SUBMITTAL COVER SHEET

From:	Tyler O'Neill	**Attn:**	Tim Brown
Company:	Piazza, Inc.		**C&S Companies**
Phone/Fax #:	(914)741-4435		**499 Col. Eileen Collins Blvd.**
Project:	Dutchess Stadium		**Syracuse, NY 13212**
Project #:	RFB-DCB-18-22		**(315) 455-2000; Fax: 455-9577**

Reference: CSI Code: 230900-1 Dwg No: _____

Paragraph: _____ Other: _____

Description: Instramentation and Control for HVAC Product Data

Supplier: CB Strain

Manufacturer: _____

Item Type:

X Product Data _____ Manf. Cert/Warranty

_____ Shop Drawings _____ Samples

_____ Other: _____

Contractor's Approval:

_____ Reviewed for general compliance of specifications.

_____ This submittal is a ***substitute*** to the specified product.

_____ For Architects / Engineers Approval

This is our _____ submittal for this item.

We are submitting _____ copies.

Contractor Submittal Review Stamp

THE ATTACHED MATERIAL HAS BEEN REVIEWED BY THE UNDERSIGNED AND IS BELIEVED TO COMPLY WITH ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS. THE UNDERSIGNED UNDERSTANDS VERIFICATION OF FIELD DIMENSIONS, AND COORDINATION WITH OTHER TRADES, REMAINS THE RESPONSIBILITY OF THE CONTRACTOR.

Submitted by: Piazza, Inc. Digitally signed by Piazza, Inc. DN: C=US, E=julianna@piazzabrothers.com, OU="Piazza, Inc.", O="Piazza, Inc.", CN="Piazza, Inc." Date: 2023.03.15 15:04:38-04'00'

Date: 09/7/2023

C&S Companies Approval:

☐ (A) Approved

☐ (A/N) Approved As Noted

☐ (R) Reviewed for General Conformance

☐ (RR) Revise and Resubmit

☐ (REJ) Rejected

☐ (SUB) Submit Specified Item

Checking is only for general compliance with the design concept of the project and general compliance with the information given in the contract documents. Any action shown is subject to the requirements of the plans and specifications. Contractor is responsible for dimensions which shall be confirmed and correlated at the jobsite; fabrication processes and techniques of construction; coordination of his work with that of all other trades; and the satisfactory performance of his work.

Reviewed by: _____

Date: _____

***Note: Provide one cover sheet for each copy of the submittal.**

DYNAMIC SYSTEMS, INC.®
MECHANICAL CONTRACTORS

SUBMITTAL COVER SHEET

SUBMITTAL NUMBER: *19*

PROJECT: *Dutchess Stadium Leftfield Clubhouse*

ARCHITECT: *DLR Group*

ENGINEER: *DLR Group*

CONSTRUCTION MANAGER: *Piazza*

DATE: 9/7/2023

CONTRACTOR: CB Strain a Division of Dynamic Systems, Inc.

SUBCONTRACTOR: Johnson Controls

ITEM: *Temperature Controls*

SPECIFICATION SECTION:

DRAWING NUMBER:

SUPPLIER ***or MANUFACTURER:***

COMMENTS:

REVIEWED BY *Charles DeMarco*

DLR Group

__ REVIEWED
__ REVIEWED – ADDITIONAL INFORMATION REQUIRED
_X_ FURNISH AS CORRECTED
__ REVISE AND RESUBMIT
__ REJECTED
__ NOT REVIEWED

This review is for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Review of submittals is not for the purpose of determining the accuracy and completeness of other information such as dimensions, quantities, and installation or performance of equipment or systems, which are the Contractor's responsibility. The Architect's review shall not constitute approval of safety precautions or construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component. The Architect's comments, notes or corrections are not an authorization to proceed with Work involving a change in the Contract Sum, the Contract Time or both. If any portion of this review requires a change to the Work, an appropriate change instrument must be executed in accordance with the Contract Documents.

DLR Group

Date: 9-20-23
By: Cody Campbell

Johnson Controls, Inc.
8 Skyline Drive,
Hawthorne, New York 10532
Tel. (866) 854-4572

TRANSMITTAL LETTER

TO: CB Strain
417 Manchester Rd,
Poughkeepsie, New York 12603

Date: September 7, 2023
Project Name: 1500 NY-9D Wappingers Dutchess Stadium
Project #: 3N62-0027
Customer PO#:

We are sending you: ☒ **Enclosed/Attached** ☐ **Under Separate Cover**

☐ Shop Drawings	☒ Product Data Sheets	☐ Copy of Letter
☐ Plans	☒ Copy of Letter	☒ Submittals
☐ Specifications	☐ Samples	☐ Operations & Maint. Manuals
☐ Damper Schedules	☒ Room Schedules	☐ Device Schedules
☐ Valve Schedules	☐ Door Schedules	☐

This material/information is being sent:

☐ Per your Request.	☐ For your Record and File	☐ For Correction & Resubmittal.
☒ For your Review and Approval.	☐ Approved as Submitted.	☐ For issue to Subcontractors.
☐ For your Review and Comment.	☐ Approved as Noted.	☐ Final Distributions
☐	☐	☐

We have detailed these Submittals based on our interpretation of the contract drawings & specifications

☒ Return 1 Approved Copy
☐ Fabrication Held for Approval & Written Release
☐ Equipment is being fabricated and any changes may create a delay in shipment and a possible increase in price.

Please have your detailing department look carefully at the attached submittals. We cannot be held responsible for any cost or lead time changes incurred for modifications once the equipment has been released for fabrication.

Item	Description / Comments	Document # / Ref	Rev	# of Sets
1	ATC Submittal	3N62-0027	00	01
2				
3				
4				
5				
6				
7				
8				

Message/Comments:

Delivered by: Michael Randle Date: 09/07/2023
Received by: Date:

CC to:	# of Copies

TRANSMITTED BY:
Michael Randle
Project Manager

Date: September 7, 2023

BUILDING AUTOMATION SYSTEM

SUBMITTAL

1500 NY-9D Wappingers Dutchess Stadium

1500 Route 9D,
Fishkill, NY 12590

Submitted To:

CB Strain
417 Manchester Rd,
Poughkeepsie, New York 12603

Submitted By:

Michael Randle
Project Manager

JCI Contract: 3N62-0027

Johnson Controls, Inc.
8 Skyline Drive,
Hawthorne, New York 10532
Phone: (866) 854-4572

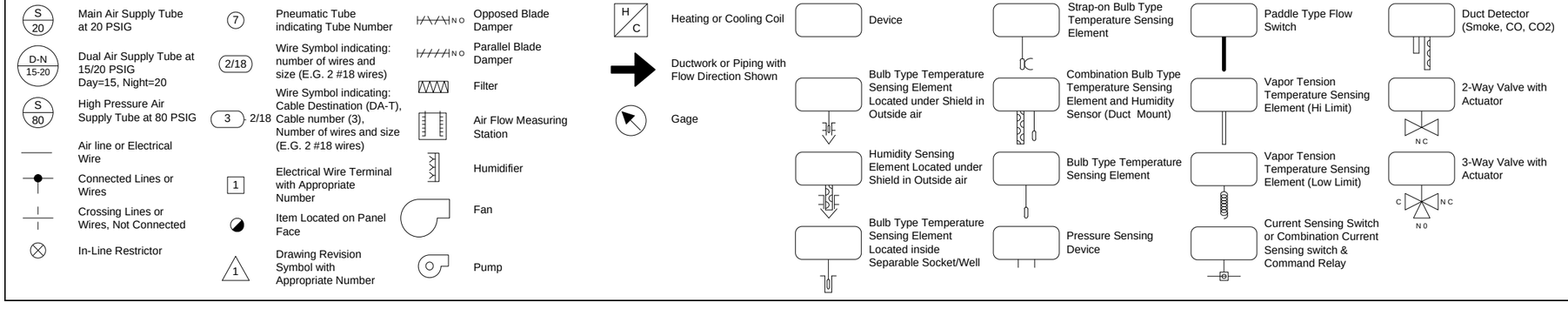
STAMPS

1500 NY-9D Wappingers Dutchess Stadium

3N62-0027

DRAWING INDEX		
Rev	**Drawing**	**Description**
0	00.01.01	TITLE PAGE DRAWING
0	00.02.01	NETWORK SCHEDULE
0	00.02.02	MSTP DEVICE SCHEDULE
0	00.02.03	MSTP INSTALLATION REFERENCE
0	00.02.04	SNE INSTALLATION REFERENCE
0	02.01.01	AHU-H FLOW LAYOUT
0	02.01.02	AHU-H SEQUENCE OF OPERATION
0	02.02.01	AHU-W FLOW LAYOUT
0	02.02.02	AHU-W SEQUENCE OF OPERATION
0	02.03.01	DOAS-K FLOW LAYOUT
0	02.03.02	DOAS-K SEQUENCE OF OPERATION
0	02.04.01	DOAS-L FLOW LAYOUT
0	02.04.02	DOAS-L SEQUENCE OF OPERATION
0	03.01.01	VAV w HTG FLOW LAYOUT
0	03.01.02	VAV w HTG POINT SCHEDULE AND WIRING DETAILS
0	04.01.01	EF FLOW LAYOUT
0	04.01.02	EF WIRING DETAILS
0	04.02.01	KITCHEN EXHAUST FAN FLOW LAYOUT
0	05.01.01	SPLIT SYSTEM AIR HANDLER FLOW LAYOUT
0	05.01.02	SPLIT SYSTEM AIR HANDLER SEQUENCE OF OPERATION
0	05.02.01	DUCTLESS SPLIT SYSTEM FLOW LAYOUT
0	05.03.01	MISC FLOW LAYOUT
0	05.03.02	MISC BOM & SEQUENCE OF OPERATION
0	05.03.03	MISC-CP POINT SCHEDULE
0	06.01.01	ROOM SCHEDULE

LEGEND



Johnson Controls

Creating a better climate for business.

- [x] **Environmental Control System**
- [x] **Facility Management System**
- [ ] **Air and Water System Balancing**
- [ ] **Fire Management System**
- [ ] **Security System**
- [ ] **Lighting Services**
- [ ] **Instrumentation System Installation**
- [ ] **Building Operations Management**
- [ ] **Energy Conservation Control**
- [ ] **Training Programs**
- [ ] **Performance Contracting**
- [ ] **Planned Service Agreements**

Air Conditioning
Heating
Diagnostic Services
Coil Cleaning
Refrigeration
Automatic Temperature Controls
Facility Management Systems
Fire Management
Security Management
Building Operations and Management
Water Treatment
Electrical Equipment
Emergency Generator / Lighting Equipment
Industrial Controls / Recording / Indication Equipment

PROJECT TITLE
1500 NY-9D Wappingers Dutchess Stadium

1500 Route 9D,
Fishkill, NY 12590

ARCHITECT
DLR Group
33 E 33rd St Suite 401,
New York, New York 10001
Phone: (212) 564-8705

ENGINEER
DLR Group
33 E 33rd St Suite 401,
New York, New York 10001
Phone: (212) 564-8705

MECHANICAL CONTRACTOR
CB Strain
417 Manchester Rd,
Poughkeepsie, New York 12603
Phone: (845) 454-0600

ELECTRICAL CONTRACTOR
,
Phone:

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Johnson Controls

Branch Information
Johnson Controls, Inc.
8 Skyline Drive,
Hawthorne, New York 10532
Phone: (866) 854-4572

SALES ENGINEER	PROJECT MANAGER	APPLICATION ENGINEER	DATE	CONTRACT NUMBER
AB	MR	SN	**9/7/2023**	**3N62-0027**

NETWORK SCHEDULE

BILL OF MATERIAL

DESIGNATION	QTY.	CODE NUMBER.	DESCRIPTION
FIELD DEVICES:			
COMPUTER	1	MS-ADS05U-0	LIC FOR APP & DATA SERVER 5-USER FOR NEW SITE
COMPUTER	1	M4-ADSTK-PC	ADS TURNKEY HC W/2 NAE85
MSEA_BUNDLE	1	TL-BUNDLEMS-0	TOOL BUNDLE METASYS, NEW
MONITOR	1	MONITOR19INCH	19 INCH VGA/DVI MONITOR
SNE-1	1	CWPNLSNE1100-0	CWPNLSNE1100-0 PNL, SNE11

Network Details			Dutchess Stadium Left Field Clubhouse						
ENGINE #	**ENGINE NAME**	**LOCATION**	**ENGINE TYPE**	**TRUNK NAME**	**IP ADDRESS**	**SUBNET MASK**	**GATEWAY**	**NETWORK DROP BY JCI (Y/N)**	**COMMENTS**
1	(2) SNE-1	ELEC A119C	M4-SNE11001	FC-A	FIELD VERIFY	FIELD VERIFY	FIELD VERIFY	N	

NOTES:

(1) IP ADDRESS, GATEWAY AND SUBNET MASK DETAILS TO BE FIELD VERIFIED.

(2) SNE TAG TO BE FIELD UPDATED.

Drawing Title

NETWORK SCHEDULE

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SW	BY	DATE	BY	DATE

Project Title

Dutchess Stadium Left Field Clubhouse

1500 Route 9D,
Fishkill, NY 12590

Johnson Controls

Branch Information

BSNA -
WESTCHESTER, NY
8 SKYLINE DR,
HAWTHORNE, New
York 10532
Phone: (862) 284-8947

CONTRACT NUMBER

3N62-0027

DRAWING NUMBER

00.02.01

MSTP DEVICE SCHEDULE

MSTP DEVICES			SNE-1/ FC-A						
ITEM	SYSTEM	ENCLOSURE	CONTROLLER	MAC ADDR	XPM	SAB ADDR	LOCATION	LEVEL	COMMENTS
1	DOAS-L	-	3RD PARTY	4	-	-	OUTSIDE	LEVEL 1	
2	AHU-W	-	3RD PARTY	5	-	-	OUTSIDE	LEVEL 1	
3	DOAS-K	-	3RD PARTY	6	-	-	OUTSIDE	LEVEL 1	
4	AHU-H	-	3RD PARTY	7	-	-	OUTSIDE	LEVEL 1	
5	IU-A117	-	3RD PARTY	8	-	-	STOARGE A116A	LEVEL 1	
6	IU-A115	-	3RD PARTY	9	-	-	VIDEO A115	LEVEL 1	
7	IU-A114	-	3RD PARTY	10	-	-	HAWK EYE A114	LEVEL 1	
8	IU-A116B	-	3RD PARTY	11	-	-	AV A116B	LEVEL 1	
9	IU-A119C	-	3RD PARTY	12	-	-	ELEC A119C	LEVEL 1	
10	LIGHTING CONTROL PANEL-1	-	3RD PARTY	13	-	-	ELEC A119C	LEVEL 1	
11	IU-A119B	-	3RD PARTY	14	-	-	TELECOM A119B	LEVEL 1	
12	TB-A111B	-	M4-CVM03050-0	15	-	-	SPORTS MED A111	LEVEL 1	
13	TB-A106		M4-CVM03050-0	16	-	-	LOUNGE A108	LEVEL 1	
14	EF-A253	-	RIBTW2401B-BC	17	-	-	MECH - A253	LEVEL 2	
15	EF-A202A	-	RIBTW2401B-BC	18	-	-	CUST - A202A	LEVEL 2	
16	LIGHTING CONTROL PANEL-2	3RD PARTY	3RD PARTY	19	-	-	ELEC A202B	LEVEL 2	
17	MISC-CP	MISC-CP	M4-CGM09090-0	20	M4-XPM09090-0	4	ELEC A202B	LEVEL 2	**EOL**

NOTES:

1. THIS IS A REPRESENTATION OF THE NETWORK ARCHITECTURE. IT MAY VARY AS PER SITE CONDITION.
2. SET EOL SWITCH TO “ON” FOR LAST JCI DEVICE ON THE TRUNK.

Drawing Title

MSTP DEVICE SCHEDULE

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
			BY	DATE	BY	DATE
AB	MR	SW				

Project Title

Dutchess Stadium Left Field Clubhouse

1500 Route 9D,
Fishkill, NY 12590

Johnson Controls

Branch Information

BSNA -
WESTCHESTER, NY
8 SKYLINE DR,
HAWTHORNE, New
York 10532
Phone: (862) 284-8947

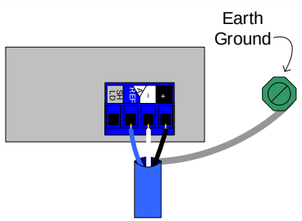
CONTRACT NUMBER

3N62-0027

DRAWING NUMBER

00.02.02

Category	Rules / Maximums Allowed
General	Typically daisy-chained; branch or star configuration acceptable when repeaters are used. See End of Line Switching and Repeater Guideline graphic.
Number of Devices	**When all of the devices connected on the FC Bus are Metasys FECs, VMAs, and/or IOMs, the device and bus segment limits are:** 100 devices total per FC Bus (maximum) 3 bus segments per FC Bus (maximum) 50 devices per bus segment (maximum, not to exceed 100 devices per FC Bus) **When one or more TEC26xx Series thermostat or third-party MS/TP device is connected on the FC Bus, the device and bus segment limits are:** 64 devices total per FC Bus (maximum) 3 bus segments per FC Bus (maximum) 32 devices per bus segment (maximum, not to exceed 64 devices per FC Bus) **Note:** Metasys MS/TP devices generate less data traffic than third-party MS/TP devices and TEC26xx thermostats. Connecting third-party devices or TEC26xx thermostats to the FC Bus increases data traffic, reduces bus performance, and reduces the number of devices that can be connected to the bus. Bus segments on an FC Bus are connected with repeaters (only). Up to two cascaded repeaters may be applied to an FC Bus (to connect three bus segments).
Line Length and Type	**When all of the devices connected on the FC Bus are Metasys FECs, VMAs, and/or IOMs, the cable length limits are:** Each bus segment can be up to 1520 m (5000 ft) in length (using 22 AWG 3-wire twisted, shielded cable). Each FC Bus can be up to 4750 m (15,000 ft) in length (using 22 AWG 3-wire twisted, shielded cable). **When one or more TEC26xx Series thermostat or third-party MS/TP device is connected on the FC Bus, the device and bus segment limits are:** Each bus segment can be up to 1220 m (4000 ft) in length (using 22 AWG 3-wire twisted, shielded cable) Each FC Bus can be up to 3660 m (12,000 ft) in length (using 22 AWG 3-wire twisted, shielded cable). When using fiber-optic connections: 2,010 m (6,600 ft.) between two fiber modems 22 AWG Stranded, 3-Wire Twisted, Shielded Cable
Cable	22 AWG stranded, 3-wire, twisted shielded cable
EOL Termination	End-of-Line (EOL) termination is required on the FC Bus to reduce signal reflection when data transmissions reach the end of a bus segment and bounce back. EOL termination is built into some Metasys FC devices and is enabled with a switch or jumper on the device. **EOL Termination on SNEs** An EOL switch on an SNE enables EOL termination. For those SNEs with two FC Bus connections, two EOL double-pole switches are provided. Set the EOL switch to the ON (up) position to set the controller as an EOL termination device. **EOL Termination on Switch-Terminating Devices** Some field controllers have an EOL switch or jumper. Such devices include FECs, IOMs, VMAs, ZFR1810s, and repeaters. Set the EOL termination to On for any of these devices when it is the last device on a bus segment. **EOL Termination on Devices Without EOL Provision** For the devices such as TECs and third-party controllers in which no EOL provision is provided, install the MS-BACEOL-0 RS485 End-of-Line Terminator at the device if at the end of the bus segment. **EOL Termination Across the FC Bus** The FC Bus may consist of up to three bus segments. Each bus segment on an FC Bus requires two EOL termination devices, one at each end of the bus segment. All other devices on the FC Bus should have their EOL termination disabled (EOL switches Off) . If only one device on an FC segment has an EOL termination, it must be set to On. **EOL on FC Bus Repeaters** When using repeaters in the FC Bus, set the EOL jumpers based on the position of the repeater in the run.



SHIELD GROUNDING

The shield should be earth grounded at one and only one point for the entire bus segment. (Preferably in the SNE Panel.) The shield screws on the controllers are simply a convenient way to continue the daisy chain of the bus. They are not attached to earth ground. You can use the shield terminal or twist together the shield and tape back at each controller.

RECOMMENDED MSTP FIELD CONTROLLER BUS CABLE

Type	Typical Usage	Anixter #	Belden #	pF/ft	Area
22/3c Shielded Plenum	Open Plenum Installations. 38400+ Baud RS-485 Communication.	CBL-22/3-FC-PLN	6501FE	25	0.014
22/3c Shielded PVC	EMT (Raceway) Installations. 38400+ Baud RS-485 Communication.	CBL-22/3-FC-PVC	5501FE	31	0.015

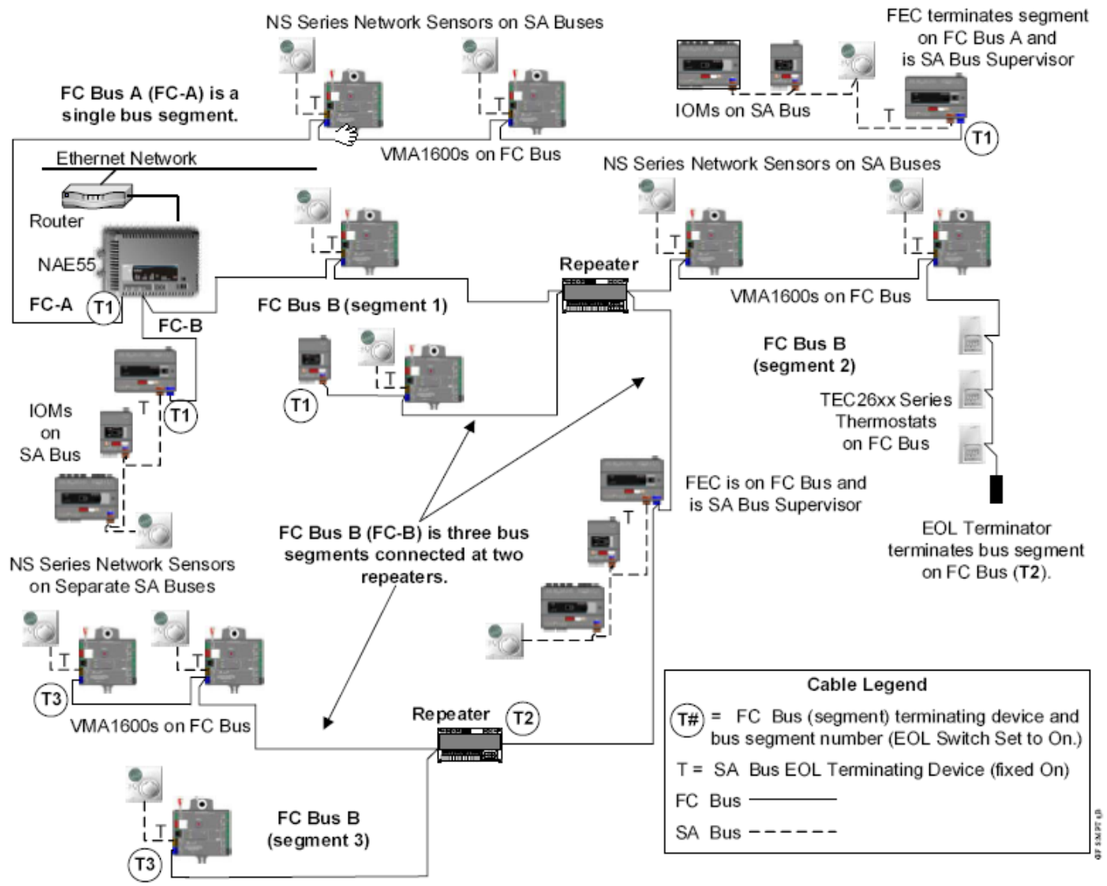
RECOMMENDED MSTP SENSOR ACTUATOR BUS CABLE

Type	Typical Usage	Anixter #	Belden #	pF/ft	Area
22/2pr Shielded Plenum	Open Plenum Installations. 38400+ Baud RS-485 Communication.	CBL-22/2P-SA-PLN	6541FE	33	0.033
22/2pr Shielded PVC	EMT (Raceway) Installations. 38400+ Baud RS-485 Communication.	CBL-22/2P-SA-PVC	5541FE	31	0.034

METASYS MSTP NETWORK INSTALLATION DETAILS

The information in this document is not intended to replace the published Technical Product Literature for the Johnson Controls systems and products presented. The Installation Instructions that are packed with products, and the Technical Bulletins and Product Bulletins released with Johnson Controls systems and products supersede the information on this page. It is the responsibility of the product installer and product user to obtain and follow the product installation, operation, and safety procedures provided with the products or project specific information required by specification or local codes.

END OF THE LINE SWITCHING AND REPEATER GUIDELINES



Drawing Title
MSTP INSTALLATION REFERENCE

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SW	BY	DATE	BY	DATE

Project Title
Dutchess Stadium Left Field Clubhouse
1500 Route 9D, Fishkill, NY 12590

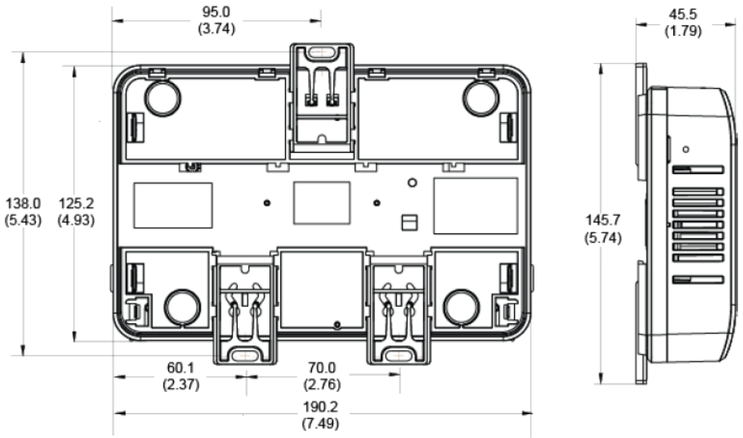
Johnson Controls

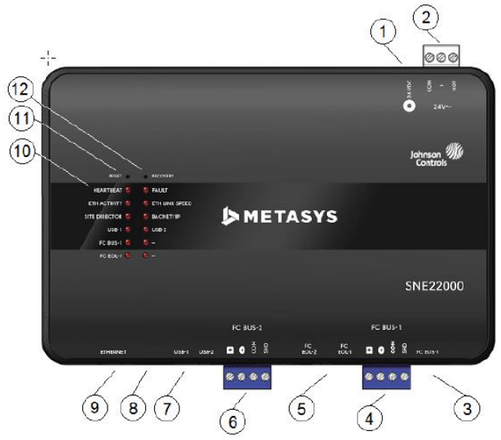
Branch Information
BSNA - WESTCHESTER, NY
8 SKYLINE DR,
HAWTHORNE, New York 10532
Phone: (862) 284-8947

CONTRACT NUMBER
3N62-0027

DRAWING NUMBER
00.02.03

SNE dimensions, mm (in.)





Network Engine with LED designations

USB Ports (USB A and USB B)

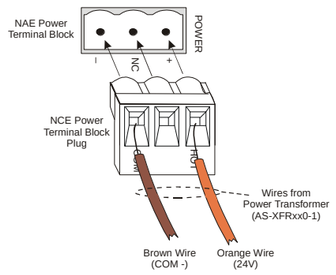
NAE USB Pinouts

+5 VDC	1
Data -	2
Data +	3
Ground	4

Ethernet Port

NAE Ethernet Pinouts

TD +	1
TD -	2
RD +	3
No Connection	4
No Connection	5
RD -	6
No Connection	7
No Connection	8



24VAC Power Connection

Network Engine LEDs designation, normal status, description, and other conditions

LED Name	Color	State	Description
HEARTBEAT	Multi color: blue or purple	**Flashing blue and purple**	1 blink per second = Normal operating status (all monitored processes have started and the device is fully operational)
		On, blue	On solid, no blink = SNE is supplied with power but not operational
		Medium flicker, purple and blue	2 blinks per second = SNE is starting up
		Fast flicker, purple and blue	5 blinks per second = SNE is shutting down
		Off	No power applied
FAULT	Red	**Off**	No faults; normal operation
		On	On steady = Diagnostics are running or fault conditions are detected (for example, excessive memory or flash usage, or high CPU temperature).
ETH ACTIVITY	Green	**Flickering**	1 blink per second = Data is transferring over the Ethernet connection. Ethernet traffic is general traffic (may not be for the network engine).
		Off	No communication
ETH LINK SPEED	Blue or yellow	**On**	On steady, blue = Network is connected at 1000 Mbps On steady, yellow = Network is connected at 100 Mbps
		Off	No network connection or if ETH ACTIVITY light is flickering, network is connected at 10 Mbps.
SITE DIRECTOR	Green	On	On steady = Network engine is a site director
		Off	Network engine is a child device
BACNET/IP	Green	**Flashing**	1 blink per second = The SNE is transmitting BACnet messages over BACnet/IP to other devices, including other engines.
		Off	No communication with other BACnet/IP devices
USB-1	Green or Red	On	Solid red = An unsupported device is connected to USB-1 **Note:** Only approved USB adapters that have been tested and qualified function with the SNE. Non-qualified adapters do not function with the SNE. Refer to *SNE/SNC Product Bulletin (LIT-12013296)* for more information.
		Flashing Green	1 blink per second = A supported device is connected to the SNE over USB-1 port.
		Off	No device is connected.
USB-2	Green or Red	On	Solid red = An unsupported device is connected to USB-2 **Note:** Only approved USB adapters that have been tested and qualified function with the SNE. Non-qualified adapters do not function with the SNE. Refer to *SNE/SNC Product Bulletin (LIT-12013296)* for more information.
		Flashing Green	1 blink per second = A supported device is connected to the SNE over USB-2 port.
		Off	No device is connected.
FC BUS-1	Green	**Flashing**	1 blink per second = data transmission with normal communication over FC BUS-1
		On	Network engines are defined on FC BUS-1, but none are communicating. Only the SNE is transmitting.
		Off	No data transmission
FC BUS-2	Blue	**Flashing**	1 blink per second = data transmission with normal communication over FC BUS-2
		On	Network engines are defined on FC BUS-2, but none are communicating. Only the SNE is transmitting.
		Off	No data transmission
FC EOL-1	Yellow	**On** if connected	On Steady = end-of-line termination is set to on for FC BUS-1
		Off if not connected	Off Steady = end-of-line termination is set to off for FC BUS-1
FC EOL-2	Yellow	**On** if connected	On Steady = end-of-line termination is set to on for FC BUS-2
		Off if not connected	Off Steady = end-of-line termination is set to off for FC BUS-2

Table 1: Physical features of the SNE

Callout	Physical features
1	Supply power adapter connection: 24 VDC barrel jack.
2	Supply power removable terminal block: gray terminals; 24 VAC, Class 2.
3	FC Bus port: RJ-12 6-pin Modular Jack.
4	FC Bus removable terminal block for FC BUS-1: blue terminal.
5	End-of-Line (EOL) switches for FC BUS-1 and FC BUS-2.
6	FC Bus removable terminal block for FC BUS-2: blue terminal. Only present on SNE2200 model.
7	Two Universal Serial Bus (USB) 2.0 host type A ports. The USB-1 port can use any Johnson Controls® approved USB device; USB-2 port can use any non-wireless, Johnson Controls® approved USB device.
8	Micro-USB port (not functional)
9	Ethernet port; 1000/100/10 Mbps; 8-pin RJ-45 connector.
10	Multi-color LED status indicators.
11	Reset button.
12	Recovery button.

Drawing Title
SNE INSTALLATION REFERENCE

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SW	BY	DATE	BY	DATE

Project Title
Dutchess Stadium Left Field Clubhouse
1500 Route 9D,
Fishkill, NY 12590

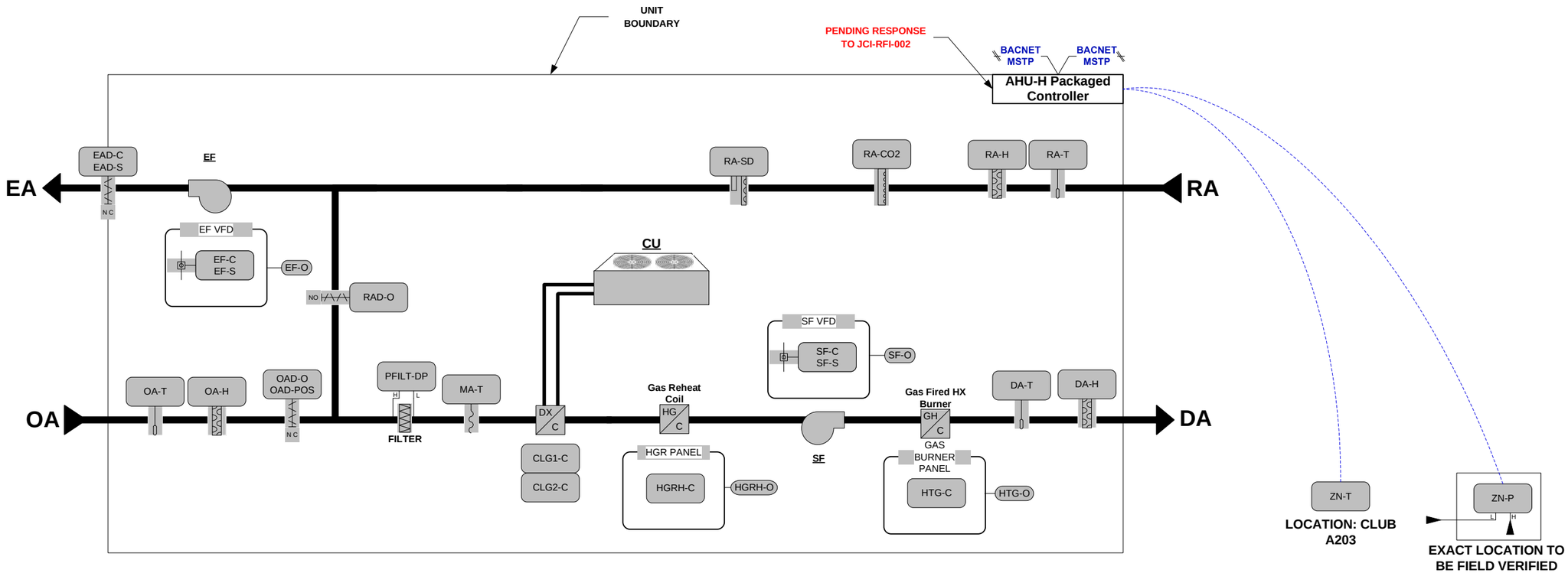
Johnson Controls

Branch Information
BSNA - WESTCHESTER, NY
8 SKYLINE DR,
HAWTHORNE, New York 10532
Phone: (862) 284-8947

CONTRACT NUMBER
3N62-0027

DRAWING NUMBER
00.02.04

AHU-H FLOW LAYOUT



PACKAGED AHU UNIT SCHEDULE								
SR. NO.	TAG	SERVICE	LOCATION	AIRFLOW			ELECTRICAL	REF. DWG.
				SA	EA	OA	V/PH/HZ	
1	AHU-H	CLUB A203, CORRIDOR C201, C202R	LEVEL 1	9700	8730	2265	460/3/60	M5.2.ii, M8.1.ii

NOTES:

1. DEVICES IN GREY WILL BE PROVIDED BY MANUFACTURER.
2. AHU UNIT IS A PACKAGED UNIT & WILL BE CONTROLLED BY MANUFACTURER PROVIDED PACKAGED CONTROLLER. JCI TO ONLY PROVIDE BACNET INTEGRATION & WIRE LOOSE CONTROL DEVICES FURNISHED BY UNIT MANUFACTURER. INTEGRATION TERMINALS TO BE FIELD VERIFIED.
3. EQUIPMENT SUBMITTALS DOES NOT INCLUDE TERMINATION WIRING DETAILS OR LIST OF SENSORS/CONTROL DEVICES FURNISHED BY MANUFACTURER. FLOW LAYOUT IS FOR REPRESENTATION ONLY. REFER MANUFACTURER'S EQUIPMENT SUBMITTAL FOR DETAILED INFORMATION.

Drawing Title
AHU-H FLOW LAYOUT

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SN	BY	DATE	BY	DATE

Project Title
1500 NY-9D Wappingers Dutchess Stadium

**1500 Route 9D,
Fishkill, NY 12590**

Johnson Controls

Branch Information
Johnson Controls, Inc.
8 Skyline Drive,
Hawthorne, New York
10532
Phone: (866) 854-4572

CONTRACT NUMBER
3N62-0027

DRAWING NUMBER
02.01.01

SEQUENCE OF OPERATION

BELOW SEQUENCE OF OPERATION IS JUST FOR REFERENCE. AHU WILL BE CONTROLLED BY THE PACKAGED CONTROLLER. REFER UNIT MANUFACTURER OPERATION MANUAL FOR EXACT CONTROL SEQUENCE.

The unit will operate as a single zone variable air volume unit to provide a variable volume of supply air at a fixed system supply air temperature to maintain the zone temperature setpoint. The fan will normally remain off and will cycle on with a call for heating or cooling or at ~~space~~ return CO2 levels above 750 ppm.
The supply fan will operate at minimum speed (30%) when in the occupied mode and the space temperature is satisfied and the system is not operating in ventilation CO2 override, heating or cooling mode.
The space temperature sensor determines the heating or cooling mode of operation. In the VAV cooling mode, the modulating cooling source will modulate to maintain the cooling leaving air setpoint, 55 deg F (adj). The supply fan VFD will begin operation at the minimum VFD cooling speed (30% default) and modulate between this setpoint and 100% as needed to maintain the space temperature setpoint.
For VAV heating the modulating heating source will modulate to maintain the heating leaving air setpoint, 90 deg F (adj). The supply fan VFD will begin operation at the minimum VFD heating speed (50% default) and modulate between this setpoint and the maximum VFD heating speed (100% default) as needed to maintain the space temperature setpoint.
Alarms will be provided as follows:

- High Zone Temp: If the zone temperature is greater than the cooling setpoint by 6 deg F (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by 6 deg F (adj.).

Zone Setpoint Adjust:
An adjustable setpoint sensor will be installed in the zone where indicated on the plans.

SUPPLY FAN:
The fan will run continuously when in the occupied mode. The fan will remain off and will cycle on with a call for heating or cooling or at ~~sspace~~ return CO2 levels above 750 ppm in the unoccupied mode.
Alarms will be provided as follows:

- Supply Fan Failure: Commanded on, but the status is off.
- Supply Fan In Hand: Commanded off, but the status is on.

ZONE UNOCCUPIED OVERRIDE:
A timed local override control will allow an occupant to override the schedule and place the unit into an occupied mode for 1 hour (adj). At the expiration of the override time period control of the unit will automatically return to the schedule.

Zone Optimal Start:
The unit will provide a morning startup sequence to bring the zone to setpoint. The unit will use an optimal start algorithm for the morning start-up sequence. This algorithm will minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period. The morning startup discharge air temperature in the heating mode will be 90 deg F (adj.). The morning startup discharge air temperature in the cooling mode will be 55 deg F (adj.). The supply fan will operate at 100%, the outside air and exhaust dampers will remain closed, and the mixed air damper open in startup mode.

Return Air Smoke Detection:
The unit will shut down and generate an alarm upon receiving a return air smoke detector status.

Exhaust Fan:
The exhaust fan will run whenever the space differential pressure to outdoors is more than 0.05" SP (adj.), and the supply fan is on. When activated, the exhaust fan will begin operation at 30% and will modulate to maintain the space differential pressure to outdoors at 0.05" SP (adj.).
Alarms will be provided as follows:

- Exhaust Fan Failure: Commanded on, but the status is off.
- Exhaust Fan In Hand: Commanded off, but the status is on.
- High Space Pressure: If the space pressure is greater than 0.07" (adj.).
- Low Space Pressure: If the space pressure is less than 0.00" (adj.).

Cooling Stage:
The cooling will be enabled whenever:

- Outside air temperature is greater than 60 deg F (adj.).
- And the economizer (if present) is disabled or fully open.
- And the zone temperature is above cooling setpoint.
- And the supply fan status is on.

The controller will measure the supply air temperature and stage the cooling to maintain its supply air setpoint. To prevent short cycling, the stage will have user definable (adj.) Minimum runtime.

Gas Heating Stage:
The heating will be enabled whenever:

- The zone temperature is below heating setpoint.
- And the supply fan status is on.

The controller will measure the supply air temperature and modulate the heating to maintain its supply air setpoint. To prevent short cycling, the stage will have user definable (adj.) Minimum runtime.
The outside and exhaust air dampers will close and the mixed air damper will open when the unit is off, operating in optimal start up or operating in the unoccupied mode.

SEQUENCE OF OPERATION

Carbon Dioxide (CO2) Monitoring, Outside Air Ventilation Control:
An airflow measurement station will measure the amount of outside air admitted to the AHU and adjust the outside air damper position to admit the required amount outdoor air at varying supply fan speeds. When in the occupied mode, under normal operation when the supply fan is in operation, the controller will modulate the outside air damper to admit the scheduled 'minimum' outside air. The controller will measure the space CO2 levels at (4) locations in the space and upon CO2 concentrations rising above 750 ppm (adj), activate the supply fan, override normal damper operation and modulate the outside air damper open to admit the 'design outside air value listed in the equipment schedule while modulating the fan speed to minimum 75% (if operating in a mode where the fan speed was less than 75%). The outside air damper will modulate to admit the scheduled 'minimum' outside air when the CO2 level drops below 700 ppm (adj.) And the fan speed will resume normal operation.
Alarms will be provided as follows:

- High Space Air Carbon Dioxide Concentration: If the space air co2 concentration is greater than 1000 ppm (adj.).

Return Air Humidity:
Whenever the supply fan status is on the controller will measure the return air humidity. When the return air humidity level rises above 60% RH (adj.) and the zone temperature is satisfied (not in cooling mode) the controller will activate the dehumidification sequence. When in dehumidification mode the supply fan will operate at minimum speed.
In dehumidification mode the controller will measure the supply air temperature and stage on the first stage of cooling to 100% and modulate the hot gas reheat maintain its supply air setpoint (the supply air setpoint will be equal to the zone setpoint 70-76 deg F).
The hot gas reheat will be enabled whenever:

- Cooling (dehumidification) is enabled
- The zone temperature is satisfied
- And the supply air temperature is 2 deg or more below setpoint.
- And the fan status is on.

Alarms will be provided as follows:

- High Return Air Humidity: If the return air humidity is greater than 70% (adj.).

Filter Differential Pressure Monitor:
The controller will monitor the differential pressure across the filters.
Alarms will be provided as follows:

- Filter Change Required: Filter differential pressure exceeds a user definable limit (adj.).

Mixed Air Temperature:
The controller will monitor the mixed air temperature and use as required for economizer control.

Return Air Temperature:
The controller will monitor the return air temperature and use as required for economizer control.
Alarms will be provided as follows:

- High Return Air Temp: If the return air temperature is greater than 80 deg F (adj.).
- Low Return Air Temp: If the return air temperature is less than 60 deg F (adj.).

Supply Air Temperature:
The controller will monitor the supply air temperature.
Alarms will be provided as follows:

- High Supply Air Temp: If the supply air temperature is greater than 100 deg F (adj.).
- Low Supply Air Temp: If the supply air temperature is less than 50 deg F (adj.).

Economizer Mode:
The system will operate in the economizer mode when the system is in the cooling mode (supply temperature is above setpoint), and the outdoor enthalpy is less than the return air enthalpy. In economizer mode the outside air, exhaust air, and mixed air dampers will modulate to maintain the supply air temperature. Set an alarm when at 100% economizer and the mixed air temperature is more than 2 deg F above or below outdoor ambient temperature.

Drawing Title
AHU-H SEQUENCE OF OPERATION

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SN	BY	DATE	BY	DATE

Project Title
1500 NY-9D Wappingers Dutchess Stadium
**1500 Route 9D,
Fishkill, NY 12590**

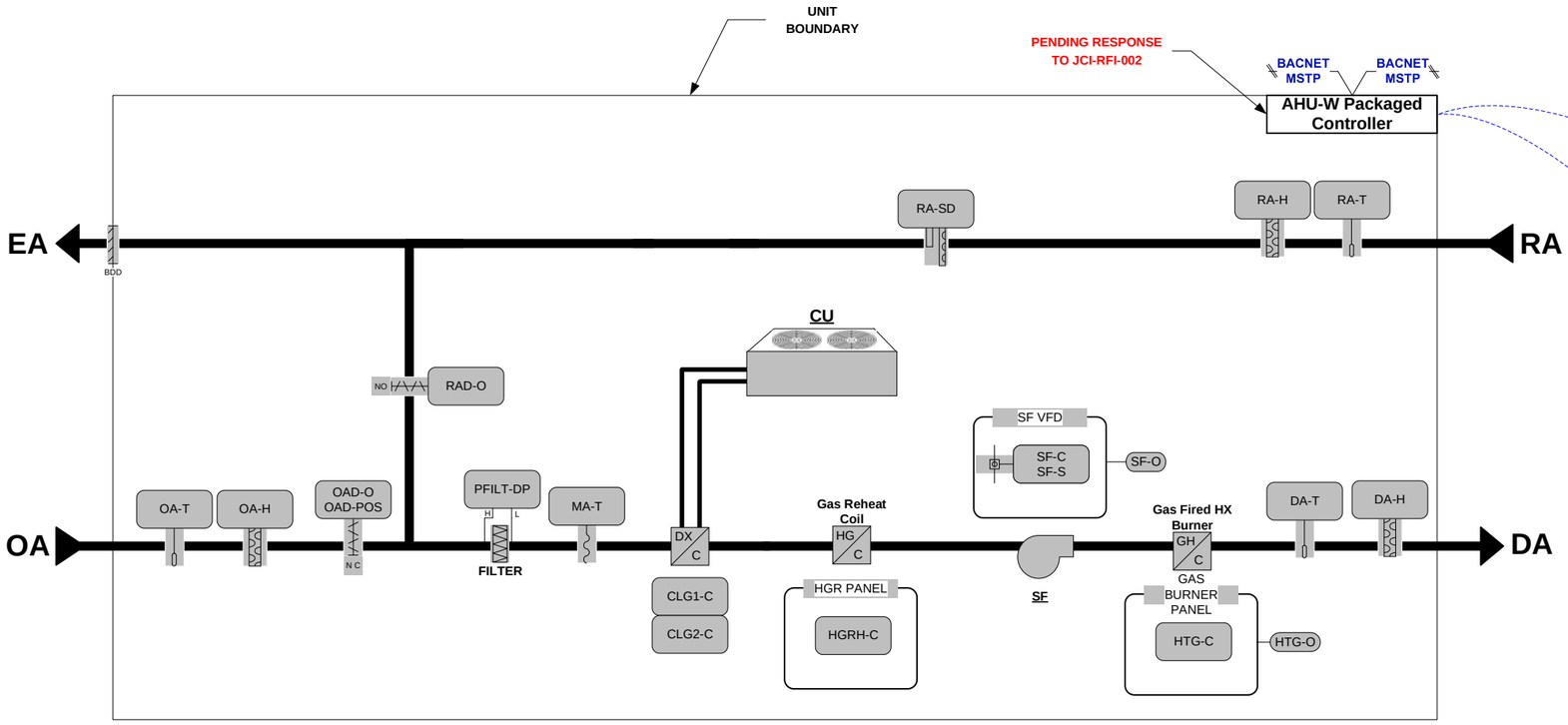
Johnson Controls

Branch Information
Johnson Controls, Inc.
8 Skyline Drive,
Hawthorne, New York
10532
Phone: (866) 854-4572

CONTRACT NUMBER
3N62-0027

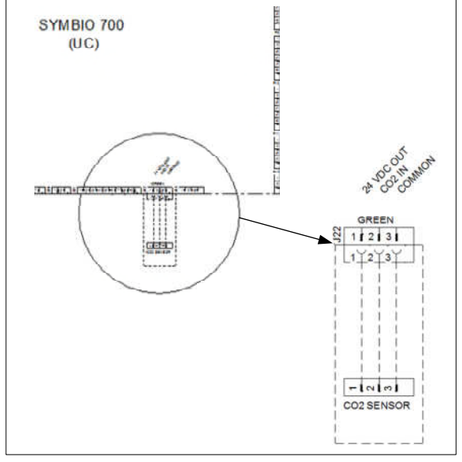
DRAWING NUMBER
02.01.02

AHU-W FLOW LAYOUT



PACKAGED AHU UNIT SCHEDULE							
SR. NO.	TAG	SERVICE	LOCATION	AIRFLOW		ELECTRICAL	REF. DWG.
				SA	OA	V/PH/HZ	
1	AHU-W	WEIGHT ROOM A112, SPORTS MED A111, LAUNDRY A118, CICULATION C101	LEVEL 1	2720	675	460/3/60	M5.2.ii, M8.1.ii

ZN-CO2 SENSOR WIRING DETAILS



NOTES:

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2. AHU UNIT IS A PACKAGED UNIT & WILL BE CONTROLLED BY MANUFACTURER PROVIDED PACKAGED CONTROLLER. JCI TO ONLY PROVIDE BACNET INTEGRATION & WIRE LOOSE CONTROL DEVICES FURNISHED BY UNIT MANUFACTURER. INTEGRATION TERMINALS TO BE FIELD VERIFIED.
3. EQUIPMENT SUBMITTALS DOES NOT INCLUDE TERMINATION WIRING DETAILS OR LIST OF SENSORS/CONTROL DEVICES FURNISHED BY MANUFACTURER. FLOW LAYOUT IS FOR REPRESENTATION ONLY. REFER MANUFACTURER'S EQUIPMENT SUBMITTAL FOR DETAILED INFORMATION.

