

FX40 Supervisory Controller

The FX40 is a Web-based supervisory-class controller in the Facility Explorer product family. The FX40 manages networks of field controllers using open communication protocols such as N2, LONWORKS®, and BACnet® protocols. The FX40 also provides onboard, input and output points for direct monitoring of equipment status or analog sensors and control of auxiliary devices or alarms.

The FX40 supports a full set of building automation features and functions specifically designed for commercial facilities such as scheduling, alarming, histories, data sharing, energy management, totalization, and customized control routines.

The FX40 includes a graphical system user interface and configuration tool that users can access with a Web browser. Multiple users can concurrently connect to the FX40. Security and presentation preferences are managed through user profiles, logon IDs, and passwords. Remote access is easily achieved from an Internet, intranet, or a dial-up connection.



Figure 1: FX40



Features and Benefits	
<input type="checkbox"/> Web-Based User Interface	Provides rich, graphical displays which users can access via a Web browser to monitor, operate, and analyze their building control system.
<input type="checkbox"/> Adoption of Industry Standard Communication Protocols	Allow for the integration of a wide variety of field controllers. This includes Facility Explorer field controllers and controllers provided by others without intermediate gateways or translators.
<input type="checkbox"/> Embedded Configuration Tool	Requires no proprietary or desktop software to configure the FX40.
<input type="checkbox"/> Onboard Inputs and Outputs	Allow direct control of auxiliary devices, which could reduce the number of field devices.

Overview

The FX40 provides integrated control supervision and network management services for one or more local networks of field controllers. The FX40 monitors and controls Heating, Ventilating, and Air Conditioning (HVAC); lighting, and other electrical systems to do the following:

- provide system-wide coordination
- improve occupant comfort
- reduce energy usage
- optimize operating efficiencies

The FX40 organizes system information into displays, reports, and graphics that users can access via a Web browser.

The FX40 is housed in a durable, sheet metal enclosure with built-in 120 VAC power supply. The FX40's capacity and performance requirements make it ideally suited for the following:

- supervisory control of small- to large-sized facilities
- distributed supervisory control within larger facilities or between facilities

Onboard Inputs and Outputs (I/Os)

The FX40 features 10 onboard inputs and outputs for direct control over auxiliary devices such as temperature and humidity sensors, pressure transducers, alarm indicators, and energy meters.

The FX40 I/O complement includes:

- four form C Single-Pole, Double-Throw (SPDT) relay outputs rated for 24 VAC/DC @ 2 Ampere resistive each with Light-Emitting Diode (LED) indication
- six universal inputs for 10k ohm type III thermistors, 4-20 mA and 0-10 VDC active inputs, or dry contact binary inputs

Communication Interfaces

The FX40 includes multiple, embedded communication interfaces, enabling the FX40 to integrate many different types of field controllers, as well as providing different methods of remote access.

The FX40's embedded communication interfaces include the following:

- 1 Ethernet port: 10/100 Mbps
- 1 RS-485 port
- 1 LONWORKS FTT-10A port
- 1 RS-232 port or modem port

Networking Protocols

The FX40 supports multiple embedded and optional networking drivers, including the following:

- N2: embedded
- LONWORKS: embedded
- BACnet Master-Slave/Token-Passing (MS/TP): embedded
- BACnet Internet Protocol (IP) Client (import): embedded
- BACnet IP Server (export): optional
- ModBus® Rooftop Unit (RTU) Client (import): optional
- ModBus RTU Server (export): optional
- ModBus Transmission Control Protocol (TCP) Client (import): optional
- ModBus TCP Server (export): optional
- M-Bus
- Simple Network Management Protocol (SNMP)
- Z-Wave
- Short Message Service (SMS)

