



Purchasing Division  
 2019 Washington Street East  
 Post Office Box 50130  
 Charleston, WV 25305-0130

State of West Virginia  
 Request for Quotation  
 09 - Construction

Proc Folder: 770903

Doc Description: Eleanor Armed Forces Reserve Center HVAC Renovations

Proc Type: Central Purchase Order

Date Issued	Solicitation Closes	Solicitation No	Version
2020-08-17	2020-09-08 13:30:00	CRFQ 0603 ADJ2100000023	1

**BID RECEIVING LOCATION**

BID CLERK  
 DEPARTMENT OF ADMINISTRATION  
 PURCHASING DIVISION  
 2019 WASHINGTON ST E  
 CHARLESTON WV 25305  
 US

RECEIVED  
 2020 SEP -8 PM 1:11  
 WV PURCHASING  
 DIVISION

**VENDOR**

Vendor Name, Address and Telephone Number:

Casto Technical Service  
 540 Leon Sullivan Way  
 Charleston, WV 25301  
 304-346-0549 plancaster@castotech.com

**FOR INFORMATION CONTACT THE BUYER**

Tara Lyle  
 (304) 558-2544  
 tara.l.lyle@wv.gov

Signature X 

FEIN #

55 053 9186

DATE

Sept. 8, 2020

All offers subject to all terms and conditions contained in this solicitation

**CRFQ ADJ21\*23**  
**Eleanor AFRC HVAC Renovations**  
**EXHIBIT-A BID FORM**

**THE PROJECT AND THE PARTIES**

**1.01 TO:**

- A. Owner  
WV Army National Guard  
1703 Coonskin Drive  
Charleston, WV 25301

**1.02 FOR:**

- A. Project: Eleanor HVAC Renovations  
111 Army Navy Drive  
Red House, WV

**1.03 DATE:** 09/08/2020 (BIDDER TO ENTER DATE)

**1.04 SUBMITTED BY: (BIDDER TO ENTER NAME AND ADDRESS)**

- A. Bidder's Full Name Casto Technical Service, Inc.  
1. Address 540 Leon Sullivan Way  
2. City, State, Zip Charleston, WV 25301

**1.05 OFFER**

- A. Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Pickering Associates for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Sum of:
- B. Base Bid: Five Hundred Thirty Thousand dollars  
(\$ 530,000.00), in lawful money of the United States of America.
- C. Alternate No. 1 (RTU-A5): ~~ADD~~  
Ninety Three Thousand dollars  
(\$ 93,000.00), in lawful money of the United States of America.
- D. Alternate No. 2 (RTU-A4): ~~ADD~~  
Ninety Seven Thousand dollars  
(\$ 97,000.00), in lawful money of the United States of America.

**1.06 ACCEPTANCE**

- A. This offer shall be open to acceptance and is irrevocable for sixty days from the bid closing date.
- B. If this bid is accepted by Owner within the time period stated above, we will:
1. Execute the Agreement within seven days of receipt of Notice of Award.
  2. Furnish the required bonds within seven days of receipt of Notice of Award.
- C. If this bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to Owner by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.

**1.07 ADDENDA**

A. The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum.

- 1. Addendum # 1 Dated 8-31-2020.
- 2. Addendum # \_\_\_\_\_ Dated \_\_\_\_\_.
- 3. Addendum # \_\_\_\_\_ Dated \_\_\_\_\_.
- 4. Addendum # \_\_\_\_\_ Dated \_\_\_\_\_.

**1.08 BID FORM SIGNATURE(S)**

- A. Casta Technical Service
- B. (Bidder - print the full name of your firm)
- C. [Signature] Manager
- D. (Authorized signing officer, Title)

**1.09 IF THE BID IS A JOINT VENTURE OR PARTNERSHIP, ADD ADDITIONAL FORMS OF EXECUTION FOR EACH MEMBER OF THE JOINT VENTURE IN THE APPROPRIATE FORM OR FORMS AS ABOVE.**

**END OF SECTION**

**ADDITIONAL TERMS AND CONDITIONS (Construction Contracts Only)**

**1. CONTRACTOR'S LICENSE:** West Virginia Code § 21-11-2 requires that all persons desiring to perform contracting work in this state be licensed. The West Virginia Contractors Licensing Board is empowered to issue the contractor's license. Applications for a contractor's license may be made by contacting the West Virginia Division of Labor. West Virginia Code § 21-11-11 requires any prospective Vendor to include the contractor's license number on its bid. If an apparent low bidder fails to submit a license number in accordance with this section, the Purchasing Division will promptly request by telephone and electronic mail that the low bidder and the second low bidder provide the license number within one business day of the request. Failure of the bidder to request shall result in number in the space provided.

Casto Technical Service  
540 Lewin Sullivan Way  
Charleston, WV 25301  
304-346-0540

Contractor's Name: \_\_\_\_\_  
Contractor's License No.: WV- 001241

The apparent successful Vendor must furnish a copy of its contractor's license prior to the issuance of a contract award document.

**2. DRUG-FREE WORKPLACE AFFIDAVIT:** W. Va. Code § 21-1D-5 provides that any solicitation for a public improvement contract requires each Vendor that submits a bid for the work to submit an affidavit that the Vendor has a written plan for a drug-free workplace policy. If the affidavit is not submitted with the bid submission, the Purchasing Division shall promptly request by telephone and electronic mail that the low bidder and second low bidder provide the affidavit within one business day of the request. Failure to submit the affidavit within one business day of receiving the request shall result in disqualification of the bid. To comply with this law, Vendor should complete the enclosed drug-free workplace affidavit and submit the same with its bid. Failure to submit the signed and notarized drugfree workplace affidavit or a similar affidavit that fully complies with the requirements of the applicable code, within one business day of being requested to do so shall result in disqualification of Vendor's bid. Pursuant to W. Va. Code 21-1D-2(b) and (k), this provision does not apply to public improvement contracts the value of which is \$100,000 or less or temporary or emergency repairs.

**2.1. DRUG-FREE WORKPLACE POLICY:** Pursuant to W. Va. Code § 21-1D-4, Vendor and its subcontractors must implement and maintain a written drug-free workplace policy that complies with said article. The awarding public authority shall cancel this contract if: (1) Vendor fails to implement and maintain a written drug-free workplace policy described in the preceding paragraph, (2) Vendor fails to provide information regarding implementation of its drug-free workplace policy at the request of the public authority; or (3) Vendor provides to the public authority false information regarding the contractor's drug-free workplace policy.

Pursuant to W. Va. Code 21-1D-2(b) and (k), this provision does not apply to public improvement contracts the value of which is \$100,000 or less or temporary or emergency repairs.

**Subcontractor List Submission (Construction Contracts Only)**

**Casto Technical Service**

540 Leon Sullivan Way  
Charleston, WV 25301

**Bidder's Name:**

304-346-0549 plancaster@castotech.com

Check this box if no subcontractors will perform more than \$25,000.00 of work to complete the project.

Subcontractor Name	License Number if Required by W. Va. Code § 21-11-1 et. seq.

Attach additional pages if necessary

**DESIGNATED CONTACT:** Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

(Name, Title)

(Printed Name)

Casto Technical Service

(Address)

540 Leon Sullivan Way  
Charleston, WV 25301  
304-346-0549 [plancaster@castotech.com](mailto:plancaster@castotech.com)

(Phone Number) / (Fax Number)

(email address)

**CERTIFICATION AND SIGNATURE:** By signing below, or submitting documentation through wvOASIS, I certify that I have reviewed this Solicitation in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that I am authorized by the vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

(Company)

Casto Technical

(Authorized Signature) (Representative Name, Title)

 Mgr.

(Printed Name and Title of Authorized Representative)

Paul A LANCASTER

(Date)

Sept. 8, 2020

(Phone Number) (Fax Number)

304-346-0549

REQUEST FOR QUOTATION  
CRFQ ADJ21\*23 - Eleanor HVAC Renovations

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- 14.2. Vendor will be responsible for controlling cards and keys and will pay replacement fee, if the cards or keys become lost or stolen.
- 14.3. Vendor shall notify Agency immediately of any lost, stolen, or missing card or key.
- 14.4. Anyone performing under this Contract will be subject to Agency's security protocol and procedures.
- 14.5. Vendor shall inform all staff of Agency's security protocol and procedures.

**15. MISCELLANEOUS:**

- 15.1. **Contract Manager:** During its performance of this Contract, Vendor must designate and maintain a primary contract manager responsible for overseeing Vendor's responsibilities under this Contract. The Contract manager must be available during normal business hours to address any customer service or other issues related to this Contract. Vendor should list its Contract manager and his or her contact information below.

Contract Manager: Paul Lancaster  
Telephone Number: 304-346-0549  
Fax Number: 304-346-8920  
Email Address: plancaster@castotech.com

- 15.2. **Owner's Representative:** Owner's representative for notice purposes is

Name: David Unrue  
Telephone Number: 304-561-6775  
Email Address: david.r.unrue.nfg@mail.mil

- 16. **Initial Decision Maker:** Pickering Associates, Inc., the Architect, shall serve as the Initial Decision Maker in matters relating to this contract.



STATE OF WEST VIRGINIA  
Purchasing Division

**PURCHASING AFFIDAVIT**

**CONSTRUCTION CONTRACTS:** Under W. Va. Code § 5-22-1(i), the contracting public entity shall not award a construction contract to any bidder that is known to be in default on any monetary obligation owed to the state or a political subdivision of the state, including, but not limited to, obligations related to payroll taxes, property taxes, sales and use taxes, fire service fees, or other fines or fees.

**ALL CONTRACTS:** Under W. Va. Code §5A-3-10a, no contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

**EXCEPTION:** The prohibition listed above does not apply where a vendor has contested any tax administered pursuant to chapter eleven of the W. Va. Code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

**DEFINITIONS:**

**"Debt"** means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

**"Employer default"** means having an outstanding balance or liability to the old fund or to the uninsured employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

**"Related party"** means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceeds five percent of the total contract amount.

**AFFIRMATION:** By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (W. Va. Code §61-5-3) that: (1) for construction contracts, the vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

Casto Technical Service

540 Leon Sullivan Way  
Charleston, WV 25301

304-346-0549 [plancaster@castotech.com](mailto:plancaster@castotech.com)

**WITNESS THE FOLLOWING SIGN**

Vendor's Name: \_\_\_\_\_

Authorized Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Sept. 8, 2020

State of \_\_\_\_\_

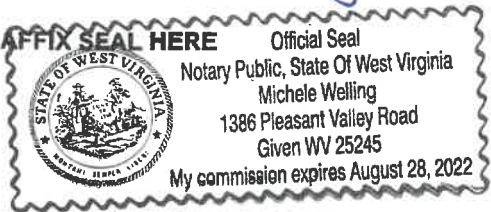
WV

County of \_\_\_\_\_, to-wit:

Kanawha

Taken, subscribed, and sworn to before me this 8 day of September, 2020

My Commission expires August 28, 2022



NOTARY PUBLIC \_\_\_\_\_

*[Handwritten Signature]*





**State of West Virginia  
DRUG FREE WORKPLACE CONFORMANCE AFFIDAVIT  
West Virginia Code §21-1D-5**

**STATE OF WEST VIRGINIA,**

**COUNTY OF Kanawha, TO-WIT:**

I, Paul A Lancaster, after being first duly sworn, depose and state as follows:

1. I am an employee of Casto Technical Service; and,  
540 Leon Sullivan Way  
Charleston, WV 25301
2. I do hereby attest that 304-346-0549 plancaster@castotech.com  
(Company Name)

maintains a written plan for a drug-free workplace policy and that such plan and policy are in compliance with **West Virginia Code §21-1D**.

