

FX05 (Advanced) Field Controller

The FX05 is the compact field controller in the Facility Explorer system. The controller is designed specifically for commercial Heating, Ventilating, and Air Conditioning (HVAC) and Refrigeration applications.

The FX05 is a high performance controller with a powerful 16-bit microprocessor and state-of-the-art software that supports the precise control of a wide variety of mechanical and electrical equipment. The FX05 controller has 16 physical inputs and outputs and supports a wide range of temperature sensors and actuating devices. A series of converter modules extends the range of inputs to active sensors for the measurement of humidity, pressure, and other variables.

The FX05 controller is fully programmable or configurable, using the FX Tools Pro software package, for a wide range of commercial environmental control applications. The FX05 controller can be fitted with an optional communication card for integration into an N2 Open or LONWORKS® compatible building automation system.



Figure 1: FX05 (Advanced) Controller

Features and Benefits	
<input type="checkbox"/> Modular Communication Card Options	Provides cost effective method for either stand-alone or networked capabilities
<input type="checkbox"/> Optional Real-Time Clock Card	Provides real-time scheduling of control activities for stand-alone applications
<input type="checkbox"/> Freely Programmable or Configurable Using FX Tools Software Package	Adapts to a wide range of HVAC or refrigeration control applications using the extensive programming features of the FX Tools Pro software package
<input type="checkbox"/> PT1000 (Standard and Extended Range), A99, or Negative Temperature Coefficient (NTC) Temperature Sensor Inputs	Allows choice of temperature sensor according to the control range and application
<input type="checkbox"/> Integrated User Interface	Provides onboard user access to the controlled system
<input type="checkbox"/> Several Output Configurations of Solid-State Triacs and Relay Contacts	Gives flexibility in use of outputs for closed loop control or line voltage switching

Onboard Inputs and Outputs

Up to 16 physical inputs and outputs can be directly connected to the FX05, including:

- 4 Analog Inputs (AIs) (model dependent)
 - A99 temperature
 - PT1000 temperature (standard and extended)
 - NTC 10 K temperature
 - Linear Input (for Converter Module)
- 5 Digital (Binary) Inputs (DIs) – for voltage free contacts
- 6 Digital (Binary) Outputs (DOs) (model dependent)
 - 6 Relays (line voltage contacts)
 - 2 Triacs (24 V), 3 Interlocked Relays, 1 Free Relay
 - 2 Triacs, 4 free Relays
- 1 Analog Output 0...10 VDC (AO)

Input Converter Modules

The FX05 supports Input Converter Modules to enable connection of active sensors. The following active input types are supported:

- 4-20 mA
- Ratiometric
- 0-10 V



Figure 2: Input Converter Module

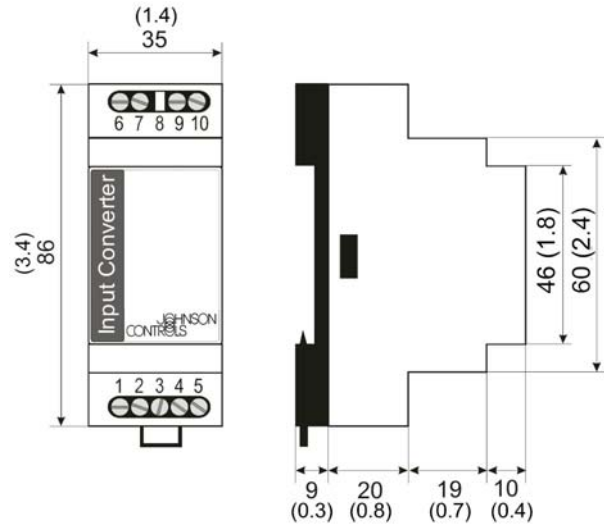


Figure 3: Input Converter Dimensions, mm (in.)

