24-10143-01493, Rev. —

SE-ZEC Controller

Installation Instructions

SE-ZEC500 - 1
SE-ZEC510 - 1

Part No. 24-10143-01493, Rev. —
Issued March 2018

Refer to the QuickLIT website for the most up-to-date version of this document.

Applications

The SE-ZEC Controllers are components of the SMART Equipment family. The VAV Zone controllers run a pre-engineered HVAC zoning sequence and provide the inputs and outputs required for this application.

The SE-ZEC Controller also uses plug and play technology to detect which network sensor types are connected. See the *Accessories* section to determine availability of additional sensing product information.

Use the Mobile Access Portal (MAP) Gateway to set up ZEC Controller and change the heat application type of the SE-ZEC Controller. The VAV controller commissioning is performed with either the MAP Gateway or the VAV Balancing Thermostat.

IMPORTANT: Use this SE-ZEC Controller only as an operating control. Where failure or malfunction of the controller could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the ZEC VAV controller.

IMPORTANT : Utiliser ce SE-ZEC Controller uniquement en tant que dispositif de contrôle de fonctionnement. Lorsqu'une défaillance ou un dysfonctionnement du controller risque de provoquer des blessures ou d'endommager l'équipement contrôlé ou un autre équipement, la conception du système de contrôle doit intégrer des dispositifs de protection supplémentaires. Veiller dans ce cas à intégrer de façon permanente d'autres dispositifs, tels que des systèmes de supervision ou d'alarme, ou des dispositifs de sécurité ou de limitation, ayant une fonction d'avertissement ou de protection en cas de défaillance ou de dysfonctionnement du ZEC VAV controller.

North American Emissions Compliance

United States

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference, in which case users will be required to correct the interference at their own expense.

Canada

This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Installation

Observe these guidelines when installing a SE-ZEC Controller:

- Transport the SE-ZEC Controller in the original container to minimize vibration and shock damage to the SE-ZEC Controller.
- Do not drop the SE-ZEC Controller or subject it to physical shock.

Parts Included

- one SE-ZEC Controller with removable FC and SA Buses and power terminal blocks
- one self-drilling No. 10 x 25 mm (1 in.) screw

Materials and Special Tools Needed

- 6 mm (1/4 in.) female spade terminals for input and output wiring and crimping tool or spade mounted terminal blocks
- small straight-blade screwdriver for securing wires in the terminal blocks
- 8 mm (5/16 in.) wrench or 10 mm (3/8 in.) 12-point socket to tighten the square coupler bolt
- shims or washers to mount the SE-SE-ZEC Controller, if necessary
- power screwdriver, 100 mm (4 in.) extension socket, or a punch, drill, and 3.5 mm (9/64 in.) drill bits to mount the SE-ZEC Controller.
- pliers to open and close the damper
- 3.97 mm (5/32 in.) ID poly tubing

Mounting

Observe these guidelines when mounting a SE-ZEC Controller:

IMPORTANT: When the air supply to the VAV box is below 10°C (50°F), make sure that any condensation on the VAV box, particularly on the damper shaft, does not enter the SE-ZEC Controller electronics. Mount the SE-ZEC Controller vertically above the damper shaft to allow any shaft condensation to fall away from the SE-ZEC Controller. Additional measures may be required in some installations.

- Ensure that the mounting surface can support the SE-ZEC Controller and any user-supplied enclosure.
- Mount the SE-ZEC Controller on a hard, even surface whenever possible.
- Use shims or washers to mount the SE-ZEC Controller securely and evenly on the mounting surface, if necessary.
- Mount the SE-ZEC Controller in an area free of corrosive vapors that matches the ambient conditions specified in the *Technical Specifications* section.
- Provide sufficient space around the SE-ZEC Controller for cable and wire connections and adequate ventilation through the controller (at least 50 mm [2 in.] on the top, bottom, sides, and front of the controllers).
- Do not mount the SE-ZEC Controller in areas where electromagnetic emissions from other devices or wiring can interfere with controller communication.
- Avoid mounting the SE-ZEC Controller on surfaces with excessive vibration.

On panel or enclosure mount applications, observe these additional guidelines:

- Do not install the SE-ZEC Controller in an airtight enclosure.
- Mount the SE-ZEC Controller so that the enclosure walls do not obstruct cover removal or ventilation through the controller.

- Mount the SE-ZEC Controller so that the power transformer and other devices do not radiate excessive heat to the controller.

To mount the SE-ZEC Controller Controllers:

1. Ensure that you have the appropriate personal protective equipment (PPE), such as a hard hat, safety glasses, steel toe boots, and gloves.
2. Disconnect power from the controller transformer as well as the VAV box fan and heater circuits, if applicable.
3. Set the Master-Slave/Token-Passing (MS/TP) address, and ensure that EOL is set to Off. See *Setup and Adjustments*.
4. Place the SE-ZEC Controller in the proper mounting position on the actuator shaft so that the wiring connections are easily accessible. Make sure the SE-ZEC Controller base is parallel to the VAV box (perpendicular to the damper shaft). If needed, use a spacer to offset tipping of the SE-ZEC Controller caused by the shaft bushings.

Note: Use the alignment marks to center the captive spacer to ensure sufficient movement in either direction (Figure 1).

Figure 1: Captive Spacer Alignment Marks

5. Secure the self-drilling No. 10 screw through the captive spacer with a power screwdriver and 100 mm (4 in.) extension socket. Otherwise, use a punch to mark the position of the shoulder washer, and then drill a hole into the VAV box using a 5/16 in. drill bit. Insert the mounting screw and tighten it against the spacer.

IMPORTANT: Do not overtighten the screw, or the threads may strip. If you mount the SE-ZEC Controller to the VAV box, make sure that the screws do not interfere with damper blade movement.

6. Locate the damper position using the typical marking on the end of the damper shaft.
7. Note the direction, clockwise (CW) or counterclockwise (CCW), required to close the damper. The actuator setup depends on the necessary amount of rotation required for the damper to go from full-open to full-closed. For 90° rotation, install the damper full-closed. For 45° or 60° rotation, install the damper full-open.

8. Push down and hold the Manual Override button and turn the SE-ZEC Controller coupler until it contacts the mechanical end-stop at either the full-closed or full-open position.

Figure 2: Manual Override and Coupler

9. If the damper for a 45° or 60° box closes CCW, rotate the coupler to the CW mechanical limit. If the damper for a 45° or 60° box closes CW, rotate the coupler to the CCW mechanical limit. This action sets the open end-stop; the closed end-stop is set by the closed damper.

   For 45° and 60° boxes, hard stops must be provided at both full-closed and full-open damper positions. By installing the SE-ZEC Controller at the full-open position, the SE-ZEC Controller provides the open stop for 45° and 60° boxes. The closed damper seal provides the full-closed stop.

10. Tighten the square coupler bolt to the shaft using an 8 mm (5/16 in.) wrench or 10 mm (3/8 in.) 12-point socket. Tighten to 10.5 to 11.5 N·m (95 to 105 lb·in).
11. Put a loop in the poly tubing, to trap condensation, when you attach the poly tubing to the SE-ZEC Controller pressure transducer ports. Loop the poly tubing before you make the final connections.
12. Push the Manual Override button, and turn the actuator coupling manually to ensure that the actuator can rotate from full-closed to full-open positions without binding.
13. Complete the mounting by rotating the damper to the full-open position.

