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FAQ

Superstats

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## Mounting

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### HOW IS THE THERMOSTAT MOUNTED?

The Superstats are designed for wall mounting using two #6 screws, either over a horizontally installed 2" x 4" junction box, or directly to block or drywall. For best results, the thermostat should be mounted on an interior wall which reflects normal room environment, at a height of approximately five feet above the finished floor. Avoid areas exposed to direct sunlight, unusual heat sources, open doors and windows, unventilated locations, or locations exposed to downward air flow from diffusers. If using a remote room sensor, it should be mounted in the manner described above. The thermostat may then be mounted in an area which is accessible for adjusting its settings.

**Caution:** Remove power from thermostat prior to mounting.



## Wiring

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### HOW DO I POWER THE THERMOSTAT IF USED ON A COMMUNICATING NETWORK?

If wiring for communications, *dedicated power* provided by a separate 24 VAC transformer must be used to power the thermostat. Several "S" Series thermostats may be powered from the same transformer, provided that the transformer has sufficient power. (Superstats require 8 VA @ 24VAC.)

**Caution:** Do not connect to 120 VAC. 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* and *have common return paths*.

### **CAN THE THERMOSTAT BE POWERED FROM THE UNIT TRANSFORMER?**

Only when the Superstat is installed as a stand-alone thermostat *without communications* should the unit transformer be used for power. To do this, install a *jumper* between the "R" and "+24" terminals. The "24-" terminal must then be connected to the *common side* of the unit transformer.

### **HOW DO I WIRE THE THERMOSTATS FOR NETWORK COMMUNICATIONS?**

To create a communications network between thermostats or controllers, a three wire 18 AWG shielded twisted cable is recommended. Each thermostat and controller has a 3 wire terminal block for communications. Connect one wire to the A terminal, another to the B terminal and the third wire to the reference terminal. These wires can run directly back to a QD Series Site Communications Center inputs, or can be connected in sequence from device to device making sure A-to-A, B-to-B and reference-to-reference wiring is maintained throughout the network.

The RS-485 specification requires that a repeater be used for any networks larger than 50 controllers, or longer than 4000 feet. 120 ohm terminating resistors, included with each QD2020 and repeater, are required to be installed at the QD Series Site Communications Center as well as at the controller furthest from the QD. These should be installed across the A and B inputs on both the controller and the QD. On a network with a repeater, two 120 ohm terminating resistors should be installed at both the IN and OUT terminal blocks.

### **WHAT WIRE IS RECOMMENDED FOR NETWORK AND SENSOR WIRING?**

18 AWG *shielded twisted-pair* wire is recommended for all *remote sensors*. 18 or 20 AWG shielded, twisted three wire cable is recommended for network wiring.

### **HOW IS A REMOTE SENSOR WIRED?**

Use 18 AWG *shielded twisted-pair*. Ground the shield at the sensor mounting location. Sensor wiring runs of up to 250 feet are attainable if properly shielded wire is used and the installation environment is free of *electrical noise*. Sensor wire should be kept at least five feet away from line voltage wiring. The SZ1022 and SZ1024 accept remote room and discharge air sensors. The SZ1009, SZ1017a, SZ1031, SZ1033, SZ1035, SZ1041, SZ1051 and SZ1053 accept remote room, discharge air and outdoor air sensors. Consult the *TS Series Temperature Sensor Submittal Data Sheet* for a complete listing of packaging and application styles. When using TCS/Basys Controls three-wire sensors, use the black and red leads and either clip off the white

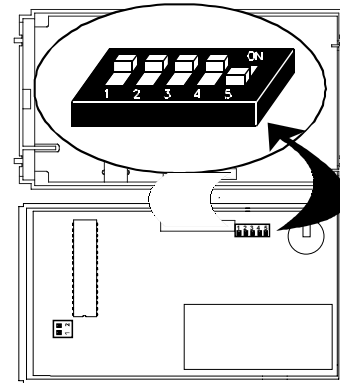
lead, or twist the red & white wires together. Make sure that the *dipswitches* are set for the sensors you are using.

## **Sensor Calibration and Setup**

### **HOW DO I CALIBRATE A SENSOR?**

If any of the temperatures on the thermostat is reading slightly higher or lower than the actual temperature where it is mounted, there are three *adjustment pots* located in the cover to make adjustments. To gain access to the thermostats adjustment pots, remove the two screws located in the center of the left side, and along the top right-hand corner of the thermostat housing.

If the temperature is at a *minimum or maximum reading*, check the sensor *dip switch* positions. If still at minimum or maximum readings, check our troubleshooting section.



First, ensure the display on the front of the thermostat shows the day and current temperature reading. If it does not, press the "Service Status" button repeatedly until this screen appears. To calibrate, insert a small screwdriver into the pot and turn, either clockwise or counterclockwise, until the display shown changes to the desired settings. Superstats used single turn pots so only a small adjustment should be necessary. All inputs are factory calibrated.

The "Display" pot is for the thermostat's LED contrast. Turning this pot will either brighten or dim the display

"T1" is for either the thermostats' *built-in temperature sensor* or a *remote temperature sensor* which is typically mounted within the zone being controlled or in a return air duct. Ensure the thermostat's *dipswitches* are set to enable either the built-in sensor or a remote temperature sensor. This reading will then be shown on the main display screen showing the day and current temperature reading. First, make sure the display on the front of the thermostat shows the day and current temperature reading. If it does not, press the "Service Status" button repeatedly until this screen appears. To

calibrate the sensor, insert a small screwdriver into the "T1" pot and turn, either clockwise or counterclockwise, until the display shown conforms to the actual temperature in the zone (or duct) where the sensor is located.

"T2" is for the remote *discharge air temperature* sensor. Ensure the thermostat's *dipswitches* are set properly to enable a remote *discharge air sensor*. First, make sure the display on the front of the thermostat shows the "Discharge Air" reading. If it does not, press the "Service Status" button repeatedly until this screen appears. To calibrate the sensor, insert a small screwdriver into the "T2" pot and turn, either clockwise or counterclockwise, until the display shown conforms to the actual temperature in the duct where the remote sensor is located. Once calibrated, press the "Service Status" button repeatedly to return to the main display screen showing the day and room temperature.

"T3" is for the remote *outdoor air temperature* sensor. Ensure the thermostat's *dipswitches* are set properly to enable a remote *outdoor air sensor*. **Note: Models SZ1022 and SZ1024 do not have an outdoor air sensor input.** First, make sure the display on the front of the thermostat shows the "Outdoor Air" reading. If it does not, press the "Service Status" button repeatedly until this screen appears. To calibrate the sensor, insert a small screwdriver into the "T3" pot and turn, either clockwise or counterclockwise, until the display shown conforms to the actual temperature in the duct where the remote sensor is located. Once calibrated, press the "Service Status" button repeatedly to return to the main display screen showing the day and room temperature.

#### **WHAT IF THE TEMPERATURE ON THE THERMOSTAT IS READING 40°F OR 90°F, THE MINIMUM OR MAXIMUM READING?**

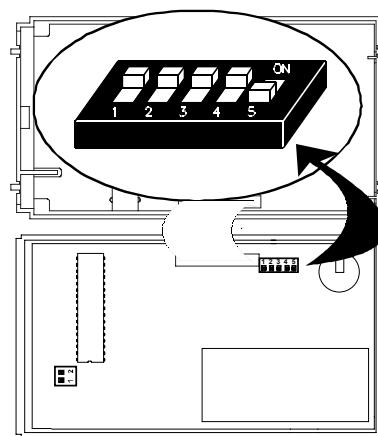
If the temperature is at a minimum or maximum reading, check the sensor dip switch positions. See "**How do I set-up my dipswitches for using remote sensors?**" If still reading at maximum or minimum, check the wiring on the *terminal blocks* of the thermostat. (see Wiring Troubleshooting guide). If wiring at the terminal block is correct, remove the terminal block and place an ohm meter on the terminal block to check for resistance. A remote 1000 ohm sensor should read 1080 ohms 70°F. The built-in sensor should read 108 to 109 ohms at 70°F.

#### **CAN I SHARE A REMOTE OUTDOOR AIR SENSOR TO OTHER CONTROLS OR THERMOSTATS?**

The reading from a single outdoor air sensor can be shared to any thermostat that has the outdoor air sensor input (exclude SZ1022, SZ1024, SL1001a and SZ1025a). This reading can be shared through the communication *network wiring* utilizing a QD2020, QD2020I or QD2020ie Site Communications Center. The thermostat that is wired directly to the remote sensor must have the *dip switches* set to receive an outdoor air sensor. Any other thermostat or control on the network should NOT have the dip switch for outdoor air sensor enabled.

#### **HOW DO I SETUP MY DIPSWITCHES FOR USING REMOTE SENSORS?**

To gain access to the thermostat's dip switches, remove the two screws located in the center of the left side, and along the top right-hand corner of the thermostat housing.



The dipswitches in the cover (shown above) must be set when using remote room, discharge, and/or outdoor sensors.

Use the following guide to determine the dipswitch settings for your application

Using built-in room sensor only.  
(This is the default setting.)



Using built-in room sensor with  
discharge air sensor only.



Using built-in room sensor with  
outdoor air sensor only.\*



Using built-in room sensor with  
both discharge and outdoor air  
sensors.\*



Using remote room sensor only.



Using remote room sensor with  
discharge air sensor only.



Using remote room sensor with  
outdoor air sensor only.\*



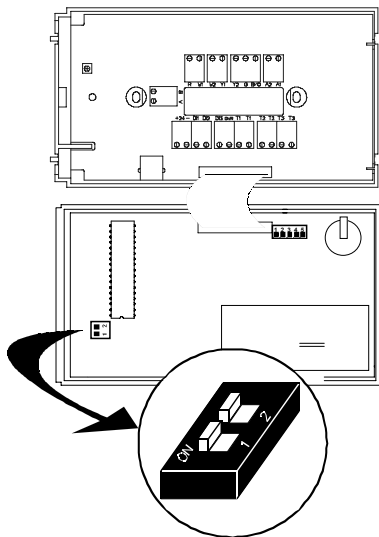
Using remote room sensor with  
both discharge and outdoor air  
sensors.\*



\* (Not available on SZ1022 and SZ1024)

## Keypad Access & Programming

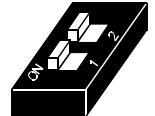
### HOW DO I LOCKOUT KEYPAD ACCESS TO PROGRAMMING AND/OR THE TIME CLOCK AND SCHEDULE?



