Product Manual

TCS Basys Controls®

SZ1025a

VAV Box Controller

Description

The SZ1025a is a microprocessor-based controller designed for VAV terminal unit applications.

Features

- Stand-alone or network operation
- Built-in velocity pressure sensor with K-factor correction
- Pressure dependent or pressure independent operation
- Capable of controlling series or parallel fan-powered boxes
- Offers two independent modulating outputs for a damper and reheat valve
- Interface available for tri-state actuator motors
- Separate heating and cooling minimum and maximum CFM settings
- Two independent dry contact outputs
- Remote setpoint capability
- Discharge air sensor input
- Filter monitor input
- External time clock input

Contents

Mounting

Use two #10 sheet metal screws to mount the SZ1025a.

Prior to mounting, place the jumpers. (See setup instructions.) If the unit will be stand-alone, all programming should be completed. Also, if the unit will be wired for communications, a unique address should be programmed into the unit. (See programming instructions.)

For best results, the room sensor should be mounted on an interior wall that reflects normal room environment, at a height of approximately five feet from the floor. Avoid areas exposed to direct sunlight, unusual heat sources, open doors and windows, or unventilated locations.

Wiring

The SZ1025a terminal designations are shown below.

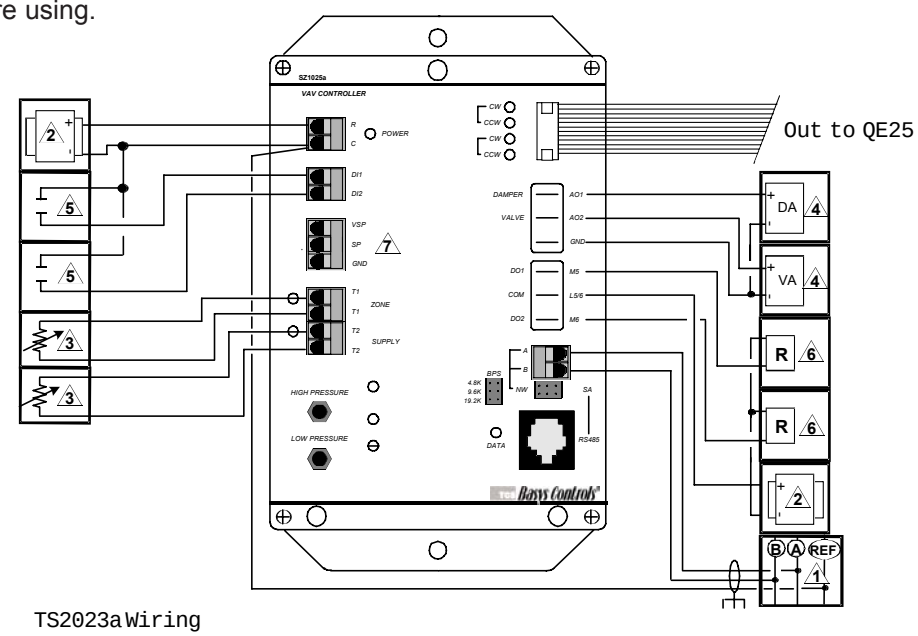
REMOTE SENSOR WIRING

The SZ1025a accepts two 1000 Ω two-wire platinum sensors. Use TS2000 or TS3000 for room sensing, TS2023a for room sensing with setpoint adjustment (when using the TS2023a, set the SZ1025a jumper to Network position), and TS1009 or TS1002 for duct sensing. When using TCS/Basys Controls three-wire sensors, use the black and red leads, and either clip or twist off the white lead. The wiring length from the room sensor to the SZ1025a should not exceed 50 ft. Make sure that both the dipswitches and programming are set for the sensors you are using.

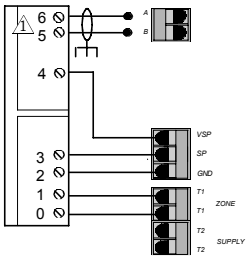
POWERING THE SZ1025a

The SZ1025a is powered from 24 VAC +/- 20 %. If wiring for communications, dedicated power must be used to power the SZ1025a. Several S-series thermostats may be powered from the same transformer, provided that the transformer has enough power.

