FX Supervisory Controllers

FX Supervisory Controllers are Web-based supervisory-class controllers in the Facility Explorer product family. FX Supervisory Controllers manage networks of field controllers using open communication protocols, such as such as BACnet®, LONWORKS®, and N2 protocols. FX Supervisory Controllers support a full set of building automation features, such as scheduling, alarming, histories, data sharing, energy management, totalization, and customized control routines, which are specifically designed for commercial facilities.

Each FX Supervisory Controller includes a graphical system user interface and configuration tool that you can access with a Web browser. Remote access is easily achieved from an Internet, intranet, or dial-up connection. Multiple users can concurrently connect to the FX Supervisory Controller. You can manage security and presentation preferences through user profiles, logon IDs, and passwords.

FX Supervisory Controllers are a family of controllers similar in function and overall capabilities. The FX20, FX60, and FX70 are compact DIN rail mountable controllers with the capability for external input and output points.

In addition, the FX Supervisory Controllers' hardware and software design is modular, so you can add accessories, such as communications cards, input and output modules, and software options, if needed. This design allows you to select the controller most appropriate for the size of your facility and those options best needed to control it.

Figure 1: FX Supervisory Controllers

Powered by niagara AX FRAMEWORK

Features and Benefits	
❑ **Web-Based User Interface**	Provides rich, graphical displays for system operation and analysis.
❑ **Adoption of Industry Standard Communication Protocols**	Allows for the integration of a wide variety of field controllers, including Facility Explorer field controllers and controllers provided by others without intermediate gateways or translators.

Continued on next page . . .

Features and Benefits (Cont.)	
❑ **Embedded Configuration Tool**	Requires no proprietary or desktop software to configure the FX Supervisory Controller. You only need a Web browser for basic configuration and monitoring.
❑ **Modular Design**	Allows you to select only those components needed to meet specific project requirements.
❑ **Small, Compact Design**	Installs easily.
❑ **FX Workbench**	Reduces engineering and installation time by easily and quickly creating the FX Supervisory Controller database from field controller configurations.

Overview

FX Supervisory Controllers provide integrated control supervision and network management services for one or more local networks of field controllers, and provide direct control over inputs and outputs. FX Supervisory Controllers use these interfaces to monitor and control Heating, Ventilating, and Air Conditioning (HVAC); lighting; and other electrical systems to:

- provide system-wide coordination
- improve occupant comfort
- annunciate off-normal and alarm conditions
- reduce energy usage
- optimize operating efficiencies

FX Supervisory Controllers organize system information into displays, reports, and graphics that users can access via a Web browser.

The FX20, FX60, and FX70 controllers are housed in compact, DIN rail mount enclosures. Their controller capacity and performance requirements make them ideally suited for:

- supervisory control of small- to large-sized facilities
- distributed supervisory control within larger facilities or between facilities
- direct control of equipment energy management

Communication Interfaces

FX Supervisory Controllers support multiple embedded and optional communication interfaces, which enables the FX Supervisory Controllers to integrate many different types of field controllers, as well as provide different methods of remote user access. The available embedded and optional communication interfaces include the following:

- 10/100 Mbps or 1 Gbps Ethernet
- RS-485
- RS-232 (up to 115, 200 baud rate)
- LONWORKS (78 Kbps FTT-10A)
- Modem (56 Kbps auto-dial/auto-answer)
- Wireless TEC communications
- GPRS Modem
- 802.11 b/g Wi-Fi (FX70)

See Table 5: FX Supervisory Controller to identify the exact number and types of embedded and optional communication interfaces supported by each model of FX Supervisory Controller.

Supported Networking Protocols

You can order the FX Supervisory controllers with the BACnet Master-Slave/Token-Passing (MS/TP) driver included for support of BACnet field controllers including:

- FX-PCG, FX-PCV, and FX-PCX Programmable Controllers
- FX07, FX14, FX15, and FX16 field controllers
- Third-party BACnet devices

All FX Supervisory Controllers include an N2 driver that enables the integration of a wide variety of N2 field controllers, including:

- Facility Explorer Field Controllers fitted with an N2 Open Communication Card (for example, FX05, FX06, FX07, FX10, FX14, FX15, FX16, MD20, or FXVMA)
- Metasys® Application-Specific Controller (ASC) devices (Air Handling Unit [AHU], Unitary [UNT], and Variable Air Volume [VAV])
- Metasys System 91 Devices (DX-9100)
- Metasys Variable Air Volume Modular Assembly (VMA1400)
- XTM-105 Extension Modules
- third-party devices supporting N2 Open protocol (VND)

In addition, each FX Supervisory Controller includes, by default, the oBIX and Niagara (Fox) client and server drivers. Optionally, you can add protocol drivers as needed to integrate various field devices or provide remote access. These optional drivers include the following:

- LONWORKS
- BACnet Master-Slave/Token-Passing (MS/TP) and BACnet Internet Protocol (IP)
- MODBUS® Transmission Control Protocol (TCP), and Remote Terminal Unit (RTU)
- M-Bus
- Simple Network Management Protocol (SNMP)
- Short Message Service (SMS)
- ZigBee™ for wireless Terminal Equipment Controllers (TEC)

Direct Inputs/Outputs (I/O)

In addition to obtaining data from field devices using network communication services, FX Supervisory Controllers also support obtaining information directly, using local or remote inputs and outputs.

