FX Supervisory Controllers Product Bulletin

Johnson Controls

Contents

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 or intranet connection. Multiple users can concurrently connect to the FX Supervisory Controller. You can manage security and presentation preferences through user profiles, login IDs, and passwords.

FX Supervisory Controllers are a family of controllers similar in function and overall capabilities. The FX30E, FX60E, FX70 and FX80 are compact DIN rail mountable controllers with the capability for external input and output points.

ⓘ **Note:** The FX80 is the only Supervisory Controller being actively manufactured.

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.

Refer to the *FX80 Supervisory Controller Product Bulletin (LIT-12012250)* for important product application.

FX Supervisory Controllers 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.

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.

Fully Commissioned and Licensed Out of the Box

Power up, connect to a web browser, change default passwords, set up network parameters, and start adding your field controllers

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 HVAC, lighting, and other electrical systems to do the following:

- Provides system-wide coordination

- Improves occupant comfort

- Annunciates off-normal and alarm conditions

- Reduces energy usage

- Optimizes operating efficiencies

FX Supervisory Controllers organize system information into displays, reports, and graphics that you can access by using a web browser.

The FX30E, FX60E, FX70 and FX80 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 and distributed supervisory control within larger facilities or between facilities.

North American Emissions Compliance

United States

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 may cause harmful interference, in which case the users will be required to correct the interference at their own expense.

Canada

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.

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)

- Wireless TEC communications (Release 6.1 and earlier)

- GPRS Modem

Supported Networking Protocols

You can order the FX Supervisory controllers with the BACnet MS/TP driver included for support of BACnet field controllers including:

- FX-PCA, FX-PCG, FX-PCV, and FX-PCX Programmable Controllers configured for BACnet MS/TP operation

- Third-party BACnet devices

ⓘ **Note:** The CH- Programmable Controller family may also be used in certain regions.

In addition, the FX30E, FX60E, and FX70 Supervisory Controllers 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 MS/TP and BACnet IP

- MODBUS® Transmission Control Protocol (TCP), and Remote Terminal Unit (RTU)

- M-Bus

- Simple Network Management Protocol (SNMP)

- Short Message Service (SMS) (Release 6.1 and earlier)

- ZigBee® for wireless Terminal Equipment Controllers (TEC) (Release 6.1 and earlier)

The FX80 controller can use network protocol driver software to obtain and model external device data. The FX80 controller licenses include the following network driver features enabled as standard:

- Johnson Controls® N2 (exclusive to FX80)

- BACnet MS/TP

- BACnet IP Client and Server

- MODBUS® Remote Terminal Unit (RTU) Client and Server

- MODBUS Transmission Control Protocol (TCP) Client and Server

- LonWorks FTT-10A (requires LonWorks communication module)

- LonWorks over IP

- M-Bus

- EIB/KNX

- Simple Network Management Protocol (SNMP)

You can purchase the optional Carrier® CCN network protocol driver feature and add it to the FX80 controller license. Also available for purchase is an AX license, which allows the FX80 controller

to run Niagara (Ax) software. This is typically required if you want to use an FX80 to replace other types of FX Supervisory Controllers on an existing site.

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 FX30E and FX60E support optional, local I/O (NDIO) modules. These modules plug into the right side of the FX30E/FX60E providing a local interface to the field inputs and outputs.

- **NDIO34**: includes 16 universal inputs, 10 relay outputs, and 8 analog outputs. One NDIO34 module can be added to an FX30E or FX60E Supervisory Controller. This NDIO34 module also provides power to the attached FX30E/FX60E 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 FX30E or FX60E 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 through RS-485 and contains the following I/O:

- 8 universal inputs

- 4 relay outputs

- 4 analog outputs

See Table 7 to identify the exact number and types of direct I/O supported by each model of FX Supervisory Controller.

Remote I/O (IOR16 AND IOR34)

The **IOR-16** is designed for the remote monitoring and control of applications to facilitate end-to-end automation and device-to-enterprise integration. It expands an FX80 Supervisory Controller with 16 I/O points consisting of the following:

- 8 universal inputs (UI): Type 3 (10K) thermistors, 0-100kΩ, 0-10 VDC, 0-20 mA with external

- resistor

- 4 relay outputs (RO): Form A contacts, 24 VAC @ 0.5 A rated

- 4 analog outputs (AO) (1-10 VDC)

The **IOR-34** is designed for remote monitoring and control of applications to facilitate end-to-end automation and device-to-enterprise integration. It expands an FX80 Supervisory Controller with 34 I/O points consisting of the following:

- 16 universal inputs (UI) compatible with 0-10 VDC, 0-20 mA, dry contacts, pulsing dry contacts, 0-100KΩ resistive, or Type 3 thermistor temperature sensors

- 10 digital outputs (DO) with Form-A relay contacts for on and off control of loads up to 24 VAC or DC, at 0.5A max

- 8 analog outputs (AO) for 0-10 VDC analog control of loads at 2.5KΩ minimum, or 4 mA drain maximum

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, allowing 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 the following functions:

- 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 provides a visually intuitive method for you to configure the daily, weekly, and exception (holiday) schedules.

