

FX-PC Series Programmable Controllers and Related Products Product Bulletin

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

Overview

The FX-PC Series Programmable Controller family comprises a group of versatile controllers and accessories designed to monitor and operate a wide variety of commercial HVAC equipment and other building systems.

The FX-PC family includes the FX-PCV Programmable VAV Box Controller, the FX-PCG General Purpose Programmable Controller, and the FX-PCA Advanced Application Programmable Controller. All of these controllers are powered by 32-bit microprocessors and are fully programmable using the FX-PCT Programming and Commissioning Tool.

Modular add-on accessories, such as the FX-PCX Expansion I/O Modules and NS Series Network Sensors, extend the capabilities of the FX-PC controllers by providing additional I/O interfaces.

Note: The FX-PCX modules are not capable nor required to work as N2 devices as they communicate through the SA bus from a field controller.

The FX-PCV18 Controller's embedded capabilities, in addition to its modular accessories, make it well suited as a replacement for legacy VMA14xx Series Controllers.

The FX-PCA, FX-PCG, FX-PCX, and FX-PCV feature an advanced design that provides optimum performance and easy access to power, network, and field terminations. These controllers come with 32-bit microprocessors to meet and exceed demanding industry standards. Some FX-PCG models include an intuitive UI with an integral LCD screen and a 6-button navigation touch pad that provides enhanced local monitoring of your controlled field equipment.

The FX-PC Series Controller family integrates easily with the NS Series Network Sensors, the FX-ZFR18 Series Wireless Field Bus system, FX-WRZ Series Wireless Sensors, and the FX-WRZ78xx One-to-One FX-ZFR System Wireless Receiver. These products complement the FX-PC family of controllers and enable enhanced capabilities in both wired and wireless network applications.

Figure 1: FX-PC Series Programmable Controllers



FX-PC controllers are housed in enclosures suitable for surface, DIN rail, and VAV box mounting and feature easy field access to power, network, and I/O terminations. FX-PCGs include an optional intuitive user interface with push buttons and LCD for local monitoring and adjustment of your controlled equipment.

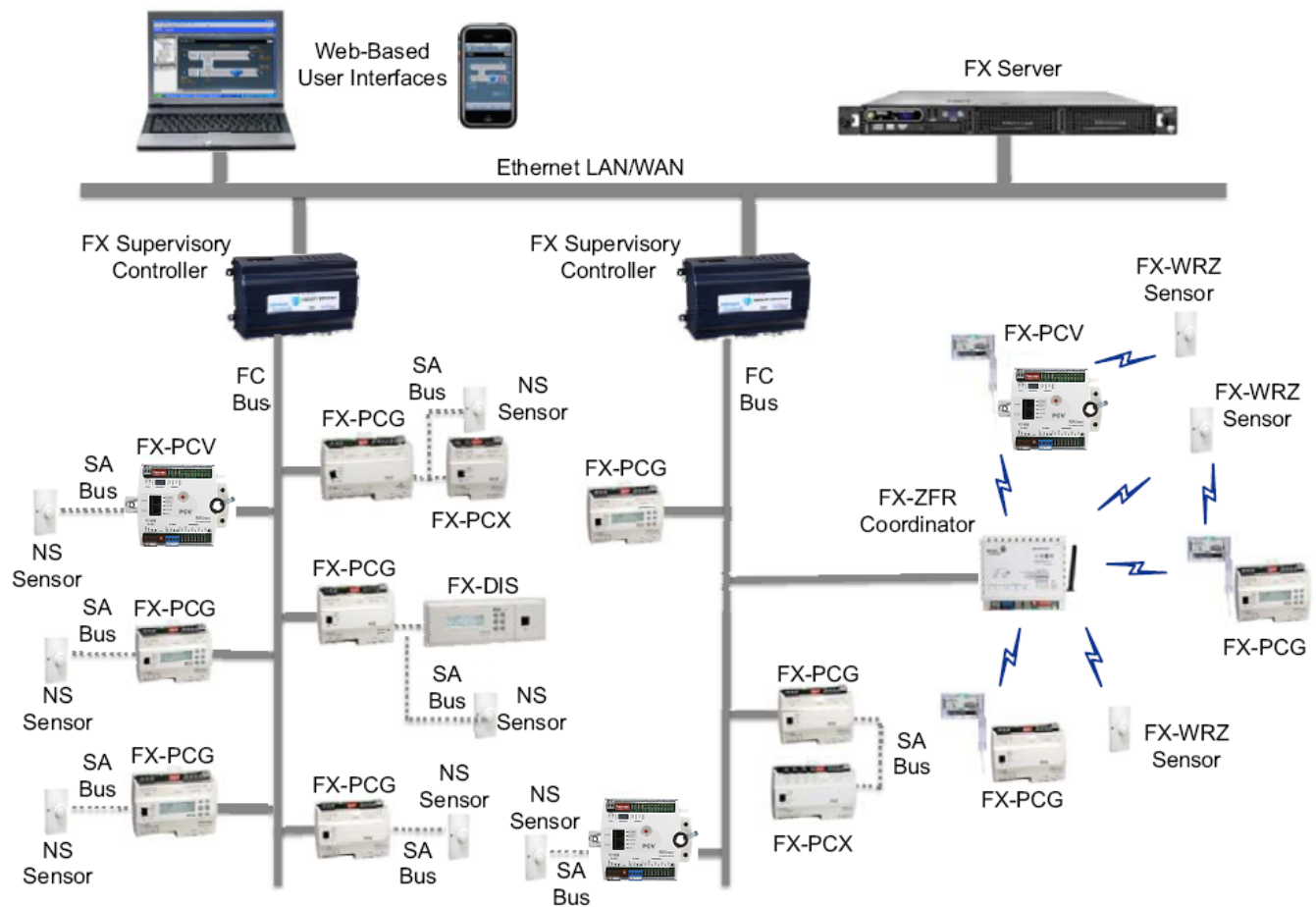
Table 1: Features and Benefits

Features	Benefits
Standard BACnet® Protocol with BTL Listing	Provides interoperability with Johnson Controls® and third-party Building Automation System (BAS) products that use the widely accepted BACnet standard.
Switchable communications protocols from BACnet MS/TP to N2 protocols or N2 to BACnet MS/TP protocols	At FX-PCT Release 10.1, a new capability allows FX-PCVs, FX-PCGs, and FX-PCAs to be configured to communicate using either the BACnet MS/TP or the N2 field bus networking protocol. The operation of the FX-PCX is not affected by the selection of the BACnet MS/TP or the N2 protocol in the host controller.

Table 1: Features and Benefits

Features	Benefits
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 (where available)	Provides a wireless alternative to hard-wired field bus networking and sensor connections, 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.

Figure 2: Facility Explorer System with FX-PC Controllers



Integration to FX Supervisory Controllers

The FX-PC family is designed to integrate seamlessly into the Facility Explorer (FX) system by connecting and communicating directly with FX Supervisory Controllers. This seamless integration enables building operators to monitor and adjust FX-PC controllers directly from the FX system UI.

In addition, service personnel can view FX-PC controller information locally through the integral LCD (included on some FX-PCG models) or through an optional local controller display (FX-DIS1710-0).

Switchable Communications Protocols

By default, the Metasys® FX-PC family controllers and network sensors communicate using the standard BACnet protocol, based on the American National Standards Institute (ANSI)/American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 135-2004.

The BACnet protocol is a standard for ANSI, ASHRAE, and the International Standards Organization (ISO) for building controls.

FX-PCG, FX-PCX, and FX-PCV controllers are BTL-tested and listed as BACnet Application Specific Controllers (B-ASCs). FX-PCA field controllers are BACnet Testing Laboratories™ (BTL)-listed as BACnet Advanced Application Controllers (B-AACs). The NS Series Sensors are BTL-listed as BACnet Smart Sensors (B-SSs).

Release 10.1 of FX-PCT can be used to switch the Field Bus communications protocol in FX-PC Controllers to be either the standard BACnet® Master-Slave/Token-Passing (MS/TP) or the N2 protocol. BACnet MS/TP is the default communications protocol for all new controllers. Switchable communications protocols provide a cost-effective upgrade and modernization path for customers with existing N2 controllers. The *Modernization Guide for Legacy N2 Controllers (LIT-12012045)* and the controller-specific documentation provide installation and commissioning support and include tips for efficient and safe replacement. Refer to the *N2 Compatibility Options* chapter of the *Controller Tool Help (LIT-12011147)* for information about mapping N2 Objects in controllers with switchable communications protocols.

