

COMFORT SYSTEM™

Commercial VAV & Zone Control System
Modulating

The Alternative to Trane® Varitrac™ and Carrier® VVT™
Zone Control Systems

Z-1600™ Zone Control



Jackson
SYSTEMS

Zone Control Made Simple™

www.jacksonsystems.com
1.888.652.9663

Z-1600 MODULATING ZONE CONTROL SYSTEM

System Features

- Fully modulating zone dampers or diffusers
- Up to 16 zones
- Auto changeover
- Works with single stage, multi-stage, or heat pump systems
- No programming required
- Auxiliary heat control option for each zone
- Night setback option
- All low voltage wiring
- LEDs indicates status of equipment and zones
- Fused inputs and outputs

System Benefits

- Low Cost
- Simple to wire
- Easy to set up (No Laptop Required)
- Reliable design
- Toll-free phone number for technical support

Z-1600 MODULATING ZONE CONTROL SYSTEM

OVERVIEW

The Z-1600 Comfort System™ is a commercial zone control system that allows a single HVAC unit to have up to 16 individual zones. Each zone is controlled by its own space thermostat and a modulating damper. When a majority of zones are calling for cooling, the system operates in the cooling mode. The Z-1600 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 Z-1600 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 request first.

Comfort System™ zone dampers are available in round and rectangular, as well as VAV diffusers. All three types are controlled by a P+I modulating thermostat that controls the mode of operation based on duct temperature. The thermostat controls the zone damper to maintain room temperature in both cooling and heating modes. When the zone temperature falls below the heating setpoint, the zone damper sends a signal to the Z-1600 control panel requesting heat. When the zone temperature rises above the cooling setpoint, the zone damper sends a signal to the Z-1600 control panel requesting cooling. These signals are used to determine the mode (heating or cooling) of the HVAC unit as described above. The zone thermostat heating output can also be used to control auxiliary baseboard, duct, or ceiling radiation heat.

A bypass damper is installed between the supply and return air duct to maintain the proper system static pressure. Bypass dampers are available in both electronic and barometric type. Electronic bypass dampers are recommended for systems with static pressure of 0.75" w.c. and over. Barometric bypass dampers are recommended for systems under 0.75" w.c. of static pressure.

Z-1600-T MODULATING ZONE THERMOSTAT WITH AUTO CHANGEOVER



DISASSEMBLING THERMOSTAT

To separate the thermostat from the backplate, hold the front of the thermostat with right hand. Use the thumbnail of left hand to hook the extremely small rounded tab located on the top edge of the thermostat backplate and pull apart.

PUSH BUTTON FUNCTIONS

Press the **ON** button to activate the thermostat.

Press the **OFF** button to deactivate the thermostat. This will also drive the zone damper closed.

The **C/F** button switches the display between Fahrenheit and Celsius.

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 to 76° F. It is recommended that these setpoint limits not be exceeded.

DISCHARGE AIR SENSOR

A discharge air sensor is supplied with each thermostat. The purpose of the discharge air sensor is to select the mode of operation of the damper. If the discharge air temperature is above 72° F, the damper will open on a call for heating. If the discharge air temperature is below 72° F, the damper will open on a call for cooling.

TESTING DISCHARGE SENSOR

Disconnecting the discharge air sensor will put the thermostat in the cool mode. Shorting out the sensor will put the thermostat in the heat mode.

