

# Chapter 14:

## Electrical schematics

### Wiring schematic 1

- A3100101 Uponor Thermostats
- A3023522 Thermal Actuators
- A3031003/A3031004 Zone Control Module (ZCM)
- A3010100 Single-zone Pump Relay
- A3050050 50 VA Transformer

The ES terminals are considered “dry contacts.” This means any wiring connected to these terminals is unpowered and will require an auxiliary

power source. In this schematic, power is applied to the ES terminals by the R/T, G/T terminals on the Uponor Single-zone Pump Relay from an internal transformer. When the circuit is completed between the relay and the ZCM, a coil in the relay is energized, closing the contacts to start the circulator and, in this illustration, fire the boiler. Again, the contact 5 and 6NO on the Uponor Single-zone Pump Relay are dry contacts and require an additional power supply. In most instances, power is supplied to these contacts from a transformer within the boiler control off the T-T or R-G terminals.

Consult the heating equipment manufacturer’s wiring schematics for the proper terminals to energize the boiler.

**Overview:** Multiple zone control and boiler enable using Uponor Thermostats, Uponor Thermal Actuators, the Uponor Zone Control Module (ZCM) and the Uponor Single-zone Pump Relay.

**Sequence of operation:** On a call for heat, the Uponor Thermostat sends a signal to the Uponor ZCM, illuminating the yellow light on the ZCM. This call for heat sends power to the actuator(s) for that zone, energizing the Y1-Y2 terminals on the ZCM. This activates or opens the actuator(s), allowing flow through these loops on the manifold. Once the actuator(s) have opened to a minimal position, an end switch inside of the actuator(s) will close, illuminating the red light on the ZCM. When end switch closure is detected, a contact will close between the ES-ES terminals on the ZCM, energizing the Uponor Single-zone Pump Relay. Following this control procedure will eliminate any “dead-head” circulator conditions for radiant circulator (P1). The actuators must be open before the circulator will operate.

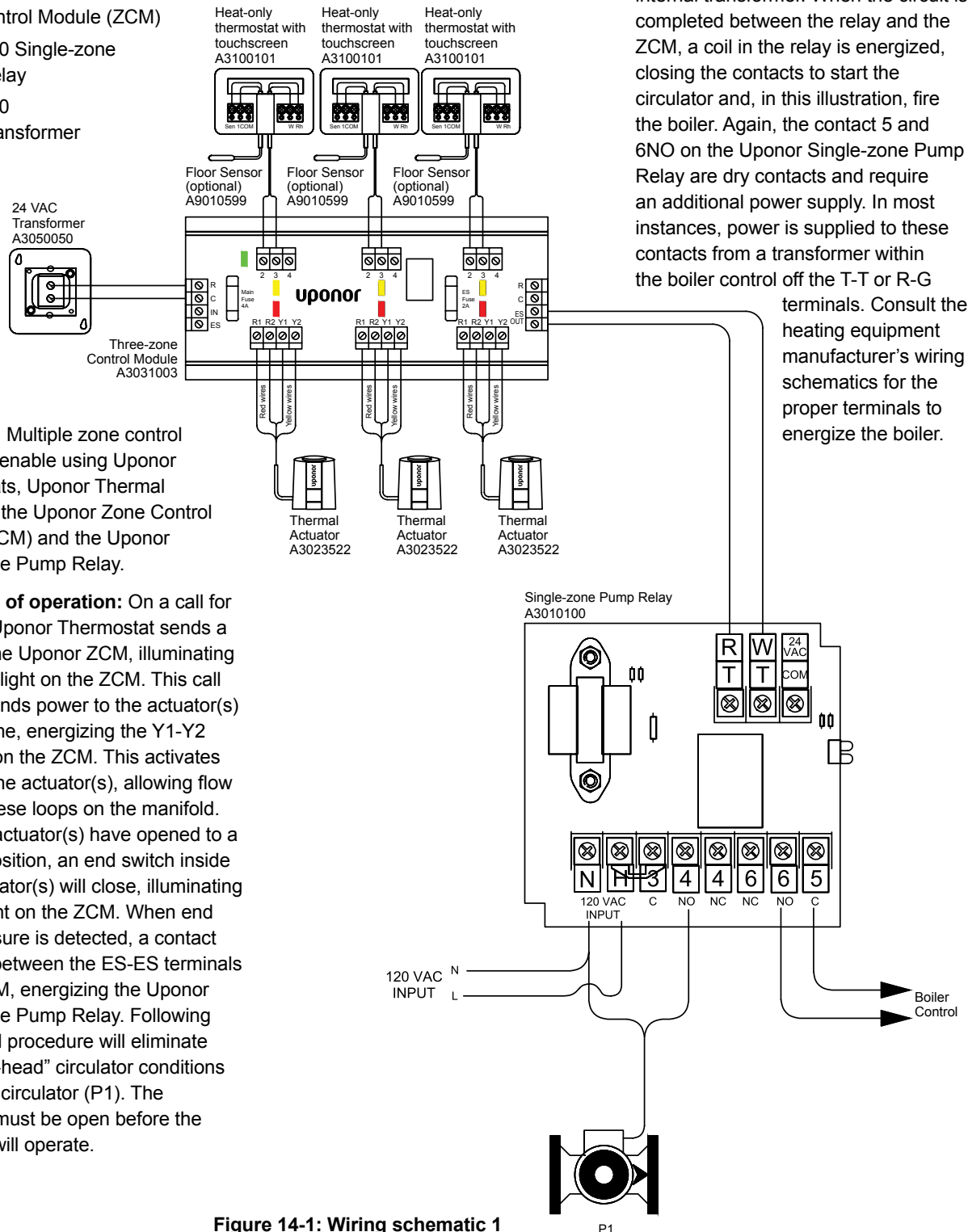


Figure 14-1: Wiring schematic 1

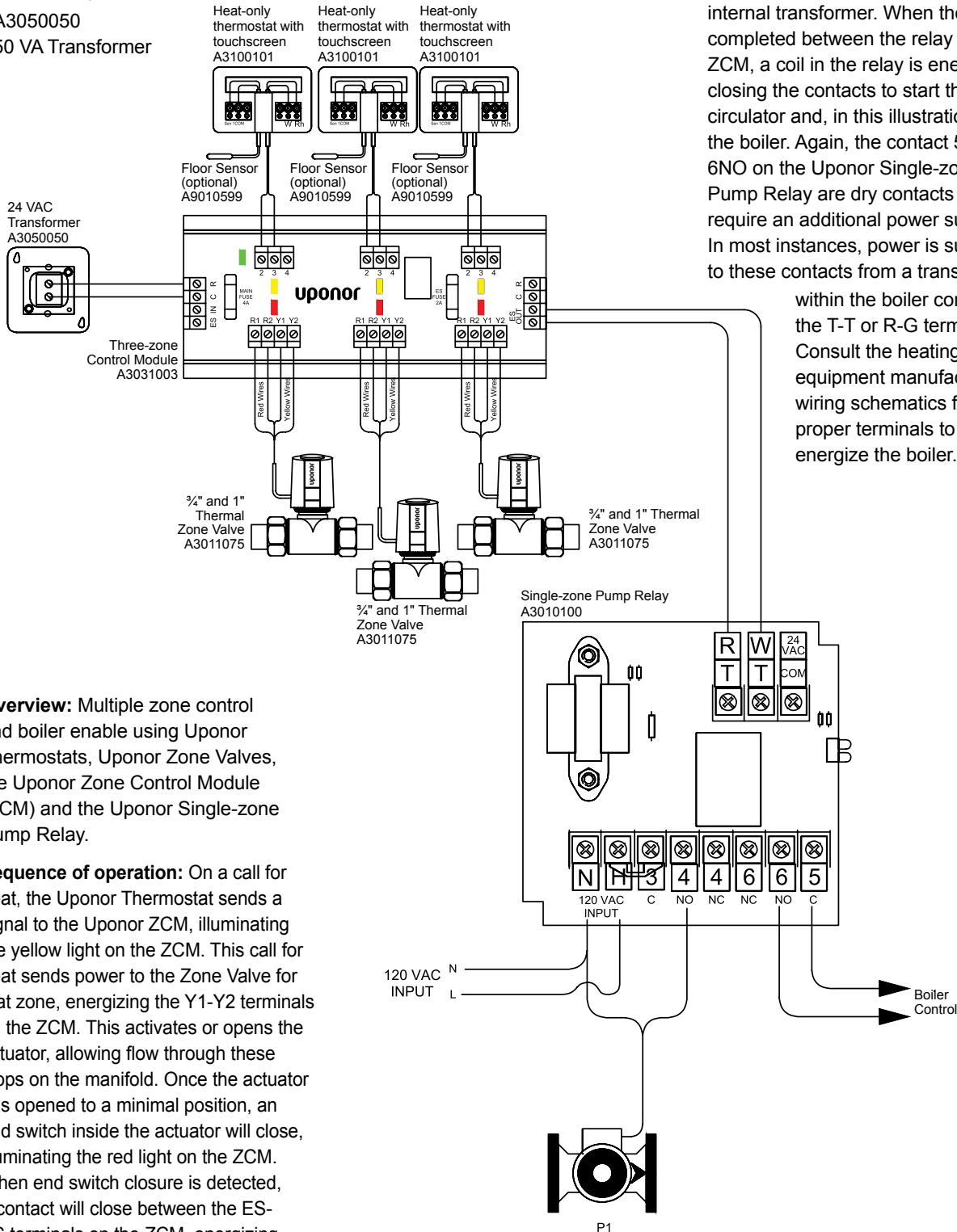
## Wiring schematic 2

- A3100101 Uponor Thermostats
- A3011075 Uponor Zone Valve
- A3031003/A3031004 Zone Control Module (ZCM)
- A3010100 Single-zone Pump Relay
- A3050050 50 VA Transformer

the Uponor Single-zone Pump Relay. Following this control procedure will eliminate any “dead-head” circulator conditions for radiant circulator (P1). The actuators must be open before the circulator will operate.

The ES terminals are considered “dry contacts.” This means any wiring connected to these terminals is unpowered and will require an auxiliary power source. In this schematic, power is applied to the ES terminals by the R/T, G/T terminals on the Uponor Single-zone Pump Relay from an internal transformer. When the circuit is completed between the relay and the ZCM, a coil in the relay is energized, closing the contacts to start the circulator and, in this illustration, fire the boiler. Again, the contact 5 and 6NO on the Uponor Single-zone Pump Relay are dry contacts and require an additional power supply. In most instances, power is supplied to these contacts from a transformer

within the boiler control off the T-T or R-G terminals. Consult the heating equipment manufacturer’s wiring schematics for the proper terminals to energize the boiler.



**Overview:** Multiple zone control and boiler enable using Uponor Thermostats, Uponor Zone Valves, the Uponor Zone Control Module (ZCM) and the Uponor Single-zone Pump Relay.