The N2-capable FX-PC controllers can be used as functional replacements for legacy N2 controllers. The N2-capable FX-PC controllers:

- have the I/O quantities and characteristics of the FX-PC family controllers
- must be programmed with FX-PCT, which has programming capabilities that are similar (but not identical) to HVACPro, GX9100, GPL, and other legacy tools
- support SA Bus devices
- support FX-WRZ wireless sensors from the controller using the FX-WRZ7860 receiver when configured for BACnet MS/TP communication

The N2-capable FX-PC controllers:

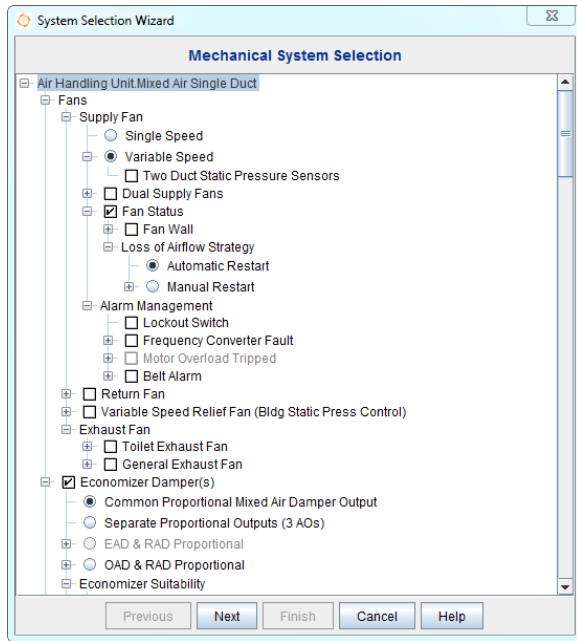
- do not support Zone Bus (for example, TMZ sensors and M100 actuators)
- do not support pass through in the commissioning mode
- do not support remote downloading or commissioning using BACnet routing
- do not support wireless connection to the N2 bus

Programming and Commissioning Tool

The Programming and Commissioning Tool (FX-PCT) is used to configure, simulate, and commission the FX-PC Series Controllers (FX-PCV, FX-PCG, FX-PCA, and FX-PCX).

The **Configuration** mode allows you to select a number of mechanical and control logic options using a System Selection Wizard for typical air handling, terminal unit, VAV box, and central plant mechanical systems. When required, you can customize the standard logic provided by the system selection process to meet your specialized control logic requirements. Configuration mode also allows you to customize certain display options available to FX-PC controllers that use a local controller display ([Figure 3](#)).

Figure 3: Mechanical System Selection in FX-PCT



The **Simulation** mode allows you to review, run, or simulate the application logic as if you were commissioning a live system. You can make adjustments to setpoints, inputs, or sensors during a simulation session to validate the logic before assigning the configuration to a specific controller.

The **Commissioning** mode manages the downloading of files to the FX-PC controllers using the following connections:

- locally, using Bluetooth® Commissioning Converter
- locally, using TL-BRTRP-0 Portable BACnet Router (available only for BACnet-configured FX-PC controllers)
- remotely, using BACnet routing mode through an FX Supervisory Controller (available only for BACnet-configured FX-PC controllers)

After downloading the controllers, you can use the FX-PCT Commissioning mode to validate the sensor and control point interfaces and adjust key setpoints and setup parameters (Figure 4).

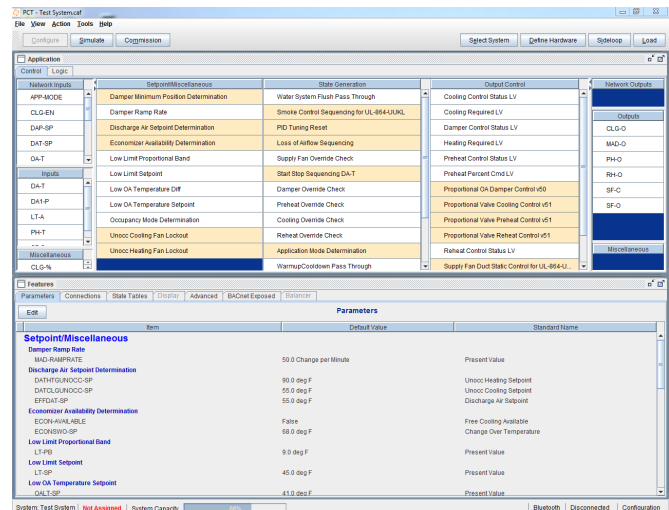
FX-PCT includes integrated productivity features with utilities to facilitate mass application uploads and downloads, including upgrades of entire trunks of controllers with just a few mouse clicks. Template files provide an intuitive method of reading and writing configuration parameters to multiple controllers, reducing the time it takes to commission your controller networks.

For VAV box applications, FX-PCT features an optional box flow test to automatically exercise all the VAV boxes to ensure correct mechanical installation and proper configuration of the key flow setup parameters. Additionally, multiple configurations of room network sensors and a handheld VAV box balancing tool are available for you to perform VAV balancing tasks.

In addition, the Commissioning wizard has a Balancer tab for VAV box applications to easily auto-calibrate VAV boxes and set flow constants in one location.

A Commissioning mode only version of the FX-PCT software is available for jobs or individuals having only commissioning tasks (for example, balancing contractors). The Configuration and Simulation modes are disabled in the FX-PCT Commissioning software.

Figure 4: FX-PCT User Interface



Features

- capability to customize standard control system logic that is created from simple system selection trees
- consistent user interface across the Configuration, Simulation, and Commissioning modes
- flexible connection capabilities for loading and commissioning controllers

FX-PC Programmable Controller Family

The FX-PC Programmable Controller Family includes the FX-PCG, FX-PCA, FX-PCV, and FX-PCX Series Programmable Controller models.

All FX-PC Controllers run pre-engineered and user-programmed applications and provide the I/O required to monitor and control a wide variety of HVAC equipment.

This large family of diverse field controllers is designed to install easily and communicate through standard BACnet Master-Slave/Token-Passing (MS/TP), N2, or wireless protocols, enabling you to build an almost endless variety of field controller network applications, ranging from simple fan coil, heat pump, or VAV control applications to very advanced central plant management and stand-alone applications.

FX-PC Controller Features

Features and benefits common to the FX-PCV, FX-PCG, FX-PCA, and FX-PCX Series controllers include the following:

- BACnet MS/TP Protocol supports seamless integration into Johnson Controls and third-party BACnet devices.
- Integral end-of-line (EOL) switch enables FX-PC controller as a terminating device on the communications bus.
- Wireless capabilities (where available) through 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 supervisory controllers, facilitating easy initial location and relocation.

Additional features and benefits common to FX-PCV, FX-PCG, and FX-PCA controllers include the following:

- Selectable N2 or BACnet MS/TP protocol supports integration into current and legacy systems.
- Patented technologies including Proportional Varying Deadzone Control (PVDC), Pattern Recognition Adaptive Control (PRAC+), and Pulse Modulation Adaptive Control (PMAC) 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.

Hardware and Installation

FX-PC controllers are encased in a durable, plenum-rated, plastic housing. The plastic housing may eliminate the need for a separate enclosure for plenum-rated construction. Check regional, national, and local code requirements for appropriate applications.

FX-PC controllers feature bright, color-coded LEDs, visible on the controller cover, that indicate the supply power, communications bus, and EOL switch status, as well as a variety of fault conditions to aid troubleshooting the controller and bus.

An integral EOL switch on each FX-PC controller allows you to enable the controller as a bus terminating device, which when properly configured, reduces reflected noise on the bus and improves bus communication.

Each FX-PC controller has an easily accessible, eight-position DIP switch that allows you to set a valid and unique device address for each controller on the bus. A blank space is included on the controller cover for recording the device address.

FX-PC controllers feature removable, color-coded, keyed, and labeled terminal block plugs for the supply power and communications bus terminations. Most models have fixed, color-coded, and labeled terminal blocks for the input and output terminations, which facilitate installing and servicing the controllers.

The I/O terminations on the FX-PCV models are spade lugs. Screw terminal adapters that connect to the I/O spade terminations are also available as optional accessories.

FX-PCA2612 models have removable, color-coded, and labeled terminal block plugs for the I/O terminations.

On FX-PCG, FX-PCA, and FX-PCX Series Controllers, integral mounting clips and a DIN rail track on the controller back-plate allow you to easily mount the controller either on a horizontal section of 35 mm DIN rail or directly to a wall or flat vertical surface.

Some FX-PCG models have a backlit user interface display with adjustable brightness and contrast to ensure readability in low-light environments. The easy-to-use display provides convenient local monitoring and adjusting of key setpoints and control parameters. For the FX-PCG and FX-PCA models without a display, a stand-alone FX-DIS1710 Local Controller Display module is available that connects directly to the SA Bus port. For details, refer to the *FX-DIS Local Controller Display Product Bulletin (LIT-12011667)*.

Table 2: FX-PCG Series Point Type Counts per Model

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

Advanced Application Programmable Controller (FX-PCA)

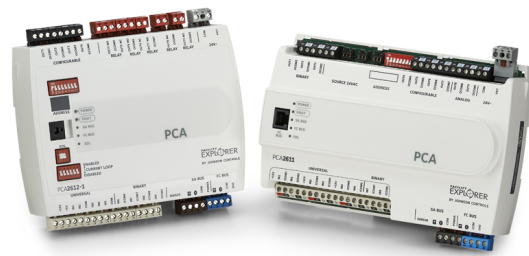
The FX-PCA Series controllers offer more advanced features than the other FX-PC controllers. FX-PCA controllers feature an integral real-time clock and support time-based control logic, such as scheduling, alarming, and trending. As a result, FX-PCAs are well suited for standalone applications that do not have a networked supervisory controller or for networked application where FX-PCAs can continue time-based control and monitoring when offline from the supervisory controller. The FX-PCAs include RS-485 field bus networking with selectable N2 or BACnet MS/TP protocols. FX-PCAs also support wireless field bus networking and sensing by adding FX-ZFR accessories.

A range of FX-PCA models are available with various onboard inputs and outputs, including a 26-point FX-PCA3611. Also, FX-PCA controllers can be combined with FX-PCX Expansion I/O Modules to gain more I/O interfaces if needed. FX-PCAs and their advanced features make them well suited for monitoring and controlling a wide range of equipment including terminal units (such as fan coils and unit ventilators), as well as more complex equipment (such as air handlers and central plants).