Local I/O (NDIO16 and NDIO34)

The FX20 and FX60 support optional, local I/O (NDIO) modules. These modules plug into the right side of the FX20/FX60 providing a local interface to the field inputs and outputs.

- **NDIO34**: includes 16 universal inputs, 10 relay outputs, and 8 analog outputs. Up to one NDIO34 module can be added to an FX20/FX60 Supervisory Controller. This NDIO34 module also provides power to the attached FX20/FX60 Supervisory Controller, using an externally supplied 24 VAC transformer or 24 VDC power supply.
- **NDIO16**: includes 8 universal inputs, 4 relay outputs, and 4 analog outputs. Up to four NDIO16s can be added to an FX20/FX60 Supervisory Controller (or up to two, if combined with an NDIO34).

Remote I/O (RIO16)

All FX Supervisory Controllers support the optional Remote I/O (RIO) module. The RIO communicates to the FX Supervisory Controller via RS-485 and contains the following I/O:

- 8 universal inputs
- 4 relay outputs
- 4 analog outputs

See Table 5 to identify the exact number and types of direct I/O supported by each model of FX Supervisory Controller.

Building Automation Control Features

FX Supervisory Controllers transform data obtained from network device integrations and direct I/O into a common set of data types. This allows you to apply the FX Supervisory Controllers' full set of building automation control features (including scheduling, alarming, histories, energy management, totalization, and custom control logic) consistently to all data points, regardless of their source.

Scheduling

You can configure the FX Supervisory Controller to automate various functions within a facility based on a time schedule. Some examples include:

- determining the expected occupancy periods
- starting or stopping HVAC equipment
- turning lights on and off

You can link any writable point in the FX Supervisory Controller system database to a schedule. The scheduler interface (Figure 2) provides a visually intuitive method for you to configure the daily, weekly, and exception (holiday) schedules.

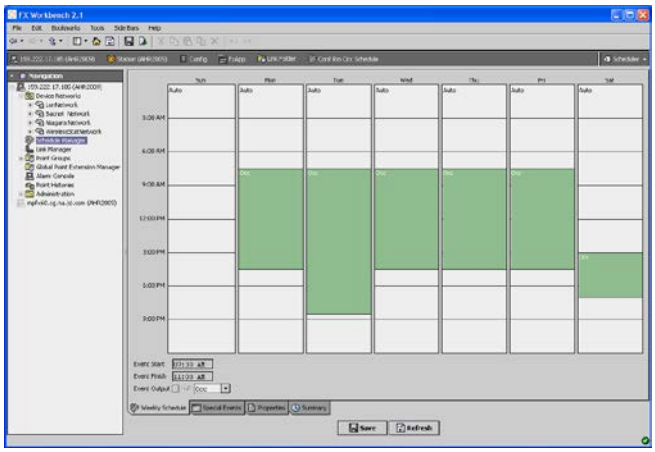

Figure 2: Scheduler

Histories

The Histories feature (Figure 3) allows the FX Supervisory Controller to collect, store, and display pertinent system data for analysis, such as control performance indication, energy consumption, and system troubleshooting. You can configure the FX Supervisory Controller to create a history on any data point in its system database. Histories are presented either graphically or in a sortable table, and you can export the data in a TXT, PDF, or CSV format.

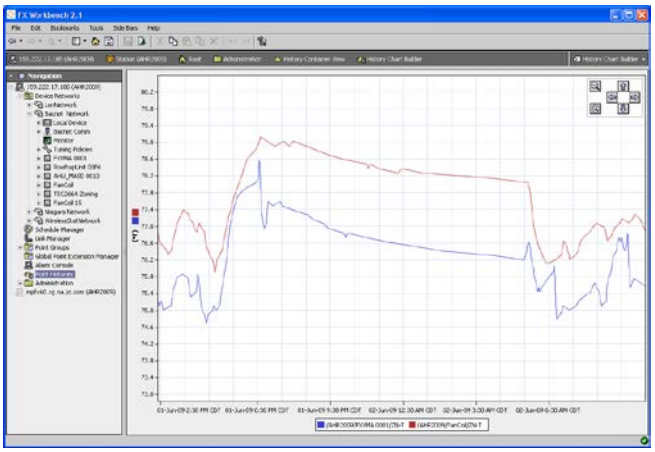

Figure 3: Histories

Alarming

The Alarming feature (Figure 4) enables the FX Supervisory Controller to initiate, route, and manage alarms and events according to user-defined criteria. You can configure the FX Supervisory Controller to generate alarms on any data point in its system database. Each alarm record contains valuable information, including the alarm and return-to-normal time and date, time duration in current state, text description, and alarm class.