**Sequence of operation:** On a call for heat, the Uponor Thermostat sends a signal to the Uponor ZCM, illuminating the yellow light on the ZCM. This call for heat sends power to the Zone Valve for that zone, energizing the Y1-Y2 terminals on the ZCM. This activates or opens the actuator, allowing flow through these loops on the manifold. Once the actuator has opened to a minimal position, an end switch inside the actuator will close, illuminating the red light on the ZCM. When end switch closure is detected, a contact will close between the ES-ES terminals on the ZCM, energizing

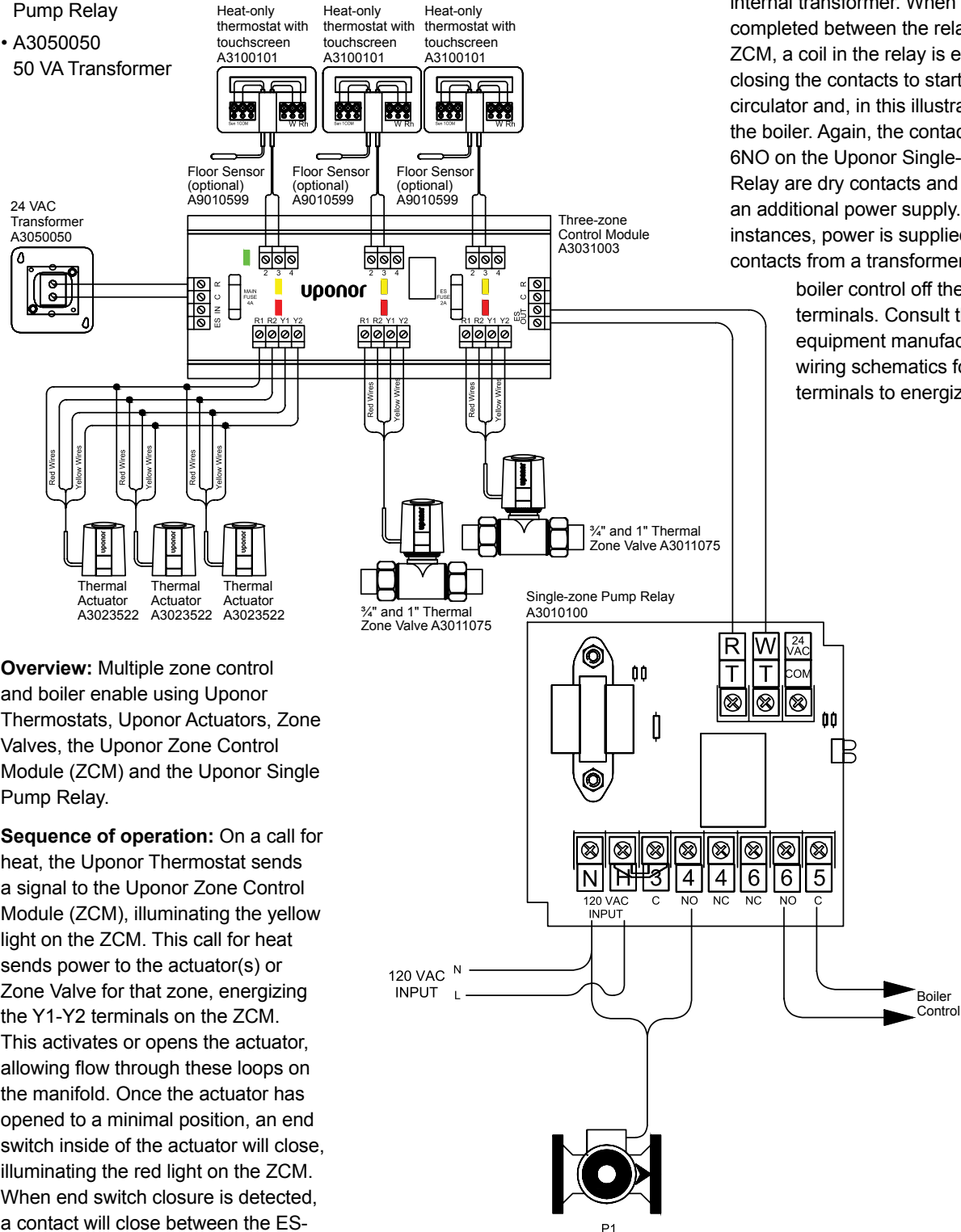
Figure 14-2: Wiring schematic 2

### Wiring schematic 3

- A3100101 Uponor Thermostats
- A3023522 Thermal Actuators
- A3023522 Uponor Zone Valve
- A3031003/A3031004 Zone Control Module (ZCM)
- A3010100 Single-zone Pump Relay
- A3050050 50 VA Transformer

ES terminals on the ZCM, energizing the Uponor Single-zone Pump Relay. Following this control procedure will eliminate any “deadhead” circulator conditions for radiant circulator (P1). The actuator(s) must be open before the circulator will operate.

The ES terminals are considered “dry contacts.” This means any wiring connected to these terminals is unpowered and will require an auxiliary power source. In this schematic, power is applied to the ES terminals by the R/T, G/T terminals on the Uponor Single-zone Pump Relay from an internal transformer. When the circuit is completed between the relay and the ZCM, a coil in the relay is energized, closing the contacts to start the circulator and, in this illustration, fire the boiler. Again, the contact 5 and 6NO on the Uponor Single-zone Pump Relay are dry contacts and require an additional power supply. In most instances, power is supplied to these contacts from a transformer within the boiler control off the T-T or R-G terminals. Consult the heating equipment manufacturer’s wiring schematics for the proper terminals to energize the boiler.



**Overview:** Multiple zone control and boiler enable using Uponor Thermostats, Uponor Actuators, Zone Valves, the Uponor Zone Control Module (ZCM) and the Uponor Single Pump Relay.

**Sequence of operation:** On a call for heat, the Uponor Thermostat sends a signal to the Uponor Zone Control Module (ZCM), illuminating the yellow light on the ZCM. This call for heat sends power to the actuator(s) or Zone Valve for that zone, energizing the Y1-Y2 terminals on the ZCM. This activates or opens the actuator, allowing flow through these loops on the manifold. Once the actuator has opened to a minimal position, an end switch inside of the actuator will close, illuminating the red light on the ZCM. When end switch closure is detected, a contact will close between the ES-

Figure 14-3: Wiring schematic 3

## Wiring schematic 4

- A3100101 Uponor Thermostats
- A3080301 Three-zone Multi-pump Relay

**Overview:** Multiple zone control and boiler enable using Uponor Thermostats operating multiple radiant circulators (P1 and P2), using the Uponor Three-zone Multi-pump Relay.

**Sequence of operation:** On a call for heat, the Uponor Thermostat sends a signal to the Uponor Three-zone Multi-pump Relay. In this schematic, power is applied to the DT10 Thermostats by the T1 and T2 terminals on the Uponor Three-zone Multi-pump Relay from an internal transformer. When the circuit is completed between the thermostat and the circulator panel, a coil in the relay is energized, closing the contacts to start the circulator and, in this illustration, fire the boiler. Contacts X1/X2 are considered “dry contacts.” This means any wiring connected to these terminals is unpowered and will require an auxiliary power source. In most instances, power is supplied to these contacts from a transformer within

the boiler controls off the T-T or R-G terminals. Consult the heating equipment manufacturer’s wiring schematics for the proper terminals to energize the boiler.

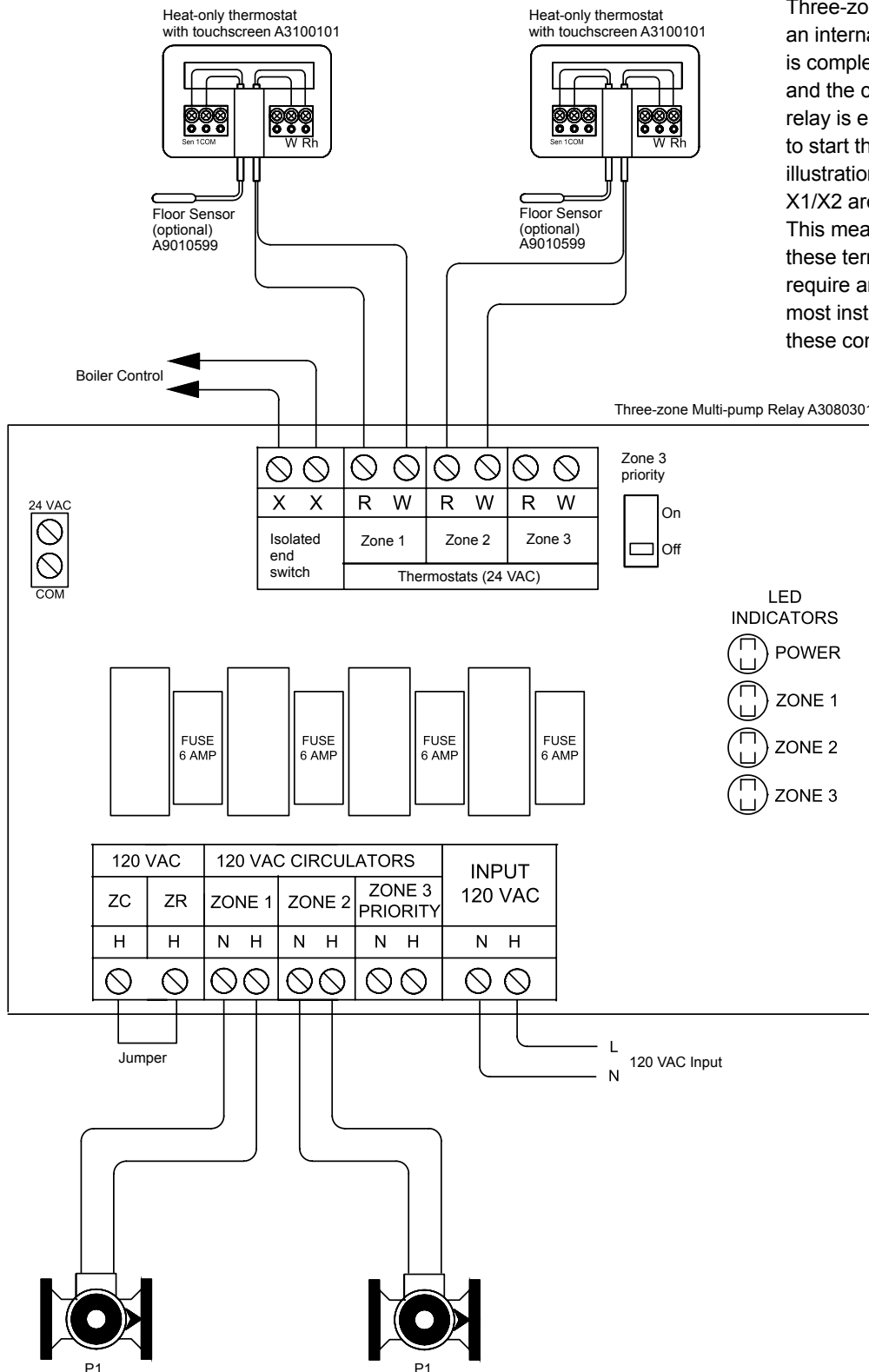


Figure 14-4: Wiring schematic 4

## Wiring schematic 5

- A3030101 Uponor Thermostats
- A3010522 Thermal Actuators
- A3030003/A3030004 Zone Control Module (ZCM)
- A3080301 Three-zone Multi-pump Relay
- A3050050 50 VA Transformer

**Overview:** Multiple zone control and boiler enable using Uponor Thermostats, Uponor Actuators, the Uponor Zone Control Module (ZCM) operating multiple radiant circulators (P1, P2, P3), using the Uponor Three-zone Multi-pump Relay.