Wiring

⚠ WARNING

Risk of Electric Shock.
Disconnect power from the controller before making any adjustments. Do not touch any part of the printed circuit board while power is applied. Failure to follow these precautions can result in personal injury or death.

⚠ ADVERTISSEMENT

Risque de décharge électrique.
Déconnecter l'alimentation du controller avant toute opération de réglage. Veiller à ne toucher aucune partie du circuit imprimé lorsque celui-ci est sous tension. Le non-respect de ces précautions peut provoquer des blessures graves, voire mortelles.

IMPORTANT: Make all wiring connections in accordance with the National Electrical Code and local regulations. Use proper electrostatic discharge (ESD) precautions during installation and servicing to avoid damaging the electronic circuits of the controller.

IMPORTANT: Do not exceed the controller electrical ratings. Exceeding controller electrical ratings can result in permanent damage to the controller and void any warranty.

IMPORTANT: Do not connect supply power to the controller before finishing wiring and checking all wiring connections. Short circuits or improperly connected wires can result in damage to the controller and void any warranty.

IMPORTANT: Use copper conductors only. Make all wiring in accordance with local, national, and regional regulations.

Observe the following guidelines when wiring a SE-ZEC Controller.

Input and Output Terminals

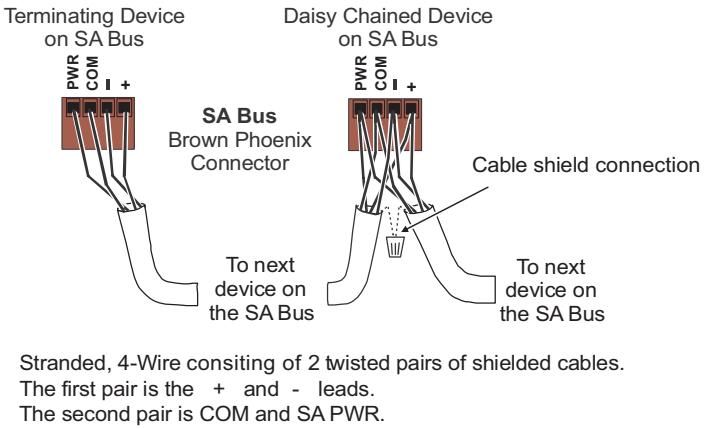
See Figure 8 for an example of the staged control wiring. See Figure 10 for an example of the incremental control wiring.

Sensor Actuator Bus Terminal Block

The Sensor Actuator Bus (SA) terminal block is a brown, removable 4-terminal plug, that is keyed to only fit into the board-mounted brown SA Bus.

Wire the removable SA Bus terminal block plugs on the SE-ZEC Controller and other field devices in a daisy-chain configuration using 4-wire twisted, shielded cable as shown in Figure 3.

Figure 3: SA Bus Terminal Block Wiring



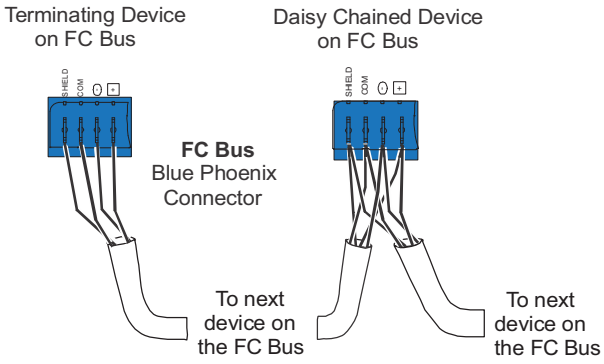
Stranded, 4-Wire consiting of 2 twisted pairs of shielded cables.
The first pair is the + and - leads.
The second pair is COM and SA PWR.

Field Controller SA Bus and FC Bus Terminal Block (SE-ZEC 510 Controller only)

The FC Bus terminal block is a blue, removable, 4-terminal plug that is keyed to only fit in to the board-mounted, gray FC Bus jack.

Wire the removable FC Bus terminal block plugs on the SE-ZEC Controller and other FC Bus controllers in a daisy-chain configuration using 3-wire twisted, shielded cable, as shown in Figure 4.

Figure 4: FC Bus Terminal Block Wiring

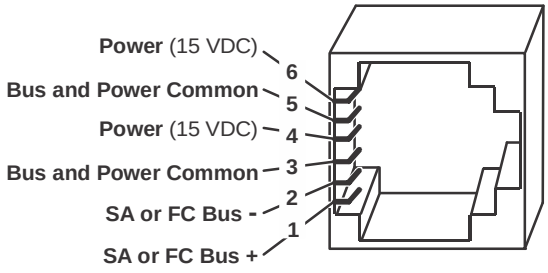


Modular Ports

The modular SA Bus and FC Bus ports on the face of the SE-ZEC Controller are RJ-12 (6-position) modular jacks.

The modular SA Bus ports provide a connection for the VAV Balancing Tool. The FC Bus port does not exist in the SE-ZEC 500 Controller..

Figure 5: Pin Number Assignments SA and FC Bus Ports

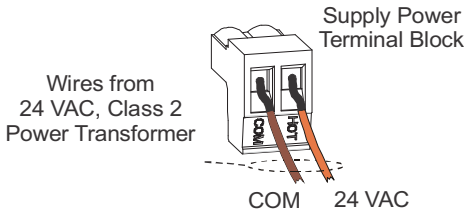


Supply Power Terminal Block

The 24 VAC supply power terminal block is a gray, removable, 2-terminal plug that fits into a board-mounted jack on the upper left of the SE-ZEC Controller.

Wire the 24 VAC supply power wires from the transformer to the HOT and COM terminals on the terminal plug.

Figure 6: VAC Supply Power Terminal Block Wiring



IMPORTANT: The 24 VAC power should not be shared with other network devices. Sharing power with other network devices may cause noise, interference, and ground loop problems. You may damage the controller by sharing power with other devices.

To wire the SE-ZEC Controller:

1. Terminate wiring according to Figure 8 if you are using staged outputs for the heating control. See Figure 10 if you are using incremental outputs for the heating control.
2. Wire the network temperature sensor and CO_2 sensor to the SE-ZEC Controller's SA Bus.
3. For the SE-ZEC510, wire the FC Bus in a daisy chain.
4. Ensure that the SE-ZEC Controller's device address DIP switches are set to the appropriate device address. (See *Setup and Adjustments*.) Also, activate the end-of-line (EOL) switch, if necessary.

