FX06 Field Controller

The FX06 is a high performance field controller designed specifically for commercial Heating, Ventilating, Air Conditioning, and Refrigeration (HVACR) applications.

The FX06 supports 17 physical inputs and outputs including a wide range of sensors and actuating devices. The FX06 includes an onboard real-time clock to support the start-stop scheduling of equipment, real-time based control sequences, and time stamping events and trend records.

With the integral user interface, you can locally monitor and adjust the FX06's operation. The FX06 also supports a remote panel- or wall-mountable Medium User Interface (MUI) for remote monitoring and adjustment.

The FX06 can be fitted with an N2 Open or LONWORKS® communication module to integrate the controller into a compatible Building Automation System (BAS). Alternatively, the FX06 can be fitted with an RS-232C serial communication module to transmit event notification messages via Short Messaging Service (SMS) through a Global System for Mobile (GSM) modem.

Using the FX Tools software package, you can program the FX06 field controller to operate a wide variety of commercial HVACR equipment; including small refrigeration compressors, close control units, packaged rooftop units, fan coil units, unit ventilators, and chilling or heating ceiling beam installations.

Note: This document applies to the LP-FX06Pxx-020C models only.



Figure 1: FX06 Field Controller

Features and Benefits	
❑ **Freely Programmable Controller**	Is suitable for a wide range of HVAC or refrigeration control applications using the extensive programming features of the FX Tools software package.
❑ **Network Communication Module Options: N2 Open, or LONWORKS Protocols**	Provide cost-effective solutions for stand-alone or networked applications.
❑ **Remote Communication Services**	Enable automatic reporting of events and alarms by SMS for stand-alone applications.
❑ **Integral Liquid Crystal Display (LCD) User Interface with Four Control Buttons**	Provides onboard user access to the controlled system parameters using a custom designed display with two rows of alphanumeric characters and graphic icons with backlight.
❑ **Optional Remote User Interface**	Provides a clear presentation of control system data (including trend log data) on a menu driven and scrolling 4 line x 26 character LCD display with backlight.

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Features and Benefits (Cont.)	
❑ **Two Analog Outputs**	Provide an interface to a wide range of actuators and drives.
❑ **Models with Various Output Configurations of Solid-State Triacs and Line Voltage Relays**	Provide cost-effective control of refrigeration, unitary and terminal unit equipment.
❑ **Network Room Module (NRM)**	Features an internal temperature sensor and optional LCD display and dial, which allow the occupant to view and adjust the temperature setpoint value and override the fan speed.

Onboard Inputs and Outputs

You can connect up to 17 physical inputs and outputs to the FX06, including:

- four Analog Inputs (AIs) (software configurable)
  - A99 temperature sensor
  - Ni1000 Johnson Controls® temperature sensor
  - PT1000 temperature sensor
  - NTC 10 K temperature sensor
  - Ratiometric (0.5-4.5 VDC)
  - 0-10 VDC
- five Digital (Binary) Inputs (DIs)
  - voltage free contacts
  - with pulse counter option
- six Digital (Binary) Outputs (DOs) (model dependent)
  - six relays (line voltage contacts)
  - two triacs (24 V), four relays
- two Analog Outputs (AOs)
  - 0-10 VDC

Integral LCD User Interface

The integral LCD user interface (Figure 2) for the FX06 features:

- two display rows with four alphanumeric characters (13 segment)
- blue or red background light
- graphic status icons: compressor, alarm, high pressure, low pressure, maintenance, heat, cool, defrost, and electric heat symbols
- keypad with four push buttons
- navigation menu to guide users

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

- display of status information
- display and modification of setpoints
- display and modification of configuration parameters
- clearing and acknowledgement of active alarms
- background lighting with red color when an alarm condition exists

