Bell & Gossett
a xylem brand

**INSTRUCTION MANUAL**
210668
REVISION C

# Bell & Gossett® ZoneTrol II™

## Models Z-4B, Z-4M, Z-6B, Z-6M, ZV-4B, ZV-4M, ZV-6B, ZV-6M

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# Installation, Operation and Service Instructions for Outdoor Reset Control

**INSTALLER:** PLEASE LEAVE THIS MANUAL FOR THE OWNER'S USE.

### SAFETY INSTRUCTION

This safety alert symbol will be used in this manual and on the unit safety instructions decal to draw attention to safety related instructions. When used, the safety alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! FAILURE TO FOLLOW THE INSTRUCTIONS MAY RESULT IN A SAFETY HAZARD.**

**NOTICE: This instruction manual is a supplement to, not a replacement for, Bell & Gossett Instruction Manual 210667. If you do not have all manuals necessary for installation, please contact the point of purchase or download the necessary manuals at www.xylem.com/bellgossett.**

## DESCRIPTION

The Bell & Gossett ZoneTrol II zone controller is integrated with an outdoor reset module. By monitoring outdoor temperature and indexing the system supply water to the varying heatloss of the building, the reset controllers minimize fuel consumption while maximizing occupant comfort.

The **Boiler Reset Control** is designed to control a single stage, non modulating heat source in order to provide outdoor reset.

The **Mix Reset Control** is designed to control the supply water temperature to a hydronic system in order to provide outdoor reset or setpoint operation. The control uses a variable speed injection pump to regulate the supply water temperature, while protecting the boiler against flue gas condensation.

**This product can expose you to chemicals including Lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to: www.P65Warnings.ca.gov.**

**Sensors Included**

The Outdoor Temperature Sensor includes a 10 kΩ thermistor which provides an accurate measurement of the outdoor temperature. The sensor is protected by a white U.V. resistant PVC plastic enclosure.

The Water Temperature Sensors have a zinc sleeve for fast response and a wide operating range. The sensors are supplied with 10 inches (250mm) of two conductor wire.

## SENSOR INSTALLATION INSTRUCTIONS

**Outdoor Air Temperature Sensor**

- Remove the screw and pull the front cover off the sensor enclosure.
- The sensor can either be mounted directly onto a wall or a 2" x 4" electrical box.
- When the sensor is wall mounted, the wiring should enter through the back or bottom of the enclosure. Do not mount the sensor with the conduit knockout facing upwards as water could enter the enclosure and damage the sensor.
- In order to prevent heat transmitted through the wall from affecting the sensor reading, it may be necessary to install an insulating barrier behind the enclosure.
- The sensor should be mounted on a wall which best represents the heat load on the building (a northern wall for most buildings and a southern facing wall for buildings with large south facing glass areas). The sensor should not be exposed to heat sources such as ventilation or window openings.

- The sensor should be installed at an elevation above the ground that will prevent accidental damage or tampering.
- Connect 18 AWG or similar wire to the two terminals provided in the enclosure and run the wires from the sensor to the control as shown in Figure 2. Do not run the wires parallel to telephone or power cables. If the sensor wires are located in an area with strong sources of electromagnetic interference (EMI), shielded cable or twisted pair should be used or the wires can be run in a grounded metal conduit. If using shielded cable, the shield wire should be connected to the Com Sen terminal on the control and not to earth ground.
- Replace the front cover of the sensor enclosure.

**Water Temperature Sensor**

- Water temperature sensors should be located as shown in Figures 1 (boiler reset) & 3 (mix reset).
- Sensor wiring is per Figure 2.
- The Water Temperature Sensor can be strapped directly to the pipe using the cable tie provided. Insulation should be placed around the sensor to reduce the effect of air currents on the sensor measurement.
- The Water Temperature Sensor should be placed downstream of a pump or after an elbow or similar fitting. This is especially important if large diameter pipes are used as the thermal stratification within the pipe can result in erroneous sensor readings. Proper sensor location requires that the fluid is thoroughly mixed within the pipe before it reaches the sensor.

## OPERATING SEQUENCE

**Boiler Reset Control**

The Boiler Reset Control operates a single on / off heat source to control the supply water temperature to a hydronic system. The supply water temperature is based on the current outdoor air temperature and the Characterized Heating Curve settings.

**Outdoor Reset:** The controller calculates a supply temperature based on the current outdoor air temperature and the Characterized Heating Curve settings. The burner on the boiler is then cycled to maintain the water temperature required based on the heating curve.

