

Programmable Controllers



Applications:

- Variable air volume boxes
- Fan coil units
- Unit ventilators
- Heat pumps
- Packaged rooftop units
- Air handling units
- Chillers
- Boilers
- Central plants

The FX-PC Series Programmable Controller family provides you with a comprehensive controls solution for a wide variety of HVAC applications. These controllers are designed to provide direct, closed loop control over mechanical and electrical HVAC equipment, either as standalone devices or as part of a larger, networked control system. You benefit from a rich set of embedded features, and you can obtain additional functionality simply by adding accessories. You can program and commission them with a powerful and flexible tool that enables you to quickly build and deploy a quality control solution ideal for your individual application.

Modular, Flexible Hardware Design

The FX-PC Series Programmable Controller family features a modular hardware design that allows you to create customized control solutions by selecting the main controllers and accessories best suited for the target application. This modularity keeps initial installation costs low, while also providing the flexibility needed to cover a wide range of equipment control applications.

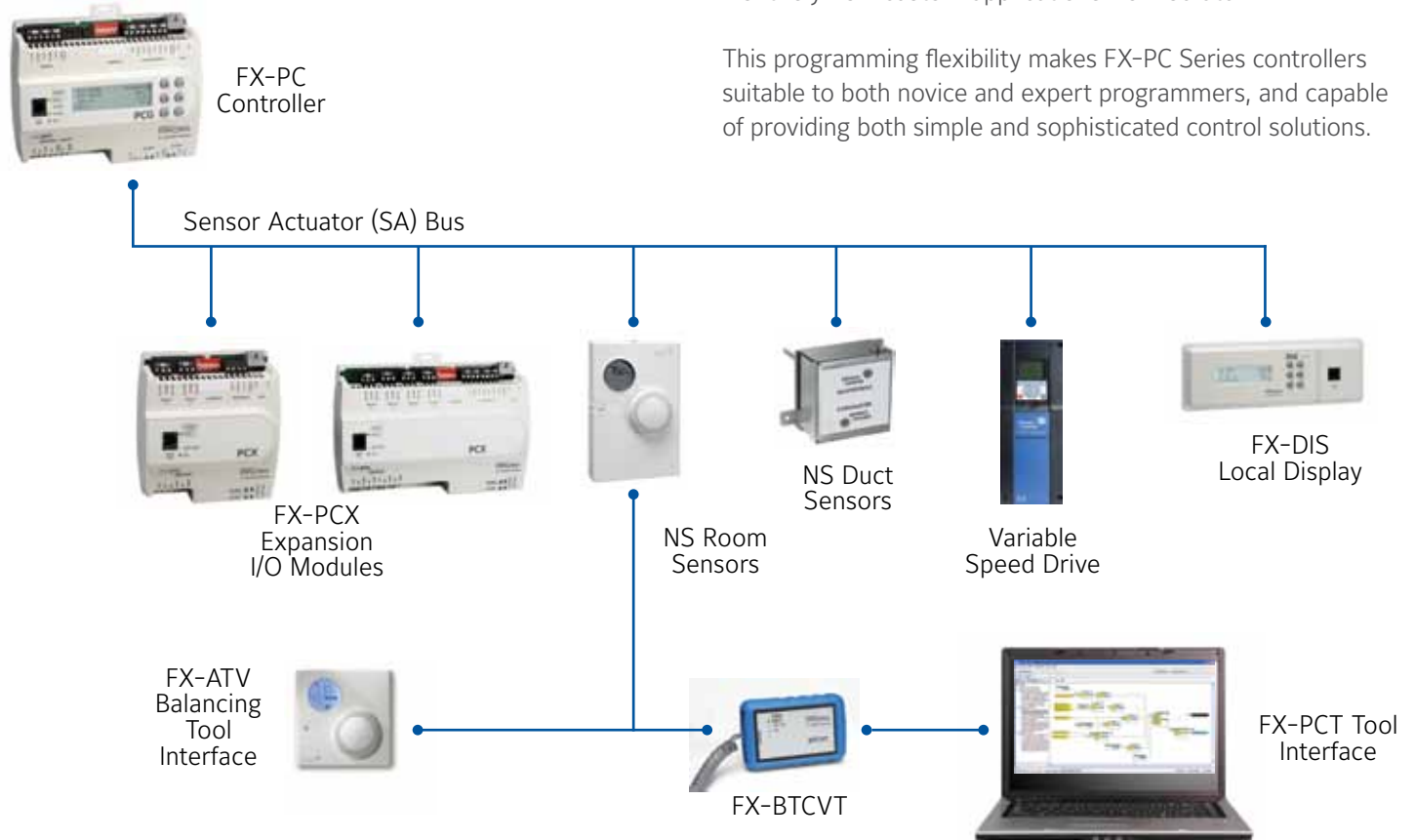
The FX-PC Series Programmable Controller family consists of three types of main controllers, each offering the embedded functionality and flexibility needed to monitor and control a variety of mechanical and electrical HVAC equipment. In addition, the FX-PC family includes a wide assortment of modular, interoperable accessories that can be added to the Sensor Actuator (SA) bus of the main controllers to further expand their capabilities.

