



Safety & Installation Instructions

Model 6401

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SAFETY INSTRUCTIONS

Read this installation manual before beginning installation of the Aprilaire® Zoned Comfort Control.
For questions call Aprilaire customer support at (800) 334-6011 or visit AprilairePartners.com.

WARNING

1. 120 volts may cause serious injury from electrical shock. Leave power disconnected until installation is complete.
2. The zone panel is designed for indoor use only. Do not expose any components to moisture.

CAUTION

1. Turn off the system power before removing or installing any wires into the terminals of any component on the system. Wiring with a live circuit can lead to electrical shorts that can damage components.
2. Installation must be done in accordance with all applicable codes.
3. Installer should touch a grounded metal object before handling the zone panel. This will prevent any static discharge that may cause damage.
4. A zone panel may not control temperature properly unless the heating and cooling system is properly sized and balanced.
5. Insufficient air flow or excessive temperatures through the heating and cooling system could result in equipment damage. Refer to the manufacturer's recommendations for minimum safe airflow and temperature requirements.
6. Install an outdoor thermostat to prevent non-seasonal equipment starts if using auto changeover thermostats.
7. Do not mount the zone panel on any exterior wall or equipment supply ductwork.
8. Do not install control panel where temperatures exceed 158°F (70°C) or are below 32°F (0°C), non-condensing.
9. Improper system installation could cause water damage from frozen pipes. Check system operation after installation.

SPECIFICATIONS

ELECTRICAL	
Input voltage	20-30 VAC
Power requirement for control panels and thermostats only	40 VA
Damper voltage	18-30 VAC
Power requirement for dampers	10 VA per damper
Fuse size	3 amps

ENVIRONMENTAL	
Temperature (operating)	32°F to 158°F (0°C to 70°C)
Temperature (shipping)	-40°F to 165°F (-40°C to 74°C)
Humidity	5% to 90% non-condensing

CONTROL PANEL LAYOUT

1. DAMPER POWER

- a. Dedicated 24 VAC power input for 2- or 3-wire dampers.
- b. Damper LED's – Red LEDs light when dampers are closed.
- c. Damper output terminals for 2- or 3-wire dampers.

2. INPUT TO EXPANSION PANEL (EP_IN)

- a. Input from 6404 zone panel or previous 6401 expansion panel.
Note: Wiring polarity is critical in establishing communication link.
- b. The POWER LED light blinks at once per second with power applied. If communications are interrupted, the LED will stop blinking and remain solid green. If 6404 zone panel is not powered, LED will remain off.

3. OUTPUT TO NEXT EXPANSION PANEL (EP_OUT)

Output from this 6401 expansion panel to the input of the next 6401 expansion panel. The green power LED will be solid if communications cannot be established. **Note:** Wiring polarity is critical in establishing a communication link to the next expansion panel.

4. EXPANSION PANEL ADDRESS

Address dip switches. Each 6401 expansion panel must have a unique address (1, 2, 3 or 4) or it will not communicate with the 6404 zone panel.

