

FX20/FX60 Supervisory Controllers

Installation Instructions

Application

The FX20 and FX60 are Web-based supervisory class controllers in the Facility Explorer product family. The FX20/FX60 manages networks of field controllers using open communication protocols, such as N2, LONWORKS®, and BACnet® protocols.



Figure 1: FX60 Supervisory Controller

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 is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her 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.

Installation

Parts Included

Unpack the FX20/FX60 and accessories (power module, option cards), if ordered. Inspect the contents of the packages for damaged or missing components. If damaged, notify the appropriate carrier and return any damaged components for repair or replacement.

Included in this package are the following items:

- FX Supervisory Series controller
- Hardware bag containing a grounding wire with quick disconnect 0.187 in. (4.75 mm) female connector.
- Power module (if ordered). The power module may be one of the following:
 - LP-FXPM24-0 (24 VAC, DIN rail mountable)
 - LP-FXPM263-0 (90-263 VAC, DIN rail mountable)
 - LP-FXPMUS-0 (90-240 VAC, with U.S. wall adapter)
 - LP-FXPMEU-0 (90-240 VAC, with European wall adapter)
 - LP-FXPMUK-0 (90-240 VAC, with U.K. wall adapter)
- Communication cards (if ordered)
 - LP-FXLONFTT-1
 - LP-FXRS232-0
 - LP-FXRS485-0
 - LP-FXMDM-0
 - LP-FXWTC-0
- Expansion Input/Output (NDIO) Modules (if ordered)
 - LP-FXNDIO16-0
 - LP-FXNDIO34-0
 - LP-FXRIO16-0

Materials and Special Tools Needed

You may require the following materials and tools for installation:

- DIN Rail: type NS35/7.5 (35 x 7.5 mm) and DIN rail end clips. Length of DIN rail depends on the number of optional DIN rail mounted options.
- If using a 24 VAC power module: UL Listed, Class 2, 24 VAC transformer, rated at minimum of 8.5 VA to 20 VA, dedicated to powering the FX20/FX60 and its accessories (cannot power additional equipment).
- Suitable screws and screwdriver for mounting DIN rail or, if DIN rail is not used, for mounting bases of FX20/FX60 and any optional accessories.
- #2 Phillips screwdriver: used to install and remove optional communication modules.
- small flat-blade screwdriver: used for mounting and removing the FX20/FX60 from the DIN rail and for making wiring connections to the RS-485, LONWORKS, and Input/Output (I/O) connectors.

Safety Precautions

The following information relates to the installation and startup of the FX20/FX60.



WARNING: Risk of Electric Shock.

Disconnect power supply before making electrical connections. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.

AVERTISSEMENT: Risque de décharge électrique. Débrancher l'alimentation avant de réaliser tout branchement électrique. Tout contact avec des composants conducteurs de tensions dangereuses risque d'entraîner une décharge électrique et de provoquer des blessures graves, voire mortelles.

IMPORTANT: Use copper conductors only. Make all wiring connections in accordance with local, national, and regional regulations. Do not exceed the FX20/FX60 electrical ratings.

IMPORTANT: Do not install or use the FX20/FX60 in or near environments where corrosive substances or vapor could be present. Exposure of the FX20/FX60 to corrosive environments may damage the device's internal components, and will void the warranty.

IMPORTANT: Use this FX20/FX60 only as an operating control. Where failure or malfunction of the FX20/FX60 could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed in the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the FX20/FX60.

Static Discharge Precautions

Static charges produce voltages high enough to damage electronic components. The microprocessors and associated circuitry within a FX20/FX60 are sensitive to static discharge.

IMPORTANT: Work in a static-free area. Discharge any static electricity you may have accumulated. Discharge static electricity by touching a known, securely grounded object. Do not handle the Printed Circuit Board (PCB) without proper protection against static discharge. Use a wrist strap when handling PCBs. Secure the wrist strap clamp to earth ground.

Accessories

The FX20/FX60 has a 20-pin, right-angle, Euro-DIN connector that accepts accessory modules. The connector provides power and signal lines to any connected modules. The connector is located on the end of the FX20/FX60 opposite the option cards.

IMPORTANT: Turn off power to the FX20/FX60 before inserting or unplugging accessory modules. Wait for the LED activity to stop (all LEDs off).



CAUTION: Risk of Property Damage.

Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

MISE EN GARDE: Risque dégâts matériels.

Ne pas mettre le système sous tension avant d'avoir vérifié tous les raccords de câblage. Des fils formant un court-circuit ou connectés de façon incorrecte risquent d'endommager irrémédiablement l'équipement.

Each accessory module has a DIN-mount base, and typically provides two 20-pin connectors that allow you to chain multiple accessories (see *DIN Rail Mounting Instructions*). Table 1 lists the currently available modules.

Table 1: Accessory Module Details

Model	Description	Notes
LP-FXPM24-0	Power module for FX20/FX60 24 VAC/DC, DIN rail mountable	Install only one power module per FX20/FX60, regardless of type.
LP-FXPM263-0	Power module for FX20/FX60 90-263 VAC, DIN rail mountable	Install only one power module per FX20/FX60, regardless of type.
LP-FXNDIO16-0	16 channel input/output module for FX20/FX60, DIN rail mountable	Provides the following I/O points: <ul style="list-style-type: none">• 8 Universal Inputs (UIs)• 4 Digital Outputs (DOs), Single Poll Single Throw (SPST) relay type• 4 Analog Outputs (AOs) (0-10 VDC) Up to four (maximum) NDIO16 accessory modules are supported.
LP-FXNDIO34-0	34 channel input/output module for FX20/FX60, DIN rail mountable. In addition, the NDIO34 provides power to the attached FX20/FX60, using an externally supplied 24 VAC transformer or 24 VDC power supply.	Provides the following I/O points: <ul style="list-style-type: none">• 16 Universal Inputs (UIs)• 10 Digital Outputs (DOs), SPST relay type• 8 Analog Outputs (AOs) (0-10 VDC) One NDIO34 plus up to 2 additional NDIO16 modules are supported. Do not power the NDIO34 if using a separate wall plug power module.
LP-FXRIO16-0	16 channel remote input/output	Provides the following I/O points: <ul style="list-style-type: none">• 8 Universal Inputs (UIs)• 4 Form A Relay Outputs• 4 1-10 VDC Analog Outputs• Up to 4 FXRIO10 modules supported on FX20• Up to 16 FXRIO16 modules supported on FX60

Mounting

Mount the FX20/FX60 in a location that allows clearance for wiring, servicing, and module removal. For mounting details, see Figure 2 through Figure 5.

Follow these recommendations and precautions when mounting and installing the unit.

- Use this controller for indoor use only. Do not expose the unit to ambient conditions outside the range of 0 to 50°C (32 to 122°F) and relative humidity outside the range of non-condensing 5 to 95% (Pollution Degree 1).
- For a controller mounted inside an enclosure, ensure that the enclosure is designed to keep the unit within its required operating range (considering a 20-watt dissipation by the controller). This is especially important if the controller is mounted inside an enclosure with other heat producing equipment.
- Do not mount the unit:
 - in an area where excessive moisture, corrosive fumes, or explosive vapors are present
 - where vibration or shock is likely to occur
 - in a location subject to electrical noise. This includes the proximity of large electrical contactors, electrical machinery, welding equipment, and spark igniters.

Physical Mounting

The following information applies to the physical mounting of the FX20/FX60.

- You do not need to remove the cover before mounting.
- Mount the FX20/FX60 in any orientation.