Drawing Title

AHU-W FLOW LAYOUT

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SN	BY	DATE	BY	DATE

Project Title

1500 NY-9D Wappingers Dutchess Stadium

1500 Route 9D,
Fishkill, NY 12590

Johnson Controls

Branch Information
Johnson Controls, Inc.
8 Skyline Drive,
Hawthorne, New York
10532
Phone: (866) 854-4572

CONTRACT NUMBER
3N62-0027

DRAWING NUMBER
02.02.01

SEQUENCE OF OPERATION

BELOW SEQUENCE OF OPERATION IS JUST FOR REFERENCE. AHU WILL BE CONTROLLED BY THE PACKAGED CONTROLLER. REFER UNIT MANUFACTURER OPERATION MANUAL FOR EXACT CONTROL SEQUENCE.

The unit will operate as a single zone variable air volume unit to provide a variable volume of supply air at a fixed system supply air temperature to maintain the zone temperature setpoint. The fan will normally remain off and will cycle on with a call for heating or cooling or at space CO2 levels above 750 ppm.
The supply fan will operate at minimum speed (30%) when in the occupied mode and the space temperature is satisfied and the system is not operating in ventilation override, heating or cooling mode.
The space temperature sensor determines the heating or cooling mode of operation. In the VAV cooling mode, the modulating cooling source will modulate to maintain the cooling leaving air setpoint, 55 deg F (adj). The supply fan VFD will begin operation at the minimum VFD cooling speed (30% default) and modulate between this setpoint and 100% as needed to maintain the space temperature setpoint.
For VAV heating the modulating heating source will modulate to maintain the heating leaving air setpoint, 90 deg F (adj). The supply fan VFD will begin operation at the minimum VFD heating speed (50% default) and modulate between this setpoint and the maximum VFD heating speed (100% default) as needed to maintain the space temperature setpoint.
Alarms will be provided as follows:
- High Zone Temp: If the zone temperature is greater than the cooling setpoint by 6 deg F (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by 6 deg F (adj.).

Zone Setpoint Adjust:
An adjustable setpoint sensor will be installed in the zone where indicated on the plans.

Supply Fan:
The fan will run continuously when in the occupied mode. The fan will remain off and will cycle on with a call for heating or cooling or at space CO2 levels above 750 ppm in the unoccupied mode.
Alarms will be provided as follows:
- Supply Fan Failure: Commanded on, but the status is off.
- Supply Fan In Hand: Commanded off, but the status is on.

Zone Unoccupied Override:
A timed local override control will allow an occupant to override the schedule and place the unit into an occupied mode for 1 hour (adj). At the expiration of the override time period control of the unit will automatically return to the schedule.

Zone Optimal Start:
The unit will provide a morning startup sequence to bring the zone to setpoint. The unit will use an optimal start algorithm for the morning start-up sequence. This algorithm will minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period. The morning startup discharge air temperature in the heating mode will be 90 deg F (adj.). The morning startup discharge air temperature in the cooling mode will be 55 deg F (adj.). The supply fan will operate at 100%, the outside air and exhaust dampers will remain closed, and the mixed air damper open in startup mode.

Return Air Smoke Detection:
The unit will shut down and generate an alarm upon receiving a return air smoke detector status.

Cooling Stage:
The cooling will be enabled whenever:
- Outside air temperature is greater than 60 deg F (adj.).
- And the economizer (if present) is disabled or fully open.
- And the zone temperature is above cooling setpoint.
- And the supply fan status is on.

The controller will measure the supply air temperature and stage the cooling to maintain its supply air setpoint. To prevent short cycling, the stage will have user definable (adj.) Minimum runtime.

Gas Heating Stage:
The heating will be enabled whenever:
- And the zone temperature is below heating setpoint.
- And the supply fan status is on.

The controller will measure the supply air temperature and modulate the heating to maintain its supply air setpoint. To prevent short cycling, the stage will have user definable (adj.) Minimum runtime.
The outside and exhaust air dampers will close and the mixed air damper will open when the unit is off, operating in optimal start up or operating in the unoccupied mode.

SEQUENCE OF OPERATION

Return Air Humidity:
Whenever the supply fan status is on the controller will measure the return air humidity. When the return air humidity level rises above 60% RH (adj.) and the zone temperature is satisfied (not in cooling mode) the controller will activate the dehumidification sequence. When in dehumidification mode the supply fan will operate at minimum speed.
In dehumidification mode the controller will measure the supply air temperature and stage on the first stage of cooling to 100% and activate the hot gas reheat maintain its supply air setpoint (the supply air setpoint will be equal to the zone setpoint 70-76 deg F).
The hot gas reheat will be enabled whenever:
- Cooling (dehumidification) is enabled
- The zone temperature is satisfied
- And the supply air temperature is 2 deg or more below setpoint
- And the fan status is on.

Alarms will be provided as follows:
- High Return Air Humidity: If the return air humidity is greater than 70% (adj.).

Filter Differential Pressure Monitor:
The controller will monitor the differential pressure across the filters.
Alarms will be provided as follows:
- Filter Change Required: Filter differential pressure exceeds a user definable limit (adj.).

Mixed Air Temperature:
The controller will monitor the mixed air temperature and use as required for economizer control.

Return Air Temperature:
The controller will monitor the return air temperature and use as required for economizer control.
Alarms will be provided as follows:
- High Return Air Temp: If the return air temperature is greater than 80 deg F (adj.).
- Low Return Air Temp: If the return air temperature is less than 60 deg F (adj.).

Supply Air Temperature:
The controller will monitor the supply air temperature.
Alarms will be provided as follows:
- High Supply Air Temp: If the supply air temperature is greater than 100 deg F (adj.).
- Low Supply Air Temp: If the supply air temperature is less than 50 deg F (adj.).

Economizer Mode:
The system will operate in the economizer mode when the system is in the cooling mode (supply temperature is above setpoint), and the outdoor enthalpy is less than the return air enthalpy. In economizer mode the outside air, exhaust air, and mixed air dampers will modulate to maintain the supply air temperature. Set an alarm when at 100% economizer and the mixed air temperature is more than 2 deg F above or below outdoor ambient temperature.

Drawing Title
AHU-W SEQUENCE OF OPERATION

NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN BY	DRAWN DATE	APPROVED BY	APPROVED DATE
AB	MR	SN				

Project Title
1500 NY-9D Wappingers Dutchess Stadium
**1500 Route 9D,
Fishkill, NY 12590**

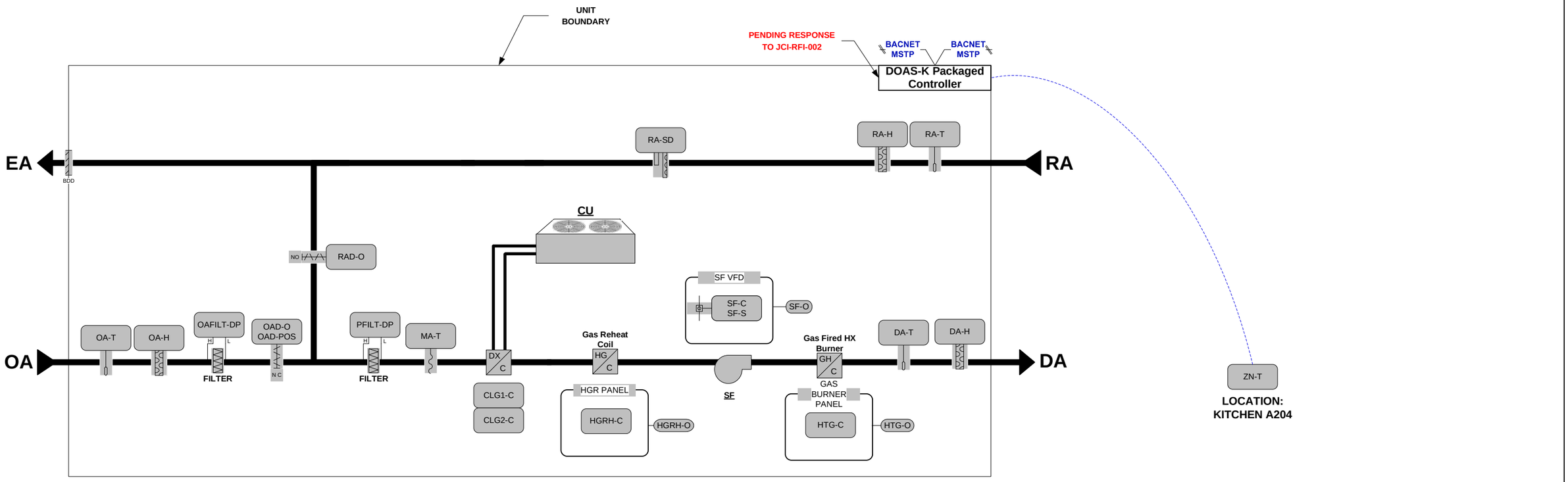
Johnson Controls

Branch Information
Johnson Controls, Inc.
8 Skyline Drive,
Hawthorne, New York
10532
Phone: (866) 854-4572

CONTRACT NUMBER
3N62-0027

DRAWING NUMBER
02.02.02

DOAS-K FLOW LAYOUT



PACKAGED DOAS UNIT SCHEDULE							
SR. NO.	TAG	SERVICE	LOCATION	AIRFLOW		ELECTRICAL	REF. DWG.
				SA	OA	V/PH/HZ	
1	DOAS-K	KITCHEN A204	LEVEL 1	3600	3600	460/3/60	M5.2.ii, M8.1.ii

NOTES:

1. DEVICES IN GREY WILL BE PROVIDED BY MANUFACTURER.
2. DOAS UNIT IS A PACKAGED UNIT & WILL BE CONTROLLED BY MANUFACTURER PROVIDED PACKAGED CONTROLLER. JCI TO ONLY PROVIDE BACNET INTEGRATION & WIRE LOOSE CONTROL DEVICES FURNISHED BY UNIT MANUFACTURER. INTEGRATION TERMINALS TO BE FIELD VERIFIED.
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Drawing Title
DOAS-K FLOW LAYOUT

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
			BY	DATE	BY	DATE
AB	MR	SN				

Project Title
1500 NY-9D Wappingers Dutchess Stadium

1500 Route 9D,
Fishkill, NY 12590

Johnson Controls

Branch Information
Johnson Controls, Inc.
8 Skyline Drive,
Hawthorne, New York
10532
Phone: (866) 854-4572

CONTRACT NUMBER
3N62-0027

DRAWING NUMBER
02.03.01

SEQUENCE OF OPERATION

BELOW SEQUENCE OF OPERATION IS JUST FOR REFERENCE. DOAS WILL BE CONTROLLED BY THE PACKAGED CONTROLLER. REFER UNIT MANUFACTURER OPERATION MANUAL FOR EXACT CONTROL SEQUENCE.

The unit will operate as a constant air volume unit to provide make up air to the kitchen at a variable supply air temperature to maintain the zone temperature setpoint. Interlock operation with the kitchen hood exhaust fan (thru BACnet integration). The unit will run and provide 100% outside air (outside air damper open, return air damper closed) when the hood exhaust fan is operating. The unit will remain off (outside air damper closed and return air damper open) and cycle on a call for heating and cooling when the kitchen hood exhaust fan is off.

Zone Setpoint Adjust:
An adjustable setpoint sensor will be installed in the zone where indicated on the plans.

Zone Optimal Start:
The unit will provide a morning startup sequence to bring the zone to setpoint. The unit will use an optimal start algorithm for the morning start-up sequence. This algorithm will minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period. The morning startup discharge air temperature in the heating mode will be 90 deg F (adj.). The morning startup discharge air temperature in the cooling mode will be 55 deg F (adj.). The supply fan will operate at 100%, the outside air damper will remain closed, and the mixed air damper open in startup mode.

Return Air Smoke Detection:
The unit will shut down and generate an alarm upon receiving a return air smoke detector status.

Cooling Stage:
The cooling will be enabled whenever:
- Outside air temperature is greater than 60 deg F (adj.).
- And the economizer (if present) is disabled or fully open.
- And the zone temperature is above cooling setpoint.
- And the supply fan status is on.

The controller will measure the supply air temperature and stage the cooling to maintain its supply air setpoint. To prevent short cycling, the stage will have a user definable (adj.) minimum runtime.

Gas Heating Stage:
The heating will be enabled whenever:
- The zone temperature is below heating setpoint.
- And the supply fan status is on.

The controller will measure the supply air temperature and modulate the heating to maintain its supply air setpoint. To prevent short cycling, the stage will have a user definable (adj.) Minimum runtime.
The outside air damper will close and the mixed air damper will open when the unit is off, operating in optimal start up or operating in the unoccupied mode.

Return Air Humidity:
Whenever the supply fan status is on the controller will measure the return air humidity. When the return air humidity level rises above 60% RH (adj.) and the zone temperature is satisfied (not in cooling mode) the controller will activate the dehumidification sequence. When in dehumidification mode the supply fan will operate at minimum speed.
In dehumidification mode the controller will measure the supply air temperature and stage on the first stage of cooling to 100% and modulate the hot gas reheat to maintain its supply air setpoint (the supply air setpoint will be equal to the zone setpoint 70-76 deg F).
The hot gas reheat will be enabled whenever:
- Cooling (dehumidification) is enabled
- The zone temperature is satisfied
- And the supply air temperature is 2 deg or more below setpoint.
- And the fan status is on.

Alarms will be provided as follows:
- High Return Air Humidity: If the return air humidity is greater than 70% (adj.).

SEQUENCE OF OPERATION

Filter Differential Pressure Monitor:
The controller will monitor the differential pressure across the filters.
Alarms will be provided as follows:
- Filter Change Required: Filter differential pressure exceeds a user definable limit (adj.).

Mixed Air Temperature:
The controller will monitor the mixed air temperature and use as required for economizer control.

Return Air Temperature:
The controller will monitor the return air temperature and use as required for economizer control.
Alarms will be provided as follows:
- High Return Air Temp: If the return air temperature is greater than 80 deg F (adj.).
- Low Return Air Temp: If the return air temperature is less than 60 deg F (adj.).

Supply Air Temperature:
The controller will monitor the supply air temperature.
Alarms will be provided as follows:
- High Supply Air Temp: If the supply air temperature is greater than 100 deg F (adj.).
- Low Supply Air Temp: If the supply air temperature is less than 50 deg F (adj.).

Economizer Mode:
The system will operate in the economizer mode when the system is in the cooling mode (supply temperature is above setpoint), and the outdoor enthalpy is less than the return air enthalpy. In economizer mode the outside air, exhaust air, and mixed air dampers will modulate to maintain the supply air temperature. Set an alarm when at 100% economizer and the mixed air temperature is more than 2 deg F above or below outdoor ambient temperature.

Drawing Title
DOAS-K SEQUENCE OF OPERATION

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SN	BY	DATE	BY	DATE

Project Title
1500 NY-9D Wappingers Dutchess Stadium
**1500 Route 9D,
Fishkill, NY 12590**

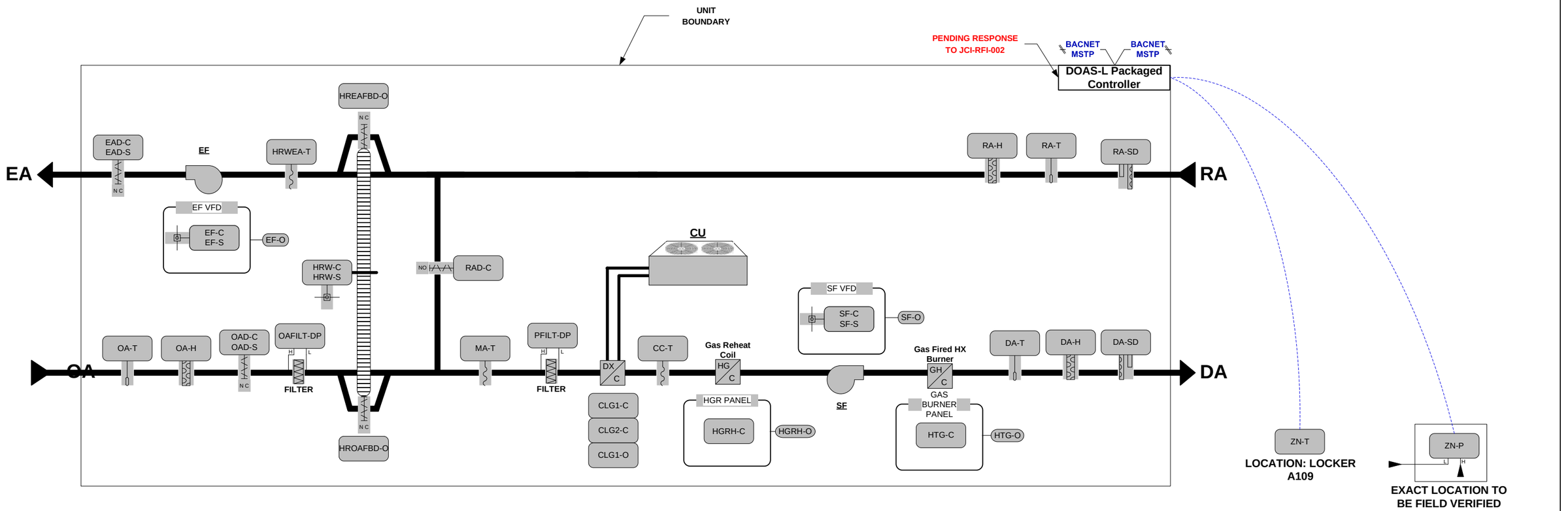
Johnson Controls

Branch Information
Johnson Controls, Inc.
8 Skyline Drive,
Hawthorne, New York
10532
Phone: (866) 854-4572

CONTRACT NUMBER
3N62-0027

DRAWING NUMBER
02.03.02

DOAS-L FLOW LAYOUT



PACKAGED DOAS UNIT SCHEDULE								
SR. NO.	TAG	SERVICE	LOCATION	AIRFLOW			ELECTRICAL	REF. DWG.
				SA	EA	OA	V/PH/HZ	
1	DOAS-L	LOCKER A109, LOUNGE A108, SHOWER A109A, TOILET A109B, COACHES LOCKER A104, FEMALE LOCKER A102, FEMALE TLT A103, SHOWER A105, LOBBY A101	LEVEL 1	3270	3400	3270	460/3/60	M5.1.ii, M8.1.ii

NOTES:

1. DEVICES IN GREY WILL BE PROVIDED BY MANUFACTURER.
2. DOAS UNIT IS A PACKAGED UNIT & WILL BE CONTROLLED BY MANUFACTURER PROVIDED PACKAGED CONTROLLER. JCI TO ONLY PROVIDE BACNET INTEGRATION & WIRE LOOSE CONTROL DEVICES FURNISHED BY UNIT MANUFACTURER. INTEGRATION TERMINALS TO BE FIELD VERIFIED.
3. EQUIPMENT SUBMITTALS DOES NOT INCLUDE TERMINATION WIRING DETAILS OR LIST OF SENSORS/CONTROL DEVICES FURNISHED BY MANUFACTURER. FLOW LAYOUT IS FOR REPRESENTATION ONLY. REFER MANUFACTURER'S EQUIPMENT SUBMITTAL FOR DETAILED INFORMATION.

Drawing Title

DOAS-L FLOW LAYOUT

Project Title

1500 NY-9D Wappingers Dutchess Stadium

**1500 Route 9D,
Fishkill, NY 12590**

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SN	BY	DATE	BY	DATE

Johnson Controls

Branch Information
Johnson Controls, Inc.
8 Skyline Drive,
Hawthorne, New York
10532
Phone: (866) 854-4572

CONTRACT NUMBER
3N62-0027

DRAWING NUMBER
02.04.01

SEQUENCE OF OPERATION

BELOW SEQUENCE OF OPERATION IS JUST FOR REFERENCE. AHU WILL BE CONTROLLED BY THE PACKAGED CONTROLLER. REFER UNIT MANUFACTURER OPERATION MANUAL FOR EXACT CONTROL SEQUENCE.

Run Conditions - Scheduled.
The unit (fan) will run based upon an operator adjustable schedule during occupied hours to provide a constant volume of variable temperature, dry ventilation air continuously during occupied hours. The unit will remain off during unoccupied hours except that it will run for a minimum of 10 minutes per hour to flush the space.

Smoke Detection:
The unit will shut down and generate an alarm upon receiving a smoke detector status.

Outside Air Dampers:
The outside air dampers will open anytime the unit operates in the occupied mode and will close anytime the unit stops. The supply and exhaust fans will start only after the damper status have proven the dampers are open. The dampers will close 5 sec (adj.) After the fans stop.
Alarms will be provided as follows:
- Outside Air Damper Failure: Commanded open, but the status is closed.
- Outside Air Damper In Hand: Commanded closed, but the status is open.
- Exhaust Air Damper Failure: Commanded open, but the status is closed.
- Exhaust Air Damper In Hand: Commanded closed, but the status is open.

Enthalpy Wheel - Constant Speed:
The controller will run the enthalpy wheel for energy recovery as follows.
Cooling Mode - The enthalpy wheel will run for full cool recovery (hot humid days) whenever:
- The outside air enthalpy is greater than the return air enthalpy.
- And the zone temperature is above cooling setpoint.
- And the supply fan is on.

The enthalpy wheel will run for partial cool recovery (hot dry days) whenever:
- The outside air humidity ratio is less than the return air humidity ratio
- And the outside air temperature is greater than the return air temperature
- And the unit discharge air dry bulb does not drop below the enthalpy wheel supply air dewpoint
- And the zone temperature is above cooling setpoint
- And the supply fan is on.

Heating Mode - the enthalpy wheel will run for full heat recovery whenever:
- Outside air enthalpy is less than return air enthalpy
- And the outside air temperature is less than the return air temperature
- And the zone temperature is below heating setpoint.
- And the supply fan is on.

Periodic Self-Cleaning: The enthalpy wheel will run for 10 sec (adj.) Every 4 hr (adj.) The unit runs.
The bypass dampers will open whenever the enthalpy wheel is disabled.
Alarms will be provided as follows:
- Enthalpy Wheel Rotation Failure: Commanded on, but the status is off.
- Enthalpy Wheel In Hand: Commanded off, but the status is on.
- Enthalpy Wheel Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).

Economizer Mode:
The system will operate in the economizer mode when the system is in the cooling mode (supply temperature is above setpoint), and the outdoor temperature is less than the return air temperature. The controller will measure the mixed air temperature and modulate the economizer and heat wheel bypass dampers in sequence to maintain a setpoint 2 deg F (adj.) Less than the supply air temperature setpoint. Set an alarm when at 100% economizer and the mixed air temperature is more than 2 deg F above or below outdoor ambient temperature.

Supply Fan:
The supply fan will run anytime the unit is in the occupied mode unless shut down on safeties. To prevent short cycling, the supply fan will have a user definable (adj.) minimum runtime.
Alarms will be provided as follows:
- Supply Fan Failure: Commanded on, but the status is off.
- Supply Fan In Hand: Commanded off, but the status is on.
- Supply Fan Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).

Exhaust Fan:
The exhaust fan will run whenever the unit is in the occupied mode, unless shutdown on safeties. To prevent short cycling, the exhaust fan will have a user definable (adj.) minimum runtime. The exhaust fan will modulate to maintain a space pressurization of 0.05” w.c. (adj.) Relative to outdoors.
Alarms will be provided as follows:
- Exhaust Fan Failure: Commanded on, but the status is off.
- Exhaust Fan In Hand: Commanded off, but the status is on.
- Exhaust Fan Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).
- High Space Pressure: Above 0.07" wc (adj.)
- Low Space Pressure: Below 0.00" wc (adj.)

SEQUENCE OF OPERATION

Zone Setpoint Adjust:
Provide an adjustable temperature sensor where shown on the plan.

Supply Air Temperature:
The controller will monitor the outdoor air temperature, supply air temperature, and supply air dewpoint. The controller will modulate the cooling, hot gas reheat, and gas heat to maintain the supply air dewpoint at 55 deg or below, and modulate the supply air temperature to maintain space temperature at setpoint.
The cooling will be enabled whenever:
- Supply air dewpoint is above 50% rh (adj)
- Or the space temperature is above cooling setpoint.
- And the fan status is on.

Hot Gas Reheat:
The controller will measure the supply air temperature and dewpoint and stage the cooling and hot gas reheat to maintain its supply air setpoints.
The hot gas reheat will be enabled whenever:
- Cooling (dehumidification) is enabled
- And the supply air temperature is 1 deg G F or more below setpoint.
- And the fan status is on.

Zone Optimal Start:
The unit will provide a morning startup sequence to assist the room air conditioning systems in bringing the building to setpoint. The unit will use an optimal start algorithm for the morning start-up sequence. This algorithm will minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period. The morning startup discharge air temperature in the heating mode will be 90 deg F (adj.). The morning startup discharge air temperature in the cooling mode will be 55 deg F (adj.). The outside air and exhaust air dampers will remain closed and the return air damper remain open during morning startup.

Supply Air Temperature:
The controller will monitor the supply air temperature.
Alarms will be provided as follows:
- High Supply Air Temp: If the supply air temperature is more than 5 deg F (adj.) above setpoint for more than 5 minutes (adj.).
- Low Supply Air Temp: If the supply air temperature is more than 5 deg F (adj.) below setpoint for more than 5 minutes (adj.)..

Supply Air Dewpoint:
The controller will monitor the supply air dewpoint.
Alarms will be provided as follows:
- High Supply Air Dewpoint: If the supply air dewpoint is greater than 60 deg f (adj.).

Filter Differential Pressure Monitor:
The controller will monitor the differential pressure across the filters.
Alarms will be provided as follows:
- Filter Change Required: Filter differential pressure exceeds a user definable limit (adj.).

Return Air Humidity:
The controller will monitor the return air humidity and use as required for economizer control.
Alarms will be provided as follows:
- High Return Air Humidity: If the return air humidity is greater than 70% (adj.).

Return Air Temperature:
The controller will monitor the return air temperature and use as required for setpoint control or economizer control.
Alarms will be provided as follows:
- High Return Air Temp: If the return air temperature is greater than 80 deg F (adj.).
- Low Return Air Temp: If the return air temperature is less than 50 deg F (adj.).

Drawing Title
DOAS-L SEQUENCE OF OPERATION

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SN	BY	DATE	BY	DATE

Project Title
1500 NY-9D Wappingers Dutchess Stadium
**1500 Route 9D,
Fishkill, NY 12590**

Johnson Controls

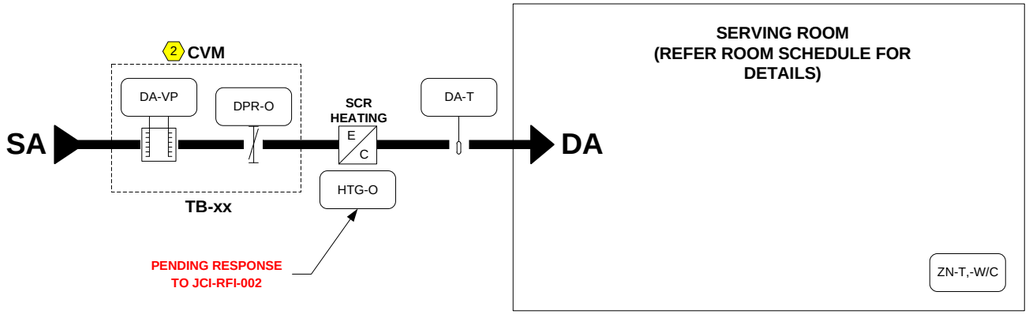
Branch Information
Johnson Controls, Inc.
8 Skyline Drive,
Hawthorne, New York
10532
Phone: (866) 854-4572

CONTRACT NUMBER
3N62-0027

DRAWING NUMBER
02.04.02

VAV w HTG FLOW LAYOUT

(TYPICAL OF 2)



BILL OF MATERIAL

DESIGNATION	QTY.	CODE NUMBER.	DESCRIPTION
FIELD DEVICES:			
CVM	2	M4-CVM03050-0	8PT CNTL VAV W/ ACT & DPT, MSTP, B-AAC, RTC, 3 UI, 2 CO, 3 BO
DA-T	2	TE-631GV-2	DUCT PROBE TEMP SENSOR 1K NICKEL SENSOR 4IN PROBE
ZN-T,-W/C	2	NSB8BTN140-0	NETWORK SENSOR, 3"X4.5" MS/TP, TEMP, ISPLAY, WARMER/ COOLER, WHITE, LOGO

SEQUENCE OF OPERATION

Run Conditions - Scheduled:
The unit will run according to a user definable time schedule in the following modes:
- Occupied Mode: The unit will maintain
  - The occupied cooling setpoint (adj.)
  - The heating setpoint (adj.)
- Unoccupied mode (night setback): The unit will maintain
  - The unoccupied cooling setpoint (adj.)
  - The unoccupied heating setpoint (adj.)

3 **Occupied Mode Control:**
When the zone temperature is between the occupied heating and cooling setpoints (inside of the bias), the primary air damper will be at the minimum CFM and there will be no mechanical heating. On a rise in zone temperature above the cooling setpoint , the primary air damper will increase the CFM and there will be no mechanical heating. On a drop in zone temperature below the heating setpoint, the reheat coil will be used to maintain the zone temperature and the damper is controlled to provide a minimum CFM.

Unoccupied Mode Control:
When in this mode, while the zone temperature is between the unoccupied heating and cooling setpoints (inside of the bias), the primary air damper will be at the minimum CFM and there will be no mechanical heating. On a rise in zone temperature above the unoccupied cooling setpoint, the primary air damper will increase the CFM (if available) and there will be no mechanical heating. On a drop in zone temperature below the unoccupied heating setpoint, the reheat coil will be used to maintain the zone temperature and the primary air damper will be at the minimum CFM.

Zone Setpoint Adjust:
The occupant will be able to adjust the zone temperature heating and cooling setpoints at the zone Sensor ±2 deg F (adj.).

Zone Optimal Start:
The unit will use an optimal start algorithm for morning start-up. This algorithm will minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period.

Zone Unoccupied Override:
A timed local override control will allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time. At the expiration of this time, control of the unit will automatically return to the schedule.

Discharge Air Temperature:
The controller will monitor the discharge air temperature.

Alarms will be provided as follows:
- High Discharge Air Temp: If the discharge air temperature is greater than 100 deg F (adj.).
- Low Discharge Air Temp: If the discharge air temperature is less than 50 deg F (adj.).
- High Zone Temp: If the zone temperature is greater than the cooling setpoint by 5 deg F (adj.).
- How Zone Temp: If the zone temperature is less than the heating setpoint by 5 deg F (adj.).

NOTES:

1. REFER ROOM SCHEDULE FOR CAV LOCATION, SERVING AND VAV BOX PARAMETER DETAILS.
2. CVM CONTROLLER WILL BE POWERED BY THE MANUFACTURER PROVIDED TRANSFORMER.
3. JCI PROPOSED STANDARD SEQUENCE FOR VARIABLE VOLUME OPERATION. ENGINEER TO REVIEW AND APPROVE.

TB-A106 is to be constant air volume terminal unit. With as little airflow as required for TB-A111B, terminal box could function as constant air volume terminal unit, but provided variable volume sequence is acceptable.

Drawing Title
VAV w HTG FLOW LAYOUT

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN BY	DRAWN DATE	APPROVED BY	APPROVED DATE
AB	MR	SN				

Project Title
1500 NY-9D Wappingers Dutchess Stadium

1500 Route 9D,
Fishkill, NY 12590

Johnson Controls

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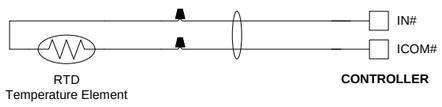
CONTRACT NUMBER
3N62-0027

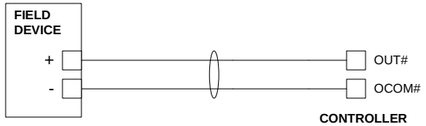
DRAWING NUMBER
03.01.01

Electrician/Fi	Point Information			Controller Information						Panel Information				Intermediate Device				Field Device					
Point Type	**System Name**	**Object Name**	**Expanded ID**	**Controller Details**	**Trunk Type**	**Trunk Nbr**	**Trunk Addr.**	**Cable Destination Bay/Terminal**	**Termination Out**	**Panel**	**Panel Location**	**Reference Drawing**	**Cable Number**	**Wiring /Tubing**	**Termination In**	**Device**	**Termination Out**	**Wiring /Tubing**	**Termination In**	**Device**	**Ref Detail Shape**	**Comment**
	VAV w HTG			CVM03050						VAV BOX	REFER RAC SCHEDULE	M108										BacNet FC Bus
	VAV w HTG			CVM03050	MS/TP	*	*			VAV BOX	REFER RAC SCHEDULE	M108										Power to Controller
UI IN-1	VAV w HTG	DA-T	Discharge Air Temperature	CVM03050	MS/TP	*	*	UI IN-1	UI-1, UI-C1/2	VAV BOX	REFER RAC SCHEDULE	M108	VAV BOX-x-UI IN-1					2/18	2-Wire	TE	V131	
UI IN-2	VAV w HTG			CVM03050	MS/TP	*	*	UI IN-2		VAV BOX	REFER RAC SCHEDULE	M108	VAV BOX-x-UI IN-2									
UI IN-3	VAV w HTG			CVM03050	MS/TP	*	*	UI IN-3		VAV BOX	REFER RAC SCHEDULE	M108	VAV BOX-x-UI IN-3									
BO OUT-1	VAV w HTG			CVM03050	MS/TP	*	*	BO OUT-1		VAV BOX	REFER RAC SCHEDULE	M108	VAV BOX-x-BO OUT-1									
BO OUT-2	VAV w HTG			CVM03050	MS/TP	*	*	BO OUT-2		VAV BOX	REFER RAC SCHEDULE	M108	VAV BOX-x-BO OUT-2									
BO OUT-3	VAV w HTG			CVM03050	MS/TP	*	*	BO OUT-3		VAV BOX	REFER RAC SCHEDULE	M108	VAV BOX-x-BO OUT-3									
CO OUT-1	VAV w HTG	HTG-O	Heating Output	CVM03050	MS/TP	*	*	CO OUT-1	CO-1, CO-C1	VAV BOX	REFER RAC SCHEDULE	M108	VAV BOX-x-CO OUT-1					2/18	See wiring detail	Output (Voltage)	V201	
CO OUT-2	VAV w HTG			CVM03050	MS/TP	*	*	CO OUT-2		VAV BOX	REFER RAC SCHEDULE	M108	VAV BOX-x-CO OUT-2									
	VAV w HTG			NET STAT						VAV BOX	REFER RAC SCHEDULE	M108										
	VAV w HTG			NET STAT	SA Bus	*	199			VAV BOX	REFER RAC SCHEDULE	M108										
STAT	VAV w HTG	ZN-T,W/C	Zone Temperature, Warm/Cool	NET STAT	SA Bus	*	199	STAT	Terminals	VAV BOX	REFER RAC SCHEDULE	M108	*-VAV BOX-199-STAT					4/18	Terminals	NS8000 NetSensor Terminals	NS202	
NOTE-1: (*) REFER NETWORK RISER FOR MSTP TRUNK NUMBER AND ADDRESS.																						
NOTE-2: DA-VP & DPR-O ARE INTEGRAL TO CVM CONTROLLER.																						

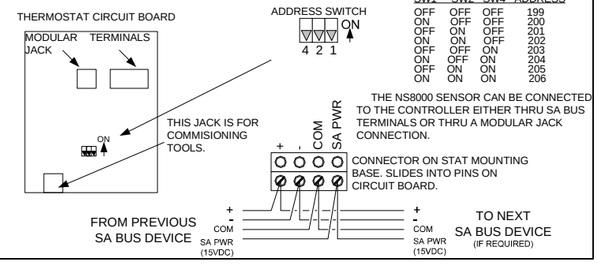
DETAIL V131 TEMPERATURE SENSOR INPUT



DETAIL V201 ANALOG OUTPUT (VOLTAGE)



DETAIL NS202 NS8000 NET SENSOR TERMINALS



Drawing Title

VAV w HTG POINT SCHEDULE AND WIRING DETAILS

Project Title

1500 NY-9D Wappingers Dutchess Stadium

1500 Route 9D, Fishkill, NY 12590

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SN	BY	DATE	BY	DATE

Johnson Controls

Branch Information
Johnson Controls, Inc.
8 Skyline Drive,
Hawthorne, New York
10532
Phone: (866) 854-4572

CONTRACT NUMBER
3N62-0027

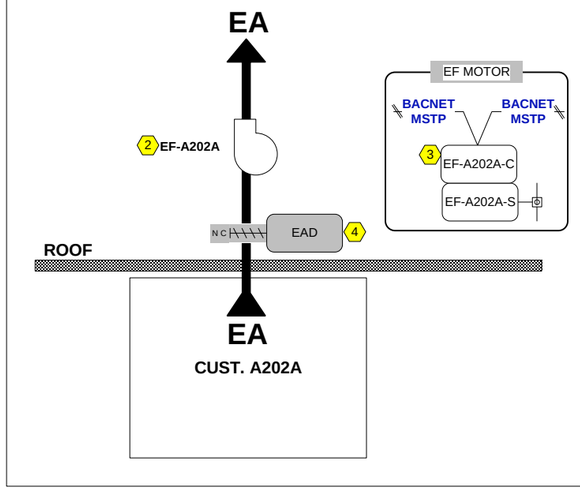
DRAWING NUMBER
03.01.02

EF FLOW LAYOUT

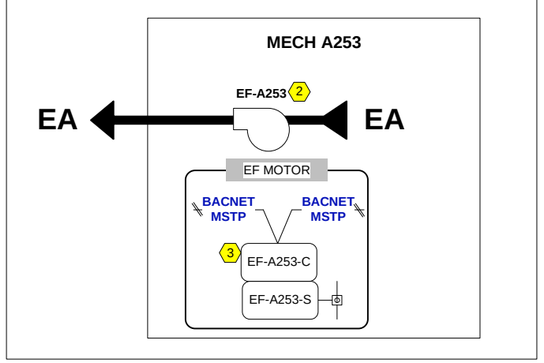
BILL OF MATERIAL

DESIGNATION	QTY.	CODE NUMBER.	DESCRIPTION
FIELD DEVICES:			
(3) EF-x-C	2	RIBTW2401B-BC	BACNET MS/TP NETWORK ENCLOSED DUAL I/O DEVICE; ONE BINARY OUTPUT
EF-x-S	2	H120	SPST NO

EF-A202A FLOW LAYOUT



EF-A253 FLOW LAYOUT



EF SCHEDULE							
S.NO.	LEVEL	EF TAG	SERVING	AIRFLOW CFM	MOTOR RATING	V/PH/HZ	REF DWG
1	ROOF	EF-A202A	CUST - A202A	75	1/60 HP	120/1/60	M1.2A.ii
2	LEVEL 2	EF-A253	MECH - A253	125	53 Watts	120/1/60	M1.2A.ii

SEQUENCE OF OPERATION

Exhaust fan (EF-A202A, A253): Exhaust Fans will run continuously. Building control system will monitor status and provide on/off override.

NOTES:

1. DEVICES IN GRAY WILL BE PROVIDED BY OTHERS.
2. EXHAUST FAN SPEED WILL BE CONTROLLED BY SOLID STATE SPEED CONTROL SHIPPED WITH THE UNIT.
3. EXHAUST FAN WILL BE CONTROLLED BY BACNET RELAY. REFER JCI DWG 04.01.02 FOR WIRING DETAILS.
4. EXHAUST AIR DAMPER WILL BE HARDWIRED INTERLOCKED WITH THE EXHAUST FAN. REFER JCI DWG 04.01.02 FOR WIRING DETAILS.

Drawing Title
EF FLOW LAYOUT

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SN	BY	DATE	BY	DATE

Project Title
1500 NY-9D Wappingers Dutchess Stadium
1500 Route 9D,
Fishkill, NY 12590

Johnson Controls

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10532
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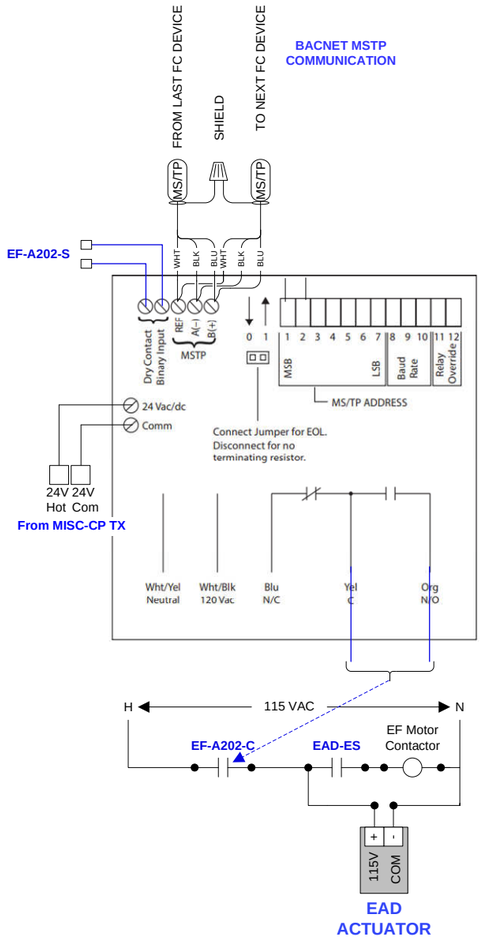
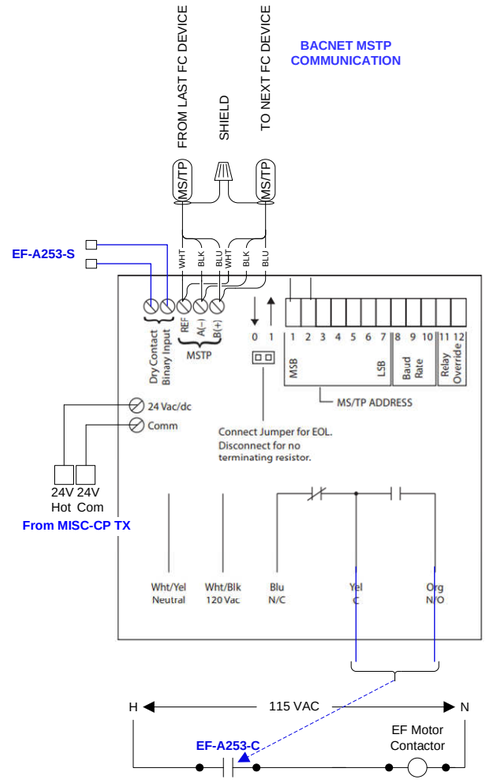
CONTRACT NUMBER
3N62-0027

DRAWING NUMBER
04.01.01

EF-A202A WIRING DETAILS



EF-A253 WIRING DETAILS



Drawing Title

EF WIRING DETAILS

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SN	BY	DATE	BY	DATE

Project Title

1500 NY-9D Wappingers Dutchess Stadium

1500 Route 9D,
Fishkill, NY 12590

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10532
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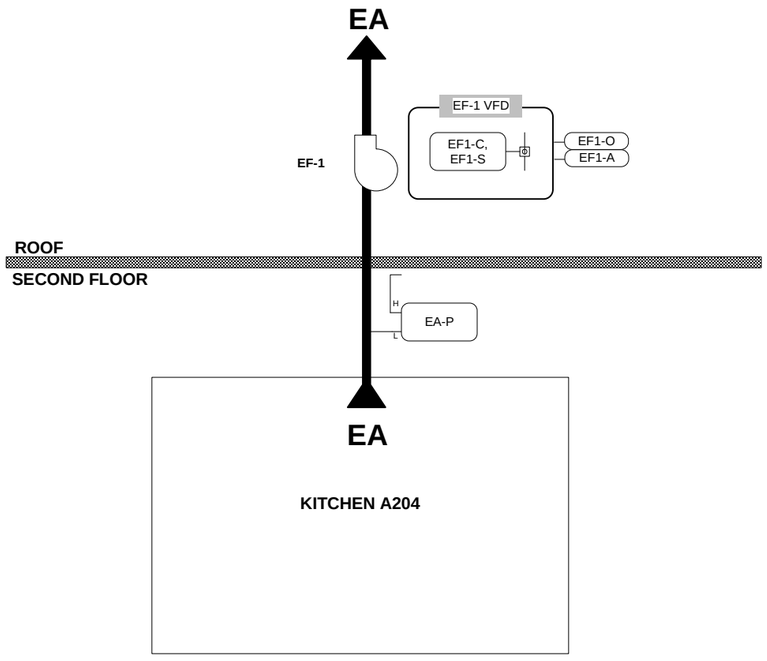
CONTRACT NUMBER

3N62-0027

DRAWING NUMBER

04.01.02

KITCHEN EXHAUST FAN FLOW LAYOUT



BILL OF MATERIAL

DESIGNATION	QTY.	CODE NUMBER.	DESCRIPTION
FIELD DEVICES:			
EA-P	1	DP1402X5U21C	UNIDIRECTIONAL 0 TO 2.5IN. W.C. 24 VDC / 4 TO 20 MA
EA-P	1	FTG18A-600R	SENSING TUBE KIT FOR P32
EF1-C,-S	1	CSDSC-C45050L1	CURR SW SELF CAL CLMP 0.45A-50A RLY OPT 24V NO

SEQUENCE OF OPERATION 2

Exhaust fan (EF-1): Exhaust fan will be started as per occupancy schedule. The controller will measure exhaust air duct static pressure and will modulate fan speed to maintain static pressure setpoint. Building control system will monitor fan status. A fan failure alarm will be generated on BAS whenever there is a fan command & status mismatch.

EF SCHEDULE								
S.NO.	**LEVEL**	**EF TAG**	**SERVING**	**AIRFLOW CFM**	**MOTOR HP**	**V/PH/HZ**	**REF DWG**	**MAPPED TO**
1	ROOF	EF-1	KITCHEN - A204	3992	5	208/3/60	M7.1.ii	MISC-CP 3

NOTES:

1. DEVICES IN GRAY WILL BE PROVIDED BY OTHERS.
2. JCI PROPOSED STANDARD SEQUENCE OF OPERATION FOR ENGINEER TO REVIEW AND APPROVE.
3. ALL CONTROL POINTS FOR EF-1 UNIT WILL BE MAPPED TO MISC-CP CONTROLLER, REFER DRAWING 05.03.03 FOR DETAILS.

