



# SetPoint 150 Controller Installation Manual



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**Uponor**

**SetPoint 150 Controller**

Installation Manual is published by

Uponor Wirsbo, Inc.

5925 148th Street West

Apple Valley, MN 55124

Phone: (952) 891-2000

Fax: (952) 891-1409

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

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**Figure 1: SetPoint 150 Controller**

**Introduction**

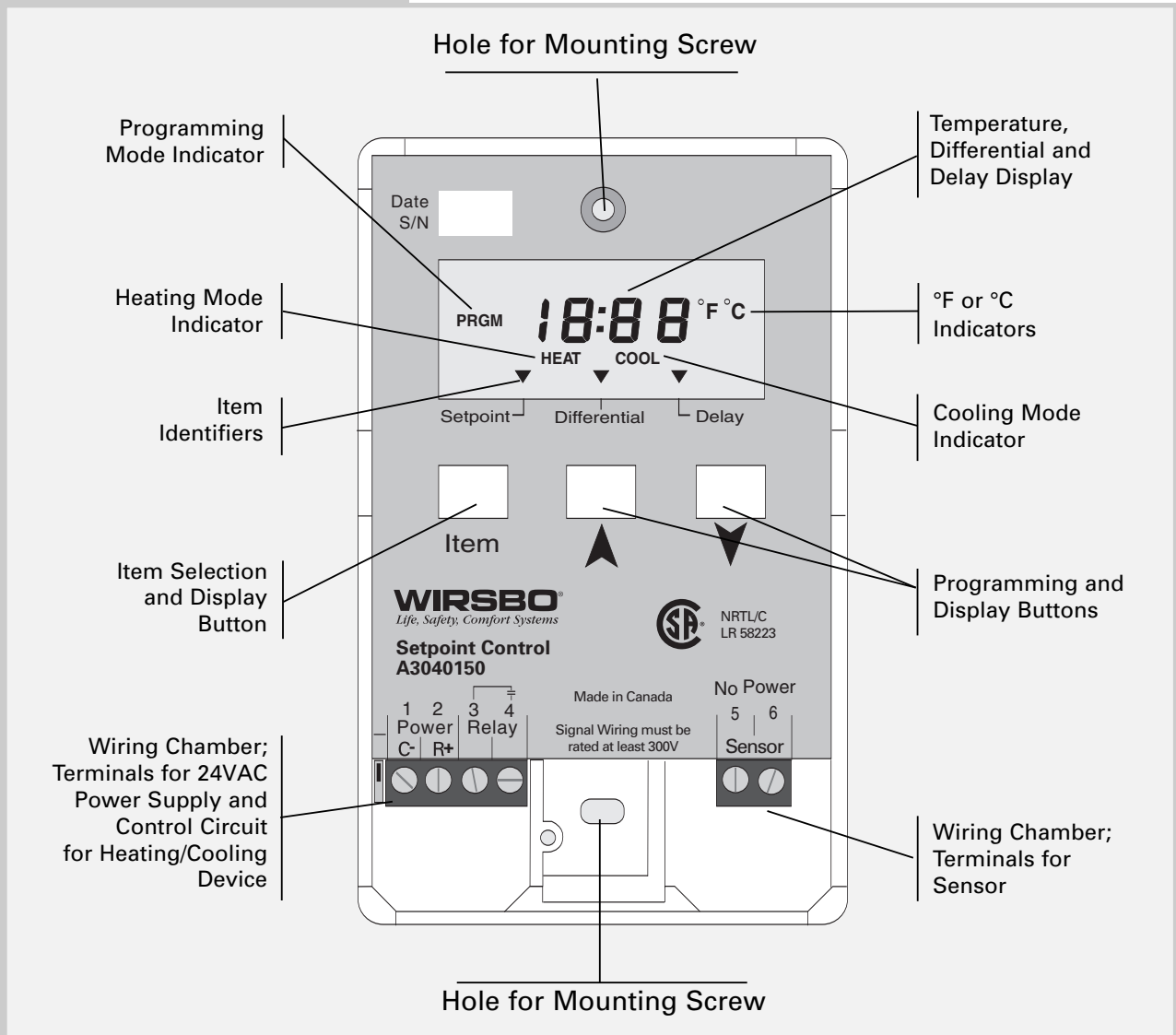
The Uponor Wirsbo SetPoint 150 Controller is a microprocessor-based control that can be programmed to maintain a fixed setpoint temperature by cycling a heating or cooling device.

This reliable and versatile controller features a wide setpoint range and an adjustable differential and time delay for several applications. A digital liquid crystal display (LCD) window shows the actual setpoint and sensor temperatures as well as other programmed settings. (See **Figure 1.**)

A Universal Sensor (A3060071) is supplied with the SetPoint 150 Controller. The wire to the sensor can be extended up to 500 feet (150m) with standard 18 AWG low-voltage wire. The display indicates a sensor fault when the sensor is open or has a short circuit.