The above statements are sworn to under the penalty of perjury.

Printed Name: Paul A Lancaster  
 Signature: [Handwritten Signature]  
 Title: Manager  
 Company Name: Casto Technical  
 Date: Sept. 8, 2020

Taken, subscribed and sworn to before me this 8 day of September, 2020.

By Commission expires August 28, 2022

(Seal)

[Handwritten Signature]  
 (Notary Public)



**BID BOND**

KNOW ALL MEN BY THESE PRESENTS, That we, the undersigned, Casto Technical Services, Inc.  
of Charleston, WV, as Principal, and Western Surety Company  
of Chicago, IL, a corporation organized and existing under the laws of the State of  
SD with its principal office in the City of Chicago, as Surety, are held and firmly bound unto the State  
of West Virginia, as Obligee, in the penal sum of Five Percent of Amount Bid (\$ 5%) for the payment of which,  
well and truly to be made, we jointly and severally bind ourselves, our heirs, administrators, executors, successors and assigns.

The Condition of the above obligation is such that whereas the Principal has submitted to the Purchasing Section of the  
Department of Administration a certain bid or proposal, attached hereto and made a part hereof, to enter into a contract in writing for  
Eleanor Armed Forces Reserve Center, Red House HVAC Renovations - ADJ2100000023 - According to Plans &  
Specifications

NOW THEREFORE,

- (a) If said bid shall be rejected, or
- (b) If said bid shall be accepted and the Principal shall enter into a contract in accordance with the bid or proposal  
attached hereto and shall furnish any other bonds and insurance required by the bid or proposal, and shall in all other respects perform  
the agreement created by the acceptance of said bid, then this obligation shall be null and void, otherwise this obligation shall remain in  
full force and effect. It is expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no  
event, exceed the penal amount of this obligation as herein stated.

The Surety, for the value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no  
way impaired or affected by any extension of the time within which the Obligee may accept such bid, and said Surety does hereby  
waive notice of any such extension.

WITNESS, the following signatures and seals of Principal and Surety, executed and sealed by a proper officer of Principal and  
Surety, or by Principal individually if Principal is an individual, this 8th day of September, 2020.

Principal Seal

Casto Technical Services, Inc.  
(Name of Principal)  
By: Chris [Signature]  
(Must be President, Vice President, or  
Duly Authorized Agent)  
VP  
(Title)

Surety Seal

Western Surety Company  
(Name of Surety)  
By: Patricia A. Moye [Signature]  
Patricia A. Moye, WV Resident Agent Attorney-in-fact

**IMPORTANT – Surety executing bonds must be licensed in West Virginia to transact surety insurance, must affix its seal, and  
must attach a power of attorney with its seal affixed.**

# Western Surety Company

## POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

Know All Men By These Presents, That WESTERN SURETY COMPANY, a South Dakota corporation, is a duly organized and existing corporation having its principal office in the City of Sioux Falls, and State of South Dakota, and that it does by virtue of the signature and seal herein affixed hereby make, constitute and appoint

**Kimberly J Wilkinson, Gregory T Gordon, Patricia A Moye, Individually**

of Charleston, WV, its true and lawful Attorney(s)-in-Fact with full power and authority hereby conferred to sign, seal and execute for and on its behalf bonds, undertakings and other obligatory instruments of similar nature

### - In Unlimited Amounts -

and to bind it thereby as fully and to the same extent as if such instruments were signed by a duly authorized officer of the corporation and all the acts of said Attorney, pursuant to the authority hereby given, are hereby ratified and confirmed.

This Power of Attorney is made and executed pursuant to and by authority of the By-Law printed on the reverse hereof, duly adopted, as indicated, by the shareholders of the corporation.

In Witness Whereof, WESTERN SURETY COMPANY has caused these presents to be signed by its Vice President and its corporate seal to be hereto affixed on this 21st day of August, 2018.



WESTERN SURETY COMPANY

*Paul T. Bruflat*

Paul T. Bruflat, Vice President

State of South Dakota }  
County of Minnehaha } ss

On this 21st day of August, 2018, before me personally came Paul T. Bruflat, to me known, who, being by me duly sworn, did depose and say: that he resides in the City of Sioux Falls, State of South Dakota; that he is the Vice President of WESTERN SURETY COMPANY described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporation and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporation.

My commission expires

June 23, 2021



*J. Mohr*

J. Mohr, Notary Public

### CERTIFICATE

I, L. Nelson, Assistant Secretary of WESTERN SURETY COMPANY do hereby certify that the Power of Attorney hereinabove set forth is still in force, and further certify that the By-Law of the corporation printed on the reverse hereof is still in force. In testimony whereof I have hereunto subscribed my name and affixed the seal of the said corporation this 8th day of September, 2020



WESTERN SURETY COMPANY

*L. Nelson*

L. Nelson, Assistant Secretary

# CONTRACTOR LICENSE

Authorized by the

**West Virginia Contractor Licensing Board**

**Number:**

WV001241

**Classification:**

ELECTRICAL  
HEATING, VENTILATING & COOLING  
PIPING

CASTO TECHNICAL SERVICES INC  
DBA CASTO TECHNICAL SERVICES INC  
PO BOX 627  
CHARLESTON, WV 25322-0627

**Date Issued**

**Expiration Date**

AUGUST 13, 2020

AUGUST 13, 2021



**WEST VIRGINIA  
CONTRACTOR  
LICENSING  
BOARD**

  
Authorized Company Signature

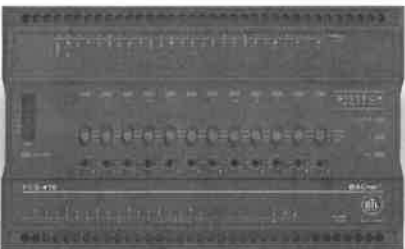
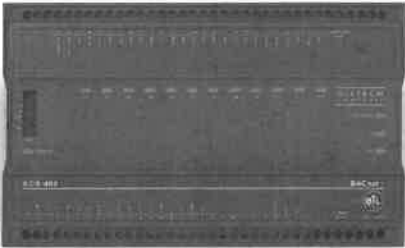
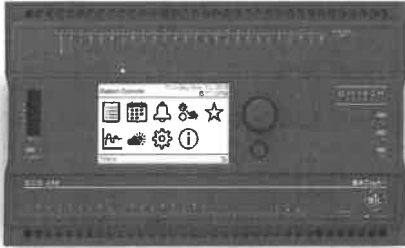
  
Chair, West Virginia Contractor  
Licensing Board

This license, or a copy thereof, must be posted in a conspicuous place at every construction site where work is being performed. This license number must appear in all advertisements, on all bid submissions and on all fully executed and binding contracts. This license cannot be assigned or transferred by licensee. Issued under provisions of West Virginia Code, Chapter 21, Article 11.



# ECB-400 Series

BACnet B-AAC 24-Point  
Programmable Controllers



## Overview

The ECB-400 Series controllers are microprocessor-based programmable controllers designed to control various building automation applications such as air handling units, multi-zone applications, chillers, boilers, pumps, cooling towers, and roof top units.

The ECB-400 Series can also be used for lighting control applications. This controller uses the BACnet<sup>®</sup> MS/TP LAN communication protocol and is BTL<sup>®</sup>-Listed as BACnet Advanced Application Controllers (B-AAC).



## Features & Benefits

- Flexible inputs and outputs support all industry-standard HVAC unitary applications
- Rugged hardware inputs and outputs eliminate the need for external protection equipment
- Models available with HOA switches and potentiometers are ideal for equipment testing or commissioning
- An optional full-color backlit display with jog dial provides direct access to a wide range of controller functions
- Supports EC-gfxProgram, making Building Automation System programming effortless
- Open-to-Wireless<sup>™</sup> ready, supporting a wide variety of wireless sensors and switches and helping to reduce installation costs
- Supports the Allure<sup>™</sup> Series Communicating Sensors, providing intelligent sensing and environmental zone control

# Model Selection

Example: ECB-453

Series	Model	Options
ECB-	400: 24-Points, 15Vdc Power Supply, 12 UI, 12 UO	UUKL: UL 864, 10 <sup>th</sup> Edition UUKL and California State Fire Marshal Listed <sup>1</sup>
	403: 24-Points, 15Vdc Power Supply, 12 UI, 8 DO, 4 UO	
	410: 24-Points, 15Vdc Power Supply, 12 UI, 12 UO, HOA	
	413: 24-Points, 15Vdc Power Supply, 12 UI, 8 DO, 4 UO, HOA	
	450: 24-Points, 15Vdc Power Supply, 12 UI, 12 UO, Color display	
	453: 24-Points, 15Vdc Power Supply, 12 UI, 8 DO, 4 UO, Color display	

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.

## Recommended Applications

Model	ECB-400 / 410 / 450	ECB-403 / 413 / 453	ECB-400 UUKL
Roof Top		■	
Air Handling Unit	■	■	■
Multi-Zone Application	■		
Chiller	■	■	
Boiler	■	■	
Cooling Tower	■	■	
Exhaust Fan			■

## BACnet Objects List

### BACnet Objects

Calendar Objects	2
Events per calendar	45
Schedule Objects	10
Special events per schedule	10
PID Loop Objects	30
Input Objects (AI, BI, MSI) <sup>1</sup>	64 <sup>2</sup>
Output Objects (AO, BO) <sup>1</sup>	12 <sup>3</sup> (400 / 410 / 453 models) 4 <sup>3</sup> (403 / 413 / 453 models)
Alarm Notification Classes	5

1. Supports object internally-generated alarms (intrinsic reporting).
2. This consists of Hardware Inputs, Allure Series Communicating Sensor Inputs, and Open-to-Wireless Inputs.
3. This consists of Hardware Outputs.