You can classify alarms so that alarms with similar characteristics are routed to common recipients. You can also create multiple alarm classes to provide a variety of alarm routing options, such as to the browser-based Alarm Console or to an e-mail address. Alarm recipients have a variety of options to manage alarms, including sorting, acknowledging, silencing, and tagging.

You can route alarms to the people who need them based on schedules and on-call lists. These lists can be prioritized and escalated based on the recipient's actions. These actions include delivery and acknowledgement via e-mail and SMS.

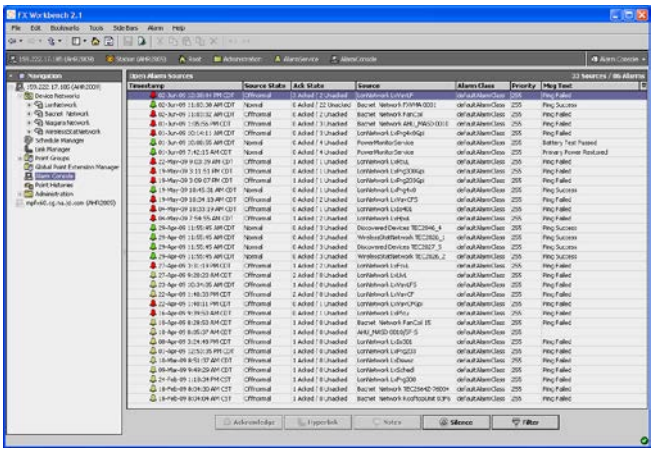

Figure 4: Alarm Console

Energy Management

The FX Supervisory Controller features several energy management functions, which you can enable and configure, including:

- electrical demand limiting/load shedding
- optimized start/stop
- free cooling determination

Totalization

The Totalization feature enables the FX Supervisory Controller to accumulate data over a period of time. You can add a totalization extension to any data point in the FX Supervisory Controller system database to summarize runtime, accumulate change of state counts, or summarize dynamic analog data. Totalized data is presented in a sortable table, and you can export it in a TXT, PDF, or CSV file format.

Customized Control Logic

The FX Supervisory Controller includes a library of control logic modules that you can enable, configure, and link together to create your own customized control routines. Some examples of the available control logic modules include the following:

- Boolean logic (AND, OR, XOR, NOT)
- comparative (greater than, less than, equal, not equal)
- mathematical (add, subtract, multiply, divide, average, negative)
- sequencers
- Proportional plus Integral plus Derivative (PID) control
- on/off control

Web-Based User Interface

The FX Supervisory Controller's Web-based User Interface (Web UI) provides system-wide monitoring and control capability via a Web browser. The Web UI capability is embedded in every FX Supervisory Controller, allowing users to access the system via a Web browser over an Ethernet Local Area Network (LAN), Internet, or dial-up modem connection.

When you create your Web UI pages, you can choose from a full library of colorful, graphical symbols including:

- HVAC equipment
- duct work
- coils
- piping
- control devices (for example, dampers or valves)
- widgets (for example, buttons, tables, or hyperlinks)

In addition, you can import your own digital images (for example, a floorplan JPEG) and incorporate them into your Web UI.

FX Workbench provides you with two sets of factory-designed, standard application graphics to include in your Web UI. One set is designed for viewing with a full-sized computer screen, and the other set is optimized for viewing with an iPhone®/iPod touch® /iPad® (and most other similarly sized) handheld device. When you import a controller with a standard application, both sets of graphics can be **automatically generated**.

You can view devices, points, schedules, alarms, and graphics with the convenience of a wireless handheld device. You can also acknowledge alarms, command points, and modify schedules. The user interface updates dynamically, so that when changes are made to the FX Supervisor configuration, these changes automatically appear. An automated configuration assistant is available to help set the correct screen size for many handheld devices.

Figure 5: iPhone/iPod touch Web UI

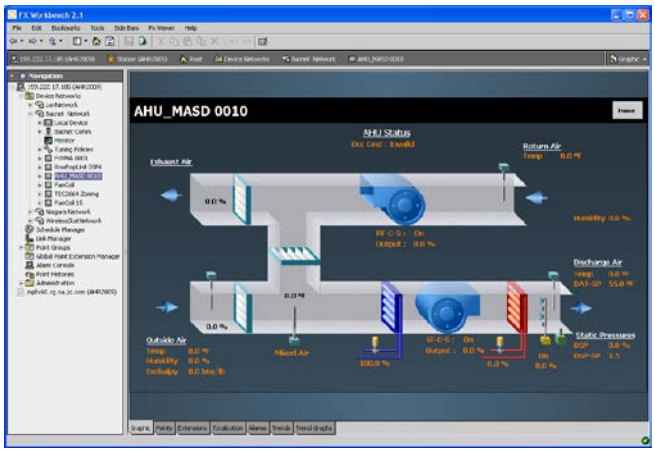

Figure 6: Full Size Web UI

Open Automatic Demand Response (OpenADR) Driver for FX Supervisory Controllers

The OpenADR standard outlines a communication model that uses the Internet to send Demand Response signals to end-user facilities to reduce energy load. OpenADR programs can be used in commercial, industrial, and residential settings to reduce cost, promote interoperability among DR technologies, and allow utilities and energy providers to better manage pricing and critical load issues while actively engaging with their customers.