Fully Programmable or Configurable

Several methods are available to define the control logic and operation for the FX-PC controllers. The FX-PCT Programming & Commissioning Tool includes the following programming capabilities:

- **System Selection Wizard:** The System Selection Wizard interfaces with a full library of applications (ranging from terminal units to central plants) with built-in configuration options. These applications are designed and tested by Johnson Controls and proven through years of field use. The System Selection Wizard provides a check-the-box interface to guide you through the configuration process.
- **Side Loop Wizard:** The Side Loop Wizard provides an easy-to-use, check-the-box mechanism to add additional, supplemental control logic to the application created by the System Selection Wizard.
- **Graphical Logic Editor:** After the application code has been created by the System Selection Wizard, you can view and even modify the actual control logic and data flow connections using FX-PCT's graphical logic editor. The graphical logic editor can also be used to create entirely new custom applications from scratch.

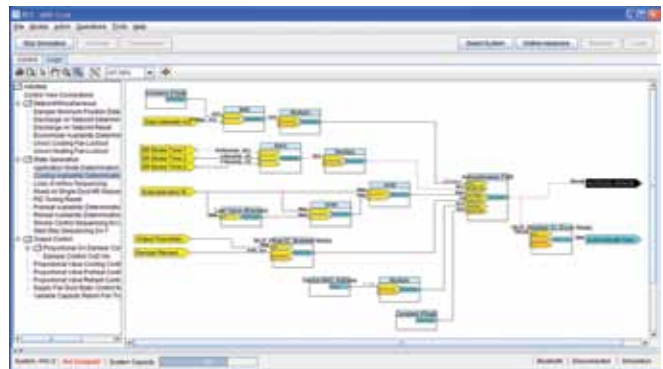
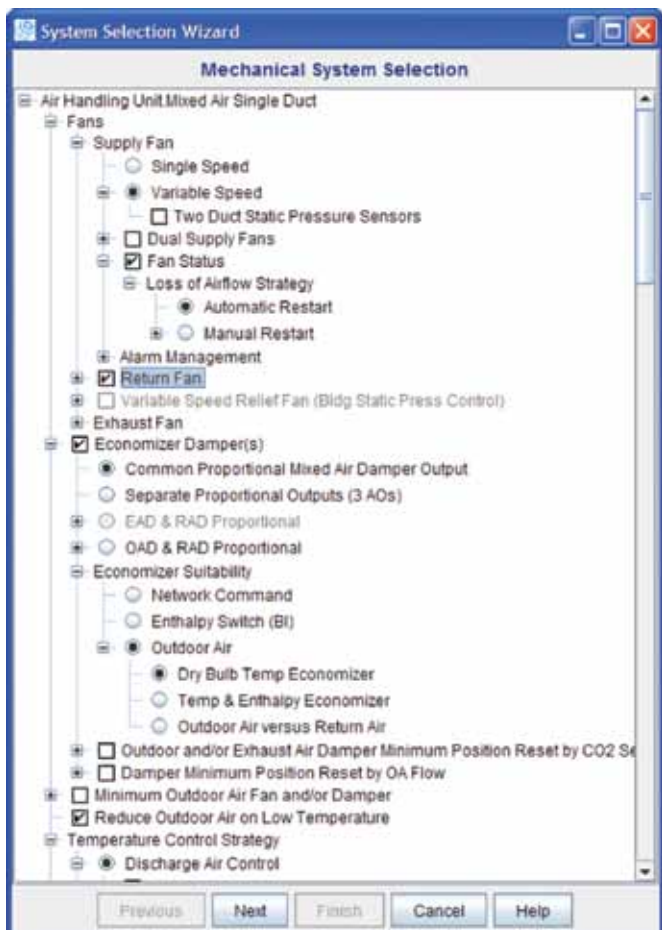
This programming flexibility makes FX-PC Series controllers suitable to both novice and expert programmers, and capable of providing both simple and sophisticated control solutions.