**Sequence of operation:** On a call for heat, the Uponor Thermostat sends a signal to the Uponor ZCM, illuminating the yellow light on the ZCM. This call for heat sends power to the actuator(s) for that zone, energizing the Y1-Y2 terminals on the ZCM. This activates or opens the actuator(s), allowing flow through these loops on the manifold. Once the actuator(s) have opened to a minimal position, an end switch inside of the actuator(s) will close, illuminating the red light on the ZCM. When end switch closure is detected, a contact will close between the ES-ES terminals on the ZCM, energizing the Uponor Three-zone Multi-pump Relay. Following this control procedure will eliminate any “dead-head” circulator conditions for the radiant circulator (P1). The actuator(s) must be open before the circulator will operate.

The ES terminals are considered “dry contacts.” This means any wiring connected to these terminals are unpowered and will require an auxiliary power source. In this schematic, power is applied to the ES terminals by the T1/T1 terminals on the Uponor Three-zone Multi-pump Relay from an internal transformer. When the circuit is completed between the relay and the ZCM, a coil in the relay is energized, closing the contacts to start the circulator and, in this illustration, fire the boiler. Again, the contacts X1/X2 are dry contacts and require an additional power supply. In most instances, power

is supplied to these contacts from a transformer within the boiler controls off the T-T or R-G terminals. Consult the heating equipment manufacturer’s wiring schematics for the proper terminals to energize the boiler.

Also shown in this schematic is a separate thermostat used to control a second radiant circulator (P2). In this example, the thermostat is directly wired to the relay to operate that second circulator. This scenario exists when a manifold is treated as a single zone, controlled by a circulator instead of a zone valve. Power is supplied to the thermostat from the T2/T2 terminals. When the thermostat calls for heat, the circuit between the T2 terminals is closed and a coil is energized in the relay, starting the radiant circulator (P2) and closing the contacts between X1/X2, starting the boiler.

**See wiring schematic 5 on page 150.**

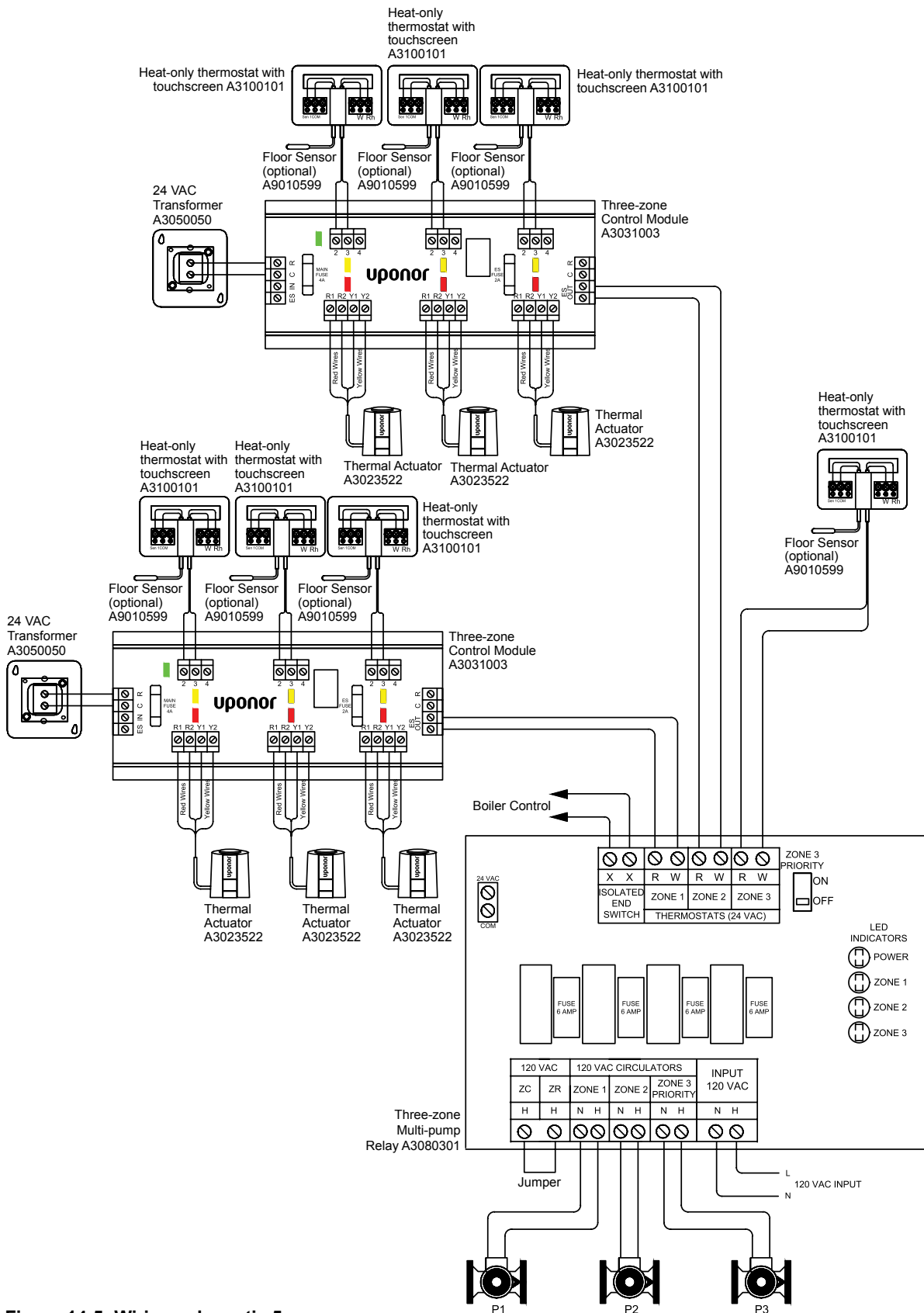


Figure 14-5: Wiring schematic 5

## Wiring schematic 6

- A3030101 Uponor Thermostats
- A3010522 Thermal Actuators
- A3030003/A3030004  
Zone Control Module (ZCM)
- A3080301 Three-zone  
Multi-pump Relay
- A3050050 50 VA Transformer

**Overview:** Multiple zone control and boiler enable using Uponor Thermostats, Uponor Actuators, the Uponor Zone Control Module (ZCM) operating one radiant circulator (P1), along with a single Uponor Thermostat operating a second radiant circulator (P2), using the Uponor Three-zone Multi-pump Relay.

**Sequence of Operation:** On a call for heat, the Uponor Thermostat sends a signal to the Uponor ZCM, illuminating the yellow light on the ZCM. This call for heat sends power to the actuator(s) for that zone, energizing the Y1-Y2 terminals on the ZCM. This activates or opens the actuator(s), allowing flow through these loops on the manifold. Once the actuator(s) have opened to a minimal position, an end switch inside of the actuator(s) will close, illuminating the red light on the ZCM. When end switch closure is detected, a contact will close between the ES-ES terminals on the ZCM, energizing the Uponor Three-zone Multi-pump Relay. Following this control procedure will eliminate any “dead-head” circulator conditions for radiant circulator (P1). The actuator(s) must be open before the circulator will operate.

The ES terminals are considered “dry contacts.” This means any wiring connected to these terminals are unpowered and will require an auxiliary power source. In this schematic, power is applied to the ES terminals by the T1/T1 terminals on the Uponor Three-zone Multi-pump Relay from an internal transformer. When the circuit is completed between the relay and the ZCM, a coil in the relay is energized, closing the contacts to start the circulator and, in this illustration, fire the boiler. Again, the contacts X1/X2 are dry contacts and require an additional power supply. In most instances, power

is supplied to these contacts from a transformer within the boiler controls off the T-T or R-G terminals. Consult the heating equipment manufacturer’s wiring schematics for the proper terminals to energize the boiler.

Also shown in this schematic is a separate thermostat used to control a second radiant circulator (P2). In this example, the thermostat is directly wired to the relay to operate that second circulator. This scenario exists when a manifold is treated as a single zone, controlled by a circulator instead of a zone valve. Power is supplied to the thermostat from the T2/T2 terminals. When the thermostat calls for heat, the circuit between the T2 terminals is closed and a coil is energized in the relay, starting the radiant circulator (P2) and closing the contacts between X1/X2, starting the boiler.

**See wiring schematic 6 on page 152.**

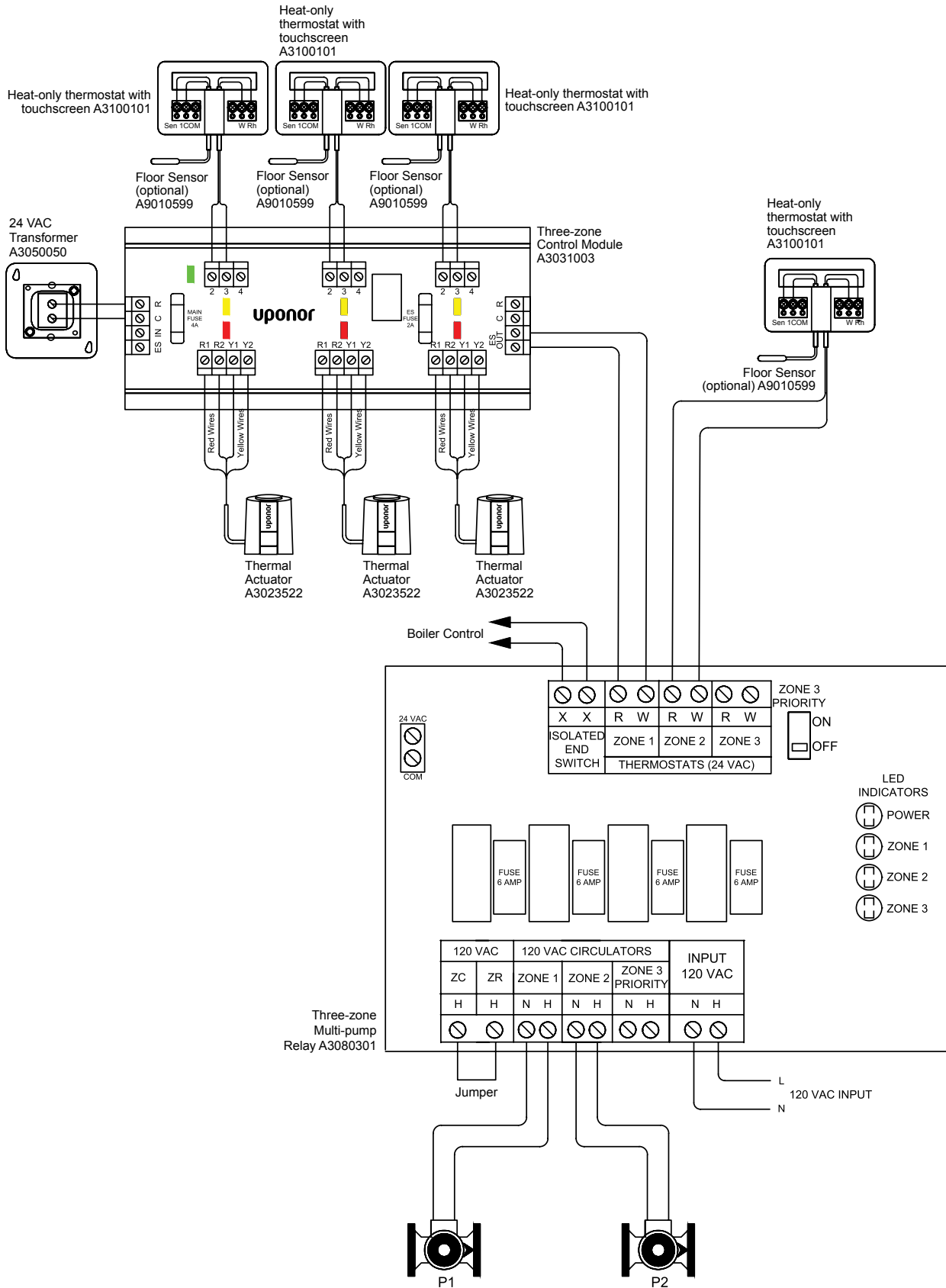


Figure 14-6: Wiring schematic 6



## Wiring schematic 7

- A3100101 Uponor Thermostats
- A3023522 Thermal Actuators
- A3031003/A3031004 Zone Control Module (ZCM)
- A3080301 Three-zone Multi-pump Relay
- A3050050 50 VA Transformer
- A3070526 Uponor 1" Zone Valve

**Overview:** Multiple zone control, multiple circulator control (P1 and P2) and boiler enable using Uponor Thermostats, Uponor Actuators, the Uponor Zone Control Module (ZCM) and the Uponor Three-zone Multi-pump Relay, along with a single Uponor Thermostat operating a zone valve (M1), also wired through the Uponor ZCM.

