

# FX15 Field Controller

The FX15 Field Controller (FX15 Classic) is a high performance field controller in the Facility Explorer system specifically designed for commercial Heating, Ventilating, and Air Conditioning (HVAC) and refrigeration applications such as chillers and rooftops, indoor packaged air conditioning units, Air Handling Units (AHUs), and close control units.

The FX15 has 27 physical inputs and outputs and supports a wide range of temperature sensors and actuating devices. Up to 64 additional physical inputs and outputs may be achieved by adding the XT/XP expansion modules on the Local N2 Open bus.

The FX15 is fully programmable or configurable, using the FX Tools software package, for a wide range of commercial HVAC and refrigeration applications. The FX15 controller can be fitted with an optional communication card for integration into an N2 Open or LONWORKS® compatible Building Automation System.

The FX15 also includes an onboard Real-Time Clock to support the start-stop scheduling of equipment and real-time based control sequences.



**Figure 1: FX15 with Integrated Medium User Interface (MUI) Display**

<b>Features and Benefits</b>	
<b>Modular Communication Card Options</b>	Provide cost-effective method for either stand-alone or networked capabilities.
<b>Onboard Real-Time Clock</b>	Allows real-time scheduling of control activities.
<b>Freely Programmable or Configurable Using FX Tools Software Package</b>	Adapts to a wide range of HVAC or refrigeration control applications using the extensive programming features of the FX Tools software package.
<b>Software Selectable Analog Inputs</b>	Allow choice of temperature sensor according to the control range and application.
<b>User Interfaces, Integrated or Remote</b>	Provide clear data presentation in numerical and text format on Liquid Crystal Display (LCD) 4 x 20 character display to manage the controlled system.

## Onboard Inputs and Outputs (I/Os)

Up to 27 physical inputs and outputs can be connected to the FX15, including:

- 6 Analog Inputs (AIs)
- 8 Digital (Binary) Inputs (DIs) - for voltage free contacts
- 9 Digital Outputs (DOs) (4 Relays - line voltage contacts - and 5 Relays - line voltage contacts - or 5 Triacs - 24 VAC)
- 4 Analog Outputs (AOs) (0 - 10 V)

## Scalable I/O Expansions

The input/output capacity of the FX15 may be extended by connecting up to four XT extension modules via the Local Link N2 Bus. Expansion modules provide input/output capability for the XT extension modules.

The available connectable expansions modules are:

- XT91D00 Extension Module
- XP91D02 6 universal AIs + 2 AOs
- XP91D03 8 DOs (triacs)
- XP91D04 4 DIs + 4 DOs (triacs)
- XP91D05 8 DIs
- XP91D06 4 DOs (Relays) 230 VAC (Europe only)
- XP91D07 4 DOs (Relays) 24 VAC (North America only)

## User Interfaces

The FX15 allows for two types of user interfaces: Medium or Large.

### Medium User Interface (MUI)

The MUI includes a 4 x 20 character, backlit LCD, 6 pushbuttons, and 10 discreet status Light-Emitting Diodes (LEDs). The MUI display and navigation is completely customizable within the FX15 application. The following mounting styles are available:

- Integrated: Can be mounted directly on top of the controller.
- Local: Can be mounted up to 3 m (10 ft) from the FX15 controller. This user interface is powered by the FX15. The LP-KIT007-000C is a flat telephone cable needed for connection of power supply and data communications to the FX15.

- Remote: Can be mounted up to 300 m (1,000 ft) from the FX15. This User Interface (UI) must be independently powered. The data communication requires a 3-wire shielded cable (not provided) connected to the Remote Display Connection of the FX15.



Figure 2: Remote or Local MUI

### Large User Interface

The Large User Interface (LUI) includes a 4 x 20 character, backlit LCD, 28 pushbuttons, and 66 discreet status LEDs. The Large User Interface must be independently powered, and can be flush mounted, wall mounted, or hand held. The LUI display and navigation is completely customizable for the FX15 application using the FX Tools software package. Custom front plate templates may be ordered, based on minimum quantity.



Figure 3: Large User Interface

## Alarm Management

The FX15 manages and records alarms associated with up to 12 data points or variables in the control application.

Application alarms indicate to the user that the controlled equipment requires attention or that the controlled conditions are not within the expected limits. Alarm examples include:

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

The table of active alarms may be viewed on the available UIs.

## Supervisory Options

The FX15 can be integrated into a supervisory building automation system for continuous monitoring of the control system. The FX15 supports two methods of integration:

### N2 Open Network

When fitted with an N2 Open Communication Card, the FX15 can be connected to an N2 Open compatible building management system, allowing access to its control system variables and parameters.