Powerful Tool Ensures Quality

As described previously, the FX-PCT tool's Programming Mode includes multiple options for creating or modifying application control logic. The FX-PCT tool also includes a Simulation Mode which enables you to verify the control logic before loading into a controller, and a Commissioning Mode, which enables you to check out the control logic and controller operation in a live environment.



FX-PCT also includes additional utilities and features that help with the commissioning activities, including:

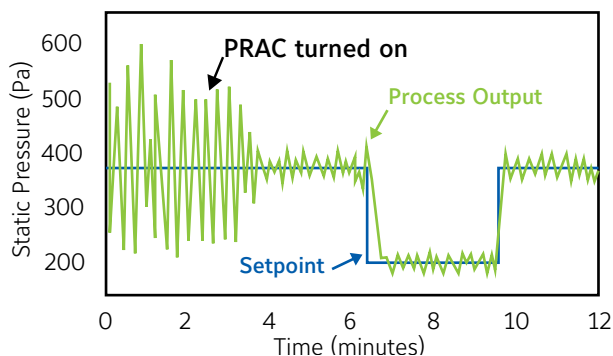
- **VAV Box Flow Test:** This utility verifies the mechanical installation quality of multiple VAV boxes at once by exercising the boxes through a series of open/close steps, taking flow measurements at each step, analyzing the data, and identifying potential issues. This Box Flow Test can identify issues such as a stuck damper, a loose coupling, or a reversed actuator.
- **Trunk Utilities:** These utilities allow you to upload, download, and upgrade multiple devices on the same trunk at once, as well as mass-edit attributes of multiple devices on the same trunk. Trunk Utilities provide huge time-savings opportunities for field technicians, especially on projects with a large number of devices.

These features assist and confirm that FX-PC controllers are programmed correctly and operate the equipment as expected, ensuring a high quality installation.



Continuous Adaptive Control

FX-PC controllers utilize Continuous Adaptive Control, which monitors and adjusts PID loop tuning parameters based on present and past conditions. With Continuous Adaptive Control, FX-PC Controllers can expertly accommodate unmeasured loads or process disturbances and automatically adjust to seasonal and setpoint changes.



In addition, Continuous Adaptive Control:

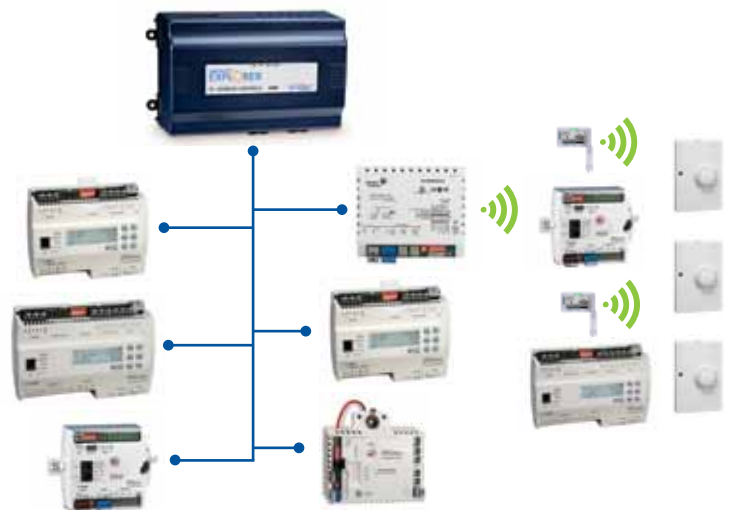
- Improves stability, dynamic response, and accuracy of control loops, resulting in better comfort and energy savings.
- Greatly reduces manual tuning or initialization, resulting in more efficient project startups.
- Avoids actuator hunting, cycling and reversals, extending their life.

