

## INSTALLATION AND OPERATION MANUAL Z2000 TWENTY ZONE FULLY MODULATING ZONE CONTROL SYSTEM

### OVERVIEW

The Z2000 Comfort System is a fully modulating commercial zone control system that allows a single HVAC unit to have up to 20 separate zones. Each zone is controlled by its own space thermostat and modulating zone damper. When a majority of zones are calling for cooling, the system operates in the cooling mode. The Z2000 controls up to two stages of cooling to maintain a cooling discharge air setpoint. If a majority of zones are calling for heating, the system changes from the cooling mode to the heating mode. The Z2000 then controls up to two stages of heating to maintain a heating discharge air setpoint. When the number of heating and cooling requests are equal, the system satisfies the cooling call first.

### SEQUENCE OF OPERATION

The Z2000 controls the system fan, two stages of cooling and two stages of heating. In the occupied cooling mode, the fan runs continuously. The two stages of cooling are cycled to maintain a discharge air temperature of approximately 54°F. The control panel is equipped with two slide switches designated "Minimum Calls" used to increase the number of zones that must be calling before the equipment will come on. All stages of heating and cooling have a five minute minimum ON/OFF time. There is also a ten minute time delay between first and second stage. The system will remain in whatever mode it is in for a minimum of 15 minutes. If equal heating and cooling calls take place, cooling will receive priority. The heating mode is the same as the cooling mode except that heating stages are cycled to maintain a discharge air temperature of approximately 140°F.

### UNOCCUPIED MODE

The panel has a set of clock terminals "T" for occupied and unoccupied scheduling. When the optional time clock contacts open, the system is placed in the unoccupied mode. All stages of heating or cooling are turned off and the fan shuts off after a five minute delay. A night thermostat and override timer may be wired in parallel to a set of terminals "N" to maintain unoccupied heating and cooling setpoints as well as provide temporary override to the occupied mode.

### WARNING

1. Turn power off to HVAC unit and control panel during installation to prevent serious injury from electrical shock and/or damage to the system.
2. Use extreme care when making duct openings and handling sheet metal to avoid injury.
3. The Z2000 and all components must be installed in a conditioned space where the ambient temperature will not exceed 150°F.
4. Install all components in a manner that provides access for test, check and startup.

### CAUTION

1. Installation of this system must be in compliance with all applicable codes.
2. HVAC system must be properly sized and balanced to assure optimum system performance.
3. A bypass damper must be installed to maintain proper system airflow and static pressure.
4. All low voltage wire must be 18 gage or heavier.
5. All wiring should be color coded and tagged for proper identification.
6. When landing wires to the control panel, make sure wires are snug but do not over-tighten screw terminals.

## Z2000 COMFORT SYSTEM DESIGN AND INSTALLATION NOTES

- Extra consideration should be given when applying any zone control system to a building that requires large amounts of cooling in the core zones during cold weather. Consider adding auxiliary heat to external zones or using one system for the core zones and one system for the external zones.
- It is recommended that the system installation be limited to 50 tons of capacity. Rooftop units with economizers and relief dampers are strongly recommended for buildings with core cooling loads.
- Over-sizing of the HVAC equipment is not recommended. In most cases, it is better to slightly undersize the equipment.
- It is recommended that the HVAC equipment have two stages of heating and two stages of cooling.
- The pressure drop through the zone dampers is negligible and should not be a factor when sizing branch duct runs.
- Zone dampers are rated up to 2" w.c. of static pressure and up to 2,000 fpm.
- Zone dampers should be installed as far back from the discharge air grille as possible. Flex duct should be used for the last 5 feet of each branch run.
- Bypass dampers should be sized for 90% of the total system air flow at 2,500 fpm.
- The Z2000 Comfort System panel should be located near the center of the building to keep wire runs as short as possible.
- DO NOT mount the Z2000 Comfort System panel on or inside the rooftop unit.
- Use a separate 24 VAC, rated at the proper VA transformer for the Z2000 Comfort System.