### Commandable Objects<sup>1</sup>

BV Objects	20
MSV Objects	20
AV Objects	35

### Non-Commandable Objects

BV Objects	55
MSV Objects	55
AV Objects	115

1. Supports object internally-generated alarms (intrinsic reporting).

## Product Specifications

### Power Supply Input

Voltage Range	24VAC/DC; ±15%; Class 2
Frequency Range	50/60Hz
Overcurrent Protection	Field replaceable fuse
Fuse Type	3.0A
Power Consumption	22 VA typical plus all external loads <sup>1</sup> , 60 VA max.
Power Consumption	22 VA typical plus all external loads <sup>1</sup> , 50 VA max.
Power Consumption	25 VA typical plus all external loads <sup>1</sup> , 63 VA max.
Power Consumption	25 VA typical plus all external loads <sup>1</sup> , 53 VA max.

1. 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-AAC <sup>1</sup>
EOL Resistor	Built-in, jumper selectable
Baud Rates	9600, 19 200, 38 400, or 76 800 bps
Addressing	Dip switch or with an Allure EC-Smart-View 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

## Room Devices Support

Maximum combined number of devices per controller	12 <sup>1</sup>
Allure EC-Smart-View Series	Up to 12
Allure EC-Smart-Comfort Series (not supported by UUKL)	Up to 6
Allure EC-Smart-Air Series (not supported by UUKL)	Up to 6

1. A controller can support a maximum of 2 Allure sensor models equipped with a CO<sub>2</sub> sensor. Any remaining connected sensors must be without a CO<sub>2</sub> sensor.

## Hardware

Processor	STM32 (ARM Cortex™ M3) MCU, 32 bit
CPU Speed	72 MHz
Applications Memory	1 MB Non-volatile Flash
Storage Memory	2 MB Non-volatile Flash
RAM Memory	96 kB RAM
Real Time Clock (RTC)	Built-in Real Time Clock with rechargeable battery Network time synchronization is initially required
RTC Battery	20 hours charge time, 20 days recharge time Up to 500 charge/discharge cycles
Green LEDs	Power status & LAN Tx
Orange LEDs	Controller status & LAN Rx
Communication Jack	BACnet 1/8" (3.5mm) stereo audio jack

## Wireless Receiver

Communication Protocol	EnOcean wireless standard <sup>1</sup>
Number of Wireless Inputs <sup>2</sup>	28
Supported Wireless Receivers	Refer to the Open-to-Wireless Application Guide
Cable	Telephone cord
Connector	4P4C modular jack
Length (maximum)	2m (6.5ft)



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.

## Mechanical

Dimensions (H x W x D)	4.7 x 7.7 x 2.03"
ECB-400 / 403 / 410 / 413	(119.38 x 195.58 x 51.47 mm)
Dimensions (H x W x D)	4.7 x 7.7 x 2.55"
ECB-450 / 453	(119.38 x 195.58 x 64.68 mm)
Shipping Weight	1.17lbs (0.53 kg)
ECB-400 / 403 / 410 / 413	
Shipping Weight	1.28lbs (0.58 kg)
ECB-450 / 453	
Enclosure Material <sup>1</sup>	FR/ABS
Enclosure Rating	Plastic housing, UL94-5VB flammability rating Plenum rating per UL1995
Installation	Direct DIN-rail mounting or wall mounting through mounting holes (see figure above for hole positions)

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

## Standards and Regulation

CE Emission	EN61000-6-3: 2007; A1:2011
CE Immunity	EN61000-6-1: 2007
FCC	Compliance with FCC rules part 15, subpart B, class B
UL Listed (CDN & US)	UL916 Energy management equipment
UL 864	UL 864, 10 <sup>th</sup> Edition, UUKL Listed Smoke Control Equipment (ECB-400 UUKL model only) <sup>1</sup>
California State Fire Marshal Listing	CSFM: 7300-2187:0100 (ECB-400 UUKL model only) <sup>1</sup>
CEC Appliance Database	Appliance Efficiency Program <sup>2</sup>



1. For detailed specifications regarding the ECB-400 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.

## ECB-450 and ECB-453 Display

Display Type	Backlit-color LCD
Display Resolution	400 W x 240 H pixels (WQVGA)
Effective Viewing Area (W x H)	2.4 x 1.4" (61.2 x 36.7mm) diagonal: 2.8" (71mm)
Menu Navigation	Jog dial turn, select navigation with Exit button



## Universal Inputs (UI)

### General

Input Type	Universal; software configurable
Input Resolution	16-Bit analog / digital converter
Power Supply Output	15VDC; maximum 240mA

### Contact

Type	Dry contact
------	-------------

### Counter UI1 to UI4:

Type	SO output compatible
Maximum Frequency	50Hz maximum
Minimum Duty Cycle	10milliseconds On / 10milliseconds Off

### UI5 to UI10:

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

### 0 to 10VDC

Range	0 to 10VDC (40k $\Omega$ input impedance)
-------	--

### 0 to 5VDC

Range	0 to 5VDC (high input impedance)
-------	-------------------------------------

### 0 to 20mA

Range	0 to 20mA  249 $\Omega$ jumper configurable internal resistor
-------	--

### Resistance/Thermistor

Range	0 to 350 K $\Omega$
-------	---------------------

Supported Thermistor Types Any that operate in this range

### Pre-configured Temperature Sensor Types:

Thermistor	10K $\Omega$ Type 2, 3 (10K $\Omega$ @ 77°F; 25°C)
Platinum	Pt1000 (1K $\Omega$ @ 32°F; 0°C)
Nickel	RTD Ni1000 (1K $\Omega$ @ 32°F; 0°C) RTD Ni1000 (1K $\Omega$ @ 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
Load Resistance	Minimum 200 $\Omega$ for 0-10VDC and 0-12VDC outputs Maximum 500 $\Omega$ for 0-20mA output
Auto-reset fuse	Provides 24VAC over voltage protection

### 0 or 12VAC (On/Off)

Range	0 or 12VDC
Source Current	Maximum 60 mA at 12VDC (minimum load resistance 200 $\Omega$ )

### 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
Source Current	Maximum 60 mA at 10VDC (minimum load resistance 200 $\Omega$ )

### 0 to 20mA

Range	0 to 20mA
Type	Current source (jumper configurable)

### HOA

Hand-Off-Auto switch	When equipped. Supervision allows control logic to read the current HOA switch and potentiometer settings
----------------------	--

Threshold Configurable

Potentiometer Voltage Range 0 to 12.5VDC

## 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

### 0 or 24VAC (On/Off)

Range	0 or 24VAC
-------	------------

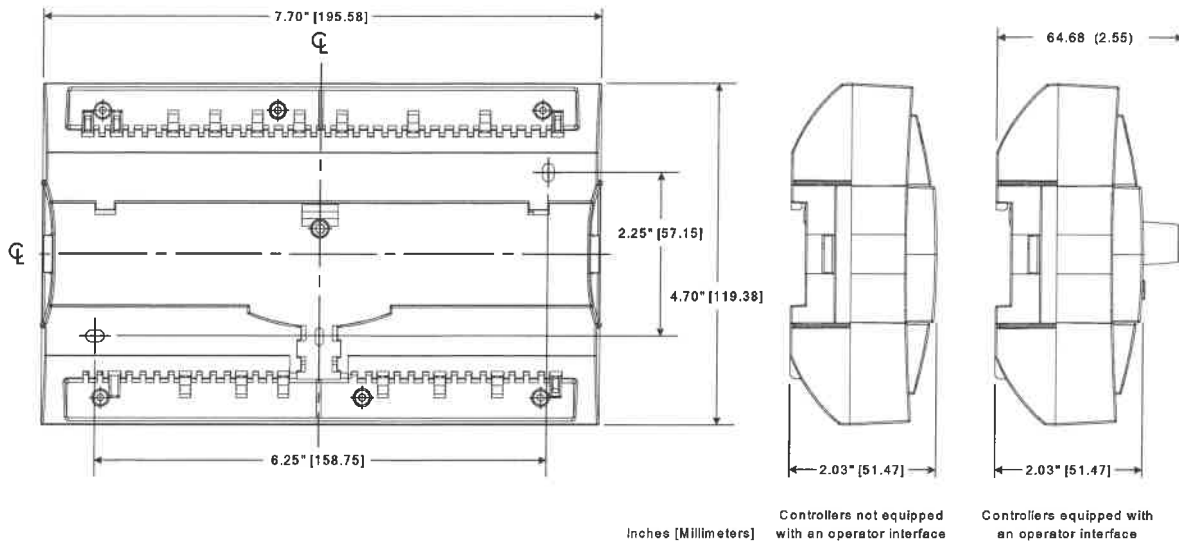
### PWM

Range	Adjustable period from 2 to 65 seconds
-------	---

### Floating

Minimum Pulse On/Off Time	500 milliseconds
Drive Time Period	Adjustable
Power Source	External

# Dimensions



Specifications subject to change without notice.

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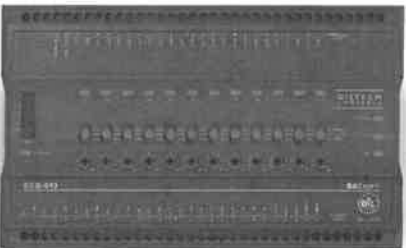
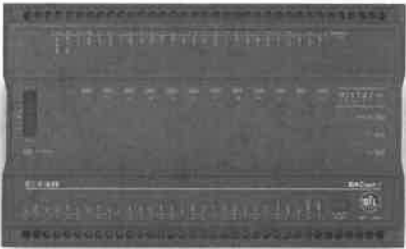
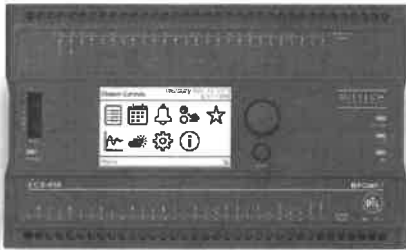
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## ECB-600 Series

### BACnet B-AAC 28-Point Programmable Controllers



### Overview

The ECB-600 Series controllers are microprocessor-based programmable controllers designed to control various building automation applications such as air handling units, chillers, boilers, pumps, cooling towers, and central plant applications. This series supports up to two ECx-400 Series I/O extension modules.

This controller uses the BACnet<sup>®</sup> MS/TP LAN communication protocol and is BTL<sup>®</sup>-Listed as BACnet Advanced Application Controllers (B-AAC).



### Features & Benefits

- Flexible inputs and outputs support all industry-standard HVAC unitary applications
- Rugged hardware inputs and outputs eliminate the need for external protection equipment
- Models available with HOA switches and potentiometers are ideal for equipment testing or commissioning
- An optional full-color backlit display with jog dial provides direct access to a wide range of controller functions
- Supports EC-*gfx*Program, making Building Automation System programming effortless
- Open-to-Wireless<sup>™</sup> ready, supporting a wide variety of wireless sensors and switches and helping to reduce installation costs
- Supports the Allure<sup>™</sup> Series Communicating Sensors, providing intelligent sensing and environmental zone control

# Model Selection

Example: ECB-600

Series	Model	Options
ECB-	600: 28 Points, 15Vdc Power Supply, 16 UI, 12 UO	UUKL: UL 864, 10 <sup>th</sup> Edition UUKL and California State Fire Marshal Listed
	610: 28 Points, 15Vdc Power Supply, 16 UI, 12 UO, HOA	
	650: 28 Points, 15Vdc Power Supply, 16 UI, 12 UO, Color Display	

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.