Persistence on the FX-PCA3611 model has been significantly upgraded and now includes a fast persistence feature that allows you to hold data values at a configurable value, up to once per second. Persistence refers to how often samples of data are stored locally. This ensures that in the event of a problem, such as a loss of power, data can be retrieved up to the rate that the data is persisted, minimizing the potential loss of data. When power is restored, previously persisted data, up to the rate of persistence, remains available and accessible. For example, if persistence is configured for once per second, you only risk losing one second of data. Persisting data may be essential for situations that require greater data accuracy. This may include certain methods of utility data collection and billing.

FX-PCA2612 controller models feature line-voltage relay outputs, making these controllers well suited for use in terminal units. The FX-PCA2612-2 model uses a line-voltage power supply, eliminating the need for a 24VAC transformer in line-voltage applications.

Figure 5: FX-PCA Series Advanced Application Programmable Controllers



Features

In addition to the features and benefits listed in [FX-PC Controller Features](#), FX-PCAs also provide:

- Support for the FX-DIS17 remote display for monitoring and commanding of I/O and configuration

parameters

- onboard real-time clock and time-based control logic, such as scheduling, alarming, and trending
- line voltage relays (FX-PCA2612 models)
- line voltage power supply (FX-PCA2612-2)

Table 3: FX-PCA Series Point Type Counts Per Model

Point Types	Signals Accepted	FX-PCA2611	FX-PCA2612-1, 2	FX-PCA3611 -0A ¹ and FX-PCA3611 -0
Universal Input (UI)	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	6	5	8
Binary Input (BI)	Dry Contact Maintained Mode Pulse Counter/Accumulator Mode (High Speed), 100 Hz	2	4	6
Analog Output (AO)	Analog Output, Voltage Mode, 0–10 VDC Analog Current Mode, 4–20 mA	2		6
Binary Output (BO)	24 VAC Triac	3		6
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac	4	4	
Relay Output (RO)	Relay Output: Single-Pole, Double-Throw (SPDT) Relay Output: Single-Pole, Single-Throw (SPST)		2 - SPDT 3 - SPST	

¹ This model is currently available only in Asia; contact your local Johnson Controls representative for more information.

FX-PCV Programmable VAV Box Controller Series

FX-PCVs are programmable, digital controllers tailored for controlling VAV boxes.

The FX-PCV controllers feature an integral digital pressure sensor, an integral damper actuator, and a 32-bit microprocessor. The controllers' small package size facilitates quick field installation and efficient use of space, while not compromising high-tech control performance.

These features make the FX-PCV the product of choice for VAV box control. The wide variety of network sensor models provides options for measuring and displaying zone temperature, occupancy detection, duct temperature, zone humidity and dew point determination, carbon dioxide (CO₂) level, setpoint adjustments, VAV box fan speed control, and discharge air temperatures.

Note: If you are replacing a VMA1400 Series controller on an existing N2 network, the FX-PCV18 Series controller is the preferred device because certain existing sensor models can be reused. FX-PCV18 controllers are intended for use as functional replacements for the VMA1410, VMA1415, VMA1420, and VMA1440 controllers only. FX-PCV18 controllers support field-selectable BACnet MS/TP or N2 protocols.

The FX-PCV1615 and FX-PCV1617 models are designed for cooling only VAV box control applications, while the FX-PCV1630 and FX-PCV1632 models are better suited for cooling with reheat VAV and fan control applications. The FX-PCV1617 and FX-PCV1632 models are only available in Asian markets.

The FX-PCV1626 controller is shipped with an actuator but without a differential pressure transducer (DPT), making the controller well suited for commercial zoning applications or for pressure-dependent VAV box applications where no DPT is required.

The FX-PCV1656 controller is shipped without a DPT but with an integrated actuator and ball valve linkage. This controller is for use on the Johnson Controls VG-1000 1/2 - 1 inch valves and needs to be used primarily as a replacement for the FX-PCG assembly of the VG-1000 Series Smart Valve product. The smart valve product line is ideal for chilled beam applications.

The FX-PCV1628 includes a DPT but does not have an actuator. Without an actuator, this controller is well suited for controlling large VAV boxes that require more than 4 N•m of torque.

The FX-PCV1826 and FX-PCV1832 models are designed to be functional replacements for the VMA14xx Series Variable Air Volume Modular Assembly controllers. They contain a sensor bus port and accessories well suited for replacing VMA14xx controllers.

FX-PCV Features

In addition to the features and benefits listed in [FX-PC Controller Features](#), FX-PCVs provide the following:

- Three universal inputs that allow an increased number of low cost sensor options.
- A state-of-the-art, digital non-flow pressure sensor to provide 14-bit resolution with bidirectional flow operation that supports automatic correction for polarity on high- and low-pressure DP tube connections. This pressure sensor eliminates high- and low-pressure connection mistakes.
- ZigBee Wireless FC/SA Bus Interface to provide a wireless alternative to hard-wired FX systems (where available), while providing application flexibility, mobility, and minimal disruption to building systems.
- A phone jack-style connector on the FC Bus and SA Bus to support quick connection to the FX-BTCVT Bluetooth Commissioning Converter, FX-ZFR1811 wireless router (where available), and network sensors.
- Models that include actuators feature a fast response actuator that drives the damper from full open to full closed (90°) in 60 seconds to reduce commissioning time.
- Available in models with or without a DPT or actuator to suit your needs

Figure 6: FX-PCV1615 Controller

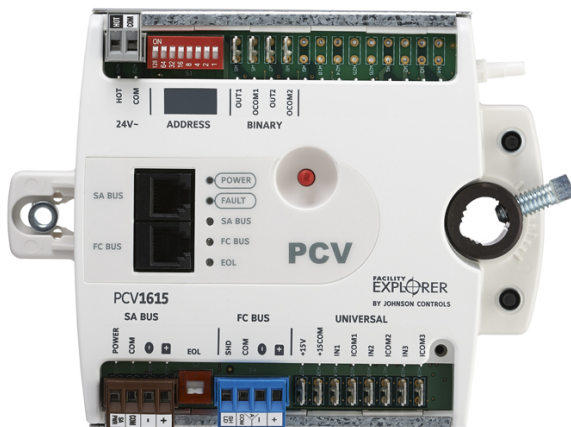


Table 4: FX-PCV Series Point Type Counts per Model

Point Types	Signals Accepted	FX-PCV1615	FX-PCV1626	FX-PCV1628	FX-PCV1630	FX-PCV1617 ²	FX-PCV1632	FX-PCV1656
Modular Jacks		6-pin SA Bus with four communicating sensors and 6-pin FC Bus for tool support				8-pin SA Bus supports analog non-communicating sensor		
Universal Input (UI)	Analog Input, Voltage Mode, 0–10VDC 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	3	3	3	3	3	3	3
Binary Output (BO)	24 VAC Triac	2	3	3	3	2	3	
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10VDC Binary Output Mode, 24VAC Triac		2	2	2		2	2
Integrated Actuator	Internal	1	1		1	1	1	1 with ball valve linkage
Integrated Flow Sensor	Internal	1		1	1	1	1	
Zone Sensor Input	On SA Bus ¹	Up to 4 NS Series Network Zone Sensors Up to 9 FX-WRZ sensors when using the FX-WFR1811 wireless router configuration and up to 5 FX-WRZ sensors when using the one-to-one FX-WRZ7860 wireless receiver (where wireless services are available)						

- 1 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.
- 2 This model is currently available only in Asia.

Table 5: FX-PCV18 Series Point Type Counts Per Model

Point Types	Signals Accepted	FX-PCV1826	FX-PCV1832
Modular Jacks		8-pin SA Bus supports analog non-communicating sensor	
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	3	3
Binary Output (BO)	24 VAC Triac	3	3
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24VAC Triac	2	2
Integrated Actuator	Internal	1	1
Differential Pressure Transducer	Internal		1
Zone Sensor Input	On SA Bus ¹	Up to 4 NS Series Network Zone 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-WRZ-78xx wireless configuration	

¹ 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.

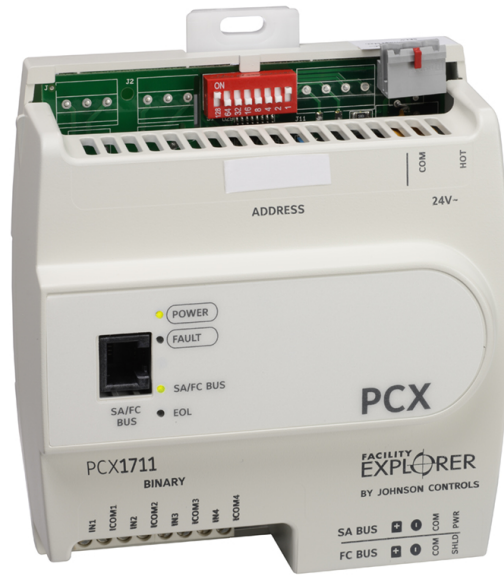
Expansion Input/Output Module (FX-PCX)

The FX-PCXs are expansion I/O modules with integral RS-485 MS/TP communications.

Note: At FX-PCT Release 10.1, FX-PCVs, FX-PCGs, and FX-PCAs can communicate by using either the BACnet® or the N2 field bus networking protocol. The operation of the FX-PCX is not affected by the selection of the BACnet or the N2 protocol in the host controller.