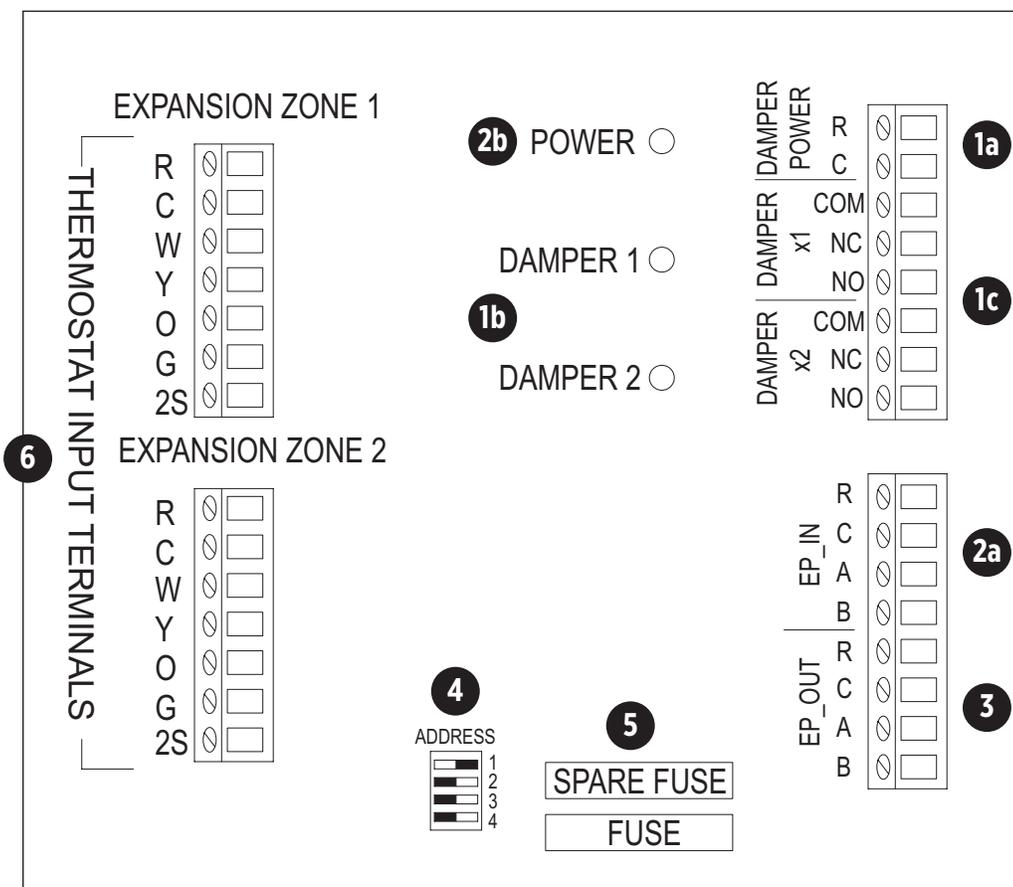
5. FUSE

3 amp fast acting fuse.

6. THERMOSTATS

Thermostat inputs.

