, supplied with boiler and heat pump, field piped.   |
| 6. Isolation valves.                                                | 11. Purge/drain valves.                                      | 24. Zone circulators.                                                                  |                                                                                      |
| 7. ■ Y-Strainer with 80 mesh screen.                                | 12. ■ Heat pump circulator (with internal flow check valve.) | 25. ■ Boiler or heat pump drain valve, supplied with boiler or heat pump, field piped. | ■ = Items supplied with boiler or heat pump - all other items supplied by installer. |
| 8. Expansion tank.                                                  | 13. Heat trap.                                               | 26. Zone Valves.                                                                       |                                                                                      |
|                                                                     | 14. Unions as needed for service.                            |                                                                                        |                                                                                      |

**Figure 27** Application C1: Multi-zone Space Heating Application Piping

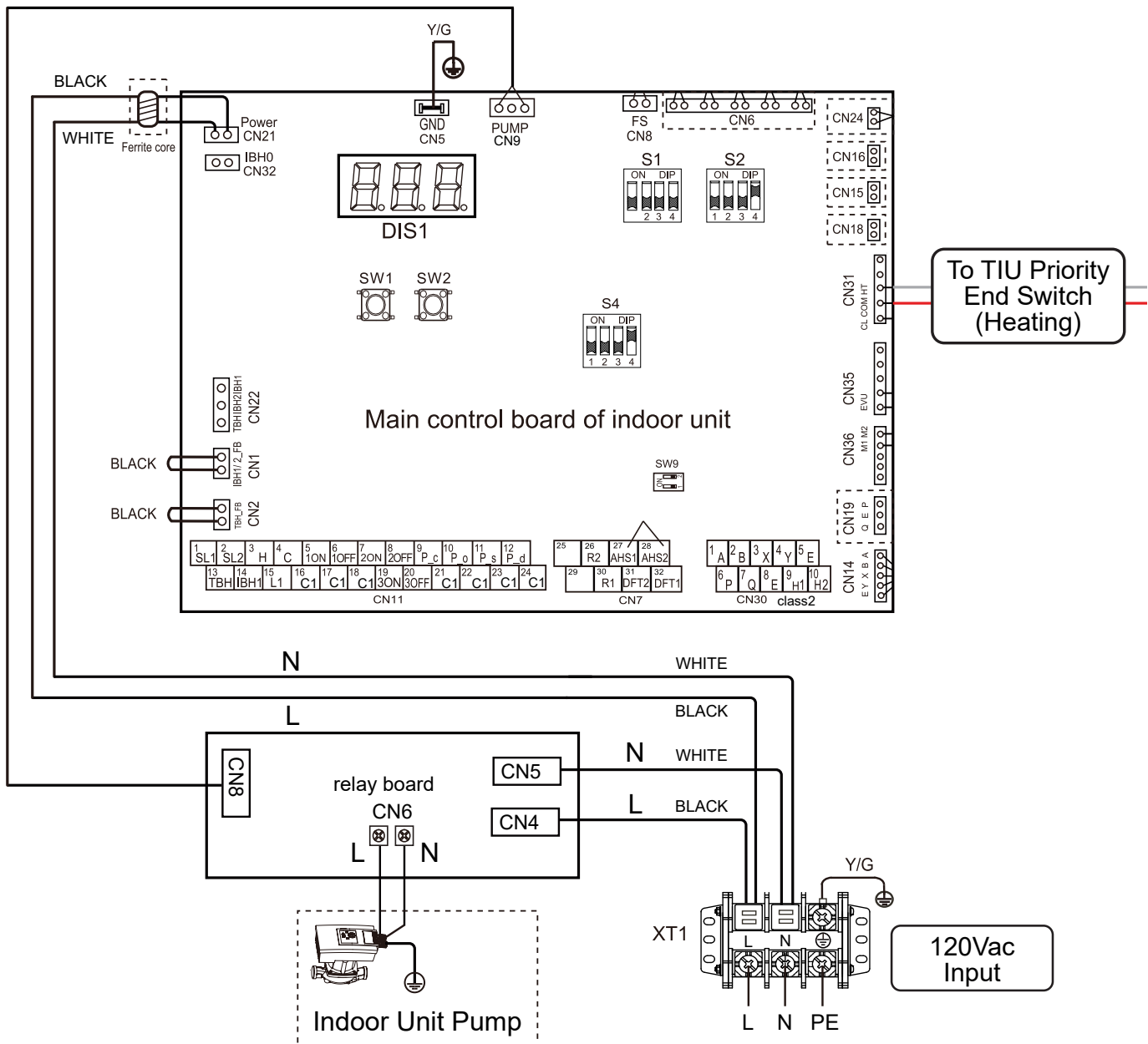


## System Type C (continued)

### Application C1: Multi-zone Space Heating (continued)

#### Application Wiring

**Figure 28** Application C1: Multi-zone Space Heating Application Wiring

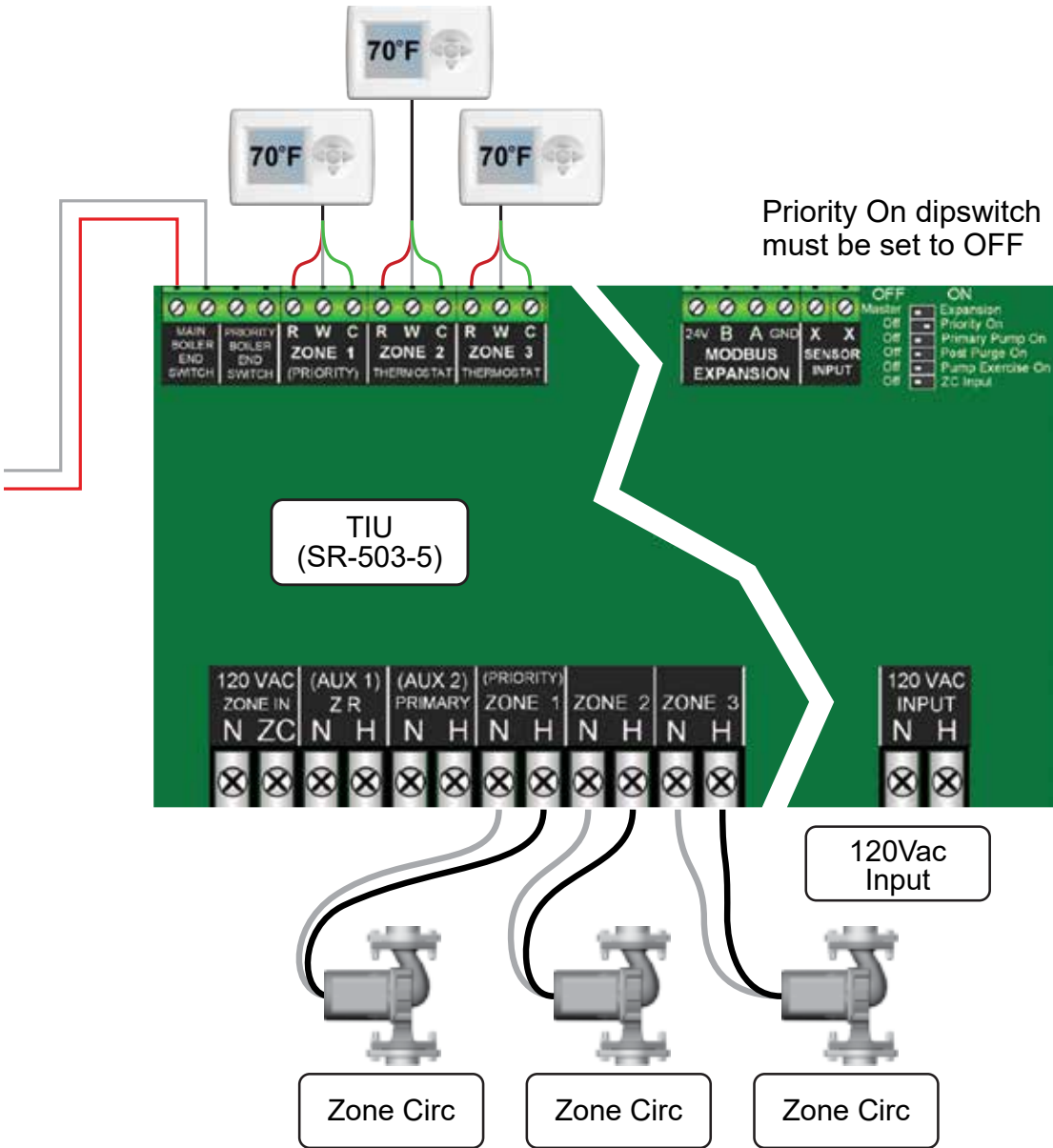


# **System Type C** (continued)

## **Application C1: Multi-zone Space Heating** (continued)

### **Application Wiring** (continued)

**Figure 29** Application C1: Multi-zone Space Heating Application Wiring





## System Type C (continued)

### Application C1: Multi-zone Space Heating (continued)

#### Control Settings

HP (Master) Configuration  