5. Connect the SE-ZEC Controller to 24 VAC, Class 2 power.

Figure 7: ZEC Controller - VAV with Staged Reheat Control Wiring Example

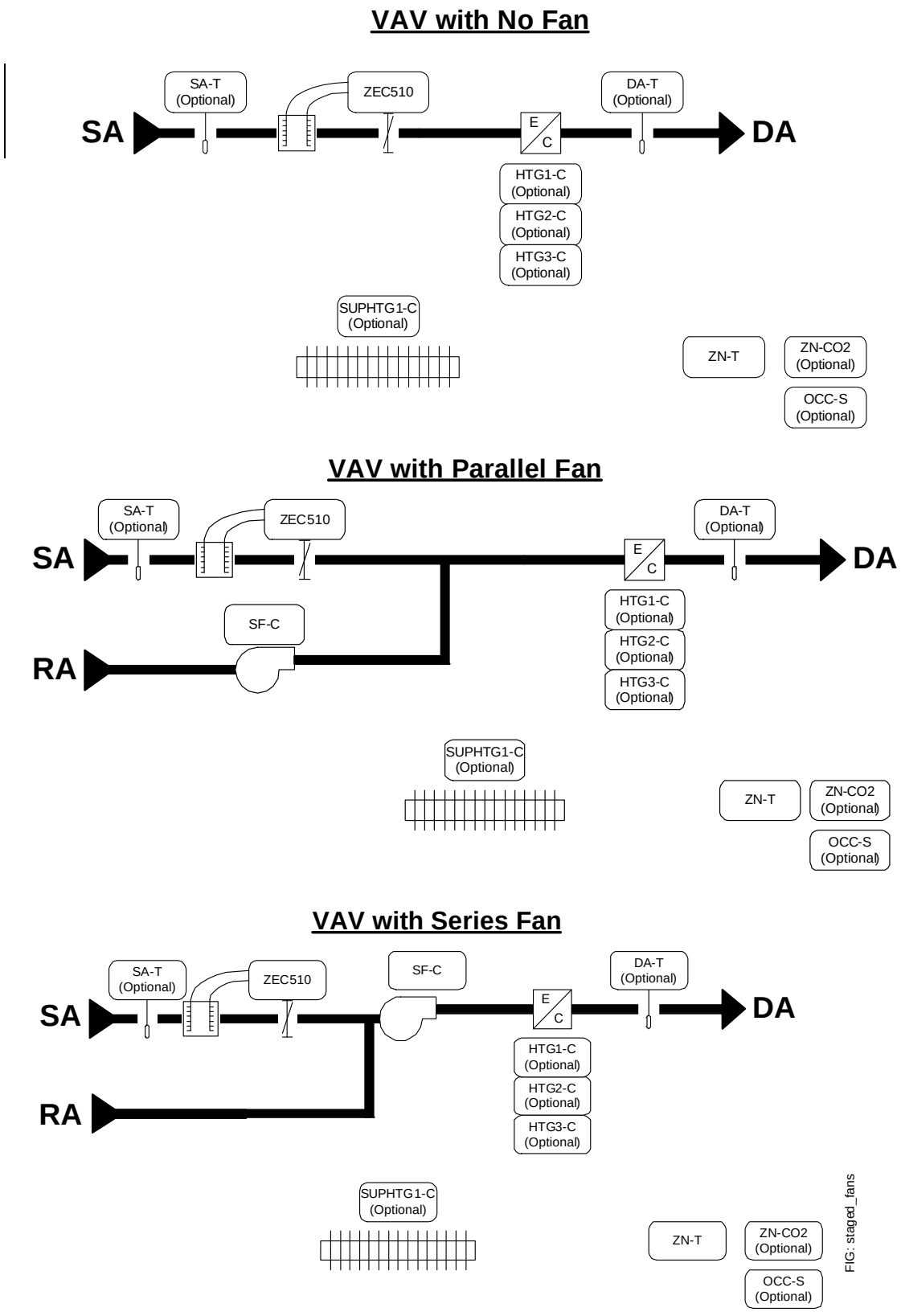


Figure 8: ZEC510 Controller - VAV with Staged Reheat Control Wiring Example

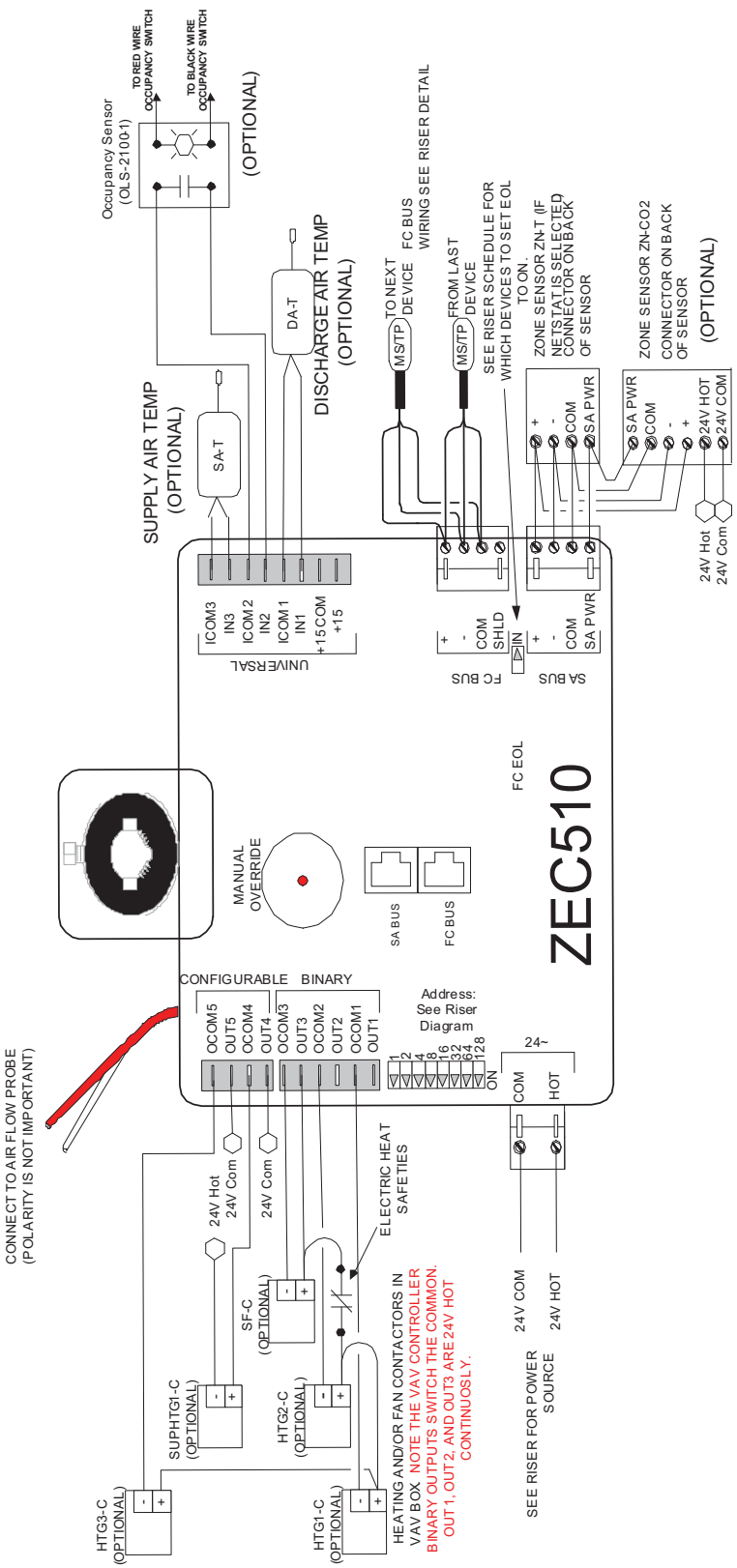
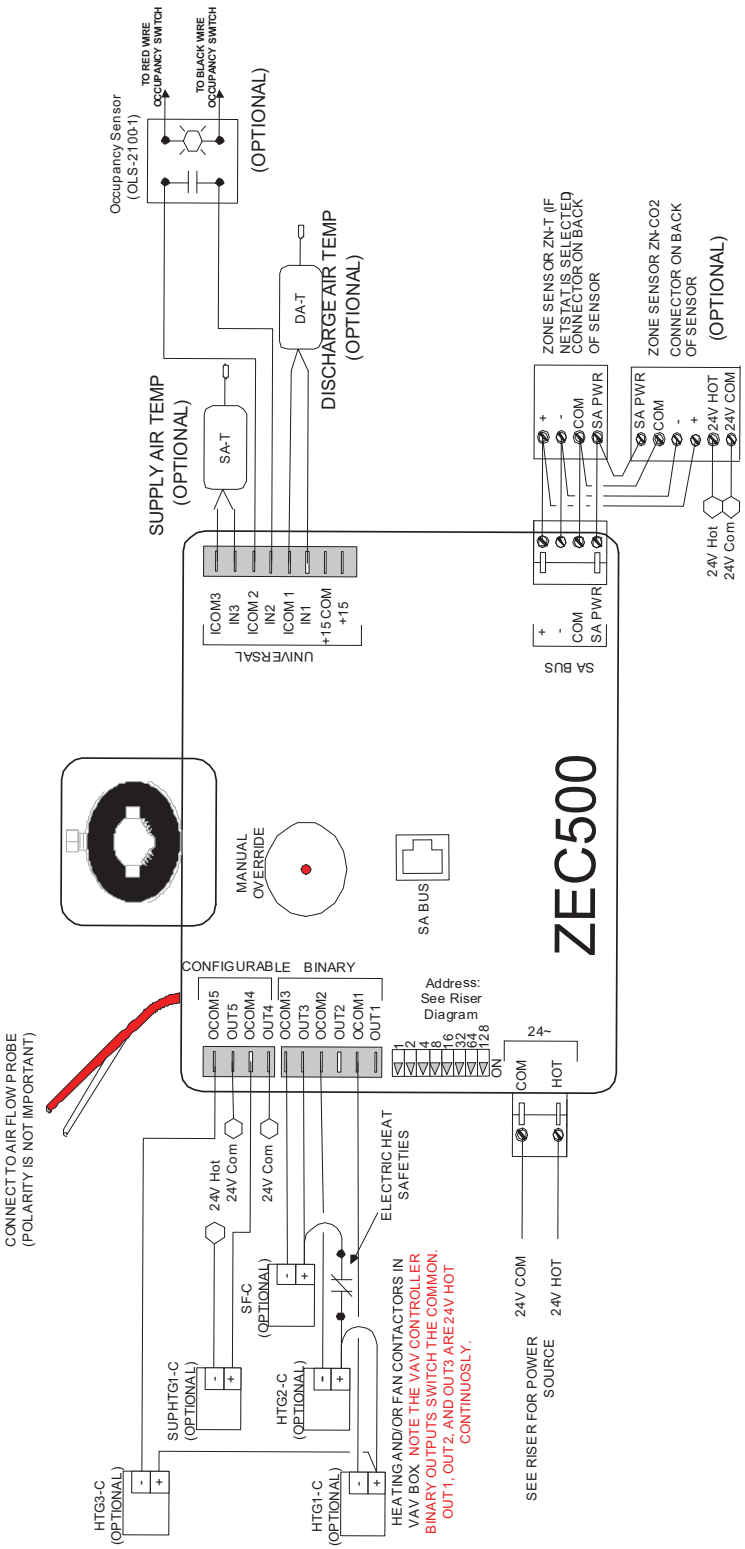