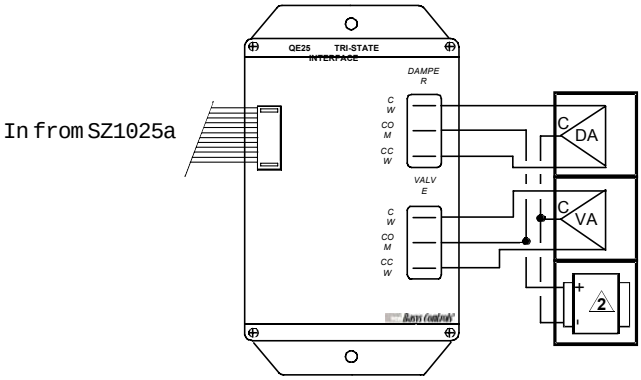
Caution: When multiple TCS/Basys Controls devices are using a single transformer, the polarity of the power wiring must be maintained because all TCS devices are half-wave rectified.



TS2023a Wiring to SZ1025a



Optional QE25 Tri-state Interface Wiring

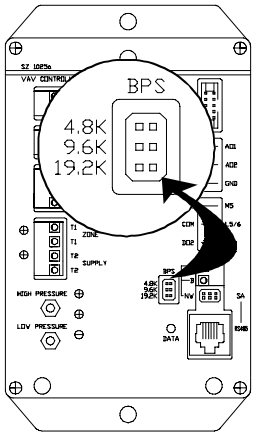


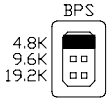
1. Twisted, Shielded 18AWG. Must be run separately. When connecting to a 3 wire RS485 network, route the Ref wire to Com the power terminal.
2. 24 VAC transformer. The SZ1025a power must be dedicated
3. If using TS2000 or TS1009, use red and black leads. If no supply sensor is used, you must short T2 to T2.
4. 4 to 20 mA output. 600 Ohm max. Do not power actuators with SZ1025a power. The SZ1025a is half-wave rectified, whereby the power ground is common with the signal ground.
5. Dry contact. Must not be powered.
6. Dry contact rated 24 VAC @ 2 A. Do not power relay with SZ1025a power.
7. If not using a TS2023a setpoint adjustment pot., you must short SP to GND.

Setup

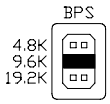
BAUD RATE SELECTION

The SZ1025a must be programmed using a PC and TCS/Basys Controls software. A communication baud rate must be set by placing one jumper in the area shown above. This baud rate will be consistent with all devices.

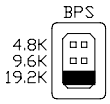




For a 4.8K baud rate.



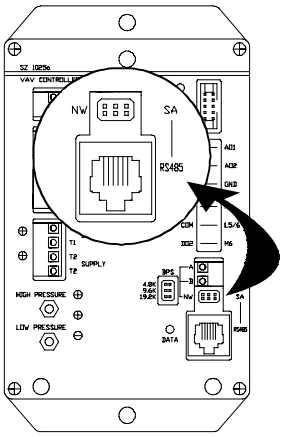
For a 9.6K baud rate.

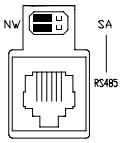


For a 19.2K baud rate.

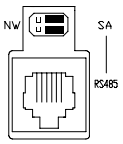
PROGRAMMING ACCESS

The mode of programming must be set by placing two vertical jumpers in the area shown above.





For network applications where the SZ1025a will be accessed through its A and B terminals.