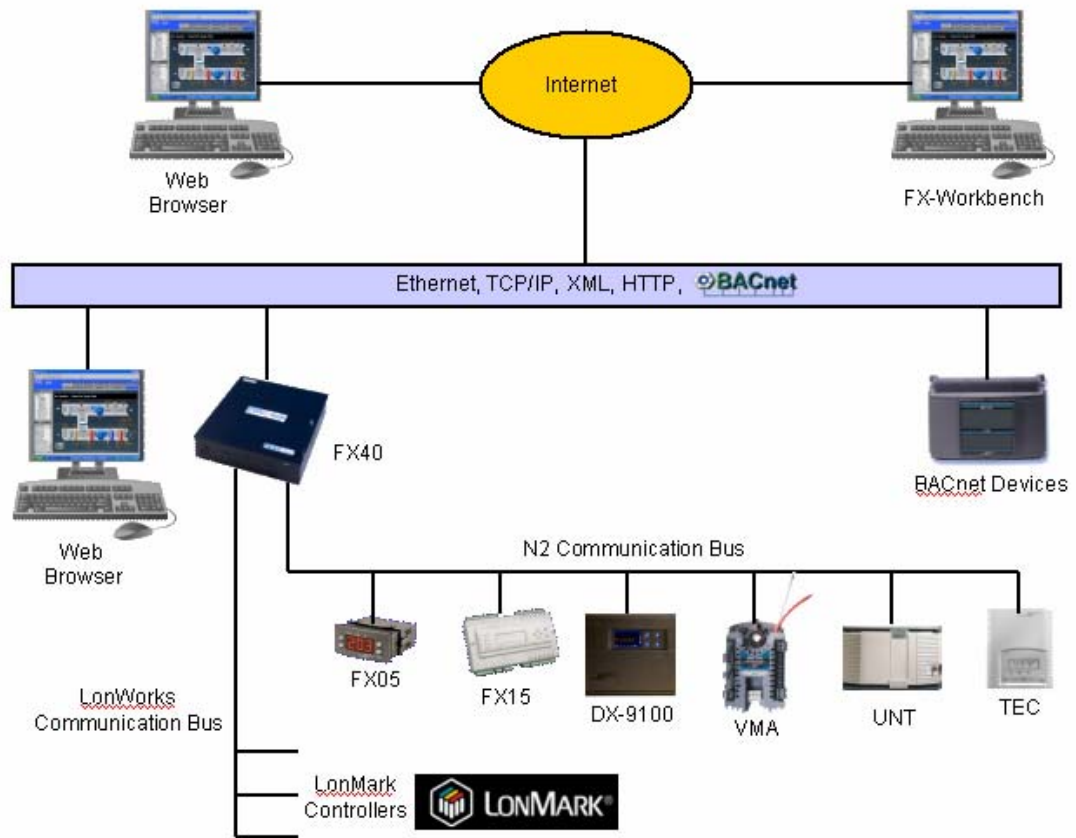


Figure 2: Example of an FX40 Configuration

Building Automation Control Features

The FX40 includes a full library of building automation control features, including scheduling, alarming, histories, energy management, totalizations, and custom control logic. You can apply these features to almost all data points regardless of their source.

Scheduling

You can configure the FX40 to automate various functions within a facility based on a time schedule. Some examples include the following:

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

You can link any writable point in the FX40 system database to a schedule. The scheduler interface (Figure 3) provides a visually intuitive method for you to configure the daily, weekly, and exception (holiday) schedules.

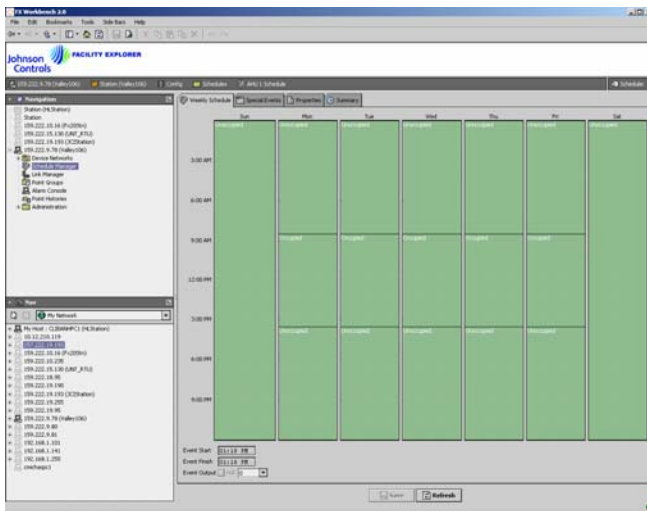


Figure 3: Event Scheduling

Histories

The Histories feature (Figure 4) allows the FX40 to collect, store, and display pertinent system data for analysis. This may include control performance indication, energy consumption, and system troubleshooting. You can configure the FX40 to create a history on any data point in the FX40 system database. Histories are presented either graphically or in a sortable table, and you can export the stored data in a .txt, .pdf, or .csv format.