### LONWORKS® Network

When fitted with a LONWORKS Communication circuit card, the FX15 can be connected to a LONWORKS compatible building management system, allowing peer-to-peer communication with other LONWORKS compatible devices.

### Real-Time Clock

The FX15 has an embedded real-time clock that supports all real-time functions, including the display of time and date on the optional user interface and the time stamping of events. The real-time clock enables the time scheduling of start and stop commands and set point changes to the equipment that is being monitored and controlled. Scheduled commands may be configured to execute on one or more days of the week and an exception day calendar allows for alternative time schedules on holidays or during special periods in the year.

Time schedules may be displayed and edited on the available UI.

The real-time clock has a battery backup with an average life of more than 2 years.

## FX Tools Pro Software

Use the FX Tools Pro software suite to program, download, test, and commission the FX devices, including the FX15. FX Tools Pro includes:

- **FX Builder** – used to program an FX15. FX Builder provides a fully programmable, function block style programming environment for you to build control algorithms for the FX15. FX Builder also includes an Application Wizard which guides you through programming applications via factory-designed and factory-tested application templates with easy-to-use configuration screens.
- **FX CommPro N2** – used to download, test, and commission an FX15 via an N2 network connection.
- **FX CommPro LON** – used to download, test, and commission an FX15 via a LONWORKS network connection.

## Application Upload/Download

You can download the application to the FX14 controller via a computer with FX CommPro or via the FX Programming Key (Figure 4) (only compatible with N2 or stand-alone applications).

