

# **MULTIPLE BOILER PIPING & WIRING GUIDE FOR USE WITH 240 & 380**

**This manual has been prepared for use in conjunction  
with the appropriate Installation, Operation and  
Maintenance Manuals.**



Manufactured by:  
ECR International Inc.  
2201 Dwyer Avenue, Utica, NY 13501  
Tel. 800 253 7900  
[www.ecrinternational.com](http://www.ecrinternational.com)  
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## IMPORTANT SAFETY INFORMATION

### 1. General

Boiler installation shall be completed by qualified agency. See Installation, Operation & Maintenance Manual for additional information.

#### **WARNING**

Fire, explosion, asphyxiation and electrical shock hazard. Improper installation could result in death or serious injury. Read this manual and understand all requirements before beginning installation.

### 2. Become familiar with symbols identifying potential hazards.



This is the safety alert symbol. Symbol alerts you to potential personal injury hazards. Obey all safety messages following this symbol to avoid possible injury or death.

#### **DANGER**

Indicates a hazardous situation which, if not avoided, WILL result in death or serious injury.

#### **WARNING**

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

#### **CAUTION**

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

### 3. Installation shall conform to requirements of authority having jurisdiction or in absence of such requirements:

- *United States*
  - National Fuel Gas Code, ANSI Z223.1/NFPA 54.
  - National Electrical Code, NFPA 70.
- *Canada*
  - Natural Gas and Propane Installation Code, CAN/CSA B149.1.
  - Canadian Electrical Code, Part I, Safety Standard for Electrical Installations, CSA C22.1

### 4. Where required by authority having jurisdiction, installation shall conform to Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1.

Additional manual reset low water cutoff or high limit may be required.

### 5. Requirements for Commonwealth of Massachusetts:

Boiler installation must conform to Commonwealth of Massachusetts code 248 CMR which includes but is not limited to:

- Installation by licensed plumber or gas fitter.

## IMPORTANT SAFETY INFORMATION

FOR YOUR SAFETY READ BEFORE OPERATING



### Hot Water Can Scald!

Water heated to temperature for clothes washing, dish washing and other sanitizing needs can scald and cause permanent injury.

Children, elderly, and infirm or physically handicapped persons are more likely to be permanently injured by hot water. Never leave them unattended in bathtub or shower. Never allow small children to use a hot water tap or draw their own bath.

If anyone using hot water in the building fits the above description, or if state laws or local codes require certain water temperatures at hot water taps, you must take special precautions:

- Use lowest possible temperature setting.
- Install some type of tempering device, such as an automatic mixing valve, at hot water tap or water heater. Automatic mixing valve must be selected and installed according to manufacturer's recommendations and instructions.
- Water passing out of drain valves may be extremely hot. To avoid injury:
  - Make sure all connections are tight.
  - Direct water flow away from any person.

Water Temperature Setting	1st Degree Burn Exposure Time For An Adult	2nd and 3rd Degree Burn Exposure Time For An Adult
120° F	1 minute	5 minutes
130° F	5 seconds	30 seconds
140° F	2 seconds	5 seconds
150° F	1 second	1.5 seconds
160° F	Instantaneous	0.5 seconds

**Note:** Warning for Infants, Children, and Elderly: Great care must be taken when exposing the aforementioned groups to warm or hot water as they can be badly burned in exposure times less than half of the time for an adult.

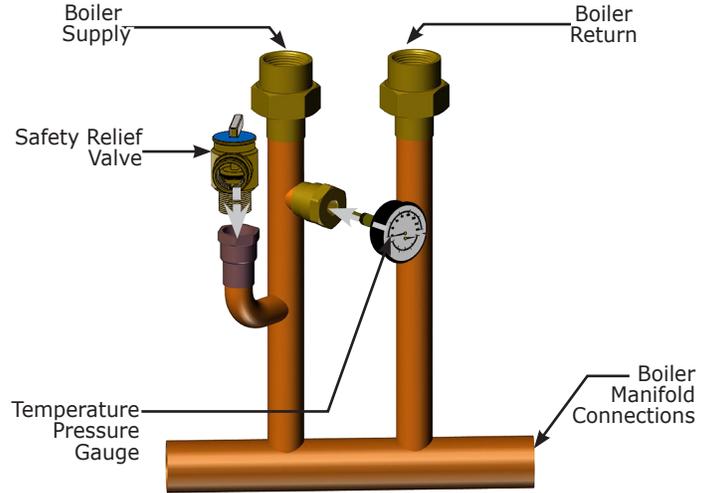
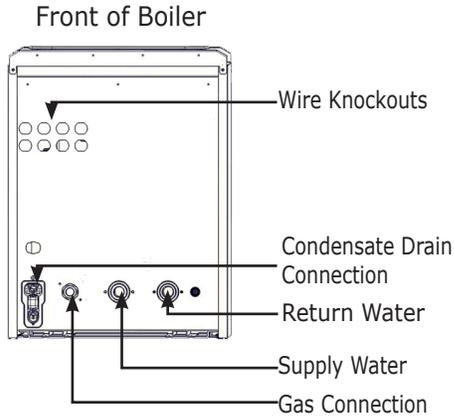
### ⚠ WARNING

Burn and scald hazard! Manufacturer requires installation of field supplied anti-scald valve. Failure to follow these instructions could result in death or serious injury.

# LABOR SAVER™ PIPING MANIFOLDS

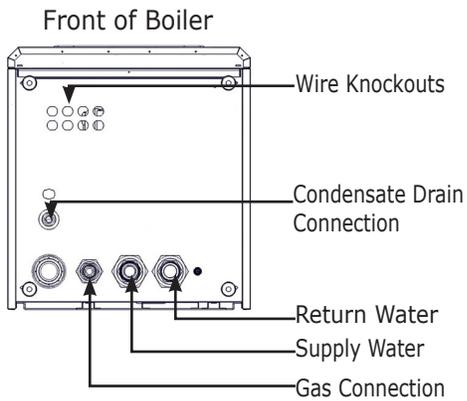
## 240 PIPING CONNECTIONS/LABOR SAVER™ MANIFOLDS

### Bottom View Connection Identification



## 380 PIPING CONNECTIONS/LABOR SAVER™ MANIFOLDS

### Bottom View Connection Identification



Piping Connections	240	380
Boiler Manifold Connections	1-1/2 in. nominal [38.1 mm]	
Pressure Relief Valve	50.00 psi [3.45 bar]	
Return Water Connection	1 in. [25.4 mm]	1-1/2 in. [38.1 mm]
Supply Water Connection	1 in. [25.4 mm]	1-1/2 in. [38.1mm]
Gas Connection	3/4 in. [22.2 mm]	1 in. [25.4 mm]
Condensate Drain Connection	3/4 in. [22.2mm]	

## GENERAL INFORMATION - HYDRONIC PIPING

### General Information:

Piping installation, materials, and joining methods shall conform to requirements of authority having jurisdiction or in absence of such requirements:

- **USA** - National Fuel Gas Code, ANSI Z223.1/NFPA 54
- **Canada** - Natural Gas and Propane Installation Code, CAN/CSA B149.1

**Note** → Provided Wiring and Piping illustrations are meant to show system concepts only. Installer is responsible for all equipment required by authority having jurisdiction.