### Sequence of operation:

On a call for heat, the Uponor Thermostat sends a signal to the Uponor ZCM, illuminating the yellow light on the ZCM. This call for heat sends power to the actuator(s) for that zone, energizing the Y1-Y2 terminals on the ZCM. This activates or opens the actuator(s), allowing flow through these loops on the manifold. Once the actuator(s) have opened to a minimal position, an end switch inside of the actuator(s) will close, illuminating the red light on the ZCM. When end switch closure is detected, a contact will close between the ES-ES terminals on the ZCM, energizing the Uponor Three-zone Multi-pump Relay. Following this control procedure will eliminate any "dead-head" circulator conditions for radiant circulator (P1). The actuator(s) must be open before the circulator will operate.

The ES terminals are considered "dry contacts." This means any wiring connected to these terminals is unpowered and will require an auxiliary power source. In this schematic, power is applied to the ZCM ES terminals by the T1-T1 and T2-T2 terminals on the Uponor Three-zone Multi-pump Relay from an internal transformer. When the circuit is completed between the relay and the ZCM, a coil in the relay is energized, closing the contacts

to start the circulator and, in this illustration, fire the boiler. Again, the contacts X1/X2 on the Uponor Three-zone Multi-pump Relay are dry contacts and require an additional power supply. In most instances, power is supplied to these contacts from a transformer within the boiler control off the T-T or R-G terminals. Consult the heating equipment manufacturer's wiring schematics for the proper terminals to energize the boiler.

Also shown in this schematic is a separate thermostat wired to a ZCM to control a zone valve (M1). The zone valve can be wired to the thermostat using the ZCM. Following the same sequence of operation as above, the red wires from the internal end switch are wired in parallel to the wiring from the multiple circulator relay panel. This wiring configuration will allow a call for heat from either the relay panel or the zone valve to activate the boiler.

**See wiring schematic 7 on page 154.**

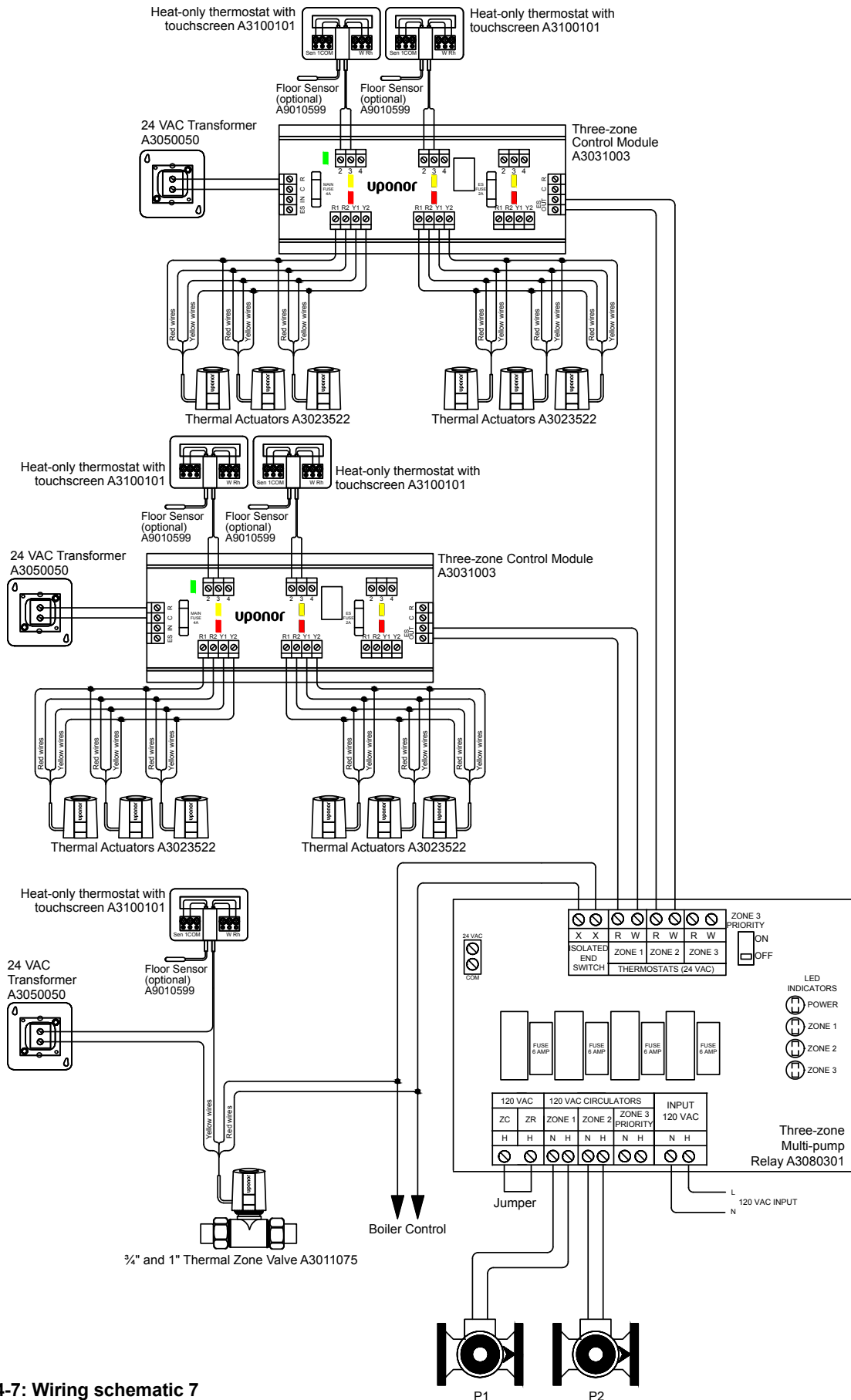


Figure 14-7: Wiring schematic 7

## Wiring schematic 8

- A3100101 Uponor Thermostats
- A3023522 Thermal Actuators
- A3031003/A3031004 Zone Control Module (ZCM)
- A3010100 Single-zone Pump Relay
- A3050050 50 VA Transformer

**Overview:** Multiple zone control and circulator control (P1) using Uponor Thermostats, Uponor Actuators, the Uponor Zone Control Module (ZCM) and the Uponor Single-zone Pump Relay. Radiant supply water temperature and boiler enable is controlled by the Uponor SetPoint 150 Controller (SPC).

**Sequence of operation:** On a call for heat, the Uponor Thermostat sends a signal to the Uponor ZCM, illuminating the yellow light on the ZCM. This call for heat sends power to the actuator(s) for that zone, energizing the Y1-Y2 terminals on the ZCM. This activates or opens the actuator(s), allowing flow through these loops on the manifold. Once the actuator(s) have opened to a minimal position, an end switch inside of the actuator(s) will close, illuminating the red light on the ZCM. When end switch closure is detected, a contact will close between the ES-ES terminals on the ZCM, energizing the Uponor Single-zone Pump Relay. Following this control procedure will eliminate any “dead-head” circulator conditions for the radiant circulator (P1). The actuators must be open before the circulator will operate.

The ES terminals are considered “dry contacts.” This means any wiring connected to these terminals is unpowered and will require an auxiliary power source. In this schematic, power is applied to the ES terminals by the R/T, G/T terminals on the Uponor Single-zone Pump Relay from an internal transformer. When the circuit is completed between the relay and the ZCM, a coil in the relay is energized, closing the contacts to start the circulator and, in this illustration,

fire the boiler. Again, the contact 5 and 6NO on the Uponor Single-zone Pump Relay are dry contacts and require an additional power supply. In most instances, power is supplied to these contacts from a transformer within the boiler control off the T-T or R-G terminals. Consult the heating equipment manufacturer’s wiring schematics for the proper terminals to energize the boiler.

The Uponor SetPoint 150 Controller is added in series to the wiring between the Uponor Single-zone Pump Relay and the boiler control. The SPC is used to control the radiant supply water temperature, possibly through a heat exchanger. For example, if the SPC is set for 120°F and the sensor (S1) is reading a temperature below the setpoint, the contacts 3 and 4 are closed and the boiler is allowed to fire. If the temperature being read on sensor S1 is higher than the desired temperature, the contacts between 3 and 4 are open and the boiler does not fire. The zones open, and the radiant circulator (P1) operates, but it is not necessary to fire the boiler and add heat when the proper supply water temperature is being delivered. Consult the boiler manufacturer’s wiring schematics for the proper terminals to energize the boiler.

