FX-PC Series Programmable Controllers and Related Products Product Bulletin

LIT-12011657

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Overview

The PC Series family comprises a group of versatile programmable controllers and accessories designed to monitor, control, and integrate a wide variety of HVAC and other building equipment. The controllers feature an advanced design that provides optimum performance and easy access to power, network, and field terminations.

The PC series includes the PCV Programmable Variable Air Volume (VAV) Box Controller, the PCA Advanced Application Programmable Controller, and the PCG General Purpose Programmable Controller. Modular add-on accessories, such as the PCX Expansion Input/Output (I/O) Modules, extend the capabilities of the PC controllers by providing additional I/O interfaces.

PC series devices feature an advanced design that provides optimum performance and easy access to power, network, and field terminations. The PC Series family integrates easily with the NS Series Network Sensors, the ZFR/ZFRPro Series Wireless Field Bus system, WRZ Series Wireless Sensors, and the FX-WRZ78xx One-to-One Wireless Receiver. These products complement the FX-PC family of controllers and enable enhanced capabilities in both wired and wireless network applications.

Note: A subset of PC Series programmable controllers with the prefix **CH-** are available for Facility Explorer in some regions. These controllers do not have the Facility Explorer brand logo on the cover.

Figure 1: PC Series programmable controllers



Features and benefits

Large product family

Provides a wide range of point mix to meet application requirements and allows for the addition of one or more PCXs to provide even more I/O capacity.

Standard hardware and software platform

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

Universal Inputs, configurable Outputs, and point expansion modules

Allow multiple signal options to provide input/output flexibility.

Auto-tuned control loops

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

Standard BACnet protocol

Provides interoperability with Johnson Controls and third-party BAS products that use the widely accepted BACnet standard.

BACnet Testing Laboratories™ (BTL) listed

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

Models to support communication protocols that are switchable between BACnet MS/TP and N2

At CCT Release 10.1, a new capability allows controllers to be configured to communicate using either the BACnet MS/TP or the N2 field bus networking protocol. The operation of the PCX is not affected by the selection of the BACnet MS/TP or the N2 protocol in the host controller.

Models to support BACnet/SC and BACnet/IP communications

The PCA4911 and the PCV1930 communicate over the BACnet/SC or BACnet/IP protocol. This allows more flexibility in choosing the devices for your site's network. BACnet/SC is a new protocol that provides a secure method of communication on IP networks. It uses standards widely accepted by the IT community and eliminates many of the IT concerns.

Note: You can upgrade existing PCV1930 units in the field to support BACnet/SC, but this model is discontinued from manufacturing.

Wireless ZFR and ZFR Pro support

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

Optional local User Interface display

Allows convenient monitoring and adjusting capabilities at the local device.

32-Bit microprocessor

Ensures optimum performance and meets industry specifications.

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

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

Pluggable communications bus and supply power terminal blocks

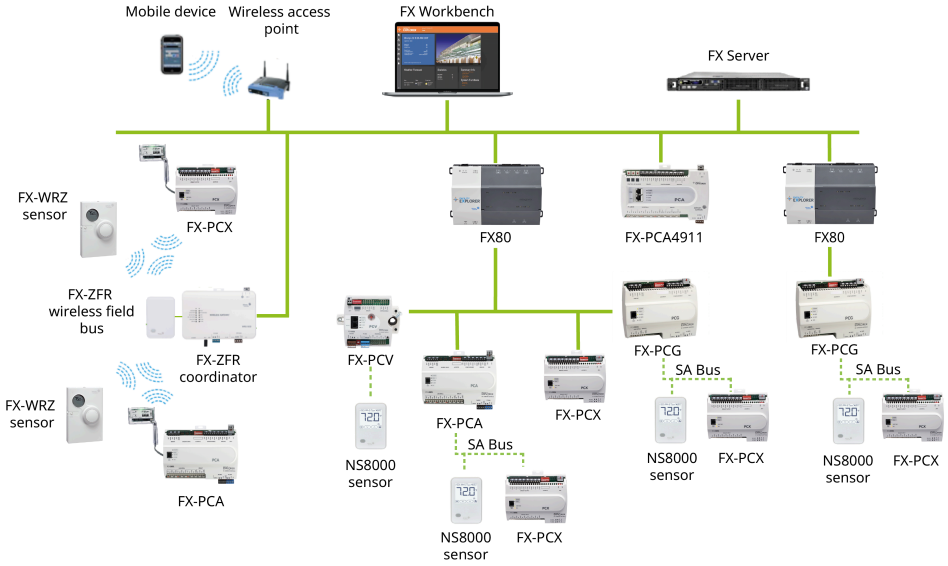
Expedite installation and troubleshooting.

Writable flash memory

Allows standard or customized applications to be downloaded from the Controller Configuration Tool (CCT) and enables persistent application data.

Network diagram with controllers

Figure 2: Facility Explorer system with PC controllers



Integration to FX supervisory controllers

PC series devices are designed to integrate seamlessly into the FX system by connecting and communicating directly with FX Supervisory Controllers. This seamless integration enables building operators to monitor and adjust the controllers directly from the FX system UI.

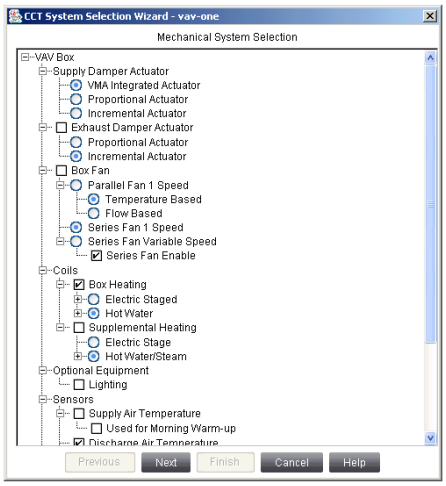
In addition, service personnel can view the controller information locally through the integral LCD (included on some FX-PCG models), through an optional local controller display (FX-DIS1710-0 or F4-DLK0350-0) available for field controllers or through the optional Mobile Access Portal (MAP) Gateway.

Controller Configuration Tool (CCT)

The CCT is used to configure, simulate, and commission the PCA family of controllers.

Configuration mode allows you to select a number of mechanical and control logic options through System Selection Trees 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 PC Controllers that use a local controller display.

Figure 3: Mechanical selection in CCT



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.

Commissioning mode manages the downloading of files to the field equipment controllers through multiple network connection points. You can connect using the MAP Gateway or by using the Ethernet Passthru mode in conjunction with the SCT through a FX Supervisory Controller.

Note: Ethernet Passthru is not available on controllers configured for N2 communications.