FIGURE 1 – EXPANSION PANEL LAYOUT



CONTROL PANEL INSTALLATION

⚠ CAUTION

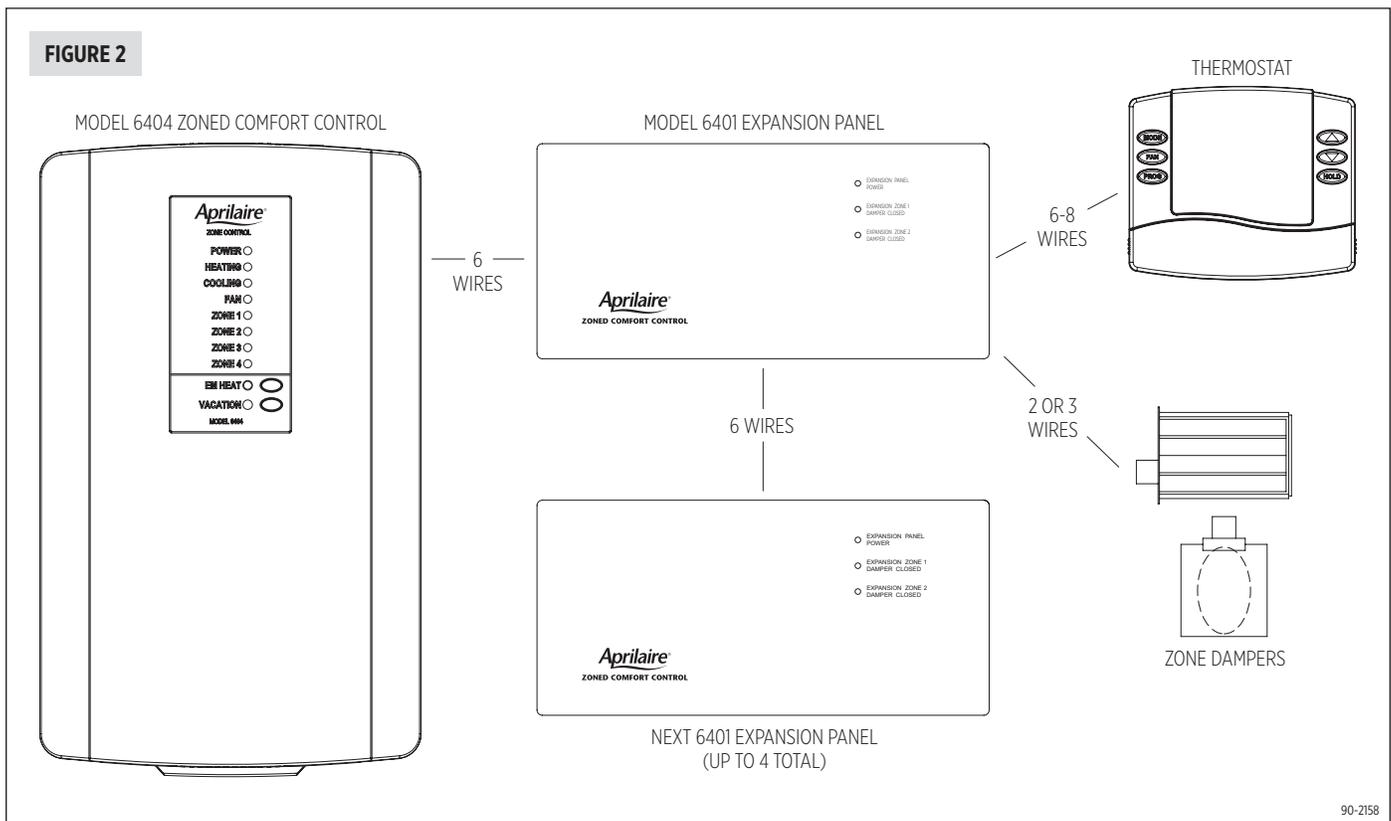
Installer must touch a grounded metal object before handling the expansion panel to avoid any static discharge that may cause damage.

RUN WIRE FOR SYSTEM

WIRE TYPE: Standard 18-24 gauge stranded or solid thermostat wire can be used for all wire runs.

IMPORTANT: Avoid running thermostat, expansion panel and sensor wire alongside line voltage and high current carrying conductors (motors). This will prevent potential interference and ensure proper operation of the Zoned Comfort Control system.

FIGURE 2



MOUNT THE EXPANSION PANEL

NOTE: Mount in a location where the temperature will not exceed 158°F (70°C) and will not drop below freezing (32°F or 0°C). Do not mount on foundation walls, or on the HVAC supply ductwork. These locations can cause the enclosure to become cooler than the surrounding air which can cause moisture to condense on the enclosure.

Four holes are provided on the back of the unit for mounting.

1. To remove cover, pull straight toward you.
2. Use #8 or #10 screws (field supplied) to mount the base.

SET EXPANSION PANEL ADDRESS

There are four address dip switches located on the 6401 panel. Each 6401 expansion panel (up to four total) must be assigned its own unique address, 1 through 4. Refer to **TABLE 1** for dip switch settings.

To set the address, move only one dip switch to the right toward the desired number. The remaining three dip switches must remain in the OFF position, to the left.

If addresses are incorrectly set or are duplicated, the expansion panel will not communicate with the 6404 zone panel and the green power LED will remain solid. Power must be cycled after any address changes, as these settings are only checked by the controller at startup.

Dip Switch Settings	1	2	3	4
1				
2				
3				
4				
Address	1	2	3	4

WIRE THE SYSTEM

CONFIRM THAT THE PROPER TRANSFORMERS HAVE BEEN SELECTED FOR THE 6404 ZONE PANEL

WARNING

120 volts may cause serious injury from electrical shock. Sudden operation may cause serious injury from moving parts. Leave power disconnected until installation is complete.