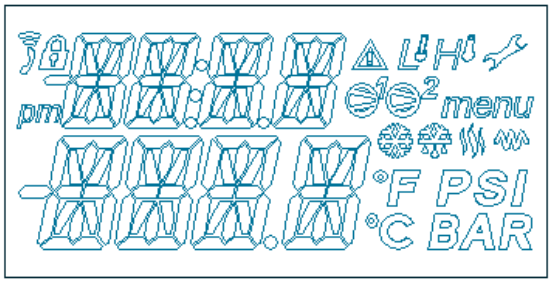


Figure 2: Detail of the LCD

Remote Medium User Interface

The FX06 also supports a remote Medium User Interface. The MUI has a 4 line x 26 character, backlit LCD screen, 6 push buttons, and 10 discrete status Light-Emitting Diodes (LEDs). See Figure 3. You can completely configure the MUI, including its navigation menu, within the FX06 application design. The mounting styles include:

- **Panel Mount:** Mounts up to 3 m (9.8 ft) from the FX06 controller. The FX06 powers and operates this user interface. A flat telephone cable connects the power supply and data communications to the FX06 controller.
- **Wall Mount:** Mounts up to 300 m (984 ft) from the FX06. The wall mount user interface must be independently powered with 24 VAC. The data communication requires a 3-wire shielded cable (not provided) for the connection from the remote display to the FX06 controller. You can also panel mount this unit.



Figure 3: Remote Medium User Interface

Communication Module Options

The FX06 can operate as a stand-alone controller, or it can be fitted with a communication module to provide various types of remote network access. The FX06 supports N2 Open, LONWORKS, or RS-232C networking communication module options.

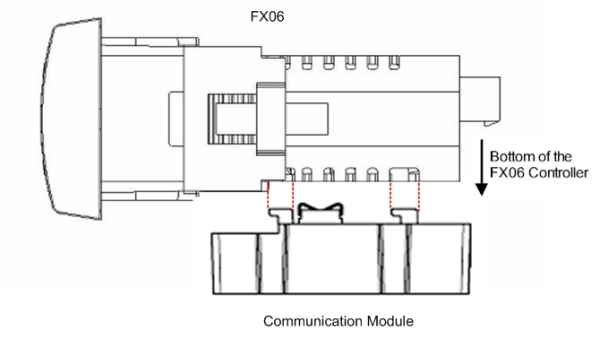


Figure 4: FX06 with Communication Module

N2 Open Communication Module

When fitted with an N2 Open communication module, the FX06 controller can connect to the N2 bus of a compatible supervisory controller. This scenario allows network access to its control system variables and parameters.

LONWORKS Communication Module

When fitted with a LONWORKS communication module, the FX06 can integrate into a LONWORKS network. This integration allows peer-to-peer communication with other LONWORKS compatible devices on the network and data access from a supervisory system.

RS-232C Serial Communication Module

When fitted with an RS-232C serial communication module, the FX06 can connect to a Global System for Mobile (GSM) modem. When an application event goes into the active or alarm state, the FX06 sends out text messages in Short Message Service (SMS) format to a prioritized list of destinations, such as to a telephone service center or directly to a mobile telephone.

Real-Time Control

The FX06 controller has an embedded real-time clock that supports real-time control functions such as the display of time and date on the user interface, scheduling, and event and trend management. The real-time clock continues to run for at least 10 days without power at room temperature.

Scheduling

The real-time clock enables the time scheduling of start and stop commands and occupancy mode changes to the equipment being monitored and controlled. You can configure scheduled commands to execute on 1 or more days of the week. An exception day calendar allows for alternative time schedules on holidays or during special periods in the year. You can also display and edit time schedules on the integral or remote user interface.

Event Management

The real-time clock enables the time stamping of alarm and event records. You can configure the FX06 controller to detect and display events and alarms associated with up to 20 data points or variables in the control application.

Application events indicate to users that the controlled equipment requires attention or that the controlled conditions are not within the expected limits. Examples of alarms include:

- analog value is outside of a desired range
- status value represents a condition that is not normal

You can view, acknowledge, or clear active alarms via the integral or remote user interface. You can view the event logs on the remote user interface. You can also monitor events as they occur from a supervisory system when the FX06 has a communication module.

