

Controls IOM

Date: 01/08/2025

Project Name: UALR Downtown Mural Case Modifications

Project Location: Little Rock, AR

Prepared For:

COMFORT SYSTEMS USA
NORTH LITTLE ROCK, AR

Sold To: COMFORT SYSTEMS USA

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UALR DOWNTOWN MURAL CASE MODIFICATIONS LITTLE ROCK, AR

MECHANICAL CONTRACTOR
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JOSH ROBINSON

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CHRIS MURRELL

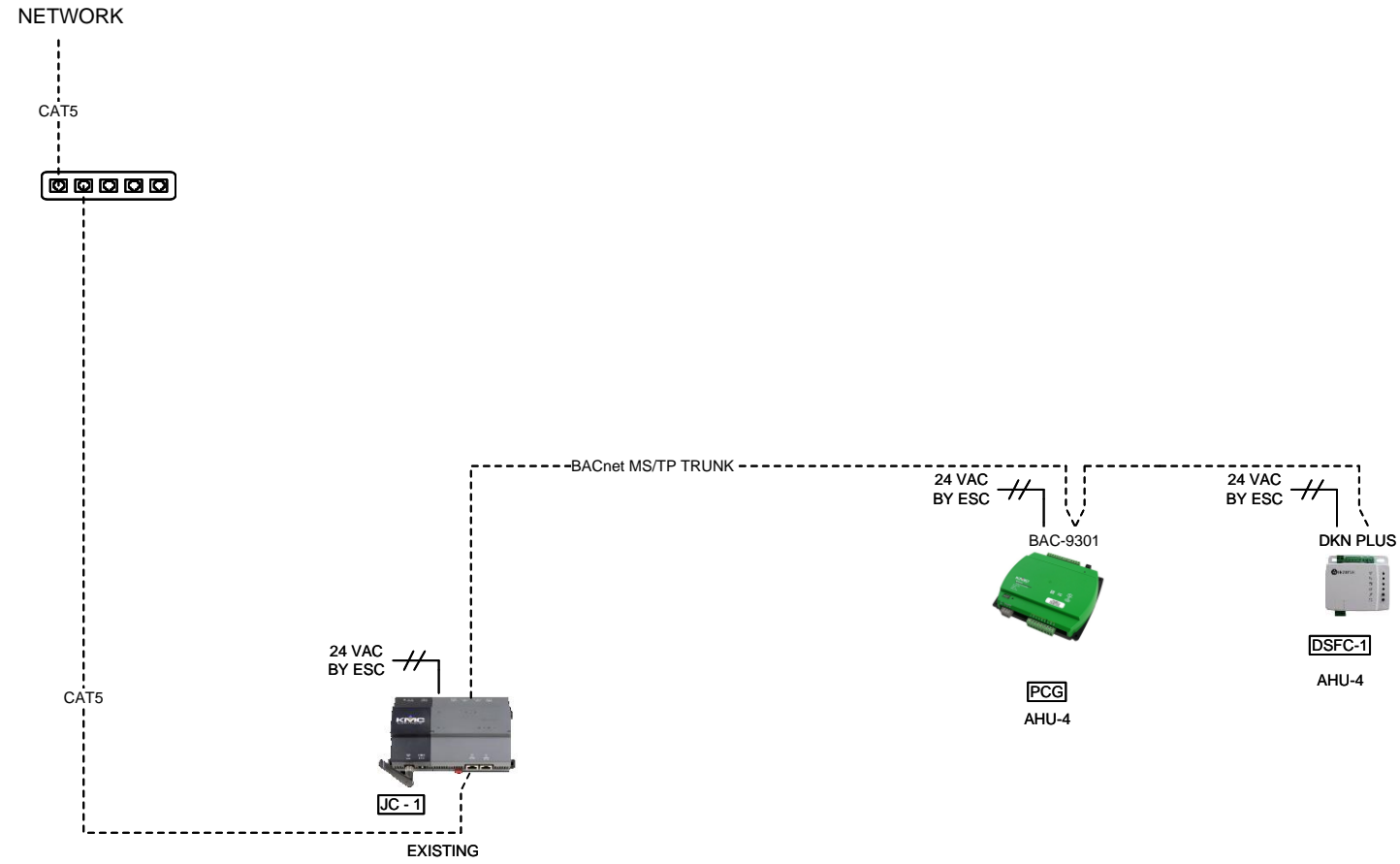
DESIGNED BY:
JERRY PICKETT


Drawing Title											
Title Page				AS BUILT		12/19/2024					
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JOSH ROBINSON	CHRIS MURRELL	JERRY PICKETT	12/19/2024								
Project Title		Office Information		CONTRACT NUMBER							
UALR DOWNTOWN MURAL CASE MODIFICATIONS LITTLE ROCK, AR		 Harrison Energy Partners Harrison Energy Partners 1501 Westpark Dr. Suite .9 Little Rock, AR 72204 (501) 661-0621		124032		DRAWING NUMBER		1 of 7			
124032 UALR Downtown Mural Mod.vsd											