**See wiring schematic 8 on page 156.**

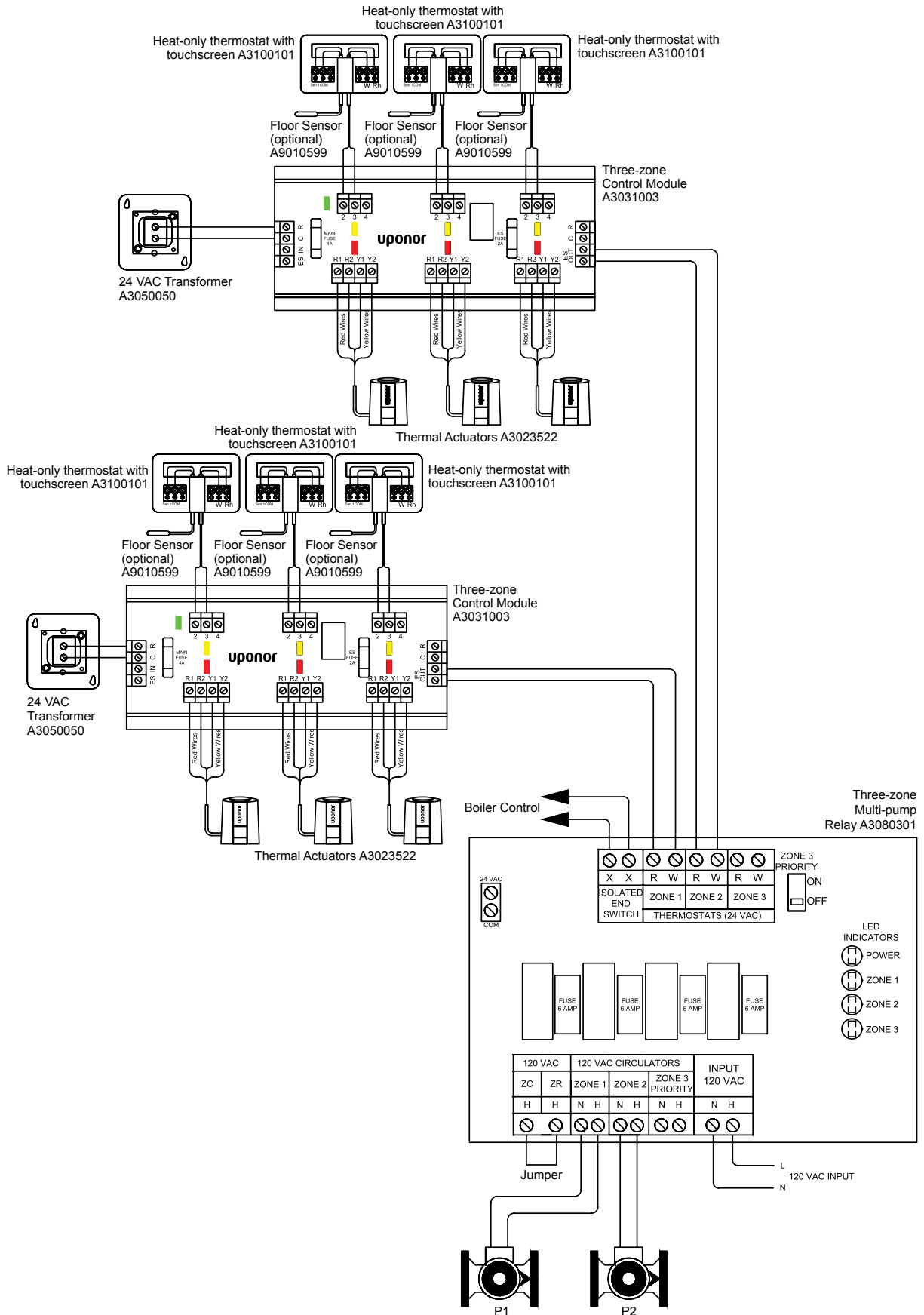


Figure 14-8: Wiring schematic 8

## Wiring schematic 9

- A3100101 Uponor Thermostats
- A3023522 Thermal Actuators)
- A3031003/A3031004  
Zone Control Module (ZCM)
- A3080301 Three-zone  
Multi-pump Relay
- A3050050 50 VA Transformer

**Overview:** Multiple zone control and boiler enable using Uponor Thermostats, Uponor Actuators, the Uponor Zone Control Module (ZCM) operating two radiant circulators (P1 and P2) using the Uponor Three-zone Multi-pump Relay.

**Sequence of operation:** On a call for heat, the Uponor Thermostat sends a signal to the Uponor ZCM, illuminating the yellow light on the ZCM. This call for heat sends power to the actuator(s) for that zone, energizing the Y1-Y2 terminals on the ZCM. This activates or opens the actuator(s), allowing flow through these loops on the manifold. Once the actuator(s) have opened to a minimal position, an end switch inside of the actuator will close, illuminating the red light on the ZCM. When end switch closure is detected, a contact will close between the ES-ES terminals on the ZCM, energizing the corresponding circulator through the Uponor Three-zone Multi-pump Relay. Following this control procedure will eliminate any “dead-head” circulator condition for the radiant circulators (P1 and P2). The actuators must be open before the circulator will operate.

The ES terminals are considered “dry contacts.” This means any wiring connected to these terminals are unpowered and will require an auxiliary power source. In this schematic, power is applied to the ES terminals on either ZCM by the T1/T1 and T2/T2 terminals on the Uponor Three-zone Multi-pump Relay from an internal transformer. When the circuit is completed between the relay and the ZCM, a coil in the relay is energized, closing the contacts to start the circulator and, in this illustration, fire the boiler. Again, the contacts X1/X2 are dry contacts and require an additional power supply.

In most instances, power is supplied to these contacts from a transformer within the boiler controls off the T-T or R-G terminals. Consult the heating equipment manufacturer’s wiring schematics for the proper terminals to energize the boiler.

**See wiring schematic 9 on page 158.**

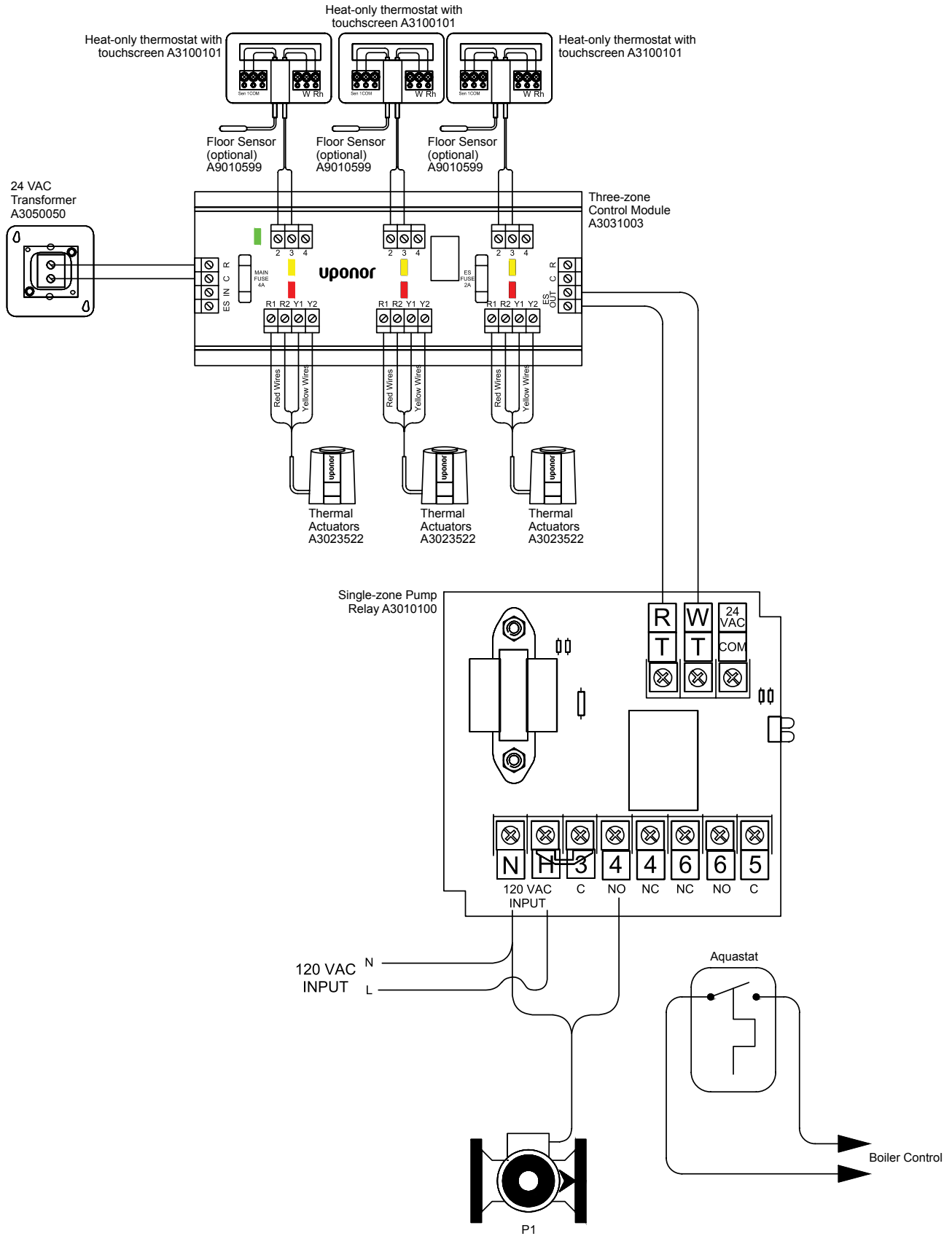


Figure 14-9: Wiring schematic 9

## Wiring schematic 10

- A3100101 Uponor Thermostats
- A3023522 Thermal Actuators
- A3031003/A3031004 Zone Control Module (ZCM)
- A3010100 Single-zone Pump Relay
- A3050050 50 VA Transformer

**Overview:** Multiple zone control and boiler enable using Uponor Thermostats, Uponor Actuators, the Uponor Zone Control Module (ZCM) and the Uponor Single-zone Pump Relay.

**Sequence of operation:** On a call for heat, the Uponor Thermostat sends a signal to the Uponor ZCM, illuminating the yellow light on the ZCM. This call for heat sends power to the actuator(s) for that zone, energizing the Y1-Y2 terminals on the ZCM. This activates or opens the actuator(s), allowing flow through these loops on the manifold. Once the actuator(s) have opened to a minimal position, an end switch inside of the actuator(s) will close, illuminating the red light on the ZCM. When end switch closure is detected, a contact will close between the ES-ES terminals on the ZCM, energizing the Uponor Single-zone Pump Relay. Following this control procedure will eliminate any “dead-head” circulator conditions for radiant circulator (P1). The actuator(s) must be open before the circulator will operate.

This wiring schematic is typical of piping arrangements using a mixing tank to add mass to the system and control water temperature. In this schematic, there is no wiring between the single circulator relay panel and the heat plant. This heat plant could be a non-condensing boiler, condensing boiler, heat circulator, etc. A call for heat from any of the zones will start the radiant circulator (P2) and begin to circulate the heat away from the buffer tank. An aquastat (AQ1) is added to the tank to control the heat plant. Depending on the differential setting on the aquastat, once the tank temperature has dropped below the desired temperature setting,

the contact will close and fire the heating equipment. The terminals inside of the aquastat are considered “dry contacts.” This means any wiring connected to these terminals is unpowered and will require an auxiliary power source. In most instances, power is supplied to these contacts from a transformer within the boiler control off the TT or R-G terminals. Consult the heating equipment manufacturer’s wiring schematics for the proper terminals to energize the boiler.

It is also important to understand how this type of wiring scheme de-energizes. Once the call from the thermostat is ended, signifying a satisfied space temperature, the radiant circulator (P1) is shut off. However, depending on the water temperature inside the tank, the aquastat contacts will remain closed, continuing to fire the heat plant, until the required water temperature is achieved by the buffer tank. After the set temperature is sensed in the tank by the aquastat, the contacts open and interrupt the signal to the heat plant.