Trend Management

The real-time clock enables the time stamping of trend records. You can configure the FX06 to record the values of up to 4 points at intervals between 1 minute and 1 day. You can then view the values and times on the remote user interface.

Room Command Modules

Two series of room command modules are available for use with the FX06 controllers: the TM Series room command modules and the Network Room Modules (NRMs).

TM Series Room Command Modules

The TM Series room command module (Figure 5) features an internal temperature sensor and an optional dial that allows the occupant to adjust the temperature setpoint value or request a warmer or cooler setpoint. Certain models also have a dial to enable the occupant to override the speed of a three-speed fan.

The operation of the push button and LED are configurable within the application. Typically, the push button initiates a temporary occupancy period (for example, at night or weekends), and the LED provides occupancy status indication.



Figure 5: TM Series Room Command Module

The TM Series room command module for North America has a 120 x 80 mm (4.72 x 3.15 in.) enclosure and has dual temperature units (°F and °C).

Network Room Modules

The NRM (Figure 6) is an intelligent device that communicates with the FX06 via the serial display bus. The NRM features an internal temperature sensor and optional LCD display and dial, which allows the occupant to view and adjust the temperature setpoint value. Certain models also have a fan button, which allows the occupant to override the speed of a three-speed fan. The override status of the fan appears on the LCD display.

The NRM also enables the initiation of a temporary occupancy period (for example, at night or weekends), and you can configure the LCD to blink when the controller is not in the occupied mode.

The North American NRMs have an additional button that allows you to select the units on the temperature display (°F or °C). These modules are also available in the 120 x 80 mm (4.72 x 3.15 in.) enclosure.



Figure 6: Network Room Modules (NRMs)

FX Tools Pro Software

Use the FX Tools Pro software suite to program, download, test, and commission the FX devices, including the FX06. FX Tools Pro includes:

- **FX Builder** – used to program an FX06. FX Builder provides a fully programmable, function block style programming environment for you to build control algorithms for the FX06. FX Builder also includes an Application Wizard which guides you through programming applications via factory-designed and -tested application templates with easy-to-use configuration screens.
- **FX CommPro N2** – used to download, test, and commission an FX06 via an N2 network connection.
- **FX CommPro LON** – used to download, test, and commission an FX06 via a LONWORKS network connection.

IMPORTANT: Use this FX06 controller only as an operating control. Where failure or malfunction of the FX06 could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the FX06.

Programming Key

You can download the application to the FX06 controller via a computer with FX CommPro or via the FX Programming Key (Figure 7) (only compatible with N2 or stand-alone applications).