- Mount the unit on a 35-mm wide DIN rail (recommended). The FX20/FX60 unit base and its accessories have molded DIN rail slots and locking clips. Mounting these components on a DIN rail ensures accurate alignment of connectors between all modules.
- If DIN rail mounting is impractical, use screws in mounting tabs on the FX20/FX60 and in any end-connected accessory (power module, NDIO module). See Figure 2 for tab dimensions.

DIN Rail Mounting Instructions

To mount on DIN rail:

1. Securely install the DIN rail using at least 2 screws near both ends of the rail.
2. Position the FX20/FX60 on the rail, then tilt it to hook the DIN rail tabs over one edge of the DIN rail (see Figure 3).
3. Use a screwdriver to pry down the plastic locking clip, and push the FX20/FX60 down and in, which forces the locking clip to snap over the edge of the DIN rail.
4. Mount the accessory modules (NDIO modules and power module) onto the DIN rail in the same manner (see Figure 5). See Table 1 for quantities allowed.
5. Slide the accessory along the DIN rail to connect its 20-position plug into the FX20/FX60.
6. Repeat these instructions for all accessories, until all are mounted on the DIN rail and firmly connected to each other. For an example, see Figure 4.

To keep the final assembly together, secure at both ends with DIN rail end-clips. This also prevents the assembly from sliding on the DIN rail. See Figure 4.

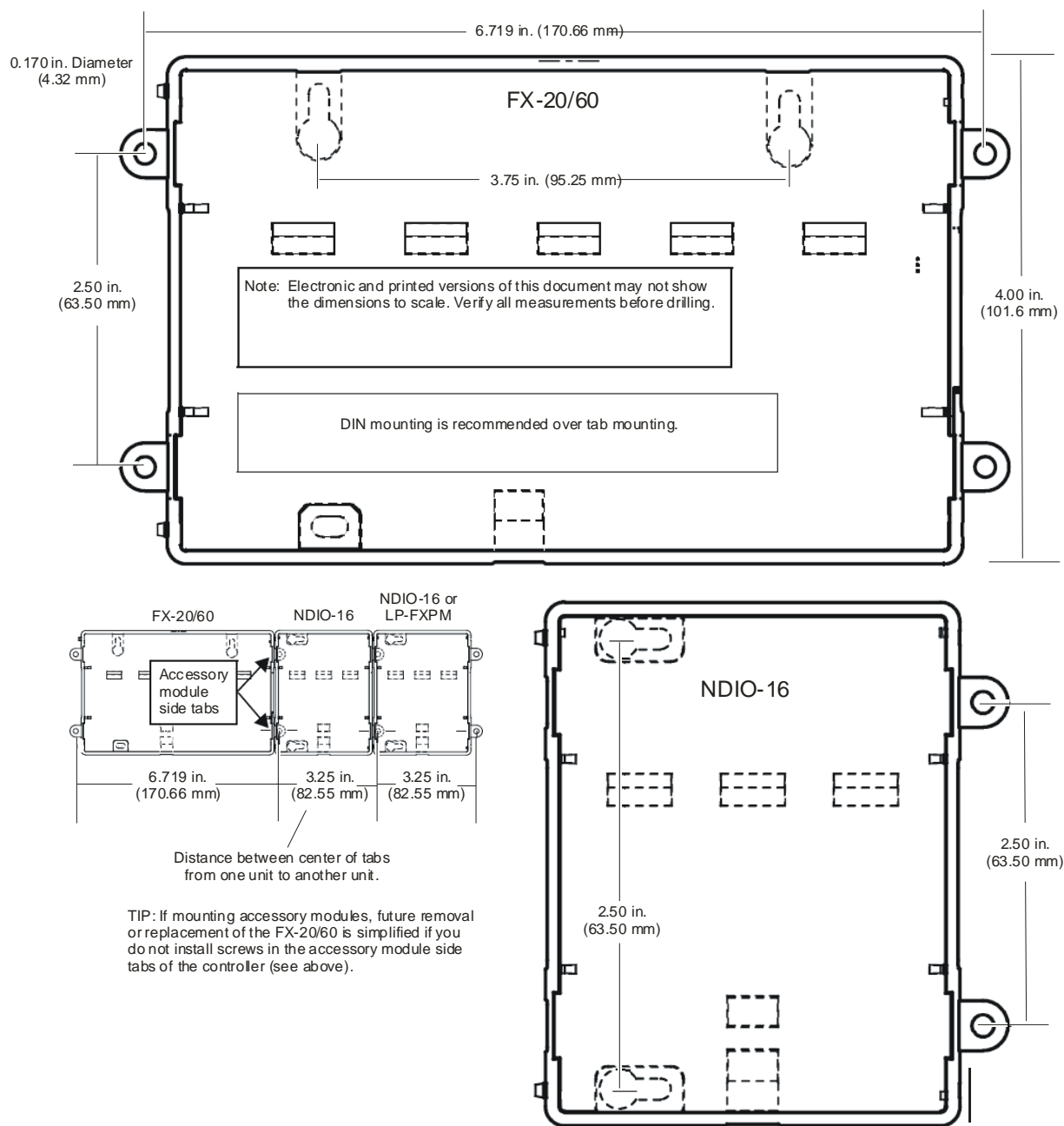


Figure 2: Tab Mounting Dimensions, in. (mm)