After downloading the controllers, you can use the CCT Commissioning mode to validate the sensor and control

point interfaces and adjust key setpoints and setup parameters, see Figure 4.

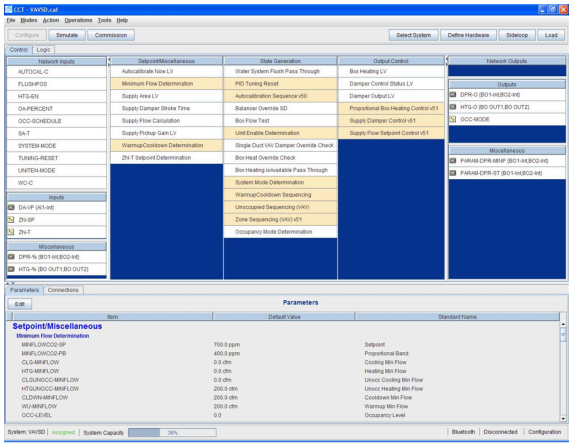
CCT includes integrated productivity features with utilities to facilitate mass application uploads and downloads, including upgrades of entire trunks of controllers with just a few mouse clicks. Template files provide an intuitive method of reading and writing configuration parameters to multiple controllers,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

For VAV applications, CCT 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, the Facility Explorer system provides multiple configurations of room network sensors and a handheld VAV balancing tool that can be used to perform VAV balancing tasks.

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

A Commissioning-mode-only version of the CCT software is available to the Johnson Controls branch offices for jobs or individuals that require only commissioning tasks, for example, balancing contractors. The configuration and simulation modes are disabled in the CCT Commissioning software.

Figure 4: CCT 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.

PC Series Programmable Controllers and Expansion Modules Family

The Programmable Controller Family includes the FX-PCG, FX-PCA, and FX-PCV Series Programmable Controller models. All the controllers run pre-engineered or user-programmed applications and provide the I/O required to monitor and control a wide variety of HVAC equipment.

This family of diverse programmable controllers is designed to install easily and communicate through standard BACnet MS/TP, N2, BACnet/IP, or BACnet/SC, 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.

Important: Some CH-PC controllers are also compatible with the FX system. Refer to *PC Series Programmable Controllers and Related Products for use with FX in the Asia Region Product Bulletin (LIT-12013279)* for further details.

Communications protocols

The FX-PC Family Controllers and network sensors communicate using the standard BACnet protocol. The BACnet protocol is a standard for ANSI, ASHRAE, and the International Standards Organization (ISO) for building controls.

PCG and PCV devices are BTL-listed as BACnet Application Specific Controllers (B-ASCs). The PCA controllers are BTL-listed as BACnet Advanced Application Controllers (B-AACs). The NS Series Sensors are BTL-listed as BACnet Smart Sensors (B-SSs).

The PCA4911 communicates using the BACnet/SC or BACnet/IP communication protocols. Use CCT Release 10.1 or later to switch the Field Bus communications protocol in supported controllers to be either the standard BACnet MS/TP or the N2 protocol. All new controllers use either BACnet MS/TP as the default communications protocol, or BACnet/IP. Switchable communications protocols in the MS/TP models 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* section of the *Controller Tool Help (LIT-12011147)* for information about mapping N2 Objects in controllers with switchable communications protocols.

You can use the N2-capable FX-PC Controllers as functional replacements for legacy N2 controllers. The N2-capable FX-PC Controllers include the following features and settings:

- The I/O quantities and characteristics of the FX-PC family controllers
- Must be programmed with CCT
- Support SA Bus devices
- Support 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 the following features or settings:

- Zone Bus, for example, TMZ sensors and M100 actuators
- Passthrough in the commissioning mode

- Remote downloading or commissioning using BACnet routing
- Wireless connection to the N2 bus

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 MS/TP 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 MS/TP controller has an easily accessible, eight-position DIP switch that you can use 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.

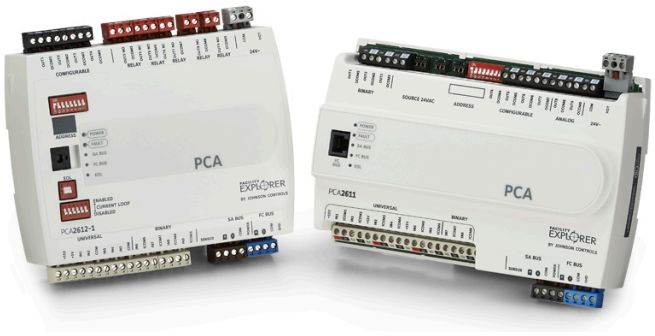
The BACnet/IP field controllers feature rotary switches to give each controller a unique number to physically identify the controller and relate it to the building drawings.

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

The I/O terminations on the PCV models are spade lugs. Pluggable screw terminal blocks that connect to the I/O spade terminations are also available as optional accessories. FX-PCA2612 models have removable, color-coded, and labelled terminal block plugs for the I/O terminations.

The controllers have integral mounting clips and a DIN rail track on the backplate so that you can easily mount the controller either on a horizontal section of 35 mm DIN rail or directly to a wall or flat vertical surface. Some 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 PCG and PCA models without a display, a stand-alone FX-DIS1710 Local Controller Display module, F4-DLK0350 Local Controller Display module, or MAP Gateway are available that connect directly to the SA Bus port. For details, refer to the *FX-DIS Local Controller Display Product Bulletin (LIT-12011667)*, *F4-DLK0350 Product Bulletin (LIT-12014010)* or *Mobile Access Portal Gateway Product Bulletin (LIT-12011884)* respectively.

PCA Programmable Controllers



PCA Series controllers are programmable controllers that can communicate through BACnet® Secure Connect (BACnet/SC), BACnet/IP, MS/TP, or N2 communications protocols, depending on the model. The PCA4911 Series controller communicates through BACnet/IP or BACnet/SC communications protocols. All other PCA Series controllers, except the PCA4911, can switch between MS/TP and N2 communications protocols. PCA series controllers in BACnet/IP, BACnet/SC, or BACnet MS/TP communication mode are BACnet network-compliant devices.

PCA Series controllers feature an integral real-time clock and support time-based tasks, which means these field controllers can monitor and control schedules, calendars, alarms, and trends. PCAs can continue time-based control and monitoring when offline for extended periods of time from a system network. The PCAs include RS-485 field bus networking with BACnet MS/TP protocols.

You can combine PCA controllers with PCX Expansion I/O modules to gain more I/O interfaces. You can use PCAs and their advanced features to monitor and control a wider range of more complex equipment, such as airhandlers and central plants.