Figure 7: FX Programming Key

FX06 Field Controller Dimensions

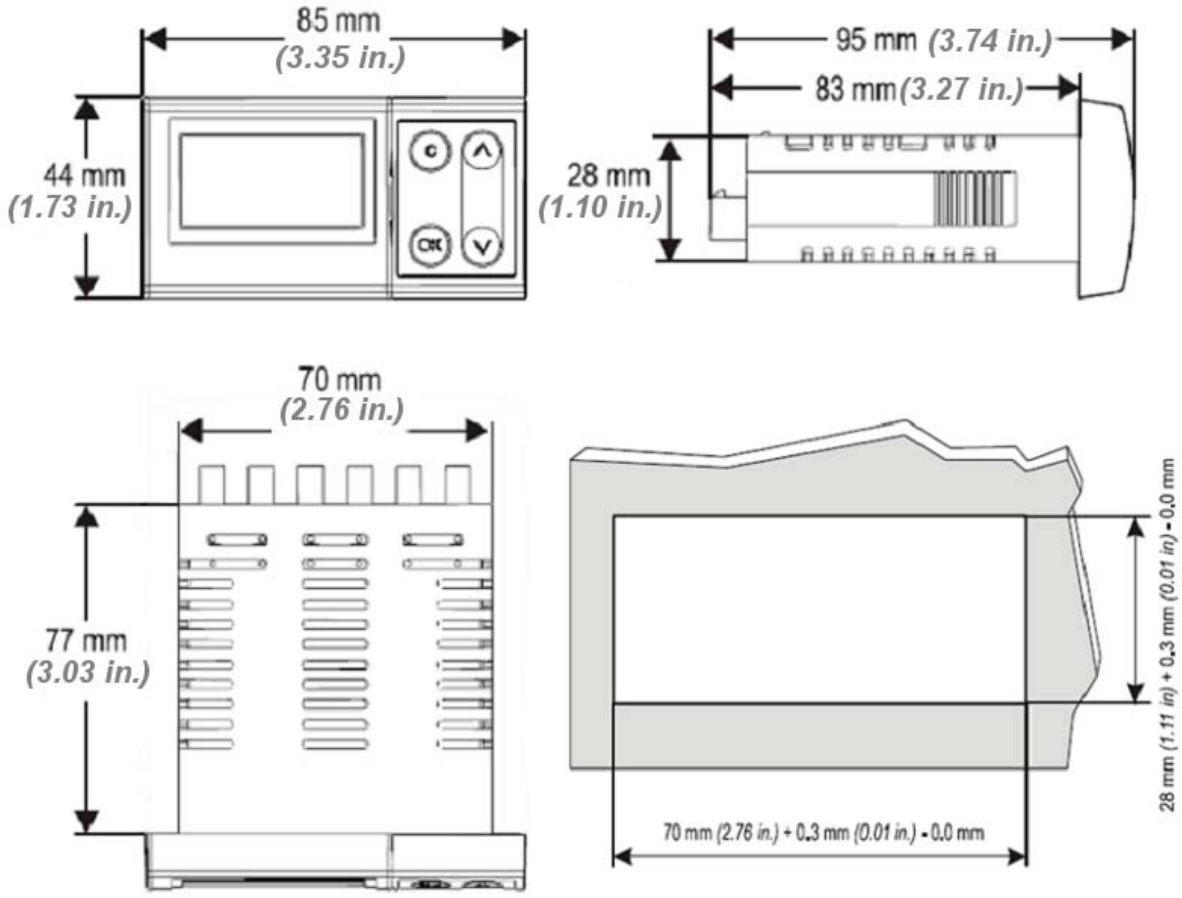


Figure 8: FX06 Controller and Panel Cut-Out Dimensions

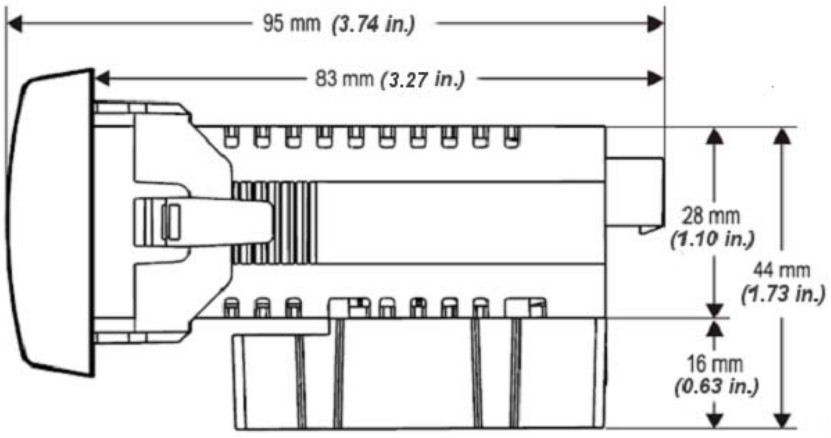


Figure 9: FX06 Dimensions Including Communication Module

Ordering Codes

Table 1: FX06 Field Controller

Product Code Number	Description
LP-FX06P00-020C	FX06 Compact Field Controller with new style wiring connector: Includes 4 Analog Inputs (AIs), 5 Binary Inputs (BIs), 2 0-10 VDC Analog Outputs, and 6 relay Binary Outputs (BOs)
LP-FX06P20-020C	FX06 Compact Field Controller with new style wiring connector: Includes 4 AIs, 5 BIs, 2 0-10 VDC Analog Outputs, 4 BOs, and 2 triac BOs