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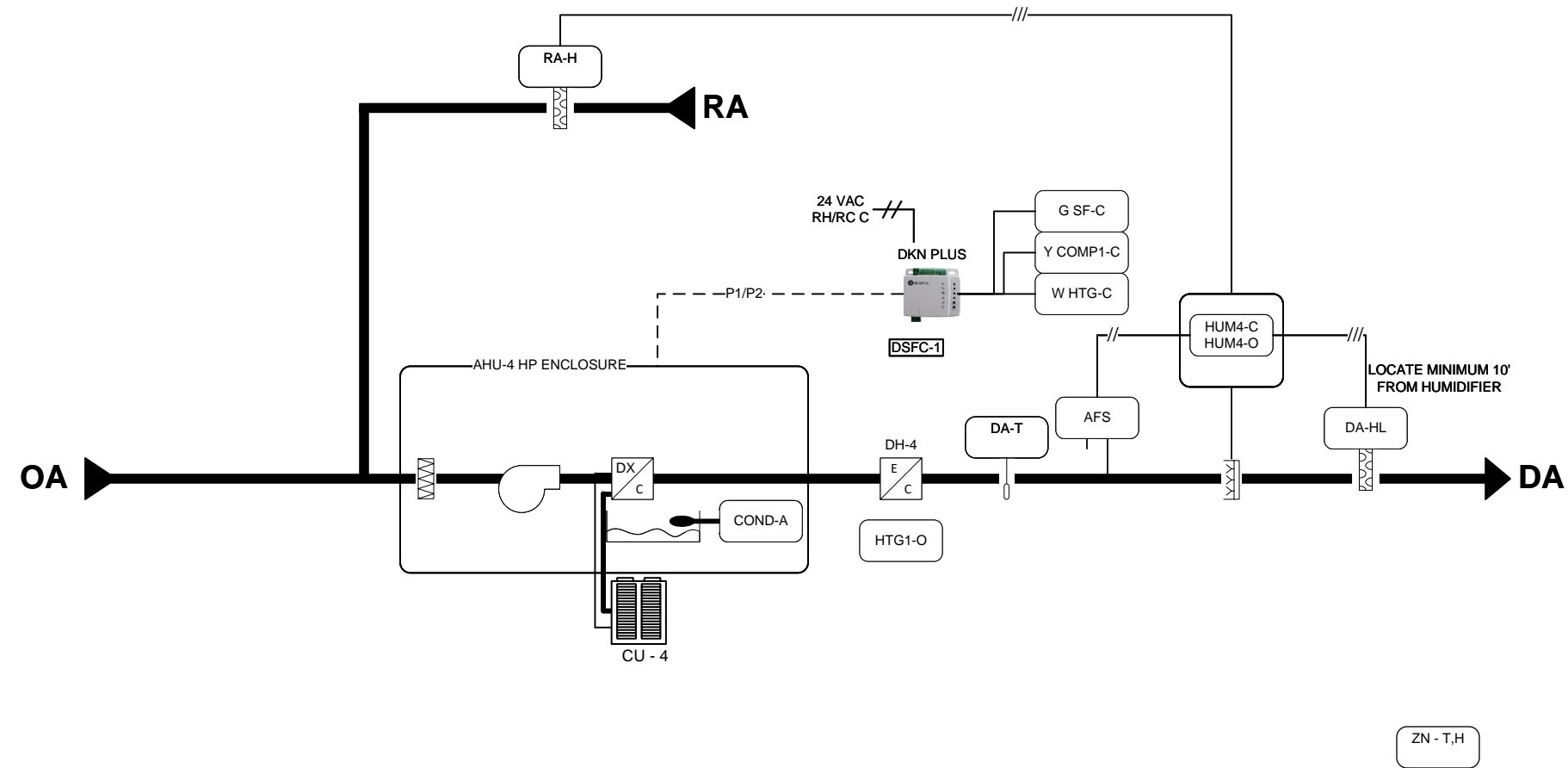
BAS RISER



