

# Eaton Ferrups FX UPS

## Ferrups FX UPS

### Eaton Ferrups FX User's Guide



## Class A EMC Statements

### FCC Part 15

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#### NOTE



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 the 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 own expense.

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### ICES-003

This Class A Interference Causing Equipment meets all requirements of the Canadian Interference Causing Equipment Regulations ICES 003.

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

### IEC 62040-2

Some configurations are classified under IEC 62040-2 as "C2 UPS for Unrestricted Sales Distribution."

## Special Symbols

The following are examples of symbols used on the product to alert you to important information:



**RISK OF ELECTRIC SHOCK** - Observe the warning associated with the risk of electric shock symbol.



**CAUTION: REFER TO OPERATOR'S MANUAL** - Refer to your operator's manual for additional information, such as important operating and maintenance instructions.



This symbol indicates that you should not discard the product in the trash. This product must be disposed of properly. For more information, contact your local recycling/reuse or hazardous waste center.



This symbol indicates that you should not discard waste electrical or electronic equipment (WEEE) in the trash. For proper disposal, contact your local recycling/reuse or hazardous waste center.



## IMPORTANT

To ensure you have the most up-to-date content and information for this product, please review the latest manual revision on our website, [www.eaton.com/ferrupsfx](http://www.eaton.com/ferrupsfx).

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## Chapter 1 Introduction

### 1.1 Safety Warnings

Read the following precautions before you install the UPS.

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#### IMPORTANT SAFETY INSTRUCTIONS - SAVE THESE INSTRUCTIONS

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This manual contains important instructions that you should follow during installation and maintenance of the UPS and batteries. Please read all instructions before operating the equipment and save this manual for future reference.

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#### DANGER

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This UPS contains **LETHAL VOLTAGES**. All repairs and service should be performed by **AUTHORIZED SERVICE PERSONNEL ONLY**. There are **NO USER SERVICEABLE PARTS** inside the UPS.

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#### WARNING

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- When using a customer supplied non Eaton battery configuration with the FX UPS the ABM charger will be disabled. The calculated UPS runtime will not be accurate and the period of time for the batteries to fully charge could be affected.
  - This UPS contains its own energy source (batteries). The output receptacles may carry live voltage even when the UPS is not connected to an AC supply.
  - Do not remove or unplug the input cord when the UPS is turned on. This removes the safety ground from the UPS and the equipment connected to the UPS.
  - To reduce the risk of fire or electric shock, install this UPS in a temperature and humidity controlled, indoor environment, free of conductive contaminants. Ambient temperature must not exceed 40°C (104°F). Do not operate near water or excessive humidity (95% max).
  - To comply with international standards and wiring regulations, the total equipment connected to the output of this UPS must not have an earth leakage current greater than 1.5 milliamperes.
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#### CAUTION

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- Batteries can present a risk of electrical shock or burn from high short-circuit current. Observe proper precautions. Servicing should be performed by qualified service personnel knowledgeable of batteries and required precautions. Keep unauthorized personnel away from batteries.
  - Proper disposal of batteries is required. Refer to your local codes for disposal requirements.
  - Never dispose of batteries in a fire. Batteries may explode when exposed to flame.
- 

### 1.2 Introduction

The Eaton Ferrups FX uninterruptible power system (UPS) series provides unmatched reliability and configurable power protection for computers and telecommunications equipment. Patented ferroresonant technology delivers "bulletproof" power protection against spikes, sags, surges, noise, and lightning. This UPS represents a breakthrough in the design of advanced, line interactive UPSs

## Receiving and Unpacking The UPS

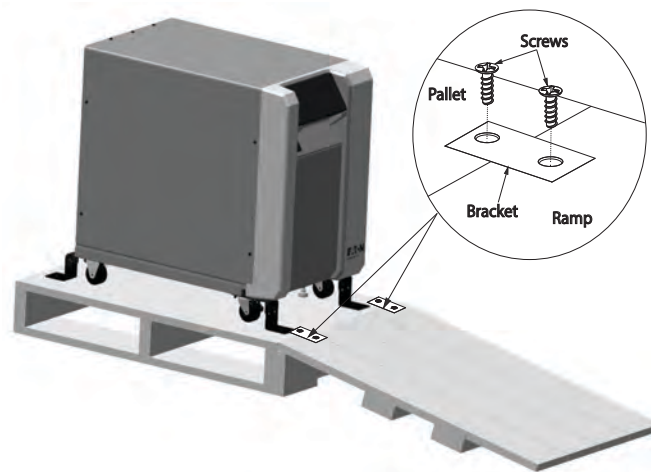
Providing outstanding performance and reliability, the Eaton Ferrups FX's unique benefits include the following:

- Active voltage regulation converts power from almost any AC source into computer grade power.
- Provides regulated output voltage without drawing power from batteries, keeping the batteries fully charged from unexpected blackouts.
- Complete offering of power management software included to ensure data availability remotely.
- ABM® technology that uses advanced battery management to increase battery service life, optimize recharge time, and provide a warning before the end of useful battery life. ABM will be enabled when the total UPS and EBM battery capacity is less than or equal to 200Ah.

### 1.3 Receiving and Unpacking The UPS

Perform an external inspection of the shipment. When the UPS arrives inspect the shipment for any signs of damage. Do not attempt to install the UPS system if damage is apparent. If any damage is noted, contact Eaton and file a damage claim with the shipping agency. Eaton recommends that you move the UPS with a pallet jack before the UPS is unpacked.

**Figure 1. UPS Ramp Attachment**



For the Eaton Ferrups FX UPS units that come with a supplied ramp follow the following steps:

1. Remove the outer cardboard container.
2. Remove any filler boxes or packing material.
3. Remove the ramp.
4. Attach the supplied ramp to the pallet with the two brackets and four wood screws provided. See [Figure 1](#)
5. Remove all the bolts that attach the UPS anchor brackets to the pallet. Retain the brackets if planning to mount the UPS to the floor.
6. Retract the leveling feet by turning them counter clockwise then carefully roll the cabinet down to its intended operating location.

## Chapter 2 System Options Overview

### 2.1 FX Remote Control Display (RCD)

The Remote Control Display (RCD) is included with all Eaton Ferrups FX UPS models providing hand held operation enabling the end user to communicate and interpret UPS operating modes, alarms and events. The RCD is connected to the UPS via a standard 28 inch ethernet cable. The ethernet cable can be extended for RCD use up to 150 feet from the UPS and can be mounted to a metal surface via the magnetic strip located on the back of the RCD.

**Figure 2. Eaton Ferrups FX Remote Control Display**



### 2.2 Battery Cabinets

If you need extended runtime, contact Eaton or your local distributor for information on adding additional Eaton FX FERRUPS battery options.

There are two types of external battery cabinets that can be used with the Eaton Ferrups FX UPS. The N cabinet and the P cabinet. External battery cabinets offer several options to extend battery runtime ( See [Table 1](#) ). The Eaton Ferrups FX UPS can have a maximum of four EBM units connected.

**Table 1. External Battery Cabinet Options**

UPS Model	Eaton Ferrups FX External Battery Runtime Options	Battery Cabinet Type	Type and Number of Batteries
FX3100	FXEBM01	N	Qty 8 (12 Volt) PWHR12280W4FR (48VDC)
FX3100	FXEBM03	P	Qty 12 (12 Volt) PWHR12280W4FR (48VDC)
FX3100	FXEBM04	P	Qty 12 (12 Volt) PWHR12330W4FR (48VDC)
FX3100	FXEBM06	P	Qty 12 (12 Volt) SWU585- 12FR (48VDC)

## 2.3 Bypass Switches

Because the Eaton Ferrups FX UPS can be hardwired, a BPE bypass switch can provide a means of directly connecting utility power to IT equipment. Bypass switch functionality helps keep critical loads running even in the event of scheduled UPS preventive maintenance, a service event or failure.