PCA Series controllers can also operate as stand-alone controllers in applications that do not require a networked supervisory device or for network applications where you perform scheduling, alarming, or trending performed locally in the field controllers.

The PCA4911 controllers operate on BACnet/SC or BACnet/IP networks and integrate into Facility Explorer and third-party systems.

The PCA3613 model includes a fast persistence feature that allows data values to be held at a configurable value, up to once per second. Persistence refers to how often samples of data are stored locally. 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, which minimizes 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, which includes certain methods of utility data collection and billing.

PCA2612 controller models feature line-voltage relay outputs, which make these controllers well suited for use in terminal units. The PCA2612-2 model uses a line-voltage

power supply, which eliminates the need for a 24 VAC transformer in line-voltage applications.

The PCA2611, PCA2612, and PCA3613 controllers use the MS/TP protocol. When used with the ZFR or ZFR Pro Series accessories, or the WRZ-7860 One-to-One Receiver, these controllers support wireless communications.

Features

In addition to the features and benefits listed in Features and benefits, PCAs also provide the following features:

- 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).

PCA series model information

Note: The PCA2513 is only available in certain regions. Contact your local Johnson Controls representative for more information. See Contact information.

Table 1: PCA series model information

		PCA2513	PCA2611	PCA2612	PCA3613	PCA4911
Communication protocol		BACnet MS/TP, N2				BACnet/SC or BACnet/IP
Modular jacks		**All models:** 6-pin SA Bus port **PCA2611, PCA2612, and PCA3613 models:** 6-pin FC Bus port				
Point types	**Signals accepted**					
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	4 Current Mode not supported	6	5	8	10
Binary Input (BI)	Dry Contact Maintained Mode Pulse Counter/Accumulator Mode (High Speed), 100 Hz	6	2	4	6	6
Analog Output (AO)	Analog Output, Voltage Mode, 0–10 VDC Analog Current Mode, 4–20 mA	2 Current Mode not supported	2		6	4
Binary Output (BO)	24 VAC Triac	2 External power only	3		6	4
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac	2	4	4		4
Relay Output (RO)	Relay Output: Single-Pole, Double-Throw (SPDT) Relay Output: Single-Pole, Single-Throw (SPST)			2 - SPDT 3 - SPST		

PCG General Purpose Programmable Controllers

You can switch PCG programmable controllers between BACnet MS/TP and N2 Communications protocols. When they are used as BACnet MS/TP devices, they are a BACnet Application Specific Controller (B-ASC) with integral MS/TP communications. In N2 mode, they can be used to modernize sites with legacy Johnson Controls controllers.

These controllers run pre-engineered and user-programmed applications and provide the inputs and outputs required to monitor and control a wide variety of HVAC equipment.

The full range of PCG models combined with the PCX expansion modules can be applied to a wide variety of building applications ranging from simple fan coil or heat pump control to advanced central plant management. All PCG Series Controllers configured for BACnet support wireless communications using the ZFR/ZFR Pro System accessories.

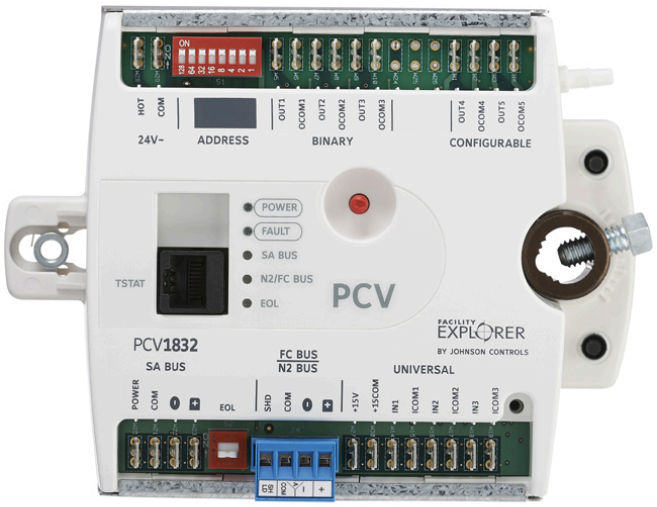
PCG controller series model information (including point type counts)

Table 2: PCG series model information (including point type counts)

		PCG16xx	PCG26xx
Communication protocol		BACnet MS/TP, N2, or Zigbee wireless with add-on modules	
Modular jacks		6-pin SA Bus Modular Port supports one communicating sensor. **Or** you can wire up to four communicating sensors to the SA Bus Terminal Block. They cannot be used at the same time.	
		6-pin FC Bus for tool support	
Point types	**Signals accepted**		
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	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

PCV Programmable VAV Box Controller Series

Figure 5: PCV1832 Programmable Controller



PCV16 and PCV18 series controllers are programmable digital controllers tailored for VAV applications that can switch between MS/TP and N2 Communications protocols. When they are used as MS/TP devices, they communicate through the BACnet® MS/TP protocol. In N2 mode, they can be used as replacements for legacy Johnson Controls® controllers.

The PCV controllers' small package size facilitates quick field installation and efficient use of space, while not compromising high-tech control performance. These controllers easily adapt NS Series Network Sensors for zone and discharge air temperature sensing.

The PCV18 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.

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

These features make the PCV controllers the product of choice for VAV systems. The wide variety of network

sensor models provides options for measuring and displaying zone temperature, occupancy detection, duct temperature, zone humidity and dewpoint determination, carbon dioxide (CO_2) level, setpoint adjustments, VAV box fan speed control, and discharge air temperatures.

Features

In addition to the features and benefits listed in Features and benefits, 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.
- A phone jack-style connector on the FC Bus and SA Bus to support quick connection to the Mobile Access Portal Gateway (MAP), FX-ZFR or FX-ZFR Pro Series wireless router, 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.

