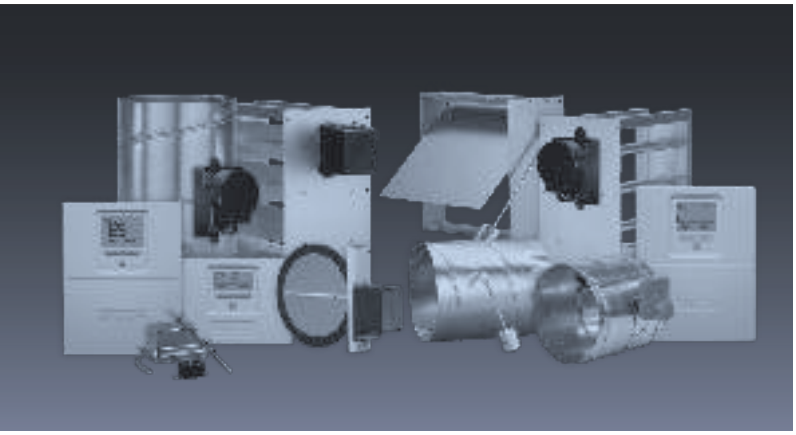
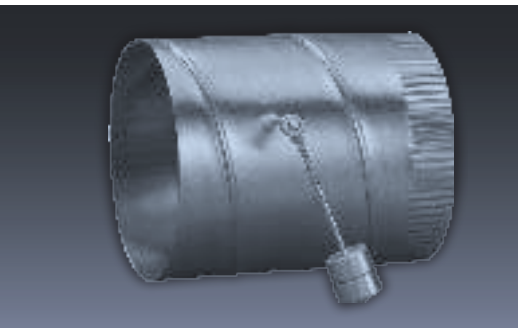
Braeburn®

Zoning Reference Guide





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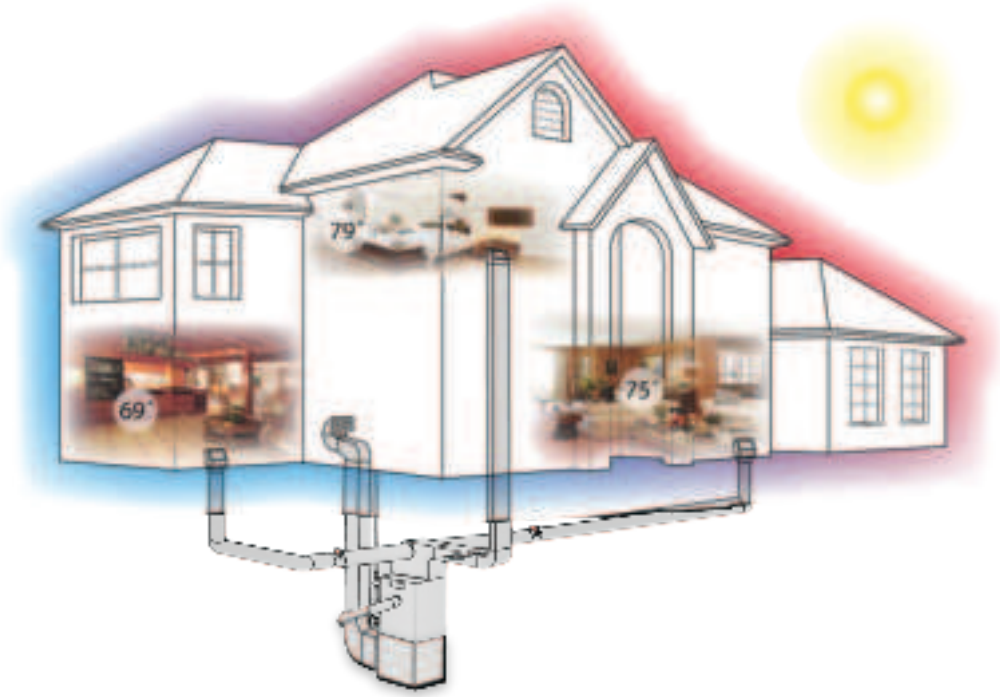
Introduction

Braeburn Zone Systems: Comfort on Demand

Given the opportunity, more than half of building owners want to improve the comfort and energy efficiency of their home or business.



Comfort

Why are so many owners dissatisfied with the comfort of their building? Even the best thermostats will only monitor the temperature in the area around the thermostat. Now consider second and third stories or interior walls that divide a building into rooms with different solar, glass, or wind loading. The result can be a 10 degree or more difference between the area around the thermostat and the rest of building.

The result of having a large temperature spread is uncomfortable occupants. According to industry data, even a 5 degree difference will cause a four-fold increase in complaints.

Zoning solves this problem by reducing or completely eliminating the large temperature variation that can come from uneven HVAC loads. Occupant comfort is increased, and complaints can be reduced.

Energy Savings

Up to 30 percent of the costs of heating and cooling can be reduced by making sure areas are not over or under air-conditioned. Usually, parts of buildings are improperly air-conditioned when the centrally located thermostat responds to the temperature around the thermostat and areas away from the thermostat are already too hot or too cold, or do not need to be conditioned.

Costs are also increased when the areas away from the thermostat are not occupied. Without zoning control, the average heating or air conditioning system will send conditioned air throughout the entire house or building even if there are no plans for the area to be occupied or used.

Zoning solves this problem by guiding conditioned air to the areas that are in use or actually require air-conditioning. Using setback thermostats will result in additional savings by making sure the zone panel only calls for conditioning at the right time. The result can be up to a 30 percent savings in energy costs.

What is a Zoning System?

A zoning system is made up of the following items:

THERMOSTAT in each zoned area

The thermostats can be off-the-shelf, single stage or multi stage, programmable or non-programmable units. They do not need any special connections or settings.

ZONE CONTROL PANEL with a power transformer

Zone panels run off the same kind of power transformer as thermostats and air conditioning equipment. The zone control panel is the “brains” of the system, and has a built in computer to monitor the thermostats, the HVAC equipment and to open and close the dampers. The transformer is the usual 40VA, 24 VAC type.

DAMPERS for each of the zoned areas

Dampers are usually wired and powered directly from the zone control panel. The job of the dampers is open or close and let conditioned air flow to where it is needed. The dampers can be either power open-power close or spring return with power close.

BYPASS DAMPER for the system

Most HVAC equipment is designed to operate with air flowing through the entire system. When zoning is applied to a system, and only a few dampers are open, the bypass damper relieves excess air pressure back into the return air.

SUPPLY AIR TEMPERATURE SENSOR

To help ensure the system runs at the proper temperature when only a few dampers are open, a supply air temperature sensor may be used by the zone panel to moderate the system output.

SYSTEM DUCTWORK AND HVAC EQUIPMENT

Properly sized ductwork and equipment is the key to a successful zoning installation. Cost savings will be made when installing one properly sized HVAC system with zoning verses installing two or more separate systems. A later section of this guide will help your understanding of the special requirements of ductwork for zoning systems.

The Braeburn Advantage

The Best Value in Zoning Today

Braeburn is one of the fastest growing indoor comfort and climate control manufacturers in the United States. Our dedicated team of specialists will help provide the best value for your customers' application requirements. Braeburn products are available to contractors via our global network of HVACR distributors.

Founded in 2001, our corporate headquarters is located in Montgomery, IL – just west of Chicago, IL. This facility is the central hub for all of our customer service, engineering, and business activities. Braeburn offers a complete line of zone control products that are shipped to our global customers from our modern distribution center near Chicago, IL. Our thermostats, zone panels, dampers, and accessories generally ship within 24 hours from our main distribution center.

At Braeburn, we're committed to providing you the quality you would expect from a world class company. Our Quality by Design product philosophy focuses on core engineering, manufacturing, and reliability testing processes to ensure you receive the product quality you can count on with every job!