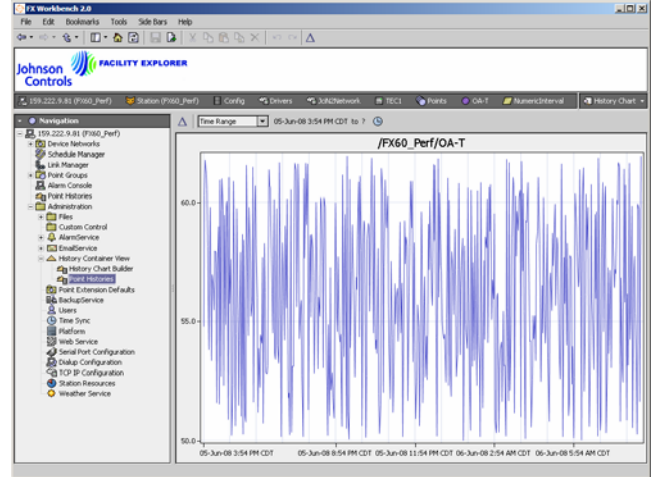


Figure 4: Histories

Alarming

The Alarm feature (Figure 5) enables the FX40 to initiate, route, and manage alarms and events according to user-defined criteria. You can configure the FX40 to generate alarms on any data point in the FX40 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, e-mail, or both. Alarm recipients have a variety of options to manage alarms, including sorting, acknowledging, silencing, and tagging.

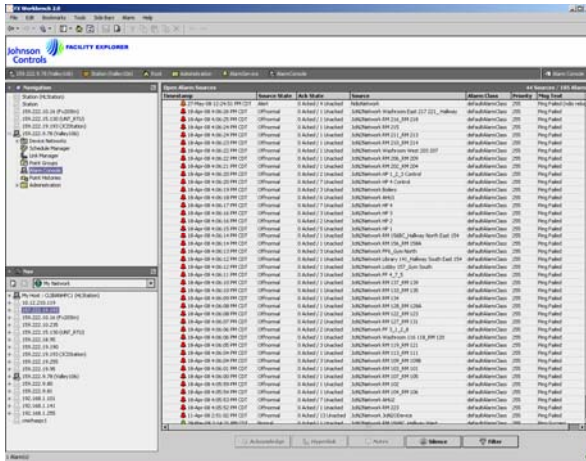


Figure 5: Alarm Console

Energy Management

The FX40 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 allows the FX40 to accumulate data on a point over a period of time. You can add a totalization extension to any data point in the FX40 system database to summarize runtime, to accumulate change of state counts, or to 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 FX40 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 FX40's Web-based User Interface (Web UI) provides system-wide monitoring and controlling capability via a web browser (Figure 6). The Web UI capability is embedded in every FX40. This allows users to access the system via a Web browser over an Ethernet Local Area Network (LAN), Internet, or dial-up modem connection.

You can format the Web UI according to specific user preferences. The presentation of the information can be as rich or as limited as needed to support a variety of user types and interface hardware (computer, Personal Digital Assistant [PDA], or cell phone). When you design Web UI pages, you can choose from a full library of symbols including the following:

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

Alternatively, you can include your own customized graphics (for example, floorplan.jpg).

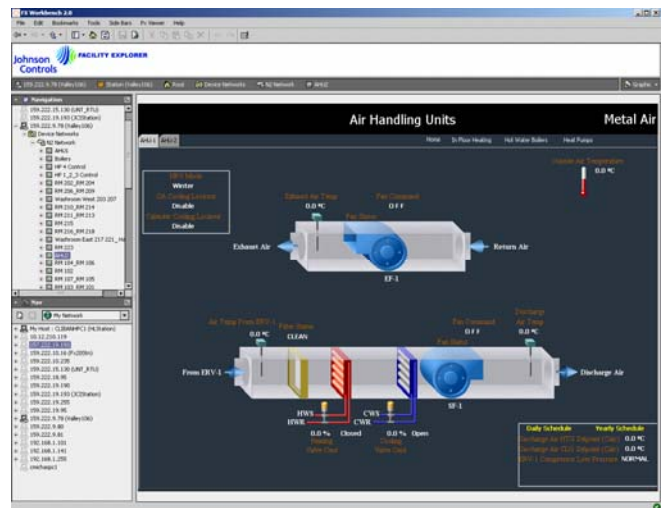


Figure 6: Web-Based User Interface

FX Workbench

FX Workbench is a software application that allows users to configure the FX40. FX Workbench is embedded in every FX40 and is served up to Web browsers of authorized users. In addition, you can purchase FX Workbench as a separate software application to reside on a computer.

Users can configure the FX40 online while directly or remotely connected with FX Workbench.