See pg 14-16 for basic settings and navigation

#### Weather Temp. Settings

|         |             |
|---------|-------------|
| T1SetH1 | Per ECOCalc |
| T1SetH2 | Per ECOCalc |
| T4H1    | Per ECOCalc |
| T4H2    | Per ECOCalc |

#### Heating Settings

|        |             |
|--------|-------------|
| T4HMAX | Per ECOCalc |
| T4HMIN | Per ECOCalc |

#### Other heat source

|              |            |
|--------------|------------|
| AHS function | Set to OFF |
|--------------|------------|

Type C installations must ensure heat pump is properly sized for location, climate and application. No auxiliary heat is available. See Type A and Type B installations for auxiliary heat applications.

For proper three zone operation with the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit, Priority On dipswitch must be set to OFF

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## System Type C (continued)

### Application C2: Multi-zone Space Heating

#### Overview

- Multiple zones for space heating only, zoned with zone valves, end switches wired to the HP.

#### ECO®HP Control Settings

- See table on [page 53](#) for heat pump control settings.
- Refer to [page 11](#) for heat pump control navigation information.
- **Note:** For proper three zone operation with the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit, Priority On dipswitch must be set to OFF.

#### Circulators and piping

- Piping must be primary/secondary.
- System circulator should be sized for required head.
- System circulator provided by installer if circulator draws more than 0.2A, an isolation relay must be used.
- Heat Pump circulator is installed in heat pump manifold and included in the heat pump accessory box.

## System Type C (continued)

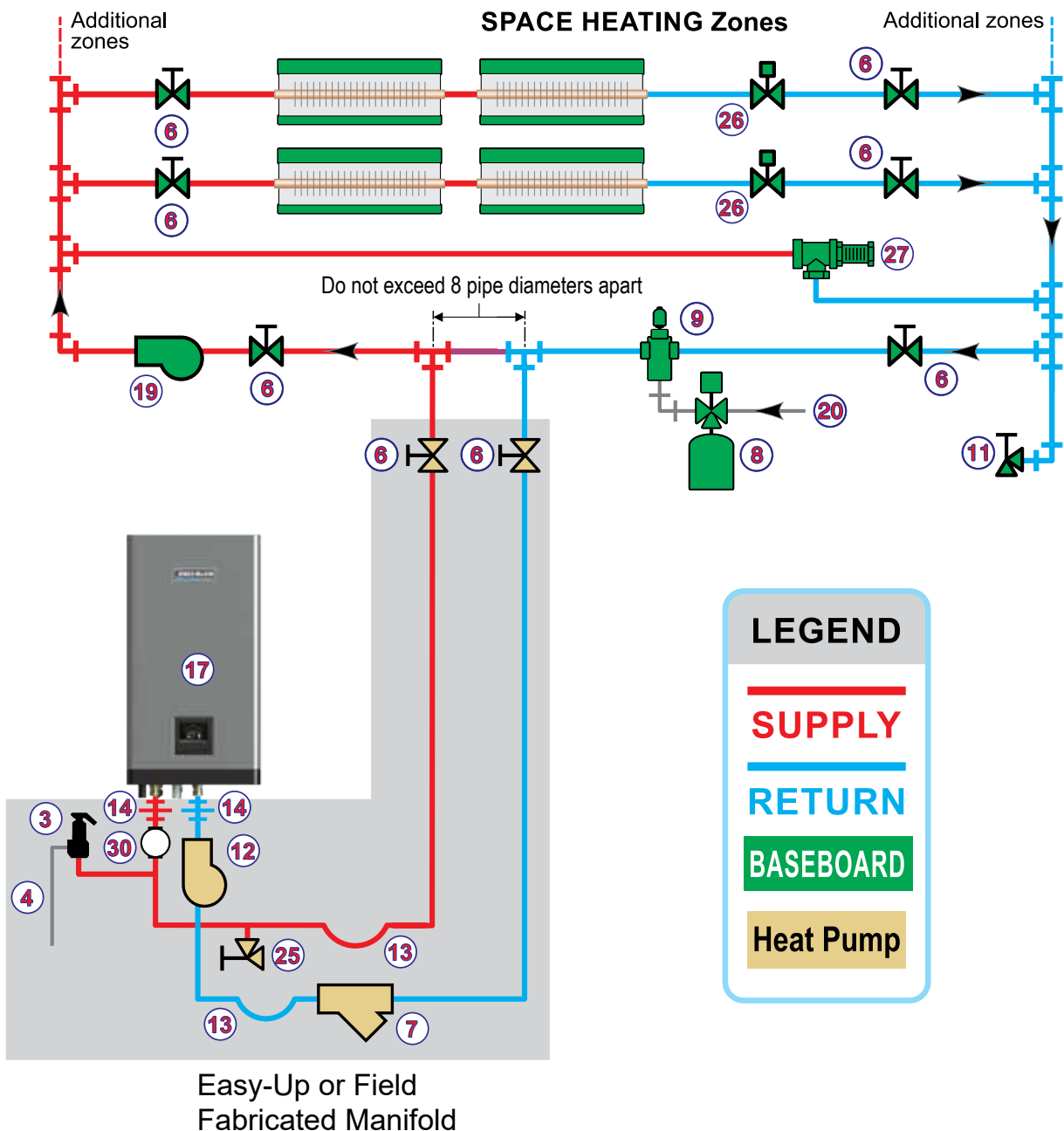
### Application C2: Multi-zone Space Heating (continued)

