



VAV Box Controllers (CV Series)

The CV series equipment controllers are designed for variable air volume (VAV) box applications. These controllers are fully programmable, but also feature a set of preloaded applications allowing these controllers to be made fully operational by selecting the appropriate VAV box application using the MAP.

CV series controllers feature an integral damper actuator, and a digital Differential Pressure Transducer (DPT) sensor. The CVM03050-0P model features an integral potentiometer to sense actual VAV box damper position. These controllers include an integral real-time clock, which enables the controllers to monitor and control schedules, calendars, and trends, and operate for extended periods of time as stand-alone controllers when offline from the Facility Explorer system network. These controllers also connect easily to the wired and wireless network sensors for zone and discharge air temperature sensing.

For product application details, refer to the *Facility Explorer CG, CV Series Controllers and XPM Expansion Modules Product Bulletin (LIT-12013225)*.

Features and benefits

Sleek and modern packaging and styling

Provides a modern, aesthetically pleasing industrial design.

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.

High memory capacity and fast processing power

Provides application engineers with the horsepower to meet sophisticated control requirements.

Auto-Tuned Control Loops

Reduce commissioning time, eliminate change-of-season re-commissioning, and reduce wear and tear on mechanical devices.

Patented Proportional Adaptive Control (P-Adaptive) and PRAC

Provides continuous loop tuning.

Standard BACnet protocol

Provides interoperability with other Building Automation System (BAS) products that use the widely accepted BACnet standard.

Models to support both BACnet MS/TP and N2, with auto-detection of the communications protocols

Controller auto-detects the BACnet MS/TP or N2 protocol that is connected to it, which enables the same controller to support multiple communication protocols without the need to purchase a special

model per protocol, and without extra manual setup.

BACnet Testing Laboratories (BTL) listed and certified as BACnet Advanced Application Controllers (B-AAC)

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

BACnet automatic discovery

Supports easy controller integration into a FX BAS.

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.

Integral real-time clock

An integral real-time clock, which enables the controllers to monitor and control schedules, calendars, and trends, and operate for extended periods of time as stand-alone controllers when offline from the FX system network.

Pluggable screw terminal blocks

Pluggable input/output wiring terminal blocks that can be removed from the controller provide electrical installers and field technicians the ability to quickly and easily install and service a controller without the need to disconnect and reconnect the input/output wiring.

Decimal MS/TP address set with three rotary switches

Easy-to-use rotary switches set the MS/TP address in decimal format.

Universal Inputs and Configurable Outputs

Allows multiple signal options to provide input/output flexibility.

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

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

Default application for Input/Output wiring validation

Enables validation of the input and output terminals' wiring without having to download an application file.

Background transfer coupled with enable/disable logic options in Controller Configuration Tool (CCT)

Saves field technicians' time, enables productivity and minimizes equipment disruption, since the controllers are operating while file updates take place in the background and the application can be left disabled until the system is ready to run.

SA Bus commissioning improvements

Saves field technicians time when commissioning SA Bus devices by enabling an equipment controller to transfer and apply firmware files to all the SA Bus devices connected to it at the same time.

An integrated damper actuator and digital Differential Pressure Transducer (DPT) sensor

Reduces installation time

Fast response actuator

Drives the damper from full open to full closed (90°) in 60 seconds to reduce commissioning time

Preloaded, selectable applications

The CV series VAV box controller is shipped with a factory-installed library of the most popular VAV box control applications. You can make this controller fully operational by using the MAP to select the appropriate VAV box application, thereby, saving field technicians' time by eliminating the provisioning workflow.

Optional integrated feedback potentiometer

Reassures users and field technicians of the VAV box damper's actual position and enables them to easily

confirm and troubleshoot VAV controller operations,

confirm actuator is at the desired position and track damper position.