**Warm Weather Shutdown:** When the outdoor air temperature rises above the WWSD setting, the controller turns on the WWSD segment in the display. When the control is in Warm Weather Shut Down, the Boiler Demand pointer is displayed, if there is a demand. However, the control does not operate the heating system to satisfy this demand.

**Mix Reset Control**

The Mix Reset Control uses a variable speed injection pump to control the supply water temperature to a hydronic system. The supply water temperature is based on either the current outdoor temperature, or a fixed setpoint.

**Outdoor Reset:** The controller calculates a mixing supply temperature based on the current outdoor air temperature and the Characterized Heating Curve settings.

**Variable Speed Injection:** circulator is connected to the controller. The controller increases or decreases the power output to a standard wet rotor circulator when there is a mixing demand. The circulator speed varies to maintain the correct mixed supply water temperature at the mix sensor. A visual indication of the current variable speed output is displayed in the LCD in the form of a horizontal bar graph.

**Boiler Protection (BOIL MIN):** The controller is capable of providing boiler protection from cold mixing system return water temperatures. If the boiler sensor temperature is cooler than the BOIL MIN setting while the boiler is firing, the controller reduces the output to the variable speed injection pump. This limits the amount of cool return water to the boiler, and allows the boiler temperature to recover.

**Exercise:** The controller has a built-in exercising function. If the pump has not been operated at least once every 3 days, the control turns on the output for 10 seconds. This minimizes the possibility of the pump seizing during a long period of inactivity.

**Warm Weather Shutdown (WWSD)**

When the outdoor air temperature rises above the WWSD setting, the controller turns on the WWSD segment in the display. When the control is in Warm Weather Shut Down, the Mixing Demand pointer is displayed, if there is a demand. However, the control does not operate the heating system to satisfy this demand.

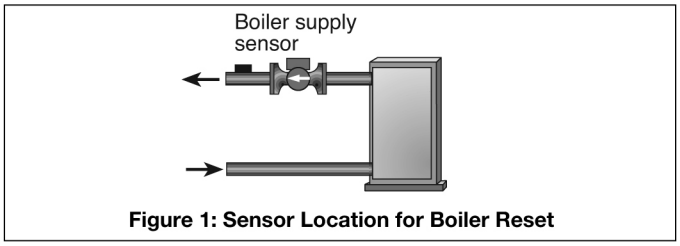



**Figure 1: Sensor Location for Boiler Reset**

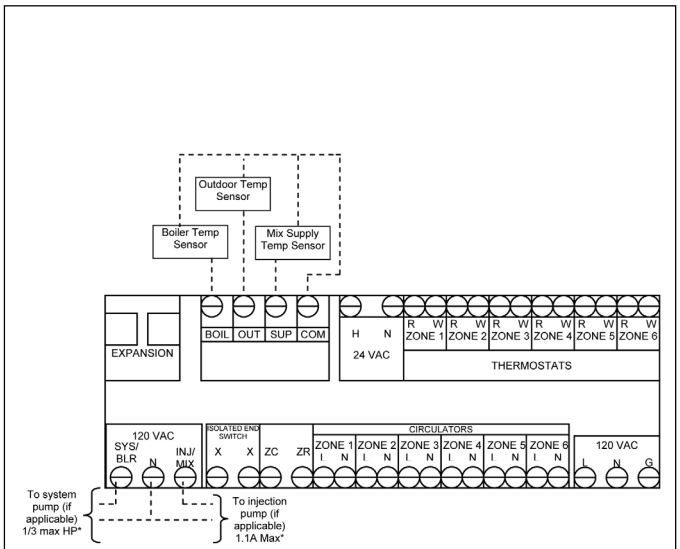



**Figure 2: Sensor and Mix Pump Wiring**

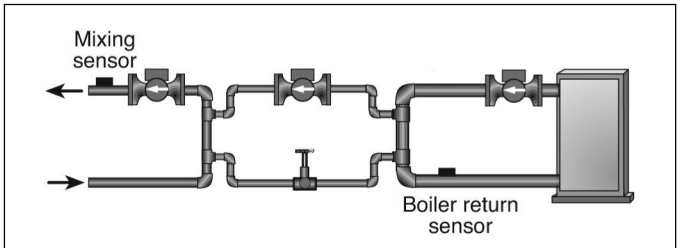
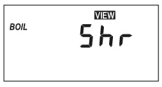
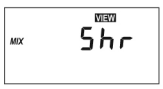



**Figure 3: Pump Terminology and Sensor Location on systems using Mix or Injection Pump**

*Do not exceed the maximum combined load.