Figure 1: Scheduler
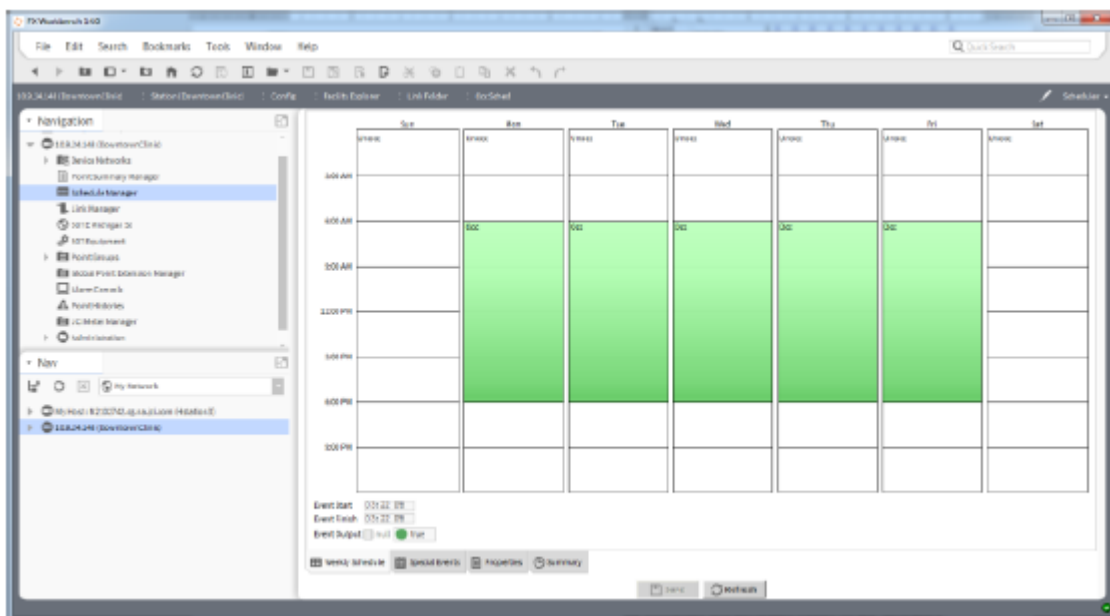
Histories

The Histories feature 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 2: Histories
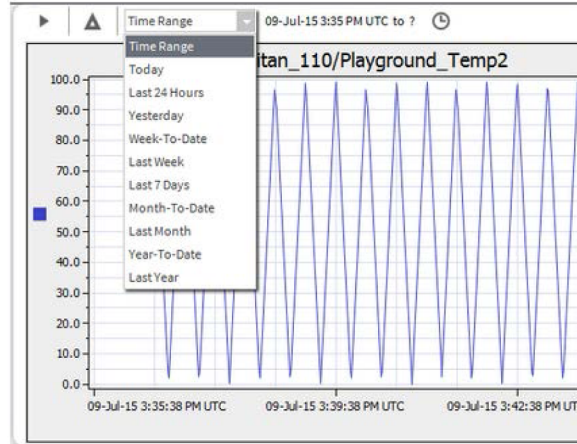
Alarming

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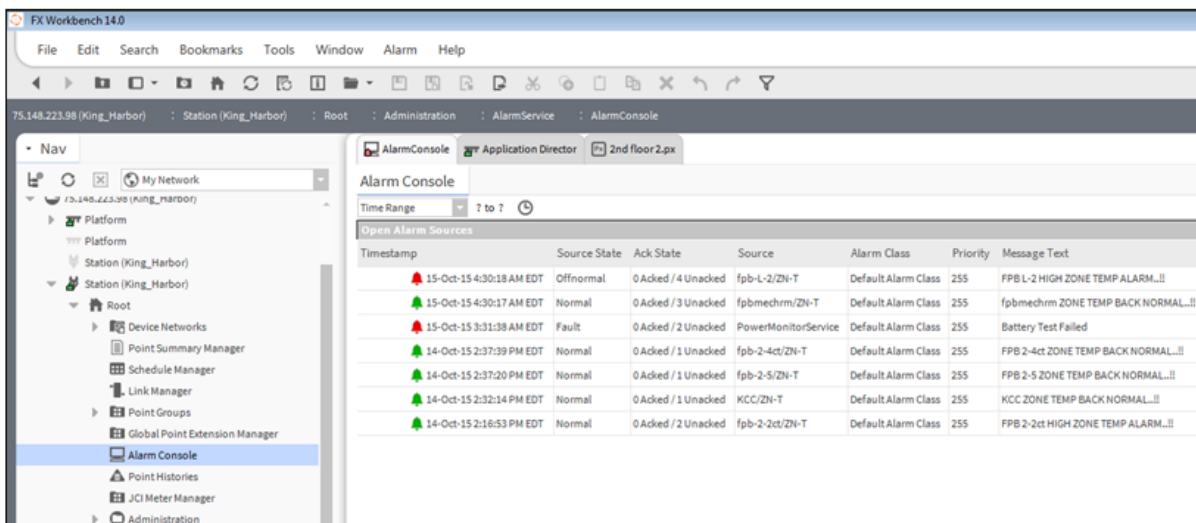n configure the FX Supervisory Controller to generate alarms on any data point in its system database. Each alarm record contains valuable information, including the alarm and return-to-normal time and date, time duration in current state, text description, and alarm class.

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 through e-mail and SMS.

Figure 3: Alarm Console

Energy Management

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

- 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.