Drawing Title
KITCHEN EXHAUST FAN FLOW LAYOUT

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SN	BY	DATE	BY	DATE

Project Title
1500 NY-9D Wappingers Dutchess Stadium
**1500 Route 9D,
Fishkill, NY 12590**

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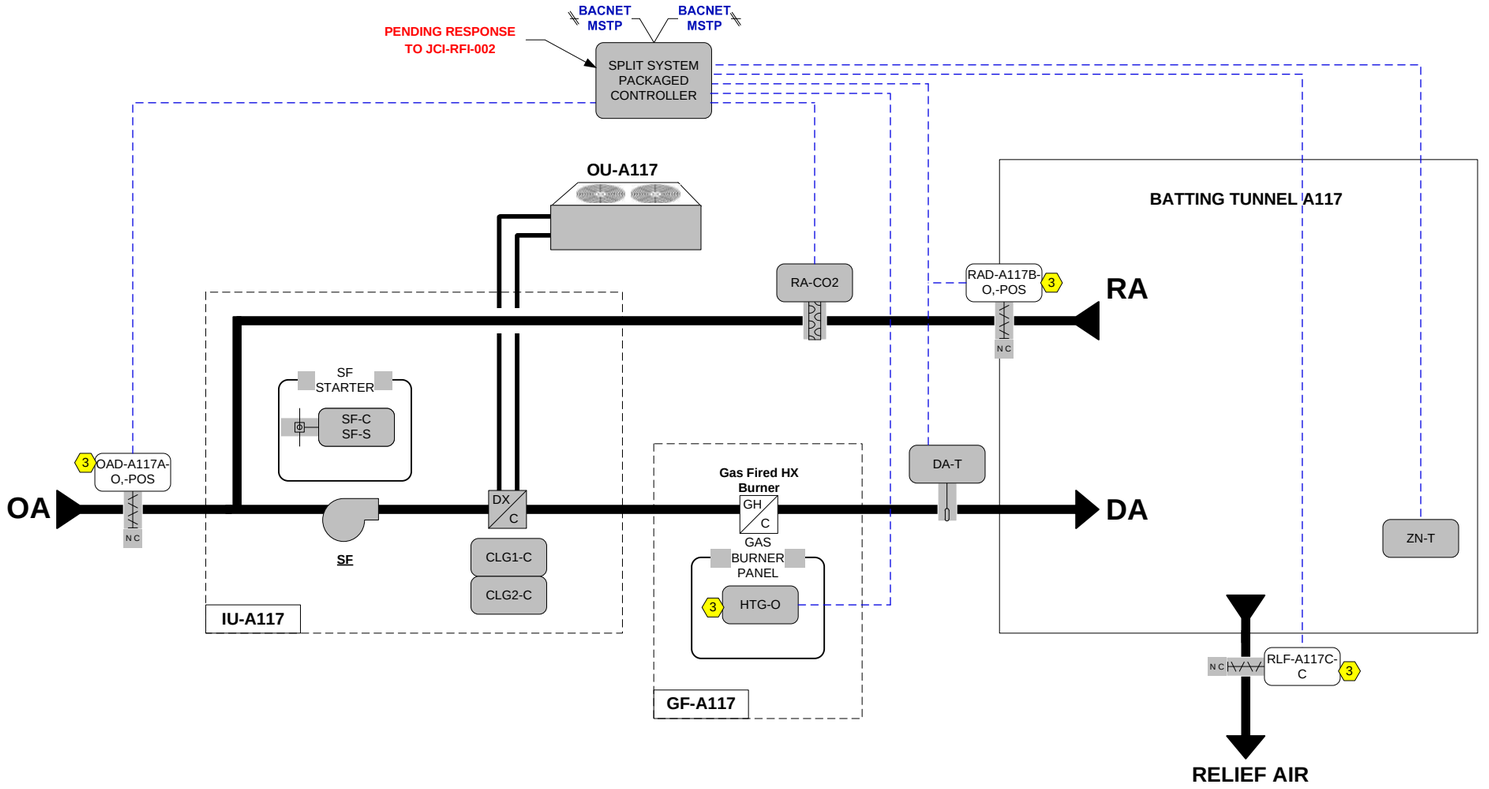
CONTRACT NUMBER
3N62-0027

DRAWING NUMBER
04.02.01

SPLIT SYSTEM AIR HANDLER FLOW LAYOUT



GAS FIRED FURNACE SCHEDULE					
SR. NO.	SYSTEM TAG	SERVING	CFM	V/PH/HTZ	MECH DWG REF
1	GF-A117	BATTING TUNNEL A117	2730	480/3/60	M1.1A.ii, M8.1.ii

SPLIT SYSTEM AIR HANDLER SCHEDULE						
SR. NO.	SYSTEM TAG	SERVING	CFM	ASSOCIATED CU	V/PH/HTZ	MECH DWG REF
1	IU-A117	BATTING TUNNEL A117	2730	OU-A117	480/3/60	M1.1A.ii, M8.1.ii

NOTES:

1. DEVICES IN GREY WILL BE PROVIED BY MANUFACTURER.
2. SPLIT AHU SYSTEM IS A PACKAGED UNIT & WILL BE CONTROLLED BY MANUFACTURER PROVIDED PACKAGED CONTROLLER. JCI TO ONLY PROVIDE BACNET INTEGRATION & WIRE LOOSE CONTROL DEVICES FURNISHED BY UNIT MANUFACTURER. INTEGRATION TERMINALS TO BE FIELD VERIFIED.
3. GAS FURNACE OUTPUT & CONTROL DAMPERS WILL BE WIRED TO SPLIT SYSTEM PACKAGED CONTROLLER. EXACT TERMINATION WIRING DETAILS TO BE FIELD VERIFIED.
4. EQUIPMENT SUBMITTALS DOES NOT INCLUDE TERMINATION WIRING DETAILS OR LIST OF SENSORS/CONTROL DEVICES FURNISHED BY MANUFACTURER. FLOW LAYOUT IS FOR REPRESENTATION ONLY. REFER MANUFACTURER'S EQUIPMENT SUBMITTAL FOR DETAILED INFORMATION.

Drawing Title
SPLIT SYSTEM AIR HANDLER FLOW LAYOUT

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SN	BY	DATE	BY	DATE

Project Title
1500 NY-9D Wappingers Dutchess Stadium
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Fishkill, NY 12590

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10532
Phone: (866) 854-4572

CONTRACT NUMBER
3N62-0027

DRAWING NUMBER
05.01.01

BILL OF MATERIAL

DESIGNATION	QTY.	CODE NUMBER.	DESCRIPTION
FIELD DEVICES:			
OAD-A117A-O,-POS	1	NFB24-SR	DAMPER ACTUATOR, 90 IN-LB, SPRING RETURN, 24V, MODULATING
RAD-A117B-O,-POS	1	NFB24-SR	DAMPER ACTUATOR, 90 IN-LB, SPRING RETURN, 24V, MODULATING
RLF-A117C-C	1	NFB24-S	DAMPER ACTUATOR, 90 IN-LB, SPRING RETURN, 24V, ON/OFF, SW

SEQUENCE OF OPERATION

BELOW SEQUENCE OF OPERATION IS JUST FOR REFERENCE. UNIT WILL BE CONTROLLED BY THE PACKAGED CONTROLLER. REFER UNIT MANUFACTURER OPERATION MANUAL FOR EXACT CONTROL SEQUENCE.

Run Conditions - Scheduled:
The unit will run according to a user definable time schedule in the following modes:
- Occupied Mode: The fan will run continuously to provide minimum ventilation and will maintain the occupied heating and cooling setpoints.
- Unoccupied Mode (night setback): The unit will maintain the unoccupied heating and cooling setpoints.

Alarms will be provided as follows:
- High Zone Temp: If the zone temperature is greater than the cooling setpoint by 5 deg F (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by 5 deg F (adj.).

Zone Setpoint Adjust:
The occupant will be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.

Zone Optimal Start:
The unit will use an optimal start algorithm for morning start-up. This algorithm will minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period.

Zone Unoccupied Override:
A timed local override control will allow an occupant to override the schedule and place the unit into an occupied mode for 1-hour (adj). At the expiration of this time, control of the unit will automatically return to the schedule.

Cooling Stage:
The controller will measure the zone temperature and stage the cooling to maintain its cooling setpoint. To prevent short cycling, the stage will have a user definable (adj.) minimum runtime.
The cooling will be enabled whenever:
- The zone temperature is above cooling setpoint.
- And the fan is on.

SEQUENCE OF OPERATION

Heating Stage:
The controller will measure the zone temperature and stage the heating to maintain its heating setpoint. To prevent short cycling, the stage will have a user definable (adj.) minimum runtime.
The heating will be enabled whenever:
- The zone temperature is below heating setpoint.
- And the fan is on.

Discharge Air Temperature:
The controller will monitor the discharge air temperature.

Fan Status:
The controller will monitor the fan status.
Alarms will be provided as follows:
- Fan Failure: Commanded on, but the status is off.
- Fan In Hand: Commanded off, but the status is on.
- Fan Runtime Exceeded: Fan status runtime exceeds a user definable limit (adj.).

Economizer:
The controller will measure the outdoor air temperature and activate economizer operation when the outdoor temperature is less than 60 deg F (adj) and there is a call for cooling. During economizer function the split system condensers will turn off and the of the outside air and return air dampers will modulate to maintain the cooling setpoint. Set an alarm when at 100% economizer and the mixed air temperature is more than 2 deg f above or below outdoor ambient temperature.

Carbon Dioxide (CO2) Monitoring, Outside Air Ventilation Control:
When in the occupied mode, under normal operation when the supply fan is in operation, the controller will modulate the outside air damper to admit the scheduled 'Minimum' outside air. The controller will measure the return air CO2 level and upon CO2 concentrations rising above 750 ppm (adj), override normal damper operation and modulate the outside air and return air dampers to admit the 'design' outside air value listed in the equipment schedule. The outside air damper will modulate to admit the scheduled 'minimum' outside air when the CO2 level drops below 700 ppm (adj.).
The relief damper will open any time the outside air damper is open.
Alarms will be provided as follows:
- High Space Air Carbon Dioxide Concentration: If the space air CO2 concentration is greater than 1000 ppm (adj.).

Drawing Title
SPLIT SYSTEM AIR HANDLER SEQUENCE OF OPERATION

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SN	BY	DATE	BY	DATE

Project Title
1500 NY-9D Wappingers Dutchess Stadium
**1500 Route 9D,
Fishkill, NY 12590**

Johnson Controls

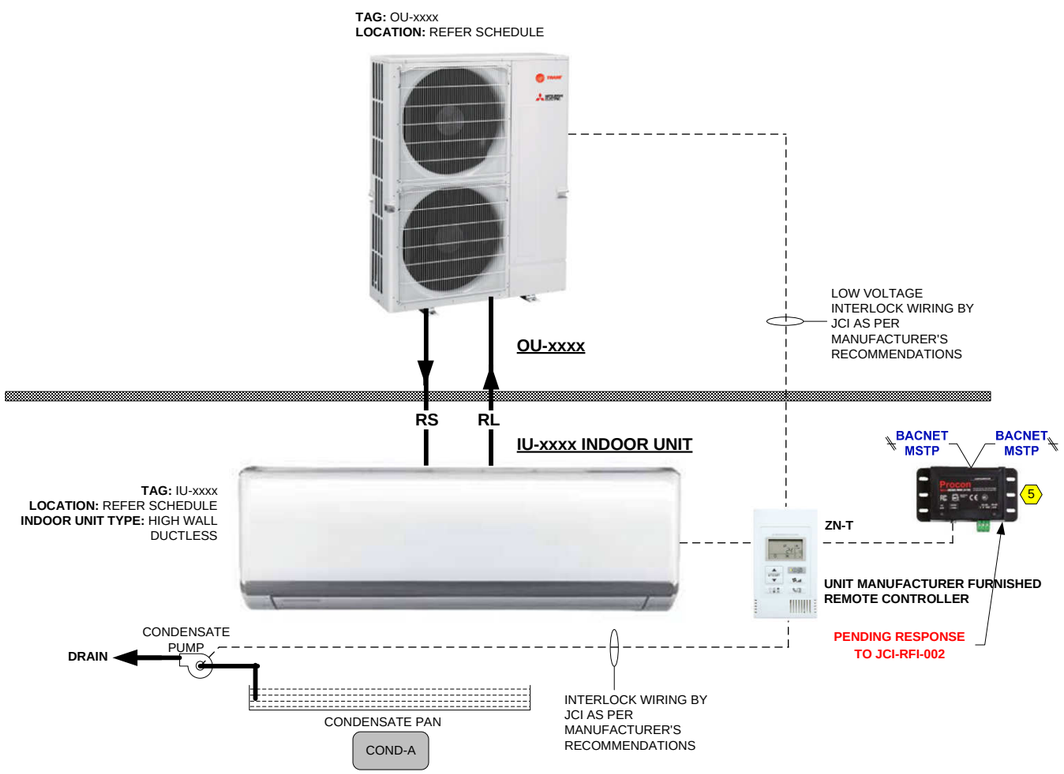
Branch Information
Johnson Controls, Inc.
8 Skyline Drive,
Hawthorne, New York
10532
Phone: (866) 854-4572

CONTRACT NUMBER
3N62-0027

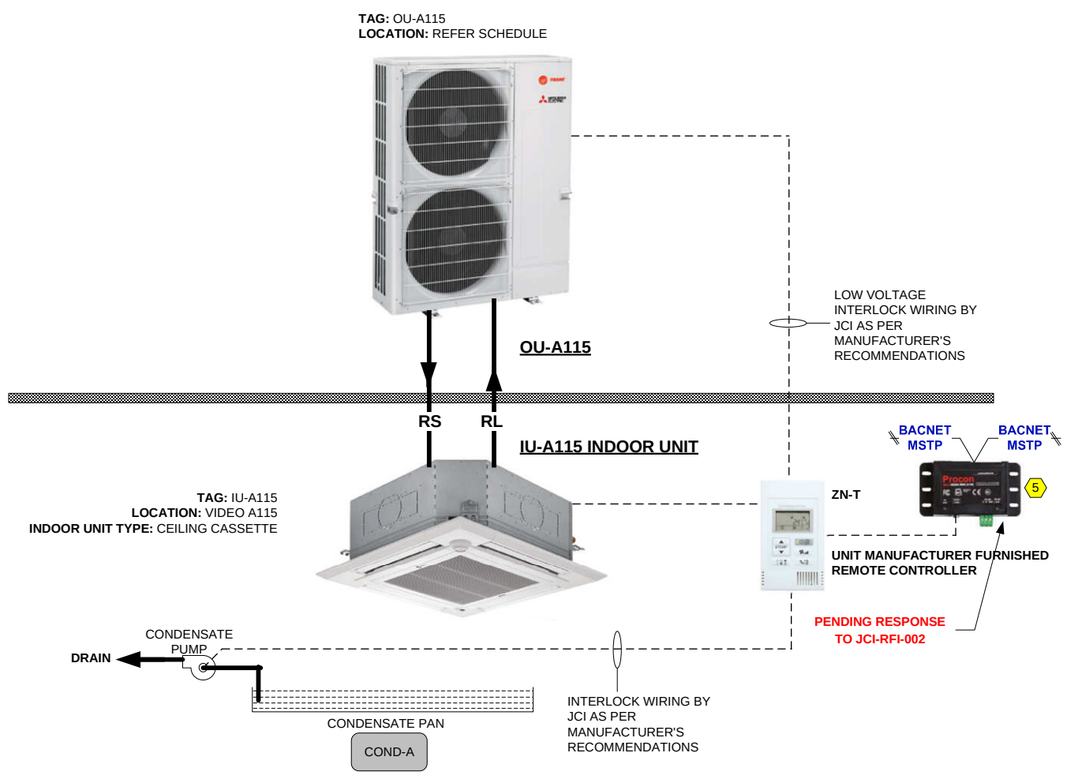
DRAWING NUMBER
05.01.02

DUCTLESS SPLIT SYSTEM FLOW LAYOUT

TYPICAL OF 4



TYPICAL OF 1



SPLIT SYSTEM SCHEDULE							
SR. NO.	SYSTEM TAG	LOCATION & SERVING	CFM	INDOOR UNIT TYPE	ASSOCIATED CU	V/PH/HTZ	MECH DWG REF
1	IU-A114	HAWK EYE A114	920	HIGH WALL DUCTLESS	OU-A114	208/1/60	M1.1A.ii, M8.1.ii
2	IU-A115	VIDEO A115	1200	CEILING CASSETTE	OU-A115	208/1/60	M1.1A.ii, M8.1.ii
3	IU-A116B	AV A116B	920	HIGH WALL DUCTLESS	OU-A116B	208/1/60	M1.1A.ii, M8.1.ii
4	IU-A119B	TELECOM A119B	920	HIGH WALL DUCTLESS	OU-A119B	208/1/60	M1.1A.ii, M8.1.ii
5	IU-A119C	ELEC A119C	920	HIGH WALL DUCTLESS	OU-A119C	208/1/60	M1.1A.ii, M8.1.ii

NOTES:

1. DEVICES IN GREY WILL BE PROVIED BY MANUFACTURER.
2. THE SPLIT AC UNITS WILL BE CONTROLLED BY PACKAGED UNIT CONTROLLER PROVIDED BY UNIT MANUFACTURER. JCI WILL ONLY MONITOR THE UNIT VIA BACNET MSTP INTEGRATION. EXACT WIRING TERMINATIONS TO BE FIELD VERIFIED.
3. JCI WILL PROVIDE INTERLOCK WIRING BETWEEN INDOOR & OUTDOOR UNIT. EQUIPMENT SUBMITTALS DOES NOT INCLUDE TERMINATION WIRING DETAILS, EXACT TERMINATIONS TO BE FIELD CO-ORDINATED.
4. CONDENSATE PUMP FURNISHED BY UNIT MANUFACTURER WILL BE CONTROLLED BY UNIT MANUFACTURER CONTROLLER.

Drawing Title
DUCTLESS SPLIT SYSTEM FLOW LAYOUT

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SN	BY	DATE	BY	DATE

Project Title
1500 NY-9D Wappingers Dutchess Stadium

1500 Route 9D,
Fishkill, NY 12590

Johnson Controls

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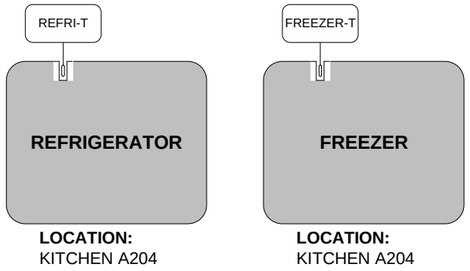
CONTRACT NUMBER
3N62-0027

DRAWING NUMBER
05.02.01

MISC FLOW LAYOUT

REFRIGERATOR & FREEZER - FLOW LAYOUT

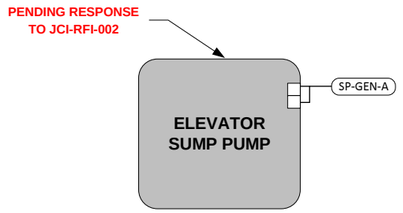


LOCATION:
KITCHEN A204

LOCATION:
KITCHEN A204

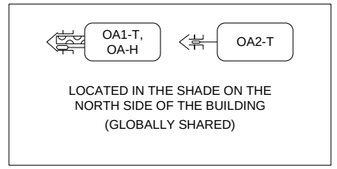
NOTES:
1. JCI WILL PROVIDE THE TEMPERATURE SENSORS TO MONITOR THE FREEZER & REFRIGERATOR EQUIPMENT TEMPERATURE.

SUMP PUMP - FLOW LAYOUT

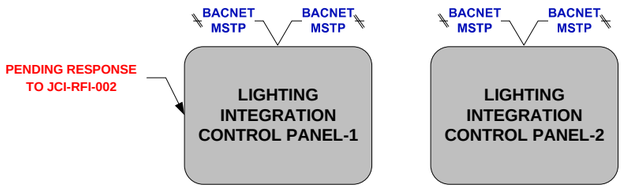


ELEVATOR SUMP PUMP SCHEDULE					
SR.NO.	SYSTEM TAG	LOCATION	FLOW GPM	V / PH/ HT Z	MAPPED TO
1	SP-A166	ELEV A166	50	115/1/60	MISC-CP

GLOBAL SENSORS - FLOW LAYOUT



LIGHTING INTEGRATION - FLOW LAYOUT



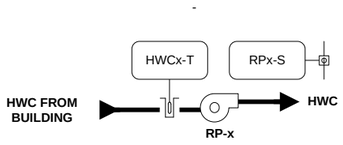
LOCATION:
ELEC A119C

LOCATION:
ELEC A202B

NOTES:
1. LIGHTING CONTROL PANEL LOCATION TO BE CO-ORDINATED WITH ELECTRICAL CONTRACTOR.
2. ALL ACCESSORIES REQUIRED FOR INTEGRATION WILL BE PROVIDED BY OTHERS. JCI WILL ONLY INTEGRATE LIGHTING CONTROL PANEL TO BAS NETWORK.

DOMESTIC HW CIRCULATION PUMP - FLOW LAYOUT

(TYPICAL OF 3)



DOMESTIC CIRCULATING PUMP SCHEDULE					
SR.NO.	SYSTEM TAG	LOCATION	FLOW GPM	V / PH/ HT Z	MAPPED TO
1	RP-1	BLDG SERVICES A119	5	115/1/60	MISC-CP
2	RP-2	STORAGE A202C	1	115/1/60	MISC-CP
3	RP-3	MECH A253	1	115/1/60	MISC-CP

NOTES:
1. DEVICES IN GREY WILL BE PROVIED BY MANUFACTURER.

Drawing Title
MISC FLOW LAYOUT

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
			BY	DATE	BY	DATE
AB	MR	SN				

Project Title
1500 NY-9D Wappingers Dutchess Stadium

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CONTRACT NUMBER
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DRAWING NUMBER
05.03.01

BILL OF MATERIAL

DESIGNATION	QTY.	CODE NUMBER.	DESCRIPTION
FIELD DEVICES:			
DHWRx-T	3	TE-631AM-2	WELL INSERTION TEMPERATURE SENSOR,1K OHM NICKEL 6 IN. PROBE
DHWRx-T	3	TE-6300W-102	THERMOWELL. 6 STAINLESS STEEL DIRECT MOUNT
FREEZER-T	1	BA-1KTBM3044BB	THERMOBUFFER TEMP 4IN SS 1K OHM 385 RTD BAPI BOX
OA1-T, OA-H	1	HE-68P3-0N000	OUTODOR RELATIVE HUMIDT TEMP DEW PT ENTHALPY WETBULB TRNSMTR
OA2-T	1	TE-6313P-1	3, FOR OUTDOOR AIR MTG.
REFRI-T	1	BA-1KTBM3044BB	THERMOBUFFER TEMP 4IN SS 1K OHM 385 RTD BAPI BOX
RPx-S	3	H120	SPST NO
PANEL DEVICES:			
MISC-CP	1	P2BAN-BA001N00	PANEL, CGM09090, 20X24 NEMA 1 ENC.
XPM-1	1	M4-XPM09090-0	18 PT INPUT/OUTPUT EXPANSION MODULE, 7 UI, 2 BI, 4 CO, 2 AO, 3 BO

SEQUENCE OF OPERATION

Kitchen Refrigerators & Freezers:
The kitchen refrigerators and freezers will be monitored by the BAS and generate an alarm on a rise in temperature 5 deg F (adj) above their operational setpoint.

Lighting Control:
1. JCI will provide a connection between BAS & time-based lighting control system in Electrical Rooms (A119C & A202B), all accessories as required to facilitate two-way communication between the systems will be provided by others. JCI will co-ordinate with the Electrical contractor for additional information.
2. The BAS will have the ability to set lighting schedules, provide manual on/off & monitor the status of the lights.

Elevator Pit Sump Pump:
Building control system will monitor the elevator pit sump pump control panels and relay alarms at the panels to the BAS.

Domestic Hot Water Circulating Pumps:
Circulating pumps will run continuously during occupied hours.
Temperature controls will:
1. JCI will provide temperature sensors placed on the inlet side of the pump used to monitor the return water temperature.
2. Generate an alarm if the temperature falls below 100 deg F.

Global Outdoor Sensors:
1. Provide two outdoor air temperature sensors and use average value. Failure of one sensor will cause it to be disabled and an alarm generated.
2. JCI will provide global outdoor air relative humidity & outdoor air enthalpy. Failure of any sensors will generate an alarm.

Drawing Title
MISC BOM & SEQUENCE OF OPERATION

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
			BY	DATE	BY	DATE
AB	MR	SN				

Project Title
1500 NY-9D Wappingers Dutchess Stadium
**1500 Route 9D,
Fishkill, NY 12590**

Johnson Controls

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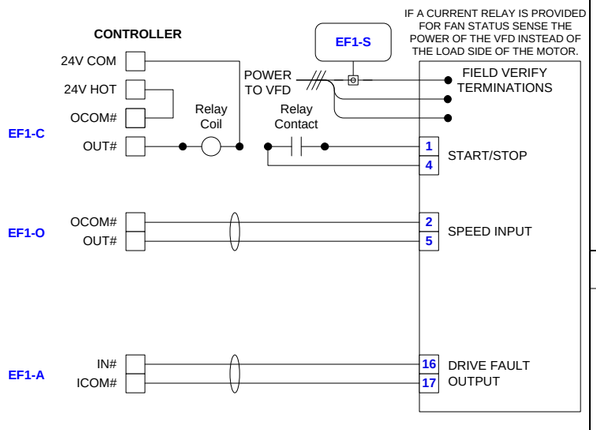
CONTRACT NUMBER
3N62-0027

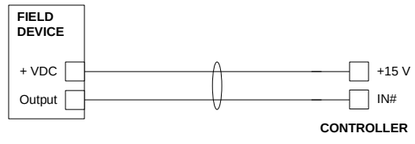
DRAWING NUMBER
05.03.02

Electrician/Fi	Point Information			Controller Information					Panel Information				Intermediate Device				Field Device				
Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	Termination Out	Panel	Panel Location	Reference Drawing	Cable Number	Wiring /Tubing	Termination In	Device	Termination Out	Wiring /Tubing	Termination In	Device	Ref Detail Shape	Comment
	MISC			CGM09090																		BacNet FC Bus
	MISC			CGM09090	MS/TP	*	*															Power to Controller
UI IN-1	MISC	OA1-T	Outside Air Temperature 1	CGM09090	MS/TP	*	*	UI IN-1	UI-1, UI-C1/2	MISC-CP	ELEC A202B	M1.2A.ii	CP-x-UI IN-1					2/18	See wiring detail	HE-68P3-0N000 OA-T (Vdc)	F159	
UI IN-2	MISC	OA-H	Outside Air Humidity	CGM09090	MS/TP	*	*	UI IN-2	UI-2, UI-C1/2,24V HOT,24V COM	MISC-CP	ELEC A202B	M1.2A.ii	CP-x-UI IN-2					2/18 / 2/18	See wiring detail	HE-68P3-0N000 OA-H (Vdc)	F159	
UI IN-3	MISC	OA2-T	Outside Air Temperature 2	CGM09090	MS/TP	*	*	UI IN-3	IN3, ICOM3	MISC-CP	ELEC A202B	M1.2A.ii	CP-x-UI IN-3					2/18	2-Wire	TE	F131	
UI IN-4	EF-1	EA-P	EF-1 Exhaust Air Static Pressure	CGM09090	MS/TP	*	*	UI IN-4	UI-4, +15V	MISC-CP	ELEC A202B	M1.2A.ii	CP-x-UI IN-4					2/18	See wiring detail	Current Input (2 Wire)	F106	
UI IN-5	EF-1	EF1-A	Exhaust Fan 1 Alarm	CGM09090	MS/TP	*	*	UI IN-5	UI-5, UI-C5/6	MISC-CP	ELEC A202B	M1.2A.ii	CP-x-UI IN-5					2/18	See wiring detail	Dry Contact	F301	
UI IN-6	MISC			CGM09090	MS/TP	*	*	UI IN-6		MISC-CP	ELEC A202B	M1.2A.ii	CP-x-UI IN-6									
UI IN-7	MISC			CGM09090	MS/TP	*	*	UI IN-7		MISC-CP	ELEC A202B	M1.2A.ii	CP-x-UI IN-7									
BI IN-1	MISC	SP-GEN-A	Sump Pump Alarm	CGM09090	MS/TP	*	*	BI IN-1	BI-1, BI-C1/2	MISC-CP	ELEC A202B	M1.2A.ii	CP-x-BI IN-1					2/18	See wiring detail	Dry Contact	F301	
BI IN-2	EF-1	EF1-S	Exhaust Fan 1 Status	CGM09090	MS/TP	*	*	BI IN-2	BI-2, BI-C1/2	MISC-CP	ELEC A202B	M1.2A.ii	CP-x-BI IN-2	2/18	OUT, COM	Current Relay	Motor Lead	Motor Lead	See wiring detail	Motor Status (Contact)	F301	
BO OUT-1	EF-1	EF1-C	Exhaust Fan 1 Command	CGM09090	MS/TP	*	*	BO OUT-1	BO-1, 24V COM	MISC-CP	ELEC A202B	M1.2A.ii	CP-x-BO OUT-1	2/18	COIL-,COIL+	Relay	COM, NO	2/18	See wiring detail	VFD (w/o Safety) (Sw Hi, EXT)	F1043A	
BO OUT-2	MISC			CGM09090	MS/TP	*	*	BO OUT-2		MISC-CP	ELEC A202B	M1.2A.ii	CP-x-BO OUT-2									
BO OUT-3	MISC			CGM09090	MS/TP	*	*	BO OUT-3		MISC-CP	ELEC A202B	M1.2A.ii	CP-x-BO OUT-3									
CO OUT-1	EF-1	EF1-O	Exhaust Fan 1 Output	CGM09090	MS/TP	*	*	CO OUT-1	CO-1, CO-C1	MISC-CP	ELEC A202B	M1.2A.ii	CP-x-CO OUT-1					2/18	See VFD Detail	VFD Speed Control (Vdc)	F1043A	
CO OUT-2	MISC			CGM09090	MS/TP	*	*	CO OUT-2		MISC-CP	ELEC A202B	M1.2A.ii	CP-x-CO OUT-2									
CO OUT-3	MISC			CGM09090	MS/TP	*	*	CO OUT-3		MISC-CP	ELEC A202B	M1.2A.ii	CP-x-CO OUT-3									
CO OUT-4	MISC			CGM09090	MS/TP	*	*	CO OUT-4		MISC-CP	ELEC A202B	M1.2A.ii	CP-x-CO OUT-4									
AO OUT-1	MISC			CGM09090	MS/TP	*	*	AO OUT-1		MISC-CP	ELEC A202B	M1.2A.ii	CP-x-AO OUT-1									
AO OUT-2	MISC			CGM09090	MS/TP	*	*	AO OUT-2		MISC-CP	ELEC A202B	M1.2A.ii	CP-x-AO OUT-2									
	MISC			XPM09090						MISC-CP	ELEC A202B	M1.2A.ii										Power to Controller
	MISC			XPM09090	SA Bus	*	4			MISC-CP	ELEC A202B	M1.2A.ii										BacNet SA Bus
UI IN-1	MISC	REFRI-T	Kitchen Refrigerator Temperature	XPM09090	SA Bus	*	4	UI IN-1	UI-1, UI-C1/2	MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-UI IN-1					2/18	2-Wire	TE	F131	
UI IN-2	MISC	FREEZER-T	Kitchen Freezer Temperature	XPM09090	SA Bus	*	4	UI IN-2	UI-2, UI-C1/2	MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-UI IN-2					2/18	2-Wire	TE	F131	
UI IN-3	MISC	HWC1-T	Domestic Hot Water Recirculating Temperature 1	XPM09090	SA Bus	*	4	UI IN-3	UI-3, UI-C3/4	MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-UI IN-3					2/18	2-Wire	TE	F131	
UI IN-4	MISC	HWC2-T	Domestic Hot Water Recirculating Temperature 2	XPM09090	SA Bus	*	4	UI IN-4	UI-4, UI-C3/4	MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-UI IN-4					2/18	2-Wire	TE	F131	
UI IN-5	MISC	HWC3-T	Domestic Hot Water Recirculating Temperature 3	XPM09090	SA Bus	*	4	UI IN-5	UI-5, UI-C5/6	MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-UI IN-5					2/18	2-Wire	TE	F131	
UI IN-6	MISC			XPM09090	SA Bus	*	4	UI IN-6		MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-UI IN-6									
UI IN-7	MISC	RP1-S	Domestic Recirculator Pump 1 Status	XPM09090	SA Bus	*	4	UI IN-7	UI-7, UI-C7	MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-UI IN-7	2/18	OUT, COM	Current Relay	Motor Lead	Motor Lead	See wiring detail	Motor Status (Contact)	F301	
BI IN-1	MISC	RP2-S	Domestic Recirculator Pump 2 Status	XPM09090	SA Bus	*	4	BI IN-1	BI-1, BI-C1/2	MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-BI IN-1	2/18	OUT, COM	Current Relay	Motor Lead	Motor Lead	See wiring detail	Motor Status (Contact)	F301	
BI IN-2	MISC	RP3-S	Domestic Recirculator Pump 3 Status	XPM09090	SA Bus	*	4	BI IN-2	BI-2, BI-C1/2	MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-BI IN-2	2/18	OUT, COM	Current Relay	Motor Lead	Motor Lead	See wiring detail	Motor Status (Contact)	F301	
BO OUT-1	MISC			XPM09090	SA Bus	*	4	BO OUT-1		MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-BO OUT-1									
BO OUT-2	MISC			XPM09090	SA Bus	*	4	BO OUT-2		MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-BO OUT-2									
BO OUT-3	MISC			XPM09090	SA Bus	*	4	BO OUT-3		MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-BO OUT-3									
CO OUT-1	MISC			XPM09090	SA Bus	*	4	CO OUT-1		MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-CO OUT-1									
CO OUT-2	MISC			XPM09090	SA Bus	*	4	CO OUT-2		MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-CO OUT-2									
CO OUT-3	MISC			XPM09090	SA Bus	*	4	CO OUT-3		MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-CO OUT-3									
CO OUT-4	MISC			XPM09090	SA Bus	*	4	CO OUT-4		MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-CO OUT-4									
AO OUT-1	MISC			XPM09090	SA Bus	*	4	AO OUT-1		MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-AO OUT-1									
AO OUT-2	MISC			XPM09090	SA Bus	*	4	AO OUT-2		MISC-CP	ELEC A202B	M1.2A.ii	*-CP-4-AO OUT-2									
NOTE-1: (*) REFER NETWORK RISER FOR MSTP TRUNK NUMBER AND ADDRESS.																						

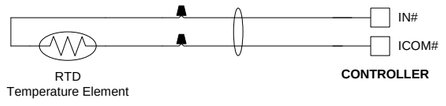
DETAIL F1043A — VFD without Safeties Wiring



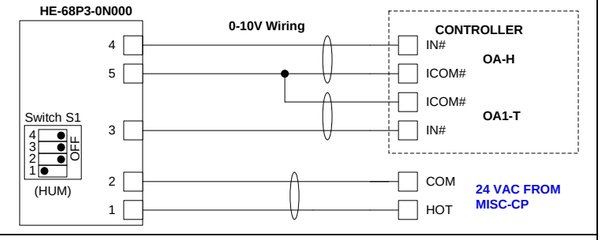
DETAIL F106 — CURRENT INPUT - INTERNAL SOURCE (2 Wire)



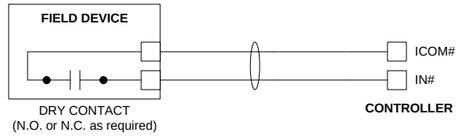
DETAIL F131 — TEMPERATURE SENSOR INPUT



DETAIL F159 — HE-68P3-0N000 Outdoor Temperature & Humidity Sensor



DETAIL F301 — BINARY INPUT (DRY CONTACT)



Drawing Title

MISC-CP POINT SCHEDULE

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

Sales Engineer	Project Manager	Application Engineer	DRAWN		APPROVED	
AB	MR	SN	BY	DATE	BY	DATE

Project Title

1500 NY-9D Wappingers Dutchess Stadium

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CONTRACT NUMBER

3N62-0027

DRAWING NUMBER

05.03.03

Space Information			Network / Equipment Tree Information					Network Information (MSTP and IP)			Definitions and Templates	Sensor	Parameters									
Site/Building/Floor (Required)	Room Number (Optional)	Leaf Space (e.g. Room) (Required)	Equipment Name (Required)	Mechanical Drawing	Served By Equipment Name (Optional)	JCI Ctrl Dwg No.	Controller Part # (Optional)	Engine Name (Required)	Trunk Name (Required)	JCI MAC Address	Controller Template Name (Required)	Code No.	Box Heat	Supplemental Heat	Box Manufacturer	Inlet Size (inches)	SA-AREA	SA-KFACTOR	CLG-MAXFLOW	CLGOCC-MINFLOW	HTGOCC-MINFLOW	Comments
DOAS/AHU																						
Dutchess Stadium Left Field Clubhouse / Level 1	A204	KITCHEN	DOAS-K	M1.1A.ii	-	02.03.01	3RD PARTY	SNE-1	FC-A	6	DOAS-K	-	-	-	-	-	-	-	3600	-	-	
Dutchess Stadium Left Field Clubhouse / Level 1	A109, A108, A109A, A109B, A104, A102, A103, A105,A101	LOCKER, LOUNGE, SHOWER, TOILET, COACHES LOCKER, FEMALE LOCKER, FEMALE TLT, SHOWER, LOBBY	DOAS-L	M1.1A.ii	-	02.04.01	3RD PARTY	SNE-1	FC-A	4	DOAS-L	-	-	-	-	-	-	-	3270	-	-	
Dutchess Stadium Left Field Clubhouse / Level 1	A203, C201, C202R	CLUB, CORRIDOR	AHU-H	M1.1A.ii	-	02.01.01	3RD PARTY	SNE-1	FC-A	7	AHU-H	-	-	-	-	-	-	-	9700	-	-	
Dutchess Stadium Left Field Clubhouse / Level 1	A112, A111, A118, C101	WEIGHT ROOM, SPORTS MED, LAUNDRY, CIRCULATION	AHU-W	M1.1A.ii	-	02.02.01	3RD PARTY	SNE-1	FC-A	5	AHU-W	-	-	-	-	-	-	-	2720	-	-	
VAV BOXES																						
Dutchess Stadium Left Field Clubhouse / Level 1	A111B	OFFICE	TB-A111B	M1.1A.ii	AHU-W	03.01.01	M4-CVM03050-0	SNE-1	FC-1	15	VAV w HTG	NSB8BTN140-0	YES	NO	Trane	6	0.35	2.65	500	90	90	
Dutchess Stadium Left Field Clubhouse / Level 1	A106	MANAGER	TB-A106	M1.1A.ii	DOAS-L	03.01.01	M4-CVM03050-0	SNE-1	FC-1	16	VAV w HTG	NSB8BTN140-0	YES	NO	Trane	6	0.20	3.08	500	90	90	
EXHAUST FANS																						
Dutchess Stadium Left Field Clubhouse / Level 2	A202A	CUST	EF-A202A	M1.2A.ii	-	04.01.01	RIBTW2401B-BC	SNE-1	FC-A	18	EF	-	-	-	-	-	-	-	75	-	-	
Dutchess Stadium Left Field Clubhouse / Level 2	A253	MECH	EF-A253	M1.2A.ii	-	04.01.01	RIBTW2401B-BC	SNE-1	FC-A	17	EF	-	-	-	-	-	-	-	125	-	-	
Dutchess Stadium Left Field Clubhouse / Level 2	A204	KITCHEN	EF-1	M1.2A.ii	-	04.02.01	-	-	-	-	KITCHEN EXHAUST FAN	-	-	-	-	-	-	-	3992	-	-	
DUCTLESS SPLIT SYSTEM																						
Dutchess Stadium Left Field Clubhouse / Level 1	A114	HAWK EYE	IU-A114	M1.1A.ii	OU-A114	05.02.01	3RD PARTY	SNE-1	FC-A	10	DUCTLESS SPLIT SYSTEM	-	-	-	-	-	-	-	920	-	-	
Dutchess Stadium Left Field Clubhouse / Level 1	A115	VIDEO	IU-A115	M1.1A.ii	OU-A115	05.02.01	3RD PARTY	SNE-1	FC-A	9	DUCTLESS SPLIT SYSTEM	-	-	-	-	-	-	-	1200	-	-	
Dutchess Stadium Left Field Clubhouse / Level 1	A116B	AV	IU-A116B	M1.1A.ii	OU-A116B	05.02.01	3RD PARTY	SNE-1	FC-A	11	DUCTLESS SPLIT SYSTEM	-	-	-	-	-	-	-	920	-	-	
Dutchess Stadium Left Field Clubhouse / Level 1	A119B	TELECOM	IU-A119B	M1.1A.ii	OU-A119B	05.02.01	3RD PARTY	SNE-1	FC-A	14	DUCTLESS SPLIT SYSTEM	-	-	-	-	-	-	-	920	-	-	
Dutchess Stadium Left Field Clubhouse / Level 1	A119C	ELECTRICAL ROOM	IU-A119C	M1.1A.ii	OU-A119C	05.02.01	3RD PARTY	SNE-1	FC-A	12	DUCTLESS SPLIT SYSTEM	-	-	-	-	-	-	-	920	-	-	
SPLIT SYSTEM AIR HANDLER																						
Dutchess Stadium Left Field Clubhouse / Level 1	A117	BATTING TUNNEL	IU-A117	M1.1A.ii	OU-A117	05.01.01	3RD PARTY	SNE-1	FC-A	8	SPLIT SYSTEM AIR HANDLER	-	-	-	-	-	-	-	2730	-	-	
MISC SYSTEM																						
Dutchess Stadium Left Field Clubhouse / Level 1	A119C	ELEC	LIGHTING CONTROL PANEL-1	M1.2A.ii	-	05.03.01	3RD PARTY	SNE-1	FC-A	13	MISC		-	-	-	-	-	-	-	-	-	
Dutchess Stadium Left Field Clubhouse / Level 1	A166	ELEV	SP-A166	P1.1A.ii	-	05.03.01	-	-	-	-	MISC		-	-	-	-	-	-	-	-	-	
Dutchess Stadium Left Field Clubhouse / Level 1	A119	BLDG SERVICES	RP-1	P5.1.ii	-	05.03.01	-	-	-	-	MISC		-	-	-	-	-	-	-	-	-	
Dutchess Stadium Left Field Clubhouse / Level 2	A202B	ELEC	LIGHTING CONTROL PANEL-2	M1.2A.ii	-	05.03.01	3RD PARTY	SNE-1	FC-A	19	MISC		-	-	-	-	-	-	-	-	-	
Dutchess Stadium Left Field Clubhouse / Level 2	A202C	STORAGE	RP-2	P5.2.ii	-	05.03.01	-	-	-	-	MISC		-	-	-	-	-	-	-	-	-	
Dutchess Stadium Left Field Clubhouse / Level 2	A253	MECH	RP-3	P5.2.ii	-	05.03.01	-	-	-	-	MISC		-	-	-	-	-	-	-	-	-	
Dutchess Stadium Left Field Clubhouse / Level 2	A202B	ELEC	MISC-CP	M1.2A.ii	-	05.03.01	M4-CGM09090-0	SNE-1	FC-A	20	MISC	-	-	-	-	-	-	-	-	-	-	

CSDSC Current Switch Devices Catalog Page

LIT-1901029

2020-11-10

Description

The Current Switch Devices Self-Calibrating (CSDSC) Series of Current Switch Devices provide reliable verification of electrical equipment operation in a variety of applications, including fans and pumps. CSDSC current switch devices use asingle-turn dial to select motor full load amps, eliminating the need for live calibration and significantly reducing installation time compared to traditional current switches.

CSDSC switches use full load amps instead of horsepower, eliminating the need for separate part numbers as a function of line voltage. CSDSC current switches are installed when the panel is de-energized. The ability to preset the sensor eliminates the need for Personal Protective Equipment (PPE) that is required by OSHA when working with a live panel.

Refer to the *CSDSC and CSDECM Current Switch Devices Product Bulletin (LIT-12012403)* for important product application information.

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Features

- **Split and Solid Core Models withMini-Sized Variants—**Fit in tight enclosures.
- **Monitored Load**—Supplies power without a power supply.
- **Optional N.O. Relay—**Adds 10 A at125 VAC switching power with a choice of 24 or 12 V coil.
- **Polarity Insensitive Output—**Provides easier wiring.
- **Low Turn on Current—**Extends use to sub-fractional HP motors.
- **LED Indication of Switch Status—**Allows you to easily check the switch's on/off status.

Table 1: Selection Chart

Code Number	Core Type	Minimum Turn- On Amps	Maximum Amps	LEDs	Relay Option
CSDSC-C45050Lx	Clamp	0.45 A	50 A	High, Low, Power	Yes[1]
CSDSC-C50100Lx		0.50 A	100 A		
CSDSC-C50150Lx			150 A		
CSDSCM-C01050		1.00 A	50 A	Trip	No
CSDSCM-S75050L	Solid	0.75 A	50 A	Trip	No
CSDSCM-S75005L					
CSDSCMM-S75050L					

1 See Table 2 for relay order code information.

Table 2: Relay Options

Relay Order Code	Contact Rating	Coil	Relay Code Number (Field Accessory)	Relay Dimensions, in. (mm) (L x H x W)
1	N.O. 10 A at 125 VAC	24 VAC/VDC 15 mA	CRCSDP-NO-24	0.84 x 0.72 x 2.06 (21.3 x 18.3 x 52.3)
2			CRCSDP-NC-24	
3		12 VDC 30 mA	CRCSDP-NO-12	
4			CRCSDP-NC-12	
0	No Relay	N/A	N/A	N/A

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Technical Specifications

Table 3: CSDSC Current Switch Devices technical specifications

		CSDSC-C45050LxCSDSC-C50100LxCSDSC-C50150Lx	CSDSCM-C01050	CSDSC-S75050L	CSDSCM-S75005LCSDSCM-S75050L
Status Output		Switch normally open			
Switch Load Capacity		1.0 at 30 VAC/VDC			
Switch Setpoint		Adjustable			
Maximum Current		50 A100 A150 A	50 A	50 A	5 A50 A
Minimum Trip Setpoint Value		0.5 A0.50 A0.50 A	1.00 A	0.75 A	0.75 A0.75 A
Aperture (Sensing Hole) Size; Dimensions, in. (mm)		0.75 x 0.75 (19.1 x 19.1)	0.4 x 0.32 (10.2 x 8.1 mm)	0.51 (13.0)	0.30 (7.6)
Switch LED Indication		Yes			
Current Switching Mode		Over/Under			
Sensor Supply Voltage		Induced from power conductor cable			
Status Output Wire Size		14 to 24 AWG (1.6 to 0.5 mm)			
Screw Torque		3.5 to 4.4 in·lb (0.4 to 0.5 N·m)			
Isolation Voltage		600 VAC rms (UL), 300 VAC rms (CE)			
Frequency Range		50/60 Hz			
Temperature Range		5 to 140°F (-15 to 60°C)			
Humidity Range		0 to 95% noncondensing			
Dimensions, in. (mm)		2.5 x 0.57 x 2.23(63.5 x 14.5 x 56.6)	2.0 x 0.75 x 1.75 (50.8 x 19.1 x 44.5)	2.26 x 0.97 x 1.6 (57.4 x 24.6 x 40.6)	1.91 x 0.88 x 1.31 (48.5 x 22.4 x 33.3)
Command Relay Device Actuation Coil		20 to 30 VAC/VDC,12 to 20 mA or10 to 14 VAC/VDC,25 to 35 mA (models except -0L0)	N/A	N/A	N/A
Relay Contact Rating		N.O. 10A at 125 VAC or N.C. 10A at 125 VAC	N/A	N/A	N/A
Relay LED Indication		Yes	N/A	N/A	N/A
Compliance	United States	UL Listed, File E493157, CCN NMTR, Under UL 508, Industrial Control Equipment			
	Canada	UL Listed, File E493157, CCN NMTR7, Under CAN/CSA C22.2 No. 14-M91			
CE	Europe	CE Mark - Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and the Low Voltage Directive.			
Shipping Weight		0.15 lb (0.07 kg)			

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

Software terms

Use of the software that is in (or constitutes) this product, or access to the cloud, or hosted services applicable to this product, if any, is subject to applicable end-user license, open-source software information, and other terms set forth at www.johnsoncontrols.com/techterms. Your use of this product constitutes an agreement to such terms.

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Patents

Patents: https://jcipat.com

Single point of contact

APAC	Europe	NA/SA
JOHNSON CONTROLS	JOHNSON CONTROLS	JOHNSON CONTROLS
C/O CONTROLS PRODUCT MANAGEMENT	WESTENDHOF 3	507 E MICHIGAN ST
NO. 32 CHANGJIJANG RD NEW DISTRICT	45143 ESSEN	MILWAUKEE WI 53202
WUXI JIANGSU PROVINCE 214028	GERMANY	USA
CHINA		

Contact information

Contact your local branch office: www.johnsoncontrols.com/locations

Contact Johnson Controls: www.johnsoncontrols.com/contact-us

Connected Workflow Turnkey Panel - Metasys SNE Series Standard Control Panel Assembly Catalog Page

2022-03-08

LIT-1901156

Description

Johnson Controls® is excited to announce a new Connected Workflow Turnkey Panel solution for the Metasys SNE series network engines. Preconfigured for remote commissioning, this high value solution saves time and money as it enables more efficient engineering, project management, commissioning, and customer closeout of projects.

The Connected Workflow Turnkey Panel is a prewired, preassembled standard control panel that contains a next-generation Metasys SNE network engine. It also contains a cell modem and a remote antenna with antenna cables. The control panel is shipped complete, mounted in a NEMA 1 steel enclosure. In addition to the engine, each assembly contains a power supply that incorporates a 5 A circuit breaker, a 96 VA 120/24 VAC transformer, and two 120 VAC outlets. Each panel includes a five port Ethernet switch that supports speeds of 10 Mbps, 100 Mbps, or 1000 Mbps.

Features and benefits

Reduce installation costs

Save the time and related expense of driving to the site with the ability to remotely monitor installations. Commissioning is faster as you can remotely commission multiple sites simultaneously.

Speed time to project completion

Engineering, commissioning, and training resources from all over the globe are able to access the system remotely, which helps complete all tasks on or before the substantial completion date.

Promote convenience and safety

Remote commissioning supports social distancing as necessary. Contractors can also access the site remotely with a mobile device.