Bypass switches come in two types **Make Before Break**, **Break Before Make** types. See [Table 2](#) and [Table 3](#).

**Table 2. Available Make Before Break Bypass Switch Models**

UPS Model	Model Number	Ratings (UL/CSA) Continuous	Ratings (TÜV) Continuous
FX3100	BPEFXMBB02	40A/300 Vac	50A/300 Vac

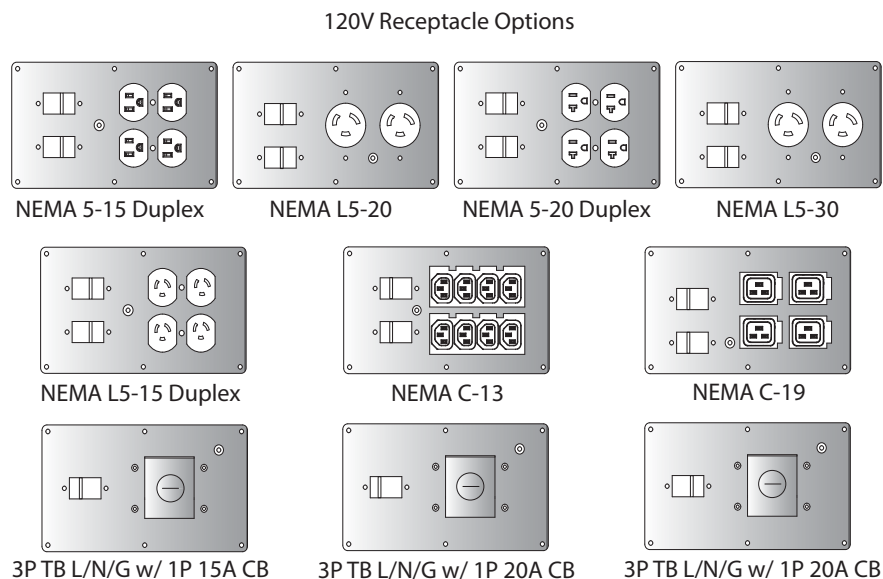
**Table 3. Available Break Before Make Bypass Switch Models**

UPS Model	Model Number	Ratings (UL/CSA) Continuous	Ratings (TÜV) Continuous
FX3100	BPEFXBBM02	40A/300 Vac	50A/300 Vac

## 2.4 Output Receptacles

Different user replaceable receptacle panel options are available for the Eaton Ferrups FX UPS. Consult your dealer or Eaton for compatibility with your UPS. See [Figure 3](#)

**Figure 3. Receptacle Panel Options**



## 2.5 Communication Overview

Eaton offers several methods of communicating with your Eaton Ferrups FX UPS system in addition to the remote control display.

**Relay Card-MS**

The Eaton Relay Card-MS enables automatic shutdown and network monitoring of UPS system status through a connected computer with a dedicated adapter that provides the essential dry-contact interface between an Eaton UPS and any relay-connected computer as well as a variety of industrial applications. The Relay Card-MS is compatible with all Eaton UPSs that have a Minislot. See [Table 11](#) for card functionality.

**Network Card— M2**

The Eaton Network Card-M2 allows an Eaton UPS to directly connect to the Ethernet network and the Internet, supporting real-time monitoring and control of UPSs across the network via a standard Web browser, SNMP-compliant network management system or power management software. Environmental monitoring is also possible via an Environmental Monitor Probe (EMP)

**Industrial Relay —MS**

The Industrial relay Card-MS (IRC-MS) provides a simple way to remotely input UPS information to an alarm system, PLC or a computer system via dry contacts. It offers five isolated dry contact outputs and one isolated dry contact input. See [Table 12](#) for card functionality.

**Industrial Gateway-M2**

The Eaton Industrial Gateway Card (INDGW-M2) combines the features of an SNMP agent, HTTP/web server and a Modbus card to facilitate remote monitoring of your UPS system through any Building Management System. Enjoy the freedom to customize and schedule actions, like shutdown protocols and load shedding, and receive immediate notifications during power events, without having to be onsite.

**IPP / IPM**

Eaton's Intelligent Power Protector (IPP) software provides graceful, automatic shutdown of network devices during a prolonged power disruption, preventing data loss and saving work-in-progress. As part of Eaton's power network management system, IPP works alongside Eaton Intelligent Power Manager to deliver comprehensive power management and protection.

Eaton's Intelligent Power Manager (IPM) software provides the tools needed to monitor and manage power devices in your physical or virtual environment. This innovative software solution ensures system uptime and data integrity by allowing you to remotely monitor, manage and control UPSs and other devices on your network. IPM provides a solution that is easy to use and maintains business continuity.

**Predict Pulse**

PredictPulse Insight is the first cloud-based analytics service for data center infrastructure to predict the failure of power components.





## Chapter 3 Installation Setup

### 3.1 Location Requirements

Install the Eaton FERRUPS FX UPS as close as possible to the equipment to be protected. If the UPS is more than 25 ft (7.6m) from the equipment, transient noise can reappear in the electrical distribution system. The UPS should be well ventilated and away from direct sunlight or other heat source.

The environment can affect the reliability and performance of both the UPS and the batteries. Verify the storage and operating environmental requirements.

If additional Eaton Ferrups FX series UPS system batteries are in a separate external battery cabinet, the cabinet should be located as close as possible to the UPS. If the batteries will be further from the unit than the standard cables allow, contact your service representative or your local distributor for assistance.

Install the system on a level floor suitable for heavy weight and wheeling.

Install the system in an area that is free of conductive contaminants.

#### Equipment Clearances

All cabinet sizes require the following clearances to allow for servicing and adequate ventilation:

**Table 4. Installation Clearances for the UPS and External Battery Cabinet**

Recommended Clearances			
Sides	Front	Top	Back Panel
36" (91.5 cm)	36" (91.5 cm)	12" (30.5 cm)	12" (30.5 cm)

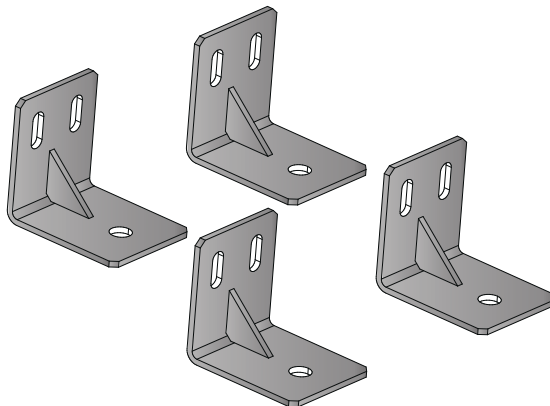


#### NOTE

A minimum clearance of 4" (10.0 cm) is required on the sides and the front, 7" (17.78 cm) on the back and 12" (30.5 cm) above the UPS for proper ventilation.

### 3.2 Anchor Bracket Installation

The Eaton Ferrups FX series UPS cabinet is shipped with four floor anchor brackets. These brackets should be reused to attach the UPS to the floor, they act as a protective stop to prevent the cabinet from rolling forward if unintentionally pushed.

