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Date: 7/12/2023
Return Request: 7/22/2023
Project: LRSD – Rockefeller Early Childhood
Supplier: Middleton
Manufacturer: Distech Controls
Submittal: Controls
Submittal Number: 23 09 23-01
Drawing # and Installation: Mechanical Drawings

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Insight Engineering
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LITTLE ROCK, ARKANSAS

JOB NAME: LRSD Rockefeller
JOB #: 23.1004
SUBMITTAL #: 23 09 23-1
VENDOR: Comfort Systems
SPEC SECTION: 23 09 23
BY: Andrew McCarty **DATE:** 7/19/23
COMMENTS:

Kinco's review indicates that general conformity to the contract drawings, specifications and addenda to the best of our technical knowledge has been met by the vendor. This review does not in any way relieve the vendor of its obligation to perform or supply their product in strict accordance with the aforementioned contract documents. This submittal is certiified to be in conformance with contract documents unless noted of herein.

MIDDLETON, INC

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Operation & Maintenance

05/03/24

PROJECT: **Rockefeller Early Childhood**
Little Rock Schools District
CONTRACTOR: **Comfort Systems**

PREPARED BY: **Middleton Heat & Air**

CONTENT

- Tridium Overview
- ECB-VAV Controller
- Smart-Vue Thermostat
- Discharge Air Temp Sensor
- ECM Current Switch
- Functional Device Transformer
- Project Visio

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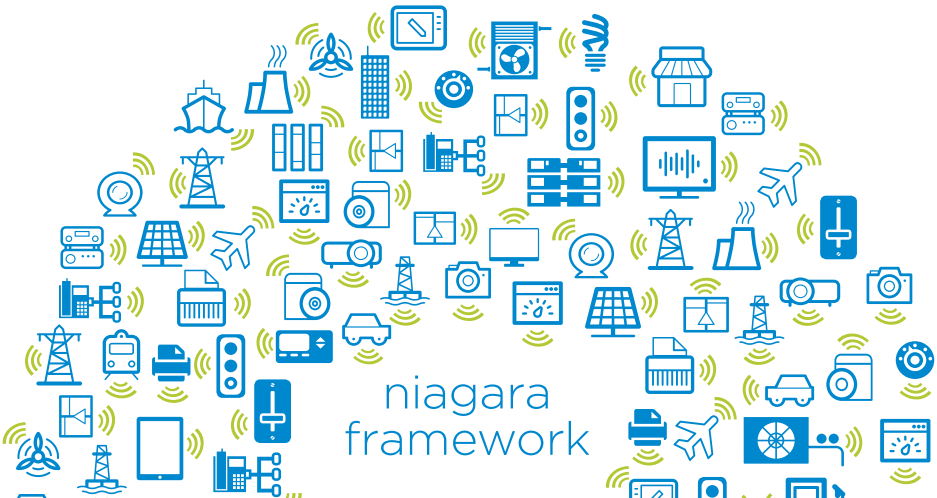

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2017-0003

ECB-VAV

BACnet B-ASC 12-Point Programmable VAV Controller

Overview

The ECB-VAV controller is a microprocessor-based programmable variable air volume (VAV) controllers designed to control any variable air volume box. Each controller uses the BACnet® MS/TP LAN communication protocol and is BTL®-Listed as BACnet Application Specific Controllers (B-ASC).

Features & Benefits

- Internal power supply uses power factor correction (PFC) to optimize power usage when multiple controllers are connected at the same power transformer
- Flexible inputs and outputs support all industry-standard VAV unitary applications
- Rugged hardware inputs and outputs eliminate the need for external protection equipment
- Polarity free, on-board airflow sensor for precise airflow monitoring and control at low and high airflow rates
- Built-in actuator with an integrated position feedback system for worry-free operation
- Factory pre-loaded applications allow for out-of-the-box, energy efficient operation of standard VAV equipment
- Optimized air balancing through *my*DC AirBalancing saving time during the commissioning process
- End-to-end solution for support of Smart Room Control of HVAC equipment, lighting and sunblinds
- Supports EC-*gfx*Program, making Building Automation System programming effortless
- Open-to-Wireless™ ready, supporting a wide variety of wireless sensors and switches and helping to reduce installation costs
- Supports the Allure™ Series Communicating Sensors, providing intelligent sensing and environmental zone control

Model Selection

Example: ECB-*VAV (SI)*

ECB-*VAV (IMP) Plenum-rated*

Series	Model	Units	Options
ECB-	***VAV***: 12 points, 18 Vdc power supply output, flow sensor, damper actuator, 4 UI, 4 DO, 2 UO, standard 24VAC/DC power supply	***(IMP)*** : Preloaded Apps in Imperial (US) units ***(SI)*** : Preloaded Apps in SI (Metric) units	***Plenum-rated***: UL2043 plenum-rated (only for North America).
			UUKL: UL 864, 10th Edition UUKL and California State Fire Marshal Listed[1].

1. The UL 864 UUKL Listed Smoke Control Equipment is used only in Distech Controls' UUKL smoke control system. For detailed specifications, requirements and procedures for installing and operating UUKL Listed equipment refer to the Distech Controls' UUKL Smoke Control documentation.

Accessories

Terminal covers	Terminal cover designed to conceal the controller's wire terminals. Required to meet local safety regulations in certain jurisdictions.

Recommended Applications

Model	ECB-VAV
Cooling Only VAV Boxes	■
Dual-Duct VAV Systems	■
Cooling with Reheat VAV Boxes	■
Parallel Fan VAV Boxes	■
Series Fan VAV Boxes	■
Room Pressurization	■
Smart Room Control support for HVAC, light, and shades/sunblinds	■

BACnet Objects List

BACnet Objects

Calendar Objects	1
Special events per calendar	25
Schedule Objects	2
Special events per schedule	5
PID Loop Objects	8

Commandable Objects

BV Objects	10
MSV Objects	10
AV Objects	25

Non-Commandable Objects

BV Objects	40
MSV Objects	40
AV Objects	75

Product Specifications

Power Supply Input

Voltage Range[1]	24VAC/DC; ±15%; Class 2
Frequency Range	50/60Hz
Overcurrent Protection	Field replaceable fuse
Fuse Type	3.0A
Power Consumption	4 VA typical plus all external loads[2], 75 VA max (including powered triac outputs).
Power Factor	>90%

1. 24VDC does not support DO (triac outputs).
2. External loads must include the power consumption of any connected modules such as an Allure Series Communicating Sensor. Refer to the respective module's datasheet for related power consumption information.

Communications

Communication Bus	BACnet MS/TP
BACnet Profile	B-ASC[1]
EOL Resistor	Built-in, selectable
Baud Rates	9600, 19 200, 38 400, or 76 800 bps
Addressing	Dip switch or with an Allure EC-Smart-Vue Series Communicating Sensor

1. Refer to Distech Controls' Protocol Implementation Conformity Statement for BACnet.

Subnetwork

Communication	RS-485
Cable	Cat 5e, 8 conductor twisted pair
Connector	RJ-45
Connection Topology	Daisy-chain
Maximum number of room devices supported per controller combined	4[1]
Allure Series sensor	Up to 4
EC-Multi Sensor	Up to 4
ECx-Light-4 / ECx-Light-4D / ECx-Light-4DALI	Up to 2
ECx-Blind-4 / ECx-Blind-4LV / ECx-Blind-4SMI / ECx-Blind-4SMI-LoVo	Up to 2

1. A controller can support a maximum of 2 Allure sensor models equipped with a CO_2 sensor. Any remaining connected sensors must be without a CO_2 sensor.

Hardware

Processor	STM32 (ARM Cortex™ M3) MCU, 32 bit
CPU Speed	68 MHz
Applications Memory	384 kB Non-volatile Flash
Storage Memory	1 MB Non-volatile Flash
Memory (RAM)	64 kB RAM
Real Time Clock (RTC)	Built-in Real Time Clock without battery Network time synchronization is required at each power-up cycle before the RTC become available
Green LEDs	Power status & LAN Tx
Orange LEDs	Controller status & LAN Rx

Wireless Receiver

Communication Protocol	EnOcean wireless standard[1]
Number of Wireless Inputs[2]	18
Supported Wireless Receivers	Refer to the Open-to-Wireless Application Guide
Cable	Telephone cord
Connector	4P4C modular jack
Length (maximum)	6.5ft (2m)

1. Available when an optional external Wireless Receiver module is connected to the controller. Refer to the Open-to-Wireless Application Guide for a list of supported EnOcean wireless modules.
2. Some wireless modules may use more than one wireless input from the controller.

Integrated Damper Actuator

Motor	Belimo brushless DC motor
Torque	45 in-lb, 5 Nm
Degrees of Rotation	95º adjustable
Shaft Diameter	5/16 to 3/4"; 8.5 to 18.2mm
Acoustic Noise Level	< 35 dB (A) @ 95º rotation in 95 seconds

Mechanical

Dimensions (H × W × D)	7.90 × 5.51 × 3.70" (200.61 × 139.93 × 94.04 mm)
Dimensions with terminal block covers (H × W × D)	7.90 × 10.84 × 3.70" (200.61 × 275.26 × 94.04 mm)
Shipping Weight (Controller)	1.95lbs (0.89 kg)
Shipping Weight Terminal Cover (one side, bulk packaged)	0.30lbs (0.14 kg)
Enclosure Material[1]	FR/ABS
Enclosure Rating	Plastic housing, UL94-5VB flammability rating Plenum rating per UL1995

1. All materials and manufacturing processes comply with the RoHS directive and are marked according to the Waste Electrical and Electronic Equipment (WEEE) directive

Environmental

Operating Temperature	32°F to 122°F (0°C to 50°C)
Storage Temperature	-4°F to 122°F (-20°C to 50°C)
Relative Humidity	0 to 90% Non-condensing
Nema Rating	1

Standards and Regulation

CE Emission	EN61000-6-3: 2007; A1:2011
CE Immunity	EN61000-6-1: 2007
CE EMC requirements, conditions and test set-up	EN 50491-5-1: 2010
EMC requirements for HBES/BACS	EN 50491-5-2: 2010
FCC	Compliance with FCC rules part 15, subpart B, class B
UL Listed (CDN & US)	UL916 Energy management equipment UL 864, 10th Edition, UUKL Listed Smoke Control Equipment (ECB-VAV UUKL model only)[1] UL2043 Suitable for use in air handling spaces (for Plenum-rated models only)
CEC Appliance Database	Appliance Efficiency Program[2]

1. For detailed specifications regarding the ECB-VAV UUKL model, refer to the Distech Controls UUKL Smoke Control Design Guide.
2. California Energy Commission's Appliance Efficiency Program: The manufacturer has certified this product to the California Energy Commission in accordance with California law.

On-Board Air-Flow Sensor

Differential Pressure Range	±2.0 in. W.C. (±500 Pa) Polarity-free high-low sensor connection
Input Resolution	0.00007 in. W.C. (0.0167 Pa)
Air Flow Accuracy	±4.0% @ > 0.05 in. W.C. (12.5 Pa) ±1.5% once calibrated through

	air flow balancing @ > 0.05 in. W.C. (12.5 Pa)
Pressure Sensor Accuracy	±(0.2 Pa +3% of reading)

Universal Inputs (UI)

General

Input Type	Universal; software configurable
Input Resolution	16-Bit analog / digital converter
Power Supply Output	18 VDC; maximum 80mA

Contact

Type	Dry contact

Counter

Type	Dry contact
Maximum Frequency	1Hz maximum
Minimum Duty Cycle	500ms On / 500ms Off

0 to 10VDC

Range	0 to 10VDC (40kΩ input impedance)

0 to 5VDC

Range	0 to 5VDC (high input impedance)

0 to 20mA

Range	0 to 20mA 249Ω external resistor wired in parallel

Resistance/Thermistor

Range	0 to 350 KΩ
Supported Thermistor Types	Any that operate in this range

Pre-configured Temperature Sensor Types:

Thermistor	10KΩ Type 2, 3 (10KΩ @ 77ºF; 25ºC)
Platinum	Pt1000 (1KΩ @ 32ºF; 0ºC)
Nickel	RTD Ni1000 (1KΩ @ 32ºF; 0ºC) RTD Ni1000 (1KΩ @ 69.8ºF; 21ºC)

Universal Outputs (UO)

General

Output Type	Universal; software configurable
Output Resolution	10-bit digital to analog converter
Output Protection	Built-in snubbing diode to protect against back-EMF, for example when used with a 12VDC relay Output is internally protected against short circuits
Auto-reset fuse	Provides 24VAC over voltage protection

0 or 12VDC (On/Off)

Range	0 or 12VDC

PWM

Range	Adjustable period from 2 to 65 seconds
Thermal Actuator Management	Adjustable warm up and cool down time

Floating

Minimum Pulse On/Off Time	500 milliseconds
Drive Time Period	Adjustable

0 to 10VDC

Range	0 to 10VDC linear
Source Current	Maximum 20 mA at 10VDC (minimum load resistance 600Ω)
Sink Current	Maximum 2.5mA at 1 VDC (minimum load resistance 4KΩ)

Digital Outputs (DO)

General

Output Type	24VAC Triac; software configurable
Maximum Current per Output	0.5A continuous 1A @ 15% duty cycle for a 10-minute period
Power Source	External or internal power supply (jumper selectable)

0 or 24VAC (On/Off)

Range	0 or 24VAC

PWM

Range	Adjustable period from 2 to 65 seconds

Floating

Minimum Pulse On/Off Time	500 milliseconds
Drive Time Period	Adjustable
Power Source	Internal power supply

Dimensions

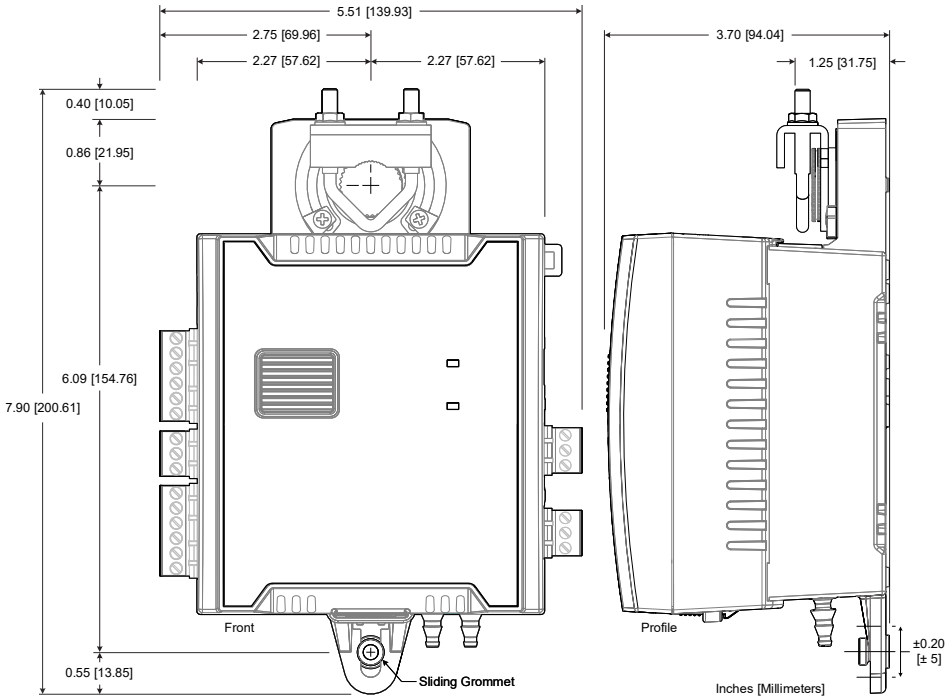

Figure 1: ECB-VAV Controller Dimensions

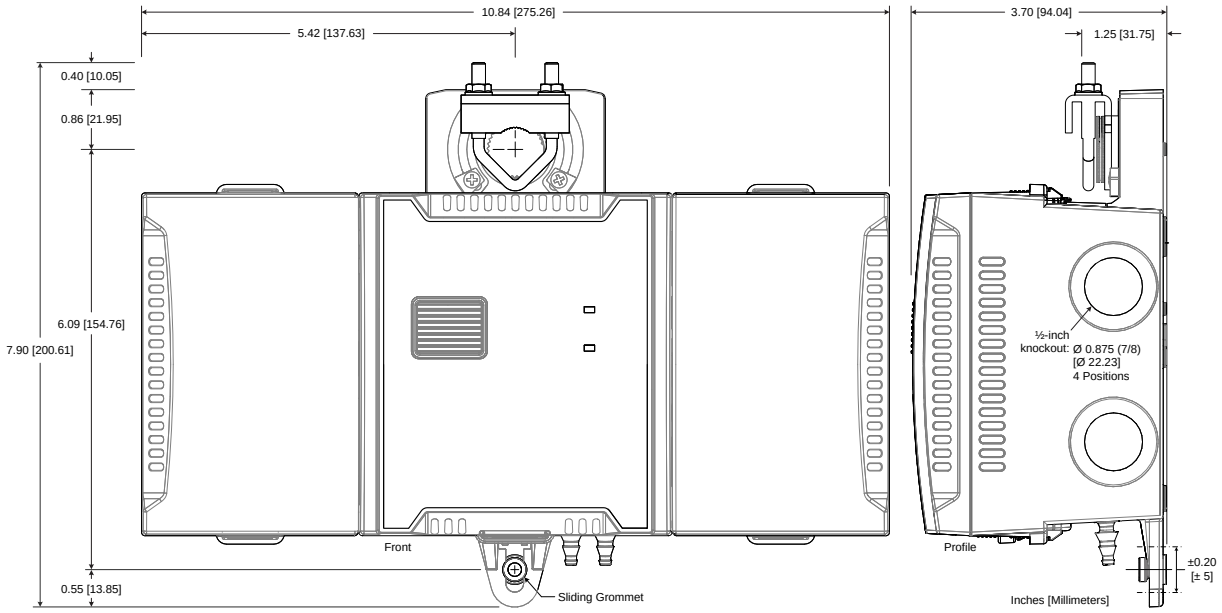

Figure 2: ECB-VAV Controller with Terminal Covers Dimensions

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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.

DISTECH CONTROLS™

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.

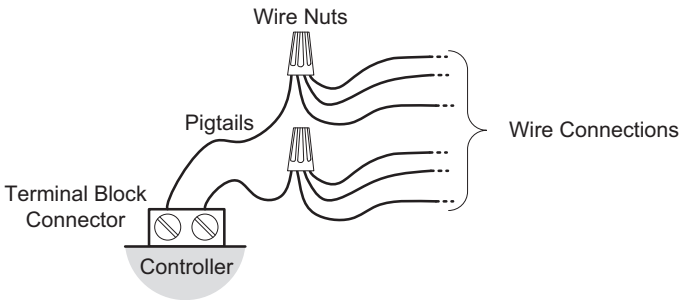


Figure 2: Using a Wire Nut and Pigtail to Wire the Controller

- ☐ 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

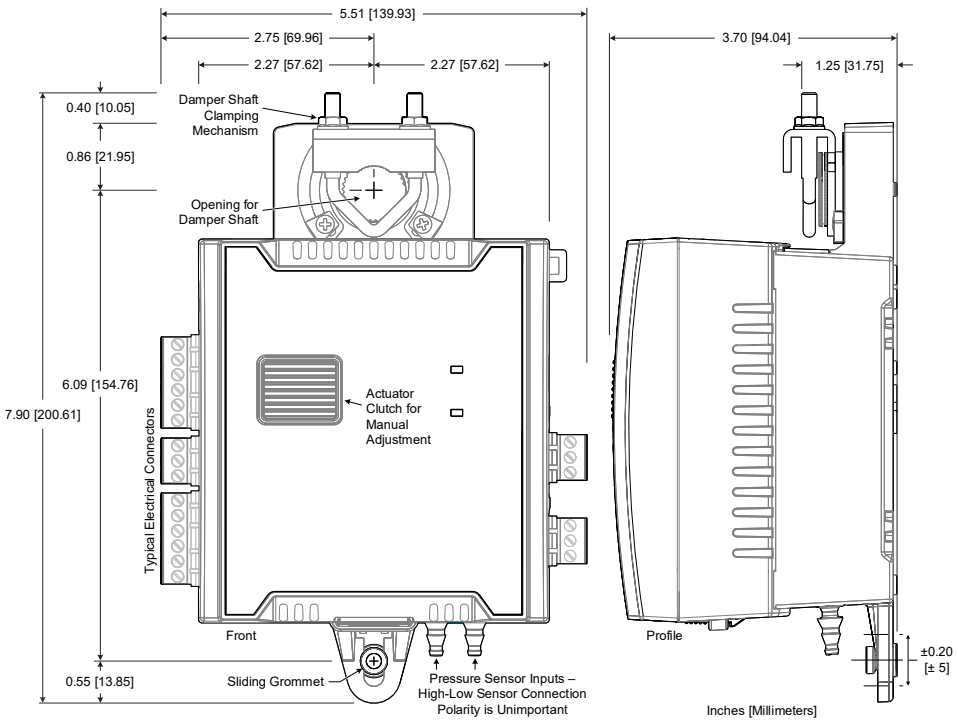


Figure 3: ECB-VAV Dimensions and Components

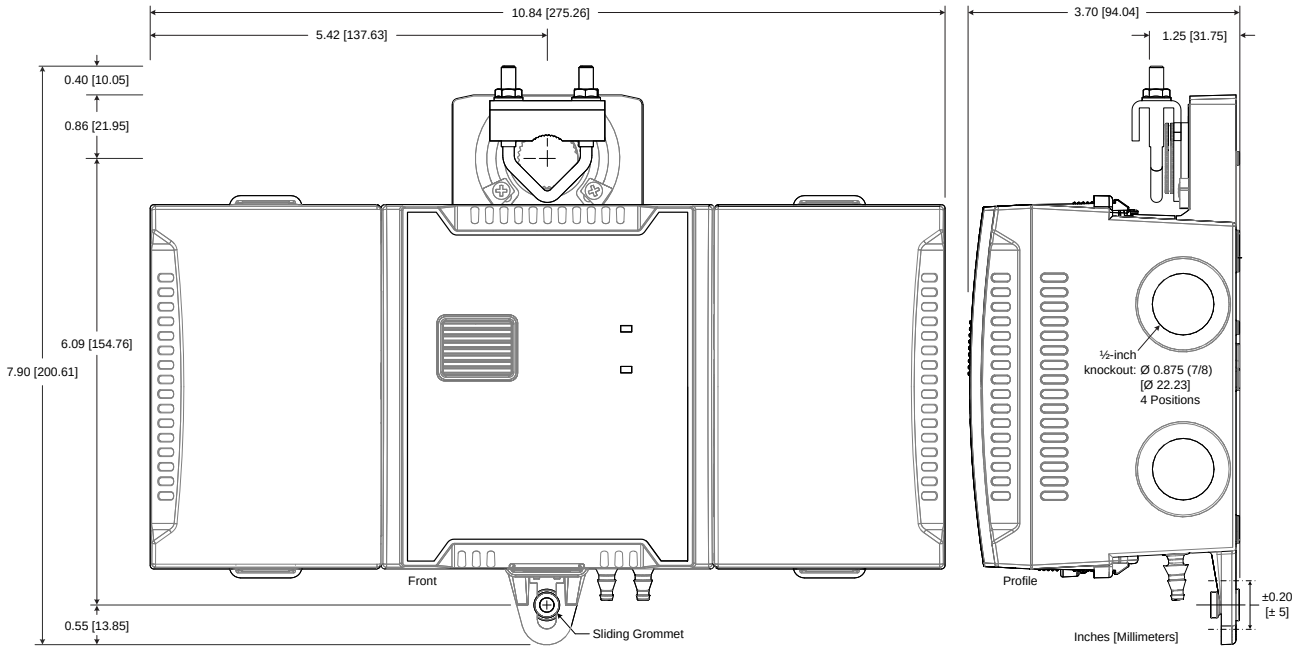


Figure 4: VAV Controller with Terminal Covers Dimensions

DIP Switch Identification and Configuration

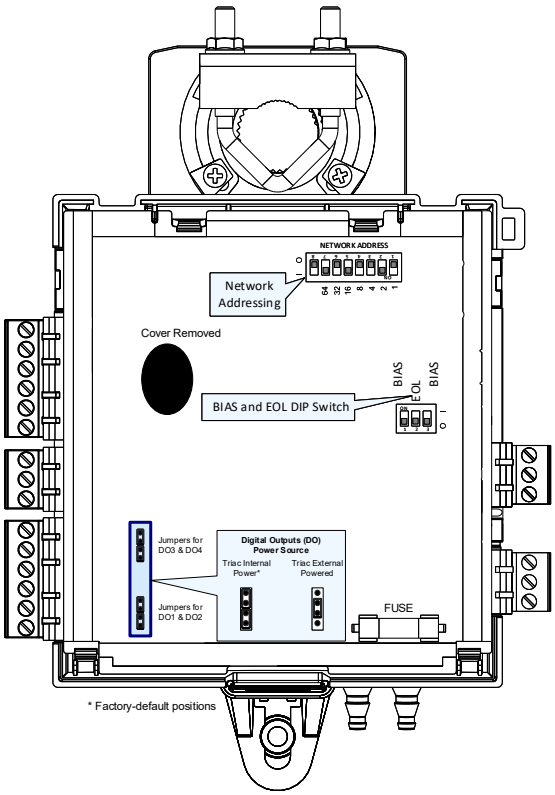


Figure 5: ECB-VAV (cover removed)

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).