Tagging and Templating

Metadata tagging provides ways for you to find data, through search and navigation hierarchies, as well as providing ways to narrow results by filtering the data. Similarly, creating templates using pre-tagged devices results in built-in reusability, which translates to shorter integration time.

Niagara Analytics (FX80 feature)

Niagara Analytics is a data analytics extension to the Niagara Framework® available on FX Supervisory Software. Niagara Analytics gives FX80 users the ability to apply a variety of analytic algorithms and diagnostics to both historical and real-time data available. At FX Supervisory Software Release 14.2 and later, every FX80 is licensed for 25 analytic objects.

Algorithm Library

The algorithm library has a group of predefined algorithms that you can customize and extend to meet the specific needs of the site. Also provided are more than 40 functional and mathematical blocks to help you design and create your own custom algorithms. Use your algorithm to evaluate a single piece of equipment or all pieces of equipment in your enterprise, then save your entire analytics operation as a template and redeploy as often as needed.

Intuitive Programming

You can drag and drop algorithms onto the wiresheet from the Analytics palette.

Real-time, On-Premise Analytics Control

You can run on-site analytics directly on the FX80 Supervisory Controller to identify a situation and make a change in real time, which enables you to make faster decisions while conserving computing power. Results can then be pushed up to the server to make changes across the enterprise.

Automated-Control Strategies

Advanced alarming can collect data from multiple real-time data sources, and can make intelligent decisions based on custom algorithms and therefore provide a more sophisticated analysis. This process eliminates many end-user nuisance alarms.

Figure 4: Analytics
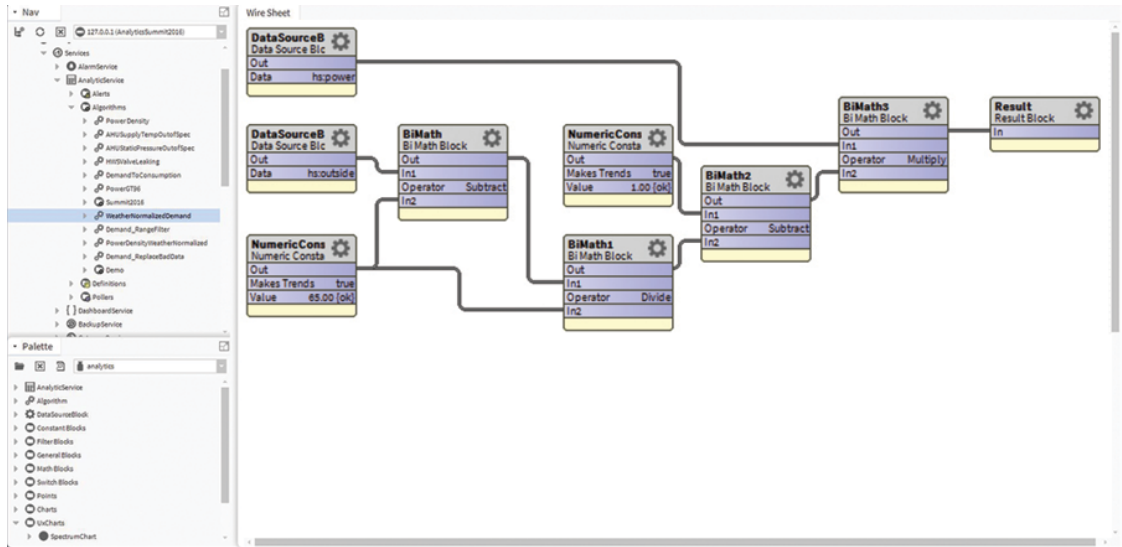
Customized Control Logic

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 through a web browser. The Web UI capability is embedded in every FX Supervisory Controller, allowing users to access the system through a web browser over an Ethernet LAN, Internet.

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

- 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 a smart phone sized device like an iPhone®, iPod touch®, or an 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: Mobile Web UI

Figure 6: Full Size Web UI
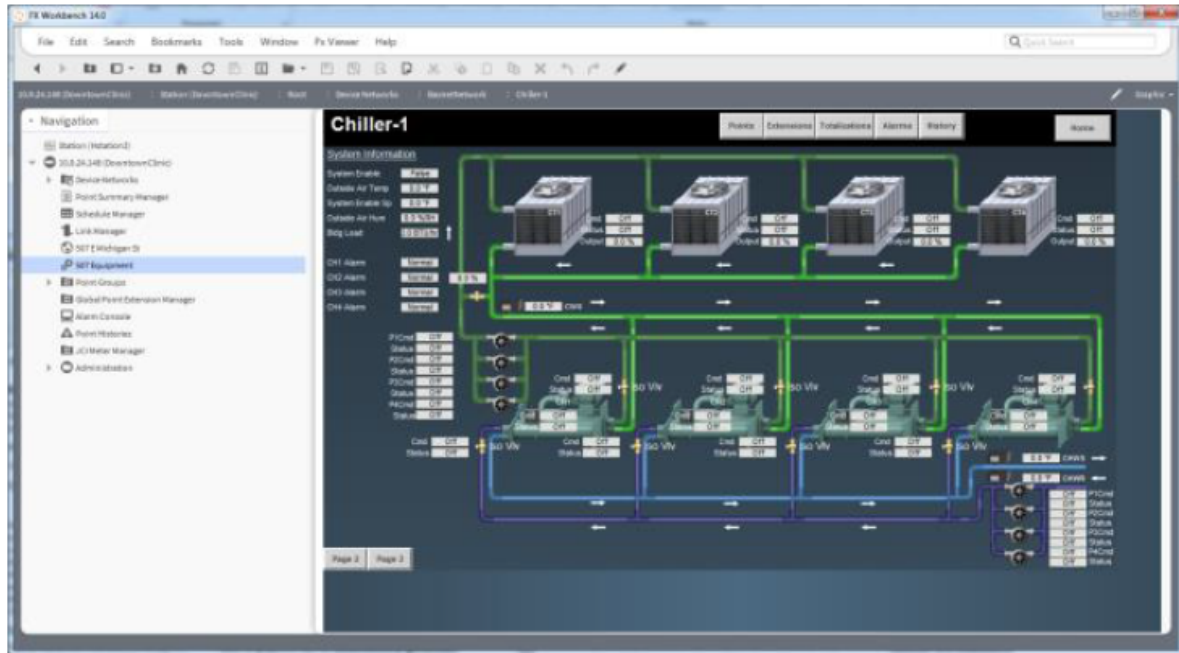
Open Automatic Demand Response (OpenADR) Driver for FX Supervisory Controllers (For Release 6.x and Earlier)