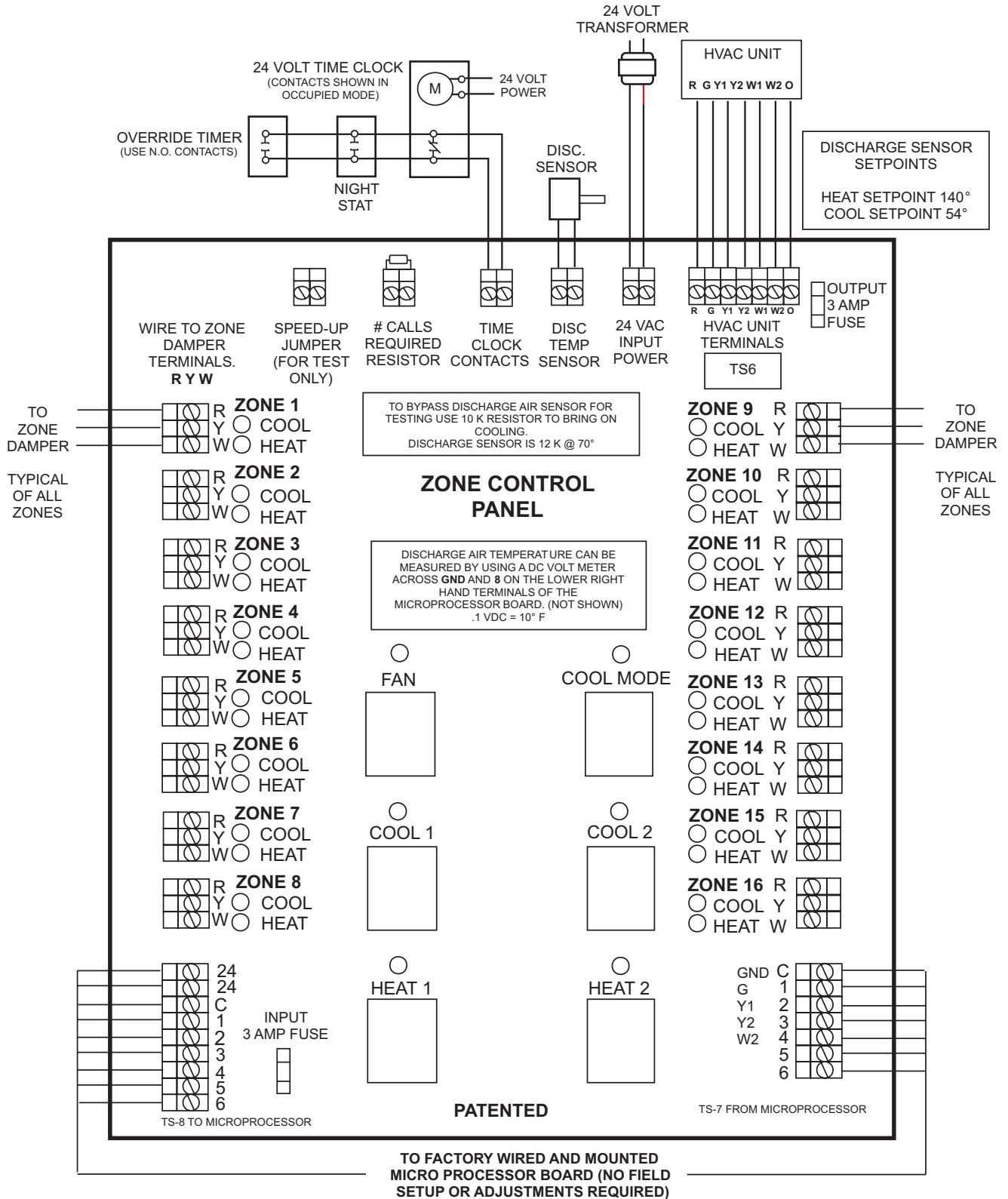
TERMINAL DESIGNATIONS

TERMINAL NUMBER	TERMINAL DESCRIPTION
1	OPEN DAMPER (24 VOLTS OUT)
2	CLOSE DAMPER (24 VOLTS OUT)
3	HEAT OUTPUT (24 VOLTS OUT)
4	HOT (24 VOLTS IN)
5	COMMON (24 VOLTS IN)
6	DUCT SENSOR
7	DUCT SENSOR
8	COOL OUTPUT (24 VOLTS OUT)