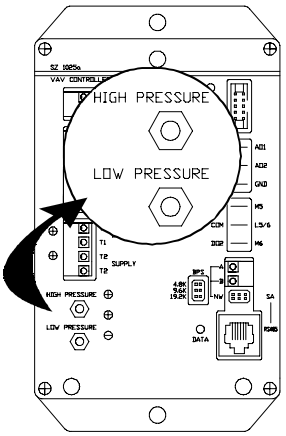


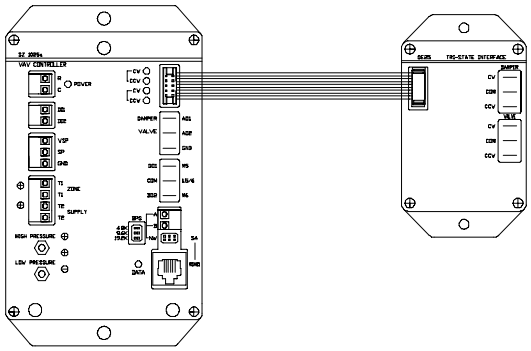
For stand-alone applications where the SZ1025a will be preprogrammed though the port shown below, or when accessing the SZ1025a when it is on a network to isolate it from the network.

Caution: If the unit is on a network and the DATA light is blinking, it indicates that the unit is being accessed by the PC. Moving the jumpers to the stand-alone position will terminate the access.

PRESSURE CONNECTIONS

For pressure independent applications, the SZ1025a provides a velocity pressure transducer. To utilize this, connect the high port on the SZ1025a to the air flow measuring station port or pitot tube port that faces the flow. Connect the low port on the SZ1025a to the air flow measuring station port or pitot tube port that faces away from the flow.





USING TRI-STATE ACTUATORS

If using tri-state actuators instead of 4 to 20 mA, a QE25 transducer is available. To connect the QE25 to the SZ1025a, use the ribbon connector included with the QE25 as shown.

Programming

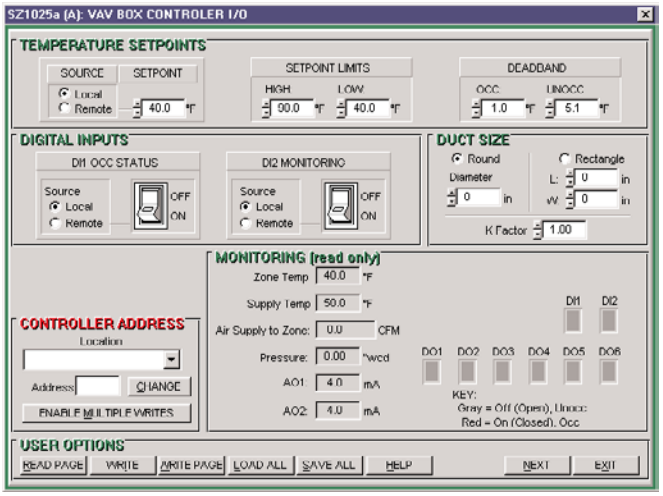
The SZ1025a must be programmed with a PC if other than factory default settings are desired. A port on the face allows local access for stand-alone applications. If you plan to program the controller while it is on a network, before putting the controller on the network, a unique address must be set in the controller by accessing it through the port on the front. For more information on programming through the PC, consult your TCS software manual.

TEMPERATURE SETPOINTS

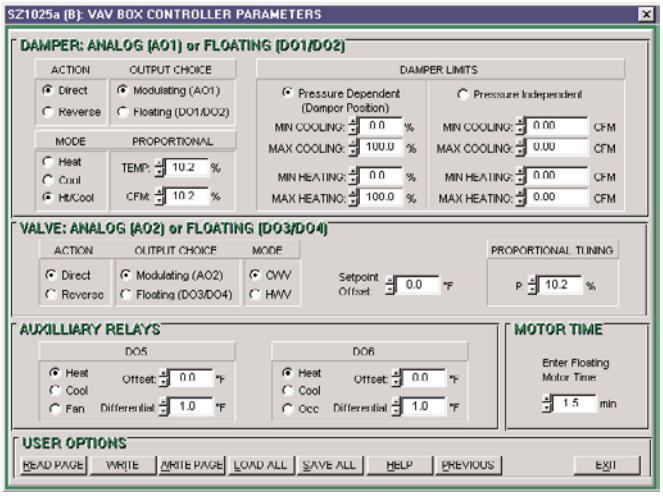
Enter a High and Low Limit for the setpoint. Also, enter the minimum heating and cooling setpoints in CFM. Revelation software will use the duct size and the CFM values to calculate the value sent to the SZ1025a. The setpoint can be “Local” (at the controller) or “Remote” (from the PC). Select “Local” or “Remote” for the setpoint. If “Remote” is selected, enter the value here.

