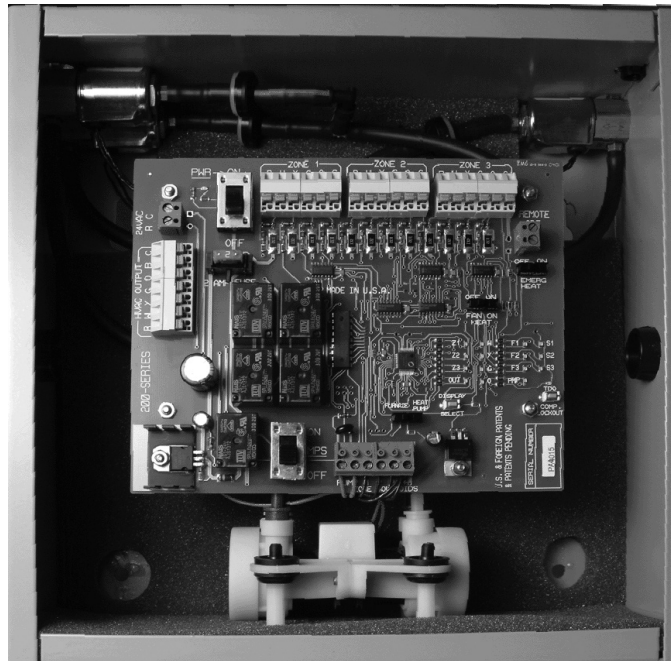


# Installation & Operation Instructions

## ZONE PAK®



## SPACE PAK®



# Installation Precautions

*This Zoning System must be installed by a qualified HVAC Contractor!*

## Caution - Electrical Hazard

**Can cause personal injury or equipment damage.** Disconnect power to HVAC system before beginning installation.

### **WHEN INSTALLING THIS PRODUCT...**

1. Read these instructions carefully. Failure to follow them could damage the ZonePak® Zoning System and/or cause a hazardous condition.
2. Disconnect power supply to the HVAC system and the ZonePak® system before making any wiring connections to prevent danger of electrical shock and equipment damage.
3. The ZonePak® System is designed for indoor use only.
4. You must touch a grounded metal object before handling the ZonePak® Control Panel to avoid potential loss of internal programs, due to electrostatic discharge.
5. Install in ambient temperature between 40° and 150°F, in a non-condensing area.
6. Complete the Commissioning Checks (p. 8) after installation is complete.
7. The ZonePak® Zoning System controls the HVAC equipment via a set of dry-contact relays. Be sure that this is compatible with the equipment operating specifications.
8. All wiring must comply with all applicable electrical codes, ordinances and regulations.
9. Use properly grounded tools. Wear safety glasses and gloves when drilling or cutting sheet metal ducts, fiber glass or any hard objects.
10. Panel contains both AC and DC Terminals. See Equipment Notes (pp. 6 and 7) for more details.
11. Leave these instructions with installed system for future use.

## FEATURES

1. The ZonePak® Zoning System uses a self-contained, low-pressure air pump to actuate dampers.
2. All zones have full-function control of heating, cooling and fan capability from their respective thermostats.
3. The ZonePak® Zoning System is both heat/cool and heat pump compatible.
4. Use any standard 24VAC thermostat-programmable/non-programmable, auto/manual changeover or wireless.
6. Emergency Heat changeover (manual switch or remote outdoor thermostat) for heat pump balance point changeover from heat pump to backup heat functions.
7. Compressor timed off control (delay on break). When the compressor is turned off, it cannot restart for four (4) minutes. This feature allows the refrigerant pressure to balance before restarting.
8. "FAN ON HEAT" switch generates fan call anytime there is a call for heat: typically used with hydronic coils or electric heat.
9. Manual Pump Switch (MPS™) is provided to start the pump manually and open all the zone dampers for check out purposes.
10. Dampers remain open in the last zone that called for service to take advantage of additional energy efficiency by expelling all conditioned air to the zone.
11. LEDs indicate all system operations.
12. A 40VA, 24VAC, self-resetting, plug-in type transformer is provided to power the control panel and thermostats.