#### Application Piping

##### Legend

- |                                                                     |                                                              |                                                                                        |                                                                                      |
|---------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 3. ■ Relief valve, supplied with boiler and heat pump, field piped. | 9. Air separator.                                            | 17. ■ ECO®HP Heat Pump                                                                 | 27. Bypass pressure regulator                                                        |
| 4. Relief valve piping to drain.                                    | 10. Flow/check or spring check valves.                       | 19. System Circulator                                                                  | 30. ■ Pressure/temperature gauge, supplied with boiler and heat pump, field piped.   |
| 6. Isolation valves.                                                | 11. Purge/drain valves.                                      | 20. Make-up water supply.                                                              |                                                                                      |
| 7. ■ Y-Strainer with 80 mesh screen.                                | 12. ■ Heat pump circulator (with internal flow check valve.) | 25. ■ Boiler or heat pump drain valve, supplied with boiler or heat pump, field piped. | ■ = Items supplied with boiler or heat pump - all other items supplied by installer. |
| 8. Expansion tank.                                                  | 13. Heat trap.                                               | 26. Zone Valves.                                                                       |                                                                                      |
|                                                                     | 14. Unions as needed for service.                            |                                                                                        |                                                                                      |

**Figure 30** Application C2: Multi-zone Space Heating Application Piping





## System Type C (continued)

### Application C2: Multi-zone Space Heating (continued)

#### Control Settings

|                                                                             |             |
|-----------------------------------------------------------------------------|-------------|
| HP (Master) Configuration<br>See pg 14-16 for basic settings and navigation |             |
| <b>Weather Temp. Settings</b>                                               |             |
| T1SetH1                                                                     | Per ECOCalc |
| T1SetH2                                                                     | Per ECOCalc |
| T4H1                                                                        | Per ECOCalc |
| T4H2                                                                        | Per ECOCalc |
| <b>Heating Settings</b>                                                     |             |
| T4HMAX                                                                      | Per ECOCalc |
| T4HMIN                                                                      | Per ECOCalc |
| <b>Other heat source</b>                                                    |             |
| AHS function                                                                | Set to OFF  |

Type C installations must ensure heat pump is properly sized for location, climate and application. No auxiliary heat is available. See Type A and Type B installations for auxiliary heat applications.

For proper three zone operation with the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit, Priority On dipswitch must be set to OFF

## System Type C (continued)

### Application C3: Multi-zone space heating DHW as zone

#### Overview

- Two zones for space heating, zoned with circulators, through the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit.
- One zone for DHW, direct piped with circulator, through the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit.
- DHW Priority – space heating is disabled during DHW combi call.

#### ECO®HP Control Settings

- See table on [page 58](#) for heat pump control settings.
- Refer to [page 11](#) for heat pump control navigation information.
- **Note:** For proper three zone operation with the DHW-priority zone panel, such as the Weil-McLain Thermostat Interface Unit, Priority On dipswitch must be set to OFF.

#### Circulators and piping

- Piping must be primary/secondary
- A mixing valve should be used to ensure supplied DHW temperatures are properly limited.
- Zone circulators should be sized for required flow.
- Space heating zone circulators and DHW zone circulator provided by installer.
- Additional zones can be added with additional zone panels.
- Heat Pump circulator is installed in heat pump manifold and included in the heat pump accessory box.

Heat pump will operate DHW priority until satisfied. Ensure space heat zones can use up to 149°F supply temperatures or install mixing valves to ensure proper temperatures. If call is present, space heat will not operate until 1 hour after DHW call is initiated.

## System Type C (continued)

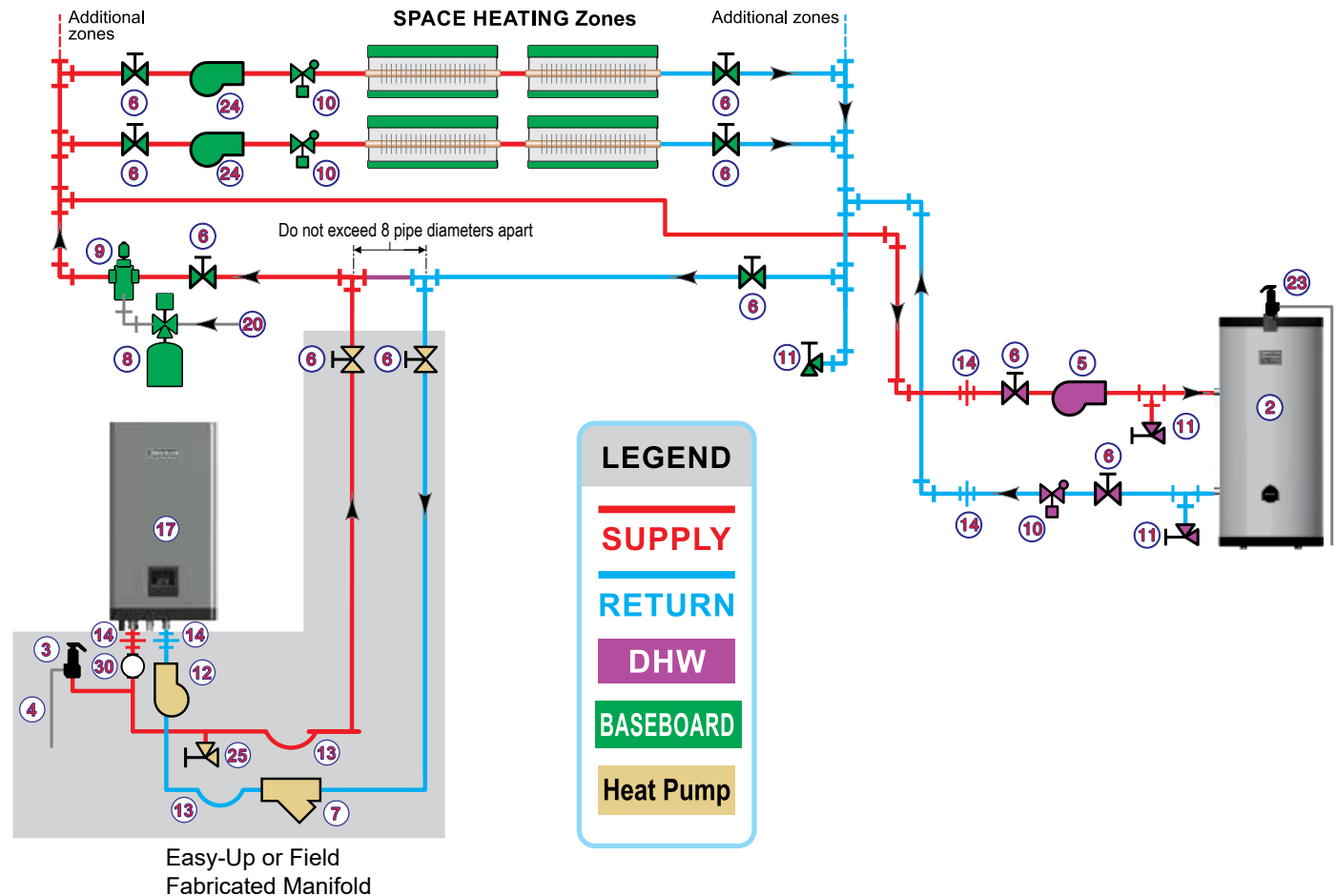
### Application C3: Multi-zone space heating DHW as zone (continued)