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 through 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 you 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.

You 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-PC Series 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 view creation

- Migration to FX Supervisory Software Version 14 and later

FX Supervisory Software Version 14.x

FX Supervisory Software Version 14.x introduces a new user interface, more robust security, and other features, such as an HTML5 web profile. These additions require a larger footprint, station conversion, and refactoring of certain software modules. Although many FX Supervisory Controllers can be migrated, be sure to see the *FX Supervisory Controller Upgrade and Migration Instructions Technical Bulletin (LIT-12011441)* for details regarding support, tools, and licenses to determine if migration is right for your application.

Figure 7: Example of a Facility Explorer Configuration

Table 1: FX Supervisory Controller Ordering Information

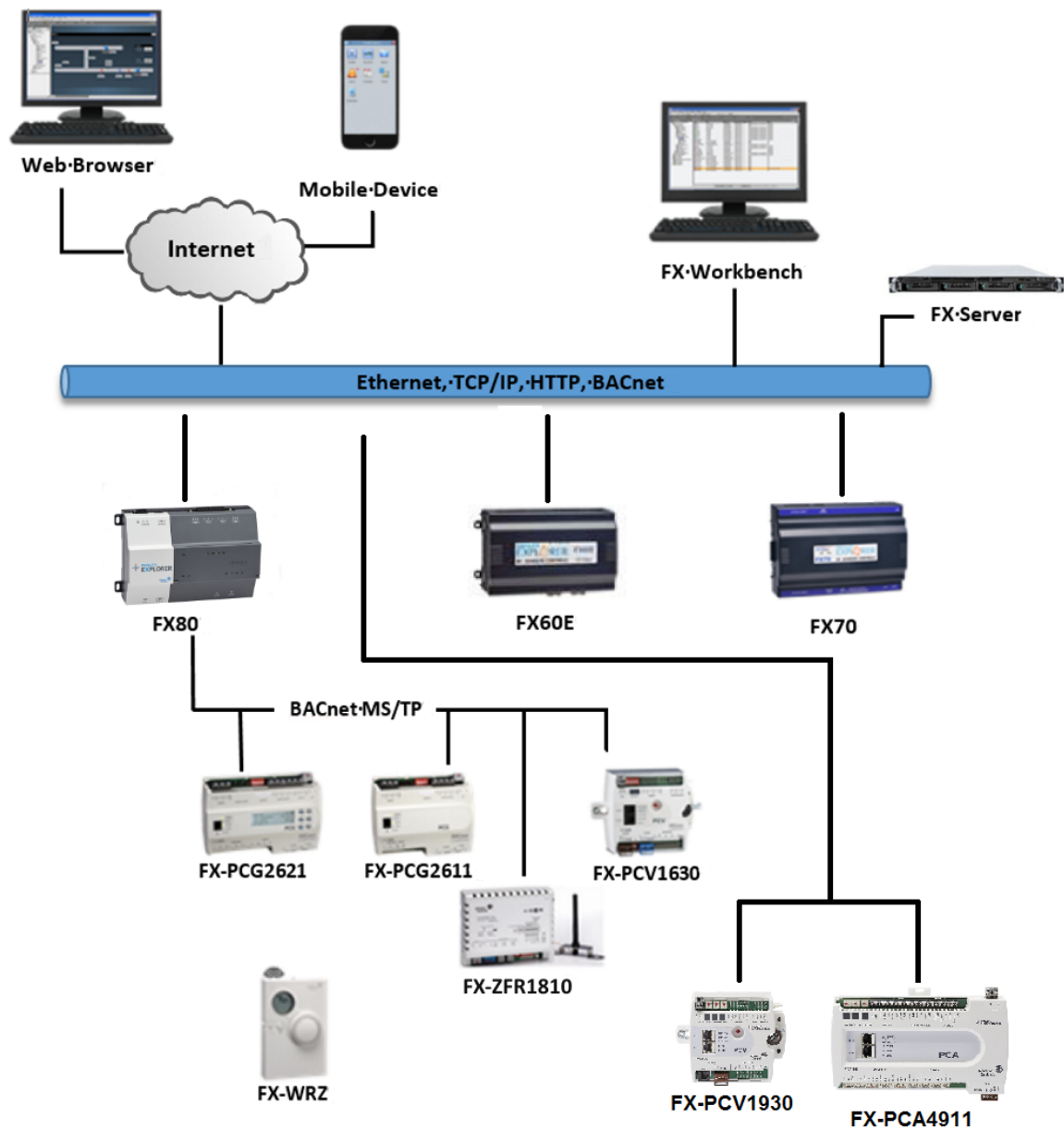| Product Code Number	Description
LP-FX3011E-1	FX30E: Includes 256 MB RAM/128 MB flash, 2 10/100 Mbps Ethernet ports, 1 non-isolated RS-485 port, 1 RS-232 port, 1 Niagara Direct Input/Output (NDIO) port, 2 communication card option slots, embedded FX Workbench, Web User Interface, Data Recovery Services with SRAM, Niagara driver, oBIX driver, and N2 driver.