Occupied and unoccupied “Dead Bands” are used to generate “Heating” and “Cooling” setpoints. The dead band is the +/- space around the setpoint where no heating or cooling is done or necessary.

SZ1025a Initialization screen "A" as displayed in Revelation Software (Default values shown).



SZ1025a Initialization screen "B" as displayed in Revelation Software (Default values shown).



DIGITAL INPUTS

External Time Clock and Filter Status

Select whether you want the "DI1" and/or "DI2" to be "Local" or "Remote". Local means the thermostat uses its own control program to manipulate these inputs. Remote means it will take a PC to make any changes to these inputs. If the "Digital Control" is "Remote" for "DI1" and/or "DI2", you can select whether they are "On" or "Off" and then "Write" or "White Page" and force these inputs and outputs on or off from a PC.

Note: When doing this, the respective input will remain in that state indefinitely until you change it from a PC, or make the "Digital Control" "Local". DI1 is for external time clock input. An open input is occupied and a shorted input is unoccupied. DI2 is for filter status.

DUCT SIZE

Select whether the VAV duct is "Round or "Rectangular". Now enter the duct area in inches in the appropriate box(es). Revelation uses this information in calculating the value to calculate the minimum and maximum CFM setpoints.

MONITORING

When a controller is "Read", the actual analog inputs and outputs will be displayed here.

The boxes will be Red if the input or output is "On" or active and Gray if the input out output is "Off" or not active.

Enter a "K" factor, if applicable.

DAMPER

Select "Reverse" or "Direct" action for the damper output. Direct action refers to the output increasing when the demand for heating or cooling increases. Reverse action refers to the output increasing when the demand for heating or cooling decreases. Select the type of output, based on the actuators for the damper as either "Floating" (tri-state) or Modulating"(4-20 mA).

Select one of the following three models for the damper output: "Heat" mode, "Cool" mode and "Heat and Cool" mode which requires a supply air sensor.

Enter a "Throttling Range" or "Proportional" value for the damper output for both temperature control and CFM control. These numbers are in percent of input span. The temperature span is 40 to 90§F and the CFM span is 0 to 1" wcd.

Select "Pressure Dependent" or Pressure Independent". Then enter the Minimum and Maximum Heating and Cooling CFM Setpoints or Minimum and Maximum mA outputs.

Note: If "Pressure Dependent" mode is used, CFM may be monitored, but is not used. (See pages 5-7 for sequences.)

VALVE

Select "Reverse" or "Direct" action for the valve output. Direct action refers to the output increasing when the space temperature increases. Reverse action refers to the output increasing when the space temperature decreases. Select the type of output, based on the actuators for the valve as either "Floating" (tri-state) or "Modulating" (4-20 mA).

Select one of the two modes for the valve output. The two modes are "HWV" (Hot Water Valve) mode and "CHW" or (Chilled Water Valve) mode.

Select a Setpoint Offset. This is a value offset from the setpoint where the output begins to modulate.

Enter a "Throttling Range or Proportional value for the valve output for temperature control. This number is in percent of input span. The temperature span is 40 to 90§F. (See pages 5-7 for sequences.)

AUXILIARY RELAYS

Select the mode for DO5 which can be "Heat" or "Cool" or for "Fan" control, and for DO6 which can be "Heat" or "Cool" or for an external time clock "Occ" signal.

For a “Cooling” output, the relay energizes when the input equals the “Setpoint” + “Deadband” + “Offset” + “Differential and de-energizes when the input falls to the “Setpoint” + “Deadband” + “Offset.”