#### Application Piping

##### Legend

- |                                                                      |                                                              |                                                                                        |                                                                                    |
|----------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| 2. Indirect water heater, if used (domestic water piping not shown.) | 7. ■ Y-Strainer with 80 mesh screen.                         | 13. Heat trap.                                                                         | 26. Zone Valves.                                                                   |
| 3. ■ Relief valve, supplied with boiler and heat pump, field piped.  | 8. Expansion tank.                                           | 14. Unions as needed for service.                                                      | 27. Bypass pressure regulator                                                      |
| 4. Relief valve piping to drain.                                     | 9. Air separator.                                            | 17. ■ ECO®HP Heat Pump                                                                 | 30. ■ Pressure/temperature gauge, supplied with boiler and heat pump, field piped. |
| 5. DHW circulator.                                                   | 10. Flow/check or spring check valves.                       | 20. Make-up water supply.                                                              |                                                                                    |
| 6. Isolation valves.                                                 | 11. Purge/drain valves.                                      | 24. Zone circulators.                                                                  |                                                                                    |
|                                                                      | 12. ■ Heat pump circulator (with internal flow check valve.) | 25. ■ Boiler or heat pump drain valve, supplied with boiler or heat pump, field piped. |                                                                                    |
- = Items supplied with boiler or heat pump - all other Items supplied by installer.