The system is designed to use one power supply for the zone panel, expansion panel, and thermostats and a second power supply for the dampers. Based on the power requirements of the system the zone panel dampers and expansion panel dampers can be powered from separate transformers. If you are using a single power supply for the zone panel dampers and expansion panel dampers use the information in step 2 below to ensure that the transformers have been sized properly to handle the increased system load.

1. A minimum of two separate 24-volt transformers will be required for the system. The HVAC equipment transformer cannot be used for power. Transformer #1 is used to power the zone panel, expansion panel, and thermostats. Transformer #2 is used to power the zone dampers on the 6404 zone panel and 6401 expansion panel. If additional power is needed a third transformer should be used to power the 6401 expansion panel dampers.

2. Size Transformer #2

- Add up all the zone dampers that are in the system.
- Subtract the number of dampers in the zone with the least number of dampers.
- This is the most number of dampers that **could be** energized at one time. Multiply this number by 10 to determine the Transformer #2 size.

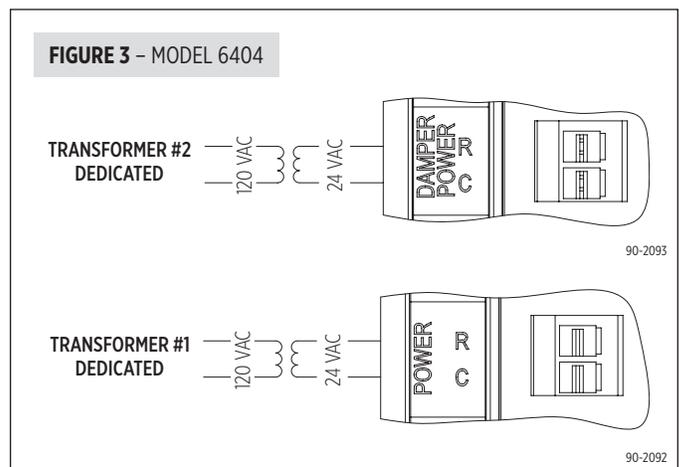
Example: If you have a 5-zone system, and there are two dampers per zone, then the total number of dampers that could be energized at one time is:

$$10 - 2 = 8 \text{ dampers}$$

$$8 \times 10 = 80 \text{ VA}$$

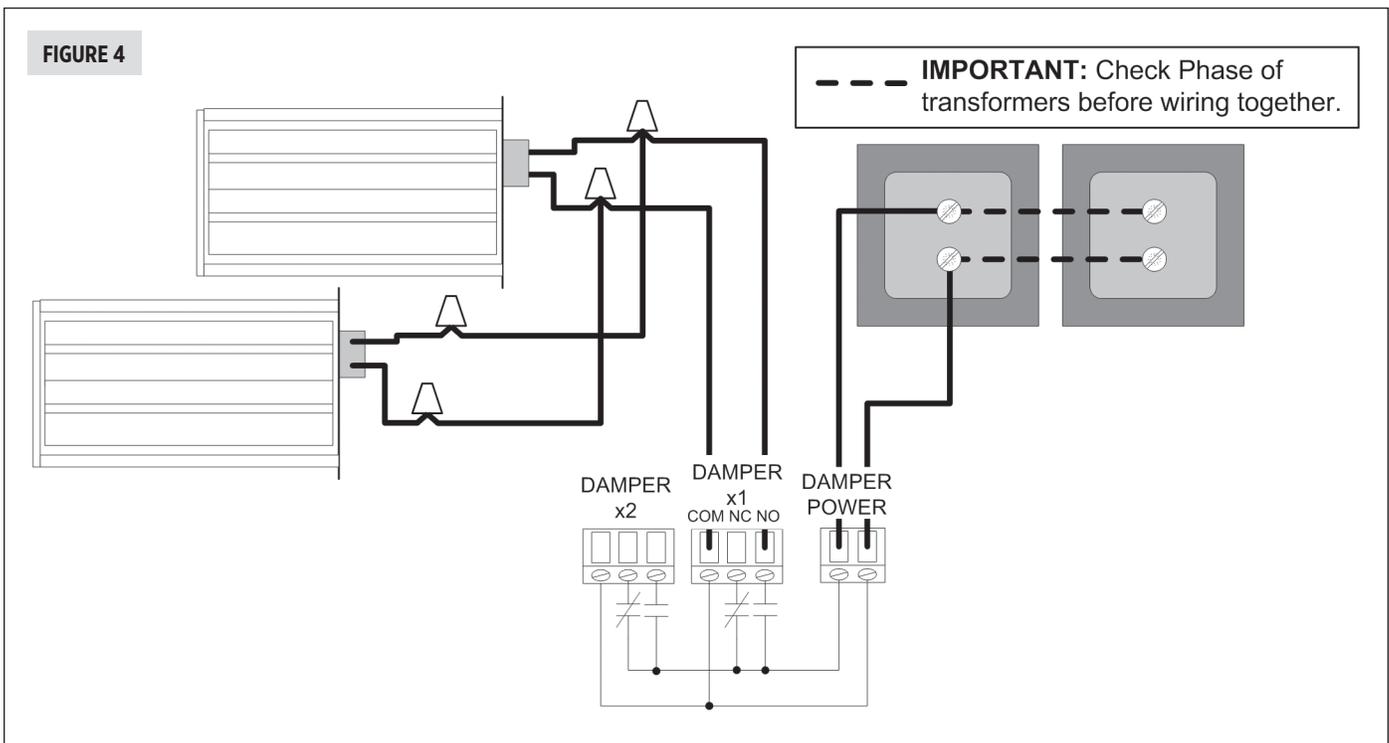
3. If multiple transformers are required for damper power, refer to **FIGURE 4** on page 6.

Component	Component VA Required	Refer to Wiring Schematic
Main control panel (6404), up to 4 expansion panels (6401) and up to 12 thermostats	40 VA	FIGURE 3
Zone damper	10 VA each	FIGURE 4 (page 6)



WIRE ZONE DAMPERS TO THE EXPANSION PANEL

1. Run 2-conductor thermostat wire for spring return dampers (normally open or normally closed). Run 3-conductor thermostat wire for power open/power close dampers. Multiple dampers for the same zone can be paralleled together as shown.
2. Wire the dampers to the Damper output terminals on the expansion panel:
 - NC** – This terminal is used to power open a normally closed damper. For power open and power close dampers this terminal is used to power open the damper.
 - NO** – This terminal is used to power close a normally open damper. For power open and power close dampers this terminal is used to power close the damper.
 - COM** – This terminal provides a common connection for the NC and NO terminals.
3. If multiple transformers will be required for the dampers, wire them in parallel as shown. Before wiring the transformers together, **ensure that they are connected in phase** by observing polarity marks or terminal orientation on each transformer.



SELECT AND WIRE THERMOSTATS

TABLE 3 – THERMOSTAT TYPE CONNECTION TO EXPANSION PANEL

Equipment Type	Heat/Cool: Heating Stages	Heat/Cool: Cooling Stages	Expansion Input Terminals
	Heat Pump: Aux Stages	Heat Pump: Comp Stages	
Heat/Cool	1	1	R, C, W, Y, G
Heat/Cool	2	1 or 2	R, C, W, Y, 2S, G
Heat/Cool	1 or 2	2	R, C, W, Y, 2S, G
Heat Pump	1	1	R, C, W, Y, G, O
Heat Pump	2	1	R, C, W, Y, 2S, G, O
Heat Pump	1	2	R, C, W, Y, 2S, G, O

EXPANSION PANEL INPUT TERMINAL DEFINITIONS

(Refer to thermostat manufacturer's literature for matching terminals.)