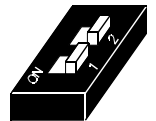
The *dipswitches* in the thermostat cover (shown above) must be properly set in order to lock the user out of either programming and/or to setting the clock and schedule. Use the guide below to set these dipswitches for your application. User access may also be limited

with an *access code* set in programming. (The *fan switch* and *system switch* are enabled or disabled in programming only, and require no dipswitch placement.)

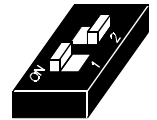
Keypad access to both  
programming and clock setup.  
(This is the default setting.)



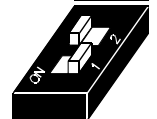
No keypad access to programming  
or clock setup.



Keypad access to  
programming only.



Keypad access to clock  
setup only.



### HOW DO I FIND OUT THE MODEL NUMBER OF A THERMOSTAT?

There are two ways to determine the model number of a thermostat:

- On the inside access door of the thermostat, remove the programming booklet. There should be a sticker in place denoting the model number. This model number will always begin with "SZ".
- If thermostat is powered and display is visible, simultaneously press both the "System Switch" and "Service Status" buttons. This will reset the thermostat and the model number of the thermostat will appear on top line of the display for a few seconds before the main display screen returns. This model number will always begin with "SZ".
- If the thermostat is not under power, or you do not want to reset the device, remove the cover by removing the two screws located in the center of the left side, and along the top right-hand corner of the thermostat housing. On the inside cover of the thermostat, a white sticker will be attached to the main EPROM chip. This sticker will have the thermostat's model number, beginning with "SZ"

### HOW DO I ACCESS PROGRAMMING?

To access the thermostat programming screens:

- Press the "Program Setup" button

### HOW DO I MAKE CHANGES ON THE SCREENS?

To make changes on each screen:

- Press the "Up or Down Arrows" until the desired selection appears
- Press the "Program Setup" button to save the selection and move to the next screen

## HOW DO I MOVE WITHIN A SCREEN IF IT HAS MORE THAN ONE FIELD?

If a screen has more than one field:

- Press the "Override" button to move between fields
- Press the "Up or Down Arrows" until the desired selection appears
- Press the "Program Setup" button to save the selection and move to the next screen

## HOW DO I CONTINUE TO THE NEXT PROGRAMMING SCREEN?

- Pressing the "Program Setup" button will both save the selection you have made, and move to the next screen

## HOW DO I EXIT PROGRAMMING ONCE I AM FINISHED WITH THE FUNCTION I NEED TO COMPLETE?

- Press the "Program Setup" button to save the last selection you have made and move to the next screen
- Press the "Service Status" button

## HOW DO I RETURN TO THE MAIN DISPLAY SCREEN, SHOWING THE DAY AND TIME?

- Press the "Service Status" button after saving change to previous screen by pressing the "Program Setup" button.
- OR, scrolling through all programming screens will return to main display screen

# Access Codes

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## REQUIRE ACCESS CODE

**How do I program the thermostat to require a access code for programming?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "REQUIRE CODE FOR PROGRAMMING?" screen appears
- Use the "Up or Down Arrows" to select YES of NO.
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## HOW DO I PROGRAM IN A 3 DIGIT ACCESS CODE?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "SET ACCESS CODE?" screen appears
- Use the "Up or Down Arrows" to select a code. Pressing the "Up Arrow" begins at 000 and scrolls up, while pressing the "Down Arrow" begins at 255 and scrolls down.

- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## HOW DO I ENTER MY ACCESS CODE?

- From the main display screen, Press the "Program Setup" button (for programming) OR "Clock Setup" button (for scheduling)

*If the display does not change when either the "Program Setup" or "Clock Setup" button is pressed, the thermostat dipswitches are set to not allow access to programming and/or scheduling. Those dipswitches will need to be changed to allow access to the thermostats programming and scheduling functions. See "How do I lockout keypad access to programming and/or the time clock and schedule?"*

- Use the "Up or Down" arrows to scroll to your access code
- The "Up" arrow will begin at 0 and scroll up to 255
- The "Down" arrow will begin at 255 and scroll down to 0
- Once selected, press "Program Setup" or "Clock Setup" button

## WHAT IF I DON'T KNOW (OR CAN'T REMEMBER) MY ACCESS CODE?

- Use the "Down" arrow to scroll to 248. This is the default access code which will always work  
How do I require an access code to access the programming and scheduling functions?
- Press the "Program Setup" button repeatedly until the "REQUIRE CODE FOR PROGRAMMING" screen appears. This is near the end of the programming selections
- Use the "Up or Down Arrows" to select YES
- Press the "Program Setup" button to save the change
- The "REQUIRE CODE FOR CLOCK/SCHED" screen appears
- Use the "Up or Down Arrows" to select YES
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## HOW DO I PROGRAM IN A NEW ACCESS CODE?

- Press the "Program Setup" button repeatedly until the "SET ACCESS CODE" screen appears. This is at the end of the programming selections
- Use the "Up or Down Arrows" to select a 3-digit access code
- Press the "Program Setup" button to save the change

## Controller Address

### **WHAT IS THE *CONTROLLER ADDRESS* USED FOR?**

The controller address is used when the thermostats or controllers are part of a communicating *network*. This controller address then acts as a unique identification number to route data to and from the thermostat.

### **HOW DO I DECIDE WHAT ADDRESS TO GIVE A THERMOSTAT OR CONTROLLER?**

The number you give to each thermostat or controller on a *network* must be unique to that particular communication network. The number you give is a personal preference, but most people use 1,2,3,etc. Use numbers between 0 and 255, excluding 248 as this is a universal address and cannot be used on a network with more than one thermostat or controller.

### **HOW DO I ADDRESS A THERMOSTAT OR CONTROLLER?**

- Press "Program Setup" on thermostats or "Next" and "Scroll" buttons simultaneously on controllers with displays.
- If required, use the "Up or Down" arrows to scroll to your access code
- Once selected, press "Program Setup" button
- The "SET ADDRESS" screen will appear
- If the thermostat has not been addressed, "000" will appear as the address
- Use the "Up or Down Arrows" to select an address between 0 and 255, excluding 248.
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## Baud Rate

### **WHY ARE THERE DIFFERENT CHOICES FOR *BAUD RATE*?**

When thermostats or controllers communicate on a network, all controllers and devices on the network must be set to the same baud rate. Since many networks still communicate via a *modem* device with a set baud rate, the thermostats and controllers have a selectable menu so they can match that modem's baud rate. Factory default is 9600 and is suitable for most applications.

### **WHY IS IT IMPORTANT TO SET THE *BAUD RATES* THE SAME?**

Since the baud rate represents per second signaling rate, it is a requirement that all thermostats and controllers on a network are transmitting and receiving data at the same rate.

### **HOW DO I PROGRAM THE *BAUD RATE*?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your access code
- Once selected, press "Program Setup" button to save the change
- Press the "Program Setup" button until the "SET BAUD RATE" screen appears
- Use the "Up or Down Arrows" to select a baud rate. Factory default is 9600 and is appropriate for most applications.
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## Temperature Type (°F or °C)

### **CAN I SET THE THERMOSTAT FOR CELSIUS OR FAHRENHEIT?**

Yes. Thermostats can display in either the Celsius or Fahrenheit scale.

### **HOW DO I PROGRAM THE THERMOSTAT TO EITHER CELSIUS OR FAHRENHEIT?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "TEMPS SHOWN IN" screen appears
- Use the "Up or Down Arrows" to select a temperature indication
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## System Mode

### **HOW DO I CHOOSE WHICH *SYSTEM MODE* TO SELECT?**

A user can adjust the system mode through the System Switch if it has been enabled. There are five different selections for system mode

- AUTO will operate both the heating and cooling functions of the unit that is being controlled, based on the cooling and heating *setpoints*. This is the factory default setting.
- HEAT will operate based on the *heating setpoint* and will perform no cooling.
- COOL will operate based on the *cooling setpoint* and will perform no heating
- OFF will turn all outputs off and will perform no heating or cooling
- EMERGENCY HEAT (SZ1024 or SZ1033 Heat Pump Thermostats ONLY) Selecting Emergency will allow the heat pump thermostat to enable emergency heat stages.

## HOW DO I PROGRAM THE SYSTEM MODE?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "SET SYSTEM MODE" screen appears
- Use the "Up or Down Arrows" to select a system mode
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## HOW DO I PROGRAM THE THERMOSTAT TO ALLOW, OR NOT ALLOW ACCESS TO THE SYSTEM MODE?

The thermostat can be programmed to allow access to the system mode by letting the user press the "System Switch" on the face of the thermostat, and change the selection. To program the thermostat to allow, or not allow access to this function:

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your access code
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "USER ACCESS TO SYSTEM MODE" screen appears
- Use the "Up or Down Arrows" to select YES or NO
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## Fan Mode

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### WHAT OPTIONS DO I HAVE TO SET THE OCCUPIED AND UNOCCUPIED FAN MODE?

The thermostat has three selections to run the fan during *occupied* periods

- ON will run the fan continuously during all occupied periods, regardless of whether the unit is heating, cooling or off. This option is used when a continuous supply of fresh air is required.
- COOL will run the fan only when the thermostat is requiring the unit to provide cooling. This option is used when the unit being controlled by the thermostat does not require a fan to be controlled by the thermostat during heating, such as electric baseboard heat or direct fired heating.
- AUTO will run the fan only when the thermostat is heating or cooling. This is the factory default setting.

The thermostat has two selections to run the fan during *unoccupied* periods

- AUTO will run the fan only when the thermostat is requiring the unit to provide heating or cooling. This is the factory default setting.

- COOL will run the fan only when the thermostat is requiring the unit to provide cooling. This option is used when the unit being controlled by the thermostat does not require a fan to be controlled by the thermostat during heating, such as electric baseboard heat or a hot water system.

## HOW DO I PROGRAM THE FAN MODE?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "SET OCCUPIED FAN MODE" screen appears
- Use the "Up or Down Arrows" to make selection
- Press the "Program Setup" button
- The "SET UNOCCUPIED FAN MODE" screen appears
- Use the "Up or Down Arrows" to make selection
- Press the "Program Setup" button to save the changes
- Press the "Service Status" button to end programming and return to the main display screen

## HOW DO I PROGRAM THE THERMOSTAT TO ALLOW, OR NOT ALLOW ACCESS TO THE FAN MODE?

The thermostat can be programmed to allow access to the fan mode during *occupied* periods by letting the user press the "Fan Switch" on the face of the thermostat, and change the selection. To program the thermostat to allow, or not allow access to this function:

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "USER ACCESS TO OCC. FAN MODE" screen appears
- Use the "Up or Down Arrows" to select YES or NO
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## Setpoints

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### HOW DO I CHOOSE WHICH TEMPERATURE SETPOINTS TO PROGRAM?