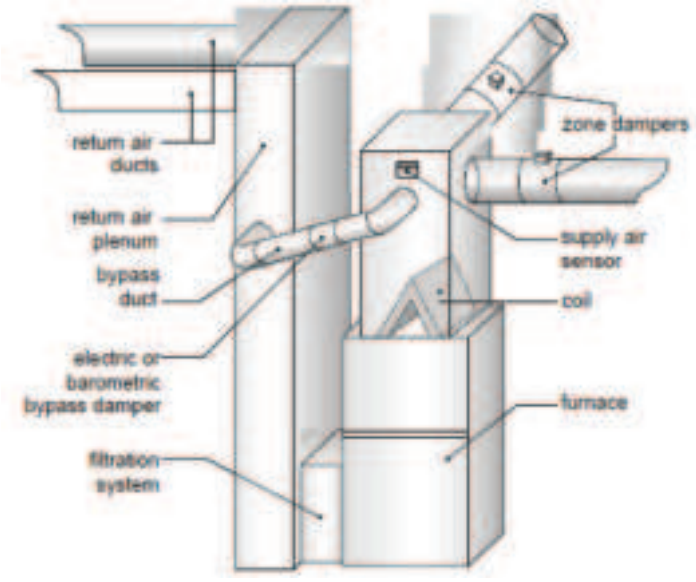
From our Builder, Economy and Premier series thermostats to our complete line of zone controls, we provide solutions to lower energy costs and increase comfort in any home or business environment. Our innovative value-added features, reliability, and contemporary designs make us the brighter choice in indoor comfort and climate control. It's easy to see why Braeburn is The Best Value in Zoning Today.

Understanding Zoning Duct Systems

When designing and installing zoned ductwork, follow all codes and regulations having authority over the installation. The following tips should help your zoning installation:

- The HVAC system must be sized to provide conditioning for the entire area. Whenever possible, do not over or under size the equipment. Better results will be achieved with capacity control such as equipment staging.
- Zone controls are not intended to balance air flow. Using good design practices and a properly balanced flow will give the best results.
- Areas that have extreme differences in temperature that would require constant opposite calls may get better results with additional HVAC equipment. Opposite mode calls work best with zoning when the calls are transition in nature rather than constant opposite modes.
- When determining duct sizes for zoning, we recommend both the “whole building load calculation” as well as a “room-by-room load calculation”.
- Once the total CFM of the system has been determined, size the dampers using the damper chart below. Consider using at least the design CFM to leave margin for the maximum CFM when multiple dampers are closed. The total CFM of the system should be at least the total design CFM of the dampers.
- The duct system for each branch should be designed to accommodate the maximum design CFM for each damper. Following this guideline will help ensure that the system is quiet even when only a single zone is receiving airflow.

Understanding Bypass System Ductwork



In many zoning installations it is necessary to install a bypass damper. A bypass damper will help the HVAC equipment maintain rated CFM past the heat exchangers and blower motor. If a system does not have a bypass, and only a few dampers are open, excess supply plenum pressure may be created. The result can be system limit trip-outs, excess noise, coil icing, or other problems. The bypass damper is installed in the bypass system duct.

Damper Sizing Chart

Damper Size	Design CFM	Maximum CFM
4 Inch	100	200
5 Inch	100	200
6 Inch	100	200
7 Inch	150	250
8 Inch	200	300
9 Inch	300	450
10 Inch	400	600
12 Inch	600	900
14 Inch	1000	1400
16 Inch	1500	2000
18 Inch	2000	2500
20 Inch	2500	3000

What is a Bypass System Duct?

It is a connection between the supply side and the return side air plenum. The connection uses a bypass damper to open when needed. The bypass damper can either be electric, that opens a damper with an electric motor when needed, or barometric (think barometer) that opens up a weighted door when the system pressure increases.

Braeburn recommends using one of three methods to control excess supply plenum pressure. The best method will be determined based on the specific requirements of the application such as cost, type of duct system used, actual duct design, and the ability to install a bypass duct in tight equipment locations.

Three common methods are:

1. Eliminate the bypass by oversizing each branch of the duct system so that each branch is capable of flowing the system CFM.
2. Install a barometric bypass damper in the bypass duct from the supply plenum to the return air plenum. Size the bypass duct by using a formula that subtracts the smallest zone CFM from the total system CFM to determine the bypass CFM. As an example with a total system CFM of 1200 and a smallest zone CFM of 700, the bypass needs to be 1200-700=500 CFM.
3. Install an electric bypass damper in the bypass duct from the supply plenum to the return air plenum. Sizing an electric bypass damper using the same sizing formula as the barometric bypass damper.

Eliminate the Bypass by Oversizing Each Branch

This option is usually used on two zone systems that are about the same size and HVAC load. It can be acceptable to oversize the ductwork in each zone so that when only one of the two zones is open, all the air produced by the indoor blower is applied to the open zone. Many installers have been successful by sizing each zone to handle about 75% of the system CFM. This duct design has advantages and disadvantages. One advantage is that no bypass duct or damper is required; and the system's operating temperature and pressure should be normal. One disadvantage is lower duct pressure when both zones are calling. This means that the system's ability to throw the air to the outside walls may be diminished. Carefully calculating the face velocity in FPM at the diffusers can help.

Install a Barometric Bypass

This low cost option uses a short duct between the supply plenum and the return air plenum. The Braeburn barometric bypass is installed in this duct. The purpose of the bypass duct is to allow the excess pressure from the supply plenum to escape into the return air plenum. Excess pressure is routed to the return air plenum by adjusting the bypass damper. The bypass damper is adjusted so that when all zones are open the bypass damper is lightly closed. As supply dampers close and pressure builds in the supply air plenum, the pressure pushes the bypass damper open. A simple, adjustable weight is used to properly position the damper.

Adjusting a barometric bypass damper is simple and requires no instruments:

1. Install the bypass damper with the arrow pointed from the supply side to the return side.
2. Ensure the damper blade pivot shaft is horizontal to the ground and the large part of the damper blade is down.
3. In normal operation, the weight arm will lift up when pressure increases. If the air is flowing left to right, position the weighted arm at 4:00. If the air is flowing right to left, position the arm 8:00 when no zones are calling.
4. Adjust the weighted arm so that the damper is barely closed when all zones are calling.

Install an Electric Bypass

This option also uses a short duct between the supply plenum and the return air plenum, but uses an electrically controlled damper to reduce excess plenum pressure. The electrically controlled damper is powered from a static pressure sensor that is mounted into the plenum. As pressure increases in the supply plenum, the static pressure sensor will register this increase and power the motorized damper open slowly so as to relieve the excess pressure. As the pressure is removed, the static pressure sensor will stop opening the damper when the plenum pressure becomes less than the setpoint on the static pressure sensor.

Installing an electric bypass requires just a few steps.

1. Install a power open / power close damper and bypass duct from the supply side to the return side.
2. Mount the static pressure controller on a vertical surface near where the pressure sensor will be installed into the supply plenum.
3. Mount the pressure sensor into the supply plenum so the air blowing past the tube, and not directly into the end.
4. Wire the damper, the static pressure controller and the start position relay as shown in the static pressure controller instructions.
5. Turn the HVAC blower on high and insure all zones are open.
6. Use a flat head screwdriver to slowly turn the setscrew on the static pressure controller clockwise. When you start to get near the right adjustment point, the damper blade on the bypass damper will start to close and then stop. Continue moving the setscrew clockwise until the damper is barely closed. The proper set-point is when all zones are calling with the fan on high, and the bypass damper is just staying closed.
7. Confirm the wiring by turning off all zones. The bypass damper should power open and stay open. If the wiring is wrong, startup will be noisy because the bypass damper will power close when the zones are turned off.

Understanding Zone Controllers

Braeburn zoning controllers serve as the brains of the zoning system. The zone controllers have a built-in computer to monitor the thermostats and the HVAC equipment, and to open and close the dampers. All equipment is connected to the zone panel.

- The zone panel has connections to hook up thermostats.
- The zone panel has connections to the HVAC equipment.
- The zone panel has connections to power the zone dampers.
- The zone panel has a connection for 24-volt power just like the HVAC equipment.
- The 3-zone and 4-zone panels have connections to the air plenum to monitor the air supply temperature.

When the zone panel is running, here is what happens:

At rest, when no zones are calling for heating or cooling, all dampers are open and the fan is off.

As soon as a thermostat calls for a temperature change in one or more of the zones, the zone panel reacts by making several changes. First, all dampers other than the calling zone(s) close. Then, the heating or cooling equipment is turned on along with the corresponding fan control. The system continues in this state until one of two things happen:

The first case occurs when the zone is satisfied. The equipment is turned off, along with the fan control, and all dampers return to their open state.

The second case occurs when a zone is heating or cooling and an opposite call occurs from one or more of the other thermostat zones. An opposite call is a call for heating when the system is already cooling, or a call for cooling when the system is already heating. The opposite call can be handled one of two ways:

Zone Priority ensures opposite calls are only answered if they are either from the selected priority zone, or match the last call from the priority zone. This method is used when you have an area that should get the highest priority, and the kind of call from that area sets the mode (heating or cooling) for the rest of the building.