# General Operation Information

The mini-pump, ① located in the bottom of the enclosure, runs anytime there is a call from any thermostat. It creates both pressure and vacuum. On a call from any thermostat, the logic board will energize the ② solenoid valve(s) for non-calling zone(s) and close the appropriate ③ dry contact relays to start the HVAC equipment.

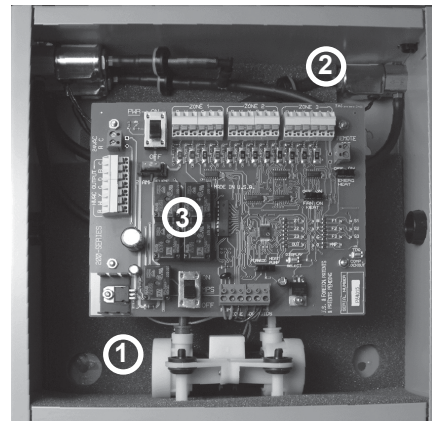
**Dampers open with vacuum.**

**Dampers close with pressure.**

The logic board is designed for heating to have priority over cooling and cooling to have priority over fan operation.

When all thermostats are satisfied, the air pump, the HVAC equipment and the solenoid air valves are de-energized. Dampers will remain in whatever position they were in when the last thermostat call was finished. Leaving the dampers open in the last zone served allows the HVAC system to utilize the residual energy in the system at the end of both the heating and cooling cycles.

The Manual Pump Switch (MPS™) is provided to run the pump continuously. Turning the MPS switch to ON manually closes the pump relay and the pump starts, driving all dampers open. This creates a failsafe. If the board fails the dampers can be easily opened and the system run from one thermostat.



## Equipment Notes

### **THERMOSTATS**

The ZonePak® Zone Control is compatible with any standard 24VAC thermostat: programmable/non-programmable auto/manual changeover or wireless.

If the thermostat has an adjustable heating anticipator (mechanical thermostats), set it to the shortest or lowest setting.

***Heat pump thermostats are required for heat pump operation.***

Set up the thermostat to call Y,G in heating: Y,G,O in cooling.

### **LEAVING AIR TEMPERATURE CONTROLS**

The ZonePak® Zone Control does not monitor the temperature of the air in the ductwork. If positive control is desired, additional temperature controls must be installed.

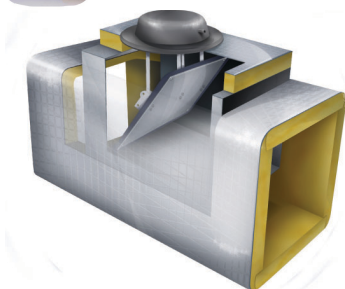
# Quick Start Instructions

The ZonePak® Zoning System™ is easy to install. Please read these instructions completely to ensure that you understand the system. **Pay special attention to the Caution Statment Section on Page 2.** This QuickStart page has been provided as an installation overveiw with references to more detailed information other places in this manual.



## 1 Install Dampers/Run Tubing

Dampers install directly into existing ductwork. Dampers install with the tubing port pointing toward the equipment. Install one tubing run for each zone. Use a tee for multiple dampers on one zone. ZonePak® recommends using a different color tube for each zone. Install sheet metal sleeve when installing in duct board.



## 2 Mount Panel

Panel must be mounted in a non-condensing area where temperatures will not normally exceed 150° F. **DO NOT MOUNT PANEL ON DUCTWORK OR THE HVAC EQUIPMENT.** The best method is to attach a piece of 3/4" plywood to a block or stud wall. Hold the panel level to the wall, mark the positions of the upper mounting holes. Drive two screws to the wall leaving the heads at least 1/2" out. Set the panel over the screws. Drive two screws into the lower mounting holes. Tighten the upper screws.

## 3 Connect Thermostats

Install a thermostat for each zone. Use 18 gauge, multi-conductor, solid thermostat wire to connect the thermostats to the control panel. Touch a mechanical ground to discharge static electricity. Connect R,W,Y,G,O, and C as appropriate to the zone terminal strips along the top of the control panel. Note which thermostats are connected to which zones on the zone layout label on the side of the enclosure.