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

- 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

Software Upgrades

Each FX40 includes a 1-year software maintenance agreement. This agreement allows you to upgrade the FX40 software with any new or interim service release for 1 year from the date of purchase. Once the software maintenance agreement expires, you can order additional upgrades.

Table 1: FX40 Ordering Information

Part Number	Description
LP-FX4020A-0	FX40: includes 128 MB RAM, 32 MB Flash, 1 Ethernet port, 1 RS-485 port, 1 RS-232 port, 1 LONWORKS FT/TP-10 port, 6 universal inputs, 4 binary outputs, N2 driver, LONWORKS driver, BACnet IP client driver, BACnet MS/TP driver, embedded FX Workbench, embedded Web UI, 1-year software maintenance agreement
LP-FX4021A-0	FX40: includes 128 Mb RAM, 32 Mb Flash, 1 Ethernet port, 1 RS-485 port, 1 RS-232 port, 1 LONWORKS FT/TP-10 port, 6 universal inputs, 4 binary outputs, Niagara driver, N2 driver, LONWORKS driver, BACnet IP client driver, BACnet IP server driver, BACnet MS/TP driver, embedded FX Workbench, embedded Web UI, 1-year software maintenance agreement
LP-FX4022A-0	FX40: includes 128 Mb RAM, 32 Mb Flash, 1 Ethernet port, 1 RS-485 port, 1 modem, 1 LONWORKS FT/TP-10 port, 6 universal inputs, 4 binary outputs, N2 driver, LONWORKS driver, BACnet IP client driver, BACnet MS/TP driver, embedded FX Workbench, embedded Web UI, 1-year software maintenance agreement
LP-FX4023A-0	FX40: includes 128 Mb RAM, 32 Mb Flash, 1 Ethernet port, 1 RS-485 port, 1 modem, 1 LONWORKS FT/TP-10 port, 6 universal inputs, 4 binary outputs, N2 driver, LONWORKS driver, BACnet IP client driver, BACnet IP server driver, BACnet MS/TP driver, embedded FX Workbench, embedded Web UI, 1-year software maintenance agreement

Table 2: FX Workbench Ordering Information

Part Number	Description
LP-FXTSPE-0	FX Tools Supervisor Pro Software on CD-ROM: End-user version. Includes FX Workbench, FX Workbench Pro, and FX Alarm Portal.
LP-FXTSPE-6	FX Tools Supervisor Pro Software Upgrade on CD-ROM. Used to upgrade any copy of FX Tools Supervisor Pro which is within the software maintenance agreement period.
LP-FXALMPTL-0	FX Alarm Portal Client Software on CD-ROM. Provides Alarm Portal functions only.
LP-FXSWMA-0	License file enabling 1 year of software maintenance for one copy of FX Tools Supervisor Pro.
LP-FXSWUPG-0	License file enabling a one-time software upgrade for one copy of FX Tools Supervisor Pro.

Table 3: FX40 Software Accessories Ordering Information

Part Number	Description
LP-FX40CN0-0	License enabling Enterprise Connectivity Station Pack (Niagara and BACnet IP server drivers) for one FX40
LP-FXMDBRTU-0	License enabling ModBus RTU client (import) driver for one FX20/FX40/FX60
LP-FXMDBRTUS-0	License enabling ModBus RTU server (export) driver for one FX20/FX40/FX60
LP-FXMDBTCP-0	License enabling ModBus TCP client (import) driver for one FX20/FX40/FX60
LP-FXMDBTCPS-0	License enabling ModBus TCP server (export) driver for one FX20/FX40/FX60
LP-FXLONIP-0	License enabling LONWORKS IP driver for one FX20/FX40/FX60
LP-FXMBUS-0	License enabling M-Bus driver for one FX20/FX40/FX60
LP-FXZWAV-0	License enabling Z-Wave driver for one FX20/FX40/FX60
LP-FXSNMP-0	License enabling Simple Network Management Protocol (SNMP) driver for one FX20/FX40/FX60
LP-FXSMS-0	License enabling Simple Messaging Service driver (SMS) for one FX20/FX40/FX60
LP-FXSSL-0	License enabling Secure Socket Layer (SSL) for one FX20/FX40/FX60
LP-FX40MA-0	License enabling 1 year of annual software maintenance for one FX20/FX40/FX60. Includes new releases and interim service releases for 1 year from the date of purchase.
LP-FX40UPG-0	License enabling one-time, new release software upgrade for one FX20/FX40/FX60