**Figure 32** Application C3: Multi-zone space heating DHW as zone Application Piping

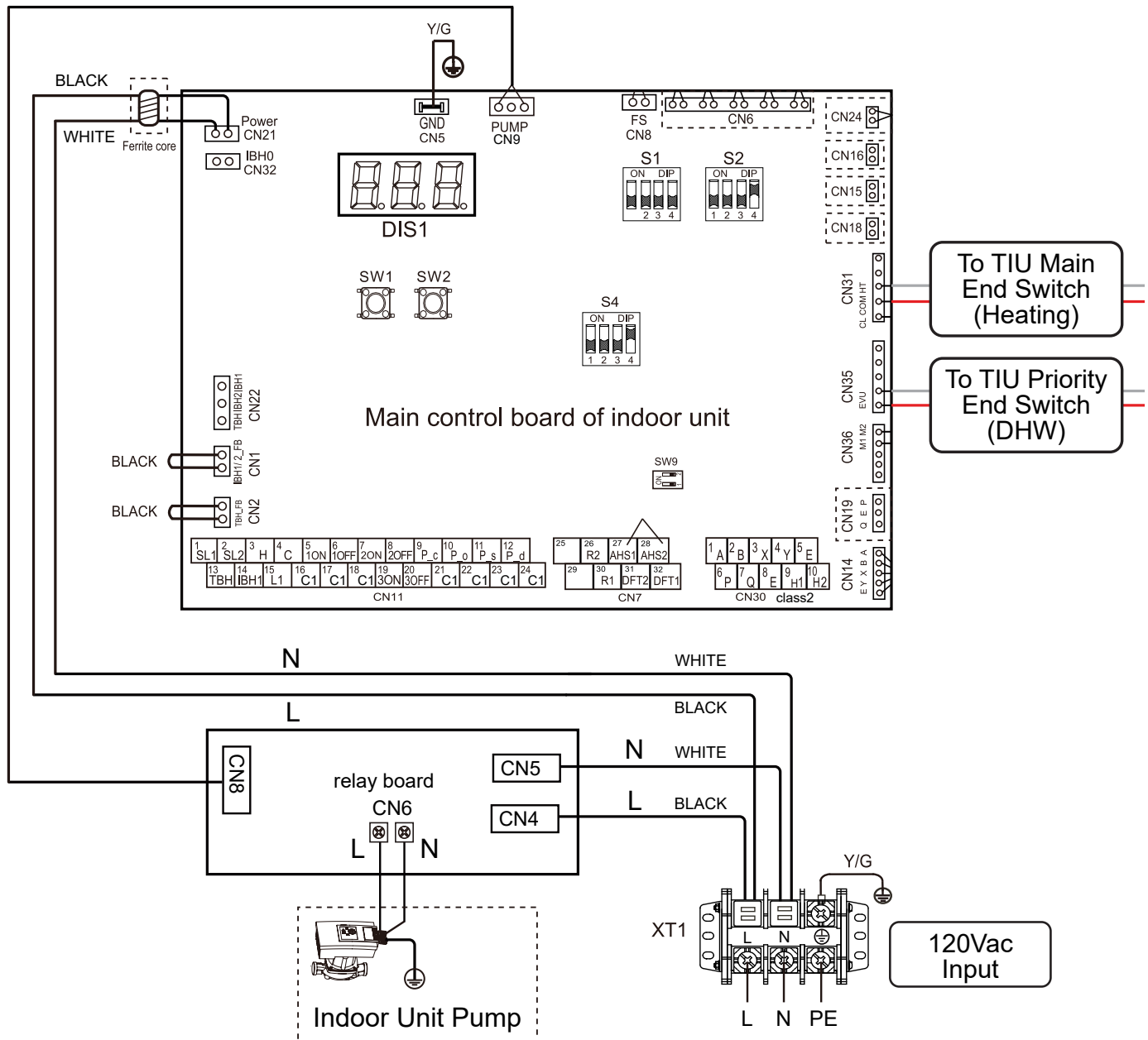


## System Type C (continued)

### Application C3: Multi-zone space heating DHW as zone (continued)

#### Application Wiring

**Figure 33** Application C3: Multi-zone space heating DHW as zone Application Wiring

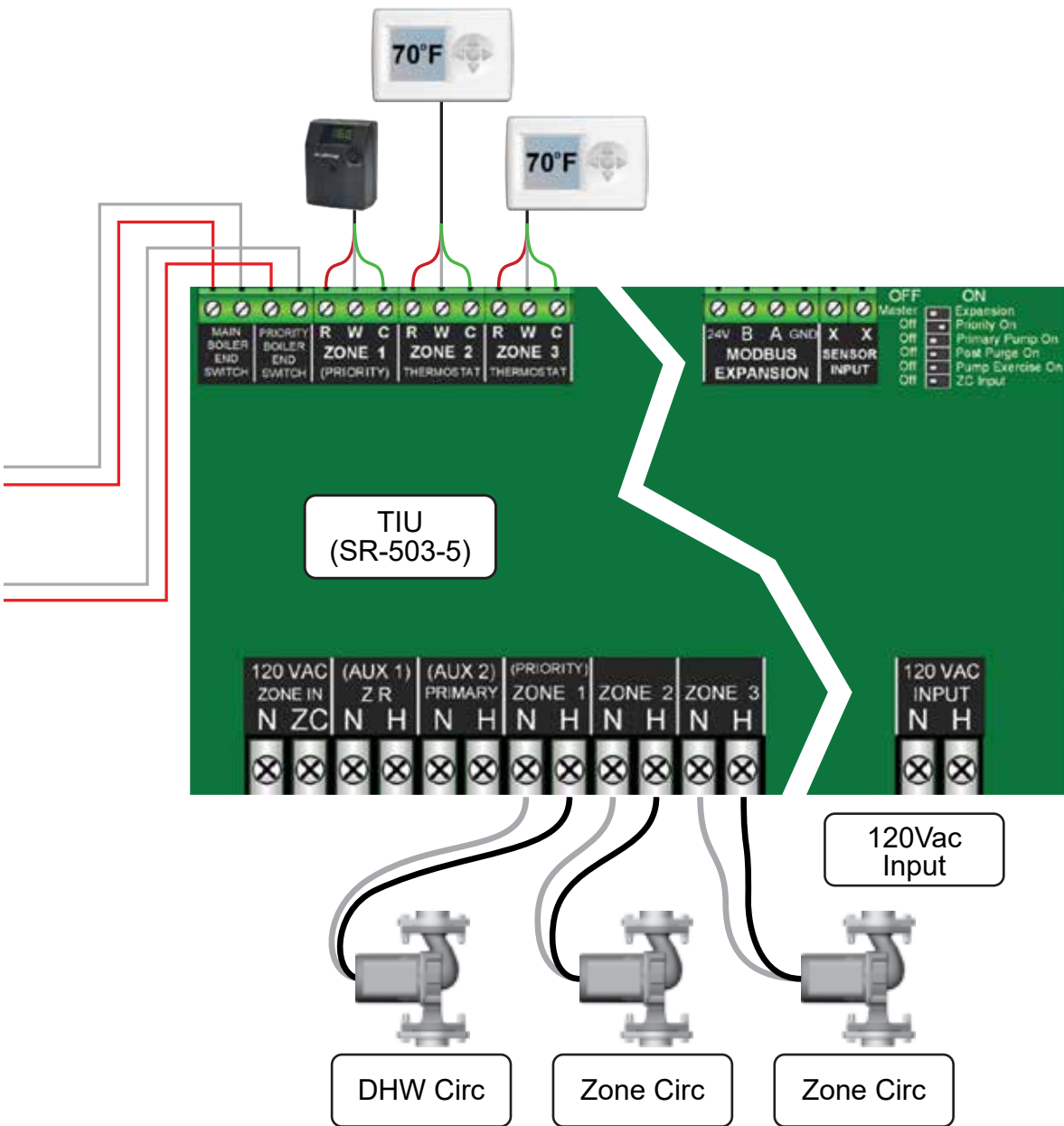


# System Type C (continued)

## Application C3: Multi-zone space heating DHW as zone (continued)

### Application Wiring (continued)

Figure 34 Application C3: Multi-zone space heating DHW as zone Application Wiring





## System Type C (continued)

### Application C3: Multi-zone space heating DHW as zone (continued)

#### Control Settings

HP (Master) Configuration  
See pg 14-16 for basic settings and navigation

#### Weather Temp. Settings

|         |             |
|---------|-------------|
| T1SetH1 | Per ECOCalc |
| T1SetH2 | Per ECOCalc |
| T4H1    | Per ECOCalc |
| T4H2    | Per ECOCalc |

#### Heating Settings

|        |             |
|--------|-------------|
| T4HMAX | Per ECOCalc |
| T4HMIN | Per ECOCalc |

#### Other heat source

|              |            |
|--------------|------------|
| AHS function | Set to OFF |
|--------------|------------|

Type C installations must ensure heat pump is properly sized for location, climate and application. No auxiliary heat is available. See Type A and Type B installations for auxiliary heat applications.

# SECTION 4

## COMMISSIONING/Troubleshooting

### VERIFY PROPER OPERATION AFTER SERVICING

Please reference the ECO®HP IDU manual and the relevant boiler manuals for specific startup instructions.

### General Commissioning

#### Water Quality Requirements

##### Clean System to Remove Sediment

1. The system must be thoroughly flushed (without heat pump connected) to remove sediment. The heat pump indoor unit can be damaged by buildup or corrosion due to sediment.
2. For zoned systems, flush each zone separately through a purge valve. (If purge valves and isolation valves are not already installed, install them to properly clean the system.)
3. Flush system until water runs clean and piping is free of sediment

#### WARNING

- Do not use petroleum-based cleaning or sealing compounds in hydronic heating system. Damage to elastomer seals and gaskets in system could occur, resulting in substantial property damage.
- Before filling the heat pump and system with water, verify the following. DO NOT fill with softened water. The corrosion can occur.
- Failure to comply could result in heat pump failure or unreliable operation

#### Freeze Protection (if used)

Follow these guidelines to prevent possibility of severe personal injury, death or substantial property damage:

#### WARNING

- Use only the products listed by WM Technologies for use with Weil-mclain products. Login at [www.weil-mclain.com](http://www.weil-mclain.com) for further details.
- Thoroughly flush any system that has used glycol before installing the heat pump.
- Review the material safety data sheets (MSDS) available online. The MSDS contains information on potential hazards and first aid procedures for exposure or ingestion.
- Check antifreeze inhibitor level at least annually. Glycol concentration and inhibitor levels may change over time. Add antifreeze to increase concentration if necessary. Add inhibitor as needed to bring to acceptable level, using inhibitor test kit to verify.
- In addition to antifreeze and inhibitor, use and maintain minimum level of Sentinel X100 inhibitor as directed on this page.
- If using freeze protection fluid with automatic fill, install a water meter to monitor water make-up. Freeze protection fluid may leak before the water begins to leak, causing concentration to drop, reducing the freeze protection level.
- DO NOT exceed 50% antifreeze by volume. Antifreeze moves more sluggishly than water and can interfere with heat transfer. At antifreeze concentrations higher than 50%, sludge can develop in heat pump, potentially causing damage to the heat exchanger.
- Clean the system before filling. Always drain and flush the system thoroughly before filling with antifreeze. Sludge, iron oxide deposits and other sediment in the system inhibit flow and can cause rapid breakdown of inhibitors.
- Use only antifreeze recommended by WM Technologies.

## General Commissioning (continued)

### Hardness less than 7 grains

1. Consult local water treatment companies for unusually hard water areas (above 7 grains hardness.)

### Chloride Concentration Must be LESS THAN 100 ppm (Required for systems with the ECO®HP)

1. Filling with chlorinated fresh water should be acceptable since drinking water chloride levels are typically less than 5 ppm.
2. Do not use the heat pump to directly heat swimming pool or spa water.
3. Do not fill heat pump or operate with water containing chloride in excess of 100 ppm.

### WARNING

Verify that the water chemistry meets the limitations and requirements of all other equipment in the system.

### WM Required Chemicals:

Contact a WM technologies representative:

- Corrosion inhibitor, Sentinel X100
- Sentinel X100 Quick Test Kit

### Antifreeze and Correct Dosage Amount

Use only antifreeze listed by WM Technologies as suitable for use with ECO®HP Split Air-to-Water Heat Pump. See below for information to obtain antifreeze through a WM Technologies distributor.

1. Determine the freezing temperature needed (to protect against lowest likely temperature the system water will encounter.)
2. Find the antifreeze concentration by volume needed for this temperature from the antifreeze manufacturer's data on the antifreeze container.
3. Add up the volume (gallons) of all system piping and components, including the expansion tank and heat pump.
  - a. Heat pump water content is 0.41 gallons.
  - b. Remember to include expansion tank water content.
4. Multiply this volume by the (percent) antifreeze needed to find the number of gallons of antifreeze to add.

