

FX16 Master Controller

multi-media programmable controller

The FX16 Master Controller is a multi-media programmable controller of the FX Platform. The FX16 Master Controller is specifically designed for commercial HVAC and refrigeration applications such as chillers and rooftops, indoor packaged air conditioning units, Air Handling Units and Close Control Units.

The controller has 27 physical inputs & outputs and supports a wide range of temperature sensors and actuating devices. Additional physical inputs & outputs may be achieved by adding the XT/XP expansion modules on the Local N2Open bus.

The FX16 Master Controller is able to manage a distributed control application with up to 8 FX Platform slave controllers (FX05 Advanced, FX15 Classic & Universal). Parameters in the distributed control application can be displayed and modified from the optional remote mounted user interface displays.

Multimedia features include the communication services to transmit event notification messages via SMS (Short Messaging Service) or by e-mail. With its on-board Web server, the user can browse and make adjustments to parameters of the application from a remote location.

The FX16 Master Controller is fully programmable, using the FX TOOLS 2 Suite, for a wide range of commercial environmental control applications including the connected XT/XP modules and FX slave controllers.

The FX16 Master Controller is also available with a serial communication card for integration into a Building Automation System with a LonWorks® or N2Open bus network.



Figure 1 : FX16 Master Controller

Features and Benefits	
<input type="checkbox"/> Distributed Control Application	Management of multiple FX Platform controllers operating as an integrated control system with a common user interface
<input type="checkbox"/> Embedded Web server	Data available from the control system on a Web browser with standard Internet Explorer® software V5.5 or later at any location with a secure access to the FX16 Master Controller
<input type="checkbox"/> Communication Services	Automatic reporting of important events/alarms by e-mail or by SMS (Short Message Service)
<input type="checkbox"/> Supervisory Communication Options	FX16 Master Controller can be integrated into a supervisory Building Management System using the optional LonWorks® or N2Open communication cards
<input type="checkbox"/> Freely Programmable using FX TOOLS 2 Software Suite	Adaptable to a wide range of HVAC or refrigeration control applications using the extensive programming features of the FX TOOLS 2 software Suite
<input type="checkbox"/> Trend and Event Logging	Automatic reporting and recording of control system events and alarms as well as continuous trending of data from selected control routines for display or long term storage.
<input type="checkbox"/> Software selectable analog inputs : A99 / NTC k10, 2k2 4-20 mA 0-10 V 0-5 V Ratiometric	Choice of temperature sensor according to the control range and application.
<input type="checkbox"/> User Interfaces, integrated or remote	Clear data presentation in numerical and text format on LCD 4 x 20 character display to manage the controlled system.

On Board Inputs and Outputs

The FX16 Master Controller features the following I/O Channels:

- ❑ 6 high resolution Analog Inputs;
- ❑ 8 opto-isolated Digital (Binary) Inputs (DI) – for voltage free contacts;
- ❑ 9 Digital Outputs (4 Relays -line voltage contacts- and 5 Relays -line voltage contacts- or 5 Triacs - 24 VAC-);
- ❑ 4 Analog Outputs (0..10 V).

Scalable I/O Expansions

The input/output capacity of the FX16 Master Controller may be extended by connecting up to four extension modules via the Local N2Open Bus.

An extension module comprises an XT-9100 processor / communications module and one or more XP expansion modules. The expansion modules provide input/output capability for the extension modules.

An extension module set is assembled from sub-modules, providing various combinations of analog and digital (binary) I/O points.

The connectable expansions are:

- ❑ XT-9100 Processor / Communication Module
- ❑ XP-9102 6 universal AIs + 2 AOs
- ❑ XP-9103 8 DOs (triacs)
- ❑ XP-9104 4 DIs + 4 DOs (triacs)
- ❑ XP-9105 8 Dis
- ❑ XP-9106 4 DOs (Relays) 230VAC (Europe only)
- ❑ XP-9107 4 Dos (Relays) 24VAC (North America only)

Refer to the *XT-9100 Technical Bulletin* for more details.

Embedded Web Server and Web Page Access

The FX16 Master Controller features an embedded Web server that enables a local or remote user to establish communication with the FX16 Master Controller from a PC and to browse live control information, active alarms, recorded data and configuration parameters. This feature provides an effective, low cost monitoring and control system without the need for any special or proprietary supervisory software.