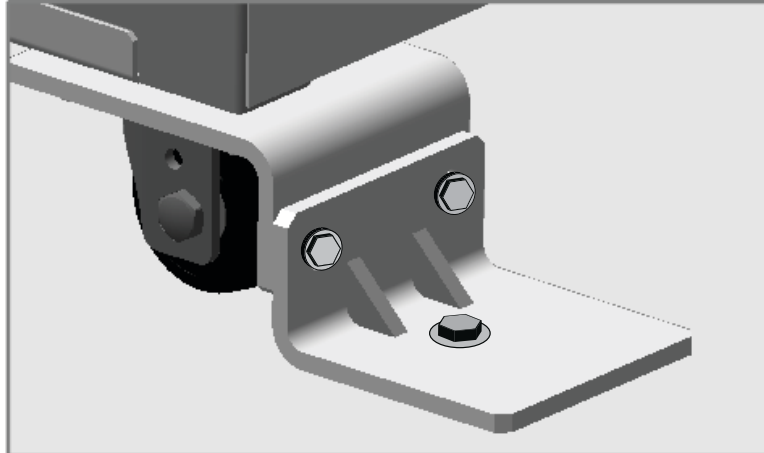


#### NOTE

For ease of installation, complete the rear electrical connections before securing the anchor brackets to the floor. Each floor bracket has holes that enable it to be attached by screws to the floor. The brackets are then attached to the UPS castor bracket.

## Anchor Bracket Installation

1. Select the location for the brackets at the floor intersection beside the intended UPS cabinet location,
2. Roll the UPS cabinet to its intended location.
3. Turn the leveling feet counter-clockwise until the cabinet is level.
4. Using the proper type of customer-supplied screws for the intended mounting surface, attach each bracket to the floor. All screws must be properly driven into the structural material.



## Chapter 4 Electrical Installation

### 4.1 UPS Hardwired Installation

#### WARNING

Risk of electrical shock. Only Qualified service personnel (such as a licensed electrician) should perform the electrical installation in this section.

#### Hardwired UPS Installation

Most of the sections in this manual are required for the electrician to install the hardwired models

If a bypass switch is not used, the UPS input may be hardwired through conduit to a main power source circuit breaker, and the UPS output may either be hardwired to a circuit breaker in a distribution panel. Without a bypass switch, power to the load cannot be maintained if the UPS is taken completely offline.

- Be sure to read section 1.1 “Safety Warnings” before installing the UPS as stated .
- Complete section 3.1 “Location Requirements” .
- Continue to section 4.1 “UPS Hardwired Installation” which describes the electrical installation requirements for hardwiring the UPS.
- Continue to section 8.1 “Startup For Hardwired Units” in the Eaton Ferrups FX series UPS users guide for units that do not have an external bypass switch.
- “ ” and “ ” describe the recommended breaker and wire size for installation of the Eaton Ferrups FX series UPS.
- If you purchased a external battery cabinet see section 5.1 “Preparation for Battery Installation” for wiring connections.
- Complete the phase check as described in section 8.2 “Initial Startup for Units Installed with a BPE Bypass Switch” .

### 4.2 Recommended Breaker And Wire Sizes

**Table 5. Wire Size Recommendations**

Model	Input Voltage	Input Breaker Size	75°C Copper Wire Size
FX3100	120Vac	50A	8 AWG (8.4 mm <sup>2</sup> )



#### IMPORTANT

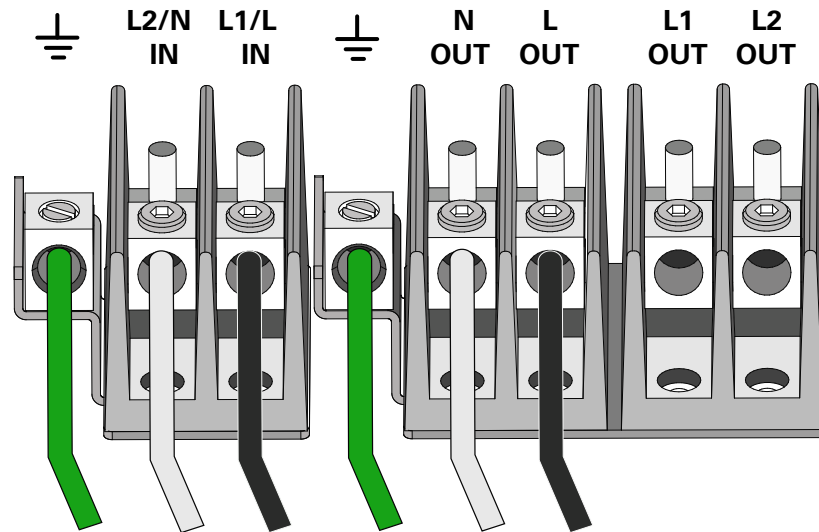
FOR U.S. INSTALLATIONS, READ THIS IMPORTANT NOTE

- The mm<sup>2</sup> and AWG wire size for each circuit breaker size shown on the wiring diagrams. The minimum recommended circuit breaker sizes for each model and voltage application are listed on the wiring diagrams.
- Conductor sizes shall be no smaller than the 75°C wire size based on the ampacities given in Table 310.15 (B) of the Electrical code® (NEC®) ANSI/NFPA 70–2020, and article 220. All circuit conductors, including the neutral conductor, must be the same size ( ampacity ) wire. Code may require a larger AWG size than shown in this table because of temperatures, number of conductors in the conduit, or long service runs. Follow local code requirements.

### 4.3 UPS Terminal Connections

#### UPS AC Power Terminal Access

Figure 4. FX3100 120 In 120 Out



#### NOTE

UPS Input and Output circuits must be installed in separate conduit systems and not shared with other electrical circuits.

1. Remove the wiring access cover from the back of the UPS.
2. Install the proper input and output strain relief connectors into the wiring access cover.
3. Insert the L1, L2 N and G cable ends thru the wiring access cover into the applicable terminal slots in the terminal block.
4. Secure the cables by screwing down the lug screws.
5. Reinstall the wiring access cover and ensure strain relief connections are secure.

#### CAUTION

To reduce the possibility of electric shock all AC and DC terminal covers must be installed on the back of the UPS prior to applying power to the Eaton Ferrups FX series UPS.

### 4.4 BPE Bypass Switch Operation

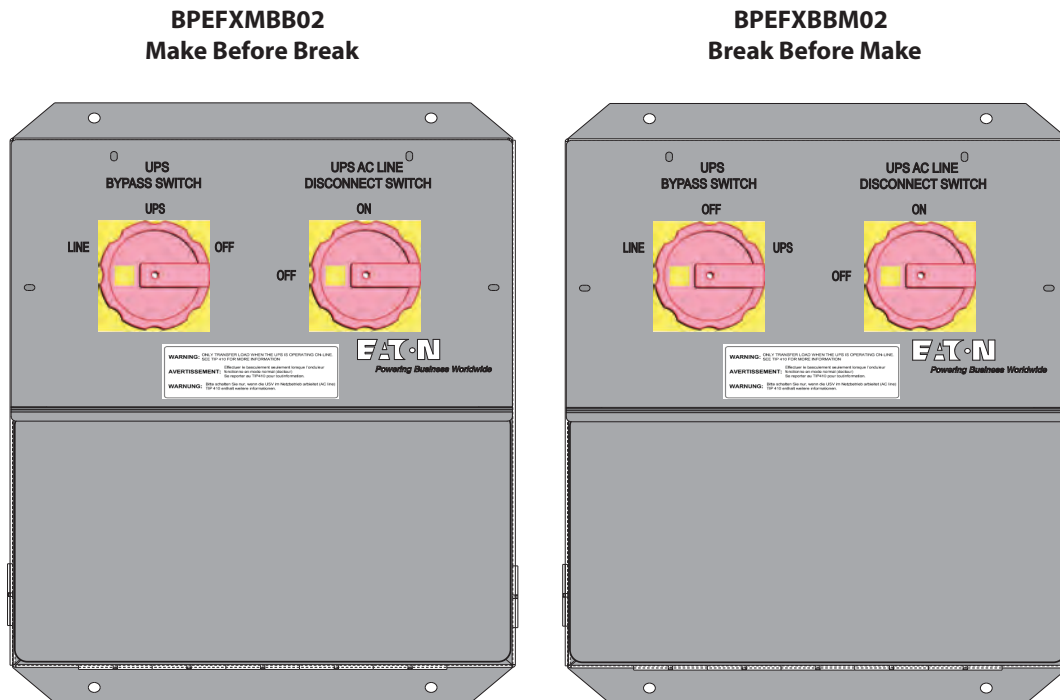
If your UPS does not have a plug, a bypass switch can transfer the protected equipment to direct AC input power conveniently when it is time to service the UPS.

