Sage Zone Control Valve Panel

Part No 104589-01

Instruction Sheet

Application Overview: The Sage Zone Control Valve Panel reduces installation time, increases system efficiency and is applicable to U.S. Boiler Company hot water boilers installed with multiple zone valves. The panel evaluates individual zone heat demands and optimizes the modulation of U.S. Boiler-brand high-efficiency condensing boilers.

Easier Installation: The Sage Zone Control saves installation time and material (120Vac wire and conduit are not required between the boiler and the zone panel). The zone panel connects to the boiler with a CAT 5 cable (included). End switch terminals, which were wired to the boiler, are available for other functions saving the cost and complexity of adding additional relays.

Three Temperature System: The Sage Zone Control supports the three temperature demands found in most contemporary, residential hydronic heating systems: "Central Heat" supports standard radiation heating and "Domestic" supports domestic hot water heating. A new "Auxiliary Heat" demand is a second heating demand that may be used to serve either low temperature radiation or warmer heat demands such as fan coils.

HeatMatch™ Software:
The Sage Zone Control is the latest in home heating system innovation. Previous boilers merely received a "call for heat", measured water temperature (cold when starting), fired the boiler to 100%, then modulated back or cycled off. After receiving the call for heat, the Sage's patent pending HeatMatch Software uses zone expected heat rates to "size" the boiler to match active (turned on) zones. It then measures water temperature and fires the boiler only as high as required for the zones calling. The result is longer run times, dramatic reduction in boiler excessive cycling and higher operating efficiency.

Sage Zone Control Panel and U.S. Boiler Company products

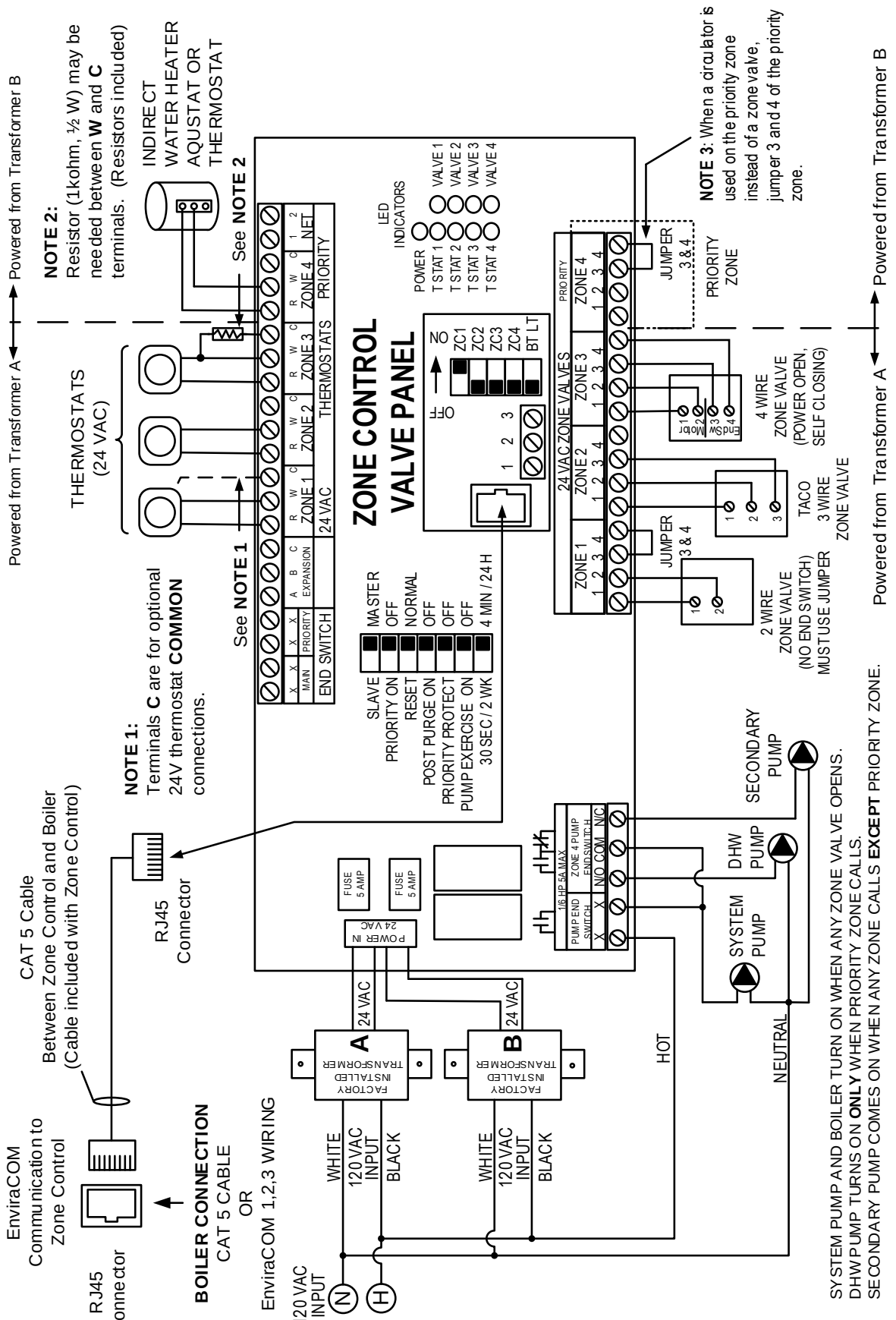
Fifth Zone: Every U.S. Boiler control offers an extra domestic pump relay output that can be added to the four zones provided by the Sage Zone Control Panel. The communication link between the Sage, and zone control panel, ensures that priority is always taken care of.