FX-PCXs can serve in one of two capacities, depending on where they are installed in the control system. When installed on the SA Bus of an FX-PCV, FX-PCG, or FX-PCA controller, the FX-PCXs expand the I/O interfaces of these controllers. When installed on the FC Bus, FX-PCXs can be used as I/O point multiplexors to support monitoring and control from a supervisory controller. The point multiplexor can also be useful for sharing points between other FX-PC controllers on the FC Bus using peer-to-peer connectivity.

Figure 7: FX-PCX1711



Features

In addition to the features and benefits listed in [FX-PC Controller Features](#), FX-PCXs, which provide the ability to reside on the FC Bus or SA Bus, to provide application flexibility.

Table 6: FX-PCX Series Point Type Counts Per Model

Point Types	Signals Accepted	FX-PCX 1711	FX-PCX 2711	FX-PCX 2721	FX-PCX 3711	FX-PCX 3721	FX-PCX 3731	FX-PCX 4711
Universal Input (UI)	Analog Input, Voltage Mode, 0–10VDC Analog Input, Current Mode, 4–20mA Analog Input, Resistive Mode, 0–2kohm, 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
Binary Input (BI)	Dry Contact Maintained Mode Pulse Counter/Accumulator Mode (High Speed), 100 Hz	4				16	8	2
Analog Output (AO)	Analog Output, Voltage Mode, 0–10VDC Analog Output, Current Mode, 4–20mA			2				2
Binary Output (BO)	24 VAC Triac						8	3

Table 6: FX-PCX Series Point Type Counts Per Model

Point Types	Signals Accepted	FX-PCX 1711	FX-PCX 2711	FX-PCX 2721	FX-PCX 3711	FX-PCX 3721	FX-PCX 3731	FX-PCX 4711
Universal Output (UO)	Analog Output, Voltage Mode, 0–10VDC Binary Output Mode, 24 VAC/DC FET Analog Output, Current Mode, 4–20mA		2		4			
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10VDC Binary Output Mode, 24 VAC Triac							4
Relay Output (RO) (-0 Models Only)	120/240 VAC		2		4			
Relay Output (RO) (-2 Models Only)	24 VAC		2		4			

Panel and Sub-Panel Assembly Options

FX-PCG, FX-PCA, and FX-PCX controllers are also available in pre-wired panels and sub-panel assemblies. The panelized controller options provide all of the controllers necessary for a complete application solution, including a pre-wired power source and a latching or lockable door.

Note: FX-PC controllers in pre-built panels and sub-panel assemblies are available for purchase **only** in North America.

Bluetooth® Commissioning Converter (FX-BTCVT)

The Bluetooth Commissioning Converter (FX-BTCVT) provides a temporary Bluetooth connection between FX-PC Series Controllers and the laptop computer used to commission them. It allows technicians to commission and service the controllers over a wireless connection (*Figure 8*).

The FX-BTCVT Bluetooth Commissioning Converter provides communication from the BACnet MS/TP FC Bus, the N2 Field Bus, or the SA Bus to a Bluetooth-enabled computer running the FX-PCT software. Any FX-PC controller on an FC Bus can be commissioned by connecting to any other FX-PC controller, any NS Series Sensor, or any FX-PCX connected to any FX-PC controller on the bus.

The 2.4 GHz Bluetooth connection allows for you to be up to 10 m (33 ft) away while you commission the controller with a laptop computer and the FX-PCT software.

Figure 8: Bluetooth Commissioning Converter



Features

The Bluetooth Commissioning Converter (FX-BTCVT) provides the following features:

- Bluetooth wireless communication provides a secure and reliable untethered connection between the laptop and the FX-PC controllers.
- Standard connection jacks on both the NS Series Sensors and FX-PC controllers provide multiple connection points to the system.

- The Bluetooth Commissioning Converter allows online access to controllers while the technician is using the Bluetooth-enabled laptop.
- Standard Bluetooth technology allows you to use a Bluetooth-enabled laptop or any laptop with a commercial off-the-shelf Bluetooth adapter.

Handheld VAV Box Balancing Tool (FX-ATV7003)

The Handheld VAV Box Balancing Tool (FX-ATV7003) lets you set the parameters for VAV box applications that reside on FX-PC Series Controllers.

The VAV box balancing parameters appear on the tool's LCD. A dial and two buttons let you navigate through intuitive menus to balance the VAV box. The menus are customized to the type of application residing in the controller. The balancing operation features an adjustable time-out parameter that returns the tool and controller to normal operation if you leave the controller in balancing mode.

The Handheld VAV Box Balancing Tool is lightweight and portable. It can plug into any model of network sensor to access the VAV box controller.

The Handheld VAV Box Balancing Tool is compatible with the following FX-PC Series devices:

- FX-PCV loaded with a VAV application
- FX-PCG or FX-PCA loaded with a VAV application
- NS Series Network Sensor connected to an FX-PCV, FX-PCG, or FX-PCA loaded with a VAV box application

Figure 9: Handheld VAV Box Balancing Tool



Features

The Handheld VAV Box Balancing Tool provides the following features:

- Allows VAV box balancing and commissioning without a laptop.
- Connects directly to the controller or the controller NS Series Network Sensor through standard RJ-12 plug.
- Intuitive, menu-driven operation simplifies balancing tasks.

Network Sensors

The NS Series Network Sensor offering includes NS Series Network Zone Sensors and NS Series Network Discharge Air Sensors (*Figure 10*).

Figure 10: Network Zone Sensors and Discharge Air Sensors



The NS Series Network Zone Sensors are designed to function directly with FX-PC Series Controllers. Several models of network zone sensors monitor room temperature. Options are available to also monitor zone humidity, carbon dioxide (CO₂), occupancy local temperature setpoint adjustments, and other variables. This data is transmitted to an FX-PC controller on the SA Bus.

The NS Series Network Zone Sensors include models with a temperature setpoint dial and LCD that allows occupants to view the zone temperature and view and adjust the zone temperature setpoint. 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 zone 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 FC Bus.

The NS Series Network Discharge Air Sensors are electronic duct sensors designed to function directly with the FX-PC controllers. Models in this series monitor the duct temperature, typically at the discharge of the VAV box, and transmit this data to an FX-PC controller on the SA Bus using the 305 cm (10 ft) wiring lead included with the unit. The 305 cm (10 ft) wiring lead consists of four 22 AWG 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 102 or 203 mm (4 or 8 in.) temperature probe. All models include DIP switches for applications requiring multiple discharge air sensors, each with a unique DIP switch address.

When using the FX-PCV18 as a replacement for an existing VMA1400, note the following:

- FX-PCV18 is able to reuse existing TE-6xxx Series sensors.
- FX-PCV18 is able to reuse existing TE-700 Series sensors.
- FX-PCV18 is able to reuse existing TE-730 Series sensors.
- FX-PCV18 is not able to reuse existing TMZ1600 Series sensors and requires replacement of the TMZ with a new sensor.
- FX-PCV18 can be used with the NS Series Network sensors.
- FX-PCV18 can be used with the WRZ Series wireless sensors and the WRZ78xx Series One-to-One wireless receiver.

Refer to the *NS Series Network Sensors Product Bulletin (LIT-12011574)* for important product application information, ordering information, and technical specifications.

FX-ZFR Series Wireless Field Bus System

The FX-ZFR Wireless Field Bus System provides wireless monitoring and control of HVAC equipment within multiple levels of a Facility Explorer (FX) system using BACnet protocol over 2.4GHz ZigBee Wireless to communicate between FX Supervisory Controllers and room temperature sensors.

Any FX-PC controller can be wirelessly enabled using an FX-ZFR1811 Wireless Field Bus Router. One router is required per FX-PC controller. This pairing is referred to as a Wireless Enabled Programmable Controller (WEPC).

Figure 11: FX-ZFR Field Bus System Components



An FX-ZFR Wireless Field Bus System consists of:

- up to 8 FX-ZFR1810 Wireless Field Bus Coordinators per field bus
- up to 35 WEPCs per coordinator
- up to 9 FX-WRZxxx Series wireless sensors per controller
- additional FX-ZFR1811 Wireless Field Bus Routers or FX-ZFR1812 Wall Mount Wireless Field Bus Routers connected to FX-ZFRRPT-0, as required, acting as repeaters

Together, these components create a wireless mesh network that allows the exchange of data between the collection of devices within the FX-ZFR Wireless Field Bus System's wireless network and wired BACnet MS/TP devices.

Use the FX-ZFRRPT-0 optional repeater power supply with an FX-ZFR1811 router to serve as a repeater to extend wireless mesh networks and provide multiple wireless transmission pathways.

Features

The FX-ZFR Wireless Field Bus System provides the following features:

- Wireless communications for an FX system provides a wireless platform for FX-PC controllers across multiple levels of an FX system—from FX Supervisory Controllers, to FX-PC controllers, to room sensors. Enables wireless devices to coexist with hard-wired devices on the same FX network. Offers simple add-on hardware to seamlessly enable standard hard-wired FX-PC controllers to function wirelessly.
- Wireless mesh network enables quick, economical, and low-maintenance installation; minimizes MS/TP BACnet hard wiring; enhances reliability through automatically forming wireless links and redundant wireless data transmission paths.
- Support of up to nine wireless room sensors per wirelessly enabled programmable controller facilitates temperature averaging and high/low selection to optimize comfort in larger zones.