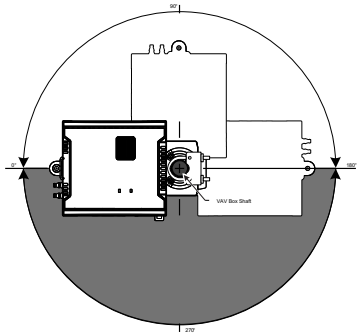


Figure 6: Recommended Mounting Position Angle Range

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.

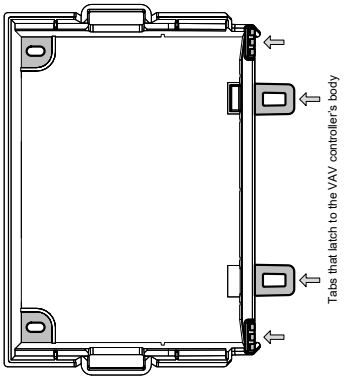


Figure 7: Terminal Cover Attachment Tabs

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

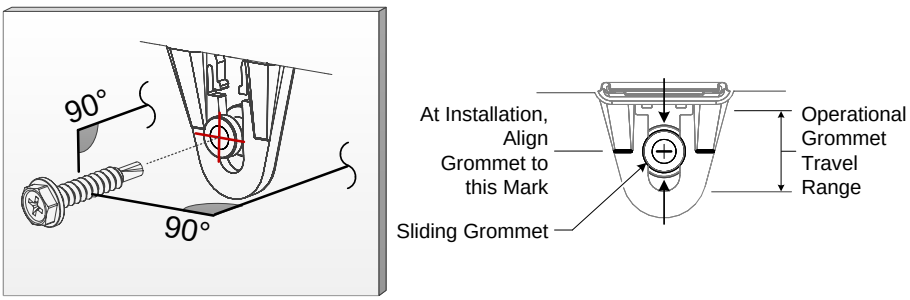


Figure 9: Supplied Mounting Hardware – Drive the screw at a right-angle to the VAV Box

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.

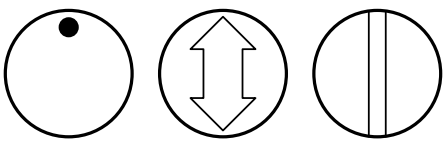


Figure 10: Typical Damper Shaft End Marking

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.

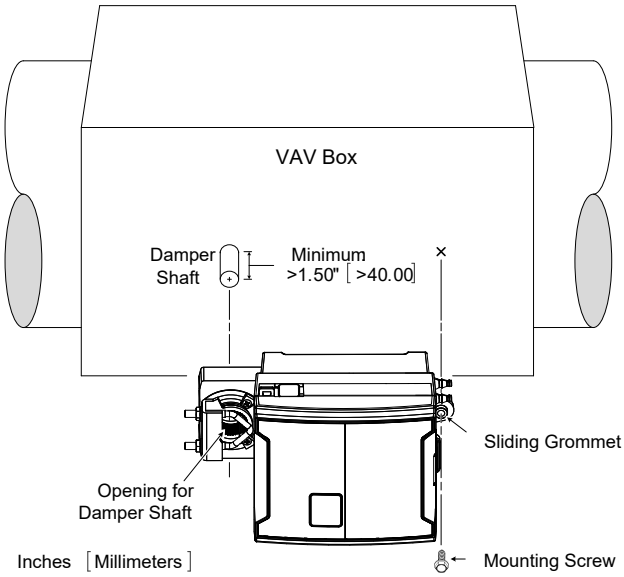


Figure 11: Standard Mounting Method: Mounting a controller on a damper shaft

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

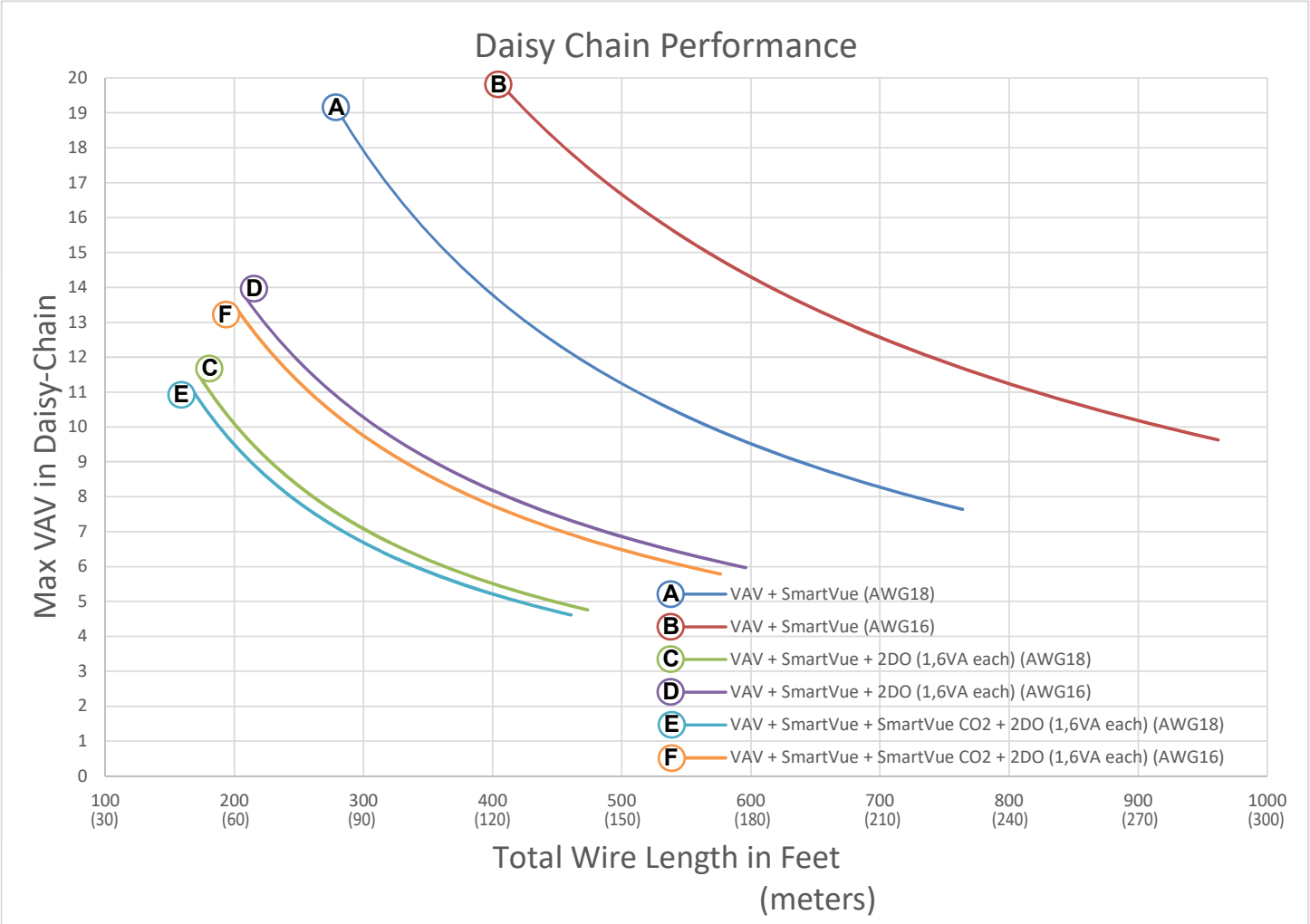


Figure 12: Maximum Number of VAV Devices on a Daisy-Chain at Evenly Spaced Intervals

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.

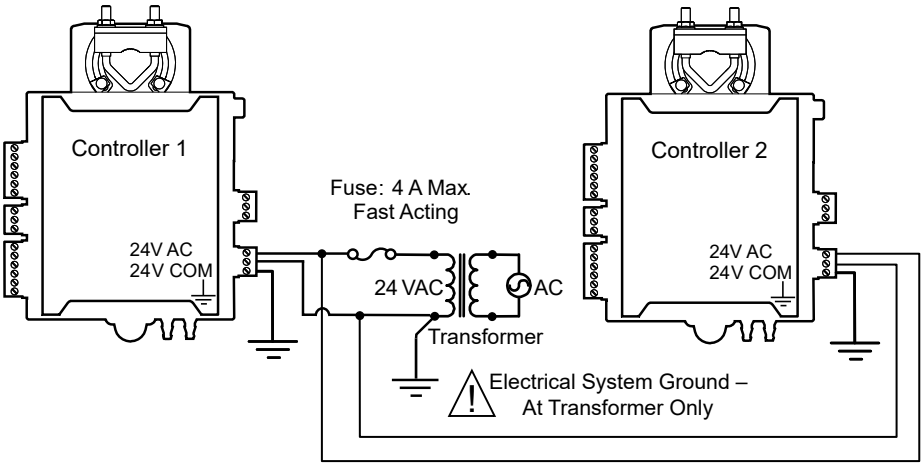


Figure 13: Power Wiring

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.

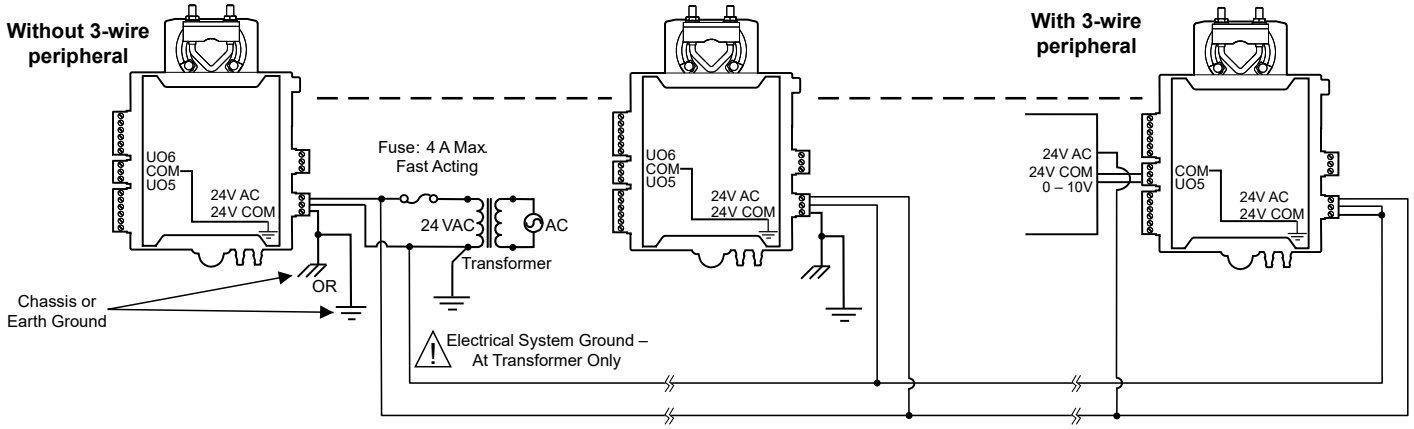


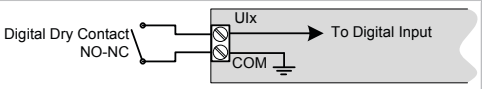
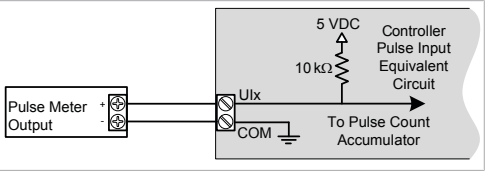
Figure 14: ECB-VAV Power Wiring with and Without 3-Wire Peripherals

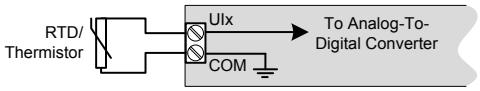
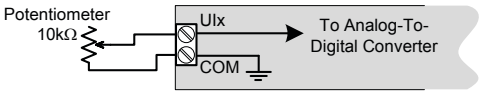
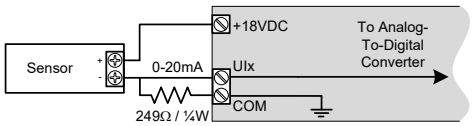
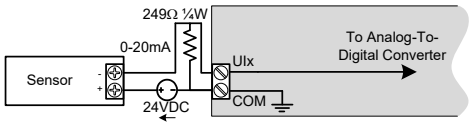
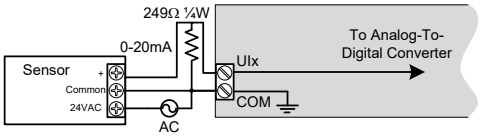
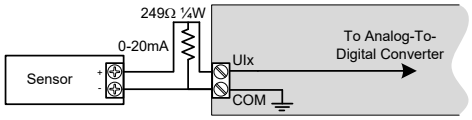
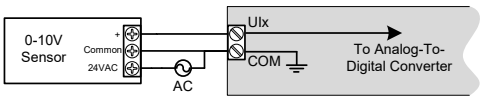
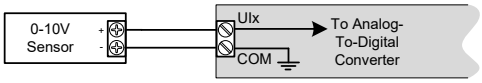
Input Wiring

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	

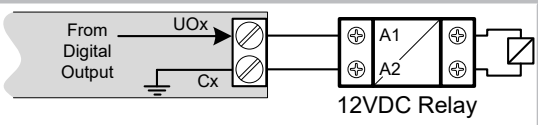
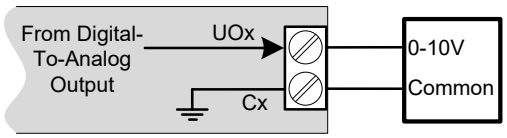
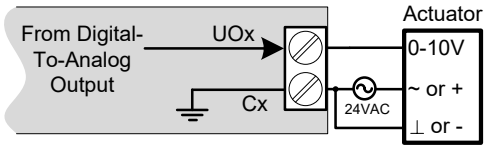
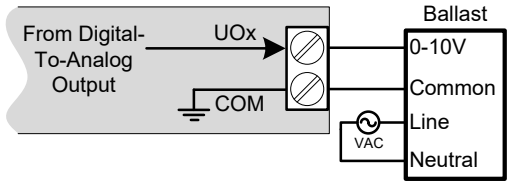
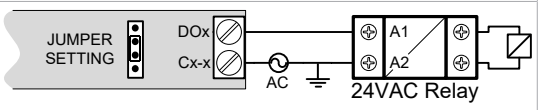
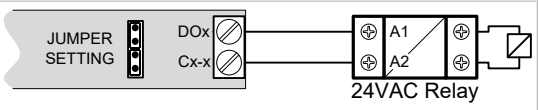
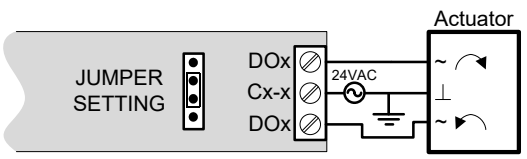
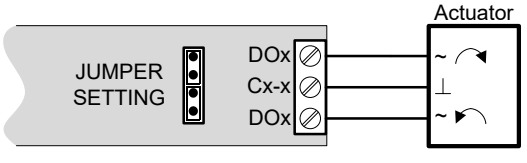
Output Wiring

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.

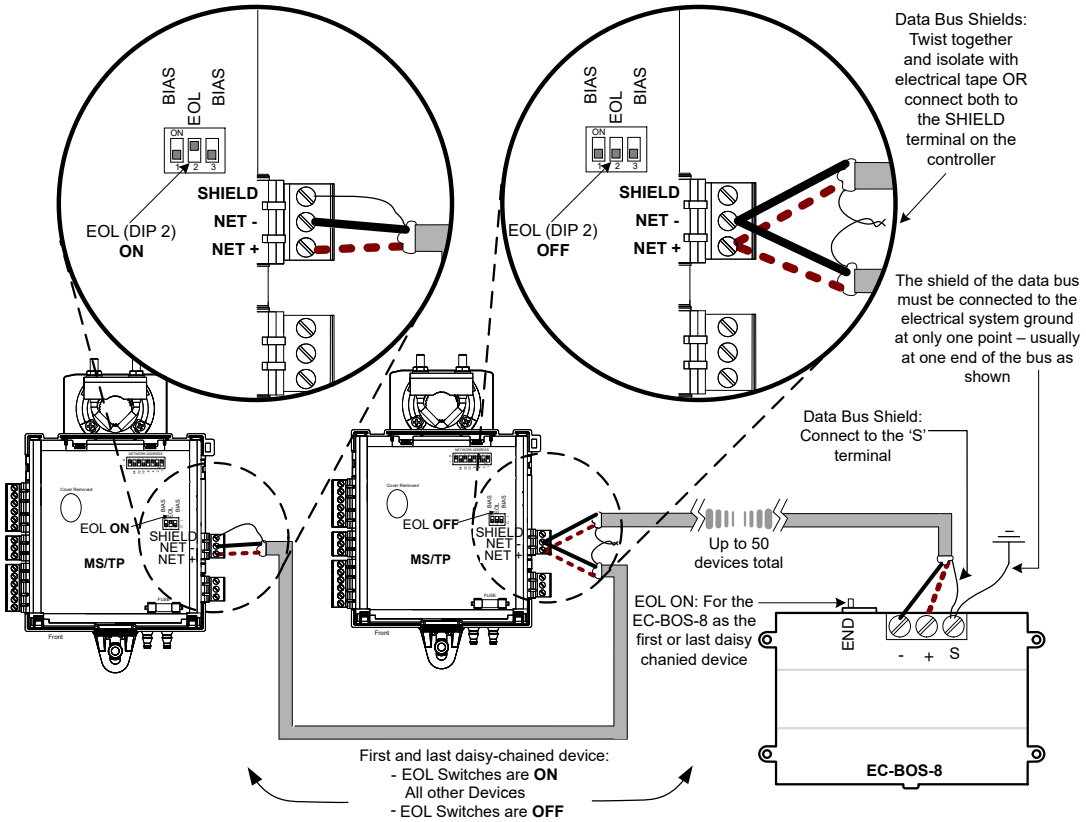


Figure 15: BACnet MS/TP Communications Wiring

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.