The zone panel can also be configured to handle opposite mode calls with a timer. This mode is called All Priority.

All Priority allows the existing call to continue for an adjustable amount of time and then starts to switch over even if the first call is not done. The switchover starts with a purge, where the heating or cooling equipment is shut off, while the fan continues to run with the dampers left just like they were. With the equipment off, and the fan running, the conditioned air is “purged’ from the system until the air is nearly room temperature. At that time, the zone controller switches on the equipment for the opposite mode, and opens the dampers for the opposite calling zone, and closes the original calling zone dampers. The switchover is now complete.

The system will continue in this state until either the call is satisfied, or if the opposite mode calls, in which case, the entire purge/changeover cycle will start over again. This normal operating mode for the zone panel will continue until all thermostats no longer call for heating or cooling.

Using the Zone Panel with Multi-Stage Equipment

All Braeburn zone panels are designed to work with multi-stage HVAC equipment. The 2-zone panel will work with up to two heating stages and one cooling stage. The 3-zone panel will work with up to three heating and two cooling stages. The 4-zone panel will work with up to four heating stages and two cooling stages. If multi-stage equipment is attached to the zone panel, the installer may select 1 of 3 different staging options to maximize occupant comfort and economy.

ZONE staging sets the number of zones that must be calling before upstaging occurs.

TIME staging sets the amount of time a call must be active before upstaging occurs.

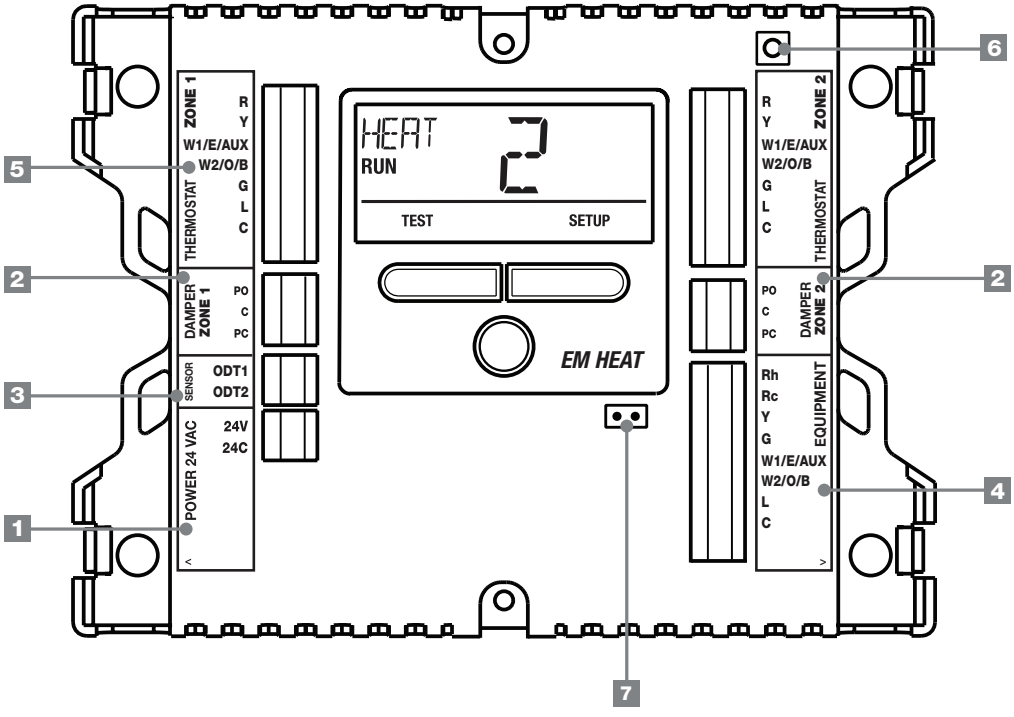
THERMOSTAT staging allows the thermostats to control the staging process.

Additionally, when set to **TIME** staging, the Braeburn 4-Zone Panel monitors time and the plenum temperature to maximize economy. The plenum temperature sensor helps the equipment stage by looking at the supply temperature and comparing it to the high or low limit. If the temperature differs by more than the fixed amount from the limit, the zone panel will permit staging. If the supply temperature approaches the limit, the panel will shut off the additional stages. If the supply temperature crosses the high or low limit, the panel turns off the equipment and switches the fan on until the temperature comes back into limits. The 3 and 4-zone panels can also control a two-speed fan.

Understanding the Zone Controller Layout

2-Zone Control Panel

See following page for wiring terminal identification.



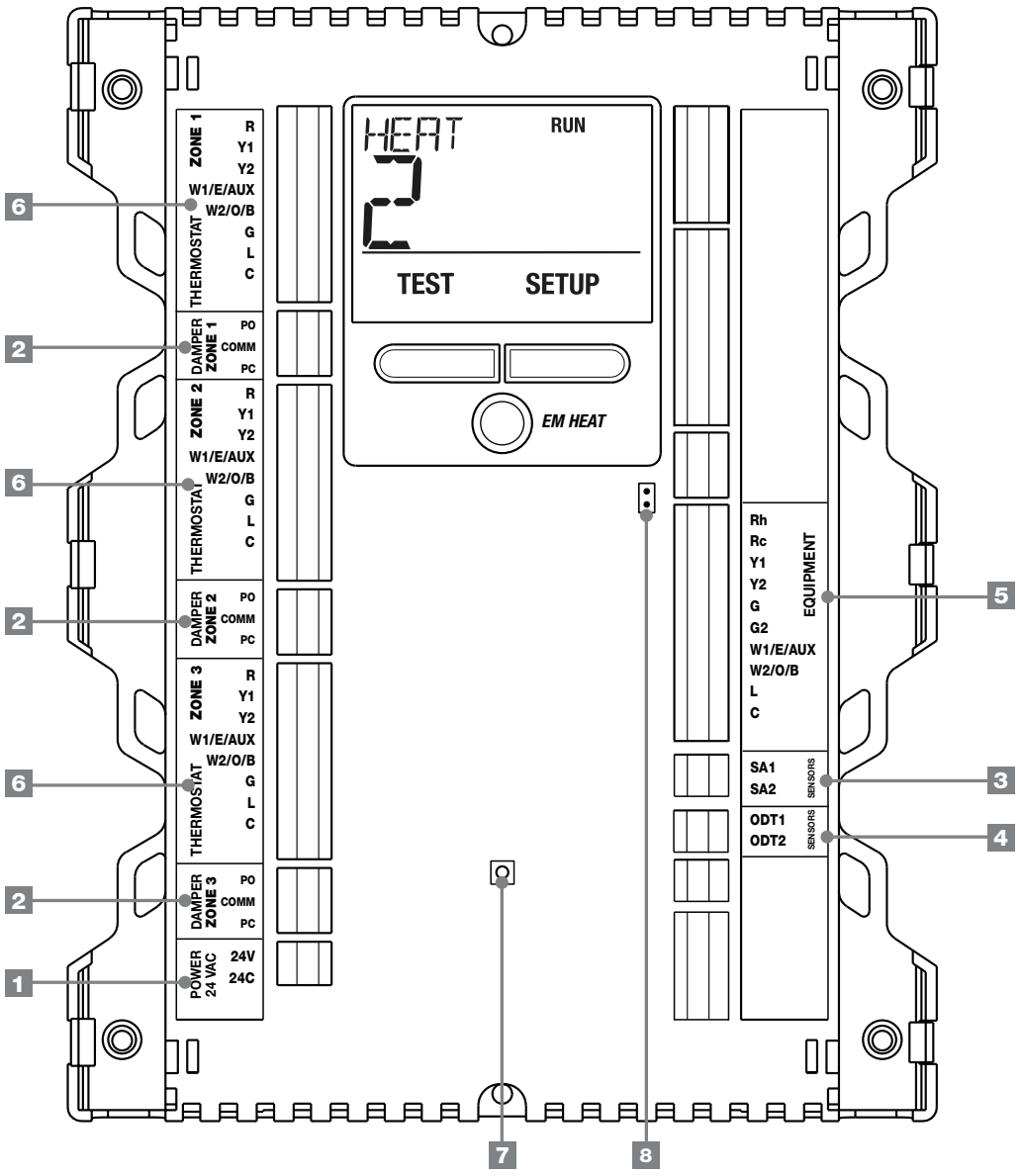
2-Zone Control Panel Wiring Terminals

Note: Wire should be stripped to 3/8" minimum.