The temperature setpoints determine the temperature range that the zone should maintain when either *occupied* or *unoccupied*. *Occupied setpoints* typically will maintain the zone at a comfort level during those times when the building is occupied.

Factory default occupied setpoints are:

- 75°F *Occupied cool setpoint*. This will turn the unit's cooling on when the room temperature exceeds 75°F cooling the zone down to 75°F and then turning off cooling

- 70°F *Occupied heat setpoint*. This will turn the unit's heating on when the room temperature falls below 70°F heating the zone up to 70°F ° and then turning off heating.
- *Unoccupied setpoints* will typically maintain the zone within a much broader range of temperature, so heating and cooling energy is not wasted. However, it may also be required that the range on these set points are not too extreme. In this way, the contents and equipment of the zone are better protected. Also, if the temperature between unoccupied and occupied is too extreme, cooling and heating equipment may operate inefficiently when converting the zone from the unoccupied to occupied temperature. Factory default occupied setpoints are:
- 80°F *Unoccupied cool setpoint*. This will turn the unit's cooling on when the room temperature exceeds 80°F cooling the space down to 80°F and then turning off cooling
- 60°F *Unoccupied heat setpoint*. This will turn the unit's heating on when the room temperature falls below 60°F heating the space up to 60°F and then turning off heating

#### HOW DO I PROGRAM THE OCCUPIED AND UNOCCUPIED HEAT AND COOL SETPOINT?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "*OCCUPIED HEAT SETPOINT*" screen appears
- Use the "Up or Down Arrows" to select the setpoint
- Press the "Program Setup" button
- The "*UNOCCUPIED HEAT SETPOINT*" screen appears
- Use the "Up or Down Arrows" to select the setpoint
- Press the "Program Setup" button
- The "*OCCUPIED COOL SETPOINT*" screen appears
- Use the "Up or Down Arrows" to select the setpoint
- Press the "Program Setup" button
- The "*UNOCCUPIED COOL SETPOINT*" screen appears
- Use the "Up or Down Arrows" to select the setpoint
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen
- **IMPORTANT:** *There must be a minimum of 1° between heating and cooling setpoint and the heating setpoint must always be lower than the cooling setpoint.*

#### WHAT IS THE SETPOINT ADJUST FEATURE?

The setpoint adjust will allow the user to raise or lower the occupied heating or cooling setpoint by up to 50°F, by pressing the "Warmer" or "Cooler" arrows. The number of degrees allowed for setpoint adjust can be programmed from +/- 0°F to +/-50°F (the factory default is +/- 5°F.

#### HOW DO I TAKE AWAY ACCESS FOR THE USER TO ADJUST THE ROOM TEMPERATURE ON THE THERMOSTAT?

Set the setpoint adjust to 0°F

#### HOW DO I PROGRAM THE SETPOINT ADJUST?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "LIMIT SETPOINT ADJUST +/-" screen appears
- Use the "Up or Down Arrows" to select from zero to five degrees of adjustment
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## Override Time

#### WHAT ARE THE TIME LIMITS FOR PROGRAMMING THE OVERRIDE TIME?

The thermostat can be programmed from 0 to 255 minutes (4 hours 15 minutes) of override time.

#### HOW DO I OVERRIDE THE THERMOSTAT, GOING FROM UNOCCUPIED TO OCCUPIED?

- Press the "Override" button on the keypad of the thermostat. This will switch the thermostat from unoccupied to occupied for the preprogrammed number of minutes. If the thermostat's occupied LED indicator does not turn on, the thermostat may be programmed for "zero" minutes of override.

#### HOW DO I TURN OFF THE OVERRIDE IF I LEAVE THE AREA BEFORE THE OVERRIDE TIME IS FINISHED?

- Press the "Override" button. The occupied LED indicator will turn off and the thermostat will become unoccupied.

#### HOW CAN I CHECK HOW MANY MINUTES ARE LEFT ON THE OVERRIDE TIME?

- Press the "Service Status" button until the OVERRIDE ON screen appears.
- The screen will show the number of override minutes remaining
- Press the "Service Status" button until you return to the main display screen

#### HOW DO I PROGRAM THE OVERRIDE TIME?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "SET OVERRIDE TIME" screen appears

- Use the "Up or Down Arrows" to select the number of preprogrammed minutes
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## Multi-stage Heating & Cooling Control

SZ1022 / SZ1031 / SZ1041

### **HOW DO I PROGRAM THE THERMOSTAT TO ENABLE ADDITIONAL HEATING STAGES AND COOLING STAGES?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button to save the change
- Press the "Program Setup" button until the "ENABLE SECOND STAGE HEAT?" screen appears
- Use the "Up or Down" arrows to select YES or NO
- Press the "Program Setup" button and the "ENABLE SECOND STAGE COOL?" screen appears
- Use the "Up or Down Arrows" to select YES or NO
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

### **HOW DO I PROGRAM THE SZ1022 OR SZ1031 TO ENABLE A THIRD STAGE OF HEATING OR COOLING?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "ENABLE THIRD STAGE AS?" screen appears
- Use the "Up or Down" arrows to select HEAT, COOL or DISABLE
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

SZ1035

### **HOW DO I PROGRAM THE THERMOSTAT TO ENABLE A THIRD STAGE OF HEATING AND COOLING?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "ENABLE 3 HEAT & 3 COOL?" screen appears
- Use the "Up or Down" arrows to select YES or NO
- If YES;
- Press the "Program Setup" button
- Press the "Service Status" button to end programming and return to the main display screen

- If NO;
- Press the "Program Setup" button until the "ENABLE SECOND STAGE HEAT?" screen appears
- Use the "Up or Down" arrows to select YES or NO
- Press the "Program Setup" button and the "ENABLE SECOND STAGE COOL?" screen appears
- Use the "Up or Down Arrows" to select YES or NO
- Press the "Program Setup" button and the "ENABLE 3RD & 4TH STAGE AS?" screen appears
- Use the "Up or Down Arrows" to select COOL or HEAT
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

SZ1017a / SZ1051 / SZ1053

### **HOW DO I PROGRAM HEATING STAGE OR COOLING STAGE 1 AND 2 FOR BOTH HEAT, BOTH COOL, 1 HEAT AND 1 COOL, OR DISABLE BOTH?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "STAGE OUTPUT 1&2 AS:" screen appears
- Use the "Up or Down" arrows to select function
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## Heat Pump Control

SZ1024 / SZ1033

### **HOW DO I PROGRAM THERMOSTAT TO OPERATE A HEAT PUMP (CONTROL REVERSING VALVE) OR AS A CONVENTIONAL THERMOSTAT (HEAT PUMP HAS BUILT-IN CONTROL OF REVERSING VALVE)?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "HEAT PUMP TYPE?" screen appears
- Use the "Up or Down" arrows to select SZ1024/33 (heat pump) or SZ1022/31 (conventional)
- Press the "Program Setup" button to save the change
- **IMPORTANT:** *If the screen option is changed, the thermostat will reset and restart. Also, some of the following conversions need to be made when programming*
- Compressor 1 = Cool 1
- Compressor 2 = Cool 2
- Aux. Heat 1 = Heat 1
- Aux. Heat 2 = Heat 2
- Emergency Heat = Heat Mode
- Aux. Heat 1 is enabled at all times

- Power-up Start-up screens will still display SZ1024 or SZ1033
- Reversing Valve Output has no meaning
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

#### **HOW DO I PROGRAM THE THERMOSTAT TO CONTROL A SECOND STAGE COMPRESSOR?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "ENABLE SECOND STAGE COMP?" screen appears
- Use the "Up or Down" arrows to select YES or NO
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

#### **HOW DO I PROGRAM THE THERMOSTAT TO CONTROL A FIRST STAGE OR SECOND STAGE OF AUXILIARY HEAT?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "ENABLE STAGE 1 AUX HEAT?" screen appears
- Use the "Up or Down" arrows to select YES or NO
- Press the "Program Setup" button until the "ENABLE STAGE 2 AUX HEAT?" screen appears
- Use the "Up or Down" arrows to select YES or NO
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

#### **WHAT IS THE EMERGENCY SELECTION IN THE SYSTEM MODE USED FOR?**

This is a selection in the System Mode programming. Selecting Emergency will not allow the compressors to be utilized and allow the heat pump thermostat to enable emergency heating if the zone being controlled reaches it's second *heating differential*. For programming the System Mode, see "How do I program the system mode?"

*(SZ1024 / SZ1033 only)*

#### **HOW DO I KNOW IF I NEED TO CONTROL A REVERSING VALVE ON A HEAT PUMP UNIT?**

If you are uncertain whether the heat pump requires control from the thermostat for the reversing valve, contact the manufacturer.

#### **HOW DO I CHOOSE WHETHER THE REVERSING VALVE OUTPUT WILL BE NORMALLY OPEN (NO) OR NORMALLY CLOSED (NC) FOR COOLING?**

Depending on the heat pump, selecting the reversing valve output to be normally open (NO) not normally closed (NC) while cooling.

#### **HOW DO I PROGRAM THE REVERSING VALVE OUTPUT?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "REV VALVE OUTPUT FOR COOLING" screen appears
- Use the "Up or Down" arrows to select open (NO) or closed (NC) for cooling
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## Offsets and Differentials

#### **HOW DO I DECIDE WHICH VALUES TO SELECT FOR MY OFFSETS AND DIFFERENTIALS?**

A *cooling offset* will be the number of degrees above the *cooling setpoint* that each stage will turn off. For the first (or single) stage of cooling, this offset will usually be 0 so the unit turns off when the cooling setpoint is reached. An offset for any additional cooling stages will be the number of degrees above the thermostat's cooling setpoint which that stage will turn off.

A *heating offset* will be the number of degrees below the *heating setpoint* that each stage will turn off. For the first (or single) stage of heating, this offset will usually be 0 so the unit turns off when the heating setpoint is met. An offset for any additional heating stages will be the number of degrees below the thermostat's heating setpoint which that stage will turn off.

A *cooling differential* plus the cooling offset will be the number of degrees above the cooling setpoint that each stage will turn on. For the first (or single) stage of cooling, this differential will usually be 1 so that the unit turns on when the temperature in the zone reaches 1 degree above the cooling setpoint. A differential for additional stages would depend on the size of the equipment in comparison to the zone being cooled. See examples below.