Table 1: FX Supervisory Controller Ordering Information

Product Code Number	Description
LP-FX3021E-1	FX30E with BACnet MS/TP Protocol: Includes 256 MB RAM/128 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, Data Recovery Services with SRAM, Niagara driver, oBIX driver, N2 driver, and BACnet MS/TP driver.
LP-FX6011E-1	FX60E: Includes 256 MB RAM/128 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, Data Recovery Services with SRAM, Niagara driver, oBIX driver, and N2 driver.
LP-FX6021E-1	FX60E with BACnet MS/TP Protocol: Includes 256 MB RAM/128 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, Data Recovery Services with SRAM 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-FX30BDEM-1	Demo version of FX30E: 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 FX30E. License expires yearly on October 31 and must be renewed yearly to continue operation.
LP-FX60BDEM-2	Demo version of FX60E: Includes all software modules and drivers. Intended for engineering and demonstration purposes only (not allowed for actual project installations). Office support and renewal fee must also be purchased to activate this FX60E. License expires yearly on October 31 and must be renewed yearly to continue operation.
FX-SC8BASE-700	Replacement FX80 Supervisory Controller, no micro SD card, no licenses
FX-SC8BDWIFI-0	FX80 Supervisory Controller Case, Disabled WLAN
FX-SC8BASE-0	FX80 Supervisory Controller and micro Secure Digital (SD) card, licensing required and purchased separately

Table 2: FX Workbench Ordering Information (Release 6.x and Earlier)

Product Code 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 through an online connection (cannot create new stations offline). 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 Server or FX Tools Supervisor Pro-End User Client. Software not included (order LP-FXWB-COPY to obtain latest copy of software).

Table 3: FX Supervisory Controller Software Accessories Ordering Information (Release 6.x and Earlier)

Product Code Number	Description
LP-FX60EX256-0	License enabling Java® heap memory expansion to 96 MB for one FX30E/FX60/FX60E.
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.

Table 3: FX Supervisory Controller Software Accessories Ordering Information (Release 6.x and Earlier)

Product Code Number	Description
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.
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 through 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.

Table 4: FX Workbench Ordering Information (Release 14.x)

Product Code Number	Description
FX-DVD-COPY	FX Supervisory Controller family software, delivered on DVD. Includes latest installation images for FX Server and FX Workbench. Licenses not included—order licenses separately.

Table 4: FX Workbench Ordering Information (Release 14.x)

Product Code Number	Description
FX-SLDEMO-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.
FX-SL001M1-0	License enabling FX Server with one Niagara network connection. Includes 1 year of software maintenance. May be used to provide end customers with client FX Workbench.
FX-SL001M3-0	License enabling FX Server with one Niagara network connection. Includes 3 years of software maintenance. May be used to provide end customers with client FX Workbench.
FX-SL001M5-0	License enabling FX Server with one Niagara network connection. Includes 5 years of software maintenance. May be used to provide end customers with client FX Workbench.
FX-SL001M1-6	License enabling 1 additional year of software maintenance to FX Server with 1 Niagara network connection.
FX-SL001M3-6	License enabling 3 additional years of software maintenance to FX Server with 1 Niagara network connection.
FX-SL001M5-6	License enabling 5 additional years of software maintenance to FX Server with 1 Niagara network connection.

ⓘ **Note:** At Facility Explorer 14.0, there is no equivalent to the Alarm Console. However, the Facility Explorer Alarm Console Release 6.x still communicates with and displays alarms from Facility Explorer servers and supervisory controllers running Facility Explorer 14.0.