BPE bypass switches are available in two types MBB ( Make Before Break ) and BBM ( Break Before Make )



A MBB switch makes a new connection before it breaks the original connection. For example, if you turn an MBB switch from UPS to LINE, the bypass switch connects the load to AC input power before disconnecting the load from UPS output power.

A BBM switch breaks the original connection before it makes a new one. If you turn a BBM switch from UPS to LINE, the switch disconnects the load from UPS output power before connecting the load to AC input power.

**Figure 5. BPEFX Bypass Types**



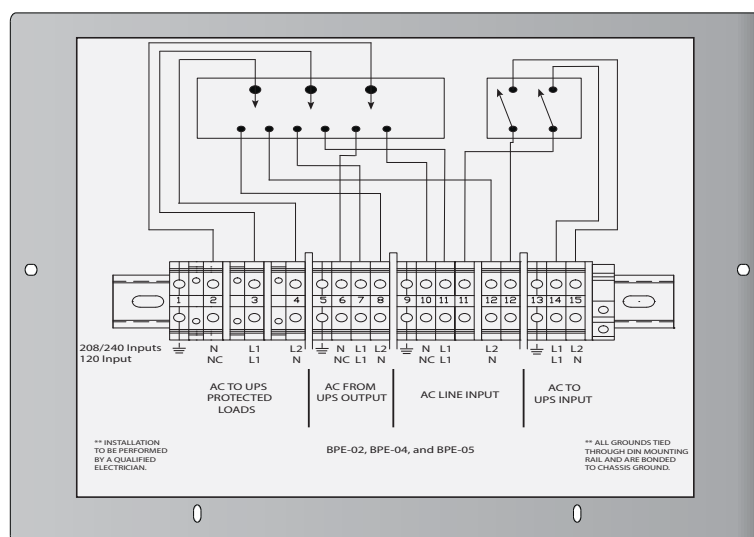
**Table 6. BPE Bypass Switch Positions**

Switch Position Description	
Line	Connects the load directly to AC input power and disconnects UPS output. AC input power is still connected to the UPS input.
Off	Disconnects the load from the UPS output power and AC input power.
UPS	Connects the UPS output to the load.
<b>NOTE</b> 	<i>In all three positions, AC input power is still connected to the input terminals inside the UPS (once the UPS is installed). Use the AC disconnect switch (located on the right side of the bypass switch) to disconnect AC input power during maintenance or service.</i>
	
Do not attempt to change the BPEFX bypass switch position if the UPS is operating on battery power. This can cause damage to the bypass switch or the UPS.	

## BPE Bypass Switch Installation

1. Select the proper diagram that applies to your Eaton Ferrups FX series UPS.
2. Review the installation diagram and applicable notes to find the proper circuit breaker size for your installation. in the U.S. see the following table to size the wire.
3. Mount the bypass switch within sight of the UPS. If you do not have a Eaton bypass switch with a AC disconnect switch or the fuse box or panel is out of sight, you must install a separate disconnect switch next to the UPS.
4. Remove the screws in the lower part of the bypass switch front cover and remove the lower cover panel.
5. Remove the knockouts or plugs in the bottom of the bypass switch for AC Line Input, AC to UPS Input, AC from UPS Output, and AC to the UPS load.
6. Remove the wiring cover from the back of the UPS.
7. Remove the knockouts in the UPS wiring cover for AC Input and AC Output.
8. Install the conduit adapter. AC Input and AC Output conductors must be run through separate pieces of conduit. UPS Output circuits shall be installed in dedicated conduit systems and not shared with other electrical circuits.
9. Find the terminal strip inside the bypass switch. Using the label on the back of the bypass switches lower front cover panel, wire the terminal strip and tighten all connections securely. use copper wire and the appropriate wire size for the current. See [Figure 6](#) .

**Figure 6. BPE External Bypass Switch Terminal Wiring Label**




**Table 7. BPEFX Bypass Switch Ratings**

UPS Model	Model Number	Ratings (UL/CSA) Continuous	Ratings (TÜV) Continuous
FX3100	BPEFXMBB02 & BPEFXBBM02	40A/300 Vac	50A/300 Vac

## 4.5 BPE Bypass System Wiring Diagrams

The following notes are referenced by their number in the UPS external bypass wiring diagrams. Refer to the correct wiring diagram for correct installation.

- 
- NOTE 1**    **The Customer must provide input over current protection.** See National Electric Code or local code requirements.
- NOTE 2**    The UPS bypass switch must be installed within sight of the UPS.
- NOTE 3**    **The customer must size the AC circuit conductors.** All AC circuit conductors, including the neutral conductors, must be the same size ( ampacity ), have the same rating (75°C) copper wire, and be sized according to the input circuit breaker. The UPS input and output conductors must be run through separate conduits.
- NOTE 4**    **The Customer must provide output overcurrent protection.** See National Electric Code or local code requirements.
- NOTE 5**    See "Equipment Clearances" for installation and service clearances before installing the UPS. Use flexible conduit on the UPS or the external battery cabinet if either must be removed.
-  **NOTE 6**    External battery cabinets are optional. See "Battery Cabinet Installation" for installation instructions.
- NOTE 7**    UPS output circuits shall be installed in dedicated conduit systems and not shared with other electrical circuits.
- NOTE 8**    Use only Eaton - supplied power cables between the UPS and battery cabinet.
- NOTE 9**    The customer must provide and install this ground connection according to NEC or local code requirements. This grounding electrode conductor must be at least #8 AWG (8.36 mm). If the UPS input circuit conductors are larger than #8 AWG (8.36 mm), Eaton requires the grounding electrode conductor to be the same size ( ampacity ) as the largest UPS input circuit conductor. Conduit is not considered an acceptable grounding electrode conductor. Eaton does not recommend routing the grounding electrode conductor through metallic conduit. This conductor may require protection from physical damage according to local requirements.
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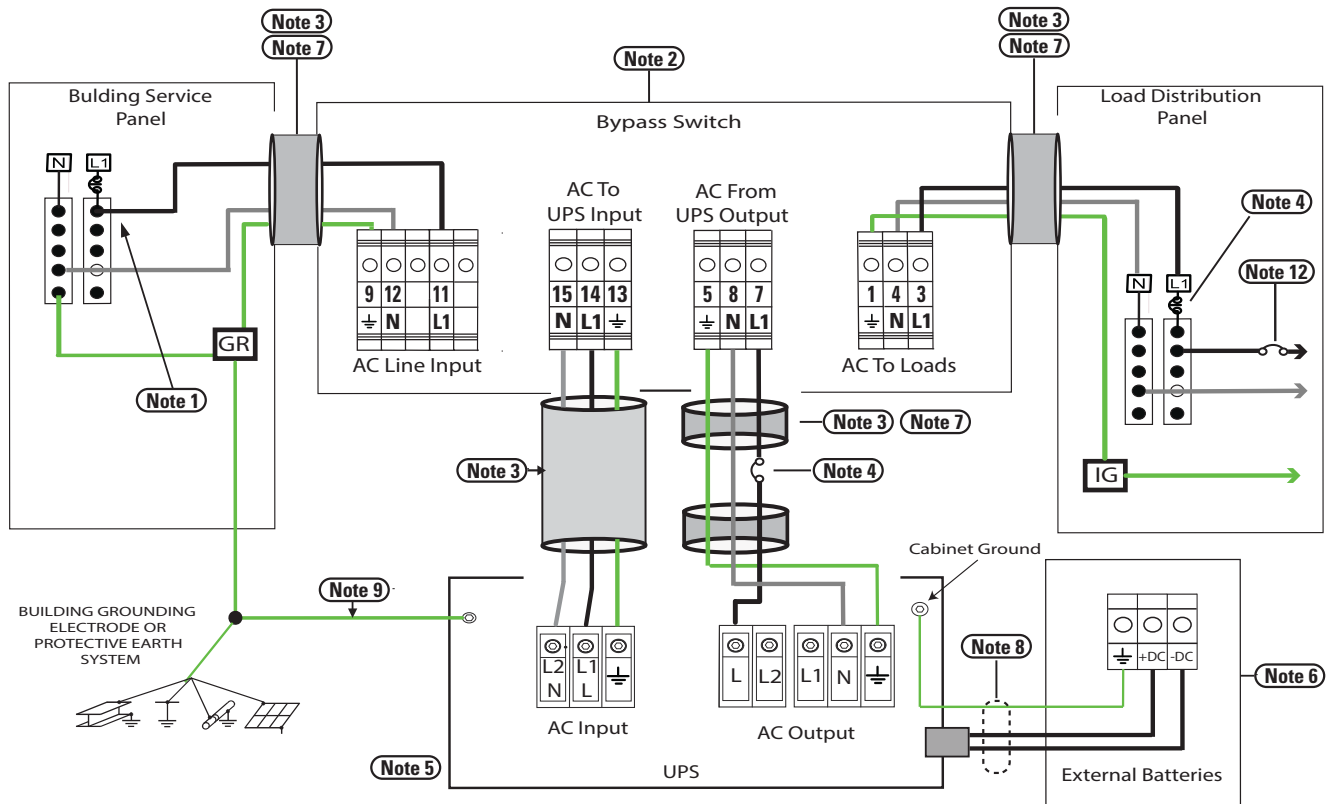