A *heating differential* plus the heating offset will be the number of degrees below the heating setpoint that each stage will turn on. For the first (or single) stage of heating, this differential will usually be 1 so that the unit turns on when the temperature in the zone reaches 1 degree below the heating setpoint. A differential for

additional stages would depend on the size of the equipment in comparison to the zone being heated. See examples below.

#### Example 1: Single Stage Heat/Cool

Cool Setpoint:	72° (unit will cool zone down to 72°)
Cool Offset:	0 (cooling will turn off when zone reaches 72°)
Cool Differential:	1 (cooling will turn on when zone reaches 73°)
Heat Setpoint:	70° (unit will heat zone up to 70°)
Heat Offset:	0 (heating will turn off when zone reaches 70°)
Heat Differential:	1 (heating will turn on when zone reaches 69°)

#### Example 2: Two Stage Heat / Two Stage Cool

Cool Setpoint:	72° (unit will cool zone down to 72°)
Stage 1 Cool Offset:	0 (stage 1 cooling will turn off when zone reaches 72°)
Stage 1 Cool Differential:	1 (stage 1 cooling will turn on when zone reaches 73°)
Stage 2 Cool Offset:	1 (stage 2 cooling will turn off when zone reaches 73°)
Stage 2 Cool Differential:	1 (stage 2 cooling will turn on when zone reaches 74°)
Heat Setpoint:	70° (unit will heat zone up to 70°)
Stage 1 Heat Offset:	0 (stage 1 heating will turn off when zone reaches 70°)
Stage 1 Heat Differential:	1 (stage 1 heating will turn on when zone reaches 69°)
Stage 2 Heat Offset:	1 (stage 2 heating will turn off when zone reaches 69°)
Stage 2 Heat Differential:	1 (stage 2 heating will turn on when zone reaches 68°)

#### HOW CAN I SET MY OFFSETS AND DIFFERENTIALS IF MY MULTI-STAGE HVAC EQUIPMENT IS UNDER-SIZED FOR THE ZONE?

If multistage HVAC equipment is undersized for the zone, it may be necessary to run multiple stages of cooling or heating simultaneously for a longer period of time in order to maintain the zone temperature near the setpoint. A possible solution shown in the example below, a two stage heat and two stage cool HVAC unit could be programmed to turn the two stages on at different zone temperatures, but keep both stages running until setpoints are reached:

Cool Setpoint:	72° (unit will cool zone down to 72°)
Stage 1 Cool Offset:	0 (stage 1 cooling will turn off when zone reaches 72°)
Stage 1 Cool Differential:	1 (stage 1 cooling will turn on when zone reaches 73°)
Stage 2 Cool Offset:	0 (stage 2 cooling will turn off when zone reaches 72°)
Stage 2 Cool Differential:	2 (stage 2 cooling will turn on when zone reaches 74°)
Heat Setpoint:	70° (unit will heat zone up to 70°)
Stage 1 Heat Offset:	0 (stage 1 heating will turn off when zone reaches 70°)
Stage 1 Heat Differential:	1 (stage 1 heating will turn on when zone reaches 69°)
Stage 2 Heat Offset:	0 (stage 2 heating will turn off when zone reaches 70°)
Stage 2 Heat Differential:	2 (stage 2 heating will turn on when zone reaches 68°)

If it is desirable to turn both stages on at the same zone temperature, this will be accomplished by setting the Stage 2 Heat and Cool Differentials to the same value as Stage 1 heating and cooling differentials.

#### HOW CAN I SET MY OFFSETS AND DIFFERENTIALS IF MY MULTI-STAGE HVAC EQUIPMENT IS OVER-SIZED FOR THE ZONE?

If multi-stage HVAC equipment is oversized for the zone, it may be necessary to turn stages on and off at larger temperature intervals to prevent stages from cycling too quickly, or having these oversized HVAC units heat or cool the space beyond setpoint. In a possible solution shown for the example below, the cooling output is oversized for the space and the heating output is correctly sized. In cooling the fans will continue to run after the stage has been shut down, using the residual cool air created to bring the zone down to *setpoint*:

Cool Setpoint:	72° (unit will cool zone down to 72°)
Stage 1 Cool Offset:	1 (stage 1 cooling will turn off when zone reaches 73°)
Stage 1 Cool Differential:	1 (stage 1 cooling will turn on when zone reaches 74°)
Stage 2 Cool Offset:	3 (stage 2 cooling will turn off when zone reaches 75°)
Stage 2 Cool Differential:	2 (stage 2 cooling will turn on when zone reaches 77°)
Heat Setpoint:	70° (unit will heat zone up to 70°)
Stage 1 Heat Offset:	0 (stage 1 heating will turn off when zone reaches 70°)
Stage 1 Heat Differential:	1 (stage 1 heating will turn on when zone reaches 69°)

- Stage 2 Heat Offset: 1 (stage 2 heating will turn off when zone reaches 69°)
- Stage 2 Heat Differential: 1 (stage 2 heating will turn on when zone reaches 68°)

It may also be desirable to enable the *P&I function* to add a time factor.

### HOW DO I PROGRAM THE HEATING AND COOLING OFFSETS AND DIFFERENTIALS ON THE FIRST STAGE?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "HEAT STAGE ONE OFFSET" screen appears
- Use the "Up or Down Arrows" to select the number of degrees for stage one offset
- Press the "Program Setup" button and the "HEAT STAGE ONE DIFF" screen appears
- Use the "Up or Down Arrows" to select the number of degrees for stage one differential
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

### HOW DO I PROGRAM THE HEATING AND COOLING OFFSETS AND DIFFERENTIALS ON ADDITIONAL STAGES?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "HEAT STAGE TWO OFFSET" screen appears
- Use the "Up or Down Arrows" to select the number of degrees for stage two offset
- Press the "Program Setup" button and the "HEAT STAGE TWO DIFF" screen appears
- Use the "Up or Down Arrows" to select the number of degrees for stage two differential
- If third or fourth stages are used, press the "Program Setup" button until the "HEAT STAGE THREE (or FOUR) OFFSET" screen appears
- Use the "Up or Down Arrows" to select the number of degrees for stage three (or four) offset
- Press the "Program Setup" button until the "HEAT STAGE THREE (or FOUR) DIFF" screen appears
- Use the "Up or Down Arrows" to select the number of degrees for stage three (or four) differential
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

### HOW DO I PROGRAM THE COMPRESSOR AND AUXILIARY HEATING OFFSETS AND DIFFERENTIALS?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "COMP STAGE 1 OFFSET" screen appears
- Use the "Up or Down Arrows" to select the number of degrees for stage one offset
- Press the "Program Setup" button and the "COMP STAGE 1 DIFF" screen appears
- Use the "Up or Down Arrows" to select the number of degrees for stage two differential
- If a second stage compressor or second stage of auxiliary heat has been enabled, press the "Program Setup" button and the "COMP STAGE 2 OFFSET" screen appears
- Use the "Up or Down Arrows" to select the number of degrees for stage two offset
- Press the "Program Setup" button and the "COMP STAGE 2 DIFF" screen appears
- Use the "Up or Down Arrows" to select the number of degrees for stage two differential
- Press the "Program Setup" button
- Press the "Program Setup" button until the "AUX HEAT STAGE 1 OFFSET" screen appears
- Use the "Up or Down Arrows" to select the number of degrees for stage one offset
- Press the "Program Setup" button and the "AUX HEAT STAGE 1 DIFF" screen appears
- Use the "Up or Down Arrows" to select the number of degrees for stage two differential
- If a second stage compressor or second stage of auxiliary heat has been enabled, press the "Program Setup" button and the "AUX HEAT STAGE 2 OFFSET" screen appears
- Use the "Up or Down Arrows" to select the number of degrees for stage two offset
- Press the "Program Setup" button and the "AUX HEAT STAGE 2 DIFF" screen appears
- Use the "Up or Down Arrows" to select the number of degrees for stage two differential
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## Modulating Outputs

*SZ1017a / SZ1051 only*

### WHAT IS THE AQUASTAT OPTION?

Both Digital Input 2 and Analog Output 1 must be selected as AQUASTAT on modulating Superstats to enable the Aquastat function.

When both of these are programmed for the Aquastat option and DI-2 is "open", AO-1 will operate in cooling mode and uses the programmed *direct action* or *reverse action*. Then when DI-2 "closes", AO-1 will operate in the heating mode and uses the opposite of the selected direct or reverse action.

#### **HOW DO I SELECT WHAT FUNCTION THE MODULATING OUTPUT WILL BE USED FOR?**

If the modulating output (AO-1) will modulate a water valve or damper for heating, choose the HEAT option, or if the modulating output will modulate a water valve or damper for cooling choose the COOL option. If the modulating output is used in conjunction with DI-2, the Aquastat option is selected.

#### **HOW DO I PROGRAM THE MODULATING OUTPUT FUNCTION TO CONTROL A SINGLE VALVE?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "MODULATING OUTPUT TYPE:" screen appears
- Use the "Up or Down" arrows to select ENDPOINT
- Press the "Program Setup" button until the "MODULATING OUT IS:" screen appears
- Use the "Up or Down" arrows to select COOL, HEAT or AQUASTAT
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

#### **HOW DO I PROGRAM THE THERMOSTAT TO ALLOW MODULATING FROM THE MID-POINT, ALLOWING BOTH A HEAT AND COOL VALVE, OR A ZONE DAMPER, TO BE MODULATED?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "MODULATING OUTPUT TYPE:" screen appears
- Use the "Up or Down" arrows to select MIDPOINT
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

#### **WHAT IS REVERSE ACTING OR DIRECT ACTING MODULATING OUTPUT?**

Direct acting refers to the analog output signal increasing as the input signal (or temperature) increases. Reverse acting refers to the analog output signal increasing the input signal (or temperature) decreases.

#### **HOW DO I PROGRAM THE MODULATING OUTPUT TO DIRECT ACTING OR REVERSE ACTING?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "OUTPUT ACTION:" screen appears
- Use the "Up or Down" arrows to select DIRECT or REVERSE
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

#### **HOW DO I SELECT IF THE MODULATING OUTPUT RANGE SHOULD BE 0-20 mA OR 4-20 mA?**

If the equipment receiving the modulating output signal requires 0-10 volts, or 0-5 volts, the 0-20 mA option should be selected. If the equipment requires 2-10 volts or 1-5 volts or 4-20 milliamps, the 4-20mA option should be selected. If the equipment requires 0-10 or 2-10 volts, a 500 ohm resistor would be required to be placed across the analog output and ground terminals at the controller or at the actuator. If the equipment requires 0-5 volts or 1-5 volts, a 250 ohm resistor would be required to be placed across the analog output and ground terminals at the controller or at the actuator.