**SetPoint 150 Controller Elements**

Refer to **Figure 2** for an explanation of all the elements on the SetPoint 150 Controller.



**Figure 2: SetPoint 150 Controller Elements**

## Installation

### Inventory

Check the contents of this package. If any contents listed below are missing or damaged, please contact your Uponor Wirsbo sales representative or distributor for assistance.

- One SetPoint 150 Controller (A3040150)
- One Universal Sensor (A3060071)
- One SetPoint 150 Controller Installation Manual

**Note:** Carefully read the Sequence of Operation section in this manual to ensure you have chosen the proper controller, and you understand its functions within the operational requirements of your system.

### Mounting the SetPoint 150 Controller

Follow the steps below to mount the controller.

1. Grasp the front cover by the fingertip grips on the top and bottom of the enclosure and pull the front cover off.
2. Remove the wiring cover screw.
3. Use #6 screws to mount the enclosure flush onto a wall or onto a 2x4 electrical box.
4. Wire the controller through the back or bottom of the enclosure into the wiring chamber.
5. Reassemble the enclosure by first replacing the wiring chamber cover and then pushing the front cover onto the enclosure until it snaps into place.

### Rough-in Wiring

All electrical wiring terminates in the two wiring chambers at the bottom front of the controller. If the controller is mounted on an electrical box, rough-in the wiring at the electrical box prior to installing the controller. Uponor Wirsbo recommends standard 18 AWG solid wire for all low-voltage wiring to this controller.



**Caution:** Do not apply power to any of the wires during this rough-in wiring stage.

1. Install the Universal Sensor and run the wiring back to the controller, but do not connect it.
2. Install a 24VAC Class II transformer with a minimum 5 VA rating close to the controller and run the wiring from the transformer to the controller. A Class II transformer must be used. Do not connect any of the transformer terminals to the ground.
3. Install the wiring from the heating or cooling device control circuit to the controller.



**Caution:** Improper installation and operation of the SetPoint 150 Controller could result in damage to equipment or possibly even personal injury. Please ensure the controller is installed according to all applicable safety codes and standards.

## Connecting the Wiring



**Caution:** Only properly trained and experienced technicians should perform these tests using standard testing practices and procedures. A good quality multimeter, capable of reading from at least 0 to 200VAC, and at least 0 to 2,000,000 Ohms, is essential to properly test this controller. Ensure voltages in excess of 28VAC are not present in any of the wires connected to this controller.

### Testing the Sensor

1. Measure the temperature using a thermometer, and then measure the resistance of the sensor at the controller.

**Note:** Do not connect the wires from the sensor to the controller while performing the test.

2. Using **Table 4** below, estimate the temperature measured by the sensor. The sensor and thermometer readings should be close. If the multimeter reads a very high resistance, this may indicate a broken wire, a poor wiring connection or a defective sensor. If the resistance is very low, this may indicate a wiring short, moisture in the sensor or a defective sensor. To test for a defective sensor, measure the resistance directly at the sensor location.

Temperature		Resistance	Temperature		Resistance	Temperature		Resistance	Temperature		Resistance
°F	°C	Ω	°F	°C	Ω	°F	°C	Ω	°F	°C	Ω
-50	-46	506,000	20	-7	47,100	90	32	7,400	160	71	1,700
-40	-40	337,000	30	-1	34,400	100	38	5,780	170	77	1,390
-30	-34	228,000	40	4	26,700	110	43	4,730	180	82	1,180
-20	-29	166,000	50	10	19,900	120	49	3,740	190	88	977
-10	-23	116,000	60	16	15,000	130	54	3,100	200	93	838
0	-18	86,500	70	21	11,900	140	60	2,490	210	99	701
10	-12	61,700	80	27	9,170	150	66	2,010	220	104	606

**Table 4: Temperature and Resistance**

### Testing the Power Supply

1. Ensure the wires from the power supply transformer are not touching each other, any other wires or the ground.
2. Turn on the power and use an AC voltmeter to measure between 20 and 28VAC at the secondary side of the transformer.
3. Turn off the power and complete the electrical connections to the terminal strip of the controller.

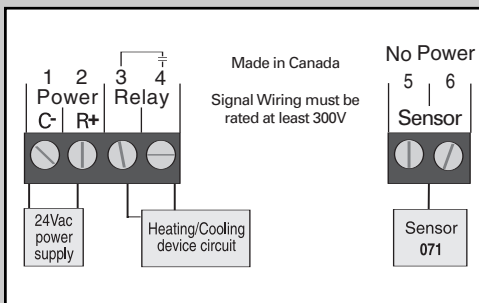
## Electrical Connections

### Power and Output Connections (See Figure 5.)



**Caution:** Maximum 24VAC

1. Connect the transformer to terminals 1 and 2 (C- and R+).
2. Connect the heating and cooling device circuit to the appropriate terminals:
  - Terminals 3 and 4 are normally open (N/O) and close when the relay turns on.