Refer to the *FX-ZFR Wireless Field Bus System Product Bulletin (LIT-12011686)* for additional information.

ZigBee Wireless USB Dongle

Figure 12: ZigBee Wireless USB Dongle



The ZigBee Wireless USB Dongle allows a laptop computer to connect to a ZigBee Field Router (FX-ZFR1811) wireless field bus for the purpose of commissioning and downloading applications to wirelessly enabled programmable controllers using the FX-PCT or for analyzing an FX-ZFR wireless mesh using the FX-ZFR Checkout Tool (FX-ZCT). The ZigBee Wireless USB Dongle requires a USB software driver, which is installed automatically with FX-PCT Version 5.3 or higher. No user configuration is required.

Repair Information

If an FX-PC Series 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.

Ordering Information

Contact your Johnson Controls representative to order FX-PC Series Controllers and related products.

Table 7: FX-PCG Series Ordering Information

Product Code Number	Description
FX-PCG1611-1	10-Point General Purpose Programmable Controller with 2 UI, 1 BI, 3 BO, and 4 CO; 24 VAC; FC and SA Bus Support
FX-PCG1611-1ET	FX-PCG1611 Extended Temperature controller for rooftop applications. Supports Operational Temperature Range of -40 to 70°C.
FX-PCG1621-1	10-Point General Purpose Programmable Controller with 2 UI, 1 BI, 3 BO, and 4 CO; 24 VAC; FC and SA Bus Support; Integral Display with Push Button User Interface
FX-PCG2611-0	17-Point General Purpose Programmable Controller with 6 UI, 2 BI, 3 BO, 2 AO, and 4 CO; 24 VAC; FC and SA Bus Support
FX-PCG2611-0ET	FX-PCG2611 Extended Temperature controller for rooftop applications. Supports Operational Temperature Range of -40 to 70°C.
FX-PCG2621-0	17-Point General Purpose Programmable Controller with 6 UI, 2 BI, 3 BO, 2 AO, and 4 CO; 24 VAC; FC and SA Bus Support; Integral Display and Push Button User Interface

Table 8: FX-PCA Series Ordering Information

Product Code Number	Description
FX-PCA2611-0	17-Point Advanced Application Programmable Controller with 6 UI, 2 BI, 4 CO, 3 BO, and 2 AO; 24 VAC; SA Bus; FC Bus; Integral Real-time Clock
FX-PCA2612-1	18-Point Advanced Application Programmable Controller with 5 UI, 4 BI, 4 CO, 2 SPDT RO, and 3 SPST RO; 24 VAC; SA Bus; FC Bus; Integral Real-time Clock
FX-PCA2612-2	18-Point Advanced Application Programmable Controller with 5 UI, 4 BI, 4 CO, 2 SPDT RO, and 3 SPST RO; 100-240 VAC; SA Bus; FC Bus; Integral Real-time Clock
FX-PCA3611-0	26-Point Advanced Application Programmable Controller with 8 UI, 6 BI, 6 BO, and 6 AO; 24 VAC; SA Bus; FC Bus; Integral Real-time Clock; Improved Fast Persistence
FX-PCA3611-0A ¹	26-Point Advanced Application Programmable Controller with 8 UI, 6 BI, 6 BO, and 6 AO; 24 VAC; SA Bus; FC Bus; Integral Real-time Clock

1 This model is currently available only in Asia; contact your local Johnson Controls representative for more information.

Table 9: FX-PCX Series Ordering Information

Product Code Number	Description	UL and cUL	CE Marked
FX-PCX1711-0	4-Point Expansion I/O Module with 4 BI, FC and SA Bus Support	X	X
FX-PCX2711-0	6-Point Expansion I/O Module with 2 UI, 2 UO, 2 RO, FC and SA Bus Support. Relays are rated for 120/240 VAC.	X	
FX-PCX2711-2	6-Point Expansion I/O Module with 2 UI, 2 UO, 2 BO, FC and SA Bus Support. Relays are rated for 240 VAC.		X
FX-PCX2721-0	10-Point Expansion I/O Module with 8 UI, 2 AO, FC and SA Bus Support	X	X
FX-PCX3711-0	12-Point Expansion I/O Module with 4 UI, 4 RO, 4 BO, FC and SA Bus Support. Relays are rated for 120/240 VAC.	X	
FX-PCX3711-2	12-Point Expansion I/O Module with 4 UI, 4 UO, 4 BO, FC and SA Bus Support. Relays are rated for 240 VAC.		X
FX-PCX3721-0	16-Point Expansion I/O Module with 16 BI, FC and SA Bus Support	X	X
FX-PCX3731-0	16-Point Expansion I/O Module with 8 BI, 8 BO, FC and SA Bus Support	X	X

Table 9: FX-PCX Series Ordering Information

Product Code Number	Description	UL and cUL	CE Marked
FX-PCX3731-0A ¹	16-Point Expansion I/O Module with 8 BI, 8 BO, FC and SA Bus Support Note: BOs on the FX-PCX3731-0A controller do not supply power for the outputs; the BOs require external low-voltage (<30 VAC) power sources.	X	X
FX-PCX4711-0	17-Point Expansion I/O Module with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, 24 VAC, FC and SA Bus Support	X	X

1 This model is currently available only in the Asian market; contact your local Johnson Controls representative for more information.

Table 10: FX-PCV Series Ordering Information

Product Code Number	Description
FX-PCV1615-0	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI and 2 BO; 24 VAC; FC Bus, and SA Bus
FX-PCV1617-0 ¹	Same description as FX-PCV1615, but includes 8-pin TSTAT Port for use with TE-7xx Series Non-Communicating Sensors
FX-PCV1626-0	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus (No DPT)
FX-PCV1628-0	32-bit, Integrated VAV Controller and DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus (No Actuator)
FX-PCV1630-0	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus
FX-PCV1632-0 ¹	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus, Includes 8-pin TSTAT Port for use with TE-7xx Series Non-Communicating Sensors
FX-PCV1656-0	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus, Integrated Ball Valve Linkage
FX-PCV1826-0	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus; Recommended use for replacing VMA1440 controllers; includes cable adapters for use when replacing VMA14xx Series controllers
FX-PCV1832-0	Same description as the FX-PCV1632, but includes cable adapters for use when replacing VMA14xx Series controllers. Recommended use for replacing VMA1410, VMA1415, and VMA1420 controllers; includes cable adapters for use when replacing VMA14xx Series controllers

1 This model is currently available only in Asia; contact your local Johnson Controls representative for more information.

Table 11: FX-PC Family Accessories (Order Separately)

Product Code Number	Description
FX-DIS1710-0	Local Controller Display. Text only available in English.
FX-BTCVT-1	Bluetooth® Commissioning Converter
TL-BRTRP-0	Portable BACnet/IP to MS/TP Router
FX-ATV7003-0	Handheld VAV Box Balancing Tool
FX-ZFR1810-1	Wireless Field Bus Coordinator, 10 mW Transmission Power. Functions with FX Supervisory Controllers.
FX-ZFR1811-1	Wireless Field Bus Router, 10 mW Transmission Power. Functions with FX-PC Controllers and FX-WRZxxx Series Wireless Sensors
FX-ZFR1812-1	Wall-mount Wireless Field Bus Router, 10 mW Transmission Power. Functions with BACnet FX-PC Controllers and FX-WRZ Series Wireless Room 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.

Table 11: FX-PC Family Accessories (Order Separately)

Product Code Number	Description
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-WRZ Series Wireless Sensors	FX-WRZ Series Wireless Sensors: Refer to the <i>FX-WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011687)</i> for specific sensor model descriptions.
NS Series Sensors	NS Series Network Sensors: Refer to the <i>NS Series Network Sensors Product Bulletin (LIT-12011574)</i> for specific sensor model descriptions.
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 of 10)
AP-TBK4FC-0	Replacement MS/TP FC Bus Terminal, 4-Position Connector, Blue (Bulk Pack of 10)
AP-TBK3PW-0	Replacement Power Terminal, 3-Position Connector, Gray (Bulk Pack of 10)
AS-CBLVMA-1	Cable Adapter, 8-Pin Female Socket to 6-Pin Male Jack (Bulk Pack of 10)
AS-CBLVMA-2	Cable Adapter, 8-Pin Female Socket to 8-Pin Male Jack with 6-Pin Female Socket for Wireless Commissioning Converter (Bulk Pack of 10)
MS-TBKLV03-0	Terminal Block Kit - FX-PCA Line Voltage AC Power - 3 Pieces
MS-TBKRO02-0	Terminal Block Kit - FX-PCA 2-Position Relay Output - 9 Pieces
MS-TBKRO03-0	Terminal Block Kit - FX-PCA 3-Position Relay Output - 6 Pieces
MS-TBKCO04-0	Terminal Block Kit - FX-PCA 4-Position Configurable Output - 6 Pieces
MS-TBKUI04-0	Terminal Block Kit - FX-PCA 4-Position Universal Input - 3 Pieces
MS-TBKUI05-0	Terminal Block Kit - FX-PCA 5-Position Universal Input - 3 Pieces
FX-PCVACT-701	Actuator Assembly Gearbox Replacement Kit for FX-PCV1615-0, FX-PCV1617-0, FX-PCV1630-0, FX-PCV1632-0, and FX-PCV1832-0
NS-WALLPLATE-0	Network Sensor Wall Plate
TE730-29C-0	Platinum 1k ohm Thin Film Resistive Temperature Sensor
TE730-39C-0	Platinum 1k ohm Thin Film Resistive Temperature Sensor with Integral Manual Occupancy Override Push Button
FX-WRZ7860-0	One-to-One ZigBee Wireless Receiver for Wireless Sensor Only Applications
FX-WRZSST-120	Wireless Sensing System Tool Kit
ZFR-USBHA	<p>USB Dongle with ZigBee® Driver provides a wireless connection through FX-PCT to allow wireless commissioning of the wirelessly enabled FX-PCA, FX-PCG, FX-PCV, and FX-PCX programmable controllers. Also allows use of the FX-ZFR Checkout Tool (FX-ZCT) in FX-PCT.</p> <p>Note: The ZFR-USBHA-0 replaces the IA OEM DAUBI_2400 ZigBee USB dongle. For additional information on the ZFR-USBHA-0 ZigBee dongle, refer to the <i>FX-ZFR Series Wireless Field Bus System Technical Bulletin (LIT-12011660)</i> or <i>FX-ZFR Series Wireless Field Bus System Quick Reference Guide (LIT-12011696)</i>.</p>