## 4 Connect Equipment

Use 18 gauge, multi-conductor, solid thermostat wire to connect the HVAC outputs along the left side of the control panel to the HVAC Equipment. Connect R,W,Y,G, O, and C as appropriate to the equipment as if the control panel were a thermostat.

## 5 Connect Transformer

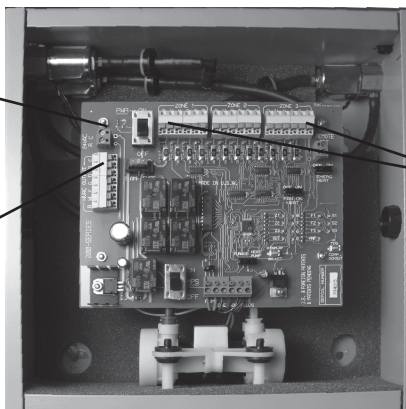
Use 18 gauge - 2- conductor solid wire to connect R and C on the 24VAC power terminal strip to the mounting screws on the 40VAC self-resetting, plug-in transformer supplied with the ZonePak® Zoning System. Plug in the transformer to any standard 120VAC receptacle.

## 6 Test the System

See commissioning procedure on pg. 8.

24VAC Transformer  
Connections  
40VA Self-Resetting  
Transformer

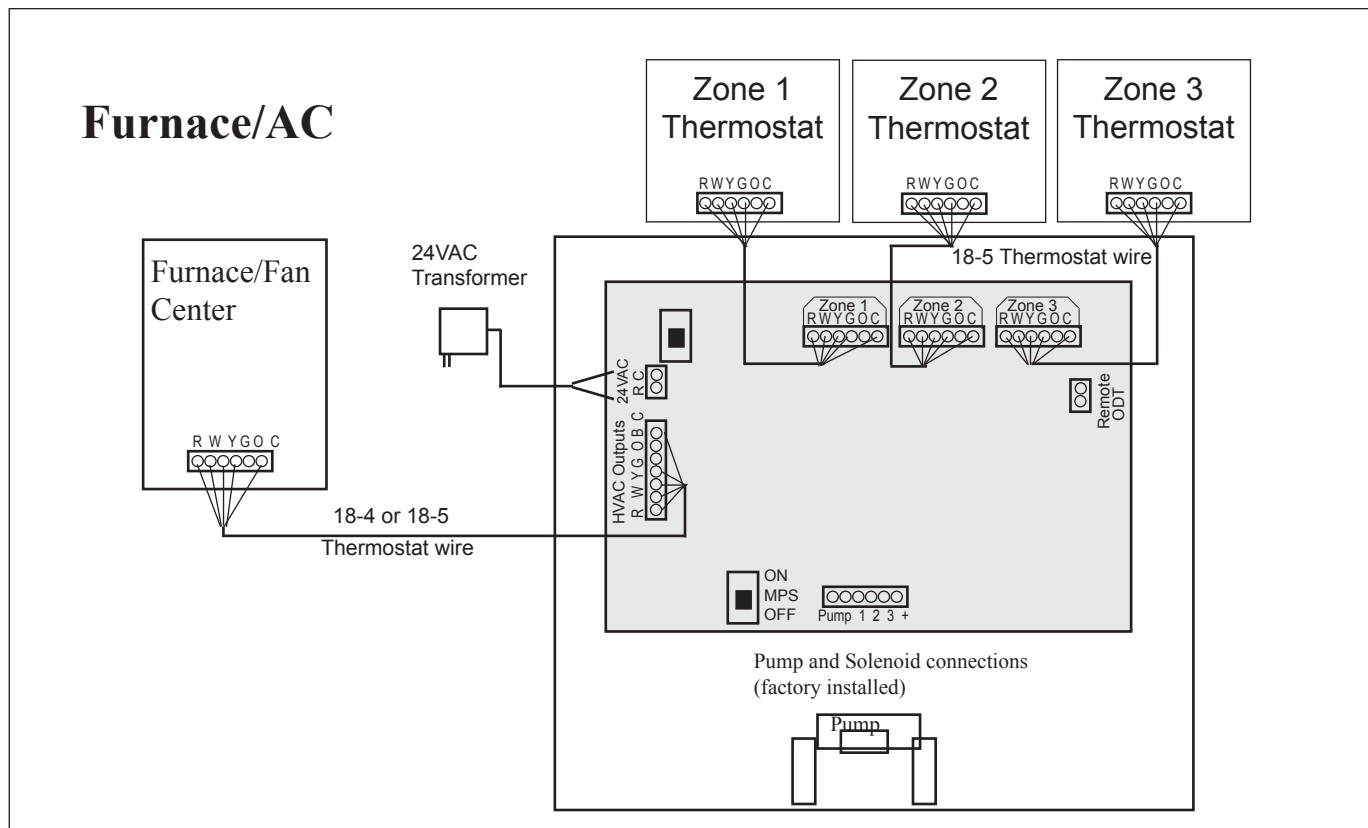
HVAC Equipment  
Connections  
Dry Contacts  
R,W,Y,G, O and C  
as necessary