OpenADR programs allow utilities to collaborate with end-user facilities to curtail energy consumption during peak usage via automatic load shedding. OpenADR programs involve three parties: the utility or energy provider, the Demand Response Automation Server (DRAS), and the facility that is consuming the energy.

The OpenADR simple client driver provides the network integration functionality between the Facility Explorer building automation system and the Demand Response Automation Server (DRAS). Currently this driver is compatible only with the Akuacom DRAS.

FX Workbench

FX Workbench is a software application that allows users to configure the FX Supervisory Controller. FX Workbench is embedded in every FX Supervisory Controller and is served up to Web browsers of authorized users. In addition, you can purchase FX Workbench as a separate software application residing on a computer.

Users can configure the FX Supervisory Controller online while directly or remotely connected with FX Workbench.

FX Workbench includes many labor-saving configuration features, such as:

- importing of FX-PCG Controller configuration files to create the point database, graphics, point and alarm summaries, Histories, and Trend graphs
- online discovery of LONWORKS and BACnet devices and points
- online discovery of N2 devices with assisted importing of N2 points
- a check box method to enable and disable points and create point extensions, such as alarms, histories, and totalizations
- intuitive managers for grouping points, creating master schedules, and linking points
- a library of predefined systems, with associated graphics, points list, and default features
- automated graphic page creation

