

## Facility Explorer

**FX Supervisory Controllers****Description**

FX Supervisory Controllers are Web-based supervisory-class controllers in the Facility Explorer product family. FX Supervisory Controllers manage networks of field controllers using open communication protocols, such as BACnet®, LONWORKS®, and N2 protocols. FX Supervisory Controllers support a full set of building automation features, such as scheduling, alarming, histories, data sharing, energy management, totalization, and customized control routines, which are specifically designed for commercial facilities.

Each FX Supervisory Controller includes a graphical system user interface and configuration tool that you can access with a Web browser. Remote access is easily achieved from an Internet, intranet, or dial-up connection. Multiple users can concurrently connect to the FX Supervisory Controller. You can manage security and presentation preferences through user profiles, logon IDs, and passwords.

FX Supervisory Controllers are a family of controllers similar in function and overall capabilities. The FX20, FX60, and FX70 are compact DIN rail mountable controllers with the capability for external input and output points.

In addition, the FX Supervisory Controllers' hardware and software design is modular, so you can add accessories, such as communications cards, input and output modules, and software options, if needed. This design allows you to select the controller most appropriate for the size of your facility and those options best needed to control it.

Refer to the *FX Supervisory Controller Product Bulletin (LIT-12011406)* for important product application information.

**Repair Information**

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

**FX Supervisory Controllers****Features**

- Web-based User Interface (UI)
- adoption of industry standard communication protocols
- embedded configuration tool
- modular design
- small, compact design
- FX Workbench

**Selection Charts****FX Supervisory Controller Ordering Information**

Product Code Number	Description
LP-FX2011N-1	FX20: Includes 128 MB RAM/64 MB Flash, 2 10/100 Mbps Ethernet ports, 1 non-isolated RS-485 port, 1 RS-232 port, 1 Niagara Direct Input/Output (NDIO) port, 2 communication card option slots, embedded FX Workbench, Web User Interface, Niagara driver, oBIX driver, and N2 driver.
LP-FX2021N-1	FX20 with BACnet MS/TP Protocol: Includes 128 MB RAM/64 MB Flash, 2 10/100 Mbps Ethernet ports, 1 non-isolated RS-485 port, 1 RS-232 port, 1 NDIO port, 2 communication card option slots, embedded FX Workbench, Web User Interface, Niagara driver, oBIX driver, N2 driver, and BACnet MS/TP driver.
LP-FX6011N-1	FX60: Includes 128 MB RAM/128 MB Flash, 2 10/100 Mbps Ethernet ports, 1 RS-485 port, 1 RS-232 port, 1 NDIO port, 2 communication card option slots, embedded FX Workbench, Web User Interface, Niagara driver, oBIX driver, and N2 driver.
LP-FX6021N-1	FX60 with BACnet MS/TP Protocol: Includes 128 MB RAM/128 MB Flash, 2 10/100 Mbps Ethernet ports, 1 RS-485 port, 1 RS-232 port, 1 NDIO port, 2 communication card option slots, embedded FX Workbench, Web User Interface, Niagara driver, oBIX driver, N2 driver, and BACnet MS/TP driver.
LP-FX7011N-0	FX70: Includes 1 GB RAM/1 GB Flash, 1 RS-232 port, 1 RS-485 port, 2 1 Gbps Ethernet ports, 1 USB ports, 2 communication card option slots, embedded Niagara driver, oBIX driver, N2 driver, FX Workbench, and Web User Interface.
LP-FX7021N-0	FX70 with BACnet MS/TP Protocol: Includes 1 GB RAM/1 GB Flash, 2 1 Gbps Ethernet ports, 1 RS-485 port, 1 RS-232 port, 1 USB port, 1 NDIO port, 2 communication card option slots, embedded FX Workbench, Web User Interface, Niagara driver, oBIX driver, N2 driver, and BACnet MS/TP driver.
LP-FX20BDEM-1	Demo version of FX20: Includes all software modules and drivers. Intended for engineering and/or demonstration purposes only (not allowed for actual project installations). You must also purchase office support and renewal fees to activate this FX20. License expires yearly on October 31 and must be renewed yearly to continue operation.
LP-FX60BDEM-1	Demo version of FX60: Includes all software modules and drivers. Intended for engineering and/or demonstration purposes only (not allowed for actual project installations). Office support and renewal fee must also be purchased to activate this FX60. License expires yearly on October 31 and must be renewed yearly to continue operation.

**FX Workbench Ordering Information**

Product Code Number	Description
LP-FXTSPE-0	FX Tools Supervisor Pro Software on CD-ROM: End-user version. Includes FX Workbench, FX Workbench Pro, and FX Alarm Portal.
LP-FXTSPE-6	FX Tools Supervisor Pro Software Upgrade on CD-ROM. Used to upgrade any copy of FX Tools Supervisor Pro which is within the software maintenance agreement period.
LP-FXALMPTL-0	FX Alarm Portal Client Software on CD-ROM. Provides Alarm Portal functions only.
LP-FXSWMA-0	License file enabling 1 year of software maintenance for one copy of FX Tools Supervisor Pro.
LP-FXSWUPG-0	License file enabling a one-time software upgrade for one copy of FX Tools Supervisor Pro.



## FX Supervisory Controllers (Continued)

### Accessories

#### FX Supervisory Controller Hardware Accessories Ordering Information

Product Code Number	Description
LP-FXNDIO16-0	16 channel input/output module for the FX20/FX60 Supervisory Controllers: Includes 8 universal inputs, 4 relay outputs, and 4 0-10 V analog outputs, maximum of 4 per FX20/FX60 Supervisory Controller, or 2 if combined with NDIO34.
LP-FXNDIO34-0	34 channel input/output module for the FX20/FX60 Supervisory Controllers: Includes 16 universal inputs, 10 relay outputs, and 8 0-10 V analog outputs, maximum of 1 per FX20/FX60/FX70 Supervisory Controller. Also provides power to the FX20/FX60/FX70 Supervisory Controller using externally connected 24 VAC transformer or 24 VDC power supply.
LP-FXRIO16-0	Remote input/output module for the FX Supervisory Controllers. Includes 8 universal inputs, 4 relay outputs, and four 0-10 V analog outputs.
LP-FXLONFTT-1	LONWORKS communication card for the FX Supervisory Controllers: 78 kbps, FTT-10A, 2-position removable screw-terminal connector plug.
LP-FXR485-0	Dual port RS-485 communication card for the FX Supervisory Controllers: electrically isolated, two 3-position removable screw-terminal connector plugs.
LP-FXWTC-0	Wireless TEC Option Card includes option card, mounting bracket, and direct-mount antenna.
TEC20-A-1	Replacement antenna for Wireless TEC Option Card.
TEC20-RA-1	Remote antenna for Wireless TEC Option Card when it is installed inside a metal cabinet or when remote antenna mounting is required by physical installation. Includes 0.53 m (1.75 ft) cable.
LP-FXR232-0	Single port RS-232 communication card for the FX Supervisory Controller: 115,200 max baud rate, DB-9M connector.
LP-FXMDM-0	56 kbps, auto-dial/auto-answer modem for the FX Supervisory Controllers: RJ-11 connector, disables onboard RS-232 port, maximum of one per FX Supervisory Controller.
LP-FXPMUS-0	Power module for FX Supervisory Controller: 90-240 VAC, 50/60 Hz, U.S. wall adapter.
LP-FXPMEU-0	Power module for FX Supervisory Controller: 90-240 VAC, 50/60 Hz, European wall adapter.
LP-FXPMUK-0	Power module for FX Supervisory Controller: 90-240 VAC, 50/60 Hz, U.K. wall adapter.
LP-FXPM24-0	Power module for FX Supervisory Controller: 24 VAC/DC, DIN rail mountable.
LP-FXPM263-0	Power module for FX Supervisory Controller: 90-263 VAC/DC, 50/60 Hz DIN rail mountable.
LP-KITFX2BAT-0	NiMH replacement backup battery assembly for FX20 and FX60.
LP-KITFX7BAT-0	FX70 replacement backup battery assembly.
LP-KITFX7HW-0	Hardware Bag for FX70, containing screw terminal connector plugs (two 6-position, one 2-position, earth grounding wire).
LP-KITGPRSA-0	Replacement right-angle GSM/GPRS quad-band SMA coax-mounted stub antenna.
LP-KITSEDAT-0	Replacement adjustable-angle 2.4 GHz RP-SMA coax-mounted stub antenna.
LP-KITSED3T-0	3-terminal wiring plug for RS-485.
LP-KIT7MEM-0	1 GB DDR-2 333 MHz Small Outline Dual In-line Memory Module (SODIMM) memory module (standard replacement for FX70).
LP-FXGPRS-0	GPRS Modem option card for FX20, FX60, FX70.
LP-FXGPRSW-0	GPRS Modem option card for FX20, FX60, FX70 with Wyleless SIM card.
LP-FXGPRSE-0	External mounting for GPRS modem antenna. Included is a 6.56 ft. (2m) SMA-type coax extension cable and steel bracket for wall or panel mounting.
LP-FXGPRSS-0	GPRS Modem SIM card replacement provisioned by Wyleless.
LP-FXSED-0	Sedona Framework option card with both wireless 6LoWPAN and wired RS-485 port, based on the Jennic JN5139 wireless microcontroller. Includes stub antenna.
LP-FXSEEXT-0	External mounting for Sedona Framework antenna. Includes a 6.56 ft (2m) RP-SMA type, coax extension cable and mounting bracket.
LP-FXLON-0	LONWORKS twisted pair driver license for FX20, FX60, FX70 Controllers.
LP-FXSRAM-0	Static RAM option card for battery-less FX supervisory controllers.
LP-FX70WIFI-0	Mini PCI 802.11 Wi-Fi adapter card for an FX70.

#### FX Supervisory Controller Software Accessories Ordering Information (Part 1 of 2)

Product Code Number	Description
LP-FX60EX256-0	License enabling 256 Mb memory expansion for one FX60.
LP-FXBACIPC-0	License enabling BACnet IP client (import) driver for one FX Supervisory Controller.
LP-FXBACIPS-0	License enabling BACnet IP server (export) driver for one FX Supervisory Controller.
LP-FXBACMS-0	License enabling BACnet MS/TP driver for one FX Supervisory Controller.
LP-FXLONIP-0	License enabling LONWORKS IP driver for one FX Supervisory Controller.
LP-FXMBUS-0	License enabling M-Bus driver for one FX Supervisory Controller.
LP-FXMDBRTU-0	License enabling MODBUS RTU client (import) driver for one FX Supervisory Controller.
LP-FXMDBRTUS-0	License enabling MODBUS RTU server (export) driver for one FX Supervisory Controller.
LP-FXFLEX-0	License enabling Flex serial Driver over RS-232 or RS-485.
LP-FXMDBTCP-0	License enabling MODBUS TCP client (import) driver for one FX Supervisory Controller.
LP-FXMDBTCP-0	License enabling MODBUS TCP server (export) driver for one FX Supervisory Controller.
LP-FXSNMP-0	License enabling Simple Network Management Protocol (SNMP) driver for one FX Supervisory Controller.
LP-FXSMS-0	License enabling Simple Messaging Service (SMS) driver for one FX Supervisory Controller.

The performance specifications are nominal and conform to acceptable industry standards. For applications at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products. © 2011 Johnson Controls, Inc. [www.johnsoncontrols.com](http://www.johnsoncontrols.com)

## FX Supervisory Controllers (Continued)

### FX Supervisory Controller Software Accessories Ordering Information (Part 2 of 2)

Product Code Number	Description
LP-FXSSL-0	License enabling Secure Socket Layer (SSL) for one FX Supervisory Controller.
LP-FX40MA-0	License enabling 1 year of annual software maintenance for one FX Supervisory Controller. Includes new releases and interim service releases for 1 year from the date of purchase.
LP-FX40UPG-0	License enabling one-time, new release software upgrade for one FX Supervisory Controller.
LP-FX40UPG-0	License enabling one-time, new release software upgrade for one FX Supervisory Controller.