Integrated User Interface

The FX05 controller has an integrated user interface comprised of the following:

- 3 x 7-segment red Light-Emitting Diode (LED) digits
- 3 freely configurable status LEDs
- 4 pushbuttons with freely configurable functions
- configurable Navigation Menu

The integrated user interface is fully configurable within the application and typically provides:

- display of status information
- display clear and acknowledgement of active alarms
- display and modification of setpoints
- display and modification of configuration parameters



Figure 4: FX05 Controller Front Plate

Communication Card Options

The FX05 controllers can operate as stand-alone units or be fitted with optional communication cards to allow integration into a building automation system. Communication cards are easily plugged in to the back of the FX05.

N2 Open Network

When fitted with an N2 Open Communication Card, the FX05 controller can be connected to an N2 Open compatible building automation system, allowing access to its control system variables.

LONWORKS Network

When fitted with a LONWORKS Communication Card, the FX05 can be integrated into a LONWORKS compatible building automation system, allowing peer-to-peer communication with other LONWORKS compatible devices.

Real-Time Clock Card

For stand-alone applications, the FX05 can be fitted with a Real-Time Clock Card, allowing real-time functions to be programmed into the application based on a daily or weekly schedule. The real-time clock is battery backed with an average battery life of more than 2 years.

Alarm Management

The FX05 controller detects and displays alarms that are associated with up to 16 data points or variables in the control application.

Alarms indicate to the user that the controlled equipment requires attention or that the controlled conditions are not within the expected limits.

- Analog value is outside of a desired range.
- Status value represents a condition that is not normal.

Active alarms may be viewed, acknowledged, or cleared via the integrated user interface.

Room Command Module

The Room Command Module is designed for use with the FX Field Controllers, including the FX05. It features an onboard adjustment dial that allows the occupants to perform setpoint or warm/cool adjustment capabilities, depending on the model.

The pushbutton and LED indicator are configurable within the application. A typical application is to configure the pushbutton to allow initiation of temporary occupancy and the LED to provide system status indication. A three-speed fan override adjuster is also an available option.

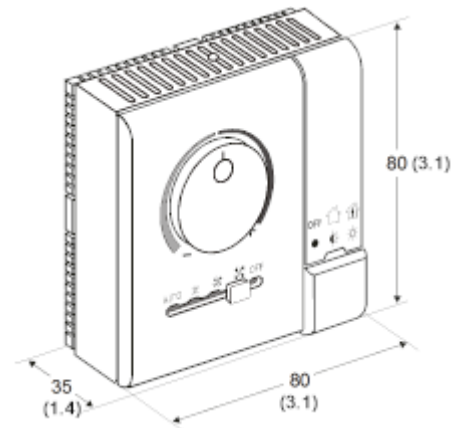


Figure 5: Room Command Module Dimensions, mm (in.)

FX Tools Pro

FX Tools is a software suite used to program, download, test, and commission the FX devices, including the FX05. FX Tools is available in two versions: FX Tools Express and FX Tools Pro. They consist of one or more of the following, depending on the version:

- FX-Builder Express: Used to select an FX05 application and configure it using graphical plug-ins
- FX-Builder: Used to fully program an FX05. FX-Builder provides complete flexibility in programming the FX05.
- FX-CommPro: Used to download, test, and commission an FX05 on an N2 Open network.
- FX CommPro LON: Used to download, test, and commission an FX05 on a LONWORKS network.

FX05 (Advanced) Field Controller Dimensions, mm (in.)