The Web pages are accessed using a direct serial line or telephone modem connection and the point-to-point protocol (PPP) from any PC with Microsoft® Internet Explorer® software that serves as a Web browser.

The FX16 Master Controller provides the formatting data for the requested pages starting with a “Home Page” from which other pages can be requested. Each page may contain graphic images and links to the other pages as well as data windows for the display of live information from the control system.

The active values are transmitted by the embedded Web server in the FX16 Master Controller to the screen of the PC. Typically up to 16 values can be continuously updated in one page and the user may adjust or override values on the screen. Access to the Web pages is protected by a password system to prevent unauthorised viewing of data and control actions.

From the Web browser the user can access the event history log, the list of active alarms in the FX16 Master Controller. The user can also display the contents of the trend log table, and enable or disable trend collection.

In summary, the Web server interface provides the following features from any PC that is directly connected to the FX16 Master Controller or with access to the telephone system.

- ❑ Display live variables in the monitored control system
- ❑ Adjust and command variables in the control system
- ❑ Display and acknowledge active alarms
- ❑ Display the event history log
- ❑ Display trended values and copy/paste to Excel spreadsheet for storage and further processing
- ❑ Enable and disable trend logs
- ❑ Read and modify communication parameters including e-mail addresses, telephone numbers, etc.

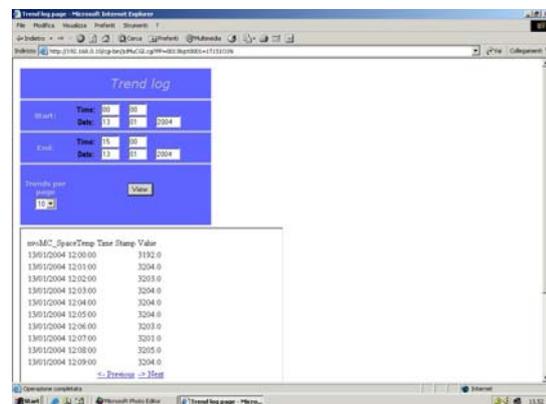


Figure 2 : Web Page with Trend Data

Communication services

E-mail, SMS Messaging

The FX16 Master Controller can be programmed to send out e-mail, SMS (Short Message Service) messages when connected to a modem and telephone line or to a GSM (Global System for Mobile communications) modem with an appropriate transmitter and antenna. E-mail messages are directed to an ISP (Internet Service Provider) that offers an e-mail forwarding service. SMS messages can be sent to a Service Centre 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.

Alternatively if the user has access to a PC with Web browser and modem connection, the control system can be viewed on the Web pages that have been generated in the FX16 Master Controller.

The e-mail service can also be used to periodically send trend log data to a remote e-mail receiver for electronic storage and to prevent the loss of data in the FX16 Master Controller when the trend buffer is full.