## Recommended Applications

Model	ECB-600 / 610 / 650	ECB-600 UUKL
Air Handling Unit	■	■
Multi-Zone Application	■	
Chiller	■	
Boiler	■	
Cooling Tower	■	
Central Plant	■	
Exhaust Fan		■

## BACnet Objects List

### BACnet Objects

Calendar Objects	2
Events per calendar	45
Schedule Objects	10
Special events per schedule	10
PID Loop Objects	40
Input Objects (AI, BI, MSI) <sup>1</sup>	68 <sup>2</sup>
Output Objects (AO, BO) <sup>1</sup>	12 <sup>3</sup>
Alarm Notification Classes	5

1. Supports object internally-generated alarms (intrinsic reporting).
2. This consists of Hardware Inputs, Allure Series Communicating Sensor Inputs, and Open-to-Wireless Inputs.
3. This consists of Hardware Outputs.

### Commandable Objects<sup>1</sup>

BV Objects	20
MSV Objects	20
AV Objects	35

### Non-Commandable Objects

BV Objects	55
MSV Objects	55
AV Objects	115

1. Supports object internally-generated alarms (intrinsic reporting).

## Product Specifications

### Power Supply Input

Voltage Range	24VAC/DC; ±15%; Class 2
Frequency Range	50/60Hz
Overcurrent Protection	Field replaceable fuse
Fuse Type	3.0A
Power Consumption	22 VA typical plus all external loads <sup>1</sup> , 65 VA max.
Power Consumption	25 VA typical plus all external loads <sup>1</sup> , 68 VA max.

1. 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-AAC <sup>1</sup>
EOL Resistor	Built-in, jumper selectable
Baud Rates	9600, 19 200, 38 400, or 76 800 bps
Addressing	Dip switch or with an Allure EC-Smart-View 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

### Room Devices Support

Maximum combined number of devices per controller	12 <sup>1</sup>
Allure EC-Smart-View Series	Up to 12
Allure EC-Smart-Comfort Series	Up to 6
(not supported by UUKL)	
Allure EC-Smart-Air Series	Up to 6
(not supported by UUKL)	

1. A controller can support a maximum of 2 Allure sensor models equipped with a CO<sub>2</sub> sensor. Any remaining connected sensors must be without a CO<sub>2</sub> sensor.

### Hardware

Processor	STM32 (ARM Cortex™ M3) MCU, 32 bit
CPU Speed	72 MHz
Applications Memory	1 MB Non-volatile Flash
Storage Memory	2 MB Non-volatile Flash

RAM Memory	96 kB RAM
Real Time Clock (RTC)	Built-in Real Time Clock with rechargeable battery Network time synchronization is initially required
RTC Battery	20 hours charge time, 20 days recharge time Up to 500 charge/discharge cycles
Green LEDs	Power status & LAN Tx
Orange LEDs	Controller status & LAN Rx
Communication Jack	BACnet 1/8" (3.5mm) stereo audio jack

#### I/O Extension Modules (ECx-400 Series)

Communication	RS-485
Number of I/O extension modules per controller	Up to 2, in daisy-chain configuration

#### Wireless Receiver

Communication Protocol	EnOcean wireless standard <sup>1</sup>
Number of Wireless Inputs <sup>2</sup>	28
Supported Wireless Receivers	Refer to the Open-to-Wireless Application Guide
Cable	Telephone cord
Connector	4P4C modular jack
Length (maximum)	2m (6.5ft)



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.

#### Mechanical

Dimensions (H x W x D)	4.7 x 7.7 x 2.03"
ECB-600 / 610	(119.38 x 195.58 x 51.47 mm)
Dimensions (H x W x D)	4.7 x 7.7 x 2.55"
ECB-650	(119.38 x 195.58 x 64.68 mm)
Shipping Weight	1.17lbs (0.53 kg)
ECB-600 / 610	
Shipping Weight	1.28lbs (0.58 kg)
ECB-650	
Enclosure Material <sup>1</sup>	FR/ABS
Enclosure Rating	Plastic housing, UL94-5VB flammability rating Plenum rating per UL1995
Installation	Direct DIN-rail mounting or wall mounting through mounting holes (see figure above for hole positions)

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

#### Standards and Regulation

CE Emission	EN61000-6-3: 2007; A1:2011
CE Immunity	EN61000-6-1: 2007
FCC	Compliance with FCC rules part 15, subpart B, class B
UL Listed (CDN & US)	UL916 Energy management equipment
UL 864	UL 864, 10 <sup>th</sup> Edition, UUKL Listed Smoke Control Equipment (ECB-600 UUKL model only) <sup>1</sup>
California State Fire Marshal Listing	CSFM: 7300-2187:0100 (ECB-600 UUKL model only) <sup>1</sup>
CEC Appliance Database	Appliance Efficiency Program <sup>2</sup>



1. For detailed specifications regarding the ECB-600 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.

#### ECB-650 Display

Display Type	Backlit-color LCD
Display Resolution	400 W x 240 H pixels (WQVGA)
Effective Viewing Area (W x H)	2.4 x 1.4" (61.2 x 36.7mm) diagonal: 2.8" (71mm)
Menu Navigation	Jog dial turn, select navigation with Exit button

#### Universal Inputs (UI)

##### General

Input Type	Universal; software configurable
Input Resolution	16-Bit analog / digital converter
Power Supply Output	15VDC; maximum 320mA

##### Contact

Type	Dry contact
------	-------------

##### Counter UI1 to UI4:

Type	SO output compatible
Maximum Frequency	50Hz maximum
Minimum Duty Cycle	10milliseconds On / 10milliseconds Off

##### UI5 to UI10:

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 jumper configurable internal resistor
-------	--

## Resistance/Thermistor

Range	0 to 350 K $\Omega$
Supported Thermistor Types	Any that operate in this range
<b>Pre-configured Temperature Sensor Types:</b>	
Thermistor	10K $\Omega$ Type 2, 3 (10K $\Omega$ @ 77°F; 25°C)
Platinum	Pt1000 (1K $\Omega$ @ 32°F; 0°C)
Nickel	RTD Ni1000 (1K $\Omega$ @ 32°F; 0°C) RTD Ni1000 (1K $\Omega$ @ 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
Load Resistance	Minimum 200 $\Omega$ for 0-10VDC and 0-12VDC outputs Maximum 500 $\Omega$ for 0-20mA output
Auto-reset fuse	Provides 24VAC over voltage protection

## 0 or 12VAC (On/Off)

Range	0 or 12VDC
Source Current	Maximum 60 mA at 12VDC (minimum load resistance 200 $\Omega$ )
<b>PWM</b>	
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
Source Current	Maximum 60 mA at 10VDC (minimum load resistance 200 $\Omega$ )

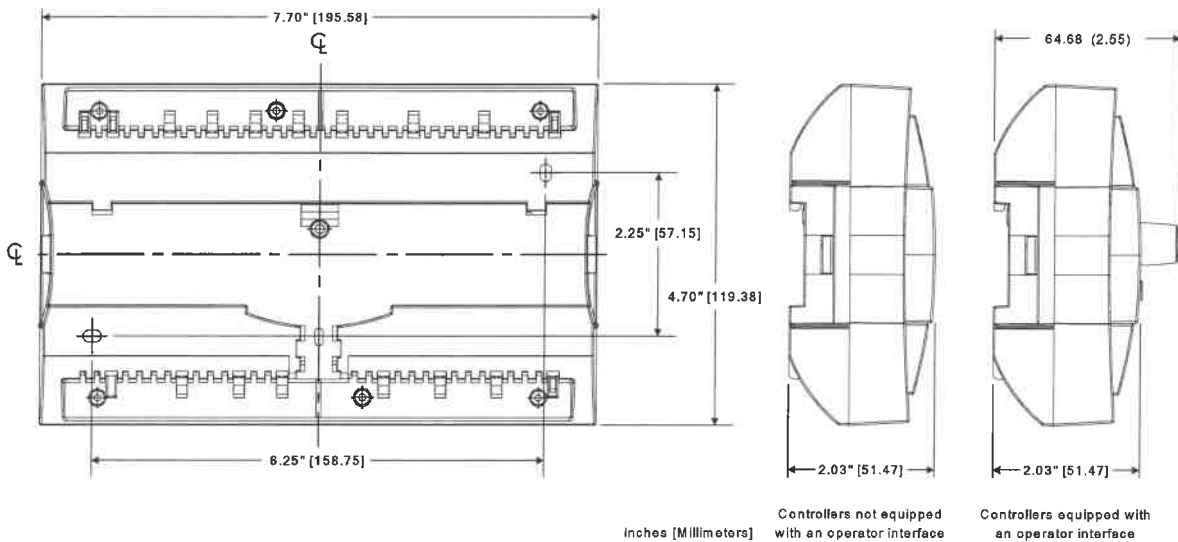
## 0 to 20mA

Range	0 to 20mA
Type	Current source (jumper configurable)

## HOA

Hand-Off-Auto switch	When equipped. Supervision allows control logic to read the current HOA switch and potentiometer settings
Threshold	Configurable
Potentiometer Voltage Range	0 to 12.5VDC

## Dimensions



Controllers not equipped with an operator interface

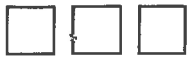
Controllers equipped with an operator interface

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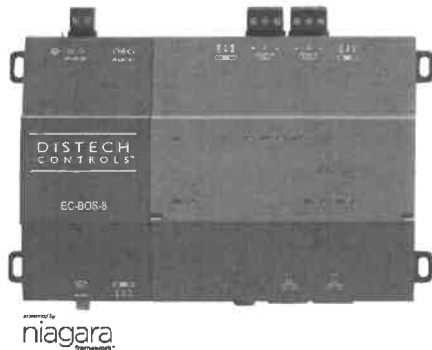
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# EC-BOS-8

## Multi-Protocol Web Building Controller



## Overview

The EC-BOS-8 is a compact, embedded controller and server platform for connecting multiple and diverse devices and sub-systems. With Internet connectivity and Webserving capability, the EC-BOS-8 provides integrated control, supervision, data logging, alarming, scheduling and network management. It streams data and graphical displays to a standard Web browser via an Ethernet or wireless LAN, or remotely over the Internet.

The EC-BOS-8 operates with EC-Net™ 4 web-based building management platform powered by the Niagara Framework®. The EC-BOS-8 can also run EC-Net Access for managing access control systems.

