ECB-VAV

Figure 1: ECB-VAV Controller

Product Description

This document describes the hardware installation procedures for the ECB-VAV Single Duct Variable Air Volume Controllers.

The Distech Controls Variable Air Volume product line is designed to control and monitor various types of HVAC equipment such as baseboards, single and multi-stage duct heaters, fans, valves, lights, etc. When connected to a Wireless Receiver, this product line can be used with a variety of wireless battery-less sensors and switches.

The ECB-VAV model supports a range of Smart Room Control modules that expand the controller's range of control to include lighting and shades/sun-blinds with the ECx-Light and ECx-Blind series control modules. This controller also supports the EC-Multi-Sensor ceiling-mounted sensor and its associated EC-Remote remote control.

Each controller uses the BACnet® MS/TP LAN communication protocol and is BTL®-Listed as BACnet Application Specific Controllers (B-ASC).

General Installation Requirements

For proper installation and subsequent operation of the device, pay special attention to the following recommendations:

- ☐ It is recommended that the controller(s) be kept at room temperature for at least 24 hours before installation to allow any condensation that may have accumulated due to low temperature during shipping/storage to evaporate.
- ☐ Upon unpacking, inspect the contents of the carton for shipping damages. **Do not install a damaged device.**
- ☐ The device is designed to operate under environmental conditions that are specified in its datasheet.
- ☐ Ensure proper ventilation of the device and avoid areas where corroding, deteriorating or explosive vapors, fumes or gases may be present.
- ☐ Allow for proper clearance around the device's enclosure and wiring terminals to provide easy access for hardware configuration and maintenance.
- ☐ When installing in an enclosure, select one that provides sufficient surface area to dissipate any heat generated by the device and by any other devices installed in the enclosure. A metal enclosure is preferred. If necessary, provide active cooling for the enclosure.
- ☐ The device's datasheet specifies the power consumption (amount of heat generated), the operating temperature range, and other environmental conditions the device is designed to operate under.
- ☐ Ensure that all equipment is installed according to local, regional, and national regulations.
- ☐ Do not drop the device or subject it to physical shock.
- ☐ If the device is used and/or installed in a manner not specified by Distech Controls, the functionality and the protection provided by the device may be impaired.

Any type of modification to any Distech Controls product will void the product's warranty

Before installation of the Wireless Receiver, verify that local communication regulations allow the installation of wireless devices and available frequencies to be supported in your area. Refer to the Open-to-Wireless™ Application Guide for more information.

Take reasonable precautions to prevent electrostatic discharge to the device when installing, servicing or during operation. Discharge accumulated static electricity by touching one's hand to a well-grounded object before working with the device.

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Device Markings (Symbols)

Certain markings (symbols) can be found on the controller and are defined as follows:

Symbol	Description
CE	CE marking: the device conforms to the requirements of applicable EC directives.
UKCA	UKCA marking: the device conforms to the requirements of applicable Great Britain regulations.
	Products must be disposed of at the end of their useful life according to local regulations.
	Read the Hardware Installation Guide for more information.
c UL us LISTED	UL marking: conforms to the requirements of the UL certification.
FC	FCC marking: This device complies with FCC rules part 15, subpart B, class B.
	Warning Symbol: Significant information required. Refer to the Hardware Installation Guide.
	Alternating Current
	Direct Current

General Wiring Recommendations

Risk of Electric Shock: Turn off power before any kind of servicing to avoid electric shock.

- ☐ All wiring must comply with electrical wiring diagrams as well as national and local electrical codes.
- ☐ To connect the wiring to a device, use the terminal connectors. Use a small flat screwdriver to tighten the terminal connector screws once the wires have been inserted (strip length: 0.25'' (6 mm), maximum tightening torque 0,4 Nm (3.45 in-lb)).
- ☐ Comply with all network and power supply guidelines outlined in the Network Guide.
- ☐ Keep wiring separate according to their function and purpose to avoid any ambient noise transmission to other wires. Use strapping to keep these wires separated. For example, keep power, hazardous voltage, SELV, PELV, network, and input wiring separate from each other.
- ☐ Power cables must be between 18 and 14 gauge (0.82 to 2.1mm^2 cross-sectional area). When connecting one wire to a controller's terminal block clamping cage (pole), the wire must be between 22 and 14 gauge (0.33 and 2.1mm^2 cross-sectional area). When connecting two wires to a controller's terminal block clamping cage, both wires must be the same thickness, both wires must be between 22 and 16 gauge (0.33 to 1.3mm^2 cross-sectional area), and both wires must be of the same type (solid or stranded). Twist the wires together and insert then into the controller's terminal block clamping cage. For any other wiring combination (mixed wire thickness, mixed solid and stranded conductors, more than three wires, wire thickness is out of range), twist the wires together and use a wire nut and a pig tail to connect to the controller's terminal block connector as show below.

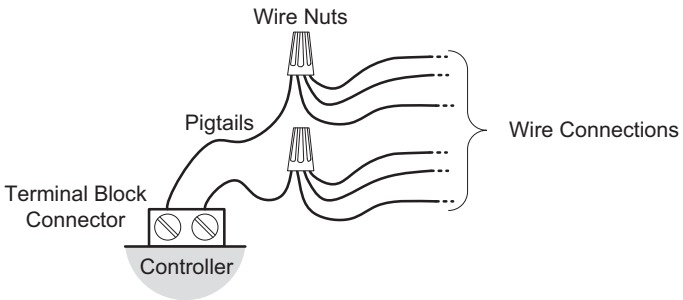


Figure 2: Using a Wire Nut and Pigtail to Wire the Controller

- ☐ The board connectors accept wires or flat cables ranging from 22 to 14AWG (0.644 to 1.630mm diameter) per pole. However, power cables must be between 18 and 14AWG (1.024 to 1.630mm diameter).
- ☐ Keep all wires away from high speed data transmission cables (for example, Ethernet, etc.).
- ☐ Keep input and output wiring in conduits, trays or close to the building frame if possible.
- ☐ Always use unshielded cabling with a minimum Category 5 (CAT5) cable for ethernet communications.
- ☐ Do not connect the universal inputs, analog/digital outputs or common terminals to earth or chassis ground (unless stated otherwise and/or using shielded Ethernet cable).

