



Bell & Gossett® ZoneTrol II™

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

McDonnell & Miller ZoneSmart™

Models ZS-4B, ZS-4M, ZS-6B, ZS-6M,
ZSV-4B, ZSV-4M, ZSV-6B, ZSV-6M

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 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.bellgossett.com.

DESCRIPTION

The outdoor reset modules are integrated into the McDonnell & Miller ZoneSmart or Bell & Gossett ZoneTrol II zone controllers. 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.



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.

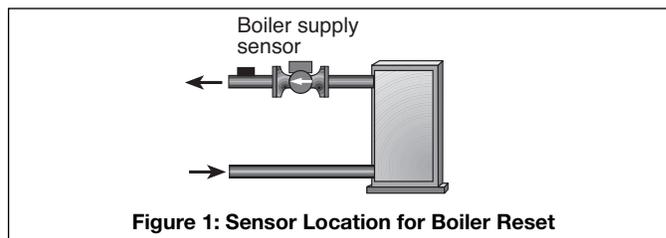


Figure 1: Sensor Location for Boiler Reset

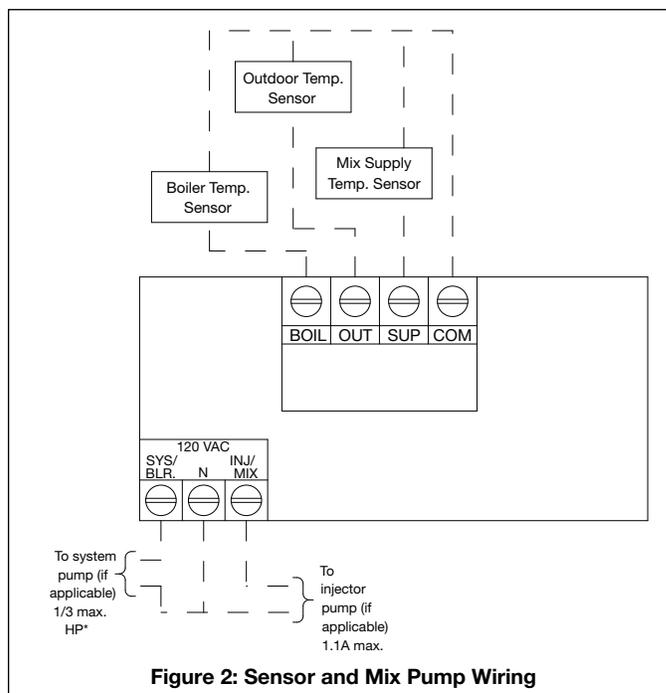


Figure 2: Sensor and Mix Pump Wiring

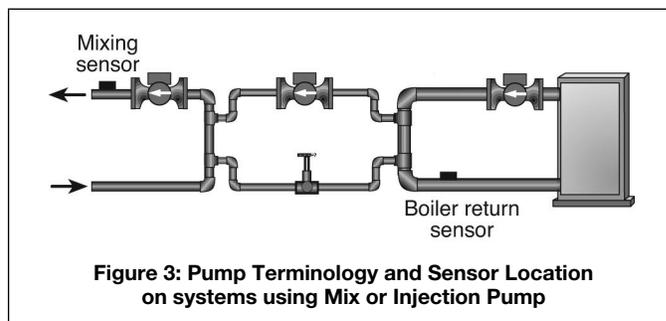
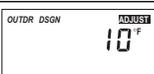
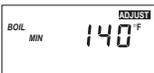
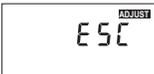


Figure 3: Pump Terminology and Sensor Location on systems using Mix or Injection Pump

*Do not exceed the maximum combined load.

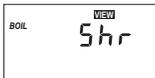
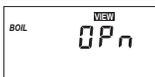
Boiler Reset Control Set-Up Parameters

Display	Parameter	Definition	Range	Notes	Field Setting
	ROOM DESIGN TEMP	The room design temperature used in the original heat loss calculation for the building	35°F to 100°F (1°C to 37°C)	If the original heating system design criteria are unknown, the ROOM DESIGN TEMP should be set to the estimated highest typical (non set-back) thermostat setting	
	OUTDOOR DESIGN TEMP	The outdoor design temperature used in the original heat loss calculation for the building	-60°F to +45°F (-51°C to 7°C)	If the original heating system design criteria are unknown, the OUTDOOR DESIGN TEMP should be set to the estimated lowest expected outdoor temperature based on geographical location	
	BOILER DESIGN TEMP	Supply water temperature required to heat the building when outdoor temperature is equal OUTDOOR DESIGN TEMP	70°F to 210°F (21°C to 93°C)	Recommended Settings High Mass Radiant (e.g., concrete): 120°F (49°C) Low Mass Radiant (e.g., wood floor): 140°F (60°C) Fancoil: 190°F (88°C) Fin Tube Convactor: 180°F (82°C) Radiator: 160°F (71°C) Baseboard: 150°F (66°C)	
	BOILER MINIMUM TEMP	Minimum water temperature to be returned to boiler	OFF 80°F to 180°F (27°C to 82°C)	Recommended Settings Cast iron boiler: 150°F Copper tube boiler: 140°F Condensing boiler: OFF Electric boiler: OFF Note: Refer to boiler installation instructions to determine the minimum allowable return temperature	
	BOILER DIFFERENTIAL TEMP	The range of temperature deviation allowed above and below boiler target temperature	ADJ 2°F to 42°F (1°C to 23°C)	The controller calculates a boiler target temperature based on multiple variables. The BOILER DIFFERENTIAL TEMP is the range around the target temp in which the supply temperature is allowed to float. For example, with a target temperature of 150°F and a BOILER DIFFERENTIAL TEMP of 10°F, the supply temp will vary between 145° and 155°F. Using the Auto Differential (ADJ) setting is recommended for optimum performance	
	WARM WEATHER SHUTDOWN TEMP	Outdoor temperature above which the controller will not activate the boiler	35°F to 100°F (1°C to 37°C) OFF	When the outdoor temperature exceeds the WWSD setting, the controller will not enable the boiler. It is typical to set the WWSD value equal to the ROOM DESIGN TEMP. The OFF setting defeats the WWSD logic	
	ENGLISH/METRIC	Parameters to be displayed in Fahrenheit or Celsius	°F or °C		
	ESCAPE	Exit set up menu	—	To escape the set up menu, press either the ↑ or ↓ key	