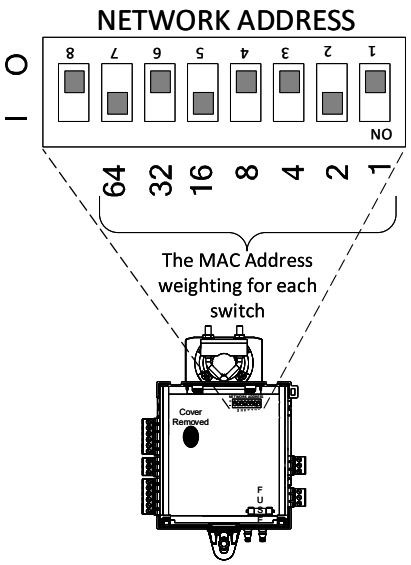


Figure 16: MAC Address DIP Switch Set to 82

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
```

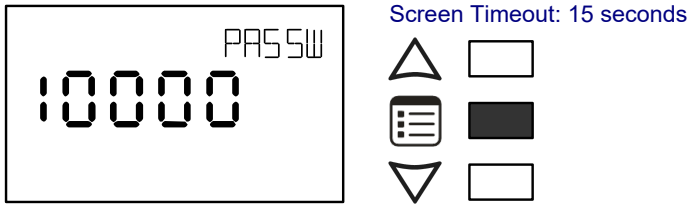
The Device Instance can be changed once the controller has been commissioned through the network management software interface.

Setting the Communicating Sensor Subnet ID

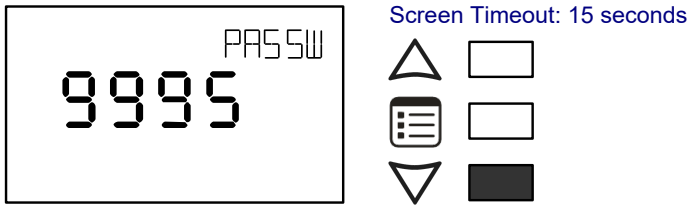
ECB Series controllers can be commissioned with an Allure EC-Smart-Vue Series Communicating Sensor by connecting it to the controller as shown in Figure 14.

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:

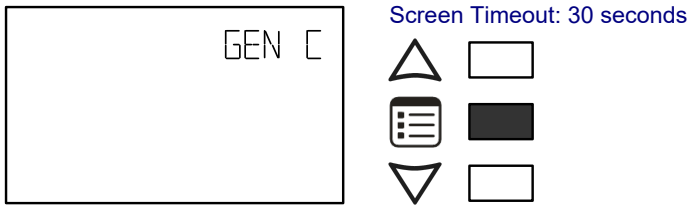
1. Connect an an Allure EC-Smart-Vue Series Communicating Sensor to the controller with a Cat 5e patch cable. Wait for the Bell icon and the number 1 to flash on the display.
2. Press and hold the Menu button for 5 seconds to enter the password menu. 10000 is shown on the display.



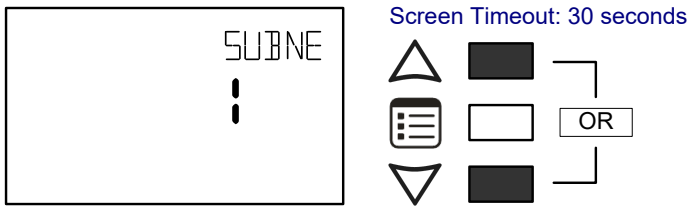
3. Press the down button to set the number to 9995 (this is the default password).



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.

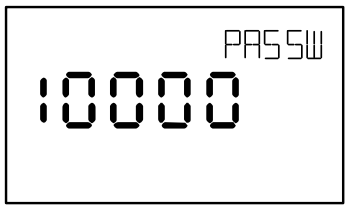
Commissioning ECB-Series Controllers

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.

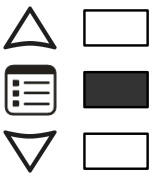
During commissioning, the sensor is used to set the controller's BACnet® MAC Address and to perform application selection if needed. Applications are pre-loaded programs that enable the ECB-VAV to control a typical VAV box.

Set the connected controller's MAC Address as follows:

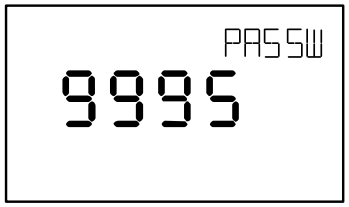
1. Connect an Allure EC-Smart-Vue Series Communicating Sensor to the controller with a Cat 5e patch cable. Wait for the display to show the room temperature.
2. Press and hold the Menu button for 5 seconds to enter the password menu. 10000 is shown on the display.



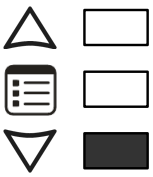
Screen Timeout: 15 seconds



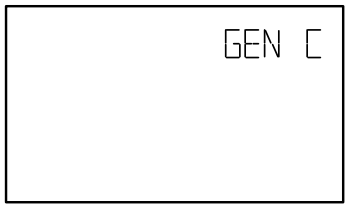
3. Use the down button to set the number to 9995 (this is the default password).



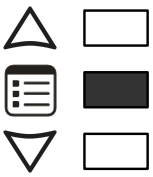
Screen Timeout: 15 seconds



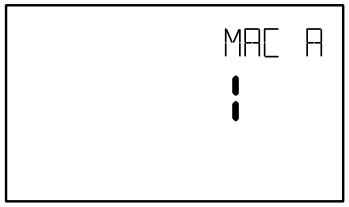
4. Press the **Menu** button to submit the password. Upon submitting the password, the **GEN CFG** menu appears on the display.



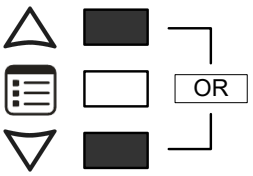
Screen Timeout: 30 seconds



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**.

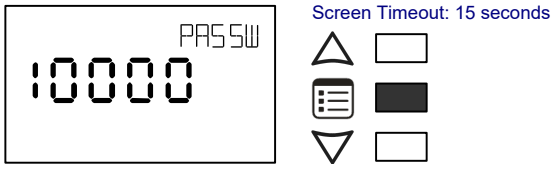
Setting the BAUD Rate (optional – ECB series controllers only)

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).

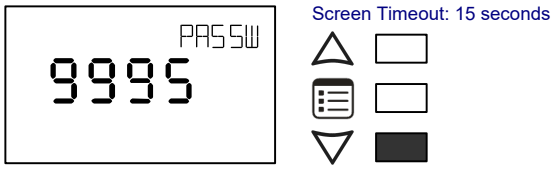
When the BAUD rate is set to AUTO, the controller cannot initiate any communication until it has detected the baud rate of the BACnet MS/TP network. If all controllers on the BACnet MS/TP network are set to AUTO, then all controllers will not communicate.

Set the connected controller's BAUD rate as follows:

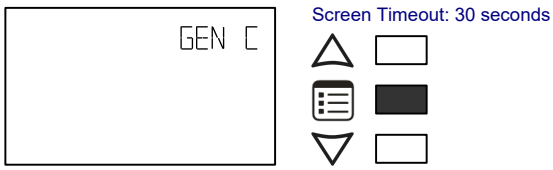
1. Connect an Allure EC-Smart-Vue Series Communicating Sensor sensor to the controller with a Cat 5e patch cable. Wait for the display to show the room temperature.
2. Press and hold the Menu button for 5 seconds to enter the password menu. 10000 is shown on the display.



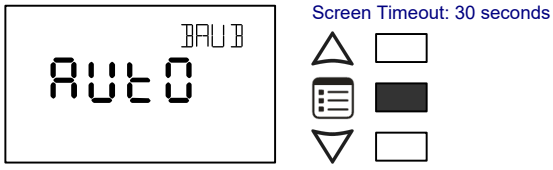
3. Use the down button to set the number to 9995 (this is the default password).



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.

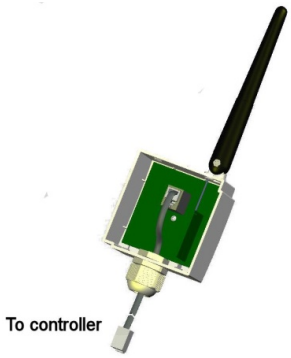


Figure 17: Location of the Wireless Receiver's telephone socket

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.

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DISTECH CONTROLS™

Datasheet

Allure™ EC-Smart-Vue Sensor Series

Line of communicating sensors with backlit display and graphical menus

Applications

- Offers temperature, CO_2, humidity, and motion sensing for the following applications:
  - VAV controllers
  - Fan coil units
  - Roof top units
  - Heat pumps
  - Unit ventilators
- Achieve energy efficiency through occupancy-based control with:
- Motion sensor to readjust the space temperature setpoint and manage lighting
- CO_2 sensor as part of the demand-controlled ventilation strategy that adjusts the amount of outdoor air intake according to the number of occupants

Overview

The Allure EC-Smart-Vue Sensor Series is designed to interface with Distech Controls' ECB and ECL Series of controllers. This line of communicating sensors with backlit display consists of eight (8) models that provide precise environmental zone control. Models are available with any combination of the following: temperature, humidity, CO_2, and motion sensor.

The innovative ECO-Vue™ leaf pattern, offered by the Allure EC-Smart-Vue sensor series, graphically indicates energy consumption in real time to promote an occupant's energy-conscious behavior. The more leaves appear in the LCD display, the more energy efficiency is being achieved, while fewer leaves will encourage the occupant to take corrective action to optimize the system's environmental performance.

Through its user-friendly interface, occupants can view and adjust environmental settings to their liking, for example, view the space temperature, adjust the setpoint, set the fan speed, and apply occupancy overrides.

The Allure EC-Smart-Vue sensors can be customized with the EC-*gfx*Program programming tool where you can fully adapt the display for the targeted application and setup user preferences.

A fully configurable password protected technician mode allows an installer to perform commissioning and troubleshooting. When connected to an ECB-VAV or ECL-VAV series controller with its pre-loaded application, commissioning can start immediately after installation. The Allure EC-Smart-Vue sensor can be used as a hand-held tool to select the appropriate controller application for the type of HVAC equipment to be controlled, to perform air balancing of the system without requiring an on-site controls engineer, and to troubleshoot the system. Furthermore, when the controller uses wireless sensors, a technician in the field can use the Allure EC-Smart-Vue sensor to make the controller learn each wireless sensor's ID on the fly, in order to commission the wireless sensors.

Features & Benefits

- "4-in-1" communicating sensors—one wire, one connection, four (4) sensing capabilities (temperature, humidity, CO_2, and motion).
- Encourage occupants to have greener habits with the ECO-Vue icon while reducing energy costs.
- Optimize energy use according to the actual building's conditions:
- Control heating and cooling setback through motion sensing and adjust outdoor air demand according to air-quality.
- Control lighting through occupancy detection.
- Commission VAV controllers immediately after installation by selecting the built-in controller application and performing system air balancing with the Allure EC-Smart-Vue sensor to get the HVAC system up and running right away.
- Occupants can override the HVAC mode and view and adjust the setpoint and fan speed for improved personal comfort.
- Slim, compact style, and clean lines are well received by architects and building owners.
- Clear and bright LCD display provides real-time access to temperature and other system information such as setpoint, occupancy status, HVAC mode, etc.
- Both power and communications pass through a single Cat 5e cable for reduced installation costs and for easier installation or system retrofit.
- The patented ABC Logic self-calibration system eliminates the need for manual CO_2 calibration in most applications.
- Lifetime CO_2 calibration guaranteed when using ABC Logic.

Allure EC-Smart-Vue Sensor Models

Model	EC-Smart-Vue	EC-Smart-Vue-C	EC-Smart-Vue-H	EC-Smart-Vue-CH	EC-Smart-Vue-M	EC-Smart-Vue-CM	EC-Smart-Vue-HM	EC-Smart-Vue-CHM
Temperature	■	■	■	■	■	■	■	■
Humidity			■	■			■	■
Motion					■	■	■	■
CO_2[1]		■		■		■		■

1. The Allure EC-Smart-Vue sensor CO_2 models must be used in spaces that are periodically unoccupied (e.g. during evening or nighttime hours). A controller can support a maximum of two (2) Allure EC-Smart-Vue sensor models equipped with a CO_2 sensor. Any remaining connected Allure EC-Smart-Vue sensor model must be without a CO_2 sensor.

ECO-Vue Icon

Distech Controls recognizes that the human factor must be considered when designing a building for energy efficiency. To encourage occupants to be as green as possible, the Allure EC-Smart-Vue sensor has an ECO-Vue icon that can be programmed to show more leaves when the occupant chooses a setpoint that reduces energy use. This helps to promote awareness for energy consciousness and to save operational costs.

Low energy efficiency | Moderate energy efficiency | Higher energy efficiency | Highest energy efficiency

Related Products

A wide range of Cat 5e patch cords (with connectors) in different lengths that feature a protective boot and dust cap. Versions are available that are rated for use in conduit or for plenum applications. The cable is labeled with Distech Controls for easy identification.

1000 ft (305 m) box of Cat 5e Cable, without connectors. Versions are available that are rated for use in conduit or for plenum applications.

100 Crimp RJ-45 connectors for making custom-length cables.

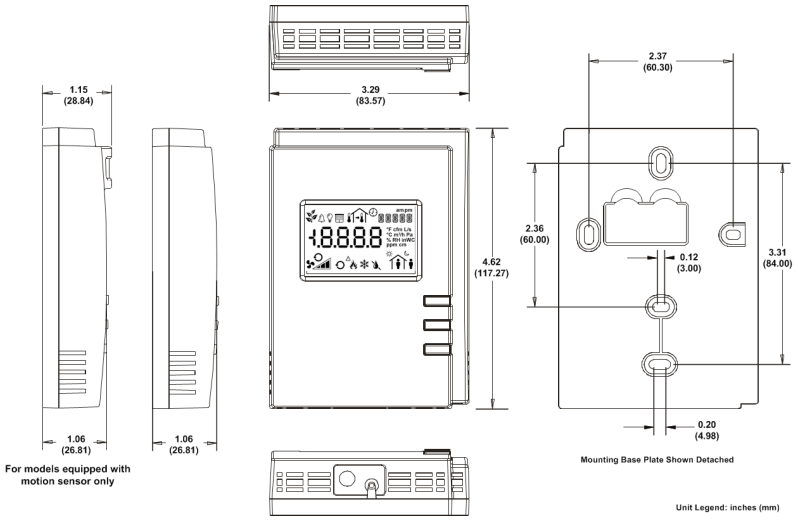
For more information on these or other Distech Controls products, please refer to our website.

Automatic Calibration of CO2 Sensors (EC-Smart-Vue-C, EC-Smart-Vue-CH, EC-Smart-Vue-CM, EC-Smart-Vue-CHM)

ABC Logic (Automatic Calibration Logic) is a patented self-calibration technique that eliminates the need for manual calibration in most applications. The Allure EC-Smart-Vue-C series is designed to work in environments where CO_2 concentrations will drop to outdoor ambient conditions (400 ppm) at least three times in a 14-day period, typically during unoccupied periods. For example, in a typical office, school, theater, etc., people are the main source of CO_2 in a building. When people go home at night, the indoor CO_2 level will drop to the outdoor CO_2 level, which is typically 380 to 400 ppm. The ABC Logic system records the lowest reading every 24-hour period for analysis. If there is a statistical difference in the baseline readings, then a calibration factor is applied to all subsequent sensor readings. The ABC Logic system typically takes three weeks of continuous run-time before making corrections.

The sensor will typically reach its operational accuracy after 25 hours of continuous operation on condition that it was exposed to ambient air reference levels of 400 ppm ±10 ppm CO_2.

Product Dimensions



Product Specifications

Power	
Voltage	16Vdc maximum, Class 2
Power Consumption	At the connected controller, an additional 5.25VA per CO_2 sensor model and 1.0VA per non-CO_2 sensor model
LCD Display	
Type	1.85” X 1.18” (47 mm X 30 mm) with backlight
Symbols	Language-independent icons for mode and operating status
Environmental	
Operating Temperature	5ºC to 40ºC; 41ºF to 104ºF
Storage Temperature	-20ºC to 50ºC; -4ºF to 122ºF
Relative Humidity	0 to 95% Non-condensing
Material	
Material	ABS
Color	White
Dimensions (overall):	
-Without Motion Sensor	3.29” x 4.62” x 1.06” (83.57mm x 117.27mm x 26.81mm)
-With Motion Sensor	3.29” x 4.62” x 1.06”/1.15” (83.57mm x 117.27mm x 26.81mm/28.80mm)
Shipping Weight	0.4 lbs to 0.44 lbs (0.18 kg to 0.2 kg)
Installation	Wall mounting through mounting holes (see hardware installation guide for hole positions)
Temperature Sensor	
Types	10KΩ NTC Thermistor
Range	5°C to 40°C; 41°F to 104°F
Accuracy	±0.5°C; ±0.9°F
Resolution	0.1°C; 0.18°F

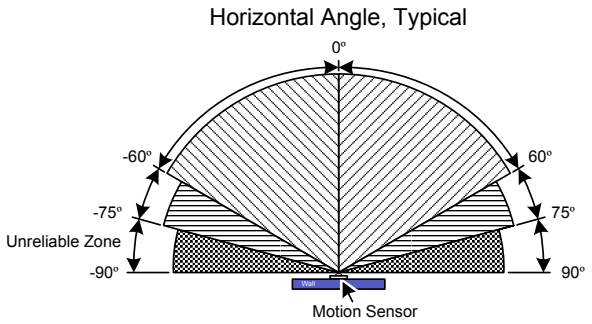
Humidity Sensor	
Accuracy	±3%
Resolution	1%
CO_2 Sensor	
Measurement Range	0 to 2000 ppm
Operating Elevation	0 to 16000 ft (4877 m)
Warm-up Time	< 2 minutes (operational), 10 minutes (maximum accuracy)
CO_2 Accuracy	400-1250 ppm ± 30 ppm or 3% of reading, whichever is greater[1]
	1250-2000 ppm ±5% of reading + 30ppm[1]
Temperature Dependence	0.2% FS per °C (±0.11% per °F)
Stability	<2% of FS over life of sensor (15 years)
Pressure Dependence	0.135% of reading per mm Hg; software adjustable
Sensing Method	Non-dispersive infrared (NDIR) absorption
	Gold-plated optics
Calibration Method	Patented ABC Logic self-calibration algorithm
Communications	
Rate	38 400 bps
Communications	RS 485
Wiring	Cable length: 600 ft (180 m) maximum
Cable Type	T568B Cat 5e network cable, 4 twisted pairs
Connectors	IN: RJ-45
	OUT: RJ-45 (pass-through for daisy chain Connection to other room devices)
	Network Access Jack: ⅛” (3.5 mm) stereo plug connector
Daisy-chaining	Up to 12 Allure EC-Smart-Vue sensors or room devices depending on the controller model – see the controller’s datasheet.

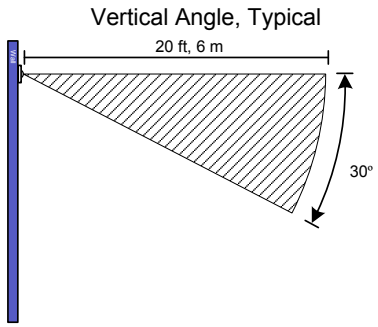
Product Specifications (continued)

Motion Sensor

Type	Passive Infrared (PIR) sensor with Fresnel lens
Range	Up to 20 ft (6 m); see Typical Motion Detection pattern figure below

Typical Motion Detection Pattern:





Agency Approvals

UL Listed (CDN & US)	UL916 Energy management equipment
Material[2]	UL94V-1

Electromagnetic Compatibility (Directive 2004/108/EC)

CE	EN 61000-6-3:2007 EN 61000-6-1:2007
FCC	Part 15, subpart B class B

1. Tolerance based on span gas of ±2% and ABC Logic enabled.