#### **HOW DO I PROGRAM THE MODULATING OUTPUT RANGE?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "MODULATING OUT RANGE" screen appears
- Use the "Up or Down" arrows to select 4-20 mA OR 0-20 mA
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

#### **HOW DO I CHOOSE WHAT THE UNOCCUPIED ACTION WILL BE?**

Selecting MODULATING as the unoccupied action will continue to modulate the valve or damper to maintain the unoccupied setpoint in the zone. Selecting 0 or 4 mA, or 20mA will either maintain the valve fully open or fully closed while unoccupied.

#### **HOW DO I PROGRAM THE UNOCCUPIED ACTION?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "UNOCCUPIED ACTION" screen appears

- Use the "Up or Down" arrows to select MOD, 4 Ma (or 0Ma), or 20 mA
- Press the "Program Setup" button to save change
- Press the "Service Status" button to end programming and return to the main display screen

### **WHAT IS THE MODULATING OUTPUT PROPORTIONAL BAND?**

This is the number of degrees away from the setpoint that the valve or damper will be fully open. The proportional band will dictate how far open the valve or damper will be as the zone goes from setpoint (valve or damper closed) to the number of degrees away from setpoint as set by the proportional band (valve or damper fully open). The equipment being used will dictate the proportional band, and how quickly that equipment can respond to maintain a zone at its setpoint. If the equipment is larger, a higher proportional band could be set so the valve does not open too far, too soon. For smaller equipment, a lower number of degrees could be set.

### **HOW DO I PROGRAM THE NUMBER OF DEGREES AWAY FROM THE SETPOINT FOR THE PROPORTIONAL BAND?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "PROPORTIONAL BAND" screen appears
- Use the "Up or Down" arrows to select the number of degrees
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

### **HOW DO I CHOOSE THE ANALOG OUTPUT OFFSET VALUE?**

This is the number of degrees above or below the setpoint that the valve or damper will begin to modulate. This function works similarly to the *differential* value on the conventional thermostats.

### **HOW DO I PROGRAM THE OFFSET VALVE?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "SET POINT OFFSET" screen appears
- Use the "Up or Down" arrows to select the number of degrees
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

Example: Modulating output used to control a heating valve

Heat Setpoint:	70°F
Setpoint Offset	1°F
Proportional Band:	5°F

Valve or damper will begin to open at the setpoint offset 69°F, and be fully open if the zone reaches 64°F. The valve will continue to modulate until 69°F is reached.

SZ1053

### **WHAT ARE MODULATING OUTPUT 1 & 2 USED FOR?**

Modulating output 1 is used to modulate a valve or damper for heating. Modulating output 2 is used to modulate a valve or damper for cooling.

### **WHAT IS THE MODULATING OUTPUT PROPORTIONAL BAND?**

This is the number of degrees away from the setpoint plus offset that the valve or damper will be fully open. The proportional band will dictate how far open the valve or damper will be as the zone goes from setpoint (valve or damper closed) to the number of degrees away from setpoint as set by the proportional band (valve or damper fully open). The equipment being used will dictate the proportional band, and how quickly that equipment can respond to maintain a zone at its setpoint. If the equipment is larger, a higher proportional band could be set so the valve does not open too far, too soon. For smaller equipment, a lower number of degrees could be set.

### **HOW DO I PROGRAM THE MODULATING PROPORTIONAL BAND FOR OUTPUT 1 & 2?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "MO 1 PROPORTIONAL BAND" screen appears
- Use the "Up or Down" arrows to select the number of degrees
- Press the "Program Setup" button until the "MO2 PROPORTIONAL BAND" screen appears
- Use the "Up or Down" arrows to select the number of degrees
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## HOW DO I CHOOSE THE *MODULATING SETPOINT OFFSET VALVE*?

This is the number of degrees above or below the setpoint that the valve or damper will begin to modulate. This function works similarly to the *differential* value on the conventional thermostats.

## HOW DO I PROGRAM THE OFFSET VALVE?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "MO1 SETPOINT OFFSET" screen appears
- Use the "Up or Down" arrows to select the number of degrees
- Press the "Program Setup" button until the "MO2 SETPOINT OFFSET" screen appears
- Use the "Up or Down" arrows to select the number of degrees
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

Example: Modulating output 1 used to control a heating valve

Heat Setpoint:	70°F
Setpoint Offset	1°F
Proportional Band:	5°F

Valve will begin to open at the setpoint offset 69°F, and be fully open if the zone reaches 64°F. The valve will continue to modulate until the 69°F is reached.

## WHAT IS *REVERSE ACTING OR DIRECT ACTING MODULATING OUTPUT*?

Direct acting refers to the analog output signal increasing as the input signal (or temperature) increases. Reverse acting refers to the analog output signal increasing the input signal (or temperature) decreases.

## HOW DO I PROGRAM THE *MODULATING OUTPUT TO DIRECT ACTING OR REVERSE ACTING*?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "MOD OUT 1 ACTION:." screen appears
- Use the "Up or Down" arrows to select DIRECT or REVERSE
- Press the "Program Setup" button until the "MOD OUT 2 ACTION:." screen appears
- Use the "Up or Down" arrows to select DIRECT or REVERSE

- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## HOW DO I SELECT IF THE *MODULATING OUTPUT RANGE SHOULD BE 0-20 mA OR 4-20 mA*?

If the equipment receiving the modulating output signal requires 0-10 volts, or 0-5 volts, the 0-20 mA option should be selected. If the equipment requires 2-10 volts or 1-5 volts or 4-20 milliamps, the 4-20mA option should be selected. If the equipment requires 0-10 or 2-10 volts, a 500 ohm resistor would be required to be placed across the analog output and ground terminals at the controller or at the actuator. If the equipment requires 0-5 volts or 1-5 volts, a 250 ohm resistor would be required to be placed across the analog output and ground terminals at the controller or at the actuator.

## HOW DO I PROGRAM THE *MODULATING OUTPUT RANGE*?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "MOD OUT 1 RANGE" screen appears
- Use the "Up or Down" arrows to select 4-20 mA OR 0-20 mA
- Press the "Program Setup" button until the "MOD OUT 2 RANGE" screen appears
- Use the "Up or Down" arrows to select 4-20 mA OR 0-20 mA
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## HOW DO I CHOOSE WHAT THE *UNOCCUPIED ACTION WILL BE*?

Selecting MODULATING as the unoccupied action will continue to modulate the valve or damper to maintain the unoccupied setpoint in the zone. Selecting 0 or 4 mA, or 20mA will either maintain the valve fully open or fully closed while unoccupied.

## HOW DO I PROGRAM THE *UNOCCUPIED ACTION*?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "MOD 1 UNOCC ACTION" screen appears
- Use the "Up or Down" arrows to select MOD, 4 Ma (or 0Ma), or 20 mA
- Press the "Program Setup" button until the "MOD 2 UNOCC ACTION" screen appears
- Use the "Up or Down" arrows to select MOD, 4 Ma

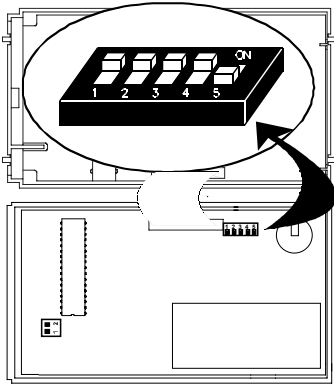
(or 0Ma), or 20 mA

- Press the "Program Setup" button
- Press the "Service Status" button to end programming and return to the main display screen

## Discharge Air Function

### HOW DO I MAKE SURE THE THERMOSTAT IS SETUP FOR A DISCHARGE AIR SENSOR? (DIP-SWITCHES)

To enable the thermostat to use a discharge air sensor, the dipswitch in the thermostat must be set properly. To gain access to the thermostat's dipswitches, remove the two screws located in the center of the left side, and along the top right-hand corner of the thermostat casing.



The #2 dipswitch in the cover (shown above) must be in the "down" position when using a remote discharge sensor.

### HOW DO I DECIDE ON THE HIGH LIMIT AND LOW LIMIT TO SELECT FOR THE DISCHARGE AIR FUNCTION?

When the discharge air function is enabled, a *discharge air sensor* must be wired to the thermostat, the discharge air function must be enabled, and a high and low limit established. The "High Limit" will be the temperature within the discharge air duct (default 125°) that the HVAC heating stages and fan will turn off until the discharge air falls 3° below that limit. The "Low Limit" will be the temperature within the discharge air duct (default 45°) that the HVAC cooling stages and fan unit will turn off until the discharge air rises 3° above that limit.

SZ1009 / SZ1022 / SZ1031 / SZ1035 / SZ1017a / SZ1053 / SZ1024 / SZ1033 only

### HOW DO I PROGRAM THE THERMOSTAT TO ENABLE THE DISCHARGE AIR FUNCTION AND PROGRAM THE LOW LIMIT AND HIGH LIMIT?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your access code

- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "ENABLE DISCHARGE AIR SENSOR?" screen appears
- **IMPORTANT:** A discharge air sensor must be wired to T2 of the thermostat to enable this function.
- Use the "Up or Down Arrows" to select YES or NO
- Press the "Program Setup" button and the "DISCHARGE AIR LOW LIMIT" screen appears
- Use the "Up or Down Arrows" to select the value in degrees
- Press the "Program Setup" button and the "DISCHARGE AIR HIGH LIMIT" screen appears
- Use the "Up or Down Arrows" to select the value in degrees
- Press the "Program Setup" button to save change
- Press the "Service Status" button to end programming and return to the main display screen

SZ1041 / SZ1051 only

### HOW DO I PROGRAM THE THERMOSTAT TO ENABLE THE DISCHARGE AIR FUNCTION, PROGRAM THE LOW LIMIT AND HIGH LIMIT AND SET THE OUTDOOR AIR ECONOMIZER SETPOINT?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "ENABLE DISCHARGE AIR SENSOR?" screen appears
- **IMPORTANT:** A discharge air sensor must be wired to T2 of the thermostat to enable this function.
- Use the "Up or Down Arrows" to select YES or NO
- Press the "Program Setup" button and the "OUTDOOR AIR ECON SETPOINT?" screen appears
- **IMPORTANT:** An outdoor air sensor must be wired to T3 of the thermostat and the outdoor air function must be enabled to utilize this function.
- Use the "Up or Down Arrows" to select the outdoor air temperature below which the thermostat must read in order to enable the economizer to supplement mechanical cooling
- Press the "Program Setup" button and the "DISCHARGE AIR ECON SETPOINT" screen appears. This is the temperature that the thermostat will attempt to maintain the discharge air temperature by modulating the economizer when there is a call for cooling
- Use the "Up or Down Arrows" to select the value in degrees
- Press the "Program Setup" button and the "DISCHARGE AIR LOW LIMIT" screen appears
- Use the "Up or Down Arrows" to select the value in degrees
- Press the "Program Setup" button and the "DISCHARGE AIR HIGH LIMIT" screen appears
- Use the "Up or Down Arrows" to select the value in degrees

- Press the "Program Setup" button
- Press the "Service Status" button to end programming and return to the main display screen

### **WHAT IS THE DISCHARGE AIR PROPORTIONAL BAND OR THROTTLING RANGE?**

This is the number of degrees away from the setpoint plus offset that the economizer damper will be fully open. The proportional band will dictate how far open the damper will be as the discharge air temperature goes from its setpoint (damper closed) to the number of degrees above the setpoint as set by the proportional band (damper fully open).