Controller Dimensions & Components

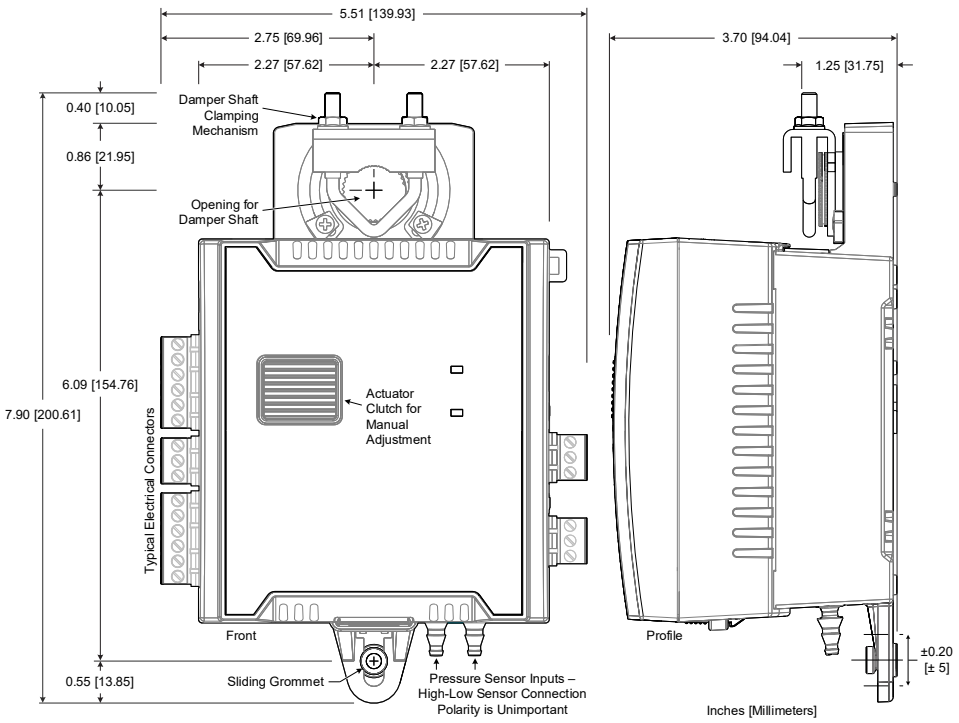


Figure 3: ECB-VAV Dimensions and Components

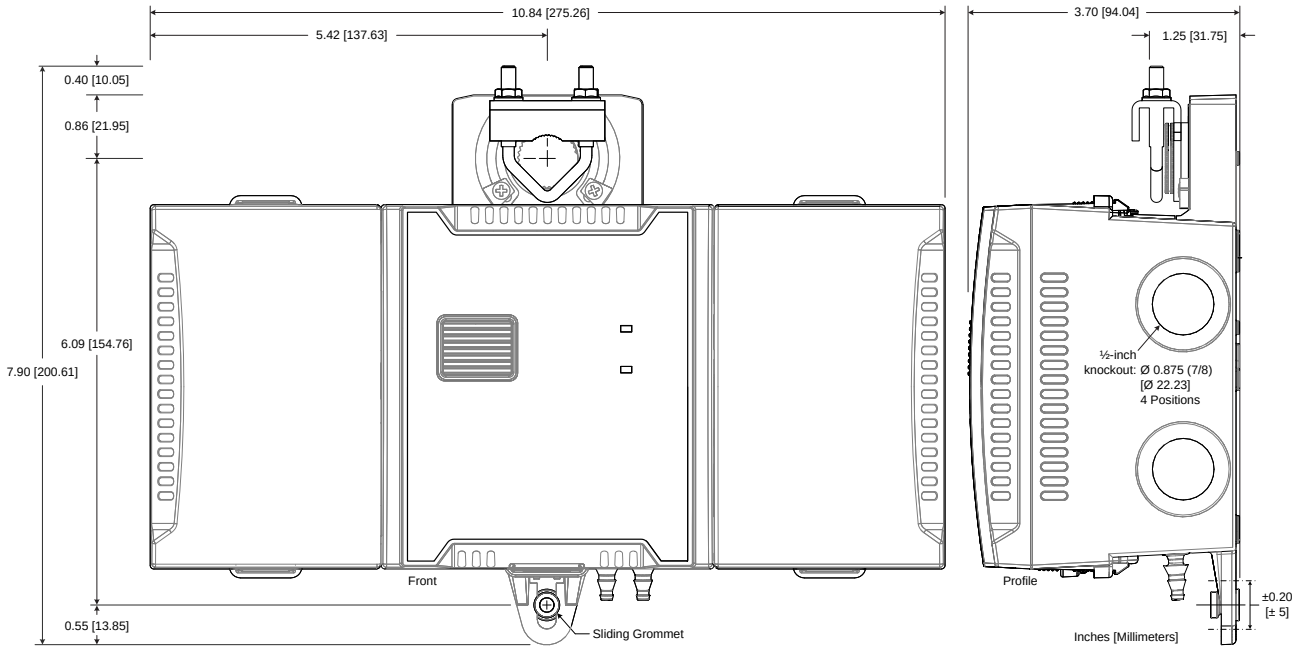


Figure 4: VAV Controller with Terminal Covers Dimensions

DIP Switch Identification and Configuration

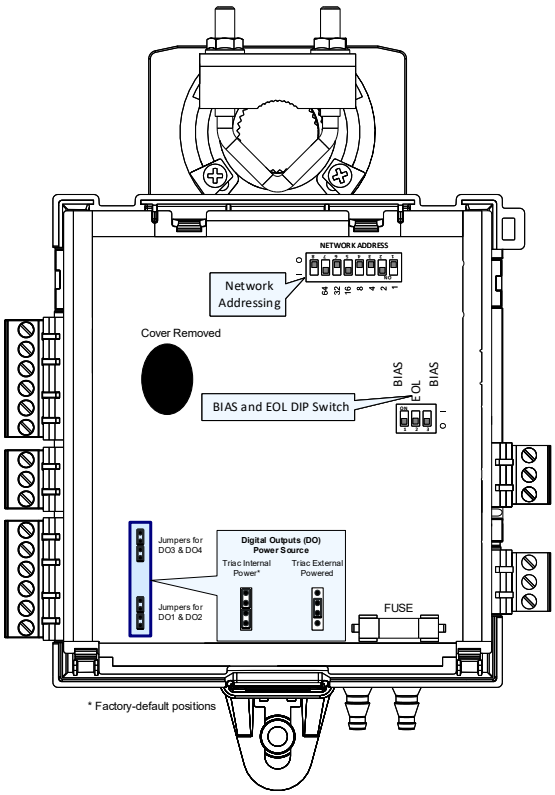


Figure 5: ECB-VAV (cover removed)

Mounting Instructions

Each controller is specially designed for easy installation either directly on an air duct or in a panel by using the integrated mounting collar and the screw that is provided with the controller. This mounting arrangement opposes the torque applied to the damper shaft.

Mounting Position

To prevent condensation on the VAV box's damper shaft from entering the controller's electronics, the controller's mounting orientation should be any position above the damper shaft (between 0 and 180°) so that any condensation from the damper shaft will fall away from the controller's electronics. Further countermeasures may be required in some installations. This is important in hot, humid climates where the VAV box is located near exterior doors or loading bays that may be blocked open or when the VAV box air supply is below 50°F (10°C).

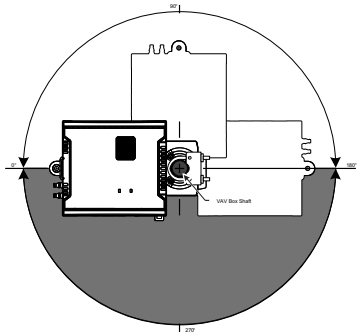


Figure 6: Recommended Mounting Position Angle Range

Mounting Procedure for Terminal Covers

Terminal covers can be added to any VAV controller to protect inadvertent contact with the controller's electrical connections.

☐ A terminal cover kit can be added to both sides of the controller.

Controllers with terminal block covers can only be mounted on a flat surface that is sufficiently large to provide space around the installation. In this scenario, conductors must be made inaccessible and wiring must comply with local wiring regulations and methods appropriate for fixed equipment installation in a building (the use of cable conduits and trunking for example).

1. Separate the cover from the base of the terminal covers.
2. Attach the base of the terminal cover(s) to the underside of the VAV controller's body with the tabs shown in Figure 7 .
3. Install the VAV controller according to the next procedure, VAV Controller Mounting Procedure.

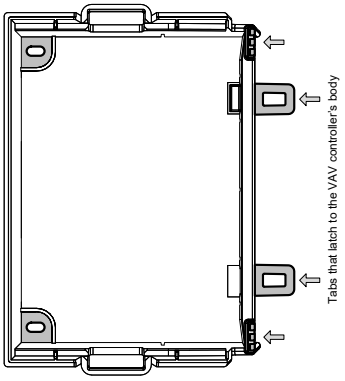


Figure 7: Terminal Cover Attachment Tabs

4. Connect and wire the controller according to the procedures shown later in this document.

VAV Controller Mounting Procedure

Mount the controller as follows:

1. Configure the controller's DIP switches. See Figure 5.
2. The VAV controller comes with the sliding grommet pre-installed.
3. Orient the controller into position on to the damper shaft so that wiring connections are easily accessible. The controller must be fitted onto the shaft such that the base of the controller is parallel to the VAV box (perpendicular to the damper shaft). If the damper shaft has an external bushing that prevents the controller from being mounted flush to the side of the VAV box, use a spacer of the same thickness to compensate and to ensure the controller is at a right-angle to the shaft to prevent binding.
4. Screw the controller onto the VAV box through the controller's Sliding Grommet. The sliding grommet allows the controller to move back and forth when the VAV box's damper shaft is off center. Ensure to center the grommet along its travel range and ensure that the screw enters the VAV box at a right angle. Using a power screwdriver with a 6" extension (Figure 8), attach the controller to the VAV box with the 1" [25mm] screw provided with the controller (Figure 9) through the controller's sliding grommet as shown in Figure 11. Otherwise, mark the positions for the screw on the VAV box with a punch and then drill a hole the into the VAV box. Then attach the controller to the VAV box with the 1" [25mm] screw provided with the controller.