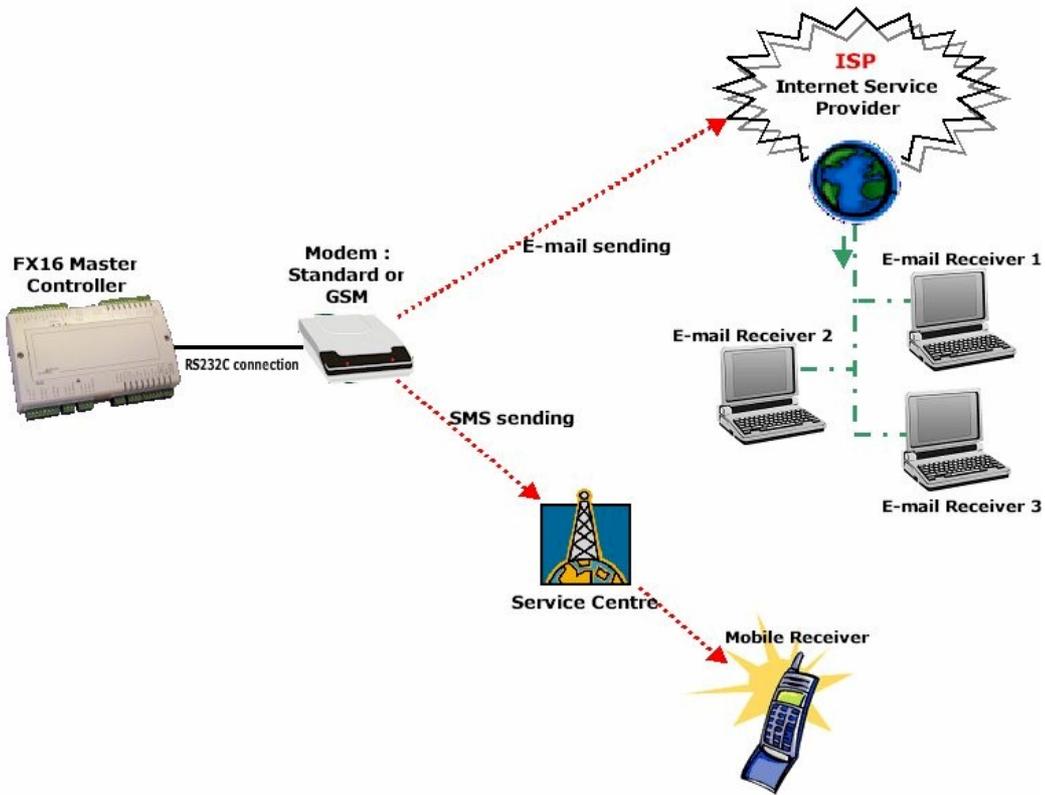


Figure 3 : Communication Services

Distributed Application

A distributed application is a control strategy that is managed by the FX16 Master Controller but is executed concurrently in the FX16 Master Controller and in up to eight FX platform controllers connected to the Local Link Bus. The communication between the controllers is defined by network variables in the distributed application and the FX16 Master Controller executes the communication in the most effective way to maintain the performance of the entire control system.

Distributed applications are used for the coordinated control of a central plant and the remote equipment that it serves. For example, a distributed application could be applied to an FX16 Master Controller controlling an air handling unit and a number of FX05 controllers controlling zone temperature controllers. Another benefit of the distributed application is the ability to combine FX controllers to provide the required inputs and outputs for the physical equipment interface and then to develop an application that is automatically distributed and executed in the individual controllers as a single control system.

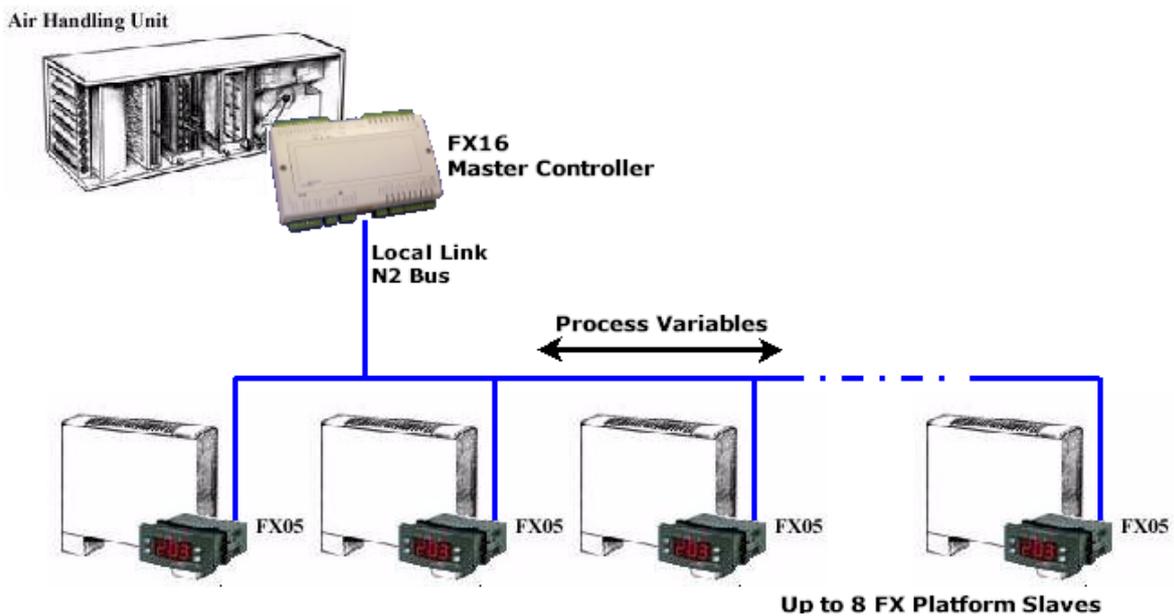


Figure 4 : Distributed Application

Supervisory Options

The FX16 Master Controller controllers can be integrated into a supervisory building management system for continuous monitoring of the control system. The FX16 Master Controller supports two methods of integration :

N2Open Network

A supervisory N2Open building management system can be connected to the FX16 Master Controller and has access to all the control system variables and parameters when the FX16 Master Controller is fitted with the N2Open communication card.