Table 5: FX Workbench Ordering Information (Release 6.x and Earlier)

Product Code Number	Description
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-FXMDBTCP-0	License enabling Modbus TCP client (import) driver for one FX Supervisory Controller

Table 5: FX Workbench Ordering Information (Release 6.x and Earlier)

Product Code Number	Description
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

Table 6: FX Supervisory Controller Software Maintenance Ordering Information (Release 14.x)

Product Code Number	Description
FX-SC3EM1-6	License enabling 1 year of software license for FX30E
FX-SC3EM3-6	License enabling 3 years of software license for FX30E
FX-SC3EM5-6	License enabling 5 years of software license for FX30E
FX-SC6EM1-6	License enabling 1 year of software license for FX60E
FX-SC6EM3-6	License enabling 3 year of software license for FX60E
FX-SC6EM5-6	License enabling 5 year of software license for FX60E
FX-SC7EM1-6	License enabling 1 year of software license for FX70
FX-SC7EM3-6	License enabling 3 years of software license for FX70
FX-SC7EM5-6	License enabling 5 years of software license for FX70
FX-SC8D005M1-0	Initial 1 year software maintenance for FX80 Supervisory Controller with 5–9 field device capacity
FX-SC8D005M3-0	Initial 3 year software maintenance for FX80 Supervisory Controller with 5–9 field device capacity
FX-SC8D005M5-0	Initial 5 year software maintenance for FX80 Supervisory Controller with 5–9 field device capacity
FX-SC8D010M1-0	Initial 1 year software maintenance for FX80 Supervisory Controller with 10–24 field device capacity
FX-SC8D010M3-0	Initial 3 year software maintenance for FX80 Supervisory Controller with 10–24 field device capacity
FX-SC8D010M5-0	Initial 5 year software maintenance for FX80 Supervisory Controller with 10–24 field device capacity
FX-SC8D025M1-0	Initial 1 year software maintenance for FX80 Supervisory Controller with 25–99 field device capacity
FX-SC8D025M3-0	Initial 3 year software maintenance for FX80 Supervisory Controller with 25–99 field device capacity
FX-SC8D025M5-0	Initial 5 year software maintenance for FX80 Supervisory Controller with 25–99 field device capacity
FX-SC8D100M1-0	Initial 1 year software maintenance for FX80 Supervisory Controller with 100–199 field device capacity
FX-SC8D100M3-0	Initial 3 year software maintenance for FX80 Supervisory Controller with 100–199 field device capacity

Table 6: FX Supervisory Controller Software Maintenance Ordering Information (Release 14.x)

Product Code Number	Description
FX-SC8D100M5-0	Initial 5 year software maintenance for FX80 Supervisory Controller with 100–199 field device capacity
FX-SC8D200M1-0	Initial 1 year software maintenance for FX80 Supervisory Controller with 200 and up field device capacity
FX-SC8D200M3-0	Initial 3 year software maintenance for FX80 Supervisory Controller with 200 and up field device capacity
FX-SC8D200M5-0	Initial 5 year software maintenance for FX80 Supervisory Controller with 200 and up field device capacity

Before you migrate an FX30E, FX60, FX60E, or FX70 to FX Supervisory Software 14 and later, you must first upgrade your FX Supervisory Controller to FX Supervisory Software 6.x (using LP-FXUPG-0). Any FX Servers would also need to be upgraded as well.

Before you upgrade to FX Supervisory Software 14, review the *FX Supervisory Controller Upgrade and Migration Technical Bulletin (LIT-12011441)* to determine if migration is right for your application. If you determine that migration is a viable path for your application, you must purchase the appropriate software maintenance part. Software maintenance is available in 1, 3, or 5 years. The purchase of software maintenance allows the installation of FX software releases during the time of the software maintenance license. When the software maintenance license time has expired, new FX software releases are not allowed. In addition, if you miss a software maintenance period and want it later, you must purchase the missed software maintenance period in addition to the new requested period.

Table 7: FX80 Controller Software Maintenance (Post Initial) Ordering Information

Product Code Number	Description
FX-SC8D005M1-6	1 year software maintenance for FX80 Supervisory Controller with 5–9 field device capacity
FX-SC8D005M3-6	3 year software maintenance for FX80 Supervisory Controller with 5–9 field device capacity
FX-SC8D005M5-6	5 year software maintenance for FX80 Supervisory Controller with 5–9 field device capacity
FX-SC8D010M1-6	1 year software maintenance for FX80 Supervisory Controller with 10–24 field device capacity
FX-SC8D010M3-6	3 year software maintenance for FX80 Supervisory Controller with 10–24 field device capacity
FX-SC8D010M5-6	5 year software maintenance for FX80 Supervisory Controller with 10–24 field device capacity
FX-SC8D025M1-6	1 year software maintenance for FX80 Supervisory Controller with 25–99 field device capacity
FX-SC8D025M3-6	3 year software maintenance for FX80 Supervisory Controller with 25–99 field device capacity
FX-SC8D025M5-6	5 year software maintenance for FX80 Supervisory Controller with 25–99 field device capacity
FX-SC8D100M1-6	1 year software maintenance for FX80 Supervisory Controller with 100–199 field device capacity

Table 7: FX80 Controller Software Maintenance (Post Initial) Ordering Information

Product Code Number	Description
FX-SC8D100M3-6	3 year software maintenance for FX80 Supervisory Controller with 100–199 field device capacity
FX-SC8D100M5-6	5 year software maintenance for FX80 Supervisory Controller with 100–199 field device capacity
FX-SC8D200M1-6	1 year software maintenance for FX80 Supervisory Controller with 200 and up field device capacity
FX-SC8D200M3-6	3 year software mintenance for FX80 Supervisory Controller with 200 and up field device capacity
FX-SC8D200M5-6	5 year software maintenance for FX80 Supervisory Controller with 200 and up field device capacity

Table 8: FX Supervisory Controller Hardware Accessories Ordering Information (Release 6.x and 14.x)

Product Code Number	Description
LP-FXNDIO16-0	16 channel input/output module 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/FX70 Supervisory Controllers: Includes 16 universal inputs, 10 relay outputs, and8 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. **(Release 6.x and earlier)**
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. (**Release 6.x and earlier)**
LP-FXRS232-0	Single port RS-232 communication card for the FX Supervisory Controller: 115,200 max baud rate, DB-9M connector.
LP-FXPMUS-0	Power module for FX Supervisory Controller: 90–240 VAC, 50/60 Hz, U.S. wall adapter.