Example:

Cool Setpoint:	70°F
Cool Stage 1 Offset	0°F
Cool Stage 1 Differential	2°F
Discharge Air Econ. Setpoint	55°F
Proportional Band:	5°F
Outdoor Air Econ Setpoint	65°F
Current Outdoor Air Temp	60°F
Current Room Temp	71°F
Current Discharge Air Temp	60°F

The current outdoor air temperature is below the Outdoor Air Economizer Setpoint in occupied mode AND the current room temperature is above the setpoint. With these conditions met, the thermostat will enable the economizer.

Now the thermostat compares the current discharge air temperature (60°) with the Discharge Air Temperature Setpoint (55°). The economizer damper modulates open to use the cooler outdoor air temperature to attempt to bring the discharge air temperature down to its setpoint. Since there is a 5° difference between the Discharge Air Setpoint (55°) and the current discharge air temperature (60°), the 5° Proportional Band will modulate the economizer damper to a fully open position.

If the room temperature reaches 72°, the first cooling stage will turn on and mechanical cooling will run until the space reaches its cool setpoint of 70°.

### **HOW DO I PROGRAM THE DISCHARGE AIR PROPORTIONAL BAND OR THROTTLING RANGE?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your access code
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "DISCHARGE AIR ECON PROP BAND" screen appears
- Use the "Up or Down" arrows to select the number of degrees

- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

### **HOW DO I PROGRAM THE MINIMUM DAMPER POSITION?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "OUT DOOR DAMPER MIN POSITION" screen appears
- Use the "Up or Down" arrows to select the percentage that the economizer will always be open to allow out door air to enter the system.
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

### **HOW DO I CHOOSE WHETHER THE MODULATING OUTPUT RANGE SHOULD BE 0-20 mA OR 4-20 mA?**

If the equipment receiving the modulating output signal requires 0-10 volts, or 0-5 volts, the 0-20 mA option should be selected. If the equipment requires 2-10 volts or 1-5 volts or 4-20 milliamps, the 4-20mA option should be selected. If the equipment requires 0-10 or 2-10 volts, a 500 ohm resistor would be required to be placed across the analog output and ground terminals at the controller or at the actuator. If the equipment requires 0-5 volts or 1-5 volts, a 250 ohm resistor would be required to be placed across the analog output and ground terminals at the controller or at the actuator.

### **HOW DO I PROGRAM THE MODULATING ECONOMIZER OUTPUT RANGE?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "ECONOMIZER OUTPUT RANGE" screen appears
- Use the "Up or Down" arrows to select 4-20 mA OR 0-20 mA
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

### **WHAT IS THE DIFFERENCE BETWEEN DIRECT ACTING AND REVERSE ACTING ECONOMIZER CONTROL?**

Direct acting refers to the analog output signal increasing as the input signal (or temperature) increases. Reverse acting refers to the analog output signal increasing the input signal (or temperature) decreases.

### HOW DO I PROGRAM *DIRECT ACTING* OR *REVERSE ACTING* ECONOMIZER CONTROL?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "ECON OUTPUT RANGE" screen appears
- Use the "Up or Down" arrows to select DIRECT or REVERSE
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

*SZ1017a / SZ1053 only*

### HOW DO I PROGRAM THE THERMOSTAT TO *CONTROL BASED ON DISCHARGE AIR* TEMPERATURE?

The thermostat can control based on either discharge air, or the temperature in the space or zone.

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "CONTROL BASED ON" screen appears
- Use the "Up or Down" arrows to select SPACE or DISCHARGE
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

### IF CONTROLLING BASED ON DISCHARGE AIR, HOW DO I PROGRAM THE *DISCHARGE AIR SETPOINT*?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "DISCHARGE AIR SETPOINT" screen appears
- Use the "Up or Down" arrows to select the discharge air setpoint to be maintained
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

### HOW DO I ENABLE THE *HEAT LOW* FUNCTION?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "ENABLE HEAT LOW LIMIT?" screen appears
- Use the "Up or Down" arrows to select YES or NO
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

### HOW DO I DECIDE HOW MANY DEGREES TO PROGRAM THE *RESET RATIO FACTOR*?

This is the number of degrees that the discharge air setpoint is raised when the space temperature falls by 1° for heating, or the number of degrees the discharge air setpoint is lowered when the space temperature rises by 1° for cooling. This number of degrees will be dictated by the size of the equipment being used to heat or cool the space, and how quickly this equipment can recover the space back a comfortable temperature.

### HOW DO I PROGRAM THE *RESET RATIO FACTOR*?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "RESET RATIO FACTOR" screen appears
- Use the "Up or Down" arrows to select how many degrees the discharge air setpoint will be raised or lowered based on the zone temperature changing by 1°
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

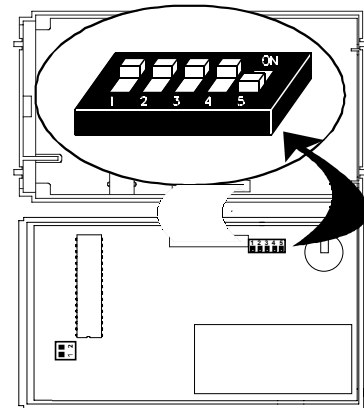
## Outdoor Air Function

*(not available on SZ1022 & SZ1024)*

### HOW DO I MAKE SURE THE THERMOSTAT IS SETUP FOR AND *OUTDOOR AIR SENSOR*? (*DIP-SWITCHES*)

To enable the thermostat to use a remote outdoor air sensor, the dipswitch in the thermostat must be set properly.

To gain access to the thermostat's dipswitches, remove the two screws located in the center of the left side, and along the top right-hand corner of the thermostat casing.



The #1 dipswitch in the cover (shown above) must be in the "down" position when using a remote discharge sensor.

#### **CAN I SHARE A REMOTE OUTDOOR AIR SENSOR VALVE TO OTHER THERMOSTATS THROUGH COMMUNICATIONS SOFTWARE?**

Yes. Using either *Revelation Professional* PC software with a QD2020 or *Ubiquity* server software with the QD2020I or QD2020ie, the value from the outdoor air sensor which is directly wired to a single thermostat can be shared to any other thermostat that has the *outdoor air function*. (excludes SZ1022 & SZ1024). This value is shared to each thermostat via communication network. It is important to note that ONLY the thermostat that is directly wired to the sensor will need to have the appropriate *dip switch* enabled.

#### **CAN I HARDWIRE A SINGLE OUTDOOR AIR SENSOR TO MORE THAN ONE THERMOSTAT?**

No. Due to the value being measured by the resistance of the wire, only a single controller can be wired to an individual outdoor air sensor.

#### **HOW DO I DECIDE ON THE OUTDOOR AIR FUNCTION COOLING AND HEATING LOCKOUT TEMPERATURE LIMITS?**

The *outdoor heating lockout* will be the temperature the thermostat reads from an outdoor air sensor that then "locks out" the thermostat from turning on any stages of heating. This will help insure that heating stages are not running unnecessarily on warmer days. The default setting on thermostats for Outdoor Heat Lockout is 70°.

The *outdoor cooling lockout* will be the temperature the thermostat reads from an outdoor air sensor that then "locks out" the thermostat from turning on any stages of cooling. This will help insure that cooling stages are not running unnecessarily on cooler days. The default setting on thermostats for Outdoor Cool Lockout is 60° (65° on model SZ1041).

#### **HOW DO I PROGRAM THE THERMOSTAT TO ENABLE THE OUTDOOR AIR FUNCTION, AND PROGRAM THE COOLING LOCKOUT TEMPERATURE AND HEATING LOCKOUT TEMPERATURE?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "ENABLE OUTDOOR AIR SENSOR" screen appears

- Use the "Up or Down Arrows" to select Yes or No. No will leave the thermostat to monitor outdoor air only
- Press the "Program Setup" button and the "COOLING LOCKOUT TEMP" screen appears
- Use the "Up or Down Arrows" to select the number of degree setting
- Press the "Program Setup" button and the "HEATING LOCKOUT TEMP" screen appears
- Use the "Up or Down Arrows" to select the number of degree setting
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## **P+I Control**

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#### **HOW DO I DECIDE IF I WANT TO CONTROL BY TEMPERATURE ONLY (P) OR ADD A TIME FACTOR (P+I)?**

If there is a large range between *setpoint*, *offsets* and *differentials* it may be desirable to enable the P&I function. This can be especially valuable when utilizing HVAC equipment that is oversized for the zone. With the P&I function enabled, if the zone temperature remains above the *cool setpoint*, but below the programmed *differential* which turns on a cooling stage, the cooling stages will eventually engage to cool the zone down to its setpoint. Likewise if the zone temperature remains below the heat setpoint, but above the programmed differential which turns on a heating stage, the heating stages will eventually engage to heat the zone to its setpoint.

#### **HOW DO I SET CONTROL MODE TO PROGRAM IN THE SELECTION FOR EITHER P OR P+I CONTROL?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "SET CONTROL MODE" screen appears
- Use the "Up or Down Arrows" to select P (control by temperature only) or P&I (add a time factor).
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

# Auxiliary Time Clock Output

(not available on SZ1009 and SZ1041)

## HOW DO I CHOOSE WHETHER THE AUXILIARY OUTPUT WILL BE OPEN OR CLOSED WHILE OCCUPIED?

The time clock, or auxiliary output can be used to send a digital signal to a piece of equipment or device when the thermostat's schedule goes from unoccupied to occupied, or from occupied to unoccupied. Two common uses of closing the auxiliary output (turn something on) while occupied would be when the output is wired to enable an outdoor air damper or packaged economizer. An example of using the auxiliary output to close while unoccupied might be to wire the output so a series of security lights turn on while the zone is unoccupied.