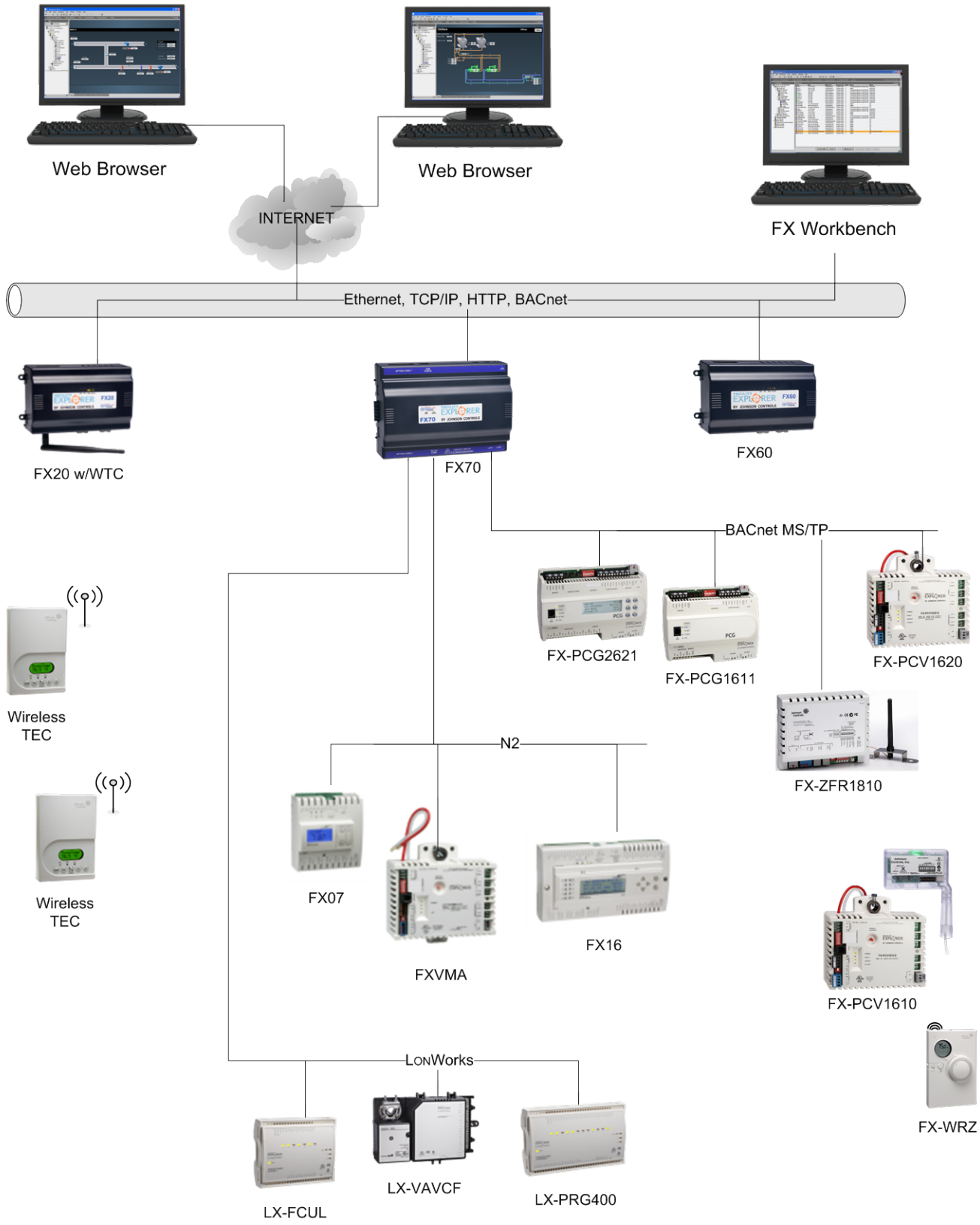

Figure 7: Example of a Facility Explorer Configuration

Table 1: FX Supervisory Controller Ordering Information

Part Number	Description
LP-FX2011N-1	FX20: Includes 128 MB RAM/64 MB Flash, 2 10/100 Mbps Ethernet ports, 1 non-isolated RS-485 port, 1 RS-232 port, 1 Niagara Direct Input/Output (NDIO) port, 2 communication card option slots, embedded FX Workbench, Web User Interface, Niagara driver, oBIX driver, and N2 driver.
LP-FX2021N-1	FX20 with BACnet MS/TP Protocol: Includes 128 MB RAM/64 MB Flash, 2 10/100 Mbps Ethernet ports, 1 non-isolated RS-485 port, 1 RS-232 port, 1 NDIO port, 2 communication card option slots, embedded FX Workbench, Web User Interface, Niagara driver, oBIX driver, N2 driver, and BACnet MS/TP driver.
LP-FX6011N-1	FX60: Includes 128 MB RAM/128 MB Flash, 2 10/100 Mbps Ethernet ports, 1 RS-485 port, 1 RS-232 port, 1 NDIO port, 2 communication card option slots, embedded FX Workbench, Web User Interface, Niagara driver, oBIX driver, and N2 driver.
LP-FX6021N-1	FX60 with BACnet MS/TP Protocol: Includes 128 MB RAM/128 MB Flash, 2 10/100 Mbps Ethernet ports, 1 RS-485 port, 1 RS-232 port, 1 NDIO port, 2 communication card option slots, embedded FX Workbench, Web User Interface, Niagara driver, oBIX driver, N2 driver, and BACnet MS/TP driver.
LP-FX7011N-0	FX70: Includes 1 GB RAM/1 GB Flash, 1 RS-232 port, 1 RS-485 port, 2 1 Gbps Ethernet ports, 1 NRIO port, 2 communication card option slots, embedded Niagara driver, oBIX driver, N2 driver, FX Workbench, and Web User Interface.
LP-FX7021N-0	FX70 with BACnet MS/TP Protocol: Includes 1 GB RAM/1 GB Flash, 2 1 Gbps Ethernet ports, 1 RS-485 port, 1 RS-232 port, 1 NRIO port, 2 communication card option slots, embedded FX Workbench, Web User Interface, Niagara driver, oBIX driver, N2 driver, and BACnet MS/TP driver.
LP-FX20BDEM-1	Demo version of FX20: Includes all software modules and drivers. Intended for engineering and/or demonstration purposes only (not allowed for actual project installations). You must also purchase office support and renewal fees to activate this FX20. License expires yearly on October 31 and must be renewed yearly to continue operation.
LP-FX60BDEM-1	Demo version of FX60: Includes all software modules and drivers. Intended for engineering and/or demonstration purposes only (not allowed for actual project installations). Office support and renewal fee must also be purchased to activate this FX60. License expires yearly on October 31 and must be renewed yearly to continue operation.

Table 2: FX Workbench Ordering Information

Part Number	Description
LP-FXWB-COPY	FX Supervisory Controller family software, delivered on DVD. Includes latest installation images for FX Server, FX Workbench, and FX Alarm Portal Client. Licenses not included—order licenses separately.
LP-FXWBDEM-0	Engineering/demo license for FX Workbench client software. Enables all features needed to engineer and demonstrate FX Supervisory Controllers and FX Server stations. Intended for installing contractors. Requires annual support fee. Expires yearly.
LP-FXWBE-0	End user license for FX Workbench client software. Enables those features needed to operate and reconfigure FX Supervisory Controllers and FX Server stations only via an online connection (cannot create new stations off line). Intended for end users (operators). Never expires.
LP-FXWBALM-0	FX Alarm Portal Client license. Enables only FX Alarm Portal and Alarm Console features. Intended for end users. Never expires.
LP-FXSWUPG-0	License file enabling a one-time software upgrade for one copy of FX Workbench or FX Alarm Portal Client. Software not included (order LP-FXWB-COPY to obtain latest copy of software).