Table 2: Communication Module

Product Code Number	Description
LP-NET061-000C	N2 Open Communication Module for FX06
LP-NET062-000C	LONWORKS Communication Module for FX06
LP-NET063-000C	RS-232C Communication Module for FX06 (only for GSM modem)

Table 3: User Interfaces

Product Code Number	Description
LP-DIS60P20-0C	Remote Medium User Interface (MUI V3) for FX06 - Panel Mount
LP-DIS60P21-0C	Remote Medium User Interface (MUI V3) for FX06 - Wall Mount
LP-KIT007-005C	Link cable for the connection of the FX06 to the Panel Mount MUI display or NRM module, 3 m (9.8 ft)

Table 4: Accessories

Product Code Number	Description
LP-KIT006-020C	Wiring Harness with new style wiring connector, 1.5 m length
LP-KIT006-025C	Wiring Harness with new style wiring connector, 5.0 m length
LP-KIT100-000C	FX Programming Key
DT-9100-8901	Power Supply Adapter for Programming Key: 230 VAC/12 VDC (Europe only)
LP-KIT007-001C	Interface cable for standard landline modem, 1.5 m (4.9 ft)
LP-KIT007-013C	Null modem cable for computer connection, 3 m (9.8 ft)
LP-KIT007-014C	Null modem cable for computer connection, 15 m (49.2 ft)
LP-KIT007-020C	Bag of replacement communication wiring connectors (N2 and LON).
LP-KIT200-000C	N2 Commissioning Adapter: Includes port powered RS-232C to RS-485 converter, 3 m (9.8 ft) cable, and mating connectors for FX05, FX06, FX07, FX14, FX15, FX16, and FXVMA.
IU-9100-8401	Converter RS-232C/RS-485 (N2) 230 VAC (Europe only)
NP-PWR1209	Power Supply Adapter for Programming Key 120 VAC/12 VDC (North America only)

Table 5: GSM Modem and Accessories (Europe Only)

Product Code Number	Description
LP-KIT007-002C	Interface Cable for GSM modem to FX06, 1.5 m (4.9 ft)
LP-KIT090-000C	GSM 900/1800 Supreme 10 FastTrack Modem
LP-KIT090-001C	GSM Modem Plug-in Antenna
LP-KIT090-003C	GSM Modem Magnetic Mount Antenna with 2.5 m (8.2 ft) Cable
LP-KIT090-004C	GSM Modem Panel Mount Antenna with 5 m (16.4 ft) Cable
LP-KIT090-005C	GSM Modem Power Adapter, 230 VAC/12 VDC, Wall Plug

Table 6: Room Command Modules, TM Series without Display - 80 x 80 mm (3.15 x 3.15 in.), °C

Product Code Number	Description
TM-2140-0000	Room Sensor Module, temperature sensor only
TM-2150-0000	Room Sensor Module, occupancy button and LED
TM-2160-0000	Room Sensor Module, 12 - 28°C setpoint dial, occupancy button and LED
TM-2160-0002	Room Sensor Module, 12 - 28°C setpoint dial, occupancy button and LED, fan speed override
TM-2160-0005	Room Sensor Module, +/- setpoint dial, occupancy button and LED
TM-2160-0007	Room Sensor Module, +/- setpoint dial, occupancy button and LED, fan speed override
TM-2190-0000	Room Sensor Module, 12 - 28°C setpoint dial
TM-2190-0005	Room Sensor Module, +/- setpoint dial

Table 7: Room Command Modules - Available in North America - TM Series without Display – 120 x 80 mm (4.72 x 3.15 in.), °F/°C