**Figure 5: Electrical Connections**

## Sensor Connection



**Caution:** Never apply voltage to these terminals.

1. Connect the Universal Sensor to Terminals 5 and 6.

## Sequence of Operation

### On/Off + Differential

Guidelines for programming the On/Off + Differential are stated below. (See **Figure 6**.)

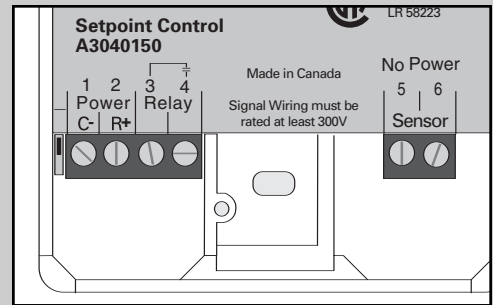
**Differential:** Setting the differential on any controller depends entirely on the actual operating characteristics of the heating or cooling equipment in each specific application. Set the differential settings as small as possible for greatest accuracy, but take care to avoid short cycling of the equipment. Experience, plus trial and error during actual operating conditions, is typically the way most installers determine the correct differential setting.

**Delay:** Setting the time delay also depends on the actual operating characteristics of the heating or cooling equipment in a specific application. With some equipment, time delays are unnecessary and the delay setting can be set to zero. Other types of equipment depend on a fixed off delay to prevent damage to equipment components, particularly in the case of certain types of refrigeration equipment. Consult the manufacturer's operating and installation instructions for advice on recommended time delays.

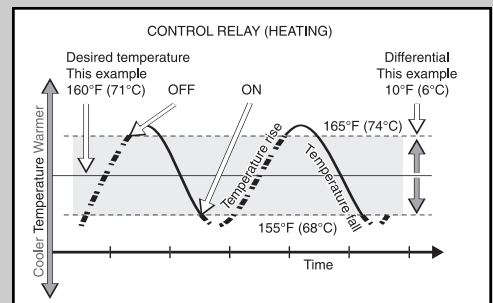
### Sequence of Operation — On/Off Mode

When the controller is programmed for heat in this mode, the relay is turned on and HEAT appears on the display when the sensor temperature is half the differential setting below the setpoint and the delay has timed out. When the sensor temperature rises half the differential setting above the setpoint, the relay turns off. HEAT disappears from the display, and the delay starts to time out. During the time-out period, the Delay pointer flashes if heating is needed. (See **Figure 7**.)

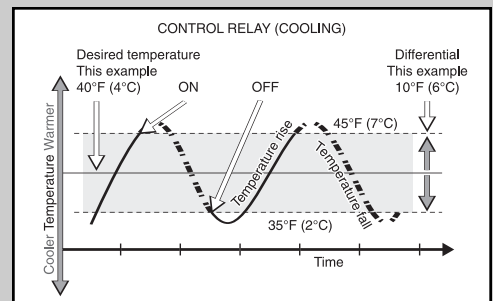
When the controller is programmed for cooling in this mode, the relay is turned on and COOL appears on the display when the sensor temperature is half the differential setting above the setpoint and the delay has timed out. When the sensor temperature drops half the differential setting below the setpoint, the relay turns off. COOL disappears from the display, and the delay starts to time out. During the time-out period, the Delay pointer flashes if cooling is needed. (See **Figure 8**.)



