FX14 Field Controller

The FX14 is a field controller in the Facility Explorer range of products. The controller is designed specifically for commercial Heating, Ventilating, Air Conditioning, and Refrigeration (HVACR) applications.

The FX14 is a high performance controller with a powerful 16-bit microprocessor and state-of-the-art software for the precise control of many types of mechanical and electrical equipment. The controller has 29 physical inputs and outputs and supports a wide range of temperature sensors and actuating devices. Active sensors for the measurement of humidity, pressure, and other variables are also supported. The FX14 also includes an on-board real-time clock to support the start-stop scheduling of equipment and real-time based control sequences.

Parameters in the control application can be displayed and modified from the optional integral Liquid Crystal Display (LCD) which has a set of graphic status icons used in the most common HVAC/R applications, or from a remote panel or wall mounted Medium User Interface (MUI).

The FX14 field controller is available with plug-in communication cards to enable the controller to be integrated into an N2 Open or LONWORKS® network of a Building Automation System.

For stand-alone applications, the FX14 also features communications services to transmit event notification messages via Short Messaging Service (SMS) using a modem communication card.

The FX14 field controller is fully configurable or programmable, using the FX Tools software package, for a wide range of commercial HVAC/R applications including multi-compressor and scroll compressors, close control units, unit ventilators and packaged air handling units.

Figure 1: FX14 Field Controller with Integral LCD Display

Features and Benefits	
❑ **Freely Programmable or Configurable Using FX Tools Software Package**	Suitable for a wide range of HVAC or refrigeration control applications using the extensive programming features of the FX Tools software package
❑ **Network Communication Card Options**	Provide cost effective solution for stand-alone or networked applications
❑ **Remote Communication Services**	Enable automatic reporting of events and alarms by Short Message Service (SMS) for stand-alone applications
❑ **Choice of User Interfaces, Integral or Remote**	Provides clear data presentation in numerical and text format on a Liquid Crystal Display (LCD) and control keys for local and remote monitoring and override of the controlled system
❑ **Onboard Real-Time Clock**	Enables real-time scheduling of control activities
❑ **Software Selectable Analog Input Type**	Allow choice of temperature and other sensors according to the control range and application
❑ **Analog Outputs with PWM Option**	Interface to a wide range of actuators and drives
❑ **Many Binary Inputs and Outputs (Triacs and Line Voltage Relay Contacts) for Auxiliary Monitoring and Control**	Provide cost effective control of refrigeration, unitary, air handling, and small central plant equipment

Onboard Inputs and Outputs

Up to 29 physical inputs and outputs can be connected to the FX14, including:

- 6 Analog Inputs (AIs) (software configurable)
  - A99 temperature
  - Ni1000 temperature
  - PT1000 temperature
  - NTC 10 K temperature
  - Ratiometric (0.5-4.5 VDC)
  - 0-10 VDC
- 12 Digital (Binary) Inputs (DIs)
  - for voltage free contacts
  - with a pulse counter on DI1
- 9 Digital (Binary) Outputs (DOs) (model dependent)
  - 9 Relays (line voltage contacts)
  - 4 Triacs (24V), 5 Relays (line voltage contacts)
- 2 Analog Outputs (AOs) (hardware and software configurable)
  - 0-10 VDC
  - PWM (Pulse Width Modulation) (100Hz)

User Interfaces

The FX14 supports two types of user interface - integral and remote.

Integral User Interface

The integral LCD user interface of the FX14 features:

- 2 display rows with 4 alpha-numeric characters (13 segment)
- blue or red colored background
- graphic status icons: compressor, alarm, high pressure, low pressure, maintenance, heat, cool, defrost and electric heat symbols
- 4 pushbuttons for user control functions
- navigation menu for user guidance

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

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

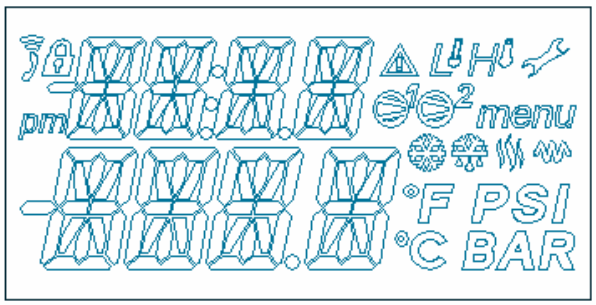

Figure 2: Detail of the LCD

Remote User Interface (MUI)

The MUI has a 4 x 20 character, backlit LCD screen, 6 pushbuttons and 10 status Light-Emitting Diodes (LEDs). The display including its navigation menu is completely configurable within the FX14 application design. The following mounting styles are available:

- Panel Mount: Can be mounted up to 3 m (10 ft) from the FX14 controller. This user interface is powered at 16 VDC by the FX14. A flat telephone cable is available for the connection of the power supply and data communications to the FX14 controller.
- Wall Mount: Can be mounted up to 300 m (1,000 ft) from the FX14. This user interface must be independently powered. The data communication requires a 3-wire shielded cable (not provided) for the connection to the remote display to the FX14 controller.