Whole Home Freeze Protection: When outside air temperature is below freezing, and an individual zone has not opened for over an hour, the primary pump and zone valves are energized for a short period of time. Water is moved past the boiler supply sensor and the zone is warmed by circulating water from other parts of the house. This feature helps prevent individual zones from freezing due to thermostats being turned too low or mounted in a poor location.

Additional features include:
- Priority Protection
- Post Purge of DHW
- Circulator Exercise
- Front External Indicator Lights
- Sealed Relays & Fuse Protected
- Expandable to 4 Zoning Controls
  (16 zones with 4 zone controls)
- Universal Thermostat Compatibility
- 100% Factory Tested
- UL Approved

Sage
Zone Control
Zone Valve Panel

Zone Control Wiring



Zone Control Wiring (Continued)

Thermostat Input (24 VAC):

R	Hot side of transformer. Connect to **R** on thermostat.
W	Switched **R** signal from thermostat. Connect to **W** on thermostat.
C	Common side of transformer. Connect to **COM** on thermostat (optional).
NET	Network terminals 1 & 2 are tied together for wiring convenience when using communicating style thermostats (optional).
End Switches	The main end switch closes when any zone thermostat calls for heat. The priority end switch closes only when the priority zone thermostat or Aquastat is calling for heat. The End Switches are **not** required to be wired to the boiler control.
Expansion	Terminals are not required.

Boiler Connection (24VAC / source / communication):

RJ45	Use Ethernet (Cat 5) Cable. Connect EnviraCOM to K2, K2WT, Aspen, Alpine and other boilers with RJ45 ports.
1,2,3	Alternately, using thermostat wire (18-22 gauge) connect 1,2,3 EnviraCOM to 1,2,3 terminals on boiler.

Power Input (120 VAC):

Connect neutral (white) leads on transformers to 120 volts ac neutral power supply.

Connect hot (black) leads on transformers to 120 volts ac hot power supply.

Pump End Switch (Dry Contacts):

Connect hot power supply to the right side of the pump end switch terminal on board.

Connect hot input lead of the circulator to the left side of the pump end switch terminal on board.

Zone 4 Pump End Switches (Dry Contacts):

See Diagram.

N/O Normally open terminal of the priority zone relay.

COM Common terminal of the priority zone relay.

N/C Normally closed terminal of the priority zone relay.