2. All materials and manufacturing processes comply with the RoHS directive and are marked according to the Waste Electrical and Electronic Equipment (WEEE) directive

Specifications subject to change without notice.
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Allure™ EC-Smart-Vue Sensor Series

Figure 1: (Left image) Allure EC Smart Vue, Allure EC Smart Vue-H/-C/-CH sensors. (Right image) Models equipped with a motion sensing window in the upper left corner: Allure EC Smart Vue-M/-CM/-HM/-CHM sensors

Product Description

The Allure EC-Smart-Vue Series is designed to interface with Distech Controls' ECL series LonWorks® Controllers, ECB series BACnet® Controllers and ECLYPSE™ series BACnet/IP and Wi-Fi Controllers.

This line of communicating sensors with backlit display consists of eight models that provide precise environmental zone control. Models are available with any combination of the following: temperature, humidity, CO_2, and motion sensor.

General Installation Requirements

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

- ☐ Upon unpacking, inspect the contents of the carton for shipping damages. **Do not install a damaged device.**
- ☐ Allow for proper clearance around the device's enclosure and wiring terminals to provide easy access for hardware configuration and maintenance.
- ☐ Ensure proper ventilation of the device and avoid areas where corroding, deteriorating or explosive vapors, fumes or gases may be present.

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

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.

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.
- ☐ Comply with all network and power supply guidelines outlined in the Network Guide.
- ☐ Use the screws, wall anchors, and wire nuts included for wall mounting and wiring.

Mounting Instructions

The Allure Allure EC-Smart-Vue has been specially designed for easy installation. However, certain conditions apply when choosing a suitable location for the device:

- ☐ Install the device in a location of average temperature approximately 5 ft (1.5 m) above the floor
- ☐ The device should not be installed on an exterior wall.
- ☐ The device should not be installed near a heat source.
- ☐ The device should not be installed near an air discharge grill.
- ☐ The device should not be installed in a place where it can be affected by the sun.
- ☐ Install the device in an area that provides proper device ventilation. Nothing must restrain air circulation to the device.

⚠ The Allure Allure EC-Smart-Vue has not been designed for outdoor use.

Mounting hardware with a separate sub-base is provided with the device for installation on dry wall or on an electrical junction box.

Wall Mounting Installation Procedure

The Allure EC-Smart-Vue can be mounted on a dry wall using supplied screws.

1. Remove the security screw from the device (See Device Mounting [pg. 3]).
2. Open the device by pressing in the two (2) tabs on the bottom of the device and pulling the bottom side of the front plate out.
3. Set any jumpers (see Connector and Jumper Location, Identification and Configuration [pg. 3]).
4. Pull all cables 6" (15cm) out of the wall, and insert them through the central hole of the back plate.
5. Align the back plate with the wall and mark the location of the mounting holes on the wall. Make sure to orient the proper side of the back plate facing upwards.
6. Remove the back plate and drill holes in the wall if necessary.
7. Install anchors in the wall if necessary.
8. Make sure that the mounting surface is flat and clean.
9. Screw the back plate onto the wall. Do not over tighten.
10. Plug the wire(s) into the connector(s).Gently push excess wiring back into the wall.
11. Reattach the front plate and make sure it clips tightly into place.
12. Install security screw.

Device Dimensions

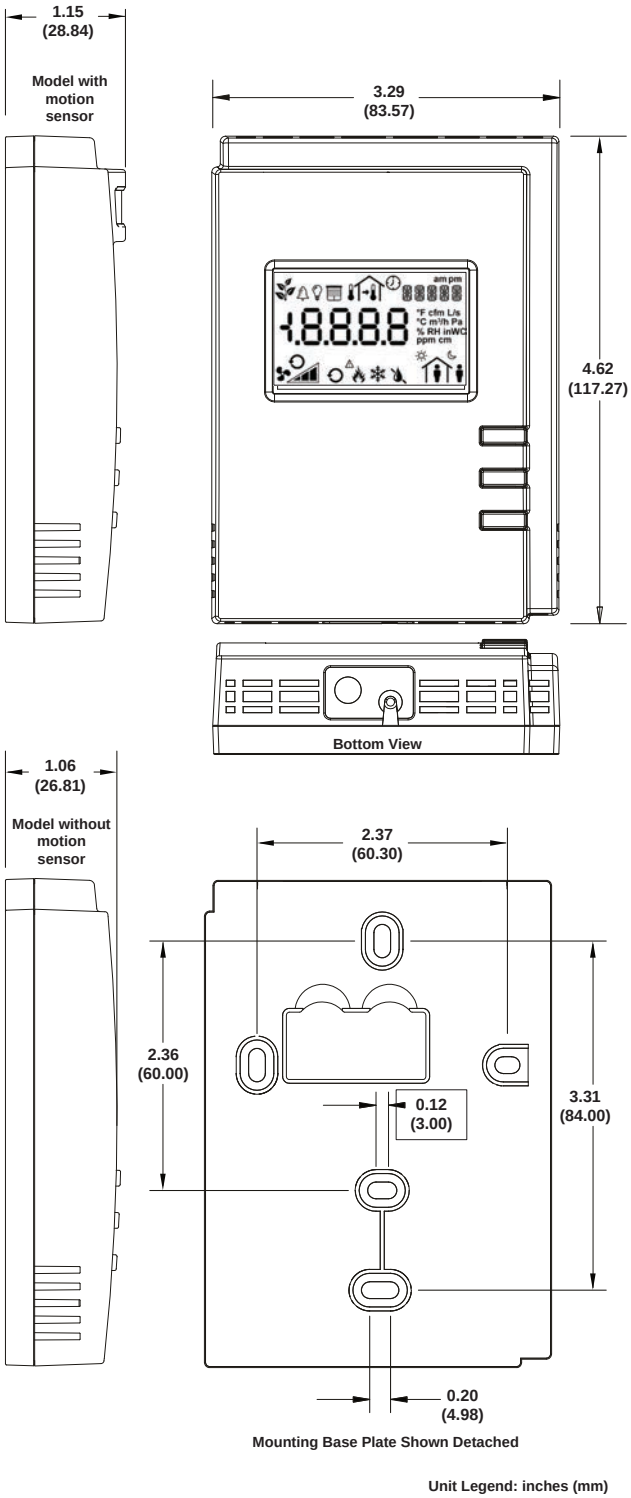


Figure 2: Front view, bottom view, back plate, and side view for models with and without motion sensor.

Device Mounting

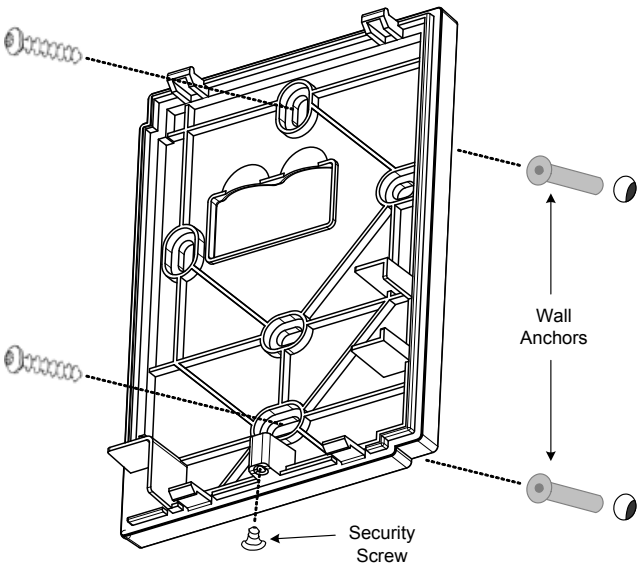


Figure 3: Mounting an Allure EC-Smart-Vue Sensor

Connector and Jumper Location, Identification and Configuration

Allure EC-Smart-Vue sensors have the following onsite configurable jumpers.

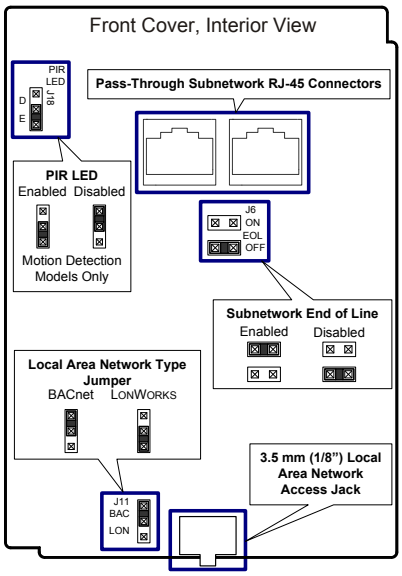


Figure 4: Connector and Jumper Locations

About an Allure EC-Smart-Vue Sensor Equipped with a CO_2 Sensor

The Allure EC-Smart-Vue C/-CM/-CH/-CHM sensors are factory calibrated to accurately read CO_2 concentration levels at sea level. When these Allure EC-Smart-Vue sensors are used in locations where the elevation is greater than 500ft (152m) above sea level, you must set the **Elevation** input of the corresponding **ComSensor** block in EC-*gfx*Program to the current location's elevation to obtain the most accurate readings.

For more information, refer to the **ComSensor** block section in the EC-*gfx*Program User Guide

Under normal conditions, an Allure EC-Smart-Vue sensor with CO_2 sensor will typically reach its operational accuracy after 25 hours of continuous operation on the condition that it was exposed to ambient air reference levels of 400 ppm ±10 ppm CO_2.

Supported Quantity

The Allure EC-Smart Vue sensor connects to the controller's **Subnet Port**. Other expansion modules may also be connected to this port in a daisy-chained fashion (see the controller's datasheet for compatibility information and supported quantities).

Each controller supports a maximum number of Allure EC-Smart Vue sensors. The Subnet ID of all Allure EC-Smart Vue sensors must be set to be within the shown addressing range.

Series	Maximum Number of Allure EC-Smart-Vue sensors[1]	Permitted Subnet ID Addressing Range
ECB-VAV ECL-VAV ECY-VAV ECY-VAV-PoE	Up to 4[2]	1 to 4
ECB-VAV-O ECL-VAV-O ECB-VAVS ECL-VAVS ECB-VVTS ECL-VVTS ECB-VAV-N ECL-VAV-N ECB-PTU Series ECL-PTU Series ECB-103 ECL-103 ECB-203 ECL-203	4	1 to 4
ECB-300 ECL-300 ECB-400 Series ECL-400 Series ECB-600 Series ECL-600 Series ECY-S1000 Series	12	1 to 12

Table 1: Number of Allure EC-Smart-Vue sensors supported by controller model

1. A controller can support a maximum of two (2) Allure EC-Smart Vue sensor models equipped with a CO2 sensor. Any remaining connected Allure EC-Smart Vue sensor models must be without a CO2 sensor.
2. See the room device calculator spreadsheet available for download from our website to know the permitted quantities according to the controller model: VAV Smart Room Control Device Calculator.xlsm.

About the Subnetwork Bus

The ECB-600 and ECL-600 controllers use the Subnetwork bus to support the ECx-400 Series I/O Extension Modules through the controllers **Subnet+** and **Subnet-** terminals with 2-wire shielded cable.

The ECB-600 and ECL-600 controllers also use the Subnetwork bus to support one or more Allure Series(s) using standard structural (Cat 5e) cabling.

Subnetwork Bus Total Length

The total maximum length of all Subnetwork buses, including both the length of the Allure Series Communicating Sensor Subnetwork bus and the ECx-400 Series Subnetwork bus is 300 m (1 000 ft). The maximum length of the Allure Series Communicating Sensor Subnetwork bus is 200 m (650 ft). The maximum length of the ECx-400 Series Subnetwork bus is 300 m (1 000 ft).

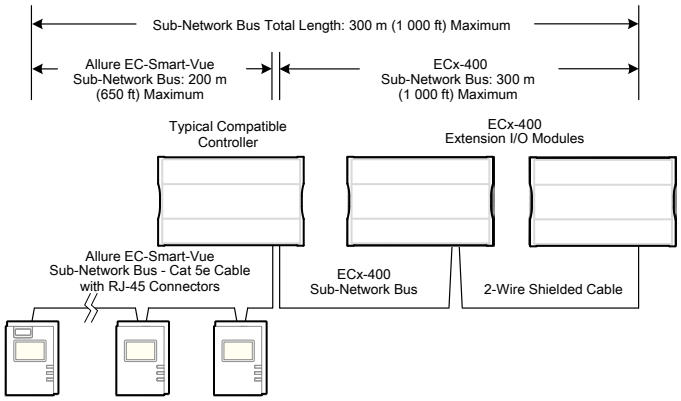


Figure 5: Subnetwork Bus Overview Showing the Allure EC-Smart-Vue Subnetwork Bus and the ECx-400 Series Subnetwork Bus.

A controller can support a maximum of two Allure EC-Smart-Vue sensor models equipped with a CO_2 sensor; the remaining connected models must be without a CO_2 sensor. See Table 1 for the quantity of room devices supported by each controller model.

For instance, if the controller model supports a subnetwork with 12 Allure EC-Smart-Vue sensors in total, then 10 sensor models must be without a CO2 sensor and the other two can be equipped with a CO2 sensor. To ensure proper operation, it is recommended to distribute the sensors throughout the length of the subnetwork.

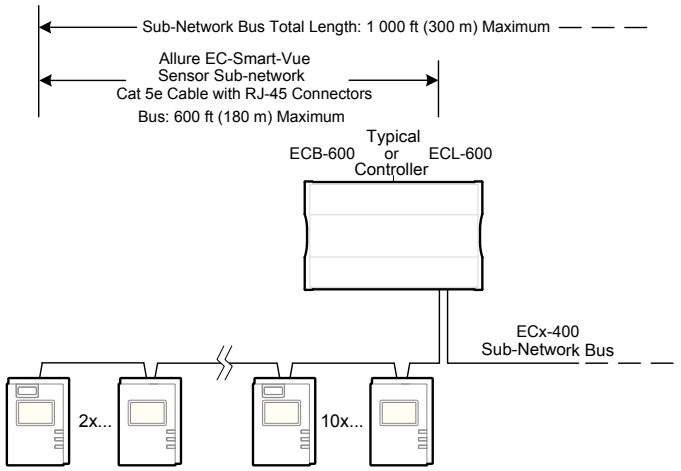


Figure 6: Allure EC-Smart-Vue Sensor Subnetwork Length and Distribution

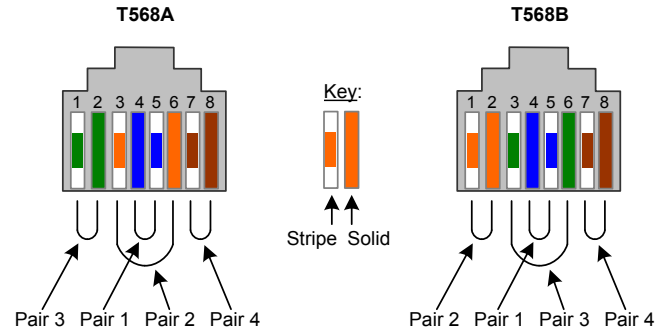
For ECB/ECL-PTU Series controllers, the maximum length between two consecutive devices on the sub-network bus is 100 feet (30 m).

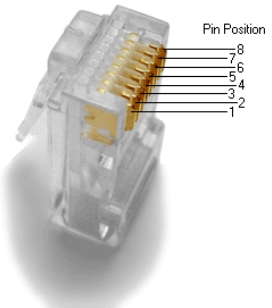
Connection Cable

Connect the device to the controller's Subnet Port with a standard Cat 5e Ethernet patch cable fitted with RJ-45 connectors.

If you make your own patch cable, use Cat 5e cable and crimp the RJ-45 connectors at both ends of the cable either as T568A or T568B.

Pin	T568A (at both cable ends)		T568B (at both cable ends)	
	Pair	Color	Pair	Color
1	3	white/green stripe	2	white/orange stripe
2	3	green solid	2	orange solid
3	2	white/orange stripe	3	white/green stripe
4	1	blue solid	1	blue solid
5	1	white/blue stripe	1	white/blue stripe
6	2	orange solid	3	green solid
7	4	white/brown stripe	4	white/brown stripe
8	4	brown solid	4	brown solid





Patch cables fitted with connectors supplied by Distech Controls are wired as T568B.

Subnetwork Bus Topology and EOL Terminations

Only a daisy chain topology is acceptable for the room device subnetwork bus. T connections are not allowed.

Some controller models support the connection of other devices to the **Subnet Port** as part of the Smart Room Control solution (see the controller's datasheet for more information).

For non ECB-600 or ECL-600 Series controllers, only the EOL terminations of the last subnetwork bus device are set to ON. All other subnetwork bus devices must have their EOL terminations set to OFF. The controller must be the first device on the Cat 5e Cable Subnetwork bus as its internal EOL termination is permanently enabled.

See Table 1 for the number of Allure EC-Smart-Vue sensors that a given controller model can support.

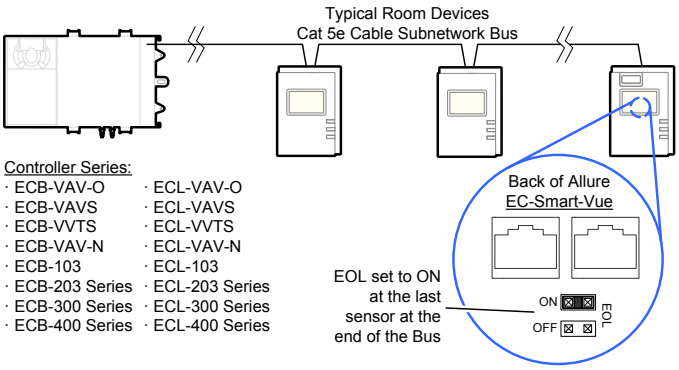


Figure 7: Setting the EOL Terminations on the Allure EC-Smart-Vue Sensor for non ECB-600 or ECL-600 series, non-Smart Room Control controllers

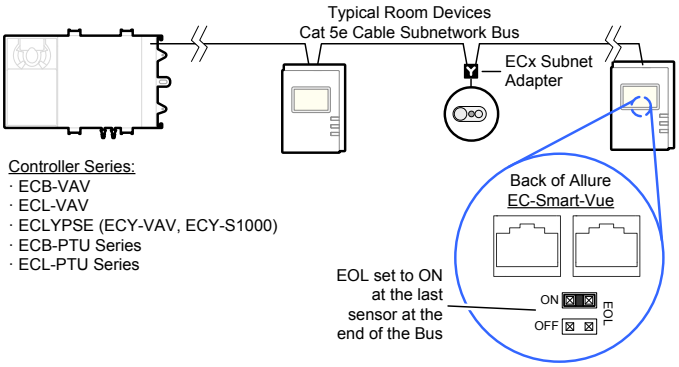


Figure 8: Setting the EOL Terminations on the Allure EC-Smart-Vue Sensor for Smart Room Control-compatible controllers

When one or more Allure EC-Smart-Vue sensors are installed with an ECB-600 or ECL-600 (without an ECx-4xx IO Extension Module), only the EOL terminations on the ECB-600 / ECL-600 and the last Allure EC-Smart-Vue sensor are set to ON. All other Allure EC-Smart-Vue sensors must have their EOL terminations set to OFF.

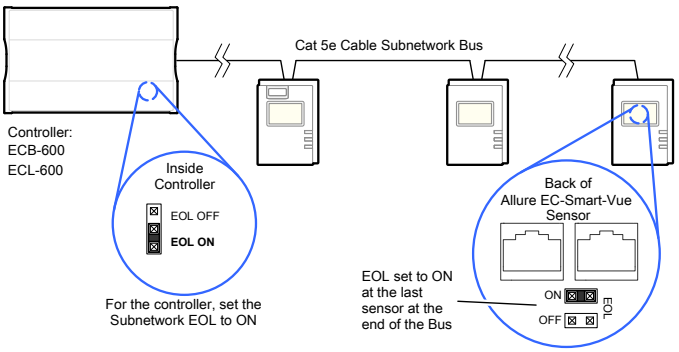


Figure 9: Setting the EOL Terminations on the Allure EC-Smart-Vue Sensor for ECB-600 or ECL-600 Series controllers

When ECx-400 Series I/O Extension Modules are installed with an ECB-600 or ECL-600 Series controller and with Allure Series Communicating Sensors, only the EOL terminations on the last I/O Extension Module and the last Allure Series Communicating Sensor are set to ON. The ECB-600 / ECL-600 and all other I/O Extension Modules and Allure Series Communicating Sensor s must have their EOL terminations set to OFF.

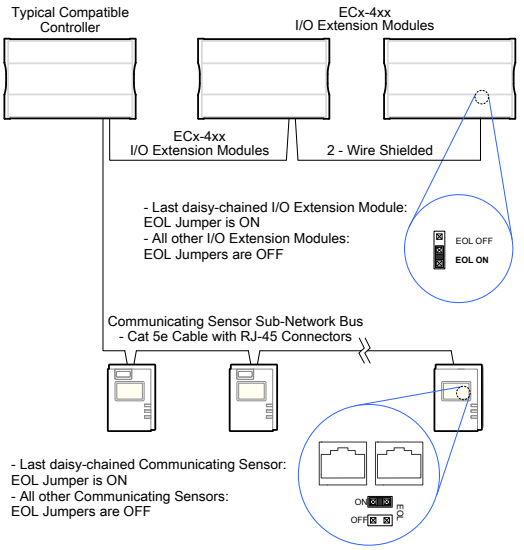


Figure 10: Setting the EOL Terminations on the ECx-400 Series Subnetwork Bus when Allure EC-Smart-Vue Sensors are used

ECx-400 Series devices and Allure EC-Smart-Vue sensors are factory-set with the EOL set to OFF by default.

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

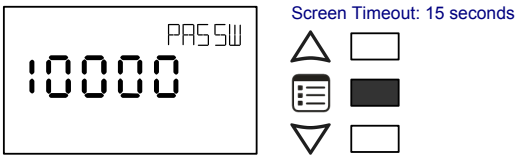
For more information and detailed explanations on network topology and wire length restrictions, refer to the Network Guide, which can be downloaded from our website *www.distech-controls.com*.

Setting the Communicating Sensor Subnet ID

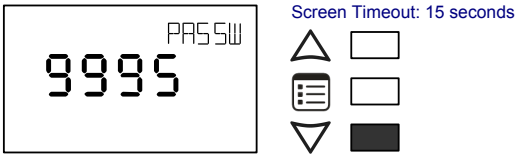
Controllers can be commissioned with an Allure EC-Smart-Vue sensor.

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:

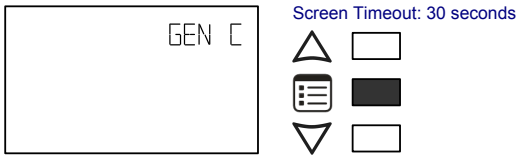
1. Connect an an Allure EC-Smart-Vue Series Communicating Sensor to the controller with a Cat 5e patch cable. Wait for the Bell icon and the number 1 to flash on the display.
2. Press and hold the Menu button for 5 seconds to enter the password menu. 10000 is shown on the display.



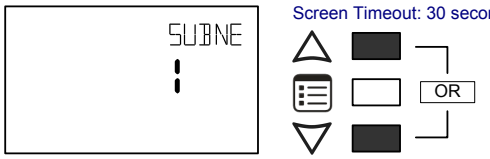
3. Press the down button to set the number to 9995 (this is the default password).



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 Controllers

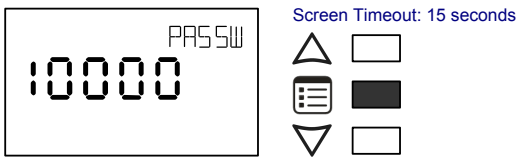
For ECB series controllers: to commission a controller with a MAC Address DIP switch located on the faceplate or under the cover in the case of an ECB-VAV Series controller, first set the DIP switch to 0 (all off). When using an Allure EC-Smart-Vue sensor for commissioning a controller (before code is downloaded to the controller from EC-*gfx*Program), connect an Allure EC-Smart-Vue sensor to the controller with its Subnet ID set to 1. (see Setting the Allure EC-Smart-Vue Sensor Subnet ID).

For controllers embedding a pre-loaded application, commissioning can be used to perform application selection if needed. Pre-loaded applications are factory-loaded programs that enable the controller to control a typical equipment. See the Pre-Loaded Application User Guide for more information.

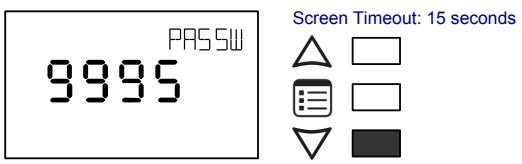
For ECB Series controllers only, during commissioning, the Allure EC-Smart-Vue sensor is used to set the controller's BACnet® MAC Address. Set the connected ECB Series controller's MAC Address as follows:

Set the connected controller's MAC Address as follows:

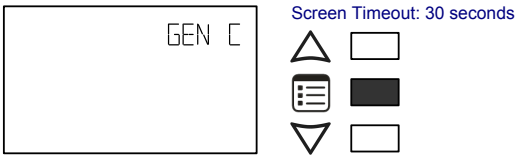
1. Connect an Allure EC-Smart-Vue Series Communicating Sensor to the controller with a Cat 5e patch cable. Wait for the display to show the room temperature.
2. Press and hold the Menu button for 5 seconds to enter the password menu. 10000 is shown on the display.



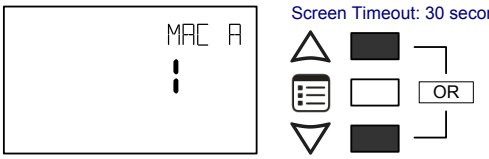
3. Use the down button to set the number to 9995 (this is the default password).



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. The **MAC ADDRESS** menu is shown with the current controller's BACnet MAC Address.



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**.

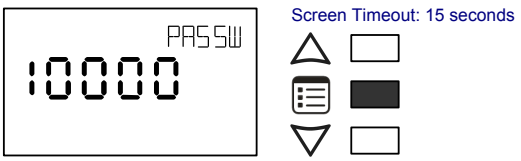
Setting the BAUD Rate (optional – ECB series controllers only)

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).

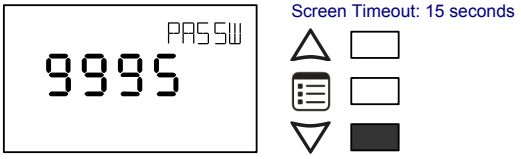
⚠ When the Baud rate is set to AUTO, the controller cannot initiate any communication until it has detected the baud rate of the BACnet MS/TP network. If all controllers on the BACnet MS/TP network are set to AUTO, then all controllers will not communicate.

Set the connected controller's BAUD rate as follows:

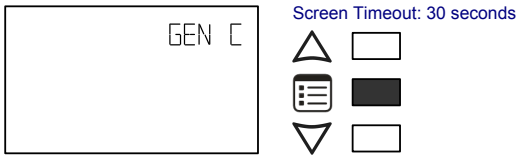
1. Connect an Allure EC-Smart-Vue Series Communicating Sensor sensor to the controller with a Cat 5e patch cable. Wait for the display to show the room temperature.
2. Press and hold the Menu button for 5 seconds to enter the password menu. 10000 is shown on the display.



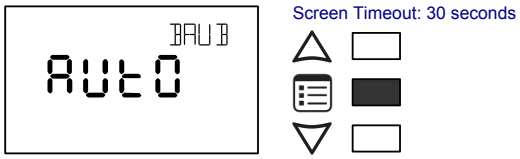
3. Use the down button to set the number to 9995 (this is the default password).



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.

Set the LAN Type

Set the BAC/LON jumper for the type LAN in use: BAC for a BACnet network, LON for a LonWorks network.

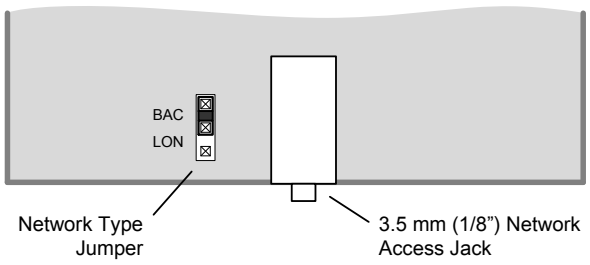


Figure 11: BAC/LON Jumper Set to the BAC (BACnet) Position when used with ECBSeries Controllers

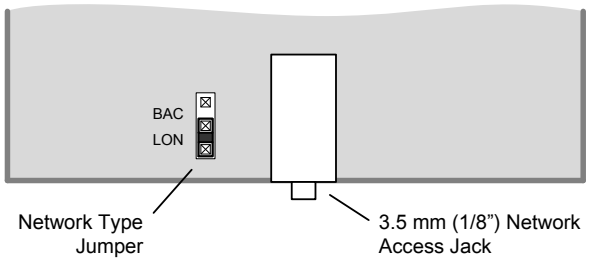
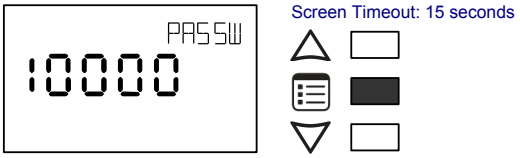


Figure 12: BAC/LON Jumper: Set to the LON (LonWorks) Position when used with ECL Series Controllers

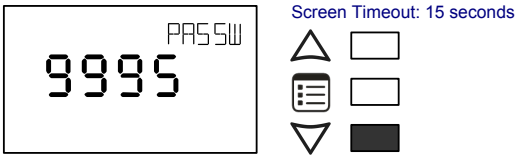
Setting Up an Allure EC-Smart-Vue Sensor Equipped with a Motion Sensor

The following procedure describes how to commission and test an Allure EC-Smart-Vue sensor equipped with a motion sensor as well as adjust the motion sensitivity (Allure EC-Smart-Vue M/-CM/-HM/-CHM sensors).

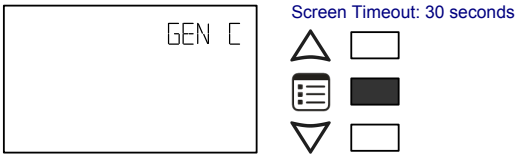
1. Connect an Allure EC-Smart-Vue sensor equipped with a motion sensor to the controller with a Cat 5e patch cable.
2. After a 30-second warm-up period, if movement is detected, the motion sensor light will turn on.
3. To test the sensor functionality, aim the sensor in the direction you want to detect motion and walk at a normal pace across the typical detection zone and verify that the sensor light turns on. The light will turn on and after 2 seconds of non-movement, the motion sensor light will turn off.
4. Now to set the motion sensitivity, on the Allure EC-Smart-Vue sensor, press and hold the **Menu** button for 5 seconds to enter the password menu. 10000 is shown on the display.



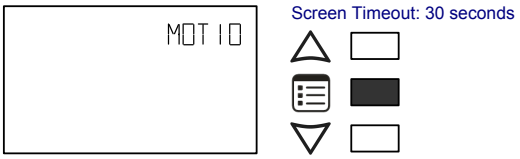
5. Press the down button to set the number to 9995 (this is the default password).



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



7. To enter the **GEN CFG** submenu, press the down button once.
8. Press the **Menu** button several times until **MOTION SENSITIVITY** appears on the display. The current motion sensitivity level is shown.



9. Use the up and down buttons to set the motion sensitivity level to 0 (low), 1 (medium - typical default setting), or 2 (high). The default and recommended level of sensitivity is medium (1) and should typically work with all installations. This setting should not be changed unless for some reason you are experiencing false detections, then a low sensitivity (0) setting may be used, or if working with larger room installations a high sensitivity (2) setting can be used.
10. Press the Menu button once to apply the value.
11. Press and hold the Menu button for 5 seconds to exit the configuration menu.

⚠ The motion indicator LED provides a visual confirmation of motion detection. By default, the indicator (PIR LED jumper) is enabled. If you wish to disable it, set jumper J18 to Disabled. See Connector and Jumper Location, Identification and Configuration [pg. 3].

BACnet Network Access from the Sensor

To temporarily access the BACnet MS/TP LAN for commissioning and maintenance purposes (not available with either the ECB-PTU series controllers or the ECLYPSE series controllers), connect a BACnet MS/TP Adaptor to the audio plug port located on the lower edge of the Allure EC Smart Vue sensor. Wire a standard ⅛" (3.5 mm) three-conductor stereo jack as shown below.

The BACnet MS/TP Adaptor must have an electrically-isolated RS-485 port. Otherwise a ground path from the BACnet network will be made through the computer that will disrupt BACnet network communications.

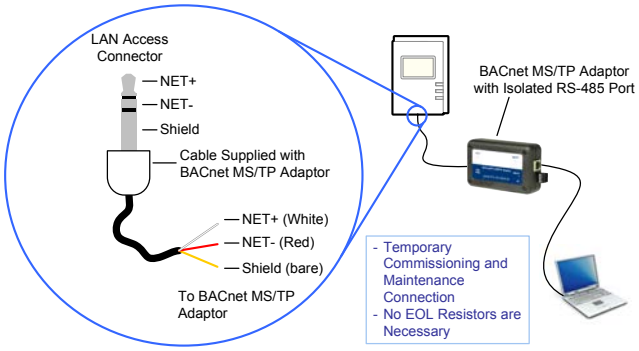


Figure 13: ⅛" (3.5 mm) Stereo Jack Connection for a Portable Router

LonWorks Network Access from the Sensor

For commissioning and maintenance purposes, the LonWorks network is optionally available from the Allure EC-Smart-Vue sensor audio plug port (not available with ECL-PTU series controllers).

Setting the two (2) Net to Subnet Port Settings jumpers inside the ECL Series controller to Enable will connect the main LonWorks network to the Allure EC-Smart-Vue sensor subnetwork Cat 5e cable.

Recommendation: Only a limited number of controllers on a LonWorks network segment should have their **Net to Subnet Port Settings** jumpers enabled. Enabling too many Allure EC-Smart-Vue sensors with network access may cause network communication issues. If there are any network communication problems, see the *Troubleshooting* section in this document.

The Cat 5e cable length is restricted by the maximum allowable subnetwork bus length (see Subnetwork Bus Total Length [pg. 4]). The standard **Net to Subnet Port Settings** jumper setting is **Disable**.

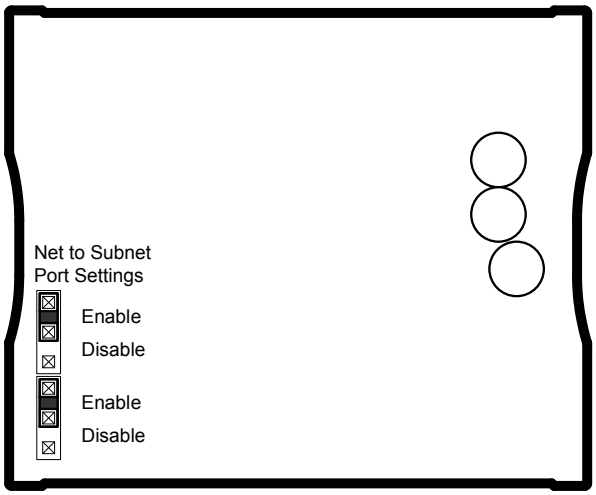


Figure 14: ECL Series controller: Net to Subnet Port Settings Jumpers

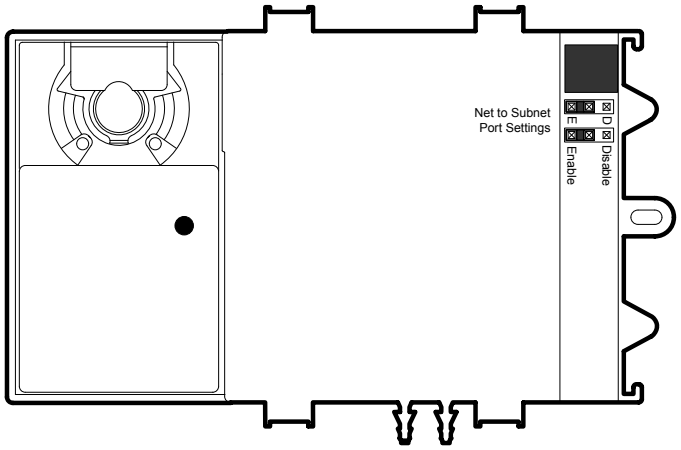


Figure 15: ECL-VAV Series controller: Net to Subnet Port Settings Jumpers

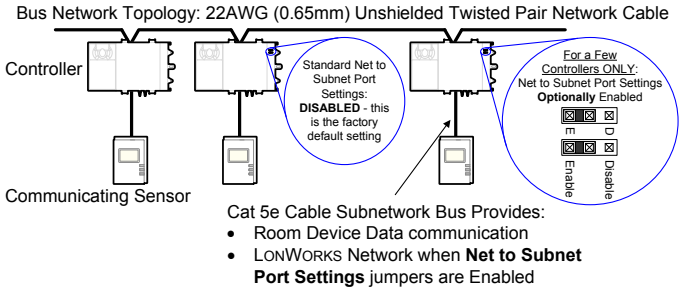


Figure 16: LonWorks Network: Bus Topology

To temporarily access the LonWorks LAN for commissioning and maintenance purposes, connect a LonWorks USB network interface to the audio plug port located on the lower edge of the Allure EC-Smart-Vue sensor. Wire a standard ⅛" (3.5 mm) three-conductor (stereo jack) or two-conductor (mono jack) as shown below.

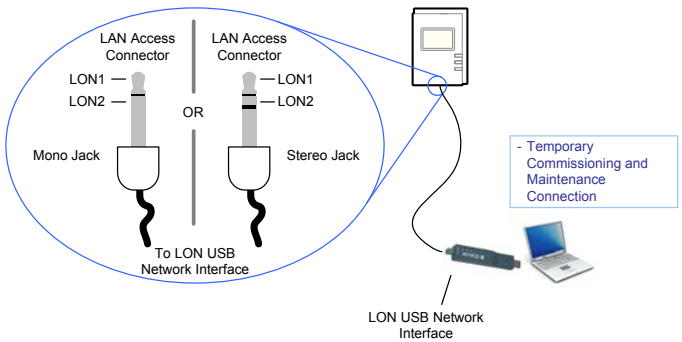


Figure 17: ⅛" (3.5 mm) Stereo or Mono Jack Connection for a LonWorks Network Interface

Troubleshooting

Allure EC-Smart-Vue sensor's screen is blank & back light is on for about 30 to 45 seconds – Normal Operation		
Firmware upgrade in progress	Wait for the upgrade to complete. Do not disconnect the sensor from the controller as the upgrade will restart once it is reconnected.	
Allure EC-Smart-Vue sensor's screen is blank & back light is off		
Is the Allure EC-Smart-Vue sensor connected to the controller?	Verify that the Allure EC-Smart-Vue sensor is connected to the controller and that the patch cables are plugged into the connectors. Refer to Wall Mounting Installation Procedure for more information.	
Is power being supplied to the controller?	There may be no power being supplied from the controller. Check if the controller has power or if the controller's internal fuses have blown or tripped.	
Is the cable connected to the controller and Allure EC-Smart-Vue sensor?	Verify wiring.	
Was the patch cable made onsite?	Verify that the RJ-45 crimp connectors were installed on the cable correctly. See Connection Cable [pg. 4].	
Device not communicating with controller		
Is the address correctly set to a unique address?	Each Allure EC-Smart-Vue sensor must be set to a unique address for each controller. See Setting the Communicating Sensor Subnet ID [pg. 5].	
Is the device too far from controller?	Verify the distance between the device and the controller. See Subnetwork Bus Total Length [pg. 4].	
Is there a configuration problem?	With EC-*gfx*Program, check the configuration of the sensor; for example, is it enabled? Refer to the EC-*gfx*Program User Guide for more information.	
Have the subnetwork EOL settings been correctly set?	Only the last Allure EC-Smart-Vue sensor must have its EOL termination set to ON. See Figure 10 and Figure 12. When one or more ECx-400 Series IO Extension modules are connected to the controller, only the last ECx-400 must have its EOL termination set to ON. See Figure 13.	
Controller cannot communicate on the LonWorks network		
Too many Allure EC-Smart-Vue sensors are providing network access	Disable the **Net to Subnet Port Settings** jumpers on all controllers (for jumper location, see Connector and Jumper Location, Identification and Configuration [pg. 3]). If communications are re-established, re-enable only a few Allure EC-Smart-Vue sensors to have network access.	
Allure EC-Smart-Vue sensor's motion detector window indicator is always ON and the Motion output of the associated ComSensor block always reads NULL in EC-*gfx*Program		
Does the connected controller have Allure EC-Smart-Vue sensor firmware that supports the motion sensor?	When the Allure EC-Smart-Vue sensor is connected to a controller, its firmware is loaded from the controller. In this case, the controller has an earlier version of Allure EC-Smart-Vue sensor firmware that does not support the motion sensor. To upgrade to the latest Allure EC-Smart-Vue sensor firmware, download the firmware from SmartInstaller and refer to the firmware upgrade procedure in the EC-*gfx*Program User Guide.	
The CO_2 output of the associated ComSensor block always reads NULL in EC-*gfx*Program		
Does the connected controller have Allure EC-Smart-Vue sensor firmware that supports the CO_2 sensor?	When the Allure EC-Smart-Vue sensor is connected to a controller, its firmware is loaded from the controller. In this case, the controller has an earlier version of Allure EC-Smart-Vue sensor firmware that does not support the CO_2 sensor. To upgrade to the latest Allure EC-Smart-Vue sensor firmware, download the firmware from SmartInstaller and refer to the firmware upgrade procedure in the EC-*gfx*Program User Guide.	
The CO_2 sensor readings are too high, too low, or inconsistent between sensors		
Immediately after installing the Allure EC-Smart-Vue sensor with CO_2 sensors, are the CO_2 sensor readings incoherent?	If the CO_2 sensor readings seem unusual or show inconsistencies between sensors in the same building right after installation, the following reasons should be taken into consideration: ☐ Concentration levels in each space may be different ☐ The installer may have unintentionally blown into the sensor while installing it. ☐ The sensor may have been dropped or mishandled during shipment causing a minor shift in the original factory calibration. Allow up to 14 days of operation (without power interruptions) for the sensor to calibrate itself according to its new environment.	
Error Code Interpretation		
Clock icon flashing for 15 seconds	Cannot communicate with controller.	Wait for the communication link to the controller to be established.
After 15 seconds: Flashing error code 1 with Bell icon		Verify wiring
		Verify that all Allure EC-Smart-Vue sensor's Subnet IDs are unique for this controller. See Setting the Communicating Sensor Subnet ID [pg. 5].
Flashing error code 2 with Bell icon	Invalid configuration.	In EC-*gfx*Program, resynchronize the code with the controller. Contact Distech Controls Customer Support.
Flashing error code 3 with Bell icon	Allure EC-Smart-Vue sensor is not properly configured in the controller	With EC-*gfx*Program, check the configuration of the sensor, for example, is the ComSensor block enabled? Refer to the EC-*gfx*Program User Guide for more information.

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Images are simulated. While all efforts have been made to verify the accuracy of information in this manual, Distech Controls is not responsible for damages or claims arising from the use of this manual. Persons using this manual are assumed to be trained HVAC specialist / installers and are responsible for using the correct wiring procedures and maintaining safe working conditions with fail-safe environments. Distech Controls reserves the right to change, delete or add to the information in this manual at any time without notice.
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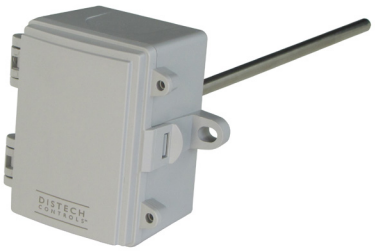
Datasheet

TS-D2X Sensor Series

Duct & Immersion Temperature Sensors, Nema 4X



Overview

TS-D2X Series all-purpose temperature sensors provide precision temperature sensing for ducts. When combined with a TS-TW series S/S thermowell, they can be used to measure liquid temperature in pipes. The TS-D2X single-point temperature sensor uses a precision sensor encapsulated in a 6.00 mm (0.236”) OD, a 304-series stainless steel probe, and it is available in various lengths. All probes provide excellent heat transfer, fast response and resistance to moisture penetration.