Product Code Number	Description
TM-2141-0000	Room Sensor Module, temperature sensor only
TM-2151-0000	Room Sensor Module, occupancy button and LED
TM-2161-0000	Room Sensor Module, 54 - 82°F/12 - 28°C setpoint dial, occupancy button and LED
TM-2161-0002	Room Sensor Module, 54 - 82°F/12 - 28°C setpoint dial, occupancy button and LED, fan speed override
TM-2161-0005	Room Sensor Module, +/- setpoint dial, occupancy button and LED
TM-2161-0007	Room Sensor Module, +/- setpoint dial, occupancy button and LED, fan speed override
TM-2191-0000	Room Sensor module, 54 - 82°F/12 - 28°C setpoint dial
TM-2191-0005	Room Sensor module, +/- setpoint dial

Table 8: Network Room Modules - Available in Europe

Product Code	Features/Options						
	Size (mm)	**Service Port Type**	**LCD Display**	**Temperature Adjustment Dial**	**Fan Speed Selector Button**	**°F/°C Button**	**Addressable**
LP-NRM001-000C	80 x 80	Program Key	No	No	No	No	No
LP-NRM002-000C			Yes	Yes	No	No	No
LP-NRM003-000C			Yes	Yes	Yes	No	No
LP-NRM511-000C		MUI	No	No	No	No	Yes[1]
LP-NRM502-000C			Yes	Yes	No	No	No
LP-NRM503-000C			Yes	Yes	Yes	No	No

1. The FX06 controller only supports one connected NRM and therefore the addressing feature is not used.

Table 9: Network Room Modules - Available in North America

Product Code	Features/Options						
	Size, mm (inch)	Service Port Type	LCD Display	Temperature Adjustment Dial	Fan Speed Selector Button	°F/°C Button	Addressable
LP-NRM511-000C	80 x 80 mm (3.15 x 3.15 in.)	MUI	No	No	No	No	Yes[1]
LP-NRM552-000C			Yes	Yes	No	Yes	No
LP-NRM553-000C			Yes	Yes	Yes	Yes	No
LP-NRM611-000C	120 x 80 mm (4.72 x 3.15 in.)	MUI	No	No	No	No	Yes[1]
LP-NRM652-000C			Yes	Yes	No	Yes	No
LP-NRM653-000C			Yes	Yes	Yes	Yes	No

1. The FX06 controller only supports one connected NRM and therefore the addressing feature is not used.

Table 10: Sensor Accessories

Product Code Number	Description
NS-WALLPLATE-0	Wall plate kit used to mount an 80 x 80 mm (3.15 x 3.15 in.) sensor onto a 51 x 102 mm (2 x 4 in.) wall box.

Table 11: Software

Product Code Number	Description
LP-FXTPRO-0	FX Tools Pro CD-ROM (FX Builder, FX CommPro N2, FX CommPro LON, FX Loader, MD Loader) - New User Version
LP-FXTPRO-6	FX Tools Pro CD-ROM (FX Builder, FX CommPro N2, FX CommPro LON, FX Loader, MD Loader) - Upgrade Version

Technical Specifications

I/O Technical Details

IMPORTANT: In North America, the controller is intended for installation with Class 2 inputs and outputs only where no special electrical safety mounting precautions are generally necessary. These controllers are UL Listed as Open Energy Management Equipment per UL 916.

Table 12: Analog Inputs (AI)

Terminal/Channel	Type	Remark/Application
AI1, AI2, AI3, AI4	See Sensor Input Types in this table	Software configurable. Application: temperature, humidity, pressure. 16-bit ADC, 13-bit effective resolution.
AI Power	+5 V at 15 mA max.	To power active or ratiometric sensors directly from the controller
AI/AO Power	+15 V at 20 mA max.	To power active sensors directly from the controller.