## INSTALLATION

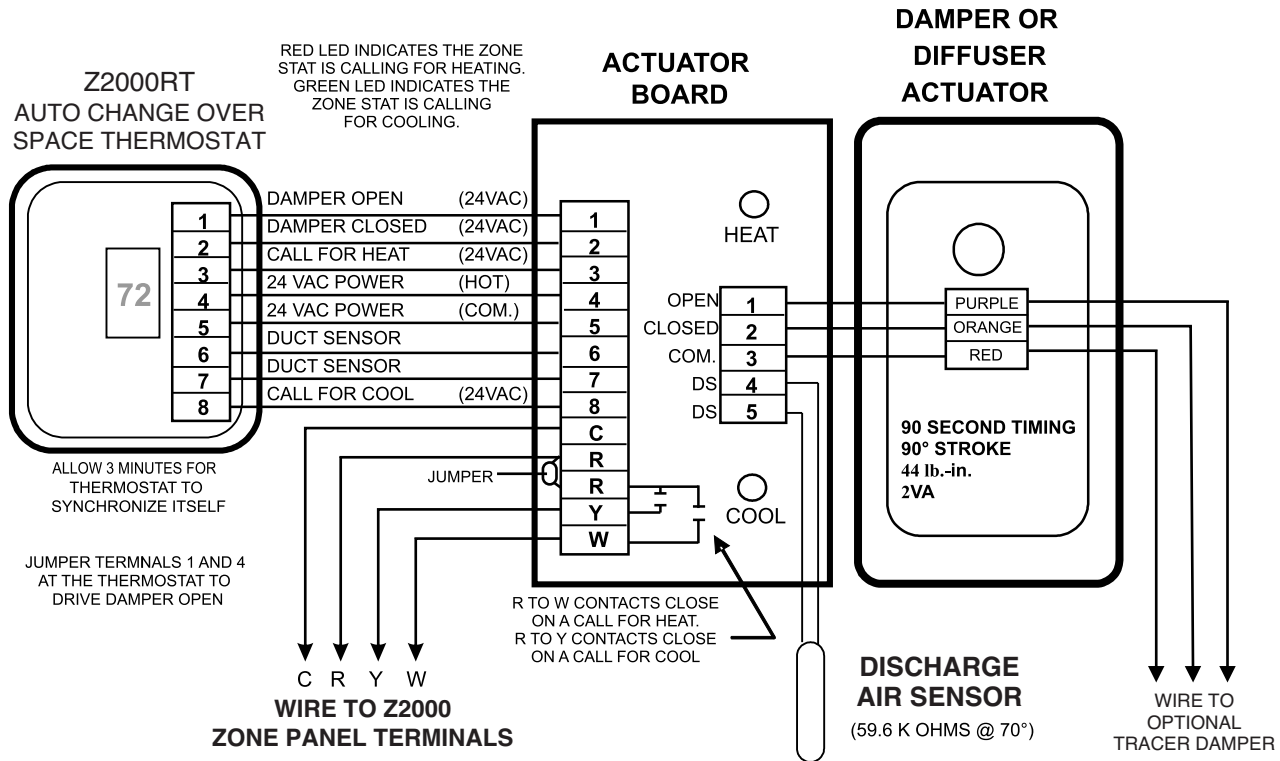
### CONTROL PANEL MOUNTING

Mount the Z2000 panel on a flat, moisture-free surface in a conditioned space that will facilitate easy access for wiring and system setup.

### CONTROL PANEL TRANSFORMER

1. Never use the 24 volt equipment transformer to power the control panel, regardless of its VA rating.
2. Wire a separate 24 VAC 75VA transformer to the designated terminals on the zone control panel marked 24 VAC.
3. A 75VA transformer can power the control panel, thermostat and up to 37 dampers with factory installed actuators.

## Z2000 SYSTEM THERMOSTAT AND DAMPER WIRING



### THERMOSTAT AND DAMPER OPERATION SEQUENCE

When the room temperature is 1.5°F below the setpoint, the thermostat will close the R to W contact on the actuator board and signal the Z2000 panel that there is a call for heating.

When the room temperature is 1.5°F above the setpoint, the thermostat will close the R to Y contact on the actuator board and signal the Z2000 panel that there is a call for cooling.