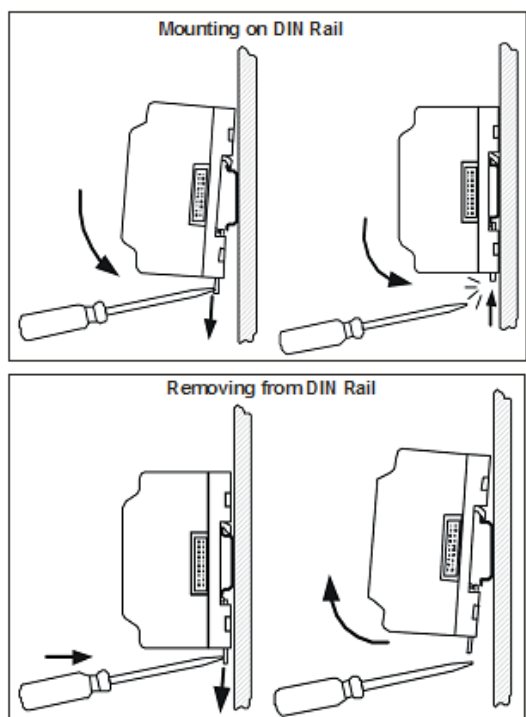


Figure 3: DIN Rail Mounting

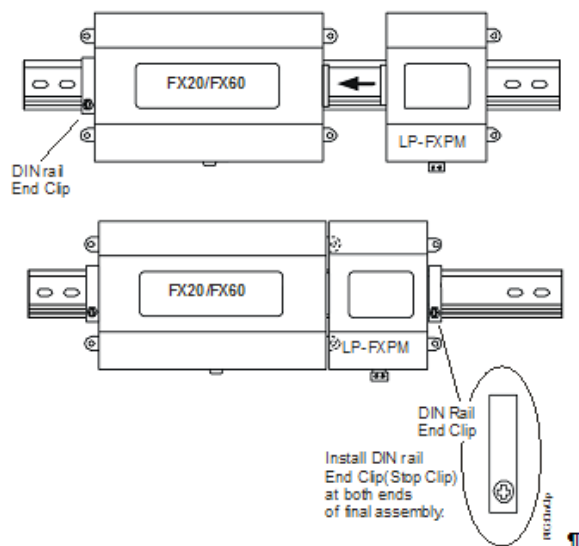


Figure 4: Using End Clips to Secure Modules

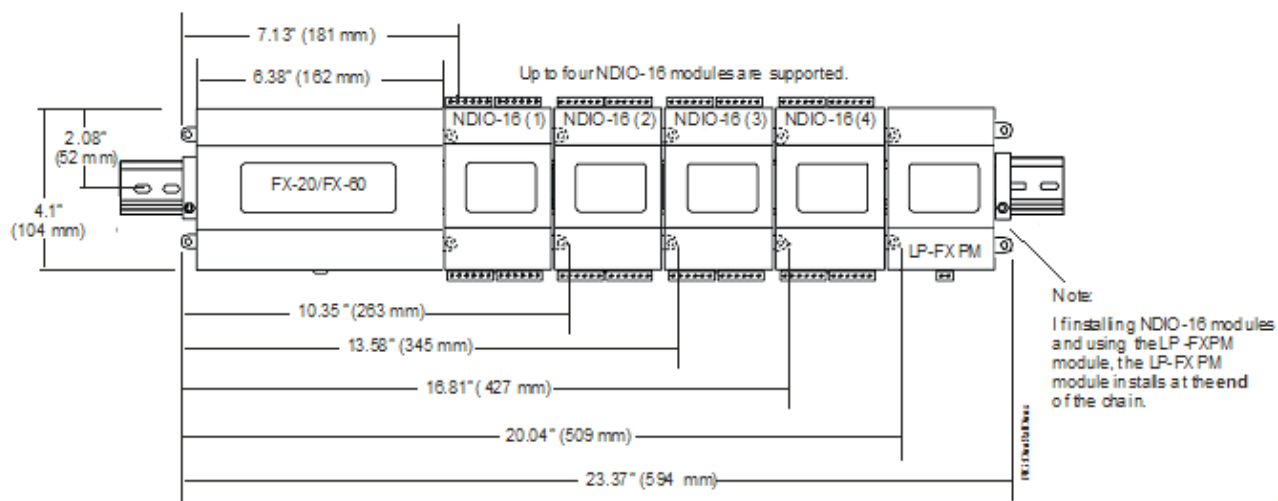


Figure 5: Mounting Accessories

Removing and Replacing the Cover

The FX20/FX60 cover is removable. You must remove the FX20/FX60 cover to connect the battery on a new unit, to replace the battery on an existing unit or to install any optional communication cards. The cover snaps onto the base with four plastic tabs (two on each end). To remove the cover, press in the four tabs on both ends of the unit and lift off the cover.

Note: If accessory modules are plugged into the FX20/FX60, you may need to slide them away from the unit to get to the cover tabs.

To replace the cover, position it so the cutout area for the communication ports is correct, then push inward to snap in place.

Board Layout

See Figure 6 for the location of Light-Emitting Diodes (LEDs), option slots, and other features of the FX20/FX60. See Figure 9 for a side view of communication ports and other features.

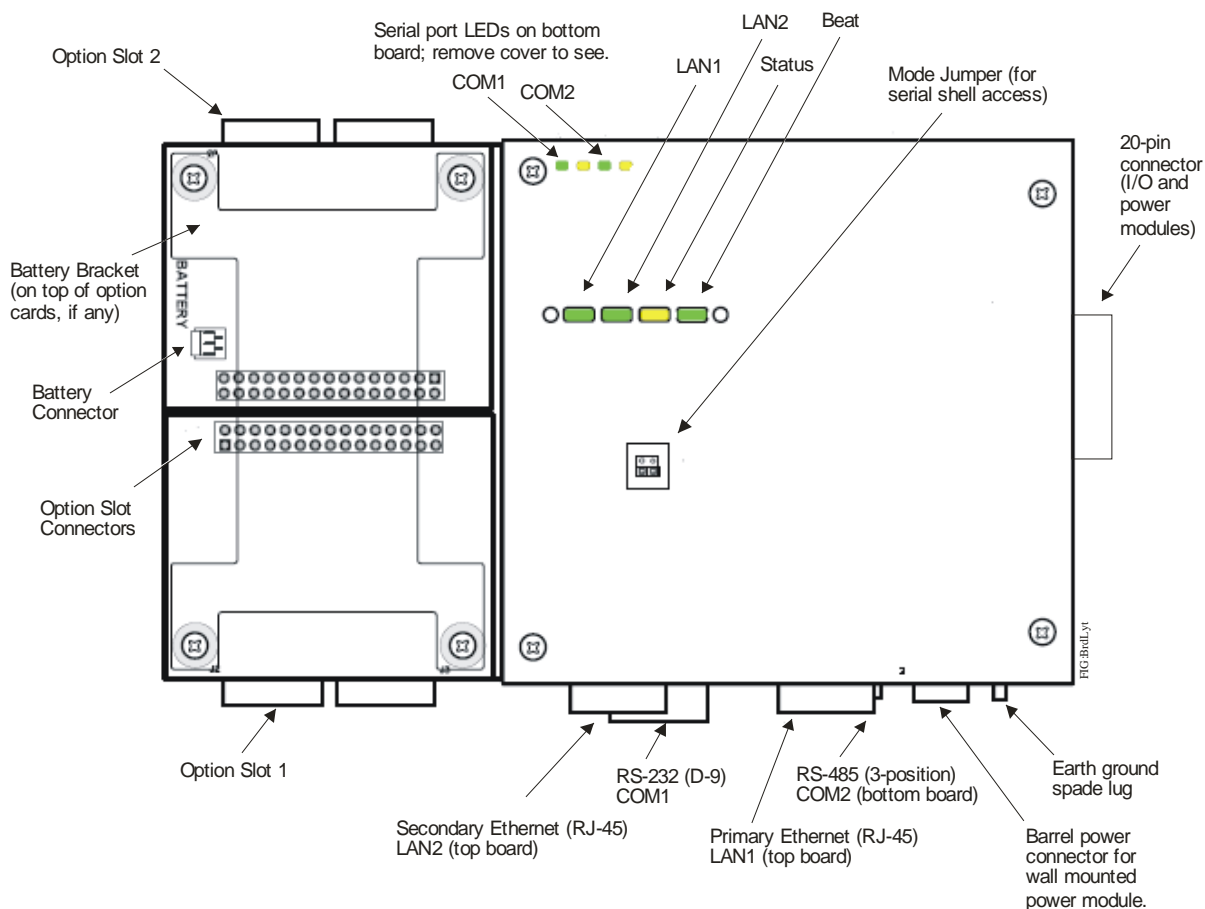


Figure 6: FX20/FX60 Board Layout Details

Expansion Options

The FX20/FX60 provides for field-installable expansion with two options:

- Option Cards: these are installed on connectors inside the FX20/FX60 base unit. See *Option Cards*.
- Accessory Modules: these are chained onto the FX20/FX60's 20-pin connector. See *Accessories*.

Option Cards

The FX20/FX60 has 2 options slots for custom option cards designed for use with the FX20/FX60. Each slot has a 20-pin connector on the FX20/FX60 base unit.



CAUTION: Risk of Property Damage.

Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

MISE EN GARDE: Risque dégâts matériels.

Ne pas mettre le système sous tension avant d'avoir vérifié tous les raccords de câblage. Des fils formant un court-circuit ou connectés de façon incorrecte risquent d'endommager irrémédiablement l'équipement.

IMPORTANT: Be careful to plug an option card into the connector properly with its pins properly aligned.

Option cards typically provide additional communication capabilities, such as those listed in Table 2. For a list of supported COM port and slot assignments for the option cards, see Table 3.