### IMPORTANT

FOR U.S. INSTALLATIONS, READ THIS IMPORTANT NOTE

- The mm<sup>2</sup> and AWG wire size for each circuit breaker size shown on the wiring diagrams. The minimum recommended circuit breaker sizes for each model and voltage application are listed on the wiring diagrams.
  - Conductor sizes shall be no smaller than the 75°C wire size . All circuit conductors, including the neutral conductor, must be the same size ( ampacity ) wire. Code may require a larger AWG size than shown in this table because of temperatures, number of conductors in the conduit, or long service runs. Follow local code requirements.
-

**Figure 7. FX 3100 60 Hz 120 Vac Input / 120 Vac Output Using a BPEFX Bypass Switch**



**FX 3100 120V In - 120V Out Using a BPE Bypass Switch**

**Table 8. Recommended Breaker and Wire Sizes**

Model	Input Voltage	Input Breaker Size	75°C Copper Wire Size
FX3100	120 Vac	50A	8 AWG (8.4 mm <sup>2</sup> )



## Chapter 5 Battery Cabinet Installation

### 5.1 Preparation for Battery Installation

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#### **⚠ WARNING**

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Only Qualified service personnel (such as a licensed electrician) should perform the electrical installation, Risk of electrical shock.

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#### **⚠ CAUTION**

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- Full voltage and current are always present at the battery terminals. The batteries used in this system can produce dangerous voltages, extremely high currents and a risk of electrical shock. They may cause severe injury if the terminals are shorted together or to ground (earth). You must be extremely careful to avoid electric shock and burns caused by contacting battery terminals or shorting terminals during installation. Do not touch uninsulated battery terminals.
  - Cabinets are designed to be used with, and batteries must be replaced with, applicable Eaton battery part numbers.
- 

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#### **⚠ CAUTION**

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The qualified service personnel (such as an electrician) must take these precautions:

- Wear protective clothing and eye wear, rubber gloves and boots. Batteries contain caustic acids and toxic materials and can rupture or leak if mistreated. Remove rings and metal wristwatches or other metal objects and jewelry. Don't carry metal objects in your pockets where the objects can fall into the external battery cabinet.
  - Tools must have insulated handles and must be insulated so that they will not short battery terminals. Do not allow a tool to short a battery terminal to another battery terminal or to the cabinet at any time. Do not lay tools or metal parts on top of the batteries, and do not lay them where they could fall onto the batteries or into the cabinet.
  - Install the batteries as shown on the drawing provided with the batteries refer to or . When connecting cables, never allow a cable to short across a battery's terminals, the string of batteries, or to the cabinet.
  - Align the cables on the battery terminals so that the cable lug will not contact any part of the cabinet even if the battery is moved. Keep the cable away from any sharp metal edges.
  - Install the battery cables so they cannot be pinched by the external battery cabinet or UPS cabinet.
  - Confirm that there is enough clearance when the cabinet cover is installed.
  - The external battery cabinet chassis (ground or earth) must be connected to the UPS chassis (ground or earth). If you use conduit, this ground conductor must be routed in the same conduit as the battery conductors.
  - Where conductors may be exposed to physical damage, protect the conductors in accordance with ANSI/ NFPA 70-2020.
  - If you are replacing batteries or repairing battery connections, follow the procedure in the Eaton FERRUPS FX User's Guide to shut off your UPS and remove both AC and DC input power.
-

**Table 9. UPS Nominal Battery Voltage**

Model	Nominal Battery Voltage
FX3100	48Vdc

The battery cable or wire used is #1 AWG (42.11 mm<sup>2</sup>) for all applications.

- If the batteries must be some distance from the UPS, you may need to install larger battery cables in conduit between the external battery cabinets and the UPS to help with EMC performance.

The UPS must have a DC disconnect switch or a removable plug so you can disconnect external batteries from the UPS.

- FX3100 VA models have a removable plug at the UPS; the external battery cabinets have a DC breaker located on the front of the battery cabinet for disconnection of the battery source from the UPS.

## 5.2 Battery Cabinet Installation

### Installation of the Batteries in a External Battery Cabinet

1. Arrange the batteries in the cabinet or rack. If optional straps are included, install the straps as shown in the battery installation diagram that came with the batteries.

Arrange the batteries so there is as much air flow as possible around the batteries and so the batteries can be cooled as much as possible.

Some external battery cabinets have cooling slots cut in the shelves to increase air flow. Arrange the batteries so these slots are not blocked. Some larger batteries must sit with the longest battery dimension in the same direction as the longest shelf dimension. These batteries will partly block the cooling slots. However, if you place the batteries next to the outside edge of the shelf to leave as much space between the batteries as possible, there will be plenty of air flow for cooling.

### CAUTION

Never install the batteries in a air tight enclosure.

2. The Eaton Ferrups FX external battery cabinets come with a battery installation diagram. Refer to this diagram for proper battery and cable connections or refer to [Figure 8](#), [Figure 9](#), [Figure 10](#), [Figure 11](#) for FX models that require 48 VDC battery options.

3. Find the battery cable assembly that connects to the UPS. (If you have a removable DC plug at the UPS end, note that this end of the cables does not go through the conduit or connect to it.)

Do not connect the external battery cables to the UPS at this time, but pull them through the conduit from the UPS to the cabinet or rack. Do not connect the cables to the batteries or cabinet terminals yet.

If you have more than one external battery cabinet, find the battery cable assembly that will connect the external battery cabinets. Pull the cables through the conduit that you installed between the cabinets.



4. Clean the cable and battery post (terminal) before you make the battery connections. Apply a thin coating of high-temperature conductive grease on the post and cable terminals to slow corrosion.

If you use a nonconductive grease like petroleum jelly, do not apply any grease before you make the connections. After you have made the connection, apply a coating of the nonconductive grease to the hardware at the battery terminals.















When you make battery terminal connections, use the torque wrench to tighten the battery terminal connections securely.