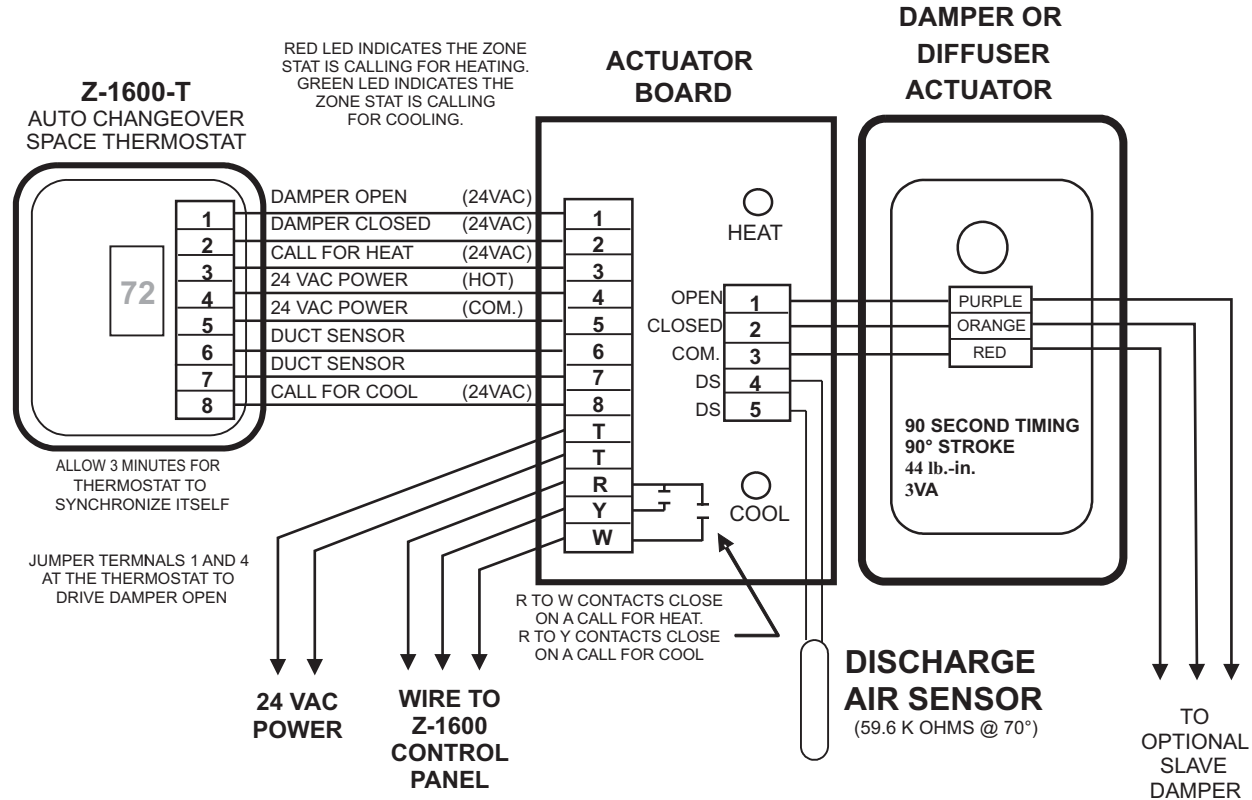
SETTING THERMOSTAT LIMITS

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 calibration.
8. Press the C/F button again to exit program.

Z-1600 COMFORT SYSTEM™ PANEL



Z-1600-T MODULATING ZONE THERMOSTAT AND DAMPER WIRING DIAGRAM



OPERATION SEQUENCE:

When the room temperature is 1.5 degrees below setpoint the thermostat will close the R to W contacts on the actuator board and signal the Z-1600 panel that there is a heating call.

When the room temperature is 1.5 degrees above the setpoint the thermostat will close the R to Y contacts on the actuator board and signal the Z-1600 panel that there is a cooling call.

DAMPER NOTES:

To balance the HVAC system, remove each zone thermostat from its subbase and jumper terminals 1 and 4 to drive dampers open.

The actuator board is located on the side of the damper actuator and is wired at the factory.

Each zone damper requires 3VA.

The space thermostat will control up to 6 damper actuators wired in parallel.

If the discharge air temperature at the damper is warmer than 72 degrees, the zone damper operates as a heating damper.