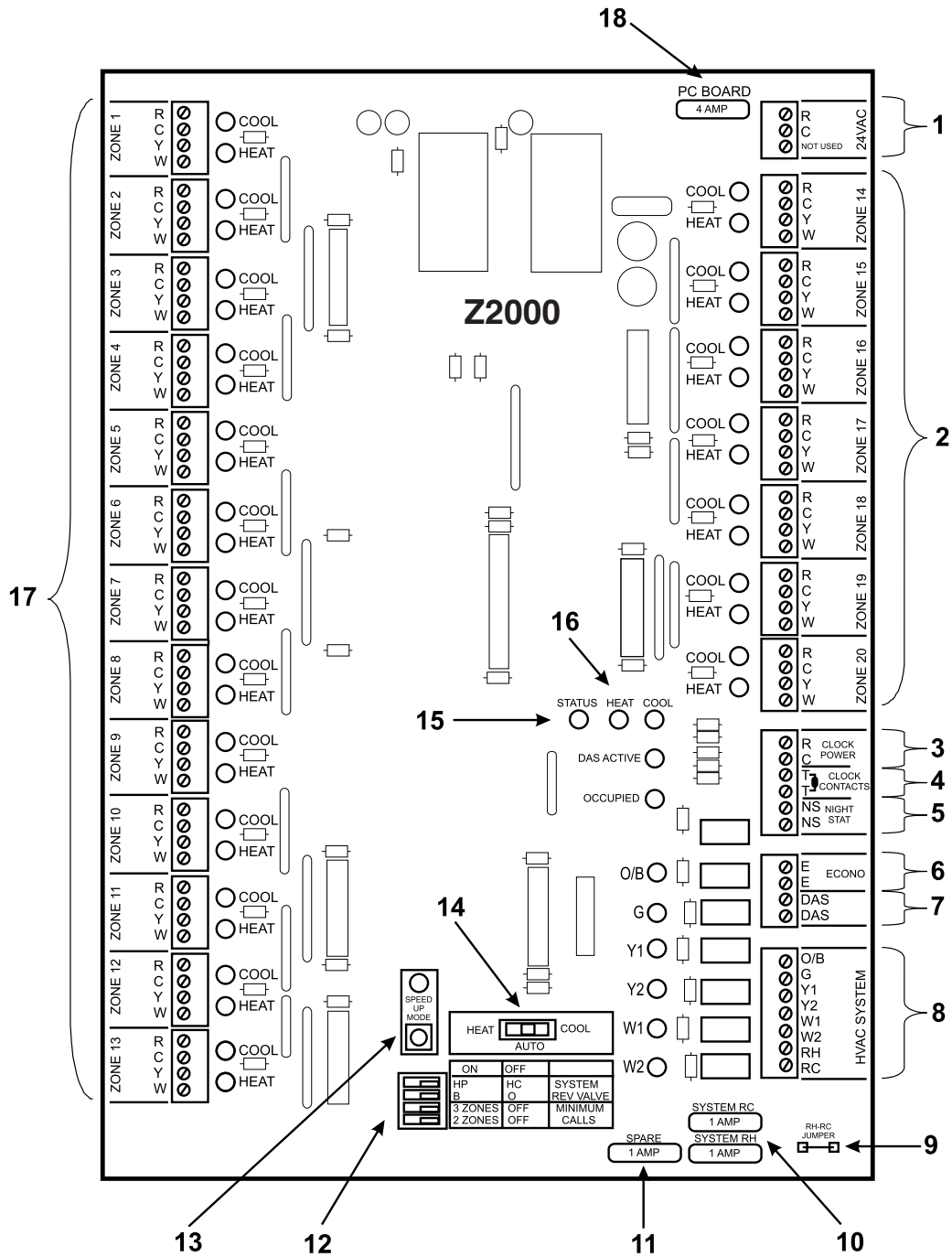
### THERMOSTAT DISPLAY

The thermostat continuously displays room temperature. If the thermostat calls for heating "HEAT" will flash on the display. If the thermostat calls for cooling, "COOL" will flash on the display. Setpoint limits are factory preset from 68°F and 76°F. It is recommended that these setpoint limits not be exceeded.