Increase customer satisfaction

As the temporary construction server is separate from the production server, you can work through any system commissioning and quality issues without the customer seeing nuisance alarms and events.

Preconfigured engine and cellular modem

The repair center preconfigures the engine and cell modem to eliminate risk. When you order, you receive an email that requests the site's name, IP address, and cell service provider.

Repair information

If the SNE Standard Control Panel Assembly fails to operate within its specifications, replace the unit. For a replacement assembly, contact the nearest Johnson Controls representative.

Selection charts

Table 1: Components included with the SNE Series Standard Control Panel Assembly

Quantity	Description
1	NEMA1 metal enclosure
1	M4-SNE10502-0, M4-SNE11002-0, or M4-SNE22002-0 network engine
1	96 VA 120/24 VAC power supply with 5 A primary circuit protection and two 120 VAC outlets
1	5 port Ethernet switch, 10 Mbps, 100 Mbps, or 1000 Mbps
1	Cellular Modem with a remote antenna and two antenna cables

Table 2: Panels — 20 x 24 NEMA 1 enclosure

Product code number	Description
CWPNLSNE1050-0	M4-SNE10502-0 engine mounted in a 20 in. W x 24 in. H x 6 in. D enclosure with a cellular modem and one year cell service with VPN included
CWPNLSNE1100-0	M4-SNE11002-0 engine mounted in a 20 in. W x 24 in. H x 6 in. D enclosure with a cellular modem and one year cell service with VPN included
CWPNLSNE2200-0	M4-SNE22002-0 engine mounted in a 20 in. W x 24 in. H x 6 in. D enclosure with a cellular modem and one year cell service with VPN included **Note:** Current engine inventories are used before new engine models are installed.

Ordering information

The Johnson Controls Repair Center will request the following information by email when a customer places an order for a Connected Workflow Turnkey panel:

- Johnson Controls project lead
- Preferred name for the ADX server
- Preferred name for the engine
- Number of engines that connect through the same cell modem
- Preferred cell carrier

Technical specifications

Table 3: Technical specifications

Specification	Description
Enclosure rating	NEMA 1
Enclosure finish	ANSI 61 gray polyester powder coating: perforated panel and enclosure
Ambient operating condition	32°F to 122°F (0°C to 50°C) 10% to 90% RH 86°F (30°C) maximum dew point conditions
Dimensions (H x W x D)	24 in. x 20 in. x 6 in. (610 mm x 508 mm x 152 mm)

Table 3: Technical specifications

Specification	Description
Ambient storage condition	5% to 95% RH 86°F (30°C) maximum dew point conditions
Agency compliance	Control Panel: UL 508A Rated (cULus listed); Enclosure UL 50 Rated, cUL-CAN/CSA C22.2 No. 14-05
Warranty	Johnson Controls offers a one year warranty on the cell modem to match the cellular service term. Standard Johnson Controls warranty on parts is three years.

Patents

Patents: https://jcipat.com

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

Single point of contact

APAC	EU	UK	NA/SA
JOHNSON CONTROLS C/O CONTROLS PRODUCT MANAGEMENT NO. 32 CHANGJIANG RD NEW DISTRICT WUXI JIANGSU PROVINCE 214028 CHINA	JOHNSON CONTROLS VOLTAWEG 20 6101 XK ECHT THE NETHERLANDS	JOHNSON CONTROLS TYCO PARK GRIMSHAW LANE MANCHESTER M40 2WL UNITED KINGDOM	JOHNSON CONTROLS 5757 N GREEN BAY AVE. GLENDALE, WI 53209 USA

Contact information

Contact your local branch office:
www.johnsoncontrols.com/locations

Contact Johnson Controls:
www.johnsoncontrols.com/contact-us

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M4-SNE Catalog Page

2022-05-05 LIT-1901126 Release 12.0

Introduction

The SNE Series of Network Engines is a new family of Metasys network engines. Network engines are Ethernet-based, supervisory engines that connect BAS networks to IP networks. The SNE network engines succeed the NAE Series of network engines to further the expansion and enhancement of Metasys supervisory control capabilities.

The SNE Series of network engines performs a key role in the Metasys system architecture. They provide network management and system-wide control coordination over one or more networks of equipment controllers, including the following Metasys controllers:

- CG series general purpose equipment controllers
- CV series VAV box controllers
- FEC and FAC series field equipment controllers
- VMA series VAV box controllers
- TEC series terminal equipment controllers
- LN series equipment controllers
- Third-party equipment controllers

These devices monitor and control networks of field-level building automation devices, including HVAC equipment, lighting, security, and fire safety equipment. Among a wide host of features, network engines provide building control scheduling, alarm and event management, energy management, data exchange, historical data storage and management, and custom control logic.

Network engines include an embedded user interface called the Site Management Portal (SMP) that provides system navigation and operation using web browser connections. Password protection, permission access control, and IT security best practices secure network engines from unauthorized access.

In addition to providing general comprehensive equipment monitoring and control, network engines also offer specialized capabilities by series and model to meet a variety of application requirements. These models are available (where x = 0,1, or 2):

- **SNE2200x-0**: succeeds NAE55 Series of network engines.
- **SNE1100x-0**: succeeds NAE45 Series of network engines.
- **SNE1050x-0**: succeeds NAE35 Series of network engines.
- **SNE110Lx-0**: succeeds NAE45-Lite Series of network engines.

Application documentation

Refer to the *SNE/SNC Product Bulletin (LIT-12013296)* for important product application information. In addition, refer to the *Metasys for Validated Environments, Extended Architecture Product Bulletin (LIT-12011326)* for information about which network engines are validated for use at facilities that require regulatory compliance.

Features and Benefits

Multiple models available

Multiple models are available with varying device capacities for integrations that meet the intended application.

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Linux® operating system

The SNE runs on Linux, which is a robust, widely-accepted, and readily-supporting operating system.

User interface

You use the Site Management Portal (SMP) user interface to access system data in the network engines from any supported web browser device connected to the network, including remote users connected by Virtual Private Network (VPN).

Encrypted Communications

All SNE network engines have self-signed certificates that provide for encrypted communication. Optionally, you can deploy trusted certificates from the customer's IT department or from a Certificate Authority (CA).

FIPS compliance

All SNEs that run Release 11.0 firmware or later include the FIPS 140-2 feature that provides FIPS compliance and is certified by NIST. The FIPS 140-2 standard is an information technology security approval program for cryptographic modules produced by private sector vendors who seek to have their products certified for use in government departments and regulated industries. For a site to be fully FIPS compliant and certified, you need to upgrade all network engines to Release 11.0, then install and license the FIPS 140-2 feature on the Metasys Server. Additionally at Release 11.0, the SNEs are FIPS 140-2 validated.

Memory

The SNE has 2 GB RAM and 16 GB Flash non-volatile memory. This memory provides capacity for further upgrades and a longer operational life.

Background file transfer

You can transfer files such as firmware upgrades, archive databases, and security databases from the SCT to the SNE while the engine remains operational, minimizing system disruptions.

Device security

Device integrity is ensured while the system is rebooting and during normal operation. Embedded technology provides trusted boot operation, firmware protection, secure storage, secure communications, and secure firmware updates complying with strong cyber security practices.

Smaller, modularized packaging

The size of the SNE is much smaller in comparison to the NAE. This smaller size reduces the amount of space you need for mounting, and can potentially reduce the size and cost of control panels.

Diagnostic multi-color LEDs

The use of multi-color LEDs can decrease installation and troubleshooting time.

Removable terminal blocks

The use of removable terminal blocks facilitates ease in installation and servicing.

Support for different site directors

The SNE can act as a site director for small sites and also communicate as a child engine to a wide variety of site director types for medium and large sites, including the NAE85/LCS85 software engines and the ADS, ADX, and OAS series application servers. The ADS-Lite-A (Asia) and ADS-Lite-E (Europe) site directors are supported for select regions only.

Supervision of controller networks including Johnson Controls devices and third-party protocol devices

Supports connectivity to open network standards for complete flexibility in the selection of field devices. They include BACnet/IP, BACnet/SC, BACnet MS/TP, N2 Bus, LonWorks, Modbus TCP/IP, Modbus RTU, M-Bus, KNX, Zettler Fire Panel, Tyco C•CURE, victor, OPC Unified Architecture (UA), and other third-party protocols.

MQTT Integration Driver

The MQTT driver supports bidirectional communication between the SNE and a generic MQTT broker, providing an option to exchange Metasys data with popular IoT platforms and applications.

No battery

The SNE uses a supercapacitor, not a battery, to provide temporary power for data backups during shutdown due to AC power loss. This design is more environmentally friendly and saves the eventual cost of replacing the battery. When the supercapacitor is fully charged, the SNE can maintain the real time clock for up to 72 hours during AC power loss.

BACnet/SC

BACnet Secure Connect (BACnet/SC) is a recent update to the BACnet interoperability standard aimed at improving cybersecurity and network infrastructure integrity. BACnet/SC identifies a secure, encrypted datalink layer specifically designed to meet the requirements, policies, and constraints of IP networking infrastructures.

SNE capabilities

Table 1: SNE series network engine details: SNE2200x, SNE1100x, SNE1050x, SNE110Lx

Features	SNE2200x	SNE1100x	SNE1050x	SNE110Lx[1]
Succeeds	NAE55 Series	NAE45 Series	NAE35 Series	NAE45-Lite
Communication interfaces	• 1 Ethernet port • 2 RS-485 ports • 2 USB ports[2]	• 1 Ethernet port • 1 RS-485 port • 2 USB ports[2]		
Maximum number of child engines when acting as a Site Director	3	2	2	0
Maximum allowed devices across all integrations. For example, MS/TP +IP. Includes VND integrations and devices brought in through routers.	600	150	60	110
BACnet/IP maximum trunks	1	1	1	1
BACnet/IP maximum devices per trunk	200	100	50	10
BACnet/SC maximum trunks	1	1	1	1
BACnet/SC maximum devices per trunk	150	100	50	10
BACnet MS/TP maximum trunks	2	1	1	1
BACnet MS/TP maximum devices per trunk (Johnson Controls devices only) ⓘ **Note:** A repeater is required if more than 50 Johnson Controls devices are on the same trunk.	100	100	50	100

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Table 1: SNE series network engine details: SNE2200x, SNE1100x, SNE1050x, SNE110Lx

Features	SNE2200x	SNE1100x	SNE1050x	SNE110Lx[1]
BACnet MS/TP maximum devices per trunk (with third party) ⓘ **Note:** A repeater is required if more than 32 devices are on the same trunk and some are third party.	64	64	50	64
N2 maximum trunks	2	1	1	N/A
Mapped N2 devices per trunk ⓘ **Note:** A repeater is required if more than 50 devices are on the same trunk.	100	100	50	N/A
LonWorks maximum trunks	1	1	1	N/A
LonWorks maximum devices	255	127	60	N/A
Remote Field Bus maximum trunks	6	3	3	N/A
Remote Field Bus maximum Johnson Controls Devices per bus	32	32	32	N/A
Remote Field Bus maximum devices per bus (with third-party devices)	16	16	16	N/A
Maximum objects in device[3]	5000	2500	2500	2500
Supported type of parent server	• ADS • ADX • OAS	• ADS • ADX • ADS-Lite-E • OAS	• ADS • ADX • ADS-Lite-E • OAS	ADS-Lite-A only

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Table 1: SNE series network engine details: SNE2200x, SNE1100x, SNE1050x, SNE110Lx

Features	SNE2200x	SNE1100x	SNE1050x	SNE110Lx[1]
Supported integrations	• BACnet/SC • BACnet/IP - Simplex® Fire Alarm Control Unit (FACU) - Cree® SmartCast® Lighting Control - Molex® Lighting Control • BACnet MS/TP Field Controller (FC) Bus • N2 Bus ⓘ **Note:** The M4-SNE110Lx-0 model does not support the N2 Bus. • LonWorks® (requires USB to LON adapter) ⓘ **Note:** The M4-SNE110Lx-0 model does not support the LonWorks network interface. • Modbus: Modbus TCP/IP on Ethernet and Modbus Remote Terminal Unit on RS-485 • KNX IP • M-Bus • Tyco® C•CURE® 9000 and victor® Video Management • Zettler® Fire Panel • OPC Unified Architecture (OPCUA/UA) • MQ Telemetry Transport (MQTT)			
Operating System	Wind River® Linux LTS 17 (LTS=long-term support)			
Microprocessor	NXP i.MX6 DualLite processor			
Memory	Flash 2GB of DDR3 RAM and 16 GB of eMMC Flash			
User Interface	Site Management Portal (SMP)			

1 These models are intended for use with the ADS-Lite-A servers (only) in Australia, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Singapore, Taiwan, Thailand, Vietnam, and select branches within regions of Africa and the Middle East.
2 Only the supported USB integration adapters function with the SNE. Other integration adapters that are not supported cannot function with the SNE.
3 Suggested object limit for performance considerations.

Ordering Information for SNE models

The SNE models listed in the following tables are also available as reconditioned models. To order a reconditioned version, add an **R** after the product code number.

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Table 2: SNE ordering information

Product code number	Description
M4-SNExxxxx-xxx (base features of each SNE)	SNE Supervisory Network Engine Series Requires a 24 VAC or 24 VDC power supply. Each model includes one Ethernet port, one RS-485 communications port, two standard USB serial ports, and one micro-USB port (future use). **Supported IP integrations**: BACnet/IP, BACnet/SC, Modbus TCP/IP, KNX IP, C-Cure/victor, MQTT, and OPC UA. **Supported field bus integrations**: MS/TP (RS-485) FC Bus, N2 Bus, Modbus RTU, M-Bus, and Zettler
M4-SNE22000-0 (version 1-discontinued) M4-SNE22001-0 (version 2) M4-SNE22002-0 (version 3	Supports two local field bus device integrations with a maximum of 100 devices on each trunk for a maximum of 200 devices per engine if only using the local field buses. The engine supports a total of 600 devices across all integrations. Also includes an RJ-12 connection for the FC Bus. An optional LonWorks adapter can be connected to USB port to add LON communications. Also supports one BACnet/IP device integration.
M4-SNE11000-0 (version 1-discontinued) M4-SNE11001-0 (version 2) M4-SNE11002-0 (version 3)	Supports one local field bus device integration with a maximum of 100 devices on the trunk. An optional LonWorks adapter can be connected to USB port to add LON communications. Also supports one BACnet/IP device integration.
M4-SNE10500-0 (version 1-discontinued) M4-SNE10501-0 (version 2) M4-SNE10502-0 (version 3)	Supports one local field bus device integration with a maximum of 50 devices on the trunk. An optional LonWorks adapter can be connected to USB port to add LON communications. Also supports one BACnet/IP device integration.
M4-SNE110L0-0 (version 1-discontinued) M4-SNE110L1-0 (version 2) M4-SNE110L2-0 (version 3)	Supports one local field bus device integration with a maximum of 100 devices on the trunk. This model is intended for use with Metasys Server Lite (ADS-Lite-A) software in select regions of Australia, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Singapore, Taiwan, Thailand, Vietnam, and select branches. ⓘ **Note:** This model does not support the N2 Bus or LonWorks network interface, but does support one BACnet/IP device integration.

Accessories ordering information

Table 3: SNE accessories ordering information

Product code number or vendor model number	Description
AS-XFR100-1	Power transformer with enclosure, class 2, 24 VAC, 92 VA maximum output.
AS-XFR010-1	Power transformer, no enclosure, class 2, 24 VAC, 92 VA maximum output.
ACC-PWRKIT-1A24	Power supply, desktop kit, 90-264 VAC to 24 VDC, 65 W, includes AC cord with North American Plug.
ACC-PWRKIT-1E24	Power supply, desktop kit, 90-264 VAC to 24 VDC, 65 W, includes AC cord with European Plug.

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Table 3: SNE accessories ordering information

Product code number or vendor model number	Description
ACC-USBLON-0[1]	USB to LonWorks adapter. Includes DIN Rail mounting bracket. Tested and qualified for use on the SNE.
ACC-USBRS232-0	USB to RS232 adapter. Tested and qualified for use with the SNE.
ACC-USBMBUS-0	USB-to-MBus level converter for up to 100 unit loads. Tested and qualified for use with SNC and SNE Supervisory Network Engines.
WRZ Series Wireless Room Sensors	Refer to the *WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653)* for specific sensor model descriptions.
WRZ-7860-0	Receiver for One-to-One Wireless Room Sensing Systems - functions with QRZ Series Sensors room sensors
WRZ-SST-120	Refer to the *WRZ-SST-120 Wireless Sensing System Tool Installation Instructions (LIT-24-10563-55)* for usage instructions.
ZFR-HPSST-0	Wireless System Survey Tool. For use with the higher power WRG1830/ ZFR183x System and lower power WRZ Sensors (10 mW). Refer to the *High Power Wireless Sensing System Tool Installation Instructions (LIT-24-11461-00012)* for usage instructions.
WRG1830/ZFR183x Pro Series Wireless Field Bus System	For more information on products needed for wireless field bus installations and for a list of available products, refer to the *WRG1830/ ZFR183x Pro Series Wireless Field Bus System Catalog Page (LIT-1901153)*.
ZFR-USBHA-0	ZFR USB Dongle provides a wireless connection through CCT to allow wireless commissioning of the wirelessly enabled CGM and CVM controllers. It also allows use of the ZFR Checkout Tool (ZCT) in CCT. ⓘ **Note:** The ZFR-USBHA-0 is not compatible with the WRG1830/ ZFR183x Pro Series. ⓘ **Note:** The ZFR-USBHA-0 replaces the IA OEM DAUBI_2400 ZFR USB dongle. For additional information about the ZFR-USBHA-0 ZFR dongle, refer to the *ZCT Checkout Tool Help LIT-12012292* or the *WNC1800_ZFR182x Pro Series Wireless Field Bus System Technical Bulletin (LIT-12012356)*.

1 Non-qualified adapters do not function in USB ports of the SNE.

Third-party integration accessory ordering information

Table 4: Modbus accessories ordering information

Product code number	Description
IU-9100-8401 (Europe)	RS232-to-RS485 converter, 230 VAC
IU-9100-8404 (Europe) or BM485-CIP (North America)	RS232-to-RS485 converter, 24 VAC
ⓘ **Note:** For the European market, order this accessory in AOMS from the Johnson Controls Essen Distribution Center. For the North American market, order this accessory from duTec (http://www.interfaceconverter.com or 1-800-248-1632); specify vendor #290904.	

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Table 5: M-Bus accessories ordering information

Product Code Number	Description
SIS-MBUSSCLL-0E	M-Bus level converter for up to 100 unit loads; 24 VAC/VDC (RS-232 connection); requires ACC-USBRS232-0 adapter
SIS-MBUSNCLL-1E	M-Bus level converter for up to 100 unit loads; 24 VAC/VDC (IP connection)
SIS-MBUSRPLL-0E	M-Bus repeater for up to 100 unit loads, 24V AC/DC
SIS-MBUSRPLH-0E	M-Bus repeater for up to 100 unit loads; 230 VAC
INT-DX-KAB01	Optional serial connection cable SUB-D to RJ-12 for use with SIS-MBUSSCLL-0E
MR003USB	Mikro-Master USB–to–M-Bus adapter for up to 10 M-Bus devices ⓘ **Note:** Order this accessory directly from the supplier, made by Relay GmbH.
ⓘ **Note:** For the European market, order the SISMBUSxxxx-0E and INT-DX-KAB01 accessories in AOMS from the Johnson Controls European Distribution Center. ⓘ **Note:** Order the MR003USB accessory directly from the supplier, made by Relay GmbH.	

Table 6: KNX accessories ordering information

Product code number	Description
GRIPIN01-S-KNX	KNX IP interface module to connect KNX line through Ethernet to the network engine
GRRIN01-KNX	KNX IP router to connect KNX line through Ethernet to a network engine, including line or area coupler functionality
ⓘ **Note:** For the European market, order these KNX accessories in AOMS from the Johnson Controls European Distribution Center. ⓘ **Note:** When you use the GRIPIN01-S-KNX for SNx integration, use the non-secure mode. Set the Metasys driver to N=ROUTING MODE, and in ETS set the Secure mode to deactivated.	

Technical Specifications

Table 7: SNE2200x network engine

Specification	Description
Power requirement	Dedicated nominal 24 VAC, Class 2 power supply (North America), SELV power supply (Europe), at 50/60 Hz (20 VAC minimum to 30 VAC maximum) Alternate: Dedicated nominal 24 VDC, Class II power supply input; North America: ACC-PWRKIT-1A24; Europe: ACC-PWRKIT-1E24
Power consumption	38 VA maximum
Operating System	Wind River® Linux LTS 17 (LTS=long-term support)
Processor	NXP i.MX6 DualLite processor, dual core Cortex-A9 processor at 1.0 GHz with 512 KB of L2 cache
Memory	16 GB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 2 GB SDRAM for operations data dynamic memory
Supported integrations	BACnet/IP, BACnet/SC, BACnet MS/TP, N2 Bus, LonWorks, Modbus, KNX, M-Bus, Zettler Fire, MQ Telemetry Transport (MQTT),OPC UA Tyco C•CURE 9000-victor video management, Simplex FACU, Molex Lighting Control, Cree SmartCast Lighting Control

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Table 7: SNE2200x network engine

Specification	Description
Network and Serial interfaces	One Ethernet port; 1000/100/10 Mbps; 8-pin RJ45 connector Two FC ports (RJ12 6-pin port; connects with 1.5 m [4.9 ft] RJ12 field bus cable) Two optically isolated RS-485 ports; with a removable 4-pin terminal block Three USB ports (one Micro-B port, and two USB A ports). All support USB 2.0 and Open Host Controller Interface [Open HCI] specification; Micro-USB port currently inactive
Transmission speeds	Ethernet communication: 100 or 10 Mbps The network engine can reside and interoperate on a 1 Gbps network, but does not itself transmit at 1 Gbps. Optically isolated, serial communication (FC Bus): 76,800, 38,400, 19,200, 9600, or 1200 bps (selectable)
Ambient temperature conditions	**Operating**: 0°C to 50°C (32°F to 122°F) **Non-Operating**: -40°C to 70°C (-40°F to 158°F)
Ambient humidity conditions	**Storage**: 5% to 95% RH, 30°C (86°F) maximum dew point conditions **Operating**: 10% to 90% RH, 30°C (86°F) maximum dew point conditions
Housing	Black Polycarbonate and Acrylonitrile butadiene styrene (ABS) blend IP protection class: IP20 UL flammability rating: UL94-5VB
Mounting	On flat surface with screws on three mounting clips or a single 35 mm DIN rail
Dimensions (Height x Width x Depth)	190 mm x 125 mm x 44.5 mm (7.48 in. x 4.92 in. x 1.75 in.)
Weight	0.387 kg (0.852 lbs)
Compliance	**United States:** UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A, Conformance to FIPS 140-2 Level 1 and validated under NIST Certificate #3389.
	Canada: UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003
CE	**Europe:** CE Mark – Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	Australia and New Zealand: RCM Mark, Australia/NZ Emissions Compliant
	BACnet International: BTL 135-2020 Listed B-BC/B-RTR/B-BBMD, Protocol Revision 18
	FIPS 140-2 Level 1: Compliant and certified with Federal Information Processing Standard; https://csrc.nist.gov/Projects/cryptographic-module-validation-program/Certificate/3389
UK CA	**United Kingdom:** Johnson Controls declares that this product is in compliance with Electromagnetic Compatibility Regulations, The Electrical Equipment (Safety) Regulations, and Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations.

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Table 8: SNE1100x, SNE1050x, and SNE110Lx network engines

Specification	Description
Power requirement	Dedicated nominal 24 VAC, Class 2 power supply (North America), SELV power supply (Europe), at 50/60 Hz (20 VAC minimum to 30 VAC maximum) Alternate: Dedicated nominal 24 VDC, Class II power supply input; North America: ACC-PWRKIT-1A24; Europe: ACC-PWRKIT-1E24
Power consumption	38 VA maximum
Operating System	Wind River® Linux LTS 17 (LTS=long-term support)
Processor	NXP i.MX6 DualLite processor, dual core Cortex-A9 processor at 1.0 GHz with 512 KB of L2 cache
Memory	16 GB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 2 GB SDRAM for operations data dynamic memory
Supported integrations	BACnet/IP, BACnet/SC, BACnet MS/TP, N2 Bus, LonWorks, Modbus, KNX, M-Bus, Zettler Fire, MQ Telemetry Transport (MQTT), OPC UA Tyco C•CURE 9000-victor video management, Simplex FACU, Molex Lighting Control, Cree SmartCast Lighting Control ⓘ **Note:** The SNE110Lx model supports one IP device integration, but does **not** support the N2 Bus or LonWorks network interface.
Network and Serial interfaces	One Ethernet port; 1000/100/10 Mbps; 8-pin RJ45 connector One FC port (RJ12 6-pin port; connects with 1.5 m [4.9 ft] RJ-12 field bus cable) One optically isolated RS-485 port; with a removable 4-pin terminal block Three USB ports (one Micro-B port, and two USB A ports). All support USB 2.0 and Open Host Controller Interface [Open HCI] specification; Micro-USB port currently inactive
Transmission speeds	Ethernet communication: 100 or 10 Mbps The network engine resides and interoperates on a 1 Gbps network, but does not itself transmit at 1 Gbps. Optically isolated, serial communication (FC Bus): 76,800, 38,400, 19,200, 9600, or 1200 bps (selectable)
Ambient temperature conditions	**Operating**: 0°C to 50°C (32°F to 122°F) **Non-Operating**: -40°C to 70°C (-40°F to 158°F)
Ambient humidity conditions	**Storage**: 5% to 95% RH, 30°C (86°F) maximum dew point conditions **Operating**: 10% to 90% RH, 30°C (86°F) maximum dew point conditions
Housing	Black Polycarbonate and Acrylonitrile butadiene styrene (ABS) blend
Mounting	On flat surface with screws on three mounting clips or a single 35 mm DIN rail
Dimensions (Height x Width x Depth)	190 mm x 125 mm x 45.5 mm (7.48 in. x 4.92 in. x 1.75 in.)
Weight	0.387 kg (0.852 lbs)
Compliance	**United States:** UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A
	Canada: UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003
CE	**Europe:** CE Mark – Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	Australia and New Zealand: RCM Mark, Australia/NZ Emissions Compliant

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Table 8: SNE1100x, SNE1050x, and SNE110Lx network engines

Specification	Description
	BACnet International: BTL 135-2020 Listed B-BC/B-RTR/B-BBMD, Protocol Revision 18
	FIPS 140-2 Level 1: Compliant and certified with Federal Information Processing Standard; https://csrc.nist.gov/Projects/cryptographic-module-validation-program/Certificate/3389
UK CA	**United Kingdom:** Johnson Controls declares that this product is in compliance with Electromagnetic Compatibility Regulations, The Electrical Equipment (Safety) Regulations, and Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations.

North American emissions compliance

United States

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

Warning (Part 15.21)

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Canada

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

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

Industry Canada Statement(s)

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage, et
2. L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Repair information

If the SNE fails to operate within its specifications, replace the unit. For a replacement SNE, contact the nearest Johnson Controls® representative.

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

Software terms

Use of the software that is in (or constitutes) this product, or access to the cloud, or hosted services applicable to this product, if any, is subject to applicable end-user license, open-source software information, and other terms set forth at www.johnsoncontrols.com/techterms. Your use of this product constitutes an agreement to such terms.

Patents

Patents: https://jcipat.com

Single point of contact

APAC	EU	UK	NA/SA
JOHNSON CONTROLS C/O CONTROLS PRODUCT MANAGEMENT NO. 32 CHANGJIANG RD NEW DISTRICT WUXI JIANGSU PROVINCE 214028 CHINA	JOHNSON CONTROLS VOLTAWEG 20 6101 XK ECHT THE NETHERLANDS	JOHNSON CONTROLS TYCO PARK GRIMSHAW LANE MANCHESTER M40 2WL UNITED KINGDOM	JOHNSON CONTROLS 5757 N GREEN BAY AVE. GLENDALE, WI 53209 USA

Contact information

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Low Differential Pressure Transducer DP140 Series Product Bulletin

LIT-12013727

2023-07-03

Introduction

The Johnson Controls® Low Differential Pressure Transducer DP140 Series offers an excellent price-to-performance ratio and meets the requirements in all typical HVAC applications. The DP140 is a low differential pressure transducer that uses a dead-ended capacitive sensing element and requires minimal amplification. The DP140 delivers ±1% full-scale (FS) accuracy with ±0.25% and ±0.5% accuracy options with pressure ranges from 0.1 in. W.C. up to ±25 in. W.C. The DP140 has a small footprint and an AC power option.

Figure 1: DP140 Series Transducer

Applications

Use the Low Differential Pressure Transducer DP140 Series in the following applications:

- HVAC systems
- Air flow stations
- Variable Air Volume (VAV) or fan control
- Filter status
- Static duct and cleanroom pressures

Features and benefits

The Low Differential Pressure Transducer DP140 delivers excellent accuracy and longterm stability. Features include:

- Excellent price-to-performance ratio
- Reduced installation costs
- ±0.25%, ±0.5%, ±1% FS accuracy options
- VDC or VAC excitation
- Voltage or milli-amp analog outputs
- Reverse wiring protection
- Internal regulation
- Fire retardant case, UL 94 V-0 approved
- CE and RoHS compliant

High performance

The DP140 is a high-value solution with exceptional features, quality, and performance.

Cost-saving installation

The design of the DP140 reduces installation costs and increases overall operating efficiency. Installation is easy with integral mounting tabs, pressure connections located on the face of the unit, and a screw terminal strip for electrical termination.

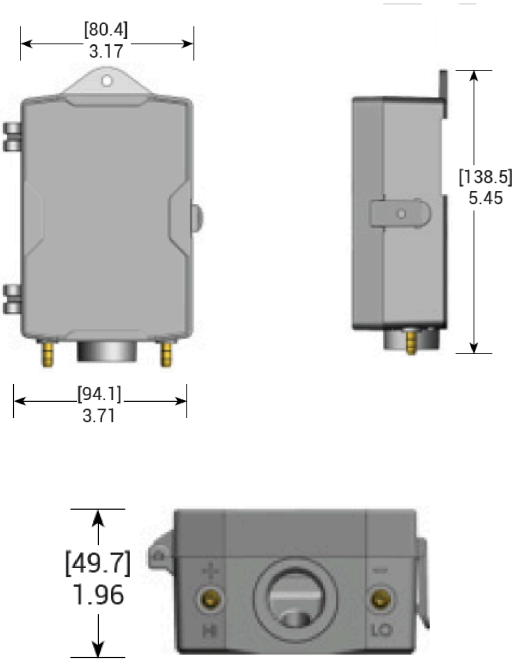
IP67-rated housing

The DP140 housing is a robust IP67-rated design, sealed with a gasket to make it wash-down capable for difficult applications. The DP140 includes a conduit fitting for easy installation and wiring.

Dimensions

The dimensions of the DP140 Transducer are shown in the following figures.

Figure 2: Dimensions of the DP140 Transducer, in. (mm)



Ordering information

See the following table for ordering options for the DP140 Low Differential Pressure Transducers. All units have a 1/2 in. conduit electrical fitting. For example, DP140X25B21F is model DP140, ± 0.25 in. W.C., bidirectional range, 4 mA to 20 mA, 1/2 in. conduit fitting, ±0.25% accuracy.

Table 1: Product codes

Product code	Range, in in. W.C.	Direction	Output	Accuracy
DP140005U21C	0 to 5	Unidirectional	4 mA to 20 mA	±1% FS
DP1402X5U21C	0 to 2.5	Unidirectional	4 mA to 20 mA	±1% FS
DP1402X5U11C	0 to 2.5	Unidirectional	0 VDC to 5 VDC	±1% FS
DP140X25B21C	±0.25	Bidirectional	4 mA to 20 mA	±1% FS
DP140005U21D	0 to 5	Unidirectional	4 mA to 20 mA	±0.5% FS
DP1402X5U21D	0 to 2.5	Unidirectional	4 mA to 20 mA	±0.5% FS
DP140005U11C	0 to 5	Unidirectional	0 VDC to 5 VDC	±1% FS
DP140005U21F	0 to 5	Unidirectional	4 mA to 20 mA	±0.25% FS
DP140025U21D	0 to 25	Unidirectional	4 mA to 20 mA	±0.5% FS
DP140010U21C	0 to 10	Unidirectional	4 mA to 20 mA	±1% FS
DP1400X1B11F	±0.1	Bidirectional	0 VDC to 5 VDC	±0.25% FS
DP140010U21D	0 to 10	Unidirectional	4 mA to 20 mA	±0.5% FS
DP1402X5U21F	0 to 2.5	Unidirectional	4 mA to 20 mA	±0.25% FS
DP140X25B21F	±0.25	Bidirectional	4 mA to 20 mA	±0.25% FS
DP140X25B11C	±0.25	Bidirectional	0 VDC to 5 VDC	±1% FS
DP140001U21F	0 to 1	Unidirectional	4 mA to 20 mA	±0.25% FS
DP140X25U21C	0 to 0.25	Unidirectional	4 mA to 20 mA	±1% FS
DP140010U11D	0 to 10	Unidirectional	0 VDC to 5 VDC	±0.5% FS
DP140001U11F	0 to 1	Unidirectional	0 VDC to 5 VDC	±0.25% FS
DP140001U21C	0 to 1	Unidirectional	4 mA to 20 mA	±1% FS
DP140X25B11F	±0.25	Bidirectional	0 VDC to 5 VDC	±0.25% FS
DP140X25U21D	0 to 0.25	Unidirectional	4 mA to 20 mA	±0.5% FS
DP140001U21D	0 to 1	Unidirectional	4 mA to 20 mA	±0.5% FS
DP1400X5U21C	0 to 0.5	Unidirectional	4 mA to 20 mA	±1% FS
DP140025U11D	0 to 25	Unidirectional	0 VDC to 5 VDC	±0.5% FS
DP1400X5B21C	±0.5	Bidirectional	4 mA to 20 mA	±1% FS
DP1400X5B21D	±0.5	Bidirectional	4 mA to 20 mA	±0.5% FS
DP1400X1B21F	±0.1	Bidirectional	4 mA to 20 mA	±0.25% FS
DP140001U11D	0 to 1	Unidirectional	0 VDC to 5 VDC	±0.5% FS
DP140010U21F	0 to 10	Unidirectional	4 mA to 20 mA	±0.25% FS
DP1400X5B21F	±0.5	Bidirectional	4 mA to 20 mA	±0.25% FS
DP1402X5B21C	±2.5	Bidirectional	4 mA to 20 mA	±1% FS
DP140005B21C	±5	Bidirectional	4 mA to 20 mA	±1% FS
DP140050U21D	0 to 50	Unidirectional	4 mA to 20 mA	±0.5% FS
DP140X25B11D	±0.25	Bidirectional	0 VDC to 5 VDC	±0.5% FS
DP140010U11C	0 to 10	Unidirectional	0 VDC to 5 VDC	±1% FS
DP1400X5U21D	0 to 0.5	Unidirectional	4 mA to 20 mA	±0.5% FS
DP140005U11D	0 to 5	Unidirectional	0 VDC to 5 VDC	±0.5% FS
DP1400X1B11D	±0.1	Bidirectional	0 VDC to 5 VDC	±0.5% FS
DP140025U21F	0 to 25	Unidirectional	4 mA to 20 mA	±0.25% FS
DP1402X5U11F	0 to 2.5	Unidirectional	0 VDC to 5 VDC	±0.25% FS
DP140X25U21F	0 to 0.25	Unidirectional	4 mA to 20 mA	±0.25% FS

Table 1: Product codes

Product code	Range, in in. W.C.	Direction	Output	Accuracy
DP1400X1B21D	±0.1	Bidirectional	4 mA to 20 mA	±0.5% FS
DP140001U11C	0 to 1	Unidirectional	0 VDC to 5 VDC	±1% FS
DP1400X5B11D	±0.5	Bidirectional	0 VDC to 5 VDC	±0.5% FS
DP1400X1B11C	±0.1	Bidirectional	0 VDC to 5 VDC	±1% FS
DP140X25U11D	0 to 0.25	Unidirectional	0 VDC to 5 VDC	±0.5% FS
DP1400X5U21F	0 to 0.5	Unidirectional	4 mA to 20 mA	±0.25% FS
DP140X25U11C	0 to 0.25	Unidirectional	0 VDC to 5 VDC	±1% FS
DP1400X5U11D	0 to 0.5	Unidirectional	0 VDC to 5 VDC	±0.5% FS
DP1402X5B21F	±2.5	Bidirectional	4 mA to 20 mA	±0.25% FS
DP1400X5B11F	±0.5	Bidirectional	0 VDC to 5 VDC	±0.25% FS
DP1402X5B21D	±2.5	Bidirectional	4 mA to 20 mA	±0.5% FS
DP1400X5U11C	0 to 0.5	Unidirectional	0 VDC to 5 VDC	±1% FS
DP140005U11F	0 to 5	Unidirectional	0 VDC to 5 VDC	±0.25% FS
DP140001B21F	±1	Bidirectional	4 mA to 20 mA	±0.25% FS
DP1402X5U11D	0 to 2.5	Unidirectional	0 VDC to 5 VDC	±0.5% FS
DP140001B21D	±1	Bidirectional	4 mA to 20 mA	±0.5% FS
DP140010U11F	0 to 10	Unidirectional	0 VDC to 5 VDC	±0.25% FS
DP1400X5B11C	±0.5	Bidirectional	0 VDC to 5 VDC	±1% FS
DP1400X1U21C	0 to 0.1	Unidirectional	4 mA to 20 mA	±1% FS
DP140001B11D	±1	Bidirectional	0 VDC to 5 VDC	±0.5% FS
DP140X25B21D	±0.25	Bidirectional	4 mA to 20 mA	±0.5% FS
DP140001B21C	±1	Bidirectional	4 mA to 20 mA	±1% FS
DP1400X1U21D	0 to 0.1	Unidirectional	4 mA to 20 mA	±0.5% FS
DP140005B21D	±5	Bidirectional	4 mA to 20 mA	±0.5% FS
DP140005B21F	±5	Bidirectional	4 mA to 20 mA	±0.25% FS
DP140100U11D	0 to 100	Unidirectional	0 VDC to 5 VDC	±0.5% FS
DP140050U11C	0 to 50	Unidirectional	0 VDC to 5 VDC	±1% FS
DP1400X1U11D	0 to 0.1	Unidirectional	0 VDC to 5 VDC	±0.5% FS
DP140001B11C	±1	Bidirectional	0 VDC to 5 VDC	±1% FS
DP1402X5B11F	±2.5	Bidirectional	0 VDC to 5 VDC	±0.25% FS
DP140025U11F	0 to 25	Unidirectional	0 VDC to 5 VDC	±0.25% FS
DP1400X1U21F	0 to 0.1	Unidirectional	4 mA to 20 mA	±0.25% FS
DP1400X1U11C	0 to 0.1	Unidirectional	0 VDC to 5 VDC	±1% FS
DP1400X5U11F	0 to 0.5	Unidirectional	0 VDC to 5 VDC	±0.25% FS
DP140005B11D	±5	Bidirectional	0 VDC to 5 VDC	±0.5% FS
DP140005B11C	±5	Bidirectional	0 VDC to 5 VDC	±1% FS
DP140050U11D	0 to 50	Unidirectional	0 VDC to 5 VDC	±0.5% FS
DP1402X5B11D	±2.5	Bidirectional	0 VDC to 5 VDC	±0.5% FS
DP140X25U11F	0 to 0.25	Unidirectional	0 VDC to 5 VDC	±0.25% FS
DP140001B11F	±1	Bidirectional	0 VDC to 5 VDC	±0.25% FS
DP1400X1U11F	0 to 0.1	Unidirectional	0 VDC to 5 VDC	±0.25% FS
DP140005B11F	±5	Bidirectional	0 VDC to 5 VDC	±0.25% FS
DP140025U21C	0 to 25	Unidirectional	4 mA to 20 mA	±1% FS
DP140050U11F	0 to 50	Unidirectional	0 VDC to 5 VDC	±0.25% FS
DP140025U11C	0 to 25	Unidirectional	0 VDC to 5 VDC	±1% FS

Table 1: Product codes

Product code	Range, in in. W.C.	Direction	Output	Accuracy
DP140005U31C	0 to 5	Unidirectional	0 VDC to 10 VDC	±1% FS
DP140001U31C	0 to 1	Unidirectional	0 VDC to 10 VDC	±1% FS
DP1402X5U31C	0 to 2.5	Unidirectional	0 VDC to 10 VDC	±1% FS
DP1400X5U31C	0 to 0.5	Unidirectional	0 VDC to 10 VDC	±1% FS
DP140X25U31C	0 to 0.25	Unidirectional	0 VDC to 10 VDC	±1% FS
DP140010U31C	0 to 10	Unidirectional	0 VDC to 10 VDC	±1% FS
DP140X25B31C	±0.25	Bidirectional	0 VDC to 10 VDC	±1% FS
DP1400X5B31C	±0.5	Bidirectional	0 VDC to 10 VDC	±1% FS
DP1400X1B31C	±0.1	Bidirectional	0 VDC to 10 VDC	±1% FS
DP140005B31C	±5	Bidirectional	0 VDC to 10 VDC	±1% FS
DP140001B31C	±1	Bidirectional	0 VDC to 10 VDC	±1% FS
DP1402X5B31C	±2.5	Bidirectional	0 VDC to 10 VDC	±1% FS

Technical specifications

Table 2: Differential Pressure Transducer DP110 technical specifications

Description		Specification
Performance data	Accuracy RSS1, at constant temperature	±1.0% FS, standard ±0.5% FS, ±0.25% FS, optional
	Non-linearity, BFSL	±0.98% FS, standard ±0.38% FS, ±0.22% FS, optional
	Hysteresis	0.10% FS
	Non-repeatibility	0.05% FS
Thermal effects ⓘ **Note:** Units calibrated at nominal 70˚F. Maximum thermal error calculated from this data.	Compensated range	0°F to 150°F (-18°C to 65°C)
	Zero shift % FS at 100°F (% FS at 50°C)	±0.033 (±0.06)
	Span shift % FS at 100°F (% FS at 50°C)	±0.033 (±0.06)
	Maximum line pressure	10 psi, 277 in. W.C.
	Overpressure	Up to 10 psi (277 in. W.C.) range dependent
	Long term stability	0.5% FS per year
	Warm-up shift	0.1% FS total
Environmental data	Operating temperature ⓘ **Note:** Operating temperature limits of the electronics only. Pressure media temperatures may be considerably higher.	0°F to 150°F (-18°C to 65°C)
	Storage temperature	-40°F to 185°F (-40°C to 85°C)
Pressure media	Clean air or similar nonconducting gases	
Physical specifications	Pressure fittings	1/4 in. push-on tube fitting
	Case	Fire retardant glass-filled polyester, UL 94-V approved
	Weight	3 oz
	Electrical connections	Removable terminal block

Table 2: Differential Pressure Transducer DP110 technical specifications

Description		Specification
Position effect	**Range**	**Zero offset (%FS/G)**
	0 to 0.5 in. W.C.	0.60
	0 to 1.0 in. W.C.	0.50
	0 to 2.5 in. W.C.	0.22
	0 to 5.0 in. W.C.	0.14
Electrical data, voltage	Circuit	3-wire: Exc, Out, Com
	Excitation for output ⓘ **Note:** Calibrated into a 50 K ohm load, operable into a 5 K ohm load or greater	13 VDC to 30 VDC for 0 VDC to 5 VDC 18 VAC to 24 VAC for 0 VDC to 5 VDC 13 VDC to 30 VDC for 0 VDC to 10 VDC 18 VAC to 24 VAC for 0 VDC to 10 VDC
	Output impedance	<100 ohm
	Bidirectional output at zero pressure	2.5 V in case of 0 V to 5 V output 5 V in case of 0 V to 10 V output
Electrical data, current	Circuit	2-wire
	Output ⓘ **Note:** Calibrated at factory with a 24 VDC loop supply voltage and a 250 ohm load.	4 mA to 20 mA ⓘ **Note:** Zero and Span FS output factory set to within ±0.16 mA, ±0.08 mA for optional accuracies.
	External load	0 ohm to 800 ohm
	Minimum supply voltage, VDC	13 + 0.02 x (resistance of receiver plus line)
	Maximum supply voltage, VDC	30 + 0.004 x (resistance of receiver plus line
	Bidirectional output at zero pressure	12 mA
Compliance CE	CE Mark - Johnson Controls declares that this product is in Compliance with the essential requirements and other relevant provisions of the EMC and RoHS Directives.	

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls shall not be liable for damages resulting from misapplication or misuse of its products.

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

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Contact Johnson Controls: www.johnsoncontrols.com/contact-us

P32 Series Sensitive Pressure Switch Catalog Page

LIT-1927195

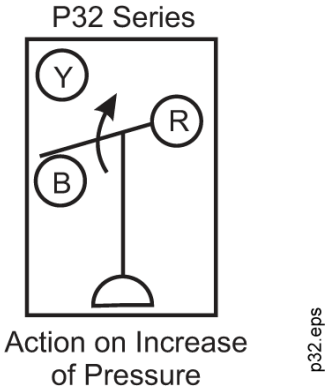
2020-04-22

Description

This differential pressure switch is used to sense pressure/air flow in ducts.

Refer to the *P32 Series Sensitive Differential Pressure Switch Product Bulletin (LIT-125435)* for important product application information.

Figure 1: P28 Action Diagram



Features

- easy-to-read setpoint scale
- versatile mounting options

Applications

- pressure/air flow proving with electric duct heaters, humidifiers, and other equipment
- maximum pressure/air flow control for variable volume systems

Johnson Controls

- reheat duct powered systems
- clogged filter detection
- detection of icing of air conditioning coils and initiation of defrost cycle
- sensitive pressure settings
- dust-tight snap switch

Repair Information

If the P32 Series Sensitive Pressure Switch fails to operate within its specifications, replace the unit. For a replacement switch, contact the nearest Johnson Controls® representative.

Selection Chart

Table 1: Selection Chart

Product Code Number	Ambient Temperature Min./Max.	Connector	Maximum Overpressure psig (kPa)[1]	Contact Action	Range in. WC(kPa)	Sensitivity at Min.Setpoint in. WC (kPa)	Setpoint	Scale Plate	Mounting Bracket (Included)
P32AC-1C	-40°F (-40°C) min. 167°F (75°C) max.	High Pressure connectors are metal 1/8 in. internal NPT inside, 1/2 in. NPSM outside for mounting Low pressure connectors are molded,1/8 in. internal NPT	1 (6.895)	Single-Pole Double-Throw (SPDT)	0.15 to 12 (0.037 to 2.99)	0.07 (0.017)	Adjustable	Yes	L  BKT182-1
P32AC-2C[2]					0.05 to 5 (0.012 to 1.24)	0.04 (0.01)			U  BKT229-1
P32AF-1C						0.025 (0.006)			L  BKT182-1
P32AF-2C[2]									U  BKT229-1

1 Maximum overpressure at either connection
2 Supplied with 1/4 in. compression fitting, 4 in. extension tube, two mounting screws, and O-gasket (angle barbed fitting installed)

Accessories

The switch can be mounted directly or with the supplied mounting bracket.

Product Code Number	Description
FTG18A-600R	Remote Mounting Kit: 4 in. flanged sensing tube, two barbed fittings, two No. 10 screws, and a gasket

P32 Series Sensitive Pressure Switch Technical Specifications

Table 2: Electrical Ratings

Motor Ratings VAC	120	208	240
Type P32AC (Standard Differential, 1/2 hp)			
AC Full Load A	9.8	5.65	4.9
AC Locked Rotor A	58.8	33.9	29.4
Non-Inductive or Resistive Load	15 A, 24 to 277 VAC		
Pilot Duty	125 VA, 24 VAC; 360 VA, 120 to 277 VAC		
Type P32AF (Close Differential, 1/4 hp)			
AC Full Load A	5.8	3.3	2.9
AC Locked Rotor A	34.8	19.8	17.4
Non-Inductive or Resistive Load	10 A, 24 to 277 VAC		
Pilot Duty	125 VA, 24 VAC; 360 VA, 120 to 277 VAC		

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Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

Single point of contact

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JOHNSON CONTROLS C/O CONTROLS PRODUCT MANAGEMENT NO. 32 CHANGJIJANG RD NEW DISTRICT WUXI JIANGSU PROVINCE 214028 CHINA	JOHNSON CONTROLS WESTENDHOF 3 45143 ESSEN GERMANY	JOHNSON CONTROLS 507 E MICHIGAN ST MILWAUKEE WI 53202 USA

Contact information

Contact your local branch office:
www.johnsoncontrols.com/locations

Contact Johnson Controls:
www.johnsoncontrols.com/contact-us

Johnson Controls

H120 SERIES

SPST Status Relay with Integral Current Switch

2-in-1

Current switch and relay are in series…connect the contacts to the load and your current switch is automatically installed

HP ratings

HP ratings make the H120 ideal for control and status of fractional HP motors

Nipple mount

The nipple mount housing can be connected to any 1/2" conduit knockout for installation versatility

0.1A turn-on

Easily monitors the smallest loads

Relay coil LED

Relay coil LED streamlines job commissioning and check out

NEMA 1 rated

NEMA 1 rated housing may be used in plenum spaces

The H120 and H120NC offer a fixed current switch and SPST relay in a single externally mounted housing. Combining the current sensor and relay in one easy-to-install package eliminates the need to fit multiple devices into small electrical enclosures and simplifies the installation. Remove the labor associated with installing a separate current sensor.