Drawing Title									
Riser				AS BUILT				12/19/2024	
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AIR HANDLING UNIT AHU-4

Bill of Material				
TAG	PART NO	VENDOR	DESCRIPTION	QTY
DA-T	STE-1405	KMC	PROBE TEMPERATURE SENSOR 6"	1
ZN - T,H	STE-9021W	KMC	NET SPACE TEMP/HUMIDITY SENSOR	1



Drawing Title									
Air Handling Unit AHU-4				AS BUILT				12/19/2024	
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AHU-4 SEQUENCE OF OPERATION

UNIT ENABLE:

When the network input unit enable switch is set to occupied, the control sequence will be enabled.

SUPPLY FAN CONTROL:

The supply fan will run continuously.

TEMPERATURE CONTROL:

The unit will control to maintain the zone temperature setpoint as sensed by the zone temperature sensor.

REHEAT COIL:

The reheat coil will be staged in sequence to maintain the temperature setpoint.

HEAT PUMP CONTROL:


When the zone temperature falls below the zone temperature setpoint, the reversing valve will be indexed to provide heating when the compressor is running. When the zone temperature rises above the zone temperature setpoint, the reversing valve will be indexed to provide cooling when the compressor is running.

HUMIDIFICATION:

The humidifier will be enabled and modulate to maintain the zone relative humidity setpoint as sensed by the zone relative humidity sensor. The humidity high limit will override the output if necessary to prevent the discharge air humidity from exceeding discharge humidity high limit setpoint.

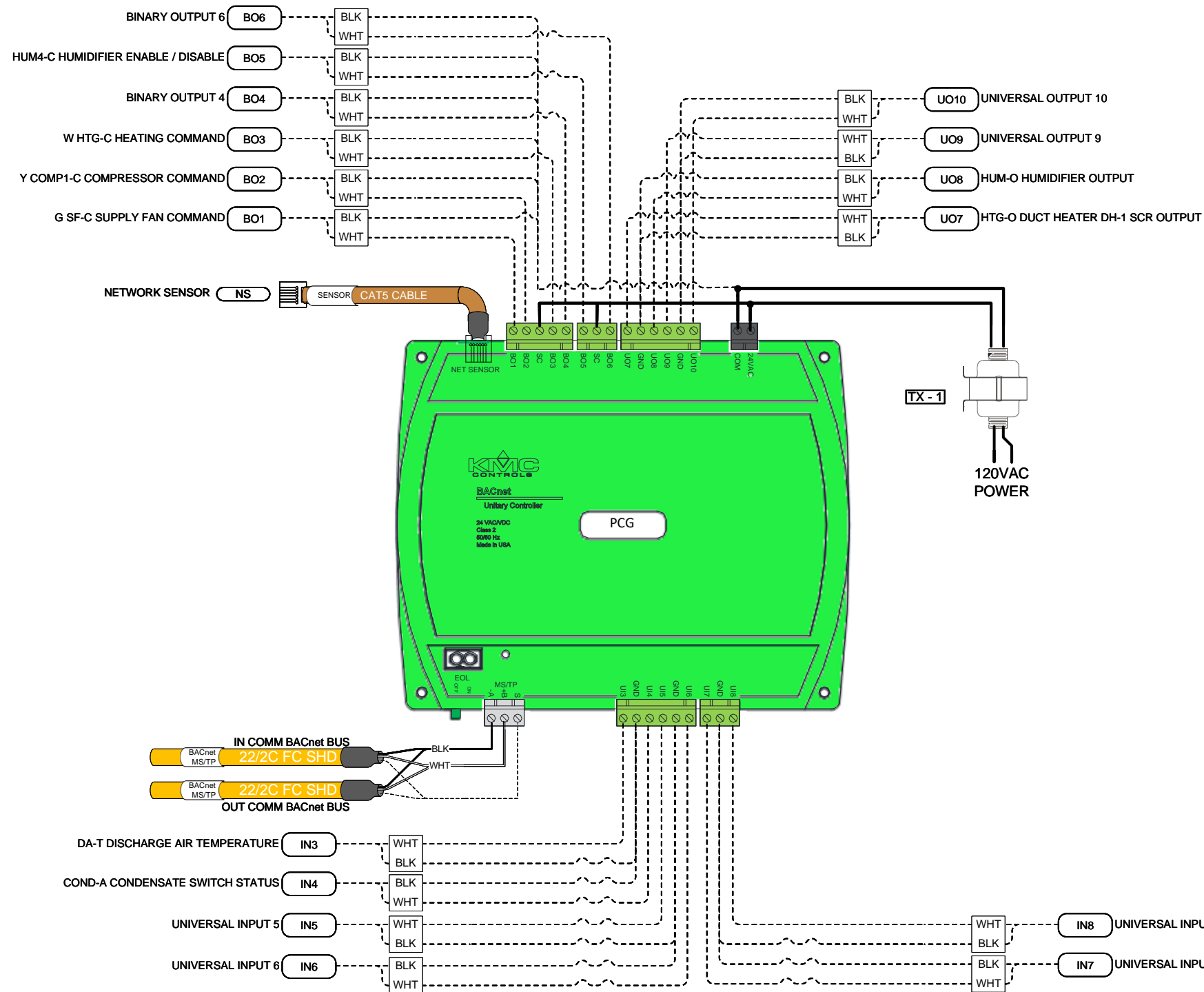
DEHUMIDIFICATION:

On a rise in the zone humidity, the cooling coil output will be overridden to maintain the zone humidity below the zone dehumidification setpoint. The reheat control will maintain the temperature at setpoint.

Drawing Title									
AHU-4 Sequence				AS BUILT		12/19/2024			
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UNITARY CONTROLLER WIRING DETAIL

Bill of Material				
TAG	PART NO	VENDOR	DESCRIPTION	QTY
ENC	HC12124P	HOFFMAN	NEMA 1 12X12X4 HINGE ENCL. W/PERF	1
PCG	BAC-9301	KMC	UNITARY PROGRAMMABLE CONTROLLER	1
TX - 1	TR50VA005	RIB	TRANSFORMER 120 VAC - 24 VAC	1



Drawing Title									
AHU-4 BAC-9301 Controller Detail				AS BUILT				12/19/2024	
REFERENCE DRAWING	NO.	DESIGNED BY	DESIGNED BY	DATE	ECN	DATE	APPROVED	BY	DATE
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Tag	Point Information				Controller Information				Field Device				Ref Detail Shape	Comment
	Point Type	System Name	Object Name	Expanded ID	Controller Details	Trunk Type	Trunk Nbr	Trunk Addr.	Wiring /Tubing	Termination In	Device	Location		
		AHU4			CGM04060									BacNet FC Bus
		AHU4			CGM04060	MS/TP	1	4						Power to Controller
	UI IN-1	AHU4	DA-T	Discharge Air Temperature	CGM04060	MS/TP	1	4	2/22	2-Wire	TE		F131	
	UI IN-2	AHU4			CGM04060	MS/TP	1	4						
	UI IN-3	AHU4			CGM04060	MS/TP	1	4						
	BI IN-1	AHU4	COND-A	Condensate Alarm	CGM04060	MS/TP	1	4						
	BO OUT-1	AHU4	COMP1-C	Compressor Stage 1 Command	CGM04060	MS/TP	1	4	9/22	R,Y1	Heat Pump Thermostat (COMP1)		F1051	
	BO OUT-2	AHU4	HUM4-C	Humidifier Enable / Disable	CGM04060	MS/TP	1	4						
	CO OUT-1	AHU4	SF-C	Supply Fan Command	CGM04060	MS/TP	1	4	9/22	R,G1	Heat Pump Thermostat (FAN1)		F1051	
	CO OUT-2	AHU4	REV1-C	Reversing Valve 1 Command	CGM04060	MS/TP	1	4	9/22	R,O1	Heat Pump Thermostat (REV VLV1)		F1051	
	CO OUT-3	AHU4	HTG1-O	Duct Heater DH-1 SCR Output	CGM04060	MS/TP	1	4						
	CO OUT-4	AHU4			CGM04060	MS/TP	1	4						
		AHU4			NET STAT									
		AHU4			NET STAT	SA Bus	1	199						
	STAT	AHU4	ZN-T	Zone Temperature	NET STAT	SA Bus	1	199	6/24	Phone Jack	NS8000 NetSensor Modular Jack		NS201	
	STAT	AHU4	ZN-SP	Zone Setpoint	NET STAT	SA Bus	1	199	6/24	Phone Jack	NS8000 NetSensor Modular Jack		NS201	
	STAT	AHU4	ZN-H	Zone Humidity	NET STAT	SA Bus	1	199	Wireless		WRZ-TTx0000 (ZONE Add Switch=0)		NS107	
	STAT	AHU4	OCC-MODE	Occupancy Status Display	NET STAT	SA Bus	1	199						