Figure 9: ZEC500 Controller - VAV with Staged Reheat Control Wiring Example



Sequence of Operation for Staged with Reheat Control

Occupied Mode: When the zone temperature is between the occupied heating and cooling setpoints (inside of the bias), the primary air damper is at the minimum CFM (cubic feet per minute) and no mechanical heating runs. When the zone temperature rises above the cooling setpoint, the primary air damper increases the CFM and no mechanical heating runs. If a drop in zone temperature below the heating setpoint occurs, the supplemental heating coil is fully used before the reheat heat coil enables, and the damper opens to provide to minimum CFM.

Note: The box reheat and supplemental reheat is a box option. You have a cooling only box if you do not select either reheat or supplemental reheat.

Unoccupied Mode: In unoccupied mode, when the zone temperature is between the unoccupied heating and cooling setpoints (inside of the bias), the primary air damper is at the minimum CFM and no mechanical heating runs. When the zone temperature rises above the unoccupied cooling setpoint, the primary air damper increases the CFM (if available), and no mechanical heating runs. When the zone temperature drops below the unoccupied heating setpoint, the supplemental heating coil is fully used before the reheat heat coil enables. The damper is at the minimum CFM.

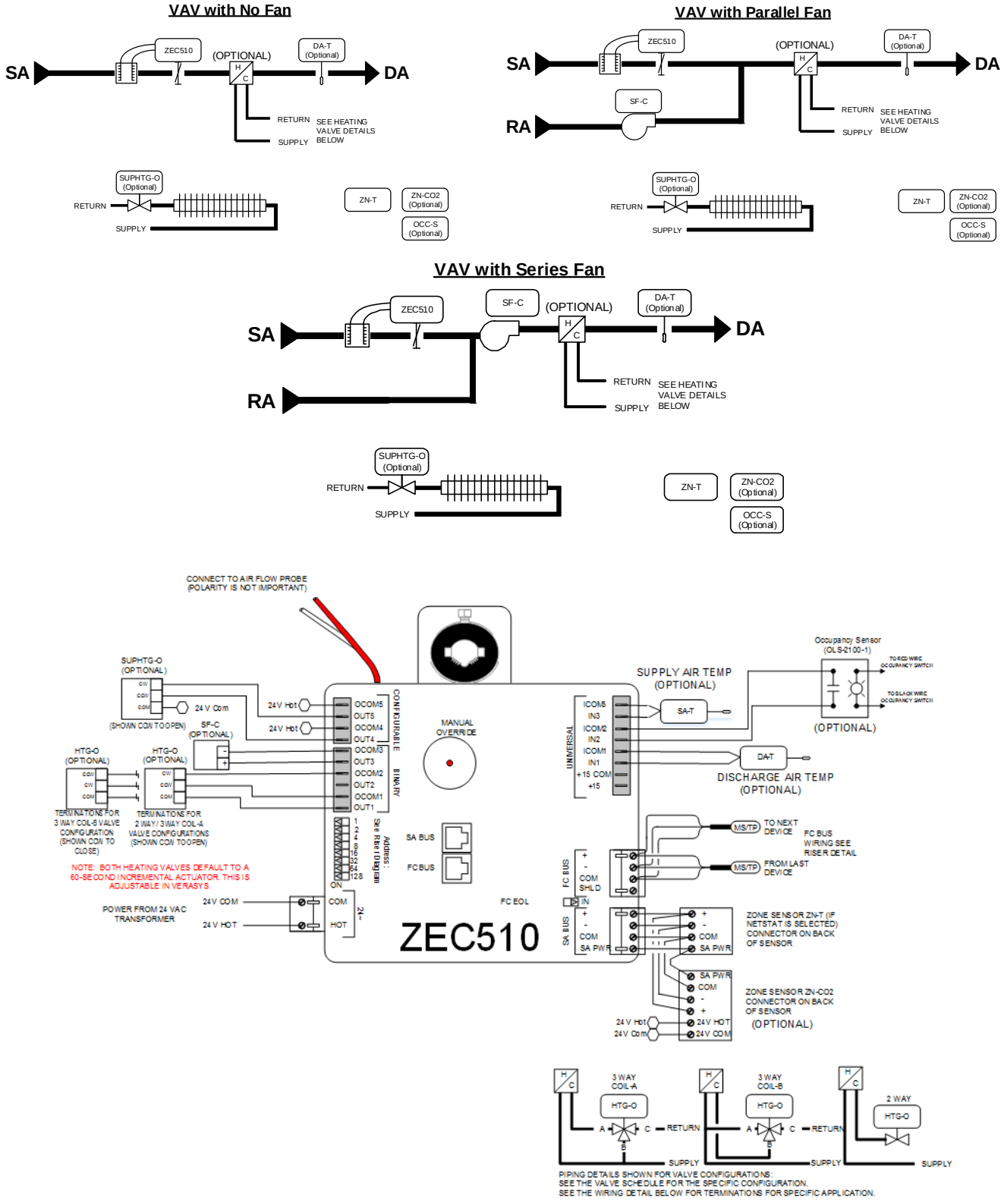
Unit Enable: A network unit enable signal controls the mode of the box.