PCV series model information

Table 3: PCV16 series model information

		PCV1626	PCV1628	PCV1656
Communication protocol		BACnet MS/TP, N2, or Wireless (using add-on modules)		
Modular jacks		6-pin SA Bus port		
		6-pin FC Bus port		
Point types	**Signals accepted**			
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	3
Binary Output (BO)	24 VAC Triac	3	3	3
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac	2	2	2
Integrated actuator	Internal	1	1	1 with ball valve linkage
Integrated flow sensor	Internal		1	
SA Bus	Supports up to 10 total wired SA Bus devices, including the XPM and PCX series expansion I/O modules and up to 4 NS series network sensors			
WRZ sensors	Supports up to 9 WRZ sensors when using the ZFR or ZFR Pro Series wireless router configuration			
	Supports up to 5 WRZ sensors when using the one-to-one WRZ-78xx wireless configuration			

Table 4: PCV18 series model information

		PCV1826	PCV1832
Communications protocol		BACnet MS/TP, N2, or Zigbee Wireless (using add-on modules)	
Modular jacks		8-pin SA Bus supports analog non-communicating sensor	
Point types	**Signals accepted**		
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, 24 VAC Triac	2	2

Table 4: PCV18 series model information

		PCV1826	PCV1832
Integrated actuator	Internal	1	1
Differential pressure transducer	Internal		1
SA Bus	Supports up to 10 total wired SA Bus devices, including the XPM and PCX series expansion I/O modules and up to 4 NS series network sensors		
WRZ sensors	Supports up to 9 WRZ sensors when using the ZFR or ZFR Pro Series wireless router configuration		
	Supports up to 5 WRZ sensors when using the one-to-one WRZ-78xx wireless configuration		

PCX Expansion Input/Output Module

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

Note: At Controller Configuration Tool (CCT) Release 10.1 and later, the PCGs, PCAs, and PCVs can communicate by using either the BACnet or the N2 field bus networking protocol. The operation of the PCX is not affected by the selection of the BACnet or the N2 protocol in the host controller.

PCXs can serve in one of two capacities, depending on where they are installed in the control system. When installed on the Sensor Actuator (SA) Bus of equipment controllers, the PCXs expand the I/O interfaces of the controllers. When installed on the Field Controller (FC) Bus, 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 PC controllers on the FC Bus using peer-to-peer connectivity.

A full range of equipment controllers combined with the PCX models can be applied to a wide variety of building applications ranging from simple fan coil or heat pump control to advanced central plant management.

Features

In addition to the features and benefits listed in Features and benefits, PCXs provide the ability to reside on the FC Bus or SA Bus to provide application flexibility.

PCX series point type counts per model

Table 5: PCX series point type counts per model

Point types	Signals accepted	PCX 1711	PCX 2711	PCX 2721	PCX 2723	PCX 3711	PCX 3721	PCX 3723	PCX 3731	PCX 3733	PCX 4711
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		2	8	8	4					6
Binary Input (BI)	Dry Contact Maintained Mode Pulse Counter/Accumulator Mode (High Speed), 100 Hz	4					16	16	8	8	2
Analog Output (AO)	Analog Output, Voltage Mode, 0–10 VDC Analog Output, Current Mode, 4–20 mA			2	2						2
Binary Output (BO)	24 VAC Triac								8	8	3
Universal Output (UO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC/DC FET Analog Output, Current Mode, 4–20 mA		2			4					

Table 5: PCX series point type counts per model

Point types	Signals accepted	PCX 1711	PCX 2711	PCX 2721	PCX 2723	PCX 3711	PCX 3721	PCX 3723	PCX 3731	PCX 3733	PCX 4711
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC 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

The 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.

Mobile Access Portal (MAP) Gateway

The MAP Gateway is a pocket-sized web server that provides a wireless mobile user interface to SMART Equipment and Johnson Controls branded system controllers and thermostats. Small, lightweight, and easy to use, the MAP Gateway joins the rapidly expanding list of Johnson Controls products that leverage the power of mobility and smart devices to improve daily operations.

The MAP Gateway can be used to access field bus devices on Facility Explorer systems and SMART Equipment rooftop units (RTUs) with unit control boards (UCBs). The MAP Gateway supports Johnson Controls branded Field Controllers, including PCA, PCG, and PCV Series devices. It also supports the TEC3000 Series Thermostats. Offering many-to-one, multi-client connectivity, the MAP Gateway provides access to any SMART Equipment device that is on a connected BACnet MS/TP field bus. The MAP Gateway solution is conveniently sized and has a built-in wireless access point. The MAP Gateway provides an intuitive, browser-based user interface to access advanced features like alarms and point configuration.

The MAP Gateway at Release 4.2 can be used to commission BACnet/IP field controllers when directly connected to them using their SA bus sensor port or through a thermostat connected on the same port.

For more information on the MAP Gateway, refer to the *Mobile Access Portal Gateway Product Bulletin (LIT-12011884)*.

Figure 6: Mobile Access Portal



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 the 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 that resides 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 devices:

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

Figure 7: Handheld VAV Box Balancing Tool



Features

The Handheld VAV Box Balancing Tool provides the following features:

- 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.

Note: All of the balancing features are built in to MAP at release 5.0.

Network Sensors

The NS Series Network Sensor offering includes NS Series Network Zone Sensors and NS Series Network Discharge Air Sensors, see Figure 8.

Figure 8: Network Zone Sensors and Discharge Air Sensors



The NS Series Network Zone Sensors are designed to function directly with the controllers. Several models of network zone sensors monitor room temperature. Options are available to also monitor zone humidity, carbon dioxide (CO_2), occupancy local temperature setpoint adjustments, and other variables. This data is transmitted to a 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 pushbutton is included to set the 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 controllers. Models in this series monitor the duct temperature, typically at the discharge of the VAV box, and transmit this data to a 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 mm or 203 mm (4 in. 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-PC18 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.

For important product application information, ordering information, and technical specifications, refer to the *NS Series Network Sensors Product Bulletin (LIT-12011574)* and *Vertical Wallbox-Mounted or Surface-Mounted NS Series Network Sensors Product Bulletin (LIT-12013113)*.

Ordering information

PCA series ordering information

Table 6: PCA series ordering information

Product code number	Description
CH-PCA2513-0	16-Point Advanced Application Programmable Controller with 4 UI, 6 BI, 2 AO, 2 BO, and 2 CO; 24 VAC; FC and SA Bus Support; Integral Real-time Clock
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-PCA3613-0	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-PCA4911-0	28-Point Advanced Application Programmable Controller with 10 UI, 6 BI, 4 BO, 4 AO, and 4 CO; 24 VAC; SA Sensor Port; Integral Real-time Clock; 2 Ethernet Ports for BACnet/SC or BACnet/IP Communications

PCG series ordering information

Table 7: 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°C to 70°C (-40°F to 158°F)
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 Pushbutton 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°C to 70°C (-40°F to 158°F)
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 Pushbutton User Interface

PCV series ordering information

Table 8: PCV series ordering information

Product code number	Description
FX-PCV1626-1	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus (No DPT)
FX-PCV1628-1	32-bit, Integrated VAV Controller and DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus (No Actuator)
FX-PCV1656-1	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

Table 8: PCV series ordering information

Product code number	Description
FX-PCV1826-1	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus; Includes cable adapters for use when replacing VMA14xx Series controllers. Recommended replacement for VMA1440 controller (No DPT)
FX-PCV1832-1	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI and 2 BO; 24 VAC; FC Bus, and SA Bus includes cable adapters for use when replacing VMA14xx Series controllers. Recommended replacement for VMA1410, VMA1415, or VMA1420 controller

PCX series ordering 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
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

Table 10: PCX series ordering information

Product code number	Description
CH-PCX2723-0	10-Point Expansion I/O Module with 8 UI, 2 AO, FC, and SA Bus Support
CH-PCX3723-0	16-Point Expansion I/O Module with 16 BI, FC, and SA Bus Support
CH-PCX3733-0	16-Point Expansion I/O Module with 8 BI, 8 BO, FC, and SA Bus Support ⓘ **Note:** BOs on the CH-PCX3733-0 controller do not supply power for the outputs; the BOs require external low-voltage (<30 VAC) power sources.