### Technical Specifications

FX Supervisory Controller (Part 1 of 2)					
	FX20	FX60	FX70	FX22	FX62
<b>Enclosure/Mounting</b>	Plastic/DIN Rail			Plastic/Wall	
<b>Dimension</b>	6.25 x 4 x 2.375 in. (158.75 x 101.6 x 60.325 mm)		8.5 x 6 x 2.625 in. (216 x 152 x 67 mm)	12.625 x 7.5 x 2.25 in. (321 x 191 x 57 mm)	
<b>Power Supply</b>	DIN Rail Power modules			Integral 24 VAC/DC	
<b>Battery Backup</b>	5-minute internal		5-minute internal, optional external	5-minute internal, optional external	
<b>Processor</b>	PowerPC 405EP at 250 MHz	PowerPC 440EP at 524 MHz	PowerPC 440EPx at 667 MHz	PowerPC 405EP at 250 MHz	PowerPC 440 at 524 MHz
<b>RAM Memory</b>	128 MB RAM	128 MB RAM (upgradeable to 256 MB)	1 GB RAM	128 MB SDRAM	256 MB SDRAM
<b>Flash Memory</b>	64 MB Flash	128 MB Flash	1 GB Flash	64 MB Flash	128 MB Flash
<b>Environment</b>	Operating Temperature: 0 to 50°C (32 to 122°F), Storage Temperature: 0 to 60°C (32 to 140°F), Relative Humidity: 5 to 95%, noncondensing				
<b>Communication Ports</b>					
<b>Onboard</b>	2 Ethernet 10/100 Mbps 1 RS-485 1 RS-232 2 option slots		Ethernet 1 Gbps 1 RS-485 (Isolated) 1 RS-232 2 option slots	2 Ethernet 10/100 Mbps 1 RS-485 1 RS-232 1 option slot Integral GPRS modem (FX2213, FX6213)	
<b>Optional</b>	Two options slots (any 2 of the following, except where noted): • Dual port RS-485 • LON FT/TP-10 • Modem (maximum of one and disables onboard RS-232) • RS-232 • Wireless TEC (maximum of one and disables onboard RS-232) • RS-232 • GPRS modem (maximum of one)			One option slot (any one of the following): • Dual port RS-485 • LON FT/TP-10 • Modem (disables onboard RS-232) • RS-232 • Wireless TEC (disables onboard RS-232) • RS-232 • GPRS modem (not available on models with integral GPRS modem)	
<b>Network Drivers</b>					
<b>Embedded</b>	N2, Niagara, oBIX				
<b>Optional</b>	LONWORKS, BACnet MS/TP, BACnet IP Client, BACnet IP Server, MODBUS RTU Client, MODBUS RTU Server, MODBUS TCP Client, MODBUS TCP Server, SNMP, SMS				
<b>Direct I/O</b>					
<b>Onboard</b>	None			8 Universal Inputs (0-100k ohm, 0-10 VDC, 0-20 mA with external resistor, or 10k ohm type 3 thermistor) 4 Relay Outputs (Form A, 24 VAC at 0.5 A) 4 Analog Outputs (0-10 VDC)	
<b>Optional</b>	Up to 66 (via NDIO modules)		Up to 256 via 16 Remote I/O Modules FXRIO16	Up to 48 via 3 Remote I/O Modules, FXRIO16	Up to 240 via 15 Remote I/O Modules FXRIO16
<b>Local (NDIO)</b>	Up to 66 total I/O (via optional NDIO modules)		None	None	
<b>Remote I/O</b>	Up to 64 I/O via 4 Remote I/O Modules (FXRIO16)		Up to 256 I/O via 16 Remote I/O Modules (FXRIO16)	Up to 48 I/O via 3 Remote I/O Modules (FXRIO16)	Up to 240 I/O via 15 Remote I/O Modules (FXRIO16)

## FX Supervisory Controllers (Continued)

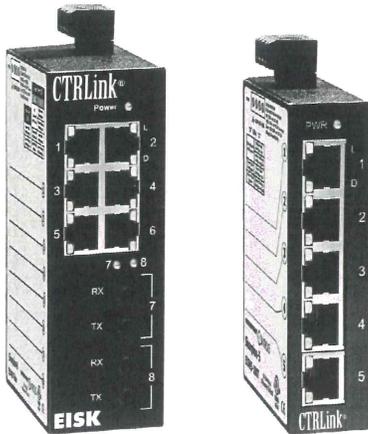
FX Supervisory Controller (Part 2 of 2)					
	FX20	FX60	FX70	FX22	FX62
<b>Compliance</b>  	<b>United States</b> UL Listed, File E107041, CCN PAZX, under UL 916, Energy Management Equipment FCC compliant to CFR 47, part 15, subpart B, class A				
	<b>Canada</b> UL Listed, File E107041, CCN PAZX7, under CSA C22.2 No. 205, Signal Equipment Industry Canada compliant to ICES-003				
	<b>Europe</b> 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.				

Local Input Output Modules	
<b>Product Codes</b>	LP-FXNDIO34-0: 16 universal inputs, 10 relay outputs, 8 analog outputs LP-FXNDIO16-0: 8 universal inputs, 4 relay outputs, 3 analog outputs
<b>Dimensions</b>	NDIO34: 6.313 x 4.820 x 2.438 in. (16.04 x 12.24 x 6.19 cm) NDIO16: 3.2 x 4.828 x 2.437 in. (8.2 x 12.24 x 6.19 cm)
<b>Universal Input Types Supported</b>	10k ohm Type 3 thermistors. Thermistor Sensor Range: -23.3 to 115.5°C (10 to 240°F). Input accuracy is in the range of ± 1% of span. Characteristic curve is customizable. 0-10 V; accuracy is ± 2% of span, without user calibration; uses an external resistor for current input (four provided, mounted by installer on terminal connections) 4-20 mA current loop; accuracy is ±2% of span, without user calibration; self powered or board-powered sensors accepted Dry contact: V open circuit, 300- µA short-circuit current Pulsing dry contact at a rate of up to 20 Hz; 50% duty cycle
<b>Digital Outputs</b>	Form A relay contacts suitable for on/off control only; floating control not supported, Max voltage 30 volts AC or DC, 0.5 A max current rating
<b>Analog Outputs</b>	0-10 VDC, Minimum load supported per output is 2,500 ohms minimum or 4 mA drain maximum

Remote Input Output Modules	
<b>Product Codes</b>	LP-FXRIO16-0: 8 universal inputs, 4 relay outputs, 3 analog outputs
<b>Dimensions</b>	4 x 3.625 x 2.625 in. (10.16 x 9.2 x 6.7 cm)
<b>Universal Input Types Supported</b>	10k ohm Type 3 thermistors. Thermistor Sensor Range: -23.3 to 115.5°C (-10 to 240°F). Input accuracy is in the range of ±1% of span. Characteristic curve is customizable. 0-10 V; accuracy is ±2% of span, without user calibration; uses an external resistor for current input (four provided, mounted by installer on terminal connections) 4-20 mA current loop; accuracy is ±2% of span, without user calibration; self powered or board-powered sensors accepted Dry contact: V open circuit, 300- µA short-circuit current, Pulsing dry contact at a rate of up to 20 Hz; 50% duty cycle
<b>Digital Outputs</b>	Form A relay contacts suitable for on/off control only; floating control not supported, Max voltage 30 volts AC or DC, 0.5 A max current rating
<b>Analog Outputs</b>	0-10 VDC, Minimum load supported per output is 2,500 ohms minimum or 4 mA drain maximum

FX Workbench Requirements	
<b>Processor</b>	Intel® Pentium® 4, 1 GHz or higher
<b>Operating System</b>	Microsoft Windows® 2003 or Microsoft Windows Server® 2008 (If Microsoft IIS is disabled), Microsoft Windows XP® Professional Operating System Microsoft Windows Vista® Operating System. The Tunneling Service does not start automatically if installed on Microsoft Windows Vista operating system; however, you can manually start the Tunneling Service.
<b>Web Browser</b>	Microsoft Internet Explorer® Web browser Version 5.0 or later, Mozilla Firefox
<b>Memory</b>	512 MB minimum
<b>Hard Disk</b>	1 GB minimum, 5 GB recommended
<b>Network Support</b>	Ethernet 10/100 Mbps with RJ-45 connector

## EISK Skorpion Ethernet Switch



- Compact size
- 10BASE-T/100BASE-TX/100BASE-FX compliant
- Auto-MDIX on all copper ports
- Auto-negotiated data rate, duplex, and flow control on twisted-pair ports

- DIN-rail mountable
- Powered from an unregulated DC power source (10–36 V) or from an AC power source (8–24 V, 47–63 Hz). Power is provided through a quick-disconnect terminal strip.
- Broadcast storm control
- Full- or half-duplex on copper ports
- Activity/link and data rate LEDs
- Industrial environment EMC compatible
- UL 508 Listed, Industrial Control Equipment
- C-UL Listed, CSA 22.2 No. 14-M91, Industrial Control Equipment
- CE Mark
- RoHS compliant

### PRODUCT OVERVIEW

The EISK Skorpion family of Plug-and-Play Ethernet switches provides reliable connectivity for industrial and building automation systems in a cost-effective manner, backed by a 5-year warranty.

The Skorpion family of 5- and 8-port switches provides copper-only and copper-fibre combinations. Copper ports provide auto-negotiation of data rates at 10 or 100 Mbps. All copper ports support half-duplex operation with backpressure flow control or full-duplex operation with PAUSE control. All copper ports are Auto-MDIX compliant, eliminating the need for crossover cables.

**Fibre ports are used when distances exceed the 100 meter limit of copper, when immunity to EMI/RFI is important or for additional communication security.** ST or SC connectors are available for use with 1300 nm multimode fibre cable to span 2000 meters or SC connectors with single-mode 1300 nm fibre cable to extend segment lengths to 15,000 meters. All fibre ports operate at 100 Mbps full-duplex.

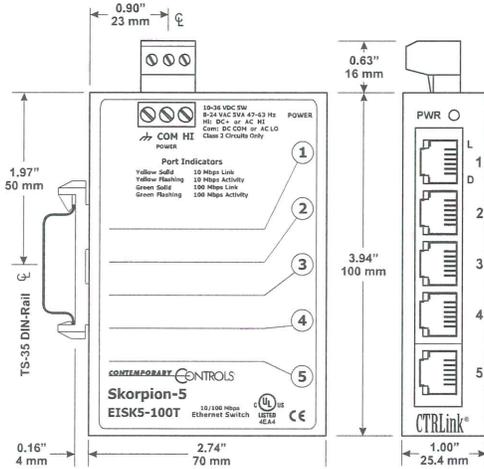
Convenient mounting is available with the attached DIN-rail clip. Low-voltage (8–24 VAC or 10–36 VDC) powers the units. Skorpion switches are designed to operate in 0° to +60°C environments.

**Diagnostics include LED indicators that show link, data rate (green for 100 Mbps, yellow for 10 Mbps), activity (flashing), duplex (green is full-duplex, off is half-duplex), and power (green).** A connection-list label is provided to document the cable connections.

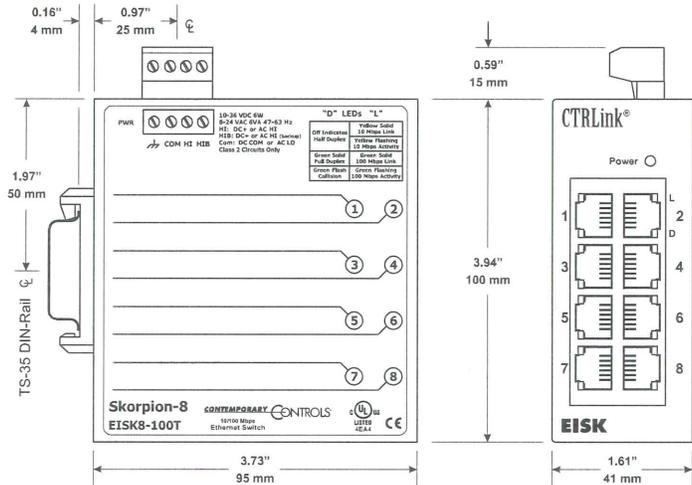
All models meet regulatory approvals including UL 508 Listed, C-UL, CSA C22.2 No. 14-M91, CE Mark and RoHS compliance.

