INSTALLATION, OPERATION & APPLICATION GUIDE

for 9330-33*

MULTIPLE ZONE THERMOSTAT CONTROLLER SYSTEM

*Last digit represents specific model number

RV Products
A Division of AIRXCEL, Inc.

Note: Thermostat may be black with white markings or white with gray markings as shown.

Caution

This thermostat should be installed and programmed by trained technicians only. Adhere to all local and national codes. Disconnect all power to the system before installing, removing, or cleaning.

Application

The **9330-33*** zone thermostats create a climate control system that allows the operator to control up to four air conditioners or heat pumps and up to two heating sources with only one thermostat.

The thermostat system will operate in both heat and cool modes, but will not allow the user to run simultaneously in heat and cool mode. Depending on the system that has been installed and programmed into the thermostat, each zone can be set up for a combination of the following systems: cool only units, heat/cool units, heat pump units and heating appliances.

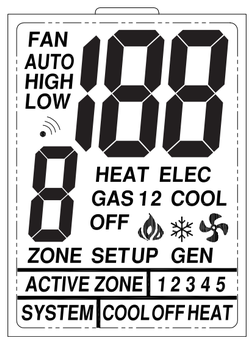
This thermostat will work with any **RV Products** air conditioner that is controlled with an **RV Products** zone control box.

A zone is an area of a motor coach that is climate controlled. This system can control up to four zones in a motor coach.

Operation

All **9330-33*** thermostats function identically. The only difference is the color of the thermostat.

Description of Controls: Liquid Crystal Display (LCD)



The LCD display screen is the main interface between the user and the thermostat. This will display which zone the user is looking at. When the system is first powered up, the thermostat determines how many zones are connected to the system and only displays the zones detected.

The LCD also displays the mode that the particular zone is currently in. These will range from Cool Auto, Cool High, Cool Low, Fan High, Fan Low and Off in cooling, and from Gas Heat, Heat Elec (heat pump or electric strip heat) and Off in heating.

Also, the LCD displays the room temperature and setpoint temperature in the displayed zone. If the word Set is shown, then the setpoint or desired temperature is shown. If the word Set is not shown, then the temperature shown is the actual room temperature in the displayed zone.

Note: *The thermostat is designed to display temperatures from 41°F to 110°F however it will operate from -40°F to +175°F. If temperature is between -40°F and 41°F then 41 will be displayed as the room temperature. Also if the temperature is between 110°F and 175°F then 110 will be displayed. When temperature extremes fall outside the operating limits of the thermostat, "Er" will display in the temperature space of the LCD to show that current ambient temperature has exceeded thermostat capabilities. Additionally, if there is a problem with one of the remote temperature sensors, "Er" will display on the thermostat.*

Note: *If the system is in cooling and is programmed to have only a heating appliance connected in a zone then the thermostat will still display the room temperature in that zone. But the user will not be able to operate any cooling appliance in that zone because there is not one connected in that zone. Additionally, if the system is in heating and is programmed to have only a cooling appliance connected in a zone then the thermostat will still display the room temperature in that zone, but the user will not be able to operate any heating appliance in that zone because there is not one connected in that zone. Your homeowner packet should contain literature that will list what heating and cooling appliances are installed in each zone of your motor home.*

Setpoint Buttons

The Setpoint buttons are located to the right and below of the LCD display. These buttons adjust the desired temperature setpoint up and down. To change the setpoint press **UP** or **DOWN** once. This displays the word Set on the LCD and puts the system in the mode to change the setpoint. Then, each press of the **UP** or **DOWN** changes the setpoint up or down for the displayed zone by one degree per press of the button.

Up button

Down button

The setpoints are not adjustable when the thermostat is turned off. Also setpoint is not adjustable for the displayed zone when the displayed zone is set to run Fan High or Fan Low in that zone, or if the displayed zone is turned to Off.

The setpoints are stored permanently in memory for each zone in both heating and cooling. This allows the user to switch between heating and cooling at season changes and still have the same settings as the previous year.

SYSTEM Button

SYSTEM

The **SYSTEM** button is used to put the thermostat into either heating, cooling or off.

When in **OFF**, the system will not operate any heating or cooling appliances. However, the LCD display will still show the room temperatures in each zone.