Accessories ordering information

Table 11: Accessories

Product code number	Description
PCX Series Expansion Modules	Refer to the *FX-PC Series Programmable Controllers and Related Products Product Bulletin (LIT-12011657)* for a complete list of available PCX series expansion modules.
TL-CCT-0	Controller Configuration Tool (CCT) software.
FX-FCP-0	License enabling Facility Explorer Equipment Controller Firmware Package Files required for the Controller Configuration Tool (CCT).
Mobile Access Portal (MAP) Gateway	Refer to the *Mobile Access Portal Gateway Catalog Page (LIT-1900869)* to identify the appropriate product for your region.
NS Series Network Sensors	Refer to the *NS Series Network Sensors Product Bulletin (LIT-12011574)* for specific sensor model descriptions.
TL-BRTRP-0	Portable BACnet/IP to MS/TP Router
WRZ Series Wireless Room Sensors	Refer to the *WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653)* for specific sensor model descriptions.

Table 11: Accessories

Product code number	Description
F4-DLK0350-0	Local Controller Display, 3.5 in. (89 mm) color display with navigation keypad. For more information, refer to the *F4-DLK0350 Product Bulletin (LIT-12014010)*.
FX-DIS1710-0	Local Controller Display, 3.0 in. (76 mm) monochrome display with navigation keypad. For more information, refer to the *Local Controller Display Product Bulletin (LIT-12011273)*.
WRZ-7860-0	Receiver for One-to-One Wireless Room Sensing Systems - functions with WRZ Series Sensors room sensors. Refer to the *WRZ-7860 Receiver for One-to-One Wireless Room Sensing Product Bulletin (LIT-12011640)* for a list of available products.
WRZ-SST-120	Wireless System Survey Tool (for use with the lower power 10mW WRZ and WRZ-7860 systems). Refer to the *WRZ-SST-120 Wireless Sensing System Tool Installation Instructions (LIT-24-10563-55)* for usage instructions.
ZFR-HPSST-0	Wireless System Survey Tool. For use with the higher power WRG1830/ZFR183x System and lower power WRZ Sensors (10mW). Refer to the *ZFR-HPSST-0 Wireless Sensing System Tool Installation Guide (LIT-24-11461-00012)* for usage instructions.
ZFR-USBHA-0	ZFR USB Dongle provides a wireless connection through CCT to allow wireless commissioning of the wirelessly enabled equipment controllers. It also allows use of the ZFR Checkout Tool (ZCT) in CCT. ⓘ **Note:** The ZFR-USBHA-0 is not compatible with the WRG1830/ZFR183x Pro Series. ⓘ **Note:** The ZFR-USBHA-0 replaces the IA OEM DAUBI_2400 ZFR USB dongle. For additional information about the ZFR-USBHA-0 ZFR dongle, refer to the *ZCT Checkout Tool Help (LIT-12012292)* or the *WNC1800_ZFR182x Pro Series Wireless Field Bus System Technical Bulletin (LIT-12012356)*.
WRG1830/ZFR183x Pro Wireless Field Bus System	For more information on products needed for wireless field bus installations and for a list of available products, refer to the *WRG1830/ZFR183x Pro Series Wireless Field Bus System Catalog Page (LIT-1901153)*.
Y64T15-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 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 VMA Output Point Spade Lug
AB-TBK1003-0	2-Position Screw Terminal that Plugs onto VMA Output Point Spade Lug
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 (Bulk Pack of 10)
AP-TBK3PW-0	Replacement Power Terminal, 3-Position Connector, Gray (Bulk Pack of 10)
AS-CBLTSTAT-0	2-Position Screw Terminal that Plugs onto PCV Output Point Spade Lug
AS-CBLVMA-1	Cable Adapter, 8-Pin Female Socket to 6-Pin Male Jack (Bulk Pack of 10)
F-1000-325	Replacement Barbed Fitting for use on PCV1832 for Connecting Tubing (Bulk Pack of 10)
F-1000-326	Flexible Tubing Extension with Barbed Fitting for PCV1832, 14 in. Length (Bulk Pack of 20). Use to extend tubing that connects between the DPT connectors and the DPT sensors, including when replacing a VMA1400 series controller with a PCV18xx controller.