Table 3: FX Supervisory Controller Hardware Accessories Ordering Information

Part Number	Description
LP-FXNDIO16-0	16 channel input/output modules for the FX20/FX60 Supervisory Controllers: Includes 8 universal inputs, 4 relay outputs, and 4 0-10 V analog outputs, maximum of 4 per FX20/FX60 Supervisory Controller, or 2 if combined with NDIO34.
LP-FXNDIO34-0	34 channel input/output module for the FX20/FX60 Supervisory Controllers: Includes 16 universal inputs, 10 relay outputs, and 8 0–10 V analog outputs, maximum of 1 per FX20/FX60/FX70 Supervisory Controller. Also provides power to the FX20/FX60/FX70 Supervisory Controller using externally connected 24 VAC transformer or 24 VDC power supply.
LP-FXRIO16-0	Remote input/output module for the FX Supervisory Controllers. Includes 8 universal inputs, 4 relay outputs, and four 0–10 V analog outputs.
LP-FXLONFTT-1	LONWORKS communication card for the FX Supervisory Controllers: 78 kbps, FTT-10A, 2-position removable screw-terminal connector plug. Order LONWORKS driver separately.(LP-FXLON-0).
LP-FXRS485-0	Dual port RS-485 communication card for the FX Supervisory Controllers: electrically isolated, two 3-position removable screw-terminal connector plugs.
LP-FXWTC-0	Wireless TEC Option Card includes option card, mounting bracket, and direct-mount antenna.
TEC20-A-1	Replacement antenna for Wireless TEC Option Card.
TEC20-RA-1	Remote antenna for Wireless TEC Option Card when it is installed inside a metal cabinet or when remote antenna mounting is required by physical installation. Includes 0.53 m (1.75 ft) cable.
LP-FXRS232-0	Single port RS-232 communication card for the FX Supervisory Controller: 115,200 max baud rate, DB-9M connector.
LP-FXMDM-0	56 kbps, auto-dial/auto-answer modem for the FX Supervisory Controllers: RJ-11 connector, disables onboard RS-232 port, maximum of one per FX Supervisory Controller.
LP-FXPMUS-0	Power module for FX Supervisory Controller: 90-240 VAC, 50/60 Hz, U.S. wall adapter.
LP-FXPMEU-0	Power module for FX Supervisory Controller: 90-240 VAC, 50/60 Hz, European wall adapter.
LP-FXPMUK-0	Power module for FX Supervisory Controller: 90-240 VAC, 50/60 Hz, U.K. wall adapter.
LP-FXPM24-0	Power module for FX Supervisory Controller: 24 VAC/DC, DIN rail mountable.
LP-FXPM263-0	Power module for FX Supervisory Controller: 90-263 VAC/DC, 50/60 Hz DIN rail mountable.
LP-KITFX2BAT-0	NiMH replacement backup battery assembly for FX20 and FX60.
LP-KITFX7BAT-0	FX70 replacement backup battery assembly.
Continued on next page . . .	

Part Number (Cont.)	Description
LP-KITFX7HW-0	Hardware Bag for FX70, containing screw terminal connector plugs (two 6-position, one 2-position, earth grounding wire).
LP-KITGPRSA-0	Replacement right-angle GSM/GPRS quad-band SMA coax-mounted stub antenna.
LP-KITSEDAT-0	Replacement adjustable-angle 2.4 GHz RP-SMA coax-mounted stub antenna.
LP-KITSED3T-0	3-terminal wiring plug for RS-485.
LP-KIT7MEM-0	1 GB DDR-2 333 MHz Small Outline Dual In-line Memory Module (SODIMM) memory module (standard replacement for FX70).
LP-FXGPRSW-0	GPRS Modem option card for FX20, FX60, FX70 with Wyless SIM card.
LP-FXGPRSE-0	External mounting for GPRS modem antenna. Included is a 6.56 ft. (2 m) SMA-type coax extension cable and steel bracket for wall or panel mounting.
LP-FXGPRSS-0	GPRS Modem SIM card replacement provisioned by Wyless.
LP-FXSED-0	Sedona Framework option card with both wireless 6LoWPAN and wired RS-485 port, based on the Jennic JN5139 wireless microcontroller. Includes stub antenna.
LP-FXSEDEXT-0	External mounting for Sedona Framework antenna. Includes a 6.56 ft (2 m) RP-SMA type, coax extension cable and mounting bracket.
LP-FXSRAM-0	Static RAM option card for battery-less FX supervisory controllers.
LP-FX70WIFI-0	Mini PCI 802.11 Wi-Fi adapter card for an FX70