When in **HEAT**, the system is in heating. The heating appliance selected will operate when the zone room temperature is one degree below the desired setpoint temperature. The heating appliance will continue to run until the zone room temperature is one degree above the desired setpoint temperature.

When in **COOL**, the system is in cooling. The cooling appliance connected in the particular zone will operate according to the mode the zone is set to.

ZONE Button

ZONE

This button allows the user to toggle through the different area zones.

By pressing the **ZONE** button the user toggles through each zone. When the system is first powered up, it determines how many zones are in the system and only displays the detected zones.

MODE Button

MODE

By pressing the **MODE** button, the user toggles through the different modes for the system. When in cool, the thermostat will toggle through the following modes: Cool Auto, Cool High, Cool Low, Fan High, Fan Low and Off. When in heat, the thermostat will toggle through the following modes: Gas Heat, Heat Elec and Off. However, this will only happen if the system has both gas and electric heat in a zone. For instance, if a system only has an air conditioner and a gas furnace in a zone, then when set to heat, the user will only be able to toggle through Gas Heat and OFF because there is not electric heat available. Furthermore, if the system does not have an appliance connected in a zone, then the user will not be able to toggle modes in that zone.

Setting the Thermostat

The thermostat default setting for each zone upon initial startup is 78°F for cooling and 68°F for heating. The fan speed for the cooling mode is **COOL AUTO**, which is set to vary the fan speed according to the cooling needs. The fan speed for the heating mode is dependent on the type of heat that is installed for each zone and can not be changed.

Note: *The temperature setpoint cannot be adjusted in the following situations: when in **OFF**, when the zone is turned off for either heating or cooling mode or when the fan is set to be running continuously in either high or low speed.*

Set Temperature

1. Use the **SYSTEM** button to select either **COOL** or **HEAT**. The current room temperature for that zone will display.
2. Press the **MODE** button to select the operation your desire.
3. Press either the **UP** or **DOWN** arrow once to place the thermostat in the **SET** mode. At this point the thermostat displays the current setpoint for the displayed zone. (**SET** will show on the LCD display).
4. Press the appropriate arrow button to change the set point temperature to the desired setting. Each press of the up arrow will increase the setpoint temperature by one degree. Each press of the down arrow will decrease the setpoint temperature by one degree.
5. Pressing **ZONE** button to toggle to the next zone or letting the thermostat sit idle for a few seconds will store the temperature setting in the thermostat memory.
6. This process should be done for each zone.

Changing Temperature Scale

Press both **SYSTEM** and **MODE** buttons in for 5 seconds. Temperature changes from °F to °C or °C to °F.

Set Fan Speed for Cooling Mode

1. Use the **SYSTEM** button to select cool option.
2. Pressing the **MODE** button will toggle through the available speeds.
   - "**COOL AUTO**" setting allows the fan speed to vary depending on the cooling needs. This is the default setting.
   - "**COOL HIGH**" or "**COOL LOW**" setting will set the fan speed to run continuously at high or low, but the upper unit will cycle when cooling is needed.
   - "**FAN HIGH**" and "**FAN LOW**" setting will set the fan to run continuously at high or low speed. The upper unit will not run to produce cooling. Setpoint is not adjustable in this mode.
   - "**OFF**" will turn the upper unit off for zone displayed. By continuing to press the "**MODE**" button, you can toggle through the settings for the zone displayed until you have determined the setting you desire. Setpoint is not adjustable in this mode.
3. Once you have established the settings for Zone 1, press the ZONE button to store settings in thermostat memory and proceed to the next zone.
4. Repeat steps for each zone.