Applications

- Used for measuring temperature on: supply and return ducts, supply and return hot water pipes of heating systems, domestic hot water tanks and piping, and supply and return lines in chillers
- Incorporated in chillers to monitor temperature gradients
- Used in heat exchangers and air handling units to provide temperature sensing for control of heating / cooling coils

Features & Benefits

- Economical
- Ease of installation
- Sensors are hermetically sealed
- Proven long stability and performance
- Probes made of corrosion-resistant 304 stainless steel
- Accurate temperature monitoring for increased comfort

Model Selection

		TS-	D	XX	002
Mounting Style	D = Duct / Immesion				
Enclosure	XX = No enclosure 2X = Plastic enclosure, Nema 4X				
Probe Length	002 = 2" (50mm) 004 = 4" (100mm) 006 = 6" (150mm) 008 = 8" (200mm) 012 = 12" (300mm) 018 = 18" (450mm)				

Accessories

Thermal Joint Compound

TS-JC2	Thermal Joint Compound, 2 oz (60ml) Jar
TS-JC5	Thermal Joint Compound, 5 oz (150ml) Tube
TS-JC8	Thermal Joint Compound, 8 oz Jar (240ml)

Thermowells

TS-TWN30402	50mm (2”) 304 SS well, NPT
TS-TWN30404	100mm (4”) 304 SS well, NPT
TS-TWN30406	150mm (6”) 304 SS well, NPT
TS-TWN30408	200mm (8”) 304 SS well, NPT
TS-TWN31602	50mm (2”) 316 SS well, NPT
TS-TWN31604	100mm (4”) 316 SS well, NPT
TS-TWN31606	150mm (6”) 316 SS well, NPT
TS-TWN31608	200mm (8”) 316 SS well, NPT

Product Specifications

Environmental

Operating Temperature	-20ºC to 105ºC; -4ºF to 221ºF
Storage Temperature	-20ºC to 105ºC; -4ºF to 221ºF
Relative Humidity	0 to 95% Non-condensing

Bracket

Material	ABS - UL94-5VB
Color	Black
Shipping Weight	0.20lbs (0.091kg)
Probe Dimension	6.35 mm (0.25”) Diameter

Electrical

Dissipation Factor	2.2mW/K (Thermistor)
Max Power @ 25°C (77°F)	75mW (Thermistor)
Thermal Time Constant	Less than 10s (Thermistor)
Wire Material (TS-DXX Series)	Plenum rated FT-6
Wire Length (TS-DXX Series)	3.05 m (10’)

Temperature Sensor with Enclosure

Sensor Type[1]	10kΩ NTC thermistor, Type 2
Accuracy	±0.2°C; ±0.36°F
Probe Sensing Range	-20 to 105°C (-4 to 221°F)
Probe Material	304 Series Stainless Steel
Probe Dimension	6.00 mm (0.236”) Diameter
Enclosure Type	Material; Grey ABS; UL94-V0, IP65 (NEMA 4X)
Shipping Weight	0.60 lbs (0.2727 kg)

Agency Approvals

Material[2]	UL94-V0

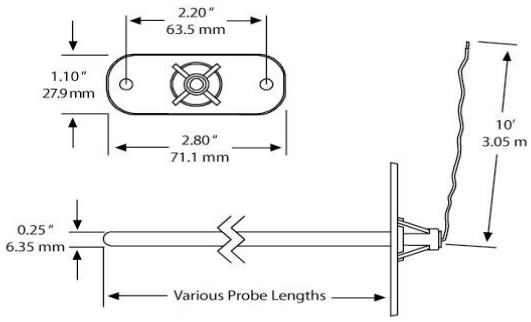
RoHS 2002/95/EC

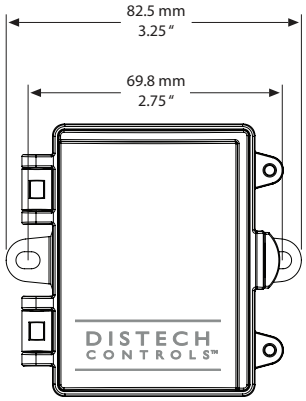
Certified System ISO 9001

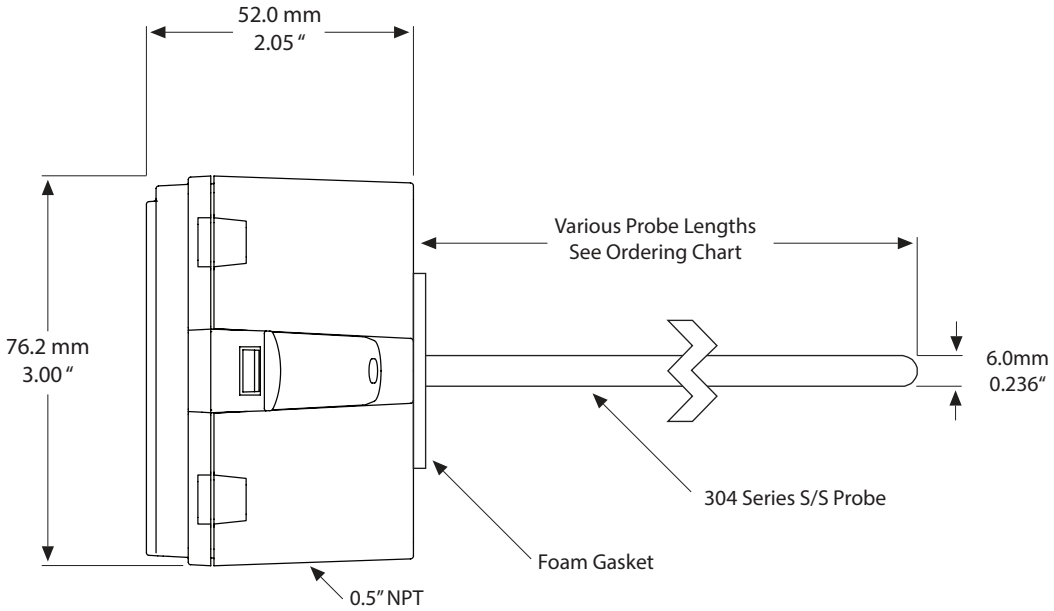
1. Temperature sensor type stated is standard. Other temperature sensor types are available.
2. All materials and manufacturing processes comply with the RoHS directive.

Dimensions

Bracket







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Datasheet

CS-RIBXGTV10

Current Sensors & Switches

Overview

Enclosed, self-powered, split core current sensors (voltage and current output) and switches (fixed and adjustable trip points).

Applications

- General Load Status
- Motor Status
- Lighting Circuit Status
- Detecting Belt Loss

Features & Benefits

- Prepackaged for Convenience
- Adjustable or Fixed Thresholds
- Split Core Models
- Miniature Size

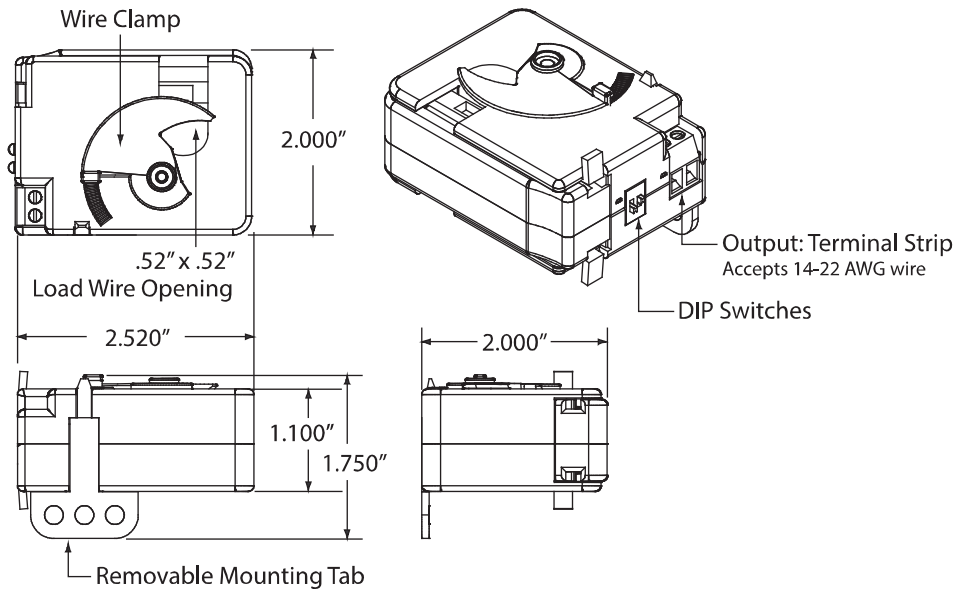
Product Specifications

Operating Temperature	-30 to 140° F
Humidity Range	5 to 95% (non-condensing)
Range	0-20A, 0-50A, 0-100A
Sensor Output	0-10 Vdc
Accuracy	96.8% Full scale
Max Sense Voltage	600 Vac
Approvals	UL Listed, UL916, UL864, California State Fire Marshal, C-UL, CE, RoHS
Mounting/Installation	Removable mounting tab provided The wire clamp locks against the load wire, securing the unit in place
Sensor Type	Split core with voltage output

Range Configuration

DIP Switch		Sensor Range
1	2	
OFF	OFF	0-20 Amp
OFF	ON	0-50 Amp
ON	OFF	0-100 Amp

Dimensions



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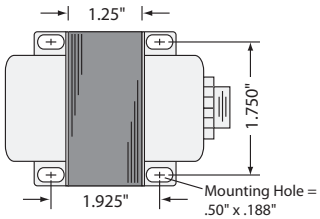
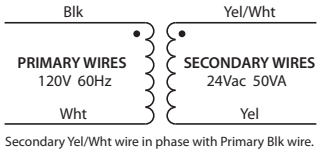
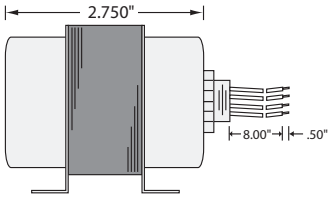
TR50VA001US

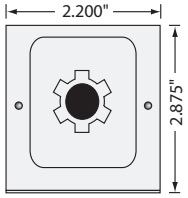
Transformer 50 VA, 120 to 24 Vac, Foot and Single Threaded Hub Mount



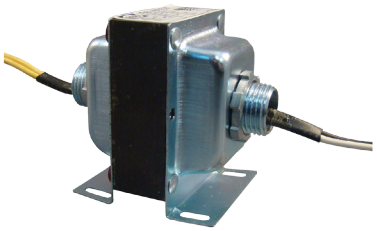


Secondary Yel/Wht wire in phase with Primary Blk wire.





Transformer



c UL us LISTED
Class 2

CE

RoHS

Made in USA
Meets
"Buy American"
of ARRA 2009

Specifications

VA Rating:	50
Frequency:	50/60 Hz
Mounting:	Foot & Single Threaded Hub
Over Current Protection:	3 Amp Fuse
Dimensions:	2.875˝ x 2.200˝ x 2.750˝ (w/ .500˝ NPT Hub)
Wire Length:	8˝ Typical w/ .5˝ Strip
Operating Temperature:	-30 to 140° F
MTBF:	100,000 Hours @ 77° F
Construction:	Split-Bobbin
Weight:	2.14 lbs.
Approvals:	Class 2 UL5085-3 Listed, C-UL, CE, RoHS

DISTECH CONTROLS™

Open System Platforms

TRIDIUM®

niagara4 FRAMEWORK®

BTL BACnet TESTING LABORATORY

MIDDLETON
BUILDING AUTOMATION SERVICES

700 E 17th St,
Little Rock, AR 72206

Prepared By: Middleton Building Automation Dept.

MIDDLETON INC

P.O. BOX 506
BRYANT, AR 72089

Job Number:

Drawings Revision: 0

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1. Title Page
2. Table of Content
3. Bacnet Network 1
4. Bacnet Network 2
5. Typical VAV controller
6. Typical VAV Controler W/ EF

Rockefellar Early Childhood			
Little Rock School District			
MIDDLETON INC			
As Built			
REV: 1	DRAWINGS	5/3/2024	JOB NO: PARTIAL
MIDDLETON BUILDING AUTOMATION SERVICES			DRAWN BY: M.B.A.D.
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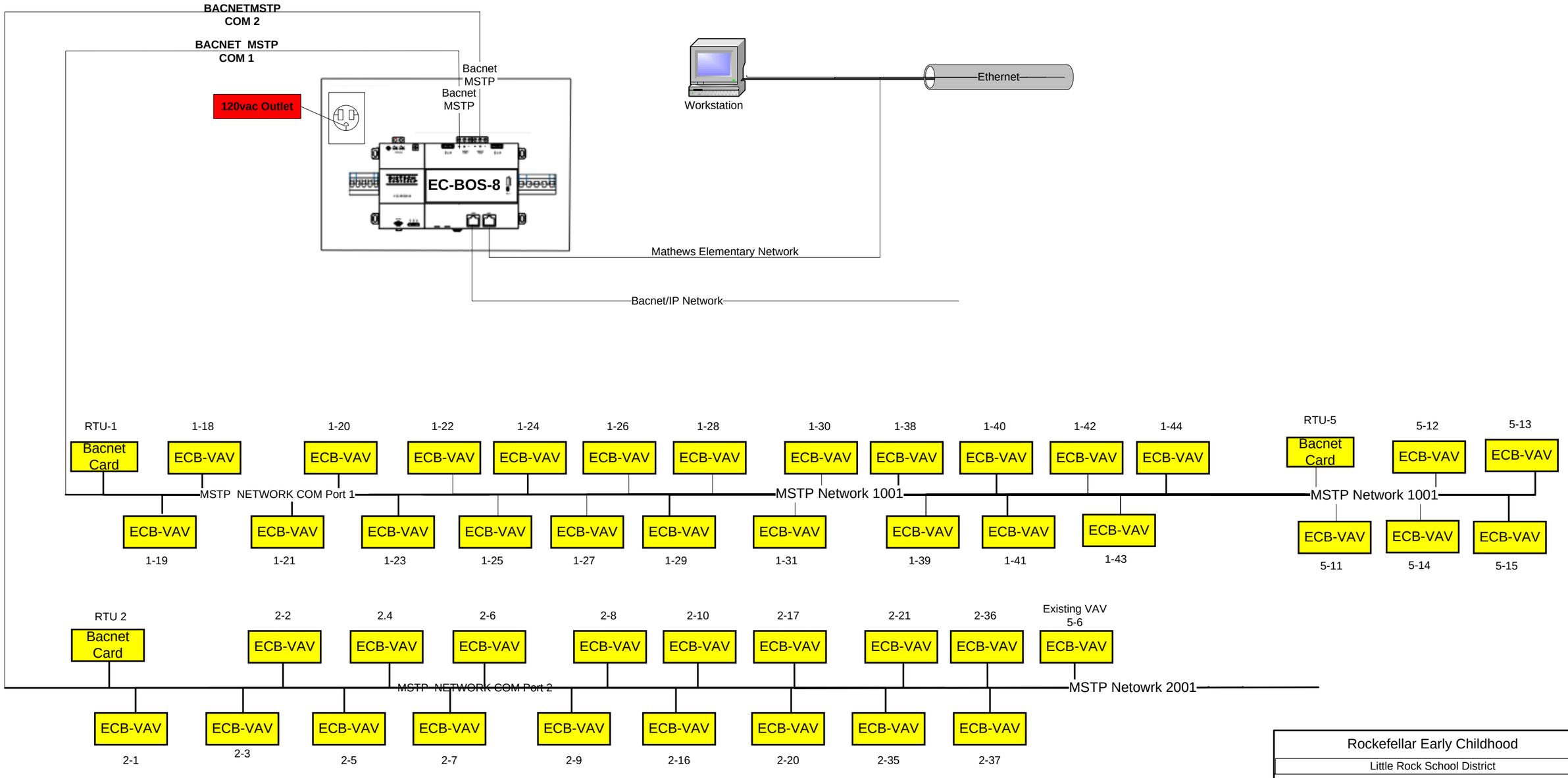
			2 of 7

Network 1



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Little Rock School District			
MIDDLETON INC			
As Built			
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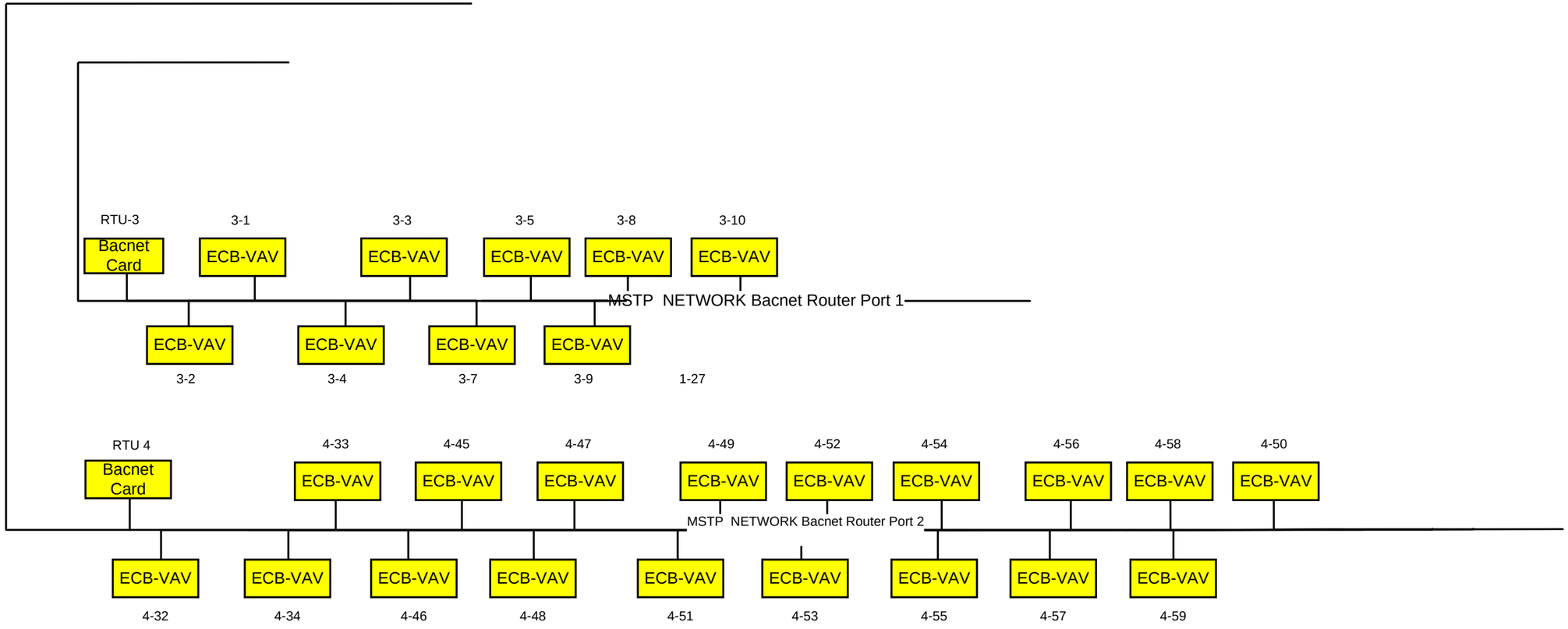
			3 of 7

Network 2



Rockefellar Early Childhood			
Little Rock School District			
MIDDLETON INC			
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MIDDLETON BUILDING AUTOMATION SERVICES			DRAWN BY: M.B.A.D.
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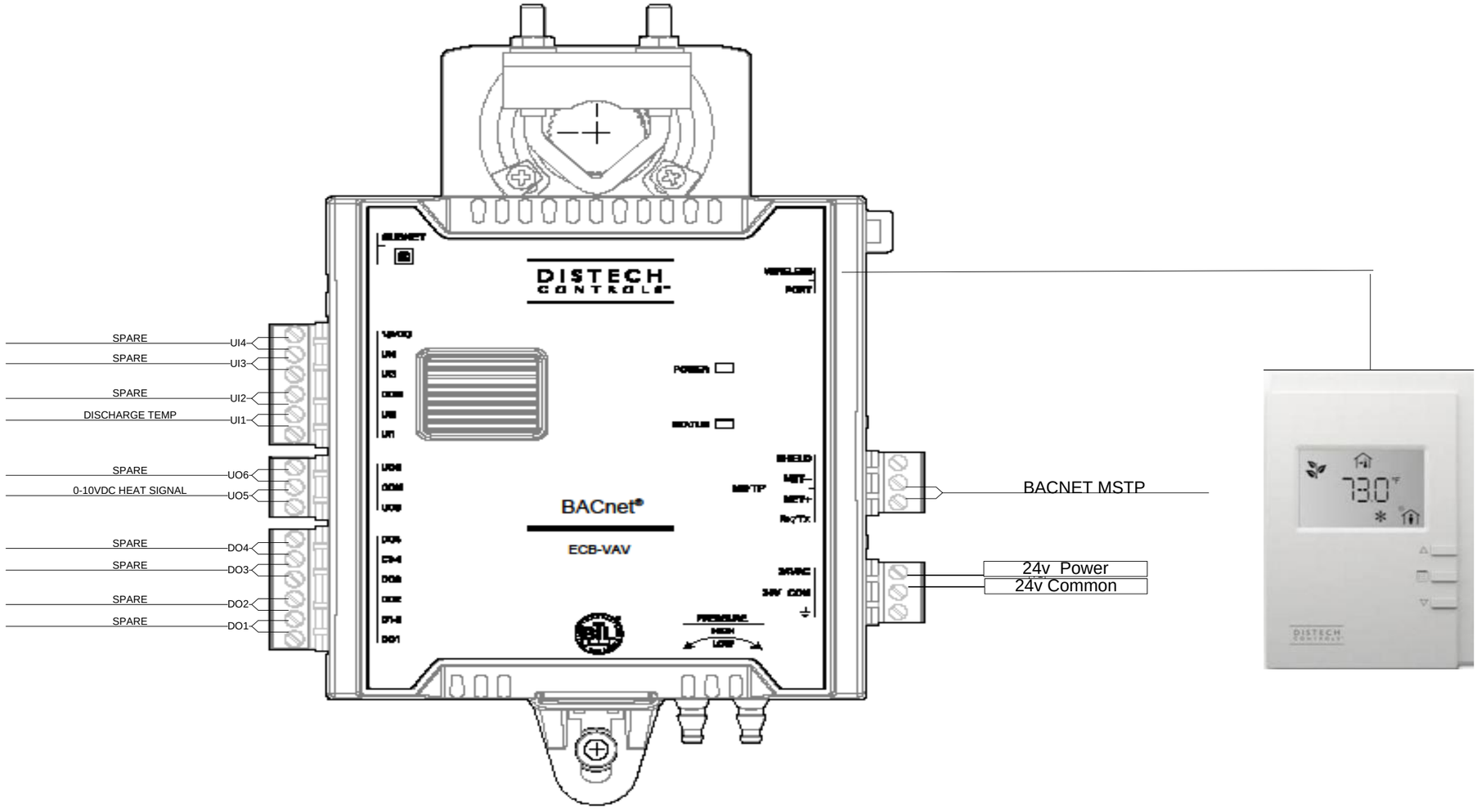
			4 of 7

Typical VAV



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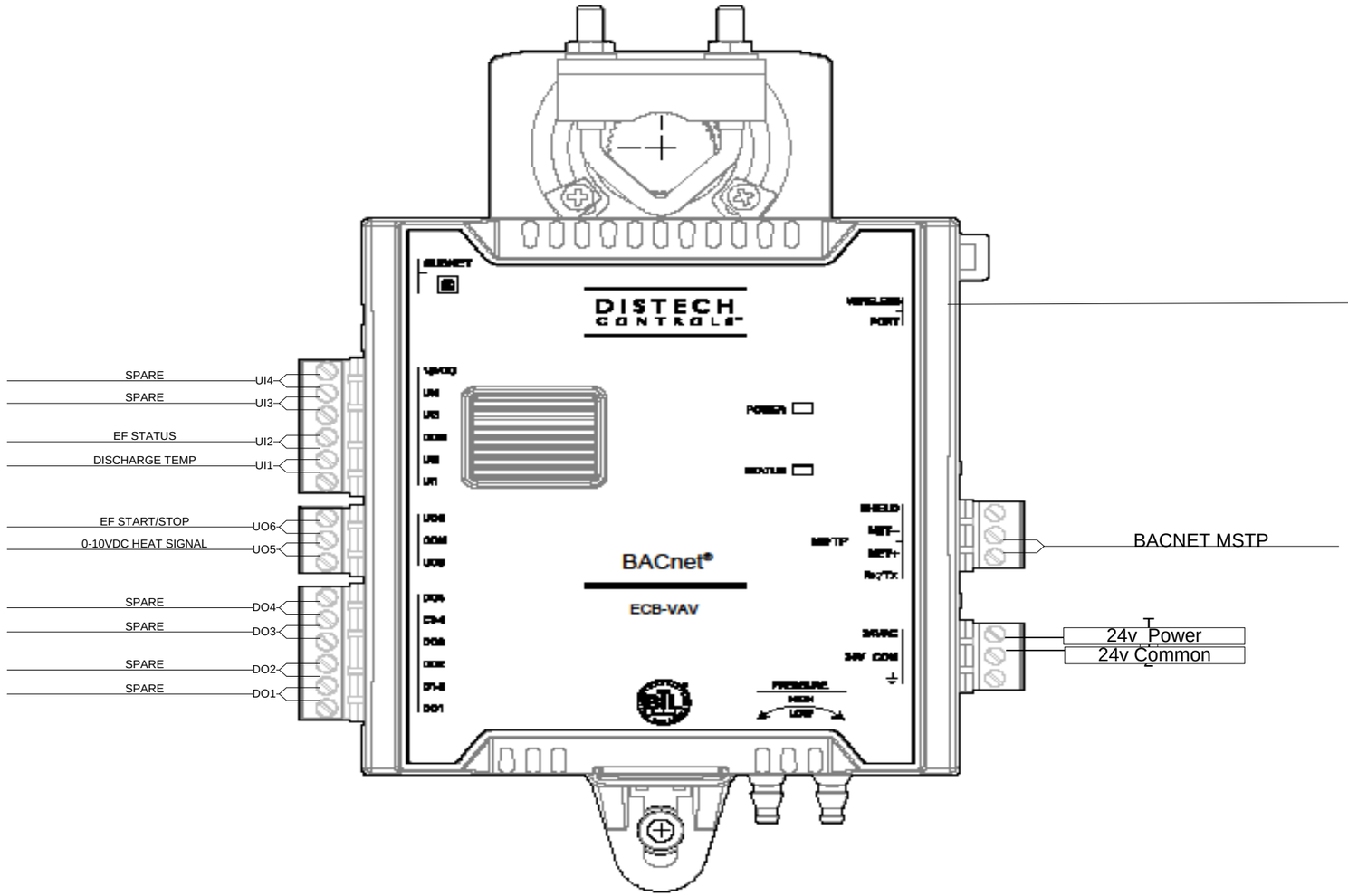
MIDDLETON BUILDING AUTOMATION SERVICES			DRAWN BY: M.B.A.D.
			00
			5 of 7

Typical VAV W/Exhaust Fan

VAV-4,9,12,14,21,29,32,40,41,43,45,46,56,58, & Existing VAV's-3-9,5-6,& 3-10



Rockefellar Early Childhood			
Little Rock School District			
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As Built			
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MIDDLETON BUILDING AUTOMATION SERVICES			DRAWN BY: M.B.A.D.
			00
			6 of 7

RTU's 1 thru 5

These unit were existing units with factory Trane controls with banet card .

Rockefellar Early Childhood			
Little Rock School District			
MIDDLETON INC			
As Built			
REV: 1	DRAWINGS	5/3/2024	JOB NO: PARTIAL
MIDDLETON BUILDING AUTOMATION SERVICES			DRAWN BY: M.B.A.D.
			00
			7 of 7

LETTER OF TRANSMITTAL

TO: *Kinco Constructors*

RE: *LRSD Rockefeller EC Center*

DATE: July 25, 2023

JOB NO.: 22-046

ATTN: Mr. Casey Sowell/ Mr. Andrew McCarty

COPIES	DATE	NO.	DESCRIPTION
1 Emailed	07/19/23	23 09 23-2	HVAC Controls

THESE ARE TRANSMITTED:

[ ]For Approval [ ]As Requested [XX] Reviewed for General Compliance [ ]Resubmit___copies for approval

[ ]For Your Use [ ]For Review and Comment [] Reviewed and Noted [ ]Submit ___copies for distribution

[ ]For Your Information [] Reject, Revise and Resubmit Comments [ ]Return___corrected prints

REMARKS:

COPY TO: Job File

BY: _____

JoAnn White, CIT
Contract Administrator

201 S Chester
Little Rock, AR 72201
501.237.3077

Submittal Comment Sheet

Project Name: Rockefeller Pre-K Renovation

Project Number:22-050
Date Received: 07/19/2023
Date Returned:07/25/2023
Reviewed By: K. Koch

1. Direct Digital Control System for HVAC
    a. Approved

End of Comments

THE CONSULTANTS OF RECORD FOR THIS PROJECT HAVE REVIEWED THESE SHOP DRAWINGS. THE CONSULTANTS' COMMENTS AND REVIEW STAMP ARE APPLICABLE FOR THEIR PORTION OF THE WORK. THE REVIEW AND CHECKING OF THE REFERENCED SUBMITTED DOCUMENTS IS FOR GENERAL CONFORMANCE WITH THE DESIGN INTENT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. REVIEW IS NOT CONDUCTED FOR THE PURPOSE OF DETERMINING THE ACCURACY AND COMPLETENESS OF OTHER DETAILS, SUCH AS DIMENSIONS AND QUANTITIES, FOR SUBSTANTIATING INSTRUCTIONS FOR INSTALLATION OR PERFORMANCE OF EQUIPMENT OR SYSTEMS, OR FOR COORDINATION OF THE WORK OF ALL TRADES, ALL OF WHICH REMAIN THE RESPONSIBILITY OF THE CONTRACTOR AS REQUIRED BY THE CONTRACT DOCUMENTS. CONTRACTOR IS RESPONSIBLE FOR ALL QUANTITIES.

Submittal #23 09 23-1.0
23 09 23 - DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

Central Arkansas
12600 Lawson Road
Little Rock, Arkansas 72210
Phone: (501) 225-7606
Fax: (501) 225-1028

Project: 23.1004 - 23.1004 LRSD Rockefeller Early Childhood Center
(WDD #22-046)
700 East 17th Street
Little Rock, 72206

HVAC Controls

SPEC SECTION:	23 09 23 - DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC	**SUBMITTAL MANAGER:**	Andrew McCarty **(Kinco Constructors, LLC)**
STATUS:	Open	**DATE CREATED:**	07/19/2023
ISSUE DATE:	07/19/2023	**REVISION:**	0
RESPONSIBLE CONTRACTOR:	Comfort Systems USA Arkansas, Inc.	**RECEIVED FROM:**	Matt Aldridge
RECEIVED DATE:		**SUBMIT BY:**	
FINAL DUE DATE:	08/28/2023	**LOCATION:**	
TYPE:	Product Data	**COST CODE:**	
APPROVERS:	JoAnn White **(Wittenberg, Delony & Davidson, Inc)**		

BALL IN COURT:
JoAnn White **(Wittenberg, Delony & Davidson, Inc)**

DISTRIBUTION:

DESCRIPTION:

ATTACHMENTS:
23 09 23-01 Controls.pdf

SUBMITTAL WORKFLOW

NAME	SUBMITTER/ APPROVER	SENT DATE	DUE DATE	RETURNED DATE	RESPONSE	ATTACHMENTS	COMMENTS
Andrew McCarty	Submitter		8/8/2023	7/19/2023	Submitted	23 09 23-1 Controls.pdf	Kinco Reviewed
JoAnn White	Approver	7/19/2023	8/28/2023		Pending		

BY **DATE** **COPIES TO**

ECB-VAV

BACnet B-ASC 12-Point
Programmable VAV Controller

Overview

The ECB-VAV controller is a microprocessor-based programmable variable air volume (VAV) controllers designed to control any variable air volume box. Each controller uses the BACnet® MS/TP LAN communication protocol and is BTL®-Listed as BACnet Application Specific Controllers (B-ASC).

Features & Benefits

- Internal power supply uses power factor correction (PFC) to optimize power usage when multiple controllers are connected at the same power transformer
- Flexible inputs and outputs support all industry-standard VAV unitary applications
- Rugged hardware inputs and outputs eliminate the need for external protection equipment
- Polarity free, on-board airflow sensor for precise airflow monitoring and control at low and high airflow rates
- Built-in actuator with an integrated position feedback system for worry-free operation
- Factory pre-loaded applications allow for out-of-the-box, energy efficient operation of standard VAV equipment
- Optimized air balancing through *my*DC AirBalancing saving time during the commissioning process
- End-to-end solution for support of Smart Room Control of HVAC equipment, lighting and sunblinds
- Supports EC-*gfx*Program, making Building Automation System programming effortless
- Open-to-Wireless™ ready, supporting a wide variety of wireless sensors and switches and helping to reduce installation costs
- Supports the Allure™ Series Communicating Sensors, providing intelligent sensing and environmental zone control

Model Selection

Example: ECB-*VAV (SI)*

ECB-*VAV (IMP) Plenum-rated*

Series	Model	Units	Options
ECB-	*VAV*: 12 points, 18 Vdc power supply output, flow sensor, damper actuator, 4 UI, 4 DO, 2 UO, standard 24VAC/DC power supply	*(IMP)* : Preloaded Apps in Imperial (US) units *(SI)* : Preloaded Apps in SI (Metric) units	*Plenum-rated*: UL2043 plenum-rated (only for North America).
			UUKL: UL 864, 10th Edition UUKL and California State Fire Marshal Listed[1].

1. The UL 864 UUKL Listed Smoke Control Equipment is used only in Distech Controls' UUKL smoke control system. For detailed specifications, requirements and procedures for installing and operating UUKL Listed equipment refer to the Distech Controls' UUKL Smoke Control documentation.

Accessories

Terminal covers	Terminal cover designed to conceal the controller's wire terminals. Required to meet local safety regulations in certain jurisdictions.

Recommended Applications

Model	ECB-VAV
Cooling Only VAV Boxes	■
Dual-Duct VAV Systems	■
Cooling with Reheat VAV Boxes	■
Parallel Fan VAV Boxes	■
Series Fan VAV Boxes	■
Room Pressurization	■
Smart Room Control support for HVAC, light, and shades/sunblinds	■

BACnet Objects List

BACnet Objects

Calendar Objects	1
Special events per calendar	25
Schedule Objects	2
Special events per schedule	5
PID Loop Objects	8

Commandable Objects

BV Objects	10
MSV Objects	10
AV Objects	25

Non-Commandable Objects

BV Objects	40
MSV Objects	40
AV Objects	75

Product Specifications

Power Supply Input

Voltage Range[1]	24VAC/DC; ±15%; Class 2
Frequency Range	50/60Hz
Overcurrent Protection	Field replaceable fuse
Fuse Type	3.0A
Power Consumption	4 VA typical plus all external loads[2], 75 VA max (including powered triac outputs).
Power Factor	>90%

1. 24VDC does not support DO (triac outputs).
2. External loads must include the power consumption of any connected modules such as an Allure Series Communicating Sensor. Refer to the respective module's datasheet for related power consumption information.