**See wiring schematic 10 on page 160.**

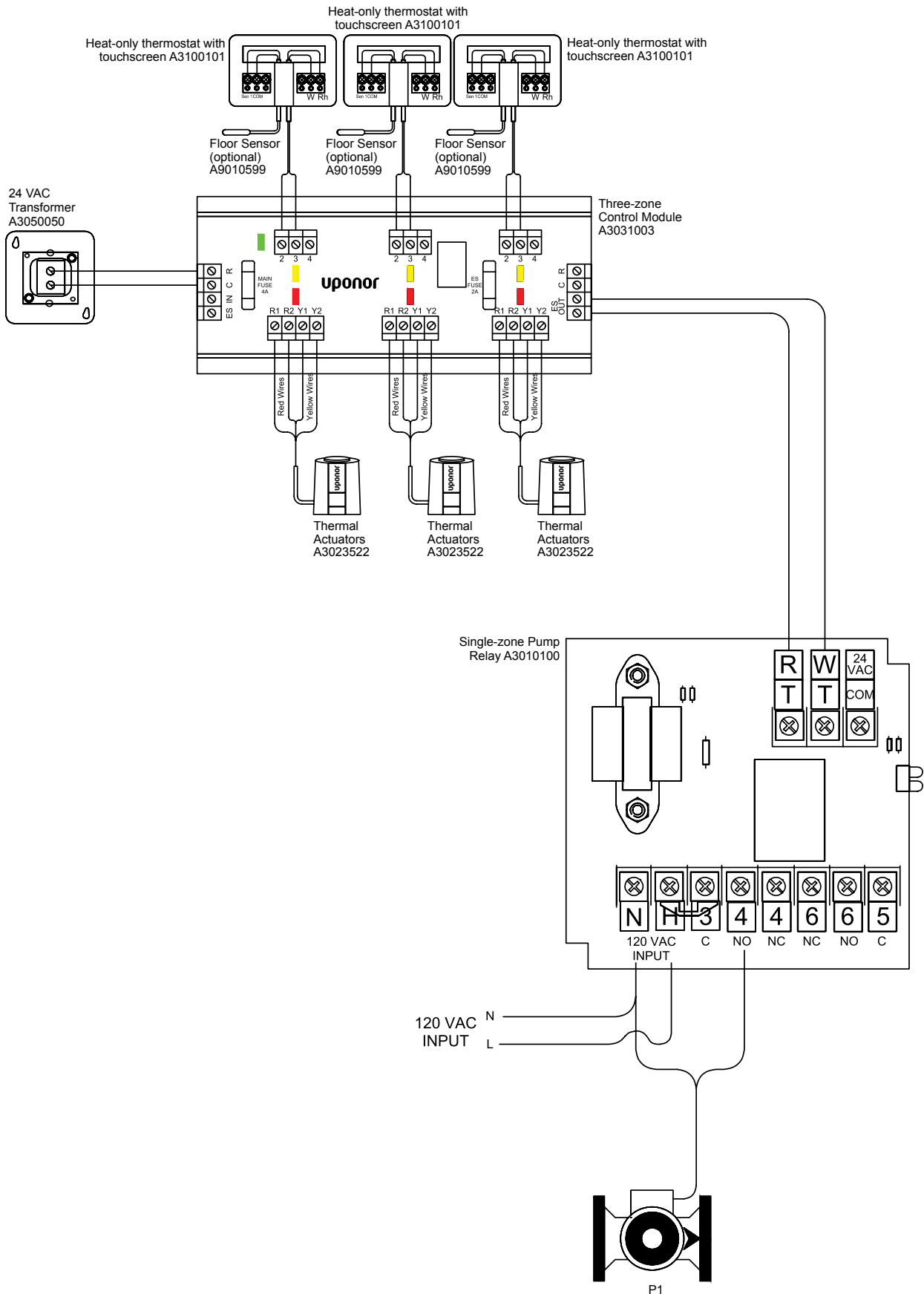


Figure 14-10: Wiring schematic 10



## Wiring schematic 11

- A3100101 Uponor Thermostats
- A3023522 Thermal Actuators
- A3031003/A3031004 Zone Control Module (ZCM)
- A3050050 50 VA Transformer

**Overview:** Multiple zone control and boiler enable using Uponor Thermostats, Uponor Actuators and the Uponor Zone Control Module (ZCM).

**Sequence of operation:** On a call for heat, the Uponor Thermostat sends a signal to the Uponor ZCM, illuminating the yellow light on the ZCM. This call for heat sends power to the actuator(s) for that zone, energizing the Y1-Y2 terminals on the ZCM. This activates or opens the actuator(s), allowing flow through these loops on the manifold. Once the actuator(s) have opened to a minimal position, an end switch inside of the actuator(s) will close, illuminating the red light on the ZCM. When end switch closure is detected, a contact will close between the ES-ES terminals on the ZCM, completing the boiler circuit. The actuator(s) must be open before the boiler will operate.

The ES terminals are considered “dry contacts.” This means any wiring connected to these terminals is unpowered and will require an auxiliary power source. In this schematic, power is supplied to these contacts from a transformer within the boiler control off the T-T or R-G terminals. Consult the heating equipment manufacturer’s wiring schematics for the proper terminals to energize the boiler.

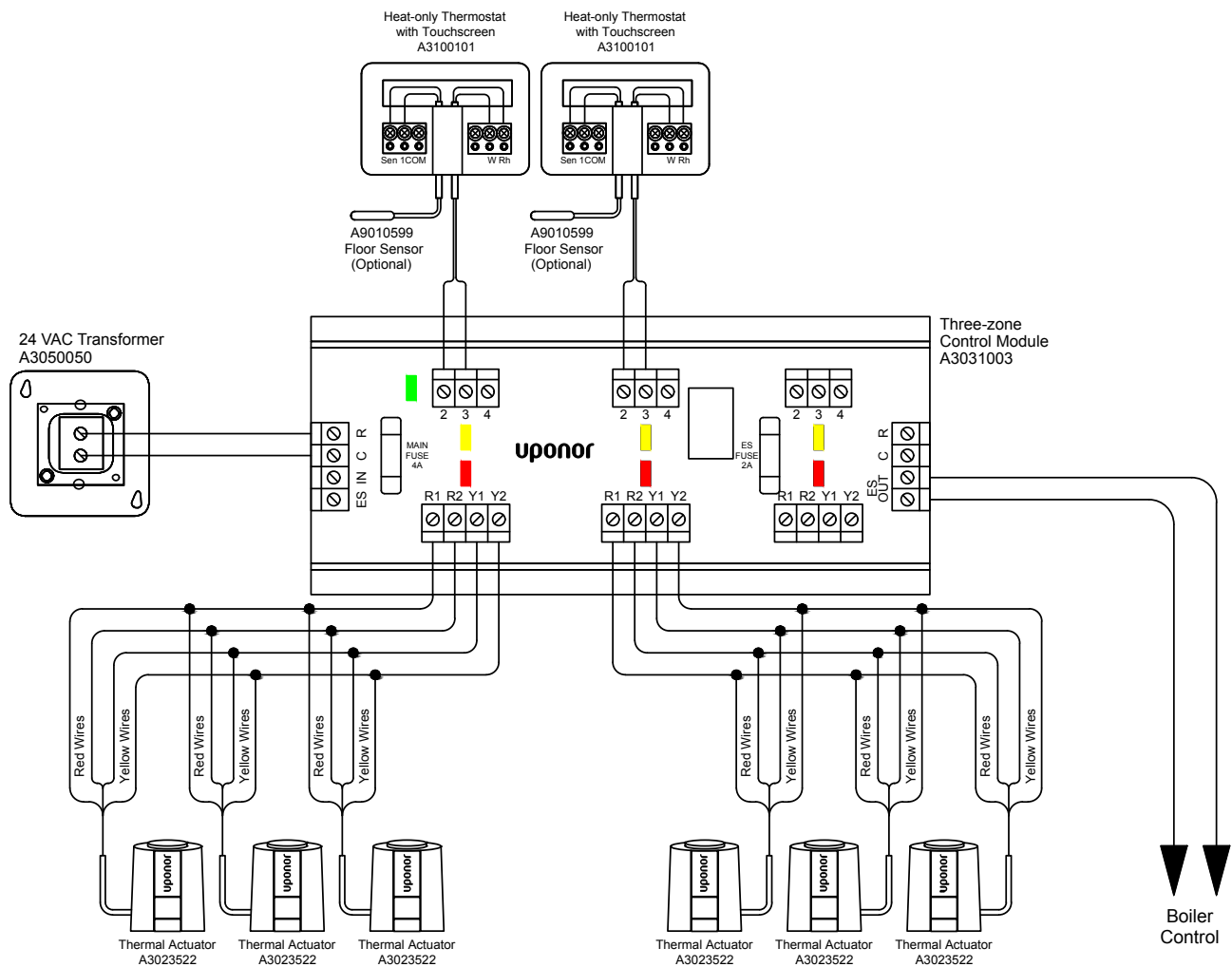


Figure 14-11: Wiring schematic 11

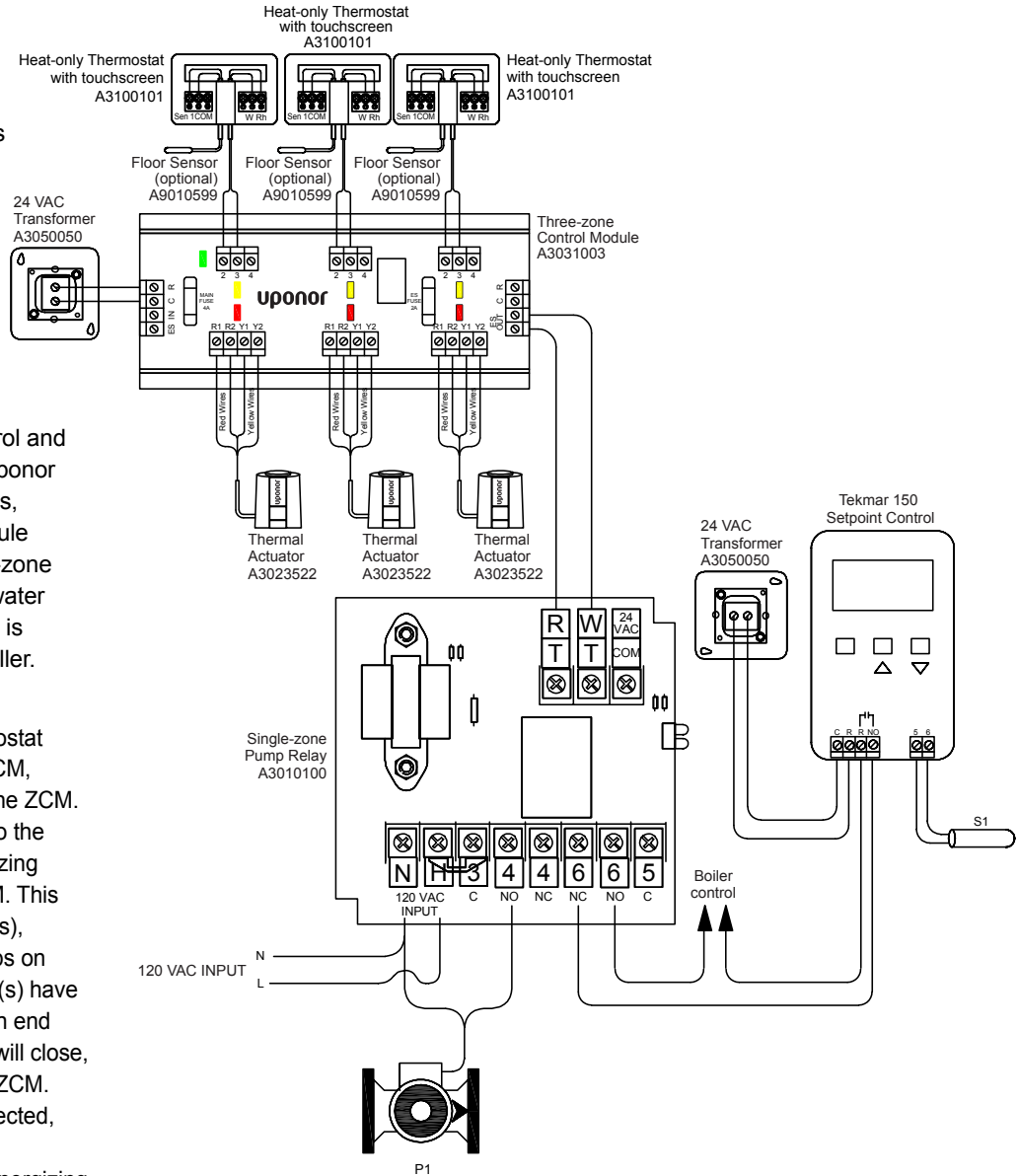
## Wiring schematic 12

- A3030101 Uponor Thermostats
- A3010522 Thermal Actuators
- A3030003/A3030004 Zone Control Module (ZCM)
- A3010100 Single-zone Pump Relay
- A3050050 50 VA Transformer
- Setpoint controller