Technical Specifications

FX-PCG Series Technical Specifications

Table 12: FX-PCG Series Technical Specifications

Product Code Numbers	<p>FX-PCG1611-1 – 10-Point General Purpose Programmable Controller</p> <p>FX-PCG1621-1 – 10-Point General Purpose Programmable Controller with Integral Display and Push Button User Interface</p> <p>FX-PCG2611-0 – 17-Point General Purpose Programmable Controller</p> <p>FX-PCG2621-0 – 17-Point General Purpose Programmable Controller with Integral Display and Push Button User Interface</p>
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	<p>14 VA maximum for FX-PCG1611 and FX-PCG2611 (no integral display)</p> <p>20 VA maximum for FX-PCG1621 and FX-PCG2621 (with integral display)</p> <p>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).</p>
Ambient Conditions	<p>Operating: 0 to 50°C (32 to 122°F); 10 to 90% RH noncondensing</p> <p>Storage: -40 to 80°C (-40 to 176°F); 5 to 95% RH noncondensing</p> <p>Note: FX-PCG models with an -0ET suffix have an operating temperature range of -40 to 70°C (-40 to 158°F).</p>
Controller Addressing	<p>BACnet/MSTP Controller</p> <p>DIP switch set; valid controller device addresses 4–127</p> <p>(Device addresses 0–3 and 128–255 are reserved and not valid controller addresses.)</p> <p>N2</p> <p>DIP switch set; valid controller device addresses 1–255</p>
Communications Bus¹	<p>RS-485, software selectable between BACnet MS/TP or N2:</p> <p>3-wire FC Bus between the supervisory controller and FX-PC controllers</p> <p>4-wire SA Bus between FX-PC controller, NS Series Network Sensors, and other sensor/actuator devices, includes a lead to source 15 VDC supply power (from FX-PC controller) to bus devices</p>
Processor	H8SX/166xR Renesas® microcontroller
Memory	1 MB Flash Memory and 512 KB RAM
Input and Output Capabilities	<p>FX-PCG16 Models:</p> <p>2 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact</p> <p>1 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode</p> <p>3 - Binary Outputs: Defined as 24 VAC Triac (selectable internal or external source power)</p> <p>4 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO</p> <p>FX-PCG26 Models:</p> <p>6 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact</p> <p>2 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode</p> <p>3 - Binary Outputs: Defined as 24 VAC Triac (selectable internal or external source power)</p> <p>4 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO</p> <p>2 - Analog Outputs: Defined as 0–10 VDC or 4–20 mA</p>

Table 12: FX-PCG Series Technical Specifications

Analog Input/Analog Output Resolution and Accuracy	Analog Input: 16-bit resolution Analog Output: 16-bit resolution and ± 200 mV in 0–10 VDC applications
Terminations	Input/Output: Fixed Screw Terminal Blocks FC Bus, SA Bus, and Supply Power: 3-wire and 4-wire Pluggable Screw Terminal Blocks FC Bus Port and Sensor Port: RJ-12 6-pin Modular Jacks
Mounting	Horizontal on single 35 mm DIN rail mount (preferred), or screw mount on flat surface with three integral mounting clips on controller
Housing	Enclosure material: ABS and polycarbonate UL94 5VB; self-extinguishing; Plenum-rated protection class: IP20 (IEC529)
Dimensions (Height x Width x Depth)	FX-PCG16 Models: 150 x 164 x 53 mm (5-7/8 x 6-7/16 x 2-1/8 in.) including terminals and mounting clips FX-PCG26 Models: 150 x 190 x 53 mm (5-7/8 x 7-1/2 x 2-1/8 in.) including terminals and mounting clips Note: Mounting space for all FX-PC 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.
Weight	FX-PCG16 Models: 0.4 kg (0.9 lb) FX-PCG26 Models: 0.5 kg (1.1 lb)
Compliance	United States: UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment Canada: UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003 Europe: CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC. Australia and New Zealand: C-Tick Mark, Australia/NZ Emissions Compliant BACnet International: BACnet Testing Laboratories (BTL) Protocol Revision 4 Listed BACnet Application Specific Controller (B-ASC)

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

FX-PCA Series Technical Specifications

Table 13: FX-PCA Series Technical Specifications

Product Code Numbers	FX-PCA2611-0 – 17-Point Advanced Application Programmable Controller with Integral Real-Time Clock and 24VAC Supply Power FX-PCA2612-1 – 18-Point Advanced Application Programmable Controller with Integral Real-Time Clock and 24VAC Supply Power FX-PCA2612-2 – 18-Point Advanced Application Programmable Controller with Integral Real-Time Clock and 100–240VAC Supply Power FX-PCA3611-0 – 26-Point Advanced Application Programmable Controller with Integral Real-time Clock, 24 VAC Supply Power, and Fast Persistence FX-PCA3611-0A ¹ – 26-Point Advanced Application Programmable Controller with Integral Real-Time Clock and 24 VAC Supply Power
Supply Voltage	FX-PCA2611-0, FX-PCA2612-1, FX-PCA3611-0A, and FX-PCA3611-0: 24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Power Supply Class 2 (North America), SELV (Europe) FX-PCA2612-2: 100–240 VAC 50/60 Hz

Table 13: FX-PCA Series Technical Specifications

Power Consumption	<p>14 VA maximum for FX-PCA2611-0, FX-PCA3611-0A, and FX-PCA3611-0</p> <p>30 VA maximum for FX-PCA2612-1</p> <p>40 VA maximum for FX-PCA2612-2</p> <p>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).</p>
Ambient Conditions	<p>Operating: 0 to 50°C (32 to 122°F); 10 to 90% RH noncondensing; Pollution Degree 2</p> <p>Storage: -40 to 80°C (-40 to 176°F); 5 to 95% RH noncondensing</p>
Controller Addressing	<p>BACnet/MSTP</p> <p>DIP switch set; valid controller device addresses 4–127</p> <p>(Device addresses 0–3 and 128–255 are reserved and not valid controller addresses.)</p> <p>N2</p> <p>DIP switch set; valid controller device addresses 1–255</p>
Communications Bus	<p>RS-485, selectable between BACnet MS/TP or N2:</p> <p>3-wire FC Bus between the supervisory controller and FX-PC controllers</p> <p>4-wire SA Bus between FX-PC controller, NS Series Network Sensors, and other sensor/actuator devices, includes a lead to source 15 VDC supply power (from FX-PC controller) to bus devices.</p>
Processor	<p>H8SX/166xR Renesas® microcontroller</p> <p>FX-PCA3611-0A and FX-PCA3611-0 use RX630 32-Bit Renesas® microcontroller</p>
Memory	<p>4 MB Flash Memory and 1 MB Random Access Memory (RAM)</p>
Input and Output Capabilities	<p>FX-PCA2611-0:</p> <p>6 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact</p> <p>2 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode</p> <p>2 - Analog Outputs: Defined as 0–10 VDC or 4–20 mA</p> <p>3 - Binary Outputs: Defined as 24 VAC Triac (selectable internal or external source power)</p> <p>4 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO</p> <p>FX-PCA2612-1 and FX-PCA2612-2:</p> <p>5 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact</p> <p>4 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode</p> <p>4 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO</p> <p>2 - Relay Outputs: (Single-Pole, Double-Throw) Rated as UL 916; 1/4 hp 120 VAC, 1/2 hp 240 VAC; 360 VA Pilot Duty at 120/240 VAC (B300); 3 A Non-inductive 24-240 VAC; EN 60730: 6 (4) N.O. or N.C. only</p> <p>3 - Relay Outputs: (Single-Pole, Single-Throw) Rated as UL 916: 1/4 HP 120 VAC, 1/2 HP 240 VAC; 360 VA Pilot Duty at 120/240 VAC (B300); 3 A Non-inductive 24-240 VAC; EN 60730: 6 (4) N.O. or N.C. only</p> <p>FX-PCA3611-0A and FX-PCA3611-0:</p> <p>8 - Universal Inputs: Defined as 0-10 VDC, 4-20 mA, 0-600k ohms, or Binary Dry Contact</p> <p>6 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode</p> <p>6 - Binary Outputs: Defined as 24 VAC Triac (external power source only)</p> <p>6 - Analog Outputs: Defined as 0-10 VDC or 4-20 mA</p>