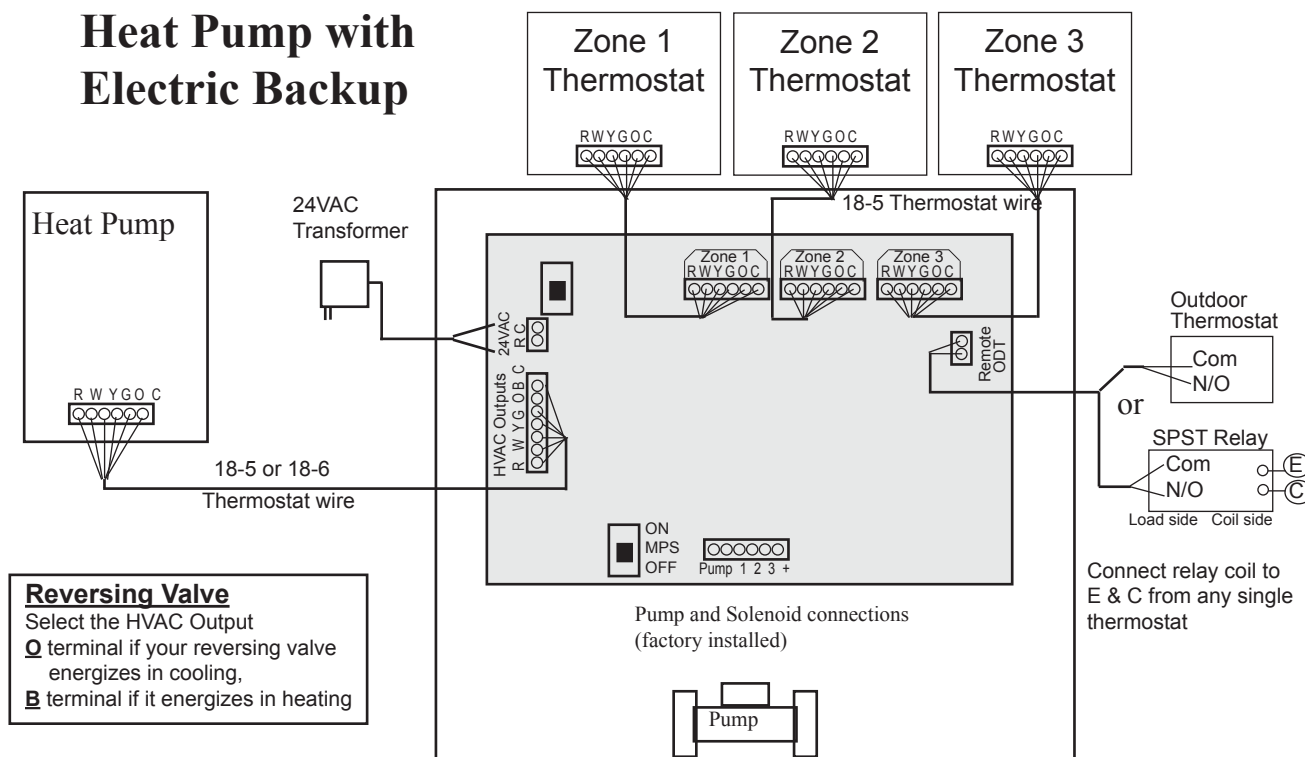
Thermostat  
Connections  
R,W,Y,G, O  
and C as  
necessary