System	Mode	Zones	Demand	Control Box HP Jumper	Operation of Unit
Off	N/A	1 - 4	N/A	N/A	No units operating in this mode, LCD is displaying temperature of zone. User can toggle thru zones to see temperature in each zone (setpoint can't be adjusted)
Cool	Cool Auto	1 – 4	No	N/A	Nothing is operating since there is no cooling demand, LCD is displaying temperature of zone
Cool	Cool Auto	1 – 4	Yes	N/A	Compressor is energized, fan is energized
Cool	Cool High	1 – 4	No	N/A	Fan high is energized
Cool	Cool High	1 – 4	Yes	N/A	Compressor is energized, fan high is energized
Cool	Cool Low	1 – 4	No	N/A	Fan low is energized
Cool	Cool Low	1 – 4	Yes	N/A	Compressor is energized, fan low is energized
Cool	Fan High	1 – 4	N/A	N/A	Fan high is energized (setpoint cannot be adjusted)
Cool	Fan Low	1 – 4	N/A	N/A	Fan low is energized (setpoint cannot be adjusted)
Cool	Off	1 – 4	N/A	N/A	Nothing operational in zone (setpoint cannot be adjusted)
Heat	Elec	1 – 4	No	Non HP	Nothing is operating in this mode since there is no heating demand
Heat	Elec	1 – 4	Yes	Non HP	Fan is energized, heat strip is energized
Heat	Elec	1 – 4	No	Hp	Nothing is operating in this mode since there is no heating demand
Heat	Elec	1 – 4	Yes	Hp	High fan energized, compressor & reversing valve energized
Heat	Gas	1 – 4	No	N/A	Nothing is operating in this mode since there is no heating demand
Heat	Gas	1 – 4	Yes	N/A	Gas heat energized
Heat	Off	1 – 4	N/A	N/A	Nothing operational in zone (setpoint cannot be adjusted)

Notes:
1) When 2nd or 3rd stage heating is activated, it stays on until setpoint is satified. When heating stage is running for more than 20 minutes without reaching setpoint then the next available heating stage will be energized.
2) The word "GAS" will display on the LCD when 2nd stage heat (low gas furnace) is operating.

Note: *There is a built-in delay between programming and operation of the new program. (Example: changing fan speed to low from high, it will take approximately 10 seconds until the fan speed is changed.) The thermostat must sit idle for five seconds before the signal is sent to the control board. The thermostat will then send the signal to the control board in the control box, then the signal is verified before the change is put into operation.*

This delay also helps to eliminate "communication noise problems".

Note: *Setting **SYSTEM** button to OFF position will shut down all unit operations.*

This table lists the operations of the thermostat system in each of the possible settings. The chart shows the operations for all types of appliances possible. All systems will not necessarily have all available options.

The chart to the left shows the system functions with the 9330-33 thermostats.*

Heat Pump Lockout

If the system has both gas heat, (LP furnace or hydronic heat) and electric heat,(electric strip heat or heatpump) appliances installed in the same zone, then the system will automatically switch from Heat Electric to Gas Heat if the electric heat can not satisfy the desired setpoint temperature. Because of the nature of the electric heating systems, they tend to be less effective the lower the outside temperature. Therefore, at low temperatures, your electric strip heat or heatpump may not be able to satisfy the setpoint. The system switches from Heat Elec to Gas Heat when the actual zone room temperature is five degrees or more below the desired setpoint temperature. If this happens three times in a row, the electric heat is locked out for two hours and the gas heat is the primary heat source. When this happens, the LCD will continue to display Elec but the word Gas will flash on the LCD to alert the user that the electric heat source is locked out. See table below for an example of how the heatpump lockout system works.

Electric heat algorithm to bring on gas furnace as 2nd stage heat (Zones 1 & 2 only).

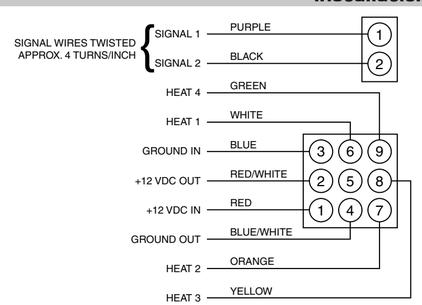
Setpoint	Indoor Temp.	Operation
70	70+	Nothing is operating
	69	Electric heat turns on (primary heat source)
	71	Electric heat turns off (thermostat satisfied)
	69	Electric heat turns on
	65	Gas furnace turns on (first strike for 2nd stage elec heat counter) *see note*
	71	Electric heat and gas furnace turn off
	69	Electric heat turns on
	65	Low gas furnace turns on (second strike for 2nd stage elec heat counter) *see note*
	71	Electric heat and gas furnace turn off
	69	Electric heat turns on
	65	Gas furnace turns on and electric heat turns off (2nd stage elec heat counter reaches 3rd strike and the electric heat is locked out for 2 hours) *see note*
	71	Gas furnace turns off (thermostat satisfied)
	69	Gas furnace turns on (becomes primary heat source)
	71	Gas furnace turns off (thermostat satisfied)
		After 2 hour lockout
	69	Electric heat turns on (resumes as primary heat source)
	65	Electric heat turns off and low gas furnace turns on (becomes primary heat source and the electric heat is locked out for another 2 hours)
	71	Gas furnace turns off (thermostat satisfied)
		After 2 hour lockout
	69	Electric heat turns on (resumes as primary heat source)
	71	Electric heat turns off (thermostat satisfied) (2nd stage elec heat counter is reset anytime the electric heat satisfies the thermostat setpoint and does not need the gas furnace)