### SETTING THERMOSTAT LIMITS AND CALIBRATION

1. Set the setpoint as low as it will go.
2. Press and hold the C/F button until the stat beeps and the word "COOL" flashes.
3. Use the (+) or (-) button to adjust the cooling limit.
4. Press the C/F button again until the stat beeps and the word "HEAT" flashes.
5. Use the (+) or (-) button to adjust the heating limit.
6. Press the C/F button again until the stat beeps and the word "AUX" flashes.
7. This is to adjust the thermostat room temperature calibration.
8. Press the C/F button again to exit the program.

# Z2000 PANEL LAYOUT



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|---|--|
| <ol style="list-style-type: none"> <li>1. 24 volt system power terminals</li> <li>2. Zone terminals 14-20</li> <li>3. 24 volt power terminals for optional time clock</li> <li>4. Time clock contact terminals (remove factory jumper when wiring clock contacts. N.C. = occupied mode)</li> <li>5. Night thermostat terminals</li> <li>6. Economizer terminals (contacts closed in occupied mode)</li> <li>7. Discharge air sensor terminals</li> <li>8. HVAC system terminals</li> <li>9. RH-RC jumper</li> </ol> | <ol style="list-style-type: none"> <li>10. 1 AMP HVAC control system fuses</li> <li>11. 1 AMP spare fuse</li> <li>12. System set-up slide switches</li> <li>13. Time delay speed up button</li> <li>14. Heat/auto/cool selector switch</li> <li>15. Microprocessor status LED</li> <li>16. Heat/cool mode status LEDs</li> <li>17. Zone terminals 1-13</li> <li>18. 4 AMP PC board fuse</li> </ol> |
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## Z2000 PANEL TIME DELAYS

FUNCTION	NORMAL MODE	SPEED UP MODE
<b>MINIMUM TIME IN HEAT OR COOL MODE</b> (Once the system is in the heat or cool mode, it will remain there for a minimum of 15 minutes. The equipment may or may not be on during this period.)	15 MINUTES	60 SECONDS
<b>MINIMUM OFF TIME REQUIRED BEFORE THE EQUIPMENT CAN SWITCH FROM HEAT OR COOL MODE</b>	5 MINUTES	20 SECONDS
<b>TIME BETWEEN STAGES (UP-STAGING)</b>	10 MINUTES	40 SECONDS
<b>EQUIPMENT MINIMUM ON/OFF TIME</b>	5 MINUTES	20 SECONDS
<b>FAN RUN TIME AFTER CLOCK CONTACTS OPEN</b>	5 MINUTES	20 SECONDS

Speed Up Mode auto-resets after 15 minutes

Use Set-Up button for testing only!