Table 8: FX Supervisory Controller Hardware Accessories Ordering Information (Release 6.x and 14.x)

Product Code Number	Description
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.
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.
FX-SC8LCCN-0	License enabling Carrier® Communication/Comfort Network (CCN) driver for one FX80 Supervisory Controller; initial purchase
FX-SC8LAX-0	License enabling AX 3.8 downgrade for one FX80; initial purchase
FX-SC8LCCN-6	License enabling Carrier CCN driver for one FX80; upgrade after initial purchase
FX-SC8LAX-6	License enabling AX 3.8 downgrade for one FX80; upgrade after initial purchase
FX-SC8LAC-6	License enabling AC256 over RS-232 or RS-485 driver
FX-SC8LAINF-6	License enabling Andover® Infinity driver
FX-SC8LAPHP-6	License enabling American Auto-Matrix™ PHP over RS-232 or RS-485 driver
FX-SC8LAPUP-6	License enabling American Auto-Matrix™ PUP over RS-232 or RS-485 driver
FX-SC8LFLEX-6	License enabling Flex™ driver over RS-232 or RS-485
FX-SC8LGLOB-6	License enabling control of IR AV equipment through an RS-232 to Global Cache FC module
FX-SC8LHELV-6	License enabling Helvar lighting control driver

Table 8: FX Supervisory Controller Hardware Accessories Ordering Information (Release 6.x and 14.x)

Product Code Number	Description
FX-SC8LHORT-6	License enabling European Hortsmann meter driver
FX-SC8LJOS-6	License enabling Josam® grease trap sensor driver
FX-SC8LLANG-6	License enabling Lang™ oven RS-232 or RS-485 driver
FX-SC8LMCQ-6	License enabling McQuay® driver to OPM driver
FX-SC8LSMS-6	License enabling SMS alarms through Global System for Mobile Communication (GSM)/General Packet Radio Services (GPRS) modem to RS-232 serial port driver
FX-SC8LVDRT-6	License enabling Veeder-Root® RS-232 or RS-485 driver

Table 9: FX80 Core Device Licenses Ordering Information

Product Code Number	Description
FX-SC8CL005-0	FX80 Supervisory Controller core device license, 5 field devices, 250 points
FX-SC8CL010-0	FX80 Supervisory Controller core device license, 10 field devices, 500 points
FX-SC8CL025-0	FX80 Supervisory Controller core device license, 25 field devices, 1,250 points
FX-SC8CL100-0	FX80 Supervisory Controller core device license, 100 field devices, 5,000 points
FX-SC8CL200-0	FX80 Supervisory Controller core device license, 200 field devices, 10,000 points
FX-SC8CLDEMO-0	FX80 Supervisory Controller demo license, 500 field devices, 25,000 points. 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.

ⓘ **Note:**

- Each FX80 controller requires the purchase of a single core device license.

- Device licenses are also dependent on point (proxy) counts. For each device that is licensed, 50 points are licensed. A 5-device core license also licenses 250 points. This could satisfy five devices with 25 points each or three devices with 80 points each. For three devices with 90 points each, you need to purchase the 10-device core license (or add a 5-device additional license to the 5-device core license).

Table 10: FX80 Controller Hardware Accessories Ordering Information

Product Code Number	Description
FX-SC8SD-700	FX80 micro SD replacement (micro SD only); no licenses
FX-SC8XLON-0	LonWorks FX80 expansion module for the FX80 Supervisory Controller
FX-SC8XD485-0	Dual port isolated RS-485 expansion module for the FX80 Supervisory Controller
FX-SC8X232-0	RS-232 expansion module for the FX80 Supervisory Controller

Table 10: FX80 Controller Hardware Accessories Ordering Information

Product Code Number	Description
FX-SC8AKIT-700	FX80 accessory kit including replacement connectors
FX-SC8XKIT-700	FX80 expansion module kit including one-size-fits-all replacement connector
FX-SC8XPS-0	FX80 universal wall mount power supply 100–240 VAC/24 V includes United States, Europe, United Kingdom, and Australia style plugs
FX-SC8WKIT-700	Extension cable and bracket for FX80 WLAN

Table 11: FX Supervisory Controllers are Restricted from Being Sold

Country	Country Code	FX80 Part Number with Wi-Fi	FX80 Part Number with Wi-Fi Disabled
Cuba	—	Restricted from Sale	Restricted from Sale
Iran	—	Restricted from Sale	Restricted from Sale
North Korea	—	Restricted from Sale	Restricted from Sale
Sudan	—	Restricted from Sale	Restricted from Sale
Syria	—	Restricted from Sale	Restricted from Sale