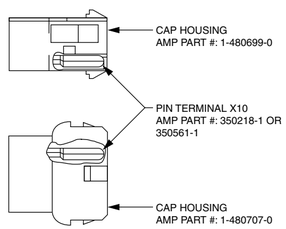
Note: The word "gas" will flash on LCD when 2nd stage heat is operating.

Installation

Wiring the System

OEM must supply these mating parts to connect these thermostats as shown below. A minimum wire size of AWG 18 must be used for this system. Check with appliance manufacturers for exact wire size needed for each appliance.





Thermostat and Room Temperature Sensor Location

This system is designed to work one of two ways. A built-in temperature sensor on the thermostat can control zone 1. In this case the thermostat must be located in zone 1. On the other hand, a remote temperature sensor can be connected to zone 1. This situation would allow the thermostat to be located virtually anywhere in the coach as long as the user can get to it to operate it. Every zone other than zone 1 must always have a remote temperature sensor to control the system.

This thermostat is a sensitive instrument. For accurate temperature control and comfort, the following considerations should be taken into account when locating both remote sensors and the thermostat if the thermostat is to be used as the zone 1 temperature sensor.

1. Locate on an inside wall about five feet above the floor. Pick a dry area where air circulation is good, but not in line with exterior doors.
2. Do not install where there are unusual heating conditions, such as direct sunlight, heat producing appliances (television, radio, wall lamps, etc.) or a furnace/air conditioner supply air register.

Attaching the Wall Thermostat and Room Temperature Sensors

1. Attach the external room sensor to the wall using (2) #6 x 3/4 screws.
2. The external room sensor is wired to the two terminals marked “ROOM” on the control box low voltage strip.
3. Separate the thermostat cover from the base by gently pulling on the left and right sides.
4. Connect motor coach wiring harness to thermostat wire plug lead.
5. Attach the new thermostat base to the wall at the desired mounting location using (2) #6 x 3/4 screws.
6. Re-attach thermostat cover to thermostat after fastening thermostat to wall.

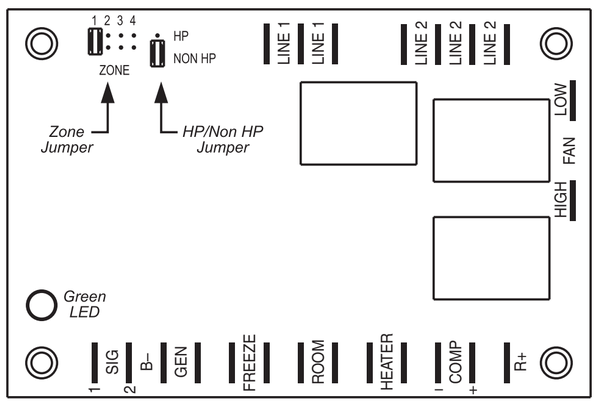
Setting the Upper Control Board

DANGER: *When adjusting the jumpers on the upper unit control board be sure the line Voltage, (115 VAC) and the control Voltage, (12 VDC) are disconnected from the board. Failure to do this could result in injury or death.*

Each zone must be controlled by an upper unit control board. When installed, this board is located in the return air plenum of the air conditioner (see installation instructions for the air conditioner control box). When installing the system, the upper unit control board must have two jumpers installed to operate properly. First of all, the zone jumper must be set according to which zone the board is to control. We recommend starting at the front of the coach as zone 1 and progressing towards the rear. If the board is to control zone 1, then the jumper must be across the two jumpers labeled 1 and so on for each zone (see drawing below). The second jumper that must be installed is the HP/NON-HP jumper (see drawing below). This tells the system whether the unit being controlled is a heat pump or not. If the unit being controlled is a heat pump, the jumper must be between the center post and the one closest to the HP. Likewise if the unit being controlled is not a heat pump, then the jumper must be between the center post and the one closest to NON-HP. For further explanation, see installation instructions for the control box.