**Figure 6**



**Figure 7**



**Figure 8**

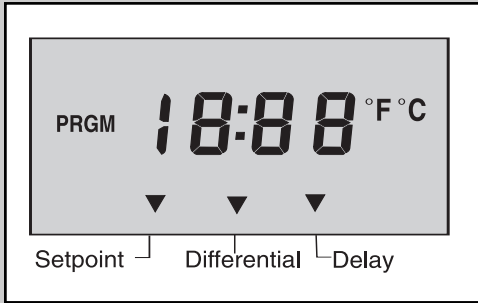


Figure 9

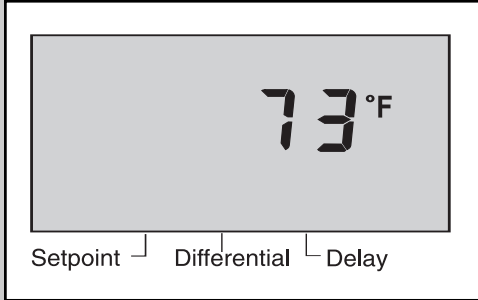


Figure 10

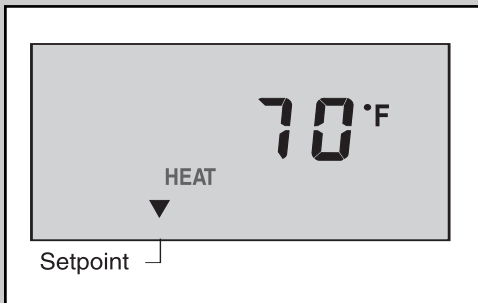


Figure 11

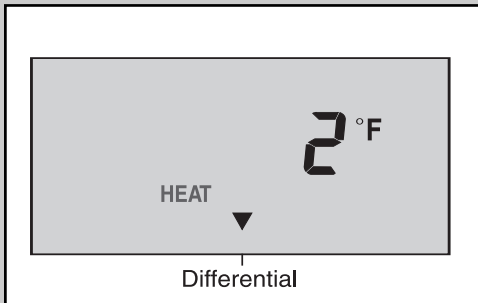


Figure 12

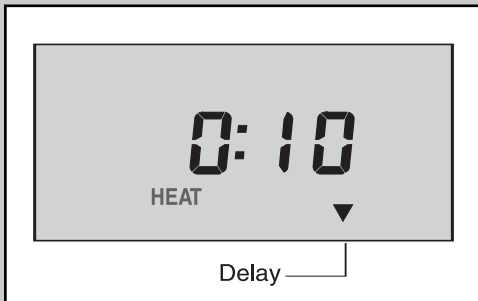


Figure 13

## Programming

### Digital Display

The digital display on the SetPoint 150 Controller has the following features.

- Displays the actual sensor temperature.
- Allows the user to view and program the various controller settings.
- Displays HEAT when the relay closes to operate a heat source and displays COOL when the relay closes to operate a cooling device.
- Displays Err when the sensor is open or has a short circuit.

### Power On

When the controller is powered up, the digital display shows all the display elements. (See **Figure 9.**)

### Operating Mode

After approximately five seconds, the controller automatically goes into operating mode. The controller monitors the temperature at the sensor and displays it in the digital display. (See **Figure 10.**)

**Note:** The control automatically goes back to operating mode when the buttons are left untouched for 20 seconds.

### Display Mode

Use the keypad buttons to view the current settings on the controller. Adjustments to the controller's settings cannot be made in the display mode. Refer to the Programming Mode for instructions on changing the control's settings. To view the current settings, do the following.

1. Push and hold the ITEM Button. The programmed heating or cooling setpoint displays. (See **Figure 11.**)
2. Push and hold the UP Arrow Button. The programmed Differential displays. (See **Figure 12.**)
3. Push and hold the DOWN Arrow Button. The programmed Delay length displays. (See **Figure 13.**)



### Programming Mode

Push all three buttons at the same time and PRGM appears in the display. The controller is now in the programming mode. The pointer will flash to Setpoint. Push the UP or DOWN arrow buttons to increase or decrease the setpoint temperature. (See **Figure 14.**)

**Setpoint Range:** -40 to 239°F (-40 to 115°C)

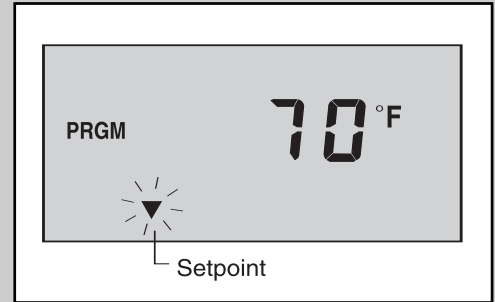
**Note:** Programming settings have a 10-year memory backup.

Pushing the ITEM button again changes the flashing pointer to Differential. Push the UP or DOWN arrow buttons to increase or decrease the differential temperature. (See **Figure 15.**)  
Differential Range: 1 to 40°F (1 to 22°C)

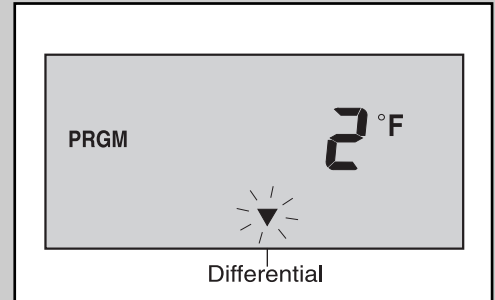
Pushing the ITEM button again changes the flashing pointer to Delay. Push the UP or DOWN arrow buttons to increase or decrease the Delay time. (See **Figure 16.**)  
Time Delay Range: 0 to 19 min. 50 sec.  
(10 second increments)

Pushing the ITEM button again selects the operating mode. Push the UP or DOWN arrow buttons to select between heating or cooling operations. (See **Figure 17.**)  
Operating Mode: Heating or Cooling

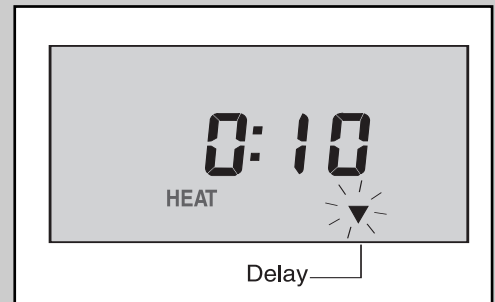
Pushing the ITEM button again selects the temperature scale. Push the UP or DOWN arrow buttons to select either Fahrenheit or Celsius. (See **Figure 18.**)  
Temperature Scale: Fahrenheit or Celsius