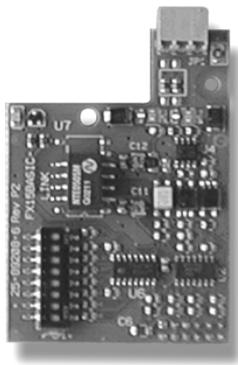


Figure 5 : N2Open Communication card

LonWorks® Network

A LonWorks® compatible building management system can be connected to the FX16 Master Controller when the FX16 Master Controller is fitted with the LonWorks® communication card.

The LonWorks® network uses the peer-to-peer LonTalk® protocol so that the FX16 Master Controller can be monitored or commanded by any LonWorks® compatible device on the system network and present the data on its user interfaces (integral or remote).

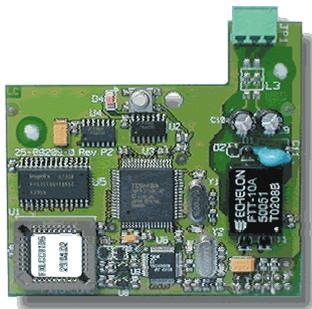


Figure 6 : LonWorks® Communication card

Real Time Clock

The FX16 Master Controller has a real time clock that supports all real time clock functions including the display of

time and date on the screen and the time stamping of each event. The real time clock also enables the time scheduling of start and stop commands and set point changes to the plant 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 User Interfaces or in a Web page on a Web browser screen. The real time clock is battery backed with an average battery life of more than two years.

Alarm and Event Management

The FX16 Master Controller manages and records events or errors that are generated by the operating system and events or alarms that are associated with data points or variables in the control application.

System events indicate to the user that the control system requires some attention and include events such as:

- System power up
- Trend buffer full
- Communication message failure (E-mail, SMS)
- Device communication error
- Application or display diagnostic error

Application events or 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

When an event goes into the active state, it is entered into the table of active events and the event history log with the time and date of occurrence, and a message window appears on the display screen. The event can also be configured to send a message to one or more of the following:

- E-mail Message Server
- Mobile Telephone with Short Message Service (SMS)

When active events are configured to be acknowledged by a user, they are only removed from the table of active events when acknowledged and they have returned to the inactive or normal state. Events may be acknowledged from the available User Interfaces. The table of active events and the event history log may be viewed on the available User Interfaces or Web browser screen.

Data Trend Logging

The FX16 Master Controller can be configured to record data samples at a defined interval from up to 16 variables within the control application. The sample interval is defined for each variable and can be set from every minute to once per day. The on-board memory can hold, for example, a trend log of samples taken at 15 minute intervals for up to 20 days.

The trend data for each variable can be viewed in text format on the available User Interfaces within a specified time range.

The trend log buffer can also be viewed from a Web browser and the trend information can be copied and pasted into a spreadsheet application such as Excel for further processing and electronic storage. The trend logs can also be transmitted at regular intervals from one hour to every day via the telephone modem connection to an e-mail server. A system event message is generated if the trend buffer is not configured in the circular recording mode and the buffer becomes full.

User Interfaces, Keyboard and Indicators

The FX16 Master Controller allows for two types of user interface: Local or Remote.

- **LOCAL:** up to 3 m (10ft) from the controller, power supply and data communication via the flat telephone cable included in the LP-KIT007-000C.
- **REMOTE:** up to 300 mt (1000ft) from the controller. The display must be independently powered. The data communication requires a 3 core shielded cable (not provided) connected to the Remote Display Connection of the FX16 Master Controller.

For more details about the connection possibilities please refer to the specific user interface technical bulletin.