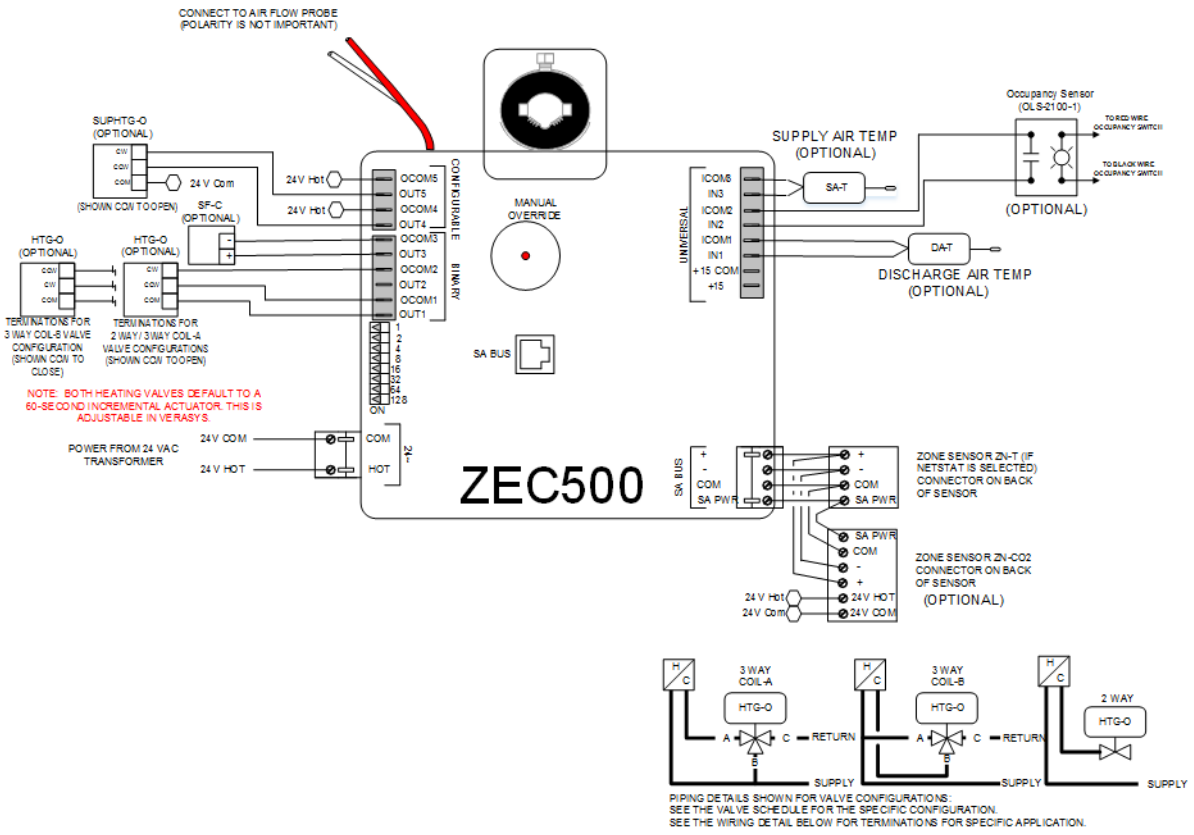
Fan Control (Optional): With parallel fans, when a call for heat occurs, the fan cycles on. In all other states the fan remains off. With series fans, in occupied mode, the fan runs continuously. In unoccupied mode, the fan cycles on with a call for heating or cooling.

Occupancy Lighting Switch (Optional): You can add an occupancy lighting switch to the box, temporarily setting the VAV box to Standby mode when the occupancy is not sensed. When the box senses occupancy, the zone switches back to occupied. Standby mode uses standby temperature setpoints that are slightly higher or lower than the occupied cooling or heating setpoints, respectively. The VAV box also uses unoccupied flow setpoints in addition to the low temperatures.

Standalone Mode (Optional): This mode is intended to allow the controller to utilize unoccupied setpoints when there is no connection to a building automation system. When standalone mode is enabled, whenever the measured flow exceeds the occupancy determination flow setpoint, the system will be in the occupied mode. Whenever the measure flow is less than the occupancy determination flow setpoint, the system will be in the unoccupied mode.

Figure 10: ZEC510 and ZEC500 Controller - VAV with Incremental Reheat Control Wiring Example





Sequence of Operation for Incremental Control Wiring Example

Occupied Mode: When the zone temperature is between the occupied heating and cooling setpoints (inside of the bias), the primary air damper is at the minimum CFM and mechanical heating is unavailable. When the zone temperature rises above the cooling setpoint, the primary air damper increases the CFM and mechanical heating is unavailable. When the zone temperature drops below the heating setpoint, the supplemental heating coil is fully used before the reheat coil enables. The damper is controlled to provide a minimum CFM.

Note: The box reheat and supplemental reheat is a box option. If you select neither, you have a cooling only box.

Unoccupied Mode: When in unoccupied mode, if the zone temperature is between the unoccupied heating and cooling setpoints (inside of the bias), the primary air damper is at the minimum CFM and mechanical heating is unavailable. When the zone temperature rises above the unoccupied cooling setpoint, the primary air damper increases the CFM, if available, and mechanical heating is unavailable. When the zone temperature drops below the unoccupied heating setpoint, the supplemental heating coil is fully used before the reheat heat coil enables. The damper is at the minimum CFM.