## Features & Benefits

- Scalable licensing model and modular hardware make the EC-BOS-8 suitable for installation in small buildings, as well as large multi-unit campuses when combined with EC-Net Supervisor
- Integrates many communication protocols and automation systems including HVAC, lighting, energy, fire & smoke, physical access, video and industrial/processing
- Two on-board isolated RS-485 ports for connecting to various common networks, e.g. BACnet MS/TP, Modbus RTU, Wiegand access control devices
- Option modules for additional physical network connections, e.g. LonWorks® FTT-10A, RS-232, RS-485, and Wiegand access readers
- USB type A port for station backup and restore functions
- Backward compatibility allows the EC-BOS-8 to run an EC-Net<sup>AX</sup> station (minimum requirement is 3.8.111)



# Model Selection

To order a fully functional EC-BOS-8, the following three components are required: EC-BOS-8, Core Software, Software Maintenance Agreement (SMA). If ordering a demo core, an SMA is not required. Refer to the [EC-Net Selection Tool](#) to calculate the required components.

## EC-BOS-8 Series

**Example:** EC-BOS-8 with Worldwide WiFi

Series	WiFi Setting <sup>1</sup>
EC-BOS-8: EC-BOS-8 includes two isolated RS485 ports, two 10/100MB Ethernet ports and USB Backup & Restore.	<p><b>With US WiFi:</b> US WiFi setting for enabling WiFi on EC-BOS-8 units installed in the US.</p> <p><b>With Worldwide WiFi:</b> Worldwide WiFi setting for enabling WiFi on EC-BOS-8 units installed anywhere in the world except the US.</p> <p><b>With Permanently Disabled WiFi:</b> WiFi setting for permanently disabling WiFi on EC-BOS-8 units.</p>

<sup>1</sup>. Refer to the [EC-BOS-8 Global Shipping Guide](#) for more information.

## EC-BOS-8 Core Software

**Example:** EC-BOS-8 Core - 100 Devices/5000 Points

Series	Devices/Points <sup>1</sup>
EC-BOS-8 Core: EC-BOS-8 core software. Includes standard open drivers. Requires EC-Net 4.1 or higher. Software Maintenance Agreement (SMA) must be purchased in conjunction with core software.	<p><b>5 Devices/250 Points:</b> Supports up to 5 devices and 250 points.</p> <p><b>10 Devices/500 Points:</b> Supports up to 10 devices and 500 points.</p> <p><b>25 Devices/1250 Points:</b> Supports up to 25 devices and 1250 points.</p> <p><b>100 Devices/5000 Points:</b> Supports up to 100 devices and 5000 points.</p> <p><b>200 Devices/10000 Points:</b> Supports up to 200 devices and 10000 points.</p>
EC-BOS-8 Core – Demo: EC-BOS-8 core software. Includes all available drivers. Supports up to 500 devices and 25000 points. Runs on EC-Net 4.1 or higher and EC-Net <sup>AX</sup> (minimum v3.8.111). Note: This license expires annually, and its renewal is covered by the EC-Net Support Fee.	N/A

<sup>1</sup>. Devices/Points cannot be added to the Demo version (EC-BOS-8 Core – Demo) of the EC-BOS-8 core software.

For more information regarding the EC-Net drivers currently offered by Distech Controls, refer to the [EC-Net Drivers Reference Guide](#).

## EC-BOS-8 Software Maintenance Agreement

Software maintenance is required when purchasing an EC-BOS-8. The minimum initial software maintenance plan is 18 months. Optional 3- or 5-year maintenance may be substituted.

If Maintenance coverage is not purchased for any period, the price of Maintenance for the next period for which it is purchased will be (a) the Maintenance fee for the period(s) for which Maintenance was not purchased, up to a maximum of 5 years; and (b) the Maintenance fee for the next year.

These software maintenance plans are ordered separately according to the EC-BOS-8 model chosen. See the price list for more details. Take advantage of the Asset Manager online tool to receive notifications about SMA expirations and Enterprise SMA to align all SMA expiration dates to a single one for the entire system.

**Example:** EC-BOS-8 (100 Device Core) 3 year SMA

Series	Software Maintenance Agreement
EC-BOS-8 (5 Device Core)	<p><b>18 month SMA:</b> Initial 18-month software maintenance agreement. Must be purchased in conjunction with initial core software. Optional 3 or 5 year maintenance may be substituted.</p> <p><b>1 year SMA:</b> 1-year software maintenance agreement (includes new and interim releases).</p> <p><b>3 year SMA:</b> 3-year software maintenance agreement (includes new and interim releases).</p> <p><b>5 year SMA:</b> 5-year software maintenance agreement (includes new and interim releases).</p>
EC-BOS-8 (10 Device Core)	
EC-BOS-8 (25 Device Core)	
EC-BOS-8 (100 Device Core)	
EC-BOS-8 (200 Device Core)	

## EC-BOS-8 Device Integration Pack

Example: EC-BOS-8 Device Integration Pack - 25

Series	Devices/Points
EC-BOS-8 Device Integration Pack: EC-BOS-8 device integration pack purchased in conjunction with initial core software.	10: Adds support for additional 10 devices and 500 points to core software.
	25: Adds support for additional 25 devices and 1250 points to core software.
	50: Adds support for additional 50 devices and 2500 points to core software.

## EC-BOS-8 Device Upgrade Pack

Example: EC-BOS-8 Device Upgrade Pack - 25

Series	Devices/Points
EC-BOS-8 Device Upgrade Pack: EC-BOS-8 device upgrade pack purchased any time <u>after</u> initial core software purchase.	10: Adds support for additional 10 devices and 500 points to core software.
	25: Adds support for additional 25 devices and 1250 points to core software.
	50: Adds support for additional 50 devices and 2500 points to core software.

## EC-BOS-8 Software Option

Example: EC-BOS-8 AX Station Pack

Option	Description
EC-BOS-8 AX Station Pack	Enables EC-BOS-8 to run EC-Net <sup>AX</sup> (minimum 3.8.111)
EC-BOS-8 EC-Net Access Pack	Enables EC-BOS-8 to run EC-Net Access (minimum 2.3.118). Includes licensing for 32 readers and EC-BOS-8 AX Station Pack.

## EC-BOS-8 Hardware Accessory

Example: EC-BOS-8 Wall Plug Module

Accessory	Description
EC-BOS-8 Wall Plug Module	100-240VAC, 50/60 Hz. Wall Adapter – Connects to the 2.5mm barrel plug 24V input on the EC-BOS-8 and includes US, EU, UK, and AU style plugs.
EC-BOS-8 WLAN Antenna Cable Extension	Extension cable and bracket for EC-BOS-8 WLAN antenna.

## EC-BOS-8 Add-on Modules

Example: IO-R-16

Add-on Module	Description
EC-NPB8-LON	EC-BOS-8 - Add-on single port LON FTT10A module.
EC-NPB8-2X-485	EC-BOS-8 - Add-on dual port RS-485 module.
EC-NPB8-232	EC-BOS-8 - Add-on single port RS-232 module.
IO-R-16	16 Point IO Module. Powered by IO-R-34. Connected to the EC-BOS-8 remotely over RS485.
IO-R-34	34 Point IO Module. Powered by 24VAC/DC. Capable of powering (4) IO-R-16 modules. Connected to the EC-BOS-8 remotely over RS485.
EC-Net Access Remote Reader	Remote reader module - 2 card reader inputs, 4 supervised inputs, 2 digital inputs, 2 form C (SPDT) relay outputs.
EC-Net Access Remote IO	Remote I/O module - 8 supervised inputs, 2 digital inputs, 8 form C (SPDT) relay outputs.

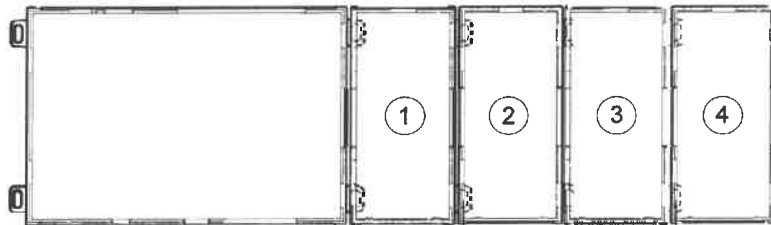
# Expansion Modules

Modules	Description	Maximum Expansion Modules Supported
EC-NPB8-LON	EC-BOS-8 - Add-on single port LON FTT10A module.	4
EC-NPB8-2X-485	EC-BOS-8 - Add-on dual port RS-485 module.	2
EC-NPB8-232	EC-BOS-8 - Add-on single port RS-232 module.	4
IO-R-16	16 Point IO Module	16 <sup>1</sup>
IO-R-34	34 Point IO Module	8 <sup>1</sup>
EC-Net Access Remote Reader	Remote reader module	16 (each or combined)
EC-Net Access Remote IO	Remote I/O module	

1. For detailed information about maximum number of modules supported and maximum combinations, refer to the EC-BOS-8 I/O Modules datasheet.

Maximum Combinations (see figure below):

Expansion 1	Expansion 2	Expansion 3	Expansion 4
EC-NPB8-232 OR EC-NPB8-LON	EC-NPB8-232 OR EC-NPB8-LON	EC-NPB8-232 OR EC-NPB8-LON	EC-NPB8-232 OR EC-NPB8-LON
EC-NPB8-2X-485	EC-NPB8-232 OR EC-NPB8-LON	EC-NPB8-232 OR EC-NPB8-LON	EC-NPB8-232 OR EC-NPB8-LON
EC-NPB8-2X-485	EC-NPB8-2X-485	EC-NPB8-232 OR EC-NPB8-LON	



# Product Specifications

## Platform

Processor	TI AM3352 1000MHz ARM® Cortex™-A8
Memory	1GB DDR3 SDRAM
	- Removable micro-SD card with 4GB flash total storage/2GB user storage
	- Real-time clock
	- Batteryless
	- Secure boot

## Communications

Wi-Fi	Client or WAP
Wi-Fi Communication Protocol	IEEE802.11a/b/g/n
	IEEE802.11n HT20 @ 2.4GHz
	IEEE802.11n HT20/HT40 @ 5GHz
Configurable radio	Off, WAP, or Client
Client Authentication Method	WPAPSK/WPA2PSK supported
USB type A connector	Back-up and restore support
RS-485	2 isolated RS-485 with selectable bias and termination
Ethernet	2 10/100MB Ethernet ports
BACnet Listing	BTL, B-BC listed with version 4.4.93 or later

## Power Supply

Voltage	24VAC/DC power supply
Consumption	24VA (24VAC); 24W (24VDC)

## Environmental

Operating Temperature	-20 to 60°C (-4 to 140 °F)
Storage Temperature	-40 to 85°C (-40 to 185 °F)
Relative Humidity	5% to 95% - Non condensing
Shipping and Vibration	ASTM D4169, Assurance Level II
MTTF	10 years+

## Operating Systems

EC-Net 4	4.1 or later
EC-Net <sup>AX</sup>	3.8.111 or later
EC-Net Access	2.3.118 or later

## EC-Net Access Licensing Quantities

Card Readers	32
Access Rights	250
Schedules	100
Access Zones	50
Simultaneous Users	10
Personnel	20,000
Area Controllers	N/A