Standalone or Networked, Wired or Wireless

FX-PCA Advanced Application Programmable Controllers feature onboard real-time clocks supporting time-based control functionality such as scheduling, alarming, and trending. These features make FX-PCA controllers ideal for standalone applications, without any supervisory controller.

FX-PC controllers are also designed for networked applications, featuring embedded, BACnet® MS/TP networking capability. BTL-listing independently ensures interoperability with the BACnet standard. So FX-PC controllers share data and services with each other, with third-party BACnet devices, and with an FX Supervisory Controller, resulting in tightly coordinated, building-wide control.

For buildings where installing the wiring needed for BACnet MS/TP networking is too invasive, the FX-PC family includes optional modules which can be added to FX-PC controllers to enable wireless mesh networking and sensing capabilities.







FX-PCV Programmable VAV Box Controllers

FX-PCV Programmable VAV Box Controllers are optimized for controlling Variable Air Volume boxes. An FX-PCV controller is a fully integrated assembly consisting of:

- Digital controller with 32-bit microprocessor
- 4 Nm non-spring return actuator
- Digital pressure transducer

Housing all three key components into a single, small, integrated assembly keeps mounting and wiring costs to a minimum. FX-PCVs also include features to ensure installation quality, including color-coded wiring terminals to prevent field miswiring and automatic high/low pressure polarity detection to eliminate field pressure misconnection.







Model	Inputs/Outputs	Other Features
FX-PCV1615-0 	<ul style="list-style-type: none"> • 3 universal inputs • 2 binary outputs 	<ul style="list-style-type: none"> • 24 VAC • Integrated 4 Nm non-spring return actuator • Integrated digital pressure sensor • BACnet MS/TP networking • BTL Listed as Application Specific Controller (B-ASC)
FX-PCV1630-0 	<ul style="list-style-type: none"> • 3 universal inputs • 3 binary outputs • 3 configurable outputs 	<ul style="list-style-type: none"> • Compatible with FX-DIS Local Controller Display/Keypad • Compatible with NS Network Sensors • Compatible with FX-PCX Expansion I/O Modules • Compatible with Wireless Field Bus Networking • Compatible with One-to-One Wireless Sensing System

FX-PCG General Purpose Programmable Controllers

While the FX-PCV controllers are optimized for specifically controlling VAV boxes, the FX-PCG controllers are designed for more general purpose applications. FX-PCGs are housed in plastic enclosures with DIN-rail mounting clips with integral holes, making them well-suited for mounting inside control panels or on a flat surface.



Model	Inputs/Outputs	Onboard Display/Keypad	Other Features
FX-PCG1611-0 	<ul style="list-style-type: none"> • 2 universal inputs • 1 binary input • 3 binary outputs • 4 configurable outputs 	No	<ul style="list-style-type: none"> • 24 VAC • BACnet MS/TP networking
FX-PCG1621-0 	<ul style="list-style-type: none"> • 2 universal inputs • 1 binary input • 3 binary outputs • 4 configurable outputs 	Yes	<ul style="list-style-type: none"> • BTL Listed as Application Specific Controller (B-ASC) • Compatible with FX-DIS Local Controller Display/Keypad • Compatible with NS Network Sensors
FX-PCG2611-0 	<ul style="list-style-type: none"> • 6 universal inputs • 2 binary inputs • 2 analog outputs • 3 binary outputs • 4 configurable outputs 	No	<ul style="list-style-type: none"> • Compatible with FX-PCX Expansion I/O Modules • Compatible with Wireless Field Bus Networking • Compatible with One-to-One Wireless Sensing System
FX-PCG2621-0 	<ul style="list-style-type: none"> • 6 universal inputs • 2 binary inputs • 2 analog outputs • 3 binary outputs • 4 configurable outputs 	Yes	<ul style="list-style-type: none"> • Extended temperature range models (with "-OET" suffix) available for operating at -40 to 70°C (-40 to 158°F).