Drawing Title											
AHU-4 Point Schedule				AS BUILT						12/19/2024	
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Harrison
Energy Partners

DATASHEET INDEX

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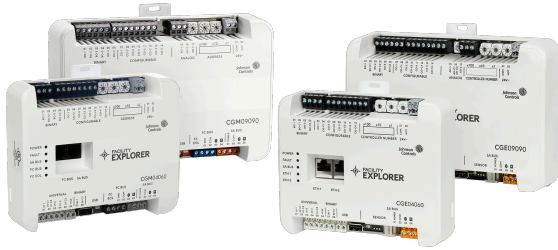
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General Purpose Application Controllers (CG Series)

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 Facility Explorer system network.

CGE controllers communicate using the BACnet/IP communication protocols. CGM controllers are switchable to use either the BACnet MS/TP or N2 communications protocol. Equipment controllers in BACnet/IP or BACnet MS/TP communication mode are BACnet network-compliant devices. Controllers running in N2 mode can be used 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 (PAdaptive) 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 communications

CGE controllers provide higher speed communication with the Controller Configuration Tool (CCT) and improved bandwidth.

Models to support both BACnet MS/TP and N2, with auto-detection of the communications protocols

CGM controllers auto-detect the BACnet MS/TP or N2 protocol that is connected to it, which enables the same controller to support multiple communication protocols without the need to purchase a special model per protocol, and without extra manual setup.

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 FX 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 comply with cyber security best practices.

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 FX 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) and System Configuration Tool (SCT)

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 connected SA Bus PCX devices at the same time.

CG model information

Table 1: CG series information including point type counts

Communication protocol	CGM09090-0 and CGM04060-0: BACnet MS/TP, N2, or Zigbee Wireless (using add-on modules) CGE09090-0 and CGE04060-0: BACnet/IP		
Modular Jacks	CGM09090-0 and CGM04060-0: FC and SA Bus Modular Ports: RJ-12 6-Pin Modular Jacks CGE09090-0 and CGE04060-0: RJ-12 6-Pin Sensor Port		
Point Types	Signals Accepted	F4-CGM09090-0 F4-CGE09090-0	F4-CGM04060-0 F4-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
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	Supports up to 9 WRZ sensors when using the ZFR or ZFR Pro Series wireless router configuration Supports up to 5 WRZ sensors when using the one-to-one WRZ-78xx wireless configuration		

Ordering information and accessories

Table 2: Ordering information

Product code number	Description
F4-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
F4-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
F4-CGE09090-0	18-point General Purpose Application Ethernet Controller Includes: BACnet/IP communication; 18 points (7 UI, 2 BI, 4 CO, 2 AO, 3 BO); real-time clock; 24 VAC input
F4-CGE04060-0	10-point General Purpose Application Ethernet Controller Includes: and BACnet/IP communication; 10 points (3 UI, 1 BI, 4 CO, 2 BO); real-time clock; 24 VAC input

Table 3: Accessories (order separately)

Product code number	Description
XPM Series Expansion Modules	Refer to the <i>F4-XPM Expansion Modules Catalog Page (LIT-1901150)</i> for a complete list of available Expansion Modules.
PCX Series Expansion Modules	Refer to the <i>FX-PC Series Programmable Controllers and Related Products Product Bulletin (LIT-12011657)</i> for a complete list of available Expansion Modules.
TL-CCT-0	License enabling Controller Configuration Tool (CCT) software for one user
FX-FCP-0	License enabling Facility Explorer Equipment Controller Firmware Package Files required for CCT
TL-MAP1810-0Px	Refer to the <i>Mobile Access Portal Gateway Catalog Page (LIT-1900869)</i> to identify the appropriate product for your region.
FX-DIS1710-0	Local Controller Display
NS Series Network Sensors	Refer to the <i>NS Series Network Sensors Product Bulletin (LIT-12011574)</i> 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 <i>WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653)</i> for specific sensor model descriptions.
WRZ-7860-0	Refer to the <i>WRZ-7860 Receiver for One-to-One Wireless Room Sensing Product Bulletin (LIT-12011640)</i> for a list of available products.
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 <i>Hi Power Survey Tool Installation Document (Part No.24-11461-00012)</i> 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 <i>WRG1830/FX-ZFR183x Pro Series Wireless Field Bus System Catalog Page (LIT-1901153)</i> .
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 <i>ZCT Checkout Tool Help LIT-12012292</i> or the <i>WNC1800_ZFR182x Pro Series Wireless Field Bus System Technical Bulletin (LIT-12012356)</i> .
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	14 VA maximum ¹ Note: The USB feature is not currently supported.
Power Source	+15 VDC power source terminals provide 100 mA total current. F4-CGM09090, F4-CGE09090: Quantity 2 located in Universal IN terminals for active (3-wire) input devices F4-CGM04060, F4-CGE04060: 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); 10 to 90% RH noncondensing Storage: -40°C to 80°C (-40°F to 176°F); 5 to 95% RH noncondensing
Communications Protocol	F4-CGM models: BACnet MS/TP; N2. Zigbee wireless also supported (at FC Bus and for Sensors) with additional hardware. F4-CGE models: BACnet/IP
Device Addressing for BACnet MS/TP	Decimal address set via three rotary switches: valid controller device addresses 4-127
Device Addressing for N2	Decimal address set via three rotary switches: valid controller device addresses 1-254
Controller Number for Ethernet controllers	3 rotary switches to assign a unique number for each controller on the subnet to identify it in the CCT controller configuration tool for uploading and downloading
Communications Bus	F4-CGM models BACnet MS/TP (default); N2 3-wire FC Bus between the supervisory controller and equipment controllers F4-CGE models BACnet/IP Two Ethernet ports; 10/100 Mbps; 8-pin RJ-45 connector All F4-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.
Input and Output Capabilities	F4-CGM09090, F4-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) F4-CGM04060, F4-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