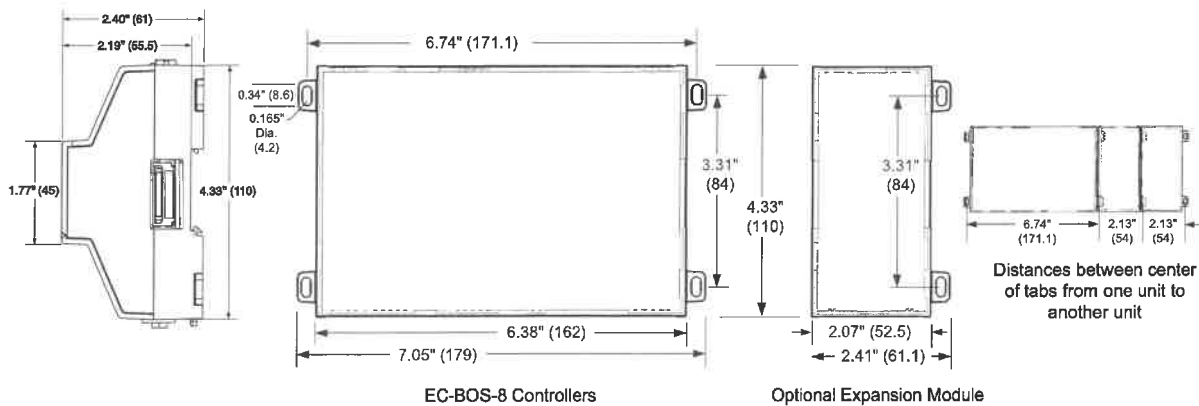
## Standards and Regulations

UL	UL 916
	C-UL listed to Canadian Standards Associations (CSA)
	C22.2 No. 205-M1983 "Signal Equipment"
	UL 864, 10 <sup>th</sup> Edition, UUKL Listed Smoke Control Equipment <sup>1</sup> (UUKL model only)
CE	EN 61326-1
FCC	Part 15 Subpart B, Class B, Part 15 Subpart C

R&TTE Compliance 1999/5/EC R&TTE Directive

Other compliances CCC, SRRC, RSS, RoHS

1. For detailed specifications regarding the EC-BOS-8 UUKL model, refer to the Distech Controls UUKL Smoke Control Design Guide (UUKL Design Guide\_UG\_10\_EN) and Distech Controls UUKL Smoke Control Application Guide (UUKL Application Guide\_UG\_10\_EN).



Specifications subject to change without notice.

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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/sunblinds 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™ Solution 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.

# Device Markings (Symbols)

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

Symbol	Description
	CE marking: the device conforms to the requirements of applicable EC directives.
	Products must be disposed of at the end of their useful life according to local regulations.
	Read the Hardware Installation Guide for more information.
	UL marking: conforms to the requirements of the UL certification.
	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), tightening torque 0.5 Nm).
- 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, network, input wiring separate from each other.
- Power cables must be between 18 and 14 gauge (0.82 to 2.1mm<sup>2</sup> 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<sup>2</sup> cross-sectional area). When connecting two wires to a controller's terminal block clamping cage, both wires must be between 22 and 16 gauge (0.33 to 1.3mm<sup>2</sup> 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.

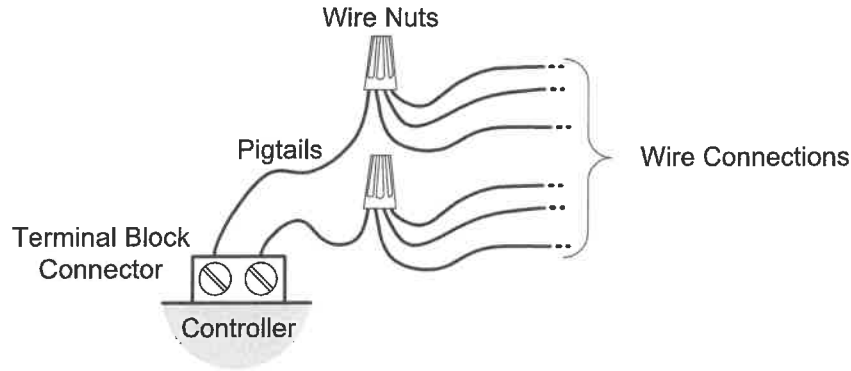


Figure 2: Using a Wire Nut and Pigtail to Wire the Controller

- 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.).
- Do not connect the universal inputs, analog/digital outputs or common terminals to earth or chassis ground (unless stated otherwise).
- Keep input and output wiring in conduits, trays or close to the building frame if possible.

# Controller Dimensions & Components

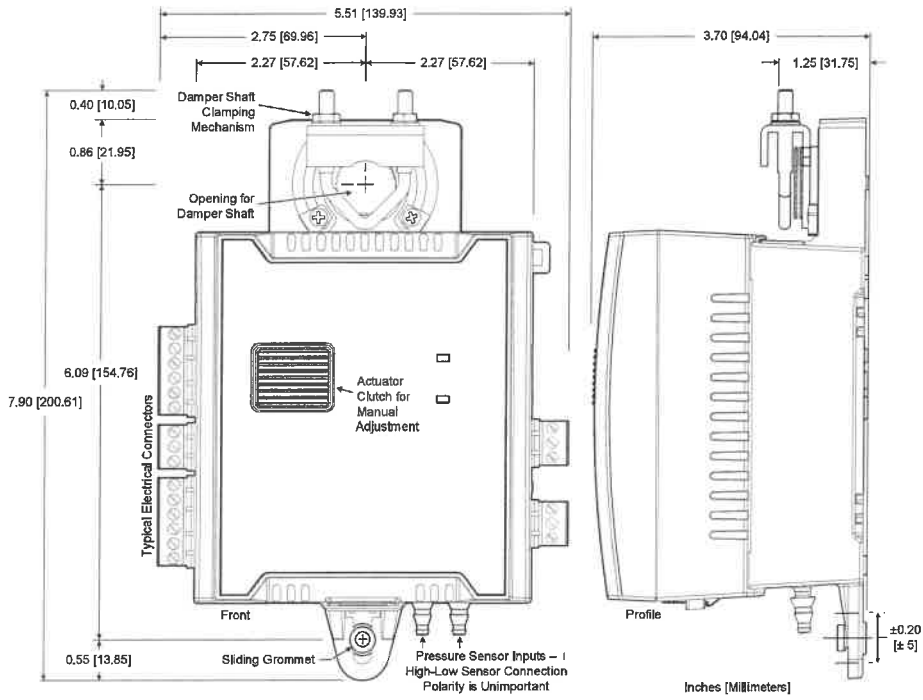


Figure 3: ECB-VAV Dimensions and Components

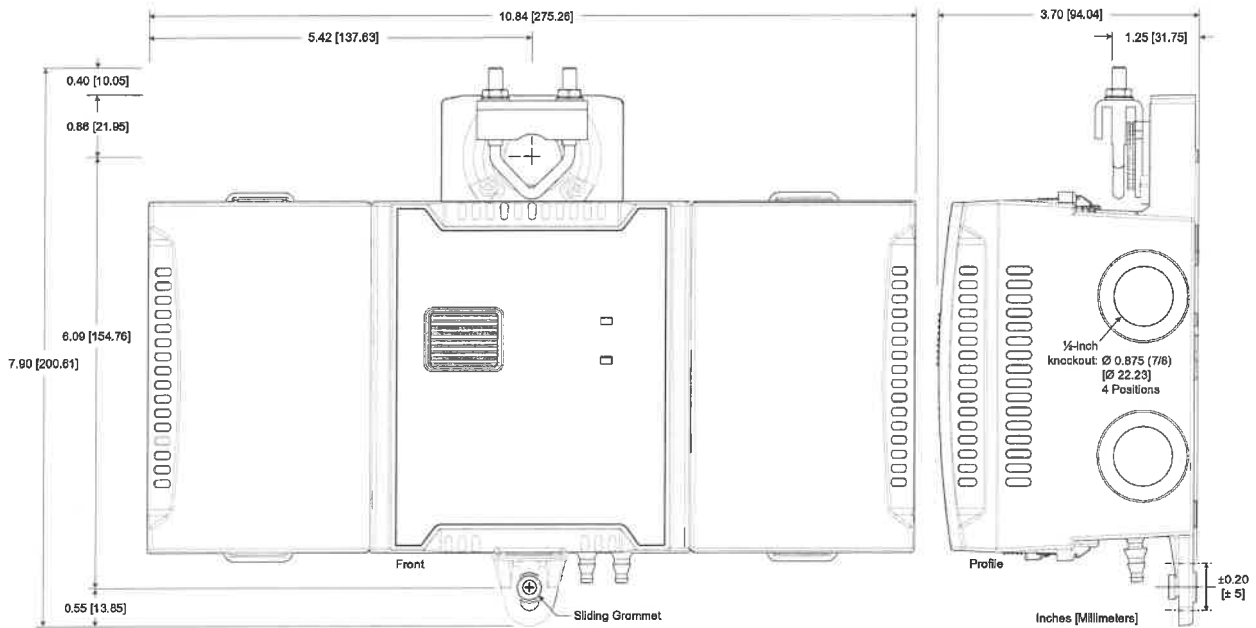


Figure 4: VAV Controller with Terminal Covers Dimensions



# DIP Switch Identification and Configuration

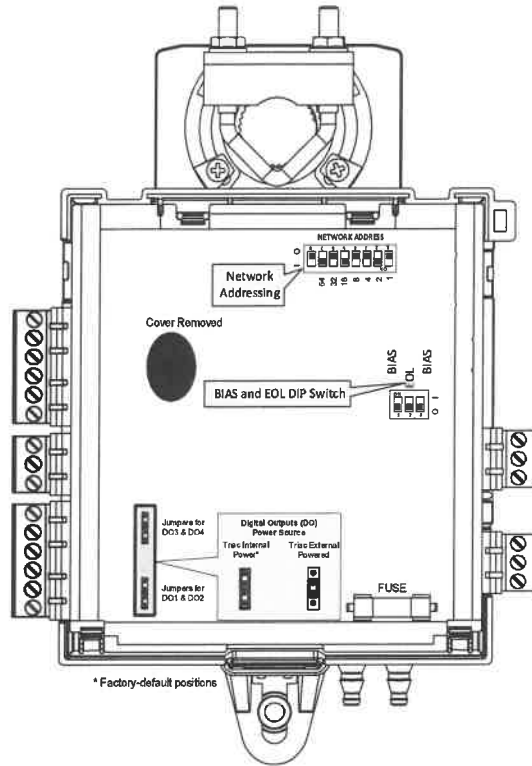


Figure 5: ECB-VAV (cover removed)