FX-PCA Advanced Application Programmable Controllers

FX-PCA controllers are similar to the FX-PCG General Purpose Programmable Controllers; however, FX-PCA controllers provide more advanced capabilities. Each FX-PCA controller contains an embedded real-time clock to support onboard, time-based control capabilities such as scheduling, alarming, and trending. These advanced capabilities enable the FX-PCA to cover more application possibilities, including:

- Stand-alone control applications (no supervisory controller)
- Networked control applications where the scheduling, alarming, and/or trending is preferred (or specified) to be performed directly at the equipment controller

FX-PCA controllers also contain more onboard application memory than FX-PCG controllers. This additional memory stores alarms and trends or can host larger size applications requiring larger amounts of control logic.






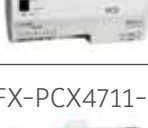



Model	Inputs/Outputs	Supply Voltage	Other Features
FX-PCA2611-0 	<ul style="list-style-type: none"> • 6 universal inputs • 2 binary inputs • 2 analog outputs • 3 binary outputs • 4 configurable outputs 	24 VAC	<ul style="list-style-type: none"> • BACnet MS/TP networking • BTL Listed as Advanced Application Controller (B-AAC)
FX-PCA2612-1 	<ul style="list-style-type: none"> • 5 universal inputs • 4 binary inputs • 5 relay outputs • 4 configurable outputs 	24 VAC	<ul style="list-style-type: none"> • Compatible with FX-DIS Local Controller Display/Keypad¹ • Compatible with NS Network Sensors • Compatible with FX-PCX Expansion I/O Modules
FX-PCA2612-2 	<ul style="list-style-type: none"> • 5 universal inputs • 4 binary inputs • 5 relay outputs • 4 configurable outputs 	100-250 VAC	<ul style="list-style-type: none"> • Compatible with Wireless Field Bus Networking • Compatible with One-to-One Wireless Sensing System

1. Allows access to inputs, outputs, and application parameters, but does not allow access to the schedules, calendars, trends or event logs.

FX-PCX Expansion Input/Output Modules

FX-PCX Expansion Input/Output Modules provide additional input and output interfaces to FX-PCV, FX-PCG, and FX-PCA controllers. FX-PCX modules share similar hardware design as FX-PCG and FX-PCAs, featuring consistent mounting and wiring for all controllers. Multiple models are available, with a wide selection of various input and output capabilities.

Model	Inputs / Outputs
 FX-PCX1711-0	<ul style="list-style-type: none"> • 4 binary inputs
 FX-PCX2711-0	<ul style="list-style-type: none"> • 2 universal inputs • 2 relay outputs • 2 universal outputs
 FX-PCX2721-0	<ul style="list-style-type: none"> • 8 universal inputs • 2 analog outputs
 FX-PCX3711-0	<ul style="list-style-type: none"> • 4 universal inputs • 4 relay outputs • 4 universal outputs
 FX-PCX3721-0	<ul style="list-style-type: none"> • 16 binary inputs
 FX-PCX3731-0	<ul style="list-style-type: none"> • 8 binary inputs • 8 binary outputs
 FX-PCX4711-0	<ul style="list-style-type: none"> • 6 universal inputs • 2 binary inputs • 2 analog outputs • 3 binary outputs • 4 configurable outputs

NS Series Network Sensors

NS Series Network Sensors provide network sensing capabilities to FX-PC Series main controllers. Multiple NS sensor models are available to measure:

- Temperature
- Humidity
- Carbon dioxide
- Occupancy detection

This sensor data is transmitted to the FX-PC controller over its Sensor Actuator (SA) Bus, which frees up the controller's onboard inputs for other uses.

NS Sensors are available in multiple packaging styles for various different mounting requirements. Duct mountable NS sensors feature probes to sense discharge or supply air temperatures. Wall mountable NS room sensors are housed in attractive enclosures that blend in with today's commercial building décor. These room sensors also feature optional onboard controls to allow occupants to adjust their comfort demands, and they also feature a tool port for service technicians to conveniently access FX-PC controllers.



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