**Note** → Arrange piping to prevent water dripping onto boiler.

### Manufacturer Requirements/Recommendations:

- Manufacturer requires all domestic hot water (DHW) installations use an anti-scald valve. Local codes may require additional equipment (expansion tank, relief valves, etc.) Select and size equipment to suit installation and meet code requirements.
- If the piping manifold is not used, the ASME temperature and pressure relief valve and temperature and pressure gauge shall be installed to conform to requirements of the authority having jurisdiction. Refer to appropriate manufacturer instructions for installation requirements.
- If the piping manifold is not used, a primary / secondary piping arrangement is required by the manufacturer and an external boiler pump must be installed. Maximum of 12 inches of separation between supply and return pipe (closely spaced tees) of the boiler shall be maintained.
- Limit combined supply and return pipe lengths to maximum linear lengths of 20 ft (6.1 m) between boiler and closely spaced tees when:
  - a. minimum 1 in NPT pipe size is used for the 240.
  - b. minimum of 1-1/2 in NPT pipe size is used for the 380.
  - c. Linear length may be increased if supply and return pipe size is increased to limit pressure drop.

All piping diagrams are shown with optional DHW Indirect Tank where applicable.

Table 1: **EXT** - Pump Selection for each boiler

Boilers	Maximum Equivalent Pipe Length Between Boiler and Closely Spaced Tee	
	Less than or equal to 20 Feet	Between 20 and 40 Feet
240 MBH	Grundfos UP 15-42 or equivalent (5 feet of head at 13 gpm)	Grundfos UPS 26-99, Speed II, or equivalent (16 feet of head at 13 gpm)
380 MBH	Grundfos UPS 26-99, Speed II, or equivalent (8 feet of head at 21 gpm)	Grundfos UPS 26-99, Speed III, or equivalent (14 feet of head at 21 gpm)

## GENERAL INFORMATION - WIRING

### Electrical Wiring Information:

All field wiring shall conform to the authority having jurisdiction or, in the absence of such requirements to:

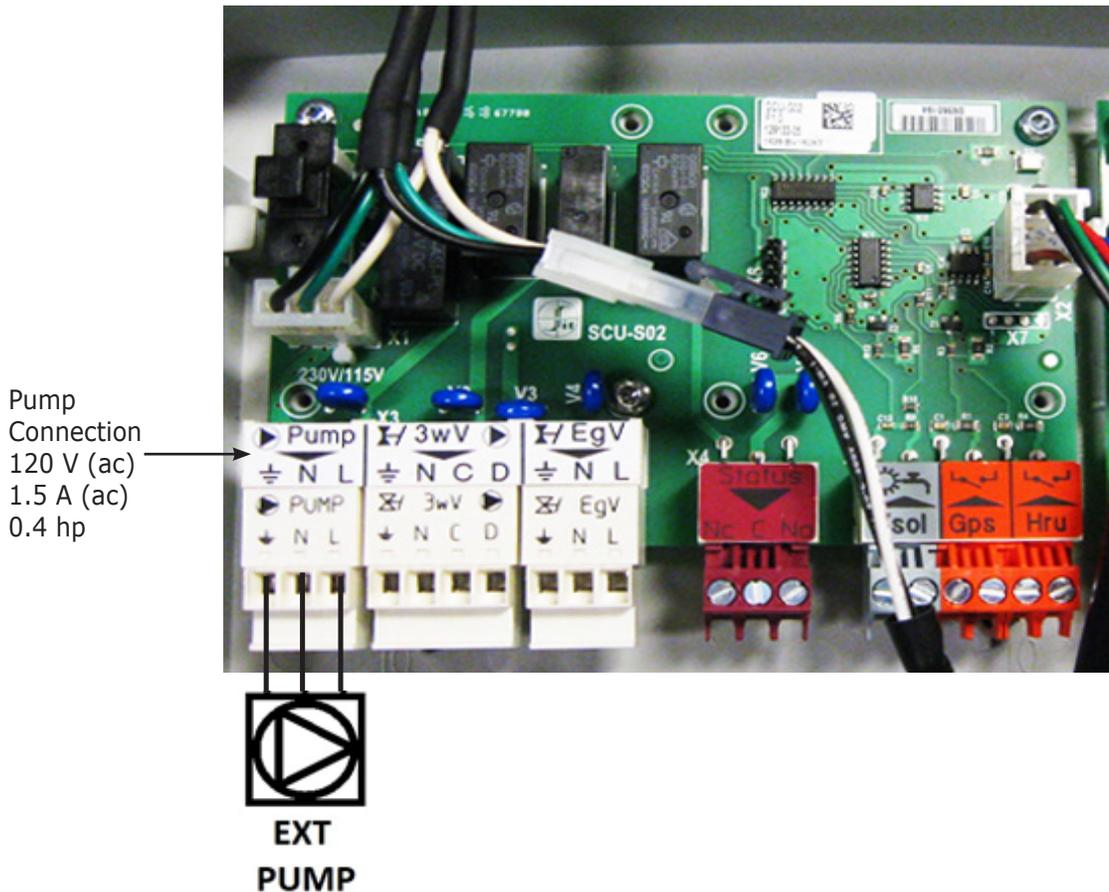
- **USA:** National Electrical Code, ANSI/NFPA 70,
- **Canada:** Canadian Electrical Code, Part I, CSA C22.1: Safety Standard for Electrical Installations.

Reference the zone control manufacturer instruction manual for control operation and priority setting of DHW zones.

### Note

Provided Wiring and Piping illustrations are meant to show system concepts only. Installer is responsible for all equipment required by authority having jurisdiction.