Figure 8: Screwdriver Shaft Extension

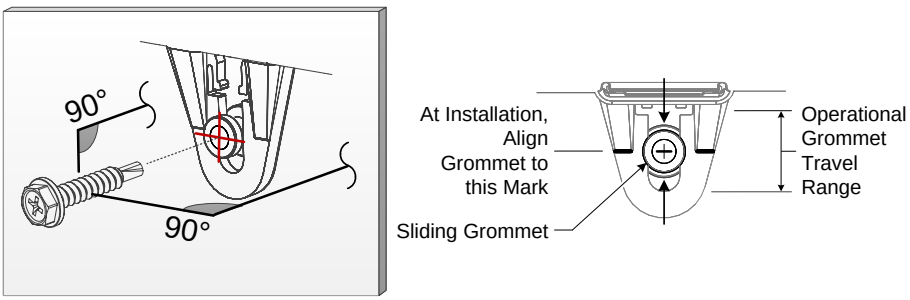


Figure 9: Supplied Mounting Hardware – Drive the screw at a right-angle to the VAV Box

Avoid over-tightening the screw so as to not strip the threads. Make sure the screw does not pierce too far into the VAV box and interfere with damper blade movement.

5. Find the damper position by the marking typically found on the end of the damper shaft.

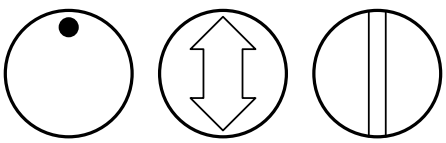


Figure 10: Typical Damper Shaft End Marking

6. Determine the direction required to close the damper: Clockwise (CW) or Counterclockwise (CCW). Turn the damper shaft with a pair of pliers to fully close the damper for 90° boxes or fully open the damper for 45° or 60° boxes
7. Press and hold down the *Actuator Clutch for Manual Adjustment* button (see Figure 3), and turn the controller's shaft coupler until it touches the mechanical end-stop to either the fully closed position (90° boxes) or the fully open position (45° and 60° boxes).

8. For 90° VAV boxes: If the damper closes CCW, turn the coupler to the CCW mechanical stop limit. If the damper closes CW, turn the coupler to the CW mechanical stop limit. The open mechanical stop is factory preset for 90° boxes.
   For 45° and 60° VAV boxes: The mechanical stops must be set for both the fully closed and fully open damper positions. By installing the controller at the fully open position, the controller provides the open mechanical stop for 45° and 60° boxes. The closed damper seal provides the fully closed stop.
9. Tighten the U-Bolt clamp on to the damper shaft using an 5/16 in (8 mm) wrench or socket. Tighten the bolts between 100 and 130 lb-in (11 and 15 N-m).
10. Test for free damper shaft movement: Press and hold down the *Actuator Clutch For Manual Adjustment* button and manually turn the actuator coupling to be certain that the actuator can rotate from full closed to full open positions without binding.
11. Connect the VAV box's flow sensor tubing to the controller's *Pressure Sensor Inputs*. The connection is polarity free (high-low ports are interchangeable). Create a condensation trap in the pneumatic tubing by forming it into a vertical loop.
12. Finalize the installation by rotating the damper to the full open position.

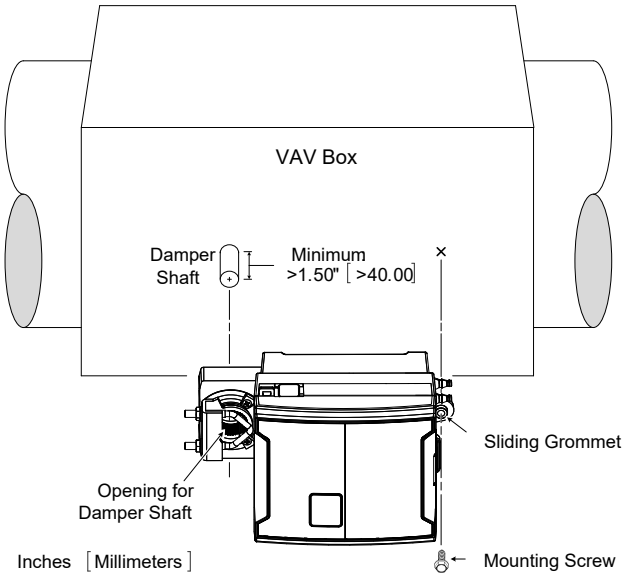


Figure 11: Standard Mounting Method: Mounting a controller on a damper shaft

Power Wiring

Voltage: 24VAC/DC; ± 15%, Class 2

This is a Class 2 Product. Use a Class 2 transformer only (rated at 100VA or less at 24VAC) to power the controller(s).

The Network Guide provides extensive information and requirements for powering a controller that uses a BACnet network for communications. It can be downloaded from Distech Controls' Documentation and Resources Portal.

It is recommended to wire only one controller per 24VAC transformer.

When calculating a controller's power consumption to size the 24VAC transformer, you must also add the external loads the controller is going to supply, including the power consumption of any connected subnet module (for example, Allure™ Series Communicating Sensors).

If only one 24VAC transformer is available, determine the maximum number of daisy-chained VAVs that can be supplied on a single power cable supplied by a 100 VA transformer, according to the controller's expected power consumption including external loads, the cable's wire gauge, and the total cable length from the following figure. Any installation condition that is outside of the parameters of the following graph should be avoided.

To maximize daisy-chaining performance, the transformer should be installed as close as possible to the first VAV. If this is not possible, then use 14 AWG wire to power the first VAV which can help reduce a voltage drop at the end of the daisy-chain.

The recommended minimum peak input voltage is 27.2V_p

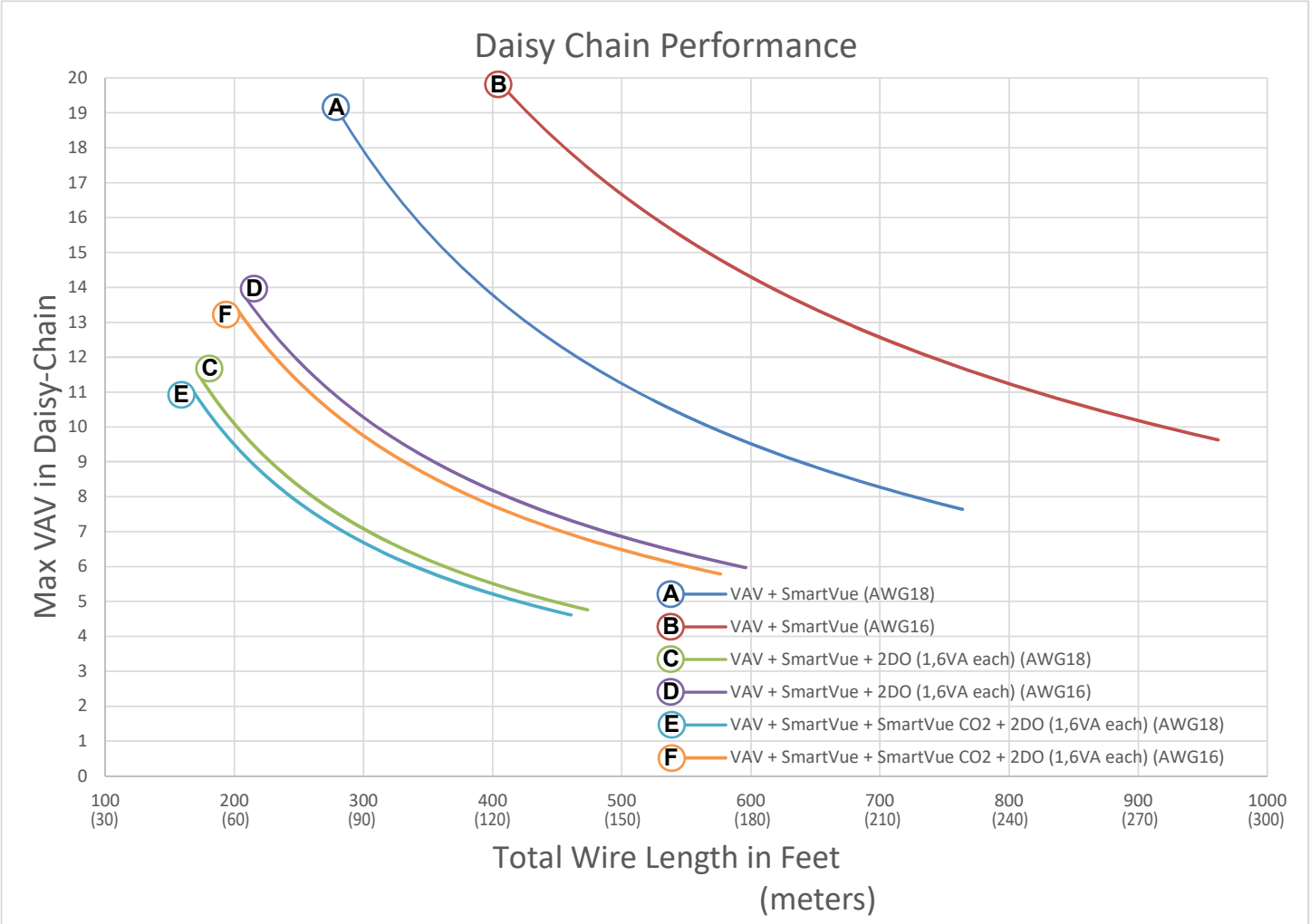


Figure 12: Maximum Number of VAV Devices on a Daisy-Chain at Evenly Spaced Intervals

Laboratory testing conditions for the above graph are as follows:

- ☐ Distance between each VAV is evenly spaced along the entire wire length
- ☐ Transformer specification: 100VA (120/24VAC)
- ☐ Tested at room temperature with low voltage line conditions: 108VAC (50Hz)

Daisy-Chain Wiring

Use an external fuse on the 24VAC side (secondary side) of the transformer, as shown below, to protect all controllers against power line spikes.