The green LED lights when there is adequate control voltage, (12 VDC) at the board. The green LED will initially flash the number of times corresponding to the zone jumper setting. The green LED will stop flashing when communication with the thermostat is established.

For further explanation, see troubleshooting section of manual.



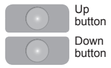
Programming the Thermostat

CAUTION: *All zones boards must be wired and should have 12 VDC at each one before programming can be done. The system only needs to be programmed once. The programmer must know what appliances are installed in each zone before proceeding with programming. If the system is programmed incorrectly the user will not be able to operate some of the climate control appliances that are installed.*

To program each zone for the type of heating and cooling installed, follow the sequence outlined below.

Press the **SYSTEM** button until in **OFF**.

Put the thermostat in the programming mode by holding down simultaneously the up and down push buttons (that are located to the right of the LCD) until words start flashing on the LCD, which should be about 5 seconds.



Press the “**ZONE**” button until zone 1 is displayed on the LCD.

Press the “**MODE**” button until the correct setup is shown for that zone.

When in the programming mode, the following sequence of options will be toggled through in this sequence:

If these applications are connected:	Then thermostat LCD display that should be selected is:
A/C	Cool
A/C Gas Heater	Cool Gas Heat
Gas Heater	Gas Heat
A/C Gas Heater HP or Strip Heat	Cool Gas Heat Elec
A/C HP or Strip Heat	Cool Heat Elec

Toggle through all options, then stop at the desired one. Once the correct setup is selected for zone 1, press the **ZONE** button and repeat the process for each zone that is connected to the system. After the correct settings are selected for each zone that is hooked up, press the **SYSTEM** button once to exit from programming. This will exit the programming mode and the setup will be stored in memory indefinitely.

Note: *If two or more upper unit control boards have been set to the same zone, the units will operate the same as one another.*

General

Once temperature settings have been set for each zone in heating and cooling, the thermostat memory will retain these settings during seasonal changovers and times of no electrical power.

A connection for an “Auto Generator Start” appliance is included on the upper unit control board that is mounted in the return air of the air conditioner or heat pump. This calls for the generator to run when calling for the compressor for cooling or heating, or when calling for strip heat. Note that the generator will not be called for fan only operation or for gas heat operation.

The thermostat wiring is factory installed by the OEM (original equipment manufacturer). The thermostat connects to the upper unit(s) with a 9-pin plug and 2-pin plug (see system wiring diagram). The OEM must supply the 12 VDC wiring and the heating appliance control wiring which connects to the 9-pin plug on the thermostat. **RV Products** suggests the thermostat wiring be a minimum of 18 gauge.

Zone arrangement should be set with the front of the vehicle as zone 1 and progress toward the rear of the coach.

The OEM installed the upper control boxes for the zone system at the factory and programmed the thermostat for the system that is installed in this motor coach. Before programming the thermostat, it is imperative that the programmer knows the types of appliances that have been installed in the motor coach in each zone. The heating appliance control circuit must not exceed 1 Amp.