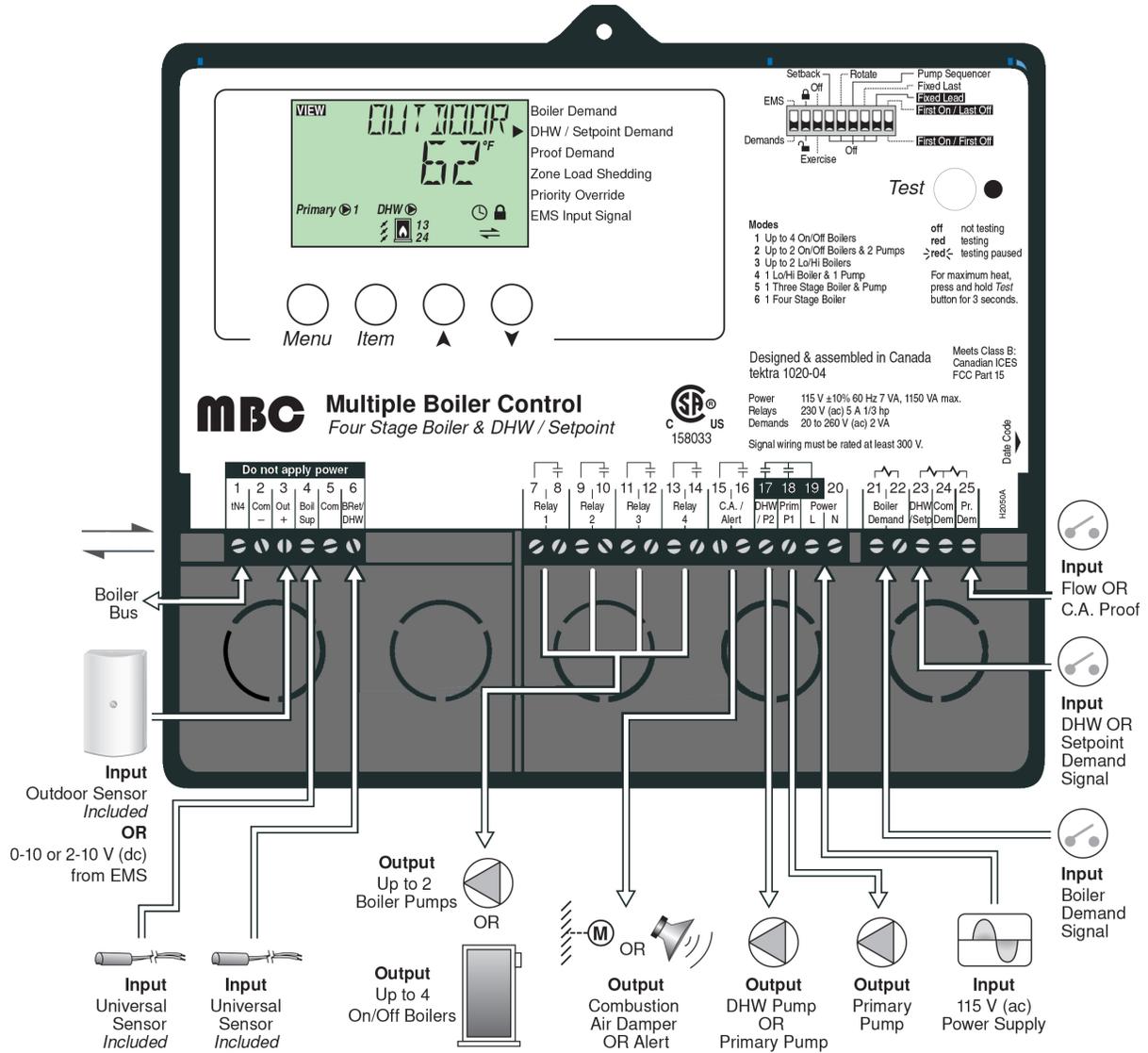
## BOILER CONTROL



**NOTE:** Please Refer to (IOM) Installation, Operation and Maintenance Manual and Cascading Controller IOM for more wiring information.

# GENERAL INFORMATION - WIRING

## CASCADING CONTROL



Cascading Control Electrical Specifications	
Power Supply	115 V (ac) ±10% 50/60 Hz 7 VA, 1150 VA max
Relays	230 V (ac) 5 A 1/3 hp
Demands	20 to 260 V (ac) 2VA

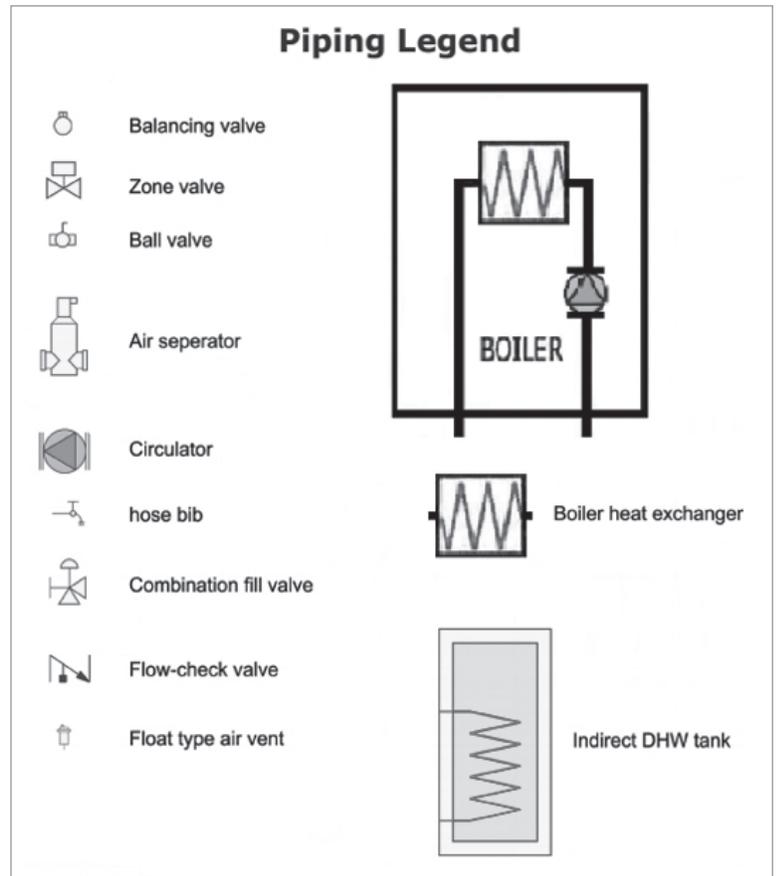
## PIPING LEGEND

Table 2: Pump/Flow Rate Chart

Number of Boilers	240/380 MBH Header Size	Total Flow Rate (gpm) for Sizing the Header Pump	
		240 MBH	380 MBH
2	2	26	42
3	2 1/2	39	63
4	3	52	84

Table 3: Piping and Wiring Diagrams

Configuration	Piping	Wiring	Configuration	Piping	Wiring
With Labor Saver™ Manifold			Without Labor Saver™ Manifold		
Zone Pump System	Figure 1	Figure 2	Zone Pump System	Figure 5	Figure 6
Zone Valve System	Figure 3	Figure 4	Zone Valve System	Figure 7	Figure 8



## SELECTING A PIPING CONFIGURATION

### Selecting a Piping Configuration

The UCS/DMG is a light commercial boiler product line manufactured by ECR International with 240 MBH and 380 MBH heating options. Due to its specific characteristics, installation sites with multiple boilers piped together need special attention. To make the whole system function correctly, piping and wiring of the group of boilers is critical. Each piping diagram found in this guide includes an associated wiring diagram. It is the installer's responsibility to choose which option is best to use. A Labor Saver™ Manifold is supplied with each boiler from the factory. This guide provides piping and wiring diagrams where the Labor Saver™ Manifold is used and when it is not.

The following statements shall be taken into consideration when installing the UCS/DMG product line;

- The integrated boiler control does not have a built-in cascade function.
- Multi-boiler systems shall be controlled by a Cascade Controller and Zone Controller designed for multi-boiler systems.
- ECR offers both a Cascading Controller and Zone Controller designed for multi-boiler systems.
- Wiring of the EXT pump to boiler control is located on page 7 of this manual.