Table 4: FX40 Replacement Parts Ordering Information

Part Number	Description
LP-KIT401A-0	Onboard modem
LP-KIT402A-0	Battery, 12 VDC, 1.2 AH
LP-KIT403A-0	FX40 Hardware Accessory Package, includes: <ul style="list-style-type: none"> • six 499 ohm, 0.6 W resistors • four 6-position I/O screw terminal connectors • one 3-position RS-485 screw terminal connector • two wire nuts • one LONWORKS 2-position screw terminal connector
LP-KIT407A-0	Battery/ground harness (also includes 6-position power connector)
LP-KIT408A-0	Adapter, RJ-45 to DB-9 null modem, for serial port to connect to Data Terminal Equipment (DTE) device
LP-KIT409A-0	Silver satin patch cable, 4 ft (used between adapter and serial port)
LP-KIT410A-0	Silver satin patch cable, 10 ft (used between adapter and serial port)
LP-KIT411A-0	Silver satin patch cable, 25 ft (used between adapter and serial port)

Technical Specifications

Table 5: FX40 Controller (Part 1 of 2)

Product Codes	LP-FX4020A-0, LP-FX4022A-0
Power Requirements	120 VAC, 50/60 Hz 25 VA maximum Lead wires for hot/neutral (wire nut), stud for ground connection
Environmental	Operating Temperature: 32 to 122°F (0 to 50°C) Storage Temperature: 32 to 158°F (0 to 70°C) Relative Humidity: 5 to 95%, noncondensing
General	Motorola® Reduced Instruction Set Computer (RISC) Processor @ 250 MHz Facility Explorer Control Engine with direct I/O support objects 128 MB RAM, 32 MB flash for database backup One 10/100 MB Ethernet RJ-45 connector FCC Class A computing device Wind River VxWorks® Operating System with Jeode® Java® Virtual Machine Facility Explorer Software with I/O control objects
Communications	One 10/100 Mb Ethernet port–RJ-45 connection One RJ-45 connector for RS-232 port One RS-485 port (up to 57,600 baud) One LONWORKS port–FTT-10 with Weidmuller connector Optional auto-dial/auto-answer 56k modem; RJ-11 connector (uses the RS-232 port when installed)
Inputs/Outputs	Four form C SPDT relay outputs rated for 24 VAC/DC @ 2 ampere resistive One LED indicator for each relay Six Universal Inputs for 10k ohm Type III (10k 4A1-International) Thermistor, 4/20 mA current loop, 0 to 10 volt, or dry contact 12-bit A/D converter Thermistor Sensor Range: -10 to 135°F (23.3 to 57.2°C). Input accuracy is in the range of ±1% of span, characteristic curve is customizable 0 – 10 volt or 4/20 mA accuracy is ±2% of span, without user calibration. Uses an external resistor for current input (four provided). Self-powered or board powered sensors accepted. Dry contacts (on UI) 20 Hz max. frequency (25 ms minimum pulse width) 3 V open circuit, 300 micro A short-circuit current 20 VDC @ 80 mA to drive 4/20 mA powered sensors. 24 VDC terminal and external resistor can be used if monitoring contacts that require higher voltages or higher current. All I/O uses screw terminals on 0.2 in. centers
Battery Backup	Provided for all onboard functions including I/O. Monitored and trickle charged. The battery maintains the processor operation through power failures for a predetermined interval, then writes all data to flash memory, turns off the processor, and maintains the clock for a minimum of 5 years.

Table 5: FX40 Controller (Part 2 of 2)

Chassis – Housed in Metal Enclosure	Intended for indoor wall mounting only Cooling: Internal air convection Dimensions: 11 x 14 x 2.5 in. (27.94 x 35.56 x 6.35 cm) Weight: Net 4 lb (1.814 kg), gross 5 lb (2.268 kg)
Agency Listing	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

Table 6: FX Workbench Requirements

Processor	Intel® Pentium® 4, 1 GHz or higher
Operating System	Microsoft® Windows NT® Version 4.0 with Service Pack (SP) 4.0 or later Microsoft Windows® 2000 Microsoft Windows XP® Professional
Web Browser	Microsoft Internet Explorer® Version 5.0 or later Netscape Navigator® Version 4.5 or later
Memory	512 MB minimum
Hard Disk	1 GB minimum, 5 GB recommended
Network Support	Ethernet 10/100 Mb 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.

Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of 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.

Industry Canada (IC) Statement

This Class (A) digital apparatus meets all 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.



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