Maintain consistent polarity when connecting controllers and devices to the transformer. One terminal on the secondary side of the transformer must be connected to the building's ground. All 24V COM terminals of all controllers and peripherals throughout the BACnet MS/TP network must be connected to the grounded transformer terminal as shown below. This ensures that the 24V COM terminals of all devices connected to any BACnet MS/TP bus in the building are at the same potential.

A mechanical ground is unacceptable: Do not use a pipe, conduit, or duct work for a ground. The power supply must have a dedicated ground wire that comes from the main electrical supply panel.

Failure to maintain consistent polarity throughout the entire network will result in a short circuit and/or damage to the controller!
Connecting a peripheral or another controller to the same transformer without maintaining polarity between these devices will cause a short circuit.

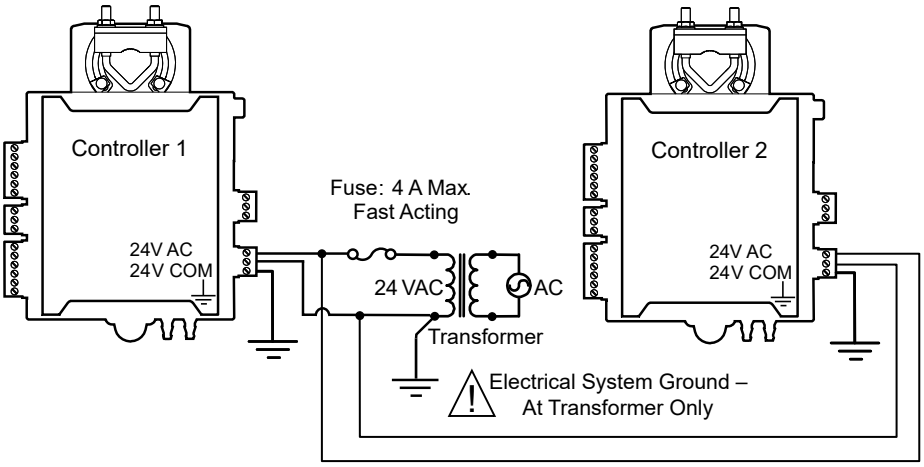


Figure 13: Power Wiring

The following diagram shows the recommended wiring of the ECB-VAV Controller with and without a 3-wire peripheral. This configuration applies either to a daisy-chain configuration or configuration with separate transformers. Note that internally, the COM terminals are no longer connected to the 24VAC COM terminal but rather to the ground terminal.

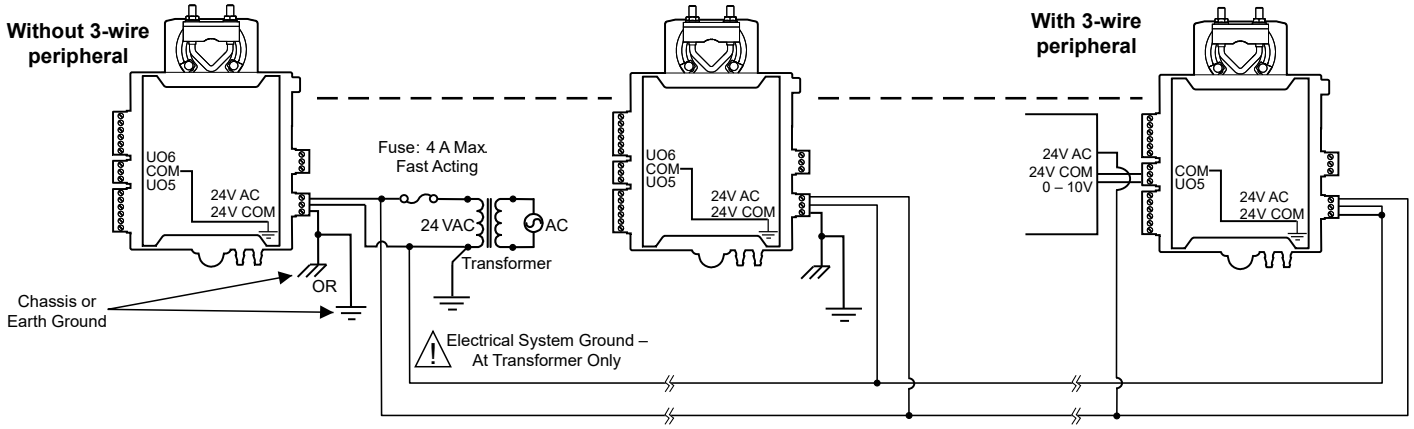


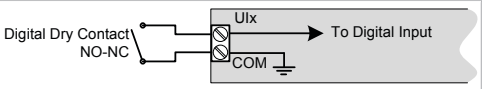
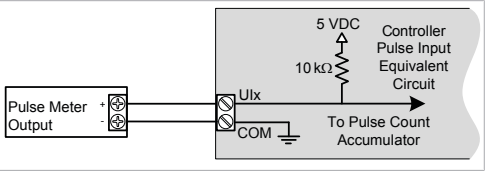
Figure 14: ECB-VAV Power Wiring with and Without 3-Wire Peripherals

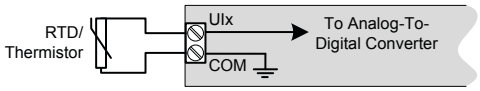
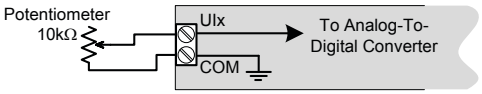
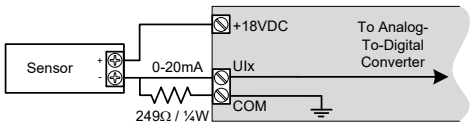
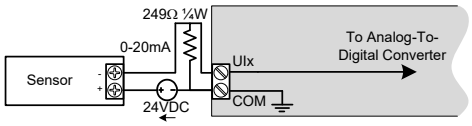
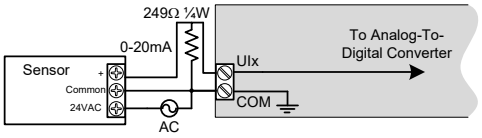
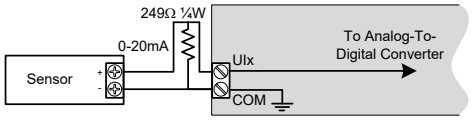
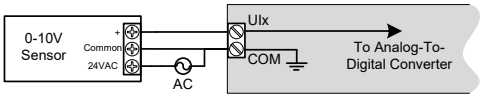
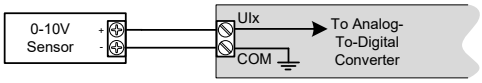
Input Wiring

Input options must be properly configured in EC-*gfx*Program to ensure correct input readings. The table below shows the controller's available universal input designation. For terminal block connector wiring best practices, see General Wiring Recommendations [pg. 2]. Inputs can be connected as follows.

Before connecting a sensor to the controller, refer to the installation guide of the equipment manufacturer.

- ☐ For a wire length less than 75' (23m), either a shielded or unshielded 18AWG wire may be used.
- ☐ For a wire up to 200' (61m) long, a shielded 18AWG wire is recommended.
- ☐ The shield of the wire should be grounded on the controller side only and the shield length should be kept as short as possible.