Table 13: FX-PCA Series Technical Specifications

Analog Input/Analog Output Resolution and Accuracy	Analog Input: 15-bit resolution Analog Output: 15-bit resolution and ± 200 mV in 0–10 VDC applications
Terminations	Input/Output: Fixed Screw Terminal Blocks on FX-PCA2611-0, FX-PCA3611-0A, and FX-PCA3611-0 and Pluggable Terminal Blocks on FX-PCA2612-1 and FX-PCA2612-2 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
Mounting	Horizontal on single 35 mm DIN rain mount (preferred), or screw mount on flat surface with three integral mounting clips on controller
Housing	Enclosure material: ABS and polycarbonate UL94 5VB; self-extinguishing; Plenum-rated Protection Class: IP20 (IEC529) (except the FX-PCA2612 controller)
Dimensions (Height x Width x Depth)	FX-PCA2611-0: 150 x 190 x 53 mm (5-7/8 x 7-1/2 x 2-1/8 in.) including terminals and mounting clips FX-PCA2612 Models: 150 x 164 x 53 mm (5-7/8 x 6-7/16 x 2-1/8 in.) including terminals and mounting clips FX-PCA3611-0A¹ and FX-PCA611-0: 150 x 220 x 57.5 mm (5-7/8 x 8-3/4 x 2-3/8 in.) including terminals and mounting clips Note: Mounting space for FX-PCA26 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.
Weight	0.5 kg (1.1 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: 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. Johnson Controls, Inc. declares that the FX-PCA2612-2 models are also in compliance with the essential requirements and other relevant provisions of the Low Voltage Directive 2006/95/EC. Declared as Independently Mounted, Intended for Panel Mounting, Operating Control Type 1.B, 4kV rated impulse voltage. 100°C ball pressure test. Australia and New Zealand: C-Tick Mark, Australia/NZ Emissions Compliant BACnet International: FX-PCA26xx Models - BACnet Testing Laboratories (BTL) Protocol Revision 7 Listed BACnet Advanced Application Controller (B-AAC) FX-PCA3611-0A and FX-PCA611-0 - BACnet Testing Laboratories™ Protocol Revision 9 (BTL) Listed BACnet Advanced Application Controller (B-AAC)

¹ This model is currently available only in Asia; contact your local Johnson Controls representative for more information.

FX-PCX Series Technical Specifications

Table 14: FX-PCX Series Technical Specifications

Product Code Numbers	<p>FX-PCX1711-0 - 4-Point Expansion Input/Output Module with 4 BI, FC and SA Bus Support.</p> <p>FX-PCX2711-0 - 6-Point Expansion Input/Output Module with 2 UI, 2 UO, 2 BO, FC and SA Bus Support. Relays are rated for 120/240 VAC.</p> <p>FX-PCX2711-2 - 6-Point Expansion Input/Output Module with 2 UI, 2 UO, 2 BO, FC and SA Bus Support. Relays are rated for 240 VAC.</p> <p>FX-PCX2721-0 - 10-Point Expansion Input/Output Module with 8 UI, 2 AO, FC and SA Bus Support</p> <p>FX-PCX3711-0 - 12-Point Expansion Input/Output Module with 4 UI, 4 UO, 4 BO, FC and SA Bus Support. Relays are rated for 120/240 VAC.</p> <p>FX-PCX3711-2 - 12-Point Expansion Input/Output Module with 4 UI, 4 UO, 4 BO, FC and SA Bus Support. Relays are rated for 240 VAC.</p> <p>FX-PCX3721-0 - 16-Point Expansion Input/Output Module with 16 BI, FC and SA Bus Support</p> <p>FX-PCX3731-0 - 16-Point Expansion Input/Output Module with 8 BI, 8 BO, FC and SA Bus Support</p> <p>FX-PCX3731-0A - 16-Point Expansion Input/Output Module with 8 BI, 8 BO, FC and SA Bus Support (Asia only)</p> <p>FX-PCX4711-0 - 17-Point Expansion Input/Output Module with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, FC and SA Bus Support</p>
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	<p>14 VA maximum</p> <p>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), depending on the FX-PCX model.</p>
Ambient Conditions	<p>Operating: 0 to 50°C (32 to 122°F); 10 to 90% RH noncondensing</p> <p>Storage: -40 to 80°C (-40 to 176°F); 5 to 95% RH noncondensing</p>
BACnet/MS/TP Addressing	<p>DIP switch set; valid controller device addresses 4–127</p> <p>(Device addresses 0–3 and 128–255 are reserved and not valid FX-PCX addresses).</p>
Communications Bus¹	<p>BACnet MS/TP, RS-485</p> <p>3-wire FC Bus between the supervisory controllers and FX-PC controllers</p> <p>4-wire SA Bus between FX-PC controller, NS Series Network Sensors, and other sensor/actuator devices. includes a lead source 15 VDC supply power (from FX-PC controller) to bus devices.</p>
Processor	H8SX/166xR Renesas® 32-bit microcontroller
Memory	512 KB Flash Memory and 128 KB RAM

Table 14: FX-PCX Series Technical Specifications

Input and Output Capabilities	<p>FX-PCX1711: 4 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/ Accumulator Mode</p>
	<p>FX-PCX2711: 2 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 2 - Universal Outputs: Analog Output: Voltage Mode, 0-10 VDC; Binary Output Mode: 24 VAC/DC FET; Analog Output: Current Mode, 4–20 mA 2 - Relay Outputs (Single-Pole, Double-Throw): UL Listing (-0 model only): 1/4 hp 120 VAC, 1/2 hp 240 VAC; 360 VA Pilot Duty at 120/240 VAC (B300); 3 A Non-inductive 24-240 VAC; CE Marking (-2 model Only): 6 (4) A N.O. or N.C. only, 240 VAC</p>
	<p>FX-PCX2721: 8 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 2 - Analog Outputs: Defined as 0–10 VDC or 4–20 mA</p>
	<p>FX-PCX3711: 4 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 4 - Universal Outputs: Analog Output: Voltage Mode, 0-10 VDC; Binary Output Mode: 24 VAC/DC FET; Analog Output: Current Mode, 4–20 mA 4 - Relay Outputs (Single-Pole, Double-Throw): UL Listing (-0 model only): 1/4 hp 120 VAC, 1/2 hp 240 VAC; 360 VA Pilot Duty at 120/240 VAC (B300); 3 A Non-inductive 24-240 VAC; CE Marking (-2 Model Only): 6 (4) A N.O. or N.C. only, 240 VAC</p>
	<p>FX-PCX3721: 16 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode</p>
	<p>FX-PCX3731: 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.)</p>
	<p>FX-PCX4711: 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</p>
	<p>Analog Input/Analog Output Resolution and Accuracy</p>
<p>Terminations</p>	<p>Input/Output: 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</p>
<p>Mounting</p>	<p>Horizontal on single 35 mm DIN rail mount (preferred), or screw mount on flat surface with three integral mounting clips on controller</p>
<p>Housing</p>	<p>Enclosure material: ABS and polycarbonate UL94 5VB; self-extinguishing, Plenum-rated protection class: IP20 (IEC529)</p>

Table 14: FX-PCX Series Technical Specifications

<p>Dimensions (Height x Width x Depth)</p>	<p>FX-PCX171x-x and FX-PCX271x-x Models: 150 x 120 x 53 mm (5-7/8 x 4-3/4 x 2-1/8 in.) including terminals and mounting clips</p> <p>FX-PCX2721-x, FX-PCX3721-x, FX-PCX3731-0, and FX-PCX3731-0A Models: 150 x 164 x 53 mm (5-7/8 x 6-7/16 x 2-1/8 in.) including terminals and mounting clips</p> <p>FX-PCX371x-x and FX-PCX471x-x Models: 150 x 190 x 53 mm (5-7/8 x 7-1/2 x 2-1/8 in.) including terminals and mounting clips</p> <p>Note: Mounting space for all 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.</p>
<p>Weight</p>	<p>0.5 kg (1.1 lb) maximum</p>
<p>Compliance</p>	<p>United States: UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A</p> <p>Note: Except FX-PCX2711-2 and FX-PCX3711-2</p> <p>Canada: UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003</p> <p>Note: Except FX-PCX2711-2 and FX-PCX3711-2</p> <p>Europe: CE Mark –Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.</p> <p>Note: Except FX-PCX2711-0 and FX-PCX3711-0</p> <p>Australia and New Zealand: C-Tick Mark, Australia/NZ Emissions Compliant</p> <p>Note: Except FX-PCX2711-0 and FX-PCX3711-0</p> <p>BACnet International: BACnet Testing Laboratories (BTL) Protocol Revision 4 Listed BACnet Application Specific Controller (B-ASC)</p>