End Switch Pump Neutral Connections:

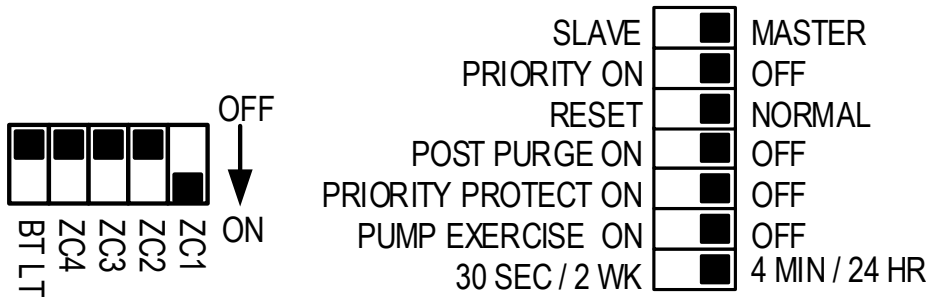
Connect neutral power supply directly to neutral lead on circulator(s).

⚠ Warning

Wiring connections must be made in accordance with all applicable electrical codes. Use copper wire. 120 VAC wiring must have a minimum temperature rating of 75°C. Failure to follow this instruction can result in personal injury or death and/or property damage. 12-18 gauge wire recommended for 120 VAC connections, 14-22 gauge wire for thermostat connections, and 14-22 gauge wire for 24 VAC source connections.

Zone Control Settings

Operation/External Diagnostics: Externally visible lights show full functionality of the switching relay. When any thermostat calls for heat, the appropriate zone valve is energized and the yellow light turns on. When the zone valve is fully open, the red light goes on and a heat demand message is sent to the boiler control. The green light should always be on, indicating that power is connected.



Factory Default Settings:
The zone panel is shipped ready to communicate to the boiler control and provide (4) central heat zones.

Factory Default Settings Shown

Slave / Master: Master Zone panel is set to MASTER to communicate with boiler control. Expansion panels must be set to SLAVE.

Priority Operation: When the priority is set to ON and the priority zone is energized, all other zones are de-energized until priority zone is satisfied. When priority is set to OFF, all zones will operate independently.

Reset / **Normal**: The Reset switch is not used.

Post Purge Operation: When Post Purge is set to ON, the priority zone output will stay energized for 2 minutes after it's thermostat, or Aquastat, is satisfied, but not operate the boiler. The post purge is only active when there is no other zone has an active call for heat. When Post Purge is set to OFF, the priority zone is de-energized when the priority demand is satisfied.

Priority Protection Operation: When the Priority Protection is set to ON, and if the priority zone calls continuously for more than one hour, power is returned to all the other zones, allowing each zone to function independently. Once the priority zone is satisfied, the timer is reset and the priority zone is again allowed to have priority for up to one hour starting from when it calls next. When Priority Protection is set to OFF, the priority zone retains priority for duration of priority demand.

Pump Exercise Operation: When the Pump Exercise is set to ON, a timer cycles connected circulators at the selected time interval. The time interval can be set for the circulators to run for either 30 seconds every 2 weeks, or for 4 minutes every 24 hours. When Pump Exercise is set to OFF pumps are not energized periodically according to exercise interval.

ZC1, ZC2, ZC3, ZC4: The Zone Control dip switches allow a panel to be set as a master, or expansion panel. The Master Panel must have ZC1 set ON and expansion panels set ZC2, ZC3 and ZC4 ON as follows:

Panel 1	Panel 2	Panel 3	Panel 4
ZC1 set **ON**	ZC1 set OFF	ZC1 set OFF	ZC1 set OFF
ZC2 set OFF	ZC2 set **ON**	ZC2 set OFF	ZC2 set OFF
ZC3 set OFF	ZC3 set OFF	ZC3 set **ON**	ZC3 set OFF
ZC4 set OFF	ZC4 set OFF	ZC4 set OFF	ZC4 set **ON**

BT LT Operation: Master panel zone 3 may be selected to send central heat or auxiliary heat demands to the boiler control. The boiler control responds to these demands with appropriate independent setpoints and outdoor air reset curves. Zone 1 and 2 are always central heat demands. When the BT LT is set to BT, the boiler control is sent a central heat demand when zone 3 is energized. When BT LT is set to LT, the boiler control is sent an auxiliary heat demand when zone 3 is energized.