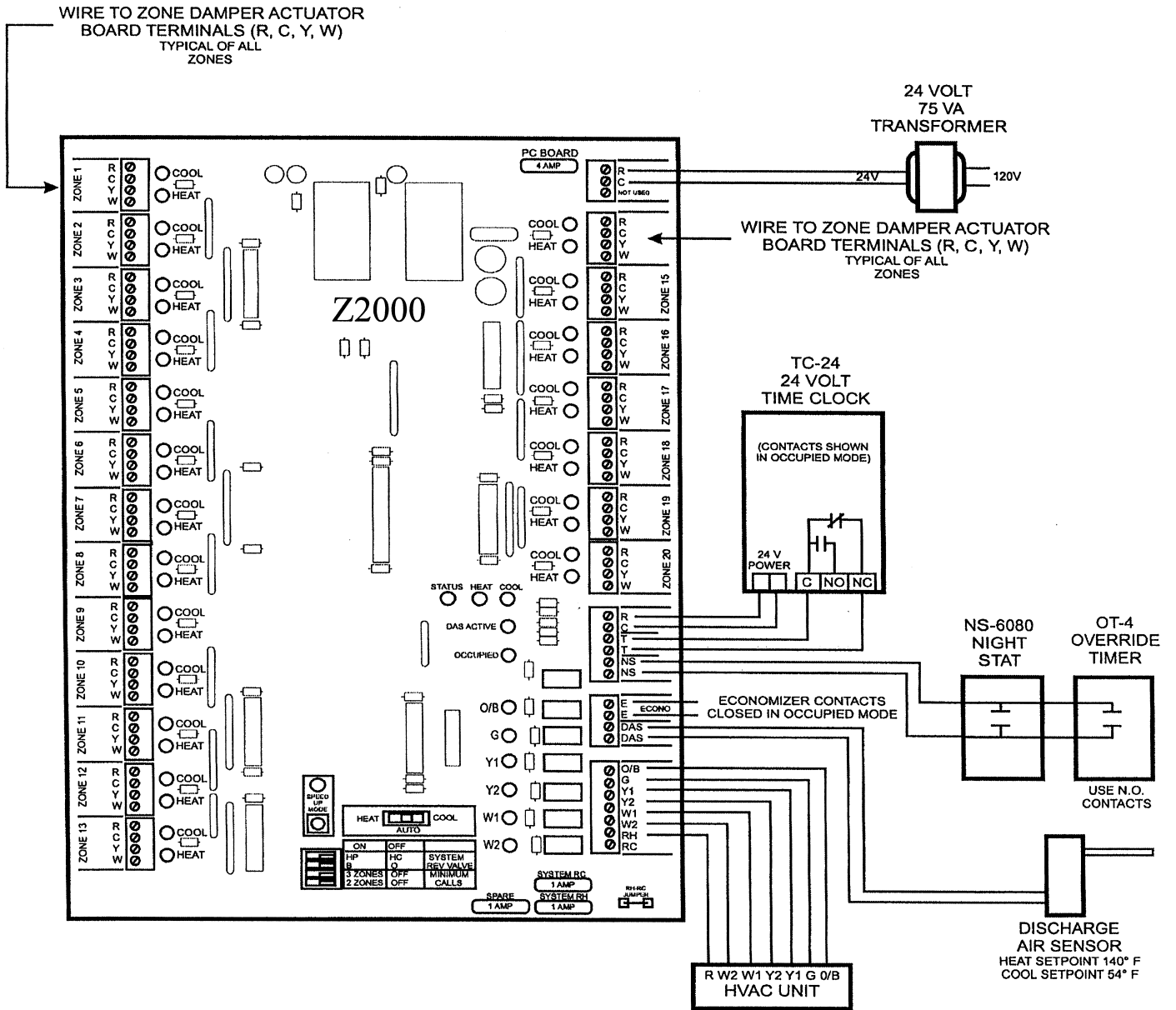
## Z2000 SYSTEM STATUS LED DEFINITIONS AND FUNCTIONS

<b>Time Delay Speed-Up</b>	<b>RED</b>	<b>BLINKS</b> when time delays are in speed up mode
<b>Discharge Air Sensor</b>	<b>GREEN</b>	<b>ON</b> when DAS is connected <b>BLINKS</b> when 1st stage heat or cool go out on limit
<b>Status</b>	<b>GREEN</b>	<b>BLINKS</b> to confirm microprocessor operation
<b>ZONES (1-20)</b>	<b>RED (Heat)</b> <b>GREEN (Cool)</b>	<b>ON</b> when there is a call for heating <b>ON</b> when there is a call for cooling
<b>HVAC System</b> W1 W2 Y1 Y2 G O/B	<b>GREEN</b> <b>GREEN</b> <b>GREEN</b> <b>GREEN</b> <b>GREEN</b> <b>GREEN</b>	<b>ON</b> when first stage heat is energized <b>ON</b> when second stage heat is energized <b>ON</b> when first stage cooling is energized <b>ON</b> when second stage cooling is energized <b>ON</b> when fan is energized <b>ON</b> when reversing valve is energized
<b>Occupied</b>	<b>GREEN</b>	<b>ON</b> when system is in occupied mode
<b>Mode</b>	<b>RED (Heat)</b> <b>GREEN (Cool)</b>	<b>ON</b> when system is in the heat mode <b>ON</b> when system is in the cooling mode