#### Piping for Zone Pumps with Labor Saver™ Manifold - Figure 1

- The Labor Saver™ Manifold, installed directly below the boiler, provides a short flow path without significant flow resistance.
- The internal boiler pump is designed for cycling water through the heat exchanger and manifold only.
- All boilers/manifolds shall have the same supply/return temperature and shall be installed in reverse return parallel to eliminate water flow and temperature stacking problems.
- A header pump is needed for the loop between the boiler manifolds and close-spaced tee on the system piping. This pump will bring hot water from the boiler manifolds to the close-spaced tee (or hydraulic separator)
- See Table 2 to determine header size and flow rate.

#### Wiring for Zone Pumps with Labor Saver™ Manifold – Figure 2

- The Cascading Controller is used to power the header pump.
- The Zone Controller powers zone pumps and DHW pump.
- On the Boiler's User Interface, the Outdoor Reset Function is not used. The Cascading Controller will sense the outdoor temperature and manage the boilers accordingly.
- When an Indirect-Fired water heater is being used, the Cascading Controller will sense system temperatures and manage the boilers to meet the DHW setpoint.
- Use the Cascading Controller to set the DHW Set Point and Outdoor Reset Function.
- CH setpoint shall be set to the same value on all the boilers and shall be higher than the temperature set points (Maximum CH Temperature and DHW Setpoint) on the Cascading Controller.

#### Piping for Zone Valve System with Labor Saver™ Manifold – Figure 3

- Near boiler piping between boilers and close-spaced tee (or hydraulic separator), is the same as Figure 1.
- See Table 2 to determine header size and flow rate.

#### Wiring for Zone Valves with Labor Saver™ Manifold – Figure 4

- The Cascading Controller powers the Header Pump. Zone Valves are controlled by the Room Thermostat and Zone Controller. Zone Controller also powers the CH Pump and DHW Pump.
- On the Boiler's User Interface, the Outdoor Reset Function is not used when using a Cascading Controller.
- When an Indirect-Fired water heater is being used, the Cascading Controller will sense system temperatures and manage the boiler to meet DHW Set Point.
- Use the Cascading Controller to set the DHW Set Point and Outdoor Reset Function.
- CH Set Point shall be set to the same value on all the boilers and shall be higher than Temperature Setpoints (Maximum CH Temperature and DHW Set Point) on the Cascading Controller.

## SELECTING A PIPING CONFIGURATION

### Piping for Zone Pumps without the Labor Saver™ Manifold – Figure 5

- When EXT Pumps are used instead of one large header pump (one per Boiler) the system shown in Figure 5 should be used.
- Size of headers shall follow the information provided in Table 2, page 9.
- Size of the pipes between the boiler and headers shall be the same as the boiler connection fitting size.
- The EXT pumps (one per boiler) shall be chosen from Table 1, page 6

### Wiring for Zone Pumps without the Labor Saver™ Manifold – Figure 6

- The EXT pumps (one per boiler) are powered by the Boiler's CH pump terminals. The EXT pumps are turned on when the corresponding boiler is activated by the Cascading Controller. If the EXT pump draws more than 1.5 amps, an independently powered external relay is needed.
- Together, the EXT pump and internal boiler pump circulate water through the boiler and all piping between the boiler and close-spaced tee (or hydraulic separator).
- On the Boiler's User Interface, the Outdoor Reset Function is not used when using a Cascading Controller. The Cascading Controller will sense outdoor temperature and manage the boilers accordingly.
- When an Indirect-Fired Water Heater is being used, the Cascading Controller will sense system temperatures and manages the boiler to meet DHW setpoint.
- Use the Cascading Controller to set the DHW Set Point and Outdoor Reset Function.
- CH setpoint shall be set to the same value on all the boilers and shall be higher than the Temperature Setpoints (Maximum CH Temperature and DHW Setpoint) on the Cascading Controller.

### Piping for Zone Valve System without Labor Saver™ Manifold – Figure 7

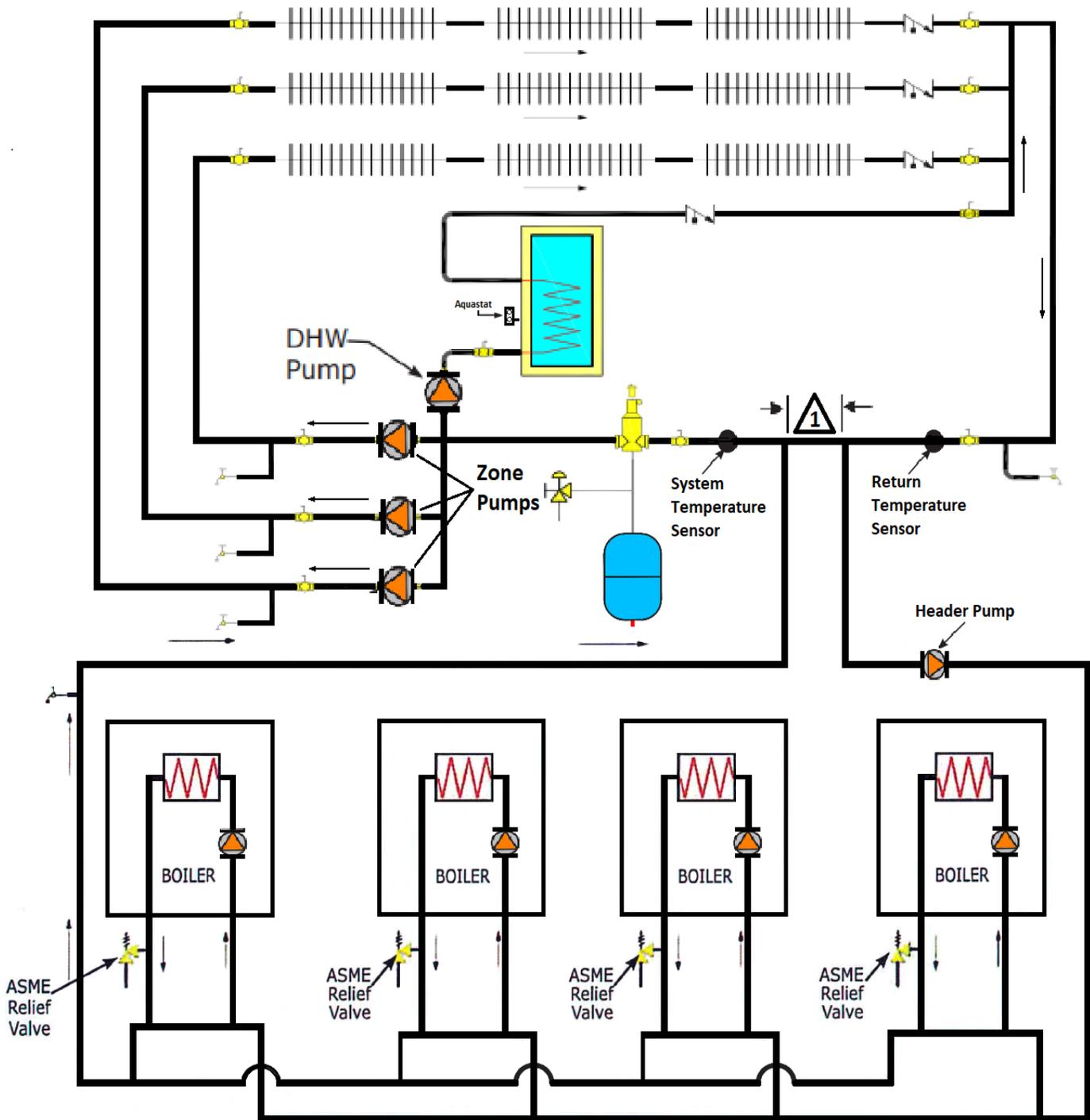
- When EXT Pumps are used instead of one large header pump (one per Boiler), the system as shown in Figure 7 should be used.
- Size of the headers shall follow the information provided in Table 2, page 9.
- EXT pumps (one per boiler) shall be chosen following Table 1, page 6.