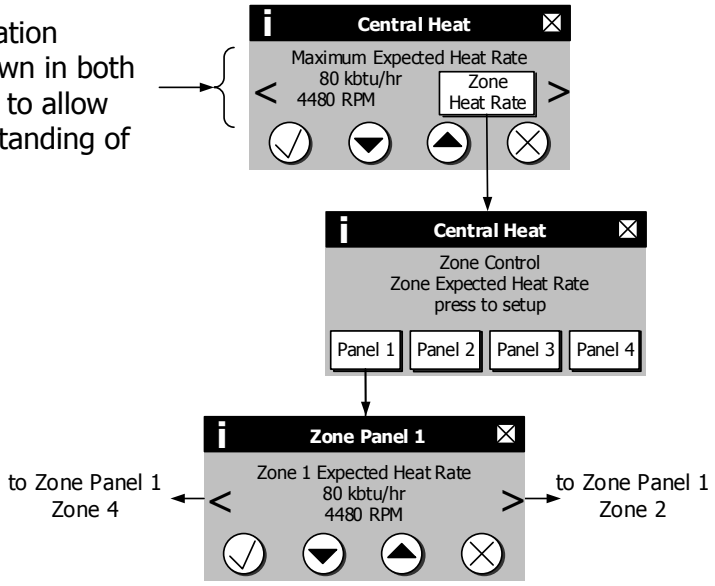
Boiler Control Settings

The Sage Zone Control helps reduce boiler cycling and increase modulating condensing boiler efficiency. It does this by preventing the boiler from over firing. The control first calculates the total expected heat rate, measures water temperature, and then sets the boiler firing rate. When any thermostat calls for heat, the boiler control sets the boiler's maximum expected heat rate equal to the corresponding Zone Expected Heat Rate. When multiple zones call for heat, the boiler's maximum expected heat rate is set equal to the sum of the active Zone Expected Heat Rates. The boiler control is shipped with each Zone Expected Heat Rate set to 40 % of the boiler's kbtu/hr capacity. For optimal performance, each Zone's Expected Heat Rate may be calculated and entered using the boiler control's display as follows:

Adjusting boiler control Expected Heat Rates:

1. Press "Adjust" button from boiler control "Home" screen.
2. Enter password "86" and Press "Save" and then "Adjust" button.
3. Press "Modulation" button.
4. Press "right arrow" button to view "Central Heat Maximum Expected Heat Rate Screen" screen.
5. Press "Zone Heat Rate" button.
6. Select a zone panel to adjust and Press "Panel" button.
7. Adjust individual zone expected heat rate.
8. Press ☒ to return to status screens.

Maximum modulation numbers are shown in both RPM and kbtu/hr to allow for easier understanding of boiler heat rate.