Technical Specifications

PCA series technical specification

Table 12: PCA series technical specifications

Technical specification	Description
Product code numbers	• **CH-PCA2513-0:** 16-Point PCA with Integral Real-Time Clock and 24 VAC Supply Power • **FX-PCA2611-0:** 17-Point PCA with Integral Real-Time Clock and 24 VAC Supply Power • **FX-PCA2612-1:** 18-Point PCA with Integral Real-Time Clock and 24 VAC Supply Power • **FX-PCA2612-2:** 18-Point PCA with Integral Real-Time Clock and 100–240 VAC Supply Power • **FX-PCA3613-0:** 26-Point PCA with Integral Real-Time Clock and 24 VAC Supply Power with Fast Persistence • **FX-PCA4911-0:** 28-Point PCA with Integral Real-Time Clock and 24 VAC Supply Power
Communications protocol	**PCA2513-0, PCA2611-0, PCA2612-1, PCA2612-2, and PCA3613-0:** BACnet MS/TP, N2 **PCA4911-0:** BACnet/SC or BACnet/IP
Power requirement	**PCA2513-0, PCA2611-0, PCA2612-1, PCA3613-0, and PCA4911-0** : 24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Power Supply Class 2 (North America), Safety Extra Low Voltage (SELV) (Europe) **PCA2612-2:** 100–240 VAC 50/60 Hz
Power consumption	**PCA2513-0, PCA2611-0, PCA3613-0, and PCA4911-0:** 14 VA maximum **PCA2612-1:** 30 VA maximum **PCA2612-2:** 40 VA maximum ⓘ **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).
Ambient conditions	**Operating:** 0°C to 50°C (32°F to 122°F), 10% to 90% RH noncondensing, Pollution Degree 2 **Storage:** -40°C to 80°C (-40°F to 176°F), 5% to 95% RH noncondensing
Device addressing for BACnet MS/TP	DIP switch set; valid field controller device addresses 4–127 (device addresses 0–3 and 128–255 are reserved and not valid controller addresses)
Device addressing for N2	DIP switch set, valid controller device addresses 1–254
Controller number for Ethernet controller	3 rotary switches to assign a unique number for each controller to physically identify the controller and relate it to the building drawings; valid controller numbers 0-999
Communications bus	**RS-485, field selectable between BACnet MS/TP and N2 communications:** 3-wire FC Bus between the supervisory controller and FX-PC controllers 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. **FX-PCA4911-0:** BACnet/SC or BACnet/IP over Ethernet cable 4-wire SA Bus between field controller, network sensors, and other sensor/actuator devices, includes a lead-to source 15 VDC supply power (from field controller) to bus devices.
Processor	**PCA2611-0, PCA2612-1, PCA2612-2**: H8SX/166xR Renesas® microcontroller **PCA2513-0, PCA3613-0:** RX631 32-Bit Renesas microcontroller **PCA4911-0:** RX63N 32-Bit Renesas microcontroller
Memory	**PCA2611-0, PCA2612-1, and PCA2612-2:** 4 MB Flash Memory and 1 MB RAM **PCA2513-0, PCA3613-0, and PCA4911-0:** 16 MB Flash Memory and 8 MB RAM
Real-time clock backup power supply	Supercapacitor maintains power to the onboard real-time clock for a minimum of 72 hours when supply power to the controller is disconnected.

Table 12: PCA series technical specifications

Technical specification	Description
Input and Output capabilities	**PCA2513-0** 4 - Universal Inputs: Defined as 0–10 VDC, 0–600k ohm, or Binary Dry Contact. 6 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode. 2 - Binary Outputs: Does not have internal 24 VAC source, external power is required. 2 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO. 2 - Analog Outputs: Defined as 0–10 VDC **PCA2612-1 and PCA2612-2:** 5 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact. 4 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode. 4 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO. 2 - 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. 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 **PCA3613-0:** 8 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0-600k ohms, or Binary Dry Contact. 6 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode. 6 - Binary Outputs: Defined as 24 VAC Triac (external power source only). 6 - Analog Outputs: Defined as 0–10 VDC or 4–20 mA **PCA4911-0** 10 - Universal Inputs: Defined as 0–10 VDC, 0–600k ohm, or Binary Dry Contact. 6 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode. 4 - Binary Outputs: Does not have internal 24 VAC source, external power is required. 4 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO. 4 - Analog Outputs: Defined as 0–10 VDC
Analog Input/Analog Output resolution and accuracy	**Analog Input:** 15-bit resolution **Analog Output:** 15-bit resolution, +/- 200 mV accuracy in 0-10 VDC applications
Terminations	**PCA2513:** Input/Output: Fixed Screw Terminal Blocks SA Bus and Supply Power: 3-wire and 4-wire Pluggable Screw Terminal Blocks SA Bus Port: RJ-12 6-pin Modular Jacks **PCA2611 and PCA3613-0:** 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 Port: RJ-12 6-pin Modular Jacks **PCA2612-1 and PCA2612-2:** Input/Output: Pluggable Screw Terminal Blocks FC Bus, SA Bus and Supply Power: 3-wire and 4-wire Pluggable Screw Terminal Blocks FC Bus and SA Bus Port: RJ-12 6-pin Modular Jacks **PCA4911-0:** Input/Output: Fixed Screw Terminal Blocks SA Bus and Supply Power: 3-wire and 4-wire Pluggable Screw Terminal Blocks SA Bus 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) (except the FX-PCA2612 controller)

Table 12: PCA series technical specifications

Technical specification	Description
Dimensions (height x width x depth)	**PCA2513-0:** 150 mm x 164 mm x 48 mm (5-7/8 in. x 6-7/16 in. x 1-7/8 in.) including terminals and mounting clips **PCA2611-0:** 150 mm x 190 mm x 53 mm (5-7/8 in. x 7-1/2 in. x 2-1/8 in.) including terminals and mounting clips **PCA2612 Models:** 150 mm x 164 mm x 53 mm (5-7/8 in. x 6-7/16 in. x 2-1/8 in.) including terminals and mounting clips **PCA3613-0 and FX-PCA4911-0:** 150 mm x 220 mm x 57.5 mm (5-7/8 in. x 8-3/4 in. x 2-1/4 in.) including terminals and mounting clips ⓘ **Note:** Mounting space requires an additional 50 mm (2 in.) space on top, bottom, and front face of controller for easy cover removal, ventilation, and wire terminations.
Weight	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
CE	**Europe:** CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and RoHS Directive. Johnson Controls, declares that the PCA2612-2 models are also in compliance with the essential requirements and other relevant provisions of the Low Voltage Directive. 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:** RCM Mark, Australia/NZ Emissions Compliant
	BACnet International: **PCA26xx Models** - BACnet Testing Laboratories (BTL) Protocol Revision 7 Listed BACnet Advanced Application Controller (B-AAC) **CH-PCA2513 and FX-PCA3613-0, and FX-PCA4911-0:** BACnet® Testing Laboratories (BTL) Protocol Revision 18 Listed and Certified BACnet Advanced Application Controller (B-AAC)
UK CA	**United Kingdom:** Johnson Controls declares that this product is in compliance with Electromagnetic Compatibility Regulations, The Electrical Equipment (Safety) Regulations, and Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations.

PCG series technical specifications

Table 13: FX-PCG series technical specifications

Technical specification	Description
Product code numbers	**FX-PCG1611-1** – 10-Point General Purpose Programmable Controller **FX-PCG1621-1** – 10-Point General Purpose Programmable Controller with Integral Display and Pushbutton User Interface **FX-PCG2611-0** – 17-Point General Purpose Programmable Controller **FX-PCG2621-0** – 17-Point General Purpose Programmable Controller with Integral Display and Pushbutton User Interface
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 13: FX-PCG series technical specifications