The user interface models connectable to the FX16 Master Controller are:

- **LP-DIS65P00-0C: Large User Interface Version 2**, panel, flush mount or hand held, 4x20 character backlit CD, IP54, extended temperature range: -20°C (68°F) to +50°C (122°F), standard JCI front-plate. The front-plate is fully customisable upon minimum order.



Figure 7 : LUI V.2

- **LP-DIS60P10-0C / LP-DIS60P11-0C: Medium User Interface Version 2**, 4x20 character backlit LCD, IP54, extended temperature range: -20°C (68°F) to +50°C (122°F). Panel mount, non-isolated version, wall mount isolated version.



Figure 8 : MUI V.2

Multi-language database

All the text on the available User Interfaces is fully programmable and can be entered in up to **five** different languages using the table provided in the programming tool that lists all the texts for translation.

The user is then able to select the preferred language from the display menu when logging into the system. This feature has been designed for equipment manufacturers who export systems to many countries in the world or for systems in areas where more than one language is spoken.

FX TOOLS 2 Suite



The FX16 Master Controller is fully programmable. The FX Builder configuration tool is used to program the controller with the required application, using the 27 physical input/output points. The application can be downloaded, tested and

commissioned using FX Loader and FX CommPro software packages.

Application Upload / Download

The FX16 Master Controller is a fully programmable controller and the application can be downloaded to the controller via PC, with the FX TOOLS 2 or uploaded / downloaded via the FX programming key.

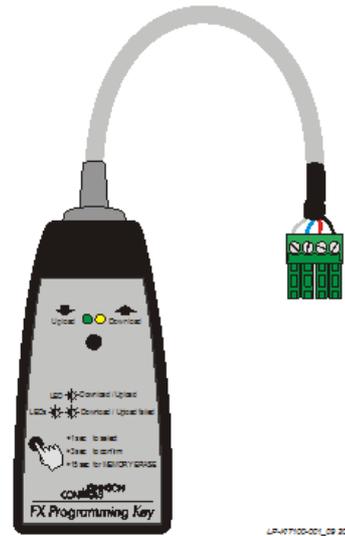
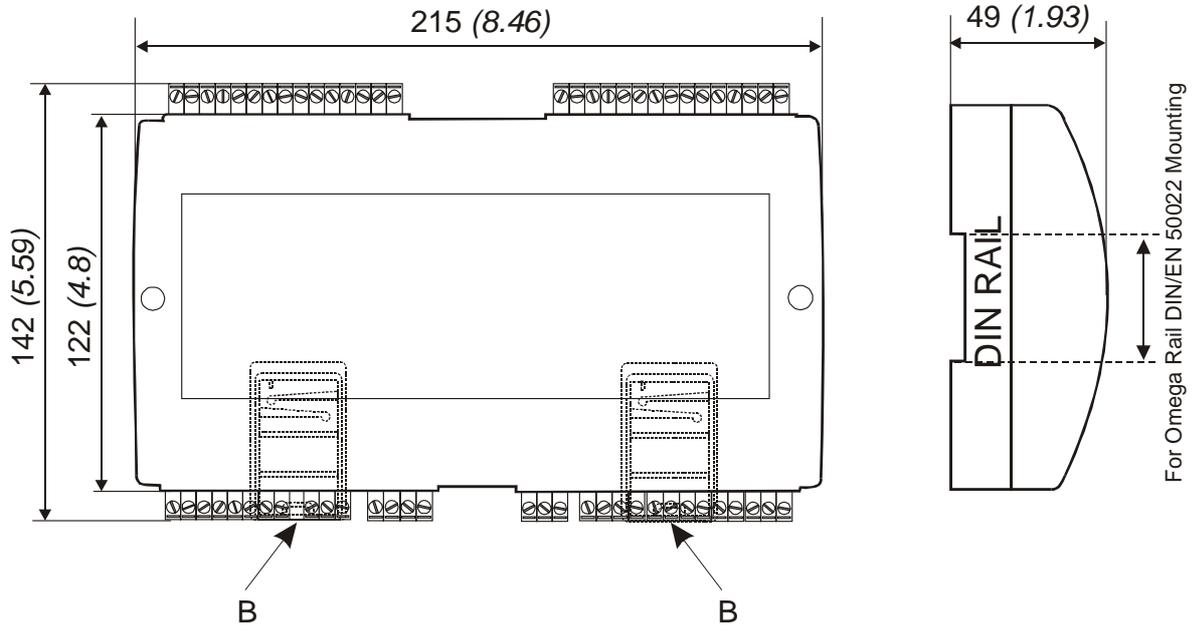