		Terminal	Qty	Function	Description
1	**Power Panel**	24V	1	INPUT	24 VAC Transformer Power 100 VA Maximum
		24C	1	INPUT	24 VAC Transformer Common
2	**Dampers**	PO	2	OUTPUT	24 VAC Power Open Zone Damper Terminal
		C	2	OUTPUT	Zone Damper Common Terminal
		PC	2	OUTPUT	24 VAC Power Close Zone Damper Terminal
3	**Outdoor Air**	ODT1	1	INPUT	Optional Outdoor Air Sensor Terminal 1 (No Polarity) Model 5490
		ODT2	1	INPUT	Optional Outdoor Air Sensor Terminal 2 (No Polarity) Model 5490
4	**Equipment**	Rh	1	INPUT	24 VAC Equipment Transformer Power Connection
		Rc	1	INPUT	24 VAC Cooling Equipment Transformer (Dual Transformer Systems Only)
		Y	1	OUTPUT	Compressor
		G	1	OUTPUT	Fan Control
		W1/E/AUX	1	OUTPUT	[W1] 1st Stage Conventional Heat [E] Emergency Heat [AUX] Auxiliary Heat
		W2/O/B	1	OUTPUT	[W2] 2nd Stage Conventional Heat [O] Cool Active Reversing Valve [B] Heat Active Reversing Valve
		L	1	INPUT	System Malfunction Indicator
		C	1	INPUT	24 VAC Transformer Common
5	**Thermostat**	R	2	OUTPUT	24 VAC Thermostat Power
		Y	2	INPUT	Compressor Call
		W1/E/AUX	2	INPUT	[W1] 1st Stage Conventional Heat Call [E] Emergency Heat Call [AUX] Auxiliary Heat Call
		W2/O/B	2	INPUT	[W2] 2nd Stage Conventional Heat Call [O] Cool Active Reversing Valve Call [B] Heat Active Reversing Valve Call
		G	2	INPUT	Fan Call
		L	2	OUTPUT	System Malfunction Indicator
		C	2	OUTPUT	24 VAC Transformer Common
6	**Reset Button**				Press once to restart panel - Hold for 5 seconds to reset panel and restore all factory defaults
7	**Rc/Rh Terminal Jumper (J1)**				Open jumper for dual transformer installations

3-Zone Control Panel

See following page for wiring terminal identification.



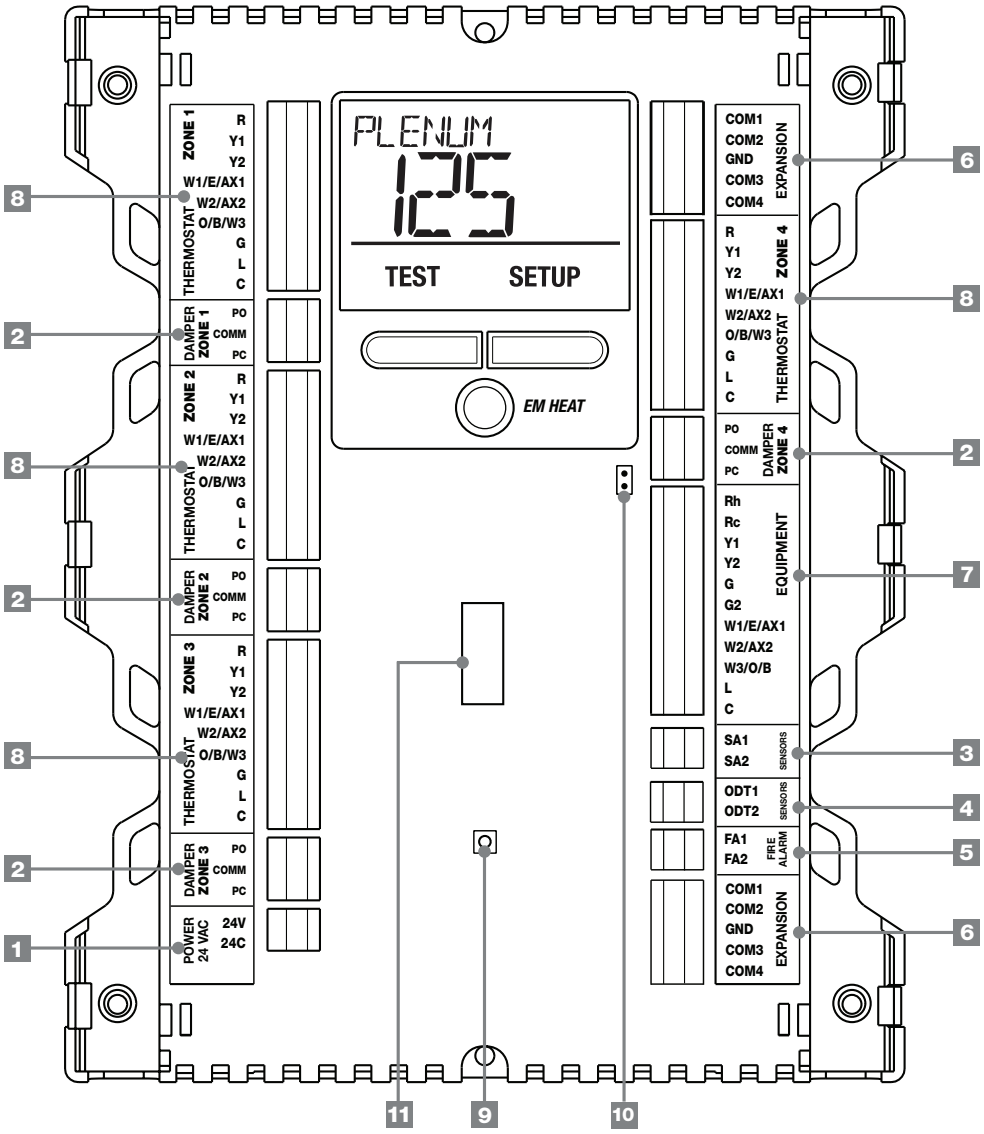
3-Zone Control Panel Wiring Terminals

Note: Wire should be stripped to 3/8” minimum.

		Terminal	Qty	Function	Description
1	Power Panel	24V	1	INPUT	24 VAC Transformer Power 100 VA Maximum
		24C	1	INPUT	24 VAC Transformer Common
2	Dampers	PO	3	OUTPUT	24 VAC Power Open Zone Damper Terminal
		COMM	3	OUTPUT	Zone Damper Common Terminal
		PC	3	OUTPUT	24 VAC Power Close Zone Damper Terminal
3	Supply Air	SA1	1	INPUT	Optional Plenum Supply Air Sensor Terminal 1 (No Polarity) Model 149156
		SA2	1	INPUT	Optional Plenum Supply Air Sensor Terminal 2 (No Polarity) Model 149156
4	Outdoor Air	ODT1	1	INPUT	Optional Outdoor Air Sensor Terminal 1 (No Polarity) Model 5490
		ODT2	1	INPUT	Optional Outdoor Air Sensor Terminal 2 (No Polarity) Model 5490
5	Equipment	Rh	1	INPUT	24 VAC Equipment Transformer Power Connection
		Rc	1	INPUT	24 VAC Cooling Equipment Transformer (Dual Transformer Systems Only)
		Y1	1	OUTPUT	1st Stage Compressor
		Y2	1	OUTPUT	2nd Stage Compressor
		G	1	OUTPUT	1st Stage Fan Control
		G2	1	OUTPUT	2nd Stage Fan Control
		W1/E/AUX	1	OUTPUT	[W1] 1st Stage Conventional Heat [E] Emergency Heat [AUX] Auxiliary Heat
		W2/O/B	1	OUTPUT	[W2] 2nd Stage Conventional Heat [O] Cool Active Reversing Valve [B] Heat Active Reversing Valve
		L	1	INPUT	System Malfunction Indicator
		C	1	INPUT	24 VAC Transformer Common
6	Thermostat	R	3	OUTPUT	24 VAC Thermostat Power
		Y1	3	INPUT	1st Stage Compressor Call
		Y2	3	INPUT	2nd Stage Compressor Call
		W1/E/AUX	3	INPUT	[W1] 1st Stage Conventional Heat Call [E] Emergency Heat Call [AUX] Auxiliary Heat Call
		W2/O/B	3	INPUT	[W2] 2nd Stage Conventional Heat Call [O] Cool Active Reversing Valve Call [B] Heat Active Reversing Valve Call
		G	3	INPUT	Fan Call
		L	3	OUTPUT	System Malfunction Indicator
		C	3	OUTPUT	24 VAC Transformer Common
7	Reset Button				Press once to restart panel Hold for 5 seconds to reset panel and restore all factory defaults
8	Rc/Rh Terminal Jumper (J1)				Open jumper for dual transformer installations

4-Zone Expandable Control Panel

See following page for wiring terminal identification.