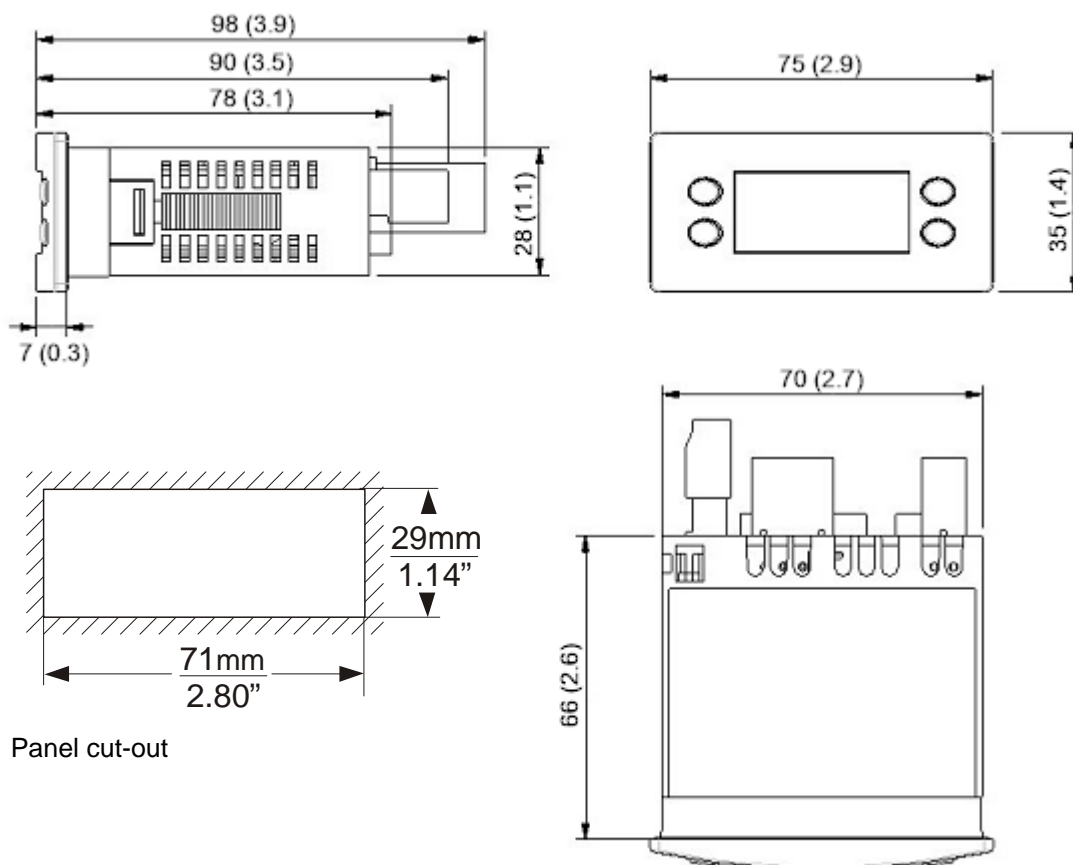


Figure 6: FX05 and Panel Cut-Out Dimensions

Ordering Codes

Tables 1 through 6 contain ordering information for the FX05, FX05 Accessories, and FX05 Software.