Sensor Input Type	Input Designation	Input Connection Diagram
☐ Dry Contact input. ☐ Pulsed input.	UIx	
☐ Pulse input used with a 2-wire sensor powered by its own power source – this input supports a maximum input frequency of 1Hz (500ms minimum ON/OFF). Connect the pulse input according to the figure for a pulse meter that can pull-down a +5VDC supply with a 10KΩ pull-up resistor (Internal supply type).	UIx	

Sensor Input Type	Input Designation	Input Connection Diagram
☐ RTD input (for example, 1000Ω). ☐ Thermistor Input (for example, 10kΩ type II and III).	UIx	
☐ Resistive input, maximum 350kΩ (for example, use with 10kΩ and 100kΩ potentiometers).	UIx	
☐ 0 to 20mA input used with a 2-wire, 0 to 20mA sensor powered by the controller's internal 18VDC power supply. ☐ An on-board 18VDC power supply can provide the necessary power for 20mA current loop sensor operation. ☐ Connect a 249Ω resistor between the UIx and COM terminals.	UIx	
☐ 0 to 20mA input used with a 2-wire, 0 to 20mA sensor powered by an external 24 AC/DC power supply. ☐ Connect a 249Ω resistor between the UIx and COM terminals.	UIx	
☐ 0 to 20mA input used with a 3-wire, 0 to 20mA sensor powered by an external 24 AC/DC power supply. ☐ Connect a 249Ω resistor between the UIx and COM terminals. When daisy-chaining two or more controllers on one transformer, wire the controller according to Figure 14.	UIx	
☐ 0 to 20mA input used with a sensor powered by its own power source. ☐ Connect a 249Ω resistor between the UIx and COM terminals.	UIx	
☐ Voltage input used with a 3-wire 0 to 10VDC or 0 to 5VDC sensor powered by an external 24 AC/DC power supply. When daisy-chaining two or more controllers on one transformer, wire the controller according to Figure 14.	UIx	
☐ Voltage input used with a 0 to 10VDC or 0 to 5VDC sensor powered by its own power source.	UIx	

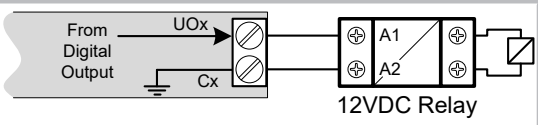
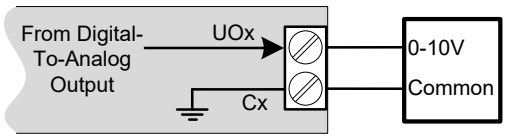
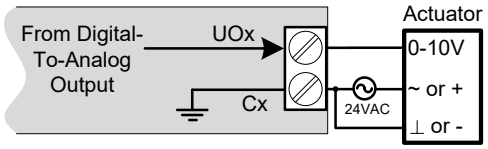
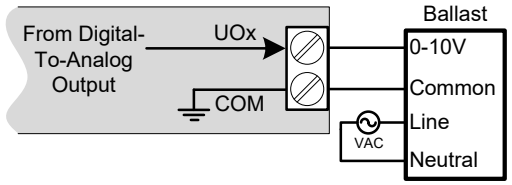
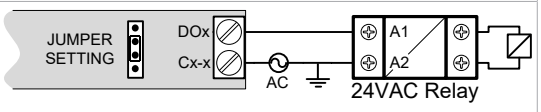
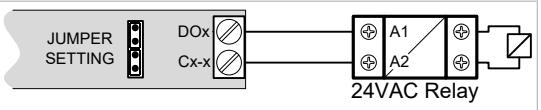
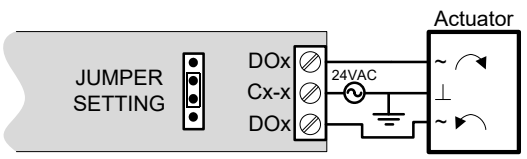
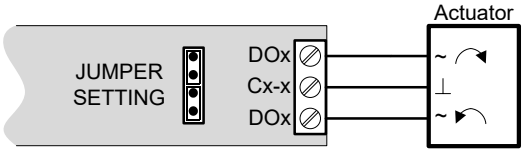
Output Wiring

Output options must be properly configured in EC-*gfx*Program to ensure correct output values. For terminal block connector wiring best practices, see General Wiring Recommendations [pg. 2] and Figure 2.

Outputs can be connected as follows.

Before connecting an output device (actuator, relay, etc.) to the controller, refer to the datasheet and installation guide of the equipment manufacturer.

- ☐ For a wire length less than 75' (23m) long, either a shielded or unshielded 18AWG wire may be used.
- ☐ For a wire length up to 200' (61m) long, a shielded 18AWG wire is recommended.
- ☐ The shield of the wire should be grounded on the controller side and the shield length should be kept as short as possible.

Control Output Type	Output Designation	Output Connection Diagram
☐ Discrete 0 or 12VDC digital, Pulse, or PWM output controlling a 12VDC relay.	UOx	
☐ 0 to 10VDC voltage output.	UOx	
☐ 0 to 10VDC voltage output controlling an analog actuator that is powered by an external 24VAC power source. ☐ This output can source up to 20 mA	UOx	
☐ 1 to 10VDC voltage output controlling dimmable lighting ballasts that require a current sink output (pull-down). ☐ This output can sink up to 2.5mA.	UOx	
☐ Discrete digital, Pulse, or PWM output: 24VAC externally-powered triac controlling a relay[1]. ☐ Set the jumper according to Figure 5.	DOx	
☐ Discrete digital, Pulse, or PWM output: 24VAC internally-powered triac controlling a relay[1,2] Set the jumper according to Figure 5.	DOx	
☐ 24VAC externally-powered triac output controlling a floating actuator[1]. ☐ Set the jumper according to Figure 5.	DOx	
☐ 24VAC internally-powered triac output controlling a floating actuator[1]. ☐ Set the jumper according to Figure 5.	DOx	

1. Maximum output current for all triac outputs is 0.5A continuous or 1A @ 15% duty cycle for a 10-minute period.

Subnet Wiring

The subnet is used to connect a range of Allure Series Communicating Sensors:

- The Allure EC-Smart-Vue Series sensor is a communicating room temperature sensor with backlit display graphical menus and VAV balancing capabilities.
- The Allure EC-Smart-Comfort and Allure EC-Smart-Air Communicating Sensors are a range of communicating room temperature sensors.

Connect the Allure Series to the controller's **Subnet Port** with a standard Category 5e Ethernet patch cable fitted with RJ-45 connectors. Refer to the Network Guide for extensive information and requirements for the connection of the Allure Series. It contains information about network topology and length, cable type, setting the Subnet ID, etc. It can be downloaded from the Distech Controls' Documentation and Resources Portal. See also the Hardware Installation Guide supplied with the Allure Series.

These controller models support the connection of EC-Multi-Sensor series, ECx-Light series, and ECx-Blind series to the **Subnet Port** as part of the Smart Room Control solution (see the controller's datasheet for more information). See the room device calculator spreadsheet, available for download from our Documentation and Resources Portal, to know the permitted quantities: **VAV-Smart Room Control Device Calculator.xlsm**

If you make your own patch cable, see the Allure Series Hardware Installation Guide.

Protect the controller's connector from being pulled on when a cable to the Allure Series is connected. Create a strain-relief by looping the cable and attaching it to a solid object with a nylon tie so that a tug on the cable will not pull out the connector on the controller.

Communications Wiring

The Network Guide provides extensive information and requirements to implement a BACnet MS/TP network. It contains information about network and sub network length, cable type, device addressing, etc. It can be downloaded from the Distech Controls' Documentation and Resources Portal. For optimal performance, use Distech Controls 24 AWG (0.65 mm) stranded, twisted pair shielded cable or refer to the Network Guide for cable specification. The BACnet MS/TP communication wire is polarity sensitive and the only acceptable topology is to daisy-chain the cable from one controller to the next.

- The first and last daisy-chained BACnet MS/TP device must have its EOL resistors enabled / installed. All other devices must have their EOL resistor disabled (default factory setting).
- When the BACnet MS/TP data bus is connected to a following device, twist data bus shields together or connect directly to the shield terminal.
- Isolate all shields with electrical tape so there is no exposed metal that can touch ground or other conductors.
- The shield of the data bus must be connected to the electrical system ground at only one point – usually at one end of the bus as shown below.
- Connect no more than 50 devices to a BACnet MS/TP data bus.