If the discharge air temperature at the damper is below 72 degrees, the zone damper operates as a cooling damper.

The Z-1600-T zone thermostats have temperature limits set at 68 degrees and 76 degrees and should not be changed.

Z-1600- PANEL NOTES:

Use standard 18 gauge thermostat wire.

Run three wire cable from the panel terminals (R,Y,W) to each individual zone damper actuator board.

Panel requires a 24 VAC 40VA transformer.

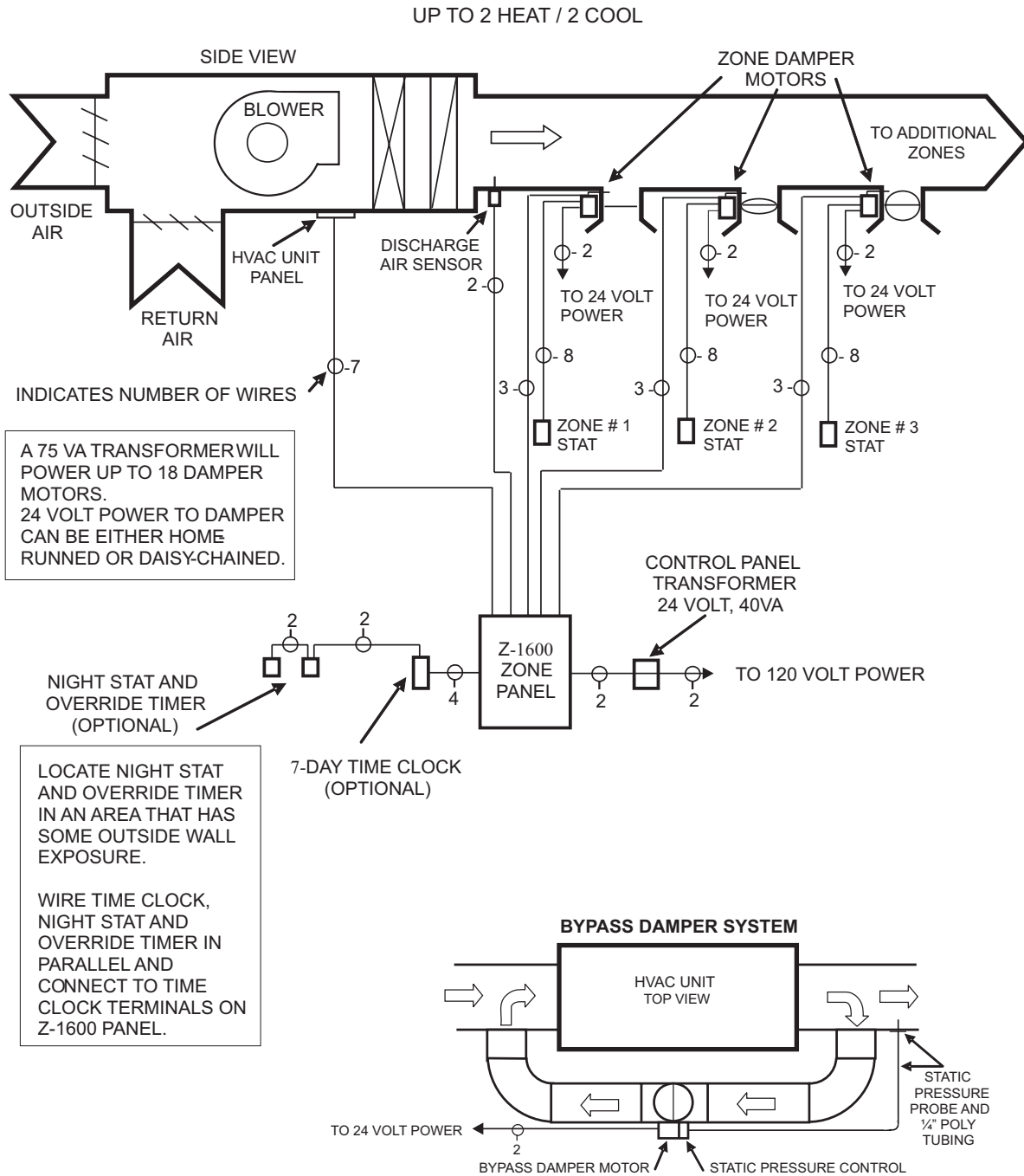
Locate discharge air sensor 3 feet down stream in trunk line.