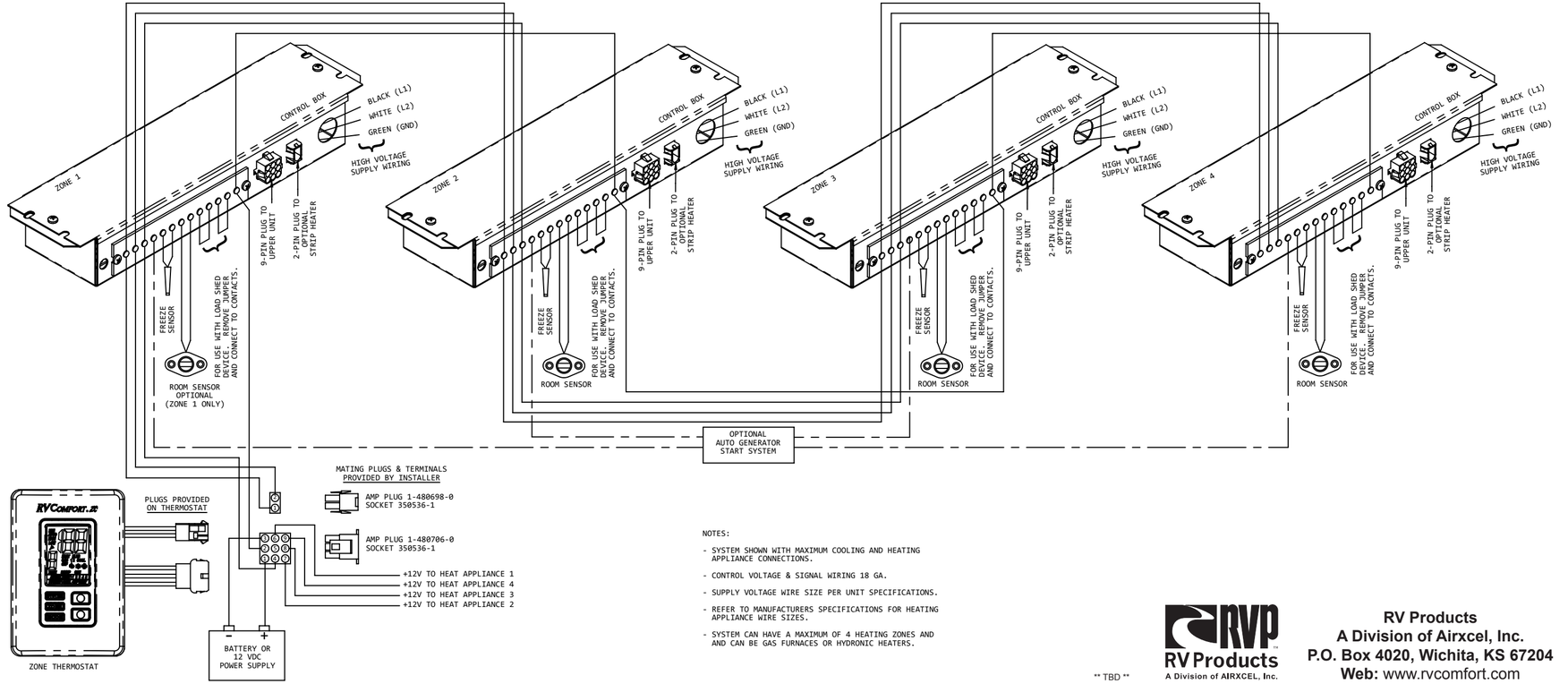
Control Box

The control box mounted in the return air plenum has an opening that allows viewing of the green LED on the control board. The green LED, when lighted, indicates that the control voltage is adequate to run the system. When the LED is not lighted, there is a problem with the 12 Volt DC control voltage and it must be serviced by a trained technician.

Troubleshooting

Symptom	Remedy
No display on LCD	No power to thermostat (Remove ceiling assembly grille and look in round opening of control box for green LED light. Light not displayed, there is no power to control box).
Heat or Cool displays on thermostat, but can’t modify settings	Appliances may not be installed on this coach, check homeowners packet
“Er” displaying on thermostat	Current temperature may be outside display range of thermostat Extenal room sensor circuit may be disrupted. Contact service technician.
Temperature does not change on thermostat when unit is running	Current temperature may be outside display range of thermostat (thermostat designed to show 41°F-110°F)
Appliances not responding to thermostat setting changes	Zone or appliance settings on upper control boards may not be correct for zones or appliances installed Built-in delay for communication signal
Setpoint cannot be adjusted	Check setting of thermostat (Setpoint cannot be adjusted when SYSTEM is set to OFF, Cool or HEAT mode is set to OFF, the zone is turned OFF, or FAN is set to run HIGH or LOW continuously)
GAS flashing on LCD display	Backup heat source is energized to supplement primary heat
Backup heat source running with Heat Pump idle	Heat pump is unable to keep up with heating demand, system locks out heat pump for 2 hours and backup heat becomes primary heat source for those 2 hours
Two or more units have identical operation	Upper unit control boards may be set to same zone. Have service technician check.
Unit not responding	Communication signal lost to that zone (Signal wire might have vibrated loose). The systemdoes not operate below 9.75 VDC.

System Wiring Diagram



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