Communications

Communication Bus	BACnet MS/TP
BACnet Profile	B-ASC[1]
EOL Resistor	Built-in, selectable
Baud Rates	9600, 19 200, 38 400, or 76 800 bps
Addressing	Dip switch or with an Allure EC-Smart-Vue Series Communicating Sensor

1. Refer to Distech Controls' Protocol Implementation Conformity Statement for BACnet.

Subnetwork

Communication	RS-485
Cable	Cat 5e, 8 conductor twisted pair
Connector	RJ-45
Connection Topology	Daisy-chain
Maximum number of room devices supported per controller combined	4[1]
Allure Series sensor	Up to 4
EC-Multi Sensor	Up to 4
ECx-Light-4 / ECx-Light-4D / ECx-Light-DALI	Up to 2
ECx-Blind-4 / ECx-Blind-4LV	Up to 2

1. A controller can support a maximum of 2 Allure sensor models equipped with a CO_2 sensor. Any remaining connected sensors must be without a CO_2 sensor.

Hardware

Processor	STM32 (ARM Cortex™ M3) MCU, 32 bit
CPU Speed	68 MHz
Applications Memory	384 kB Non-volatile Flash
Storage Memory	1 MB Non-volatile Flash
Memory (RAM)	64 kB RAM
Real Time Clock (RTC)	Built-in Real Time Clock without battery Network time synchronization is required at each power-up cycle before the RTC become available
Green LEDs	Power status & LAN Tx
Orange LEDs	Controller status & LAN Rx

Wireless Receiver

Communication Protocol	EnOcean wireless standard[1]
Number of Wireless Inputs[2]	18
Supported Wireless Receivers	Refer to the Open-to-Wireless Application Guide
Cable	Telephone cord
Connector	4P4C modular jack
Length (maximum)	6.5ft (2m)

enocean

1. Available when an optional external Wireless Receiver module is connected to the controller. Refer to the Open-to-Wireless Application Guide for a list of supported EnOcean wireless modules.
2. Some wireless modules may use more than one wireless input from the controller.

Integrated Damper Actuator

Motor	Belimo brushless DC motor
Torque	45 in-lb, 5 Nm
Degrees of Rotation	95° adjustable
Shaft Diameter	5/16 to 3/4"; 8.5 to 18.2mm
Acoustic Noise Level	< 35 dB (A) @ 95° rotation in 95 seconds

Mechanical

Dimensions (H × W × D)	7.90 × 5.51 × 3.70" (200.61 × 139.93 × 94.04 mm)
Dimensions with terminal block covers (H × W × D)	7.90 × 10.84 × 3.70" (200.61 × 275.26 × 94.04 mm)
Shipping Weight (Controller)	1.95lbs (0.89 kg)
Shipping Weight Terminal Cover (one side, bulk packaged)	0.30lbs (0.14 kg)
Enclosure Material[1]	FR/ABS
Enclosure Rating	Plastic housing, UL94-5VB flammability rating Plenum rating per UL1995

1. All materials and manufacturing processes comply with the RoHS directive and are marked according to the Waste Electrical and Electronic Equipment (WEEE) directive

Environmental

Operating Temperature	32°F to 122°F (0°C to 50°C)
Storage Temperature	-4°F to 122°F (-20°C to 50°C)
Relative Humidity	0 to 90% Non-condensing
Nema Rating	1

Standards and Regulation

CE Emission	EN61000-6-3: 2007; A1:2011
CE Immunity	EN61000-6-1: 2007
CE EMC requirements, conditions and test set-up	EN 50491-5-1: 2010
EMC requirements for HBES/BACS	EN 50491-5-2: 2010
FCC	Compliance with FCC rules part 15, subpart B, class B
UL Listed (CDN & US)	UL916 Energy management equipment UL 864, 10th Edition, UUKL Listed Smoke Control Equipment (ECB-VAV UUKL model only)[1] UL2043 Suitable for use in air handling spaces (for Plenum-rated models only)
CEC Appliance Database	Appliance Efficiency Program[2]

1. For detailed specifications regarding the ECB-VAV UUKL model, refer to the Distech Controls UUKL Smoke Control Design Guide.
2. California Energy Commission's Appliance Efficiency Program: The manufacturer has certified this product to the California Energy Commission in accordance with California law.

On-Board Air-Flow Sensor

Differential Pressure Range	±2.0 in. W.C. (±500 Pa) Polarity-free high-low sensor connection
Input Resolution	0.00007 in. W.C. (0.0167 Pa)
Air Flow Accuracy	±4.0% @ > 0.05 in. W.C. (12.5 Pa) ±1.5% once calibrated through

	air flow balancing @ > 0.05 in. W.C. (12.5 Pa)
Pressure Sensor Accuracy	±(0.2 Pa +3% of reading)

Universal Inputs (UI)

General

Input Type	Universal; software configurable
Input Resolution	16-Bit analog / digital converter
Power Supply Output	18 VDC; maximum 80mA

Contact

Type	Dry contact

Counter

Type	Dry contact
Maximum Frequency	1Hz maximum
Minimum Duty Cycle	500ms On / 500ms Off

0 to 10VDC

Range	0 to 10VDC (40kΩ input impedance)

0 to 5VDC

Range	0 to 5VDC (high input impedance)

0 to 20mA

Range	0 to 20mA 249Ω external resistor wired in parallel

Resistance/Thermistor

Range	0 to 350 KΩ
Supported Thermistor Types	Any that operate in this range

Pre-configured Temperature Sensor Types:

Thermistor	10KΩ Type 2, 3 (10KΩ @ 77°F; 25°C)
Platinum	Pt1000 (1KΩ @ 32°F; 0°C)
Nickel	RTD Ni1000 (1KΩ @ 32°F; 0°C) RTD Ni1000 (1KΩ @ 69.8°F; 21°C)

Universal Outputs (UO)

General

Output Type	Universal; software configurable
Output Resolution	10-bit digital to analog converter
Output Protection	Built-in snubbing diode to protect against back-EMF, for example when used with a 12VDC relay Output is internally protected against short circuits
Auto-reset fuse	Provides 24VAC over voltage protection

0 or 12VDC (On/Off)

Range	0 or 12VDC

PWM

Range	Adjustable period from 2 to 65 seconds
Thermal Actuator Management	Adjustable warm up and cool down time

Floating

Minimum Pulse On/Off Time	500 milliseconds
Drive Time Period	Adjustable

0 to 10VDC

Range	0 to 10VDC linear
Source Current	Maximum 20 mA at 10VDC (minimum load resistance 600Ω)
Sink Current	Maximum 2.5mA at 1 VDC (minimum load resistance 4KΩ)

Digital Outputs (DO)

General

Output Type	24VAC Triac; software configurable
Maximum Current per Output	0.5A continuous 1A @ 15% duty cycle for a 10-minute period
Power Source	External or internal power supply (jumper selectable)

0 or 24VAC (On/Off)

Range	0 or 24VAC

PWM

Range	Adjustable period from 2 to 65 seconds

Floating

Minimum Pulse On/Off Time	500 milliseconds
Drive Time Period	Adjustable
Power Source	Internal power supply

Dimensions

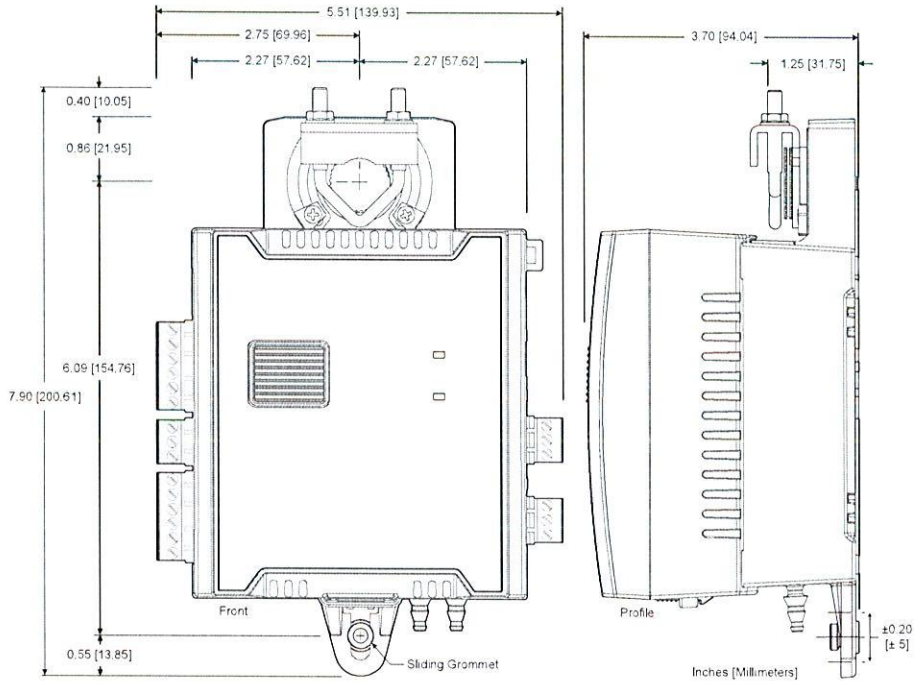

Figure 1: ECB-VAV Controller Dimensions

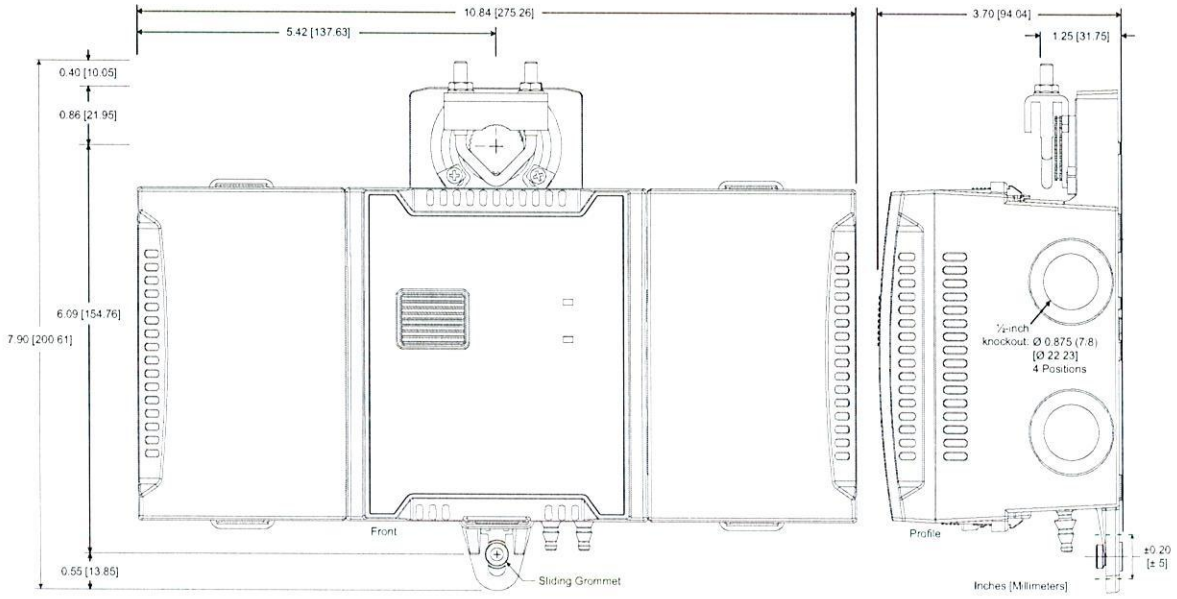

Figure 2: ECB-VAV Controller with Terminal Covers Dimensions

Specifications subject to change without notice.
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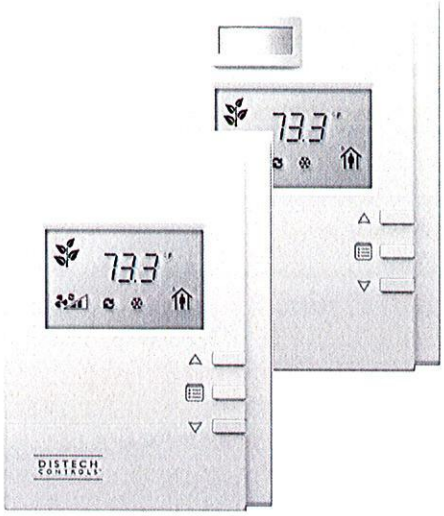
Global Head Office - 4205 place de Java, Brossard, QC, Canada, J4Y 0C4 - EU Head Office - ZAC de Sacuny, 558 avenue Marcel Mérieux, 69530 Brignais, France

Allure™ EC-Smart-Vue Sensor Series

Line of communicating sensors with backlit display and graphical menus



Overview

The Allure EC-Smart-Vue Series is designed to interface with Distech Controls' ECLYPSE™ series BACnet/IP and Wi-Fi Controllers, ECB series BACnet® Controllers and ECL series LonWorks® Controllers.

This line of communicating sensors with backlit display consists of eight models that provide precise environmental zone control. Models are available with any combination of the following: temperature, humidity, CO_2, and motion sensor.

Features & Benefits

- Multi-sensing capabilities (temperature, humidity, CO_2, and motion) using one wire and one connection
- Optional CO_2 sensor facilitates demand-controlled ventilation strategies
- Optional motion sensor helps achieve energy efficiency through occupancy-based control
- Automatic self-calibration system guarantees lifetime CO_2 calibration
- The ECO-Vue leaf pattern graphically indicates energy consumption in real time to promote an occupant's energy-conscious behavior
- Password protected technician mode allows an installer to perform commissioning and troubleshooting
- Can be used as a hand-held tool for HVAC equipment configuration and system troubleshooting
- When associated to VAV controllers, the Allure EC-Smart-Vue Series sensors can also perform air balancing of the system without requiring an onsite controls engineer.
- Programmability with Distech Controls' EC-*gfx*Program, which makes Building Automation System programming effortless
- Quick and easy installation: Both power and communications pass through a single Cat 5e cable for reduced installation costs and easier installation
- Two RJ-45 ports facilitate the daisy-chain connections of room devices.

Model Selection Table

Example: Allure EC-Smart-Vue-*M*

Series	Functionality
Allure EC-Smart-Vue	[blank]: Temperature only
	-C: CO_2[1], Temperature
	-H: Humidity, Temperature
	-M: Motion, Temperature
	-CH: CO_2[1], Humidity, Temperature
	-CM: CO_2[1], Motion, Temperature
	-HM: Humidity, Motion, Temperature
	-CHM: CO_2[1], Humidity, Motion, Temperature

1. The Allure EC-Smart-Vue CO_2 models must be used in spaces that are periodically unoccupied (e.g. during evening or nighttime hours). A controller can support a maximum of two communicating sensors equipped with a CO_2 sensor. Any remaining connected communicating sensors must be without a CO_2 sensor.

Product Specifications

Power Supply Input

Voltage	16 VDC maximum, Class 2
Power Consumption	At the connected controller, an additional 5.25 VA per CO_2 sensor model and 1.0 VA per non-CO_2 sensor model.

Communications

Rate	38 400 bps
Communications	RS-485
Wiring	Cable length: 600 ft (180 m) maximum
Cable Type	T568B Cat 5e network cable, 4 twisted pairs
Input Connector	RJ-45
Output Connector	RJ-45 (pass-through for daisy chain connection to other room devices)
Network Access Jack[1]	⅛" (3.5 mm) stereo plug connector
Daisy-chaining	Up to 12 Allure EC-Smart-Vue sensors or room devices depending on the controller model – see the controller's datasheet

1. Not available with ECLYPSE Series, PTU Series, ECB-VAVS, or ECL-VAVS

Temperature Sensor

Type	10 kΩ NTC Thermistor
Range	41°F to 104°F (5°C to 40°C)
Sensing Component Typical Accuracy	±0.5°F (±0.28°C)
Overall Accuracy	± 0.9°F (± 0.5°C)
Resolution	0.18°F (0.1°C)

Humidity Sensor

Accuracy	±3%
Resolution	1%

Motion Sensor

Type	Passive Infrared (PIR) sensor with Fresnel lens. See Figure 2.

CO_2 Sensor

Measurement Range	0 to 2000 ppm
Operating Elevation	0 to 10000 ft (0 to 3050 m)
Warm-up Time	< 2 minutes (operational), 10 minutes (maximum accuracy)
CO_2 Accuracy	400-1000 ppm ± 75 ppm or 3% of reading, whichever is greater [1] 1000-2000 ppm ± (40 ppm + 5% of reading) [1]
Repeatability	± 10 ppm
Response Time	60 s
Accuracy Drift	< 0.03 °C / year
Additional accuracy drift per year after five years of sensor operation and with automatic self-calibration algorithm enabled	Typical ± (5 ppm + 0.5 % of reading)
Pressure Dependence	0.135% of reading per mm Hg; Elevation adjusted in configuration software
Sensing Method	Non-dispersive infrared (NDIR)
Calibration Method	Automatic self-calibration enabled

1. Tolerance based on span gas of ±2% and automatic self-calibration enabled.

Mechanical

Dimensions with motion sensor (H×W×D)	4.62 × 3.29 × 1.15" (117.27 × 83.57 × 28.84 mm)
Dimensions without motion sensor (H×W×D)	4.62 × 3.29 × 1.06" (117.27 × 83.57 × 26.81 mm)
Shipping weight with motion sensor	0.20 kg (0.44lbs)
Shipping weight without motion sensor	0.18 kg (0.40lbs)
Enclosure Material	ABS
Enclosure Rating	Plastic housing, UL94-V1
Color	white
Installation	wall mounting through mounting holes (see Figure 1 for hole positions)

Environmental

Operating Temperature	32°F to 122°F (0°C to 50°C)
Storage Temperature	-4°F to 122°F (-20°C to 50°C)
Relative Humidity	0 to 90% Non-condensing

Standards and Regulations

CE Emission	EN 61000-6-3: 2007 + A1: ed.2011
CE Immunity	EN 61000-6-1: 2007
FCC	FCC rules part 15, subpart B class B
UL Listed (CDN & US)	UL916 Energy management equipment

WEEE	All products are marked according to the Waste Electrical and Electronic Equipment (WEEE) directive
RoHS	All materials and manufacturing processes comply with the RoHS directive

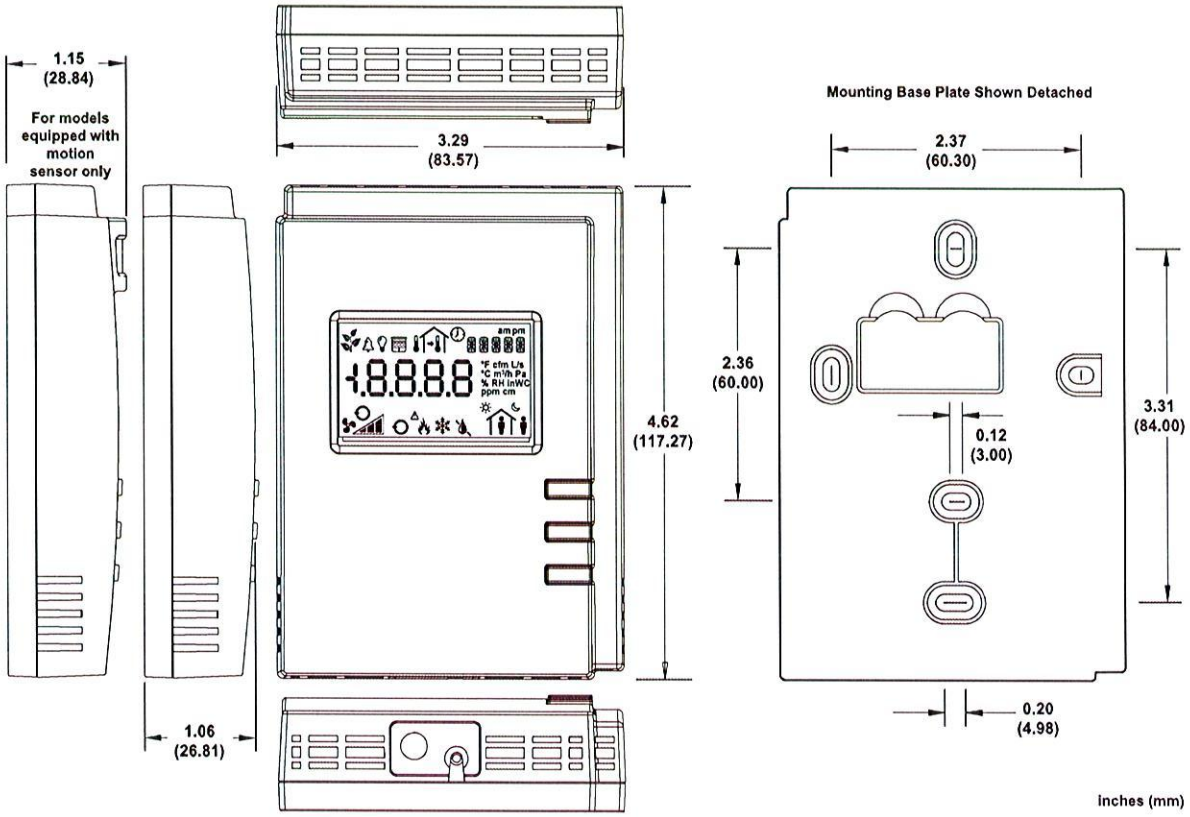


Figure 1: EC-Smart-Vue Dimensions

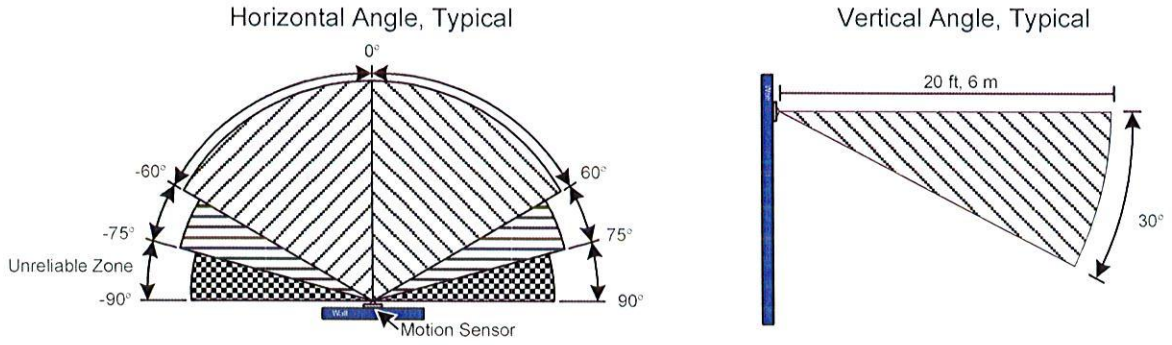


Figure 2: Motion Sensor

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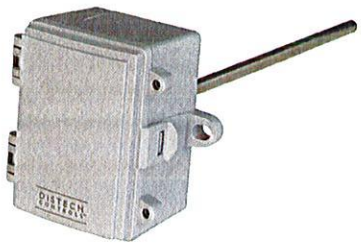
Datasheet

TS-D2X Sensor Series

Duct & Immersion Temperature Sensors, Nema 4X



Overview

TS-D2X Series all-purpose temperature sensors provide precision temperature sensing for ducts. When combined with a TS-TW series S/S thermowell, they can be used to measure liquid temperature in pipes. The TS-D2X single-point temperature sensor uses a precision sensor encapsulated in a 6.00 mm (0.236") OD, a 304-series stainless steel probe, and it is available in various lengths. All probes provide excellent heat transfer, fast response and resistance to moisture penetration.

Applications

- Used for measuring temperature on: supply and return ducts, supply and return hot water pipes of heating systems, domestic hot water tanks and piping, and supply and return lines in chillers
- Incorporated in chillers to monitor temperature gradients
- Used in heat exchangers and air handling units to provide temperature sensing for control of heating / cooling coils

Features & Benefits

- Economical
- Ease of installation
- Sensors are hermetically sealed
- Proven long stability and performance
- Probes made of corrosion-resistant 304 stainless steel
- Accurate temperature monitoring for increased comfort

Model Selection

		TS-	D	XX	002
Mounting Style	D = Duct / Immesion				
Enclosure	XX = No enclosure 2X = Plastic enclosure, Nema 4X				