Table 1: FX05 (Advanced) Field Controller Ordering Information

Product Code Number	Description
LP-FX05P11-002C	FX05 Controller with 3 A99 AIs, 1 NTC AI, 5 DIs, 6 relay DOs, 1 AO, no comm. card, no cable
LP-FX05N11-002C	FX05 Controller with 3 A99 AIs, 1 NTC AI, 5 DIs, 6 relay DOs, 1 AO, N2 Open comm. card, 1 set Molex Cable
LP-FX05L11-002C	FX05 Controller with 3 A99 AIs, 1 NTC AI, 5 DIs, 6 relay DOs, 1 AO, LON comm. card, 1 set Molex Cable
LP-FX05P11-012C	FX05 Controller with 4 PT1000 std AIs, 5 DIs, 6 relay DOs, 1 AO, no comm. card, no cable
LP-FX05N11-012C	FX05 Controller with 4 PT1000 std AIs, 5 DIs, 6 relay DOs, 1 AO, N2 Open comm. card, 1 set Molex Cable
LP-FX05L11-012C	FX05 Controller with 4 PT1000 std AIs, 5 DIs, 6 relay DOs, 1 AO, LON comm. card, 1 set Molex Cable
LP-FX05P11-022C	FX05 Controller with 4 SW select AIs (A99, PT1000 ext., Linear), 5 DIs, 6 relay DOs, 1 AO, no comm. card, no cable
LP-FX05N11-022C	FX05 Controller with 4 SW select AIs (A99, PT1000 ext., Linear), 5 DIs, 6 relay DOs, 1 AO, N2 Open comm. card, 1 set Molex Cable
LP-FX05L11-022C	FX05 Controller with 4 SW select AIs (A99, PT1000 ext., Linear), 5 DIs, 6 relay DOs, 1 AO, LON comm. card, 1 set Molex Cable
LP-FX05P12-002C	FX05 Controller with 3 A99 AIs, 1 NTC AI, 5 DIs, 2 triac DOs, 3 interlocked relays DOs, 1 free relay DO, 1 AO, no comm. card, no cable
LP-FX05N12-002C	FX05 Controller with 3 A99 AIs, 1 NTC AI, 5 DIs, 2 triac DOs, 3 interlocked relays DOs, 1 free relay DO, 1 AO, N2 Open comm. card, 1 set Molex Cable
LP-FX05L12-002C	FX05 Controller with 3 A99 AIs, 1 NTC AI, 5 DIs, 2 triac DOs, 3 interlocked relays DOs, 1 free relay DO, 1 AO, LON comm. Card, 1 set Molex Cable
LP-FX05P12-012C	FX05 Controller with 4 PT1000 std AIs, 5 DIs, 2 triac DOs, 3 interlocked relays DOs, 1 free relay DO, 1 AO, no comm. card, no cable
LP-FX05N12-012C	FX05 Controller with 4 PT1000 std AIs, 5 DIs, 2 triac DOs, 3 interlocked relays DOs, 1 free relay DO, 1 AO, N2 Open comm. card, 1 set Molex Cable
LP-FX05L12-012C	FX05 Controller with 4 PT1000 std AIs, 5 DIs, 2 triac DOs, 3 interlocked relays DOs, 1 free relay DO, 1 AO, LON comm. card, 1 set Molex Cable
LP-FX05P12-022C	FX05 Controller with 4 SW select AIs (A99, PT1000 ext., Linear), 5 DIs, 2 triac DOs, 3 interlocked relays DOs, 1 free relay DO, 1 AO, no comm. card, no cable
LP-FX05N12-022C	FX05 Controller with 4 SW select AIs (A99, PT1000 ext., Linear), 5 DIs, 2 triac DOs, 3 interlocked relays DOs, 1 free relay DO, 1 AO, N2 Open comm. card, 1 set Molex Cable
LP-FX05L12-022C	FX05 Controller with 4 SW select AIs (A99, PT1000 ext., Linear), 5 DIs, 2 triac DOs, 3 interlocked relays DOs, 1 free relay DO, 1 AO, LON comm. card, 1 set Molex Cable
LP-FX05P13-002C	FX05 Controller with 3 A99 AIs, 1 NTC AI, 5 DIs, 2 triac DOs, 4 free relay DOs, 1 AO, no comm. card, no cable
LP-FX05N13-002C	FX05 Controller with 3 A99 AIs, 1 NTC AI, 5 DIs, 2 triac DOs, 4 free relay DOs, 1 AO, N2 Open comm. card, 1 set Molex Cable
LP-FX05L13-002C	FX05 Controller with 3 A99 AIs, 1 NTC AI, 5 DIs, 2 triac DOs, 4 free relay DOs, 1 AO, LON comm. card, 1 set Molex Cable
LP-FX05P13-012C	FX05 Controller with 4 PT1000 std AIs, 5 DIs, 2 triac DOs, 4 free relay DOs, 1 AO, no comm. card, no cable
LP-FX05N13-012C	FX05 Controller with 4 PT1000 std AIs, 5 DIs, 2 triac DOs, 4 free relay DOs, 1 AO, N2 Open comm. card, 1 set Molex Cable
LP-FX05L13-012C	FX05 Controller with 4 PT1000 std AIs, 5 DIs, 2 triac DOs, 4 free relay DOs, 1 AO, LON comm. card, 1 set Molex Cable