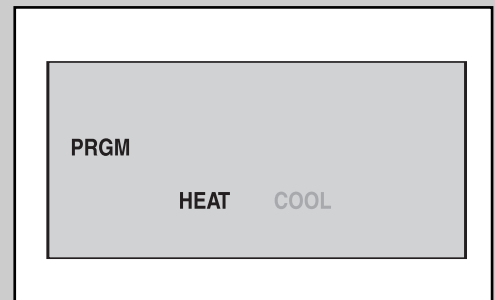
**Figure 14**



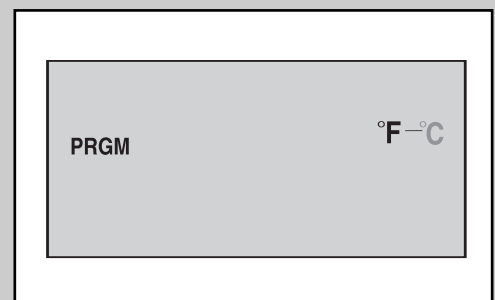
**Figure 15**



**Figure 16**



**Figure 17**



**Figure 18**

## Troubleshooting

Follow the Testing the Wiring procedure on **page 4** of this manual to troubleshoot the controller.

1. If Err displays, the sensor is open, has a short circuit or the sensor temperature is outside the temperature range of the controller. When this fault occurs, the controller turns off its relay.
2. If the controller appears to be operating incorrectly, check that the settings are correct and that the problem is not due to external causes.
3. Ensure all wiring connections are connected properly and the sensor is in the correct location.

### **Before Leaving**

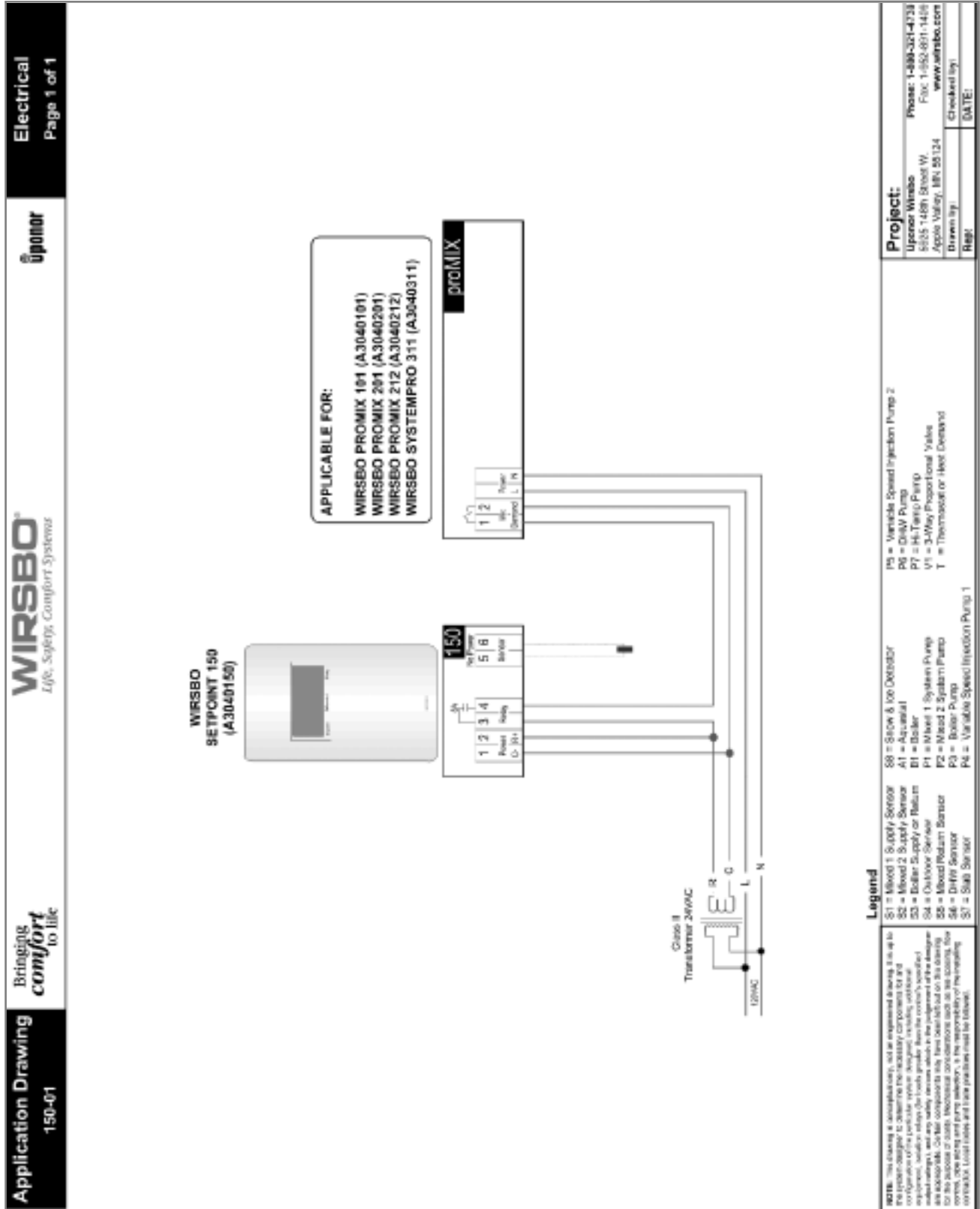
1. Install the wiring cover over the wiring chamber and secure it with the screw provided.
2. Place the front cover on the controller to conceal the setting dials and snap the cover into place.
3. Leave this manual in a conspicuous location near the controller for future reference.
4. Explain the operation of this controller to the end user or anyone else who will operate the system.