Sensor Input Types		
Sensor Type	**Full Linearization Range**	**Accuracy at 20°C (68°F) - Controller and Sensor (sensor accuracy not included)**
A99	-50 to 100°C (-58 to 212°F)	±0.5°C (±1°F)
NTC 10k	-40 to 150°C (-40 to 300°F)	±0.5°C (±1°F)
PT1000 Extended	-50 to 160°C (-58 to 320°F)	±0.5°C (±1°F)
Ni1000 (Johnson Controls® temperature sensor)	-45 to 120°C (-49 to 248°F)	±0.5°C (±1°F)
Active Voltage	0-10 VDC	±0.05 VDC
Active Ratiometric	0.5-4.5 VDC	±0.05 VDC

Table 13: Digital (Binary) Input (DI)

Terminal/Channel	Type	Remark/Application
DI1, DI2, DI3, DI4, DI5	Potential free contacts for status monitoring	Status and events.
	Transition Counter at 50 Hz max.	Minimum Time ON: 10 ms Minimum Time OFF: 10 ms

Table 14: Digital (Binary) Outputs (DO)

Digital (Binary) Outputs for Selected Models	Model	Channel	Type	Remark/ Application
	FX06P0x	DO1 – DO6	SPST 3(1)A, 250 VAC power relay	Each relay contact is independent with its own terminals.
	FX06P2x	DO1, DO2	0.5A/24 VAC triacs	3-point incremental actuators, thermal actuators, and other actuators
		DO3 – DO6	SPST 3(1)A, 250 VAC power relay	Each relay contact is independent with its own terminals.
Relay Outputs	Dielectric strength coil-contacts: 4,000 V RMS for 1 minute Dielectric test voltage on open relay contact: 1,000 VAC RMS Maximum relay switching rate at maximum load: 6 operations/minute Average relay contact life: 30,000 operations at maximum load			

Table 15: Analog Output (AO)

Terminal/Channel	Type	Remark/Application
AO1, AO2	0-10 VDC (3 mA max.)	Actuators and control devices

FX06 Controller

Table 16: FX06 Controller

Product Codes	LP-FX06Pxx-xxxC	
Power Supply Requirements	24 VAC/VDC ±15%, 50/60 Hz – Safety Extra-Low Voltage (SELV) (Europe) – Class 2 North America	
Power Consumption	Controller: 7 VA maximum (Additional 3 VA if MUI is connected)	
Housing Material	ABS + polycarbonate, self-extinguishing: UL 94-5VB flammability rating	
Protection Class	Front Plate (when mounted in panel) IP55; Rear Enclosure IP20, IEC 60529	
Ambient Operating Conditions	-40 to 50°C (-40 to 122°F), 10 to 95% RH (noncondensing) Note that the integral user interface does not operate below -20°C (-4°F).	
Ambient Storage Conditions	-40°C (-40°F) to +70°C (158°F), 10 to 95 % RH (noncondensing)	
Dimensions (H x W x D)	See Figure 8 and Figure 9.	
Weight (with package)	0.32 kg (0.7 lb) including communication module 0.68 kg (1.5 lb) including communication module and cable set	
Real-Time Clock	Accuracy: Better than ± 200 ms per day at constant ambient temperature of 25°C Backup: Minimum 10 days without power at 25°C	
Integral LCD Display Resolution	-999 to 999 or -99.9 to 99.9 (4 digits for each row)	
I/O Ratings	See *I/O Technical Details*.	
Power Supply Outputs	24 VAC/DC for panel mount MUI (from controller power supply input) 15 VDC 20 mA power supply for active sensors 5 VDC 15 mA power supply for ratio-metric sensors	
Connections	Removable plug connectors. Mating connectors and cables provided with controller or available to order. See *Ordering Codes*.	
Cable Length for Inputs	Max. 100 m (330 ft) with cables ≥ 0.6 mm, 22 AWG	
Agency Compliance	**Europe**	– 2004/108/EEC, EMC Directive: EN 61000-6-3, EN 61000-6-2 – 2006/95/EEC, Low Voltage Directive: EN 60730.
	Canada	– UL Listed (PAZX7), CAN/CSA C22.2 No. 205, Signal Equipment – Industry Canada, ICES-003
	United States	– UL Listed (PAZX), UL 916, Energy Management Equipment – FCC compliant to CFR 47, Part 15, Subpart B, Class A