5. Connect the battery cables between batteries as shown in the battery installation diagram. Do NOT connect the cables between battery strings or between the UPS and the batteries yet. If you are only using one string of batteries, go to Step 7.
6. If you are connecting more than one battery string, connect the positive cables as shown in the battery installation diagram. Next, use the voltmeter to check the DC voltage between the negative terminals of the strings. The measured voltage should be less than 3V. If it is more than 3V, correct any wiring errors before you continue.
7. Use the cables provided to connect the negative (-) battery terminals of the battery strings as shown in the battery installation diagram. If the external battery cabinet has a DC switch, the DC switch has been installed at the factory.

Figure 8. FXEBM01 Battery Cabinet Wiring Diagram Breaker at Top

External Wire Table						
Number of Cabinets	Part#	Cable#	QTY	Length	GA	Termination & Labeling
1 *	BAA-0212	15	1	108"	1	+15 — 
		16	1	108"	1	-16 — 
1	BAA-0203	15	1	108"	1	+15 — +15
		16	1	108"	1	-16 — -16

\* For use with FX1-3.1k \*

Internal Wire Table						
Part #	Cable #	QTY	Length	GA	Termination & Labeling	
BAA-0195	1	4	9"	1		2 — 
BAA-0194	3	2	18"	1		3 — 
BAA-0207	5	1	24"	1		5 — 
BAA-0208	6	1	32"	1	+ 	6 — 
P-175000115	17	1	45"	1	+ 	17 — +
P-175000116	18	1	35"	1	+ 	18 — +
P-175000117	19	1	38"	1	- 	19 — -
P-175000118	20	1	31"	1	- 	20 — -
P-175000119	21	4	17"	1		21 — 

Termination & Labeling Descriptors

- \* Wire 17 connect at the top breaker contact
- \* Wire 18 connect at the top breaker contact
- \* Wire 19 connect at the bottom breaker contact
- \* Wire 20 connect at the bottom breaker contact

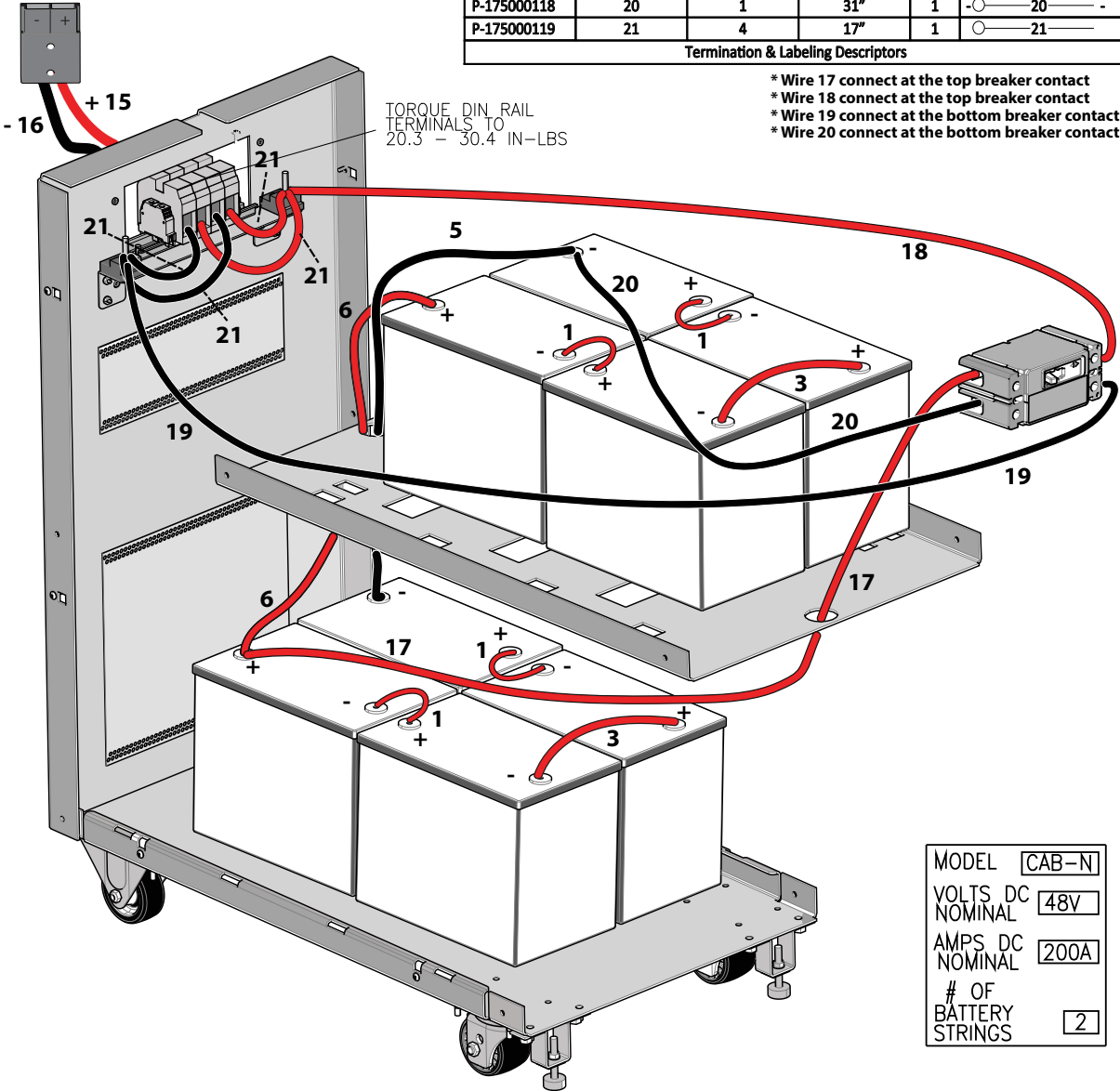


Figure 9. FXEBM01 Battery Cabinet Wiring Diagram Breaker at Bottom

External Wire Table						
Number of Cabinets	Part#	Cable#	QTY	Length	GA	Termination & Labeling
1 *	BAA-0212	15	1	108"	1	+15
		16	1	108"	1	-16
1	BAA-0203	15	1	108"	1	+15 +15
		16	1	108"	1	-16 -16

\* For use with FX1-3.1k \*

Internal Wire Table					
Part #	Cable #	QTY	Length	GA	Termination & Labeling
BAA-0195	1	4	9"	1	○ — 1 — ○
BAA-0194	3	2	18"	1	○ — 3 — ○
BAA-0207	5	1	24"	1	- ○ — 5 — ○ -
BAA-0208	6	1	32"	1	1 + ○ — 6 — ○ +
P-175000115	17	1	45"	1	1 + ○ — 17 — ○ + *
P-175000116	18	1	35"	1	1 + ○ — 18 — ○ + *
P-175000117	19	1	38"	1	1 - ○ — 19 — ○ - *
P-175000118	20	1	31"	1	1 - ○ — 20 — ○ - *
P-175000119	21	4	17"	1	1 ○ — 21 — ○
Termination & Labeling Descriptors					

- \* Wire 17 connect at the top breaker contact
- \* Wire 18 connect at the top breaker contact
- \* Wire 19 connect at the bottom breaker contact
- \* Wire 20 connect at the bottom breaker contact