Table 2: Option Card Details

Model	Description	Number of Option Cards Allowed per Controller
LP-FXLONFTT-1	LONWORKS FTT-10A adapter with a 2-position removable screw terminal plug	One or two
LP-FXRS485-0	Dual, optically isolated, RS-485 adapter with two 3-position removable screw terminal connector plugs	One or two
LP-FXMMDM-0	56 Kbps auto-dial/auto-answer modem with one RJ-11 connector for phone line	One*
LP-FXRS232-0	Single port RS-232 adapter, with a DB-9M connector	One or two
LP-FXWTC-0	Wireless TEC Card (WTC) with direct mount antenna	One
LP-FXSED-0	Sedona Framework™ option card	One
LP-FXGPRS-0	GPRS Modem card	One
LP-FXGPRSW-0	GPRS Modem option card with Wyless™ SIM card	One

* If a modem card is installed, and the mode jumper is put in Serial Shell position (see Figure 6), then the FX20/FX60 base RS-232 port becomes active immediately following a reboot. This allows an RS-232 connection to the serial shell for debugging purposes. To re-enable the modem, you must put the mode jumper back in the Normal position and reboot.

Table 3: COM Port and Option Slot Assignments for FX20/FX60 Option Cards

Option Slot 1	Option Slot 2	Onboard RS232	Onboard RS485
None	None	COM1	COM2
RS-232 = COM3	None	COM1	COM2
RS-232 = COM3	RS-232 = COM4	COM1	COM2
RS-232 = COM3	RS-485 = COM4, COM5	COM1	COM2
RS-232 = COM3	LON = LON1	COM1	COM2
RS-232 = COM3	Sedona = COM4	COM1	COM2
RS-232 = COM3	GPRS = COM4, COM5	COM1	COM2
RS-485 = COM3, COM4	None	COM1	COM2
RS-485 = COM3, COM4	RS-232 = COM5	COM1	COM2
RS-485 = COM3, COM4	RS-485 = COM5, COM6	COM1	COM2
RS-485 = COM3, COM4	LON = LON1	COM1	COM2
RS-485 = COM3, COM4	Sedona = COM5	COM1	COM2
RS-485 = COM3, COM4	GPRS = COM5, COM6	COM1	COM2
LON = LON1	None	COM1	COM2
LON = LON1	RS-232 = COM3	COM1	COM2
LON = LON1	RS-485 = COM3, COM4	COM1	COM2
LON = LON1	LON = LON2	COM1	COM2
LON = LON1	Sedona = COM3	COM1	COM2
LON = LON1	GPRS = COM3, COM4	COM1	COM2
Wireless TEC = COM1	None	Disabled	COM2
Wireless TEC = COM1	RS-232 = COM3	Disabled	COM2
Wireless TEC = COM1	RS-485 = COM3, COM4	Disabled	COM2
Wireless TEC = COM1	LON = LON1	Disabled	COM2
Wireless TEC = COM1	Sedona = COM3	Disabled	COM2
Wireless TEC = COM1	GPRS = COM3, COM4	Disabled	COM2
Sedona = COM3	None	COM1	COM2
Sedona = COM3	RS-232 = COM4	COM1	COM2
Sedona = COM3	RS-485 = COM4, COM5	COM1	COM2
Sedona = COM3	LON = LON1	COM1	COM2
Sedona = COM3	GPRS = COM4, COM5	COM1	COM2
Modem = COM1	None	Disabled	COM2
Modem = COM1	RS-232 = COM3	Disabled	COM2
Modem = COM1	RS-485 = COM3, COM4	Disabled	COM2
Modem = COM1	LON = LON1	Disabled	COM2
Modem = COM1	Sedona = COM3	Disabled	COM2
Modem = COM1	GPRS = COM3, COM4	Disabled	COM2
GPRS = COM3, COM4	None	COM1	COM2
GPRS = COM3, COM4	RS-232 = COM5	COM1	COM2
GPRS = COM3, COM4	RS-485 = COM5, COM6	COM1	COM2
GPRS = COM3, COM4	LON = LON1	COM1	COM2
GPRS = COM3, COM4	SEDONA = COM5	COM1	COM2

Mounting Option Cards

For complete details, refer to the specific mounting and wiring guide that shipped with the option card. Follow these basic steps:

1. Remove power from the FX20/FX60.
2. Remove the cover.
3. Remove the battery and bracket assembly by taking out the four screws holding it in place. Set the screws aside for later. Unplug the battery from the connector on the FX20/FX60.
4. Remove the blanking end plate for the slot into which you are installing the option card. Retain the blanking plate in case you need to remove the option card at a later time.
5. Carefully insert the pins of the option card into the socket of the appropriate option card slot. The mounting holes on the option card should line up with the standoffs on the base unit. If they do not, the connector is not properly aligned. Press until the option card is completely seated.
6. Place the custom end plate that came with the option card over the connector(s) of the option card.
7. Insert the battery connector plug into the battery connector on the FX20/FX60.
8. Set the battery and bracket assembly back over the option card slots, with the mounting holes aligned with the standoffs.
9. Place the four screws through the battery bracket, end plates, and into the standoffs on the FX20/FX60 base unit. Hand-tighten these screws.
10. Replace the cover.

Wiring

See Figure 6 to locate connectors and other components on the FX20/FX60.

Make connections to the FX20/FX60 in the following order.

1. Install any option cards (LON, RS-232, RS-485, modem, WTC) in Option Slots 1 and 2. See *Mounting Option Cards* for the general procedure. For complete details, refer to the specific mounting and wiring guide that shipped with the option card.
2. Connect supplied earth grounding wires (with spade connector) from the earth ground lug on the FX20/FX60 and any accessory modules (if used) to a nearby earth grounding point. See *Grounding* for details.
3. Prepare power wiring (leave the unit powered off). See *Power Wiring* for details.
4. Connect communications cables. See *Communications Wiring* for ports available on the FX20/FX60 base unit. For ports on any installed option card (LON, RS-232, RS-485, modem, and WTC), refer to the specific mounting and wiring guide for additional details.
5. If NDIO modules are installed, connect the I/O wiring. Refer to the appropriate mounting and wiring guide for complete details.
6. Connect the backup battery to the FX20/FX60 battery connector, and apply power to the unit. See *Powerup and Initial Checkout*.

Grounding

An earth ground spade lug (0.187 in. [4.75 mm]) is provided on the base of the FX20/FX60 for connection to earth ground. For maximum protection from electrostatic discharge or other forms of electromagnetic interference, connect the supplied earth grounding wire to this lug and a nearby earth ground (see Figure 7). Keep this wire as short as possible.

Power is provided for the FX20/FX60 plug-in accessory modules through the 20-pin accessory connectors; however, connect the earth ground spade lug of each accessory module to ground in the same manner.

Power Wiring

The FX20/FX60 must be powered by an approved 15 VDC power source. This can come from one of the following:

- an external wall mount AC adapter (LP-FXPMUS/EU/UK-0)
- a DIN rail mount 24 VAC/DC powered module (LP-FXPM24-0)
- a DIN rail mount line voltage (90-263 VAC) module (LP-FXPM263-0)
- an NDIO34 module (LP-FXNDIO34-0)

The FX20/FX60 does not include an on/off switch. To apply power, you can do one of the following:

- plug in the power connector to the FX20/FX60, if the wall mount power module is used
- plug in its 2-position power connector, if the 24 VAC DIN rail power supply is used
- energize the AC circuit (90-263 VAC) wired to that module, if the line voltage DIN rail power supply is used



CAUTION: Risk of Property Damage.

Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

MISE EN GARDE: Risque dégâts matériels.

Ne pas mettre le système sous tension avant d'avoir vérifié tous les raccords de câblage. Des fils formant un court-circuit ou connectés de façon incorrecte risquent d'endommager irrémédiablement l'équipement.

If desired, you can use the wall mount power adapter in your office to initially commission the FX20/FX60, and then install the DIN rail mount power supply at the project site.