“Speed up jumper” shortens all the time delays on the control panel (use for testing only).

“Number of calls required resistor” determines the number of zones that must be calling in order for the system to bring on the heating or cooling equipment.

Time clock contacts are closed during occupied cycle.

Z-1600 MODULATING ZONE CONTROL SYSTEM SYSTEM WIRING AND LAYOUT GUIDE



Z-1600 PANEL OPERATION

This system generally does not require any adjustments.

A red light indicates the zone is calling for heating. A green light indicates the zone is calling for cooling.

The number printed on the "Call Required Resistor" indicates the number of like calls that must take place before the heating or cooling equipment will start.

MAJORITY WINS

If more zones call for heating than cooling, the system will be in the heating mode. If more zones call for cooling than heating, the system will be in the cooling mode.

If the number of heating and cooling calls are equal, the system will be in the cooling mode. This is referred to as Cooling Priority.

The heating discharge air setpoint is approximately 140° F.

The cooling discharge air setpoint is approximately 54° F.

TIME DELAYS

	SPEED-UP JUMPER <u>NOT</u> INSTALLED	JUMPER INSTALLED
MINIMUM TIME IN HEAT OR COOL MODE (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 MIN.	3 MIN.
MINIMUM OFF TIME REQUIRED BEFORE THE EQUIPMENT CAN SWITCH FROM HEAT TO COOL MODE (Same as purge cycle)	5 MIN.	1 MIN.
TIME BETWEEN STAGES (Up-staging)	15 MIN.	3 MIN.
EQUIPMENT MINIMUM OFF TIME (Same as short cycle protection)	5 MIN.	1 MIN.

USE SPEED-UP JUMPER FOR TESTING ONLY!

Z-1600 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.
- Oversizing 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 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 Z-1600 Comfort System™ panel should be located near the center of the building to keep wire runs as short as possible.
- DO NOT mount the Z-1600 Comfort System™ panel on or inside the rooftop unit.
- Use a separate 24 VAC, 40 VA transformer for the Z-1600 Comfort System™ panel.

Z-1600 COMFORT SYSTEM™

WIRING DETAILS

GENERAL NOTES

Install the Z-1600 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, 40VA transformer. 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 **DISC TEMP SENSOR** 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 UNIT TERMINALS** on the interface board. 18-8 thermostat wire is recommended.

R, Y, AND W ZONE DAMPER TERMINALS

The control panel requires a heating and cooling contact closure from each zone damper. Connect terminals **R, Y, and W** from each zone damper to the terminals labeled **R, Y, and W** on the interface board. 18-3 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 **TIME CLOCK CONTACTS**. Wire the time clock using the contacts that are closed during the occupied mode. A normally open night stat and override timer can be wired in parallel with the time clock for unoccupied temperature control. 18-2 thermostat wire is recommended.

PROGRAMMING RESISTOR

The control panel is equipped with a “2 calls required” resistor factory installed on the interface board. This resistor determines the number of zones that must be calling for heating or cooling before the system will change modes. Resistor for 1 through 4 “calls required” are also shipped with the control panel. Install the appropriate resistor in the terminals labeled **# CALLS REQUIRED RESISTOR**.

SPEED-UP JUMPER

The control panel is equipped with “speed-up jumper” terminals. Installing a jumper between the two terminals labeled **SPEED-UP JUMPER** will reduce the time delays between stages and between modes of operation. The standard time delay between stages and between modes is 15 minutes. With the jumper installed, the time delays are reduced to 3 minutes. The speed-up-jumper is for commissioning only. Do not leave the jumper installed after the unit is commissioned.