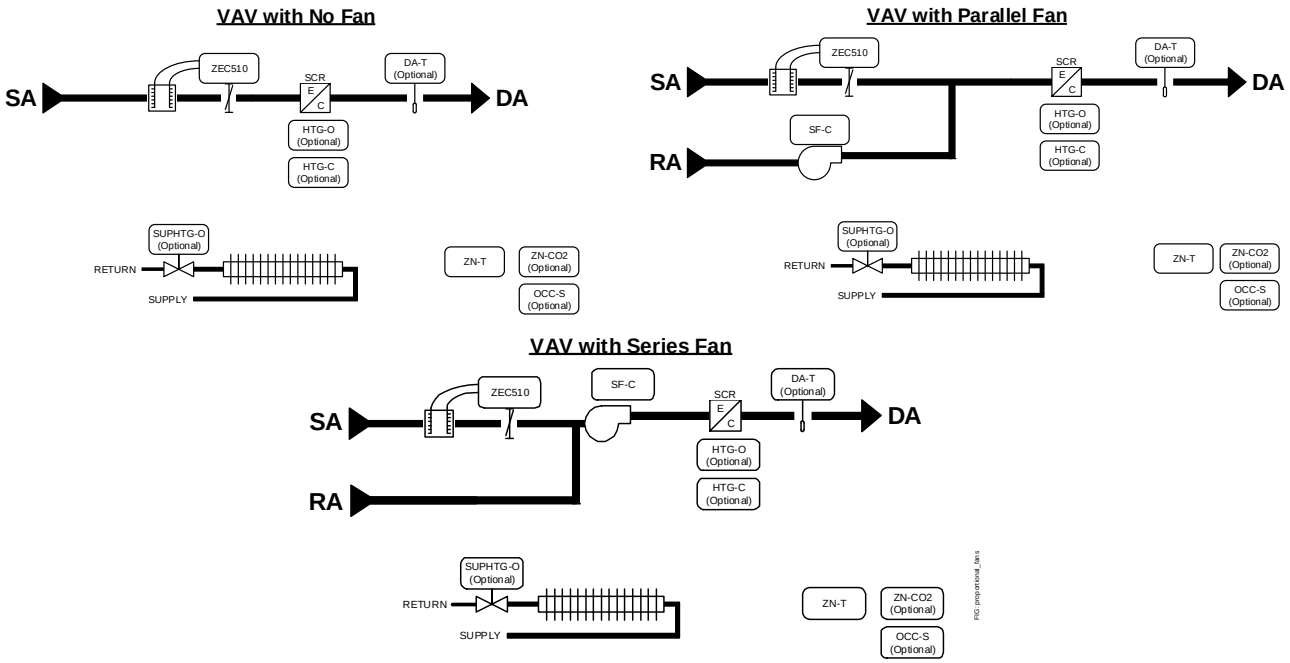
Unit Enable: A network unit enable sign controls the box mode.

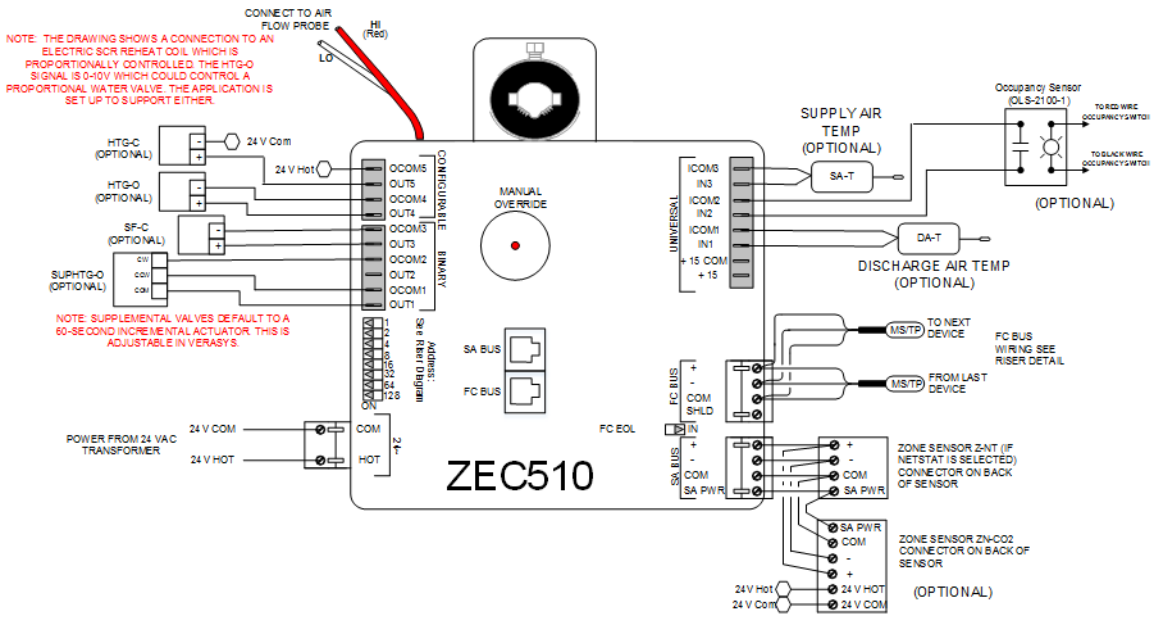
Fan Control (Optional): For parallel fans, upon a call for heat, the fan cycles on. For all other states, the fan is off. For a Series fan, the fan runs continuously during occupied mode. During the unoccupied mode, the fan cycles on with a call for heating or cooling.

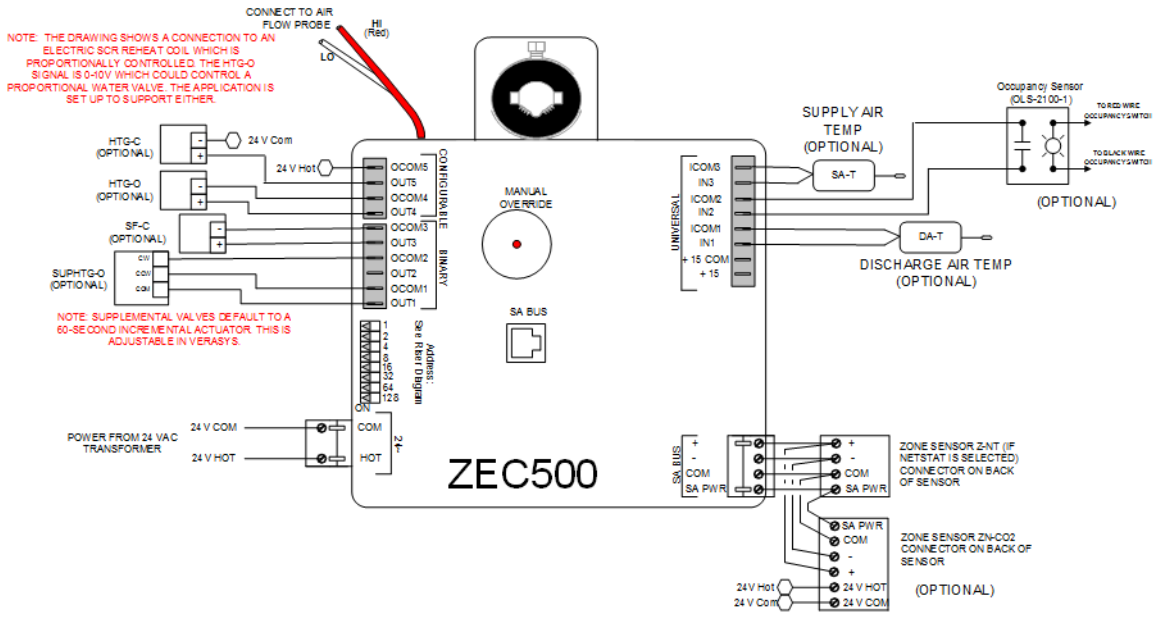
Occupancy Lighting Switch (Optional): You can add an occupancy lighting switch to the box. This temporarily sets the VAV box to Standby mode when the occupancy is not sensed. When the box senses occupancy, the zone switches back to occupied. Standby mode uses standby temperature setpoints that are slightly higher or lower than the occupied cooling or heating setpoints, respectively. The VAV Box also uses unoccupied flow setpoints in addition to the low standby temperatures.