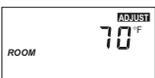
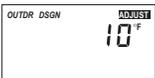
Boiler Reset Controller Display Parameters

Display	Parameter	Notes
	OUTDOOR TEMP	Current outdoor air temperature as measured by the outdoor sensor. This is also the default display for the control
	BOILER TEMP	Current boiler supply water temperature as measured by the boiler sensor
	BOILER TARGET TEMP	Target boiler supply is the temperature the control is currently trying to maintain at the boiler sensor

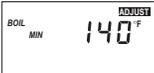
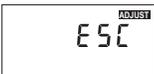
Boiler Reset Controller Fault Messages

Display	Fault	Notes
	EEPROM FAULT	The control was unable to read a piece of information from its EEPROM. This error can be caused by a noisy power source. The control will load the factory defaults and stop operation until all the settings are verified
	OUTDOOR SENSOR SHORT CIRCUIT	The control is no longer able to read the outdoor sensor due to a short 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 wire insulation and sensor for damage. To clear the error message from the control after the sensor has been repaired, press the Item button
	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 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

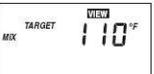
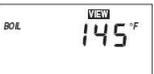
Mix Reset Control Set-Up Parameters

Display	Parameter	Definition	Range	Notes	Field Setting
	ROOM DESIGN TEMP	The room design temperature used in the original heat loss calculation for the building	35°F to 100°F (1°C to 37°C)	If the original heating system design criteria are unknown, the ROOM DESIGN TEMP should be set to the estimated highest typical (non set-back) thermostat setting	
	OUTDOOR DESIGN TEMP	The outdoor design temperature used in the original heat loss calculation for the building	-60°F to +45F (-51°C to 7°C)	If the original heating system design criteria are unknown, the OUTDOOR DESIGN TEMP should be set to the estimated lowest expected outdoor temperature based on geographical location	

Mix Reset Control Set-Up Parameters (continued)

Display	Parameter	Definition	Range	Notes	Field Setting
	MIX DESIGN TEMP	MIX water temperature required to heat the building when outdoor temperature is equal OUTDOOR DESIGN TEMP	70°F to 220°F (21°C to 93°C)	Recommended Settings High Mass Radiant (e.g., concrete): 120°F (49°C) Low Mass Radiant (e.g., wood floor): 140°F (60°C) Fancoil: 190°F (88°C) Fin Tube Convactor: 180°F (82°C) Radiator: 160°F (71°C) Baseboard: 150°F (66°C)	
	BOILER MINIMUM TEMP	Minimum water temperature to be returned to boiler	OFF 80°F to 180°F (27°C to 82°C)	Recommended Settings Cast iron boiler: 150°F Copper tube boiler: 140°F Condensing boiler: OFF Electric boiler: OFF Note: Refer to boiler installation instructions to determine the minimum allowable return temperature	
	WARM WEATHER SHUTDOWN TEMP	Outdoor temperature above which the controller will not activate the boiler	35°F to 100°F (1°C to 37°C) OFF	When the outdoor temperature exceeds the WWSD setting, the controller will not enable the boiler. It is typical to set the WWSD value equal to the ROOM DESIGN TEMP. The OFF setting defeats the WWSD logic	
	ENGLISH/METRIC	Parameters to be displayed in Fahrenheit or Celsius	°F or °C		
	ESCAPE	Exit set up menu	—	To escape the set up menu, press either the ↑ or ↓ key	

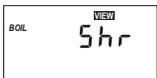
Mix Reset Control Display Parameters

Display	Parameter	Notes
	OUTDOOR TEMP	Current outdoor air temperature as measured by the outdoor sensor. This is also the default display for the control. (OUTDOOR DSGN ≠ OFF)
	MIX TEMP	Current mixed supply water temperature as measured by the mixing sensor
	MIX TARGET TEMP	Target mixed supply is the temperature the control is currently trying to maintain at the mixing sensor
	BOILER TEMP	Current boiler temperature as measured by the boiler sensor. (Boiler sensor is present)

Mix Reset Fault Messages

Display	Fault	Notes
	EEPROM FAULT	The control was unable to read a piece of information from its EEPROM. This error can be caused by a noisy power source. The control will load the factory defaults and stop operation until all the settings are verified
	OUTDOOR SENSOR SHORT CIRCUIT	The control is no longer able to read the outdoor sensor due to a short 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 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 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 an 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 fixed 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 an open circuit. In this case, the control will operate the injection pump at a fixed 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



Xylem Inc.
 8200 N. Austin Avenue
 Morton Grove, Illinois 60053
 Phone: (847) 966-3700
 Fax: (847) 965-8379
www.xyleminc.com/brands/bellgossett