APPLICATIONS

- Unit ventilators
- Fan coil units
- Exhaust fans
- Fan terminal units
- Fractional HP motors
- Light resistive loads

SPECIFICATIONS

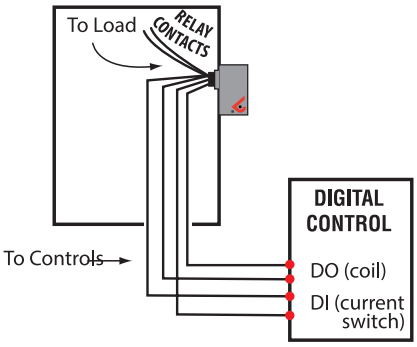
Sensor Power	Induced from relay coil power
Operating Temperature	-15 to 60 °C (5 to 140 °F) (13.8 A max.), -15 to 50 °C (5 to 12 °F) (2 A max.)
Operating Humidity	10 to 90% RH non-condensing
Expected Relay Life (mechanical)	10 million cycles
Relay Status	LED ON=energized
LEAD WIRE SPECIFICATIONS	
Lead Length	14" (356 mm) min.
Style and Gauge	UL1015; Coil: 18 AWG; Contacts: 12 AWG; Status: 16 AWG
WARRANTY	
Limited Warranty	5 years
AGENCY APPROVALS	
Agency Approvals	UL 508 closed type device listing, CAT III, Pollution Degree 2, basic insulation

c UL us LISTED

Note: Do not use the LED status indicators as evidence of applied voltage.

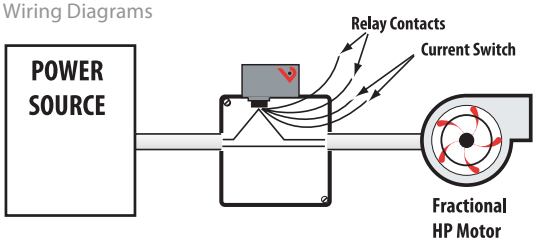
NIPPLE MOUNT DIRECTLY TO A PANEL

Wiring Diagrams

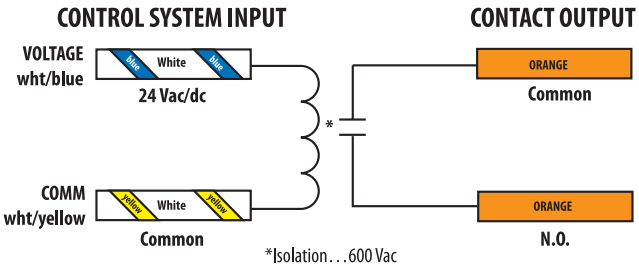


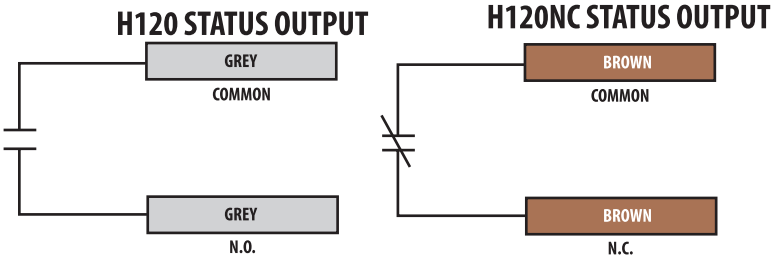
NIPPLE MOUNT TO 4X ELECTRICAL BOX

Wiring Diagrams

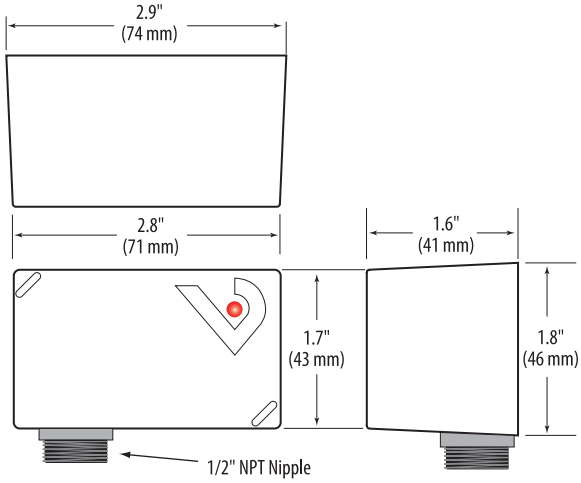


WIRE COLOR CODES





DIMENSIONAL DRAWING



RELAY CONTACT RATINGS	
Resistive	20 A (r)· @ 277 Vac/28Vdc
	(250,00 Cycles)
Motor	120 Vac, 1HP
	208 Vac, 1HP
	250 Vac, 2HP
	277 Vac, 2HP
Ballast	277 Vac, 20 A
Tungsten	120 Vac, 10 A

TYPICAL COIL PERFORMANCE		
Voltage	Coil Current	
	AC	DC
24V	75 mA	32 mA

*See operating temperature specifications

ORDERING INFORMATION

MODEL	AMPERAGE RANGE	COIL	RELAY	STATUS OUTPUT	TRIP POINT	HOUSING	RELAY POWER LED	UL
H120	0.1 to 20 A	24 Vac/dc	SPST, N.O.	N.O. 100 mA @ 30 Vac/dc	0.1 A or Less	Nipple Mount	•	•
H120NC				N.C. 100 mA @ 30 Vac/dc			•	•

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Hx-68P3 Series Outside Humidity and Temperature Transmitters Catalog Page

LIT-1900867

2020-10-16

Description

The Hx-68P3 Series Outside Humidity and Temperature Transmitter measures and transmits outside relative humidity (RH) from 0 to 100% and temperatures from -40 to 140°F (-40 to 60°C). In addition to RH, the transmitter offers selectable parameters including dew point, wet bulb temperature, and enthalpy.

The humidity sensor is impervious to dust and most chemicals and is not damaged by condensation. The weather shield protects the sensors from solar radiation and precipitation without affecting performance. The multiple discs have a unique profile that permits easy passage of air. The disc material is especially formulated for high reflectivity, low thermal conductivity and maximum weather resistance. This rugged enclosure will assure a long life, even under extreme weather conditions.

The sensor and shield function as one unit for optimal performance. Mount the transmitter outside on a pole or on a side of a building. It requires no routine maintenance or recalibration.

Refer to the *Hx-68P3 Series Outside Humidity and Temperature Transmitters Product Bulletin (LIT-12011896)* for important product application information.

Johnson Controls

Features

- 0 to 100% RH offers a full range of accurate RH measurement
- rugged shield construction protects sensors from solar radiation and precipitation without affecting performance
- multiplate shield design maximizes airflow for precise RH and temperature readings
- excellent long-term stability provides accurate RH measurement over long periods of time without degeneration
- no routine maintenance or calibration ensures low maintenance cost
- two wire loop powered connection 4 to 20 mA or four wire 0 to 10 VDC loopedpower-output enables easy installation
- polymer thin film sensor omits inaccuracies due to dust, water vapor, harsh environments or most chemicals
- negligible temperature coefficient ensures that temperature changes are immaterial to accurate RH measurement

Applications

Humidity is an important aspect of any climate control system. The significance of indoor air quality to our health has become evident. Humans are best suited to and feel most comfortable at certain humidities and temperatures, whereas excessively high or low humidities or temperatures cause discomfort. Accurate outdoor humidity measurement means that steps can be taken indoors to ensure a quality building environment.

The right humidity makes it possible to optimize energy consumption. Energy management projects with hundreds of setpoints may have only one outdoor humidity sensor. If that sensor is not accurate, energy costs may rise and building comfort may suffer. The maintenance-free, accurate, year-after-year service of our transmitters keeps energy costs low and building comfort high. The sensors are compatible with most energy management systems.

Selection Chart

Table 1: Hx-68P3 Series Humidity Transmitters

Code Number	Description
HE-68P3-0N000	Outdoor RH Transmitter with Temperature Sensor, 10 VDC Output
HT-68P3-0N000	Outdoor RH Transmitter with Temperature Sensor, 4 to 20 mA Output

Repair Information

If the Hx-68P3 Series Humidity Transmitter fails to operate within its specifications, replace the unit. For a replacement transmitter, contact the nearest Johnson Controls® representative.

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Technical Specifications

Table 2: Hx-68P3 Series Outside Humidity and Temperature Transmitter technical specifications

Specification		Description
Operating Conditions	Temperature	-40 to 140°F (-40 to 60°C)
	Humidity	0 to 100% RH
Relative Humidity	Measurement range	0 to 100% RH
	Accuracy: Temperature Range 50 to 86°F (10 to 30°C): 0 to 90% RH 90 to 100% RH	±3% RH ±5% RH
	Accuracy: Temperature Range -4 to 50°F (-20 to 10°C) 86 to 140°F (30 to 60°C): 0 to 90% RH 90 to 100% RH	±5% RH ±7% RH
	Accuracy: Temperature Range -40 to -4°F (-40 to -20°C): 0 to 100% RH	±7% RH
	Stability in typical HVAC app.	±2% RH over 2 years
Temperature	Measurement range	-40 to 140°F (-40 to 60°C)
	Accuracy at 68°F (20°C)	±0.54°F (±0.3°C)
	Temperature dependance	±0.01°C/°C
	Temperature sensor	Pt1000 RTD Class F0.1 IEC60751
Dewpoint	Accuracy at 68°F (20°C) and 80% RH	±1.6°F (±0.9°C)
Wet Bulb		±1.3°F (±0.7°C)
Enthalpy		±0.9 BTU/lb (±2kj/kg)
Ingress Protection		IP65
Maximum Wind/Flow Speed		98.42 ft/s (30 m/s)
Storage Temperature		-40 to 140°F (-40 to 60°C)
Current Output(HT-68P3-0N000) (Two-Wire)	Outputs	4 to 20 mA, loop powered
	Loop resistance	0 to 600 ohm
	Supply voltage	20 to 28 VDC at 600 ohm load;10 to 28 VDC at 0 ohm load
Voltage Output (HE-68P3-0N000) (Three-Wire)	Outputs	0 to 10 V
	Load resistance	10k ohm minimum
	Supply voltage	18 to 35 VDC; 24 VAC ±20%, 50/60 Hz
Wire Size		16 AWG (1.5 mm^2) maximum
Electromagnetic Compliance		EN61326-1 Industrial Environment
Standard Housing Color		White (RAL9003)
Compliance	United States	FCC compliant to CFR 47, Part 15, Subpart B, Class A
	Canada	Under CAN/CSA-CEI/IEC CISPR 22:02, Class A
CE	Europe	CE Mark - Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive - 2004/108/EC.
	Australia and New Zealand	C-Tick mark

Product warranty

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CG General Purpose Application Controller Catalog Page

2022-05-03 LIT-1901086 12.0

General Purpose Application Controllers (CG Series)

The CG series general purpose application controllers are well-suited for controlling a wide variety of facility and HVAC equipment, including fan coils, air handling units, packaged HVAC equipment, and central plant equipment. CG series controllers run pre-engineered and user-programmed applications.

CG series controllers include an integral real-time clock, which enables the controllers to monitor and control schedules, calendars, and trends, and operate for extended periods of time as standalone controllers when offline from the Metasys system network. Some models feature an integral color display with a navigation keypad that enables enhanced local monitoring of controlled field equipment.

CGE controllers communicate using the BACnet® Secure Connect (BACnet/SC) or BACnet/IP communication protocols. CGM controllers are switchable to use either the BACnet MS/TP or N2 communications protocol. Equipment controllers in BACnet/SC, BACnet/IP, or BACnet MS/TP communication mode are BACnet network-compliant devices. You can use controllers running in N2 mode to maintain or modernize sites with installed legacy Johnson Controls® controllers.

Features and benefits

Sleek and modern packaging and styling

Provides a modern, aesthetically pleasing industrial design.

Standard hardware and software platform

Uses a common hardware design throughout the family line to support standardized wiring practices and installation workflows. Also uses a common software design to support use of a single tool for control applications, commissioning, and troubleshooting to minimize technical training.

High memory capacity and fast processing power

Provides application engineers with the horsepower to meet sophisticated control requirements.

Auto-Tuned Control Loops

Proportional Adaptive Control (P-Adaptive) and Pattern Recognition Adaptive Control (PRAC) delivers continuous control loop tuning, which reduces commissioning time, eliminates change-of-season re-commissioning, and reduces wear and tear on actuators.

Standard BACnet protocol

Provides interoperability with other Building Automation System (BAS) products that use the widely accepted BACnet standard.

Models to support BACnet/IP and BACnet/SC communications

Provides higher speed communication with the Controller Configuration Tool (CCT) and improved bandwidth. BACnet/SC is a new protocol that provides a secure method of communication on IP networks. It uses standards widely accepted by the IT community thus eliminating many of the IT concerns.

Johnson Controls

Models to support wired BACnet MS/TP, ZFR wireless, and N2 with streamlined workflow

CGM controllers can support multiple communication protocols without the need to purchase a special model per protocol and without extra manual setup. If an application configured for N2 communication is loaded on the controller, it automatically communicates through N2. Controllers will otherwise default to MS/TP communication. If a ZFR Pro Wireless Field Bus Router is connected to the controller when the controller is initially powered on, it automatically enters wireless mode.

BACnet Testing Laboratories (BTL) listed and certified as BACnet Advanced Application Controllers (B-AAC)

Ensures openness and interoperability with other BTL-listed devices. BTL is a third-party agency, which validates that BAS vendor products meet the BACnet industry-standard protocol.

BACnet automatic discovery

Supports easy controller integration into a Metasys BAS.

Device Security

Ensures device integrity while the system is rebooting and during normal operation. Embedded software in the CGE controller provides secure boot operation, firmware protection, secure communications, and secure firmware updates to comply with cyber security best practices.

FIPS 140-2 Level 1 compliance

CGE controllers are FIPS 140-2 Level 1 compliant. FIPS 140-2 is a U.S. government cyber security standard used to approve cryptographic modules and algorithms used for encryption. Assures operators that Metasys uses leading cyber security techniques to help prevent unauthorized access to systems and data.

Wireless ZFR and ZFR Pro support

Wireless ZFR and ZFR Pro support provides a wireless alternative to hard-wired MS/TP networking, offering application flexibility and mobility with minimal disruption to building occupants, and also simplifies and speeds up replacements.

Integral real-time clock

An integral real-time clock, which enables the controllers to monitor and control schedules, calendars, and trends, and operate for extended periods of time as stand-alone controllers when offline from the Metasys system network.

Pluggable screw terminal blocks

Pluggable input/output wiring terminal blocks that can be removed from the controller provide electrical installers and field technicians the ability to quickly and easily install and service a controller without the need to disconnect and reconnect the input/output wiring.

Rotary switches for controller address/controller number

Easy-to-use rotary switches set the MS/TP address or controller number in decimal format.

Universal Inputs and Configurable Outputs

Allows multiple signal options to provide input/output flexibility.

End-of-Line (EOL) switch in MS/TP equipment controllers

Enables equipment controllers to be terminating devices on the communications bus.

Default State for Input/Output wiring validation

Enables validation of the input and output terminals' wiring without having to download an application file.

Background transfer coupled with enable/disable logic options in Controller Configuration Tool (CCT)

Saves field technicians' time, enables productivity and minimizes equipment disruption, since the controllers are operating while file updates take place in the background and the application can be left disabled until the system is ready to run.

SA Bus device provisioning improvements

Saves field technicians time when commissioning SA Bus devices by enabling an equipment controller to transfer and apply firmware files to all the SA Bus (IOM, XPM, NS8000) devices connected to it.

Models with onboard display and navigation keypad

Provides an intuitive local interface for users to monitor point values and status, view alarms, view trends, override outputs, and adjust setpoints and parameters. The easy-to-use display provides the ability to quickly troubleshoot issues and restore control while being near the associated mechanical equipment.

Local Controller Display and the MAP Gateway Support

Enable monitoring and commanding of I/O and configuration parameters.

CG series model information

Table 1: CG series information including point type counts

Communication protocol	**CGM09090-0/0H and CGM04060-0:** BACnet MS/TP, N2, or Zigbee Wireless (using add-on modules) **CGE09090-0/0H and CGE04060-0:** BACnet/SC or BACnet/IP		
Supported Network Engines	**CGM09090-0/0H and CGM04060-0:** All network engine model types **CGE09090-0/0H and CGE04060-0:** All network engine model types at R9.0 or later. Refer to the *Network Engines Product Bulletin (LIT-12012138)* for details.		
Modular Jacks	**CGM09090-0/0H and CGM04060-0:** FC and SA Bus Modular Ports: RJ-12 6-Pin Modular Jacks **CGE09090-0/0H and CGE04060-0:** RJ-12 6-Pin Sensor Port		
Point Types	**Signals Accepted**	**M4-CGM09090-0/0H M4-CGE09090-0/0H**	**M4-CGM04060-0 M4-CGE04060-0**
Universal Input (UI)	15 VDC Power Source (Provide 100mA total current) Analog Input - Voltage Mode (0–10 VDC) Analog Input - Current Mode (4–20 mA) Analog Input - Resistive Mode (0–600k ohm), RTD (1k Nickel [Johnson Controls sensor], 1k PT, A998 SI), NTC (10k Type L, 2.252k Type 2) Binary Input - Dry Contact Maintained Mode Universal Input Common	7	3
Binary Input (BI)	Binary Input - Dry Contact Maintained Mode Binary Input - Pulse Counter/Accumulator Mode Binary Input Common	2	1
Binary Output (BO)	Binary Output - 24 VAC Triac (External Power Source) Binary Output Common	3	2
Configurable Output (CO)	Analog Output - Voltage Mode (0–10 VDC) Binary Output - 24 VAC Triac Analog Output Signal Common Binary Output Signal Common	4	4
Analog Output (AO)	Analog Output - Voltage Mode (0–10 VDC) Analog Output - Current Mode (4–20 mA) Analog Output Signal Common	2	0

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Table 1: CG series information including point type counts

SA Bus	Supports up to 10 total wired SA Bus devices, including the XPM and IOM series expansion I/O modules.
	Supports up to four NS Series Network Sensors.
WRZ Sensors	Supports up to nine WRZ sensors when using the ZFR or ZFR Pro Series wireless router configuration.
	Supports up to five WRZ sensors when using the one-to-one WRZ-78xx wireless configuration.

CG series ordering information and accessories

Table 2: CG series ordering information

Product code number	Description
M4-CGM09090-0	18-point General Purpose Application MS/TP Controller Includes: MS/TP and N2 communication; 18 points (7 UI, 2 BI, 4 CO, 2 AO, 3 BO); real-time clock; 24 VAC input
M4-CGM09090-0H	18-point General Purpose Application MS/TP Controller with integral display Includes: MS/TP and N2 communication; 18 points (7 UI, 2 BI, 4 CO, 2 AO, 3 BO); real-time clock; 24 VAC input; Integral 2.4 inch color display and navigation keypad
M4-CGM04060-0	10-point General Purpose Application MS/TP Controller Includes: MS/TP and N2 communication; 10 points (3 UI, 1 BI, 4 CO, 2 BO); real-time clock; 24 VAC input
M4-CGE09090-0	18-point General Purpose Application Ethernet Controller Includes: BACnet/SC and BACnet/IP communication; 18 points (7 UI, 2 BI, 4 CO, 2 AO, 3 BO); real-time clock; 24 VAC input
M4-CGE09090-0H	18-point General Purpose Application Ethernet Controller with integral display Includes: BACnet/SC and BACnet/IP communication; 18 points (7 UI, 2 BI, 4 CO, 2 AO, 3 BO); real-time clock; 24 VAC input; Integral 2.4 inch color display and navigation keypad
M4-CGE04060-0	10-point General Purpose Application Ethernet Controller Includes: BACnet/SC and BACnet/IP communication; 10 points (3 UI, 1 BI, 4 CO, 2 BO); real-time clock; 24 VAC input

Table 3: CG series accessories (order separately)

Product code number	Description
XPM Series Expansion Modules	Refer to the *M4-XPM Expansion Modules Catalog Page (LIT-1901145)* for a complete list of available Expansion Modules.
IOM Series Expansion Modules	Refer to the *Metasys System Field Equipment Controllers and Related Products Product Bulletin (LIT-12011042)* for a complete list of available Expansion Modules.
TL-CCT-0	License enabling Controller Configuration Tool (CCT) software for one user
MS-FCP-0	License enabling Metasys Equipment Controller Firmware Package Files required for CCT
Mobile Access Portal (MAP) Gateway	Refer to the *Mobile Access Portal Gateway Catalog Page (LIT-1900869)* to identify the appropriate product for your region.
M4-DLK0350-0	Local Controller Display, 3.5 in. (89 mm) color display with navigation keypad
NS-ATV7003-0	Handheld VAV Balancing Tool
NS Series Network Sensors	Refer to the *NS Series Network Sensors Product Bulletin (LIT-12011574)* for specific sensor model descriptions.
AS-CBLTSTAT-0	Cable adapter for connection to 8-pin TE-6700 Series sensors
NS-WALLPLATE-0	Network Sensor Wall Plate
WRZ Series Wireless Room Sensors	Refer to the *WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653)* for specific sensor model descriptions.
WRZ-7860-0	Refer to the *WRZ-7860 Receiver for One-to-One Wireless Room Sensing Product Bulletin (LIT-12011640)* for a list of available products.

Table 3: CG series accessories (order separately)

Product code number	Description
WRZ-SST-120	Refer to the *WRZ-SST-120 Wireless Sensing System Tool Installation Instructions (LIT-24-10563-55)*for usage instructions.
ZFR-HPSST-0	Wireless System Survey Tool. For use with the higher power WRG1830/ZFR183x System and lower power WRZ Sensors (10mW). Refer to the *Hi Power Survey Tool Installation Document (Part No.24-11461-00012)* for usage instructions.
WRG1830/ZFR183x Pro Series Wireless Field Bus System	For more information on products needed for wireless field bus installations and for a list of available products, refer to the *WRG1830/ZFR183x Pro Series Wireless Field Bus System Catalog Page (LIT-1901153)*.
ZFR-USBHA-0	ZFR USB Dongle provides a wireless connection through CCT to allow wireless commissioning of the wirelessly enabled CGM and CVM controllers. It also allows use of the ZFR Checkout Tool (ZCT) in CCT. ⓘ **Note:** The ZFR-USBHA-0 is not compatible with the WRG1830/ZFR183x Pro Series. ⓘ **Note:** The ZFR-USBHA-0 replaces the IA OEM DAUBI_2400 ZFR USB dongle. For additional information about the ZFR-USBHA-0 ZFR dongle, refer to the *ZCT Checkout Tool Help LIT-12012292* or the *WNC1800_ZFR182x Pro Series Wireless Field Bus System Technical Bulletin (LIT-12012356)*.
Y64T15-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 72.2 cm (30 in.), Primary Leads and 76.2 cm (30 in.) Secondary Leads, Class 2
Y65A13-0	Transformer, 120 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AS), 20.32 cm (8 in.), Primary Leads and 76.2 cm (30 in.) Secondary Leads, Class 2
Y65T31-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AR+), 20.32 cm (8 in.), Primary Leads and Secondary Screw Terminals, Class 2
Y65T42-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 20.32 cm (8 in.), Primary Leads and Secondary Screw Terminals, Class 2
MS-FIT100-0	The Field Inspection Tool or (FIT) is a portable handheld device with a user interface that is used to test and troubleshoot the BACnet protocol MS/TP RS-485 communications bus that connects supervisory controllers and equipment controllers to field point interfaces. The FIT can be used to check out the wiring of the MS/TP RS-485 bus as well as verify proper communications of supervisory controllers and equipment controllers connected to the bus. The FIT can be used on both the FC Bus and SA Bus.
TL-BRTRP-0	Portable BACnet/IP to MS/TP Router
ACC-TBKPWFCSA-0	Power, FC Bus, and SA Bus terminal block replacement kit for SNC, CG series, CV series, and XPM products. Kit includes 5 of each terminal block type. 15 terminal blocks in total.
ACC-TBKINOUT-0	Input and Output terminal block replacement kit for SNC, CG series, CV series, and XPM products. Kit includes 5 of each 2, 3, and 4 position Input and Output terminal blocks. 30 terminal blocks in total.

CG Series technical specifications

Table 4: Technical Specifications for CG Series Controllers

Power Requirement	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, power supply Class 2 (North America), Safety Extra-Low Voltage (SELV) (Europe)
Power Consumption	**M4-CGM models:** 14 VA maximum[1] **M4-CGE models:** 15 VA maximum ⓘ **Note:** The USB feature is not currently supported.
Power Source	+15 VDC power source terminals provide 100 mA total current. **M4-CGM09090, M4-CGE09090:** Two +15VDC power sources terminal located in Universal IN terminals for active (3-wire) input devices **M4-CGM04060, M4-CGE04060:** One +15VDC power sources terminal located in Universal IN terminals for active (3-wire) input devices
Ambient Conditions	**Operating:** 0°C to 50°C (32°F to 122°F); 10 to 90% RH noncondensing **Storage:** -40°C to 80°C (-40°F to 176°F); 5 to 95% RH noncondensing
Supported Network Engines	**M4-CGM models:** All network engine model types **M4-CGE models:** All network engine model types at R9.0 or later.
Communications Protocol	**M4-CGM models:** BACnet MS/TP; N2. Zigbee Wireless also supported (at FC Bus and for Sensors) with additional hardware. **M4-CGE models:** BACnet/IP or BACnet/SC
Device Addressing for BACnet MS/TP	Decimal address set using three rotary switches: valid controller device addresses 4-127
Device Addressing for N2	Decimal address set using three rotary switches: valid controller device addresses 1-254
Controller Number for Ethernet controllers	Three rotary switches to assign a unique number for each controller to physically identify the controller and relate it to the building drawings; valid controller numbers 0-999
Communications Bus	**M4-CGM models** BACnet MS/TP (default); N2 3-wire FC Bus between the supervisory controller and equipment controllers **M4-CGE models** BACnet/IP (default); BACnet/SC Two Ethernet ports; 10/100 Mbps; 8-pin RJ-45 connector **All M4-CG models** 4-wire SA Bus between equipment controller, network sensors and other sensor/actuator devices, includes a lead to source 15 VDC supply power, from equipment controller, to bus devices.
Processor	RX64M Renesas® 32-Bit microcontroller
Memory	16 MB flash memory and 8 MB SDRAM
Real-Time Clock Backup Power Supply	Super capacitor maintains power to the onboard real-time clock for a minimum of 72 hours when supply power to the controller is disconnected.

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Table 4: Technical Specifications for CG Series Controllers

Input and Output Capabilities	**M4-CGM09090, M4-CGE09090** 7 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohms, or Binary Dry Contact 2 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 4 - Configurable Outputs: Defined as 0-10 VDC or 24 VAC Triac BO 2 - Analog Outputs: Defined as 0–10 VDC or 4–20 mA 3 - Binary Outputs: Defined as 24 VAC Triac (external power source only) **M4-CGM04060, M4-CGE04060** 3 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohms, or Binary Dry Contact 1 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 4 - Configurable Outputs: Defined as 0-10 VDC or 24 VAC Triac BO 2 - Binary Outputs: Defined as 24 VAC Triac (external power source only)
Universal Input (UI) Resolution/ Analog Output (AO) Accuracy	**Input:** 24-bit Analog to Digital converter **Output:** +/- 200 mV accuracy in 0–10 VDC applications
Terminations	**Input/Output:** Pluggable Screw Terminal Blocks **FC Bus, SA Bus, and Supply Power:** 4-Wire and 2-Wire Pluggable Screw Terminal Blocks **FC and SA Bus Modular Ports:** RJ-12 6-Pin Modular Jacks ⓘ **Note:** The FC Bus Terminal and FC Bus Port are only available on the CGM models
Mounting	Horizontal on single 35 mm DIN rail mount (recommended), or screw mount on flat surface with three integral mounting clips on controller
Housing	**Enclosure material:** ABS and polycarbonate UL94 5VB; Self-extinguishing Protection Class: IP20 (IEC529)
Dimensions (Height x Width x Depth)	**M4-CGM09090, M4-CGE09090:** 150 mm x 190 mm x 44.5 mm (5-7/8 in. x 7-1/2 in. x 2-1/8 in.) including terminals and mounting clips. **M4-CGM04060, M4-CGE04060:** 150 mm x 152 mm x 44.5 mm (5-7/8 in. x 6 in. x 2-1/8 in.) including terminals and mounting clips ⓘ **Note:** Mounting space requires an additional 50 mm (2 in.) space on top, bottom, and front face of controller for easy cover removal, ventilation, and wire terminations.
Weight	**M4-CGM04060,M4-CGE04060:** 0.29 kg (0.64 lb) **M4-CGM09090,M4-CGE09090:** 0.4 kg (0.89 lb) **M4-CGM09090-0H,M4-CGE09090-0H:** 0.47 kg (1.04 lb)
Compliance CE 	**United States:** UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment FCC Compliant to CFR47, Part 15, Subpart B, Class A
	Canada: UL Listed, File E107041, CCN PAZX7 CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada Compliant, ICES-003
	Europe: Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and RoHS Directive.
	Australia and New Zealand: RCM Mark, Australia/NZ Emissions Compliant

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Table 4: Technical Specifications for CG Series Controllers

UK CA	**BACnet International:** BACnet Testing Laboratories™ (BTL) Protocol Revision 18 Listed and Certified BACnet Advanced Application Controller (B-AAC), based on ANSI/ASHRAE 135-2020
	United Kingdom: Johnson Controls declares that this product is in compliance with Electromagnetic Compatibility Regulations, The Electrical Equipment (Safety) Regulations, and Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations.

1 The VA rating does **not** include any power supplied to the peripheral devices connected to Configurable Outputs (COs) or Binary Outputs (BOs), which can consume up to 12 VA for each CO or BO; for a possible total consumption of an additional 84 VA (maximum).

The performance specifications are nominal and conform to acceptable industry standard. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls shall not be liable for damages resulting from misapplication or misuse of its products.

Repair information

If a controller, network sensor, or any related product fails to operate within its specifications, replace the product. For replacement products, contact the nearest Johnson Controls representative.

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

Patents

Patents: https://jcipat.com

Single point of contact

APAC	EU	UK	NA/SA
JOHNSON CONTROLS C/O CONTROLS PRODUCT MANAGEMENT NO. 32 CHANGJIANG RD NEW DISTRICT WUXI JIANGSU PROVINCE 214028 CHINA	JOHNSON CONTROLS VOLTAWEG 20 6101 XK ECHT THE NETHERLANDS	JOHNSON CONTROLS TYCO PARK GRIMSHAW LANE MANCHESTER M40 2WL UNITED KINGDOM	JOHNSON CONTROLS 5757 N GREEN BAY AVE. GLENDALE, WI 53209 USA

Contact information

Contact your local branch office:
www.johnsoncontrols.com/locations

Contact Johnson Controls:
www.johnsoncontrols.com/contact-us

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CV Series VAV Box Controllers Catalog Page

2022-05-03 LIT-1901087 Release 12.0

VAV Box Controllers (CV Series)

The CV series equipment controllers, which include the CVM and CVE models, are designed for variable air volume (VAV) box applications. These controllers are fully programmable, but also feature a set of preloaded applications allowing these controllers to be made fully operational by selecting the appropriate VAV box application using the MAP.

CV series controllers feature an integral damper actuator, and a digital Differential Pressure Transducer (DPT) sensor. Certain models also feature an integral potentiometer to sense actual VAV box damper position. CV series controllers include an integral real-time clock, which enables the controllers to monitor and control schedules, calendars, and trends, and operate for extended periods of time as stand-alone controllers when offline from the Metasys system network. These controllers also connect easily to the wired and wireless network sensors for zone and discharge air temperature sensing.

CVE controllers communicate using the BACnet® Secure Connect (BACnet/SC) or BACnet/IP communication protocols. CVM controllers are switchable to use either the BACnet MS/TP or N2 communications protocol. Equipment controllers in BACnet/SC, BACnet/IP, or BACnet MS/TP communication mode are BACnet network-compliant devices. You can use controllers running in N2 mode to maintain or modernize sites with installed legacy Johnson Controls® controllers.

Features and Benefits

Sleek and modern packaging and styling

Provides a modern, aesthetically pleasing industrial design.

Standard hardware and software platform

Uses a common hardware design throughout the family line to support standardized wiring practices and installation workflows. Also uses a common software design to support use of a single tool for control applications, commissioning, and troubleshooting to minimize technical training.

High memory capacity and fast processing power

Provides application engineers with the horsepower to meet sophisticated control requirements.

Auto-Tuned Control Loops

Proportional Adaptive Control (P-Adaptive) and Pattern Recognition Adaptive Control (PRAC) deliver continuous control loop tuning, which reduces commissioning time, eliminates change-of season re-commissioning, and reduces wear and tear on actuators.

Standard BACnet protocol

Provides interoperability with other Building Automation System (BAS) products that use the widely accepted BACnet standard.

Model to support BACnet/SC and BACnet/IP communications

CVE controllers provide higher speed communication with the Controller Configuration Tool (CCT) and improved bandwidth. BACnet/SC is a new protocol that provides a secure method of communication on IP networks. It uses standards widely accepted by the IT community thus eliminating many of the IT concerns.

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Models to support wired BACnet MS/TP, ZFR wireless, and N2 with streamlined workflow

CVM controllers can support multiple communication protocols without the need to purchase a special model per protocol and without extra manual setup. If an application configured for N2 communication is loaded on the controller, it automatically communicates through N2. Controllers otherwise default to MS/TP communication. If a ZFR Pro Wireless Field Bus Router is connected to the controller when the controller is initially powered on, it automatically enters wireless mode.

BACnet Testing Laboratories (BTL) listed and certified as BACnet Advanced Application Controllers (B-AAC)

Ensures openness and interoperability with other BTL-listed devices. BTL is a third-party agency, which validates that BAS vendor products meet the BACnet industry-standard protocol.

BACnet automatic discovery

Supports easy controller integration into a Metasys BAS.

Device Security

Ensures device integrity while the system is rebooting and during normal operation. Embedded software in the CVE controller provides secure boot operation, firmware protection, secure communications, and secure firmware updates to comply with cyber security best practices.

FIPS 140-2 Level 1 compliance

CVE controllers are FIPS 140-2 Level 1 compliant. FIPS 140-2 is a U.S. government cyber security standard used to approve cryptographic modules and algorithms used for encryption. Assures operators that Metasys uses leading cyber security techniques to help prevent unauthorized access to systems and data.

Wireless ZFR and ZFR Pro support

Wireless ZFR and ZFR Pro support provides a wireless alternative to hard-wired MS/TP networking, offering application flexibility and mobility with minimal disruption to building occupants, and also simplifies and speeds up replacements.

Integral real-time clock

An integral real-time clock, which enables the controllers to monitor and control schedules, calendars, and trends, and operate for extended periods of time as stand-alone controllers when offline from the Metasys system network.

Pluggable screw terminal blocks

Pluggable input/output wiring terminal blocks that can be removed from the controller provide electrical installers and field technicians the ability to quickly and easily install and service a controller without the need to disconnect and reconnect the input/output wiring.

Rotary switches for controller address/controller number

Easy-to-use rotary switches set the MS/TP address or controller number in decimal format.

Universal Inputs and Configurable Outputs

Allows multiple signal options to provide input/output flexibility.

End-of-Line (EOL) switch in MS/TP equipment controllers

Enables equipment controllers to be terminating devices on the communications bus.

Default application for Input/Output wiring validation

Enables validation of the input and output terminals' wiring without having to download an application file.

Background transfer coupled with enable/disable logic options in Controller Configuration Tool (CCT)

Saves field technicians' time, enables productivity and minimizes equipment disruption, since the controllers are operating while file updates take place in the background and the application can be left disabled until the system is ready to run.

SA Bus device provisioning improvements

Saves field technicians time when commissioning SA Bus devices by enabling an equipment controller to transfer and apply firmware files to all the SA Bus (IOM, XPM, NS8000) devices connected to it.

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An integrated damper actuator and digital Differential Pressure Transducer (DPT) sensor

Reduces installation time.

Fast response actuator

Drives the damper from full open to full closed (90°) in 60 seconds to reduce commissioning time.

Preloaded, selectable applications

The CV series VAV box controller is shipped with a factory-installed library of the most popular VAV box control applications. You can make this controller fully operational by using the MAP to select the appropriate VAV box application, thereby, saving field technicians' time by eliminating the provisioning workflow.

Optional integrated feedback potentiometer

Reassures users and field technicians of the VAV box damper’s actual position and enables them to easily confirm and troubleshoot VAV controller operations, confirm actuator is at the desired position and track damper position.

Local Controller Display and the MAP Gateway Support

Enable monitoring and commanding of I/O and configuration parameters.

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CV series model information

Table 1: CV Series information including point type counts

		M4-CVM03050-0	M4-CVM03050-0P	M4-CVE03050-0P
Communication Protocols	**CVM models:** BACnet MS/TP, N2, or Zigbee Wireless using add-on modules **CVE models:** BACnet/SC or BACnet/IP			
Modular Jacks	**CVM models:** FC and SA Bus modular ports: RJ-12 6-pin modular jacks **CVE models:** RJ-12 6-pin sensor port			
Point Types	**Signals Accepted:**			
Universal Input (UI)	15 VDC Power Source (Provides 35mA total current source) Analog Input - Voltage Mode (0–10 VDC) Analog Input - Resistive Mode (0–600k ohm), RTD (1k Nickel [Johnson Controls sensor], 1k PT, A998 SI), NTC (10k Type L, 2.252k Type 2) Binary Input - Dry Contact Maintained Mode	3	3	3
Configurable Output (CO)	Analog Output - Voltage Mode (0–10 VDC) Binary Output - 24 VAC Triac Analog Output Signal Common Binary Output Signal Common	2	2	2
Binary Output (BO)	Binary Output - 24 VAC Triac	3	3	3
Integrated Actuator	Internal	1	1	1
Differential Pressure Transducer	Internal	1	1	1
Integrated Feedback Potentiometer	Internal	No	Yes	Yes
SA Bus	Supports up to 10 total wired SA Bus devices, including the XPM and IOM series expansion I/O modules and up to 4 NS series network sensors.			
WRZ Sensors	Support up to 9 WRZ sensors when using the ZFR or ZFR Pro Series wireless router configuration			
	Support up to 5 WRZ sensors when using the one-to-one WRZ-78xx wireless configuration			

CV series ordering information and accessories

Table 2: CV series ordering information

Product code number	Description
M4-CVM03050-0	VAV Box Controller with Integrated Actuator and Digital Differential Pressure Transducer (DPT) Sensor. Includes MS/TP and N2 communication; 8 points (3 UI, 2 CO, and 3 BO); real-time clock; 24 VAC input.
M4-CVM03050-0P	VAV Box Controller with Integrated Actuator, Position Feedback, and DPT Sensor. Includes MS/TP and N2 communication; 8 points (3 UI, 2 CO, and 3 BO); real-time clock; 24 VAC input
M4-CVE03050-0P	VAV Box Controller with Integrated Actuator, Position Feedback, and DPT Sensor. Includes BACnet/SC and BACnet/IP communication; 8 points (3 UI, 2 CO, and 3 BO); real-time clock; 24 VAC input.

Table 3: CV series accessories (order separately)

Product code number	Description
XPM Series Expansion Modules	Refer to the *M4-XPM Expansion Modules Catalog Page (LIT-1901145)* for a complete list of available Expansion Modules.
IOM Series Expansion Modules	Refer to the *Metasys System Field Equipment Controllers and Related Products Product Bulletin (LIT-12011042)* for a complete list of available Expansion Modules.

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Table 3: CV series accessories (order separately)

Product code number	Description
TL-CCT-0	License enabling Controller Configuration Tool (CCT) software for one user
MS-FCP-0	License enabling Metasys Equipment Controller Firmware Package Files required for CCT
Mobile Access Portal (MAP) Gateway	Refer to the *Mobile Access Portal Gateway Catalog Page (LIT-1900869)* to identify the appropriate product for your region.
M4-DLK0350-0	Local controller display with a 3.5 in. (8.9 cm) color display and a navigation keypad
NS-ATV7003-0	Handheld VAV Balancing Tool
NS Series Network Sensors	Refer to the *NS Series Network Sensors Product Bulletin (LIT-12011574)* for specific sensor model descriptions.
AS-CBLTSTAT-0	Cable adapter for connection to 8-pin TE-6700 Series sensors
NS-WALLPLATE-0	Network Sensor Wall Plate
WRZ Series Wireless Room Sensors	Refer to the *WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653)*for specific sensor model descriptions.
WRZ-7860-0	Receiver for One-to-One Wireless Room Sensing Systems - functions with WRZ Series Sensors room sensors. Refer to the *WRZ-7860 Receiver for One-to-One Wireless Room Sensing Product Bulletin (LIT-12011640)* for a list of available products.
WRZ-SST-120	Wireless System Survey Tool (for use with the lower power 10mW WRZ and WRZ-7860 systems) Refer to the *WRZ-SST-120 Wireless Sensing System Tool Installation Instructions (LIT-24-10563-55)* for usage instructions.
ZFR-HPSST-0	Wireless System Survey Tool. For use with the higher power WRG1830/ZFR183x System and lower power WRZ Sensors (10mW). Refer to the *Hi Power Survey Tool Installation Document (LIT-24-11461-00012)* for usage instructions.
WRG1830/ZFR183x Pro Series Wireless Field Bus System	For more information on products needed for wireless field bus installations and for a list of available products, refer to the *WRG1830/ZFR183x Pro Series Wireless Field Bus System Catalog Page (LIT-1901153)*.
ZFR-USBHA-0	ZFR USB Dongle provides a wireless connection through CCT to allow wireless commissioning of the wirelessly enabled CGM and CVM controllers. It also allows use of the ZFR Checkout Tool (ZCT) in CCT. ⓘ **Note:** The ZFR-USBHA-0 is not compatible with the WRG1830/ZFR183x Pro Series. ⓘ **Note:** The ZFR-USBHA-0 replaces the IA OEM DAUBI_2400 ZFR USB dongle. For additional information about the ZFR-USBHA-0 ZFR dongle, refer to the *ZCT Checkout Tool Help LIT-12012292* or the *WNC1800_ZFR182x Pro Series Wireless Field Bus System Technical Bulletin (LIT-12012356)*.
Y64T15-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 72.2 cm (30 in.), Primary Leads and 76.2 cm (30 in.) Secondary Leads, Class 2
Y65A13-0	Transformer, 120 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AS), 20.32 cm (8 in.), Primary Leads and 76.2 cm (30 in.) Secondary Leads, Class 2
Y65T31-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AR+), 20.32 cm (8 in.), Primary Leads and Secondary Screw Terminals, Class 2
Y65T42-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 20.32 cm (8 in.), Primary Leads and Secondary Screw Terminals, Class 2
MS-FIT100-0	The Field Inspection Tool or (FIT) is a portable handheld device with a user interface that is used to test and troubleshoot the BACnet protocol MS/TP RS-485 communications bus that connects supervisory controllers and equipment controllers to field point interfaces. The FIT can be used to check out the wiring of the MS/TP RS-485 bus as well as verify proper communications of supervisory controllers and equipment controllers connected to the bus. The FIT can be used on both the FC Bus and SA Bus.
TL-BRTRP-0	Portable BACnet/IP to MS/TP Router
ACC-TBKPWFCSA-0	Power, FC Bus, and SA Bus terminal block replacement kit for SNC, CG series, CV series, and XPM series of products. Kit includes 5 of each terminal block type. 15 terminal blocks in total.
ACC-TBKINOUT-0	Input and Output terminal block replacement kit for SNC, CG series, CV series, and XPM series of products. Kit includes 5 of each 2, 3, and 4 position Input and Output terminal blocks. 30 terminal blocks in total.
M4-CVACT-0R	Actuator Assembly Replacement Kit for M4-CV series controllers.

CV Series technical specifications

Table 4: Technical specification for CV Series Controllers

Power requirement	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Power Supply Class 2 (North America), Safety Extra-Low Voltage (SELV) (Europe)
Power consumption	10 VA typical, 14 VA maximum[1] ⓘ **Note:** The USB feature is not currently supported.
Power source	+15 VDC power source terminals provide 35 mA total current. Quantity 1 located in Universal IN terminals - for active (3-wire) input devices
Ambient conditions	**Operating:** 0°C to 50°C (32°F to 122°F) **Storage:** -40°C to 70°C (-40°F to 158°F)
Network engines	**M4-CVM models:** All network engine model types **M4-CVE03050-0P:** All network engine model types at R9.0 or later.
Communications protocol	**M4-CVM models:** BACnet MS/TP, N2, Zigbee Wireless also supported (at FC Bus and for Sensors) with additional hardware. **M4-CVE03050-0P:** BACnet/SC or BACnet/IP
Device addressing for BACnet MS/TP	Decimal address set using the three rotary switches: valid controller device addresses 4-127
Controller Number for Ethernet controller	3 rotary switches to assign a unique number for each controller to physically identify the controller and relate it to the building drawings; valid controller numbers 0-999
Device addressing for N2	Decimal address set using the three rotary switches: valid controller device addresses 1-254
Communications bus	**M4-CVM models:** BACnet MS/TP (default), N2. CV Series controllers support wireless functionality for the FC bus and for sensors with additional hardware. 3-wire FC Bus between the supervisory controller and equipment controllers ⓘ **Note:** For more information, refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034)*. **M4-CVE03050-0P:** BACnet/IP (default); BACnet/SC Two Ethernet ports; 10/100 Mbps; 8-pin RJ-45 connector **All CV series models:** 4-wire SA Bus between equipment controller, network sensors and other sensor/actuator devices, includes a lead to source 15 VDC supply power (from equipment controller) to bus devices
Processor	RX64M 32-bit Renesas microcontroller
Memory	16MB Flash Memory and 8MB SDRAM
Real-time clock backup power supply	Super capacitor maintains power to the onboard real-time clock for a minimum of 72 hours when supply power to the controller is disconnected.
Input and output capabilities	**3 - Universal Inputs**: Defined as 0–10 VDC, 0–600k ohms, or Binary Dry Contact **2 - Configurable Outputs:** Defined as 0-10 VDC or 24 VAC Triac BO **3 - Binary Outputs:** Defined as 24 VAC Triac (external power source only)
Universal Input (UI) Resolution/ Configurable Output (CO) accuracy	**UI Analog Input Mode:** 15-bit resolution on UIs **CO Analog Output Mode:** 0–10 VDC ± 200 mV
Air pressure differential sensor	Range: -2 in. to 2 in. H2O **Performance Characteristics:** Typical accuracy at ambient operating conditions: +/- 0.5 % in. Water column full scale Typical accuracy at zero (null) pressure is +/- 0.0006 in. Water column
Actuator rating	4 N·m (35 lb·in) minimum shaft length = 44 mm (1-3/4 in.) (if provided)
Terminations	**Inputs/Outputs**: Pluggable Screw Terminal **FC Bus, SA Bus, and Supply Power**: 4-Wire and 2-Wire Pluggable Screw Terminal Blocks **FC and SA Bus Modular Ports**: RJ-12 6-Pin Modular Jacks ⓘ **Note:** The FC Bus Terminal and FC Bus Port are only available on the CVM models

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Table 4: Technical specification for CV Series Controllers

Mounting	Mounts to damper shaft using single set screw and to duct with single mounting screw
Housing	**Enclosure material:** ABS and polycarbonate UL94 5VB; Self-extinguishing **Protection Class:** IP20 (IEC529)
Dimensions **(height x width x depth)**	165 mm x 125 mm x 73 mm (6.5 in. x 4.92 in. x 2.9 in.) **Center of Output Hub to Center of Captive Spacer:** 135 mm (5-5/16 in.)
Weight	0.69 kg (1.52 lb)
Compliance	**United States:** UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment. FCC Compliant to CFR47, Part 15, Subpart B, Class A. Suitable for Use in Other Environmental Air Space (Plenums) in Accordance with Section 300.22(C) of the National Electrical Code.
	Canada: UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment. Industry Canada Compliant, ICES-003
CE	**Europe:** CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and RoHS Directive.
RCM	**Australia and New Zealand:** RCM Mark, Australia/NZ Emissions Compliant.
	BACnet International: BACnet Testing Laboratories™ (BTL) Protocol Revision 18 Listed and Certified BACnet Advanced Application Controller (B-AAC), based on ANSI/ASHRAE 135-2020
UKCA	**United Kingdom:** Johnson Controls declares that this product is in compliance with Electromagnetic Compatibility Regulations, the Electrical Equipment (Safety) Regulations, and the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations.