Table 4: Technical Specifications for CG Series Controllers

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 CVM 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)	F4-CGM09090, F4-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. F4-CGM04060, F4-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	F4-CGM09090, F4-CGE09090: 0.5 kg (1.1 lb) F4-CGM04060, F4-CGE04060: 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 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 Advanced Application Controller (B-AAC), based on ANSI/ASHRAE 135-2016

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://jciapat.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



ENCLOSURES

NEMA 1 HINGE COVER BOXES HC SERIES

DESCRIPTION

The Kele HC Series NEMA 1 hinge cover boxes serve as surface-mounted junction boxes or switch boxes. With the addition of a field-installed perforated subpanel, they can also house controls and instruments in areas that do not require oil-tight and dust-tight ratings.

FEATURES

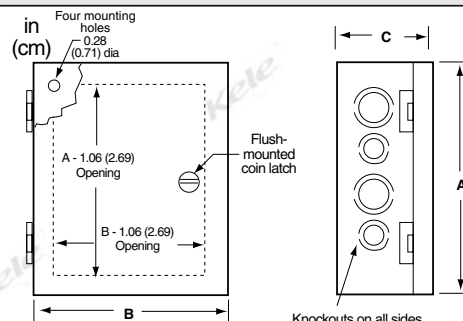
- 16-gauge steel construction meets NEMA 1
- Removable doors with butt hinges
- Door hinge on left or right side
- Mounting holes on back of enclosure
- Easy operation of flush latch with a screwdriver or coin
- Various sizes of easily removable knockouts on all sides
- ANSI 61 gray polyester-powder finish inside and out over phosphatized surfaces
- Available with optional perf panel
- UL File #E27525
- CSA File #LL42184, RoHS
- One-year warranty



HC Series



DIMENSIONS



ORDERING INFORMATION

ENCLOSURE MODEL†	DIMENSIONS A x B x C in (cm)	WEIGHT lb (Kg)	OPTIONAL PERF PANEL DIMENSION SIZE H x W in (cm)
HC664	6 x 6 x 4 (15 x 15 x 10)	3.2 (1.5)	4.25 x 4.25 (11 x 11)
HC666	6 x 6 x 6 (15 x 15 x 15)	4.0 (1.8)	4.25 x 4.25 (11 x 11)
HC886	8 x 8 x 6 (20 x 20 x 15)	6.0 (2.7)	6.25 x 6.25 (16 x 16)
HC1084	10 x 8 x 4 (25 x 20 x 10)	7.0 (3.2)	8.25 x 6.25 (21 x 16)
HC1284	12 x 8 x 4 (30 x 20 x 10)	8.0 (3.6)	10.25 x 6.25 (26 x 16)
HC12104	12 x 10 x 4 (30 x 25 x 10)	8.0 (3.6)	10.25 x 8.25 (26 x 21)
HC12124	12 x 12 x 4 (30 x 30 x 10)	8.8 (4.0)	10.25 x 10.25 (26 x 26)
HC12126	12 x 12 x 6 (30 x 30 x 15)	10.3 (4.7)	10.25 x 10.25 (26 x 26)
HC16124	16 x 12 x 4 (41 x 30 x 10)	12.0 (5.5)	14.25 x 10.625 (36 x 26)
HC16126	16 x 12 x 6 (41 x 30 x 15)	13.0 (5.9)	14.25 x 10.25 (36 x 26)
HC18124	18 x 12 x 4 (46 x 30 x 10)	12.0 (5.4)	16.25 x 10.25 (41 x 26)
HC18126	18 x 12 x 6 (46 x 30 x 15)	14.0 (6.4)	16.25 x 10.25 (41 x 26)