Probe Length	002 = 2" (50mm) 004 = 4" (100mm) 006 = 6" (150mm) 008 = 8" (200mm) 012 = 12" (300mm) 018 = 18" (450mm)				

Accessories

Thermal Joint Compound

TS-JC2	Thermal Joint Compound, 2 oz (60ml) Jar
TS-JC5	Thermal Joint Compound, 5 oz (150ml) Tube
TS-JC8	Thermal Joint Compound, 8 oz Jar (240ml)

Thermowells

TS-TWN30402	50mm (2") 304 SS well, NPT
TS-TWN30404	100mm (4") 304 SS well, NPT
TS-TWN30406	150mm (6") 304 SS well, NPT
TS-TWN30408	200mm (8") 304 SS well, NPT
TS-TWN31602	50mm (2") 316 SS well, NPT
TS-TWN31604	100mm (4") 316 SS well, NPT
TS-TWN31606	150mm (6") 316 SS well, NPT
TS-TWN31608	200mm (8") 316 SS well, NPT

Product Specifications

Environmental

Operating Temperature	-20°C to 105°C; -4°F to 221°F
Storage Temperature	-20°C to 105°C; -4°F to 221°F
Relative Humidity	0 to 95% Non-condensing

Bracket

Material	ABS - UL94-5VB
Color	Black
Shipping Weight	0.20lbs (0.091kg)
Probe Dimension	6.35 mm (0.25") Diameter

Electrical

Dissipation Factor	2.2mW/K (Thermistor)
Max Power @ 25°C (77°F)	75mW (Thermistor)
Thermal Time Constant	Less than 10s (Thermistor)
Wire Material (TS-DXX Series)	Plenum rated FT-6
Wire Length (TS-DXX Series)	3.05 m (10')

Temperature Sensor with Enclosure

Sensor Type[1]	10kΩ NTC thermistor, Type 2
Accuracy	±0.2°C; ±0.36°F
Probe Sensing Range	-20 to 105°C (-4 to 221°F)
Probe Material	304 Series Stainless Steel
Probe Dimension	6.00 mm (0.236") Diameter
Enclosure Type	Material; Grey ABS; UL94-V0, IP65 (NEMA 4X)
Shipping Weight	0.60 lbs (0.2727 kg)

Agency Approvals

Material[2]	UL94-V0

RoHS 2002/95/EC

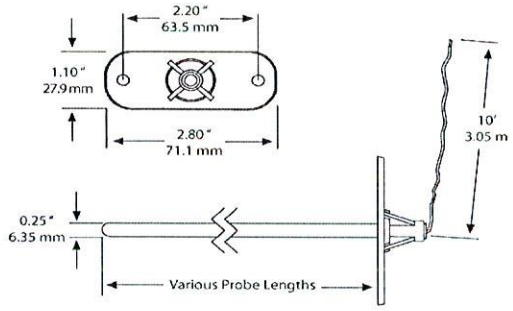
Certified System ISO 9001

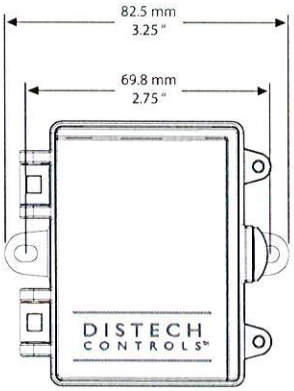
CE

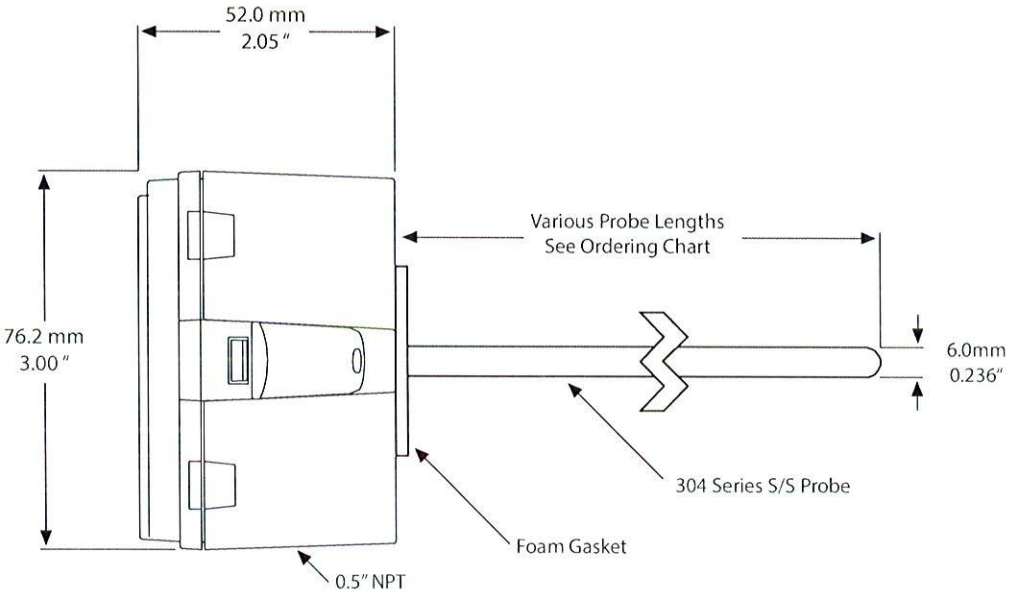
1. Temperature sensor type stated is standard. Other temperature sensor types are available.
2. All materials and manufacturing processes comply with the RoHS directive.

Dimensions

Bracket







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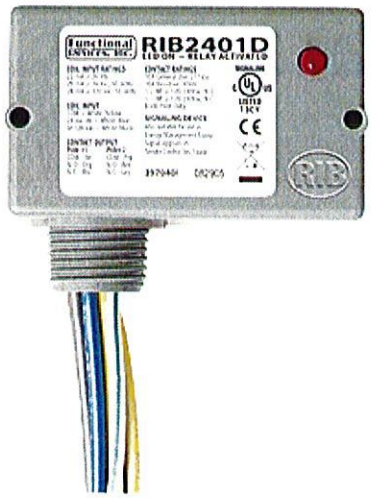
Datasheet

RE-RIB (Enclosed Pilot Relay) Series

Enclosed Pilot Relays



Overview

Enclosed 10 Amp Relay with 24 VAC/DC Coil

DISTECH CONTROLS™

Connecting People with
Intelligent Building Solutions

Model Selection

Model #	UL[1]	Coil Voltage		Coil Current	Relays	Contacts			Dimensions	Nipple	Override Switch	Gold Flash
		AC/DC	AC			Form	Rating	NO / NC				
RE-RIBU1C	•	10-30[2]	120	Type 1	1	SPDT	Type 1	NO	1.70" x 2.80" x 1.50"	.50" NPT		•
RE-RIBH1C	•	10-30[2]	208-277	Type 1	1	SPDT	Type 1	NO	1.70" x 2.80" x 1.50"	.50" NPT		•
RE-RIBL1C-DC	•	10-30[4]		Type 3	1	SPDT	Type 1	NO	1.70" x 2.80" x 1.50"	.50" NPT		•
RE-RIB2421C	•	24[5]	120-277	Type 4	1	SPDT	Type 5	NO	1.70" x 2.80" x 1.50"	.50" NPT		
RE-RIBU2C	•	10-30[2]	120	Type 1	2	2 SPDT	Type 1	NO	2.30" x 3.20" x 1.80"	.75" NPT		•
RE-RIBH2C	•	10-30[2]	208-277	Type 1	2	2 SPDT	Type 1	NO	2.30" x 3.20" x 1.80"	.75" NPT		•
RE-RIBL3C	•	10-30[2]		Type 1	3	3 SPST	Type 1	NO	4.00" x 4.00" x 1.80"	.50" NPT		•
RE-RIBL3C-NC	•	10-30[2]		Type 1	3	3 SPST	Type 1	NC	4.00" x 4.00" x 1.80"	.50" NPT		•
RE-RIBL4C	•	10-30[2]		Type 1	4	3 SPST, 1 SPDT	Type 1	NO	4.00" x 4.00" x 1.80"	.50" NPT		•
RE-RIBL4C-NC	•	10-30[2]		Type 1	4	3 SPST, 1 SPDT	Type 1	NC	4.00" x 4.00" x 1.80"	.50" NPT		•
RE-RIBU1S	•	10-30[2]	120	Type 1	1	SPST	Type 2	NO	2.30" x 3.20" x 1.80"	.50" NPT	1	•
RE-RIBU1S-NC	•	10-30[2]	120	Type 1	1	SPST	Type 2	NC	2.30" x 3.20" x 1.80"	.50" NPT	1	•
RE-RIBH1S	•	10-30[2]	208-277	Type 1	1	SPST	Type 2	NO	2.30" x 3.20" x 1.80"	.50" NPT	1	•
RE-RIBH1S-NC	•	10-30[2]	208-277	Type 1	1	SPST	Type 2	NC	2.30" x 3.20" x 1.80"	.50" NPT	1	•
RE-RIBU1SM-250	•	10-30[2]	120	Type 2	1	SPST	Type 3	NO	2.30" x 3.20" x 1.80"	.50" NPT	1+monitor[6]	•
RE-RIBU1SM-250 -NC	•	10-30[2]	120	Type 2	1	SPST	Type 3	NC	2.30" x 3.20" x 1.80"	.50" NPT	1+monitor[6]	•
RE-RIBH1SM-250	•	10-30[2]	208-277	Type 2	1	SPST	Type 3	NO	2.30" x 3.20" x 1.80"	.50" NPT	1+monitor[6]	•
RE-RIBH1SM-250 -NC	•	10-30[2]	208-277	Type 2	1	SPST	Type 3	NC	2.30" x 3.20" x 1.80"	.50" NPT	1+monitor[6]	•
RE-RIBU2SC	•	10-30[2]	120	Type 1	2	1 SPST, 1 SPDT	Type 2	NO	2.30" x 3.20" x 1.80"	.75" NPT	1	•
RE-RIBU2SC-NC	•	10-30[2]	120	Type 1	2	1 SPST, 1 SPDT	Type 2	NC	2.30" x 3.20" x 1.80"	.75" NPT	1	•
RE-RIBU2S2	•	10-30[2]	120	Type 1	2	2 SPST	Type 2	NO	4.00" x 4.00" x 1.80"	.50" NPT	2	•
RE-RIBU2S2-NC	•	10-30[2]	120	Type 1	2	2 SPST	Type 2	NC	4.00" x 4.00" x 1.80"	.50" NPT	2	•
RE-RIB2401D	•	24[3]	120	Type 5	1	DPDT	Type 4	NO	1.70" x 2.80" x 1.50"	.50" NPT		
RE-RIB2402D	•	24[3]	208-277	Type 5	1	DPDT	Type 4	NO	1.70" x 2.80" x 1.50"	.50" NPT		
RE-RIBU1SC	•	10-30[2]	120	Type 1	1	SPDT	Type 2	NO	2.30" x 3.20" x 1.80"	.50" NPT	2[7]	•
RE-RIBH1SC	•	10-30[2]	208-277	Type 1	1	SPDT	Type 2	NO	2.30" x 3.20" x 1.80"	.50" NPT	2[7]	•

1. UL Listed : UL916 Energy Management, UL864 Fire ; USA & Canada
2. Coil Drop Out Voltage = 2.1 Vac / 2.8 Vdc, Coil Pull In Voltage = 9 Vac / 10 Vdc
3. Coil Drop Out Voltage = 3 Vac / 3.8 Vdc, Coil Pull In Voltage = 18 Vac / 20 Vdc
4. DC Only, Coil Drop Out Voltage = 2.8 Vdc, Coil Pull In Voltage = 10 Vdc
5. Coil Drop Out Voltage = 3 Vac / 3.8 Vdc, Coil Pull In Voltage = 20 Vac / 20 Vdc
6. Second pole of override switch can be connected to digital-in of controller to report position of override switch. Rating of second pole is 250 Vac max and 5 Amp max.
7. SPDT with override requires 2 switches

Product Specifications

Relay Coil	Continuous Duty Coil
Expected Relay Life	**10 million cycles minimum mechanical**
Operating Temperature	-30 to 140° F
Humidity Range	**5 to 95% (noncondensing)**
Relay Status	LED On = Activated
Wires	**16″, 600V Rated**
Approvals	**UL Listed, UL916, UL864, C-UL, California State Fire Marshal, CE, RoHS**
Housing Rating	UL Accepted for Use in Plenum, NEMA 1
AC Coil Frequency	**50/60Hz**
Operate Time:	
☐ All Models	20ms
☐ **Except RE-RIB2401D & RE-RIB2402D**	**8ms**

Coil Current

Type 1 Relay Coil(s):

☐	33 mA @ 10 Vac
☐	13 mA @ 10 Vdc
☐	**35 mA @ 12 Vac**
☐	**15 mA @ 12 Vdc**
☐	46 mA @ 24 Vac
☐	**18 mA @ 24 Vdc**
☐	**55 mA @ 30 Vac**
☐	20 mA @ 30 Vdc
☐ For Models with a 120 Vac Coil	**28 mA @ 120 Vac**
☐ **For Models with a 208-277 Vac Coil**	**39 mA @ 208-277 Vac**

Type 2 Relay Coil(s):

☐	**55 mA @ 30 Vac**
☐	20 mA @ 30 Vdc
☐ For Models with a 120 Vac Coil	**28 mA @ 120 Vac**
☐ **For Models with a 208-277 Vac Coil**	**39 mA @ 208-277 Vac**

Type 3 Relay Coil(s):

☐	13 mA @ 10 Vdc
☐	**15 mA @ 12 Vdc**
☐	**18 mA @ 24 Vdc**
☐	20 mA @ 30 Vdc

Type 4 Relay Coil(s):

☐	66 mA @ 24 Vac
☐	**38 mA @ 24 Vdc**
☐	40 mA @ 120-277 Vac

Type 5 Relay Coil(s):

☐	**24 mA @ 18 Vac**
☐	20 mA @ 20 Vdc
☐	32 mA @ 24 Vac
☐	24 mA @ 24 Vdc
☐	40 mA @ 30 Vac
☐	36 mA @ 30 Vdc
☐ For Models with a 120 Vac Coil	31 mA @ 120 Vac
☐ **For Models with a 208-277 Vac Coil**	**36 mA @ 208-277 Vac**

Contact Ratings

Type 1 Contact(s):

- ☐ 10 Amp Resistive @ 277 Vac
- ☐ **10 Amp Resistive @ 28 Vdc**
- ☐ **480 VA Pilot Duty @ 240-277 Vac**
- ☐ **480 VA Ballast[1] @ 277 Vac**
- ☐ 600 Watt Tungsten @ 120 Vac (N/O)
- ☐ 240 Watt Tungsten @ 120 Vac (N/C)
- ☐ 1/3 HP @ 120-240 Vac (N/O)
- ☐ 1/6 HP @ 120-240 Vac (N/C)
- ☐ 1/4 HP @ 277 Vac (N/O)
- ☐ **1/8 HP @ 277 Vac (N/C)**

Type 2 Contact(s):

- ☐ 10 Amp Resistive @ 277 Vac
- ☐ **480 VA Pilot Duty @ 277 Vac**
- ☐ **480 VA Ballast[1] @ 277 Vac**
- ☐ 600 Watt Tungsten @ 120 Vac (N/O)
- ☐ 240 Watt Tungsten @ 120 Vac (N/C)
- ☐ 1/3 HP @ 120-240 Vac (N/O)
- ☐ 1/6 HP @ 120-240 Vac (N/C)
- ☐ 1/4 HP @ 277 Vac (N/O)
- ☐ **1/8 HP @ 277 Vac (N/C)**

Type 3 Contact(s):

- ☐ **10 Amp Resistive @ 120/250 Vac**
- ☐ **345 VA Pilot Duty @ 120/240 Vac**
- ☐ 211 VA Pilot Duty @ 120/240 Vac
- ☐ 1/3 HP @ 120-240 Vac (N/O)
- ☐ 1/6 HP @ 120-240 Vac (N/C)

Type 4 Contact(s):

- ☐ 10 Amp Resistive @ 30 Vdc
- ☐ 10 Amp General Use @ 277 Vac
- ☐ 1/2 HP @ 120/240 Vac (N/O)
- ☐ 1/3 HP @ 120/240 Vac (N/C)
- ☐ B300 Pilot Duty — 120 Vac 30A Make 3A Break (360 VA)
- ☐ B300 Pilot Duty — **240 Vac 15 A Make 1.5A Break (360 VA)**
- ☐ B300 Pilot Duty — **208 Vac 17.3A Make 1.73A Break (360 VA)**
- ☐ B300 Pilot Duty — 277 Vac 13A Make 1.3A Break (360 VA)
- ☐ B300 Pilot Duty — **24 Vac 30A Make 5A Break (120VA) 5A Max**

Type 5 Contact(s):

- ☐ 10 Amp General Use @ 277 Vac
- ☐ 10 Amp Resistive @ 30 Vdc (N/O)
- ☐ 7 Amp Resistive @ 30 Vdc (N/C)
- ☐ **1/2 HP @ 125 Vac**
- ☐ **1 HP @ 250 Vac**
- ☐ 1/4 HP @ 277 Vac
- ☐ C300 Pilot Duty

1. Not rated for Electronic Ballast

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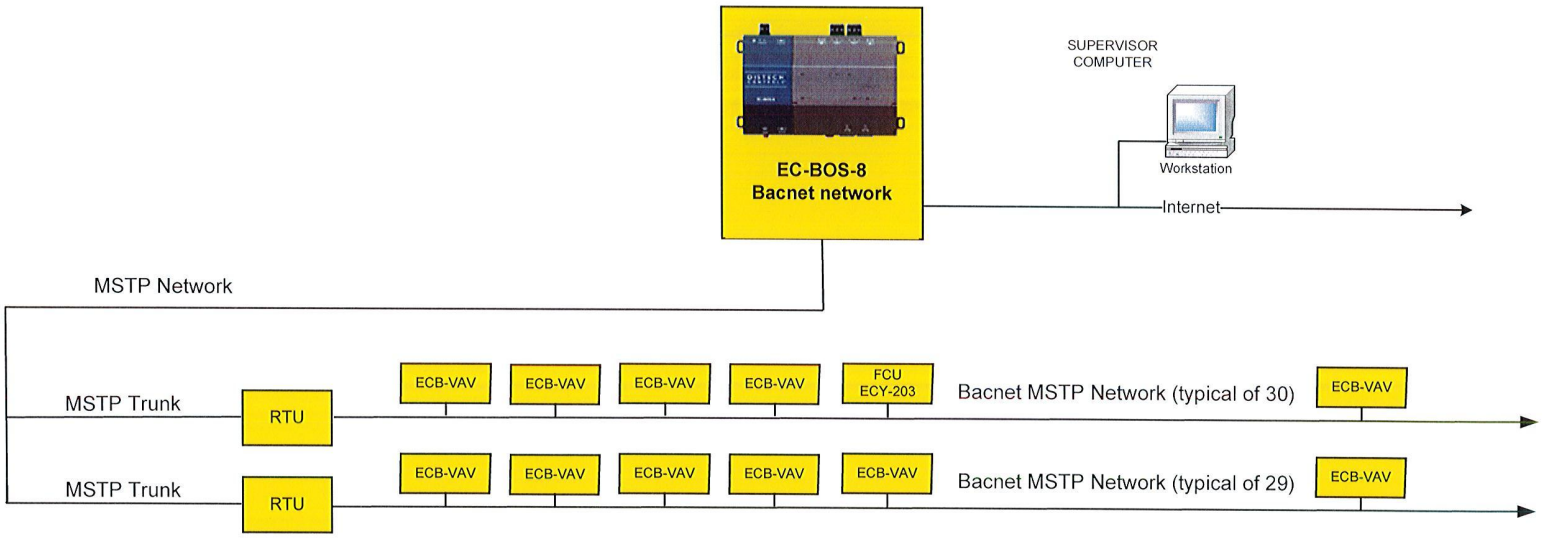
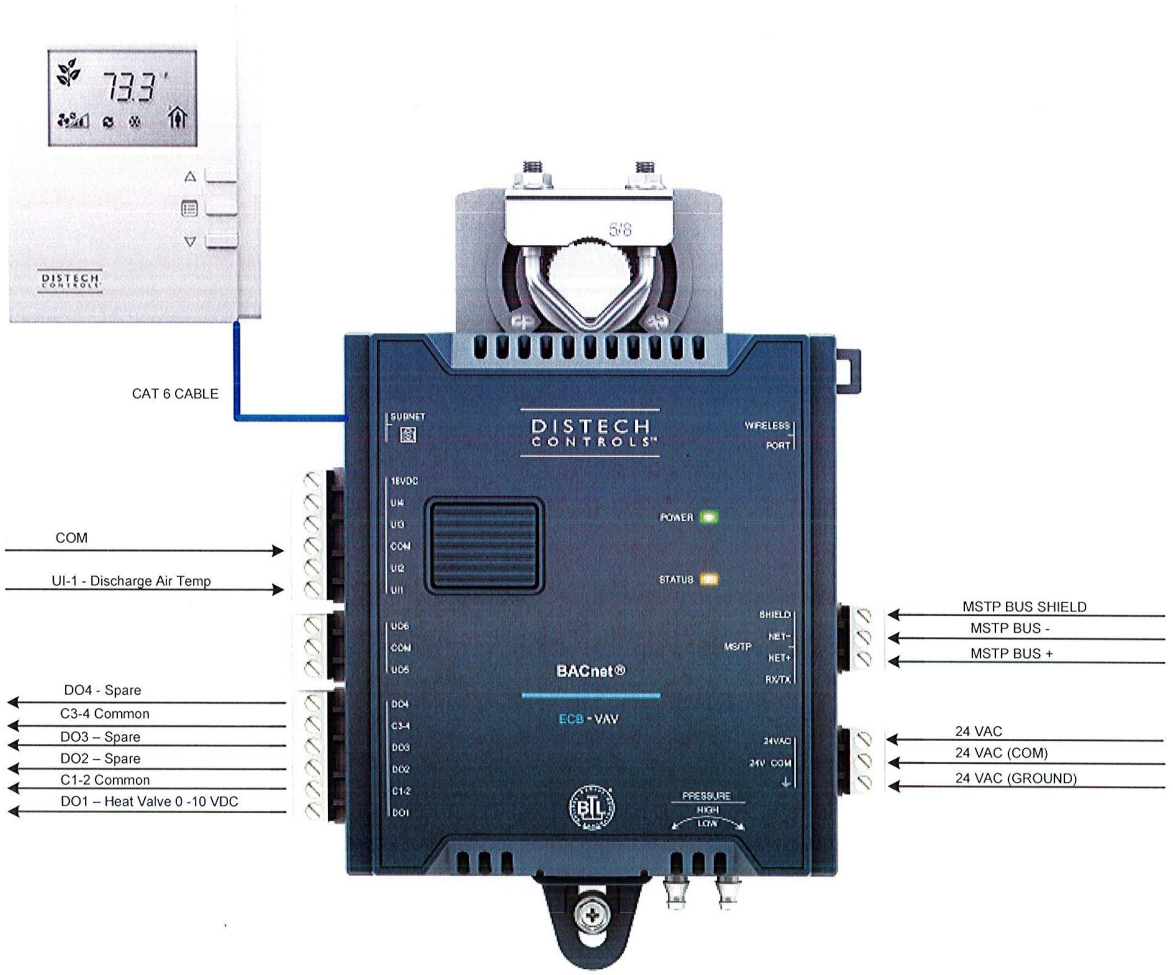
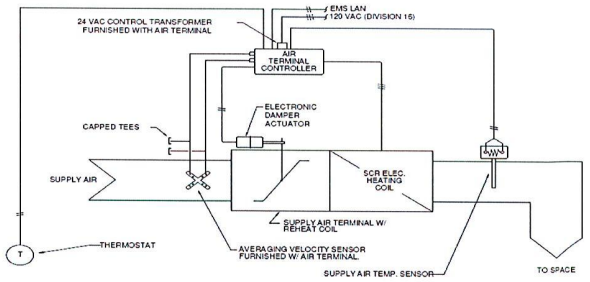


LRSD Rockefeller Remodel			
Network			
MIDDLETON INC			
REV: 1		DATE	06/27/2023
MIDDLETON Heat & Air			DRAWN BY: MKM





BUILDING AUTOMATION SYSTEM INTERFACE:
THE BUILDING AUTOMATION SYSTEM (BAS) SHALL SEND THE CONTROLLER OCCUPIED, AND UNOCCUPIED COMMANDS. THE BAS MAY ALSO SEND A HEAT/COOL MODE, PRIORITY SHUTDOWN COMMANDS, SPACE TEMPERATURE AND/OR SPACE TEMPERATURE SETPOINT. IF COMMUNICATION IS LOST WITH THE BAS, THE CONTROLLER SHALL OPERATE USING ITS LOCAL SETPOINTS.

OCCUPIED:
NORMAL OPERATING MODE FOR OCCUPIED SPACES OR DAYTIME OPERATION. WHEN THE UNIT IS IN THE OCCUPIED MODE THE VAV SHALL MAINTAIN THE SPACE TEMPERATURE AT THE ACTIVE OCCUPIED HEATING OR COOLING SETPOINT. APPLICABLE VENTILATION AND AIRFLOW SETPOINTS SHALL BE ENFORCED. THE OCCUPIED MODE SHALL BE THE DEFAULT MODE OF THE VAV.

UNOCCUPIED:
NORMAL OPERATING MODE FOR UNOCCUPIED SPACES OR NIGHTTIME OPERATION. WHEN THE UNIT IS IN UNOCCUPIED MODE THE VAV CONTROLLER SHALL MAINTAIN THE SPACE TEMPERATURE AT THE STORED UNOCCUPIED HEATING OR COOLING SETPOINT REGARDLESS OF THE PRESENCE OF A HARDWIRED OR COMMUNICATED SETPOINT. WHEN THE SPACE TEMPERATURE EXCEEDS THE ACTIVE UNOCCUPIED SETPOINT THE VAV SHALL MODULATE FULLY CLOSED.

OCCUPIED BYPASS:
MODE USED TO TEMPORARILY PLACE THE UNIT INTO THE OCCUPIED OPERATION. TENANTS SHALL BE ABLE TO OVERRIDE THE UNOCCUPIED MODE FROM THE SPACE SENSOR. THE OVERRIDE SHALL LAST FOR A MAXIMUM OF 4 HOURS (ADJ.). THE TENANTS SHALL BE ABLE TO CANCEL THE OVERRIDE FROM THE SPACE SENSOR AT ANY TIME. DURING THE OVERRIDE THE UNIT SHALL OPERATE IN OCCUPIED MODE.

COOLING MODE:
WHEN THE UNIT IS IN COOLING MODE, THE VAV CONTROLLER SHALL MAINTAIN THE SPACE TEMPERATURE AT THE ACTIVE COOLING SETPOINT BY MODULATING THE AIRFLOW BETWEEN THE ACTIVE COOLING MINIMUM AIRFLOW SETPOINT TO THE MAXIMUM COOLING AIRFLOW SETPOINT. THE VAV SHALL USE THE MEASURED SPACE TEMPERATURE AND THE ACTIVE COOLING SETPOINT TO DETERMINE THE REQUESTED COOLING CAPACITY OF THE UNIT. THE OUTPUTS WILL BE CONTROLLED BASED ON THE UNIT CONFIGURATION AND THE REQUESTED COOLING CAPACITY. WHEN IN THE OCCUPIED MODE, THE CONTROLLER SHALL USE THE MEASURED SPACE TEMPERATURE AND THE ACTIVE COOLING SETPOINT TO DETERMINE THE REQUESTED COOLING CAPACITY OF THE UNIT. THE OUTPUTS SHALL BE CONTROLLED BASED ON THE UNIT CONFIGURATION AND THE REQUESTED COOLING CAPACITY.

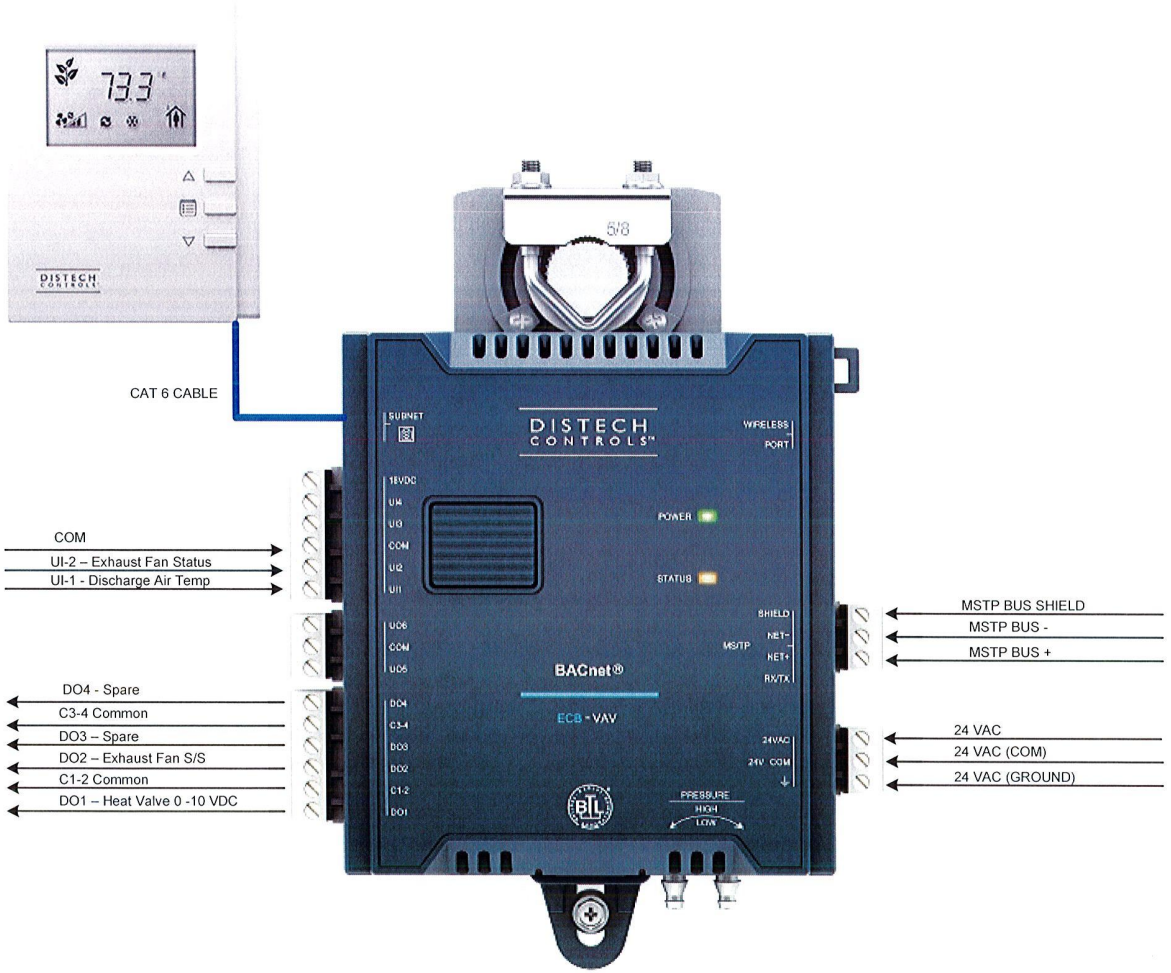
HEATING MODE:
WHEN THE UNIT IS IN HEATING MODE, THE VAV CONTROLLER SHALL MAINTAIN THE SPACE TEMPERATURE AT THE ACTIVE HEATING SETPOINT BY MODULATING THE AIRFLOW BETWEEN THE ACTIVE HEATING MINIMUM AIRFLOW SETPOINT TO THE MAXIMUM HEATING AIRFLOW SETPOINT. THE VAV CONTROLLER SHALL USE THE MEASURED SPACE TEMPERATURE AND THE ACTIVE HEATING SETPOINT TO DETERMINE THE REQUESTED HEATING CAPACITY OF THE UNIT. THE OUTPUTS WILL BE CONTROLLED BASED ON THE UNIT CONFIGURATION AND THE REQUESTED HEATING CAPACITY.

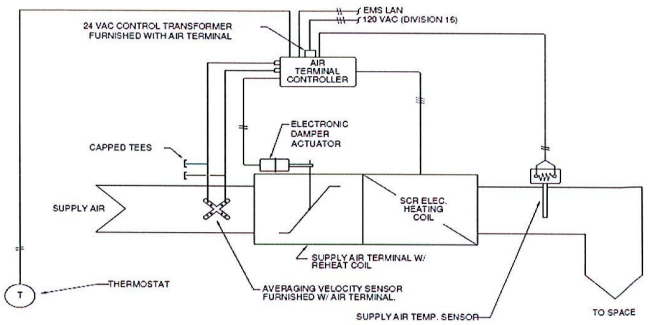
ELECTRIC REHEAT (SCR):
IF THE SPACE TEMPERATURE IS AT THE HEATING SETPOINT, THE ELECTRIC HEATER SHALL MODULATE AS REQUIRED TO MAINTAIN SPACE TEMPERATURE AT THE ACTIVE HEATING SETPOINT WHILE THE VAV OPERATES AT ITS MINIMUM HEATING AIRFLOW SETPOINT. IF THE DISCHARGE AIR TEMPERATURE REACHES THE DESIGN HEATING DISCHARGE AIR TEMPERATURE SETPOINT (ADJ.), THE VAV SHALL MODULATE AIRFLOW BETWEEN THE MINIMUM HEATING AIRFLOW SETPOINT AND THE MAXIMUM HEATING AIRFLOW SETPOINT AS REQUIRED TO MAINTAIN SPACE TEMPERATURE AT THE ACTIVE HEATING SETPOINT, WHILE THE ELECTRIC HEATER MODULATES TO MAINTAIN DISCHARGE AIR TEMPERATURE AT THE DESIGN HEATING DISCHARGE AIR TEMPERATURE SETPOINT. IF THE AIRFLOW REACHES THE MAXIMUM HEATING AIRFLOW SETPOINT, THE VAV SHALL MODULATE THE ELECTRIC HEATER AS REQUIRED TO MAINTAIN SPACE TEMPERATURE AT THE ACTIVE HEATING SETPOINT, WHILE THE VAV OPERATES AT ITS MAXIMUM HEATING AIRFLOW SETPOINT

SPACE SENSOR FAILURE:
IF THERE IS A FAULT WITH THE OPERATION OF THE ZONE SENSOR AN ALARM SHALL BE ANNUNCIATED AT THE BAS. SPACE SENSOR FAILURE SHALL CAUSE THE VAV TO DRIVE THE DAMPER TO MINIMUM AIR FLOW IF THE VAV IS IN THE OCCUPIED MODE, OR DRIVE IT CLOSED IF THE VAV IS IN THE UNOCCUPIED MODE.

(2) AIR TERMINAL ELECTRIC REHEAT CONTROL DIAGRAM
NOT TO SCALE:

Typical VAV Wiring			
Typical VAV Controller			
MIDDLETON INC			
REV: 1		DATE	06/27/2023
MIDDLETON Heat & Air			DRAWN BY: MKM

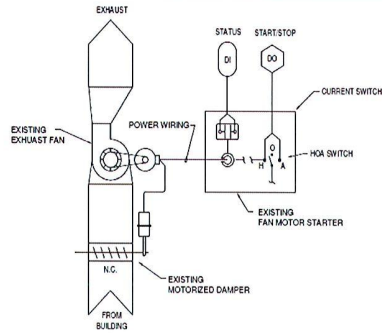




SEQUENCE OF OPERATIONS

GENERAL EXHAUST FAN SEQUENCE OF OPERATION:

EXHAUST FAN SHALL BE STARTED AND STOPPED BY HOA SWITCH AT FAN MOTOR STARTER. WHEN SWITCH IS IN THE AUTO POSITION FAN SHALL BE STARTED AND STOPPED BY BUILDING DDC PANEL THROUGH DIGITAL OUTPUT BASED UPON WEEKLY SCHEDULE OR OPERATOR COMMAND.



1 GENERAL EXHAUST FAN CONTROL DIAGRAM
NOT TO SCALE:

Typical VAV Wiring

Typical VAV Controller with Exhaust Fan

MIDDLETON INC

REV: 1		DATE	06/27/2023
			DRAWN BY: MKM

MIDDLETON Heat & Air