Wall Mount Power Module

Three models of wall power modules are available: United States (U.S.), European Union (EU), and United Kingdom (U.K.). All are self-contained, isolated switching power supplies designed to plug into a standard building power receptacle for appropriate voltage. To supply power to the FX20/FX60, you simply plug the barrel connector plug from the power module into the barrel power connector on the FX20/FX60 base unit (see Figure 9).

IMPORTANT: Do not plug the barrel connector plug from the power module into the FX20/FX60 until all other mounting and wiring is completed.

Wiring LP-FXPM24-0 Power Module

The LP-FXPM24-0 module lets you power the FX20/FX60 (and, if installed, the NDIO16 modules) from a dedicated, Class 2, 24 VAC transformer, or from a 24 VDC power supply. If installing NDIO16 modules, install the power module as the last (end) module in the chain. See Figure 5.

IMPORTANT: If powering from a 24 VAC transformer, do not power any other equipment with it. Otherwise, conducted noise problems may result. Also, do not ground either side of the transformer's secondary.

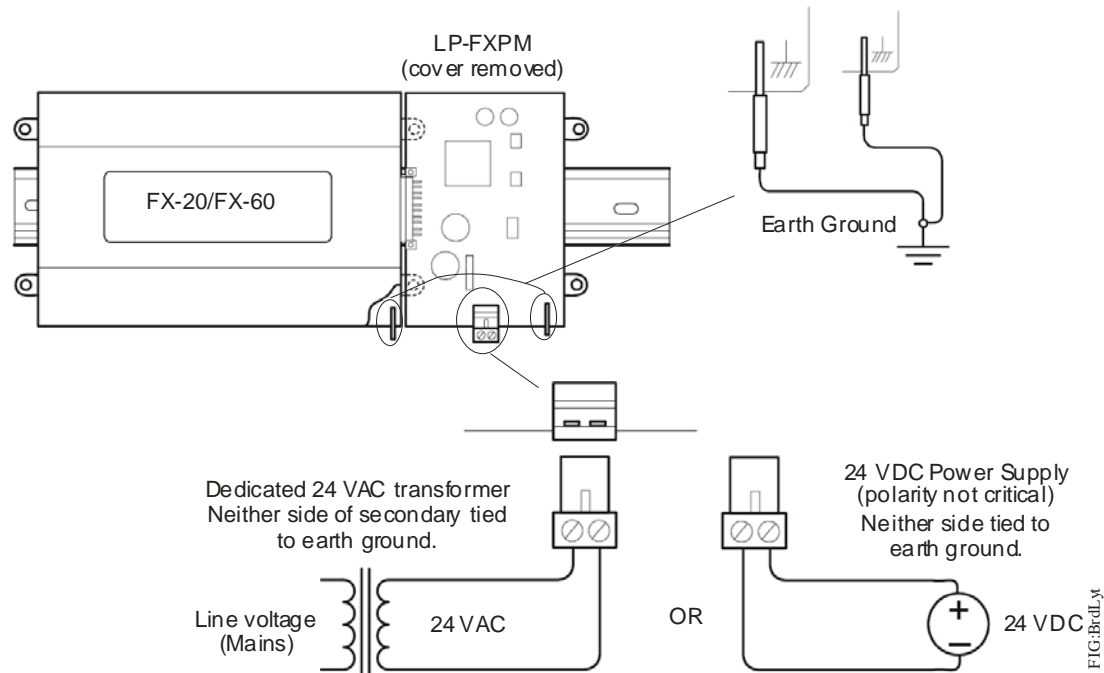


Figure 7: LP-FXPM Power Module Wiring Connections

Located at the bottom of the power module is a 2-position power connector and an earth ground spade lug (see Figure 7). Connect the supplied earth ground wire to a nearby earth ground point. Unplug the power connector plug from the module and make connections to it as shown in Figure 7.



CAUTION: Risk of Property Damage.

Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

MISE EN GARDE: Risque dégâts matériels.

Ne pas mettre le système sous tension avant d'avoir vérifié tous les raccords de câblage. Des fils formant un court-circuit ou connectés de façon incorrecte risquent d'endommager irrémédiablement l'équipement.

Power consumption depends on installed accessories and option cards, and may vary from:

- FX20/FX60 with power module alone: approximately 8.5 VA (AC) or 8.5 W (DC)
- FX20/FX60 with power module and 4 NDIO modules, plus option cards: up to 20 VA (AC) or 20 W (DC)

LP-FXPM263-0 Line Voltage Power Module

Using the LP-FXPM263-0 module lets you power the FX20/FX60 (and, if installed, the NDIO16 modules) from AC line power, with a universal input range from 90-263 VAC. If installing NDIO16 modules, install the power module as the last (end) module in the chain (see Figure 5).



WARNING: Risk of Electric Shock.

Disconnect power supply before making electrical connections. Contact with components carrying hazardous voltage can cause electric shock and may result in personal injury or death.

AVERTISSEMENT: Risque de décharge électrique.

Débrancher l'alimentation avant de réaliser tout branchement électrique. Tout contact avec des composants conducteurs de tensions dangereuses risque d'entraîner une décharge électrique et de provoquer des blessures graves, voire mortelles.

Note: The 6-pin connector of the LP-FXPM263-0 is not used with a FX20/FX60.

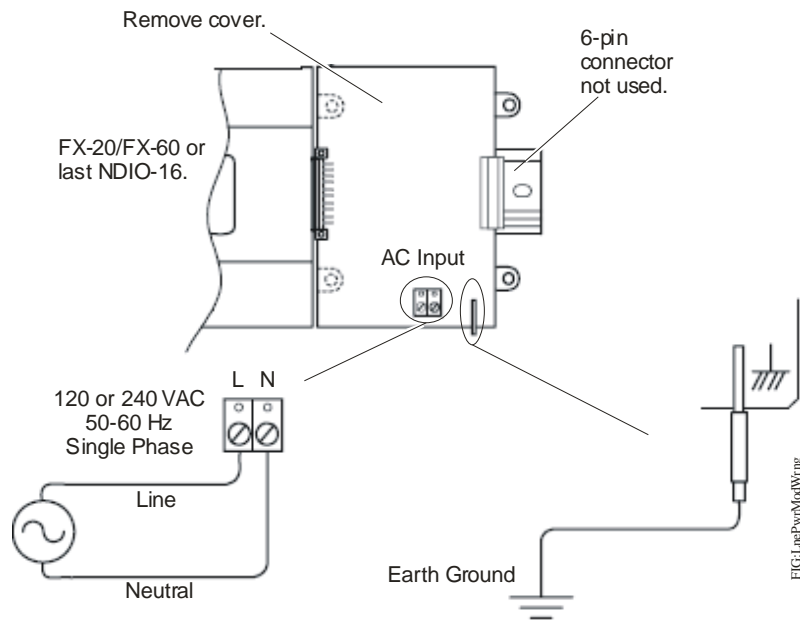


Figure 8: LP-FXPM263-0 Line Voltage Power Module Wiring Connections

To wire the DIN rail mount line voltage power module, see Figure 8 and follow these instructions:

1. Remove power from the AC circuit being wired to the power module.
2. Remove the power module cover by pressing in the 4 tabs on both ends of the unit, and lifting the cover off. If the power module is plugged into the FX20/FX60 or an NDIO16, you may need to slide it away to access the cover tabs.
3. Connect the supplied earth grounding wire to a nearby grounding point (see Figure 8).
4. Make AC circuit connections line (mains) and neutral to the terminals labeled INPUT PWR.
5. Replace the cover on the power module.
6. Make sure that all modules in the assembly are firmly connected together and secured.



CAUTION: Risk of Property Damage.

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MISE EN GARDE: Risque dégâts matériels.