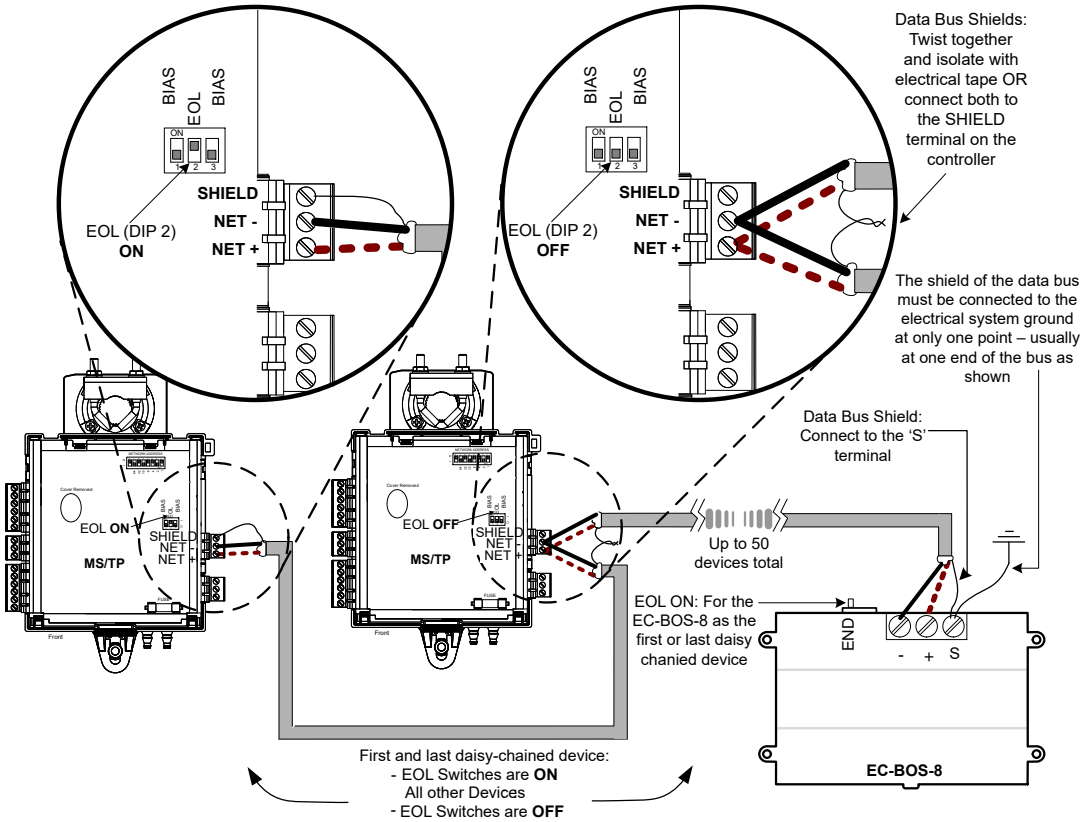


Figure 15: BACnet MS/TP Communications Wiring

BIAS DIP switches must be off unless they are required by another controller other than an ECB-VAV that is on the same daisy-chain. In the case where there is another device other than a ECB-VAV on the same daisy-chain, then both BIAS DIP switches must be in the ON position on no more than ONE controller on the line. Typically the most easily accessible controller will have its BIAS DIP switches in the ON position such as the first VAV, last VAV, or the supervisor (if equipped).

If inserting multiple wires in the terminals, ensure to properly twist wires together prior to inserting them into the terminal connectors.

For more information and detailed explanations on network topology and wire length restrictions, refer to the Network Guide, which can be downloaded from the Distech Controls' Documentation and Resources Portal.

Device Addressing

The Network Guide provides extensive information and requirements to implement a BACnet MS/TP network. It contains information about network planning and MAC Address numbering schemes. It can be downloaded from the Distech Controls' Documentation and Resources Portal.

The MAC Address must be set according to your network planning document by setting the DIP switch located under the cover or when this DIP switch is set to 0 (all off), the MAC address can be set by connecting an Allure EC-Smart-Vue Series Communicating Sensor to the controller as shown in Step 5 of *Setting the Communicating Sensor Subnet ID* in the following section. An example of how to set the device's MAC Address DIP switch is shown below.

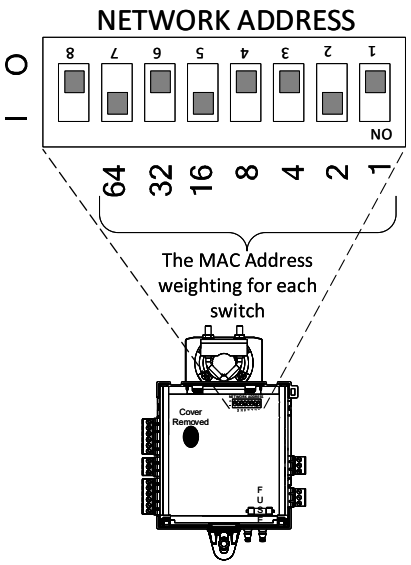


Figure 16: MAC Address DIP Switch Set to 82

DIP Switch number 8 must be set to OFF at all times.

The address is the sum of the numbers set to ON. For example, if the second (2), fifth (16), and seventh (64) DIP switches are set to ON, the device MAC address is 82 (2 + 16 + 64). Only addresses from 1 to 127 are recommended to be used.

The controller must be power cycled after the MAC address DIP switch has been changed. The device instance (DevID) is automatically configured when setting the MAC Address to prevent network address conflict. The following formula is used to determine the device instance:

```
DevID = 364 * 1000 + MAC
```

For example:

```
MAC: 37
DevID = 364 * 1000 + 37 = 364037
```

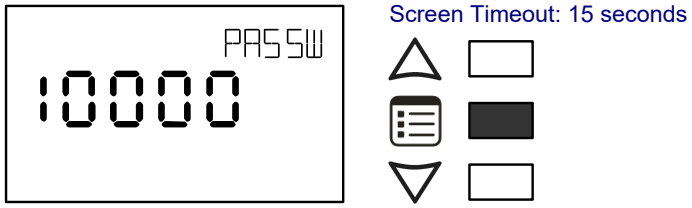
The Device Instance can be changed once the controller has been commissioned through the network management software interface.

Setting the Communicating Sensor Subnet ID

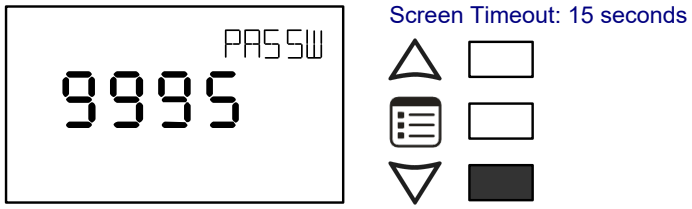
ECB Series controllers can be commissioned with an Allure EC-Smart-Vue Series Communicating Sensor by connecting it to the controller as shown in Figure 14.

The default Subnet ID for an Allure EC-Smart-Vue Series Communicating Sensor is 1. To commission an ECB Series controller, the sensor's Subnet ID must be set to 1. If the sensor's Subnet ID has been set to another value (for example, the display flashes error code 1 with the Bell icon when the sensor is connected to a controller for commissioning), change the Subnet ID to 1 as follows:

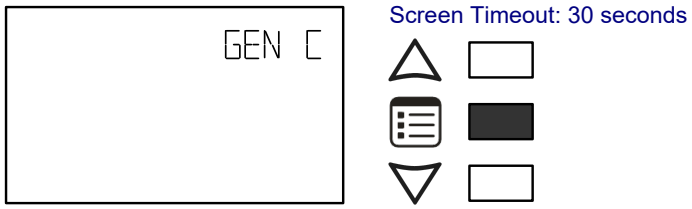
1. Connect an an Allure EC-Smart-Vue Series Communicating Sensor to the controller with a Cat 5e patch cable. Wait for the Bell icon and the number 1 to flash on the display.
2. Press and hold the Menu button for 5 seconds to enter the password menu. 10000 is shown on the display.



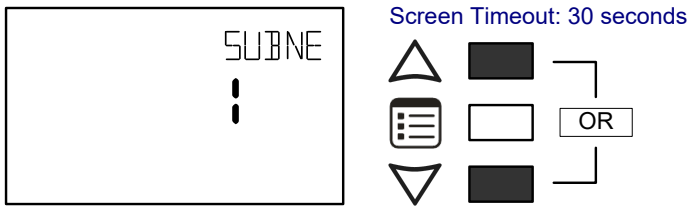
3. Press the down button to set the number to 9995 (this is the default password).



