FX-PCV Programmable VAV Box Controllers Catalog Page

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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 (CO_2) 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-PCV assembly of the VG-1000 Series Smart Valve product. The smart valve product line is ideal for chilled beam applications.

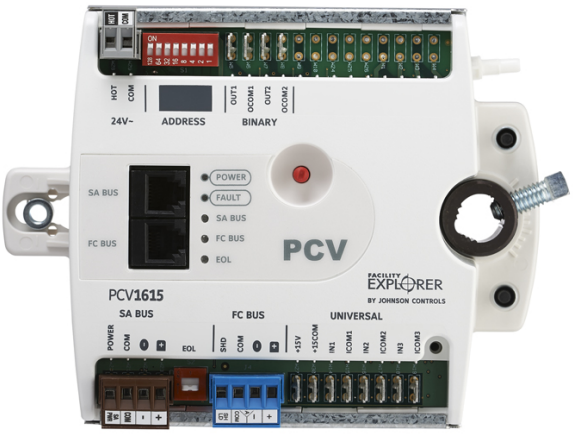
The FX-PCV1628 includes a DPT but does not have an actuator. Without an actuator, this controller is well suited for controlling large VAV boxes that require more than 4 N•m of torque.

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.

Refer to the *FX-PC Series Programmable Controllers and Related Products Product Bulletin (LIT-12011657)* or *FX-PC Series Programmable Controllers and Related Products for Building Control Management (BCM) System Product Bulletin (LIT-12011915)* for product application details.

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

Figure 1: FX-PCV1615 Controller



Features

- 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.
- 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.
- 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.

- 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.
- 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.

Table 1: 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 [2]	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, 0–10 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	3	3	3	3
Binary Output (BO)	24 VAC Triac	2	3	3	3	2	3	
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC 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 2: 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.

Table 3: 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.

Accessories

Table 4: 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 Mesh 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.
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

Table 4: FX-PC Family Accessories (Order Separately)

Product Code Number	Description
FX-WRZ Series Wireless Sensors	FX-WRZ Series Wireless Sensors: Refer to the *FX-WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011687)* for specific sensor model descriptions.
NS Series Sensors	NS Series Network Sensors: Refer to the *NS Series Network Sensors Product Bulletin (LIT-12011574)* 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	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. **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 *FX-ZFR Series Wireless Field Bus System Technical Bulletin (LIT-12011660)* or *FX-ZFR Series Wireless Field Bus System Quick Reference Guide (LIT-12011696)*.

FX-PCV Series Technical Specifications

Table 5: FX-PCV Series Technical Specifications

Product Code Numbers	**FX-PCV1615-0:** 32-bit, Integrated VAV Controller/Actuator/Pressure Sensor, 3 UI and 2 BO; 24 VAC; FC and SA Bus **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) **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, 2 CO; 24 VAC; FC and SA Bus **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) **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) **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) **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
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 to 50°C (32 to 122°F) **Storage:** -40 to 70°C (-40 to 158°F)
Terminations	**FX-PCV1615 and FX-PCV1630:** 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 **FX-PCV1617 and FX-PCV1632:** Inputs/Outputs, SA Bus, and Supply Power: 6.3 mm (1/4 in.) Spade Lugs FC Bus Pluggable Screw Terminal Block TSTAT Modular Port: RJ-45 8-Pin Modular Jack **FX-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	**BACnet/MSTP** 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 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.
Communication Bus for FX-PCV1832	**N2 Open Protocol:** 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 Protocol:** 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

Table 5: FX-PCV Series Technical Specifications

Processor	RX630 32-bit Renesas microcontroller
Memory	1 MB Flash Memory and 512 KB RAM
Analog Input/Analog Output Accuracy	**Analog Input:** 15-bit resolution on UIs **Analog Output:** 0–10 VDC ± 200 mV
Air Pressure Differential Sensor	Range: -1.5 in. to 1.5 in. W.C. **Performance Characteristics:** Accuracy: ±0.75% Full Span Maximum (±0.0225 in. W.C.) Typical accuracy at zero (null) pressure is ±0.003 in. W.C.
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 x 125 x 73 mm (6.5 x 4.92 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; 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.
	Australia and New Zealand: C-Tick Compliant (N1813), Australia/NZ Emissions Compliant.
	BACnet International: BACnet Testing Laboratories (BTL) Protocol Revision 7 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)*.
2 Combined error due to calibration, accuracy, non-linearity, and temperature variation.
3 Includes error due to non-linearity

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