### Wiring for Zone Valve System without Labor Saver™ Manifold – Figure 8

- EXT pumps (one per boiler) are powered by the boiler's CH pump terminals. EXT pumps are turned on when the corresponding boiler is activated by the Cascading Controller. If the pump draws more than 1.5 amps, an independently powered external relay is needed.
- Together, the EXT pump and internal boiler pump circulate water through the boiler and all piping between the boiler and close-spaced tee (or hydraulic separator)
- Zone Controller powers the zone pumps and DHW pumps.
- All zone valves are controlled by the zone thermostat and Zone Controller.
- On boilers user interface, the Outdoor Reset Function is not used when using a Cascading Controller. The Cascading Controller will sense outdoor temperature and manage the boilers accordingly.
- When an Indirect-Fired Water Heater is being used, the Cascade Controller will sense system temperatures and manage the boilers to meet the DHW Setpoint.
- Use the Cascading Controller to set the DHW Set Point and Outdoor Reset Function.
- CH Setpoint shall be set to the same value on all the boilers and shall be higher than temperature setpoints (Maximum CH Temperature and DHW Setpoint) on the Cascading Controller.

## ZONE PUMPS WITH LABOR SAVER™ MANIFOLD

Figure 1: Zone Pumps with Manifold



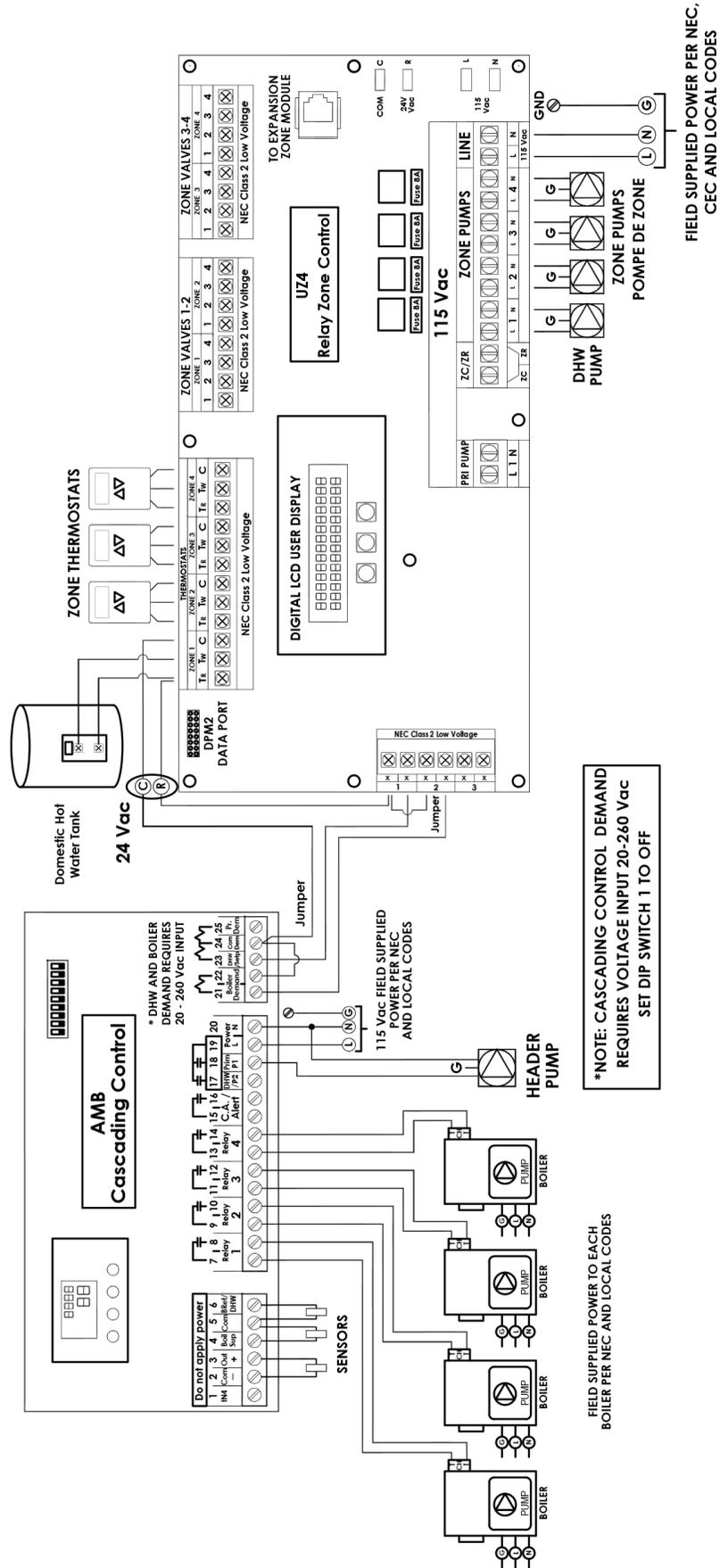
**NOTE:** Manufacturer requires all domestic hot water (DHW) installations use an anti-scald valve. Local codes may require additional equipment (expansion tank, relief valves, etc.) Select and size equipment to suit installation and meet code requirements.