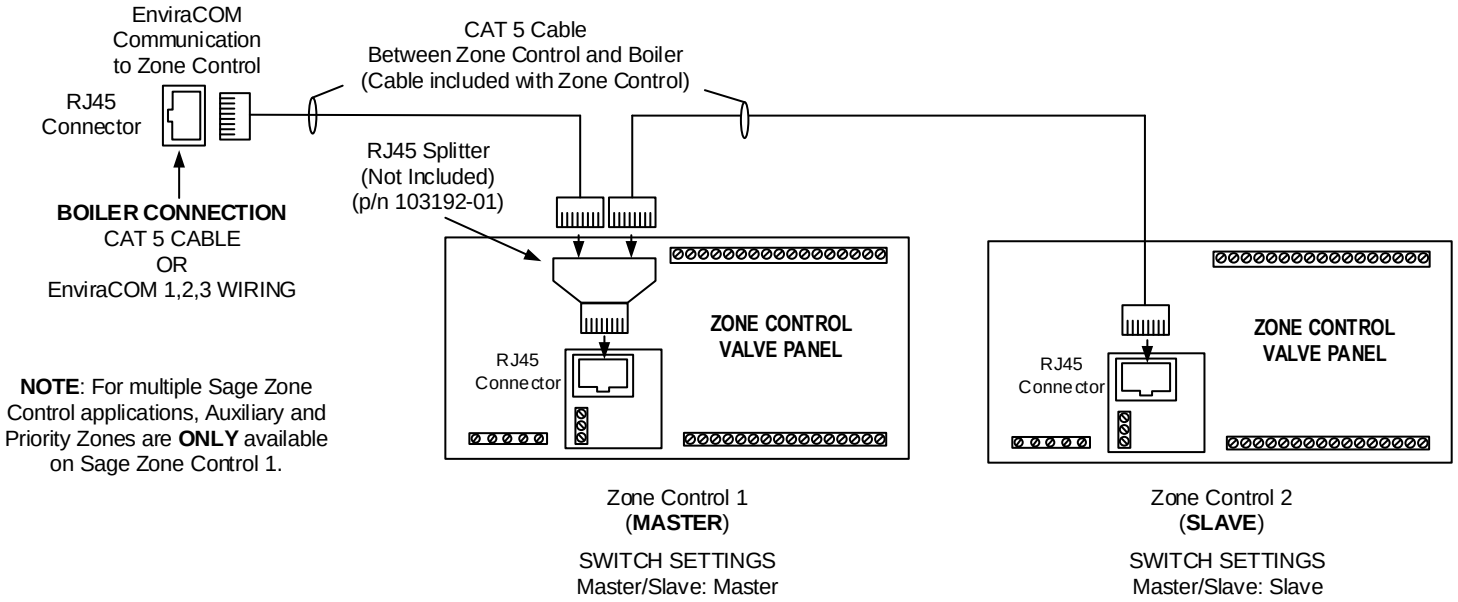


Zone Panel 1, Zone 1 shown,
(Typical for zones 1 through 16)

The sum of Zone Expected Heat Rates plus DHW Maximum Expected Heat Rate (if DHW is active) is used to calculate the active maximum modulation rate.

Multiple Zone Control Wiring

Expansion Connections: Set zone panel 1 Slave / Master switch to MASTER and set all other daisy chained controls to SLAVE. Connect a CAT 5 Cable between the RJ45 terminals on the MASTER panel, SLAVE panels, and the boiler control. Alternately, connect thermostat wire (18-22 gauge) between terminals 1,2,3 on the MASTER panel to the corresponding 1,2,3 on the SLAVE panels and the boiler control. Boiler controls may be daisy chained up to 4 zoning panels (16 zones if all 4 zone panels).



RJ45 Connection Diagram (2 panels shown, typical for up to 4 panels)

Specifications

PART NUMBER	NUMBER OF ZONES	INPUT VOLTAGE	MAX 24 VAC OUTPUT @ 25°C	TYPE 1 ENCLOSURE WIDTH	HEIGHT	DEPTH
104589-01	4 with Priority	120/60/1 VAC, 3A	24 VA per Zone 40 VA per Transformer	12 ¼ "	8"	3 "

The pump end switches are rated 1/6 hp, 5 amps at 120 VAC. The main and priority end switch connections are rated 24 VAC, 1 amp. All thermostat and zone valve connections supply a 24 VAC class 2 output.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Requirements:
Sage Boiler Control: Software version 3219.4716, Sage 2.2 or newer.
Boiler Display: LCD Display GT02r07 or newer.

Notes Page

Ordering Information

Part Number	Description
104589-01	Sage Zone Control Valve Panel
104590-01	Sage Zone Control Circulator Panel
103192-01	RJ45 Splitter for use with expansion panels.

Replacement zone valve control fuse manufacture: Littlefuse, Part Number: 229005

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