### Fill and Test Water System

1. Fill system only after ensuring the water meets the requirements of this manual.
2. Close manual and automatic air vents and heat pump drain valve.
3. Fill to correct system pressure. Correct pressure will vary with each application.
  - a. Typical cold water fill pressure for a residential system is 12 psi.

- b. Pressure will rise when heat pump is turned on and system water temperature increases. Operating pressure must never exceed 24 psi.

4. At initial fill and during heat pump startup and testing, check system thoroughly for any leaks. Repair all leaks before proceeding further.

### WARNING

Eliminate all system leaks. Continual fresh make-up water will reduce heat pump and boiler life. Minerals can build up in the heat exchanger, reducing heat transfer, overheating heat exchanger, and causing heat exchanger failure.

### Purge Air from Water System

1. Connect a hose to the system purge valve. Route hose to an area where water can drain and be seen.
2. Close the heat pump or system isolation valve between the purge valve and fill connection to the system.
3. Close zone isolation valves.
4. Open quick-fill valve on cold water make-up line.
5. Open purge valve.
6. One zone at a time, open the isolation valves. Allow water to run through the zone, pushing out the air. Run until no noticeable air flow is present. Close the zone isolation valves and proceed with the next zone. Follow this procedure until all zones are purged. Follow the same procedure to purge air from the boiler and its internal piping.
7. Close the quick-fill water valve and purge valve and remove the hose. Open all isolation valves. Watch that system pressure rises to correct cold-fill pressure.
8. After the system has operated for a while, eliminate any residual air by using the manual air vents located throughout the system.
9. If purge valves are not installed in system, open manual air vents in system one at a time, beginning with lowest floor. Close vent when water squirts out. Repeat with remaining vents.
10. Open automatic air vent (diaphragm-type or bladder-type expansion tank systems only) one turn.
11. Starting on the lowest floor, open air vents one at a time until water squirts out.
12. Repeat with remaining vents.
13. Refill to correct pressure.

## General Commissioning (continued)

### X100 Inhibitor is Required

#### **WARNING**

1. It is required that the ECO®HP Split Air-to-Water Heat Pump have Sentinel X100 added to the system to prevent damage to its heat exchanger. See WM Required Chemicals section on previous page for part number ordering information.
2. After filling the system as directed in these instructions, fill with the X100 aerosol, following the instructions on the container.
3. After adding the inhibitor to the system, allow time for the water to circulate and mix. Then check the inhibitor level. Add additional inhibitor if necessary.
4. See separate instructions or [weil-mclain.com](http://weil-mclain.com) for suggested guidelines to determine how much inhibitor to use.

### Check/Verify Water Chemistry

1. The system may have residual substances that could affect water chemistry.
2. After the system has been filled and leak tested, verify water pH and chloride concentrations are acceptable.
3. Test the pH of a sample of system water at least annually. The pH of the water mixture must be between 7.0 and 8.5. (Or use the Sentinel inhibitor test kit to check concentration.)

#### **Water pH between 7.0 and 8.5**

- a. Maintain boiler water pH between 7.0 and 8.5. Check with litmus paper or have chemically analyzed by water treatment company.
  - b. If pH differs from above, consult local water treatment company for treatment needed.
4. If pH is outside this range (or inhibitor test kit indicates low level), the inhibitor level may not be sufficient to prevent corrosion.
  5. Verify and test antifreeze concentration, if used.

#### **WARNING**

Test antifreeze concentration at least annually. If concentration is low, add antifreeze or drain system and refill with correct mixture.

6. Follow instructions on antifreeze container to determine the amount of antifreeze needed. DO NOT exceed 50% by volume concentration of antifreeze.
7. Follow the instructions on the Sentinel test kit to sample the system water and verify inhibitor concentration.
8. Check inhibitor level after adjustments are made. Check concentration annually.

### Verify Thermostat Circuits

1. To avoid wiring errors, mark wires connected thermostat inputs on the control board (Unity 2.0 board for System Type A applications and the DHW-priority zone

panel, such as the Weil-McLain Thermostat Interface Unit board for System Type B and C applications.) Disconnect wires.

2. Close each thermostat, zone valve and/or relay in the external circuit one at a time and check the voltmeter reading at each wire to a ground to ensure no voltage is being fed back into the boiler's control module.
3. There should NEVER be a voltage reading when external device is closed.
4. If a voltage reading is measured on the incoming wires, check and correct the external wiring. DO NOT connect the thermostat terminals to 3-wire zone valves. This could cause control damage.
5. Once the external thermostat circuit wiring is checked and corrected, if necessary, reconnect the external thermostat circuit wires.

### Verify Flow Rate Through ECO®HP

1. Check the hydraulic configuration to find out the space heating loops that can be closed by mechanical, electronic, or other valves.
2. Close all space heating loops that can be closed.
3. Start and operate the circulation pump.
  - a. The **Test run** menu in the **For Serviceman** menu contains a **Point check** menu where Pump\_i can be actuated manually.
4. Verify the flow rate and adjust as necessary. The recommended flow rate is 6 GPM - 10 GPM (the minimum flow rate is 3.1 GPM and the HP will not operate if this is not met.)
  - When using the W-M Easy-Up Manifold, setting the speed control dial on the circulator to "MAX" will result in a flow rate of approximately 7-12 GPM (Use ECOCalc to optimize an exact flow between this range.)
  - The Taco 0018e circulator included with the ECO®HP offers a companion app for iOS or Android that can be used to read and adjust the flow rate. Refer to the instructions included with the circulator to install the app and configure the pump to the appropriate flow rate.

### Verify Heating Operation

1. For system **Type A** applications:
  - a. provide a thermostat call to test. The ECO®HP should run and begin heating. If the ECO®HP does not run, verify the outdoor temperature or target temperature is not above or below application limits (if so, adjust AHD settings temporarily to enable test.) Be sure to change back to application settings before finalizing commissioning.
  - b. To verify boiler operation AHD should be temporarily disabled to operate boiler first. Refer to the boiler manual for startup checks. Be sure to re-enable the AHD before finalizing commissioning.

## General Commissioning (continued)

2. For system **Type B** applications
  - a. Provide a thermostat call to test. The ECO®HP should run and begin heating. If the ECO®HP does not run, verify the outdoor temperature is not above or below application limits (if so, adjust T4HMAX and T4HMIN temporarily to enable test.) Be sure to change back to application settings before finalizing commissioning.
  - b. The SG terminals, found on the HP IDU control board, can be used to force AHS calls, although no thermostat or DHW input call may. Close the contacts and the boiler should receive a call for heat and enable verification of proper function. Refer to the boiler manual for startup checks.
3. For system **Type C** applications
  - a. Provide a thermostat call to test. The ECO®HP should run and begin heating. If the ECO®HP does not run, verify the outdoor temperature is not above or below application limits (if so, adjust T4HMAX and T4HMIN temporarily to enable test.) Be sure to change back to application settings before finalizing commissioning.
4. Repeat tests as needed for each zone or for DHW calls.

## Troubleshooting

This section provides useful information for diagnosing and correcting certain troubles which may occur in the unit. This troubleshooting and related corrective actions may only be carried out by your local technician. Refer to the boiler and heat pump manuals for further information and troubleshooting details.