## HOW DO I PROGRAM THE AUXILIARY OUTPUT?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "TIME CLOCK OUTPUT OCCUPIED =" screen appears
- Use the "Up or Down" arrows to select CLOSED or OPEN
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

# Digital Inputs

## WHAT ARE THE OPTIONS FOR PROGRAMMING DI-1?

When wiring a device which sends a digital input signal to Digital Input 1, this signal can be used for either *fan proving*, or as way to monitor a digital input point.

## WHAT IS FAN PROVING AND WHAT WILL SELECTING THIS OPTION DO?

Fan proving is an HVAC equipment risk management tool. By wiring a *contact switch* from the fan motor of the HVAC unit to the thermostat, or a *differential pressure switch* in the air ducts to the thermostat, the fan proving option will insure that the fan is engaged while the unit is heating or cooling. If the fan is not engaged within 30 seconds of the call for heating or cooling, the thermostat will switch the thermostat to *OFF*, the Service LED indicator will go *ON* and the thermostat will need to be reset to the original desired system mode.

## WHAT ARE THE OPTIONS FOR PROGRAMMING DI-2?

When wiring a device that sends a digital input signal to Digital Input 2, there are different options for Digital Input 2 depending to the type of thermostat used:

The options for Conventional and Heat Pumps Superstats are:

(Models SZ1009 / SZ1022 / SZ1031 / SZ1035 / SZ1024 / SZ1033)

- SERVICE
- COOL LOCKOUT (not on SZ1009)
- MONITOR

The options for Modulating Superstats are:

(Models SZ1017a / SZ1041 / SZ1051 / SZ1053)

- SERVICE
- AQUASTAT
- MONITOR

## WHAT WOULD THE SERVICE OPTION ON DI-2 BE UTILIZED FOR?

The Service options for Digital Input 2 receives a signal that a programmed condition exists, or service is required on a piece of equipment. When a digital input closes on DI-2, the Service LED will turn *ON*. Since the Service LED can be *ON* for various reasons, the user can check the status of the Service LED pressing the "Service Status" button on the front of the thermostat. The message CHECK DI2 will appear.

## WHAT IS THE COOL LOCKOUT AND WHAT WILL SELECTING THIS OPTION DO?

The Cool Lockout feature on Digital Input 2 is typically used in conjunction with an *economizer*. When DI-2 receives a signal that the economizer is being utilized, this cool lockout feature will only allow the first stage of cooling by disabling the second (or third or fourth) stage of cooling.

## WHAT IS THE MONITOR OPTION ON DI-2 USED FOR?

The Monitor option on Digital Input 2 provides simple monitoring of a digital input, or the thermostat can use that monitored point to initiate the *Setpoint Shift* feature. If there is no input wired to DI-2, MONITOR should be selected.

## WHAT IS THE SETPOINT SHIFT OPTION ON DI-2?

Setpoint shift option is utilized for energy demand setback during occupied mode. When the input wired to DI-2 closes, the setpoint shift option will be enabled. This will then "shift" the *heating setpoint* down by a predetermined number of degrees, and "shift" the *cooling setpoint* up by this same number of degrees. When the input wired to DI-2 then opens, the setpoints for heating

and cooling will return to their programmed settings. The fan will continue to operate according to its occupied program selection. *If DI-2 is being used to monitor for another purpose, make sure to set this value to zero.*

#### **HOW DO I PROGRAM IN THE ABILITY TO USE THE SETPOINT SHIFT FUNCTION, AND PROGRAM THE VALUE?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "DI2 USED FOR" screen appears
- Use the "Up or Down Arrows" to select MONITOR
- Press the "Program Setup" button
- The "DI2 SETPOINT SHIFT" screen appears
- Use the "Up or Down Arrows" to select the number of degrees of setpoint shift.
- **IMPORTANT:** *If DI-2 is programmed for MONITOR and used for another purpose than Setpoint Shift, set the degree value to zero*
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

#### **WHAT IS THE AQUASTAT OPTION ON MODULATING SUPERSTATS USED FOR?**

Digital Input 2 must be used in conjunction with Analog Output 1 on modulating Superstats to enable the Aquastat function and programmed for the Aquastat option.

When the thermostat is programmed for the Aquastat option and DI-2 is "open", AO-1 will operate in cooling mode and uses *selected action* or *reverse action*. Then when DI-2 "closes", AO-1 will operate in the heating mode and uses the opposite of the selected direct or reverse action.

#### **WHAT ARE THE OPTIONS FOR PROGRAMMING DI-3?**

When wiring a device which sends a digital input signal to Digital Input 3, the options for all Superstats on programming are:

- *FILTER STATUS*
- *EXTERNAL OVERRIDE*
- *EXTERNAL TIME CLOCK*

#### **WHAT WILL SELECTING THE FILTER STATUS FUNCTION DO?**

When DI-3 is wired to a *differential pressure switch*, the switch is programmed to confirm when the air flow through the filter becomes inefficient. This will indicate the need to change the filter so the HVAC unit will run more efficiently. By programming for filter status, when

the differential pressure switch closes the contact, the Service LED will light. Since the Service LED can be ON for various reasons, the user can check the status of the Service LED pressing the "Service Status" button on the front of the thermostat. The message CHECK FILTER will appear.

#### **WHAT WILL SELECTING THE EXTERNAL TIME CLOCK FUNCTION DO?**

Selecting the External Time Clock option will direct the thermostat to NOT utilize its internal schedule, and go *occupied* or *unoccupied* based on a digital signal it receives from Digital Input 3. This digital input could be from various sources such as a light switch, an occupancy sensor, or another controller.

#### **WHAT WILL SELECTING THE EXTERNAL OVERRIDE FUNCTION DO?**

The External Override option will allow the thermostat to operate with its own programmed schedule until the device wired to Digital Input 3 closes, forcing the thermostat into an *occupied* mode. However, if the thermostat is in its occupied schedule and DI-3 opens, the thermostat will continue to follow its programmed occupied schedule until it reaches its programmed *unoccupied* time.

#### **HOW DO I PROGRAM DI-3?**

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "DI3 USED FOR" screen appears
- Use the "Up or Down Arrows" to select the option
- **IMPORTANT:** *To utilize these functions in stand-alone mode, a device must be wired to DI-3. In network operation, these functions can be shared through Revelation Professional or Ubiquity software without direct wiring to DI-3. If DI-3 is not being used, select EXTERNAL OVERRIDE.*
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## Digital Input Summary Table

DIGITAL INPUT	APPLICATION	LED INDICATION?	SERVICE SCREEN (DI STATUS SCREEN)	CONTROL PROVIDED	SENSOR OR DEVICE NEEDED
DI1	Fan Proving	YES	CHECK FAN, FAN OK or FAIL	YES - turns system mode to "off" — requires manual re-start (set system to auto)	Differential pressure or current switch
DI1	Equipment Monitoring	NO	OK (DI1 OPEN or CLOSED)	NO	Dry contact, switch. Any type for monitoring and indication
DI2	Service Alert	YES (DI2 SERVICE OFF or ON)	OK or CHECK DI2	NO for monitoring and indication	Dry contact, switch. Any type
DI2	Monitor with setpoint shift	NO	OK (DI2 OPEN or CLOSED)	YES - shifts setpoint by programmed amount	Dry contact, switch.
DI2	Cooling Lockout	NO	OK (COOL LOCKOUT ON or OFF)	YES - locks out 2nd and 3rd stage cooling	Dry contact, switch.
DI3	Filter Service	YES	OK or CHECK FILTER (FILTER OK or CHECK)	NO	Differential pressure switch
DI3	External Occupancy Override	NO	OK (EXT OVER ON or OFF)	YES - switches to occupied mode as long as contact is made	Dry contact such as twist timer, light switch, etc.
DI3	External Time Clock Input*	NO	OK (EXT TIMECLOCK ON or OFF)	YES -input overrides thermostat* occupancy program	Dry contact; external time clock (TCS part SL1001a)

## Built-In Delays

### WHAT ARE THE BUILT-IN DELAYS ON THE SUPER-STATS?

The Superstats have delays built into the programming sequences to protect equipment. The fan has a minimum on and off time of 30 seconds. When the fan is in AUTO mode, it will come on 30 seconds before the heating or cooling stages are allowed to sequence on, and remain on for 30 seconds after the heating or cooling stages sequence off. Each stage has a minimum on and off time of two minutes.

### Delay on Power

#### HOW DO I PROGRAM DELAY ON POWER UP?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "DELAY ON POWERUP" screen appears
- Use the "Up or Down Arrows" to select the number of seconds for delay.
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## Smart Recovery

### HOW DO I PROGRAM TO THE THERMOSTAT TO ENABLE SMART RECOVERY?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "ENABLE SMART RECOVERY" screen appears
- Use the "Up or Down Arrows" to select YES or NO.
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## Setting Clock & Schedule

### GENERAL PROGRAMMING

#### HOW DO I ACCESS THE TIME CLOCK AND SCHEDULE SCREENS?

- Press "Clock Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Clock Setup" button

## HOW DO I PROGRAM THE THERMOSTAT TO REQUIRE A TIME CLOCK AND SCHEDULE CODE?

- Press "Program Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Program Setup" button
- Press the "Program Setup" button until the "REQUIRE CODE FOR CLOCK/SCHED?" screen appears
- Use the "Up or Down Arrows" to select YES or NO.
- Press the "Program Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## SETTING THE TIME, DAY AND DATE

### HOW DO I SET THE TIME AND DAY OF THE WEEK?

- Press "Clock Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Clock Setup" button
- Use the "Up or Down Arrows" to select the hour. Insure AM or PM is correct
- Press the "Override" button
- Use the "Up or Down Arrows" to select the minutes
- Press the "Override" button
- Use the "Up or Down Arrows" to select the day of the week
- Press the "Clock Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

### HOW DO I SET THE DATE? (365 DAY MODELS ONLY)

- Press "Clock Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Clock Setup" button
- Press the "Clock Setup" button until the "SET DATE" screen appears
- Use the "Up or Down Arrows" to select the month
- Press the "Override" button
- Use the "Up or Down Arrows" to select the date
- Press the "Override" button
- Use the "Up or Down Arrows" to select the year
- Press the "Clock Setup" button to save the change
- Press the "Service Status" button to end programming and return to the main display screen

## SETTING OCCUPIED TIMES

### HOW DO I PROGRAM THE OCCUPIED TIMES?

- Press "Clock Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Clock Setup" button
- Press the "Clock Setup" button until the "SET OCCUPIED TIMES MONDAY" screen appears

- Press the "Clock Setup" button
- Use the "Up or Down Arrows" to select the start hour for schedule A
- Press the "Override" button
- Use the "Up or Down Arrows" to select the start minutes for schedule A
- Press the "Override" button
- Use the "Up or Down Arrows" to select the end hour for schedule A.
- Press the "Override" button
- Use the "Up or Down Arrows" to select the end minutes for schedule A
- Press the "Override" button
- Use the "Up or Down Arrows" to select the start hour for schedule B. If not using a second schedule, enter 00
- Press the "Override" button
- Use the "Up or Down Arrows" to select the start minutes for schedule B. If not using a second schedule, enter 00
- Press the "Override" button
- Use the "Up or Down Arrows" to select the end hour for schedule B. If not using a second schedule, enter 00
- Press the "Override" button
- Use the "Up or Down Arrows" to select the end minutes for schedule B. If not using a second schedule, enter 00
- Press "Clock Setup" button and the "SET OCCUPIED TIMES TUESDAY" screen appears
- Press "Clock Setup" button again and the "COPY MON FOR TUES?" screen appears
- Use the "Up or Down Arrows" to select YES or NO.
- If YES is selected, the schedules created for Monday will automatically copy for Tuesday
- If NO is selected, follow the preceding procedures to set occupied schedules for Tuesday
- When finished programming days of the week, press "Clock Setup" button
- Press the "Service Status" button to end programming and return to the main display screen

### CAN I COPY ONE DAY'S SCHEDULE TO THE NEXT DAY?

Yes. See "**How do I program the *occupied times?***" for programming instructions.