Standalone Mode (Optional): This mode is intended to allow the controller to utilize unoccupied setpoints when there is no connection to a building automation system. When standalone mode is enabled, whenever the measured flow exceeds the occupancy determination flow setpoint, the system will be in the occupied mode. Whenever the measure flow is less than the occupancy determination flow setpoint, the system will be in the unoccupied mode.

Figure 11: Multizone Unit VAV with Proportional Reheat







Sequence of Operation - Multizone Unit VAV with Proportional Reheat Control

Occupied Mode: When the zone temperature is between the occupied heating and cooling setpoints (inside of the bias), the primary air damper is at the minimum CFM and mechanical heating is unavailable. When the zone temperature rises above the cooling setpoint, the primary air damper increases the CFM and mechanical heating is unavailable. When the zone temperature drops below the heating setpoint, the supplemental heating coil is fully used before the reheat coil enables. The damper is controlled to provide a minimum CFM.

Note: The box reheat and supplemental reheat is a box option. If you select neither, you have a cooling only box.

Unoccupied Mode: When in unoccupied mode, if the zone temperature is between the unoccupied heating and cooling setpoints (inside of the bias), the primary air damper is at the minimum CFM and mechanical heating is unavailable. When the zone temperature rises above the unoccupied cooling setpoint, the primary air damper increases the CFM, if available, and mechanical heating is unavailable. When the zone temperature drops below the unoccupied heating setpoint, the supplemental heating coil is fully used before the reheat heat coil enables. The damper is at the minimum CFM.

Unit Enable: A network unit enable sign controls the box mode.

Fan Control (Optional): For parallel fans, upon a call for heat, the fan cycles on. For all other states, the fan is off. For Series fan, during the occupied mode the fan runs continuously. During the unoccupied mode, the fan cycles on with a call for heating or cooling.

Occupancy Lighting Switch (Optional): You can add an occupancy lighting switch to the box. This temporarily sets the VAV box to Standby mode when the occupancy is not sensed. When the box senses occupancy, the zone switches back to occupied. Standby mode uses standby temperature setpoints that are slightly higher or lower than the occupied cooling or heating setpoints, respectively. The VAV Box also uses unoccupied flow setpoints in addition to the low standby temperatures.

Standalone Mode (Optional): This mode is intended to allow the controller to utilize unoccupied setpoints when there is no connection to a building automation system. When standalone mode is enabled, whenever the measured flow exceeds the occupancy determination flow setpoint, the system will be in the occupied mode. Whenever the measure flow is less than the occupancy determination flow setpoint, the system will be in the unoccupied mode.

SE-ZEC Controller Terminal Functions, Ratings, Requirements, and Wiring Guidelines

Input and Output Wiring Guidelines

Table 1 provides information about the functions, ratings, and requirements for the SE-ZEC Controller input and output terminals.

In addition to the wiring guidelines Table 1, observe these guidelines when wiring SE-ZEC Controller inputs and outputs:

- Run all low-voltage wiring and cables separate from high-voltage wiring.
- All input and output cables, regardless of wire size or number of wires, should consist of twisted, insulated, and stranded copper wires.
- Shielded cable is not required for input or output cables.
- Shielded cable is recommended for input and output cables that are exposed to high electromagnetic or radio frequency noise.

FC Bus Supply Power Wiring Guidelines

Table 1 provides information about terminal block functions, ratings, and requirements.

In addition to the guidelines in Table 1, observe these guidelines when wiring the FC Buses and supply power:

- Run all low-voltage wiring and cables separate from high-voltage wiring.
- All FC and SA Bus cables, regardless of wire size, should be twisted, insulated, stranded copper wire.
- Shielded cable is strongly recommended for all FC and SA Bus cables.
- Refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011670)* for detailed information regarding wire size and cable length requirements for the FC Bus.

Wire Gauges and Lengths

Table 1 outlines the VAV controller wiring details.

Table 1: SE-ZEC Controller Wiring (Part 1 of 2)

Terminal	Terminal Labels	Function and Electrical Ratings/ Requirements	Recommended Cable Type and Length
Analog Input (AI)	IN1	Provides an AI connection for discharge air (DA-T) sensor	0.6 mm (22 AWG) stranded, 2-wire twisted cable recommended for runs of <30 m (99 ft).
	IN2	Provides a BI connection for occupancy sensor dry contact (optional)	N/A
	IN3	Provides an A1 connection for supply air (SA-T)	0.6 mm (22 AWG) stranded, 2-wire twisted cable recommended for runs of <30 m (99 ft).

Table 1: SE-ZEC Controller Wiring (Part 2 of 2)

Terminal	Terminal Labels	Function and Electrical Ratings/ Requirements	Recommended Cable Type and Length
Binary Output (BO)	(Integrated)	Provides a BO connection for clockwise (CW) rotation to (Open) of actuator, 24 VAC triac output.	N/A
	(Integrated)	Provides a BO connection for counterclockwise (CCW) rotation to (Close) of actuator, 24 VAC triac output.	N/A
Sensor Actuator (SA) Bus Terminal Block	+, -, Com, Power	Sources 15 VDC power for SA Bus devices; supports 5 NS Series Network Zone Temperature Sensors and up to 5 NS Series Network CO_2 Sensors.	0.6 mm (22 AWG) stranded, 4-wire twisted cable recommended for runs of <30 m (99 ft)
FC Bus Terminal Block (SE-ZEC Controller510 model only)	+, -, Com, Shd	Provides communication network	0.65 mm (22 AWG) stranded, twisted shielded cable recommended for runs of 305 m (1,000 ft) maximum
24 VAC Power	Hot	AC supply input supply 20–30 VAC (Nominal 24 VAC)	0.8 mm to 1.5 mm (20 to 16 AWG) 2-wire
	Com	24 VAC power common	

Setup and Adjustments

Setting the Device Address

SE-ZEC Controllers are master devices on BACnet® MS/TP (SA or FC) Buses. Before operating field controllers on a Bus, you must set a valid and unique device address for each controller on the Bus.

You set a field controller's device address by setting the positions of the switches on the Device Address DIP switch block at the top of the controller. Device addresses 4 through 127 are the valid addresses for the SE-ZEC Controller.

Note: SE-ZEC Controllers ship with all address switches set to ON. Set a valid and unique device address on the field controller before applying power to the controller on the Bus.