CV model information

Table 1: CV Series information including point type counts

		CVM03050-0	CVM03050-0P
Communication Protocols	BACnet MS/TP, N2, or Wireless (using add-on modules)		
Modular Jacks	FC and SA Bus Modular Ports: RJ-12 6-Pin Modular Jacks		
Point Types	Signals Accepted:		
Universal Input (UI)	15 VDC Power Source (Provides 35mA total current source) Analog Input - Voltage Mode (0–10 VDC) Analog Input - Resistive Mode (0–600k ohm), RTD (1k Nickel [Johnson Controls sensor], 1k PT, A998 SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode	3	3
Configurable Output (CO)	Analog Output - Voltage Mode (0–10 VDC) Binary Output 24 VAC Triac Analog Output Signal Common Binary Output Signal Common	2	2
Binary Output (BO)	Binary Output - 24 VAC Triac	3	3
Integrated Actuator	Internal	1	1
Differential Pressure Transducer	Internal	1	1
Integrated Feedback Potentiometer	Internal	No	Yes
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.	Up to 4 NS Series Network Sensors Up to 9 WRZ sensors when using the ZFR or ZFR Pro Series wireless router configuration and up to 5 WRZ sensors when using the one-to-one WRZ-78xx wireless configuration	

Ordering information

Table 2: Ordering information

Product code number	Description
F4-CVM03050-0	VAV Box Controller with Integrated Actuator and Digital Differential Pressure Transducer (DPT) Sensor. Includes MS/TP (and N2) communication; 8 points (3 UI, 2 CO, and 3 BO); real-time clock; 24 VAC input.
F4-CVM03050-0P	VAV Box Controller with Integrated Actuator, Position Feedback, and DPT Sensor. Includes MS/TP (and N2) communication; 8 points (3 UI, 2 CO, and 3 BO); real-time clock; 24 VAC input.

Table 3: Accessories (order separately)

Product code number	Description
XPM Series Expansion Modules	Refer to the <i>F4-XPM Expansion Modules Catalog Page (LIT-1901150)</i> for a complete list of available Expansion Modules.
PCX Series Expansion Modules	Refer to the <i>FX-PC Series Programmable Controllers and Related Products Product Bulletin (LIT-12011657)</i> for a complete list of available Expansion Modules.
TL-CCT-0	License enabling Controller Configuration Tool (CCT) software for one user
Mobile Access Portal (MAP) Gateway	Refer to the <i>Mobile Access Portal Gateway Catalog Page (LIT-1900869)</i> to identify the appropriate product for your region.
FX-DIS1710-0	Local Controller Display
NS Series Network Sensors	Refer to the <i>NS Series Network Sensors Product Bulletin (LIT-12011574)</i> for specific sensor model descriptions.
AS-CBLTSTAT-0	Cable adapter for connection to 8-pin TE-6700 Series sensors
NS-WALLPLATE-0	Network Sensor Wall Plate
WRZ Series Wireless Room Sensors	Refer to the <i>WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653)</i> for specific sensor model descriptions.
WRZ-7860-0	Refer to the <i>WRZ-7860 Receiver for One-to-One Wireless Room Sensing Product Bulletin (LIT-12011640)</i> for a list of available products.
WRZ-SST-120	Refer to the <i>WRZ-SST-120 Wireless Sensing System Tool Installation Instructions (LIT-24-10563-55)</i> for usage instructions.
WRG1830/ZFR183x Pro Series Wireless Field Bus System	Refer to the <i>WRG1830/FX-ZFR183x Pro Series Wireless Field Bus System Technical Bulletin (LIT-12013553)</i> for a list of available products.
Y64T15-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 72.2 cm (30 in.), Primary Leads and 76.2 cm (30 in.) Secondary Leads, Class 2
Y65A13-0	Transformer, 120 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AS), 20.32 cm (8 in.), Primary Leads and 76.2 cm (30 in.) Secondary Leads, Class 2
Y65T31-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AR+), 20.32 cm (8 in.), Primary Leads and Secondary Screw Terminals, Class 2
Y65T42-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 20.32 cm (8 in.), Primary Leads and Secondary Screw Terminals, Class 2
MS-FIT100-0	The Field Inspection Tool or (FIT) is a portable handheld device with a user interface that is used to test and troubleshoot the BACnet protocol MS/TP RS-485 communications bus that connects supervisory controllers and equipment controllers to field point interfaces. The FIT can be used to check out the wiring of the MS/TP RS-485 bus as well as verify proper communications of supervisory controllers and equipment controllers connected to the bus. The FIT can be used on both the FC Bus and SA Bus.
TL-BRTRP-0	Portable BACnet/IP to MS/TP Router
ACC-TBKPWFCSA-0	Power, FC Bus, and SA Bus terminal block replacement kit for SNC, CG, CV, and XPM products. Kit includes 5 of each terminal block type. 15 terminal blocks in total.
ACC-TBKINOUT-0	Input and Output terminal block replacement kit for SNC, CG, CV and XPM products. Kit includes 5 of each 2, 3, and 4 position Input and Output terminal blocks. 30 terminal blocks in total.