## EISK Skorpion Ethernet Switch

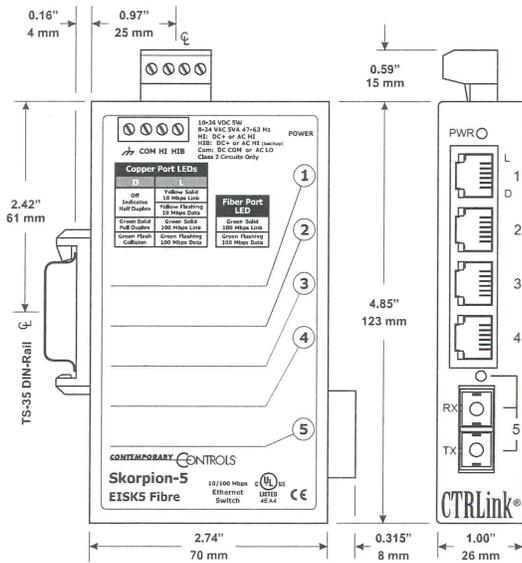
### Mechanical



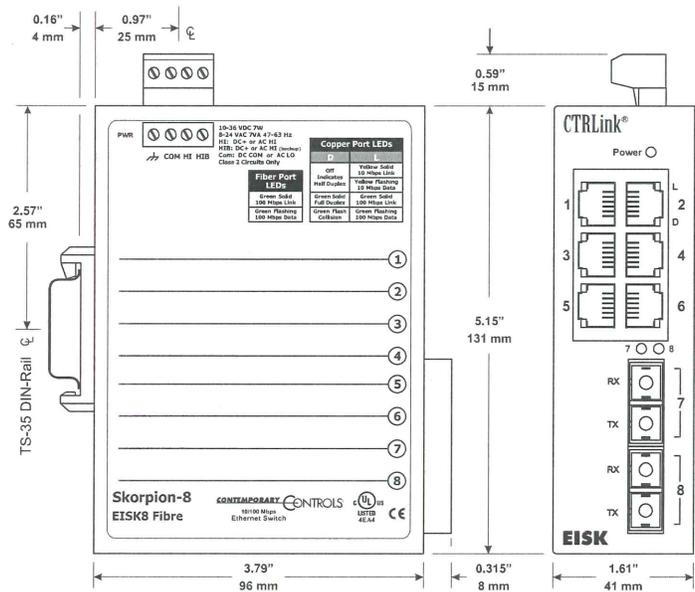
EISK5-100T



EISK8-100T



EISK5 Fibre Models

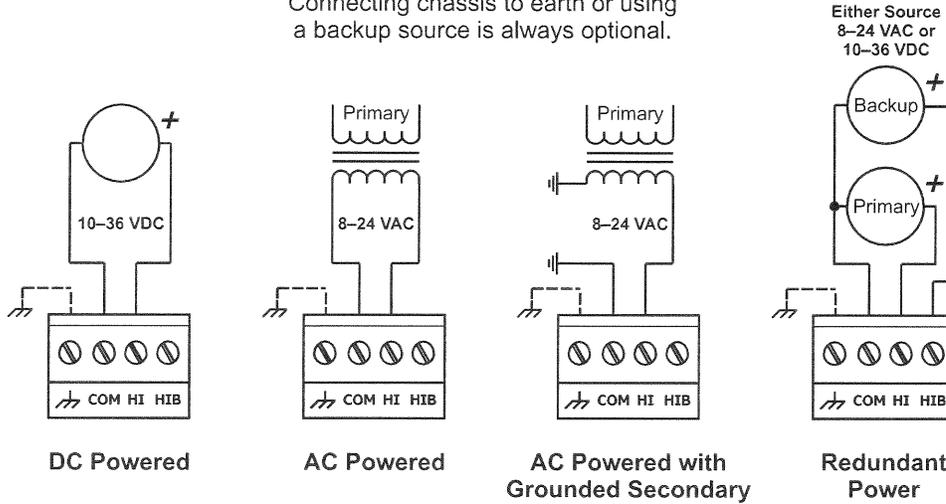


EISK8 Fibre Models

## EISK Skorpion Ethernet Switch

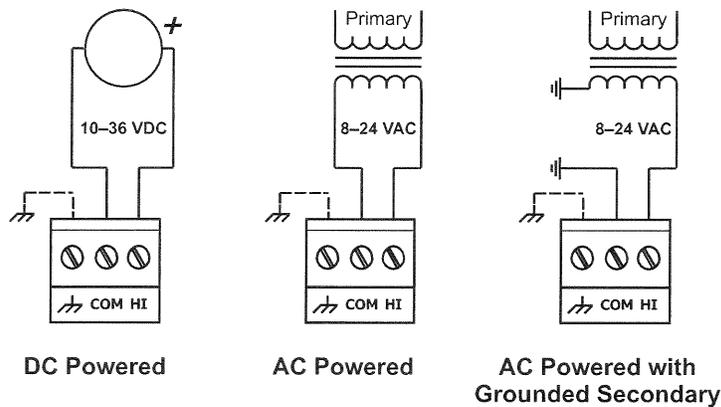
### Power Diagrams

Connecting chassis to earth or using a backup source is always optional.



### EISK5 Fibre Models and EISK8 all Models

Connecting chassis to earth or using a backup source is always optional.



### EISK5-100T Model

## EISK Skorpion Ethernet Switch

### Specifications

Electrical	DC	AC
Input voltage	10–36 Volts	8–24 Volts
Input power	5 W (EISK5-100T)	5 VA (EISK5-100T)
	5 W (EISK5-100T/FT, FC, FCS)	5 VA (EISK5-100T/FT, FC, FCS)
	6 W (EISK8-100T)	6 VA (EISK8-100T)
	7 W (EISK8-100T/FT, FC, FCS)	7 VA (EISK8-100T/FT, FC, FCS)
<b>Input frequency</b>	N/A	47–63 Hz

### Environmental

Operating temperature	0°C to +60°C
Storage temperature	–40°C to +85°C
Relative humidity	10–95% non-condensing
Protection	IP30

### Functionality

Standards	IEEE 802.3
Process type	Store-and-Forward

### Ports

	Copper twisted-pair	Fibre 1300 nm
Interface	10BASE-T/100BASE-TX 10/100 Mbps Auto-negotiated data rate, flow control, full- or half-duplex mode, and Auto-MDIX cable connection	100BASE-FX 100 Mbps Full-duplex
Connectors	Shielded RJ-45	SC (on multimode or single-mode models) ST (only on multimode models)
Maximum segment length	100 m	2 km (multimode), optical budget: 13 dB 15 km (single-mode), optical budget: 19 dB
Signal LEDs	Link (L): Yellow — 10 Mbps Green — 100 Mbps Flashing — Activity  Duplex (D): Off — Half-duplex Green — Full-duplex	Link (L): Green — 100 Mbps Flashing — Activity
Power LED	Green — Power	
Flow control	Half-duplex (backpressure) Full-duplex (PAUSE)	Full-duplex (PAUSE)

## EISK Skorpion Ethernet Switch

### RJ-45 Pin Assignments

MDI-X <sup>1</sup> 10BASE-T/100BASE-TX	
RJ-45	Usage
1	TD+
2	TD-
3	RD+
4	Not Used
5	Not Used
6	RD-
7	Not Used
8	Not Used

<sup>1</sup> Ports normally assume the internal crossover function, but will automatically adapt to connected devices.

### Electromagnetic Compatibility

Standard	Test Method	Description	Test Levels
EN 55024	EN 61000-4-2	Electrostatic Discharge	6 kV contact & 8 kV air
EN 55024	EN 61000-4-3	Radiated Immunity	10 V/m, 80 MHz to 1 GHz
EN 55024	EN 61000-4-4	Fast Transient Burst	1 kV clamp & 2 kV direct
EN 55024	EN 61000-4-5	Voltage Surge	1 kV L-L & 2 kV L-Earth
EN 55024	EN 61000-4-6	Conducted Immunity	10 Volts (rms)
EN 55024	EN 61000-4-11	Voltage Dips & Interruptions	1 Line Cycle, 1 to 5 s @ 100% dip
EN 55022	CISPR 22	Radiated Emissions	Class A
EN 55022	CISPR 22	Conducted Emissions	Class B
CFR 47, Part 15	ANSI C63.4	Radiated Emissions	Class A

## EISK Skorpion Ethernet Switch

### Ordering Information (all models use DIN-rail mounting)

#### Copper Only

Model	Description
→ EISK5-100T	→ Five-port 10BASE-T/100BASE-TX switch
EISK8-100T	Eight-port 10BASE-T/100BASE-TX switch

#### Fibre and Copper

EISK5-100T/FC	Four-port 100BASE-TX/one-port 100BASE-FX (multimode) switch, SC connectors
EISK5-100T/FT	Four-port 100BASE-TX/one-port 100BASE-FX (multimode) switch, ST connectors
EISK5-100T/FCS	Four-port 100BASE-TX/one-port 100BASE-FX (single-mode) switch, SC connectors
EISK8-100T/FC	Six-port 100BASE-TX/two-port 100BASE-FX (multimode) switch, SC connectors
EISK8-100T/FT	Six-port 100BASE-TX/two-port 100BASE-FX (multimode) switch, ST connectors
EISK8-100T/FCS	Six-port 100BASE-TX/two-port 100BASE-FX (single-mode) switch, SC connectors

#### Accessories

Model	Description
AI-XFMR	Wall-mount plug-in transformer, 120 VAC input/24 VAC output (nominal values)
AI-XFMR-E	Wall-mount plug-in transformer, 230 VAC input/24 VAC output (nominal values)

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# FX-PCG General Purpose Programmable Controllers

## Description

The Facility Explorer General Purpose Programmable Controllers (FX-PCGs) can be applied to a wide variety of building equipment control applications ranging from simple fan coil or heat pump control to advanced central plant management.

The FX-PCG models include the 10-point FX-PCG16 and the 17-point FX-PCG26. FX-PCG models include a 32-bit microprocessor, intuitive design, and are available with an optional built-in Liquid Crystal Display (LCD) screen local User Interface (UI).

Refer to the *FX-PC Series Programmable Controllers and Related Products Product Bulletin (LIT-12011657)* for important product application information.

## Features

- Patented Proportional Adaptive Control (P-Adaptive) and Pattern Recognition Adaptive Control (PRAC) technologies — provide continuous loop tuning
- user-friendly graphic theme and clear push-button identification — facilitate easy controller use

- writable flash memory — allows you to download standard or customized applications from the Facility Explorer Programmable Controller Programming and Commissioning Tool (FX-PCT) Software
- large product family — provides a wide range of point mix to meet application requirements and allows for the addition of one or more FX-PCX Expansion Input/Output Modules and/or network sensors to provide even more application capacity
- FX-Supervisory Controller Import Wizard — allows for easy controller integration
- local UI display option (integral display or stand-alone display) — provides enhanced local monitoring
- BACnet® Master-Slave/Token-Passing (MS/TP) communication — provides open system compatibility
- 32-bit microprocessor — ensures optimum performance and meets industry specifications
- wireless capability via FX-ZFR Series Wireless Field Bus System — enables wireless mesh connectivity between FX-PCGs, FX-WRZ Series Wireless Room Temperature Sensors, and FX-Supervisory Controllers, facilitating easy initial location and relocation
- universal and configurable inputs and outputs — support multiple signal options and increase controller application flexibility



**FX-PCG26 Controller**

## Repair Information

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

## Selection Charts

**FX-PCG Series Point Type Counts per Model**

Point Types	Signals Accepted	FX-PCG16	FX-PCG26
<b>Universal Input (UI)</b>	Analog Input, Voltage Mode, 0–10 VDC Analog Input, Current Mode, 4–20 mA <sup>1</sup> Analog Input, Resistive Mode, 0–2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A99B SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode	2	6
<b>Binary Input (BI)</b>	Dry Contact Maintained Mode Pulse Counter/Accumulator Mode (High Speed), 100 Hz	1	2
<b>Analog Output (AO)</b>	Analog Output, Voltage Mode, 0–10 VDC Analog Output, Current Mode, 4–20 mA	0	2
<b>Binary Output (BO)</b>	24 VAC Triac	3	3
<b>Configurable Output (CO)</b>	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac	4	4

1. Analog Input, Current Mode is set by hardware for the FX-PCG26, and as software for the FX-PCG16.

## FX-PCG General Purpose Programmable Controllers (Continued)

### Ordering Information

Product Code Number	Description
FX-PCG1611-0	10-Point General Purpose Programmable Controller with 2 UI, 1 BI, 3 BO, and 4 CO
FX-PCG1621-0	10-Point General Purpose Programmable Controller with 2 UI, 1 BI, 3 BO, and 4 CO; Integral Display
FX-PCG2611-0	17-Point General Purpose Programmable Controller with 6 UI, 2 BI, 3 BO, 2 AO, and 4 CO
FX-PCG2621-0	17-Point General Purpose Programmable Controller with 6 UI, 2 BI, 3 BO, 2 AO and 4 CO; Integral Display

### Accessories (Order Separately)

Product Code Number	Description
Y64T15-0 <sup>1</sup>	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 30 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65A13-0 <sup>1</sup>	Transformer, 120 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AS), 8 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65T42-0 <sup>1</sup>	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
Y65T31-0 <sup>1</sup>	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AR+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
AP-TBK4SA-0	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown, Bulk Pack
AP-TBK4FC-0	Replacement MS/TP FC Bus Terminal, 4-Position Connector, Blue, Bulk Pack
AP-TBK3PW-0	Replacement Power Terminal, 3-Position Connector, Gray, Bulk Pack
FX-BTCVT-1	Bluetooth® Commissioning Converter
FX-BTCVTCBL-700	Cable Replacement Set for the FX-BTCVT-1 or the NS-ATV7003-0; includes one 1.5 m (5 ft) retractable cable
FX-DIS1710-0	Local Controller Display for FX-PCG1611 and FX-PCG2611 models
FX-ZFR1810-0	Wireless Field Bus Coordinator, 10 mW Transmission Power; functions with FX Supervisory Controllers
FX-ZFR1811-0	Wireless Field Bus Router, 10 mW Transmission Power; functions with FX-PC Programmable Controllers and FX-WRZ Wireless Room Sensors

1. Additional Y6x Series Transformers are available from Johnson Controls. Refer to the *Series Y63, Y64, Y65, Y66, and Y69 Transformer Catalog Page (LIT-1922175)* for more information regarding transformers.