4-Zone Expandable Control Panel Wiring Terminals

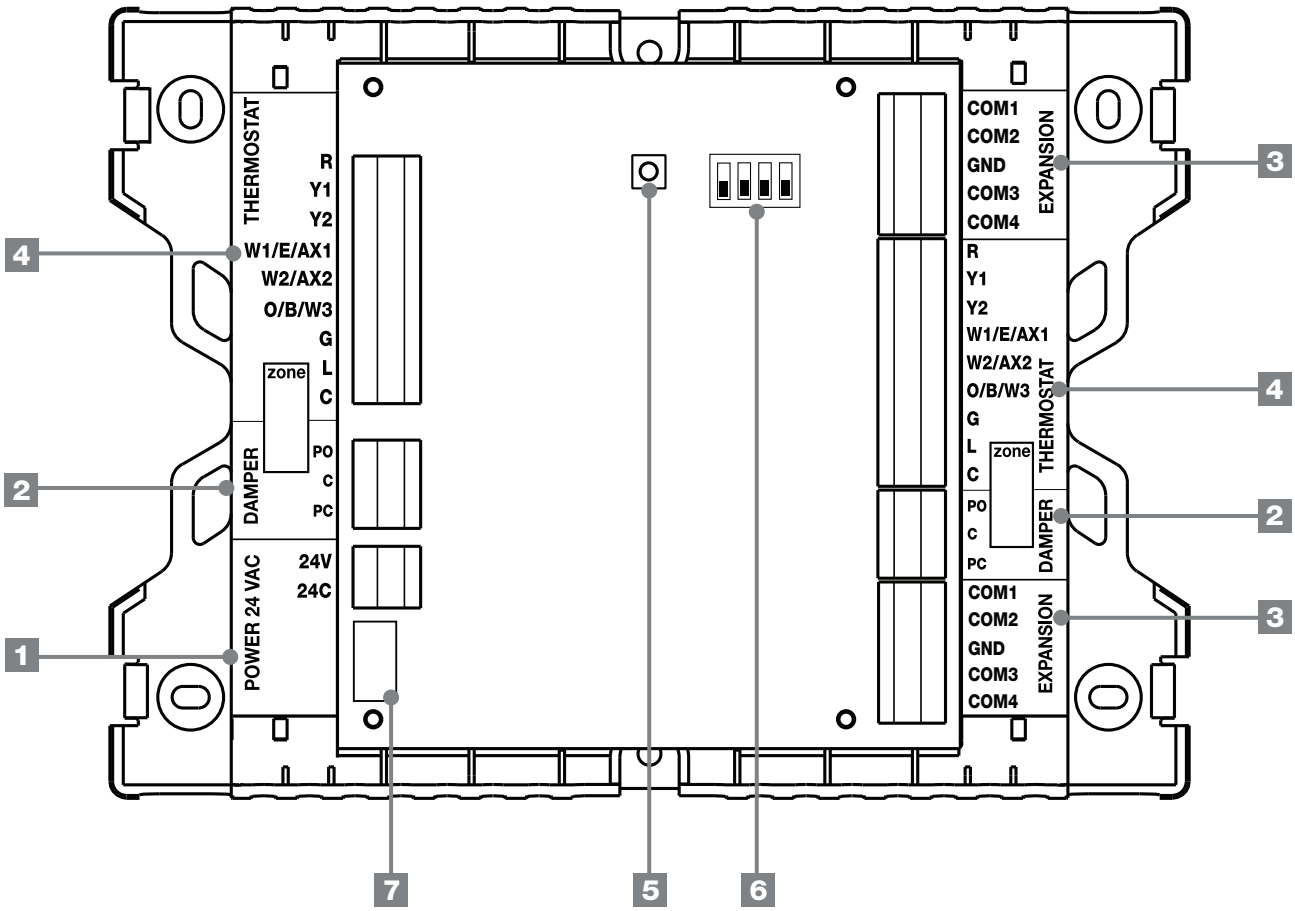
Note: Wire should be stripped to 3/8” minimum.

		Terminal	Qty	Function	Description
1	Power Panel	24V	1	INPUT	24 VAC Transformer Power 100 VA Maximum
		24C	1	INPUT	24 VAC Transformer Common
2	Dampers	PO	4	OUTPUT	24 VAC Power Open Zone Damper Terminal
		COMM	4	OUTPUT	Zone Damper Common Terminal
		PC	4	OUTPUT	24 VAC Power Close Zone Damper Terminal
3	Supply Air	SA1	1	INPUT	Plenum Supply Air Sensor Terminal 1 (No Polarity)
		SA2	1	INPUT	Plenum Supply Air Sensor Terminal 2 (No Polarity)
4	Outdoor Air	ODT1	1	INPUT	Outdoor Air Sensor Terminal 1 (No Polarity)
		ODT2	1	INPUT	Outdoor Air Sensor Terminal 2 (No Polarity)
5	Fire Alarm	FA1	1	INPUT	Normally Closed or Open Dry Pair (No Polarity)
		FA2	1	INPUT	Normally Closed or Open Dry Pair (No Polarity)
6	Expansion	COM1	2	PANEL	Expander Panel Communication
		COM2	2	PANEL	Expander Panel Communication
		GND	2	PANEL	Expander Panel Communication Ground
		COM3	2	PANEL	Expander Panel Communication
		COM4	2	PANEL	Expander Panel Communication
7	Equipment	Rh	1	INPUT	24 VAC Equipment Transformer Power Connection
		Rc	1	INPUT	24 VAC Cooling Equipment Transformer (Dual Transformer Systems Only)
		Y1	1	OUTPUT	1st Stage Compressor
		Y2	1	OUTPUT	2nd Stage Compressor
		G	1	OUTPUT	1st Stage Fan Control
		G2	1	OUTPUT	2nd Stage Fan Control
		W1/E/AX1	1	OUTPUT	[W1] 1st Stage Conventional Heat [E] Emergency Heat [AX1] 1st Stage Auxiliary Heat
		W2/AX2	1	OUTPUT	[W2] 2nd Stage Conventional Heat [AX2] 2nd Stage Auxiliary Heat
		W3/O/B	1	OUTPUT	[W3] 3rd Stage Conventional Heat [O] Cool Active Reversing Valve [B] Heat Active Reversing Valve
		L	1	INPUT	System Malfunction Indicator
		C	1	INPUT	24 VAC Transformer Common
8	Thermostat	R	4	OUTPUT	24 VAC Thermostat Power
		Y1	4	INPUT	1st Stage Compressor Call
		Y2	4	INPUT	2nd Stage Compressor Call
		W1/E/AX1	4	INPUT	[W1] 1st Stage Conventional Heat Call [E] Emergency Heat Call [AX1] 1st Stage Auxiliary Heat Call
		W2/AX2	4	INPUT	[W2] 2nd Stage Conventional Heat Call [AX2] 2nd Stage Auxiliary Heat Call
		O/B/W3	4	INPUT	[O] Cool Active Reversing Valve Call [B] Heat Active Reversing Valve Call [W3] 3rd Stage Conventional Heat Call
		G	4	INPUT	Fan Call
		L	4	OUTPUT	System Malfunction Indicator
		C	4	OUTPUT	24 VAC Transformer Common
9	Reset Button				Press once to restart panel Hold for 5 seconds to reset panel and restore all factory defaults
10	Rc/Rh Terminal Jumper (J1)				Open jumper for dual transformer installations
11	Wire Strip Guide				Wires should be stripped 3/8 inch minimum

2-Zone Expander Panel

The 2-Zone Expander Panel can be used to expand the 4-Zone Control Panel up to a total of 32 zones in 2-zone increments.

See following page for wiring terminal identification.



2-Zone Expander Panel Wiring Terminals

Note: Wire should be stripped to 3/8” minimum.