**NOTE:** → |  | ← 12" (305mm) Maximum Separation between closely spaced tee's or hydraulic separator.

# 240 & 380 WITH ZONE PUMPS AND LABOR SAVER™ MANIFOLD

Figure 2: Zone Pumps with Manifold

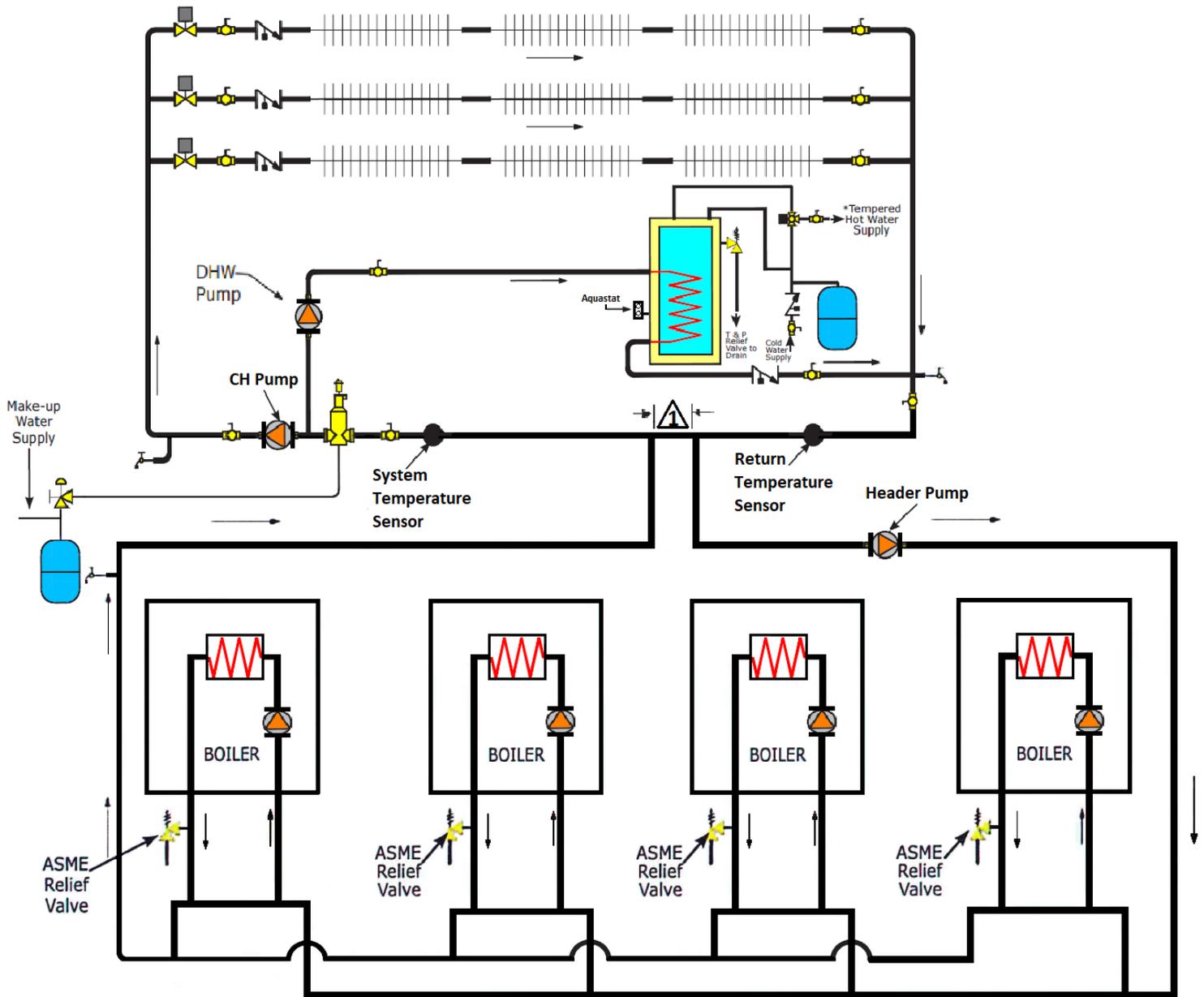
## 240 & 380 WITH ZONE PUMPS AND LABOR SAVER™ MANIFOLD



**Note:** Refer to IOM's of each appropriate control for programming information.

## ZONE VALVES WITH LABOR SAVER™ MANIFOLD

Figure 3: Zone Valves with Manifold



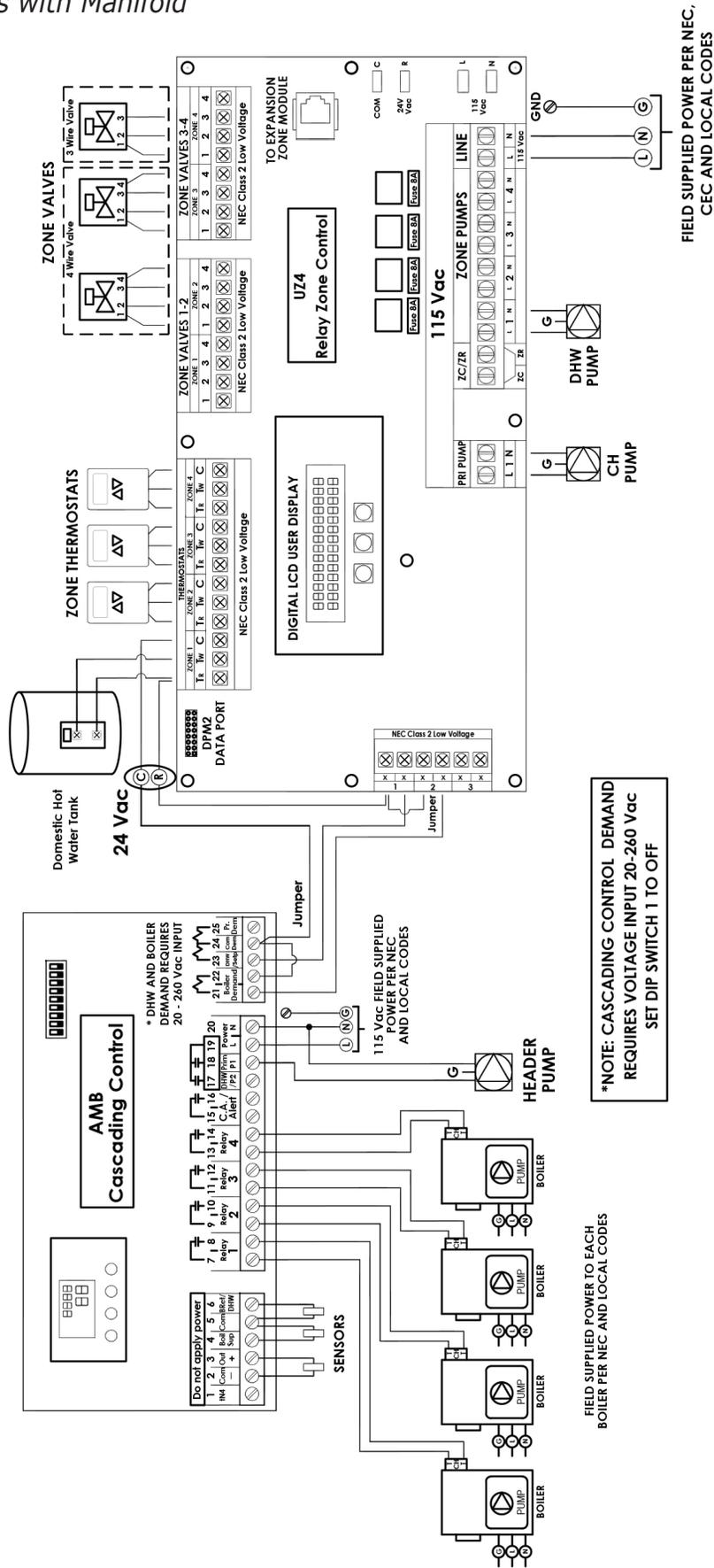
**NOTE:** Manufacturer requires all domestic hot water (DHW) installations use an anti-scald valve. Local codes may require additional equipment (expansion tank, relief valves, etc.) Select and size equipment to suit installation and meet code requirements.