## FX-PCG General Purpose Programmable Controllers (Continued)

### Technical Specifications

FX-PCG Series							
<b>Product Code Numbers</b>	<b>FX-PCG1611-0:</b> 10-Point General Purpose Programmable Controller <b>FX-PCG2611-0:</b> 17-Point General Purpose Programmable Controller <b>FX-PCG1621-0:</b> 10-Point General Purpose Programmable Controller with Display and Push Button User Interface <b>FX-PCG2621-0:</b> 17-Point General Purpose Programmable Controller with Display and Push Button User Interface						
<b>Supply Voltage</b>	24 VAC Nominal, (20 VAC Minimum/30 VAC Maximum), 50/60 Hz, Power Supply Class 2 (North America), Safety Extra-Low Voltage (SELV) (Europe)						
<b>Power Consumption</b>	14 VA Maximum for FX-PCG1611 and FX-PCG2611 (No Integral Display) 20 VA Maximum for FX-PCG1621 and FX-PCG2621 (With Integral Display) <b>Note:</b> Note: VA ratings do 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).						
<b>Ambient Conditions</b>	<b>Operating:</b> 0 to 50°C (32 to 122°F); 10 to 90% RH Noncondensing <b>Storage:</b> -40 to 80°C (-40 to 176°F); 5 to 95% RH Noncondensing						
<b>Controller Addressing</b>	DIP Switch Set; Valid Controller Device Addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid controller addresses.)						
<b>Communications Bus</b>	<b>BACnet® MS/TP, RS-485:</b> 3-Wire FC Bus Between the Supervisory Controller and Programmable Controllers 4-Wire SA Bus Between Programmable Controller, Network Sensors, and other Sensor/Actuator Devices, Includes a lead to source 15 VDC supply power (from Programmable Controller) to bus devices.						
<b>Processor</b>	H8SX/166xR Renesas® Microcontroller						
<b>Memory</b>	1 MB Flash Memory and 512 KB Random Access Memory (RAM)						
<b>Input and Output Capabilities</b>	<b>FX-PCG16 Models:</b> 2 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 1 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 3 - Binary Outputs: Defined as 24 VAC Triac (Selectable Internal or External Source Power) 4 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO <b>FX-PCG26 Models:</b> 6 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 2 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 3 - Binary Outputs: Defined as 24 VAC Triac (Selectable Internal or External Source Power) 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						
<b>Analog Input/Analog Output Resolution and Accuracy</b>	Analog Input: 16-bit Resolution Analog Output: 16-bit Resolution and ±200 mV in 0–10 VDC Applications						
<b>Terminations</b>	Input/Output: Fixed Screw Terminal Blocks FC Bus, SA Bus, and Supply Power: 3-Wire and 4-Wire Pluggable Screw Terminal Blocks FC Bus and SA Bus: RJ-12 6-Pin Modular Jacks						
<b>Mounting</b>	Horizontal on Single 35 mm DIN Rail Mount (preferred), or Screw Mount on Flat Surface with Three Integral Mounting Clips on Controller						
<b>Housing</b>	Enclosure material: ABS and Polycarbonate UL94 5VB; Self-extinguishing, Plenum-rated Protection Class: IP20 (IEC529)						
<b>Dimensions (Height x Width x Depth)</b>	<b>FX-PCG16 Models:</b> 150 x 164 x 53 mm (5-7/8 x 6-7/16 x 2-1/8 in.) Including Terminals and Mounting Clips <b>FX-PCG26 Models:</b> 150 x 190 x 53 mm (5-7/8 x 7-1/2 x 2-1/8 in.) Including Terminals and Mounting Clips <b>Note:</b> Mounting space for FX-PCG16 and FX-PCG26 Models requires an additional 50 mm (2 in.) space on top, bottom, and front face of controller for easy cover removal, ventilation, and wire terminations.						
<b>Weight</b>	<b>FX-PCG16 Models:</b> 0.4 kg (0.9 lb) <b>FX-PCG26 Models:</b> 0.5 kg (1.1 lb)						
<b>Compliance</b>	<table border="1"> <tr> <td><b>United States</b></td> <td>UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A</td> </tr> <tr> <td><b>Canada</b></td> <td>UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada Compliant, ICES-003</td> </tr> <tr> <td><b>Australia and New Zealand</b></td> <td>C-Tick Mark, Australia/NZ Emissions Compliant</td> </tr> </table>	<b>United States</b>	UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A	<b>Canada</b>	UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada Compliant, ICES-003	<b>Australia and New Zealand</b>	C-Tick Mark, Australia/NZ Emissions Compliant
<b>United States</b>	UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A						
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<b>Australia and New Zealand</b>	C-Tick Mark, Australia/NZ Emissions Compliant						

# FX-PCX Expansion Input/Output Modules

## Description

FX-PCX Expansion Input/Output Modules can serve in one of two capacities depending on where they are installed in the Facility Explorer (FX) system. When installed on the SA bus of an FX-PCG or FX-PCV controller, the FX-PCXs expand the point count of these controllers. When installed on the FC Bus as point multiplexors, FX-PCXs allow an FX Supervisory Controller to monitor and control points directly.

Refer to the *FX-PC Series Programmable Controllers and Related Products Product Bulletin (LIT-12011657)* for important product application information.

## Features

- large product family provides a wide range of input/output point combinations to best fit the applications
- ability to reside on the FC Bus or SA Bus provides application flexibility
- pluggable communications bus, inputs/outputs, and power terminals expedites installation BACnet MS/TP communication provides open system compatibility
- 32-bit microprocessor ensures optimum performance and meets industry specifications
- wireless capabilities via FX-ZFR Series Wireless Field Bus System enable wireless mesh connectivity between FX-PCGs/FX-PCXs to FX-WRZ Series Wireless Sensors, and to FX Supervisory Controllers, to facilitate easy initial location and relocation
- universal and configurable inputs and outputs support multiple signal options and increase controller application flexibility



**Expansion I/O Module**

## Repair Information

If the Expansion Input/Output Module fails to operate within its specifications, replace the unit. For a replacement Expansion Input/Output (I/O) Module, contact the nearest Johnson Controls® representative.

## Selection Chart.

### FX-PCX Series Point Type Counts per Model

Point Types	Signals Accepted	FX-PCX 17xx	FX-PCX 2711	FX-PCX 2721	FX-PCX 3711	FX-PCX 3721	FX-PCX 3731	FX-PCX 4711
<b>Universal Input (UI)</b>	Analog Input, Voltage Mode, 0–10 VDC Analog Input, Current Mode, 4–20 mA Analog Input, Resistive Mode, 0–2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A99B SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode		2	8	4			6
<b>Binary Input (BI)</b>	Dry Contact Maintained Mode Pulse Counter/Accumulator Mode (High Speed), 100 Hz	4				16	8	2
<b>Analog Output (AO)</b>	Analog Output, Voltage Mode, 0–10 VDC Analog Output, Current Mode, 4–20 mA			2				2
<b>Binary Output (BO)</b>	24 VAC Triac						8 <sup>1</sup>	3
<b>Universal Output (UO)</b>	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 V AC/DC FET Analog Output, Current Mode, 4–20 mA		2		4			
<b>Configurable Output (CO)</b>	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac							4
<b>Relay Output</b>	120/240 VAC		2		4			

1. If the EXT jumper is active on models with Binary Outputs, an external low-voltage power source is required



## FX-PCX Expansion Input/Output Modules (Continued)

### Ordering Information

Code Number	Description
FX-PCX1711-0	4-Point Expansion I/O Module with 4 BI
FX-PCX2711-0	6-Point Expansion I/O Module with 2 UI, 2 UO, 2 BO
FX-PCX2721-0	10-Point Expansion I/O Module with 8 UI, 2 AO
FX-PCX3711-0	12-Point Expansion I/O Module with 4 UI, 4 UO, 4 BO
FX-PCX3721-0	16-Point Expansion I/O Module with 16 BI
FX-PCX3731-0	16-Point Expansion I/O Module with 8 BI, 8 BO
FX-PCX4711-0	17-Point Expansion I/O Module with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO

### Accessories (Order Separately)

Code Number	Description
Y64T15-0 <sup>1</sup>	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 30 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65A13-0 <sup>1</sup>	Transformer, 120 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AS), 8 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65T42-0 <sup>1</sup>	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
Y65T31-0 <sup>1</sup>	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AR+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
AP-TBK4SA-0	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown, Bulk Pack
AP-TBK4FC-0	Replacement MS/TP FC Bus Terminal, 4-Position Connector, Blue, Bulk Pack
AP-TBK3PW-0	Replacement Power Terminal, 3-Position Connector, Gray, Bulk Pack
FX-BTCVT-1	Bluetooth® Commissioning Converter
FX-BTCVTCBL-700	Cable Replacement Set for the FX-BTCVT-1 or the FX-ATV7003-0; Includes one 1.5 m (5 ft) Retractable Cable

1. Additional Y6x Series Transformers are available from Johnson Controls. Refer to the *Series Y63, Y64, Y65, Y66, and Y69 Transformer Catalog Page (LIT-1922175)* for more information regarding transformers.

### Technical Specifications

FX-PCX (Part 1 of 2)	
Product Code Numbers	<b>FX-PCX1711-0:</b> 4-Point Expansion Input/Output Module <b>FX-PCX2711-0:</b> 6-Point Expansion Input/Output Module <b>FX-PCX2721-0:</b> 10-Point Expansion Input/Output Module <b>FX-PCX3711-0:</b> 12-Point Expansion Input/Output Module <b>FX-PCX3721-0:</b> 16-Point Expansion Input/Output Module <b>FX-PCX3731-0:</b> 16-Point Expansion Input/Output Module <b>FX-PCX4711-0:</b> 17-Point Expansion Input/Output Module
Supply Voltage	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 <b>Note:</b> 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).
Ambient Conditions	<b>Operating:</b> 0–50°C (32–122°F); 10–90% RH Noncondensing <b>Storage:</b> -40–80°C (-40–176°F); 5–95% RH Noncondensing
Addressing	DIP Switch Set; FX-PCX Controller Device Addresses are 4–127 (Device addresses 0–3 and 128–255 are reserved and are not valid FX-PCX addresses.)
Communications Bus	<b>BACnet MS/TP, RS-485:</b> 3-Wire FC Bus Between the Supervisory Controller and Programmable Controllers. 4-wire SA Bus Between Programmable Controller, Expansion I/O Modules, Network Sensors, and other Sensor/Actuator devices, includes a lead source 15 VDC supply power (from programmable controller) to SA bus devices.
Processor	H8SX/166xR Renesas® 32-bit Microcontroller
Memory	<b>FX-PCX17, FX-PCX27, and FX-PCX37 Models:</b> 640 KB Flash Memory and 128 KB Random Access Memory (RAM) <b>FX-PCX47 Models:</b> 1 MB Flash Memory and 512 KB RAM