Ne pas mettre le système sous tension avant d'avoir vérifié tous les raccords de câblage. Des fils formant un court-circuit ou connectés de façon incorrecte risquent d'endommager irrémédiablement l'équipement.

Communications Wiring

Connect communications wiring to the ports on the bottom of the FX20/FX60.

Prior to connecting cables, provide strain relief for them to prevent damage to the controller.

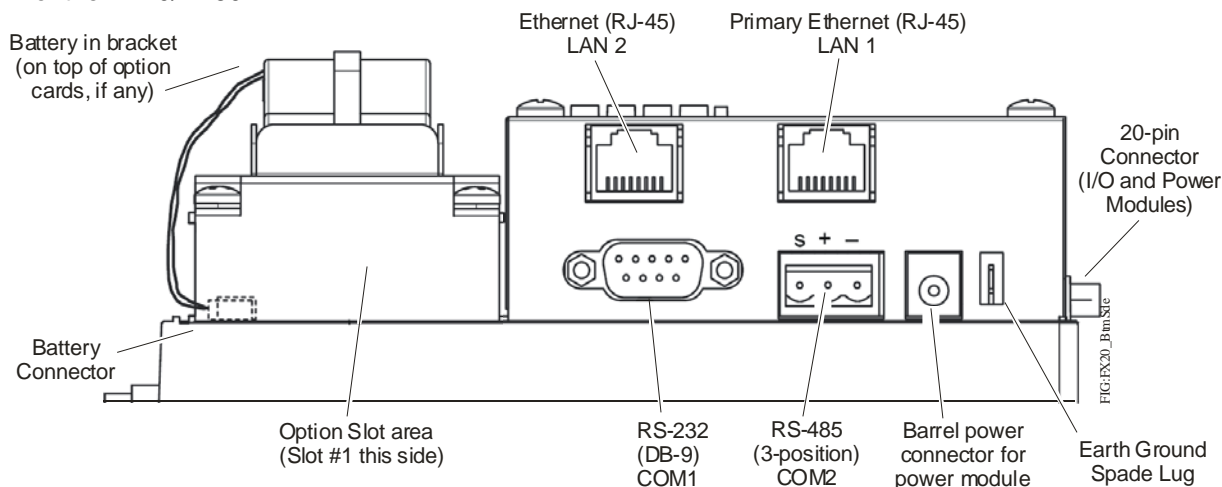


Figure 9: FX20/FX60 Bottom Side (Cover Removed)

Ethernet Port

Two female 10/100-Mbit Ethernet connections are provided on the FX20/FX60. These connections are capable of running at either 10 Mbps or 100 Mbps; the controller automatically adjusts to either speed. This means the FX20/FX60 can exist on the same network with a mixture of 10BaseT and 100BaseTX hardware connected to a smart 10/100 hub capable of adjusting to the devices it supports.

Two RJ-45 connectors labeled LAN1 and LAN2 are provided for the Ethernet connections (Figure 9). Use a standard Ethernet patch cable for connecting to a hub or Ethernet switch. An activity LED for each Ethernet port is visible, labeled LAN1 and LAN2 on the cover.

The factory default IP address for LAN1 is 192.168.1.149. By default, LAN2 is disabled.

Note: Typically, you only use LAN1 (primary port). If you have a specific application for isolating a driver's network traffic to a separate local area network (LAN), you can use LAN2. **Do not** use LAN2 as the primary port.

Serial Ports

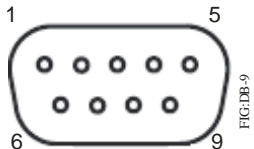
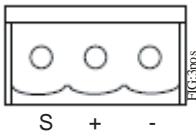
The FX20/FX60 has two serial ports (see Figure 9). Each port has a Universal Asynchronous Receive Transmit (UART) capable of operation of up to 115,200 baud. The left port is an RS-232 port that requires a DB-9 male plug connector. The right port is a non-isolated RS-485 port that uses two wires with a shield connection and a screw-terminal connector plug. In addition, the FX60 controller has a standard Universal Serial Bus (USB) port (not shown).

Note: A green receive LED and yellow transmit LED are provided for each serial port. These LEDs are located on the bottom board opposite of the serial connectors (see Figure 6). The LEDs are labeled on the board (COM1, COM2) and are not visible with the cover on.

RS-232 Port

An RS-232 serial port uses a DB-9 male connector and always operates as COM1. You can use a standard DB-9 serial cable with this port. The FX20/FX60 is a serial Data Terminal Equipment (DTE) device, so connecting another DTE device (computer) requires a null modem cable. To connect the FX20/FX60 to a Data Communication Equipment (DCE) device (modem), use a straight-through cable. Table 4 provides the standard serial DB-9 pinouts.

Table 4: Serial Port Pinouts

Pinout References	Signal		DB-9 Plug Pin	Base RS-485 Port (COM2) Pinouts
DB-9 Plug (Male) 	DCD	Data carrier detect	1	
	RXD	Receive data	2	
	TXD	Transmit data	3	
	DTR	Data terminal ready	4	
	GND	Ground	5	
	DSR	Data set ready	6	
	RTS	Request to send	7	
	CTS	Clear to send	8	
	Not used on the FX20/FX60		9	

RS-485 Port

An RS-485 non-isolated port uses a 3-position, screw terminal connector and always operates as COM2. Use shielded 18-22 AWG wire for this connector (refer to the Telecommunications Industry Association/Electronic Industries Alliance [TIA/EIA-485 standard]). As shown in Table 4, the screw terminals (from left to right) are shield, plus (+), and minus (–).

USB Port (FX60 only)

A single USB port is on the top of the FX60.

Note: The USB port is for future use. Do not use the port at this time.

Setup and Adjustments

Default Communication and Login Properties

The new FX20/FX60 are pre-configured with default properties as defined in Table 5.

Table 5: FX20/FX60 Default Properties

Name	Default Property
Internet Protocol (IP) Address	192.168.1.149
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
Remote User Name	jci
Remote Password	explorer

Powerup and Initial Checkout

Ensure that power wiring to the transformer is complete before you proceed (see *Power Wiring*). See Figure 6 for locations of the battery connector, status LEDs, and barrel power connector. See Figure 7 for location of the power connector on the DIN rail power modules.

After you have completed all mounting and wiring steps:

1. Connect the backup battery.
2. Apply power.

Check the status LEDs.

Connecting the Backup Battery

With the cover removed from the FX20/FX60, locate the red and black wires with a plug on the backup battery. Insert the plug into the battery connector on the bottom board as shown in Figure 10.

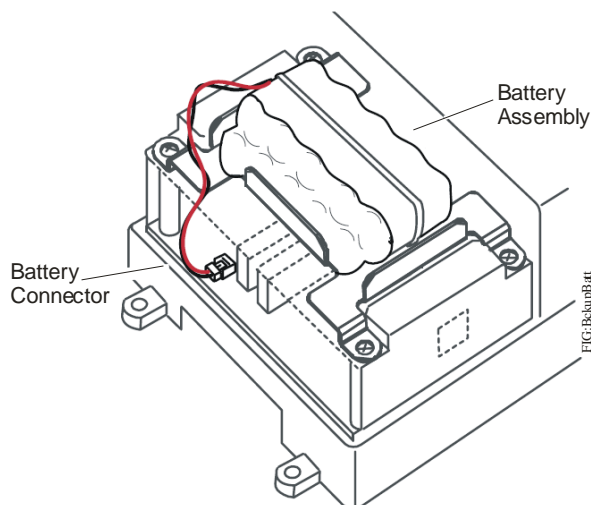


Figure 10: Backup Battery Connector Location

The connector is keyed so you cannot insert it incorrectly. The red (positive) connection should be the furthest from the two 30-pin option board connectors. For more battery details, see *About the Battery*.