## Technical Data

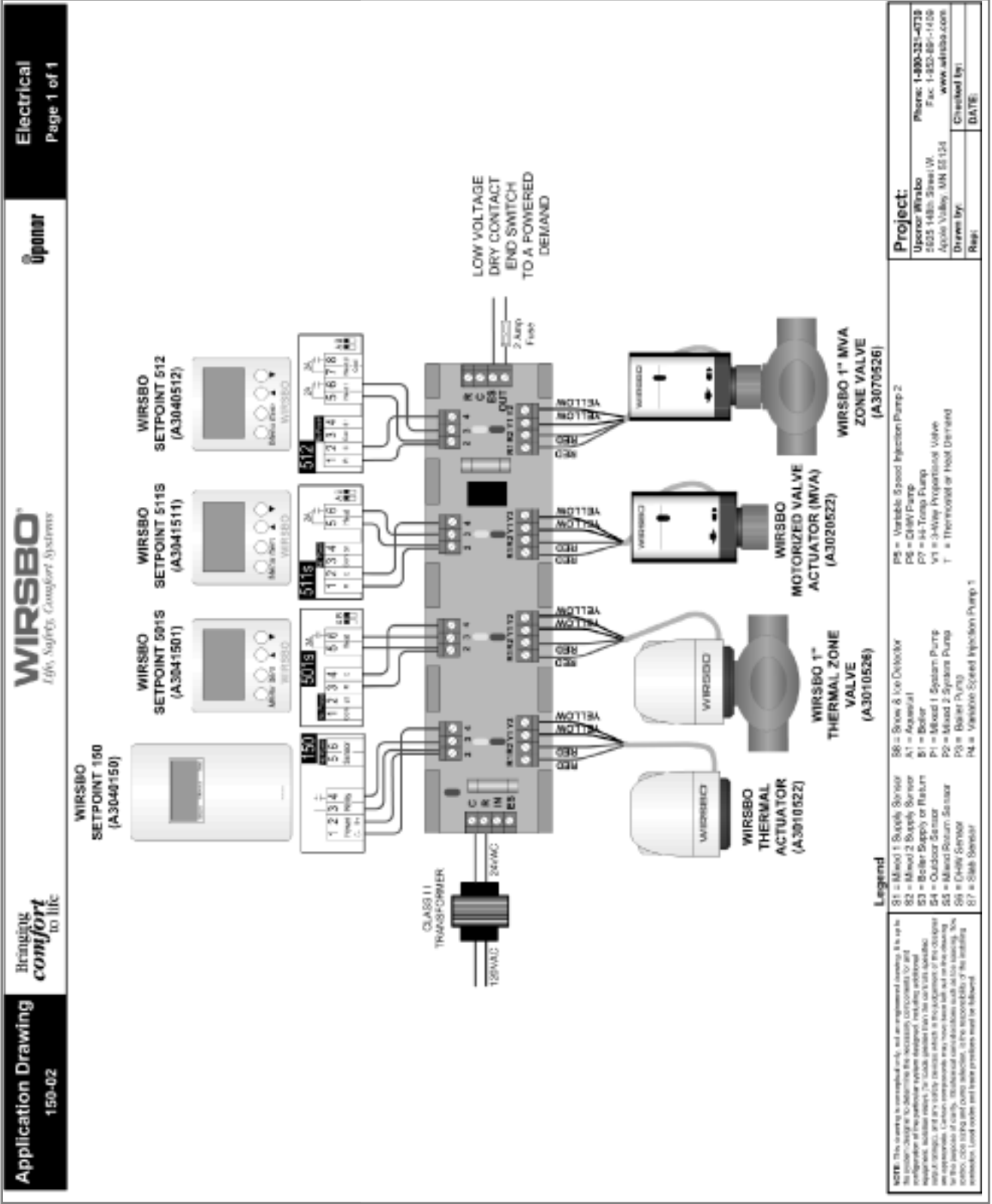
### SetPoint 150 Controller (A3040150)