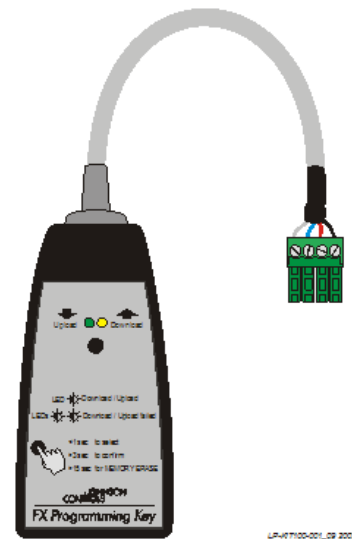


Figure 4: FX Programming Key

# FX15 Controller Dimensions

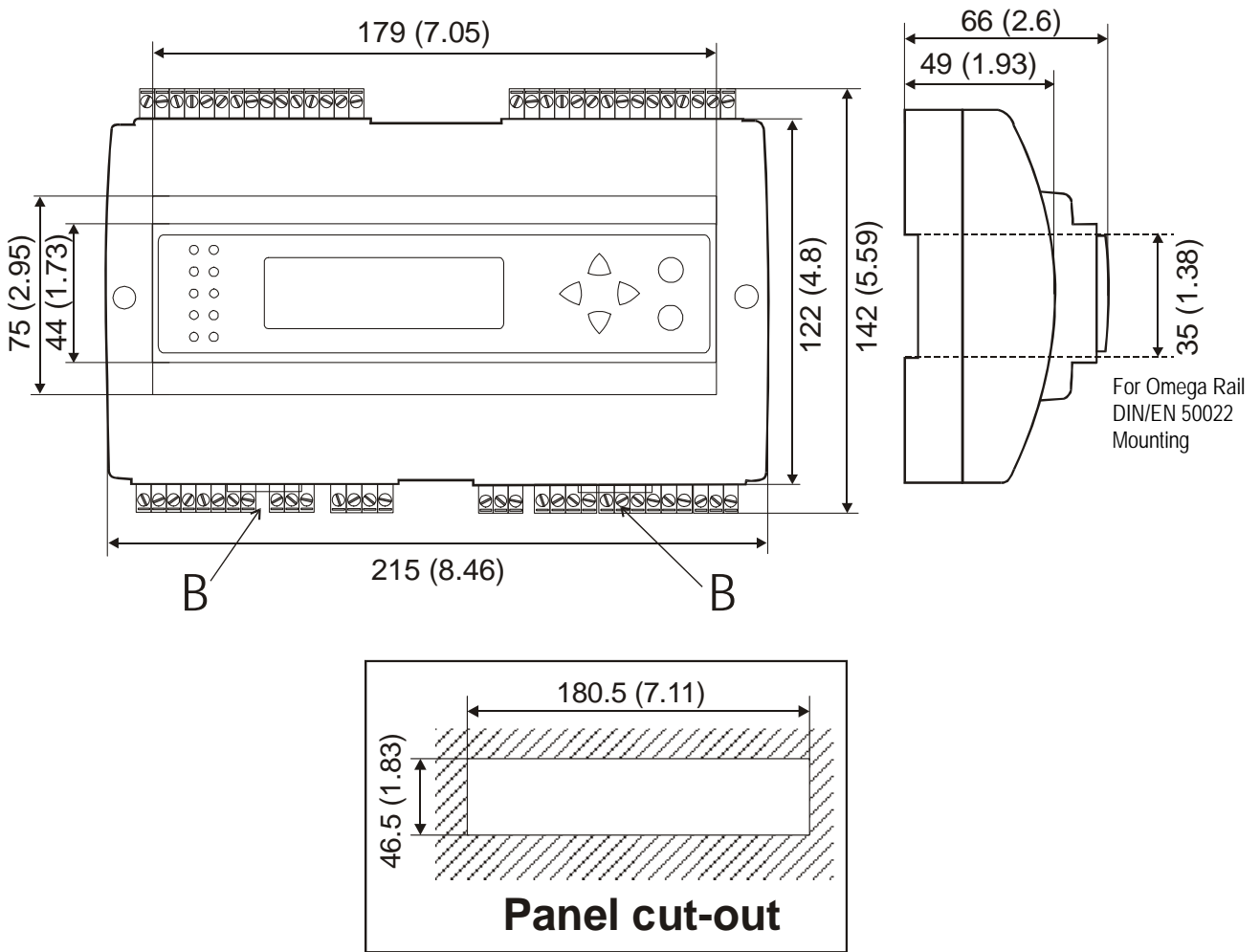


Figure 5: FX15 with Integrated MUI and Panel Cut-Out Dimensions, mm (in.)

## Ordering Codes

**Table 1: Standard Temperature Range Controllers Ordering Information**

Product Code Number	Description
LP-FX15D10-000C	FX15: Digital Outputs: 4 Relays and 5 Triacs
LP-FX15D11-000C	FX15: Digital Outputs: 4 Relays and 5 Triacs. Includes N2 Open Card.
LP-FX15D12-000C	FX15: Digital Outputs: 4 Relays and 5 Triacs. Includes LONWORKS Card.
LP-FX15D60-000C	FX15: Digital Outputs: 4 Relays and 5 Triacs. Includes Integrated MUI.
LP-FX15D61-000C	FX15: Digital Outputs: 4 Relays and 5 Triacs. Includes N2 Open Card and Integrated MUI.
LP-FX15D62-000C	FX15: Digital Outputs: 4 Relays and 5 Triacs. Includes LONWORKS Card and Integrated MUI.
LP-FX15D20-000C	FX15: Digital Outputs: 9 Relays
LP-FX15D21-000C	FX15: Digital Outputs: 9 Relays. Includes N2 Open Card.
LP-FX15D22-000C	FX15: Digital Outputs: 9 Relays. Includes LONWORKS Card.
LP-FX15D70-000C	FX15: Digital Outputs: 9 Relays. Includes Integrated MUI.
LP-FX15D71-000C	FX15: Digital Outputs: 9 Relays. Includes N2 Open Card and Integrated MUI.
LP-FX15D72-000C	FX15: Digital Outputs: 9 Relays. Includes LONWORKS Card and Integrated MUI.

**Table 2: Extended Temperature Range Controllers Ordering Information**

Product Code Numbers	Description
LP-FX15X10-000C	FX15: Digital Outputs: 4 Relays and 5 Triacs
LP-FX15X11-000C	FX15: Digital Outputs: 4 Relays and 5 Triacs. Includes N2 Open Card.
LP-FX15X12-000C	FX15: Digital Outputs: 4 Relays and 5 Triacs. Includes LONWORKS Card.
LP-FX15X20-000C	FX15: Digital Outputs: 9 Relays
LP-FX15X21-000C	FX15: Digital Outputs: 9 Relays. Includes N2 Open Card.
LP-FX15X22-000C	FX15: Digital Outputs: 9 Relays. Includes LONWORKS Card.