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

FX-PCV Series Technical Specifications

Table 15: FX-PCV Series Technical Specifications

Product Code Numbers	<p>FX-PCV1615-0: 32-bit, Integrated VAV Controller/Actuator/Pressure Sensor, 3 UI and 2 BO; 24 VAC; FC and SA Bus</p> <p>FX-PCV1617-0: Same description as FX-PCV1615 but includes 8-pin TSTAT Port for use with TE-7xx Series Non-Communicating Sensors (Asia Only)</p> <p>FX-PCV1626-0: 32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus (No DPT)</p> <p>FX-PCV1628-0: 32-bit, Integrated VAV Controller and DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus (No Actuator)</p> <p>FX-PCV1630-0: 32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI, 3 BO, 2 CO; 24 VAC; FC and SA Bus</p> <p>FX-PCV1632-0: Same description as FX-PCV1630 but includes 8-pin TSTAT Port for use with TE-7xx Series Non-Communicating Sensors (Asia Only)</p> <p>FX-PCV1656-0: 32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus, Integrated Ball Valve Linkage (No DPT)</p> <p>FX-PCV1826-0: 32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus, with 8-9in TSTAT Port, Recommended for use as a replacement for VMA1440 (No DPT)</p> <p>FX-PCV1832-0: 32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI, 3 BO, 2 CO; 24 VAC; FC and SA Bus, with 8-pin TSTAT Port. Recommended for use as a replacement for VMA1410, VMA1415, or VMA1420</p>
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	<p>10 VA typical, 14 VA maximum</p> <p>Note: 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).</p>
Ambient Conditions	<p>Operating: 0 to 50°C (32 to 122°F)</p> <p>Storage: -40 to 70°C (-40 to 158°F)</p>
Terminations	<p>FX-PCV1615 and FX-PCV1630:</p> <p>Inputs/Outputs: 6.3 mm (1/4 in.) Spade Lugs</p> <p>FC Bus, SA Bus, and Supply Power: 4-Wire and 2-Wire Pluggable Screw Terminal Blocks</p> <p>FC and SA Bus Modular Ports: RJ-12 6-Pin Modular Jacks</p> <p>FX-PCV1617 and FX-PCV1632:</p> <p>Inputs/Outputs, SA Bus, and Supply Power: 6.3 mm (1/4 in.) Spade Lugs</p> <p>FC Bus Pluggable Screw Terminal Block</p> <p>TSTAT Modular Port: RJ-45 8-Pin Modular Jack</p> <p>FX-PCV1832:</p> <p>Inputs/Outputs, SA Bus, and Supply Power: 6.3 mm (1/4 in.) Spade Lugs</p> <p>N2/FC Bus Pluggable Screw Terminal Block</p> <p>TSTAT Modular Port: RJ-45 8-Pin Modular Jack</p>

Table 15: FX-PCV Series Technical Specifications

Controller Addressing	<p>BACnet/MSTP</p> <p>DIP switch set; valid controller device addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid controller addresses.)</p> <p>N2</p> <p>DIP switch set; valid controller device addresses 1–255</p>
Communications Bus	<p>RS-485, software selectable between BACnet MS/TP or N2:</p> <p>3-wire FC Bus between the supervisory controller and FX-PC</p> <p>4-wire SA Bus from the FX-PCV 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.</p>
Communication Bus for FX-PCV1832	<p>N2 Open Protocol:</p> <p>N2/FC Bus: 1.5 mm (18 AWG) standard 3-wire, twisted, shielded cable recommended between the supervisory controller and field controllers</p> <p>BACnet MS/TP Protocol:</p> <p>SA Bus: 0.6 mm (22 AWG) stranded, 4-wire (2-twisted pairs) shielded cable recommended from the FX-PCV controller for network sensors and other sensor/actuator devices; includes a terminal to source 15 VDC supply power from FX-PCV to SA Bus devices</p>
Processor	RX630 32-bit Renesas microcontroller
Memory	1 MB Flash Memory and 512 KB RAM
Analog Input/Analog Output Accuracy	<p>Analog Input: 15-bit resolution on UIs</p> <p>Analog Output: 0–10 VDC ± 200 mV</p>
Air Pressure Differential Sensor	<p>Range: -1.5 in. to 1.5 in. W.C.</p> <p>Performance Characteristics:</p> <p>Accuracy: ±0.75% Full Span Maximum (±0.0225 in. W.C.)</p> <p>Typical accuracy at zero (null) pressure is ±0.003 in. W.C.</p>
Mounting	Mounts to damper shaft using single set screw and to duct with single mounting screw.
Actuator Rating	4 N•m (35 lb•in.) minimum shaft length = 44 mm (1-3/4 in.)
Dimensions	<p>(Height x Width x Depth): 165 x 125 x 73 mm (6.5 x 4.92 x 2.9 in.)</p> <p>Center of Output Hub to Center of Captive Spacer: 135 mm (5-5/16 in.)</p>
Weight	0.65 kg (1.45 lb)
Compliance	<p>United States: UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A</p> <p>Canada: UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003</p> <p>Europe: CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.</p> <p>Australia and New Zealand: C-Tick Compliant (N1813), Australia/NZ Emissions Compliant.</p> <p>BACnet International: BACnet Testing Laboratories (BTL) Protocol Revision 7 Listed BACnet Application Specific Controller (B-ASC)</p>

- 1 For more information, refer to the *FX-PC Series Controllers MS/TP Communications Bus Technical Bulletin (LIT-12011670)*.
- 2 Combined error due to calibration, accuracy, non-linearity, and temperature variation.
- 3 Includes error due to non-linearity

Bluetooth Commissioning Converter Technical Specifications

Table 16: Bluetooth Commissioning Converter Technical Specifications

Product Code	FX-BTCVT-1
Power Requirement	Nominal 15 VDC, supplied by the FX-PC controller SA/FC Bus Port
Power Consumption	1.35 watts maximum
Ambient Conditions	Operating: 0 to 50°C (32 to 122°F), 5 to 95% RH, Noncondensing, 30°C (86°F) Maximum Dew Point Storage: -40 to 85°C (-40 to 185°F), 5 to 95% RH, Noncondensing
Transmission Power	2.5 mW maximum
Transmission Speed	Wireless Communication: 115.2 bits per second (bps) Serial Communication (SA/FC Bus): 9600, 19.2k, 38.4k, or 76.8k bps
Transmission Range (Typical)	Wireless Communication: 10 m (33 ft) Line-of-Sight
Wireless Security	Security Mode 3 - Link Level Enforced Security
Network and Serial Interfaces	Bluetooth Wireless Technology One RS-485 Bus
Dimensions	116 x 75 x 35 mm (4.6 x 3.0 x 1.4 in.)
Housing	Black ABS Plastic Housing Blue PVC Protective Boot
Weight	0.165 kg (0.365 lb) without hanging components
Compliance	United States: UL 916 Energy Management; Plenum-rated per UL1995 UL94-5VB Flammability Rating Transmitter complies with FCC Part 15.247 regulations for low-power unlicensed transmitters (Transmitter FCC Identification: CB2-MS-BTCVT-0) Receiver complies with FCC Part 15.109 regulations for low-power unlicensed receivers (Transmitter FFC Identification: CB2-MS-BTCVT-0) Canada: Industry Canada (IC: 279A-MSBTCVT0) Europe: CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the R&TTE Directive 1999/05/EC. Japan: Telecommunications Certification - 003NY05068 0000

Handheld VAV Box Balancing Tool Technical Specifications

Table 17: Handheld VAV Box Balancing Tool Technical Specifications

Product Code	FX-ATV7003-0
Supply Voltage	9.8 to 16.5 VDC; 15 VDC Nominal, supplied by the Sensor Actuator (SA) Bus Port
Current Consumption	90 mA maximum
Terminations	RJ-12, 6-Position Modular Jack
Transmission Speed	Serial Communication (SA Bus) 9600, 19.2k, 38.4k, or 76.8k bps
Sensor Addressing	Fixed address of 198
Ambient Conditions	Operating: 0 to 50°C (32 to 122°F); 5 to 95% RH, Noncondensing; 30°C (86°F) Maximum Dew Point Storage: -40 to 85°C (-40 to 185°F); 5 to 95% RH, Noncondensing
Dimensions	80 x 80 x 25 mm (3.2 x 3.2 x 1.0 in.)
Weight	0.165 kg (0.365 lb)

Table 17: Handheld VAV Box Balancing Tool Technical Specifications

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, ICES-003
	Europe: CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.
	Australia and New Zealand: C-Tick Mark, Australia/NZ Emissions Compliant
	BACnet International: BACnet Testing Laboratories (BTL) 135-2004 Listed BACnet Smart Sensor (B-SS)

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

North American Emissions Compliance for FX-PCG Series, FX-PCX Series, and FX-PCV Series Controllers

United States

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

Canada

This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

North American Emissions Compliance for Bluetooth Commissioning Converters

United States

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

RF Transmitters: Compliance Statement (Part 15.19)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: This device may not cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation.

Warning (Part 15.21)

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

Canada

This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations. Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

RF Transmitters: Industry Canada Statement

The term IC before the certification/registration number only signifies that the Industry Canada technical specifications were met. Le terme «IC» précédant le numéro d'accréditation/inscription signifie simplement que le produit est conforme aux spécifications techniques d'Industry Canada.

Section 5.5 of RSS-210

This device has been designed to operate with an antenna having a maximum gain of 2 dB. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms. Cet appareil a été conçu pour fonctionner avec une antenne d'un gain maximum de 2 dBi. En application des réglementations d'Industry Canada, l'utilisation d'une antenne de gain supérieur est strictement interdite. L'impédance d'antenne requise est de 50 ohms.

Section 5.11 of RSS-210

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication. Pour réduire les interférences radio potentielles avec les dispositifs d'autres utilisateurs, le type d'antenne et son gain doivent être choisis de façon à ce que la puissance isotrope rayonnée équivalente (PIRE) ne soit pas supérieure à la puissance nécessaire pour une bonne communication.



Building Efficiency
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