**Overview:** Multiple zone control and circulator control (P1) using Uponor Thermostats, Uponor Actuators, the Uponor Zone Control Module (ZCM) and the Uponor Single-zone Pump Relay. Radiant supply water temperature and boiler enable is controlled by a setpoint controller.

**Sequence of operation:** On a call for heat, the Uponor Thermostat sends a signal to the Uponor ZCM, illuminating the yellow light on the ZCM. This call for heat sends power to the actuator(s) for that zone, energizing the Y1-Y2 terminals on the ZCM. This activates or opens the actuator(s), allowing flow through these loops on the manifold. Once the actuator(s) have opened to a minimal position, an end switch inside of the actuator(s) will close, illuminating the red light on the ZCM. When end switch closure is detected, a contact will close between the ES-ES terminals on the ZCM, energizing the Uponor Single-zone Pump Relay. Following this control procedure will eliminate any “dead-head” circulator conditions for the radiant circulator (P1). The actuators must be open before the circulator will operate.

The ES terminals are considered “dry contacts.” This means any wiring connected to these terminals is unpowered and will require an auxiliary power source. In this schematic, power is applied to the ES terminals by the R/T, G/T terminals on the Uponor Single-zone Pump Relay from an internal transformer. When the circuit is completed between the relay and the ZCM, a coil in the relay is energized, closing the contacts to start the circulator and, in this illustration, fire the



**Figure 14-12: Wiring schematic 12**

boiler. Again, the contact 5 and 6NO on the Uponor Single-zone Pump Relay are dry contacts and require an additional power supply. In most instances, power is supplied to these contacts from a transformer within the boiler control off the T-T or R-G terminals. Consult the heating equipment manufacturer’s wiring schematics for the proper terminals to energize the boiler.

The setpoint controller is added in series to the wiring between the Uponor Single-zone Pump Relay and the boiler control. The setpoint controller is used to control the radiant supply water temperature, possibly through a heat exchanger.

For example, if the setpoint controller is set for 120°F and the sensor (S1) is reading a temperature below the setpoint, the contacts 3 and 4 are closed and the boiler is allowed to fire. If the temperature being read on sensor S1 is higher than the desired temperature, the contacts between 3 and 4 are open and the boiler does not fire. The zones open, and the radiant circulator (P1) operates, but it is not necessary to fire the boiler and add heat when the proper supply water temperature is being delivered. Consult the boiler manufacturer’s wiring schematics for the proper terminals to energize the boiler.

## Wiring schematic 13

- A310101 Uponor Thermostats
- A3023522 Thermal Actuators
- A3031003/A3031004 Zone Control Modules (ZCM)
- A3050050 50VA Transformer
- A3040075 / A3040100 Three-way Mixing Valve

**Overview:** Multiple zone control and boiler enable using Uponor Thermostats, Uponor Actuators, the Uponor Zone Control Module (ZCM), the Uponor Transformer and the Uponor Three-way Mixing Valve to control the radiant supply water temperature.

**Sequence of operation:** On a call for heat, the Uponor Thermostat sends a signal to the ZCM, illuminating the yellow light for that specific zone. This call for heat sends power to the actuator(s) for that zone, energizing the Y1-Y2 terminals on the ZCM. This activates or opens the actuator(s), allowing flow through these loops on the manifold. Once the actuator(s) have opened to a minimal position, an end switch inside the actuator(s) will close, illuminating the red light on the ZCM. When the end switch closure is detected, the contacts between ES-ES terminals will close, energizing the Uponor Single-zone Pump Relay. Following this control procedure will eliminate any “dead-head” circulator conditions for the radiant circulator (P1). The actuators must be open before the circulator will operate.

Power is supplied to the Three-way Mixing Valve from the power supply on the Uponor Single-zone Pump Relay, using the R and COM terminals. Note that the Three-way Mixing Valve does not require wiring for a call for heat, only power. This valve will automatically adjust itself to deliver the correct water temperature based on the user set-up information and the current outdoor and supply water temperature. This valve will open and close, mixing the return water from the radiant loops along with the boiler supply water to achieve the correct temperature based on the supply sensor.

The ES terminals are considered “dry” contacts”. This means any wiring connected to these terminals will require an auxiliary power source. In this schematic, power is applied to the ES terminals by the R and W terminals on the Uponor Single-zone Pump Relay from an internal transformer. Then, the circuit is completed between the relay and the ZCM, energizing a coil in the relay and closing the contacts to start the circulator (P1) and the boiler. Again, contacts 5 and 6NO on the Uponor Single-zone Pump Relay are dry contacts and require an additional power supply. In most instances, power is supplied to these contacts from a transformer within the boiler control. Consult the heating equipment manufacturer’s wiring schematic for the proper terminals to energize the boiler.

**See wiring schematic 13 on page 164.**

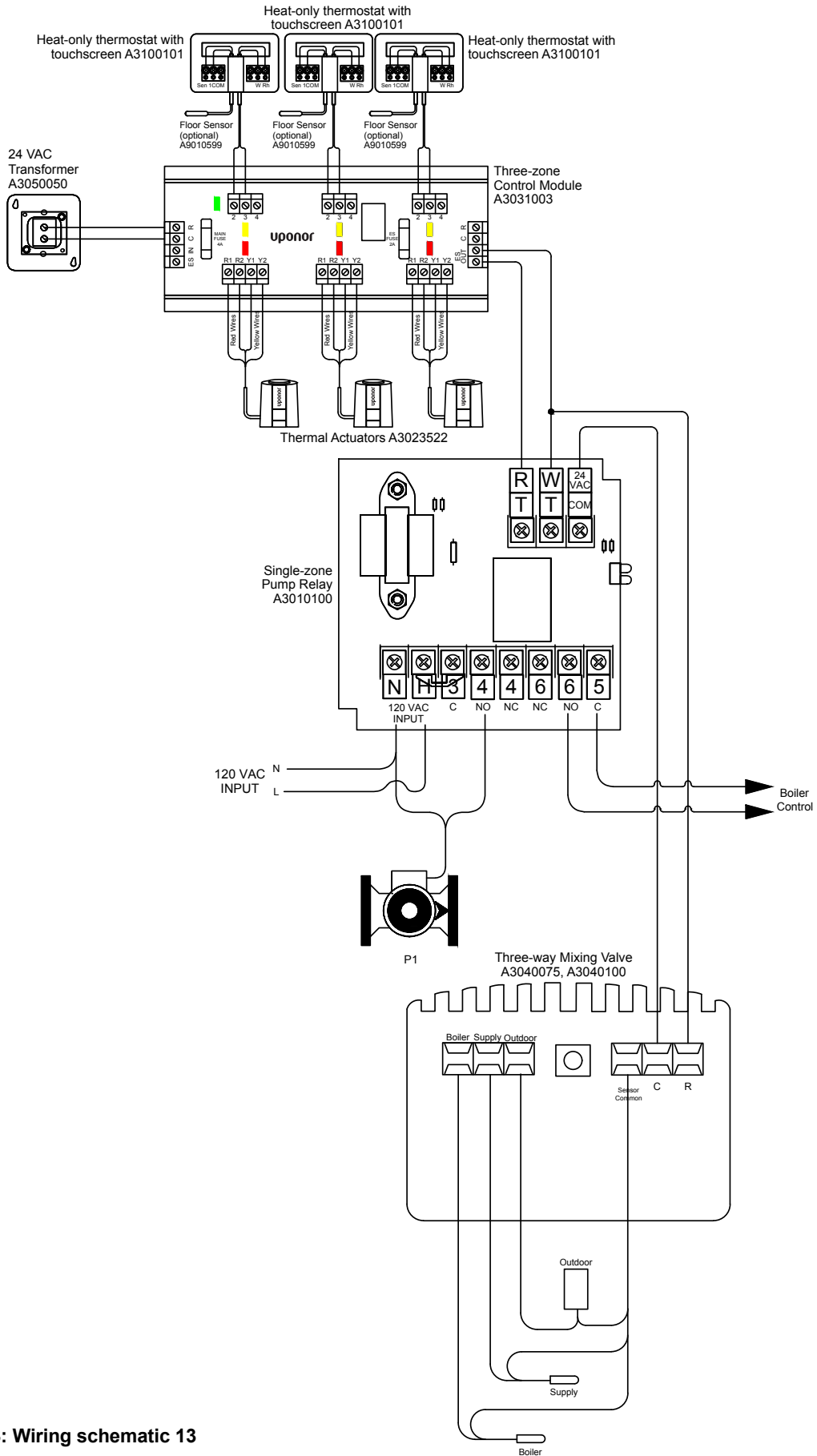


Figure 14-13: Wiring schematic 13

## Wiring schematic 14

- A310101 Uponor Thermostats
- A3023522 Thermal Actuators
- A3031003/A3031004 Zone Control Modules (ZCM)
- A3050050 50VA Transformer
- Third-party mixing controls

**Overview:** Multiple zone control and boiler enable using Uponor Thermostats, Uponor Actuators, the Uponor Zone Control Module (ZCM), the Uponor Transformer and third-party mixing controls to control multiple radiant supply water temperatures using injection pumps.

**Sequence of operation:** On a call for heat, the Uponor Thermostat sends a signal to the ZCM, illuminating the yellow light for that specific zone. This call for heat sends power to the actuator(s) for that zone, energizing the Y1-Y2 terminals on the ZCM. This activates or opens the actuator(s), allowing flow through these loops on the manifold. Once the actuator(s) have opened to a minimal position, an end switch inside the actuator(s) will close, illuminating the red light on the ZCM. When the end switch closure is detected, the contacts between ES-ES terminals will close, energizing the appropriate third-party mixing control. Following this control procedure will eliminate any “dead-head” circulator conditions for the radiant circulators (SP1/SP2). The actuators must be open before the circulator will operate.