Technical Specifications

Table 12: FX Supervisory Controllers Specifications

FX Supervisory Controller				
	FX30E	**FX60E**	**FX70**	**FX80**
Enclosure/ Mounting	Plastic/DIN Rail			
Dimension	158.75 mm x 101.6 mm x 60.325 mm (6.313 in. x 4.820 in. x 2.438 in.)		216 mm x 152 mm x 68 mm (8.5 in. x 6 in. x 2.625 in.)	
Power Supply	DIN Rail Power modules			
Battery Backup	Data Recovery Services with SRAM (Static Random Access Memory) (optional Battery available for extended run time)		5-minute internal, optional external	
Processor	Power PC 405EX at 400 MHz	PowerPC 440EP at 524 MHz	PowerPC 440EPx at 652 MHz	TI AM3352: 1000MHz ARM® Cortex™ A8
RAM Memory	256 MB RAM	256 MB RAM	1 GB RAM	1 GB DDR3 SD RAM

Table 12: FX Supervisory Controllers Specifications

FX Supervisory Controller				
	FX30E	**FX60E**	**FX70**	**FX80**
JAVA Heap Memory	24 MB Heap (upgrade able to96 MB)	48 MB Heap (upgrade able to 96 MB)	384 MB Heap	
Flash Memory	128 MB Flash	128 MB Flash	1 GB Flash	Removable micro-SD card with 4GB flash total storage, 2 GB user storage
Environment	Operating Temperature: 0°C to 50°C (32°F to 122°F), Storage Temperature: 0°C to 60°C (32°F to 140°F), Relative Humidity: 5% to 95%, noncondensing			
Communication Ports				
Onboard	2 Ethernet 10/100 Mbps; 1 RS-485 non-isolated; 1 RS-232; 2 option slots		Ethernet 1 Gbps; 1 RS-485 (Isolated); 1 RS-232; 2 option slots; Mini PCI express slot	2 Ethernet 10/100 Mbps; 2 RS-485 (Isolated); 1 USB, 1 Micro USB, Fast USB Bus; Wi-Fi
Optional	Two options slots (any 2 of the following, except where noted): • Dual port RS-485 • LON FT/TP-10 • RS-232 • Wireless TEC (maximum of one and disables onboard RS-232) **(Release 6.x and earlier)** • GPRS modem (maximum of one) • Battery-less Option Card			**Plug-in options**: Dual port RS-485 (Isolated); LON FT/TP-10; RS-232
Network Drivers				
Embedded	N2, Niagara, oBIX			N2, BACnet, Niagara
Direct I/O				
Onboard	None			
Optional	Up to 66 (by using NDIO modules)		Up to 256 by using 16 Remote I/O Modules FXRIO16	
Local (NDIO)	Up to 66 total I/O (through optional NDIO modules)		None	
Remote I/O	Up to 64 I/O by using 4 Remote I/O Modules (FXRIO16)		Up to 256 I/O by using 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			

Table 12: FX Supervisory Controllers Specifications

FX Supervisory Controller				
	FX30E	**FX60E**	**FX70**	**FX80**
CE	**Canada** UL Listed, File E107041, CCN PAZX7, under CSA C22.2 No. 205, Signal Equipment Industry Canada compliant to ICES-003			
	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. FX60E controllers used in conjunction with the LP-FXPM263-0 power module require the addition of a ferrite ring around a shielded power cord.			
	BACnet International: BACnet Testing Laboratories® (BTL) 135-2004 Listed BACnet Building Controller (B-BC)			

Table 13: Local Input Output Modules

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: 160 mm x 122 mm x 62 mm (6.313 in. x 4.820 in. x 2.438 in.) NDIO16: 81 mm x 123 mm x 62 mm (3.2 in. x 4.828 in. x 2.437 in.)
Universal Input Types Supported	10k ohm Type 3 thermistors. Thermistor Sensor Range: -23.3°C to 115.5°C (-10°F 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 VDC, Minimum load supported per output is 2,500 ohms minimum or 4 mA drain maximum

Table 14: Remote Input Output Modules

Remote Input Output Modules	
Product Codes	LP-FXRIO16-0: 8 universal inputs, 4 relay outputs, 4 analog outputs
Dimensions	102 mm x 92 mm x 67 mm (4 in. x 3.625 in. x 2.625 in.)

Table 14: Remote Input Output Modules

Remote Input Output Modules	
Universal Input Types Supported	10k ohm Type 3 thermistors. Thermistor Sensor Range: -23.3°C to 115.5°C (-10°F 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 VDC, Minimum load supported per output is 2,500 ohms minimum or 4 mA drain maximum

Table 15: FX Workbench Requirements

Processor	Intel® Pentium® 4, 1 GHz or higher
	102 mm x 92 mm x 67 mm (4 in. x 3.625 in. x 2.625 in.)
Operating System	**32-bit**: Windows® 10 Pro or Enterprise, Windows 8 Pro or Enterprise, Windows 7 Professional, Enterprise, or Ultimate, or Windows XP® Professional
	64-bit: Windows® 10 Pro or Enterprise, Windows 8.1 Pro or Enterprise, Windows 8 Pro or Enterprise, Windows 7 Professional, Enterprise, or Ultimate, Windows Server 2012 Standard or Enterprise with SP2, or Windows Server® 2012 R2 Standard or Enterprise with SP2
Memory	1 GB minimum, 4 GB or more recommended for larger systems
Hard Disk	4 GB minimum, more recommended depending on archiving requirements
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.