### General Guidelines

Before starting the troubleshooting procedure, carry out a thorough visual inspection of the unit and look for obvious defects such as loose connections or defective wiring.

#### **WARNING**

When inspecting internal components ensure power is removed from the unit.

1. Inspect the most recent items listed in the error or lockout histories of each unit. See the error codes section for details on each error code for the ECO®HP.
2. Using a volt-meter, verify both boiler and heat pump indoor unit have 120Vac power. Verify the heat pump outdoor unit has 240Vac. Refer to boiler and heat pump manuals for details on power connections.
3. Ensure thermostat is providing call for heat and 24Vac is present between thermostat wires and ground.
4. Verify no safety devices have been activated. If a safety device was activated, stop the unit and find out why the safety device was activated before resetting it. Under no circumstances can safety devices be bridged or changed to a value other than the factory setting. If the cause of the problem cannot be found, call your local dealer.
5. Verify all control connectors are securely seated in their respective connections.
6. Verify all fuses are not blown. If necessary, replace blown fuses.
7. Verify temperature sensors are reading properly using known temperatures and resistance measurements of the sensors. See Table for heat pump temperature sensors.

#### **CAUTION**

If the pressure relief valve is not working correctly and is to be replaced, ensure that the drain piping is properly reconnected.

## Troubleshooting (continued)

| Error Code | Description                                                                                    | Notes                                                                                                           |
|------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| C7         | Transducer module temperature too high protection.                                             |                                                                                                                 |
| E0         | Water flow failure (E8 appears 3 times)                                                        | Verify circulator is operating and there is no air in the system                                                |
| E1         | Phase sequence error (for 3phase models)                                                       | Not applicable to the ECO <sup>®</sup> HP                                                                       |
| E2         | Communication error between the main control board of the hydraulic module and IDU             | Verify wiring connections are secure between indoor unit control board and wired controller                     |
| E3         | Backup electric heater exchanger water outlet temperature sensor T1 error                      | Not applicable to ECO <sup>®</sup> HP                                                                           |
| E4         | Domestic hot water tank temperature sensor T5 error                                            | Not applicable to ECO <sup>®</sup> HP                                                                           |
| E5         | Air side heat exchanger refrigerant outlet temperature sensor T3 error                         |                                                                                                                 |
| E6         | Outdoor ambient temperature sensor T4 error                                                    |                                                                                                                 |
| E7         | Balance tank sensor Tbt1 error                                                                 | Not applicable to ECO <sup>®</sup> HP                                                                           |
| E8         | Water flow failure within 3 times                                                              | Verify circulator is operating and there is no air in the system                                                |
| E9         | Suction pipe temperature sensor Th error                                                       |                                                                                                                 |
| EA         | Discharge pipe temperature sensor Tp error                                                     |                                                                                                                 |
| Eb         | Solar board sensor Tsolar error                                                                | Not applicable to ECO <sup>®</sup> HP                                                                           |
| Ec         | Balance tank sensor Tbt2 error                                                                 | Not applicable to ECO <sup>®</sup> HP                                                                           |
| Ed         | Water side heat exchanger inlet temperature sensor Twin error                                  |                                                                                                                 |
| EE         | Hydronic box EEPROM error                                                                      |                                                                                                                 |
| F1         | DC generatrix voltage is too low                                                               |                                                                                                                 |
| H0         | Communication error between outdoor unit main control board and indoor unit main control board | Verify wiring connections are secure between outdoor unit main control board and indoor unit main control board |
| H1         | Communication error between outdoor unit main control board and inverter driver board          | Verify wiring connections are secure between outdoor unit main control board and inverter driver board          |
| H2         | Water side heat exchanger refrigerant outlet (liquid pipe) temperature sensor T2 error         |                                                                                                                 |
| H3         | Water side heat exchanger refrigerant inlet (gas pipe) temperature sensor T2B error            |                                                                                                                 |
| H4         | Inverter module protection (L0/L1 appear 3 times in one hour)                                  |                                                                                                                 |
| H5         | Room temperature sensor Ta error                                                               |                                                                                                                 |
| H6         | DC fan error                                                                                   |                                                                                                                 |
| H7         | Abnormal main circuit voltage                                                                  | Verify voltage to indoor unit is 120Vac and the outdoor unit is 240Vac                                          |
| H8         | Pressure sensor error                                                                          |                                                                                                                 |
| H9         | Zone 2 water outlet temperature sensor Tw2 error                                               |                                                                                                                 |
| HA         | Water side heat exchanger water outlet temperature sensor error                                |                                                                                                                 |
| Hb         | PP protection appears three times in a row and Twout<44.6°F                                    |                                                                                                                 |
| HF         | Invert module EEPROM error                                                                     |                                                                                                                 |

## Troubleshooting (continued)

| Error Code | Description                                                                                                        | Notes                    |
|------------|--------------------------------------------------------------------------------------------------------------------|--------------------------|
| HH         | H6 appears 10 times in 120min                                                                                      |                          |
| HP         | Low pressure protection (pressure < 0.6MPa for 3 times in one hour)                                                |                          |
| P0         | Low pressure protection                                                                                            |                          |
| P1         | High pressure protection                                                                                           |                          |
| P3         | Compressor current protection                                                                                      |                          |
| P4         | Discharge temperature sensor Tp protection                                                                         |                          |
| P5         | High temperature difference between water side heat exchanger water inlet and water outlet temperatures protection |                          |
| P6         | Inverter module protection                                                                                         |                          |
| L0         | Inverter module protection                                                                                         |                          |
| L1         | DC bus low voltage protection                                                                                      |                          |
| L2         | DC bus high voltage protection                                                                                     |                          |
| L4         | MCE error                                                                                                          |                          |
| L5         | Zero speed protection                                                                                              |                          |
| L7         | Phase sequence error                                                                                               | Not applicable to ECO®HP |
| L8         | Compressor frequency variation greater than 15Hz within one second protection                                      |                          |
| L9         | Actual compressor frequency differs from target frequency by more than 15Hz protection                             |                          |
| Pb         | Water side heat exchanger anti-freeze protection                                                                   |                          |
| Pd         | Air side heat exchanger refrigerant outlet temperature sensor T3 error                                             |                          |
| PP         | Water side heat exchanger inlet temperature is higher than outlet temperature in heating/DHW mode                  |                          |
| bH         | PED board error                                                                                                    |                          |

## General Symptoms

**Symptom 1:** The unit is turned on but the unit is not heating or cooling as expected

| POSSIBLE CAUSES                                  | CORRECTIVE ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The temperature setting is not correct.          | Ensure all parameters listed in the application settings are set correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| The water flow is too low.                       | <ul style="list-style-type: none"> <li>• Check that all shut off valves of the water circuit are in the right position.</li> <li>• Check if the strainer is plugged.</li> <li>• Make sure there is no air in the water system.</li> <li>• Check on the pressure and temperature gage that there is sufficient water pressure.<br/>The water pressure must be &gt;14.5 PSI (water is cold.)</li> <li>• Make sure that the expansion vessel is not broken.</li> <li>• Check that the resistance in the water circuit is not too high for the pump.</li> </ul> |
| The water volume in the installation is too low. | Make sure that the water volume in the installation is above the minimum required system fill level                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## Troubleshooting (continued)