For a “Heating” output, the relay energizes when the input equals the “Setpoint” - “Deadband” - “Offset” - “Differential and de-energizes when the input rises to the “Setpoint” **-** “Deadband” - “Offset.”

For “Fan” control, the relay is energized during the occupied time and energized on a call for heat or cool during the occupied time.

Enter the “Offset” and “Differential” values here. (See pages 5-7 for sequences.)

MOTOR TIME

Enter the “Motor Time” in minutes if you choose that the actuator is “floating or tri-state”. Larger times will speed up the response and smaller times will slow down the response. The number of minutes is from 1 to 10 minutes. We recommend to use the speed actuator takes to go from fully open to fully closed.

Sequence of Operations

SEQUENCE LEGEND

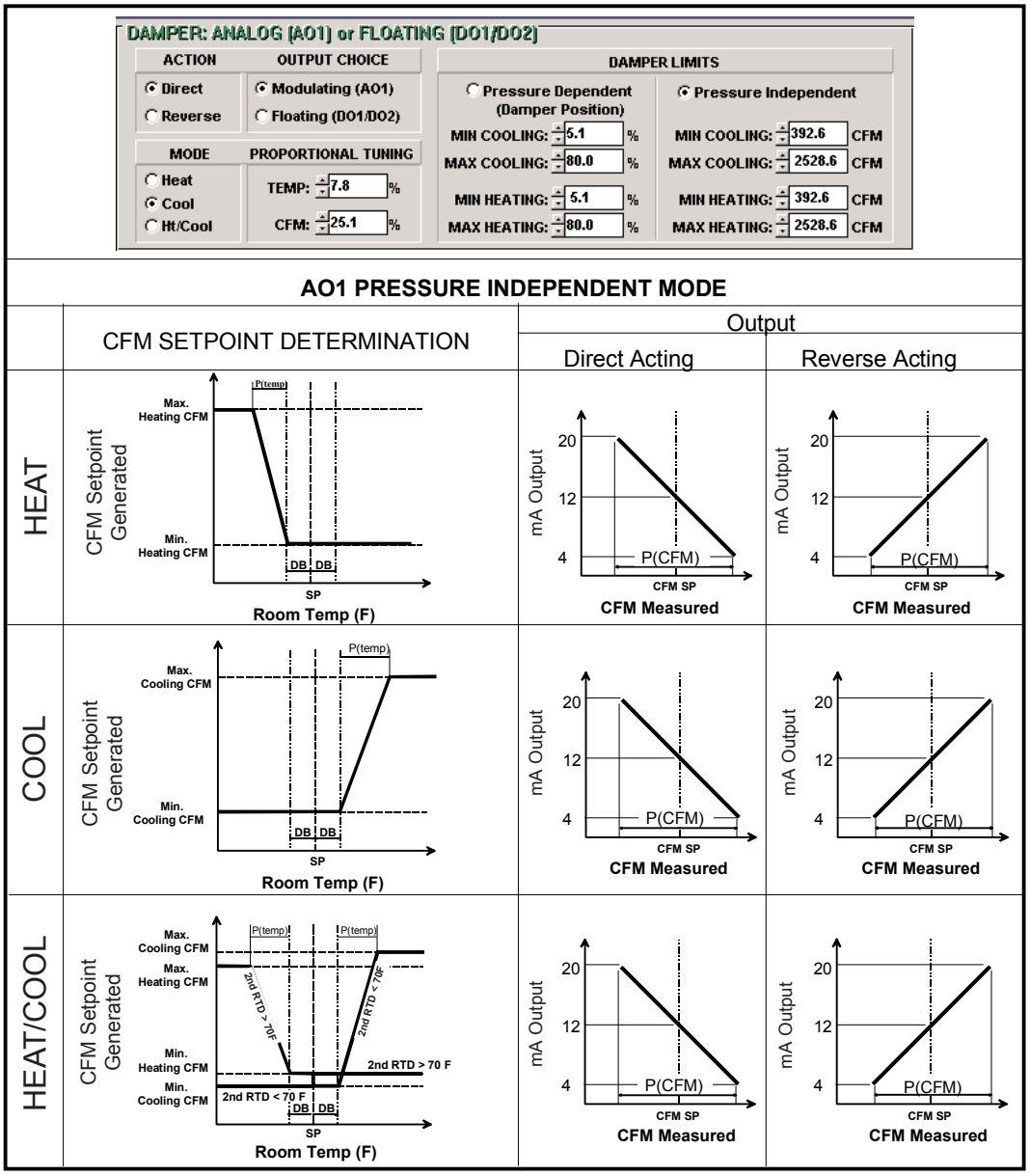
SP=Setpoint

DB=Deadband

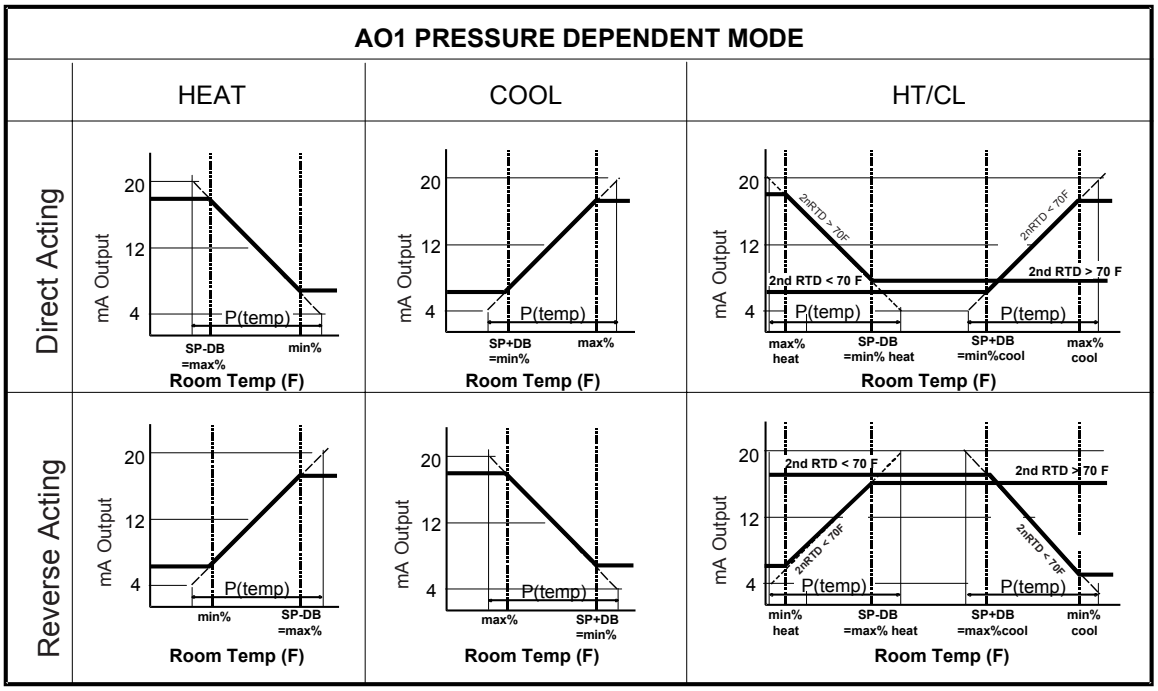
P(temp)=Temperature Proportional Band

P(CFM)=CFM Proportional Band

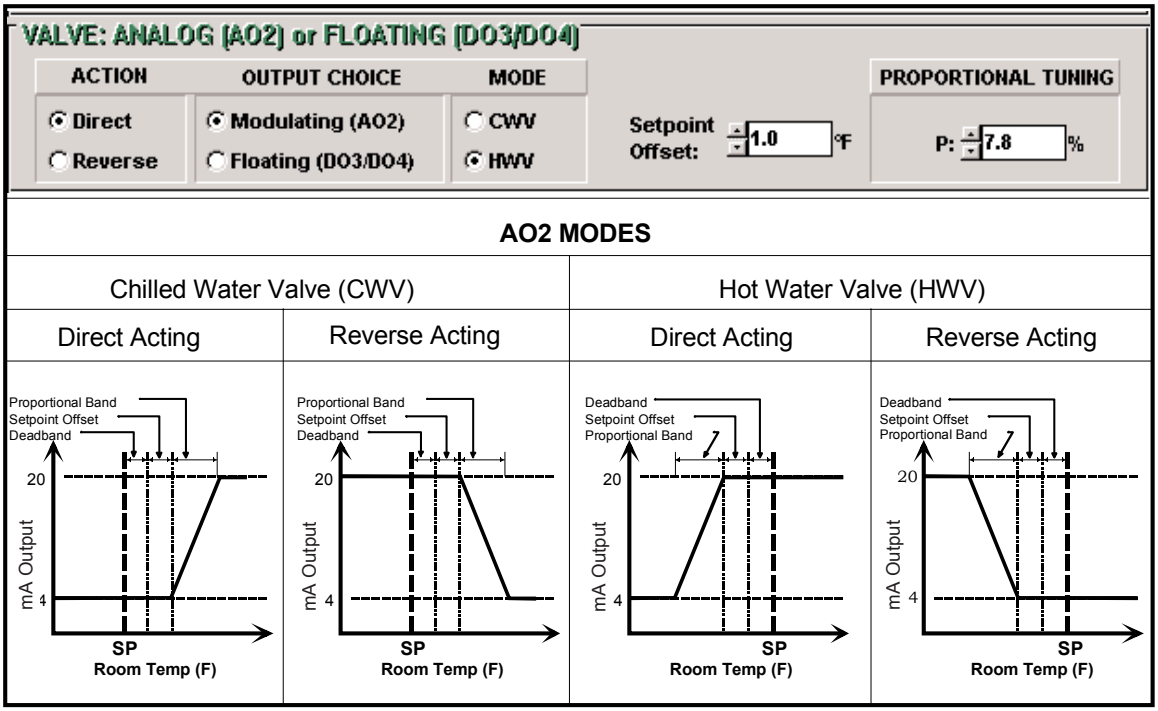
AO1 Pressure Independent Mode



Modulating Output AO1



Modulating Output AO2



MODULATING OUTPUT AO1

For pressure independent systems, a CFM setpoint is generated based on: temperature proportional band, sensed temperature and the temperature setpoint. The control output is dependent on the CFM proportional band, CFM measured and the CFM setpoint that has been generated. For pressure dependent systems, the control output is based on the temperature proportional band, sensed temperature and the temperature setpoint.