## 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).

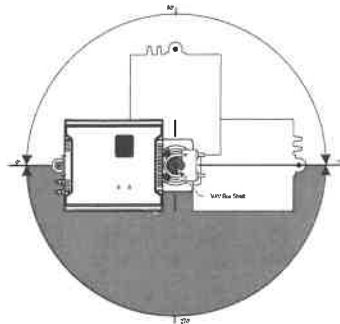


Figure 6: Recommended Mounting Position Angle Range

### 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.

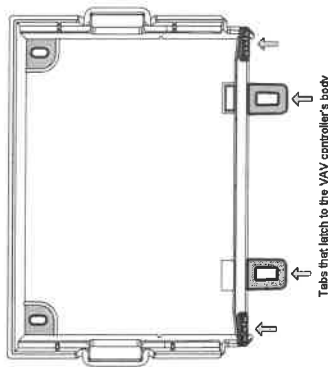


Figure 7: Terminal Cover Attachment Tabs

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 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

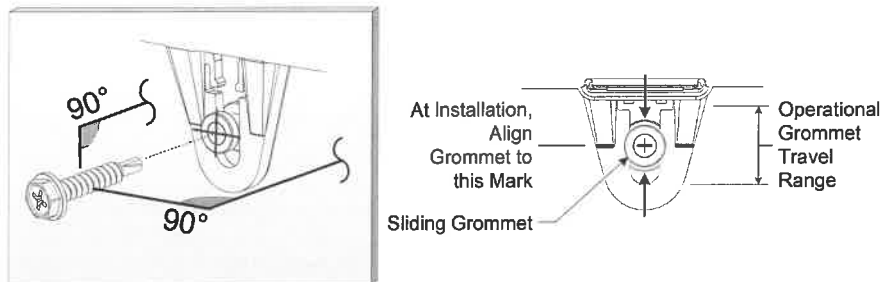


Figure 9: Supplied Mounting Hardware – Drive the screw at a right-angle to the VAV Box



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.

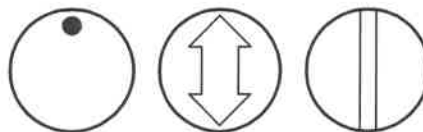


Figure 10: Typical Damper Shaft End Marking

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.

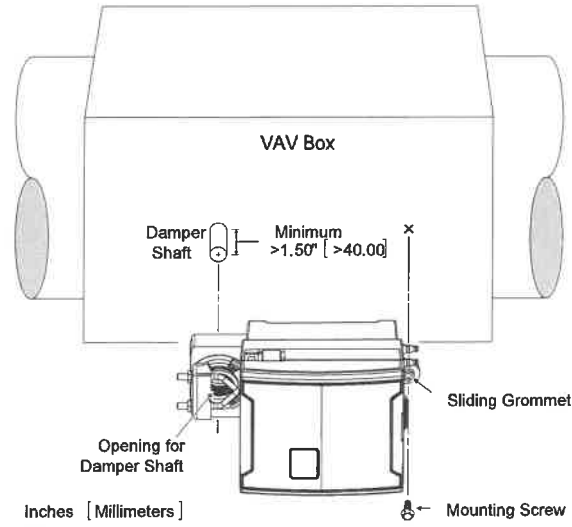


Figure 11: Standard Mounting Method: Mounting a controller on a damper shaft

# Power Wiring

**Voltage:** 24VAC/DC;  $\pm 15\%$ , 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 our website.

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<sub>p</sub>.

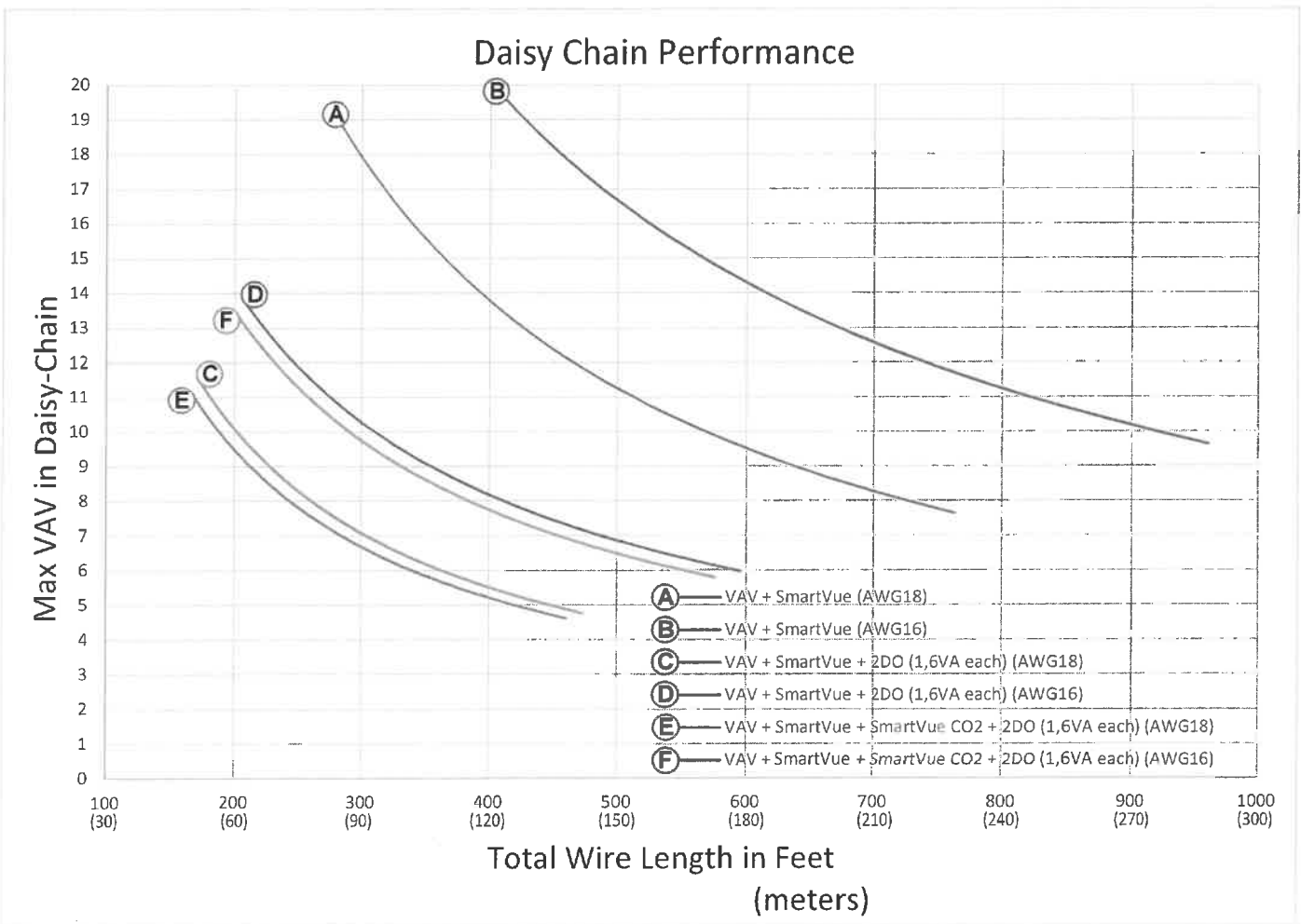


Figure 12: Maximum Number of VAV Devices on a Daisy-Chain at Evenly Spaced Intervals



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.

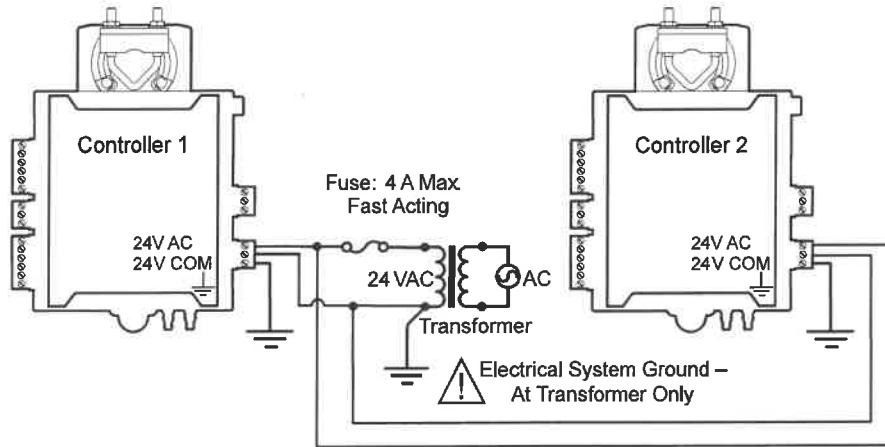


Figure 13: Power Wiring

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.