**Symptom 2:** The unit is turned on but the compressor is not starting (space heating or domestic water heating)

| POSSIBLE CAUSES                                                                      | CORRECTIVE ACTION                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The unit is operating out of its operation range (the water temperature is too low.) | <p>In case of low water temperature, the system utilizes the AHS to reach the minimum water temperature first (54 °F.)</p> <ul style="list-style-type: none"> <li>• Verify AHS parameters are set correctly</li> <li>• Verify the boiler is called when AHS is activated</li> </ul> |

**Symptom 3:** Pump is making noise (cavitation)

| POSSIBLE CAUSES                          | CORRECTIVE ACTION                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| There is air in the system.              | Purge air.                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Water pressure at pump inlet is too low. | <ul style="list-style-type: none"> <li>• Check on the pressure and temperature gage that there is sufficient water pressure.<br/>The water pressure must be &gt; 14.5 psi (water is cold.)</li> <li>• Check that the pressure and temperature gage is not broken.</li> <li>• Check that the expansion vessel is not broken.</li> <li>• Check that the setting of the pre-pressure of the expansion vessel is correct.</li> </ul> |

**Symptom 4:** The water pressure relief valve opens

| POSSIBLE CAUSES                                             | CORRECTIVE ACTION                                                   |
|-------------------------------------------------------------|---------------------------------------------------------------------|
| The filling water pressure in the installation is too high. | Make sure that the operating water pressure does not exceed 24 psi. |

**Symptom 5:** The water pressure relief valve leaks

| POSSIBLE CAUSES                                          | CORRECTIVE ACTION                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dirt is blocking the water pressure relief valve outlet. | <p>Check for correct operation of the pressure relief valve by activating the lever</p> <ul style="list-style-type: none"> <li>• If you do not hear a clacking sound, contact your local dealer.</li> <li>• In case the water keeps running out of the unit, close both the water inlet and outlet shut-off valves first and then contact your local dealer.</li> </ul> |

**Symptom 6:** Space heating capacity shortage at low outdoor temperatures

| POSSIBLE CAUSES       | CORRECTIVE ACTION                                                                                                                                                        |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AHS is not activated. | Ensure the AHS is on and configured to provide heat (If AHS is not being used in the system, refer to ECOCalc inputs to confirm low outdoor temperature considerations.) |



Troubleshooting (continued)

Symptom 7: Heat mode can't change to DHW mode immediately

| POSSIBLE CAUSES                                          | CORRECTIVE ACTION                                                                                         |
|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| The heat pump does not receive the control signal DHW=ON | Check whether there is a problem with the DHW wiring and whether the DHW=ON signal can be sent correctly. |

Symptom 8: DHW mode can't change to Heat mode immediately

| POSSIBLE CAUSES                                        | CORRECTIVE ACTION                                                          |
|--------------------------------------------------------|----------------------------------------------------------------------------|
| The heat pump did not receive the DHW shutdown signal. | Check that the tank controller can correctly send the DHW shutdown signal. |

## EcoCalc Value Records

|                                      | Parameter                                                                             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Priority 1 | Priority 2 | Priority 3 |
|--------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|------------|
| Boiler (System Type A)               | WWSD Temp                                                                             | Max outdoor temperature heating will operate                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |            |            |
|                                      | Outdoor Temperature Setpoint                                                          | Min outdoor temperature HP will operate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |            |            |
|                                      | Switchover Target Temp                                                                | Max Target Temperature HP will operate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |            |            |            |
|                                      | Assign AHD Contact                                                                    | AHD Contact used for Priority                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |            |            |
|                                      | AHD Staging Order                                                                     | Order AHD contact will activate, 1st (contacts close immediately with call for heat), 2nd (boiler fires first with call for heat), ODT (contact closes based on outdoor temperature setpoint and actions), Target Temp (contact closes based on system target temp and actions.)                                                                                                                                                                                                                                         |            |            |            |
|                                      | 2nd Stage Response Delay                                                              | Time to wait before performing the secondary activate contact action (e.g. if AHD closes first, will wait x minutes to activate boiler)                                                                                                                                                                                                                                                                                                                                                                                  |            |            |            |
|                                      | AHD Criteria                                                                          | If yes, system temperature must be below target temp before AHD contacts close                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |            |            |
|                                      | Activate contact below set point / above Crossover                                    | "1st, 2nd, Emergency, or OFF<br>-if limited by supply temp, set to 1st or Emergency<br>-if limited by capacity, set to 1st (Boiler will run after response time has elapsed)"                                                                                                                                                                                                                                                                                                                                            |            |            |            |
|                                      | Activate contact above set point / below Crossover                                    | 1st, 2nd, Emergency, or OFF (always set to 1st in Type A systems)                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            |            |            |
|                                      | Max Target Temp                                                                       | Max target water flow temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            |            |            |
|                                      | Min Target Temp                                                                       | Min target water flow temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            |            |            |
|                                      | Outdoor Temp for Max Target                                                           | Outdoor temp for Max target water flow temp                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |            |            |
|                                      | Outdoor Temp for Min Target                                                           | Outdoor temp for Min target water flow temp                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |            |            |
| "Boiler (System Type B)              | Enter any settings applied on System Type B boiler (outdoor reset, target temp, etc.) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |            |            |
|                                      |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |            |            |
|                                      |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |            |            |
|                                      |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |            |            |
| "Heat Pump (System Type A, B, or C)" | T4HMAX                                                                                | "Max outdoor temperature HP heating will operate<br>-if System Type A, this will be equal to the WWSD Temp"                                                                                                                                                                                                                                                                                                                                                                                                              |            |            |            |
|                                      | T4HMIN                                                                                | "Min outdoor temperature HP heating will operate<br>-if system Type A and limited by supply temp, this will be equal to the Outdoor Temperature Setpoint<br>-if system Type A and limited by capacity, this will be determined by the ECOCalc calculation to some temp below the Switchover Outdoor Temp<br>-if system Type B and limited by supply temp, this will be equal to T4_AHS_ON<br>-if system Type B and limited by capacity, this will be determined by the ECOCalc calculation to some temp below T4_AHS_ON" |            |            |            |
|                                      | T1SetH1                                                                               | Max target HP water flow temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |            |            |
|                                      | T1SetH2                                                                               | Min target HP water flow temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |            |            |
|                                      | T4H1                                                                                  | Outdoor temp for Max target HP water flow temp                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |            |            |
|                                      | T4H2                                                                                  | Outdoor temp for Min target HP water flow temp                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |            |            |
|                                      | dT1SH                                                                                 | On differential for heating. The unit will not activate if the actual temp is less than dT1SH degrees below the target temp                                                                                                                                                                                                                                                                                                                                                                                              |            |            |            |
| Heat Pump (System Type B)            | T4_AHS_ON                                                                             | Temperature HP will activate boiler, for Type B systems, usually equal to T4HMIN                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |            |            |
|                                      | dT1_AHS_ON                                                                            | On differential for AHS. The AHS will not activate if the actual temp is less than dT1_AHS_ON degrees below the target temp. If dT1SH is greater than dT1_AHS_ON, then AHS will not turn on until the actual temp is dT1SH degrees below the target temp.                                                                                                                                                                                                                                                                |            |            |            |