Product Code Number (Cont.)	Description
LP-FX05P13-022C	FX05 Controller with 4 SW select AIs (A99, PT1000 ext., Linear), 5 DIs, 2 triac DOs, 4 free relay DOs, 1 AO, no comm. card, no cable
LP-FX05N13-022C	FX05 Controller with 4 SW select AIs (A99, PT1000 ext., Linear), 5 DIs, 2 triac DOs, 4 free relay DOs, 1 AO, N2 Open comm. card, 1 set Molex Cable
LP-FX05L13-022C	FX05 Controller with 4 SW select AIs (A99, PT1000 ext., Linear), 5 DIs, 2 triac DOs, 4 free relay DOs, 1 AO, LON comm. card, 1 set Molex Cable

Table 2: Communication Card Ordering Information

Product Code Number	Description
LP-NET051-000C	N2 Open communication card
LP-NET05A2-000C	LONWORKS communication card

Table 3: Accessories Available in Europe and North America Ordering Information

Product Code Number	Description
LP-RTC05-000C	Real-Time Clock Card
LP-KIT001-010C	Input Converter Module 4 - 20 mA to linear for FX05
LP-KIT002-010C	Input Converter Module Ratiometric to linear for FX05
LP-KIT004-010C	Input Converter Module 0 - 10 V to linear for FX05
LP-KIT005-010C	MOLEX cable - multi-color for LP-FX05Pxx

Table 4: Accessories Only Available in Europe

Product Code Number	Description
LP-TR23024-10VA	Transformer for FX05, 10 VA
LP-KIT006-000C	Room Sensor module for FX05 +/- dial, occupancy button, fan speed, service port
LP-KIT006-001C	Room Sensor module for FX05 12 - 28°C dial
LP-KIT006-002C	Room Sensor module for FX05 12 - 28°C dial, occupancy button, service port
LP-KIT006-003C	Room Sensor module for FX05 +/- dial, occupancy button, service port

Table 5: Accessories Only Available in North America

Product Code Number	Description
LP-KIT006-004C	Room Command module for FX05. Includes warm/cool adjustment dial, fan speed selector, occupancy button, and US mounting kit.
LP-KIT006-005C	Room Command module for FX05. Includes warm/cool adjustment dial, occupancy button, and US mounting kit.
LP-KIT006-006C	Room Command module for FX05. Includes setpoint (-54 - 82°F) adjustment dial, fan speed selector, occupancy button, and U.S. mounting kit.
LP-KIT006-007C	Room Command module for FX05. Includes setpoint (-54 - 82°F) adjustment dial, occupancy button, and U.S. mounting kit.

Table 6: Software Ordering Information

Product Code Number	Description
LP-FXTPRO-0	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON)
LP-FXTEXP-0	FX Tools Express CD-Rom (FX Builder Express, FX CommPro N2)

Technical Specifications

FX05 (Advanced) Controller (Part 1 of 2)

Product Codes	LP-FX05xxx-xxxC (See Table 1 for details.)			
Power Requirements	24 VAC/VDC $\pm 15\%$, 50/60 Hz			
Power Consumption	6 VA			
Protection Class	Front Plate IP54; Rear IP20			
Insulation	Class II			
Ambient Operating Conditions	-20°C (-4°F) to 65°C (149°F) 10 to 95 % RH (noncondensing)			
Ambient Storage Conditions	-30°C (-22°F) to +80°C (176°F) 10 to 95 % RH (noncondensing)			
Control Accuracy at 20°C (68°F) Ambient (sensor error not included)	Sensor Type	Range	Accuracy	
	A99	-40 to 70°C (-40 to 158°F)	$\pm 0.5^\circ\text{C}$ ($\pm 1^\circ\text{F}$)	
	NTC K10	-40 to 160°C (-40 to 320°F)	$\pm 0.5^\circ\text{C}$ ($\pm 1^\circ\text{F}$)	
	PT1000 Extended	-40 to 100°C (-40°F to 212°F)	$\pm 1^\circ\text{C}$ ($\pm 1.8^\circ\text{F}$)	
	PT1000 Standard	-10 to 70°C (14°F to 158°F)	$\pm 0.5^\circ\text{C}$ ($\pm 1^\circ\text{F}$)	
	Linear	Software Configurable	$\pm 1\%$ of the total range	
Display Resolution	$\pm 0.1^\circ\text{C}$, between -9.9 to +99.9			
Digital Inputs:	Voltage free contacts, 3k3 pull-up resistors, not isolated			
Analog Inputs:	Not isolated. Spare inputs must be connected to the common.			
	Model	Channel	Type	Remark/Application
	FX05P1x-002	A11 ÷ A13	A99 Range: -40 to 100°C (-40 to 212°F) Accuracy: $\pm 0.3^\circ\text{C}$ ($\pm 0.6^\circ\text{F}$) at 20°C (68°F) ambient	Application: temperature. Humidity, pressure, etc.
		A14	NTC K10 Range: -10 to 70°C (14 to 158°F) Accuracy: $\pm 0.5^\circ\text{C}$ ($\pm 1^\circ\text{F}$) at 20°C (68°F)	Also for the Fan Speed control signal coming from the Room Command Module
	FX05P1x-012	A11 ÷ A14	PT1000 Standard Range: -40 to 70°C (-40 to 158°F) Accuracy: $\pm 0.5^\circ\text{C}$ ($\pm 1^\circ\text{F}$) at 20°C (68°F) ambient (sensor error not included)	Application: temperature
	FX05P1x-022	A11 ÷ A14	A99 or PT1000 Extended or Linear See following table.	Software configurable
Analog Outputs:	0...10 VDC, 5 mA, not isolated, 16-bit resolution, used for analog actuators, frequency drives.			
Continued on next page . . .				