## SYSTEM SET UP SWITCH DESIGNATIONS

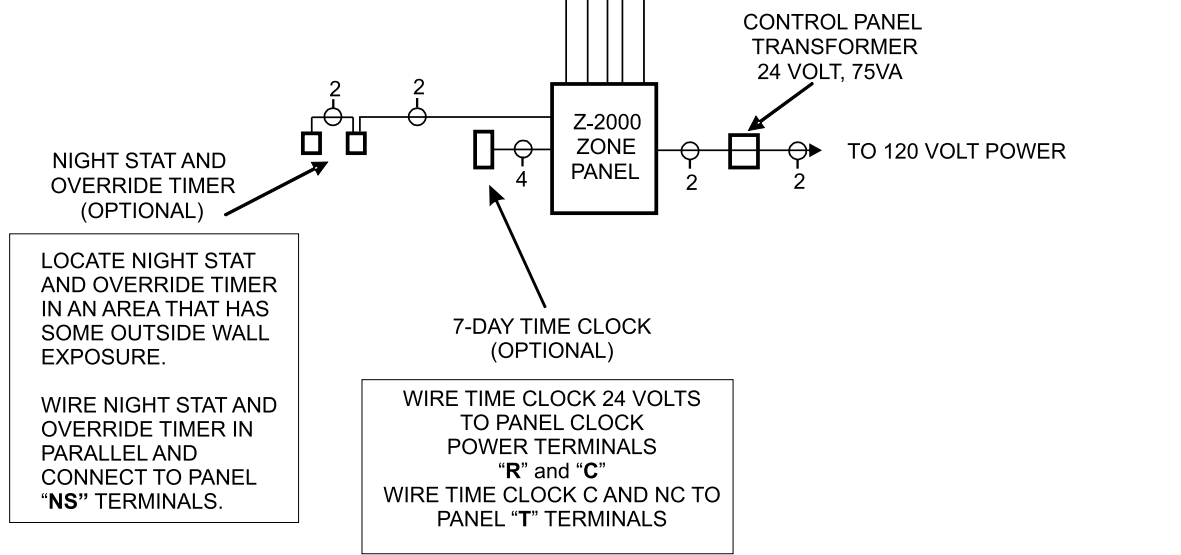
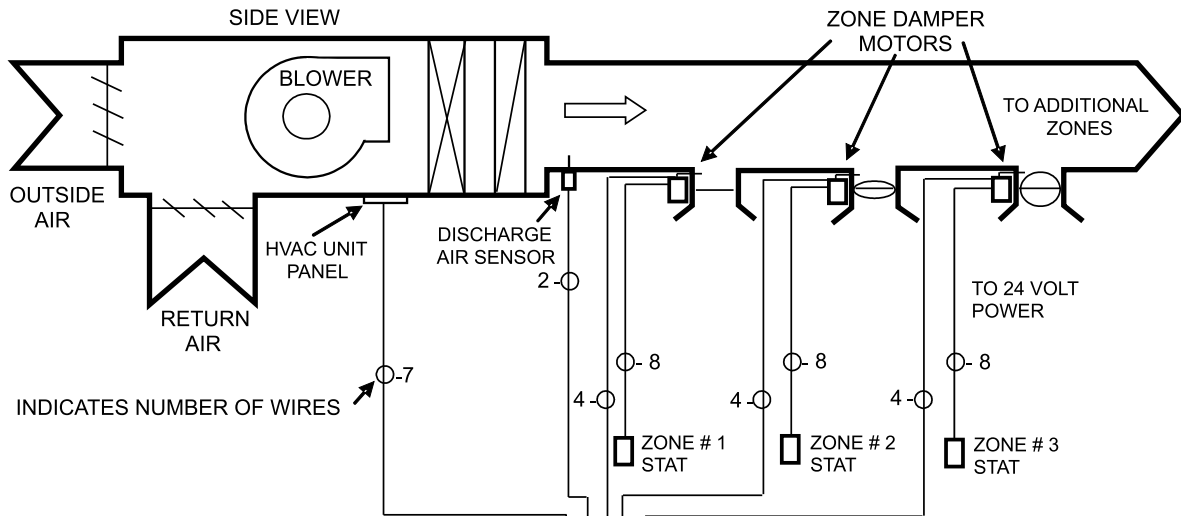
	<p><b>HC</b> Conventional Heat/Cool System</p> <p><b>HP</b> Heat Pump System</p> <p><b>B</b> Energizes the reversing valve on a call for heating</p> <p><b>O</b> Energizes the reversing valve on a call for cooling</p> <p><b>2 ZONES</b> Two zones must call to energize the equipment</p> <p><b>3 ZONES</b> Three zones must call to energize the equipment (When both switches are OFF, the default is 1)</p>
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# Z2000 COMPONENT WIRING DIAGRAM