## FX-PCX Expansion Input/Output Modules (Continued)

FX-PCX (Part 2 of 2)	
<b>Input and Output Capabilities</b>	<b>FX-PCX1711:</b> 4 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode
	<b>FX-PCX2711:</b> 2 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 2 - Universal Outputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 2 - Relay Outputs (Single-Pole, Double-Throw) Rate as: 240 VAC Maximum Voltage 1/3 hp 125 VAC, 1/2 hp 250 VAC 400 VA Pilot Duty at 240 VAC 200 VA Pilot Duty at 120 VAC 3 A Noninductive 24–240 VAC
	<b>FX-PCX2721:</b> 8 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact
	<b>FX-PCX3711:</b> 4 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 4 - Universal Outputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 4 - Relay Outputs (Single-Pole, Double-Throw) Rate as: 240 VAC Maximum Voltage 1/3 hp 125 VAC, 1/2 hp 250 VAC 400 VA Pilot Duty at 240 VAC 200 VA Pilot Duty at 120 VAC 3 A Noninductive 24–240 VAC
	<b>FX-PCX3721:</b> 16 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode
	<b>FX-PCX3731:</b> 8 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 8 - Binary Outputs: Defined as 24 VAC Triac (Require external low-voltage power source.)
	<b>FX-PCX4711:</b> 6 - Universal Inputs: Defined as 0–VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 2 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 3 - Binary Outputs: Defined as 24 VAC Triac (Selectable Internal or External Source Power) 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
<b>Analog Input/Analog Output Resolution and Accuracy</b>	<b>Analog Input:</b> 16-bit Resolution <b>Analog Output:</b> 16-bit Resolution and $\pm 200$ mV in 0–10 VDC Applications
<b>Terminations</b>	<b>Input/Output:</b> Fixed Screw Terminal Blocks SA/FC Bus and Supply Power: 4-Wire and 3-Wire Pluggable Screw Terminal Blocks SA/FC Bus Port: RJ-12 6-Pin Modular Jacks
<b>Mounting</b>	Horizontal on Single 35 mm DIN Rail Mount (preferred), or Screw Mount on Flat Surface with Three Integral Mounting Clips on Controller
<b>Housing</b>	<b>Enclosure material:</b> ABS and Polycarbonate UL94 5VB; Self-extinguishing, Plenum-rated Protection Class: IP20 (IEC529)
<b>Dimensions (Height x Width x Depth)</b>	<b>FX-PCX17 and FX-PCX27 Models:</b> 150 x 120 x 53 mm (5-7/8 x 4-3/4 x 2-1/8 in.) Including Terminals and Mounting Clips <b>FX-PCX37 and FX-PCX47 Models:</b> 150 x 190 x 53 mm (5-7/8 x 7-1/2 x 2-1/8 in.) Including Terminals and Mounting Clips <b>Note:</b> For all models, mounting space requires an additional 50 mm (2 in.) space on top, bottom, and front face of controller for easy removal, ventilation, and wire terminations.
<b>Weight</b>	0.5 kg (1.1 lb)
<b>Compliance</b>	<b>United States</b> UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A
	<b>Canada</b> UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003
	<b>Australia and New Zealand</b> C-Tick Mark, Australia/NZ Emissions Compliant
	<b>BACnet International</b> BACnet Testing Laboratories (BTL) 135-2004 Listed BACnet Application Specific Controller (B-ASC) (FX-PCX2721, FX-PCX3721, and FX-PCX3731 models pending.)

# FX-PCV1610 and FX-PCV1620 Programmable VAV Box Controllers Catalog Page

Code No. LIT-1900672  
Issued January 30, 2013

Refer to the [QuickLIT website](#) for the most up-to-date version of this document.

FX-PCV1610/1620 are 16-bit, programmable VAV box controllers with RS-485 Master-Slave/Token-Passing (MS/TP) communications. FX-PCV1610/1620 controllers feature an integral 4 N·m damper actuator and Differential Pressure Transducer (DPT) with models for cooling only or cooling with reheat applications and fan control.

The differential pressure sensor in the FX-PCV1610/1620 controllers provides consistent flow readings with minimal drift and requires minimal auto-zero calibration. There are no filters to change, which helps to ensure very close tolerance to published accuracy.

The FX-PCV1610/1620 controllers can be configured single-duct, dual-duct, and supply/exhaust applications. Note that some of these applications may require an additional actuator and DPT.

FX-PCV1610/1620 controllers support NS and FX-WRZ Series Communicating Network Sensors for temperature sensing, fan override, and occupancy override control.

FX-PCV1610/1620 Series Controllers support wireless communications using the FX-ZFR Series accessories.

Refer to the *FX-PC Series Programmable Controllers and Related Products Product Bulletin (LIT-12011657)* for product application details.

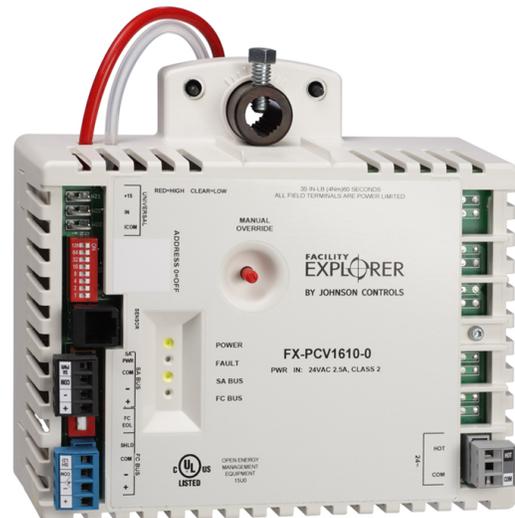
## Features

- Standard BACnet® Protocol with BTL Listing - Provides interoperability with FX Supervisory Controllers as well as other third-party Building Automation System (BAS) products that use the widely accepted BACnet standard.
- 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.
- ZigBee™ Wireless Field Controller (FC)/Sensor/Actuator (SA) Bus Interface - Provides a wireless alternative to hard-wired system counterparts, providing application flexibility, mobility, and minimal disruption to building occupants.
- State-Based Application Control Logic with Adaptive, Automatically Tuned Control Loops - Prevents simultaneous heating and cooling, reduces commissioning time, eliminates change-of-season re-commissioning, and reduces wear and tear on mechanical devices.
- Universal Inputs and Configurable Outputs - Allow multiple signal options per channel to provide input/output flexibility.
- Complete Product Family with Modular Components - Meets any HVAC equipment or building system control requirement using only the needed components.
- BACnet MS/TP Protocol supports seamless integration into FX Supervisory Controllers as well as integration with third-party BACnet devices.
- Integral End-of-Line (EOL) switch enables FX-PC controller as a terminating device on the communications bus.

- Wireless capabilities via an FX-ZFR Series Wireless Field Bus System enable wireless mesh connectivity between FX-PC controllers to FX-WRZ Series Wireless Room Temperature Sensors and to FX Supervisory Controllers, facilitating easy initial location and relocation.
- Patented proportional adaptive control (P-Adaptive) and Pattern Recognition Adaptive Control (PRAC) technologies provide continuous loop tuning.
- Writable flash memory allows standard or customized applications to be downloaded from the FX-PCT and enables persistent application data.
- Large product family provides a wide range of point mix to meet application requirements and allows for the addition of one or more FX-PCXs or NS Series Network Sensors to provide even more I/O capacity.
- Integrated differential air-pressure sensor and actuator reduces installation time.
- Fast response actuator drives the damper from full open to full closed (90°) in 60 seconds to reduce commissioning time.
- Point capacity can be expanded by adding FX-PCXs to the SA Bus, providing further application flexibility.

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

Figure 1: FX-PCV1610/1620 Controller



**Table 1: FX-PCV1610 and FX-PCV1620 Series Point Type Counts per Model**

Point Types	Signals Accepted	FX-PCV1610	FX-PCV1620
Universal Input (UI)	Analog Input, Voltage Mode, 0–10 VDC Analog Input, Resistive Mode, 0–2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A998 SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode	1	1
Binary Output (BO)	24 VAC Triac		3
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac		2
Integrated Actuator	Internal	1	1
Integrated Flow Sensor	Internal	1	1
Zone Sensor Input	On SA Bus <sup>1</sup>	Up to 4 NS Series Network Sensors Up to 9 FX-WRZ sensors when using the FX-ZFR1811 wireless router configuration and up to 5 FX-WRZ sensors when using the one-to-one FX-WRZ7860 wireless receiver	

<sup>1</sup> A total of 10 MS/TP master addresses (FX-PCXs), not including sensor addresses (MS/TP slaves), can be used in a single FX-PCV controller.

**Table 2: FX-PCV1610 and FX-PCV1620 Series Ordering Information**

Product Code Number	Description
FX-PCV1610-0	16-bit, 1-Point Programmable VAV Box Controller with Integrated Actuator and Pressure Sensor; 1 UI; 24 VAC; FC and SA Bus Support (Cooling only)
FX-PCV1620-0	16-bit, 6-Point Programmable VAV Box Controller with Integrated Actuator and Pressure Sensor; 1 UI, 3 BO, and 2 CO; 24 VAC; FC and SA Bus (for Reheat and Fan Control)

**Accessories**

**Table 3: FX-PCV1610 and FX-PCV1620 (16-bit) Accessories**

Product Code Number	Description
Y64T15-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 30 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65A13-0	Transformer, 120 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AS), 8 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65T42-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
Y65T31-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AR+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
AP-TBK1002-0	2-Position Screw Terminal that Plugs onto FX-PCV Output Point Spade Lug
AP-TBK1003-0	3-Position Screw Terminal that Plugs onto FX-PCV Output Point Spade Lugs
AP-TBK4SA-0	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown, Bulk Pack
AP-TBK4FC-0	Replacement MS/TP FC Bus Terminal, 4-Position Connector, Blue, Bulk Pack
AP-TBK3PW-0	Replacement Power Terminal, 3-Position Connector, Gray, Bulk Pack
FX-BTCVT-1	Bluetooth Commissioning Converter
TL-BRTRP-0	Portable BACnet/IP to MS/TP Router
FX-BTCVTCBL-700	Cable Replacement Set for the FX-BTCVT-1 or the FX-ATV7003-0; Includes One 5 ft (1.5 m) Retractable Cable
FX-ZFR1810-0	Wireless Field Bus Coordinator, 10 mW Transmission Power. Functions with FX Supervisory Controllers Enabled with BACnet MS/TP
FX-ZFR1811-0	Wireless Field Bus Router, 10 mW Transmission Power. Functions with FX-PC controllers and FX-WRZTx Series Wireless Sensors
FX-ZFRCBL-0	Wire Harness which allows an FX-PCV1610/1620 to be connected to an SA Bus device (Bluetooth Commissioning Converter, Local Controller Display, or NS Series Sensor) when its SA Bus RJ-12 jack is occupied by an FX-ZFR1811 router.

**FX-PCV1610 and FX-PCV1620 Series Technical Specifications**

**Table 4: FX-PCV1610 and FX-PCV1620 Series Technical Specifications**

Product Code Numbers	FX-PCV1610-0: 1-Point Programmable VAV Box Controller (Cooling Only) FX-PCV1620-0: 6-Point Programmable VAV Box Controller (Cooling with Reheat and Fan Control)
Supply Voltage	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Power Supply Class 2 (North America), Safety Extra-Low Voltage (SELV) (Europe)

**Table 4: FX-PCV1610 and FX-PCV1620 Series Technical Specifications**

<b>Power Consumption</b>	10 VA typical, 14 VA maximum  <b>Note:</b> 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 60 VA (maximum).
<b>Ambient Conditions</b>	<b>Operating:</b> 0 to 50°C (32 to 122°F) <b>Storage:</b> -40 to 70°C (-40 to 158°F)
<b>Terminations</b>	Inputs/Outputs: 6.3 mm (1/4 in.) Spade Lugs  FC Bus, SA Bus, and Supply Power: 4-Wire and 3-Wire Pluggable Screw Terminal Blocks  Sensor Port: RJ-12 6-Pin Modular Jacks
<b>Controller Addressing</b>	DIP switch set; valid controller device addresses 4–127  (Device addresses 0–3 and 128–255 are reserved and not valid controller addresses.)
<b>Communications Bus<sup>1</sup></b>	BACnet MS/TP, RS-485:  3-wire FC Bus between the FX Supervisory Controller and FX-PC controllers  4-wire SA Bus from the FX-PC controller, NS Series Network Sensors, and other sensor/actuator devices, includes a terminal to source 15 VDC supply power from FX-PCV to SA Bus devices
<b>Processor</b>	Renesas® 16-Bit H8S/166xR Microcontroller
<b>Memory</b>	1 MB Flash Memory and 512 KB Random Access Memory (RAM)
<b>Input and Output Capabilities</b>	<b>FX-PCV1610:</b> 1 - Universal Input: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact  <b>FX-PCV1620:</b> 1 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 3 - Binary Outputs: Defined as 24 VAC Triac (internal power source) 2 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO
<b>Analog Input/Analog Output Resolution and Accuracy</b>	<b>Analog Input:</b> 15-bit resolution <b>Analog Output:</b> 16-bit resolution and ±200 mV in 0–10 VDC applications
<b>Air Pressure Differential Sensor</b>	Setra transducer, differential pressure to electrical, 0 to 0.375 kPa (0 to 1.5 in. WC) , 0.5 to 4.5 VDC output, 5 VDC supply, aluminum plated.  <b>Performance Characteristics</b> Combined Repeatability and Hysteresis Error: ±0.05% of Full Span Maximum Non-linearity Errors (Best Fit Method): ±1.0% of Full Span Maximum Response Time (to within 63% of Full Scale Pressure with Step Change on Input): 15 ms Temperature Error from 15.6 to 48.9°C (60 to 120°F) Null: ±0.06% of Full Span per °F Maximum Span: ±1.5% of Full Span Maximum Stability, Null: ±0.5% of Full Scale Maximum, 1 Year Minimum Stability, Span: ±2.0% of Full Scale Maximum, 1 Year Minimum
<b>Mounting</b>	Mounts to damper shaft using single set screw and to duct with single mounting screw.
<b>Actuator Rating</b>	4 N•m (35 lb•in.) minimum shaft length = 44 mm (1-3/4 in.)
<b>Dimensions</b>	<b>(Height x Width x Depth):</b> 182 x 182 x 64 mm (7-3/16 x 7-3/16 x 2-1/2 in.) <b>Center of Output Hub to Center of Anti Rotation Slot:</b> 160 mm (6-5/16 in.) <b>Note:</b> Mounting space for all field controllers requires an additional 50 mm (2 in.) space on top, bottom, and front face of controller for easy cover removal, ventilation, and wire terminations.
<b>Weight</b>	0.86 kg (1.9 lb)

**Table 4: FX-PCV1610 and FX-PCV1620 Series Technical Specifications**

	<b>United States:</b> UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A
	<b>Canada:</b> UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003
	<b>Europe:</b> 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 and the Low Voltage Directive 2006/95/EC.
	<b>Australia and New Zealand:</b> C-Tick Mark, Australia/NZ Emissions Compliant
	<b>BACnet International:</b> BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Application Specific Controller (B-ASC)

<sup>1</sup> For more information, refer to the *FX-PC Series Controllers MS/TP Communications Bus Technical Bulletin (LIT-12011670)*.