# Wiring Diagrams

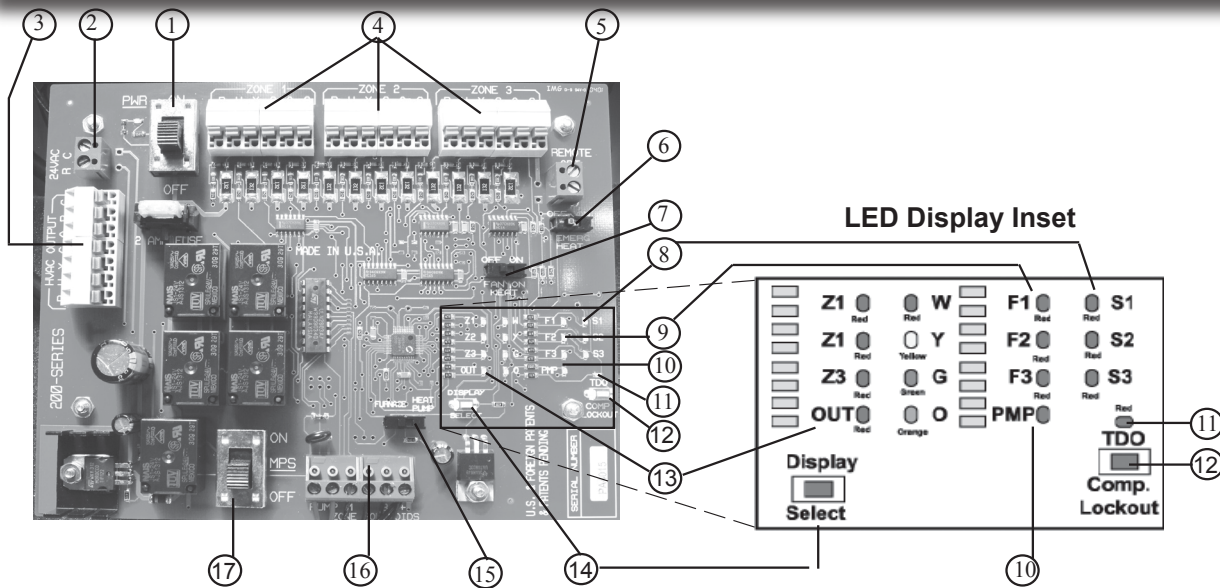
The following diagrams have been provided for your convenience. They represent the most common installation techniques. If your application does not look like either of these or you need additional help, there are additional diagrams at [www.SpacePak.com](http://www.SpacePak.com) or contact technical support at (866)325-5107.



Choose thermostats that energize the O terminal in cooling



# Circuit Board Layout & Equipment Notes



| # | Name                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | PWR<br>On/Off w/LED      | The ZonePak® System is powered by a 40 VA 24VAC transformer (provided). This switch and the HVAC system equipment power switch must always be in the “OFF” position when connecting wires to any terminals.<br>(See Caution Statement page 2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 2 | 24VAC Terminals          | The ZonePak® 40 VA transformer (provided) must be connected to these two terminals.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 3 | HVAC Output<br>Terminals | Output to the HVAC equipment is controlled by a set of dry-contact relays. The HVAC “R” signal is switched and sent out to start the appropriate equipment when called by any zone thermostat however completely isolated from the thermostat power supply. (Connect hot or + side of HVAC equipment transformer (24 VAC) to this terminal.)<br><br><b>R</b> Connect to W1 of furnace. (Aux. heat terminal if heat pump is installed.)<br><b>W</b> Connect to compressor contactor.<br><b>Y</b> Connect to equipment fan relay.<br><b>G</b> Connect either “O” or “B” to heat pump reversing valve, as required by heat pump manufacturer.<br><b>O/B</b> Use the “O” signal if the unit reverses in the cooling cycle; the “B” if it reverses in the heating cycle.<br><b>C</b> Connect common side of HVAC equipment transformer (24 VAC) to this terminal. |
| 4 | Thermostat Terminals     | Connect thermostat wires (R,W,Y,G,O, and C) as required for your application.<br>Note which thermostats are connected to which zones. (24VAC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