# Z2000 MODULATING ZONE CONTROL SYSTEM SYSTEM WIRING AND LAYOUT GUIDE

UP TO 2 HEAT / 2 COOL



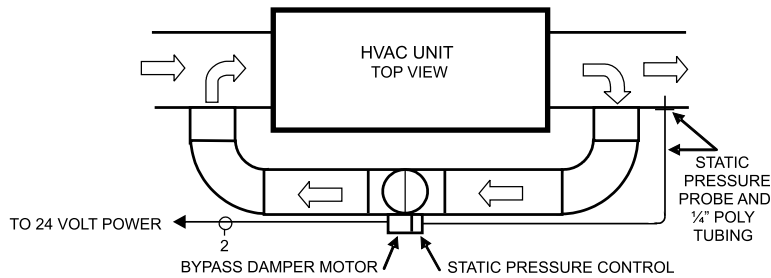
LOCATE NIGHT STAT AND OVERRIDE TIMER IN AN AREA THAT HAS SOME OUTSIDE WALL EXPOSURE.

WIRE NIGHT STAT AND OVERRIDE TIMER IN PARALLEL AND CONNECT TO PANEL "NS" TERMINALS.

WIRE TIME CLOCK 24 VOLTS TO PANEL CLOCK POWER TERMINALS "R" and "C"

WIRE TIME CLOCK C AND NC TO PANEL "T" TERMINALS

## BYPASS DAMPER SYSTEM



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## Z2000 COMFORT SYSTEM™ WIRING DETAILS

### GENERAL NOTES

Install the Z2000 Comfort System control panel on a flat surface near the HVAC equipment. The panel should be installed in a dry, clean location approximately 60 inches from the floor. Do not install the control panel on or inside a rooftop unit.

### 24 VOLT POWER

The control panel requires a 24 Volt transformer with a proper VA rating. Do not power the control panel from the transformer in the HVAC equipment. Connect 24 Volts to the terminals labeled **24 VAC INPUT POWER** on the interface board. 18-2 thermostat wire is recommended.

### DISCHARGE AIR TEMPERATURE SENSOR

The control panel requires a discharge air temperature sensor. Mount the sensor 26 inches from the HVAC equipment in the supply duct. Connect the sensor to the terminals labeled **DAS** on the interface board. 18-2 thermostat wire is recommended.

### HVAC UNIT

The control panel is wired to the HVAC equipment in the same way as a standard 2-stage heat / 2-stage cool thermostat. Connect the HVAC equipment to the terminals labeled **HVAC SYSTEM** on the interface board. 18-8 thermostat wire is recommended.

### R, C, Y AND W ZONE DAMPER TERMINALS

The control panel requires a heating and cooling contact closure from each zone damper. Connect terminals **R**, **C**, **Y**, and **W** from each zone damper to the terminals labeled **R**, **C**, **Y**, and **W** on the interface board. 18-4 thermostat wire is recommended.

### TIME CLOCK, NIGHT STAT AND OVERRIDE TIMER (optional)

The control panel has an optional input for a time clock, night stat, and override timer. To install a time clock, remove the factory installed jumper between the two terminals labeled **T** and **T**. Wire the time clock using the contacts that are closed during the occupied mode. Wire 24 volts to the time clock using terminals **R** and **C** located above the **T** and **T** terminals. A normally open night stat and override timer can be wired in parallel to terminals **NS** and **NS** to provide unoccupied temperature control and override during unoccupied periods. 18-2 thermostat wire is recommended.

### MINIMUM CALLS SELECTION SWITCHES

The control panel is equipped with two **Minimum Calls** selector switches located on the interface board. When both switches are in the OFF position, any zone calling can bring on the equipment. When the **2 ZONES** switch is in the ON position, at least two zones have to call to bring on the equipment. When the **3 ZONES** switch is in the ON position, at least three zones have to call to bring on the equipment. If both **2 ZONES** and **3 ZONES** switches are in the ON position, the default is three.

### TIME DELAY SPEED UP BUTTON

Time delay speed up should only be used for start up and service. The control panel is equipped with a time delay speed up button. When the speed up button is engaged the time delays between stages and between modes of operation are divided by 15. The time delay speed up mode will reset after fifteen minutes.

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