Technical specification	Description
Power consumption	14 VA maximum for FX-PCG1611, FX-PCG2611 (no integral display) 20 VA maximum for FX-PCG1621 and FX-PCG2621 (with integral display) ⓘ **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).
Ambient conditions	**Operating:** 0°C to 50°C (32°F to 122°F); 10% to 90% RH noncondensing **Storage:** -40°C to 80°C (-40°F to 176°F); 5% to 95% RH noncondensing ⓘ **Note:** FX-PCG models with an -0ET suffix have an operating temperature range of -40°C to 70°C (-40°F to 158°F).
Controller addressing	**BACnet/MS/TP Controller** DIP switch set; valid controller device addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid controller addresses.) **N2** DIP switch set; valid controller device addresses 1–255
Communications bus	**RS-485, software selectable between BACnet MS/TP or N2:** 3-wire FC Bus between the supervisory controller and FX-PC controllers 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 ⓘ **Note:** For more information, refer to the *FX-PC Series Controllers MS/TP Communications Bus Technical Bulletin (LIT-12011670).*
Processor	RX631 Renesas® 32-bit microcontroller
Memory	**FX-PCG16 and FX-PCG26:** 1 MB Flash Memory and 512 KB RAM
Input and Output capabilities	**FX-PCG16: Models:** 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 **FX-PCG26 Models:** 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
Analog Input/Analog Output resolution and accuracy	**FX-PCG16 and FX-PCG26:** Analog Input: 16-bit resolution Analog Output: 16-bit resolution and ±200 mV in 0–10 VDC applications
Terminations	**FX-PCG16 and FX-PCG26:** 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	**FX-PCG16 and FX-PCG26:** ABS and polycarbonate UL94 5VB; self-extinguishing; Plenum-rated protection class: IP20 (IEC529)
Dimensions (Height x Width x Depth)	**FX-PCG16 Models:** 150 mm x 164 mm x 53 mm (5-7/8 in. x 6-7/16 in. x 2-1/8 in.) including terminals and mounting clips **FX-PCG26 Models:** 150 mm x 190 mm x 53 mm (5-7/8 in. x 7-1/2 in. 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.

Table 13: FX-PCG series technical specifications

Technical specification	Description
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; FCC Compliant to CFR47, Part 15, Subpart B, Class A
	Canada: UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003
CE	**Europe:** CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	**Australia and New Zealand:** RCM Mark, Australia/NZ Emissions Compliant
	FX-PCG16 and FX-PCG26: BACnet Testing Laboratories (BTL) Protocol Revision 4 Listed BACnet Application Specific Controller (B-ASC)
UK CA	**United Kingdom:** Johnson Controls declares that this product is in compliance with Electromagnetic Compatibility Regulations, The Electrical Equipment (Safety) Regulations, and Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations.

PCV series technical specifications

Table 14: PCV series technical specifications

Technical specification	Description
Product code numbers	**FX-PCV1626-1:** 32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus (No DPT) **FX-PCV1628-1:** 32-bit, Integrated VAV Controller and DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus (No Actuator) **FX-PCV1656-1:** 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) **FX-PCV1826-1:** 32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus, with 8–pin TSTAT Port, Recommended for use as a replacement for VMA1440 (No DPT) **FX-PCV1832-1:** 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
Communications protocol	BACnet MS/TP, N2, and Wireless (using add-on modules)
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	10 VA typical, 14 VA maximum ⓘ **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).
Ambient conditions	**Operating:** 0°C to 50°C (32°F to 122°F); 10% to 90% RH noncondensing **Storage:** -40°C to 80°C (-40°F to 176°F); 5% to 95% RH noncondensing
Terminations	**PCV1626, PCV1628, and PCV1656:** Inputs/Outputs: 6.3 mm (1/4 in.) Spade Lugs FC Bus, SA Bus, and Supply Power: 4-Wire and 2-Wire Pluggable Screw Terminal Blocks FC and SA Bus Modular Ports: RJ-12 6-Pin Modular Jacks **PCV1826 and PCV1832:** Inputs/Outputs, SA Bus, and Supply Power: 6.3 mm (1/4 in.) Spade Lugs N2/FC Bus Pluggable Screw Terminal Block TSTAT Modular Port: RJ-45 8-Pin Modular Jack
Controller addressing	**For BACnet MS/TP-configured controllers:** DIP switch set: valid field controller device addresses 4-127 (device addresses 0–3 and 128–255 are reserved) **For N2-configured controllers:** DIP switch set; valid control device addresses 1–253
Communications bus	**PCV16xx and PCV18xx models:** RS-485, field selectable between BACnet MS/TP and N2 communications: **N2/FC Bus**: 1.5 mm (18 AWG) standard 3-wire, twisted, shielded cable recommended between the supervisory controller and field controllers **BACnet MS/TP:** 0.6 mm (22 AWG) stranded, 4-wire (2-twisted pairs) shielded cable recommended from the PCV controller for network sensors and other sensor/actuator devices; includes a terminal to source 15 VDC supply power from PCV to SA Bus devices ⓘ **Note:** For more information, refer to the *FX-PC Series Controllers MS/TP Communications Bus Technical Bulletin (LIT-12011670).*
Processor	**PCV16 (32-bit) and PCV18 models:** RX630 32-bit Renesas® microcontroller
Memory	**PCV16 (32-bit) and PCV18 models:** 1 MB Flash Memory and 512 KB RAM
Input and output capabilities	**PCV1626-1, PCV1628-1, PCV1656-1, PCV1826-1, and PCV1832-1:** 3 - Universal Input: Defined as 0–10 VDC, 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
Analog Input/Analog Output accuracy	**Analog Input:** 15-bit resolution on UIs **Analog Output:** 0–10 VDC ± 200 mV

Table 14: PCV series technical specifications

Technical specification	Description
Differential pressure transducer	Range: -1.5 in. to 1.5 in. W.C. **Performance Characteristics:** Accuracy +/-1.3% Full Span Maximum (+/- .039 in. w.c.) **Note:** Combined error due to offset, non-linearity, and temperature variation. Typical accuracy at zero (null) pressure is +/-0.2% fullscale **Note:** Includes error due to non-linearity.
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	**(Height x Width x Depth):** 165 mm x 125 mm x 73 mm (6.5 in. x 4.92 in. x 2.9 in.) **Center of Output Hub to Center of Captive Spacer:** 135 mm (5-5/16 in.)
Weight	0.65 kg (1.45 lb)
Compliance	**United States:** UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment. Suitable for use in other environmental air space (plenums) in accordance with Section 300.22(C) of the National Electric Code (1626, 1628, 1656, 1832, 1826). FCC Compliant to CFR47, Part 15, Subpart B, Class A
	Canada: UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003
CE	**Europe:** CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and RoHS Directive.
	**Australia and New Zealand:** RCM Mark, Australia/NZ Emissions Compliant
	BACnet International: **PCV16xx and PCV18 models:** BACnet Testing Laboratories (BTL) Protocol Revision 7 Listed BACnet Application Specific Controller (B-ASC)
UK CA	**United Kingdom:** Johnson Controls declares that this product is in compliance with Electromagnetic Compatibility Regulations, The Electrical Equipment (Safety) Regulations, and Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations.