1 The VA rating does not include any power supplied to the peripheral devices connected to Configurable Outputs (COs) or Binary Outputs (BOs), which can consume up to 12 VA for each CO or BO, for a possible total consumption of an additional 60 VA (maximum).

The performance specifications are nominal and conform to acceptable industry standard. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls shall not be liable for damages resulting from misapplication or misuse of its products.

Repair information

If a controller, network sensor, or any related product fails to operate within its specifications, replace the product. For replacement products, contact the nearest Johnson Controls representative.

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

Patents

Patents: https://jcipat.com

Single point of contact

APAC	EU	UK	NA/SA
JOHNSON CONTROLS C/O CONTROLS PRODUCT MANAGEMENT NO. 32 CHANGJIANG RD NEW DISTRICT WUXI JIANGSU PROVINCE 214028 CHINA	JOHNSON CONTROLS VOLTAWEG 20 6101 XK ECHT THE NETHERLANDS	JOHNSON CONTROLS TYCO PARK GRIMSHAW LANE MANCHESTER M40 2WL UNITED KINGDOM	JOHNSON CONTROLS 5757 N GREEN BAY AVE. GLENDALE, WI 53209 USA

Contact information

Contact your local branch office:
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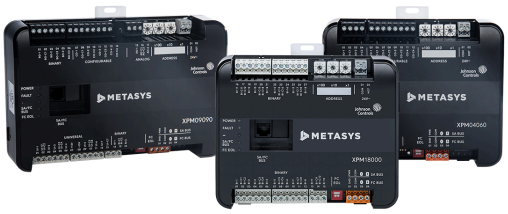
XPM Expansion Modules Catalog Page

2022-05-03 LIT-1901145 12.0



XPM Expansion Modules

The M4-XPM series input/output (I/O) expansion modules are part of the Metasys system CG, CV Equipment Controller family and can serve in one of two capacities depending on where they are installed in the Metasys system. When installed on the Sensor/Actuator (SA) Bus of a Metasys controller, an XPM expands the input and output interfaces that can be used with that equipment controller. When installed on the Field Controller (FC) Bus of a Metasys network engine, an XPM can be used as I/O point multiplexors to support monitoring and control from a Metasys network engine. The point multiplexor can also be useful for sharing points between other equipment controllers on the FC Bus using peer-to-peer connectivity.

XPMs operate on an RS-485 BACnet MS/TP Bus and are BACnet Testing Laboratory (BTL) listed and certified to the BACnet Smart Actuator (B-SA) profile.

Compatibility

You can connect XPM series expansion modules to the SA Bus of the following equipment controller device types:

- CG series General Purpose Application Equipment Controllers
- CV series VAV Box Controllers
- FAC series Advanced Application Field Equipment Controllers
- FEC series Field Equipment Controllers
- VMA16, VMA17, VMA18, and VMA19 series VAV Box Controllers
- SNC series Network Control Engines
- NCE series Network Control Engines

Note: XPM series expansion modules may coexist on the SA Bus with IOM series input/output expansion modules.

You can connect XPM series expansion modules to the FC bus of the following network engine types:

- SNE series Network Engines
- SNC series Network Control Engines
- NAE35, NIE39, NAE45, NAE49, NAE55, and NAE59 series Network Automation and Integration Engines
- NCE25 and NIE29 series Network Control Engines

Note: XPM series modules may coexist on the FC Bus with IOM series input/output expansion modules.

Features and benefits

Sleek and modern packaging and styling

Provides a modern, aesthetically pleasing industrial design.

Standard hardware and software platform

Uses a common hardware design throughout the family line to support standardized wiring practices and installation workflows. Also uses a common software design to support use of a single tool for control applications, commissioning, and troubleshooting to minimize technical training.

Ability to reside on the FC Bus or SA Bus

Provides application flexibility.

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BACnet Testing Laboratories (BTL) listed and certified

Ensures openness and interoperability with other BTL-listed devices. BTL is a third-party agency, which validates that BAS vendor products meet the BACnet industry-standard protocol.

BACnet automatic discovery

Supports easy integration into a Metasys BAS.

Wireless ZFR and ZFR Pro support

Wireless ZFR and ZFR Pro support provides a wireless alternative to hard-wired FC Bus MS/TP networking, offering application flexibility and mobility with minimal disruption to building occupants, and also simplifies and speeds up replacements.

Pluggable screw terminal blocks

Pluggable input/output wiring terminal blocks provide electrical installers and field technicians the ability to quickly and easily install and service a device without the need to disconnect and reconnect the input/output wiring.

Decimal MS/TP address set with three rotary switches

Easy-to-use rotary switches set the MS/TP address in decimal format.

Universal Inputs and Configurable Outputs

Allows multiple signal options to provide input/output flexibility.

End-of-Line (EOL) switch

Enables devices to be terminating devices on the communications bus.

XPM series model information

Table 1: XPM Series information including point type counts

		M4-XPM04060-0	M4-XPM09090-0	M4-XPM18000-0
Communication Protocols	BACnet MS/TP			
Network Engines	For a list of compatible Network Engines, see Compatibility. Refer to the *Network Engines Product Bulletin (LIT-12012138)* for details.			
Modular Jacks	SA/FC Bus Port: RJ-12 6-Pin Modular Jack			
Point Types	Signals Accepted	Number of points		
Universal Input (UI)	15 VDC Power Source (Provide 100mA total current) Analog Input - Voltage Mode (0–10 VDC) Analog Input - Current Mode (4–20 mA) Analog Input - Resistive Mode (0–600k ohm), RTD (1k Nickel [Johnson Controls sensor], 1k PT, A998 SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode Universal Input Common	3	7	0
Binary Input (BI)	Binary Input, Dry Contact Maintained Mode Binary Input - Pulse Counter/Accumulator Mode Binary Input Common	1	2	18
Configurable Output (CO)	Analog Output - Voltage Mode (0–10 VDC) Binary Output 24 VAC Triac Analog Output Signal Common Binary Output Signal Common	4	4	0

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Table 1: XPM Series information including point type counts

		M4-XPM04060-0	M4-XPM09090-0	M4-XPM18000-0
Analog Output (AO)	Analog Output - Voltage Mode (0–10 VDC) Analog Output - Current Mode (4–20 mA) Analog Output Signal Common	0	2	0
Binary Output (BO)	Binary Output - 24 VAC Triac (External Power Source) Binary Output Common	2	3	0

Ordering information and accessories

The following tables provide the product code number and description for the XPM models and accessories.

Table 2: XPM Series ordering information

Product code number	Description
M4-XPM04060-0	10-point Input/Output Expansion Module Includes: MS/TP communication; 10 points (3 UI, 1 BI, 4 CO, 2 BO); 24VAC input
M4-XPM09090-0	18-point Input/Output Expansion Module Includes: MS/TP communication; 18 points (7 UI, 2 BI, 4 CO, 2 AO, 3 BO); 24VAC input
M4-XPM18000-0	18-point Input Expansion Module Includes: MS/TP communication; 18 points (18 BI); 24VAC input

Table 3: XPM series accessories (order separately)

Product Code Number	Description
TL-CCT-0	Controller Configuration Tool (CCT) software
MS-FCP-0	Metasys Equipment Controller Firmware Package Files required for CCT
Mobile Access Portal (MAP) Gateway	Refer to the *Mobile Access Portal Gateway Catalog Page (LIT-1900869)* to identify the appropriate product for your region.
WRZ Series Wireless Room Sensors	Refer to the *WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653)* for specific sensor model descriptions.
WRZ-7860-0	Receiver for One-to-One Wireless Room Sensing Systems - functions with WRZ Series Sensors Refer to the *WRZ-7860 Receiver for One-to-One Wireless Room Sensing Product Bulletin (LIT-12011640)* for a list of available products.
WRZ-SST-120	Wireless System Survey Tool. For use with the lower power 10mW WRZ and WRZ-7860 systems. Refer to the *WRZ-SST-120 Wireless Sensing System Tool Installation Guide (24-10563-55)* for usage instructions.
ZFR-HPSST-0	Wireless System Survey Tool. For use with the higher power WRG1830/ZFR183x System and lower power WRZ Sensors (10mW). Refer to the *Hi Power Survey Tool Installation Document (24-11461-00012)* for usage instructions.
Receiver for One-to-One Wireless Room Sensing WRG1830/ZFR183x Pro Series Wireless Field Bus System	For more information on products needed for wireless field bus installations and for a list of available products, refer to the *WRG1830/ZFR183x Pro Series Wireless Field Bus System Catalog Page (LIT-1901153)*.
Y64T15-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 72.2 cm (30 in.), Primary Leads and 76.2 cm (30 in.) Secondary Leads, Class 2
Y65A13-0	Transformer, 120 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AS), 20.32 cm (8 in.), Primary Leads and 76.2 cm (30 in.) Secondary Leads, Class 2
Y65T31-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AR+), 20.32 cm (8 in.), Primary Leads and Secondary Screw Terminals, Class 2

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Table 3: XPM series accessories (order separately)

Product Code Number	Description
Y65T42-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 20.32 cm (8 in.), Primary Leads and Secondary Screw Terminals, Class 2
ACC-TBKINOUT-0	Input and Output terminal block replacement kit for SNC, CGE, CGM, CVE, CVM and XPM products. Kit includes 5 of each 2, 3, and 4 position Input and Output terminal blocks. 30 terminal blocks in total.
ACC-TBKPWFCSA-0	Power, FC Bus, and SA Bus terminal block replacement kit for SNC, CGE, CGM, CVE, CVM, and XPM products. Kit includes 5 of each terminal block type. 15 terminal blocks in total.
MS-FIT100-0	The Field Inspection Tool or (FIT) is a portable handheld device with a user interface that is used to test and troubleshoot the BACnet protocol MS/TP RS-485 communications bus that connects supervisory controllers and equipment controllers to field point interfaces. The FIT can be used to check out the wiring of the MS/TP RS-485 bus as well as verify proper communications of supervisory controllers and equipment controllers connected to the bus. The FIT can be used on both the FC Bus and SA Bus.
TL-BRTRP-0	Portable BACnet/IP to MS/TP Router

XPM Expansion Modules technical specifications

Table 4: Technical specifications

Power Requirement	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Power Supply Class 2 (North America), Safety Extra-Low Voltage (SELV) (Europe)
Power Consumption	14 VA maximum ⓘ **Note:** The VA rating does not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO; for a possible total consumption of an additional 84 VA (maximum).
Power Source	+15 VDC power source terminals provide 100 mA total current. ⓘ **Note:** Only present on XPM09090 and XPM04060 models. • **M4-XPM09090-0:** Quantity 2-located in Universal Input terminals for active (3-wire) input devices. • **M4-XPM04060-0:** Quantity 1-located in Universal Input terminals for active (3-wire) input devices.
Ambient Conditions	**Operating:** 0°C to 50°C (32°F to 122°F); 10% to 90% RH noncondensing **Storage:** -40°C to 80°C (-40°F to 176°F); 5% to 95% RH noncondensing
Network Engines	All network engine model types
Communications Protocol	BACnet MS/TP; Zigbee Wireless also supported (at FC Bus and for Sensors) with additional hardware. XPM expansion modules support Zigbee wireless functionality for the FC bus and for sensors with additional hardware.
Device Addressing for BACnet MS/TP	Decimal address set using the three rotary switches; valid controller device addresses 4-127
Communications Bus	RS-485 3-wire FC Bus between the supervisory controller and expansion modules 4-wire SA Bus between equipment controller, network sensors and other sensor/actuator devices, includes a lead to source 15 VDC supply power (from equipment controller) to bus devices.
Processor	RX64M Renesas® 32-Bit microcontroller
Memory	16 MB flash memory and 8 MB SDRAM

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Table 4: Technical specifications

Input and Output Capabilities	**Universal Inputs:** Defined as 0–10 VDC, 4–20 mA, 0–600k ohms, or Binary Dry Contact **Binary Inputs:** Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode **Configurable Outputs:** Defined as 0-10 VDC or 24 VAC @500mA Triac BO **Analog Outputs:** Defined as 0–10 VDC or 4–20 mA **Binary Outputs:** Defined as 24 @500mA VAC Triac (external power source only)
Universal Input (UI) Resolution / Analog Output (AO) Accuracy	**Input:** 24-bit Analog to Digital converter **Output:** +/- 200 mV accuracy in 0–10 VDC applications
Terminations	**Input/Output:** Pluggable Screw Terminal Blocks **SA/FC Bus and Supply Power:** 4-Wire and 2-Wire Pluggable Screw Terminal Blocks **SA/FC Bus Port:** RJ-12 6-Pin Modular Jack
Mounting	Horizontal on single 35 mm DIN rail mount (recommended), or screw mount on flat surface with three integral mounting clips on controller
Housing	**Enclosure material:** ABS and polycarbonate UL94 5VB; Self-extinguishing Protection Class: IP20 (IEC529)
Dimensions (Height x Width x Depth)	**XPM09090-0:** 150 mm x 190 mm x 44.5 mm (5-7/8 in. x 7-1/2 in. x 2-1/8 in.) including terminals and mounting clips **XPM04060-0 and XPM18000-0:** 150 mm x 152 mm x 44.5 mm (5-7/8 in. x 6 in. x 2-1/8 in.) including terminals and mounting clips ⓘ **Note:** Mounting space requires an additional 50 mm (2 in.) space on top, bottom, and front face of controller for easy cover removal, ventilation, and wire terminations.
Weight	**XPM09090-0:** 0.5 kg (1.1 lb) **XPM04060-0 and XPM18000-0:** 0.29 kg (0.64 lb)
Compliance	**United States:** UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment FCC Compliant to CFR47, Part 15, Subpart B, Class A
	Canada: UL Listed, File E107041, CCN PAZX7 CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada Compliant, ICES-003
CE	**Europe:** Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and RoHS Directive.
	**Australia and New Zealand:** RCM Mark, Australia/NZ Emissions Compliant
	BACnet International: BACnet Testing Laboratories™ (BTL) Protocol Revision 18 Listed and Certified BACnet Smart Actuator (B-SA), based on ANSI/ASHRAE 135-2020
UK CA	**United Kingdom:** Johnson Controls declares that this product is in compliance with Electromagnetic Compatibility Regulations, The Electrical Equipment (Safety) Regulations, and Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations.

The performance specifications are nominal and conform to acceptable industry standard. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls shall not be liable for damages resulting from misapplication or misuse of its products.

Repair information

If an expansion module fails to operate within its specifications, replace the expansion module. For a replacement expansion module, contact your Johnson Controls representative.

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

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Single point of contact

APAC	EU	UK	NA/SA
JOHNSON CONTROLS C/O CONTROLS PRODUCT MANAGEMENT NO. 32 CHANGJIANG RD NEW DISTRICT WUXI JIANGSU PROVINCE 214028 CHINA	JOHNSON CONTROLS VOLTAWEG 20 6101 XK ECHT THE NETHERLANDS	JOHNSON CONTROLS TYCO PARK GRIMSHAW LANE MANCHESTER M40 2WL UNITED KINGDOM	JOHNSON CONTROLS 5757 N GREEN BAY AVE. GLENDALE, WI 53209 USA

Contact information

Contact your local branch office:
www.johnsoncontrols.com/locations

Contact Johnson Controls:
www.johnsoncontrols.com/contact-us

Application and Data Server (ADS) and Extended Application and Data Server (ADX) Catalog Page

2023-07-26 LIT-1900200 Release 12.0.50

Background

The Application and Data Server (ADS) and Extended Application and Data Server (ADX) are optional components of the Metasys system that manage the collection and presentation of large amounts of trend data, event messages, operator transactions, and system configuration data. The ADS is an entry-level server that runs on personal computers and supports up to five concurrent users. The ADX is a larger scale system that runs on a server operating system to provide extended historical archiving and reporting capabilities. The ADX is offered in several models to support up to 10, 25, 50, or 100 concurrent users. As Site Director, the ADS/ADX provides secure communication to a network of NAE, NIE, NCE, SNE and SNC series engines.

At release 12.0.50, Metasys for Validated Environments (MVE) supports both Metasys User Interface (UI) and Site Management Portal (SMP).

The ADS/ADX supports robust features that continue to position the Metasys system as the leading building automation system in the industry, including:

- Use fault detection to identify and lists building system-related faults in order of severity to help you quickly fix issues and avoid equipment issues, energy waste, and comfort complaints.
- Fault triage is an additional component to fault detection that helps less experienced operators with guided assistance to independently resolve issues. It provides operators with fault duration, occurrence information, and corrective action recommendations to improve fault prioritization.
- Building Network tree allows for faster delivery of the Metasys User Interface (UI) by enabling its deployment prior to the spaces and equipment configuration process. It also provides a familiar navigation experience for Metasys operators who have previous experience using the All Items tree of the Site Management Portal.
- Use Advanced Search and Reporting in the Metasys UI to find and report on operational data and make bulk commands to restore order more quickly. The Advanced Search and Reporting feature provides the ability to quickly search Metasys objects by Building Network, equipment, equipment type, or space.
- Use Custom Dashboards to create dashboards that provide the most relevant and critical information to Metasys operators for enhanced productivity and create an experience that mimics users operational styles for ease of use.
- Graphics Custom Behaviors provide the flexibility to use custom symbols that are required for their individual building or campus needs or their local standards.
- Use trend widget updates to identify patterns including outliers, using an intuitive candlestick chart that displays min, max, and averages.
- Cyber Health Dashboard provides a centralized view of potential security-related issues or system issues which are detectable by an ADS/ADX, but which may not surface as part of general system alarms.
- User Management facilitates the creation and management of users and their roles, category-based permissions, and privileges.

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- Historical data management, including an ODBC-compliant database package for storage of trend data, event messages, operator transactions, and system configuration data.

Metasys UI and Site Management Portal UI (SMP) of the ADS/ADX provides a flexible system to change the online configuration of the Metasys system, optimize control strategies, and perform administrative tasks. The ADS/ADX includes an Open Database Connectivity (ODBC) compliant database package for secure storage of historical and configuration data.

Note: For non-MVE sites at Release 12.0 or later, SMP requires a license. The license is available only to existing Metasys customers. On MVE sites, SMP is available without a license.

The ADS and ADX support virtual environments, including VMware® and Microsoft® Hyper-V™. Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for more information.

The Metasys system can communicate with cloud-based applications easily and securely. To make this connection, the Metasys system requires minor programming and setup by Johnson Controls. When you are connected, you can access multiple cloud-based applications and features. To learn more, visit the Building Management page located on the Johnson Controls® website.

Figure 1: Metasys UI

For the ADX, the Metasys Advanced Reporting System reports on the system configuration and system behavior, including reports that provide performance and diagnostic information.

Applications

Use an ADS in the following situations:

- When the number of network engines becomes larger than a single network engine can handle efficiently as Site Director.
- The long-term historical data storage needs exceed the capacity of a typical network engine.
- The number of simultaneous users logging on to SMP or Metasys UI exceeds the capacity of a single network engine. The ADS supports up to five simultaneous users, and up to 10 to 14 SNx/NxE engines. Refer to the *Metasys System Configuration Guide (LIT-12011832)*.

Use an ADX when any of the following criteria apply:

- The Metasys Advanced Reporting System or the Metasys for Validated Environments (MVE) application is required.
- You need to support more than five simultaneous users logging on to SMP or Metasys UI. The ADX supports up to 10, 25, 50, or 100 users, and up to 1,000 SNx/NxE engines. Refer to the *Metasys System Configuration Guide (LIT-12011832)*.
- Any of your data storage or access requirements is not met by an ADS.

To further help you decide whether an ADS or ADX is right for your facility, consider their respective data storage and data access capabilities.

Ordering information

For complete ordering information, refer to the *Metasys System Software Purchase Options Product Bulletin (LIT-12011703).*

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Table 1: ADS/ADX Ordering Information for New or Upgrade Software

Base Product Code	Product Descriptions	New Software Product Code Number	Upgrade Software Product Code Number	Migration Software Product Code Number
MS-ADS05U	Application and Data Server	MS-ADS05U-0	MS-ADS05U-6	MS-ADS05U-8
MS-ADX10U	Extended Application and Data Server	MS-ADX10U-0	MS-ADX10U-6	MS-ADX10U-8
MS-ADX10SQL	Extended Application and Data Server Includes Microsoft SQL Server 2019 software with core license	MS-ADX10SQL-0	MS-ADX10SQL-6	MS-ADX10SQL-8
MS-ADX25U	Extended Application and Data Server	MS-ADX25U-0	MS-ADX25U-6	MS-ADX25U-8
MS-ADX25SQL	Extended Application and Data Server Includes Microsoft SQL Server 2019 software with core license	MS-ADX25SQL-0	MS-ADX25SQL-6	MS-ADX25SQL-8
MS-ADX50U	Extended Application and Data Server	MS-ADX50U-0	MS-ADX50U-6	MS-ADX50U-8
MS-ADX50SQL2	Extended Application and Data Server For use on server with dual processors or 8 cores[1] Includes Microsoft SQL Server 2019 software with core license	MS-ADX50SQL2-0	MS-ADX50SQL2-6	MS-ADX50SQL2-8

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Table 1: ADS/ADX Ordering Information for New or Upgrade Software

Base Product Code	Product Descriptions	New Software Product Code Number	Upgrade Software Product Code Number	Migration Software Product Code Number
MS-ADX50SQL	Extended Application and Data Server For use on server with single processor or 4 cores Includes Microsoft SQL Server 2019 software with core license	MS-ADX50SQL-0	MS-ADX50SQL-6	MS-ADS50SQL-8
MS-ADX100U	Extended Application and Data Server	MS-ADX100U-0	MS-ADX100U-6	MS-ADX100U-8
MS-ADX100SQL2	Extended Application and Data Server For use on server with dual processors or 8 cores[1] Includes Microsoft SQL Server 2019 software with core license	MS-ADX100SQL2-0	MS-ADX100SQL2-6	MS-ADX100SQL2-8

1 Servers with dual processors or 8 cores are **recommended** for ADX 50 user and 100 user software.

Table 2: Optional features add-on licenses

Code number	Description
M4-APIMOCMD-0	License enabling the Monitoring and Commanding API for a new site.

Table 2: Optional features add-on licenses

Code number	Description
M4-APIMOCMD-6	License enabling the upgrade of the Monitoring and Commanding API for existing sites. ⓘ **Note:** Existing sites upgrading to Release 12.0.x must purchase this upgrade to continue using the API.
M4-FAULT-0	License enabling Fault Detection feature for one Metasys server (ADS, ADS-Lite, ADX, or OAS series). [1]
M4-TRIAGE-0	License enabling Fault Triage feature for one Metasys server (ADS, ADS-Lite, ADX, or OAS series). ⓘ **Note:** M4-FAULT-0 is also required as a prerequisite.
M4-ADFS-0	License enabling Active Directory Federation Services (ADFS) feature for one Metasys server (ADS, ADS-Lite, ADX or OAS series).
M4-FIPS-0	License enabling Federal Information Processing Standard 140-2 (FIPS 140-2 Level 1 compliance) for one Metasys server (ADS, ADS-Lite, ADX, or OAS series), or for one software network engine (NAE85 or LCS85 series).

Table 2: Optional features add-on licenses

Code number	Description
MS-SMP-6	License enabling SMP for existing non-MVE sites. MVE sites include SMP without this license. ⓘ **Note:** This is a one-time purchase license that is only available to customers upgrading Metasys from a release before 12.0.
M4-BACNETSC-0	License enabling BACnet Secure Connect.
MS-MVE-0	License enabling MVE and SMP UI.

1 The OAS must meet minimum requirements.

ADS/ADX concurrent users

The following table shows examples of the total number of supported users who can be simultaneously logged in to the SMP and Metasys UI.

ⓘ **Note:** The following information provides the supported concurrent user limitations. Usage beyond the supported limitations may yield system or server performance issues.

Table 3: Examples of ADS/ADX/ADS-Lite concurrent users

ADS/ADX type	Examples of ADS/ADX concurrent users	
	SMP UI	Metasys UI
5-user ADS/ADS-Lite	0	5
	2	3
	5	0

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Table 3: Examples of ADS/ADX/ADS-Lite concurrent users

ADS/ADX type	Examples of ADS/ADX concurrent users	
	SMP UI	Metasys UI
10-user ADX	0	25[1]
	5	20
	8	17
	10	15
25-user ADX	0	25
	10	15
	20	5
	25	0
50-user ADX	0	50
	10	40
	25	25
	50	0
100-user ADX	5	50[2]
	10	50[2]
	25	50[2]
	50	50[2]
	75	25

Table 3: Examples of ADS/ADX/ADS-Lite concurrent users

ADS/ADX type	Examples of ADS/ADX concurrent users	
	SMP UI	Metasys UI
	100	0

1 The 10-user ADX has an SMP 10 concurrent user limitation. The Metasys UI concurrent user limitation is 25.

2 The 100-user ADX has an SMP 100 concurrent user limitation. The Metasys UI concurrent user maximum is 50.

For example, with a 5-user ADS or ADS-Lite, 5 Metasys UI users are supported if no SMP users are logged in, or 3 Metasys UI users are supported if 2 SMP users are logged in. Similarly, with a 50-user ADX, 50 Metasys UI users are supported if no SMP users are logged in, or 10 Metasys UI users are supported if 40 SMP users are logged in. The only Metasys UI user restriction applies to a 50-user or 100-user ADX: no more than 50 Metasys UI users are supported, regardless of the number of SMP users.

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Application and Data Server (ADS) system requirements

Table 4: Application and Data Server (ADS) system requirements (5 Users)

Recommended Computer Platform[1]	Intel Core i7-8700 Processor (Six Core, 3.20GHz) 2 x 500 GB 7200 rpm SATA 3.5 in. drive[2] with 40 GB free space after installation of all prerequisite software and before installation of ADS software. Configure RAID 1 (mirroring) with disk write-caching turned on. If you use a VM, allocate at least 100-150 GB of storage to the Database files. You can increase the storage over time as the databases grow. ⓘ **Note:** Prerequisite software includes the supported operating system, database software, .NET Framework, and any other software or service packs required for your ADS configuration.
	Graphics card (1 GB RAM, ATI® Technologies or NVIDIA® Corporation, 64-bit compatible, Small Form Factor [SFF] if required)
Required Minimum Memory[3]	16 GB RAM The VM host must have at least 8 GB of allocated RAM at all times. When you configure the VM, do not select the enable dynamic memory option.
Number of engines supported	For information about the number of engines supported, refer to the table labeled *Maximum number of network engines supported based on Metasys Server type and Server size* in the *Metasys System Configuration Guide (LIT-12011832)*.
Number of Site Management Portal users supported	Up to five
Number of Metasys UI users supported	Up to five
Supported Operating Systems[4] **and Database Software**	Windows® 10 Pro and Windows 10 Enterprise Editions versions 21H2, 22H2 (64-bit). For all future Windows 10 updates after version 22H2, Johnson Controls will evaluate and certify that Metasys software can support the updates before we provide guidance on support. Windows® 10 Enterprise LTSC (1809, 21H2) (64-bit) Supports: • SQL Server® 2019 Express with CU19 (64-bit) ⓘ **Note:** SQL Server 2019 may cause the configuration service cache that builds stored procedures to time out. This causes the user's login to Metasys UI to fail. To resolve this issue, set SQL Server 2019 databases to run in 2017 compatibility mode. For more information, refer to docs.microsoft.com • SQL Server® 2017 Express with CU31 (64-bit) • SQL Server® 2016 Express with SP3 GDR (64-bit)
Supported Operating Systems for Metasys Site Management Portal Client Computer	Windows® 10 Pro and Windows 10 Enterprise Editions versions 21H2, 22H2 (64-bit). For all future Windows 10 updates after version 22H2, Johnson Controls will evaluate and certify that Metasys software can support the updates before we provide guidance on support. Apple® macOS® 11 Big Sur Apple® macOS® 10.15 Catalina Apple® macOS® 10.14 Mojave

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Table 4: Application and Data Server (ADS) system requirements (5 Users)

Supported Web Browser Software for Metasys Site Management Portal Client Computers	Apple® Safari® 15 or later ⓘ **Notes:** • In OS X, you cannot view Graphics+ graphics in the Site Management Portal UI. • You use the web browser to download the Launcher application. After you install the Launcher application, you use the Launcher, not the web browser, to log in to the Site Management Portal (SMP) UI.
Supported Web Browser Software for Metasys UI Client Devices	Microsoft® Edge® version 100 or later Google® Chrome™ version 100 or later ⓘ **Note:** Metasys UI does not support Incognito mode. To exit Incognito mode, click or tap the **X** icon of the browser window or tab and then open a new browser window or tab. For more information on Incognito mode in Google Chrome, click here. Apple® Safari® 15 or later ⓘ **Note:** Metasys UI does not support private browsing. To exit private browsing, click or tap **Private** in the browser window. Other web browsers, such as Mozilla® Firefox®, are not officially supported by the UI. However, the Metasys UI may appear and function appropriately in these web browsers.
Supported Virtual Environments	Microsoft Hyper-V™ VMware®
Supported User Interfaces	Metasys UI Site Management Portal (SMP) ⓘ **Note:** SMP requires a license at Release 12.0 and later. The license is available only to existing Metasys customers.
Additional Software Included with the ADS Software Download	Launcher software, Summary Definition Examples, Microsoft .NET Framework (multiple versions), SQL Server Management Studio, Metasys Database Manager, SNMP Management Information Base example files (MIBs), Report Viewer 2010 and Report Viewer 2012.
Optional Hardware	Any network or local printer supported by the qualified Windows operating system
Optional Software	CCT software SCT software Metasys Export Utility software

1 Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable. Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for more information regarding computer/server recommendations.
2 For best performance, use Serial Attached SCSI (SAS) hard drives, not Small Computer System Interface (SCSI) hard drives.
3 For best performance, use the maximum amount of memory that the computer allows.
4 Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for specific Microsoft Windows operating system settings that may be required for your Metasys system configuration.

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Extended Application and Data Server system requirements (Unified 10 or 25 User ADX)

Use the following recommendations for small sites and small to medium sites.

Table 5: Extended Application and Data Server system requirements (Unified ADX Systems, 10 or 25 Users)

Recommended Server Platform[1]	**Processor for small sites:** Intel® Xeon® Gold 5222 3.8 GHz, 4 cores/8 threads, 10.4GT/s, 16.5M Cache, Turbo, HT (105W) DDR4-2933 **or** Intel® Xeon® Gold 6244 3.6 GHz, 8 cores/16 threads, 10.4GT/s, 24.75M Cache, Turbo, HT (150W) DDR4-2933 **Processor for small to medium sites:** Intel® Xeon® Gold 5222 3.8 GHz, 4 cores/8 threads, 10.4GT/s, 16.5M Cache, Turbo, HT (105W) DDR4-2933 and recommended second processor type is Intel® Xeon® Gold 5222 3.8 GHz, 4 cores/8 threads, 10.4GT/s, 16.5M Cache, Turbo, HT (105W) DDR4-2933 **Hard drive:** 2 x 960 GB SSD SATA Mix Use 6Gbps 512 2.5in Hot-plug Drive (RAID 1)[2] with 40 GB free space after installation of all prerequisite software and before installation of ADS software. Configure RAID 1 (mirroring) with disk write-caching turned on. If you use a VM, allocate at least 100-150 GB of storage to the Database files. You can increase the storage over time as the databases grow. ⓘ **Note:** ADX prerequisite software includes the Windows operating system, SQL Server software, Windows .NET Framework, and any other software or SPs required by your ADX configuration.
Required Minimum Memory[3]	32 GB RDIMM, 2933MT/s, Dual Rank The VM host must have at least 8 GB of allocated RAM at all times. When you configure the VM, do not select the enable dynamic memory option.
Number of engines supported	For information about the number of engines supported, refer to the table labeled *Maximum number of network engines supported based on Metasys Server type and Server size* in the *Metasys System Configuration Guide (LIT-12011832)*.
Number of Site Management Portal users supported	**For small sites:** Up to 10 **For small to medium sites:** Up to 10
Number of Metasys UI users supported	**For small sites:** Up to 15 **For small to medium sites:** Up to 25

Table 5: Extended Application and Data Server system requirements (Unified ADX Systems, 10 or 25 Users)

Supported Operating Systems[4] and Database Software	Windows® Server® 2019 (version 1809 or later) (64-bit) Supports: • SQL Server® 2019 with CU19 (64-bit) ⓘ **Note:** SQL Server 2019 may cause the configuration service cache that builds stored procedures to time out. This causes the user's login to Metasys UI to fail. To resolve this issue, set SQL Server 2019 databases to run in 2017 compatibility mode. For more information, refer to docs.microsoft.com ⓘ **Note:** Metasys Advanced Reporting System does not support SQL Server 2019. • SQL Server® 2017 with CU31 (64-bit) • SQL Server® 2016 with SP3 GDR (64-bit)
	Windows® Server® 2016 (version 1607 or later) (64-bit) Supports: • SQL Server® 2019 with CU19 (64-bit) ⓘ **Note:** SQL Server 2019 may cause the configuration service cache that builds stored procedures to time out. This causes the user's login to Metasys UI to fail. To resolve this issue, set SQL Server 2019 databases to run in 2017 compatibility mode. For more information, refer to docs.microsoft.com ⓘ **Note:** Metasys Advanced Reporting System does not support SQL Server 2019. • SQL Server® 2017 with CU31 (64-bit) • SQL Server® 2016 with SP3 GDR (64-bit)
Supported Operating Systems for Metasys Site Management Portal Client Computer	Windows® 10 Pro and Windows 10 Enterprise Editions versions 21H2, 22H2 (64-bit). For all future Windows 10 updates after version 22H2, Johnson Controls will evaluate and certify that Metasys software can support the updates before we provide guidance on support. Apple® macOS® 11 Big Sur Apple® macOS® 12 Monterey Apple® macOS® 13 Ventura
Supported Web Browser Software for Metasys Site Management Portal Client Computers	Apple® Safari® 15 or later ⓘ **Notes:** • In OS X, you cannot view Graphics+ graphics in the Site Management Portal UI. • You use the web browser to download the Launcher application. After you install the Launcher application, you use the Launcher, not the web browser, to log in to the Site Management Portal (SMP) UI.

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Table 5: Extended Application and Data Server system requirements (Unified ADX Systems, 10 or 25 Users)

Supported Web Browser Software for Metasys UI Client Devices	Microsoft® Edge® version 100 or later Google® Chrome™ version 100 or later ⓘ **Note:** Metasys UI does not support incognito mode. To exit incognito mode, click or tap the **X** icon of the browser window or tab and then open a new browser window or tab. For more information on incognito mode in Google Chrome, click here. Apple® Safari® 15 or later ⓘ **Note:** Metasys UI does not support private browsing. To exit private browsing, click or tap **Private** in the browser window. Other web browsers, such as Mozilla® Firefox®, are not officially supported by the UI. However, the Metasys UI may appear and function appropriately in these web browsers.
Supported Virtual Environments	Microsoft Hyper-V™ VMware®
Supported User Interfaces	Site Management Portal (SMP) ⓘ **Note:** For non-MVE sites at Release 12.0 or later, SMP requires a license. The license is available only to existing Metasys customers. On MVE sites, SMP does not require a license. The MVE license includes SMP UI access. Metasys UI
Additional Software Included with the ADX Software Download	Microsoft .NET Framework 4.7.2 Microsoft .NET 6.0.6 Launcher Software Metasys Database Manager software Metasys Advanced Reporting System software RabbitMQ Server 3.8.16 Erlang OTP 23.2 (11.1.4) ⓘ **Note:** The Metasys Advanced Reporting System requires an ADX. The SCT computer must be online and accessible to the ADX at all times.
Optional Hardware	Any network or local printer supported by the qualified Windows operating system
Optional Software	Graphic Generation Tool CCT Software SCT Software Metasys Export Utility

1 Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable. Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for more information regarding computer/server recommendations.
2 For best performance, use SSD (preferred) or SAS hard drives (not SATA hard drives) that use RAID controllers with write-caching enabled.
3 For best performance, use the maximum amount of memory. An ADX with 32 GB RAM has much greater performance than an ADX with only 16 GB RAM.
4 Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for specific Microsoft Windows operating system settings that may be required for your Metasys system configuration.

For SQL Server software, you must purchase SQL Server software licenses per the guidelines listed here: SQL Server 2019, SQL Server 2017, and SQL Server 2016.

Extended Application and Data Server system requirements (Unified 50 or 100 User ADX)

Use the following recommendations for medium to large sites and large sites.

Table 6: Extended Application and Data Server system requirements (Unified ADX Systems, 50 or 100 Users)

Recommended Server Platform [1]	**Processor for medium to large sites:** Intel® Xeon®Gold 5222 3.8GHz, 4 cores/8 threads, 10.4GT/s, 16.5M Cache, Turbo, HT (105W) DDR4-2933 and the recommended second processor type is Intel® Xeon® Gold 5222 3.8GHz, 4 cores/8 threads, 10.4GT/s, 16.5M Cache, Turbo, HT (105W) DDR4-2933 **Processor for large sites:** Intel® Xeon® Gold 6244 3.6GHz, 8 cores/16 threads, 10.4GT/s, 24.75M Cache, Turbo, HT (150W) DDR4-2933 and the recommended second processor type is Intel® Xeon® Gold 5222 3.8GHz, 4 cores/8 threads, 10.4GT/s, 16.5M Cache, Turbo, HT (105W) DDR4-2933 **Hard drive for medium to large sites:** 2 x 960GB SSD SATA Mix Use 6Gbps 512 2.5in Hot-plug Drive (RAID 1)[2] with 50 GB free space after installation of all prerequisite software and before installation of ADS software. Configure RAID 1 (mirroring) with disk write-caching turned on **Hard drive for large sites:** 2 x 960GB SSD SAS Mixed use 12Gbps 512e 2.5in Hot-Plug PM5-V Drive, 3 DWPD, 5256 TBW (RAID 1) [2] with 50 GB free space after installation of all prerequisite software and before installation of ADS software. Configure RAID 1 (mirroring) with disk write-caching turned on If you use a VM, allocate at least 100-150 GB of storage to the Database files. You can increase the storage over time as the databases grow. PERC H730P RAID Controller, 2GB NV Cache, Minicard **Note:** ADX prerequisite software includes the Windows operating system, SQL Server software, Windows .NET Framework, and any other software or SPs required by your ADX configuration.
Required Minimum Memory[3]	64 GB RDIMM, 2933MT/s, Dual Rank The VM host must have at least 8 GB of allocated RAM at all times. When you configure the VM, do not select the enable dynamic memory option.
Number of engines supported	For information about the number of engines supported, refer to the table labeled *Maximum number of network engines supported based on Metasys Server type and Server size* in the *Metasys System Configuration Guide (LIT-12011832)*.
Number of Site Management Portal users supported	**For medium to large sites:** Up to 25 **For large sites:** Up to 100
Number of Metasys UI users supported	**For medium to large sites:** Up to 50 **For large sites:** Up to 50

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Table 6: Extended Application and Data Server system requirements (Unified ADX Systems, 50 or 100 Users)

Supported Operating Systems[4] and Database Software	Windows® Server® 2019 (version 1809 or later) (64-bit) Supports: • SQL Server® 2019 with CU19 (64-bit) ⓘ **Note:** SQL Server 2019 may cause the configuration service cache that builds stored procedures to time out. This causes the user's login to Metasys UI to fail. To resolve this issue, set SQL Server 2019 databases to run in 2017 compatibility mode. For more information, refer to docs.microsoft.com ⓘ **Note:** Metasys Advanced Reporting System does not support SQL Server 2019. • SQL Server® 2017 with CU31 (64-bit) • SQL Server® 2016 with SP3 GDR (64-bit)
	Windows® Server® 2016 (version 1607 or later) (64-bit) Supports: • SQL Server® 2019 with CU19 (64-bit) ⓘ **Note:** SQL Server 2019 may cause the configuration service cache that builds stored procedures to time out. This causes the user's login to Metasys UI to fail. To resolve this issue, set SQL Server 2019 databases to run in 2017 compatibility mode. For more information, refer to docs.microsoft.com ⓘ **Note:** Metasys Advanced Reporting System does not support SQL Server 2019. • SQL Server® 2017 with CU31 (64-bit) • SQL Server® 2016 with SP3 GDR (64-bit)
Supported Operating Systems for Metasys Site Management Portal Client Computer	Windows® 10 Pro and Windows 10 Enterprise Editions versions 21H2, 22H2 (64-bit). For all future Windows 10 updates after version 22H2, Johnson Controls will evaluate and certify that Metasys software can support the updates before we provide guidance on support. Apple® macOS® 11 Big Sur Apple® macOS® 12 Monterey Apple® macOS® 13 Ventura
Supported Web Browser Software for Metasys Site Management Portal Client Computers	Apple® Safari® 15 or later ⓘ **Notes:** • In OS X, you cannot view Graphics+ graphics in the Site Management Portal UI. • You use the web browser to download the Launcher application. After you install the Launcher application, you use the Launcher, not the web browser, to log in to the Site Management Portal (SMP) UI.

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Table 6: Extended Application and Data Server system requirements (Unified ADX Systems, 50 or 100 Users)

Supported Web Browser Software for Metasys UI Client Devices	Microsoft® Edge® version 100 or later Google® Chrome™ version 100 or later ⓘ **Note:** Metasys UI does not support incognito mode. To exit incognito mode, click or tap the **X** icon of the browser window or tab and then open a new browser window or tab. For more information on incognito mode in Google Chrome, click here. Apple® Safari® 15 or later ⓘ **Note:** Metasys UI does not support private browsing. To exit private browsing, click or tap **Private** in the browser window. Other web browsers, such as Mozilla® Firefox®, are not officially supported by the UI. However, the Metasys UI may appear and function appropriately in these web browsers.
Supported Virtual Environments	Microsoft Hyper-V™ VMware®
Supported User Interfaces	Site Management Portal (SMP) ⓘ **Note:** For non-MVE sites at Release 12.0 or later, SMP requires a license. The license is available only to existing Metasys customers. On MVE sites, SMP does not require a license. The MVE license includes SMP UI access. Metasys UI
Additional Software Included with the ADX Software Download	Microsoft .NET Framework 4.7.2 Microsoft .NET 6.0.6 Launcher Software Metasys Database Manager software Metasys Advanced Reporting System software RabbitMQ Server 3.8.16 Erlang OTP 23.2 (11.1.4) ⓘ **Note:** The Metasys Advanced Reporting System requires an ADX. The SCT computer must be online and accessible to the ADX at all times.
Optional Hardware	Any network or local printer supported by the qualified Windows operating system
Optional Software	Graphic Generation Tool CCT Software SCT Software Metasys Export Utility

1 Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable. Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for more information regarding computer/server recommendations.
2 For best performance, use SSD (preferred) or SAS hard drives (not SATA hard drives) that use RAID controllers with write-caching enabled.
3 For best performance, use the maximum amount of memory. An ADX with 64 GB RAM has much greater performance than an ADX with only 32 GB RAM.
4 Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for specific Microsoft Windows operating system settings that may be required for your Metasys system configuration.

For SQL Server software, you must purchase SQL Server software licenses per the guidelines listed here: SQL Server 2019, SQL Server 2017, and SQL Server 2016.

Extended Application and Data Server system requirements (Split 10 or 25 User ADX)

Use the following recommendations for medium to large sites.

Table 7: Extended Application and Data Server system requirements (Split ADX Systems, 10 or 25 Users)

Recommended Server Platform[1]	**Web/Application Server** Intel® Xeon® Gold 5222 3.8GHz, 4 cores/8 threads, 10.4GT/s, 16.5M Cache, Turbo, HT (105W) DDR4-2933 and the recommended second processor type is Intel® Xeon® Gold 5222 3.8GHz, 4 cores/8 threads, 10.4GT/s, 16.5M Cache, Turbo, HT (105W) DDR4-2933 2 x 960GB SSD SATA Mix Use 6Gbps 512 2.5in Hot-plug Drive (RAID 1)[2] with 50 GB free space after installation of all prerequisite software[3] and before installation of ADS software. Configure RAID 1 (mirroring) with disk write-caching turned on **Notes:** • Metasys Advanced Reporting System must reside on the ADX web/application server. • Metasys UI must reside on the ADX web/application server.
	Database Server Intel® Xeon® Gold 5222 3.8GHz, 4 cores/8 threads, 10.4GT/s, 16.5M Cache, Turbo, HT (105W) DDR4-2933 and the recommended second processor type is Intel® Xeon® Gold 5222 3.8GHz, 4 cores/8 threads, 10.4GT/s, 16.5M Cache, Turbo, HT (105W) DDR4-2933 2 x 960GB SSD SATA Mix Use 6Gbps 512 2.5in Hot-plug Drive (RAID 1) [2] with 50 GB free space after installation of all prerequisite software[3] and before installation of ADS software. Configure RAID 1 (mirroring) with disk write-caching turned on
	SCT Computer In a split configuration, you cannot install SCT on either the ADX web/application server computer or the ADX database server computer. Refer to the *System Configuration Tool Catalog Page (LIT-1900198)* for current SCT computer requirements.
Required Minimum Memory[4]	64 GB RDIMM, 2933MT/s, Dual Rank (web/application server and database server for 10 or 25 user ADX) The VM host must have at least 8 GB of allocated RAM at all times. When you configure the VM, do not select the enable dynamic memory option.
Number of engines supported	For information about the number of engines supported, refer to the table labeled *Maximum number of network engines supported based on Metasys Server type and Server size* in the *Metasys System Configuration Guide (LIT-12011832)*.
Number of Site Management Portal users supported	Up to 25
Number of Metasys UI users supported	Up to 25

Table 7: Extended Application and Data Server system requirements (Split ADX Systems, 10 or 25 Users)

Supported Operating Systems[5,6] with Supported Database Software	Windows® Server® 2019 (version 1809 or later) (64-bit) Supports: • SQL Server® 2019 with CU19 (64-bit) ⓘ **Note:** SQL Server 2019 may cause the configuration service cache that builds stored procedures to time out. This causes the user's login to Metasys UI to fail. To resolve this issue, set SQL Server 2019 databases to run in 2017 compatibility mode. For more information, refer to docs.microsoft.com ⓘ **Note:** Metasys Advanced Reporting System does not support SQL Server 2019. • SQL Server® 2017 with CU31 (64-bit) • SQL Server® 2016 with SP3 GDR (64-bit)
	Windows® Server® 2016 (version 1607 or later) (64-bit) Supports: • SQL Server® 2019 with CU19 (64-bit) ⓘ **Note:** SQL Server 2019 may cause the configuration service cache that builds stored procedures to time out. This causes the user's login to Metasys UI to fail. To resolve this issue, set SQL Server 2019 databases to run in 2017 compatibility mode. For more information, refer to docs.microsoft.com ⓘ **Note:** Metasys Advanced Reporting System does not support SQL Server 2019. • SQL Server® 2017 with CU31 (64-bit) • SQL Server® 2016 with SP3 GDR (64-bit)
Supported Operating Systems for Metasys Site Management Portal Client Computer	Windows® 10 Pro and Windows 10 Enterprise Editions versions 21H2, 22H2 (64-bit). For all future Windows 10 updates after version 22H2, Johnson Controls will evaluate and certify that Metasys software can support the updates before we provide guidance on support. Apple® macOS® 11 Big Sur Apple® macOS® 12 Monterey Apple® macOS® 13 Ventura
Supported Web Browser Software for Metasys Site Management Portal Client Computers	Apple® Safari® 15 or later ⓘ **Notes:** • In OS X, you cannot view Graphics+ graphics in the Site Management Portal UI. • You use the web browser to download the Launcher application. After you install the Launcher application, you use the Launcher, not the web browser, to log in to the Site Management Portal (SMP) UI.

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Table 7: Extended Application and Data Server system requirements (Split ADX Systems, 10 or 25 Users)

Supported Web Browser Software for Metasys UI Client Devices	Microsoft® Edge® version 100 or later Google® Chrome™ version 100 or later ⓘ **Note:** Metasys UI does not support incognito mode. To exit incognito mode, click or tap the **X** icon of the browser window or tab and then open a new browser window or tab. For more information on incognito mode in Google Chrome, click here. Apple® Safari® 15 or later ⓘ **Note:** Metasys UI does not support private browsing. To exit private browsing, click or tap **Private** in the browser window. Other web browsers, such as Mozilla® Firefox®, are not officially supported by the UI. However, the Metasys UI may appear and function appropriately in these web browsers.
Supported Virtual Environments	Microsoft Hyper-V™ VMware®
Supported User Interfaces	Site Management Portal (SMP) ⓘ **Note:** For non-MVE sites at Release 12.0 or later, SMP requires a license. The license is available only to existing Metasys customers. On MVE sites, SMP does not require a license. The MVE license includes SMP UI access. Metasys UI
Additional Software Included with the ADX Software Download	Microsoft .NET Framework 4.7.2 Microsoft .NET 6.0.6 Launcher Software Metasys Database Manager software Metasys Advanced Reporting System software RabbitMQ Server 3.8.16 Erlang OTP 23.2 (11.1.4) ⓘ **Note:** The Metasys Advanced Reporting System requires an ADX. The SCT computer must be online and accessible to the ADX at all times.
Optional Hardware	Any network or local printer supported by the qualified Windows operating system
Optional Software	Graphic Generation Tool CCT Software SCT Software Metasys Export Utility

1 Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable. Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for more information regarding computer/server recommendations.
2 For best performance, use SSD (preferred) or SAS hard drives (not SATA hard drives) that use RAID controllers with write-caching enabled.
3 ADX prerequisite software includes the Windows operating system and SQL Server software, Windows .NET Framework, and any other software or service packs required for your ADX configuration.
4 For best performance, use the maximum amount of memory.
5 The web/application and database servers must have the same operating system installed.
6 Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for specific Microsoft Windows operating system settings that may be required for your Metasys system configuration.