N2 Open Communication

Table 17: N2 Open Network Specifications

RS-485 Bus - 9600 Baud	Maximum bus segment length without repeater: 1,200 m (4,000 ft), 0.8/0.6 mm diameter (20/22 AWG) 2 x twisted pair with shield. Use the same cable type throughout segment.
Number of Devices	Maximum of 32 devices on a bus segment without repeater
Repeaters	Maximum 2 repeaters between the master (supervisory) device and any slave (FX controller) device on the network. RP-9100 is recommended.
End-of-Line Termination	220 ohm at each end of segment >100 m (330 ft). For segment <100 m (330 ft), only one 220 ohm termination is required.
RS-485/RS-232C Converter for FX CommPro N2	IU-9100 or LP-KIT200-000C. (Other converters must support automatic Data Send Control [DSC]. RTS is not supported by FX CommPro.)
Electrical Isolation in FX06	500 V

LON Communication

Table 18: LON Network Specifications

LON network topology and Line Terminators	Daisy chained Bus Topology: two terminators of 100 ohm required - one at each end of the bus. Free (star) topology: single terminator of 50 ohm required at a central point in network. Use the same cable type throughout bus or network.	
Number of Nodes	64 (if repeaters are not used), FTT-10 nodes only.	
Cable type	**Length with FTT-10 devices**	
	Bus Topology	**Free Topology**
Belden® 85102	2,700 m (8,900 ft)	500 m (1,640 ft)
Belden 8471	2,700 m (8,900 ft)	500 m (1,640 ft)
Level IV 22 AWG	1,400 m (4,600 ft)	400 m (1,300 ft)

Note: For full technical details of LONWORKS networks, refer to the LONMARK® Guidelines at www.lonmark.org.

FX Programming Key

Table 19: Programming Key Specifications

Power Supply	Directly powered from the Display Bus port of the FX06 or from an AC/DC adapter 230V/12 to 15 VDC 2 VA minimum
Memory Type and Size	Flash memory 1 MB
Connection to Controller	RS-485, not isolated. Cable (10 cm/4 in.) provided with connector for FX06 front display socket, and a screw terminal block for connection to an RS485 converter.
Enclosure IP Class	IP40
Ambient Limits	Operating: 0°C (32°F) – 40°C (104°F), 10-95% RH (noncondensing) Storage: -20°C (-4°F) – 70°C (158°F), 10-95% RH (noncondensing)
Compliance	**Europe** 2004/108/EEC, EMC Directive: EN 61000-6-3, EN 61000-6-2

GSM Connection

Table 20: GSM Modem Specifications

GSM Modem – Supreme 10		GSM 900			GSM 1800/1900		
Voltage Range	5 to 32 VDC						
Power Supply @25°C		**Min.**	**Typ.**	**Max.**	**Min.**	**Typ.**	**Max.**
Input Supply Voltage		5	13.2	32	5	13.2	32
Input Peak Supply Current (in Communication)	@5 V			1.8 A			1.1 A
	@13.2 V			0.7 A			0.4 A
	@32 V			0.4 A			0.2 A
Input Average Supply Current (in Communication)	@5 V			330 mA			220 mA
	@13.2 V			130 mA			95 mA
	@32 V			65 mA			50 mA
Input Average Supply Current (in Idle Mode)	@5 V			31.4 mA			31.4 mA
	@13.2 V			13.2 mA			13.2 mA
	@32 V			5.6 mA			5.6 mA
Ambient Operating Conditions	-20°C (-4°F) to +55°C (131°F)						
Ambient Storage Conditions	-25°C (-13°F) to +70°C (158°F)						
Housing Material	Aluminum profiled						
Volume	12.2 cm^3 (0.7 $in.^3$)						
Weight	< 130 g (0.3 lb)						
Dimensions	98 mm (3.9 in.) x 54 mm (2.1 in.) x 25 mm (1 in.) (excluding connectors)						
Overall Dimensions	110 mm (4.3 in.) x 54 mm (2.1 in.) x 25 mm (1 in.)						

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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