† Add P to the end of part number to order optional perf panel. (Standoffs are field installed, drilling required.)
See Hoffman Enclosure Accessory page in the Enclosure section for locks, latches, heaters, fans, and ventilation kits. Additional box sizes available.

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 (CO₂), 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, CO₂, 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, CO₂, 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, CO₂, 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.

- 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.

① **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.

① **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.

Selection charts

Table 1: NS Series Network Sensor ordering information: temperature, humidity and CO₂ 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

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
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 CO₂ 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
NSB8BTC341-0	No		White	No

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
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: CO₂ 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	

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)	
	NSB8BHxxx-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 <i>NS8000 Series Network Sensors Installation Guide (24-11256-00007)</i> 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		

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
	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
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://jciapat.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 Johnson Controls representative: www.johnsoncontrols.com/locations

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

TE-6300 Series Temperature Sensors Catalog Page

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.

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

TE-63xxP Models

The TE-63xxP (plastic enclosure) models:

- provide a thermoplastic conduit box with 1/2-14 internal NPT for connecting to conduit
- provide aluminum mounting plate and 1/2-14 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

TE-6300 Series Temperature Sensors



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).

TE-6300 Series Temperature Sensors Catalog Page (Continued)

Selection Chart

TE-6300 Temperature Sensor Models (Part 1 of 2)

Sensor	Mounting Style	Probe Length in. (mm)	Product Code Number	
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		

TE-6300 Temperature Sensor Models (Part 2 of 2)

Sensor	Mounting Style	Probe Length in. (mm)	Product Code Number	
Platinum Equivalent	1k ohm Averaging ¹	10 ft (3 m)	TE-6327P-1	
		20 ft (6.1 m)	TE-6328P-1	
	100 ohm Averaging 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	
	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	
	8 (203)	TE-636AM-2		

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

Optional Accessories (Part 1 of 2)

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) ¹
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 Series Temperature Sensors Catalog Page (Continued)

Optional Accessories (Part 2 of 2)

Product Code Number	Description
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)

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

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		■		Brown and gold/beige
T-4000-2639	■			
T-4000-2640	■		■	
T-4000-2644		■		Brushed aluminum/white
T-4000-3139	■			
T-4000-3140	■		■	
T-4000-3144		■		

- Without Johnson Controls logo

TE-6300 Series Temperature Sensors Catalog Page (Continued)

Technical Specifications

TE-6300 Series Temperature Sensors (Part 1 of 2)		
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	±1.0F° at 70°F (± 0.58C° at 21°C)
	1k ohm platinum averaging	
	2.2k ohm thermistor	±0.36F° (±0.2C°) 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
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)
TE-63xxV	Wire harness: -50 to 122°F (-46 to 50°C)	

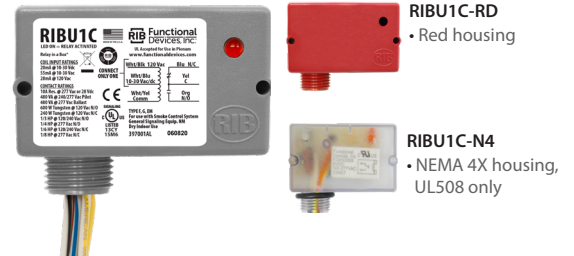
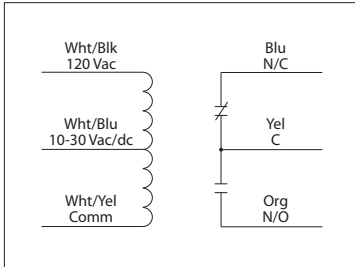
TE-6300 Series Temperature Sensors Catalog Page (Continued)

TE-6300 Series Temperature Sensors (Part 2 of 2)		
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 mm) 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