**Table 3: Communications Cards Ordering Information**

Product Code Numbers	Description
LP-NET151-010C	N2 Open Communication Card
LP-NET152-010C	LONWORKS Communication Card

**Table 4: Accessories Ordering Information**

Product Code Numbers	Description
LP-KIT007-000C	Link Interface cable (3 m/9.8 ft) for the connection of the FX15 to the MUI/LUI user interfaces
LP-KIT007-020C	Bag of replacement communication wiring connectors
DT-9100-8902	LUI Wall Mounting Kit
NP-PWR1209	LUI Power Adapter (120 VAC/12 VDC)
DT-9100-8901	LUI Power Adapter (230 VAC/12 VDC)
LP-KIT015-000C	Kit of Female Screw Connectors
LP-KIT015-001C	Kit of Female Cage Clamp Connectors
LP-KIT100-000C	FX Programming Key

**Table 5: User Interfaces Ordering Information**

<b>Product Code Numbers</b>	<b>Description</b>
LP-DIS65P10-0C	Large User Interface
LP-DIS60P10-0C	Medium User Interface (Local Mount)
LP-DIS60P11-0C	Medium User Interface (Remote Mount)
LP-DIS60U10-C	Medium User Interface (Integral Mount)

**Table 6: Expansion I/O Modules Ordering Information**

<b>Product Code Numbers</b>	<b>Description</b>
LP-XT91D00-000C	Extension Module
LP-XP91D02-000C	Expansion Board: 6 AIs, 2 AOs
LP-XP91D03-000C	Expansion Board: 8 DOs (triacs)
LP-XP91D04-000C	Expansion Board: 4 DIs, 4 DOs (triacs)
LP-XP91D05-000C	Expansion Board: 8 DIs
LP-XP91D06-000C	Expansion Board: 4 DOs (relays) 230 VAC (Europe only)
LP-XP91D07-000C	Expansion Board: 4 DOs (relays) 24 VAC (North America only)

**Table 7: Software Tools Ordering Information**

<b>Product Code Numbers</b>	<b>Description</b>
LP-FXTPRO-0	FX Tools Pro CD (Includes the FX Builder, FX CommPro N2, and LON Software) - New User
LP-FXTPRO-6	FX Tools Pro CD (Includes the FX Builder, FX CommPro N2, and LON Software) - Upgrade

# Technical Specifications

Table 8: I/O Details

Terminals	Channel	Type	Remark/Application
<b>Analog Input (AI)</b>			
<b>TB1</b>	AI1, AI2, AI3, AI4, AI5, AI6	See following table. 16-bit resolution	Freely software configurable. Application: temperature, humidity, or pressure
<b>3, 8</b>	EXT-VDC	+16 V, 80 mA	0 - 10 V Sensors <b>or</b> max no. 4 0/4 - 20 mA Sensors
<b>13</b>	AVPS/ EXT-VDC	AVPS = +5 V, 20 mA EXT-VDC = +16 V, 80 mA	To power directly from the FX15 ratiometric sensors, with AVPS <b>or</b> 0 - 10 V, 0/4 - 20 mA Sensors with EXT-VDC. The selection between AVPS and EXT-VDC is done by jumpers.
<b>Digital Input (DI)</b>			
<b>TB2</b>	DI1, DI2, DI3, DI4, DI5, DI6, DI7, DI8	Potential free contacts	The insulation from the microprocessor is achieved if a different 24 VAC power supply from the one used to power the controller is used to power the digital inputs (through Terminals 34, 35). Transition counter function maximum 500 ms on and 500 ms off (1 Hz). For quicker counter function, use the LP-XP91D05 module.
<b>Digital Output (DO)</b>			
<b>TB3</b>	DO1, DO2, DO3	SPST 8(3)A, 250 V power relays	There is double insulation between the relays, and they can be used at different voltages from one another.
<b>TB4</b>	DO4, DO5	SPST 5(3)A, 250 V power relays <b>or</b> 0.5A, 24 VAC triacs	This group is double insulated from the other relays, but they share the same common between them; therefore, they have to be connected at the same voltage.
<b>TB5</b>	DO6, DO7, DO8	SPST 5(3)A, 250 V power relays <b>or</b> 0.5A, 24 VAC triacs	This group is double insulated from the other relays, but they share the same common between them; therefore, they have to be connected at the same voltage.
<b>TB6</b>	FAIL	SPDT 8(3)A, 250 V power relay	Fail relay for enhanced security. The relay returns to its NC position not only at power fail, but also in case the microprocessor should fail: watch-dog, brown-out, and so on.
<b>Analog Output (AO)</b>			
<b>TB7</b>	AO1, AO2	0...10 VDC 16 bit resolution	The insulation from the microprocessor is achieved if a different 24 VAC power supply from the one used to power the controller is used to power the analog outputs.
<b>TB8</b>	AO3, AO4	0...10 VDC 16-bit resolution	The insulation from the microprocessor is achieved if a different 24 VAC power supply from the one used to power the controller is used to power the analog outputs (through Terminals 79, 80).