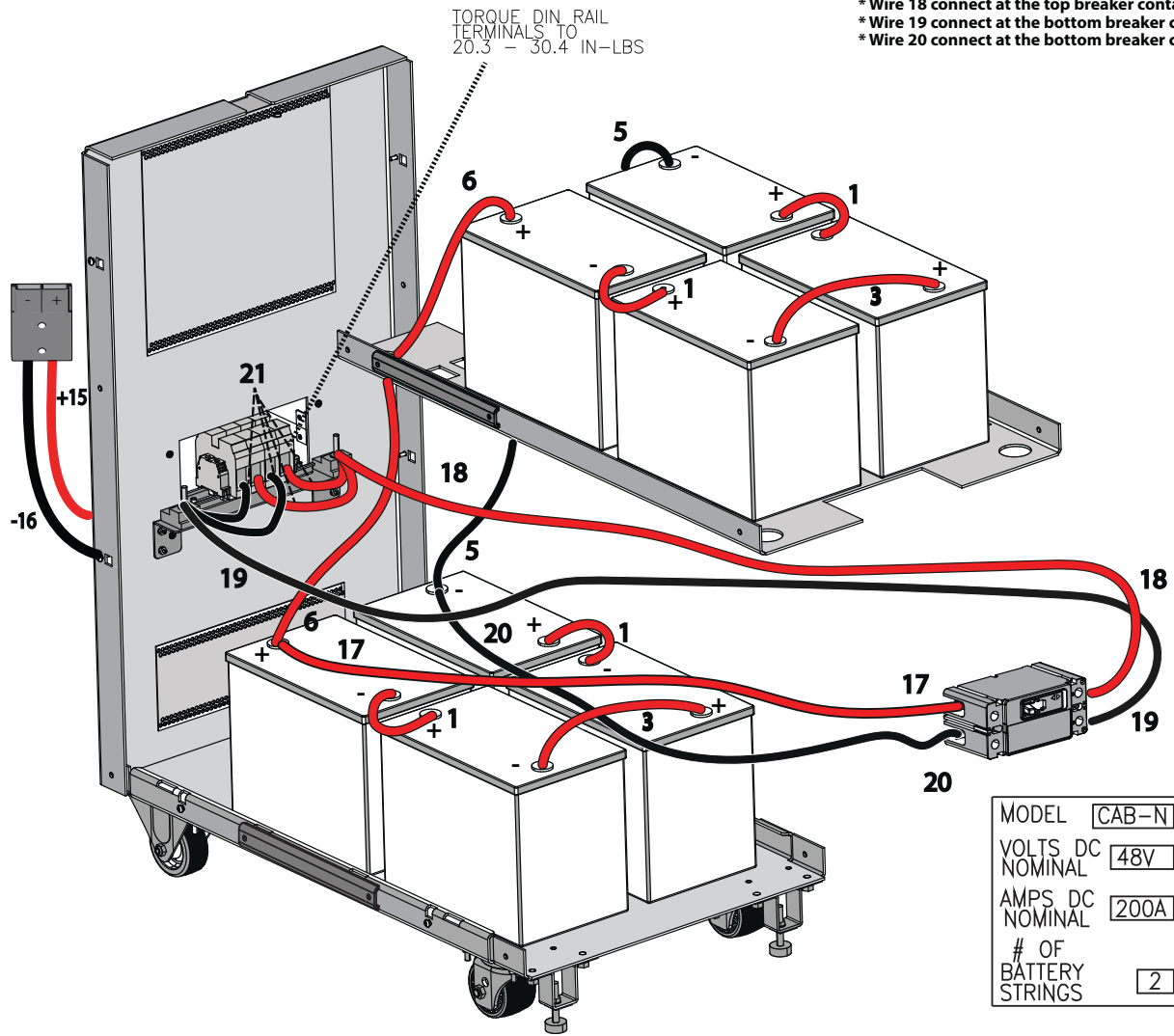


Figure 10. FXEBM03 — FXEBM04 Battery Cabinet Wiring Diagram Breaker at Top

External Wire Table						
Number of Cabinets	Part#	Cable#	QTY	Length	GA	Termination & Labeling
1 *	BAA-0212	15	1	108"	1	+15 —
		16	1	108"	1	-16 —
1	BAA-0203	15	1	108"	1	+15 — +15
		16	1	108"	1	-16 — -16

\* For use with FX1-3.1k \*

Internal Wire Table						
Part #	Cable #	QTY	Length	GA	Termination & Labeling	
BAA-0193	2	9	14"	1	○	2 — ○
BAA-0207	5	2	24"	1	- ○	5 — ○ -
BAA-0208	6	2	32"	1	+ ○	6 — ○ +
P-175000115	17	1	45"	1	+ ○	17 — ○ + *
P-175000116	18	1	35"	1	+ ○	18 — ○ + *
P-175000117	19	1	38"	1	- ○	19 — ○ - *
P-175000118	20	1	31"	1	- ○	20 — ○ - *
P-175000119	21	4	17"	1	○	21 — ○ *

Termination & Labeling Descriptors

- \* Wire 17 connect at the top breaker contact
- \* Wire 18 connect at the top breaker contact
- \* Wire 19 connect at the bottom breaker contact
- \* Wire 20 connect at the bottom breaker contact