|    |                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5  | ODT Terminals                         | Emergency Heat changeover terminals "REMOTE ODT" (5VDC) are used for remote switching by outdoor thermostat. This remote switch (or thermostat) will change heat pump operation to backup heat or fossil fuel. If a heat pump is installed with a fossil fuel furnace (without fossil fuel kit) do not connect the (W) wires from the zone thermostats.                                                                                                                                                             |
| 6  | Emergency Heat Switch                 | Emergency Heat changeover switch, is used to manually bypass the heat pump and energize the auxiliary heat on a call for service (heat pump application only).                                                                                                                                                                                                                                                                                                                                                      |
| 7  | Fan-on-Heat Switch                    | This switch in the "ON" position will provide automatic fan operation on a call for heating for electric furnaces, hot water coils, steam coils, etc.                                                                                                                                                                                                                                                                                                                                                               |
| 8  | S1,S2,S3 Solenoid LEDs                | These LEDs indicate which zones are being served and their zone dampers are open.<br>[S1,S2,S3(Red)]                                                                                                                                                                                                                                                                                                                                                                                                                |
| 9  | Fault Code LEDs F1,F2,F3              | The 3 Fault Code LEDs illuminate when a thermostat sends an illegal call. A call is illegal if it is improper for the type of HVAC equipment installed. LED will stay lit until the power switch is cycled.<br><i>F1 = illegal call on zone 1.</i><br><i>F2 = illegal call on zone 2.</i><br><i>F3 = illegal call on zone 3.</i><br>Illegal calls are ignored. The system will continue to operate normally, serving any legal calls. Illegal calls may indicate a thermostat or wiring fault in the affected zone. |
| 10 | PMP LED                               | Pump LED (Red) light is ON anytime the pump is running.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 11 | Comp Lockout LED                      | Compressor lockout LED. Any time the zoning system turns the compressor off it holds it off for four(4) minutes. This prevents short cycling the compressor.                                                                                                                                                                                                                                                                                                                                                        |
| 12 | TDO Time Delay Override               | This momentary contact, Time Delay Override switch (TDO), is provided on the PC board to speed the checkout of the zoning system. Before using this TDO switch, you must disconnect the HVAC "R" wire in order to avoid short cycling the equipment. The "COMP LOCKOUT" LED (Red) light will indicate 4 minute compressor lockout condition.                                                                                                                                                                        |
| 13 | System Status LEDs                    | The "DISPLAY SELECT" switch controls what information is displayed on the Service LEDs. By default the LEDs indicate the HVAC Output Signal. It will illuminate the "Out" LED and the appropriate service LEDs to indicate the call to the equipment.                                                                                                                                                                                                                                                               |
| 14 | Display Select Switch                 | Push the button once and the system illuminates the Zone 1 (Z1) LED and shows what the Zone 1 Thermostat is calling for. Push it again and The Zone 2 (Z2) LED illuminates and the display LEDs show what Zone 2 is calling for. Push the button a third time and Zone 3 is displayed. Pushing it a fourth time will return it to the output display.<br><br>The system will revert to displaying the Output signal anytime the button is idle for 1 minute.                                                        |
| 15 | Furnance/ HeatPump Switch             | This switch sets the operational mode for the zoning system. Set the switch for the type of equipment that the zoning system is controlling.                                                                                                                                                                                                                                                                                                                                                                        |
| 16 | Solenoid Terminals and Pump Terminals | <u>Factory connection for the Zone Solenoids (24VDC)</u> . Solenoids are energized to provide pressure to close the dampers and de-energized to provide vacuum to open the dampers.<br><u>Factory connections for the pressure/vacuum pump.(24VAC)</u> The pump operates only when a thermostat calls for a heat/cool or fan operation or when the MPS switch is in the ON position.                                                                                                                                |
| 17 | MPS Switch                            | MPS™ switch starts pump and opens all zone dampers when Power Switch is OFF.                                                                                                                                                                                                                                                                                                                                                                                                                                        |