The DIP switch block has eight switches numbered 128, 64, 32, 16, 8, 4, 2, and 1.

To set the device addresses on a ZEC field controller:

1. Set all of the switches on the field controller's device address DIP switch block (128 through 1) to OFF.
2. Set one or more of the seven address switches from 64 to 1 to ON, so that the sum of the switch numbers set to ON equals the intended device address.

   Set the highest number switch that is less than or equal to the intended device address to ON. Then continue setting lower numbered switches until the total equals the intended address.

   For example: If the intended device address is 21, set the switches so that 16+4+1=21.

   a. Set switch 16 to ON

   b. Set switch 4 to ON

   c. Set switch 1 to ON
3. Set a unique and sequential device address for each of the field controllers connected on the FC Bus, starting with device address 4.

   To ensure the best Bus performance, set sequential device addresses with no gaps in the device address range (4, 5, 6, and so on). The field controllers do not need to be physically connected on the Bus in their numerical device address order.
4. Write each field controller's device address on the white label below the DIP switch block on the controller's cover.

Refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034)* for more information on field controller device addresses and how to set them on MS/TP Bus devices.

Setting the heat application type

Use the MAP Gateway to change the heat application of the SE-ZEC Controller to Incremental, Staged, or Proportional SCR. For more information about the MAP Gateway, see the *Mobile Access Portal Gateway User's Guide (LIT-12011999).*

Note: After changing the heat application type, the SE-ZEC Controller goes offline for approximately 30 seconds to one minute.

1. Log in to the MAP Gateway.
2. Click **Devices.**
3. Select the **Device** that you want to change the heat application for.
4. Click **Application Type**.
5. Click the **Command** drop down and select **Set State**.
6. Click the **Value** drop down and select a heat application.
7. Click **Save.**

Accessories

Table 2 lists the SE-ZEC Controller accessories.

Table 2: Zone Controller Accessories

Product Code Number	Description
Zone Temperature Sensors (Hardwired)	
TE-68NT-0N00S	Wall temperature sensor, 1k ohm, nickel with temperature occupancy button.
TE-68NT-1N00S	Wall temperature sensor, 1k ohm, nickel with warmer/cooler (W/C) adjustment and temperature occupancy pushbutton.
Zone CO_2 Sensor	
NS-BCN7004-0	BACnet network CO_2 sensor designed to function directly with Johnson Controls ® BACnet MS/TP digital controllers, in a 80 x 120 mm (3 x 4.5 in.) enclosure with terminal block and modular jack wiring connections. Only addresses 212 to 214 are supported.
Network Sensors for Zone Temperature	
NS-BTB7003-0	Network sensor, 120 x 80 mm (4.7 x 3.1 in.), Johnson Controls logo, local setpoint, terminals
NS-BTB7003-2	Network sensor, 120 x 80 mm (4.7 x 3.1 in.), no logo, local setpoint, terminals
NS-BTN7003-0	Network sensor, 120 x 80 mm (4.7 x 3.1 in.), no logo, no setpoint, terminals
NS-BTN7003-2	Network sensor, 120 x 80 mm (4.7 x 3.1 in.), no logo, no setpoint, terminals.
NS-BTP7002-0	Network sensor, 120 x 80 mm (4.7 x 3.1 in.), Johnson Controls logo, warmer/cooler adjustment, terminals
NS-BTP7002-2	Network sensor, 120 x 80 mm (4.7 x 3.1 in.), no logo, warmer/cooler adjustment, terminals
Occupancy Lighting Switch	
NS-BCN7004	Occupancy sensing light switch for control of indoor incandescent and fluorescent lights
RIBU1C	Enclosed relay for OLS-2100-1 sensor
Balancing Tool	
NS-ATV7003-0	Handheld VAV balancing tool

Operation

The SE-ZEC Controller is pre-programmed for the VAV box operating sequence as ordered. You do not need to program the controller; however, you need to provide configuration information using either the Balancing Sensor or the Home screen on the MAP Gateway.

Occupancy Sensor

All zone controllers support an occupancy sensor. The occupancy sensor enables the controller to switch to standby mode from occupied mode when local activity is absent during a set time period in a normally occupied zone. When in standby mode, the zone controller uses standby temperature setpoints that are higher and lower than the occupied cooling and occupied heating temperature setpoints, respectively. These standby setpoints help save energy by reducing the demand for heating and cooling in an unoccupied zone. For VAV zone dampers, the sensor uses unoccupied flow setpoints in addition to standby temperature setpoints. You can enable the occupancy sensor in the Home screen from the MAP Gateway. You can set occupancy sensitivity and time delay until standby locally at the sensor.

Troubleshooting

Use the following information to troubleshoot the SE-ZEC Controllers.

Power Status LED

A green LED shows the power supply status to the VAV zone damper controller. See Table 3 for a description of the modes.

Table 3: Status LED for Power (PWR)

Mode	Description
Off	No power
On	Power is supplied by primary voltage (normal operation)

Communication Bus Problems

Several factors may influence the behavior of the FC Communication Bus.

I/O Wiring

The SE-ZEC Controller must be wired properly. If the SE-ZEC Controller is wired incorrectly, communication problems may occur. These problems include devices going online and offline, or devices not coming online at all.

Duplicate Addresses

Two or more devices on a communication Bus cannot have the same address. Two controllers on the FC Communication Bus cannot both have an address of 18, for example. If two devices on the same Bus have the same address, performance can degrade or serious communication problems may occur. These problems include the devices not coming online and all communication stopping completely.

Check for duplicate addresses in the following ways:

- If a specific device is not communicating, remove the device with communication problems and check if device address remains online at the MAP Gateway to determine if the device address remains online.
- If the Bus communication problems are severe and no communication is present, or you cannot determine where communication is unreliable, partition (disconnect and isolate a portion of the Bus for testing purposes) and test the Bus portion connected to the Zone Coordinator.

Correcting Physical Communication Bus Problems

The communication Bus is subject to a number of physical factors that can affect performance. Consider the following list of common physical problems that affect the communications Bus:

- Check status LED to verify power at the controller
- Check wires
  - Verify that the wire is a 0.6 mm (22 AWG) three-conductor, twisted, shielded cable.

Technical Specifications

Product Code Number	**SE-ZEC5xx-1**
Power Supply Requirement	20–30 VAC at 50 to 60 Hz, Class 2 power supply or Safety Extra-Low Voltage (SELV) at 50/60 Hz (20 VAC minimum)
Power Consumption	10 VA, 14 VA maximum
Ambient Conditions	Ambient Operating Conditions: 0 to 50°C (32 to 122°F); 10 to 90% RH condensing Ambient Storage Conditions: -40 to 85°C (-40 to 185°F); 10 to 90% RH
Processor	Renesas® RX630
Memory	1.5 MB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 512k Synchronous Random Access Memory (SRAM) for operations data dynamic memory
Mounting	On a flat surface with screws
Dimensions (Height x Width x Depth)	140 x 140 x 25 mm (5-1/2 x 5-1/2 x 1 in.)
Shipping Weight	0.14 kg (0.30 lb)
Compliance	**United States** UL Listed, File E107041, CCN PAZX, UL 916 FCC Compliant to CFR47, Part 15, Subpart B, Class A
	Canada UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada Compliant, ICES-003

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