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For SQL Server software, you must purchase SQL Server software licenses per the guidelines listed here: SQL Server 2019, SQL Server 2017, and SQL Server 2016.

Extended Application and Data Server system requirements (Split 50 or 100 User ADX)

Use the following recommendations for large to extra large sites and for extra large sites.

Table 8: Extended Application and Data Server system requirements (Split ADX System, 50 or 100 Users)

Recommended Server Platform[1]	**Web/Application Server** **Processor for large to extra large sites:** Intel® Xeon® Gold 6244 3.6GHz, 8 cores/16 threads, 10.4GT/s, 24.75M Cache, Turbo, HT (150W) DDR4-2933 and the recommended second processor type is Intel® Xeon® Gold 6244 3.6GHz, 8 cores/16 threads, 10.4GT/s, 24.75M Cache, Turbo, HT (150W) DDR4-2933 **Processor for extra large sites:** Intel® Xeon® Gold 6136 3.0GHz, 12 cores/24 threads, 10.4GT/s, 24.75M Cache, Turbo, HT (150W) DDR4-2666 and the recommended second processor type is Intel® Xeon® Gold 6136 3.0GHz, 12 cores/24 threads, 10.4GT/s, 24.75M Cache, Turbo, HT (150W) DDR4-2666 **Hard drive for large to extra large sites:** 960GB SSD SAS Mixed use 12Gbps 512e 2.5in Hot-Plug PM5-V Drive, 3 DWPD, 5256 TBW (RAID 5)[2] with 50 GB free space after installation of all prerequisite software[3] and before installation of ADS software. Configure RAID 5 with disk write-caching turned on. Use a minimum of three hard drives for RAID 5 or a minimum of four hard drives for RAID 10. **Hard drive for extra large sites:** 960GB SSD SAS Mixed use 12Gbps 512e 2.5in Hot-Plug PM5-V Drive, 3 DWPD, 5256 TBW (RAID 5) [2] with 50 GB free space after installation of all prerequisite software[3] and before installation of ADS software. Configure RAID 5 with disk write-caching turned on. Use a minimum of three hard drives for RAID 5 or a minimum of four hard drives for RAID 10. PERC H730P RAID Controller, 2GB NV Cache, Minicard ⓘ **Notes:** • Metasys Advanced Reporting System must reside on the ADX web/application server. • Metasys UI must reside on the ADX web/application server.

Table 8: Extended Application and Data Server system requirements (Split ADX System, 50 or 100 Users)

Recommended Server Platform	**Database Server** **Processor for large to extra large sites:** Intel® Xeon® Gold 6244 3.6GHz, 8 cores/16 threads, 10.4GT/s, 24.75M Cache, Turbo, HT (150W) DDR4-2933 and the recommended second processor type is Intel® Xeon® Gold 6244 3.6GHz, 8 cores/16 threads, 10.4GT/s, 24.75M Cache, Turbo, HT (150W) DDR4-2933 **Processor for extra large sites:** Intel® Xeon® Gold 6136 3.0GHz, 12 cores/24 threads, 10.4GT/s, 24.75M Cache, Turbo, HT (150W) DDR4-2666 and the recommended second processor type is Intel® Xeon® Gold 6136 3.0GHz, 12 cores/24 threads, 10.4GT/s, 24.75M Cache, Turbo, HT (150W) DDR4-2666 **Hard drive for large to extra large sites:** 960GB SSD SAS Mixed use 12Gbps 512e 2.5in Hot-Plug PM5-V Drive, 3 DWPD, 5256 TBW (RAID 5) [2] with 50 GB free space after installation of all prerequisite software[3] and before installation of ADS software. Configure RAID 5 with disk write-caching turned on. Use a minimum of three hard drives for RAID 5 or a minimum of four hard drives for RAID 10. **Hard drive for extra large sites:** 960GB SSD SAS Mixed use 12Gbps 512e 2.5in Hot-Plug PM5-V Drive, 3 DWPD, 5256 TBW (RAID 5) [2] with 50 GB free space after installation of all prerequisite software[3] and before installation of ADS software. Configure RAID 5 with disk write-caching turned on. Use a minimum of three hard drives for RAID 5 or a minimum of four hard drives for RAID 10. PERC H730P RAID Controller, 2GB NV Cache, Minicard
Recommended Server Platform	**SCT Computer** In a split configuration, you cannot install SCT on either the ADX web/application server computer or the ADX database server computer. Refer to the *System Configuration Tool Catalog Page (LIT-1900198)* for current SCT computer requirements.
Required Minimum Memory[4]	**For large to extra large sites:** 64 GB RDIMM, 2933MT/s, Dual Rank **For extra large sites:** 64 to 128 GB RDIMM, 2933MT/s, Dual Rank The VM host must have at least 8 GB of allocated RAM at all times. When you configure the VM, do not select the enable dynamic memory option.
Number of engines supported	For information about the number of engines supported, refer to the table labeled *Maximum number of network engines supported based on Metasys Server type and Server size* in the *Metasys System Configuration Guide (LIT-12011832)*.
Number of Site Management Portal users supported	**For large to extra large sites:** Up to 50 **For extra large sites:** Up to 100
Number of Metasys UI users supported	**For large to extra large sites:** Up to 50 **For extra large sites:** Up to 50

Table 8: Extended Application and Data Server system requirements (Split ADX System, 50 or 100 Users)

Supported Operating Systems and Database Software[5,6]	Windows® Server® 2019 (version 1809 or later) (64-bit) Supports: • SQL Server® 2019 with CU19 (64-bit) ⓘ **Note:** SQL Server 2019 may cause the configuration service cache that builds stored procedures to time out. This causes the user's login to Metasys UI to fail. To resolve this issue, set SQL Server 2019 databases to run in 2017 compatibility mode. For more information, refer to docs.microsoft.com ⓘ **Note:** Metasys Advanced Reporting System does not support SQL Server 2019. • SQL Server® 2017 with CU31 (64-bit) • SQL Server® 2016 with SP3 GDR (64-bit)
	Windows® Server® 2016 (version 1607 or later) (64-bit) Supports: • SQL Server® 2019 with CU19 (64-bit) ⓘ **Note:** SQL Server 2019 may cause the configuration service cache that builds stored procedures to time out. This causes the user's login to Metasys UI to fail. To resolve this issue, set SQL Server 2019 databases to run in 2017 compatibility mode. For more information, refer to docs.microsoft.com ⓘ **Note:** Metasys Advanced Reporting System does not support SQL Server 2019. • SQL Server® 2017 with CU31 (64-bit) • SQL Server® 2016 with SP3 GDR (64-bit)
Supported Operating Systems for Metasys Site Management Portal Client Computer	Windows® 10 Pro and Windows 10 Enterprise Editions versions 21H2, 22H2 (64-bit). For all future Windows 10 updates after version 22H2, Johnson Controls will evaluate and certify that Metasys software can support the updates before we provide guidance on support. Apple® macOS® 11 Big Sur Apple® macOS® 12 Monterey Apple® macOS® 13 Ventura
Supported Web Browser Software for Metasys Site Management Portal Client Computers	Apple® Safari® 15 or later ⓘ **Notes:** • In OS X, you cannot view Graphics+ graphics in the Site Management Portal UI. • You use the web browser to download the Launcher application. After you install the Launcher application, you use the Launcher, not the web browser, to log in to the Site Management Portal (SMP) UI.

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Table 8: Extended Application and Data Server system requirements (Split ADX System, 50 or 100 Users)

Supported Web Browser Software for Metasys UI Client Devices	Microsoft® Edge® version 100 or later Google® Chrome™ version 100 or later ⓘ **Note:** Metasys UI does not support incognito mode. To exit incognito mode, click or tap the **X** icon of the browser window or tab and then open a new browser window or tab. For more information on incognito mode in Google Chrome, click here. Apple® Safari® 15 or later ⓘ **Note:** Metasys UI does not support private browsing. To exit private browsing, click or tap **Private** in the browser window. Other web browsers, such as Mozilla® Firefox®, are not officially supported by the UI. However, the Metasys UI may appear and function appropriately in these web browsers.
Supported Virtual Environments	Microsoft Hyper-V™ VMware®
Supported User Interfaces	Site Management Portal (SMP) ⓘ **Note:** For non-MVE sites at Release 12.0 or later, SMP requires a license. The license is available only to existing Metasys customers. On MVE sites, SMP does not require a license. The MVE license includes SMP UI access. Metasys UI
Additional Software Included with the ADX Software Download	Microsoft .NET Framework 4.7.2 Microsoft .NET 6.0.6 Launcher Software Metasys Database Manager software Metasys Advanced Reporting System software RabbitMQ Server 3.8.16 Erlang OTP 23.2 (11.1.4) ⓘ **Note:** The Metasys Advanced Reporting System requires an ADX. The SCT computer must be online and accessible to the ADX at all times.
Optional Hardware	Any network or local printer supported by the qualified Windows operating system
Optional Software	Graphic Generation Tool CCT Software SCT Software Metasys Export Utility

1 Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable. Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for more information regarding computer/server recommendations.
2 For best performance, use SSD (preferred) or SAS hard drives (not SATA hard drives) that use RAID controllers with write-caching enabled.
3 ADX prerequisite software includes the Windows operating system and SQL Server software, Windows .NET Framework, and any other software or service packs required for your ADX configuration.
4 For best performance, use the maximum amount of memory. An ADX with 64 GB RAM has much greater performance than an ADX with only 32 GB RAM.
5 The web/application and database servers must have the same operating system installed.
6 Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for specific Microsoft Windows operating system settings that may be required for your Metasys system configuration.

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For SQL Server software, you must purchase SQL Server software licenses per the guidelines listed here: SQL Server 2019, SQL Server 2017, and SQL Server 2016.

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

Software terms

Use of the software that is in (or constitutes) this product, or access to the cloud, or hosted services applicable to this product, if any, is subject to applicable end-user license, open-source software information, and other terms set forth at www.johnsoncontrols.com/techterms. Your use of this product constitutes an agreement to such terms.

Patents

Patents: https://jcipat.com

Contact information

Contact your local Johnson Controls representative:
www.johnsoncontrols.com/locations
Contact Johnson Controls:
www.johnsoncontrols.com/contact-us

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Description

Figure 1: NS8000 Series Network Sensor models

The NS Series Network Sensors function directly with Metasys® system Field Equipment Controllers (FECs), Metasys Network and Control Engines (NCEs), Advanced Application Field Equipment Controller (FACs), Metasys VAV Box Equipment Controllers (CVM) and General Purpose Application Controllers (CGM), VAV Modular Assembly (VMA16) Controllers, and Facility Explorer™ FX-PC Series Programmable Controllers (FX-PCGs, FX-PCVs, and FX-PCXs). The sensors are also compatible with Verasys® and Johnson Controls® Smart Equipment.

The NS Series Network Sensors monitor zone temperature, relative humidity (RH), carbon dioxide (CO_2), motion, and local temperature setpoint adjustments. The sensor transmits this data to a controller on the Sensor/Actuator (SA) bus.

Some NS Series Network Sensors models include an onboard passive infrared (PIR) occupancy sensor that detects motion to determine if a space is occupied. This feature maximizes up to 30% energy savings in high-energy usage environments such as schools, dormitories, offices, hospitals, and hotels by adjusting the temperature of the space based on the occupancy status. In addition, the PIR occupancy sensor facilitates trending of floor space usage in these environments.

Display models of the NS Series Network Sensors are available with a backlit LCD fixed segment display or a full color graphical LCD interface. These models allow the user to view zone temperature, RH, CO_2, and adjust the zone temperature setpoint and fan speed. Graphical models provide a summary of sensor values at the base of the display. Fixed segment models have the capability to set the default display to temperature, RH, or temperature setpoint.

The user can also choose between degrees Fahrenheit (F) and degrees Celsius (C). To prevent tampering with the sensor, display models also include a screen lockout feature. The graphical display enables the user to choose between a light or dark color theme and to set the sleep mode to dim or turn off.

Some models also have a Warmer/Cooler interface to adjust the zone temperature. Instead of a display, these models have two cap touch buttons with seven LED lights that represent the current setpoint.The display models include the following fan speeds: automatic, off, low, medium, or high.

Interaction with the sensor sets the occupancy override function to signal to the controller that the zone is occupied and to override the scheduled mode. The full color graphical LCD models use the

graphical user interface to set a unique BACnet® address for applications that require multiple sensors. Other models have DIP switches to set a unique address for applications that require multiple sensors. All models ship standard with modular phone jacks and screw terminals to terminate wiring connecting the sensors to the controller.

ⓘ **Note:** To connect the NS Series Network Sensor to the same SA bus segment, use only one of the two connection methods, either the modular phone jack or the screw terminals.

Each network sensor includes a SA bus access port, allowing for accessories to connect to the SA bus. Through this connector, the user can use accessories to service or commission the connected controller or gain access to any other controller on the same field controller (FC) bus.

ⓘ **Note:** Device programming for the NS8000 sensor connected to the controller does not include balancing functionality and features.

The NS Series Network Sensors can be surface mounted or vertical wallbox mounted to meet the requirements of the specific application. All display models are optimized for the California Energy Code (Title 24). To suit specific architectural and interior design needs, the models come with either black or white enclosures.

Modern enclosures in black or white design themes are available in the following styles:

- LCD fixed segment and LCD full color graphical displays: view zone temperature, RH, CO_2, occupancy status, and adjust the zone temperature setpoint and fan speed. These models have the capability to set the default display to temperature, RH, or temperature setpoint. On these display models, you can also choose between degrees Fahrenheit (F) and degrees Celsius (C).
- Warmer/Cooler interface: this interface incorporates cap touch buttons with seven LED lights that represent the current setpoint status.
- No display: the NS Series Network Sensors are available in high gloss black or white with or without the Johnson Controls logo.
- All sensors are serialized for quality and warranty purposes. Based on the serial number, the user can obtain factory calibration certificates.

ⓘ **Note:** The LCD full color graphical models are only available in white. See Table 1 through Table 6 for ordering information.

Refer to the *NS 8000 Series Network Sensors Product Bulletin (LIT-12013113)* for important product application and single point of contact information.

Features and benefits

- BACnet MS/TP protocol communication: provides compatibility with Metasys system field controllers, Facility Explorer programmable controllers as well as Verasys and Johnson Controls Smart Equipment in a proven communication network.
- Single and multifunctional sensors: choose temperature, RH, CO_2, and occupancy sensing depending on HVAC needs.
- Large backlit LCD fixed segment display or LCD full color graphical display on some models: provides real-time status of the environment with backlighting activated during user interaction.
- Simple temperature setpoint adjustment or Warmer/Cooler mode available on display models: configure simple setpoint adjustment or Warmer/Cooler mode.
- Onboard occupancy sensor available on PIR models: maximizes up to 30% energy savings in high-energy usage environments, and facilitates trending of floor space usage.

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- Temporary occupancy included on all display and Warmer/Cooler models: provides a timed override command, which initiates a temporary occupancy state.
- Field-selectable default display setting on display models: toggle between temperature, RH or temperature setpoint on the display, and set the desired default for continuous viewing.
- Fahrenheit/Celsius (°F/°C) selectable on display models: display temperature in degrees Fahrenheit or degrees Celsius.
- All display models meet California Energy Code (Title 24): displays the required State of California Title 24 economizer fault conditions.
- All display models include a screen lockout: prevents sensor tampering.
- Serialized sensors and calibration certificates: obtain factory calibration certificates for all models.

Repair information

If the NS Series Network Sensor fails to operate within its specifications, replace the unit. For a replacement sensor, contact the nearest Johnson Controls representative.

Ordering information

See Table 1 through Table 6 for the various NS Series Network Sensor models available. See Table 7 for accessories.

Note: Product codes marked with an asterisk are made in America to meet the Buy American Standard.

Important: The NS Series Network Sensor is intended to provide an input to equipment under normal operating conditions. Where failure or malfunction of the network sensor could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the network sensor.

Note: Keep the Metasys system software up to date as some NS Series Network Sensor features are not supported in previous releases of Metasys, Facility Explorer, Verasys, or Johnson Controls Smart Equipment system software.

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Selection charts

Table 1: NS Series Network Sensor ordering information: temperature, humidity and CO_2 models (3% RH)

Product code number	Display and interface information	Johnson Controls logo	Color	PIR occupancy sensor
NSB8BHC040-0	No display	Yes	White	No
NSB8BHC041-0		No	White	No
NSB8BHC042-0		Yes	Black	No
NSB8BHC043-0		No	Black	No
NSB8MHC040-0		Yes	White	Yes
NSB8MHC041-0		No	White	Yes
NSB8MHC042-0		Yes	Black	Yes
NSB8MHC043-0		No	Black	Yes
NSB8BHC040-0G*		Yes	White	No
NSB8MHC040-0G*		Yes	White	Yes
NSB8BHC240-0	Fixed segment display	Yes	White	No
NSB8BHC241-0		No	White	No
NSB8BHC242-0		Yes	Black	No
NSB8BHC243-0		No	Black	No
NSB8MHC240-0		Yes	White	Yes
NSB8MHC241-0		No	White	Yes
NSB8MHC242-0		Yes	Black	Yes
NSB8MHC243-0		No	Black	Yes
NSB8BHC240-0G*		Yes	White	No
NSB8MHC240-0G*		Yes	White	Yes
NSB8BHC140-0	Warmer/Cooler interface	Yes	White	No
NSB8BHC141-0		No	White	No
NSB8BHC340-0	Graphical user interface	Yes	White	No
NSB8BHC341-0		No	White	

Table 2: NS Series Network Sensor ordering information: temperature and humidity models (3% RH)

Product code number	Display and interface information	Johnson Controls logo	Color	PIR occupancy sensor
NSB8BHN240-0	Fixed segment display	Yes	White	No
NSB8BHN241-0		No	White	No
NSB8BHN242-0		Yes	Black	No
NSB8BHN243-0		No	Black	No
NSB8MHN240-0		Yes	White	Yes
NSB8MHN241-0		No	White	Yes
NSB8MHN242-0		Yes	Black	Yes
NSB8MHN243-0		No	Black	Yes
NSB8BHN240-0G*		Yes	White	No

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Table 2: NS Series Network Sensor ordering information: temperature and humidity models (3% RH)

Product code number	Display and interface information	Johnson Controls logo	Color	PIR occupancy sensor
NSB8BHN040-0	No display	Yes	White	No
NSB8BHN041-0		No	White	No
NSB8BHN042-0		Yes	Black	No
NSB8BHN043-0		No	Black	No
NSB8MHN040-0		Yes	White	Yes
NSB8MHN041-0		No	White	Yes
NSB8MHN042-0		Yes	Black	Yes
NSB8MHN043-0		No	Black	Yes
NSB8BHN040-0G*		Yes	White	No
NSB8BHN140-0	Warmer/Cooler interface	Yes	White	No
NSB8BHN141-0		No	White	No
NSB8BHN142-0		Yes	Black	No
NSB8BHN143-0		No	Black	No
NSB8BHN140-0G*		Yes	White	No
NSB8BHN340-0	Graphical user interface	Yes	White	No
NSB8BHN341-0		No	White	No

Table 3: NS Series Network Sensor ordering information: temperature and CO_2 models

Product code number	Display and interface information	Johnson Controls logo	Color	PIR occupancy sensor
NSB8BTC040-0	No display	Yes	White	No
NSB8BTC041-0		No	White	No
NSB8BTC042-0		Yes	Black	No
NSB8BTC043-0		No	Black	No
NSB8MTC040-0		Yes	White	Yes
NSB8MTC041-0		No	White	Yes
NSB8MTC042-0		Yes	Black	Yes
NSB8MTC043-0		No	Black	Yes
NSB8BTC040-0G*		Yes	White	No
NSB8MTN040-0G*		Yes	White	Yes
NSB8BTC240-0	Fixed segment display	Yes	White	No
NSB8BTC241-0		No	White	No
NSB8BTC242-0		Yes	Black	No
NSB8BTC243-0		No	Black	No
NSB8MTC240-0		Yes	White	Yes
NSB8MTC241-0		No	White	Yes
NSB8MTC242-0		Yes	Black	Yes
NSB8MTC243-0		No	Black	Yes
NSB8BTC240-0G*		Yes	White	No
NSB8BTC340-0	Graphical user interface	Yes	White	No
NSB8BTC341-0		No	White	No

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Table 4: NS Series Network Sensor ordering information: temperature only models

Product code number	Display and interface information	Johnson Controls logo	Color	PIR occupancy sensor
NSB8BTN240-0	Fixed segment display	Yes	White	No
NSB8BTN241-0		No	White	No
NSB8BTN242-0		Yes	Black	No
NSB8BTN243-0		No	Black	No
NSB8MTN240-0		Yes	White	Yes
NSB8MTN241-0		No	White	Yes
NSB8MTN242-0		Yes	Black	Yes
NSB8MTN243-0		No	Black	Yes
NSB8BTN240-0G*		Yes	White	No
NSB8MTN240-0G*		Yes	White	Yes
NSB8BTN040-0	No display	Yes	White	No
NSB8BTN041-0		No	White	No
NSB8BTN042-0		Yes	Black	No
NSB8BTN043-0		No	Black	No
NSB8MTN040-0		Yes	White	Yes
NSB8MTN041-0		No	White	Yes
NSB8MTN042-0		Yes	Black	Yes
NSB8MTN043-0		No	Black	Yes
NSB8BTN040-0G*		Yes	White	No
NSB8BTN140-0	Warmer/Cooler interface	Yes	White	No
NSB8BTN141-0		No	White	No
NSB8BTN142-0		Yes	Black	No
NSB8BTN143-0		No	Black	No
NSB8BTN140-0G*		Yes	White	No
NSB8BTN340-0	Graphical user interface	Yes	White	No
NSB8BTN341-0		No	White	No

Table 5: NS Series Network Sensor ordering information: CO_2 only models without display

Product code number	Johnson Controls logo	Color
NSB8BNC040-0	Yes	White
NSB8BNC041-0	No	White
NSB8BNC042-0	Yes	Black
NSB8BNC043-0	No	Black
NSB8BNC040-0G*	Yes	White

Table 6: NS Series Network Sensor ordering information: temperature and humidity models (2% RH)

Product code number	Display and interface information	Johnson Controls logo	Color
NSB8BPN240-0	Fixed segment display	Yes	White
NSB8BPN241-0		No	White
NSB8BPN242-0		Yes	Black
NSB8BPN243-0		No	Black
NSB8BPN240-0G*		Yes	White

Table 7: Accessories

Product code number	Description
NS-WALLPLATE-0	Wall plates fit seamlessly around the NS8000 Sensor models and enable you to mount a sensor where a larger one was previously mounted.

NS Sensors with fault code capability error codes

The fault indication comes through the network sensor bus when a network sensor is used in the zone. The LCD indicates the code number for all the required state of California Title 24 economizer fault conditions.

Display text	California Title 24 economizer fault condition	Possible problem
E00	Air temperature sensor failure/fault	Problem with one of the air temperature sensors. Check outdoor air, return air, or supply air sensors.
E01	Not economizing when it should	The economizer is not using outdoor air when it should.
E02	Economizing when it should not	The economizer is allowing outdoor air inside when the conditions are not suitable for economizer operation.
E03	Damper not modulating	The economizer damper is not able to modulate properly. Check damper, linkage to actuator, or the actuator.
E04	Excess outdoor air	The economizer is allowing excess outdoor air inside.

Technical specifications

Table 8: NS8000 Series Network Sensors technical specifications

Description			Specification
Supply voltage			9.8 VDC to 16.5 VDC 15 VDC nominal from SA bus
Current consumption	Base current draw, graphical models	Screen off	18 mA maximum, non-transmitting
		Screen on	45 mA maximum
	Base current draw, other models		3 mA maximum, non-transmitting
	CO_2 models	LCD graphical	13 mA maximum additional current during measurement
		Other models	15 mA maximum additional current during measurement

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Table 8: NS8000 Series Network Sensors technical specifications

Description			Specification
	Fixed segment display models - backlight on		10 mA additional current
	Warmer/Cooler models - LEDs on		8 mA additional current
	ⓘ **Note:** The MAP gateway is connected to the SA bus. SA bus applications are limited to a power load of 210 mA. The best practice when configuring an SA bus is to limit the total available operating power consumption to 120 mA or less. This power level enables you to connect a MAP Gateway temporarily or a DIS1710 Local Controller Display to the bus for commissioning, adjusting, and monitoring.		
Terminations	Modular jack and screw terminal block		
Network sensor addressing	LCD graphical display models		Configurable through graphical user interface
	Other models		DIP switch set from 199 to 206, factory set at 199
Wire size	Modular jack models		24 AWG or 26 AWG (0.5 mm or 0.4 mm diameter) Three twisted pairs, six conductors
	Screw terminal block models		18 AWG to 22 AWG (1 mm to 0.6 mm diameter) 22 AWG (0.6 mm) diameter
Communication rate			Auto-detect: 9.6 kbps, 19.2 kbps, 38.4 kbps, or 76.8 kbps
Temperature measurement range			32°F (0°C) to 104°F (40°C)
Temperature sensor type			Digital temperature sensor
Humidity sensor type			Thin film capacitive sensor
Ambient Conditions	Operating		32°F (0°C) to 122°F (50°C), 10% RH to 90% RH, noncondensing 85°F (29°C) maximum dew point
	Storage	Display models	-40°F (-40°C) to 122°F (50°C), 5% RH to 95% RH, noncondensing
		Non-display models	-40°F (-40°C) to 185°F (70°C), 5% RH to 95% RH, noncondensing
Temperature resolution	±0.5°F (±0.5°C)		
Temperature element accuracy	±0.36°F (±0.2°C) at 70°F (21°C)		
Humidity element accuracy	NSB8BPN24x-0 models		±2% RH for 20% RH to 80% RH at 50°F (10°C) to 95°F (35°C) ±4% RH for 10% RH to 20% RH and 80% RH to 90% RH at 50°F (10°C) to 95°F (35°C)
	NSB8BHxxxx-0 models		±3% RH for 20% RH to 80% RH at 50°F (10°C) to 95°F (35°C) ±6% RH for 10% RH to 20% RH and 80% RH to 90% RH at 50°F (10°C) to 95°F (35°C)
CO_2 measurement range	0 ppm to 2000 ppm		
CO_2 sensor accuracy	Accuracy		±30 ppm ±3% of CO_2 reading at 77°F (25°C) and 978 hPa (1,000 ft/300m)
	Temperature dependence		±1.4 ppm/°F (± 2.5 ppm/°C)
	Pressure dependence		Refer to the *NS8000 Series Network Sensors Installation Guide (24-11256-00007)* for CO_2 altitude compensation.
CO_2 sensor operation range			32°F (0°C) to 122°F (50°C)
Time constant			10 min nominal at 10 fpm airflow
Default temperature setpoint adjustment range			50°F (10°C) to 86°F (30°C) in 0.5° increments
CO_2 sensor lifespan			10 years under standard operating conditions
LCD lifespan for graphical display models			Screen timeout set to off > 10 years
			Screen timeout set to dim, at least 6 years

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Table 8: NS8000 Series Network Sensors technical specifications

Description		Specification
PIR occupancy sensor motion detection		Minimum 94 angular degrees up to a distance of 26 ft (8m) based on clear line of sight
Compliance	United States	UL Listed, File E107041, CCN PAZX,Under UL 60730-1, Energy Management Equipment
		FCC Compliant to CFR 47, Part 15, Subpart B, Class B
	Canada	cUL Listed, File E107041, CCN PAZX7,Under CAN/CSA E60730-1, Signal Equipment
		Industry Canada, ICES-003
CE	Europe	CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and RoHS Directive.
	Australia and New Zealand	RCM Mark, Australia/NZ Emissions Compliant
	China	RoHS2
Dimensions (H x W x D)		3.4 in. (85.3 mm) x 5 in. (127.55 mm) x 1.1 in. (26.8 mm)
Shipping weight		0.4 lb/0.18 kg

The performance specifications are nominal and conform to acceptable industry standard. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls shall not be liable for damages resulting from misapplication or misuse of its products.

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

Software terms

Use of the software that is in (or constitutes) this product, or access to the cloud, or hosted services applicable to this product, if any, is subject to applicable end-user license, open-source software information, and other terms set forth at www.johnsoncontrols.com/techterms. Your use of this product constitutes an agreement to such terms.

Patents

Patents: https://jcipat.com

Johnson Controls

Single point of contact

APAC	EU	UK	NA/SA
JOHNSON CONTROLS C/O CONTROLS PRODUCT MANAGEMENT NO. 32 CHANGJIANG RD NEW DISTRICT WUXI JIANGSU PROVINCE 214028 CHINA	JOHNSON CONTROLS VOLTAWEG 20 6101 XK ECHT THE NETHERLANDS	JOHNSON CONTROLS TYCO PARK GRIMSHAW LANE MANCHESTER M40 2WL UNITED KINGDOM	JOHNSON CONTROLS 5757 N GREEN BAY AVE. GLENDALE, WI 53209 USA

Contact information

Contact your local Johnson Controls representative: www.johnsoncontrols.com/locations
Contact Johnson Controls: www.johnsoncontrols.com/contact-us

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M4-CGM/XPM Series Standard Control Panel Assembly Catalog Page

2023-03-05

LIT-1901089

Description

The General Purpose Application MS/TP Controller (CGM) and Input/Output Expansion Module (XPM) control panel is a pre-wired, preassembled standard control panel that contains a CGM controller. Some models include an XPM Input/Output Expansion Module. This predesigned solution saves time and money by avoiding expensive and time-consuming field installations and inspections. In addition, you can tailor the assembly to a variety of common applications for additional savings.

The control panel is shipped complete and mounted in either a NEMA 1 or NEMA 3R steel enclosure. In addition to the controllers, every assembly contains a power supply incorporating a 5 A circuit breaker, a 96 VA 120/24 VAC transformer, and two 120 VAC outlets. Some models provide an optional second 96 VA 120/24 VAC transformer. A five- or ten-point 24 VAC distribution terminal block that allows for termination of additional field-mounted devices is also included. All models include a CGM04060 or CGM09090 controller, which communicates using BACnet® MS/TP or wireless Zigbee® networks and integrates with Johnson Controls® and third-party systems. Designated models also include an XPM Input/Output Expansion Module, an M4-DLK0350-0 remote door-mounted display, or terminal blocks. Some models offer additional space in the panel along with a section of DIN rail to mount relays, transducers or other approved ancillary devices.

Sub-panel assemblies are the complete internal portion of the panel without the enclosure. A subpanel contains all of the same components as a comparable standard panel but it is only the perforated sub-panel with all components already mounted. This is recommended if it is critical to reserve the panel mounting location in the designated installation area with an empty enclosure, and then add the subpanel at a later date.

For additional NEMA ratings, enclosure materials, and customizations, contact the Custom Panel Group at BE-CustomPanelGroup@jci.com.

Features

- Consistent layout for all standard control panel solutions simplifies installation and commissioning
- Power supply with resettable circuit breaker and transformer provides high- and low-voltage protection
- Space and DIN rail reserved for future component additions allow for easy field upgrades to the panel
- Prebuilt, prewired, and pretested in an ISO 9001:2015 manufacturing facility provides products of consistently high quality
- UL 508A-rated control panel, UL 50 enclosure, cUL - CAN/CSA C22.2 No. 14-05 meet local and national code requirements for the United States and Canada (cULus listed)
- California Office of Health Care Access Information (HCAI) Special Seismic Certification Preapproved control panel assembly meets standards for rigid and flexible mounting conditions to account for unit-mounted and remote-mounted applications.

  ⓘ **Note:** Subpanels are not available with seismic certification.

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- Controller with color-coded and clearly labeled screw terminals provides easily identifiable input/output

Repair information

If the M4-CGM/XPM Standard Control Panel Assembly fails to operate within its specifications, replace the unit. For a replacement assembly, contact the nearest Johnson Controls representative.

Components included

Table 1: Components included

Quantity	Description
1	Metal enclosure, NEMA 1 or NEMA 3R
1	M4-CGM09090-0, M4-CGM04060-0 programmable controller
1	M4-XPM04060-0, M4-XPM09090-0, M4-XPM18000-0 expansion I/O module if applicable
1	M4-DLK0350-0 remote mount display, if applicable
1	96 VA 120/24 VAC power supply with 5 A primary circuit protection and two 120 VAC outlets, standard on all panels
1	96 VA 120/24 VAC transformer with secondary protection
1	Five or ten-point 24 VAC distribution terminal block ⓘ **Note:** All panels with a single power supply are provided with a five-point terminal block. Panels with an additional transformer are provided with a ten-point terminal block.

Selection charts

Table 2: Panels — 20 in. x 16 in. x 6.5 in. enclosure - NEMA 1 (dimensions in H x W x D)

Product code number	Description
P2AAN-BC001N01	Control panel, 20 in. x 16 in. x 6.5 in. (508 mm x 406 mm x 165 mm) enclosure, M4-CGM04060-0 General Purpose Controller, 120/24 VAC power supply
P2AAN-BA001N00	Control panel, 20 in. x 16 in. x 6.5 in. (508 mm x 406 mm x 165 mm) enclosure, M4-CGM09090-0 General Purpose Controller, 120/24 VAC power supply

Table 3: Panels – 20 in. x 16 in. 6.5 in. enclosure – NEMA 1 (dimensions in H x W x D) with remote door-mounted display

Product code number	Description
P2AAY-BC001N01	Control panel, 20 in. x 16 in. x 6.5 in. (508 mm x 406 mm x 165 mm) Enclosure, M4-CGM04060-0 General Purpose Controller, 120/ 24 VAC power supply and remote door-mounted display
P2AAY-BA001N00	Control panel, 20 in. x 16 in. x 6.5 in. (508 mm x 406 mm x 165 mm) Enclosure, M4-CGM09090-0 General Purpose Controller, 120/ 24 VAC power supply and remote door-mounted display

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Table 4: Panels – 20 in. x 16 in. 6.5 in. enclosure – NEMA 1 (dimensions in H x W x D) with integral display controller

Product code number	Description
P2AAN-BE001N00	Control panel, 20 in. x 16 in. x 6.5 in. (508 mm x 406 mm x 165 mm) enclosure, M4-CGM09090-0H General Purpose Controller with Integral Display, 120/24 VAC power supply

Table 5: Panels – 24 in. x 20 in. 6.5 in. enclosure – NEMA 1 (dimensions in H x W x D)

Product code number	Description
P2BAN-BC001N01	Control panel, 24 in. x 20 in. x 6.5 in. (610 mm x 508 mm x 165 mm) enclosure, M4-CGM04060-0 General Purpose Controller, 120/24 VAC power supply
P2BAN-BA001N00	Control panel, 24 in. x 20 in. x 6.5 in. (610 mm x 508 mm x 165 mm) enclosure, M4-CGM09090-0 General Purpose Controller, 120/24 VAC power supply
P2BAN-BA002N00	Control panel, 24 in. x 20 in. x 6.5 in. (610 mm x 508 mm x 165 mm) enclosure, M4-CGM09090-0 General Purpose Controller, 120/24 VAC power supply with additional 96 VA transformer
P2BAN-BCHA1N01	Control Panel, 24 in. x 20 in. x 6.5 in. (610 mm x 508 mm x 165 mm) enclosure, M4-CGM04060-0 and M4-XPM04060-0 General Purpose Controller and expansion module, 120/24 VAC power supply
P2BAN-BAHA1N01	Control panel, 24 in. x 20 in. x 6.5 in. (610 mm x 508 mm x 165 mm) enclosure, M4-CGM09090-0 and M4-XPM04060-0 General Purpose Controller and expansion module
P2BAN-BAHB2N01	Control panel, 24 in. x 20 in. x 6.5 in. (610 mm x 508 mm x 165 mm) enclosure, M4-CGM09090-0 and M4-XPM09090-0 General Purpose Controller and expansion module, 120/24 VAC power supply with additional 96 VA transformer
P2BAN-BAHC1N01	Control panel, 24 in. x 20 in. x 6.5 in. (610 mm x 508 mm x 165 mm) enclosure, M4-CGM09090-0 and M4-XPM18000-0 General Purpose Controller and expansion module, 120/24 VAC power supply

Table 6: Panels – 24 in. x 20 in. x 6.5 in. enclosure – NEMA 1 (dimensions in H x W x D) with remote door-mounted display

Product Code Number	Description
P2BAY-BA001N00	Control panel, 24 in. x 20 in. x 6.5 in. (610 mm x 508 mm x 165 mm) enclosure, M4-CGM09090-0 General Purpose Controller, 120/24 VAC power supply and remote door-mounted display

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Table 7: Panels – 24 in. x 20 in. x 6.5 in. enclosure – NEMA 1 (dimensions in H x W x D) with integral display controller

Product Code Number	Description
P2BAN-BE001N00	Control panel, 24 in. x 20 in. x 6.5 in. (610 mm x 508 mm x 165 mm) enclosure, M4-CGM09090-0H General Purpose Controller with integral display, 120/24 VAC power supply
P2BAN-BEHA1N01	Control panel, 24 in. x 20 in. x 6.5 in. (610 mm x 508 mm x 165 mm) enclosure, M4-CGM09090-0H and M4-XPM04060-0 General Purpose Controller with integral display, 120/24 VAC power supply
P2BAN-BEHB2N01	Control panel, 24 in. x 20 in. x 6.5 in. (610 mm x 508 mm x 165 mm) enclosure, M4-CGM09090-0H and M4-XPM09090-0 General Purpose Controller with integral display, 120/24 VAC power supply with additional 96VA transformer
P2BAN-BEHC1N01	Control panel, 24 in. x 20 in. x 6.5 in. (610 mm x 508 mm x 165 mm) enclosure, M4-CGM09090-0H and M4-XPM18000-0 General Purpose Controller with integral display, 120/24 VAC power supply

Table 8: Panels – 24 in. x 24 in. x 6.5 in. enclosure – NEMA 1 (dimensions in H x W x D)

Product Code Number	Description
P2CAN-BC001Y01	Control panel, 24 in. x 24 in. x 6.5 in. (610 mm x 610 mm x 165 mm) enclosure, M4-CGM04060-0 General Purpose Controller, 120/24 VAC power supply with terminal block
P2CAN-BA001Y00	Control panel, 24 in. x 24 in. x 6.5 in. (610 mm x 610 mm x 165 mm) enclosure, M4-CGM09090-0 General Purpose Controller, 120/24 VAC power supply with terminal block

Table 9: Panels – 24 in. x 24 in. x 6.5 in. enclosure – NEMA 1 (dimensions in H x W x D) with integral display controller

Product code number	Description
P2CAN-BE001Y00	Control panel, 24 in. x 24 in. x 6.5 in. (610 mm x 610 mm x 165 mm) enclosure, M4-CGM09090-0H General Purpose Controller with integral display, 120/24 VAC power supply with terminal blocks

Table 10: Panels – 36 in. x 24 in. x 6.5 in. enclosure – NEMA 1 (dimensions in H x W x D)

Product code number	Description
P2DAN-BC002N01	Control panel, 36 in. x 24 in. x 6.5 in. (914 mm x 610 mm x 165 mm) enclosure, M4-CGM04060-0 General Purpose Controller, 120/24 VAC power supply and 96 VA transformer
P2DAN-BCHA2N01	Control panel, 36 in. x 24 in. x 6.5 in. (914 mm x 610 mm x 165 mm) enclosure, M4-CGM04060-0 and M4-XPM04060-0 General Purpose Controller and expansion module, 120/24 VAC power supply and 96 VA transformer
P2DAN-BCHA2Y01	Control panel, 36 in. x 24 in. x 6.5 in. (914 mm x 610 mm x 165 mm) enclosure, M4-CGM04060-0 and M4-XPM04060-0 General Purpose Controller and expansion module, 120/24 VAC power supply and 96 VA transformer with terminal block

Table 10: Panels – 36 in. x 24 in. x 6.5 in. enclosure – NEMA 1 (dimensions in H x W x D)

Product code number	Description
P2DAN-BA001N00	Control panel, 36 in. x 24 in. x 6.5 in. (914 mm x 610 mm x 165 mm) enclosure, M4-CGM09090-0 General Purpose Controller, 120/24 VAC power supply
P2DAN-BA001Y00	Control panel, 36 in. x 24 in. x 6.5 in. (914 mm x 610 mm x 165 mm) enclosure, M4-CGM09090-0 General Purpose Controller, 120/24 VAC power supply with terminal block
P2DAN-BAHB2N01	Control panel, 36 in. x 24 in. x 6.5 in. (914 mm x 610 mm x 165 mm) enclosure, M4-CGM09090-0 and M4-XPM09090-0 General Purpose Controller and expansion module, 120/24 VAC power supply and 96 VA transformer
P2DAN-BAHB2Y01	Control panel, 36 in. x 24 in. x 6.5 in. (914 mm x 610 mm x 165 mm) enclosure, M4-CGM09090-0, M4-XPM09090-0 General Purpose Controller and expansion module, 120/24 VAC power supply, 96 VA transformer, and terminal block
P2DAN-BAHD2N01	Control panel, 36 in. x 24 in. x 6.5 in. (914 mm x 610 mm x 165 mm) enclosure, M4-CGM09090-0, M4-XPM04060-0 and M4-XPM09090-0 General Purpose Controller and expansion modules , 120/24 VAC power supply and 96 VA transformer

Table 11: Panels – 36 in. x 24 in. x 6.5 in. enclosure – NEMA 1 (dimensions in H x W x D) with remote door-mounted display

Product code number	Description
P2DAY-BA001N00	Control panel, 36 in. x 24 in. x 6.5 in. (914 mm x 610 mm x 165 mm) enclosure, M4-CGM09090-0 General Purpose Controller, 120/ 24 VAC power supply with remote door-mounted display
P2DAY-BAHB2N01	Control panel, 36 in. x 24 in. x 6.5 in. (914 mm x 610 mm x 165 mm) enclosure, M4-CGM09090-0 and M4-XPM09090-0 General Purpose Controller and expansion module, 120/ 24 VAC power supply, 96 VA transformer and remote door-mounted display

Table 12: Panels – 36 in. x 24 in. x 6.5 in. enclosure – NEMA 1 (dimensions in H x W x D) with integral display controller

Product code number	Description
P2DAN-BE001N00	Control panel, 36 in. x 24 in. x 6.5 in. (914 mm x 610 mm x 165 mm) enclosure, M4-CGM09090-0H General Purpose Controller with integral display, 120/24 VAC power supply
P2DAN-BEHB2N01	Control panel, 36 in. x 24 in. x 6.5 in. (914 mm x 610 mm x 165 mm) enclosure, M4-CGM09090-0H and M4-XPM09090-0 General Purpose Controller with integral display, 120/24 VAC power supply with additional 96VA transformer

Table 13: Panels – 24 in. x 20 in. x 8 in. enclosure – NEMA 3R (dimensions in H x W x D)

Product code number	Description
P2BCN-BAHB2N01	Control panel, 24 in. x 20 in. x 8 in. (610 mm x 508 mm x 203 mm) NEMA 3R enclosure, M4-CGM09090-0 and M4-XPM09090-0 General Purpose Controller and expansion module, 120/ 24 VAC power supply and 96 VA transformer

Table 14: Panels – 36 in. x 24 in. x 8 in. enclosure – NEMA 3R (dimensions in H x W x D)

Product code number	Description
P2DCN-BA001N00	Control panel, 36 in. x 24 in. x 8 in. (914 mm x 610 mm x 203 mm) NEMA 3R enclosure, M4-CGM09090-0 General Purpose Controller, 120/ 24 VAC power supply
P2DCN-BAHB2N01	Control panel, 36 in. x 24 in. x 8 in. (914 mm x 610 mm x 203 mm) NEMA 3R enclosure, M4-CGM09090-0 and M4-XPM09090-0 General Purpose Controller and expansion module, 120/ 24 VAC power supply and 96 VA Transformer

Table 15: Subpanels — 20 in. x 16 in. enclosure (dimensions in H x W)

Product code number	Description
S2A0N-BA001N00	Subpanel, 20 in. x 16 in. (508 mm x 406 mm), M4-CGM09090-0 General Purpose Controller, 120/24 VAC power supply
S2A0Y-BA001N00	Subpanel, 20 in. x 16 in. (508 mm x 406 mm), M4-CGM09090-0 General Purpose Controller, 120/24 VAC power supply, with door-mounted remote display

Table 16: Subpanels — 24 in. x 20 in. enclosure (dimensions in H x W)

Product code number	Description
S2B0N-BAHA1N01	Subpanel, 24 in. x 20 in. (610 mm x 508 mm), M4-CGM09090-0 and M4-XPM04060-0 General Purpose Controller and expansion module, 120/ 24 VAC power supply
S2B0N-BAHB2N01	Subpanel, 24 in. x 20 in. (610 mm x 508 mm), M4-CGM09090-0 and M4-XPM09090-0 General Purpose Controller and expansion module, 120/ 24 VAC power supply with additional 96 VA transformer
S2B0N-BA001N00	Subpanel, 24 in. x 20 in. (610 mm x 508 mm), M4-CGM09090-0 General Purpose Controller, 120/24 VAC power supply

Table 17: Subpanels — 24 in. x 24 in. enclosure (dimensions in H x W)

Product code number	Description
S2C0N-BA001Y00	Subpanel, 24 in. x 24 in. (610 mm x 610 mm), M4-CGM09090-0 General Purpose Controller, 120/24 VAC power supply, with terminal block

Table 18: Subpanels — 36 in. x 24 in. enclosure (dimensions in H x W)

Product code number	Description
S2D0N-BAHB2N01	Subpanel, 36 in. x 24 in. (914 mm x 610 mm), M4-CGM09090-0 and M4-XPM09090-0 General Purpose Controller and expansion module, 120/ 24 VAC power supply and 96 VA transformer
S2D0N-BA001N00	Subpanel, 36 in. x 24 in. (914 mm x 610 mm), M4-CGM09090-0 General Purpose Controller, 120/24 VAC power supply

Technical specifications

Table 19: Technical specifications

Specification	Description
Terminals	Controller mounted removable screw termination
Wire size	• Ground wire: 14 AWG • Transformer wires: 16 AWG
Enclosure rating	NEMA 1 or NEMA 3R
Enclosure finish	ANSI 61 gray polyester powder coating - perforated panel and enclosure.
Ambient operating conditions	• 32°F to 122°F (0°C to 50°C) • 10% to 90% RH
Dimensions (height x width x depth)	• 20 in. x 16 in. x 6.5 in. (508 mm x 406 mm x 165 mm) • 24 in. x 20 in. x 6.5 in. (610 mm x 508 mm x 165 mm) • 24 in. x 20 in. x 8 in. (610 mm x 508 mm x 203 mm) • 24 in. x 24 in. x 6.5 in. (610 mm x 610 mm x 165 mm) • 36 in. x 24 in. x 6.5 in. (914 mm x 610 mm x 165 mm) • 36 in. x 24 in. x 8 in. (914 mm x 610 mm x 203 mm)
Ambient storage conditions	• -40°F to 176°F (-40°C to 80°C) • 5% to 95% RH
Agency compliance	• Control Panel: UL 508A Rated (cULus listed); Enclosure UL 50 Rated, cUL-CAN/CSA C22.2 No. 14-05 • HCAI Special Seismic Certification Pre-approval: OSP-0140-10 ⓘ **Note:** Subpanels are not available with seismic certification. • California Building Code (CBC) - 2019, International Building Code (IBC) - 2021 • Seismic Performance Characteristics: $S_{DS}(g) = 2.26$, $z/h = 1.0$, $I_p = 1.5$

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Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

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Single point of contact

APAC	EU	UK	NA/SA
JOHNSON CONTROLS C/O CONTROLS PRODUCT MANAGEMENT NO. 32 CHANGJIANG RD NEW DISTRICT WUXI JIANGSU PROVINCE 214028 CHINA	JOHNSON CONTROLS VOLTAWEG 20 6101 XK ECHT THE NETHERLANDS	JOHNSON CONTROLS TYCO PARK GRIMSHAW LANE MANCHESTER M40 2WL UNITED KINGDOM	JOHNSON CONTROLS 5757 N GREEN BAY AVE. GLENDALE, WI 53209 USA

Contact information

Contact your local Johnson Controls representative: www.johnsoncontrols.com/locations

Contact Johnson Controls: www.johnsoncontrols.com/contact-us

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FUNCTIONAL DEVICES BACNET RELAY IN A BOX

RIBTW2401B-BC, RIBTW2402B-BC

DESCRIPTION

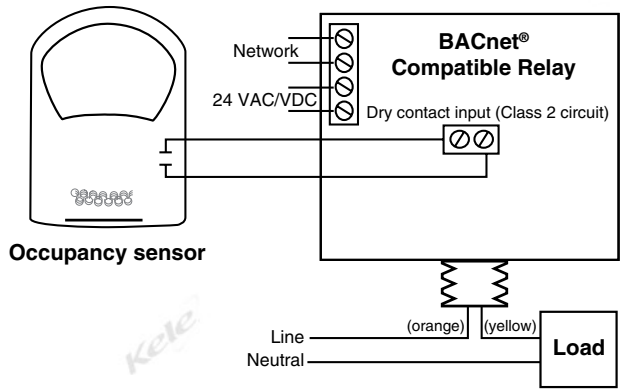
The **Model RIBTW2401B-BC** and **RIBTW2402B-BC** from Functional Devices are open-protocol relays controlled from a remote location using a BACnet network. These are also available in the LonWorks protocol. The relay is powered locally, and communication with the network is over a twisted pair of wires. Using standard BACnet or LonWorks objects, the relay can be commanded on and off over the network and the relay state communicated back. A separate digital input is provided to conveniently allow the state of a status feedback signal from a current switch (or other switched feedback device) to be communicated on the network. Click on the related parts and pricing tab for a more complete listing of available models.