**Building Efficiency**  
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**TEC260x-4** and TEC260x-4+PIR Series

# BACnet® MS/TP Networked Thermostat Controllers

## Description

The TEC260x-4 and TEC260x-4+PIR Series Thermostat Controllers are BACnet® Master-Slave/Token-Passing (MS/TP) networked devices that provide control of rooftop units (with or without economizers), heat pumps, and single- and multi-stage heating/cooling equipment. The TEC260x-4+PIR Series Thermostat Controllers have occupancy sensing capability built into the device. These devices provide energy savings in high-energy usage light commercial buildings such as schools and hotels. The devices maximize these energy savings by using additional setpoint strategies during occupied times.

The technologically advanced TEC260x-4 and TEC260x-4+PIR Series Thermostat Controllers feature a Building Automation System (BAS) BACnet MS/TP communication capability that enables remote monitoring and programming for efficient space temperature control.

The TEC260x-4 and TEC260x-4+PIR Series Thermostat Controllers feature an intuitive user interface with backlit display that makes setup and operation quick and easy. The thermostats also employ a unique, Proportional-Integral (PI) time-proportioning algorithm that virtually eliminates temperature offset associated with traditional, differential-based thermostats.

Refer to the *TEC260x-4 and TEC260x-4+PIR Series BACnet® MS/TP Networked Thermostat Controllers Product Bulletin (LIT-12011585)* for important product application information.

## Features

- BACnet MS/TP communication—provides compatibility with a proven communication network; BACnet MS/TP is widely accepted by Heating, Ventilating, and Air Conditioning (HVAC) control suppliers
- onboard occupancy sensor (Passive Infrared [PIR] Models)—provides energy savings without additional installation time and cost
- password protection option—provides against unwanted thermostat controller tampering
- backlit Liquid Crystal Display (LCD)—offers real-time control status of the environment in easy-to-read, English text messages with constant backlight that brightens during user interaction
- simplified setpoint adjustment—enables the user to change the setpoint by simply pressing the **UP/DOWN** arrow keys
- five easy-to-use interface keys—allow for easy commissioning of the thermostat, and eliminate the need for DIP switches
- two configurable digital inputs—provide additional inputs for advanced functions such as remote night setback, occupancy override, and service or filter alarms



**TEC260x-4+PIR Series BACnet MS/TP Networked Thermostat Controller**

- over 20 configurable parameters—enable the thermostat to adapt to any application, allowing installer parameter access without opening the thermostat cover
- optional discharge air sensor—monitors unit efficiency
- economizer output (TEC2604-4 and TEC2604-4+PIR models)—provides control of economizer operation for single- and multi-stage unitary rooftop equipment

## Repair Information

If a TEC260x-4 or TEC260x-4+PIR Series Thermostat Controller fails to operate within its specifications, replace the unit. For a replacement thermostat, contact the nearest Johnson Controls® representative.

## Selection Chart

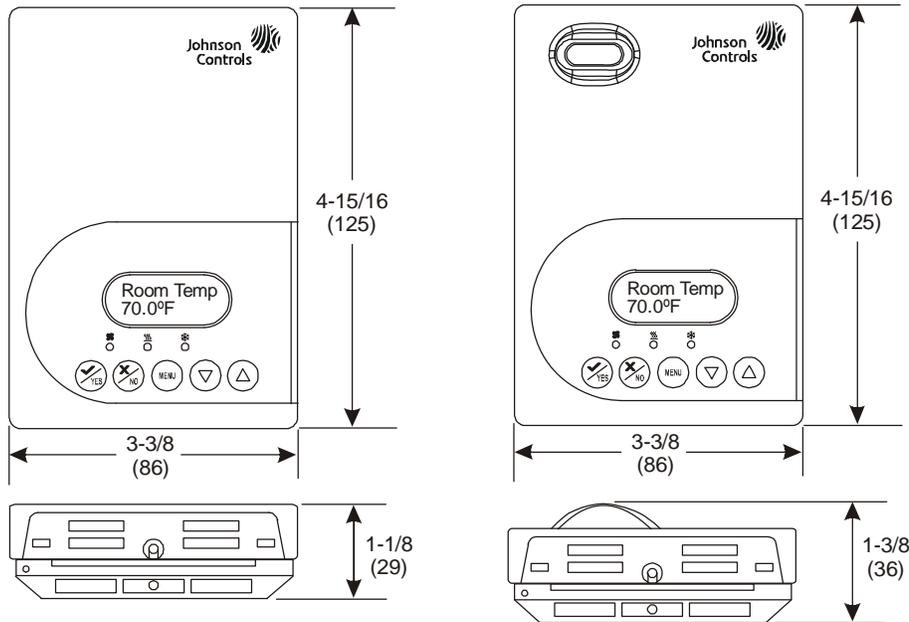
Code Number	Description	Applications
<b>TEC2601-4</b>	<b>Single-Stage</b>	<b>Fan Coil Units, Unit Heaters, and Single-Stage Packaged Heating/Cooling Equipment</b>
TEC2601-4+PIR	Single-Stage with Onboard Occupancy Sensor	
TEC2602-4	Heat Pump	One or Two Heat Pump Stages with Optional Auxiliary Heat Stage
TEC2602-4+PIR	Heat Pump with Onboard Occupancy Sensor	
TEC2603-4	Multi-Stage	Multi-Stage Packaged Heating/Cooling Equipment
TEC2603-4+PIR	Multi-Stage with Onboard Occupancy Sensor	
TEC2604-4	Multi-Stage Economizer	Economizer Operation for Single- and Multi-Stage Unitary Rooftop Equipment
TEC2604-4+PIR	Multi-Stage Economizer with Onboard Occupancy Sensor	

## Accessories

Code Number	Description
SEN-600-1	Remote Indoor Air Temperature Sensor
SEN-600-4	Remote Indoor Air Temperature Sensor with Occupancy Override and LED
TE-6363P-1	Outdoor Air Temperature Sensor
<b>TE-6361M-1</b>	<b>8 in. (203 mm)<sup>1</sup> Duct Mount Air Temperature Sensor</b>
TEC-3-PIR <sup>2</sup>	Cover with Occupancy Sensor

1. Other probe lengths available.  
 2. The TEC-3-PIR Accessory Cover can replace the existing cover on a non-PIR TEC260x-4 Series Thermostat Controller to provide occupancy sensing.

## TEC260x-4 and TEC260x-4+PIR Series BACnet® MS/TP Networked Thermostat Controllers (Continued)



Thermostat Controller Dimensions, in. (mm)

### Technical Specifications

TEC260x-4 and TEC260x-4+PIR Series BACnet MS/TP Networked Thermostat Controllers		
<b>Power Requirements</b>		19 to 30 VAC, 50/60 Hz, 2 VA (Terminals RC and C) at 24 VAC Nominal, Class 2 or Safety Extra-Low Voltage (SELV)
<b>Economizer Output Rating (TEC2604-4 and TEC2604-4+PIR Models)</b>		0 to 10 VDC into 2k ohm Resistance (Minimum)
<b>Relay/Triac Contact Rating</b>		19 to 30 VAC, 1.0 A Maximum, 15 mA Minimum, 3.0 A In-Rush, Class 2 or SELV
<b>Digital Inputs</b>		Voltage-Free Contacts across Terminal C to Terminals DI1 and DI2
<b>Wire Size</b>		18 AWG (1.0 mm Diameter) Maximum, 22 AWG (0.6 mm Diameter) Recommended
<b>MS/TP Network Guidelines</b>		32 Devices Maximum; 4,000 ft (1,219 m) Maximum Cable Length
<b>Thermostat Measurement Range</b>		-40.0°F/-40.0°C to 122.0°F/50.0°C
<b>Sensor Type</b>		Local 10k ohm Negative Temperature Coefficient (NTC) Thermistor
<b>Resolution</b>		±0.2°F/±0.1°C
<b>Control Accuracy</b>		±0.9°F/±0.5°C at 70.0°F/21.0°C Typical Calibrated
<b>Temperature Range</b>	<b>Backlit Display</b>	-40.0°F/-40.0°C to 122.0°F/50.0°C
	<b>Heating</b>	40.0°F/4.5°C to 90.0°F/32.0°C in 0.5° Increments
	<b>Cooling</b>	54.0°F/12.0°C to 100.0°F/38.0°C in 0.5° Increments
<b>Minimum Deadband</b>		2°F/1°C between Heating and Cooling
<b>Ambient Conditions</b>	<b>Operating</b>	32 to 122°F (0 to 50°C); 95% RH Maximum, Noncondensing
	<b>Storage</b>	-22 to 122°F (-30 to 50°C); 95% RH Maximum, Noncondensing
<b>Compliance</b>	<b>United States</b>	UL Listed, File E27734, CCN XAPX, Under UL 873, Temperature Indicating and Regulating Equipment
		FCC Compliant to CFR 47, Part 15, Subpart B, Class A
	<b>Canada</b>	UL Listed, File E27734, CCN XAPX7, Under CAN/CSA C22.2 No. 24, Temperature Indicating and Regulating Equipment
		Industry Canada, ICES-003
	<b>Europe</b>	CE Mark, EMC Directive 2004/108/EC
	<b>Australia and New Zealand</b>	C-Tick Mark, Australia/NZ Emissions Compliant
<b>BACnet International</b>	BACnet Testing Laboratories™ (BTL) 135-2001 Listed BACnet Application Specific Controller (B-ASC)	
<b>Shipping Weight</b>	<b>TEC260x-4 Models</b>	0.75 lb (0.34 kg)
	<b>TEC260x-4+PIR Models</b>	0.77 lb (0.35 kg)

**TEC26x6 Series**

# BACnet® MS/TP Networked Thermostat Controllers with Dehumidification Capability, Fan Control, and Occupancy Sensing Capability

## Description

The TEC26x6(H)-4 and TEC26x6H-4+PIR Series Thermostat Controllers are BACnet® Master-Slave/Token-Passing (MS/TP) networked devices that provide control of two- or four-pipe fan coils, cabinet unit heaters, or other equipment using on/off, floating, or proportional 0 to 10 VDC control input, three speeds of fan control, and dehumidification capability. The TEC26x6H-4+PIR Series Thermostat Controllers have occupancy sensing capability built into the device. These devices maximize up to 30% energy savings in high-energy usage light commercial buildings, such as schools and hotels, during occupied times by using additional Stand-By setpoints.

The technologically advanced TEC26x6(H)-4 and TEC26x6H-4+PIR Series Thermostat Controllers feature a Building Automation System (BAS) BACnet MS/TP communication capability that enables remote monitoring and programming for efficient space temperature control. Specific models are available to accommodate commercial and hospitality applications.

The TEC26x6(H)-4 and TEC26x6H-4+PIR Series Thermostat Controllers feature an intuitive User Interface (UI) with backlit display that makes setup and operation quick and easy. The thermostats also employ a unique, Proportional-Integral (PI) time-proportioning algorithm that virtually eliminates temperature offset associated with traditional, differential-based thermostat controllers.

Refer to the *TEC26x6(H)-4 and TEC26x6H-4+PIR Series BACnet MS/TP Networked Thermostat Controllers with Dehumidification Capability, Fan Control, and Occupancy Sensing Capability Product Bulletin (LIT-12011587)* for important product application information.