CV Series technical specifications

Table 4: Technical specification for CV Series Controllers

Product code numbers	<p>F4-CVM03050-0 VAV Box Controller with Integrated Actuator and Digital Differential Pressure Transducer (DPT) Sensor. Includes MS/TP (and N2) communication; 8 points (3 UI, 2 CO, and 3 BO); real-time clock; 24 VAC input.</p> <p>F4-CVM03050-0P VAV Box Controller with Integrated Actuator, Position Feedback, and DPT Sensor. Includes MS/TP (and N2) communication; 8 points (3 UI, 2 CO, and 3 BO); real-time clock; 24 VAC input.</p>
Power requirement	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 ¹ i Note: The USB feature is not currently supported.
Power source	+15 VDC power source terminals provide 35 mA total current. Quantity 1 located in Universal IN terminals - for active (3-wire) input devices
Ambient conditions	Operating: 0°C to 50°C (32°F to 122°F) Storage: -40°C to 70°C (-40°F to 158°F)
Network engines	All network engine model types
Communications protocol	BACnet MS/TP; N2. Wireless also supported (at FC Bus and for Sensors) with additional hardware.
Device addressing for BACnet MS/TP	Decimal address set via three rotary switches: valid controller device addresses 4-127
Device addressing for N2	Decimal address set via three rotary switches: valid controller device addresses 1-254
Communications bus	BACnet MS/TP (default), N2 3-wire FC Bus between the supervisory controller and equipment controllers 4-wire SA Bus between equipment controller, network sensors and other sensor/actuator devices, includes a lead to source 15 VDC supply power (from equipment controller) to bus devices
i Note: For more information refer to <i>FX-PC Series Controllers MS/TP Communications Bus Technical Bulletin (LIT-12011670)</i>	
Processor	RX64M 32-bit Renesas microcontroller
Memory	16MB Flash Memory and 8MB SDRAM
Real-time clock backup power supply	Super capacitor maintains power to the onboard real-time clock for a minimum of 72 hours when supply power to the controller is disconnected.
Input and output capabilities	3 - Universal Inputs: Defined as 0-10 VDC, 0-600k ohms, or Binary Dry Contact 2 - Configurable Outputs: Defined as 0-10 VDC or 24 VAC Triac BO 3 - Binary Outputs: Defined as 24 VAC Triac (external power source only)
Universal Input (UI) Resolution/ Configurable Output (CO) accuracy	UI Analog Input Mode: 15-bit resolution on UIs CO Analog Output Mode: 0-10 VDC ± 200 mV
Air pressure differential sensor	Range: -2 in. to 2 in. H2O Performance Characteristics: Typical Accuracy at ambient operating conditions: +/- 0.5 % in. H2O Typical accuracy at zero (null) pressure is +/- 0.0006 in. H2O
Actuator rating	4 N·m (35 lb·in) minimum shaft length = 44 mm (1-3/4 in.) (if provided)
Terminations	Inputs/Outputs: Pluggable Screw Terminal 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
Mounting	Mounts to damper shaft using single set screw and to duct with single mounting screw
Housing	Enclosure material: ABS and polycarbonate UL94 5VB; Self-extinguishing Protection Class: IP20 (IEC529)