### HOW DO I SCHEDULE THE THERMOSTAT TO REMAIN OCCUPIED ALL DAY?

Program the start time to "00:00" and the end time to "24:00". See "**How do I program the *occupied times?***" for programming instructions.

## **IF I AM NOT USING A SECOND OCCUPIED SCHEDULE. HOW DO I PROGRAM THE SECOND OCCUPIED SCHEDULE?**

Program the start time to "00:00" and the end time to "00:00". See "**How do I program the occupied times?**" for programming instructions.

## **HOW DO I PROGRAM OCCUPIED TIMES TO GO BEYOND MIDNIGHT?**

To program beyond midnight, both schedule A and B will be utilized.

Example: A site needs to stay occupied from 9:00 AM until 2:00 AM. To accomplish this:

- Program Monday's schedule A from 00:00 until 02:00. This will keep the zone in occupied mode for the two hours from midnight until 2:00 AM
- Program Monday's schedule B from 09:00 until 24:00. This will keep the zone in occupied mode from 9:00 AM until midnight
- Repeat these same steps for each day of the week.

## **SETTING HOLIDAY SCHEDULES & AUTOMATIC DAYLIGHT SAVINGS TIME (365 DAY MODELS ONLY)**

### **How do I program holiday schedules? (365 Day models only)**

- Press "Clock Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Clock Setup" button
- Press the "Clock Setup" button until the "SET OCCUPIED TIMES HOLIDAY #1" screen appears
- Press the "Clock Setup" button
- Since this screen follows the Sunday programming screen, the "COPY SUN FOR HOL #1" screen appears
- Use the "Up or Down Arrows" to select YES or NO. If YES is selected, the schedules created for Sunday will automatically copy for Holiday 1
- Press the "Clock Setup" button
- Use the "Up or Down Arrows" to select the start hour for schedule A
- Press the "Override" button
- Use the "Up or Down Arrows" to select the start minutes for schedule A
- Press the "Override" button
- Use the "Up or Down Arrows" to select the end hour for schedule A.
- Press the "Override" button
- Use the "Up or Down Arrows" to select the end minutes for schedule A
- Press the "Override" button
- Use the "Up or Down Arrows" to select the start hour for schedule B. If not using a second schedule, enter 00
- Press the "Override" button
- Use the "Up or Down Arrows" to select the start minutes for schedule B. If not using a second schedule, enter 00

- Press the "Override" button
- Use the "Up or Down Arrows" to select the end hour for schedule B. If not using a second schedule, enter 00
- Press the "Override" button
- Use the "Up or Down Arrows" to select the end minutes for schedule B. If not using a second schedule, enter 00
- Press the "Clock Setup" button
- The "SET OCCUPIED TIMES HOLIDAY #2" screen appears
- Use the "Up or Down Arrows" to select the start hour for schedule A. If not using a second schedule, enter 00
- Press the "Override" button
- Use the "Up or Down Arrows" to select the start minutes for schedule A. If not using a second schedule, enter 00
- Press the "Override" button
- Use the "Up or Down Arrows" to select the end hour for schedule A. If not using a second schedule, enter 00
- Press the "Override" button
- Use the "Up or Down Arrows" to select the end minutes for schedule A. If not using a second schedule, enter 00
- Press the "Override" button
- Use the "Up or Down Arrows" to select the start hour for schedule B. If not using a second schedule, enter 00
- Press the "Override" button
- Use the "Up or Down Arrows" to select the start minutes for schedule B. If not using a second schedule, enter 00
- Press the "Override" button
- Use the "Up or Down Arrows" to select the end hour for schedule B. If not using a second schedule, enter 00
- Press the "Override" button
- Use the "Up or Down Arrows" to select the end minutes for schedule B. If not using a second schedule, enter 00
- Press the "Clock Setup" button
- Press the "Service Status" button to end programming and return to the main display screen

## **HOW DO I PROGRAM THE DATES TO UTILIZE THE HOLIDAY SCHEDULES? (365 DAY MODELS ONLY)**

- Press "Clock Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Clock Setup" button
- Press the "Clock Setup" button until the "ENTER DATES FOR HOLIDAY #1" screen appears
- Press the "Clock Setup" button
- Use the "Up or Down Arrows" to select which period you are scheduling. Each of the two holiday schedules

can have up to 12 periods, extending from 1-99 days each.

- Press the "Override" button
- Use the "Up or Down Arrows" to select the month which the period will begin to follow the Holiday #1 schedule.
- Press the "Override" button
- Use the "Up or Down Arrows" to select the day which the period will begin to follow the Holiday #1 schedule..
- Press the "Override" button
- Use the "Up or Down Arrows" to select how many days for this period that the thermostat should follow the Holiday #1 schedule.
- Press the "Override" button
- Use the "Up or Down Arrows" to select which another period to schedule Holiday #1
- Follow the preceding procedures to schedule up to 12 periods for the thermostat to follow the Holiday #1 schedule.
- When finished scheduling periods for Holiday #1 schedule, press the "Clock Setup" button.
- The "ENTER DATES FOR HOLIDAY #2" screen appears
- Press the "Clock Setup" button
- Follow the same procedures to schedule up to 12 periods for the thermostat to follow the Holiday #2 schedule.
- When finished scheduling periods for Holiday #2 schedule, press the "Clock Setup" button
- Press the "Service Status" button to end programming and return to the main display screen

#### **How do I clear a previously programmed holiday period? (365 Day models only)**

To clear a holiday period so it will not be used again on those same dates the follow year, change the duration of the period in question to 00 days. If you have a holiday that you would like to reprogram for that period using the same Holiday #1 or #2 schedule, then change the date and duration on that period. For instructions on how to program the thermostat for holiday scheduling, see "**How do I program the dates to utilize the holiday schedules?**"

#### **HOW DO I PROGRAM THE STAT TO AUTOMATICALLY ADJUST FOR DAYLIGHT SAVINGS TIME? (365 DAY MODELS ONLY)**

- Press "Clock Setup" button
- If required, use the "Up or Down" arrows to scroll to your *access code*
- Once selected, press "Clock Setup" button
- Press the "Clock Setup" button until the "DAYLIGHT SAVINGS?" screen appears
- Use the "Up or Down Arrows" to select yes OR no
- Press the "Clock Setup" button
- Thermostat will return to the main display screen

## Limiting Occupied Access

### **WHAT ARE THE DIFFERENT OPTIONS TO LIMIT OR LOCKOUT OCCUPIED ACCESS TO FUNCTIONS?**

#### **Setpoint Adjustment**

The occupant may temporarily change the *occupied* heating and cooling *setpoints* +/- 5°F by factory default. This setpoint change will remain until the end of the current occupied period, at which time the program reverts to the setpoints defined in programming. To change the range of adjustment allowed, see "**How do I program the setpoint adjust?**" *Reminder: The setpoint adjust will stay active until the thermostat goes into the unoccupied mode. If the thermostat remains occupied 24 hours per day, the setpoint adjust will not expire.*

#### **Override**

The occupant has the ability to put the unit into occupied mode by pressing the override button on the front of the thermostat. By factory default, the unit will remain in the occupied mode for 180 minutes. Setting the override time to zero will effectively disable this function. To see how to program the override, see "**How do I program the Override Time?**"

#### **Fan Switching**

The option to allow the occupant to change the occupied fan mode is allowed by factory default. To lock out access to fan switching, see "**How do I program the thermostat to allow, or not allow access to the fan mode?**"

#### **System Switching**

The option to allow the occupant to change the *system mode* is allowed by factory default. To lock out access to system switching, see "**How do I program the thermostat to allow, or not allow access to the system mode?**"

#### **Setting Clock & Schedule**

The ability to set the clock and schedule is allowed by factory default. An access code may be required as set in programming, or access may be denied altogether using dipswitches. To program the thermostat to require an access code to set the clock and schedule, see "**How do I program the thermostat to require a Access code?**" To set the dipswitches to deny access to the clock and schedule altogether, see "**How do I lockout keypad access to programming and/or the time clock and schedule?**"

## Programming

The ability to program control parameters is allowed by factory default. An access code may be required as set in programming, or access may be denied altogether using dipswitches. To program the thermostat to require an access code for programming, see **"How do I require an access code to access the programming and scheduling functions?"** To set the dipswitches to deny access to the clock and schedule altogether, see **"How do I lockout keypad access to programming and/or the time clock and schedule?"**

## LED Description

### WHAT ARE THE LED INDICATORS ON THE THERMOSTAT USED FOR?

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

#### OCCUPIED

This LED will be lit whenever the unit is operating in the occupied or override mode.

#### HEATING

This LED will be lit when any heat output is closed.

#### COOLING

This LED will be lit when any cooling output is closed.

#### FAN

This LED will be lit when the fan output is closed.

#### SERVICE

This LED will be lit when the high or low discharge air limit has been reached, when the fan interlock has indicated failure, or when the filter service or service input are closed.

#### PROGRAM/DATA

This LED will be lit when the thermostat is within the programming or clock setup menus. It will blink when the unit is being accessed by a PC or remote connection. Additional monitoring is available by continually pressing the Service Status button.