Figure 3: Panel or Wall Mount User Interface (MUI)

Supervisory Options

The FX14 can be integrated into a supervisory building automation system for continuous monitoring of the control system. The FX14 supports two methods of integration:

N2 Open Network

When fitted with an N2 Open Communication Card, the FX14 can be connected to the N2 Open bus of a building automation system, allowing access to its control system variables and parameters.

LONWORKS Network

When fitted with a LONWORKS Communication Card, the FX14 can be connected to a LONWORKS compatible building management system, allowing peer-to-peer communication with other LONWORKS compatible devices and access to system parameters.

Communication Services

RS232C Serial Card

The RS232C Serial Communication Card enables the FX14 controller to be connected to a Global System for Mobile communications (GSM) modem for event and alarm notification.

Short Message Service (SMS)

The FX14 Field Controller can be programmed to send out text messages in SMS format when connected to a GSM modem with an appropriate transmitter and antenna. SMS messages can be sent to a Service Center or directly to a mobile telephone. Messages are sent when an event goes into the active or alarm state and can be directed to a prioritized list of destinations.

Real-Time Clock

The FX14 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 a remote user interface.

The real-time clock is battery backed with an average battery capacity of more than 10 days without power at room temperature.

Event Management

The FX14 manages and records events and alarms that are associated with up to 20 data points or variables in the control application.

Application events indicate to the user 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

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

FX Tools

FX Tools is a software suite used to program, download, test, and commission the FX devices, including the FX14. 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 a standard application and configure it using a graphical user interface.
- FX Builder: Used to program an FX14. FX Builder provides complete flexibility in programming the FX14.
- FX CommPro N2: Used to download, test, and commission an FX14 on an N2 Open bus.
- FX CommPro LON: Used to download, test, and commission an FX14 controller on a LONWORKS network.

Programming Key

The FX14 is a fully programmable or configurable controller and the application can be downloaded to the controller via computer with FX Tools or uploaded/downloaded via the FX Programming Key.

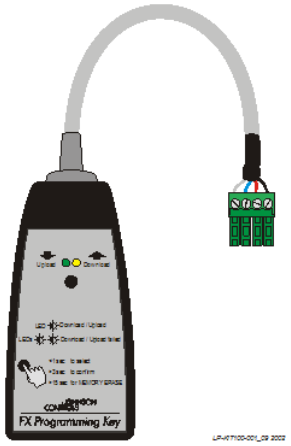

Figure 4: FX Programming Key

IMPORTANT: Use this FX14 controller only as an operating control. Where failure or malfunction of the FX14 could lead to personal injury or 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 that are intended to warn of, or protect against, failure or malfunction of the FX14 controller.