		Terminal	Qty	Function	Description
1	**Power Panel**	24V	1	INPUT	24 VAC Transformer Power 75 VA Maximum
		24C	1	INPUT	24 VAC Transformer Common
2	**Dampers**	PO	2	OUTPUT	24 VAC Power Open Zone Damper Terminal
		C	2	OUTPUT	Zone Damper Common Terminal
		PC	2	OUTPUT	24 VAC Power Close Zone Damper Terminal
3	**Expansion**	COM1	2	OUTPUT	Expander Panel Communication
		COM2	2	OUTPUT	Expander Panel Communication
		GND	2	INPUT	Expander Panel Communication Ground
		COM3	2	INPUT	Expander Panel Communication
		COM4	2	INPUT	Expander Panel Communication
4	**Thermostat**	R	2	OUTPUT	24 VAC Thermostat Power
		Y1	2	INPUT	1st Stage Compressor Call
		Y2	2	INPUT	2nd Stage Compressor Call
		W1/E/AX1	2	INPUT	[W1] 1st Stage Conventional Heat Call [E] Emergency Heat Call [AX1] 1st Stage Auxiliary Heat Call
		W2/AX2	2	INPUT	[W2] 2nd Stage Conventional Heat Call [AX2] 2nd Stage Auxiliary Heat Call
		O/B/W3	2	INPUT	[O] Cool Active Reversing Valve Call [B] Heat Active Reversing Valve Call [W3] 3rd Stage Conventional Heat Call
		G	2	INPUT	Fan Call
		L	2	OUTPUT	System Malfunction Indicator
		C	2	OUTPUT	24 VAC Transformer Common
5	**Reset Button**				Press once to restart panel Hold for 5 seconds to reset panel and restore all factory defaults
6	**Zone Address Dip Switches**				See Zone Addressing (page 21)
7	**Wire Strip Guide**				Wires should be stripped 3/8 inch minimum

Configuring Zone Panels

All Braeburn Zone Panels feature an easy to read digital display. The display is used to view panel status, and to configure the various controller settings. If power is lost or the reset button is pressed, these settings will not be lost. To reset all settings back to factory defaults, hold down the RESET button for 5-10 seconds.

Entering Configuration Mode

1. Press **SETUP** 1 and hold for 3 seconds.
2. The panel backlight will turn on and the display will change.
3. Change the displayed setting (if needed) by pressing **SELECT** 2.
4. To save and advance to the next setting press the **NEXT** 3 button.
5. Repeat steps 3-4 as necessary.
6. Press **HOLD FOR BACK** 4 for 3 seconds to go back a step.
7. Press **HOLD FOR EXIT** 5 for 3 seconds to exit setup menu.

2-Zone Controller Configuration

No.	Installer Setting (Notes follow table)	Display Indicator	Factory Default	Setting Options	Comments (More information follows this table)
1	System Type	SYSTEM	SSC	SSC MSC SSH MSH	Select for 1H/1C conventional equipment **[Note 1]** Select for 2H/1C conventional equipment **[Note 1]** Select for 1H/1C Heat Pump equipment Select for 2H/1C Heat Pump Equipment
2	Thermostat Type	TSTAT TP	CON	CON HP	Select for all thermostats conventional type Select for all thermostats heat pump type
3	1st Stage Fan Control	FAN 1	GAS	GAS EL	Select for 1st Stage fan controlled by equipment Select for 1st Stage fan controlled by panel
4	Auxiliary Fan Control	AUX FAN	EL	GAS EL	Select for auxiliary fan controlled by equipment Select for auxiliary fan controlled by panel
5	Reversing Valve Control	REV VAL	O	O B	Select for cool active reversing valve Select for heat active reversing valve **[Note 2]**
6	Auxiliary Stage Compressor Heat Lockout	COMP LOC	OFF	OFF ON	Select for Compressor runs with Auxiliary Heat Call Select for Compressor is off with Auxiliary Heat Call
7	Zone Fan Purge Time	PURGE	90	300 240 180 120 90 60 30 0	Select for 300 second purge into calling zone at call end Select for 240 second purge into calling zone at call end Select for 180 second purge into calling zone at call end Select for 120 second purge into calling zone at call end Select for 90 second purge into calling zone at call end Select for 60 second purge into calling zone at call end Select for 30 second purge into calling zone at call end Select for no purge into calling zone at call end
8	Short Cycle Protection	SCP	5	5 to 0	Selects a compressor short cycle protection delay of 5, 4, 3, 2 or zero minutes after a compressor call
9	Temperature Scale*	DEG	DEG F	DEG F DEG C	Select for Fahrenheit display Select for Celsius display
10	Outdoor Sensor Compressor Balance Point	COM BAL	NO	NO 0 to 50 (-18°C to 10°C)	Disables Compressor Balance Point Control Selects a Compressor Balance Point of 0 to 50° F (-18° C to 10° C) **[Note 3, 4]**
11	Outdoor Sensor Auxiliary Heat Balance Point	AUX BAL	NO	NO, 40 to 70 (4°C to 22°C)	Disables Auxiliary Heat Balance Point Control Selects an Auxiliary Heat Balance Point of 40 to 70° F (4° C to 22° C) **[Note 3, 4]**
12	Equipment Staging	STAGING	ZON	ZON TIM TST	Select to stage on number of zones calling (Setting 16) Select to stage on Zone Panel Timer Select to stage on Thermostat Staging Calls **[Note 5]**
13	Upstage Time	STAGTIM	10	5, 10, 15, 20, 25, 30	Select an upstage timer of 5-30 minutes
14	Priority Zone	PRIORTY	OFF	OFF 1 or 2	Select to have opposite calls answered in any zone Select zone 1 or 2 to limit calls so equipment will only service call matching last call of zone 1 or 2.
15	Opposite Mode Timer	OP MODE	15	15 to 60	Select the number of minutes to delay system changeover when zones are calling for heat and others zones are calling for cooling.
16	Zone to Activate Emergency Heat	EM HEAT	1	NO 1 or 2	Select to allow Emergency Heat from Thermostats Select to match the Zone on the main panel allowed to call emergency heat. **[Note 6]**

*Note: Changing #9 will reset settings 10, 11, 13 and 14 to their default value.

NOTES - Configuration

[1] Set thermostats to conventional.
[2] O/B selection on equipment must match thermostat O/B selection.
[3] Only available if MSH system type is selected.
[4] Only available if outdoor sensor is connected.
[5] Multi-stage thermostats must be used.
[6] Thermostat type must be heat pump.

3-Zone Controller Configuration

No.	Installer Setting (Notes follow table)	Display Indicator	Factory Default	Setting Options	Comments (More information follows this table)
1	System Type	SYSTEM	SSC	SSC MSC SSH MSH	Select for 1H/1C conventional equipment **[Note 1]** Select for 2H/1C up to 2H/2C conventional equipment **[Note 1]** Select for 1H/1C Heat Pump equipment Select for 2H/1C up to 3H/2C Heat Pump Equipment
2	Thermostat Type	TSTAT TP	CON	CON HP	Select for all thermostats conventional type Select for all thermostats heat pump type
3	1st Stage Fan Control	FAN 1	GAS	GAS EL	Select for 1st Stage fan controlled by equipment Select for 1st Stage fan controlled by panel
4	Auxiliary Fan Control	AUX FAN	EL	GAS EL	Select for auxiliary fan controlled by equipment Select for auxiliary fan controlled by panel
5	Reversing Valve Control	REV VAL	O	O B	Select for cool active reversing valve Select for heat active reversing valve **[Note 2]**
6	Auxiliary Stage Compressor Heat Lockout	COMP LOC	OFF	OFF ON	Select for Compressor runs with Auxiliary Heat Call Select for Compressor is off with Auxiliary Heat Call
7	Zone Fan Purge Time	PURGE	90	300 240 180 120 90 60 30 0	Select for 300 second purge into calling zone at call end Select for 240 second purge into calling zone at call end Select for 180 second purge into calling zone at call end Select for 120 second purge into calling zone at call end Select for 90 second purge into calling zone at call end Select for 60 second purge into calling zone at call end Select for 30 second purge into calling zone at call end Select for no purge into calling zone at call end
8	Supply Air Sensor Control	SA SENS	YES	YES NO	Select for Active Supply Air Sensor Select for Inactive Supply Air Sensor **[Note 3, 4]**
9	Temperature Scale*	DEG	DEG F	DEG F DEG C	Select for Fahrenheit display Select for Celsius display
10	Plenum High Limit Cutout	PLENUM SET HI LIMIT	135 Conv 120 HP (60°C Conv) (50°C HP)	100 to 180 (40 to 80°C)	Select the maximum Supply Air Temperature the system can reach before shutting off all heating stages **[Note 4, 5]**
11	Plenum Low Limit Cutout	PLENUM SET LO LIMIT	45 (18°C)	30 to 60 (0°C to 15°C)	Select the minimum Supply Air Temperature the system can reach before shutting off all cooling stages **[Note 4, 5]**
12	Short Cycle Protection	SCP	5	5 to 0	Selects a compressor short cycle protection delay of 5, 4, 3, 2, 1 or zero minutes after a compressor call
13	Outdoor Sensor Compressor Balance Point	COM BAL	NO	NO 0 to 50 (-18°C to 10°C)	Disables Compressor Balance Point Control Selects a Compressor Balance Point of 0 to 50° F (-18° C to 10° C) **[Note 6, 7]**
14	Outdoor Sensor Auxiliary Heat Balance Point	AUX BAL	NO	NO, 40 to 70 (4°C to 22°C)	Disables Auxiliary Heat Balance Point Control Selects an Auxiliary Heat Balance Point of 40 to 70° F (4° C to 22° C) **[Note 6, 7]**
15	Equipment Staging	STAGING	ZON	ZON TIM TST	Select to stage on number of zones calling (Setting 16) Select to stage on Zone Panel Timer Select to stage on Thermostat Staging Calls **[Note 8]**
16	Equipment Staging Lock	STAGLOK	2	2, 3	Selects the number of zones that must call before the equipment will upstage Zone Count (setting 15 = ZON)
17	Aux Heat Upstage Time	STAGTIM	10	5, 10, 15, 20, 25, 30	Selects an Aux Heat upstage timer of 5-30 minutes (second stage for conventional systems) **[Note 9]**
18	Second Stage Fan Control	G2 FAN	ZON	ZON STG	Select to Turn on Second Stage Fan on number of calling zones (Setting 19) Select to Turn on Second Stage Fan when second stage is activated
19	Second Stage Fan	G2 ZONES	2	2, 3	Select the number of zones that must call before the second stage fan will turn on
20	Priority Zone	PRIORTY	1	OFF 1 to 3	Select to have opposite calls answered in any zone Select zone 1 to 3 to limit calls so equipment will only service call matching last call of zone 1-3
21	Opposite Mode Timer	OP MODE	15	15 to 60	Select the number of minutes to delay system changeover when zones are calling for heat and others zones are calling for cooling.
22	Zone to Activate Emergency Heat	EM HEAT	1	NO 1 to 3	Select to allow Emergency Heat from Thermostats Select to match the Zone on the main panel allowed to call emergency heat. **[Note 10]**