4. Press the Menu button to submit the password. Upon submitting the password, the GEN CFG menu appears on the display.



5. Press the down button once to enter the **GEN CFG** submenu.
6. Press the Menu button several times until SUBNET ID appears on the display. The current controller's Subnet ID is shown.



7. Use the up and down buttons to set the controller's Subnet ID to **1**. *Tip*: Hold down either the up or down button to fast-advance the display value.
8. Press the Menu button once.
9. Press and hold the Menu button for 5 seconds to exit the configuration menu.

The an Allure EC-Smart-Vue Series Communicating Sensor can now be used to go from one ECB series controller to the next for commissioning purposes.

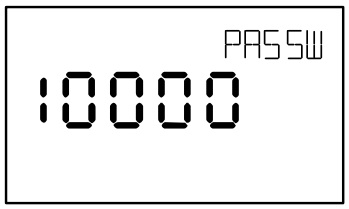
Commissioning ECB-Series Controllers

When using an Allure EC-Smart-Vue Series Communicating Sensor for commissioning ECB Series controllers (the DIP switch located on the faceplate is set to 0 (all off) and before code is downloaded to the controller from EC-*gfx*Program), connect an Allure EC-Smart-Vue Series Communicating Sensor to the controller with its Subnet ID set to 1.

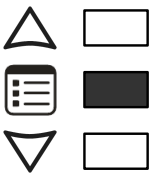
During commissioning, the sensor is used to set the controller's BACnet® MAC Address and to perform application selection if needed. Applications are pre-loaded programs that enable the ECB-VAV to control a typical VAV box.

Set the connected controller's MAC Address as follows:

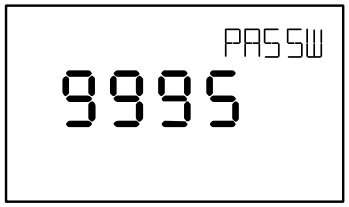
1. Connect an Allure EC-Smart-Vue Series Communicating Sensor to the controller with a Cat 5e patch cable. Wait for the display to show the room temperature.
2. Press and hold the Menu button for 5 seconds to enter the password menu. 10000 is shown on the display.



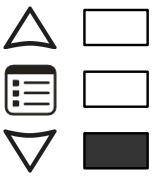
Screen Timeout: 15 seconds



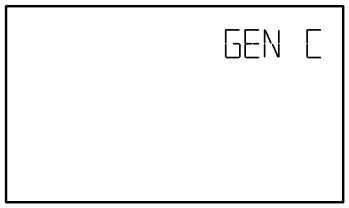
3. Use the down button to set the number to 9995 (this is the default password).



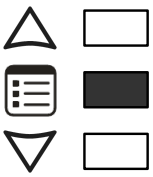
Screen Timeout: 15 seconds



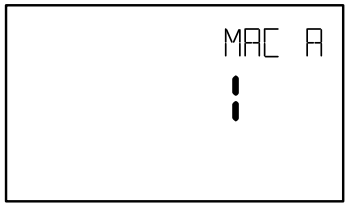
4. Press the **Menu** button to submit the password. Upon submitting the password, the **GEN CFG** menu appears on the display.



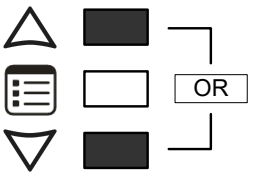
Screen Timeout: 30 seconds



5. Press the down button once to enter the **GEN CFG** submenu. The **MAC ADDRESS** menu is shown with the current controller's BACnet MAC Address.



Screen Timeout: 30 seconds



6. Use the up and down buttons to set the controller's MAC Address. Only addresses from 1 to 127 are recommended to be used.
7. Press the Menu button once to apply the value.
8. Press and hold the Menu button for 5 seconds to exit the configuration menu.

Once the controller's network is operational, the controller can be programmed with EC-*gfx*Program. For each Allure EC-Smart-Vue Series Communicating Sensor, set its Subnet ID number to the block number of its associated ComSensor block in EC-*gfx*Program. This is done in the sensor's **GEN CFG** menu under **SUBNET ID**.

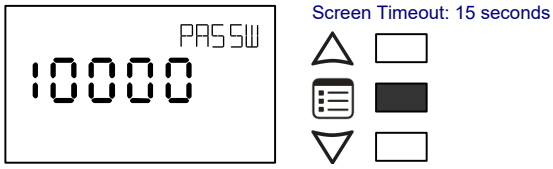
Setting the BAUD Rate (optional – ECB series controllers only)

By default, the BAUD rate for the controller is set to automatically detect the current communication BAUD rate of the connected BACnet MS/TP network (AUTO). This is the preferred setting for a controller. However, at least one controller on the BACnet MS/TP network data bus must have its BAUD rate set. The preference is to set the building controller's BAUD rate (if present). Otherwise, set the BAUD rate on one controller that will set the BAUD rate for all other controllers (to act as the master for setting the BAUD rate).

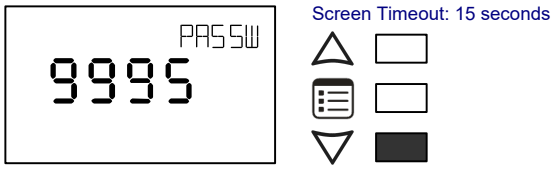
When the BAUD rate is set to AUTO, the controller cannot initiate any communication until it has detected the baud rate of the BACnet MS/TP network. If all controllers on the BACnet MS/TP network are set to AUTO, then all controllers will not communicate.

Set the connected controller's BAUD rate as follows:

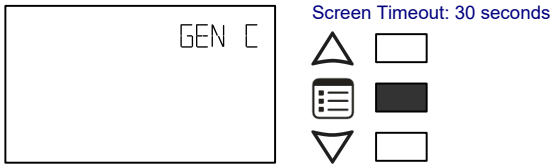
1. Connect an Allure EC-Smart-Vue Series Communicating Sensor sensor to the controller with a Cat 5e patch cable. Wait for the display to show the room temperature.
2. Press and hold the Menu button for 5 seconds to enter the password menu. 10000 is shown on the display.



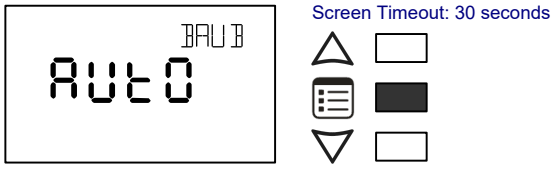
3. Use the down button to set the number to 9995 (this is the default password).



4. Press the **Menu** button to submit the password. Upon submitting the password, the **GEN CFG** menu appears on the display.



5. Press the down button once to enter the **GEN CFG** submenu.
6. Use the Menu button several times until **BAUD RATE appears on the display**. The current controller's BAUD rate is shown.



7. Use the up and down buttons to set the controller's Baud rate. The **AUTO** setting detects and uses the current baud rate being used by the BACnet MS/TP network.
8. Press the Menu button once to apply the value.
9. Press and hold the Menu button for 5 seconds to exit the configuration menu.

Wireless Installation

When connected to a Wireless Receiver, controllers can receive input signals from a wide selection of wireless devices. Compatible wireless devices include temperature sensors, duct sensors, window/door contacts and light switches. These devices are easy to install, and can be mounted on a wide range of building materials.

Before connecting any wireless equipment to the controller, refer to the Open-to-Wireless Application Guide.

Connecting the Wireless Receiver

The Wireless Receiver is connected to the controller using a 2m (6.5ft) telephone cable with 4P4C modular connectors at both ends. Do not exceed this cable length. The Wireless Receiver's telephone socket is located inside the device. To locate it, open the Wireless Receiver by separating its front and back plates.

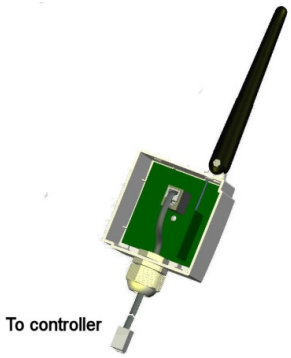


Figure 17: Location of the Wireless Receiver's telephone socket

Connecting to the Controller's Wireless Port

Each controller has a wireless port in which one end of the Wireless Receiver's telephone cable plugs in.

Uncover the controller to locate the wireless port on the PCB board (marked as *Wireless Module*).