# Commissioning Procedure

## FAN CHECK-OUT

1. Set all thermostats to the OFF position and all fan switches to AUTO.
2. Turn the HVAC system and the ZonePak® system PWR switches to ON. The LED light next to the switch will illuminate on the ZonePak control panel.
3. Turn the Zone 1 thermostat fan switch ON. The S1 indicator, the Fan output (G) and Pump LED lights will illuminate. The fan in the HVAC system will turn on. The pump and solenoids will position all the dampers. Check the air flow at all register outlets to determine that only Zone 1 dampers are open and all other dampers are closed.
4. Follow the above procedure for all other zones.

## HEATING & COOLING CHECK-OUT

1. Set all thermostats to the OFF position and all fan switches to AUTO before starting heating system check out.
2. Set Zone 1 thermostat to the HEAT position and turn thermostat up so that the thermostat is calling for heat. The S1 indicator, the W output, and the pump LED lights will illuminate. The pump and solenoids will position all the dampers. Check to see that the heating circuit is energized. If heat pump is installed, check operation of Emergency Back-up heating. Turn the thermostat down until the thermostat is satisfied. The LED lights will go out and the pump will stop. Dampers will remain open in the last zone that called. For heat pump, LED indication will be Y & G.
3. Set thermostat for Zone 1 to the COOL position. Turn thermostat down so that the thermostat is calling for cooling. The S1 indicator, the Y and G outputs and the pump LED will illuminate. The pump and solenoids will position all the dampers. Check to see that the compressor contactor is energized. For heat pump, LED indication will be Y, G & O.
4. Place Zone 1 thermostat in the OFF position.
5. Follow the above procedure for all other zones.

## IF ALL ELSE FAILS...

1. Turn the ZonePak® power switch to OFF.
  2. Disconnect the thermostat wires from any zone and connect them to the HVAC OUTPUT terminals.
  3. Turn the ZonePak switch ON, this will open ALL zone dampers.
- The HVAC system will work without the benefit of the zoning system. The heating and air conditioning equipment is now controlled by that thermostat. All dampers will stay open. If the HVAC system does not work in this configuration, you probably have a wiring, thermostat or other equipment problem.

# Troubleshooting Matrix

| Problem                        | Possible Causes                                                   | Correction                                                                                                                                                                                      |
|--------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No LEDs lit                    | 1- Power Switch OFF<br>2- No 24VAC from transformer               | Turn Power Switch to ON.<br>Check Transformer input/output. Replace if 110V is present w/ no 24vac output.                                                                                      |
| Dampers not opening or closing | 1- Insufficient Pressure/Vacuum<br>2- Binding on rectangular duct | Check for open tube ends or leaky damper actuator.<br>Cut opening to specified dimension per installation instructions.                                                                         |
| HVAC system not operating      | 1- No equipment control power<br>2- Output relay failure          | Check equipment transformer and/or control wiring<br>Check continuity between "R" and calling circuit (W,Y,G) at the HVAC Output, if none and the appropriate output LED is lit, replace board. |
| One zone not being served      | 1- Illegal call at panel<br>2- Faulty board component             | Check wiring of thermostat to Panel ("O" is energized with cooling call only).<br>If call is legal and no service provided, replace PC board                                                    |
| Slave zone not operating       | No Common wire from equipment control transformer                 | Connect "C" from equipment to "C" of HVAC Output terminals in panel.                                                                                                                            |
| Low air flow to zones          | 1- Bypass Damper Open<br>2- Restriction in system                 | Adjust weight on bypass damper for maximum static to smallest zone.<br>Check filter, DX-coil, or secondary heat exchanger coil for blockage.                                                    |

For additional technical support, please call: 866-325-5107