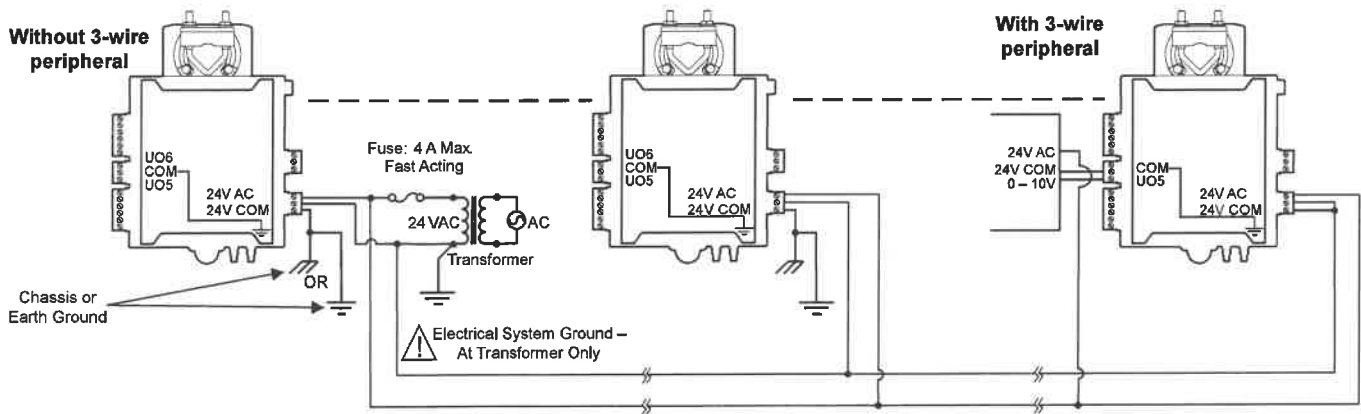


Figure 14: ECB-VAV Power Wiring with and Without 3-Wire Peripherals

# 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
<input type="checkbox"/> Dry Contact input. <input type="checkbox"/> Pulsed input.	UIx	
<input type="checkbox"/> 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	
<input type="checkbox"/> RTD input (for example, 1000Ω). <input type="checkbox"/> Thermistor Input (for example, 10kΩ type II and III).	UIx	
<input type="checkbox"/> Resistive input, maximum 350kΩ (for example, use with 10kΩ and 100kΩ potentiometers).	UIx	
<input type="checkbox"/> 0 to 20mA input used with a 2-wire, 0 to 20mA sensor powered by the controller's internal 18VDC power supply. <input type="checkbox"/> An on-board 18VDC power supply can provide the necessary power for 20mA current loop sensor operation. <input type="checkbox"/> Connect a 249Ω resistor between the UIx and COM terminals.	UIx	
<input type="checkbox"/> 0 to 20mA input used with a 2-wire, 0 to 20mA sensor powered by an external 24 AC/DC power supply. <input type="checkbox"/> Connect a 249Ω resistor between the UIx and COM terminals.	UIx	
<input type="checkbox"/> 0 to 20mA input used with a 3-wire, 0 to 20mA sensor powered by an external 24 AC/DC power supply. <input type="checkbox"/> 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	
<input type="checkbox"/> 0 to 20mA input used with a sensor powered by its own power source. <input type="checkbox"/> Connect a 249Ω resistor between the UIx and COM terminals.	UIx	
<input type="checkbox"/> 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	
<input type="checkbox"/> 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-gfxProgram 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
<input type="checkbox"/> Discrete 0 or 12VDC digital, Pulse, or PWM output controlling a 12VDC relay.	UOx	<p style="text-align: center;">12VDC Relay</p>
<input type="checkbox"/> 0 to 10VDC voltage output.	UOx	<p style="text-align: center;">0-10V Common</p>
<input type="checkbox"/> 0 to 10VDC voltage output controlling an analog actuator that is powered by an external 24VAC power source. <input type="checkbox"/> This output can source up to 20 mA	UOx	<p style="text-align: center;">Actuator 0-10V ~ or + 24VAC ~ or -</p>
<input type="checkbox"/> 1 to 10VDC voltage output controlling dimmable lighting ballasts that require a current sink output (pull-down). <input type="checkbox"/> This output can sink up to 2.5mA.	UOx	<p style="text-align: center;">Ballast 0-10V Common Line Neutral VAC</p>
<input type="checkbox"/> Discrete digital, Pulse, or PWM output: 24VAC externally-powered triac controlling a relay <sup>1</sup> . <input type="checkbox"/> Set the jumper according to Figure 5.	DOx	<p style="text-align: center;">24VAC Relay</p>
<input type="checkbox"/> Discrete digital, Pulse, or PWM output: 24VAC internally-powered triac controlling a relay <sup>1,2</sup> . Set the jumper according to Figure 5.	DOx	<p style="text-align: center;">24VAC Relay</p>
<input type="checkbox"/> 24VAC externally-powered triac output controlling a floating actuator <sup>1</sup> . <input type="checkbox"/> Set the jumper according to Figure 5.	DOx	<p style="text-align: center;">Actuator 24VAC</p>
<input type="checkbox"/> 24VAC internally-powered triac output controlling a floating actuator <sup>1</sup> . <input type="checkbox"/> Set the jumper according to Figure 5.	DOx	<p style="text-align: center;">Actuator</p>

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 [www.distech-controls.com](http://www.distech-controls.com) website. 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 website 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 at the [www.distech-controls.com](http://www.distech-controls.com) website. 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.

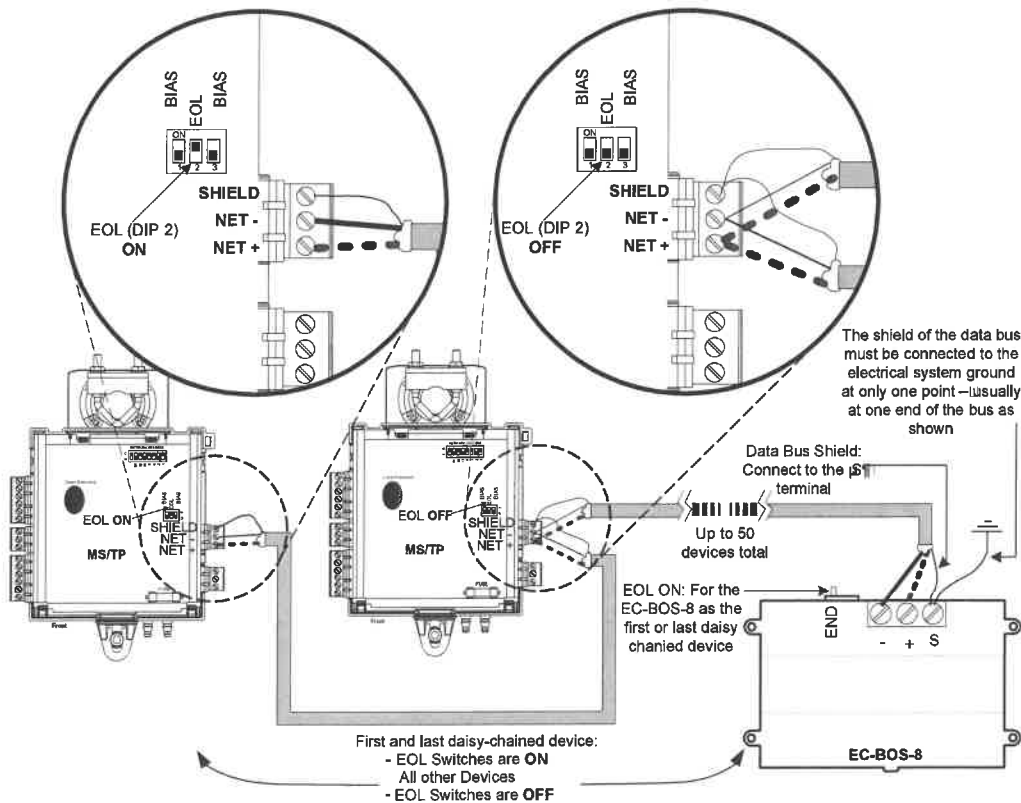


Figure 15: BACnet MS/TP Communications Wiring



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 our website.





## 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 [www.distech-controls.com](http://www.distech-controls.com) website.

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.

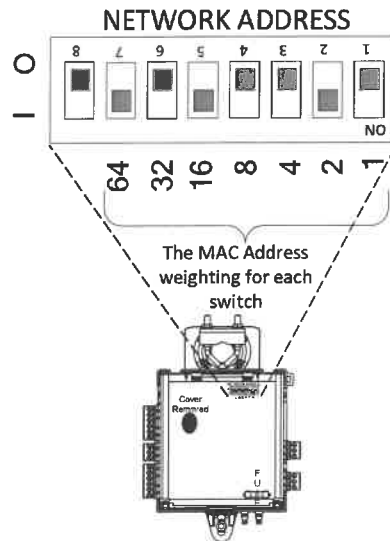


Figure 16: MAC Address DIP Switch Set to 82



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:

$$\text{DevID} = 364 * 1000 + \text{MAC}$$

For example:

MAC: 37


$$\text{DevID} = 364 * 1000 + 37 = 364037$$

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.


PASSW

10000

Screen Timeout: 15 seconds









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


PASSW

9995

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.


GEN C

Screen Timeout: 30 seconds








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.

SUBNE


!



Screen Timeout: 30 seconds




OR



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-gfxProgram ), connect an Allure EC-Smart-Vue Series Communicating Sensor to the controller with its Subnet ID set to 1.

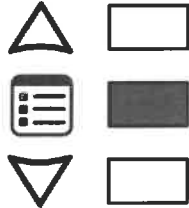
During commissioning, the sensor is used to set the controller's BACnet® MAC Address and to perform application selection if needed. Applications are pre-loaded programs that enable the ECB-VAV to control a typical VAV box.

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.



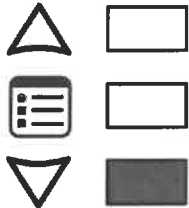
Screen Timeout: 15 seconds



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



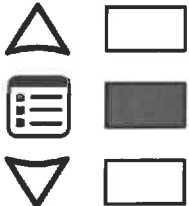
Screen Timeout: 15 seconds



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



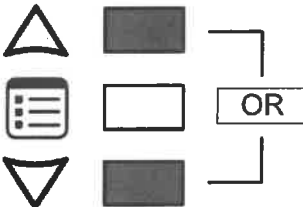
Screen Timeout: 30 seconds







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-gfxProgram. 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-gfxProgram. This is done in the sensor's GEN CFG menu under SUBNET ID.

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

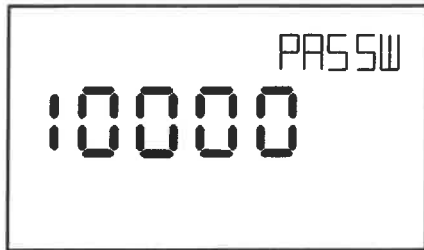
By default, the BAUD rate for the controller is set to automatically detect the current communication BAUD rate of the connected BACnet MS/TP network (AUTO). This is the preferred setting for a controller. However, at least one controller on the BACnet MS/TP network data bus must have its BAUD rate set. 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).



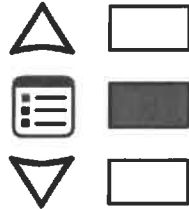
When the Baud rate is set to AUTO, the controller cannot initiate any communication until it has detected the baud rate of the BACnet MS/TP network. If all controllers on the BACnet MS/TP network are set to AUTO, then all controllers will not communicate.

Set the connected controller's BAUD rate as follows:

1. Connect an Allure EC-Smart-View 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.



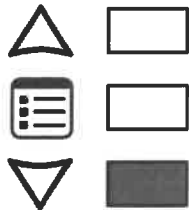
Screen Timeout: 15 seconds



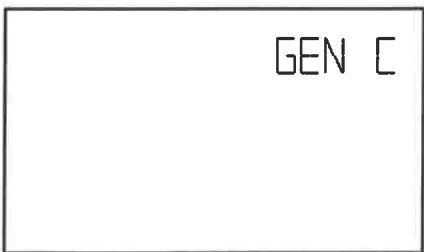
3. Use the down button to set the number to 9995 (this is the default password).



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.



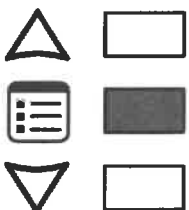
Screen Timeout: 30 seconds



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



Screen Timeout: 30 seconds



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 Solution 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.
- 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 <i>Power Wiring</i> .

## Controller cannot communicate on a BACnet MS/TP network

Absent or incorrect supply voltage	1. Check power supply voltage between 24VAC $\pm$ 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 <i>Network Guide</i> .
Wire type	Check that the wire type agrees with the specification of the <i>Network Guide</i> .
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 <i>Network Guide</i> .
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-gfxProgram, check the configuration of the input. Refer to the <i>EC-gfxProgram user guide</i> 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 <i>Open-to-Wireless Solution Guide</i> .
Configuration problem	Using the device configuration plug-in or wizard, check the configuration of the input. Refer to the <i>Wireless Battery-less Sensors and Switches Solutions Guide</i> 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.