Operation

Apply power to the FX20/FX60 by plugging in the power plug into either the FX20 (if using the wall mount power module) or the 24 VAC/DC power module. If the controller is using the line voltage power module, energize the 90-263 VAC circuit.

IMPORTANT: Do not connect both the wall power module and the DIN rail power modules at the same time, or equipment damage will result, or a power outage may go unrecognized.

Checking the Status LEDs

When power is applied, the green LED labeled **Status** is lit. This indicates that the system is normal and power is applied. Once the FX20/FX60 boots, the yellow **BEAT** (heartbeat) LED begins to blink, with a typical rate of about one blink per second. Blinking should begin within 30 seconds after power is applied.

If, after applying power, the **STATUS** LED goes out, or the **BEAT** LED comes on steady and stays lit for longer than 2 minutes, contact your technical support representative for assistance. See also *Using Status LEDs*.

About the Battery

The FX20/FX60 is provided with a custom, 10-cell NiMH battery pack mounted to the unit under the cover. This battery allows the FX Supervisory to continue operation through very short power interruptions (a few seconds in duration). If a longer power outage occurs, the battery provides enough run time for the FX Supervisory to backup data and then shutdown. Typically, this takes 1 minute to complete. Shutdown occurs automatically, after data is backed up to onboard flash memory.

The FX20/FX60 charges the battery during normal operation, until fully charged. Typically, the charge operation completes within 18 hours. Following a power outage, the battery is charged again, as necessary. The power and battery circuitry is monitored by a station running on the FX20/FX60 (via the PowerMonitorService). Station alarms are generated when primary power is lost, or if the battery is uncharged or unable to hold a sufficient charge.

The battery should be replaced about every 3 years. If the unit is in a high temperature environment, replace it more often.

Note: The NiMH battery loses its charge if not left in trickle-charge mode. If you leave the battery disconnected or attached to the unit when powered off, the battery fully discharges in a matter of weeks. A new FX20/FX60 ships from the factory with a completely discharged battery; after installation, allow at least 18 hours for the battery to fully charge.

Using Status LEDs

The FX20/FX60 includes several LEDs that can help determine the status of the unit. These LEDs include:

- Ethernet Ports
- Heartbeat
- Status
- Serial Ports

Refer to Figure 6 for the location of the status LEDs.

Ethernet Ports LEDs

Each Ethernet port has one green LED, visible on the top cover. A LAN# LED indicates activity on that port as follows:

- **Off:** No Ethernet link is established.
- **On:** Ethernet link is established, but no activity is on the LAN.
- **Blinking:** Ethernet link is established with data activity on the LAN.

Heartbeat LED

The yellow BEAT LED is located to the right of the Ethernet status LEDs. Under normal operation, this LED should blink about once per second. If the BEAT LED stays on constantly, does not light, or blinks very fast (more than once per second), contact your technical support representative for assistance.

IMPORTANT: During boot-up, the heartbeat LED blinks in a 90% on, 10% off pattern. **Do not remove power** during this time, or data loss may result (NDIO module's firmware upgrade may be in progress).

Status LED

The green Status LED is located to the right of the heartbeat (BEAT) LED. This LED provides a central processing unit (CPU) machine status check, and remains lit whenever the FX20/FX60 is powered. If the Status LED does not light while power is applied, contact your technical support representative for assistance.

Serial Port LEDs

LEDs for the 2 serial ports are located on the FX20/FX60's bottom board on the opposite side of the RS-232 and RS-485 ports (see Figure 6). Labels **COM1** and **COM2** correspond to the software configuration of the COM ports. LEDs show, transmit, and receive activity for the serial ports and optional modem.

Note: You must remove the cover to see the serial port LEDs. See *Removing and Replacing the Cover*.

- The yellow Transmit LED indicates that the FX20/FX60 is sending data out the serial port over a communications line to a connected device.
- The green Receive LED indicates that the FX20/FX60 is receiving data from a connected device.

These LEDs are driven by pulse detectors that provide a fixed on-time sequence when data is detected on the port. If the receive LED is on constantly, a problem with the communications channel may be present, such as a shorted wire or reversed wiring.

Niagara^{AX} Software Installation

As shipped from the factory, FX20/FX60 are pre-configured with a Niagara build, a license, and four Johnson Controls® specific Java® Archive (JAR) files. With these components in place, you only need to change login credentials and IP settings (per network requirements) when setting up the FX20/FX60. This section provides step-by-step instructions for these tasks.

The most straightforward way to set up an FX20/FX60 (and to upgrade to a newer Niagara build at a later date) is to use the administrative tools available under the Tools Menu in the FX Workbench software.

Note: If upgrading JAR files with patches at a later date, use the Update Remote Site menu item. If upgrading to a newer Niagara build, use the Upgrade Remote Software Version menu item. If changing login credentials, use the Change Remote Login Credentials menu item.

Preparing for Setup

Providing Power and Connectivity

Perform the initial startup of an FX20/FX60 in your office before physically mounting it in place at a job site.

After you complete the commissioning process, mount and wire the FX20/FX60 at the job site, making permanent mounting and wiring connections.

For this initial Ethernet connection, you can use one of the following:

- a crossover cable connected directly between your computer and the FX20/FX60
- a standard Local Area Network (LAN) connection in which your computer and the FX20/FX60 are physically connected to the same Ethernet hub or switch

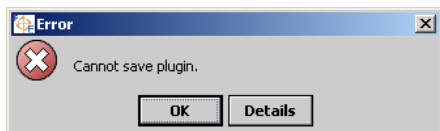
IP Address

When shipped, a new FX20/FX60 Series controller is pre-configured with an IP address of 192.168.1.149 and a default subnet mask of 255.255.255.0.

To change the IP settings, perform the following steps:

1. Use the Microsoft® Windows® Network Connections utility on your workstation to configure your Transmission Control Protocol (TCP)/IP settings with an IP address of 192.168.1.100 and subnet mask of 255.255.255.0.
2. Make an Ethernet connection to the FX20/FX60 as indicated in *Providing Power and Connectivity*.
3. Run the FX Workbench application.
4. Under the File Menu, select the Open Remote Station menu item. When prompted, enter the Remote Site Address (**192.168.1.149**), Remote Username (**jci**), and Remote Password (**explorer**). Click OK. When the Authentication dialog appears, enter the Username (**admin**), leave the Password field empty, and click OK.
5. The station running on the FX20/FX60 opens with the FX Workbench application, which has a Navigation Tree on the left and a Display Window on the right. In the Navigation Tree, open the Administration folder. Double-click the TCP IP Configuration option.
6. On the TCP/IP Configuration screen, make sure the Interfaces field is expanded so that the IP Address and Subnet Mask fields appear. Modify the Gateway, IP Address and Subnet Mask fields, and click Save. When prompted to Reboot Now, click Yes. Give the FX20/FX60 a couple of minutes to reboot and restart the station that is installed.

Note: If the following message appears, just click OK. The changes are saved anyway.



Platform Daemon Credentials

An FX20/FX60 Series controller is shipped with the following Platform Daemon (Administrator) credentials:

User Name: **jci**

Password: **explorer**

Initially, you use these default credentials to open a platform connection (log in) to the FX20/FX60. Like the factory-assigned IP address, default credentials are intended to be temporary. Change these credentials to be something unique, and **guard them closely**.