FX 05 (Advanced) Field Controller Technical Specifications (Part 2 of 2)

Digital Outputs General	<p>Relays of the group DO2 to DO6 or DO3 to DO6 must be at the same voltage source. Double isolation between relay DO1 and the group DO2 to DO6 or between triacs DO1, DO2 and group DO3 to DO6.</p> <p>Any combination of loads on DO2 to DO6 or DO3 to DO6 must not exceed 15 A. Max 5 A on the common terminals.</p> <p>Dielectric test voltage at open relay contact: 1,000 VAC RMS. Maximum relay switching rate at nominal load: 6 operations / min</p>			
Digital Outputs for Selected Models	Model	Channel	Type	Remark/Application
	FX05P11	DO1	SPST 5A, 250 VAC power relay	Double insulated from the other relay group. Application: alarm output, and others.
		DO2 – DO6	SPST 5A, 250 VAC power relay	Max. 5 A on C2/3 Max. 5 A on C4/5 Max. 5 A on C6 In any case, any combination of loads must not exceed 15 A in total (the commons pins are internally connected).
	FX05P12/P13	DO1, DO2	0,5A / 24 VAC triacs	3-point incremental actuators, thermal actuators, etc
		DO3 – DO6	SPST 5A, 250 VAC power relay	On the P12 model the DO3 ÷ DO5 relays are physically interlocked (that is, only one output can be closed at one time). Application: 3-speed fan motors. The DO6 relay is free. On the P13 model , all relays are freely usable. Max. 5A on C3, C4, C5 and C6
Connections	Molex connectors Relay outputs: Mini-Fit family: Series 5569 94V-2, mates with 5557 dual row receptacle, terminals Series 5556, cables AWG18 Low voltage I/Os: Series 5268-NA, mates with 5264-N terminal housing, terminals Series 5263, cables AWG22			
Dimensions (H x W x D)	35 mm (1.4 in.) x 75 mm (2.9 in.) x 90 mm (3.6 in.)			
Compliance	Europe	– 89/336/EEC, EMC Directive: EN 61000-6-3, EN 61000-6-1 – 72/23/EEC, Low Voltage Directive: EN 60730		
	Canada	– UL Listed (PAZX7), CAN/CSA C22.2 No. 205, Signal Equipment – UL Recognized (XAPX8), CAN/CSA C22.2 No. 24, Temperature Indicating and Regulating Equipment – Industry Canada, ICES-003		
	United States	– UL Listed (PAZX), UL 916, Energy Management Equipment – UL Recognized (XAPX2), UL 873, Temperature Indicating and Regulating Equipment – FCC compliant to CFR 47, Part 15, Subpart B, Class A		

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



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