Figure 9 : FX Programming Key

Dimensions in mm (inch)



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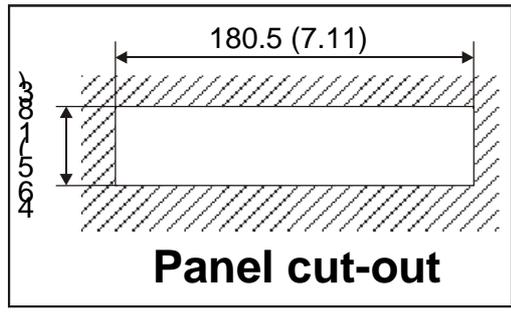


Figure 10 : FX16 Master Controller dimension and cut-out

Ordering Codes

Controller	Ordering Codes
FX16 Master Controller, 9 relays, application-less	LP-FX16D00-000C
FX16 Master Controller, 9 relays, application-less, N2Open card pre-assembled	LP-FX16D01-000C
FX16 Master Controller, 9 relays, application-less, LonWorks® card pre-assembled	LP-FX16D02-000C
FX16 Master Controller, 9 relays, application-less, RS-232 card pre-assembled	LP-FX16D03-000C
FX16 Master Controller, 4 relays + 5 triacs, application-less	LP-FX16D10-000C
FX16 Master Controller, 4 relays + 5 triacs, application-less, N2Open card pre-assembled	LP-FX16D11-000C
FX16 Master Controller, 4 relays + 5 triacs, application-less, LonWorks® card pre-assembled	LP-FX16D12-000C
FX16 Master Controller, 4 relays + 5 triacs, application-less, RS-232 card pre-assembled	LP-FX16D13-000C

Communication Card	Ordering Codes
N2Open communication card	LP-NET151-010C
LonWorks® communication card	LP-NET152-010C
RS232 communication card	LP-NET163-000C

Accessories	Ordering Codes
Link cable for the connection of the FX16 Master Controller to the MUI / LUI display - 3m (10ft).	LP-KIT007-000C
Link cable FX16 Master Controller - STD modem - DB9, 1.5m (5ft)	LP-KIT007-001C
Link cable FX16 Master Controller - GSM modem - DB15, 1.5m (5ft)	LP-KIT007-002C
NULL MODEM link cable - RS232, 3m (10ft)	LP-KIT007-013C
NULL MODEM link cable - RS232, 15m (49ft)	LP-KIT007-014C
Kit of female screw connectors	LP-KIT015-000C
Kit of female cage clamp connectors.	LP-KIT015-001C
MODEM GSM 900/1800 FastTrack	LP-KIT090-000C
GSM modem plug-in antenna	LP-KIT090-001C
GSM modem magnetic mount antenna - 2,5m (9ft) cable	LP-KIT090-003C
GSM modem panel mount antenna - 5m (16ft)	LP-KIT090-004C
GSM modem power adpater, 230Vac/12Vdc, wall plug	LP-KIT090-005C
FX Programming Key	LP-KIT100-000C

Demos	Ordering Codes
DEMO FX16 Master Controller, 9 relays, application-less, N2Open card pre-assembled	LP-FX16DEM-001C
DEMO FX16 Master Controller, 9 relays, application-less, LonWorks® card pre-assembled	LP-FX16DEM-002C
DEMO FX16 Master Controller, 9 relays, application-less, RS-232 card pre-assembled	LP-FX16DEM-003C

User Interface Displays	Ordering Codes
Large User Interface V.2, (4x20 character) LCD backlit display (LUI with standard JCI front plate).	LP-DIS65P10-0C
Medium User Interface V.2, (4x20 character) LCD backlit display, panel mount version.	LP-DIS60P10-0C
Medium User Interface V.2, (4x20 character) LCD backlit display, wall mount isolated version.	LP-DIS60P11-0C

Expansion Modules	Ordering Codes
Extension module	XT-9100-8304
Expansion board: 6AI, 2AO	XP-9102-8304
Expansion board: 8DO (triacs)	XP-9103-8304
Expansion board: 4DI, 4DO (triacs)	XP-9104-8304
Expansion board: 8DI	XP-9105-8304
Expansion board: 4DO (relays) 230VAC (Europe only)	XP-9106-8304
Expansion board: 4DO (relays) 24VAC (North America only)	XP-9107-8304