MICROPROCESSOR BOARD

The microprocessor board requires no wiring, adjustment, or maintenance.

Z-1600 COMFORT SYSTEM™

CONTROL PANEL SPECIFICATIONS

APPLICATION:

The model Z-1600 Comfort System™ is a commercial zone control system that allows a single heating and cooling unit to have up to 16 individual zones. Each zone is controlled by its own space thermostat and motorized damper. If a majority of zones are calling for heat, the system will operate in the heating mode. The two stages of heat will be cycled to maintain the heating discharge air setpoint. If a majority of zones are calling for cooling, the system will operate in the cooling mode and the two stages of cooling will be cycled to maintain the cooling discharge air setpoint. If the number of zones calling for heating and cooling are equal, the system will operate in the cooling mode first. This is known as Cooling Priority. Each zone damper or diffuser will modulate, based on zone and discharge air temperature, to maintain the individual zone temperature setpoint. A barometric or electronic bypass damper will modulate to maintain the duct static pressure.

DIMENSIONS:

Height: 16.0"
Width: 13.0"
Depth: 2.75"

PANEL CONSTRUCTION:

Rating: NEMA 1
Material: #18 aluminum with 6 knock-outs on top (open bottom)
Door: Fully removable, self-centering
Finish: Anodized

POWER REQUIREMENTS:

Voltage: 24 VAC
VA: Panel - 20 VA
Dampers / Diffusers - 3 VA Each

OPERATING AMBIENT:

Temperature: 32°F to 120°F

SHIPPING WEIGHT:

Panel Weight: 10.0 lbs.

WARRANTY:

Panel: 5 Years

Z-1600 COMFORT SYSTEM™

ZD SERIES ZONE CONTROL DAMPER SPECIFICATIONS

APPLICATION:

The model ZD is a round commercial zone control damper assembly that includes a damper, modulating actuator, duct temperature sensor, and actuator control board. The ZD zone damper can be used as part of the Z-1600 Comfort System™, or as a stand-alone control damper.

AVAILABLE SIZES:

Diameters:	6", 8", 10", 12", 14", 16", 18", 20"		
Length:	6" - 10" diameter =	10"	
	12" diameter =	13"	
	14" - 20" =	14"	

CONSTRUCTION:

Shell Material:	18 gauge spiral steel
Damper Material:	18 gauge
Shaft:	½" aluminum

AIR FLOW & PRESSURE:

Max static pressure:	2 inches w.c.
Max velocity:	2,000 fpm
CFM:	0 - 4,000 cfm

WARRANTY:

Damper:	5 Years
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Z-1600 COMFORT SYSTEM™ VAV DIFFUSER SPECIFICATIONS

APPLICATION:

The Model VAV Comfort System™ Diffuser is used to vary the supply air volume from a wall-mounted thermostat. The diffuser is designed to maintain the coanda effect (draft free) of discharge air along the ceiling, providing a sustained discharge velocity throughout the volume range. The Comfort System™ VAV Diffuser can be used as part of the Z-1600 Comfort System™ or with the Z-1600-T wall-mounted thermostat that enables the user to choose their own desired comfort level.

AVAILABLE SIZES:

Face Size: 12" X 12"
24" X 24"
Neck Size: 6", 8" for 12" x 12" face size
6", 8", 10", 12", 14" for 24" x 24" face size

CONSTRUCTION:

Face Plate: Removable 18 gauge steel with baked white enamel finish
Back Cone: Unitary stamped 18 gauge steel

OPERATION:

Diffuser: Integral modulating disk that continually regulates supply air volume in response to thermostat control
Air Volume Range: 118 to 710 CFM

DIFFUSER ACTUATOR OPTIONS:

24 VAC, 3VA, 3-wire floating point actuator (standard)
Pneumatic actuator
Lon Works compatible
Custom mounting for BAS controls
Manually adjustable volume controller

AIR HANDLER CONTROL OPTIONS:

Master thermostat
Standard VAV controller (55° F discharge air)
Changeover VAV controller (heating & cooling VAV)