<b>Literature</b>	SetPoint 150 Controller Installation Manual
<b>Control</b>	Microprocessor P control; This is not a safety (limit) control.
<b>Package Weight</b>	1 lb. (450 g)
<b>Dimensions</b>	4¾" H x 2⅞" W x ⅞" D (120 x 74 x 22mm)
<b>Approvals</b>	Meets DOC and FCC regulations for EMI/RFI
<b>Ambient Conditions</b>	Indoor use only, -20 to 122°F (-30 to 50°C), < 90% RH non-condensing
<b>Power Supply</b>	Class II, 24VAC ±10% 1 VA or 32 VDC ±20% 0.02 A
<b>Relay Rating</b>	120VAC 5AΩ ¼ hp Pilot duty 240VA 2A
<b>Sensor</b>	NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) β=3892
<b>Temperature Display</b>	-85 to 302°F (-65 to 150°C) (150m) of 18 AWG wire to sensors
<b>Programmed Settings</b>	10-year memory backup
<b>Temperature Display</b>	-85 to 302°F (-65 to 150°C)
<b>Setpoint Operation</b>	-40 to 239°F (-40 to 115°C)
<b>Differential</b>	1 to 40°F (1 to 22°C)
<b>Time Delay</b>	0 to 19 min., 50 sec.
<b>Operating Mode</b>	Heating or Cooling
<b>Temperature Display</b>	Fahrenheit or Celsius