**TEC26x6(H)-4 Series Thermostat Controller**



**TEC26x6H-4+PIR Series Thermostat Controller**

## Features

- BACnet MS/TP communication — provides compatibility with a proven communication network; BACnet MS/TP is widely accepted by Heating, Ventilating, and Air Conditioning (HVAC) control suppliers
- onboard occupancy sensor (Passive Infrared [PIR] Models) — provides energy savings without additional installation time and cost
- password protection option — protects against unwanted thermostat controller tampering
- integral humidity sensing capability (dehumidification models) — increases occupancy comfort by providing dehumidification
- backlit Liquid Crystal Display (LCD) — offers real-time control status of the environment in easy-to-read, English plain text messages with constant backlight that brightens during user interaction
- on/off, floating, or proportional 0 to 10 VDC control — offers additional application flexibility by providing more advanced control signals
- three speeds of fan control — provide easy **FAN** speed selection via the interface key, to meet the application requirements
- single/dual setpoint adjustment — enables user setpoint options to accommodate application
- override interface key (commercial models) — allows easy access for temporarily overriding the unoccupied mode
- temperature scale selector key (hospitality models) — offers guests the ability to select a Fahrenheit (°F) or Celsius (°C) temperature scale display
- two configurable binary inputs — provide additional inputs for advanced functions such as remote night setback, service or filter alarms, motion detector, and window status
- over 20 configurable parameters — enable the thermostat to adapt to any application, allowing installer parameter access without opening the thermostat cover
- optional discharge air sensor — monitors unit efficiency

## Repair Information

If a TEC26x6(H)-4 or TEC26x6H-4+PIR Series Thermostat fails to operate within its specifications, replace the unit. For a replacement thermostat, contact the nearest Johnson Controls® representative.

## Selection Chart

**TEC26x6(H)-4 and TEC26x6H-4+PIR Thermostat Controller Models (Part 1 of 2)**

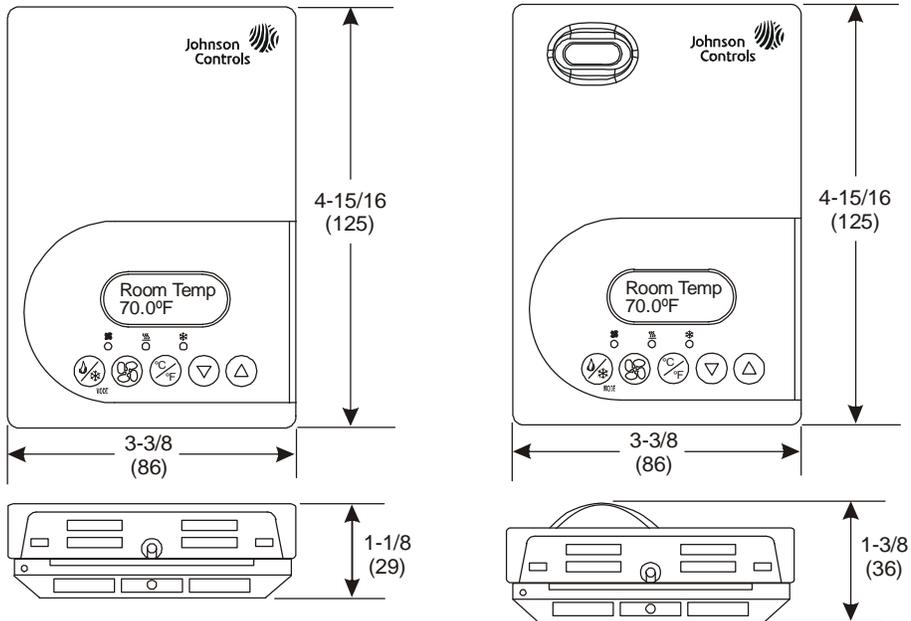
Code Number	Control Outputs	Onboard Occupancy Sensor	Dehumidification Capability	Application
TEC2616-4	Two On/Off	No	No	Commercial Market
TEC2616H-4	Two On/Off	No	No	Hospitality Market
TEC2616H-4+PIR	Two On/Off	Yes	No	Hospitality Market
<b>TEC2626-4</b>	Two On/Off or Floating	No	No	Commercial Market
TEC2626H-4	Two On/Off or Floating	No	No	Hospitality Market
TEC2626H-4+PIR	Two On/Off or Floating	Yes	No	Hospitality Market

## TEC26x6 Series BACnet® MS/TP Networked Thermostat Controllers with Dehumidification Capability, Fan Control, and Occupancy Sensing Capability

### TEC26x6(H)-4 and TEC26x6H-4+PIR Thermostat Controller Models (Part 2 of 2)

Code Number	Control Outputs	Onboard Occupancy Sensor	Dehumidification Capability	Application
TEC2636-4	Two On/Off or Floating	No	Yes	Commercial Market
TEC2636H-4	Two On/Off or Floating	No	Yes	Hospitality Market
TEC2636H-4+PIR	Two On/Off or Floating	Yes	Yes	Hospitality Market
TEC2646-4	Two Proportional 0 to 10 VDC	No	No	Commercial Market
TEC2646H-4	Two Proportional 0 to 10 VDC	No	No	Hospitality Market
TEC2646H-4+PIR	Two Proportional 0 to 10 VDC	Yes	No	Hospitality Market
TEC2656-4	Two Proportional 0 to 10 VDC	No	Yes	Commercial Market
TEC2656H-4	Two Proportional 0 to 10 VDC	No	Yes	Hospitality Market
TEC2656H-4+PIR	Two Proportional 0 to 10 VDC	Yes	Yes	Hospitality Market

### Dimensions



TEC26x6(H)-4 and TEC26x6H-4+PIR Thermostat Controller Dimensions, in. (mm)

### Accessories (Order Separately)

Code Number	Description
SEN-600-1	Remote Indoor Air Temperature Sensor
TE-6361M-1 <sup>1</sup>	Duct Mount Air Temperature Sensor
SEN-600-4	Remote Indoor Air Temperature Sensor with Occupancy Override and LED
TE-636S-1	Strap-Mount Temperature Sensor
MS-BACEOL-0	RS485 End-of-Line Terminator
TEC-6-PIR <sup>2</sup>	Commercial Fan Coil Cover for Occupancy Sensor
TEC-6H-PIR <sup>2</sup>	Hospitality Fan Coil Controller Cover for Occupancy Sensor

1. Additional TE-636xx-x Series 10k ohm Johnson Controls Type II Thermistor Sensors are available; refer to the *TE-6300 Series Temperature Sensors Product Bulletin (LIT-216320)* for more details.
2. The TEC-6-PIR and TEC-6H-PIR Accessory Covers can be used to replace the existing cover on a non-PIR TEC26x6(H)-4 Series Thermostat Controller to provide occupancy sensing capability.



## TEC26x6 Series BACnet® MS/TP Networked Thermostat Controllers with Dehumidification Capability, Fan Control, and Occupancy Sensing Capability

### Technical Specifications

TEC26x6(H)-4 and TEC26x6H-4+PIR Series BACnet MS/TP Networked Thermostat Controllers with Dehumidification Capability, Fan Control, and Occupancy Sensing Capability		
<b>Power Requirements</b>		19 to 30 VAC, 50/60 Hz, 2 VA (Terminals 4 and 5) at 24 VAC Nominal, Class 2 or Safety Extra-Low Voltage (SELV)
<b>Relay/Triac Contact Rating</b>	<b>On/Off and Floating Control</b>	19 to 30 VAC, 1.0 A Maximum, 15 mA Minimum, 3.0 A In-Rush, Class 2 or SELV
<b>Analog Output Rating</b>	<b>Proportional Control</b>	0 to 10 VDC into 2k ohm Resistance (Minimum)
<b>Fan Relay Output Rating</b>		19 to 30 VAC, 1.0 A Maximum, 15 mA Minimum, 3.0 A In-Rush
<b>Auxiliary Output Rating</b>	<b>Triac Output</b>	19 to 30 VAC, 1.0 A Maximum, 15 mA Minimum, 3.0 A In-Rush
<b>Binary Inputs</b>		Voltage-Free Contacts across Terminal Scsm to Terminals BI1, BI2, or UI3
<b>Analog Inputs</b>		Resistive Inputs (RS and UI3) for 10k ohm Johnson Controls Type II Negative Temperature Coefficient (NTC) Thermistor Sensors
<b>Temperature Sensor Type</b>		Local 10k ohm Negative Temperature Coefficient (NTC) Thermistor
<b>Wire Size</b>		18 AWG (1.0 mm Diameter) Maximum, 22 AWG (0.6 mm Diameter) Recommended
<b>MS/TP Network Guidelines</b>		32 Devices Maximum; 4,000 ft (1,219 m) Maximum Cable Length
<b>Temperature Range</b>	<b>Backlit Display</b>	-40.0°F/-40.0°C to 122.0°F/50.0°C in 0.5° Increments
	<b>Heating Control</b>	40.0°F/4.5°C to 90.0°F/32.0°C
	<b>Cooling Control</b>	54.0°F/12.0°C to 100.0°F/38.0°C
<b>Accuracy</b>	<b>Temperature</b>	±0.9F°/±0.5C° at 70.0°F/21.0°C Typical Calibrated
	<b>Humidity</b>	±5% RH from 20 to 80% RH at 50 to 90°F (10 to 32°C)
<b>Minimum Deadband</b>		2F°/1C° between Heating and Cooling
<b>Ambient Conditions</b>	<b>Operating</b>	32 to 122°F (0 to 50°C); 95% RH Maximum, Noncondensing
	<b>Storage</b>	-22 to 122°F (-30 to 50°C); 95% RH Maximum, Noncondensing
<b>Compliance</b>	<b>United States</b>	UL Listed, File E27734, CCN XAPX, Under UL 873, Temperature Indicating and Regulating Equipment
		FCC Compliant to CFR 47, Part 15, Subpart B, Class A
	<b>Canada</b>	UL Listed, File E27734, CCN XAPX7, Under CAN/CSA C22.2 No. 24, Temperature Indicating and Regulating Equipment
		Industry Canada, ICES-003
	<b>Europe</b>	CE Mark, EMC Directive 2004/108/EC
<b>BACnet International</b>	BACnet Testing Laboratories™ (BTL) 135-2001 Listed BACnet Application Specific Controller (B-ASC)	
<b>Australia and New Zealand</b>	C-Tick Mark, Australia/NZ Emissions Compliant	
<b>Shipping Weight</b>		TEC26x6(H)-4 Models: 0.75 lb (0.34 kg) TEC26x6H-4+PIR Models: 0.77lb (0.35 kg)

## NS Series Network Sensors

### Description

The NS Series Network Sensor offering includes NS Series Network Zone Sensors and NS Series Network Discharge Air Sensors. The NS Series Network Sensors are designed to function directly with Metasys® system Field Equipment Controllers (FECs), Input/Output Modules (IOMs), Variable Air Volume (VAV) Modular Assembly (VMA16) Controllers, and Facility Explorer FX-PC Series Programmable Controllers (FX-PCGs, FX-PCVs, and FX-PCXs).

The majority of NS Series Network Zone Sensors monitor room temperature; however, options are available to also monitor zone humidity, carbon dioxide (CO<sub>2</sub>), local temperature setpoint adjustments, and other variables. This data is transmitted to a controller on the Sensor Actuator (SA) Bus.

Some models of NS Series Network Zone Sensors 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.

The NS Series Network Zone Sensors include models with a temperature setpoint dial and Liquid Crystal Display (LCD) that allows occupants to view the zone temperature, Relative Humidity (RH), and view and adjust the zone temperature setpoint. Some temperature and humidity models include a push button to toggle between temperature and RH on the display. These models also have the capability to set the desired default display to either temperature or RH.

A fan mode push button is included to set the desired fan speed (AUTO-OFF-low-medium-high). An occupancy override function allows the user to signal the controller that the zone is occupied to override the scheduled mode. Some models have DIP switches to set a unique address for applications that require multiple sensors.

For communication wiring flexibility, the wires connecting the network zone sensor to a controller can be terminated using a modular jack or screw terminals.

Each network sensor includes an SA Bus access port to allow accessories to access the SA Bus. This plug allows accessories to service or commission the connected controller or gain access to any other controller on the same Field Controller (FC) Bus.

The NS Series Network Zone Sensor offering includes models that can be surface mounted, vertical wallbox mounted, or flush mounted to meet the requirements of the specific application.

The NS Series Network Discharge Air Sensors monitor the duct temperature, typically at the discharge of the VAV box, and transmit this data to a local controller on the SA Bus using the 10 ft (305 cm) wiring lead included with the unit. The 10 ft (305 cm) wiring lead consists of four 22 AWG (0.6 mm) trade size color-coded wires encased in a plenum-rated jacket. Each of the wires is stripped and tinned for easy connection to the SA Bus screw terminal block.

The NS Series Network Discharge Air Sensors are available with either a 4 or 8 in. (102 or 203 mm) temperature probe. All models include DIP switches for applications requiring multiple discharge air sensors, each with a unique DIP switch address.