FX14 Field Controller Dimensions

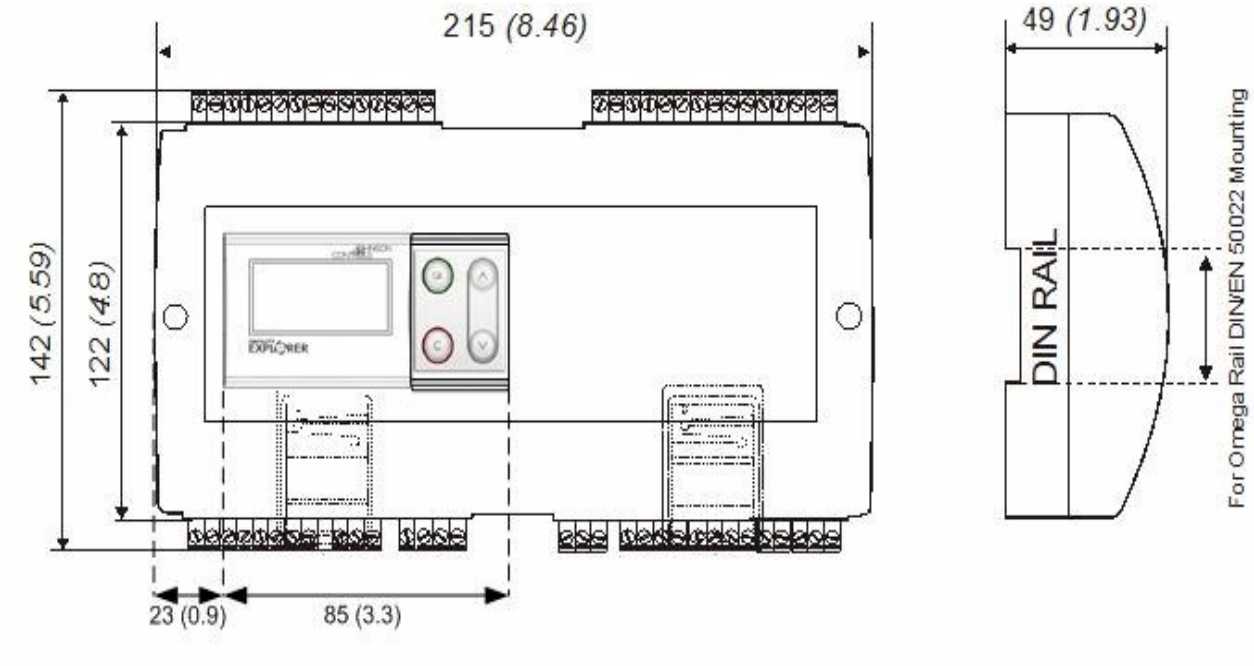

Figure 5: FX14 Controller Dimensions, mm (in.)

Ordering Codes

Table 1: FX14 Controllers Ordering Information

Product Code Number	Description
LP-FX14D10-000C	FX14: Digital Outputs: 5 Relays + 4 Triacs.
LP-FX14D11-000C	FX14: Digital Outputs: 5 Relays + 4 Triacs - includes N2 Open Card
LP-FX14D12-000C	FX14: Digital Outputs: 5 Relays + 4 Triacs - includes LONWORKS Card
LP-FX14D13-000C	FX14: Digital Outputs: 5 Relays + 4 Triacs - includes RS232C Card
LP-FX14D60-000C	FX14: Digital Outputs: 5 Relays + 4 Triacs - includes Integral User Interface
LP-FX14D61-000C	FX14: Digital Outputs: 5 Relays + 4 Triacs - includes N2 Open Card and Integral User Interface
LP-FX14D62-000C	FX14: Digital Outputs: 5 Relays + 4 Triacs - includes LONWORKS Card and Integral User Interface
LP-FX14D63-000C	FX14: Digital Outputs: 5 Relays + 4 Triacs - includes RS232C Card and Integral User Interface
LP-FX14D20-000C	FX14: Digital Outputs: 9 Relays
LP-FX14D21-000C	FX14: Digital Outputs: 9 Relays - includes N2 Open Card
LP-FX14D22-000C	FX14: Digital Outputs: 9 Relays - includes LONWORKS Card
LP-FX14D23-000C	FX14: Digital Outputs: 9 Relays - includes RS232C Card
LP-FX14D70-000C	FX14: Digital Outputs: 9 Relays - includes Integral User Interface
LP-FX14D71-000C	FX14: Digital Outputs: 9 Relays - includes N2 Open Card and Integral User Interface
LP-FX14D72-000C	FX14: Digital Outputs: 9 Relays - includes LONWORKS Card and Integral User Interface
LP-FX14D73-000C	FX14: Digital Outputs: 9 Relays - includes RS232C Card and Integral User Interface

Table 2: Communications Cards Ordering Information

Product Code Numbers	Description
LP-NET151-010C	N2 Open Communication Card
LP-NET142-000C	LONWORKS Communication Card
LP-NET163-000C	RS232C Communication Card

Table 3: User Interfaces Ordering Information

Product Code Numbers	Description
LP-DIS60P10-0C	Medium User Interface (MUI) - Panel Mount
LP-DIS60P11-0C	Medium User Interface (MUI) - Wall Mount

Table 4: Accessories Ordering Information

Product Code Numbers	Description
LP-KIT007-000C	Link cable for the connection of the FX14 to the Panel Mount MUI display -3m (19 ft)
LP-KIT014-000C	Kit of female screw connectors
LP-KIT100-000C	FX Programming Key
DT-9100-8901	Power Supply Adapter for Programming Key : 230 VAC/12 VDC