*Note: Changing #9 will reset settings 10, 11, 13 and 14 to their default value.

NOTES - Configuration

[1] Set thermostats to conventional.

[2] O/B selection on equipment must match thermostat O/B selection.

[3] Disable will not show plenum temperature.

[4] Only available if optional supply air sensor is connected (Part No. 149156)

[5] Only available if supply air sensor is enabled.

[6] Only available if MSH system type is selected.

[7] Only available if outdoor sensor is connected.

[8] Multi-stage thermostats must be used.

[9] For multi-stage heat pump equipment, Y2 is automatically upstaged 5 minutes after the initial call for heating and cooling.

[10] Thermostat type in option 2 must be heat pump.

4-Zone Controller Configuration

No.	Installer Setting (Notes follow table)	Display Indicator	Factory Default	Setting Options	Comments (More information follows this table)
1	System Type	SYSTEM	SSC	SSC MSC SSH MSH	Select for 1H/1C conventional equipment **[Note 9]** Select for 2H/1C up to 3H/2C conventional equipment **[Note 9]** Select for 1H/1C Heat Pump equipment Select for 2H/1C up to 4H/2C Heat Pump Equipment
2	Thermostat Type	TSTAT TP	CON	CON HP	Select for all thermostats conventional type Select for all thermostats heat pump type
3	1st Stage Fan Control	FAN 1	GAS	GAS EL	Select for 1st Stage fan controlled by equipment Select for 1st Stage fan controlled by panel
4	Auxiliary Fan Control	AUX FAN	EL	GAS EL	Select for auxiliary fan controlled by equipment Select for auxiliary fan controlled by panel
5	Reversing Valve Control	REV VAL	O	O B	Select for cool active reversing valve Select for heat active reversing valve **[Note 7]**
6	Auxiliary Stage Compressor Heat Lockout	COMP LOC	OFF	OFF ON	Select for Compressor runs with Auxiliary Heat Call Select for Compressor is off with Auxiliary Heat Call
7	Zone Fan Purge Time	PURGE	90	300 240 180 120 90 60 30 0	Select for 300 second purge into calling zone at call end Select for 240 second purge into calling zone at call end Select for 180 second purge into calling zone at call end Select for 120 second purge into calling zone at call end Select for 90 second purge into calling zone at call end Select for 60 second purge into calling zone at call end Select for 30 second purge into calling zone at call end Select for no purge into calling zone at call end
8	Supply Air Sensor Control	SA SENS	YES	YES NO	Select for Active Supply Air Sensor Select for Inactive Supply Air Sensor **[Note 5]**
9	Plenum High Limit Cutout	PLENUM SET HI LIMIT	170	100 to 180	Select the maximum Supply Air Temperature the system can reach before shutting off all heating stages **[Note 6]**
10	Plenum Low Limit Cutout	PLENUM SET LO LIMIT	45	30 to 60	Select the minimum Supply Air Temperature the system can reach before shutting off all cooling stages **[Note 6]**
11	Short Cycle Protection	SCP	5	5 to 0	Selects a compressor short cycle protection delay of 5, 4, 3, 2 or zero minutes after a compressor call
12	Outdoor Sensor Compressor Balance Point	COM BAL	NO	NO 0 to 50	Disables Compressor Balance Point Control Selects a Compressor Balance Point of 0 to 50° F **[Note 1, 2]**
13	Outdoor Sensor Auxiliary Heat Balance Point	AUX BAL	NO	NO, 40 to 70	Disables Auxiliary Heat Balance Point Control Selects an Auxiliary Heat Balance Point of 40 to 70° F **[Note 1, 2]**
14	Equipment Staging	STAGING	ZON	ZON TIM TST	Select to stage on number of zones calling (Setting 15) Select to stage on Zone Panel Timer Select to stage on Thermostat Staging Calls **[Note 8]**
15	Equipment Staging Lock	STAGLOK	2	2 - # of zones	Selects the number of zones that must call before the equipment will upstage Zone Count (setting 14 = ZON)
16	Second Stage Fan Control	G2 FAN	ZON	ZON STG	Select to Turn on Second Stage Fan on number of calling zones (Setting 17) Select to Turn on Second Stage Fan when second stage is activated
17	Second Stage Fan	G2 ZONES	2	2 - # of zones	Select the number of zones that must call before the second stage fan will turn on
18	Priority Zone	PRIORTY	1	OFF 1 to 4	Select to have opposite calls answered in any zone Select zone 1 to 4 to limit calls so equipment will only service call matching last call of zone 1-4
19	Opposite Mode Timer	OP MODE	15	15 to 60	Select the number of minutes to delay system changeover when zones are calling for heat and others zones are calling for cooling.
20	Zone to Activate Emergency Heat	EM HEAT	1	NO 1 to 4	Select to allow Emergency Heat from Thermostats Select to match the Zone on the main panel allowed to call emergency heat. **[Note 3]**
21	Fire Alarm Normal Active / Normal Inactive	FIRE ALM	NI	NI NA	Select for a normally inactive (Open) fire relay Select for a normally active (Closed) fire relay **[Note 4]**

NOTES - Configuration

[1] Only available if MSH system type is selected.

[2] Only available if outdoor sensor is connected.

[3] Thermostat type must be heat pump.

[4] All equipment and fans will shut down and all dampers will power close

[5] Disable will not show plenum temperature and will prevent staging by temperature.

[6] Only available if supply air sensor is enabled.

[7] O/B selection on equipment must match thermostat O/B selection.

[8] Multi-stage thermostats must be used.

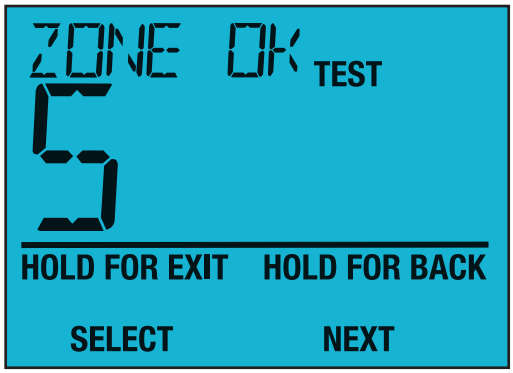
[9] Set thermostats to conventional.