10 AMP PILOT CONTROL RELAY

RIBU1C

Enclosed Relay 10 Amp SPDT with 10-30 Vac/dc/120 Vac Coil



SPECIFICATIONS

Relays & Contact Type: One (1) SPDT Continuous Duty Coil
Expected Relay Life: 10 million cycles minimum mechanical
Operating Temperature: -30 to 140° F
Humidity Range: 5 to 95% (noncondensing)
Operate Time: 20ms
Relay Status: LED On = Activated
Dimensions: 1.70" x 2.80" x 1.50" with .50" NPT nipple
Wires: 16", 600V Rated
Approvals: UL Listed, UL916, UL864, C-UL California State Fire Marshal, CE, RoHS
Housing Rating: UL Accepted for Use in Plenum, NEMA 1
Gold Flash: Yes
Override Switch: No

Contact Ratings:
 10 Amp Resistive @ 277 Vac
 10 Amp Resistive @ 28 Vdc
 480 VA Pilot Duty @ 240-277 Vac
 480 VA Ballast @ 277 Vac
Not rated for Electronic Ballast
 600 Watt Tungsten @ 120 Vac (N/O)
 240 Watt Tungsten @ 120 Vac (N/C)
 1/3 HP @ 120-240 Vac (N/O)
 1/6 HP @ 120-240 Vac (N/C)
 1/4 HP @ 277 Vac (N/O)
 1/8 HP @ 277 Vac (N/C)

Coil Current:
 33 mA @ 10 Vac 13 mA @ 10 Vdc
 35 mA @ 12 Vac 15 mA @ 12 Vdc
 46 mA @ 24 Vac 18 mA @ 24 Vdc
 55 mA @ 30 Vac 20 mA @ 30 Vdc
 28 mA @ 120 Vac

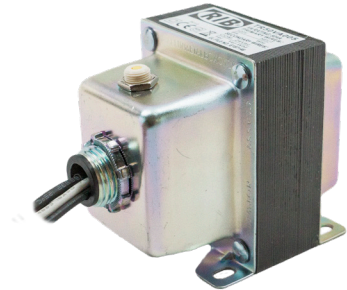
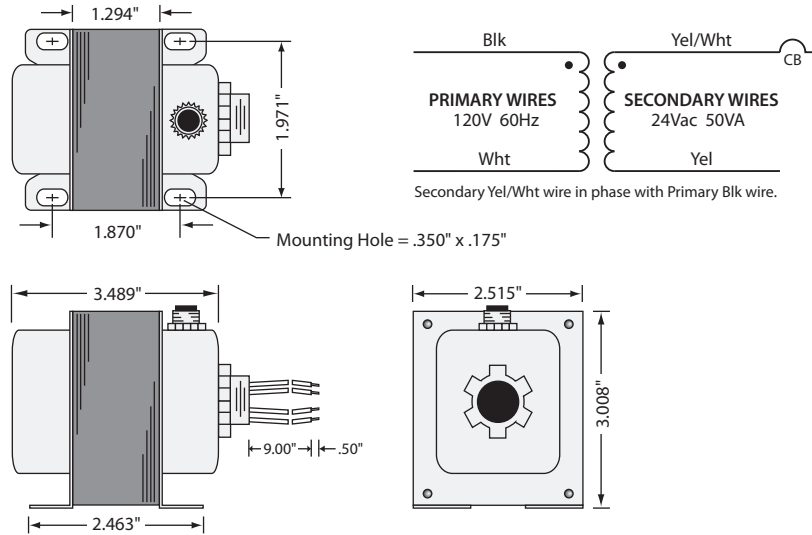
Coil Voltage Input:
 10-30 Vac/dc ; 120 Vac ; 50-60 Hz
 Drop Out = 2.1 Vac / 2.8 Vdc
 Pull In = 9 Vac / 10 Vdc

Note:
 • Order in bulk by adding "-5PACK", "-10PACK", "-25PACK", or "-100PACK" to end of model number.

TRANSFORMER

TR50VA005

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



SPECIFICATIONS

- VA Rating:** 50
- Frequency:** 50/60 Hz
- Mounting:** Foot & Single Threaded Hub
- Over Current Protection:** Circuit Breaker
- Dimensions:** 3.489" x 2.515" x 3.008" (w/ .500" NPT Hub)
- Wire Length:** 9" Typical w/ .5" Strip
- Operating Temperature:** -30 to 140° F
- MTBF:** 100,000 Hours @ 77° F
- Construction:** Split-Bobbin
- Approvals:** Class 2 UL5085-3 Listed, C-UL, CE, RoHS