Table 5: Software Tools Ordering Information

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

Technical Specifications

Table 6: I/O Details

Terminals	Channel	Type	Remark/Application
Analog Input (AI)			
TB1 (1-15)	AI1, AI2, AI3, AI4, AI5, AI6	See table below. 16-bit resolution	Freely software configurable. Application: temperature, humidity, or pressure
TB1 (3,8,13)	AI V Ref	+16 V, max. 20 mA or +5 V, max. 15 mA (jumper selection)	To power active 0-10 V sensors or potentiometers **or** To power ratiometric sensors or potentiometers
Digital Input (DI)			
TB2 (21-36)	DI1, DI2, DI3, DI4, DI5, DI6, DI7, DI8, DI9, DI10, DI11,DI12	Potential free contacts	Transition counter function on DI1 (TB2 (21-22), maximum 10ms on and 10ms off (@ 50 Hz).
Digital Output (DO)			
Relay Outputs	Dielectric test voltage on open relay contact: 1,000 VAC RMS Maximum relay switching rate at nominal load: 6 operations/min Rated circuit breaking capacity at 250 VAC: 500 VA		
TB6 (41-48)	DO1, DO2, DO3	SPST 8(3)A, 250 V relays	As there is double insulation between the relays, they can be used to switch circuits with different power and voltage sources.
TB7 (51-55)	DO4, DO5	SPST 8(3)A, 250 V relays	
TB7 (57-58)	DO6	SPST 8(3)A, 250 V relays **or** 0.5A, 24 VAC triacs	
TB8 (61-68)	DO7, DO8, DO9	SPST 8(3)A, 250 V relays **or** 0.5A, 24 VAC triacs	
Analog Output (AO)			
TB9 (71)	AO V Ref	15 VDC, max. 10 mA	Voltage Reference signal used for PWM output.
TB9 (72-73)	AO1	0-10 VDC, max. 3 mA **or** PWM, 100 Hz	Used to drive motor actuator, control device or fan speed controller. 16 bit resolution.
TB10 (74)	AO V Ref	15 VDC, max. 10 mA	Voltage Reference signal used for PWM output.
TB10 (75-76)	AO2	0-10 VDC, max, 3 mA **or** PWM, 100 Hz	Used to drive motor actuator, control device or fan speed controller. 16 bit resolution.

Table 7: Analog Input Types

Sensor Type	Linearization Range	Accuracy at 20°C (68°F) Ambient (Sensor Not included)
A99	-40 to 100°C (-40 to 212°F)	±0.5°C (1°F)
NTC 10K	-20 to 70°C (-4 to 158°F)	±0.5°C (1°F)
Pt1000	-40 to 160°C (-40 to 320°F)	±1°C (1.8°F)
Ni1000 JCI	-40 to 120°C (-40 to 248°F)	±1°C (1.8°F)
Active Voltage	0-10 VDC	±0.1 VDC
Active Ratiometric	0.5-4.5 VDC	±0.05 VDC

Table 8: FX14 Field Controller

Product Codes	LP-FX14Dxx-000C
Power Supply Requirements	24 VAC ±15%, 50/60 Hz – SELV in Europe - Class 2 North America
Power Consumption	19.5 VA at max. load
Housing Material	ABS + polycarbonate, self-extinguishing: UL 94-5VB flammability rating
Protection Class	IP20
Ambient Operating Conditions	-40°C (-40°F) to +60°C (140°F), 10 to 95% RH (noncondensing) Note: Integral display will 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)	142 mm (5.6 in.) x 215mm (8.5 in.) x 49 mm (1.9 in.)
Weight (with Package)	0.74 kg (1.6 lb)
Integrated LCD Display Numeric Resolution	-999 to 999 or -99.9 to 99.9
Connection Terminals for AIs, DOs and Power Supply	Screw terminals for max. 2 x 1.5 mm^2 (AWG16) wires, included in the package.
Connection Terminals for LON/N2 Open Bus	Screw terminals for max. 1 x 1.5 mm^2 (AWG16) wires, included in the package. Belden cable, 2-core twisted pair with shield ≥ 0.8 mm (AWG20)
Connection Terminals for AOs, DIs and Remote Display	Screw terminals for max. 1 x 1.5 mm^2 (AWG16) wires included in the package.
Compliance	**Europe** – 89/336/EEC, EMC Directive: EN 61000-6-3, EN 61000-6-2 – 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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