Software	Ordering Codes
FX TOOLS 2 Suite CD-Rom (FX Builder, FX CommPro, FX Loader)	LP-FXTOOLS2
FX TOOLS Express Suite CD-Rom (FX Builder Express, FX CommPro Express)	LP-FXTOOLS-EXP

Technical Specifications

I/O Details

Terminals		Type	Remark/Application
Analog Input (AI)			
TB1	AI1, AI2, AI3, AI4, AI5, AI6	See table below 16 bit resolution	Freely software configurable. Application: temperature, humidity, pressure, etc.
3, 8	EXT-VDC	+16 V, 80 mA	0-10 V Sensors or max no. 4 0/4 - 20 mA Sensors
13	AVPS / EXT-VDC	AVPS = +5 V, 20 mA EXT-VDC = +16 V, 80 mA	To power directly from the FX16 ratiometric sensors, with AVPS or 0-10 V, 0/4 - 20 mA Sensors with EXT-VDC. The selection between AVPS and EXT-VDC is done through jumpers.

List of available sensor input

Sensor Type	Linearization Range	Accuracy @ 20°C ambient
Ni1000 JCI	-45°C (-49°F) to 120 °C (248°F)	+/- 0.5° C (32°F)
Ni1000 JCI Extended	20°C (68°F) to 287°C (548.6°F)	+/- 0.5° C (32°F)
Ni1000 Siemens	-50,00°C (-58°F) to 160°C (320°F)	+/- 0.5° C (32°F)
Ni1000 DIN	-60,00°C (-76°F) to 180°C (356°F)	+/- 0.5° C (32°F)
Pt1000	-50°C (-58°F) to 605°C (1121°F)	+/- 0.6° C (32°F)
A99	-50°C (-58°F) to 110°C (230°F)	+/- 0.5° C (32°F)
NTC 2,2K	-40°C (-40°F) to 150°C (302°F)	+/- 0.5° C (32°F)
0 to 5 VDC ratiometric	10 to 90% of supply voltage	0.3%
0 to 10 VDC	0 to 10 Volts	0.3%
0 to 20 mA	0 to 20 mA	0.3%

Digital Input (DI)			
TB2	DI1, DI2, DI3, DI4, DI5, DI6, DI7, DI8	Potential free contacts	In order to assure galvanic isolation a different 24 VAC power supply must be used to empower the digital inputs (through terminals 34, 35). Transition counter function maximum 1Hz. For quicker counter function use the XP-9105 module.
Digital Output (DO)			
TB3	DO1, DO2, DO3	SPST 8(3)A power relays	Max switching power: 2000VA, 240W, 0.5HP, 250VAC UL/CUR rating: 8A 250VAC 8A 30VDC VDE rating: 8A 250VAC Expected electrical life min. operations: 1 x 10 ⁵ operations (360 ops x hour) Dielectric strength: coil-contacts 4000 Vrms
TB4	DO4, DO5	SPST 5(3)A power relays or 0,5A / 24 VAC triacs	Max switching power: 1250VA, 150W Rating (resistive): 10A 125VAC 5A 250VAC 5A 30VDC Expected electrical life (min operations): 10A 125Vac 5x10 ⁴ 5A 250VAC 5x10 ⁴ 5A 30VDC 10 ⁵ Dielectric strength: coil-contacts 4000 Vrms for 1 min
TB5	DO6, DO7, DO8	SPST 5(3)A power relays or 0,5A / 24 VAC triacs	
TB6	DO9	SPDT NC 8(3)A 250V relay	Same as TB3 relays Fail relay for enhanced security. The relay will return to its NC position not only at power fail but also in case the microprocessor should fail: watch-dog, brown-out, etc.
Analogue Outputs (AO)			
TB7	AO1, AO2	0 ÷ 10 VDC (max 1.5 mA)	Used to drive analog actuators, frequency drives. 16 bit resolution.
TB8	AO3, AO4	0 ÷ 10 VDC (max 1.5 mA)	Used to drive analog actuators, frequency drives. 16 bit resolution.
79, 80	AO V~ Hot AO V~ Com	24VAC	In order to assure galvanic isolation a different 24 VAC power supply must be used to empower the analog outputs.