Terminal Block Cover

In certain jurisdictions, terminal block covers are required to meet local safety regulations. Terminal block covers are available for all controllers and are used to conceal the controllers' wire terminals. Terminal block covers are optional and are sold as peripherals.

The terminal block cover can be clipped on to the controller as shown below.

Figure 18: Terminal Block Covers

Maintenance

Unplug device before any kind of servicing.

The device requires minimal maintenance, but it is important to take note of the following:

- ☐ If it is necessary to clean the outside of the device, use a dry cloth.
- ☐ Using a torque limited screw driver set to 0.4 Nm (3.54 in-lb), retighten terminal connector screws annually to ensure the wires remain securely attached.

Disposal

The Waste Electrical and Electronic Equipment (WEEE) Directive set out regulations for the recycling and disposal of products. The WEEE2002/96/EG Directive applies to standalone products, for example, products that can function entirely on their own and are not a part of another system or piece of equipment.

For this reason Distech Controls products are exempt from the WEEE Directive. Nevertheless, Distech Controls products are marked with the WEEE symbol , indicating devices are not to be thrown away in municipal waste.

Products must be disposed of at the end of their useful life according to local regulations and the WEEE Directive.

North American Emissions Compliance

United States

Changes or modifications not expressly approved by Distech Controls could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential and commercial installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ☐ Reorient or relocate the receiving antenna.
- ☐ Increase the separation between the equipment and receiver.
- ☐ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- ☐ Consult the dealer or an experienced radio/TV technician for help.

Canada

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

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

Troubleshooting Guide

Controller is powered but does not turn on

Fuse has blown	Disconnect the power. Check the fuse integrity. Reconnect the power.
Power supply polarity	Verify that consistent polarity is maintained between all controllers and the transformer. Ensure that the 24VCOM terminal of each controller is connected to the same terminal on the secondary side of the transformer. See *Power Wiring*.

Controller cannot communicate on a BACnet MS/TP network

Absent or incorrect supply voltage	1. Check power supply voltage between 24VAC ±15% and 24VCOM pins and ensure that it is within acceptable limits. 2. Check for tripped fuse or circuit breaker.
Overloaded power transformer	Verify that the transformer used is powerful enough to supply all controllers.
Network not wired properly	Double check that the wire connections are correct.
Absent or incorrect network termination	Check the network termination(s).
Max Master parameter	Configure the maximum number of master device on the MS/TP network in all devices to the controller's highest MAC address used on the MS/TP trunk.
There is another controller with the same MAC Address on the BACnet MS/TP data bus	Each controller on a BACnet MS/TP data bus must have a unique MAC Address. Look at the MAC Address DIP switch on the faceplate or under the cover of the controller. If it is set to 0 (all off), use an Allure EC-Smart-Vue sensor to check the MAC Address.
There is another controller with the same Device ID on the BACnet intranetwork	Each controller on a BACnet intranetwork (the entire BACnet BAS network) must have a unique Device ID. Use an Allure EC-Smart-Vue sensor to check the Device ID of each controller.

Controller communicates well over a short network, but does not communicate on large network

Network length	Check that the total wire length does not exceed the specifications of the *Network Guide*.
Wire type	Check that the wire type agrees with the specification of the *Network Guide*.
Network wiring problem	Double check that the wire connections are correct.
Absent or incorrect network termination	Check the network termination(s). Incorrect or broken termination(s) will make the communication integrity dependent upon a controller's position on the network.
Number of controllers on network segment exceeded	The number of controllers on a channel should never exceed 50. Use a router or a repeater in accordance to the *Network Guide*.
Max Master parameter	Configure the maximum number of master device on the MS/TP network in all devices to the controller's highest MAC address used on the MS/TP trunk.
There is another controller with the same MAC Address on the BACnet MS/TP data bus	Each controller on a BACnet MS/TP data bus must have a unique MAC Address. Look at the MAC Address DIP switch on the faceplate or under the cover of the controller. If it is set to 0 (all off), use an Allure EC-Smart-Vue sensor to check the MAC Address.
There is another controller with the same Device ID on the BACnet intranetwork	Each controller on a BACnet intranetwork (the entire BACnet BAS network) must have a unique Device ID. Use an Allure EC-Smart-Vue Series Communicating Sensor to check the Device ID of each controller.

Hardware input is not reading the correct value

Input wiring problem	Check that the wiring is correct according to this manual and according to the peripheral device's manufacturer.
Configuration problem	Using EC-gfxProgram, check the configuration of the input. Refer to the EC-gfxProgram user guide for more information.

Over-voltage or over-current at an input	An over-voltage or over-current at one input can affect the reading of other inputs. Respect the allowed voltage / current range limits of all inputs. Consult the appropriate datasheet for the input range limits of this controller.
Open circuit or short circuit	Using a voltmeter, check the voltage on the input terminal. For example, for a digital input, a short circuit shows approximately 0V DC and an open circuit shows approximately 5V DC.

Hardware output is not operating correctly

Fuse has blown (Auto reset fuse)	Disconnect the power and outputs terminals. Then wait a few seconds to allow the auto-reset fuse to cool down. Check the power supply and the output wiring. Reconnect the power.
Output wiring problem	Check that the wiring is correct according to this manual and according to the peripheral device's manufacturer.
Configuration problem	Using EC-gfxProgram, check the configuration of the input. Refer to the EC-gfxProgram user guide for more information.
0 to 10V output, 24VAC powered actuator is not moving.	Check the polarity of the 24VAC power supply connected to the actuator while connected to the controller. Reverse the 24VAC wire if necessary.

Wireless devices not working correctly

Device not associated to controller	Using EC-*gfx*Program, check the configuration of the input. Refer to the *EC-gfxProgram user guide* for more information.
Power discharge	1. Recharge device with light (if solar-powered) or replace battery (if battery-powered), 2. Ensure sufficient light intensity (200lx for 4 hours/day).
Device too far from the Wireless Receiver	Reposition the device to be within the range of the Wireless Receiver. For information on typical transmission ranges, refer to the *Open-to-Wireless Application Guide.*
Configuration problem	Using the device configuration plug-in or wizard, check the configuration of the input. Refer to the Wireless Battery-less *Sensors and Switches Solutions Guide* for more information.

Flow sensor is not giving proper readings

Tubing connection problem	1. Ensure the tubing is installed properly and that the tubing is not bent.
Controller is not calibrated properly	Recalibrate the controller. Refer to the controller's user guide for more information.

Damper is not opening or closing properly

Mechanical stops not in proper position	The two mechanical stops must be positioned to stop the damper motion when it is completely closed and completely opened. The mechanical stops can be moved by increments of 5°.
Controller in Override	Set the Override to OFF in the wizard.

Rx/Tx LEDs

RX LED not blinking	Data is not being received from the BACnet MS/TP data bus.
TX LED not blinking	Data is not being transmitted onto the BACnet MS/TP data bus.

Status LED– Normal Operation

One fast blink ●	Initialization: The device is starting up.
Fast blink continuous: ● ● ● ● ● (150ms On, 150ms Off, continuous)	Firmware upgrade in progress. Controller operation is temporarily unavailable. The new firmware is being loaded into memory. This takes a few seconds. Do not interrupt power to the device during this time.
The Status LED is always OFF	The controller is operating normally.

Status LED blink patterns – Repeats every 2 seconds (highest priority shown first)

Long Long Long blink ▬ ▬ ▬ (800ms On, 300ms Off, 800ms On, 300ms Off, 800ms On)	The device has not received a BACnet token, and therefore cannot communicate on the network: Verify that the controller's MAC Address is unique on the BACnet MS/TP Data Bus – see Device Addressing. Make sure the controller's BAUD rate is the same as the BACnet MS/TP Data Bus' BAUD rate (see Setting the BAUD Rate (optional)). Verify that the Max Master is set high enough to include this controller's MAC Address (See the Network Guide).
Short Short Long blink ● ● ▬ (150ms On, 300ms Off, 150ms On, 300ms Off, 800 ms On)	Poor-quality power; The device has browned-out: The voltage at the 24VAC and 24VCOM terminals has gone below the device's acceptable limit during power up.
Short Long blink ● ▬ (150ms On, 300ms Off)	Invalid MAC address: The device's MAC address is set to zero (0) or is set to an address higher than the Max Master. See the Network Guide.

For issues with the Allure EC-Smart-Vue Series Communicating Sensor, refer to the Allure EC-Smart-Vue Series Communicating Sensor Hardware Installation Guide.