RIBTW2401B-BC

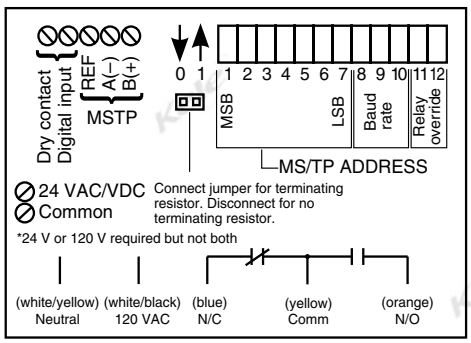
FEATURES

- ***Enclosed BACnet relay with 20A contacts***
- ***Additional dry contact input (powered by Class 2 circuit)***
- ***LED indication of network status and relay status***
- ***UL listed and BACnet compatible, CE***

APPLICATION



WIRING



NOTE: When using 120 VAC, there will be residual voltage on 24V terminals; this is not to be used for powering external devices.

SPECIFICATIONS

Supply Voltage	24 VAC @ 111 mA, 24 VDC @ 81 mA, 120 VAC @ 96 mA
Contact Rating	20A resistive @ 277 VAC, 20A ballast N.O. @ 120/277 VAC, N.C. @ 277 VAC, 10A tungsten N.O. @ 120 VAC, 1110 VA pilot duty @ 277 VAC, 770 VA pilot duty @ 120 VAC, 2 hp @ 277 VAC, 1 hp @ 120 VAC
Frequency	50/60 Hz
Relay Type	SPDT
Duty	Continuous duty
Life Expectancy	10 million cycles minimum
Baud Rate	9600, 19200, 38400, 57600, 76800, and 115200
LED Indication	Green: network status, Red: relay status
Operating Temperature	-30° to 140°F (35° to 60°C)
Operating Humidity	5% to 95% non-condensing
Housing Type	NEMA 1, plenum rated
Conduit Hub	1/2" NPT
Dimensions	4"H x 4"W x 1.8"D (10.2 x 10.2 x 4.6 cm) 1/2" NPT nipple
Approvals	UL listed file #E68805, CE certified, BACnet certified
Weight	0.83 lb (0.38 Kg)
Warranty	1 year

ORDERING INFORMATION

MODEL	DESCRIPTION
RIBTW2401B-BC	BACnet RIB relay, SPDT, 24 VAC/VDC or 120 VAC power input
RIBTW2402B-BC	BACnet RIB relay, SPDT, 24 VAC/VDC or 208/277VAC power input

TE-6300 Series Temperature Sensors Catalog Page

LIT-1900217

2020-10-13

Description

The TE-6300 Temperature Sensor line provides economical solutions for a wide variety of temperature sensing needs, including wall-mount, outdoor-air, duct, strap-mount, well-insertion, duct-averaging, and VAV Modular Assembly (VMA) flange-mount duct-probe applications. The TE-6300 line offers both a metal and a plastic enclosure for the most popular models.

Sensors are available in the following types:

- 1k ohm thin-film nickel
- 1k ohm nickel averaging
- 1k ohm thin-film platinum
- 100 ohm platinum equivalent averaging
- 1k ohm platinum equivalent averaging
- 2.2k (2,252) ohm thermistor
- 10k ohm thermistor, Johnson Controls® Type II

Refer to the *TE-6300 Series Temperature Sensors Product Bulletin (LIT-216320)* for important product application information.

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Features and Benefits

Each sensor is packaged with the necessary mounting accessories to maximize ordering and installation ease and to reduce both commissioning time and cost.

- Full Line of Versatile Sensors—Supports all your temperature sensing needs from a single supplier: wall-mount, outdoor-air, duct, duct-averaging, strap-mount, well-insertion, and flange-mount duct-probe.
- Single Assembly Ordering—Simplifies ordering; provides a complete assembly in one box.
- Models Featuring an Integral National Pipe Thread (NPT) Adaptor—Increase sensor connection strength, which eliminates the need for a special adaptor.
- Models with a Stainless Steel Sensor Probe—Protect the sensor while increasing corrosion resistance.
- Metal Enclosure (TE-63xxE, TE-63xxM, and TE-63xxV Models)—Meets plenum requirements.
- Models Featuring a Retainer for the Sensor Holder—Allow you to lock the sensor holder into the conduit box.
- Brushed Stainless Steel Mounting Plate—Offers a durable, aesthetically pleasing design.
- Low Profile Flush Mount Design (TE-63xxF Models)—Provides a tamper-proof installation ideally suited for schools, sporting complexes, retailers, prisons, and more.

All TE-6300 Series Temperature Sensors are two-wire, passive, resistance-output devices.

TE-63xxA Models

The TE-63xxA (adjustable length) models:

- provide a thermoplastic mounting flange and gland nut to adjust the length of the probe
- include two hex-head self-drilling screws for mounting
- come equipped with a 10 ft (3 m)plenum-rated cable with 1/4 in. (6.35 mm) internal thread insulated quick-connect terminations on leads

TE-63xxE Models

The TE-63xxE (economizer mount) models:

- provide a stainless steel mounting flange
- include two hex-head self-drilling screws for mounting
- meet UL 1995 plenum use requirements

TE-63xxF Models

The TE-63xxF (flush mount) models:

- provide a low profile when installed in an electrical box
- thermally isolate sensor from the wall with a foam pad
- offer a rugged stainless steel cover
- provide 22 AWG (0.6 mm diameter) lead wires with low voltage installation

TE-63xxM Models

The TE-63xxM (metal enclosure) models:

- come with a corrosion-protected steel enclosure with a 0.88 in. (22 mm) hole for a 1/2 in. (12.7 mm) conduit fitting
- include two hex-head self-drilling screws for mounting the duct and duct-averaging models
- offer either a direct-mount or 1/2-14 NPT threaded well sensor holder for mounting in TE-6300W Series Thermowells (well models; order the thermowell separately)
- provide optional well sensor holders (order separately) to mount duct models in thermowells
- meet UL 1995 plenum use requirements
- offer optional accessory kit (order separately) to replace plastic hole plug and wiring bushing to meet International Mechanical Code (IMC) requirements

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TE-63xxP Models

The TE-63xxP (plastic enclosure) models:

- provide a thermoplastic conduit box with1/2-14 internal NPT for connecting to conduit
- provide aluminum mounting plate and1/2-14 internal NPT hub mounting options for the duct and duct-averaging models
- use the 1/2-14 internal NPT to mount the outdoor air models directly to rigid conduit
- include sensor holders to mount duct models in thermowells (order thermowell separately)
- offer an optional accessory metal cover and gasket kit (order separately) to replace the plastic cover to meet UL 1995 plenum use requirements
- include a replaceable sensing probe on duct-probe, outdoor-air, and well-insertion models

TE-63x4P Wall Mount Models

The TE-63x4P (plastic enclosure) models:

- come with a white thermoplastic ventilated cover with a brushed aluminum face plate and a steel mounting plate for surface mounting
- include faceplates for both horizontal and vertical mounting
- offer an accessory mounting kit for mounting to a standard electrical box
- offer optional covers

TE-63xS Models

The TE-63xS (strap-mount) models:

- provide a 1/4 in. (6.35 mm) diameter stainless steel probe without an enclosure
- include three cable ties for mounting to pipe up to 2-5/8 in. (67 mm) in diameter
- come equipped with a 10 ft (3 m)plenum-rated cable
- meet UL 1995 plenum use requirements
- offer an accessory mounting kit for mounting to a pipe up to 11 in. (280 mm) in diameter

TE-63xxV Models

The TE-63xxV (VAV flange mount) models:

- provide a stainless steel mounting flange with two hex-head self-drilling mounting screws
- come equipped with a 10 ft (3 m) plenum-rated cable with 1/4 in. (6.35 mm) internal thread insulated quick-connect terminations on leads
- meet UL 1995 plenum use requirements

Repair Information

If the TE-6300 Series Temperature Sensor fails to operate within its specifications, replace the unit. For information on replacement temperature sensors and replacement sensor probes, refer to the TE-6300 Series Temperature Sensors Product Bulletin (LIT-216320).

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Selection Chart

Table 1: TE-6300 Temperature Sensor Models

Sensor	Mounting Style	Probe Length in. (mm)	Product CodeNumber
Nickel (1k ohm)	Adjustable	8 (203)	TE-6311A-1
	Averaging[1]	8 ft (2.4 m)	TE-6315M-1
			TE-6315P-1
			TE-6315V-2
		17 ft (5.2 m)	TE-6316M-1
			TE-6316P-1
			TE-6316V-2
	Duct	4 (102)	TE-631GM-1
		8 (203)	TE-6311M-1
			TE-6311P-1
		18 (457)	TE-631JM-1
	Flange (VAV)	4 (102)	TE-631GV-2
		8 (203)	TE-6311V-2
	Flush	N/A	TE-6310F-0
			TE-6310F-1
	Outdoor air	3 (76)	TE-6313P-1
	Strap-mount	3 (76)	TE-631S-1
	Wall[2]	N/A	TE-6314P-1
	Well	6 (152)	TE-631AM-1[3]
			TE-631AM-2
			TE-631AP-1
		8 (203)	TE-6312M-1
			TE-6312P-1
Platinum (1k ohm)	Adjustable	8 (203)	TE-6351A-1
	Duct	4 (102)	TE-635GM-1
		8 (203)	TE-6351M-1
			TE-6351P-1
		18 (457)	TE-635JM-1
	Flange (VAV)	4 (102)	TE-635GV-2
		8 (203)	TE-6351V-2
	Flush	N/A	TE-6350F-0
			TE-6350F-1
	Outdoor air	3 (76)	TE-6353P-1
	Strap-mount	3 (76)	TE-635S-1
	Wall[2]	N/A	TE-6324P-1
	Well	6 (152)	TE-635AM-1[3]
			TE-635AM-2
			TE-635AP-1
		8 (203)	TE-6352M-1
			TE-6352P-1
Platinum Equivalent	1k ohmAveraging[1]	10 ft (3 m)	TE-6327P-1
		20 ft (6.1 m)	TE-6328P-1
	100 ohmAveraging[1]	10 ft (3 m)	TE-6337P-1
		20 ft (6.1 m)	TE-6338P-1
Thermistor (2.2k ohm)	Adjustable	8 (203)	TE-6341A-1
	Duct	8 (203)	TE-6341P-1
	Flange (VAV)	4 (102)	TE-634GV-2
		8 (203)	TE-6341V-2
	Outdoor Air	3 (76)	TE-6343P-1
	Wall[2]	N/A	TE-6344P-1
	Well	6 (152)	TE-634AM-2
		8 (203)	TE-6342M-1

Johnson Controls

Table 1: TE-6300 Temperature Sensor Models

Sensor	Mounting Style	Probe Length in. (mm)	Product CodeNumber
Thermistor (10k ohm) Type II	Adjustable	8 (203)	TE-6361A-1
	Duct	4 (102)	TE-636GM-1
		8 (203)	TE-6361M-1
			TE-6361P-1
		18 (457)	TE-636JM-1
	Flange (VAV)	4 (102)	TE-636GV-2
		8 (203)	TE-6361V-2
	Flange (economizer)	2 (51)	TE-6369E-2
		6 (152)	TE-636ME-2
		8 (203)	TE-6361E-2
		12 (305)	TE-636NE-2
	Flush	N/A	TE-6360F-0
			TE-6360F-1
	Outdoor air	3 (76)	TE-6363P-1
	Strap-mount	3 (76)	TE-636S-1
	Well	6 (152)	TE-636AM-1[3]
			TE-636AM-2
		8 (203)	TE-6362M-1

1 Two TE-6001-8 Element Holders come with the platinum equivalent averaging sensors. Order separately to use with a nickel averaging sensor.
2 Order the TE-1800-9600 Mounting Hardware separately to mount the wall unit to a wallbox.
3 TE-631AM-1, TE-635AM-1, and TE-636AM-1 include TE-6300-612 Threadless Brass Sensor Holder/Well Adaptor for retrofit toTE-6300W-103 or WZ-1000-5 Thermowells.

Table 2: Optional Accessories

Product Code Number	Description
F-1000-182	Thermal conductive grease for element wells (8 oz. [0.23 kg])
T-4000-119	Allen head tool for wall mount cover screws (order in multiples of 30)
TE-1800-9600	Mounting hardware for mounting the wall-mount unit to a wall box
TE-6001-8	Averaging sensor mounting bracket (order in multiples of ten)
TE-6001-13	Metal cover and gasket kit (order in multiples of five)
TE-6300-101	12 in. (305 mm) 1k ohm nickel probe (cut to an appropriate length)[1]
TE-6300-103	1/2-14 NPT plastic sensor holder without retainer (order in multiples of ten)
TE-6300-105	12 in. (305 mm) 1k ohm platinum Class A probe (cut to an appropriate length)[2]
TE-6300-601	8 in. (203 mm) 1k ohm nickel probe
TE-6300-603	3 in. (76 mm) 1k ohm nickel probe
TE-6300-605	1/2-14 NPT threaded plastic sensor holder/well adaptor with retainer (order in multiples of ten)
TE-6300-606	8 in. (203 mm) 2.2k ohm thermistor probe
TE-6300-607	3 in. (76 mm) 2.2k ohm thermistor probe
TE-6300-611	1/2-14 NPT threaded brass sensor holder/well adaptor (order in multiples of ten)
TE-6300-612	Threadless brass sensor holder/well adaptor (order in multiples of ten)
TE-6300-613	IMC kit with metal plugs and clamp connector (order in multiples of ten)
TE-6300-614	Cable tie mounting kit, 0.50 to 2.625 in. (12.7 to 66.7 mm) bundle diameter (order in multiples of ten)
TE-6300-615	Cable tie mounting kit, 11 in. (280 mm) maximum bundle diameter
TE-6300-616	8 in. (203 mm) 1k ohm platinum Class A probe
TE-6300-617	3 in. (76 mm) 1k ohm platinum Class A probe
TQ-6000-1	4 to 20 mA output transmitter for use with the 100 ohm platinum sensor
TE-6300W-101[2]	Thermowell, brass with copper bulb, 2.38 in. (60.5 mm) immersion depth, with thermal grease, direct mount, no adaptor required, for use with 6 in. (150 mm) probe model TE-63xAM-2
TE-6300W-102[2]	Thermowell, stainless steel, 2.38 in. (60.5 mm) immersion depth, without thermal grease, direct mount, no adaptor required, for use with 6 in. (150 mm) probe model TE-63xAM-2
TE-6300W-103	Thermowell, brass with copper bulb, 2.38 in. (60.5 mm) immersion depth, with thermal grease, threadless adaptor required, for use with 6 in. (150 mm) probe models TE-63xAM-1 (adaptor included) and TE-63xAP-1 (adaptor included)
TE-6300W-110	Thermowell, stainless steel, 4.50 in. (114.3 mm) immersion depth, without thermal grease, 1/2-14 NPT adaptor required, for use with 8 in. (200 mm) probe models TE-63x2M-1 (adaptor included) and TE-63x2P-1 (adaptor included)

1 Cut 12 in. (305 mm) probes to a minimum of 3 in. (76 mm).
2 Direct-mount thermowells TE-6300W-101 and TE-6300W-102 can be used only with the TE-6300M Sensors.

Johnson Controls

Table 3: T-4000 Covers Available for the Wall Mount TE-63x4P Series

Product Code Number	Horizontal Johnson Controls Logo	Vertical Johnson Controls Logo	Thermometer,with °F/°C Scale	Faceplate/Cover Color
T-4000-2138[1]				Brushed aluminum/beige
T-4000-2139	▪			
T-4000-2140	▪		▪	
T-4000-2144		▪		
T-4000-2639	▪			Brown and gold/beige
T-4000-2640	▪		▪	
T-4000-2644		▪		
T-4000-3139	▪			Brushed aluminum/white
T-4000-3140	▪		▪	
T-4000-3144		▪		

1 Without Johnson Controls logo

Technical Specifications

Table 4: TE-6300 Series Temperature Sensors technical specifications

Specification		Description
Sensor Reference Resistance	1k ohm nickel	1k ohms at 70 °F (21°C)
	1k ohm nickel averaging	
	1k ohm platinum	1k ohms at 32°F (0°C)
	100 ohm platinum averaging	100 ohms at 32°F (0°C)
	1k ohm platinum averaging	1k ohms at 32°F (0°C)
	2.2k ohm thermistor	2,252 ohms at 77°F (25°C)
	10k ohm thermistor	10.0k ohms at 77°F (25°C)
Sensor Accuracy	1k ohm nickel	±0.34F° at 70°F (±0.19C° at 21°C)
	1k ohm nickel averaging	±3.4F° at 70°F (±1.9C° at 21°C)
	1k ohm platinum Class A (TE-635xx)	EN 60751 Class A, ± [0.15 + 0.002 * | T °C |], ±0.19C° at 21°C (±0.35F° at 70°F)
	100 ohm platinum Class A	
	1k ohm platinum Class B (TE-632xx)	EN 60751 Class B, ± [0.30 + 0.005 * | T °C |], ±0.41C° at 21°C (±0.73F° at 70°F)
	100 ohm platinum averaging	±1.0°Fat 70°F (± 0.58°C at 21°C)
	1k ohm platinum averaging	
	2.2k ohm thermistor	± 0.36°F (± 0.2°C) in the range: 32 to 158°F (0 to 70°C)
	10k ohm thermistor	± 0.9°F (± 0.5°C) in the range: 32 to 158°F (0 to 70°C)
Sensor Temperature Coefficient	1k ohm nickel	Approximately 3 ohms/F° (5.4 ohms/C°)
	1k ohm nickel averaging	
	1k ohm platinum	Approximately 2 ohms/F° (3.9 ohms/C°) 3,850 ppm/K
	100 ohm platinum averaging	Approximately 0.2 ohms/F° (0.39 ohms/C°)
	1k ohm platinum averaging	Approximately 2 ohms/F° (3.9 ohms/C°)
	2.2k ohm thermistor	Nonlinear, negative temperature coefficient (NTC)
	10k ohm thermistor	Nonlinear NTC, Johnson Controls Type II

Johnson Controls

Table 4: TE-6300 Series Temperature Sensors technical specifications

Specification		Description
Electrical Connection	TE-63xxE	22 AWG (0.6 mm diameter) x 6 in. (152 mm) long
	TE-63xxM	
	TE-63xxP	
	TE-63xxF	22 AWG (0.6 mm diameter) x 12 ft (3 m) braided-copper wires, low voltage insulation, half-stripped ends
	TE-63xxP nickel averaging	18 AWG (1.0 mm diameter) x 6 in. (152 mm) long
	TE-63xS	22 AWG (0.6 mm diameter) x 10 ft (3 m) long plenum-rated cable
	TE-63xxA	22 AWG (0.6 mm diameter) x 10 ft (3 m) long plenum-rated cable, with 2-position plug terminal block for 1/4 in. (6.35 mm) external tab terminals on 0.197 in. (5 mm) centers
	TE-63xxV	
Materials	Probes	Nickel averaging: 0.094 in. (2.4 mm) outside diameter (O.D.) copper tubing Nickel averaging adaptor: 0.25 in. (6.35 mm) O.D. brass Platinum averaging probe: 0.19 in. (4.8 mm) aluminum tubing All others: 0.25 in. (6.35 mm) O.D. stainless steel
	TE-63xxA	Mounting adaptor plate and gland: thermoplastic
	TE-63xxF	Flush mount: stainless steel
	TE-63xxM	Enclosure: corrosion-protected steel Well sensor holder: 0.875 in. (22.2 mm) hex brass
	TE-63xxP	Conduit box and shield: rigid thermoplastic Mounting plate : aluminum Sensor holder: rigid thermoplastic Wall mount base plate: corrosion-protected steel Wall mount cover: rigid thermoplastic (white) Wall mount face plate: brushed aluminum
	TE-63xxE	Mounting flange: stainless steel
	TE-63xxV	
Operating Conditions	TE-63xxA	-50 to 140°F (-46 to 60°C)
	TE-63xxF	32 to 104°F (0 to 40°C)
	TE-63xxE	-50 to 220°F (-46 to 104°C)
	TE-63xxM	
	TE-63xxP	Enclosure: -50 to 122°F (-46 to 50°C) Sensor probe: -50 to 220°F (-46 to 104°C)
	TE-63xS	Sensor probe: -50 to 220°F (-46 to 104°C) Wire harness: -50 to 122°F (-46 to 50°C)
	TE-63xxV	
Shipping Weight	TE-63xxA	0.2 lb (0.09 kg)
	TE-63xxE	
	TE-63xxF	0.25 lb (113.4 kg)
	TE-63xxM	Duct averaging: 0.9 lb (0.41 kg) Duct mount: 0.4 lb (0.18 kg) Well insertion: 0.5 lb (0.23 kg)
	TE-63xxP	Duct averaging: 0.5 lb (0.23 kg) Duct mount: 0.4 lb (0.18 kg) Outdoor air: 0.5 lb (0.23 kg) Wall mount: 0.2 lb (0.09 kg) Well insertion: 0.35 lb (0.16 kg)
	TE-63xS	Strap mount: 0.2 lb (0.09 kg)
	TE-63xxV	Duct averaging: 0.7 lb (0.32 kg) Duct mount: 0.2 lb (0.09 kg)
Dimensions (H x W x D)	TE-63xxA	2.17 in. (55 mm) diameter plus 4 or 8 in. (102 or 203 m) element
	TE-63xxE	Duct mount: 2.5 x 1.50 in. (57 x 38 mm) plus 2, 6, 8, or 12 in. (51, 152, 203, or 305 mm) element
	TE-63xxF	Flush mount: 4-1/2 x 2-3/4 in. (114 x 70 mm)
	TE-63xxM	Duct averaging: 1.87 x 1.87 x 1.80 in. (47.5 x 47.5 x 45.8 mm) plus 8 or 17 ft (2.4 or 5.2 m) element Duct mount: 1.87 x 1.87 x 1.80 in. (47.5 x 47.5 x 45.8 mm) plus 4, 8, or 18 in. (102, 203, or 457 mm) element Well insertion: 1.87 x 1.87 x 1.80 in. (47.5 x 47.5 x 45.8 mm) plus 6 or 8 in. (152 or 203 mm) element
	TE-63xxP	Duct averaging: 5.97 x 1.38 x 2.75 in. (152 x 35 x 70 mm) plus 8, 10, 17, or 20 ft (2.4, 3.0, 5.2, or 6.1 m) element Duct mount: 5.97 x 1.38 x 2.75 in. (152 x 35 x 70 mm) plus 6 or 8 in. (152 or 203 mm) probe Outdoor air: 5.97 x 3.47 x 4.46 in. (152 x 88 x 113 mm) Wall mount: 2.09 x 3.12 x 1.80 in. (53 x 79 x 46 mm) Well insertion: 5.97 x 1.38 x 2.75 in. (152 x 35 x 70 mm) plus 6 or 8 in. (152 or 203 mm) probe
	TE-63xS	Strap mount: 0.25 in. (6.4 mm) diameter x 3.00 in. (76 mm) long
	TE-63xxV	Duct averaging: 2.25 x 1.50 in. (57 x 38 mm) plus 8 or 17 ft (2.4 or 5.2 m) element Duct mount: 2.25 x 1.50 in. (57 x 38 mm) plus 4 or 8 in. (102 or 203 mm) element

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

Software terms

Use of the software that is in (or constitutes) this product, or access to the cloud, or hosted services applicable to this product, if any, is subject to applicable end-user license, open-source software

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information, and other terms set forth at www.johnsoncontrols.com/techterms. Your use of this product constitutes an agreement to such terms.

Patents

Patents: https://jcipat.com

Single point of contact

APAC	Europe	NA/SA
JOHNSON CONTROLS	JOHNSON CONTROLS	JOHNSON CONTROLS
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WUXI JIANGSU PROVINCE 214028	GERMANY	USA
CHINA		

Contact information

Contact your local branch office: www.johnsoncontrols.com/locations

Contact Johnson Controls: www.johnsoncontrols.com/contact-us

Johnson Controls

THERMOBUFFER TEMPERATURE SENSORS

BA/-TB SERIES*

DESCRIPTION

The **BAPI BA Series Thermobuffer Sensors** are designed specifically for freezers and coolers to simulate the temperature of the contents and not the air temperature. The fluid-filled chamber allows for slower reaction to abrupt temperature changes from opening or closing the cooler door. The Thermobuffer helps eliminate spikes and short cycling of refrigeration equipment.

FEATURES

- ***Fluid-filled to mimic core temperatures***
- ***Decreases false high limit alarms***
- ***Stainless steel or aluminum***
- ***Use in frozen applications***
- ***Wall Mount or wire shelf hanger***
- ***Lower temperature ranges available***

BA/10K2TBM3042HB

BA/10K2TBM3044BB2

BA/10K2TBM3044BB

SPECIFICATIONS

Accuracy	
Thermistor	±0.36°F (0.2°C)
RTD	±0.55°F (0.30°C)
Sensor Type	
Thermistor	10kΩ, Type II & III
RTD	100Ω, 1000Ω 385 curve
Temperature Range	-40° to 185°F (-40° to 85°C)
Stability	
Thermistor	±0.036°F (0.02°C) per year
RTD	0.14 °C with 6,000 continuous hours at 400 °C
Heat Dissipation	0.4°C/mW at 0°C, 2.7 mW/°C (power need to raise the temperature 1C)
Chamber Fluid	Glycol (customer supplied)

HB	Remote probe with 30" cable and bracket
Enclosure Rating	
BB	NEMA 4, BAPI Box: IP66, UV- resisant polycarbonate
BB2	NEMA 4, BAPI Box 2: IP66, UV- resisant polycarbonate
Mounting	Directly to wall or with hanging bracket
Wiring Terminations	22 AWG wire, etched teflon leads
Weight	
HB	0.55 lb (0.25 Kg)
BB	0.8 lb (0.36 Kg)
BB2	0.8 lb (0.36 Kg)
Approvals	CE, RoHS
Warranty	Lifetime

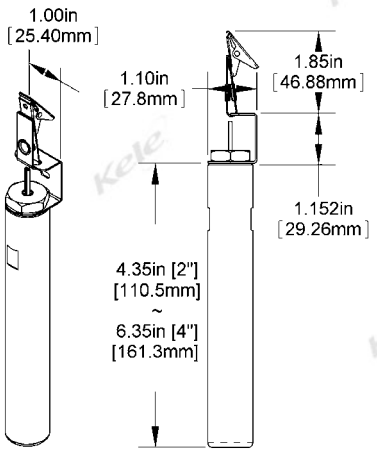
APPROXIMATE TIME DELAY IN MINUTES AND SECONDS

Sales Name	Description	Air	Veg. Oil	Glycol	Water
BA/*-TB-M304-1	1" SS buffer	6:59	13:30	16:08	18:48
BA/*-TB-M304-2	2" SS buffer	29:17	37:57	46:33	47:16
BA/*-TB-M304-4	4" SS buffer	41:10	50:24	65:37	69:14
BA/*-TB-MAL-2	2" Aluminum buffer	19:18	30:10	31:23	39:42
BA/*-TB-MAL-4	4" Aluminum buffer	30:32	40:14	52:00	53:09

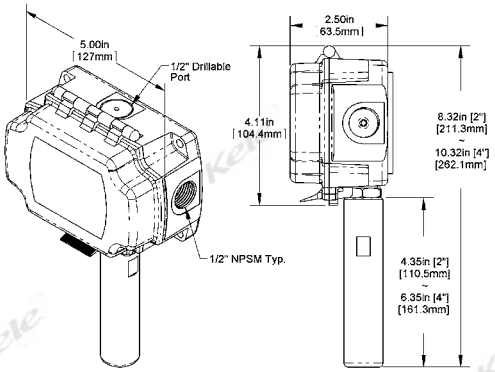
THERMOBUFFER TEMPERATURE SENSORS

BA/-TB SERIES*

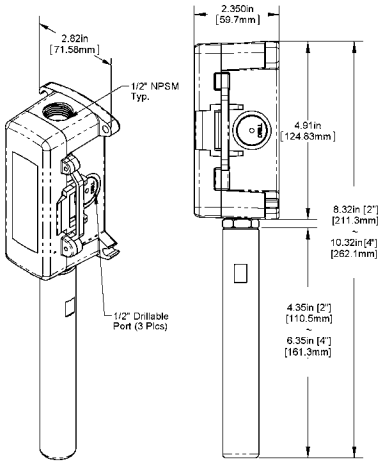
DIMENSIONS



THERMAL-THERMOBUFFER



BB-THERMOBUFFER



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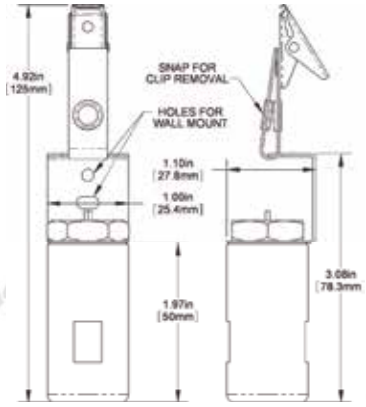


THERMAL-THERMOBUFFER

ORDERING INFORMATION

BA-1KTBM3044BB

MODEL	DESCRIPTION
BA/	Probe temperature sensor
REQUIRED SENSOR TYPE	
10K2	10,000Ω thermistor @ 77°F (25°C), Type II
10K3	10,000Ω thermistor @ 77°F (25°C), Type III
100	100Ω RTD @32°F (0°C), 385 curve
1K	1000Ω RTD @32°F (0°C), 385 curve
REQUIRED PROBE TYPE AND LENGTH	
TB-M3042	Thermobuffer probe 2" long, 304 stainless chamber
TB-M3044	Thermobuffer probe 4" long, 304 stainless chamber
TB-MAL2	Thermobuffer probe 2" long, aluminum chamber
TB-MAL4	Thermobuffer probe 4" long, aluminum chamber
HB	Hanging bracket with jacketed cable (30"); other lengths available
BB	BAPI box NEMA 4X
BB2	BAPI box 2 NEMA 4X

BA/ — **10K3** — **TB-M3044** — **HB**

Example: **BA/100TBM3044HB** Thermobuffer probe 10,000Ω Type III with hanging bracket and jacketed cable (30"); other lengths available

RELATED PRODUCTS

T85U-XR	1000 ohm, Type 85 4-20 mA temperature transmitter, custom rangeable
T81U-XR	100 ohm, Type 81 4-20 mA temperature transmitter, custom rangeable

BELIMO

Technical data sheet NFB24-SR

Basic Fail-Safe modulating actuator for controlling dampers in typical commercial HVAC applications.

- Torque motor 90 in-lb [10 Nm]
- Nominal voltage AC/DC 24 V
- Control modulating
- Position feedback 2...10 V

5-year warranty

Technical data

Electrical data	Nominal voltage	AC/DC 24 V
	Nominal voltage frequency	50/60 Hz
	Nominal voltage range	AC 19.2...28.8 V / DC 21.6...28.8 V
	Power consumption in operation	3.5 W
	Power consumption in rest position	2.5 W
	Transformer sizing	6 VA
	Electrical Connection	18 GA appliance cable, 1 m, with 1/2" conduit connector
	Overload Protection	electronic throughout 0...95° rotation
	Electrical Protection	actuators are double insulated
Functional data	Torque motor	90 in-lb [10 Nm]
	Operating range Y	2...10 V
	Operating range Y note	4...20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)
	Input impedance	100 kΩ for 2...10 V (0.1 mA), 500 Ω for 4...20 mA
	Position feedback U	2...10 V
	Position feedback U note	Max. 0.5 mA
	Direction of motion motor	selectable with switch 0/1
	Direction of motion fail-safe	reversible with cw/ccw mounting
	Manual override	5 mm hex crank (3/16" Allen), supplied
	Angle of rotation	95°
	Angle of rotation note	adjustable with mechanical end stop, 35...95°
	Running Time (Motor)	95 s / 90°
	Running time fail-safe	<20 s @ -4...122°F [-20...50°C], <60 s @ -22°F [-30°C]
	Noise level, motor	40 dB(A)
	Noise level, fail-safe	62 dB(A)
	Position indication	Mechanical
Safety data	Power source UL	Class 2 Supply
	Degree of protection IEC/EN	IP54
	Degree of protection NEMA/UL	NEMA 2
	Enclosure	UL Enclosure Type 2
	Agency Listing	cULus listed to UL60730-1A:02; UL 60730-2-14:02 and CAN/CSA-E60730-1:02
	Quality Standard	ISO 9001
	UL 2043 Compliant	Suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC
	Ambient humidity	Max. 95% RH, non-condensing
	Ambient temperature	-22...122°F [-30...50°C]
	Storage temperature	-40...176°F [-40...80°C]

Safety data	Servicing	maintenance-free
Weight	Weight	4.9 lb [2.2 kg]
Materials	Housing material	Galvanized steel and plastic housing

Footnotes †Rated Impulse Voltage 800V, Type of action 1.AA, Control Pollution Degree 3

Product features

Application For fail-safe, modulating control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft. The actuator operates in response to a 2 to 10 VDC or, with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. A 2 to 10 VDC feedback signal is provided for position indication. Not to be used for a master-slave application.

Operation The NF..24-SR series actuators provide true spring return operation for reliable fail-safe application and positive close off on air tight dampers. The spring return system provides constant torque to the damper with, and without, power applied to the actuator. The NF..24-SR series provides 95° of rotation and is provided with a graduated position indicator showing 0° to 95°. The NF..24-SR uses a brushless DC motor which is controlled by an Application Specific Integrated Circuit (ASIC) and a microprocessor. The microprocessor provides the intelligence to the ASIC to provide a constant rotation rate and to know the actuator's exact fail-safe position. The ASIC monitors and controls the brushless DC motor's rotation and provides a digital rotation sensing function to prevent damage to the actuator in a stall condition. The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches. The NF..24-SR actuator is shipped at 5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off.

Typical specification Spring return control damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a jackshaft up to a 1.05" diameter. The actuator must provide modulating damper control in response to a 2 to 10 VDC or, with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. The actuators must be designed so that they may be used for either clockwise or counter clockwise fail-safe operation. Actuators shall use a brushless DC motor controlled by a microprocessor and be protected from overload at all angles of rotation. Run time shall be constant, and independent of torque. A 2 to 10 VDC feedback signal shall be provided for position feedback. Actuators with auxiliary switches must be constructed to meet the requirements for Double Insulation so an electrical ground is not required to meet agency listings. Actuators shall be cULus listed and have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Accessories

Electrical accessories

Description	Type
DC Voltage Input Rescaling Module	IRM-100
Auxiliary switch, mercury-free	P475
Auxiliary switch, mercury-free	P475-1
Signal simulator, Power supply AC 120 V	PS-100
Convert Pulse Width Modulated Signal to a 2...10 V Signal for Belimo Proportional Actuators	PTA-250
Positioner for wall mounting	SGA24
Positioner for front-panel mounting	SGF24
Cable conduit connector 1/2"	TF-CC US
Resistor, 500 Ω, 1/4" wire resistor with 6" pigtail wires	ZG-R01
Resistor kit, 50% voltage divider	ZG-R02
Transformer, AC 120 V to AC 24 V, 40 VA	ZG-X40

Mechanical accessories

Description	Type
Anti-rotation bracket, for AF / NF	AF-P
Shaft extension 240 mm ø20 mm for damper shaft ø8...22.7 mm	AV8-25
End stop indicator	IND-AFB
Shaft clamp reversible, for central mounting, for damper shafts ø12.7 / 19.0 / 25.4 mm	K7-2
Ball joint suitable for damper crank arm KH8 / KH10, Multipack 10 pcs.	KG10A
Ball joint suitable for damper crank arm KH8, Multipack 10 pcs.	KG8
Damper crank arm Slot width 8.2 mm, clamping range ø14...25 mm	KH10
Damper crank arm Slot width 8.2 mm, for ø1.05"	KH12
Damper crank arm Slot width 8.2 mm, clamping range ø10...18 mm	KH8
Actuator arm, for 3/4" shafts, clamping range ø10...22 mm, Slot width 8.2 mm	KH-AFB
Push rod for KG10A ball joint 36" L, 3/8" diameter	SH10
Push rod for KG6 & KG8 ball joints (36" L, 5/16" diameter).	SH8
Wrench 0.32 in and 0.39 in [8 mm and 10 mm]	TOOL-06
RetroFIT clip	Z-AF
Mounting bracket for AF..	ZG-100
Mounting bracket	ZG-101
Mounting bracket	ZG-109
Linkage kit	ZG-110
Mounting bracket for AF / NF	ZG-118
Jackshaft mounting bracket.	ZG-120
Mounting kit for linkage operation for flat and side installation	ZG-AFB
Mounting kit for foot mount installation	ZG-AFB118
Damper clip for damper blade, 3.5" width.	ZG-DC1
Damper clip for damper blade, 6" width.	ZG-DC2
1" diameter jackshaft adaptor (11" L).	ZG-JSA-1
1-5/16" diameter jackshaft adaptor (12" L).	ZG-JSA-2
1.05" diameter jackshaft adaptor (12" L).	ZG-JSA-3
Weather shield 13x8x6" [330x203x152 mm] (LxWxH)	ZS-100
Base plate, for ZS-100	ZS-101
Weather shield 406x213x102 mm [16x8-3/8x4"] (LxWxH)	ZS-150
Explosion proof housing 16x10x6.435" [406x254x164 mm] (LxWxH), UL and CSA, Class I, Zone 1&2, Groups B, C, D, (NEMA 7), Class III, Hazardous (classified) Locations	ZS-260
Weather shield 17-1/4x8-3/4x5-1/2" [438x222x140 mm] (LxWxH), NEMA 4X, with mounting brackets	ZS-300
Weather shield 17-1/4x8-3/4x5-1/2" [438x222x140 mm] (LxWxH), NEMA 4X, with mounting brackets	ZS-300-5
Shaft extension 1/2"	ZS-300-C1
Shaft extension 3/4"	ZS-300-C2
Shaft extension 1"	ZS-300-C3
Base plate extension	Z-SF
Linkage kit	ZG-JSL
Jackshaft Retrofit Linkage with Belimo Rotary Actuators	

Electrical installation

Warning! Live electrical components!
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

Meets cULus requirements without the need of an electrical ground connection.

(A) Actuators with appliance cables are numbered.

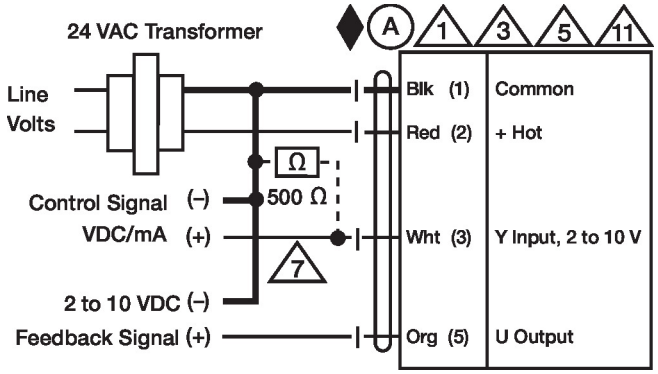
1 Provide overload protection and disconnect as required.

3 Actuators may also be powered by DC 24 V.

5 Only connect common to negative (-) leg of control circuits.

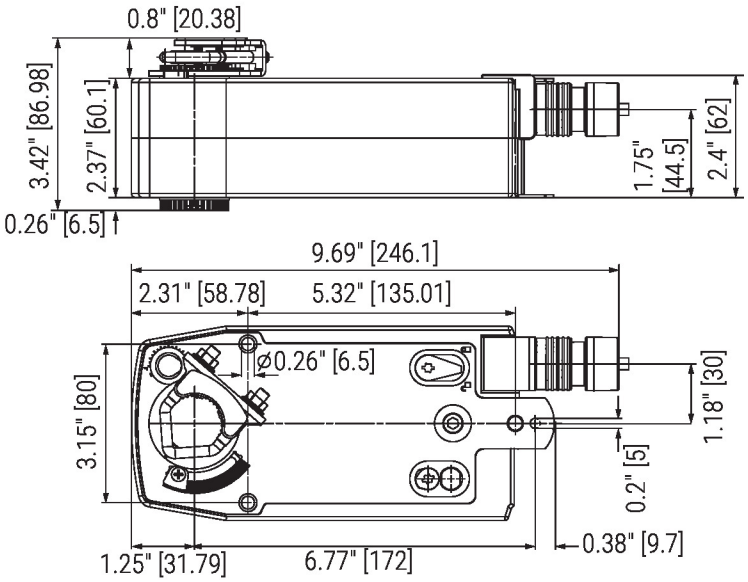
7 A 500 Ω resistor (ZG-R01) converts the 4...20 mA control signal to 2...10 V.

11 Actuators may be connected in parallel if not mechanically linked. Power consumption and input impedance must be observed.



2...10 V / 4...20 mA Control

Dimensions



BELIMO

Technical data sheet NFB24-S

Basic Fail-Safe actuator for controlling dampers in typical commercial HVAC applications.

- **Torque motor 90 in-lb [10 Nm]**
- **Nominal voltage AC/DC 24 V**
- **Control On/Off**
- **2 x SPDT**

5-year warranty

Technical data

Electrical data	Nominal voltage	AC/DC 24 V
	Nominal voltage frequency	50/60 Hz
	Nominal voltage range	AC 19.2...28.8 V / DC 21.6...28.8 V
	Power consumption in operation	6 W
	Power consumption in rest position	2.5 W
	Transformer sizing	8.5 VA
	Auxiliary switch	2 x SPDT, 1 mA...3 A (0.5 A inductive), DC 5 V...AC 250 V, one set at 10°, one adjustable 10...90°
	Switching capacity auxiliary switch	1 mA...3 A (0.5 A inductive), DC 5 V...AC 250 V
	Electrical Connection	(2) 18 GA appliance cables, 1 m, with 1/2" conduit connectors
	Overload Protection	electronic throughout 0...95° rotation
	Electrical Protection	actuators are double insulated
Functional data	Torque motor	90 in-lb [10 Nm]
	Direction of motion motor	selectable by ccw/cw mounting
	Direction of motion fail-safe	reversible with cw/ccw mounting
	Manual override	5 mm hex crank (3/16" Allen), supplied
	Angle of rotation	95°
	Angle of rotation note	adjustable with mechanical end stop, 35...95°
	Running Time (Motor)	75 s / 90°
	Running time fail-safe	<20 s @ -4...122°F [-20...50°C], <60 s @ -22°F [-30°C]
	Noise level, motor	50 dB(A)
	Noise level, fail-safe	62 dB(A)
	Position indication	Mechanical
Safety data	Power source UL	Class 2 Supply
	Degree of protection IEC/EN	IP54
	Degree of protection NEMA/UL	NEMA 2
	Enclosure	UL Enclosure Type 2
	Agency Listing	cULus listed to UL60730-1A:02; UL 60730-2-14:02 and CAN/CSA-E60730-1:02
	Quality Standard	ISO 9001
	UL 2043 Compliant	Suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC
	Ambient humidity	Max. 95% RH, non-condensing
	Ambient temperature	-22...122°F [-30...50°C]
	Storage temperature	-40...176°F [-40...80°C]
	Servicing	maintenance-free

Weight	Weight	5.3 lb [2.4 kg]
Materials	Housing material	Galvanized steel and plastic housing

Footnotes †Rated Impulse Voltage 800V, Type of Action 1.AA.B, Control Pollution Degree 3.

Product features

Application

For On/Off, fail-safe control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. Control is On/Off from an auxiliary contact or a manual switch. The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft.

Operation

The NF..24-S series actuators provide true spring return operation for reliable failsafe application and positive close off on air tight dampers. The spring return system provides constant torque to the damper with, and without, power applied to the actuator. The NF..24-S series provides 95° of rotation and is provided with a graduated position indicator showing 0° to 95°. The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches. The NF..24-S versions are provided with two built-in auxiliary switches. These SPDT switches are provided for safety interfacing or signaling, for example, for fan start-up. The switching function at the fail-safe position is fixed at 10°, the other switch function is adjustable between 10° to 90°. The NF..24-S actuator is shipped at 5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off.

Typical specification

On/Off spring return damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a jackshaft up to a 1.05” diameter. The actuators must be designed so that they may be used for either clockwise or counter clockwise fail-safe operation. Actuators shall be protected from overload at all angles of rotation. If required, two SPDT auxiliary switch shall be provided having the capability of one being adjustable. Actuators with auxiliary switches must be constructed to meet the requirements for Double Insulation so an electrical ground is not required to meet agency listings. Actuators shall be cULus listed and have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Accessories

Electrical accessories

Description	Type
Auxiliary switch, mercury-free	P475
Auxiliary switch, mercury-free	P475-1
Signal simulator, Power supply AC 120 V	PS-100
Cable conduit connector 1/2"	TF-CC US
Transformer, AC 120 V to AC 24 V, 40 VA	ZG-X40

Mechanical accessories

Description	Type
Anti-rotation bracket, for AF / NF	AF-P
Shaft extension 240 mm ø20 mm for damper shaft ø8...22.7 mm	AV8-25
End stop indicator	IND-AFB
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Meets cULus requirements without the need of an electrical ground connection.

Apply only AC line voltage or only UL-Class 2 voltage to the terminals of auxiliary switches. Mixed or combined operation of line voltage/safety extra low voltage is not allowed.

(A) Actuators with appliance cables are numbered.

1 Provide overload protection and disconnect as required.

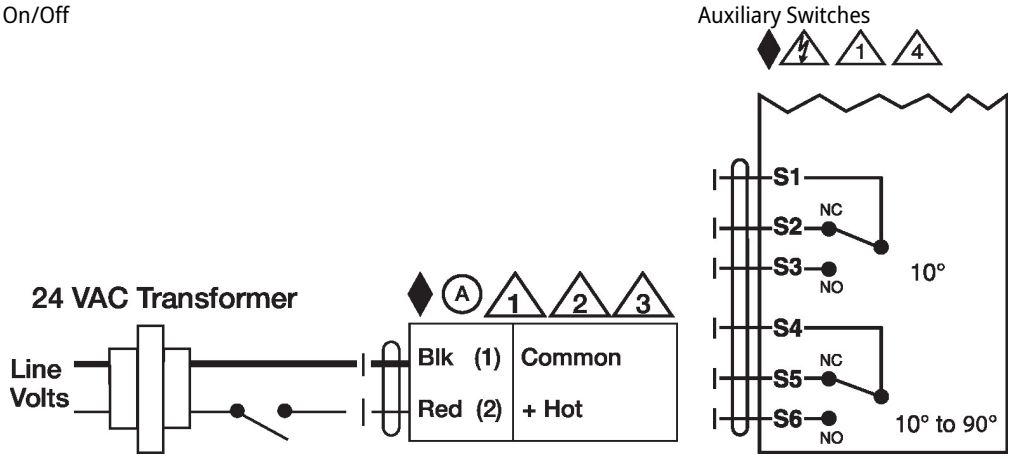
3 Actuators may also be powered by DC 24 V.

4 Two built-in auxiliary switches (2x SPDT), for end position indication, interlock control, fan startup, etc.

11 Actuators may be connected in parallel if not mechanically linked. Power consumption and input impedance must be observed.

Wiring diagrams

On/Off



Dimensions