Table 4: FX Supervisory Controller Software Accessories Ordering Information

Part Number	Description
LP-FX60EX256-0	License enabling 256 Mb memory expansion for one FX60.
LP-FXBACIPC-0	License enabling BACnet IP client (import) driver for one FX Supervisory Controller.
LP-FXBACIPS-0	License enabling BACnet IP server (export) driver for one FX Supervisory Controller.
LP-FXBACMS-0	License enabling BACnet MS/TP driver for one FX Supervisory Controller.
LP-FXLONIP-0	License enabling LONWORKS IP driver for one FX Supervisory Controller.
LP-FXLON-0	License enabling LONWORKS twisted pair driver license for one FX Supervisory Controller.
LP-FXMBUS-0	License enabling M-Bus driver for one FX Supervisory Controller.
LP-FXMDBRTU-0	License enabling MODBUS RTU client (import) driver for one FX Supervisory Controller.
LP-FXMDBRTUS-0	License enabling MODBUS RTU server (export) driver for one FX Supervisory Controller.
LP-FXFLEX-0	License enabling Flex serial Driver over RS-232 or RS-485.
LP-FXMDBTCP-0	License enabling MODBUS TCP client (import) driver for one FX Supervisory Controller.
LP-FXMDBTCPS-0	License enabling MODBUS TCP server (export) driver for one FX Supervisory Controller.
LP-FXSNMP-0	License enabling Simple Network Management Protocol (SNMP) driver for one FX Supervisory Controller.
LP-FXCCN-0	License enabling Carrier® Communication/Comfort Network (CCN) driver for one FX Supervisory Controller
LP-FXMCQU-0	License enabling McQuay® OPM driver for one FX Supervisory Controller
LP-FXAINF-0	License enabling Andover™ Infinity driver for one FX Supervisory Controller
LP-FXSMS-0	License enabling Simple Messaging Service (SMS) driver for one FX Supervisory Controller.
LP-FX40UPG-0	License enabling one-time, new release software upgrade for one FX Supervisory Controller.
Continued on next page . . .	

Part Number (Cont.)	Description
LP-FXAPHP-0	License enabling the American Auto-Matrix Public Host Protocol (PHP) driver for one FX Supervisory Controller.
LP-FXAPUP-0	License enabling the American Auto-Matrix Public Unitary Protocol (PUP) driver for one FX Supervisory Controller.
LP-FXAC-0	License enabling the Andover AC 256 driver for one FX Supervisory Controller.
LP-FXGLOB-0	License enabling the Global Cache driver for one FX Supervisory Controller. Enables control of IR controlled AV equipment via an RS-232 connection to a Global Cache FC module.
LP-FXHELV-0	License enabling the Helvar Lighting Control driver for one FX Supervisory Controller.
LP-FXHORT-0	License enabling the European Hortsmann meter driver for one FX Supervisory Controller.
LP-FXJOS-0	License enabling the Josam Grease Trap Sensor driver for one FX Supervisory Controller.
LP-FXLANG-0	License enabling the Lang Oven (over RS-232 or RS-485) driver for one FX Supervisory Controller.
LP-FXVDRT-0	License enabling the Veeder-Root driver for one FX Supervisory Controller.
LP-FXEIB-0	License enabling the EIB/Konnex IP Driver for one FX Supervisory Controller.
LP-FXSADR-0	License enabling Simple OpenADR driver for communication between FX Supervisory Controller and Akuacom DRAS. Limited to one client connection. Includes CRYPTO license for the SSL connection.
LP-FXSADR1-0	License enabling one additional connection to OpenADR compliant DRAS.

Technical Specifications

Table 5: FX Supervisory Controller

	FX20	FX60	FX70
Enclosure/ Mounting	Plastic/DIN Rail		
Dimension	6.313 x 4.820 x 2.438 in. (158.75 x 101.6 x 60.325 mm)		8.5 x 6 x 2.625 in. (216 x 152 x 68 mm)
Power Supply	DIN Rail Power modules		
Battery Backup	5-minute internal		5-minute internal, optional external
Processor	IBM® PowerPC® 405EP at 250 MHz	PowerPC 440EP at 524 MHz	PowerPC 440EPx at 652 MHz
RAM Memory	128 MB RAM	128 MB RAM (upgradeable to 256 MB)	1 GB RAM
Flash Memory	64 MB Flash	128 MB Flash	1 GB Flash
Environment	Operating Temperature: 0 to 50°C (32 to 122°F) Storage Temperature: 0 to 60°C (32 to 140°F) Relative Humidity: 5 to 95%, noncondensing		
Communication Ports			
Onboard	2 Ethernet 10/100 Mbps 1 RS-485 1 RS-232 2 option slots		2 Ethernet 1 Gbps 1 RS-485 (Isolated) 1 RS-232 2 option slots Mini PCI express slot
Optional	Two options slots (any 2 of the following, except where noted): • Dual port RS-485 • LON FT/TP-10 • Modem (maximum of one and disables onboard RS-232) • RS-232 • Wireless TEC (maximum of one and disables onboard RS-232) • GPRS modem (maximum of one) • Battery-less Option Card		
Network Drivers			
Embedded	N2, Niagara, oBIX		
Optional	LONWORKS, BACnet MS/TP, BACnet IP Client, BACnet IP Server, MODBUS RTU Client, MODBUS RTU Server, MODBUS TCP Client, MODBUS TCP Server, SNMP, SMS, Flex Serial, Carrier CCN, McQuay OPM		

Continued on next page . . .