**NOTE:** → |  | ← 12" (305mm) Maximum Separation between closely spaced tee's or hydraulic separator.

# 240 & 380 WITH ZONE VALVES AND LABOR SAVER™ MANIFOLD

Figure 4: Zone Valves with Manifold

## 240 & 380 WITH ZONE VALVES AND LABOR SAVER™ MANIFOLD



\*NOTE: CASCADING CONTROL DEMAND REQUIRES VOLTAGE INPUT 20-260 Vac SET DIP SWITCH 1 TO OFF

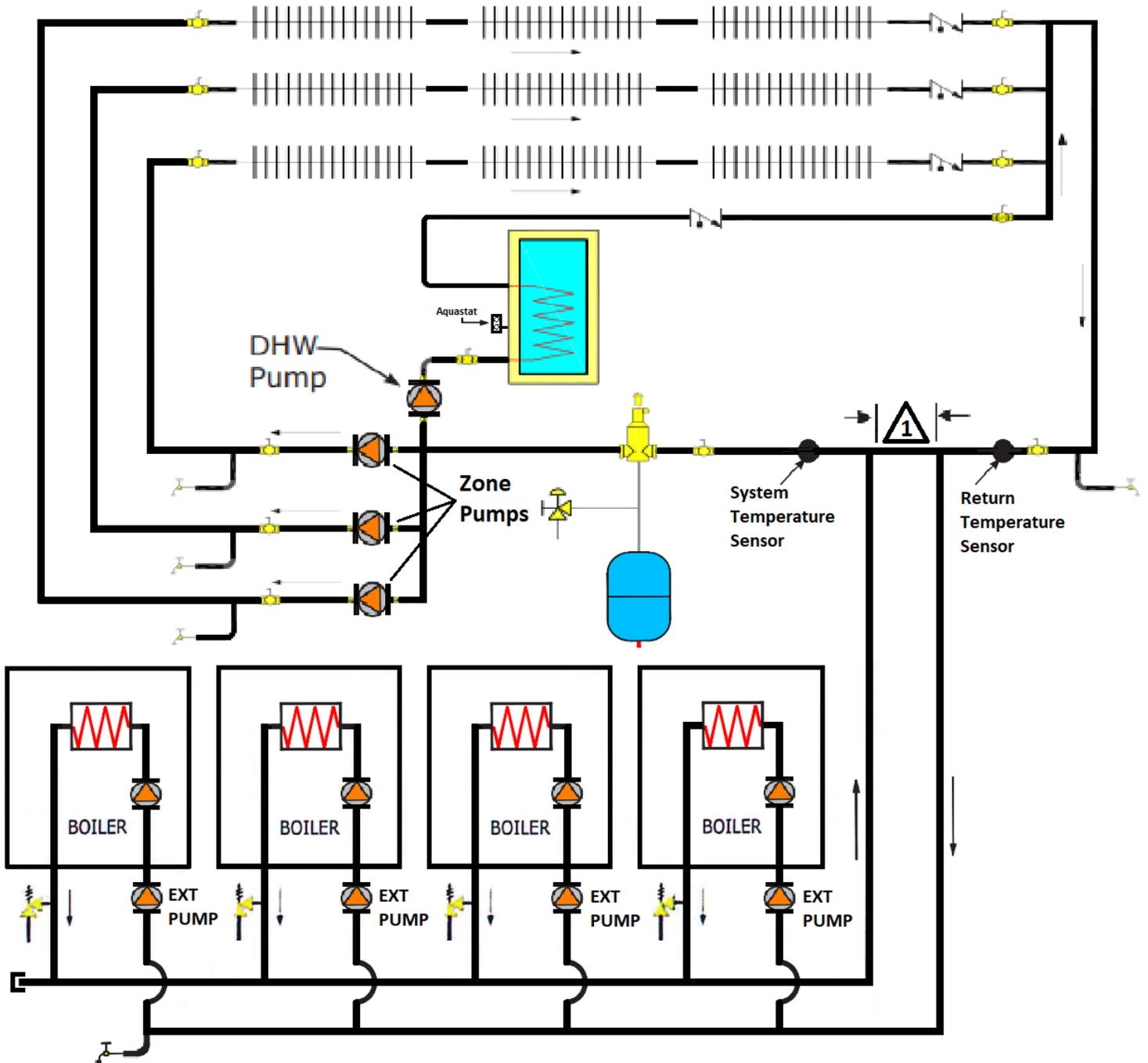
FIELD SUPPLIED POWER TO EACH BOILER PER NEC AND LOCAL CODES

FIELD SUPPLIED POWER PER NEC, CEC AND LOCAL CODES

**Note:** Refer to IOM's of each appropriate control for programming information.

## ZONE PUMPS *without* LABOR SAVER™ MANIFOLD

Figure 5: Zone Pumps *without* Manifold



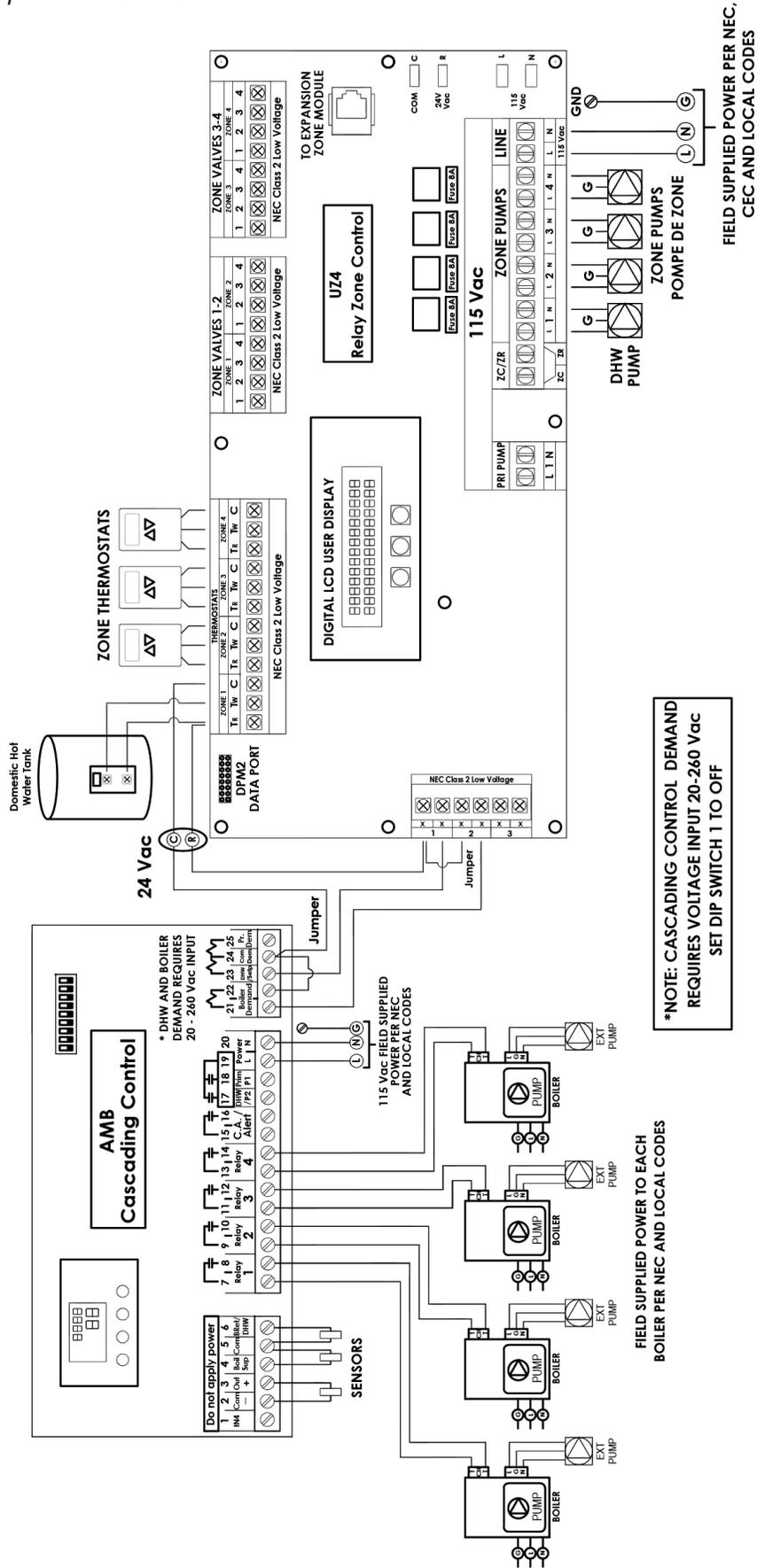
**NOTE:** Manufacturer requires all domestic hot water (DHW) installations use an anti-scald valve. Local codes may require additional equipment (expansion tank, relief valves, etc.) Select and size equipment to suit installation and meet code requirements.