## Mix Reset Fault Messages (continued)

| Display | Fault | Notes |
|---|---|---|
|  | OUTDOOR SENSOR OPEN CIRCUIT | The control is no longer able to read the outdoor sensor due to an open circuit. In this case, the control assumes an outdoor temperature of 32°F (0°C) and continues operation. Check wiring between outdoor sensor and control unit. Verify all connections and inspect for broken wire or damaged sensor. To clear the error message from the control after the sensor has been repaired, press the **Item** button |
|  | BOILER SENSOR SHORT CIRCUIT | The control is no longer able to read the boiler sensor due to a short circuit. In this case, if the BOIL MIN adjustment is set to OFF the control does not operate the Boiler contact. If the BOIL MIN adjustment is not set to OFF and a boiler demand is present, the Boiler contact will operate for up to 10 minutes of a 20 minute cycle. Check wiring between outdoor sensor and control unit. Verify all connections and inspect wire insulation and sensor for damage. To clear the error message from the control after the sensor has been repaired, press the **Item** button |
|  | BOILER SENSOR OPEN CIRCUIT | The control is no longer able to read the boiler sensor due to a open circuit. In this case, if the BOIL MIN adjustment is set to OFF, the control does not operate the Boiler contact. If the BOIL MIN adjustment is not set to OFF, and a boiler demand is present, the Boiler contact will operate for up to 10 minutes of a 20 minute cycle. Check wiring between outdoor sensor and control unit. Verify all connections and inspect wire insulation and sensor for damage. To clear the error message from the control after the sensor has been repaired, press the **Item** button |
|  | MIX SENSOR SHORT CIRCUIT | The control is no longer able to read the mixing sensor due to a short circuit. In this case, the control will operate the injection pump at a fized output as long as there is a mixing demand. Check wiring between sensor and control unit. Verify all connections and inspect wire insulation and sensor for damage. To clear the error message from the control after the sensor has been repaired, press the **Item** button |
|  | MIX SENSOR OPEN CIRCUIT | The control is no longer able to read the mixing sensor due to a open circuit. In this case, the control will operate the injection pump at a fized output as long as there is a mixing demand. Check wiring between sensor and control unit. Verify all connections and inspect wire insulation and sensor for damage. To clear the error message from the control after the sensor has been repaired, press the **Item** button |

## Sensor Resistance Chart

| Temperature | | Resistance | Temperature | | Resistance | Temperature | | Resistance | Temperature | | Resistance |
|---|---|---|---|---|---|---|---|---|---|---|---|
| °F | °C | Ω | °F | °C | Ω | °F | °C | Ω | °F | °C | Ω |
| -50 | -46 | 490,813 | 20 | -7 | 46,218 | 90 | 32 | 7,334 | 160 | 71 | 1,689 |
| -45 | -43 | 405,710 | 25 | -4 | 39,913 | 95 | 35 | 6,532 | 165 | 74 | 1,538 |
| -40 | -40 | 336,606 | 30 | -1 | 34,558 | 100 | 38 | 5,828 | 170 | 77 | 1,403 |
| -35 | -37 | 280,279 | 35 | 2 | 29,996 | 105 | 41 | 5,210 | 175 | 79 | 1,281 |
| -30 | -34 | 234,196 | 40 | 4 | 26,099 | 110 | 43 | 4,665 | 180 | 82 | 1,172 |
| -25 | -32 | 196,358 | 45 | 7 | 22,763 | 115 | 46 | 4,184 | 185 | 85 | 1,073 |
| -20 | -29 | 165,180 | 50 | 10 | 19,900 | 120 | 49 | 3,760 | 190 | 88 | 983 |
| -15 | -26 | 139,402 | 55 | 13 | 17,436 | 125 | 52 | 3,383 | 195 | 91 | 903 |
| -10 | -23 | 118,018 | 60 | 16 | 15,311 | 130 | 54 | 3,050 | 200 | 93 | 829 |
| -5 | -21 | 100,221 | 65 | 18 | 13,474 | 135 | 57 | 2,754 | 205 | 96 | 763 |
| 0 | -18 | 85,362 | 70 | 21 | 11,883 | 140 | 60 | 2,490 | 210 | 99 | 703 |
| 5 | -15 | 72,918 | 75 | 24 | 10,501 | 145 | 63 | 2,255 | 215 | 102 | 648 |
| 10 | -12 | 62,465 | 80 | 27 | 9,299 | 150 | 66 | 2,045 | 220 | 104 | 598 |
| 15 | -9 | 53,658 | 85 | 29 | 8,250 | 155 | 68 | 1,857 | 225 | 107 | 553 |

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