	FX20 (Cont.)	FX60	FX70
Direct I/O			
Onboard	None		
Optional	Up to 66 (via NDIO modules)		Up to 256 via 16 Remote I/O Modules (FXRIO16)
Local (NDIO)	Up to 66 total I/O (via optional NDIO modules)		None
Remote I/O	Up to 64 I/O via 4 Remote I/O Modules (FXRIO16)	Up to 256 I/O via 16 Remote I/O Modules (FXRIO16)	
Compliance	**United States** UL Listed, File E107041, CCN PAZX, under UL 916, Energy Management Equipment FCC compliant to CFR 47, part 15, subpart B, class A		
	Canada UL Listed, File E107041, CCN PAZX7, under CSA C22.2 No. 205, Signal Equipment Industry Canada compliant to ICES-003		
CE	**Europe** CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.		
	BACnet International: BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Building Controller (B-BC)		

Table 6: Local Input Output Modules

Product Codes	LP-FXNDIO34-0: 16 universal inputs, 10 relay outputs, 8 analog outputs LP-FXNDIO16-0: 8 universal inputs, 4 relay outputs, 4 analog outputs
Dimensions	NDIO34: 6.313 x 4.820 x 2.438 in. (16.04 x 12.24 x 6.19 cm) NDIO16: 3.2 x 4.828 x 2.437 in. (8.2 x 12.24 x 6.19 cm)
Universal Input Types Supported	• 10k ohm Type 3 thermistors. Thermistor Sensor Range: -23.3 to 115.5°C (-10 to 240°F). Input accuracy is in the range of ±1% of span. Characteristic curve is customizable. • 0-10 V; accuracy is ±2% of span, without user calibration; uses an external resistor for current input (four provided, mounted by installer on terminal connections) • 4-20 mA current loop; accuracy is ±2% of span, without user calibration; self-powered or board-powered sensors accepted • Dry contact: V open circuit, 300- µA short-circuit current • Pulsing dry contact at a rate of up to 20 Hz; 50% duty cycle
Digital Outputs	• Form A relay contacts suitable for on/off control only; floating control not supported • Max voltage 30 volts AC or DC • 1/2 A max current rating
Analog Outputs	• 0-10 V DC • Minimum load supported per output is 2,500 ohms minimum or 4 mA drain maximum

Table 7: Remote Input Output Modules

Product Codes	LP-FXRIO16-0: 8 universal inputs, 4 relay outputs, 4 analog outputs
Dimensions	4 x 3.625 x 2.625 in. (10.16 x 9.2 x 6.7 cm)
Universal Input Types Supported	• 10k ohm Type 3 thermistors. Thermistor Sensor Range: -23.3 to 115.5°C (-10 to 240°F). Input accuracy is in the range of ±1% of span. Characteristic curve is customizable. • 0-10 V; accuracy is ±2% of span, without user calibration; uses an external resistor for current input (four provided, mounted by installer on terminal connections) • 4-20 mA current loop; accuracy is ±2% of span, without user calibration; self-powered or board-powered sensors accepted • Dry contact: V open circuit, 300- µA short-circuit current • Pulsing dry contact at a rate of up to 20 Hz; 50% duty cycle
Digital Outputs	• Form A relay contacts suitable for on/off control only; floating control not supported • Max voltage 30 volts AC or DC • 0.5 A max current rating
Analog Outputs	• 0-10 V DC • Minimum load supported per output is 2,500 ohms minimum or 4 mA drain maximum

Table 8: FX Workbench Requirements

Processor	Intel® Pentium® 4, 1 GHz or higher
Operating System	Microsoft® Windows® 7, Microsoft Windows 2003 or Microsoft Windows Server® 2008 (If Microsoft IIS is disabled), Microsoft Virtual Server 2008, Microsoft Windows XP® Professional Operating System Microsoft Windows Vista™ Operating System. The Tunneling Service does not start automatically if installed on Microsoft Windows Vista operating system; however, you can manually start the Tunneling Service.
Web Browser	Microsoft Internet Explorer® Web browser Version 5.0 or later, Mozilla Firefox
Memory	512 MB minimum
Hard Disk	1 GB minimum, 5 GB recommended
Network Support	Ethernet 10/100 Mbps with RJ-45 connector

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, contact a Facility Explorer technical support resource. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

United States Emissions Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

Canadian Emissions Compliance

This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Johnson Controls

Building Efficiency
507 E. Michigan Street, Milwaukee, WI 53202