**NOTE:** → |  | ← 12" (305mm) Maximum Separation between closely spaced tee's or hydraulic separator.

# 240 & 380 WITH ZONE PUMPS WITHOUT LABOR SAVER™ MANIFOLD

Figure 6: Zone Pumps without Manifold

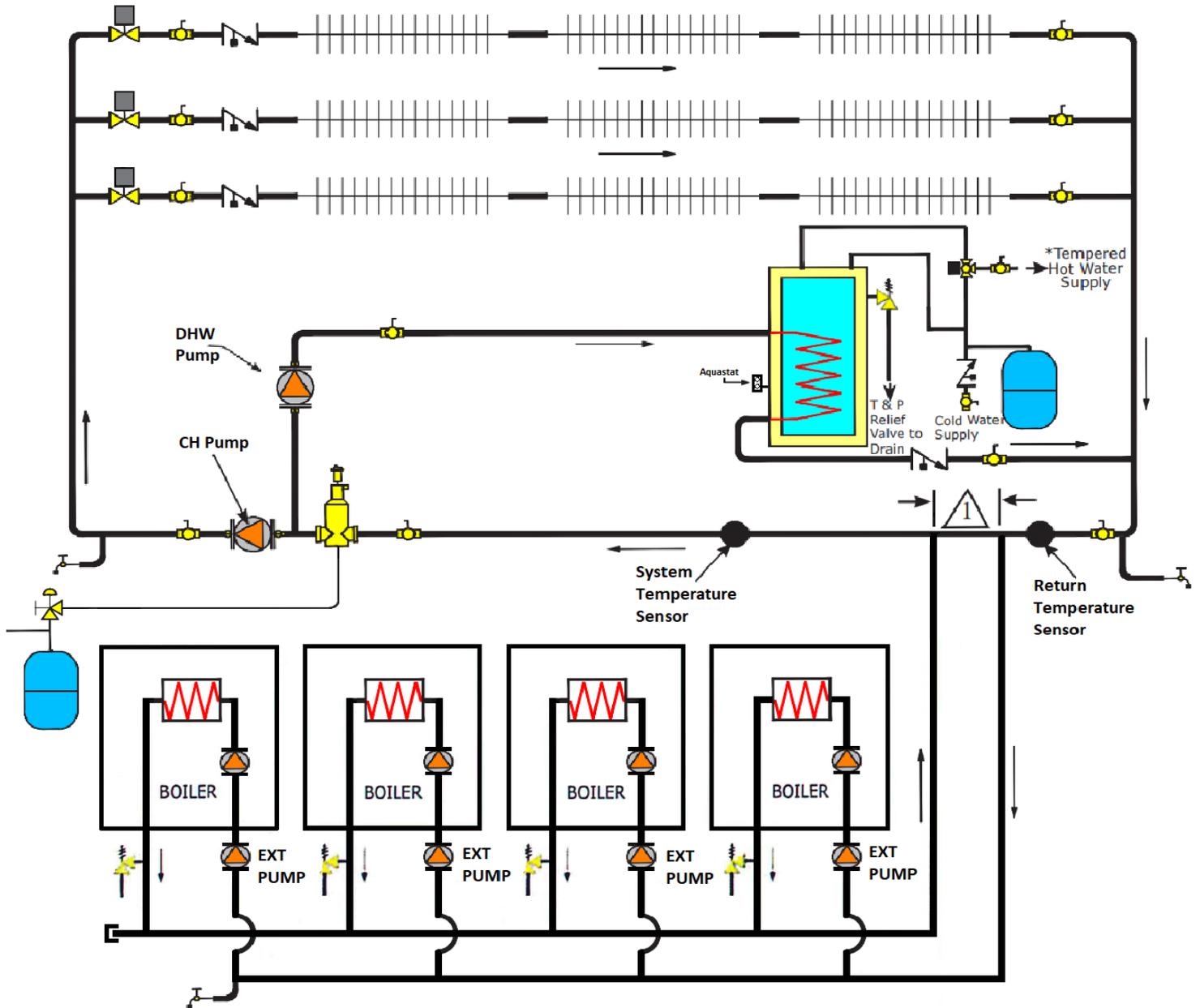
## 240 & 380 WITH ZONE PUMPS Without LABOR SAVER™ MANIFOLD



**Note:** Refer to IOM's of each appropriate control for programming information.

## ZONE VALVES *without* LABOR SAVER™ MANIFOLD

Figure 7: Zone Valves *without* Manifold



**NOTE:** Manufacturer requires all domestic hot water (DHW) installations use an anti-scald valve. Local codes may require additional equipment (expansion tank, relief valves, etc.) Select and size equipment to suit installation and meet code requirements.

**NOTE:** → |  | ← 12" (305mm) Maximum Separation between closely spaced tee's or hydraulic separator.





2201 Dwyer Avenue, Utica, NY 13501

Tel. 800 253 7900

[www.ecrinternational.com](http://www.ecrinternational.com)

All specifications subject to change without notice.

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