2-Zone Expander Panel Configuration: Adding More Zones

The 4-zone panel can be expanded to up to 32 zones with 4 zones on the main panel and 28 total expansion zones. Additional zones must have power and communication wires to be recognized and controlled by the main panel. To add more zones, complete all wiring, follow instructions included with expander panel and start the main panel test mode.

Start the panel test mode to add additional zones:

1. Ensure all zones are installed, zone addresses are set, wiring is complete and power is applied to the main panel and expansion panels.
2. Press **TEST** on main panel for 3 seconds and release.
3. Press **SELECT** once for each new zone added. New zones must be added in blocks of two. ***NOTE:*** *After second new zone is added, Expander LED will change from Red to Green, and ZONE OK will appear on the main panel display.*
4. If new zones do not appear, check wiring and ensure expansion zones have power.
5. Press **HOLD FOR EXIT** for 3 seconds to complete adding zones.



The expansion zones may be wired to either the top or bottom communication terminals on the main panel or to the top or bottom communication terminals on the expansion panel. This wiring flexibility allows the installer to choose the most flexible, cost effective wiring for the installation.

Each expansion panel must have a 5 Wire connection for proper communication. It is not necessary to use shielded wire for the panel to panel connection. 18 - 20 Gauge solid thermostat wire or similar is acceptable. When wiring the expansion panel(s) be sure to connect the terminals from one panel to the next using the following terminal connections:

MAIN Panel to Expander

Main Panel		Expansion Panel
COM1	⟷	COM1
COM2	⟷	COM2
GND	⟷	GND
COM3	⟷	COM3
COM4	⟷	COM4

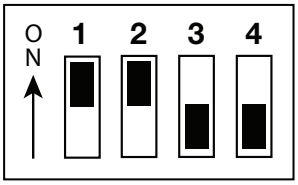
Expander to Expander

Expansion Panel		Expansion Panel
COM1	⟷	COM1
COM2	⟷	COM2
GND	⟷	GND
COM3	⟷	COM3
COM4	⟷	COM4

Zone Addressing

Use the following instructions to identify the zones on the zone panel expander. No other configuration is necessary on the zone panel expander. Carefully slide the dip switches to match the new zone numbers.

Use the open area provided on the expander panel to mark the new zone numbers. When setting the switches to identify the expander panel, use a pen or small screwdriver. Do not use a pencil, which may contain conductive material in the writing point.

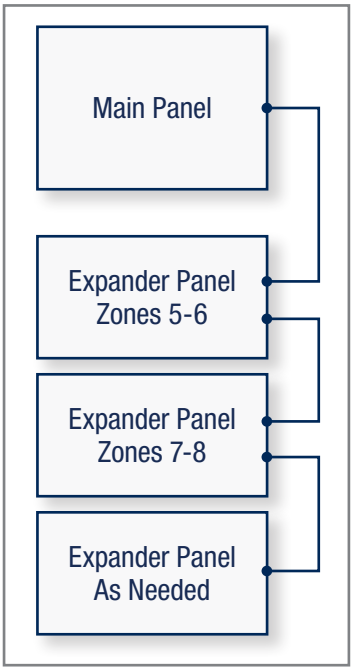


Example Switch Position for Zones 15 and 16

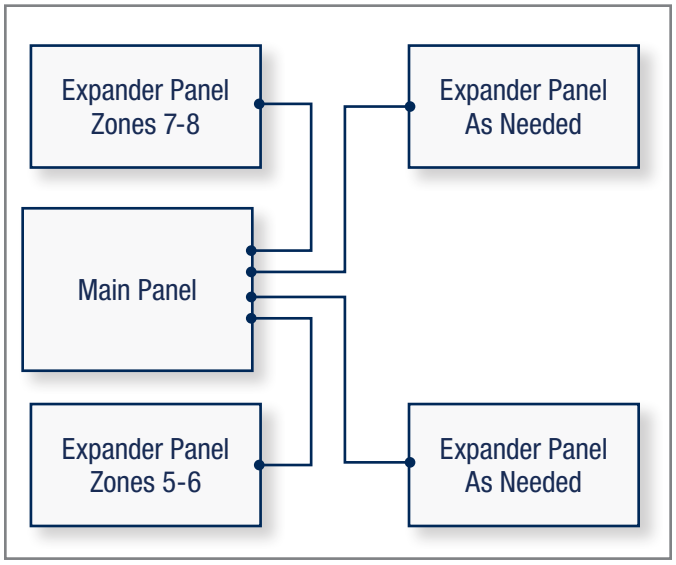
	Switch Position			
Zone ID	**1**	**2**	**3**	**4**
5 and 6	OFF	OFF	OFF	OFF
7 and 8	ON	OFF	OFF	OFF
9 and 10	OFF	ON	OFF	OFF
11 and 12	OFF	OFF	ON	OFF
13 and 14	OFF	OFF	OFF	ON
15 and 16	ON	ON	OFF	OFF
17 and 18	ON	OFF	ON	OFF
19 and 20	ON	OFF	OFF	ON
21 and 22	OFF	ON	ON	OFF
23 and 24	OFF	ON	OFF	ON
25 and 26	OFF	OFF	ON	ON
27 and 28	ON	ON	OFF	OFF
29 and 30	ON	ON	OFF	ON
31 and 32	ON	OFF	ON	ON

Example Expander Panel Wiring

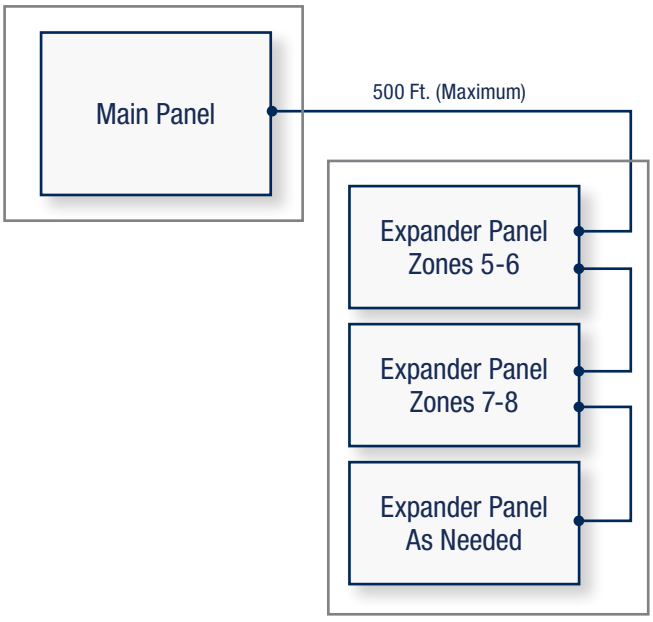
Daisy Chain
All Zones Located at Main Panel



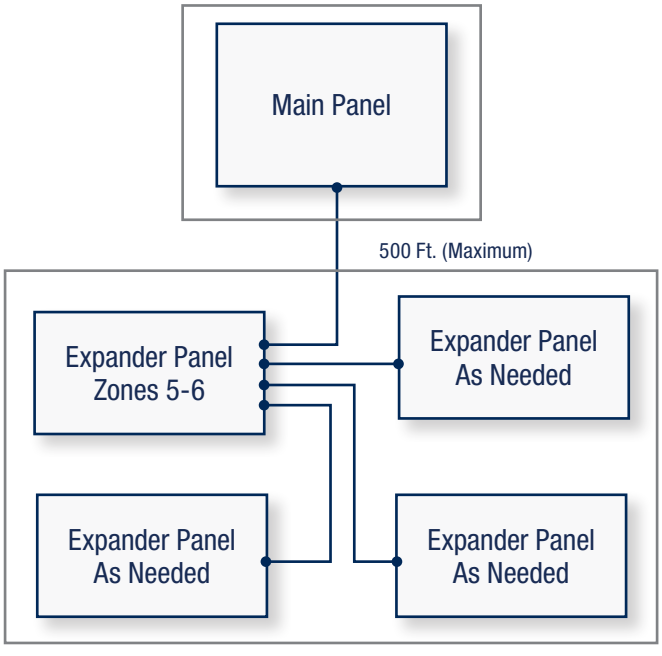
Star Wiring
All Zones Located at Main Panel



Daisy Chain
Zones Located Remote to Main Panel
(Up to 500 Feet)



Daisy Chain
Zones Located Remote to Main Panel,
Remote Panels Wired in Star Configuration



NOTE: To prevent possible interference do not run low voltage wiring along side 120 VAC wiring or magnetic ballasts.

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Rev. 04-03-25