**Table 9: Available Sensor Types**

<b>Sensor Type</b>	<b>Linearization Range</b>	<b>Accuracy @ 20°C (68°F) ambient</b>
<b>Ni1000 JCI</b>	-45°C (-49°F) to 120°C (248°F)	+/- 0.5°C (+/- 1°F)
<b>Ni1000 JCI Extended</b>	20°C (68°F) to 287°C (548.6°F)	+/- 0.5°C (+/- 1°F)
<b>Ni1000 Siemens®</b>	-50°C (-58°F) to 160°C (320°F)	+/- 0.5°C (+/- 1°F)
<b>Ni1000 DIN</b>	-60°C (-76°F) to 180°C (356°F)	+/- 0.5°C (+/- 1°F)
<b>Pt1000</b>	-50°C (-58°F) to 605°C (1121°F)	+/- 0.5°C (+/- 1°F)
<b>A99</b>	-50°C (-58°F) to 110°C (230°F)	+/- 0.5°C (+/- 1°F)
<b>NTC 2.2K</b>	-40°C (-40°F) to 150°C (302°F)	+/- 0.5°C (+/- 1°F)
<b>0 to 5 VDC ratiometric</b>	10 to 90% of supply voltage	0.3%
<b>0 to 10 VDC</b>	0 to 10 Volts	0.3%
<b>0 to 20 mA</b>	0 to 20 mA	0.3%



**Table 10: FX15 Standard and Extended Range Models (Extended Range Information in Bold)**

<b>Product Codes</b>	LP-FX15Dxx-000C (see Table 1 for Standard Range Models) <b>LP-FX15Xxx-000C (see Table 2 for Extended Range Models)</b>	
<b>Power Supply Requirements</b>	24 VAC ±15%, 50/60 Hz - Class 2 Power Supply – SELV in Europe	
<b>Power Consumption</b>	15 VA at max load	
<b>Protection Class</b>	IP20 controller IP40 integrated MUI	
<b>Ambient Operating Conditions</b>	STD controller: -20°C (-4°F) to +50°C (122°F), 10 to 95% RH (noncondensing) <b>Extended range controller: -40°C (-40°F) to 60°C (140°F), 10 to 95% RH (noncondensing)</b>	
<b>Ambient Storage Conditions</b>	-20°C (-4°F) to 70°C (158°F), 10 to 95% RH (noncondensing)	
<b>Dimensions (H x W x D)</b>	142 mm (5.6 in.) x 215mm (8.5 in.) x 49 mm (1.9 in.)	
<b>Weight (with package)</b>	0.74 kg (1.6 lb)	
<b>Connection Terminals for Signals and Power Supply</b>	Screw terminals for max 1 x 1.5 mm <sup>2</sup> (AWG16) wires, included in the package.	
<b>LON/N2 Open Bus Connection Terminals</b>	Screw terminals, cable size 0.2 to 1.5 mm <sup>2</sup> , AWG24 to AWG16, included in the package. Belden® cable, 2-core twisted pair with shield ≥ 0.8 mm (AWG20)	
<b>Connection Terminals for Extension Bus and Remote Display</b>	Screw terminals, cable size 0.2 to 1.5 mm <sup>2</sup> , AWG24 to AWG16, included in the package.	
<b>Single Cable Lengths</b> <i>Digital Inputs DI1 - DI8</i> <i>Analog Inputs AI1 - AI6</i> <i>Triac outputs (when present)</i> <i>Analog Outputs AO1 - AO4</i> <i>Remote Display</i>  <i>Extension Modules</i> <b>Display and Extensions Cable Type</b>	Max. 100 m (328 ft) with wire ≥ 0.6 mm (AWG22) Max. 100 m (328 ft) with wire ≥ 0.6 mm (AWG22) Max. 100 m (328 ft) with wire = 1.5 mm <sup>2</sup> (AWG16) Max. 100 m (328 ft) with wire + 1.5 mm <sup>2</sup> (AWG16) Max. 3 m (10 ft) if display is powered by controller. Max. 1 km (0.6 miles) if display independently powered. Max. 1 km (0.6 miles) Belden 4-core, twisted pair, shielded, ≥ 0.8 mm (AWG20)	
<b>Compliance</b>	<b>Europe</b>	– 2004/108/EEC, EMC Directive: EN 61000-6-3, EN 61000-6-2 – 2006/95/EEC, Low Voltage Directive: EN 60730
	<b>Canada</b>	– 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
	<b>United States</b>	– 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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