The ES terminals are considered “dry” contacts. This means any wiring connected to these terminals will require an auxiliary power source. In this schematic, there is a generic reference to a third-party mixing control.

**Important:** Consult the manufacturer’s wiring schematic for that control to verify if an external transformer will be required. When a heat demand occurs on either control, the secondary pumps (SP1/SP2) will run continuously until the heat demand has ended. At the same time, the injection pumps (IP1/IP2) will become active. These will automatically adjust to deliver the correct water

temperature based on the user set-up information and the current outdoor and supply water temperature.

Typically, the boiler connection on these controls are considered “dry” contacts. This means any wiring connected to these terminals is unpowered and will require an auxiliary power source. In most instances, power is supplied to these contacts from a transformer within the boiler control. Consult the heating equipment manufacturer’s wiring schematic for the proper terminals to energize the boiler.

**See wiring schematic 14 on page 166.**

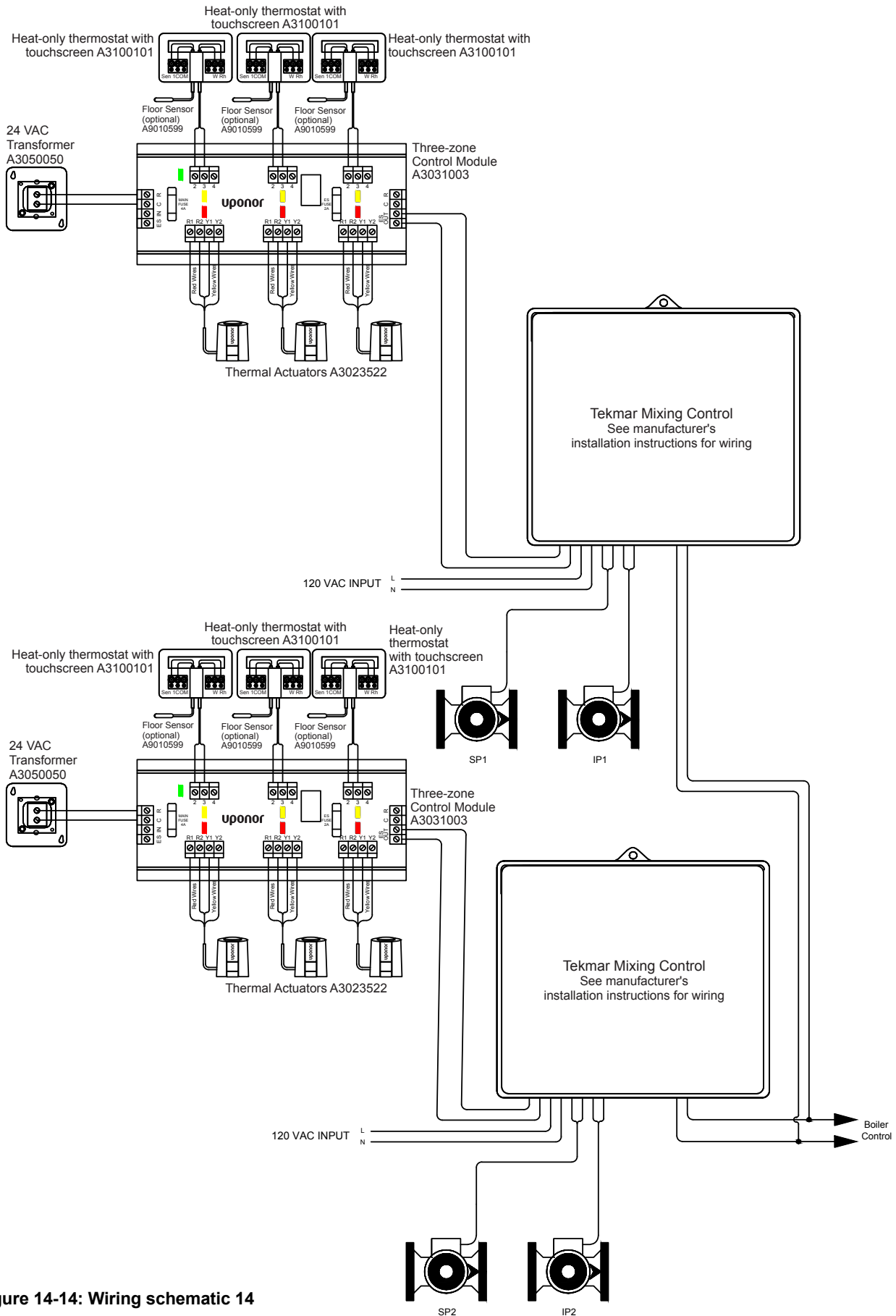


Figure 14-14: Wiring schematic 14

## Wiring schematic 15

- A310101 Uponor Thermostats
- A3023522 Thermal Actuators
- A3031003/A3031004 Zone Control Modules (ZCM)
- A3050050 50VA Transformer
- A3040075 / A3040100 Three-way Mixing Valve
- A3010100 Single-pump Relay
- Taco SR-504 Multiple-pump Relay

**Overview:** Multiple zone control and boiler enable using Uponor Thermostats, Uponor Actuators, the Uponor Zone Control Module (ZCM), the Uponor Transformer, the Uponor Transformer, the Uponor Three-way Mixing Valve and relays to control multiple radiant supply water temperatures, high temperature baseboard and domestic hot water (DHW).

**Sequence of operation:** On a call for heat, the Uponor Thermostat sends a signal to the ZCM, illuminating the yellow light for that specific zone. This call for heat sends power to the actuator(s) for that zone, energizing the Y1-Y2 terminals on the ZCM. This activates or opens the actuators(s), allowing flow through these loops on the manifold. Once the actuator(s) have opened to a minimal position, an end switch inside the actuator(s) will close illuminating the red light on the ZCM. When the end switch closure is detected, the contacts between ES-ES terminals will close, energizing the pump wired to the Taco relay panel. Following this control procedure will eliminate any “dead-head” circulator conditions for the radiant circulators (P2/P3). The actuators must be open before the circulator will operate.

The single thermostat for the high temperature baseboard is directly connected to the pump relay panel. A call for heat will activate P4 and circulate continuously until the need for heating has ended. Heating calls from ZCMs or the single thermostat will all activate the primary pump (P1) and will run continuously until all heating calls have ended, unless there is a heating

need for the domestic hot-water tank. There is an aquastat that measures the tank temperature. Once that falls below the differential, the aquastat will close and energize the DHW pump and turn the other pumps (P1, P2, P3) off to “prioritize” the hot-water demand. The primary pump (P1) will continue to run. Once the domestic hot water call is satisfied, the other pumps will return to normal operation, providing the heating demand still exists.

Power is supplied to the Three-way Mixing Valve from an external transformer. Note that the Three-way Mixing Valve does not require wiring for a call for heat, only power. This valve will automatically adjust itself to deliver the correct water temperature based on the user set-up information and the current outdoor and supply water temperature. This valve will open and close, mixing the return water from the radiant along with the boiler supply water to achieve the correct temperature based on the supply sensor.

Typically, the boiler connection on these controls are considered dry contacts. This means any wiring connected to these terminals is unpowered and will require an auxiliary power source. In most instances, power is supplied to these contacts from a transformer within the boiler control. Consult the heating equipment manufacturer’s wiring schematic for the proper terminals to energize the boiler.

**See wiring schematic 15 on page 168.**

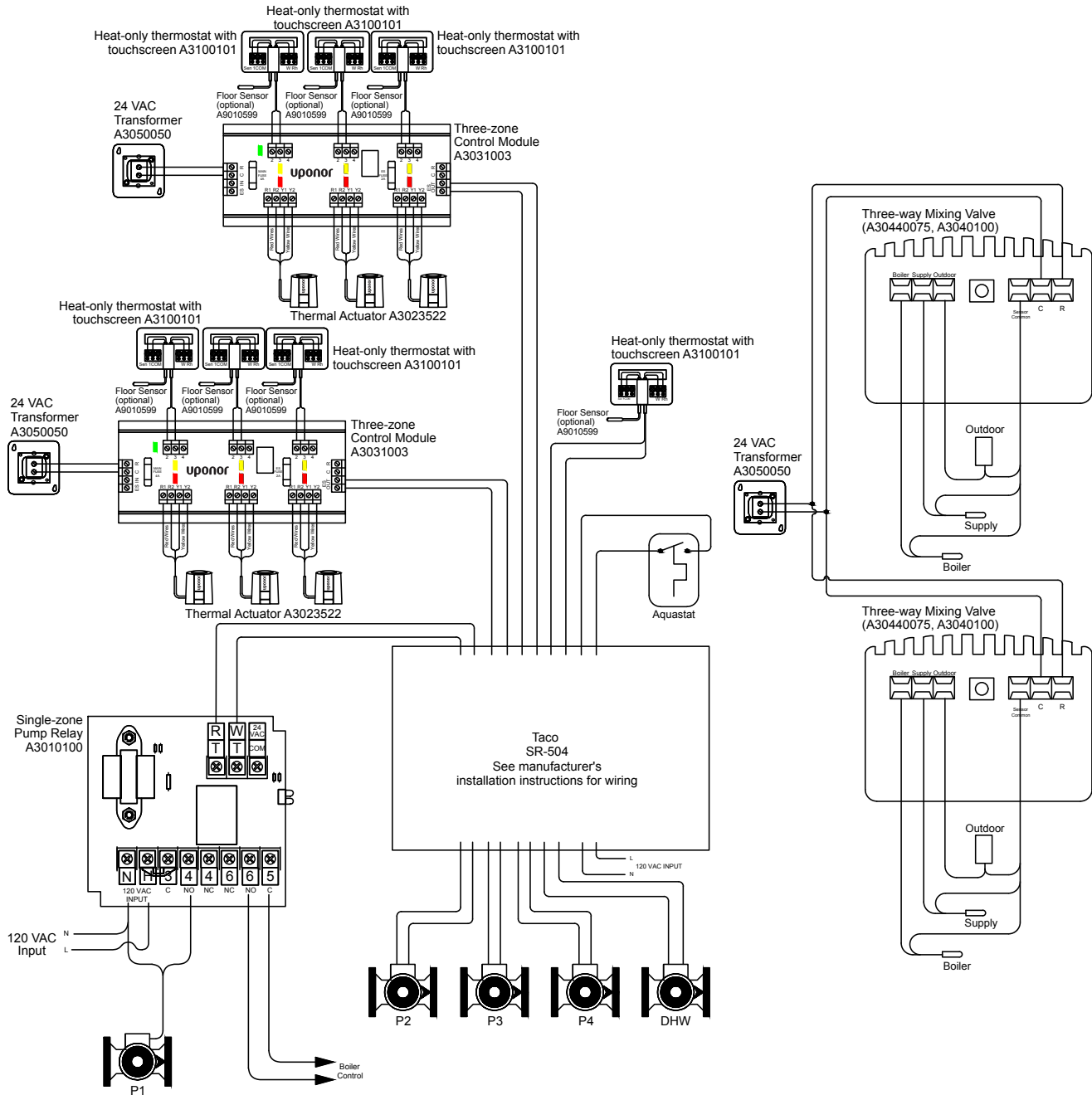


Figure 14-15: Wiring schematic 15