To change the Platform Daemon credentials, perform the following steps:

1. Start the FX Workbench application.
2. Under the File Menu, select the Open Remote Station menu item. When prompted, enter the Remote Site Address (for example, 192.168.1.149), Remote Username (**jci**), and Remote Password (**explorer**). Click OK. When the Authentication dialog appears, enter the Username (**admin**), leave the password field empty, and click OK.
3. Under the Tools menu, select Change Remote Login Credentials. In the Change Remote Login Credentials dialog, fill in the Username, Password, and Confirm Password fields, then click OK. The next time you log into the FX20/FX60, use these new credentials.

Restoring a Backed Up Station

If the FX20/FX60 ever gets into an erroneous condition where you cannot fix a station, you can restore a previously backed up station by using the Restore Backed Up Station menu item under the Tools menu.

To restore a backed up station, perform the following steps:

1. Run the FX Workbench application.
2. Under the File Menu, select the Open Remote Station menu item. When prompted, enter the Remote Site Address (for example, 192.168.1.149), Remote Username (**jci**), and Remote Password (**explorer**). Click OK. When the Authentication dialog appears, enter the Username (**admin**), Password (optional), and click OK.
3. Under the Tools menu, select Restore Backed Up Station. In the Restore Backed Up Station dialog, enter the Remote Site IP Address, Remote Username, Remote Password, and select the .dist (station backup) file. Click OK. The FX20/FX60 reboots automatically.

Note: You can back up a station by using the Backup Station menu item from the station node's popup menu in the Navigation Tree. We recommend that you back up a station daily to minimize the chance of information loss.

Cleaning

If dust or metal filings are present inside the unit, clean with vacuum or compressed air. Otherwise, no cleaning inside the unit is required. Optionally, if the outer enclosure becomes dirty, you can wipe it with a damp cloth and mild detergent.

Required Battery Maintenance

Battery life expectancy is a function of its discharge cycles (the number of discharges and their depth) and the ambient temperature of the battery during normal operation. In most applications, the battery should see relatively few discharges. Therefore, ambient temperature has more to do with determining the life expectancy of the battery than any other factor. If the FX20/FX60 is installed in a conditioned space, the battery should provide dependable service for approximately 3 years. In an environment where the operating temperature is higher (50°C or 122°F), you should only expect the battery to last approximately 1 year.

The NiMH battery in the FX20/FX60 is fully discharged before shipping. Additionally, NiMH batteries lose charge over time if not kept trickle-charged. Therefore, even a new unit (or replacement battery) requires up to 18 hours of powered operation before it becomes fully charged to provide reliable backup power.

The FX20/FX60 monitors the battery and periodically loads the battery to test its ability to maintain battery-backed functions. Investigate any battery trouble message, and check the battery connections to the unit. Replace the battery as required.

To order a new battery, see *Standard Replacement Parts*.

Replacing the Battery

The replacement battery is a complete assembly, consisting of a custom NiMH battery pack pre-attached to a battery bracket (see Figure 10).

IMPORTANT: Use only NiMH battery packs approved for use with the FX20/FX60.

To replace the battery:

1. Back up the FX20/FX60's configuration to your computer using FX Workbench.
2. Remove power from the FX20/FX60. Wait for LED activity to stop. After several seconds, all LEDs on the FX20/FX60 should be off.
3. Remove the cover. See *Removing and Replacing the Cover*.

4. Remove the old battery and bracket assembly by removing the four screws holding it in place. Set the screws aside for later.
5. Remove the battery from the connector on the FX20/FX60.
6. Recycle the battery as defined by your regional codes. For recycling within the United States, see the battery label.
7. Plug the battery connector plug of the replacement battery into the battery connector on the FX20/FX60.
8. Place the replacement battery/bracket assembly over the option card slots, with the mounting holes aligned with the standoffs.
9. Place the four screws through the battery bracket, option card blanking plates, option cards (if used), and into the standoffs on the FX20/FX60 base board. Using a screwdriver, hand-tighten these screws.
10. Replace the cover.
11. Restore power to the FX20/FX60 and verify normal operation.

Repair Information

Servicing the FX20/FX60 may call for replacement parts.

Non-replaceable Parts

Other than the parts listed in the *Standard Replacement Parts* section, no serviceable components are on the base assembly.

Memory

Any addition, modification, or replacement of memory components requires software configuration changes and is not field upgradeable. For additional information on modifying the memory capacity of the FX20/FX60, consult your local sales representative.

Fuse

The FX20/FX60 contains a non-user replaceable fuse soldered on the circuit board. This fuse provides protection from internal shorts or connection to incorrect power supplies. If the fuse circuitry is suspect, contact your technical support representative for assistance.

Standard Replacement Parts

Standard replacement parts are listed in Table 6.

Table 6: Standard Replacement Parts

Part Number	Description
LP-KITFX2BAT-0	NiMH Battery Pack: includes battery bracket (See <i>Replacing the Battery</i> .)

New Replacement Unit

To replace a faulty FX20/FX60, order a new one. To ensure proper credit for a FX20/FX60 still under warranty, contact the Johnson Controls Product Sales Operations Team for return authorization.

Replacing an FX20/FX60

IMPORTANT: Before handling circuit boards, discharge any accumulated static by touching the metal surface of the FX20/FX60.

To replace the FX20/FX60 in the field, follow these procedures:

1. Use FX Workbench to back up the FX20/FX60 configuration to your computer.
2. Remove power to the FX20/FX60. The unit powers down automatically.

Note: If NDIO accessory modules are installed, and any I/O points have voltage, turn the devices off or disconnect power from them.

1. Note the positions of all communications and other wiring cables going to the FX20/FX60, as well as all installed accessory modules (if they must be removed). If necessary, label connectors and accessory modules to avoid misconnection later when you are replacing the FX20/FX60.
2. Unplug all Ethernet, serial, LON, modem, and I/O connectors from the FX20/FX60.
3. Unplug the earth ground wire.
4. If an NDIO accessory module is installed:

- a. If DIN rail mounting with DIN end clips were used, you may be able to remove the DIN rail end clip that secures the FX20/FX60 end of the assembly and then slide the FX20/FX60 away from the rest of the assembly. Then, remove the FX20/FX60 from the DIN rail (see Figure 3), leaving the mounting and wiring of the NDIO modules untouched. Go to Step 5.
- b. If tab (screw) mounting was used instead of DIN rail mounting, or if a combination of DIN rail mounting and tab screws were used, remove the accessory modules first, then remove the FX20/FX60. Carefully observe all wiring terminations, then unplug the I/O connector plugs and earth ground wires from the installed NDIO modules. Remove the installed accessory modules, starting with the end module. You can secure modules with screws through the mounting tabs or clipped to a DIN rail, or fastened by some combination. Remove any screws fastening the FX20/FX60 and remove the FX20/FX60.

5. Remove the cover from the old FX20/FX60 (see *Removing and Replacing the Cover*). Note the position of installed option boards, if any. You must transfer them to the replacement FX20/FX60.
6. Remove the option boards from the old FX20/FX60 and install them into the replacement FX20/FX60, if applicable. See Mounting Option Cards.
7. Mount the replacement FX20/FX60 as it was previously, using the same DIN rail location and/or screws.
8. Reconnect/remount any removed accessory modules, being careful to replace them in the same order, using the same DIN rail location and/or screws. Secure all accessory modules as done previously.
9. Reconnect the earth ground wires to the FX20/FX60 grounding lug and any installed accessory modules.

10. Reconnect any Ethernet, serial, modem, and I/O connectors to the FX20/FX60 and any installed accessory modules.
11. If using NDIO modules, and if any of your I/O points have voltage, turn on the devices or reconnect power to them.
12. Restore power to the FX20/FX60. To verify operation, see *Checking the Status LEDs*.
13. Use FX Workbench to recommission the FX20/FX60 and install the saved station database.



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