R = 24V-hot

C = 24V-common

W = 1st-stage heat (heat/cool) or 1st-stage auxiliary heat (heat/pump)

Y = 1st-stage cool (heat/cool) or 1st-stage compressor (heat/pump)

2S = 2nd-stage heat or 2nd-stage cool (heat/cool) or 2nd stage compressor (heat pump)

O = Reversing valve – cooling

G = Fan

THERMOSTAT TERMINAL DEFINITIONS

(Refer to thermostat manufacturer's literature for matching terminals.)

R = 24V-hot

C = 24V-common

W / W1 = 1st-stage heat (heat/cool) or 1st-stage auxiliary heat (heat pump)

W2 = 2nd-stage heat (heat/cool)

Y / Y1 = 1st-stage cool (heat/cool) or 1st-stage compressor (heat pump)

Y2 = 2nd-stage cool (heat/cool) or compressor (heat pump)

B = Reversing valve – heating

O = Reversing valve – cooling

G = Fan

WIRE EXPANSION PANELS

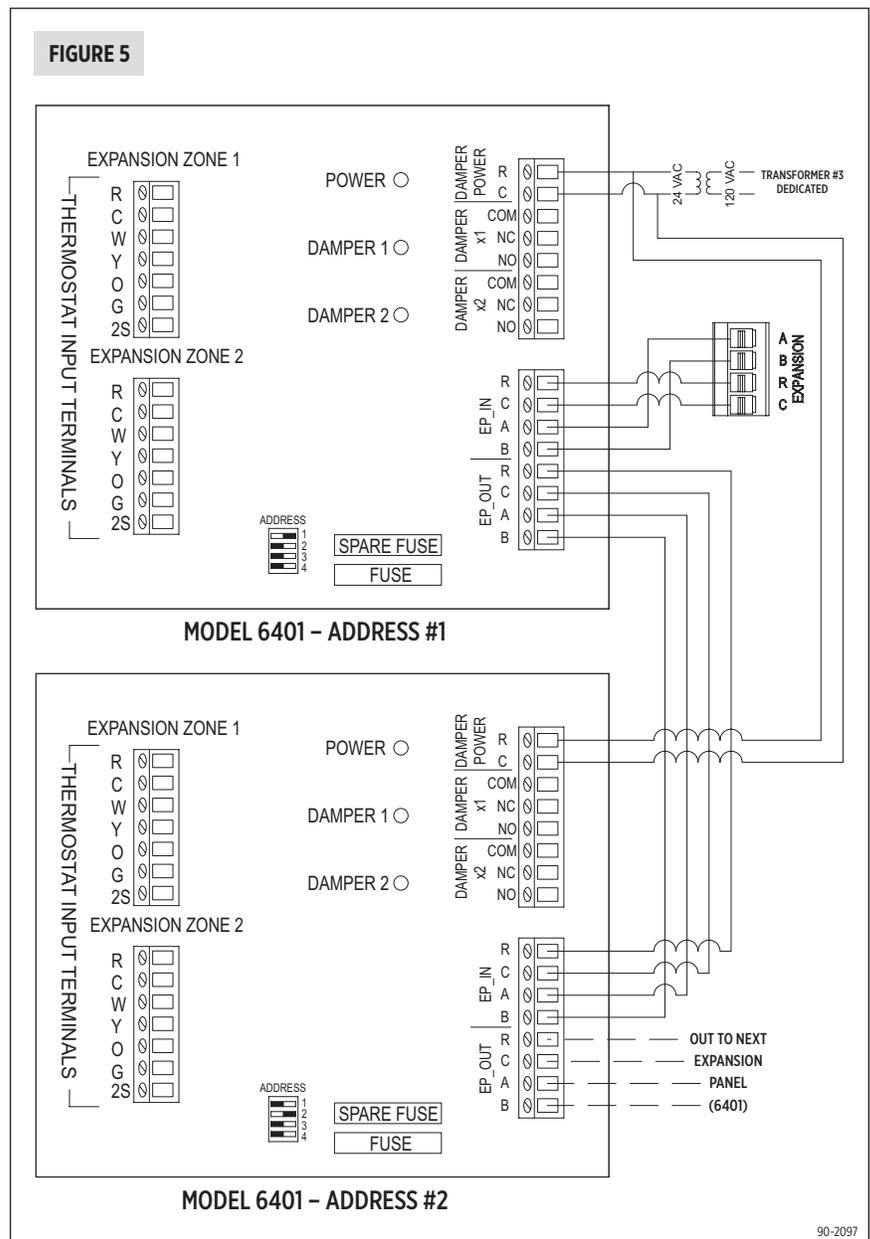
Up to four expansion panels, each with 2 zones, can be added to the Model 6404 zone panel if additional zones are required.