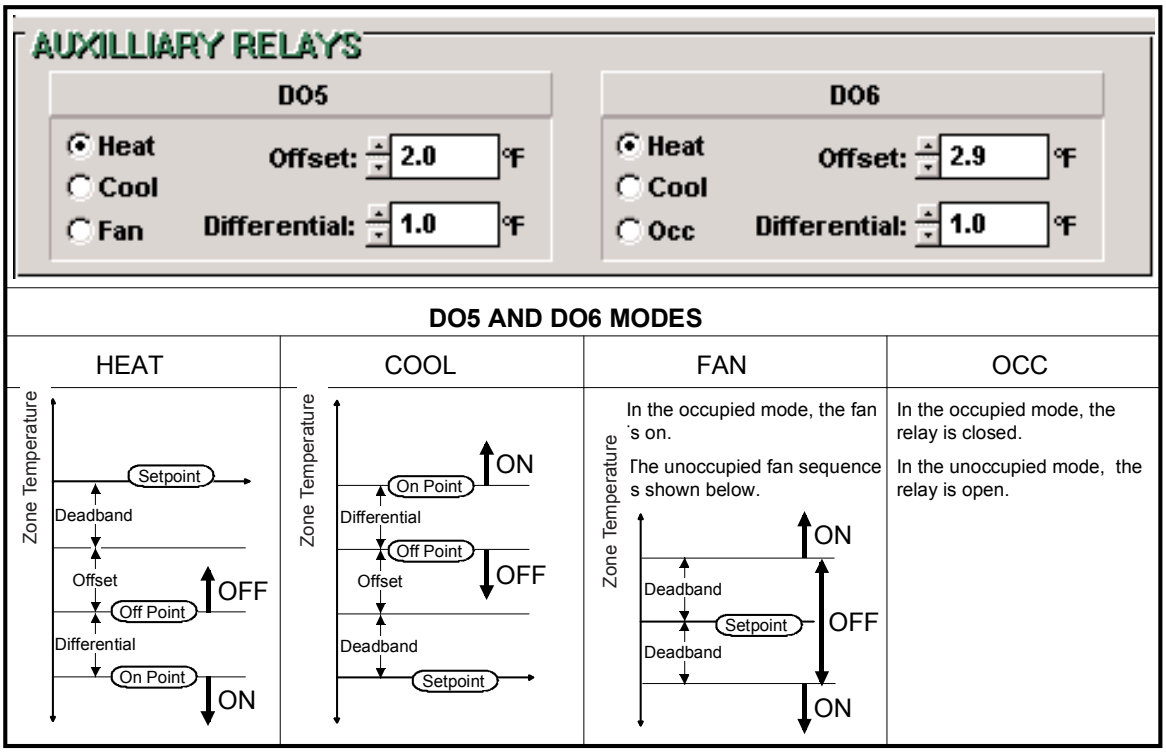
TRIACS DO1, DO2, DO3 AND DO4

The SZ1025a can be configured for floating damper and/or valve motors when used with the QE25 interface. The CW1 provides clockwise rotation to open the damper motor.

The CCW1 provides a counter-clockwise rotation to close the damper motor. The power that CW1 and CCW1 provide to the damper motor must not exceed 200 mA.

The CCW2 provides clockwise rotation to open the valve motor. The CCW2 provides a counter-clockwise rotation to close the valve motor. The power that CW2 and CCW2 provide to the valve motor must not exceed 200 mA.

Digital Outputs DO5 and DO6



Checkout & Troubleshooting

1. Be sure to check and verify all wiring before powering the SZ1025a.
2. Turn power on. The SZ1025a “Power” LED should light up.
3. If the SZ1025a has not been pre-programmed, it should be programmed at this time.
4. Increase the setpoint on the TS2023a. Observe the damper operation and heating stage(s) if used.
5. Decrease the setpoint on the TS2023a. Observe the damper operation and cooling stage(s) if used.
6. Note that the operation of the SZ1025a will depend on how it is programmed.

The SZ1025a is now ready for operation.

TROUBLESHOOTING

Power LED will not come on

Check for 24 VAC on terminals “R” and “C”. The rest of the troubleshooting will be done with a PC and the Revelation software.

No communication

Make sure baud rate selection jumper for the QD1010 OR QD2020 and the SZ1025a are the same and that Revelation is configured for that same baud rate. Address 248 will always work provided that the SZ1025a is **not** connected to a network.

No communication while connected to TS2023a

When a QD1010 is connected to a TS2023a, the QD1010 must be powered with the external power supply supplied with the QD1010. The TS2023a does not provide power on the phone connector.

Inputs do not read correctly

If not using a setpoint input, SP must be shorted to GND. If not using a discharge air sensor, T2 must be shorted to T2. If this is not done, all readings will be inaccurate. For the room temperature and discharge air temperature readings, make slight adjustments to the pot located closest to the respective input terminals. For different pressure readings, make slight adjustments to the zero port which is the middle pressure port located closest to the high pressure port fitting.

Output operation is not correct

Check programmed parameters. In particular check “Reverse” and “Direct” acting selections for the damper and valve and offset and differential selections for the relay outputs. Check wiring.

LED Description

Six LEDs on the face allow the occupant to view the current operating status of the SZ1025a.

POWER: This LED will be lit whenever the unit has power.

CW and CWW: These four LEDs will be lit when the corresponding tri-state relay is active. The upper two indicate the damper relays and the lower two indicate the valve relays.

PROGRAM/DATA: This LED will blink when the unit is being accessed by a PC.