Z-1600 COMFORT SYSTEM™

SPECIFICATION SUGGESTIONS

1.01 ZONE CONTROL SYSTEMS

- A. General. Provide a Z-1600 Comfort System™ zone control system manufactured by Jackson Systems to meet the performance as specified in this section. Each zone control system shall meet the following requirements.
1. The zone control system shall be composed of one logic panel, up to 16 zone dampers with actuators, zone thermostats, and bypass damper(s).
 2. The zone control system shall be capable of controlling up to 16 zones and must use proprietary fully modulating thermostats.
 3. The system shall have auto changeover and be capable of controlling two stages of heat and two stages of cooling. The system shall also be compatible with heat pump systems.
 4. The zone control system shall not require any field programming. A laptop computer or service tool shall not be required for setup and troubleshooting.
- B. Environment. The zone control panel shall be suitable for the indoor ambient conditions and shall be rated for operation between 32°F and 120° F.
- C. Serviceability. Provide diagnostic LEDs for heating stages, cooling stages, fan, and the heating or cooling request of each zone.
- D. No battery back-up. The zone control system shall not require a battery back-up.
- E. Power and Immunity to noise. The zone control system shall be able to operate between 90% and 110% of nominal voltage rating and shall not be affected by radio frequency interference (RFI).

1.02 ZONE DAMPERS

- A. Zone dampers shall be round, rectangular or VAV diffuser type. Round dampers shall have a diameter of 6 inch to 36 inch. Rectangular dampers shall have a minimum size of 8 inch by 8 inch. VAV diffusers shall have an inlet size of 6 inch to 14 inch.
1. Frames. 18 gauge (minimum) galvanized steel.
 2. Blades. 18 gauge (minimum) galvanized steel.
 3. Bearings. Oil impregnated sintered iron bushings.

Z-1600 COMFORT SYSTEM™

SPECIFICATION SUGGESTIONS

4. Seals for Round Dampers. EDPM seal installed on inside of round damper shell. Leakage shall be less than 2% at 3 inches of static pressure.
5. Dampers shall be Jackson Systems ZD-XX, ZD-XXXX or approved equal.
6. VAV Diffusers shall be Jackson Systems VD-XX or approved equal.
7. All zone dampers to have minimum position adjustments.

1.03 ELECTRIC DAMPER ACTUATORS AND ACTUATOR CONTROL BOARDS

- A. Modulating and two position damper actuators. All zone damper actuators shall have sufficient reserve power to provide smooth action as specified.
 1. Damper actuators shall be capable of turning clockwise or counterclockwise and be powered by a reversible motor which is connected to the output shaft.
 2. All actuators shall be factory wired to the damper control board.
 3. All damper actuators shall be mounted outside of the air stream.
- B. The damper actuator control board shall provide wiring terminals for all field and factory wiring. The damper actuator board will also provide an output for auxiliary zone heat.
 1. Factory Wiring. Damper actuator and duct sensor.
 2. Field Wiring. Zone thermostat, 24 VAC power, wiring to system panel, and optional auxiliary heat.

1.04 BYPASS DAMPERS

- A. Bypass damper(s) shall be provided to maintain the proper duct static pressure.
 1. The bypass damper(s) shall be round or rectangular.
 2. Systems under 0.75" w.c. of static pressure shall use a barometric bypass damper.
 3. Systems 0.75" w.c. and over of static pressure shall use an electronic bypass damper with static pressure controller.
 4. The bypass damper(s) shall be sized for 90% of the total air flow at 2500 FPM.

Z-1600 COMFORT SYSTEM™

SPECIFICATION SUGGESTIONS

1.05 WIRING

A. Control Wiring.

1. All control wiring shall be 24 Volts or less.
2. All control wiring shall be standard or plenum-rated thermostat wire. 18 gauge minimum. No shielded cable shall be required.
3. Control wire and cable shall be installed in accordance with NEC.

1.06 SERVICE AND GUARANTEE

- A. General. The entire zone control system shall be warranted for a period of five (5) years from date of installation. This includes the components only and does not include labor of any kind.