PCX series technical specifications

Table 15: FX-PCX series technical specifications

Technical specification	Description
Product code numbers	**FX-PCX1711-0** - 4-Point Expansion Input/Output Module with 4 BI, FC and SA Bus Support. **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. **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. **FX-PCX2721-0** - 10-Point Expansion Input/Output Module with 8 UI, 2 AO, FC and SA Bus Support **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. **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. **FX-PCX3721-0** - 16-Point Expansion Input/Output Module with 16 BI, FC and SA Bus Support **FX-PCX3731-0** - 16-Point Expansion Input/Output Module with 8 BI, 8 BO, FC and SA Bus Support **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
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 ⓘ **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.
Ambient conditions	**Operating:** 0°C to 50°C (32°F to 122°F); 10% to 90% RH noncondensing **Storage:** -40°C to 80°C (-40°F to 176°F); 5% to 95% RH noncondensing
BACnet MS/TP addressing	DIP switch set; valid controller device addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid FX-PCX addresses).
Communications bus	BACnet MS/TP, RS-485 3-wire FC Bus between the supervisory controllers and FX-PC controllers 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.
Processor	H8SX/166xR Renesas® 32-bit microcontroller
Memory	512 KB Flash Memory and 128 KB RAM

Table 15: FX-PCX series technical specifications

Technical specification	Description
Input and Output capabilities	**FX-PCX1711:** 4 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/ Accumulator Mode **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 **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 **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 **FX-PCX3721:** 16 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode **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.) **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
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 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
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-PCX171x-x and FX-PCX271x-x models:** 150 mm x 120 mm x 53 mm (5-7/8 in. x 4-3/4 in. x 2-1/8 in.) including terminals and mounting clips **FX-PCX2721-x, FX-PCX3721-x, and FX-PCX3731-0 models:** 150 mm x 164 mm x 53 mm (5-7/8 in. x 6-7/16 x 2-1/8 in.) including terminals and mounting clips **FX-PCX371x-x and FX-PCX471x-x models:** 150 mm x 190 mm x 53 mm (5-7/8 in. x 7-1/2 in. x 2-1/8 in.) including terminals and mounting clips ⓘ **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.

Table 15: FX-PCX series technical specifications

Technical specification	Description
Weight	0.5 kg (1.1 lb) maximum
Compliance	**United States:** UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A ⓘ **Note:** Except FX-PCX2711-2 and FX-PCX3711-2
	Canada: UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003 ⓘ **Note:** Except FX-PCX2711-2 and FX-PCX3711-2
CE	**Europe:** CE Mark –Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC. ⓘ **Note:** Except FX-PCX2711-0 and FX-PCX3711-0
	Australia and New Zealand: RCM Mark, Australia/NZ Emissions Compliant ⓘ **Note:** Except FX-PCX2711-0 and FX-PCX3711-0
	BACnet International: BACnet Testing Laboratories (BTL) Protocol Revision 4 Listed BACnet Application Specific Controller (B-ASC)
UK CA	**United Kingdom:** Johnson Controls declares that this product is in compliance with Electromagnetic Compatibility Regulations, The Electrical Equipment (Safety) Regulations, and Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations.

Table 16: PCX series technical specifications

Technical specification	Description
Product code numbers	**CH-PCX2723-0** - 10-Point Expansion Input/Output Module with 8 UI, 2 AO, FC and SA Bus Support **CH-PCX3723-0** - 16-Point Expansion Input/Output Module with 16 BI, FC and SA Bus Support **CH-PCX3733-0** - 16-Point Expansion Input/Output Module with 8 BI, 8 BO, FC and SA Bus Support
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 ⓘ **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 CH-PCX model.
Ambient conditions	**Operating:** 0°C to 50°C (32°F to 122°F); 10% to 90% RH noncondensing **Storage:** -40°C to 80°C (-40°F to 176°F); 5% to 95% RH noncondensing
BACnet/MS/TP Addressing	DIP switch set; valid controller device addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid CH-PCX addresses).
Communications bus	BACnet MS/TP, RS-485 3-wire FC Bus between the supervisory controllers and CH-PC controllers 4-wire SA Bus between CH-PC controller, NS Series Network Sensors, and other sensor/actuator devices. Includes a lead source 15 VDC supply power (from CH-PC controller) to bus devices.
Processor	RX631 Renesas 32-bit microcontroller
Memory	4 MB External Serial Flash Memory
Input and Output capabilities	**CH-PCX2723:** 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
	CH-PCX3723: 16 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode
	CH-PCX3733: 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)

Table 16: PCX series technical specifications

Technical specification	Description
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 ⓘ **Note:** There are no labels on I/O terminal blocks. The labels are above/below the terminal blocks on the PCX packaging. 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
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)	150 mm x 164 mm x 53 mm (5-7/8 in. x 6-7/16 in. x 2-1/8 in.) including terminals and mounting clips ⓘ **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.
Weight	0.5 kg (1.1 lb) maximum
Compliance	**United States:** UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A
	Canada: UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003
CE	**Europe:** CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	**Australia and New Zealand:** RCM Mark, Australia/NZ Emissions Compliant
	BACnet International: BACnet Testing Laboratories Protocol Revision 18 Listed and Certified BACnet Smart Actuator (B-SA)
UK CA	**United Kingdom:** Johnson Controls declares that this product is in compliance with Electromagnetic Compatibility Regulations, The Electrical Equipment (Safety) Regulations, and Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations.

Handheld VAV Balancing Tool technical specifications

Table 17: Handheld VAV Balancing Tool

	Description
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°C to 50°C (32°F to 122°F); 5% to 95% RH, Noncondensing; 30°C (86°F) Maximum Dew Point **Storage:** -40°C to 85°C (-40°F to 185°F); 5% to 95% RH, Noncondensing
Dimensions	80 mm x 80 mm x 25 mm (3.2 in. x 3.2 in. x 1.0 in.)
Weight	0.165 kg (0.365 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

Table 17: Handheld VAV Balancing Tool

	Description
	Canada: UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada, ICES-003
CE	**Europe:** CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	**Australia and New Zealand:** RCM Mark, Australia/NZ Emissions Compliant
	BACnet International: BACnet Testing Laboratories (BTL) Listed BACnet Smart Sensor (B-SS)
UK CA	**United Kingdom:** Johnson Controls declares that this product is in compliance with Electromagnetic Compatibility Regulations, The Electrical Equipment (Safety) Regulations, and Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations.

North American Emissions Compliance 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.

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.

Product warranty

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

Single point of contact

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

Contact information

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

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