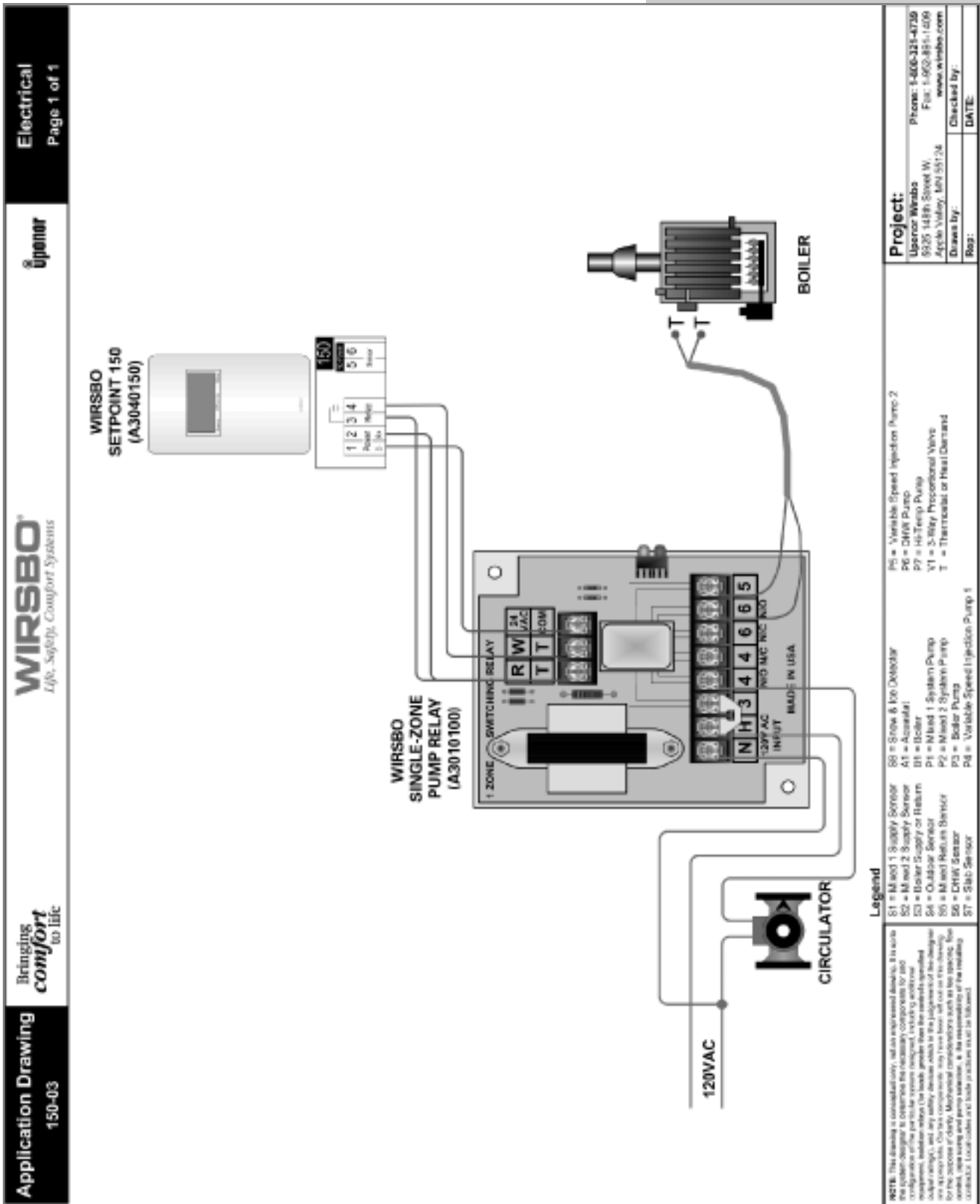
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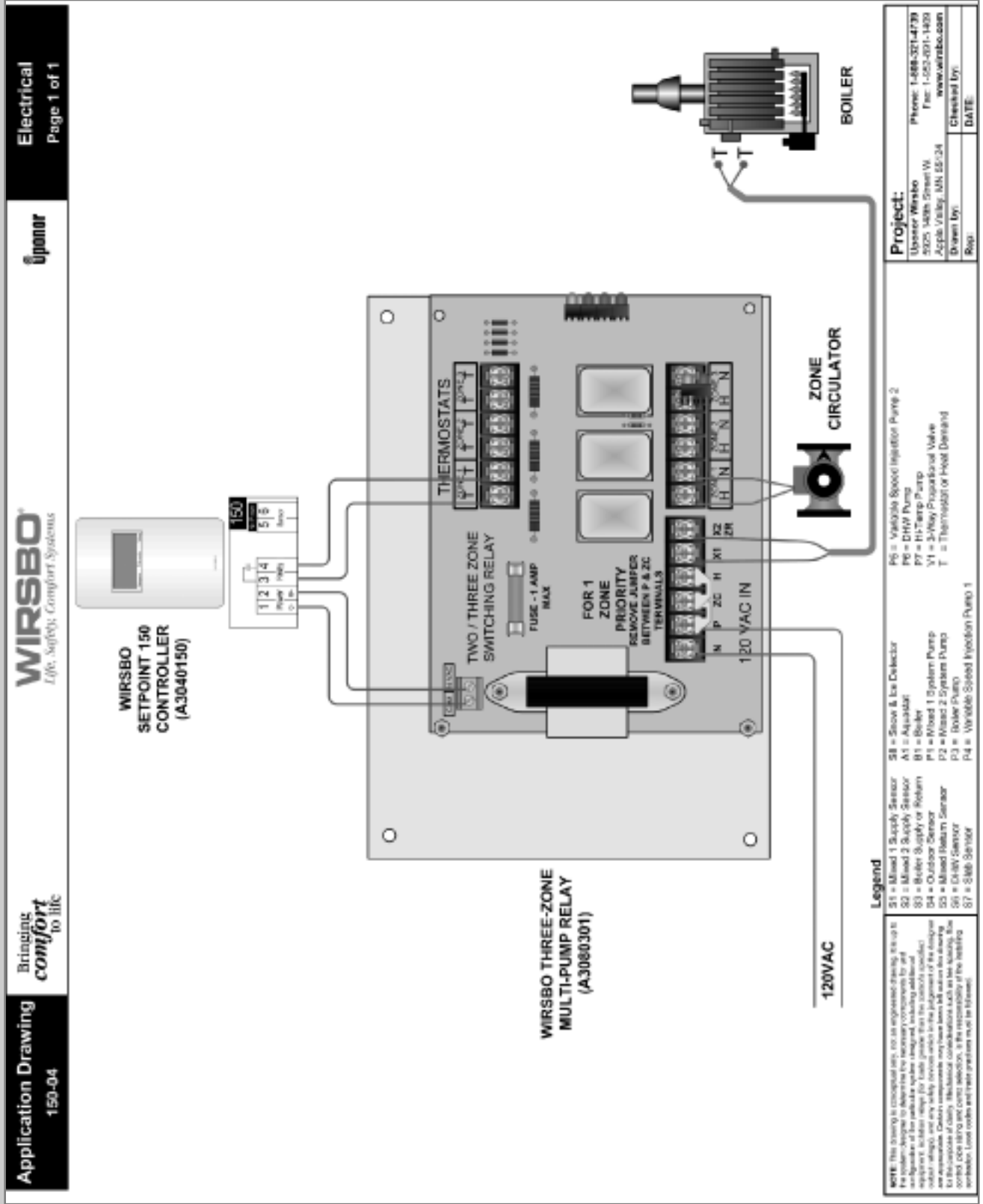
This electrical drawing shows the connections between the SetPoint 150 Controller and respective pro Series controls.



As shown, the SetPoint 150 Controller provides input to the Zone Control Module (ZCM) and operates the associated Motorized Valve Actuators (MVAs) on the corresponding terminal connections. The sensor (S1) can be placed within a concrete slab or strapped to supply or return piping in order to operate a pump (P1) and boiler based on a drop in temperature.



**SetPoint 150 Controller Wired to a Three-zone Multi-pump Relay**



As shown, the SetPoint 150 Controller operates a single pump using a Three-zone Multi-pump Relay (A3080301). The sensors (S1) can be placed within a concrete slab or strapped to piping in order to operate a pump (P1) based on a drop in temperature.











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**Uponor Wirsbo, Inc.**  
5925 148th Street West  
Apple Valley, MN 55124

Tel: (800) 321-4739  
Fax: (952) 891-1409  
[www.wirsbo.com](http://www.wirsbo.com)