NS Series Network Sensors

### Features

- BACnet® Master-Slave/Token-Passing (MS/TP) protocol communication — provides compatibility with Metasys system field controllers and Facility Explorer programmable controllers in a proven communication network
- backlit Liquid Crystal Display (LCD) available on some models — provides real-time status of the environment with backlighting activated during user interaction
- simple temperature setpoint adjustment available on some models — enables you to change the setpoint with the turn of a dial
- onboard PIR occupancy sensor available on some models — maximizes up to 30% energy savings in high-energy usage environments, and facilitates trending of floor space usage
- temporary occupancy available on some models — provides a timed override command, which temporarily initiates an alternate mode
- field selectable default display setting on some models — allows you to toggle between temperature and RH on the display, and set the desired default for continuous viewing
- Fahrenheit/Celsius (F/C) button available on some models — toggles the display temperature between degrees Celsius and degrees Fahrenheit

### Repair Information

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

## NS Series Network Sensors (Continued)

### Selection Charts

#### Network Zone Sensor Ordering Information — Temperature Only Models

Product Code Number	Size (mm), Height x Width	Vertical Wallbox-Mounted (WB) or Surface-Mounted (SM)	Johnson Controls Logo	LCD Display	Temperature Adjustment: Setpoint (Set) or Warmer/Cooler Dial (W/C)	Occupancy Override Button, PIR Occupancy Sensor	F/C Scale Toggle	Fan Control	Screw Terminals (ST) or Modular Jack (MJ)	Address Switches	VAV Balancing Feature
NS-ATA7001-0	80 x 80	SM	Yes	Yes	Set	Yes, No	No	No	MJ	No	No
NS-ATA7002-0	80 x 80	SM	Yes	Yes	Set	Yes, No	No	No	ST	No	No
NS-ATA7003-0	80 x 80	SM	Yes	Yes	Set	Yes, No	No	No	ST	Yes	No
NS-ATB7001-0	80 x 80	SM	Yes	Yes	Set	Yes, No	Yes	No	MJ	No	No
NS-ATB7002-0	80 x 80	SM	Yes	Yes	Set	Yes, No	Yes	No	ST	No	No
NS-ATB7003-0	80 x 80	SM	Yes	Yes	Set	Yes, No	Yes	No	ST	Yes	No
NS-ATC7001-0	80 x 80	SM	Yes	Yes	Set	Yes, No	No	Yes	MJ	No	No
NS-ATC7002-0	80 x 80	SM	Yes	Yes	Set	Yes, No	No	Yes	ST	No	No
NS-ATD7001-0	80 x 80	SM	Yes	Yes	Set	Yes, No	Yes	Yes	MJ	No	No
NS-ATD7002-0	80 x 80	SM	Yes	Yes	Set	Yes, No	Yes	Yes	ST	No	No
NS-ATF7001-0	80 x 80	SM	Yes	Yes	W/C	Yes, No	Yes	No	MJ	No	No
NS-ATF7002-0	80 x 80	SM	Yes	Yes	W/C	Yes, No	Yes	No	ST	No	No
NS-ATN7001-0	80 x 80	SM	Yes	No	N/A	No, No	No	No	MJ	No	No
NS-ATN7001-2	80 x 80	SM	No	No	N/A	No, No	No	No	MJ	No	No
NS-ATN7003-0	80 x 80	SM	Yes	No	N/A	No, No	No	No	ST	Yes	No
NS-ATN7003-2	80 x 80	SM	No	No	N/A	No, No	No	No	ST	Yes	No
NS-ATP7001-0	80 x 80	SM	Yes	No	W/C	Yes, No	No	No	MJ	No	No
NS-ATP7001-2	80 x 80	SM	No	No	W/C	Yes, No	No	No	MJ	No	No
NS-ATP7002-0	80 x 80	SM	Yes	No	W/C	Yes, No	No	No	ST	No	No
NS-ATP7002-2	80 x 80	SM	No	No	W/C	Yes, No	No	No	ST	No	No
NS-ATP7003-0	80 x 80	SM	Yes	No	W/C	Yes, No	No	No	ST	Yes	No
NS-ATP7003-2	80 x 80	SM	No	No	W/C	Yes, No	No	No	ST	Yes	No
NS-ATV7001-0	80 x 80	SM	Yes	Yes	Set	Yes, No	Yes	No <sup>1</sup>	MJ	No	Yes
NS-ATV7002-0	80 x 80	SM	Yes	Yes	Set	Yes, No	Yes	No <sup>1</sup>	ST	No	Yes
NS-BTB7001-0	120 x 80	WB, SM	Yes	Yes	Set	Yes, No	Yes	No	MJ	No	No
NS-BTB7001-2	120 x 80	WB, SM	No	Yes	Set	Yes, No	Yes	No	MJ	No	No
NS-BTB7002-0	120 x 80	WB, SM	Yes	Yes	Set	Yes, No	Yes	No	ST	No	No
NS-BTB7003-0	120 x 80	WB, SM	Yes	Yes	Set	Yes, No	Yes	No	ST	Yes	No
NS-BTB7003-2	120 x 80	WB, SM	No	Yes	Set	Yes, No	Yes	No	ST	Yes	No
NS-BTF7001-0	120 x 80	WB, SM	Yes	Yes	W/C	Yes, No	Yes	No	MJ	No	No
NS-BTF7002-0	120 x 80	WB, SM	Yes	Yes	W/C	Yes, No	Yes	No	ST	No	No
NS-BTN7001-0	120 x 80	WB, SM	Yes	No	N/A	No, No	No	No	MJ	No	No
NS-BTN7001-2	120 x 80	WB, SM	No	No	N/A	No, No	No	No	MJ	No	No
NS-BTN7003-0	120 x 80	WB, SM	Yes	No	N/A	No, No	No	No	ST	Yes	No
NS-BTN7003-2	120 x 80	WB, SM	No	No	N/A	No, No	No	No	ST	Yes	No
NS-BTP7001-0	120 x 80	WB, SM	Yes	No	W/C	Yes, No	No	No	MJ	No	No
NS-BTP7001-2	120 x 80	WB, SM	No	No	W/C	Yes, No	No	No	MJ	No	No
NS-BTP7002-0	120 x 80	WB, SM	Yes	No	W/C	Yes, No	No	No	ST	No	No
NS-BTP7002-2	120 x 80	WB, SM	No	No	W/C	Yes, No	No	No	ST	No	No
NS-BTP7003-0	120 x 80	WB, SM	Yes	No	W/C	Yes, No	No	No	ST	Yes	No
NS-BTV7001-0	120 x 80	WB, SM	Yes	Yes	Set	Yes, No	Yes	No <sup>1</sup>	MJ	No	Yes
NS-BTV7002-0	120 x 80	WB, SM	Yes	Yes	Set	Yes, No	Yes	No <sup>1</sup>	ST	No	Yes
NS-MTB7001-0	120 x 80	WB, SM	Yes	Yes	Set	No, Yes	Yes	No	MJ	No	No
NS-MTB7002-0	120 x 80	WB, SM	Yes	Yes	Set	No, Yes	Yes	No	ST	No	No
NS-MTL7001-0	120 x 80	WB, SM	Yes	No	N/A	Yes, Yes	No	No	MJ	No	No
NS-MTL7002-0	120 x 80	WB, SM	Yes	No	N/A	Yes, Yes	No	No	ST	No	No

1. In the VAV balancing models, the fan control button is replaced by a light bulb button used in the VAV balancing process.

## NS Series Network Sensors (Continued)

### Network Zone Sensor Ordering Information — Temperature and Humidity Models without RH Display

Product Code Number	Size (mm), Height x Width	Vertical Wallbox-Mounted (WB) or Surface-Mounted (SM)	Johnson Controls Logo	LCD Display, RH Display	Humidity Element Accuracy	Temperature Adjustment: Setpoint (Set) or Warmer/Cooler Dial (W/C)	Occupancy Override Button, PIR Occupancy Sensor	F/C Scale Toggle	Screw Terminals (ST) or Modular Jack (MJ)	Address Switches
NS-AHA7001-0	80 x 80	SM	Yes	Yes, No	3%	Set	Yes, No	No	MJ	No
NS-AHA7002-0	80 x 80	SM	Yes	Yes, No	3%	Set	Yes, No	No	ST	No
NS-AHB7001-0	80 x 80	SM	Yes	Yes, No	3%	Set	Yes, No	Yes	MJ	No
NS-AHB7002-0	80 x 80	SM	Yes	Yes, No	3%	Set	Yes, No	Yes	ST	No
NS-AHB7003-0	80 x 80	SM	Yes	Yes, No	3%	Set	Yes, No	Yes	ST	Yes
NS-AHN7001-0	80 x 80	SM	Yes	None	3%	N/A	No, No	No	MJ	No
NS-AHP7001-0	80 x 80	SM	Yes	None	3%	W/C	Yes, No	No	MJ	No
NS-AHN7001-2	80 x 80	SM	No	None	3%	N/A	No, No	No	MJ	No
NS-APA7001-0	80 x 80	SM	Yes	Yes, No	2%	Set	Yes, No	No	MJ	No
NS-APA7002-0	80 x 80	SM	Yes	Yes, No	2%	Set	Yes, No	No	ST	No
NS-APB7001-0	80 x 80	SM	Yes	Yes, No	2%	Set	Yes, No	Yes	MJ	No
NS-APB7002-0	80 x 80	SM	Yes	Yes, No	2%	Set	Yes, No	Yes	ST	No
NS-APB7003-0	80 x 80	SM	Yes	Yes, No	2%	Set	Yes, No	Yes	ST	Yes
NS-BHB7001-0	120 x 80	WB, SM	Yes	Yes, No	3%	Set	Yes, No	Yes	MJ	No
NS-BHB7002-0	120 x 80	WB, SM	Yes	Yes, No	3%	Set	Yes, No	Yes	ST	No
NS-BHB7003-0	120 x 80	WB, SM	Yes	Yes, No	3%	Set	Yes, No	Yes	ST	Yes
NS-BHN7001-0	120 x 80	WB, SM	Yes	None	3%	N/A	No, No	No	MJ	No
NS-BHN7001-2	120 x 80	WB, SM	No	None	3%	N/A	No, No	No	MJ	No
NS-BHP7001-0	120 x 80	WB, SM	Yes	None	3%	W/C	Yes, No	No	MJ	No
NS-BPB7001-0	120 x 80	WB, SM	Yes	Yes, No	2%	Set	Yes, No	Yes	MJ	No
NS-BPB7002-0	120 x 80	WB, SM	Yes	Yes, No	2%	Set	Yes, No	Yes	ST	No
NS-BPB7003-0	120 x 80	WB, SM	Yes	Yes, No	2%	Set	Yes, No	Yes	ST	Yes
NS-MHL7001-0	120 x 80	WB, SM	Yes	No, No	3%	N/A	Yes, Yes	No	MJ	No
NS-MHL7002-0	120 x 80	WB, SM	Yes	No, No	3%	N/A	Yes, Yes	No	ST	No

### Network Zone Sensor Ordering Information — Temperature and Humidity Models with Temperature or RH Display (Field Selectable Default Display)

Product Code Number	Size (mm), Height x Width	Vertical Wallbox-Mounted (WB) or Surface-Mounted (SM)	LCD Display, RH Display	Humidity Element Accuracy	Temperature Adjustment: Setpoint (Set) or Warmer/Cooler Dial (W/C)	Occupancy Override Button	F/C Scale Toggle	Screw Terminals (ST) or Modular Jack (MJ)	Address Switches
NS-AHR7101-0	80 x 80	SM	Yes, Yes	3%	Set	Yes	Yes	MJ	No
NS-AHR7102-0	80 x 80	SM	Yes, Yes	3%	Set	Yes	Yes	ST	No
NS-AHR7103-0	80 x 80	SM	Yes, Yes	3%	Set	Yes	Yes	ST	Yes
NS-APR7101-0	80 x 80	SM	Yes, Yes	2%	Set	Yes	Yes	MJ	No
NS-APR7102-0	80 x 80	SM	Yes, Yes	2%	Set	Yes	Yes	ST	No
NS-BHR7101-0	120 x 80	WB, SM	Yes, Yes	3%	Set	Yes	Yes	MJ	No
NS-BHR7103-0	120 x 80	WB, SM	Yes, Yes	3%	Set	Yes	Yes	ST	Yes

### Network Zone Sensor Ordering Information — Motion Detection Only Models (No Temperature or Humidity Sensing)

Product Code Number	Size (mm), Height x Width	Vertical Wallbox-Mounted (WB) or Surface-Mounted (SM)	LCD Display	PIR Occupancy Sensor	Screw Terminals (ST), or Modular Jack (MJ)	Address Switches
NS-MNN7001-0	120 x 80	WB, SM	No	Yes	MJ	No
NS-MNN7003-0	120 x 80	WB, SM	No	Yes	ST	Yes