To add Model 6401 expansion panels, follow these guidelines:

1. Disconnect the **Power** and **Damper Power** on the 6404 zone panel until installation is complete.
2. Connect the R, C, A and B terminals labeled **"EXPANSION"** on the 6404 zone panel to the R, C, A and B terminals labeled **"EP_IN"** on the first 6401 expansion panel. To wire additional 6401 expansion panels, connect the R, C, A and B terminals labeled **"EP_OUT"** on the first expansion panel to the R, C, A and B terminals labeled **"EP_IN"** on the next expansion panel. See **FIGURE 5**. Polarity is important.

If wired incorrectly control panel power and/or communications will be affected. Use wire color as a means to ensure the terminals are connected correctly.

3. Connect a dedicated transformer to the **Damper Power R** and **C** terminals on the first 6401 expansion panel. For additional 6401 expansion panels, damper power can be daisy chained as shown in **FIGURE 5**.
4. Wire dampers to 6401 expansion panel(s) as previously described in the "Wire Dampers to Control Panel Section".
5. Wire thermostats to 6401 expansion panel(s). **Use the same type of thermostats that were selected for zones 1-4 on the 6404 zone panel.**
6. Address each 6401 expansion panel. **Each expansion panel must have its own unique address, 1 through 4, or communications cannot be established between the 6404 zone panel and the 6401 expansion panel.**



SEQUENCE OF OPERATION

Refer to the Installation Guide for the Model 6404 Zone Panel for a description of the sequence of operation.

SYSTEM STARTUP

1. Before applying power to the 6404 zone panel or the HVAC equipment, perform the following inspections:
 - Use wire colors to verify wiring of the R, C, A and B terminals between the 6404 zone panel and the 6401 expansion panels.
 - Ensure that each 6401 expansion panel has a unique address, 1 through 4.
 - Verify that any configuration switches on the thermostat(s) are set to the installer settings for the thermostat type and the gas/electric settings.
 - Use wire colors to verify wiring to each thermostat terminal in each zone.
2. Power up the 6404 zone panel transformer – do not power the HVAC equipment.
 - Verify that the green power LED on the 6404 zone panel is on and the green power LED on the 6401 and any additional 6401 expansion panels is blinking (approximately once per second). It may take about 5 seconds before the 6401 expansion panels establish communications and the green LED begins flashing.

TROUBLESHOOTING GUIDE

SYMPTOM	CAUSE
Power LED on 6404 zone panel not on.	<ul style="list-style-type: none">• No power to zone panel – check power wiring.
Power LEDs on 6401 expansion panels not illuminated.	<ul style="list-style-type: none">• No power to expansion panel – check power wiring between panels.
Power LEDs on 6401 expansion panels remain solid green.	<ul style="list-style-type: none">• Expansion panels are not addressed correctly. Check to insure each expansion panel has a unique address, 1 through 4. Cycle power after any address changes.• No communications – check communication wiring, paying special attention to polarity, between the 6404 zone panel and any additional 6401 expansion panels.

3. Power up the damper transformers.
4. Restore Power to the HVAC equipment.