FX16 Master Controller

Product	FX16 Master Controller
Power Supply Requirements	24 VAC \pm 15%, 50/60 Hz - Class 2 Power Supply
Power Consumption	15 VA at max load
Internal Fuse	2 A, 250 V
Protection Class	IP 20
Ambient Operating Conditions	-20°C to +50°C 10 to 95% rH (non condensing)
Ambient Storage Conditions	-20°C to +70°C 10 to 95% rH (non condensing)
Dimensions (H x W x D)	142 x 215 x 49
Weight (with package)	0,74 Kg
Connection terminals for signals and power supply	Screw terminals for max 1 x 1.5 mm ² wires or Cage clamp connectors 1 x 1.5 mm ² wires To be ordered separately
LonWorks® / N2Open bus connection terminals	Screw terminals, cable size 0.05 to 1.5 mm ² , AWG30 to AWG14 Belden cable, 2-core twisted pair with shield
Connection terminals for extension bus and remote display	Screw terminals, cable size 0.05 to 1.5 mm ² , AWG30 to AWG14
Single cable lengths	
<i>Digital Inputs DI1 - DI8</i>	Max. 100m (328,1 ft) with diameters \geq 0.6 mm (0.02 in)
<i>Analog Inputs AI1 - AI6</i>	Max. 100m (328,1 ft) with diameters \geq 0.6 mm (0.02 in)
<i>Triac outputs (when present)</i>	Max. 100m (328,1 ft) where A \geq 1.5 mm ² (0.002 in ²)
<i>Analog Outputs AO1 - AO4</i>	Max. 100m (328,1 ft) where A \geq 1.5 mm ² (0.002 in ²)
<i>Remote Display</i>	Max. 3m (9.8 ft) if display is powered by controller. Max. 1km (1.9 mi) if display independently powered
<i>Extension Modules Bus</i>	Max. 1km (0.6 mi)
Display and Extensions cable type	Belden 4-core, twisted pair, shielded
 CE Compliance	89/336 EEC directive: EN 50081-1 (EN 61000-6-3), EN 50082-1 (EN 61000-6-1) 73/23 EEC directive: EN 60730
UL compliance	UL873

N2Open Bus Characteristics

RS485 line	maximum length without repeater: 1200m (4000ft), AWG26 twisted pair with shield.
Devices	maximum of 32 per 1200m (4000ft) bus segment.
RS485/232 Converter	IU-9100 if third party converter is used then make sure it supports automatic DSC (Data Send Control)
Electrical Isolation	1500 V

LonWorks® Network Characteristics

LonWorks® network 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.	
Nodes	64 (if repeaters are not used), FTT-10 nodes only.	
Cable type:	Length with FTT-10 devices	
	Bus topology	Free topology
Belden 85102	2700m (1.7mi)	500m (0.3mi)
Belden 8471	2700m (1.7mi)	500m (0.3mi)
Level IV 22 AWG	1400m (0.9mi)	400m (0.3mi)

GSM modem

		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			1.8A			1.1 A
	@13.2 V			0.7A			0.4 A
	@32 V			0.4A			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	Aluminium profiled						
Volume	12.2cm ³ (0.7in ³)						
Weight	< 130g (0.3lb)						
Dimensions	98mm (3.9in) x 54mm (2.1in) x25mm (1in) (excluding connectors)						
Overall dimensions	110mm (4.3in) x 54mm (2.1in) x 25mm (1in)						

Programming Key

Power Supply	Directly powered from the Display Bus port of the FX15 Classic or from an AC/DC adapter 230V to 12 VAC ÷ 15 VDC min 2 VA
Memory type and size	Flash memory 1 Mbytes
Connection to controller	Via RS485, not isolated, 10 cm cable provided with the key
Enclosure IP class	IP40
Ambient Limits	Operating: 0°C (32°F) – 40°C (104°F), 10-95% rH (not condensing) Storage: -20°C (-4°F) – 70°C (158°F), 10-95% rH (not condensing)
Agency Listing	89/336 EEC directive: EN 50081-1 (EN 61000-6-3), EN 50082-1 (EN 61000-6-1)

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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Microsoft® Internet Explorer® is a registered trademark of the Microsoft Corporation.



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