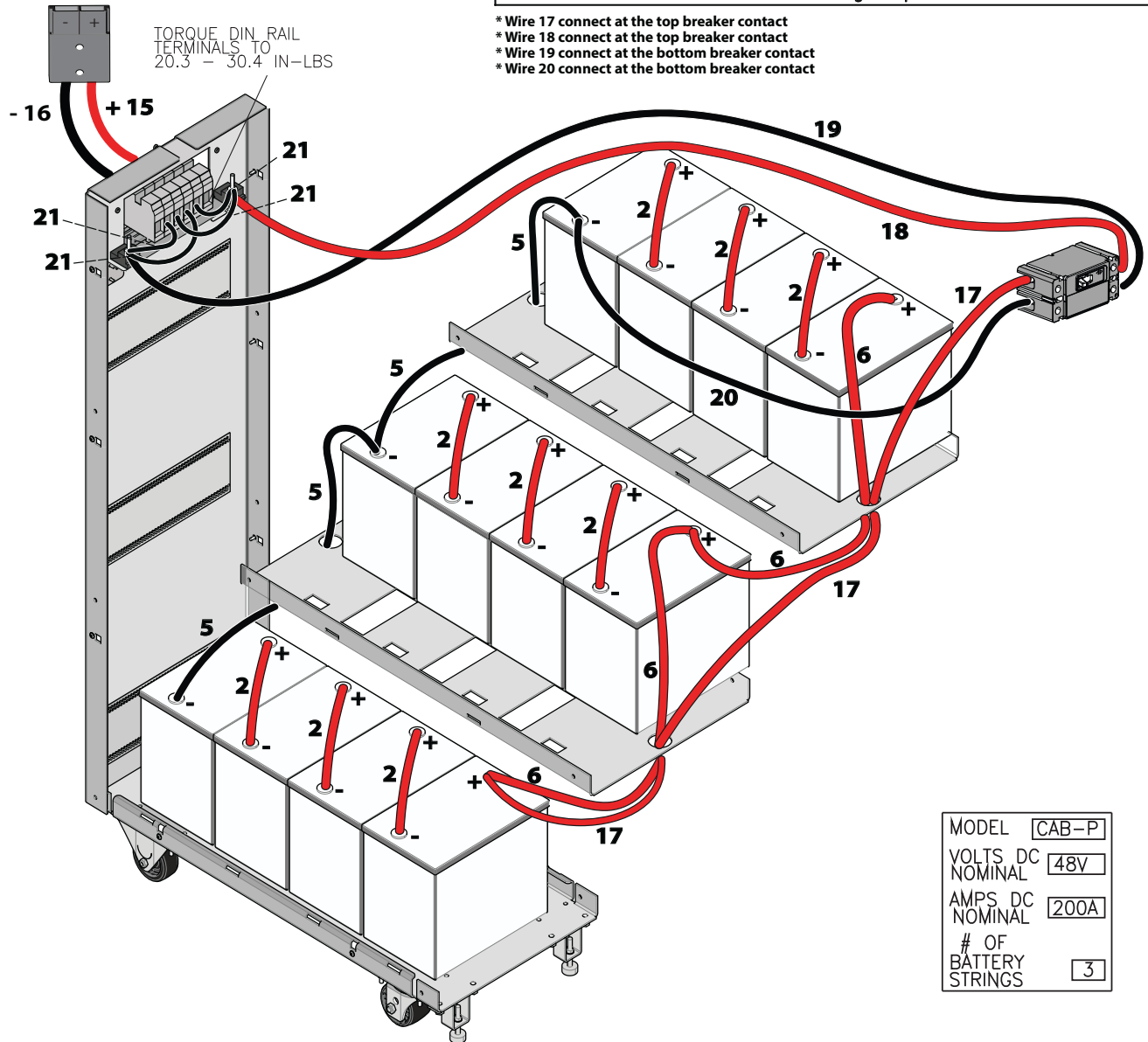
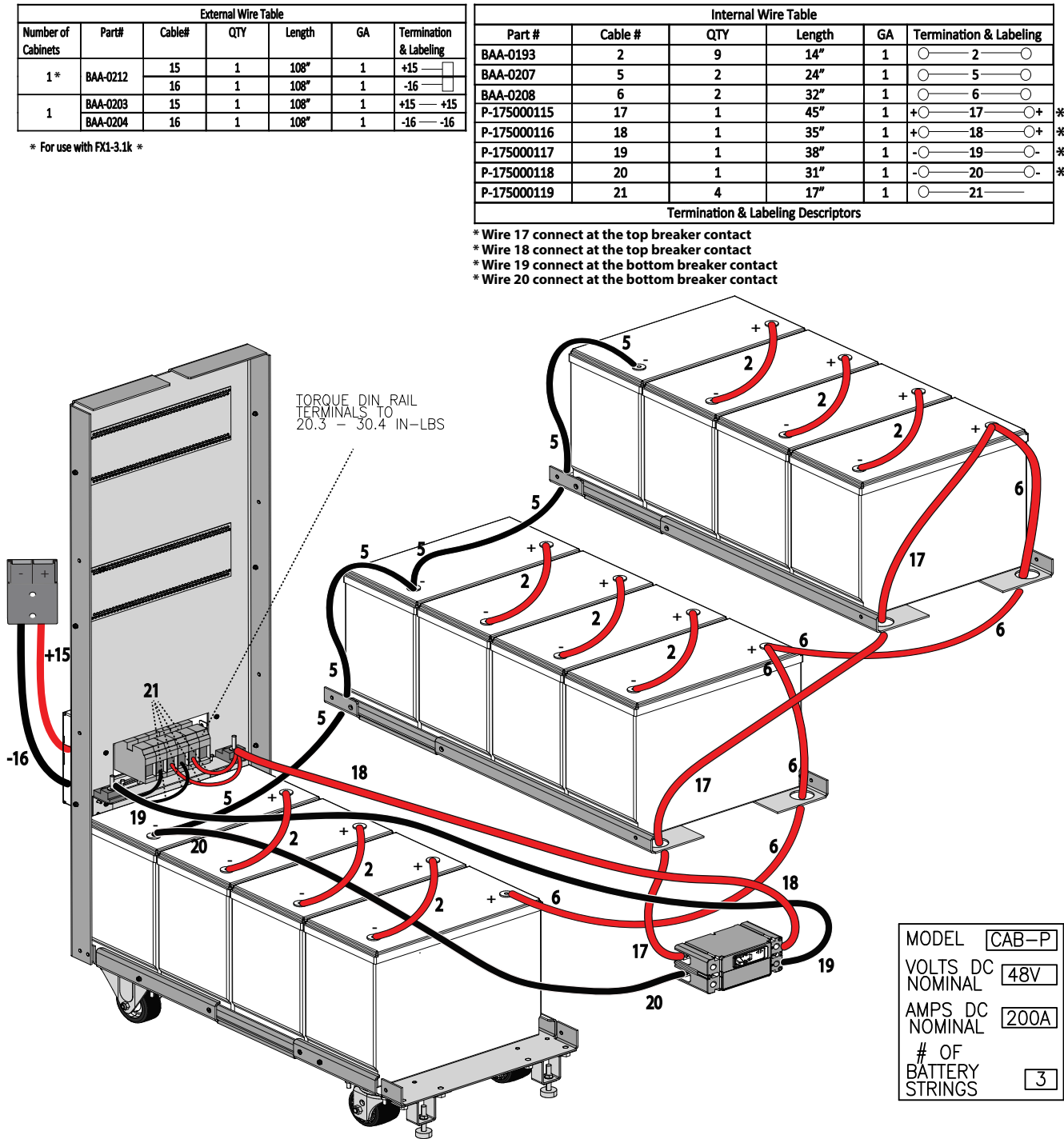


Figure 11. FXEBM03 – FXEBM06 Battery Cabinet Wiring Diagram Breaker at Bottom



### Installing and Connecting the External Battery Cabinets

1. Place the external battery cabinet or rack as close as possible to the Eaton Ferrups FX UPS. If the batteries will be further from the unit than the standard cables allow, contact your service representative or your local distributor for assistance.

The external battery cabinet should be well ventilated and away from direct sunlight or other heat source. Ensure that the floor is level and can support the weight of the batteries, the cabinet or rack, and any other necessary equipment. Your Eaton sales coordinator can tell you the size and weight of external batteries.

The temperature should be below 77 F (25 C) for the best battery performance. Batteries will be less efficient at temperatures below 65° (18°). High temperatures will reduce battery life. Typically at about 95° F (35°) battery life will be half of what it would be at a normal temperature of 77° (25°C). At about 113 ° (45°C), battery life will be one-fourth of normal.

The batteries should be as close as possible to the UPS to reduce DC wiring costs and improve battery performance.



#### NOTE

If you are installing the batteries in a place where there may be seismic activity, you should anchor the UPS and external battery cabinets to the floor.

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2. Wherever conductors may be exposed to physical damage, you must protect the conductors in accordance with National Electrical Code ANSI/NFPA 70-2020. This includes battery cables between the UPS and the external battery cabinet and cables between external battery cabinets (if you have more than one).

We suggest routing battery cables through flexible conduit. For models with a removable DC plug at the UPS end of the cables, we suggest routing the cables through the conduit to within about 12" (30.5 cm) of the UPS because the connector or plug does not connect to flexible conduit. Install flexible conduit for battery cables according to local or national code.

3. The external battery cabinet chassis ground (or earth) must be connected to the UPS chassis ground (or earth).

You must make a good connection to the external battery cabinet chassis ground (or earth). If the external battery cabinet has a terminal strip, you can make the ground connection at the terminal strip ground (or earth) lug inside the cabinet. If not, you can make the ground connection at one of the screws on the external battery cabinet; to ensure a good connection, remove the paint under the cabinet screw.

At the UPS, the procedure for connecting ground depends on your model.

**FX 3.1kVA:** At the UPS, connect the ground wire to the ground lug (located next to the EBM connector). This UPS ground (or earth) screw is marked with a ground symbol. See [Figure 12](#).

4. To connect external batteries to your UPS, follow the instructions for your model.

If your external battery cabinet has a DC breaker or switch, verify that the breaker or switch is in the OFF position; then, find the battery cables between the UPS and the batteries. The removable DC connector at one end of the cables connects to the UPS, and the other ends of the positive and negative cables connect to the external battery cabinet. You should connect the cables to the battery cabinet first. Refer to the battery installation diagram as that come with the UPS as you follow the steps below.

If your external battery cabinet has a DC breaker or switch on the front, the positive and negative cables connect to the terminal strip in the back of the external battery cabinet. First, find the positive (+) cable, and strip 0.5" (1.3 cm) of insulation from the end. Insert the cable into the positive (+) external battery cabinet terminal. Next, strip 0.5" ( 1.3cm ) of insulation from the end of the negative (-) cable, and connect that cable to the negative (-) terminal in the external battery cabinet. Tighten both terminal connections securely.

Now, connect the battery cables to the UPS by plugging the removable DC connector into the matching connector on the back of the UPS.



If the external battery cabinet has a DC breaker or switch, turn the breaker or switch to the ON position.

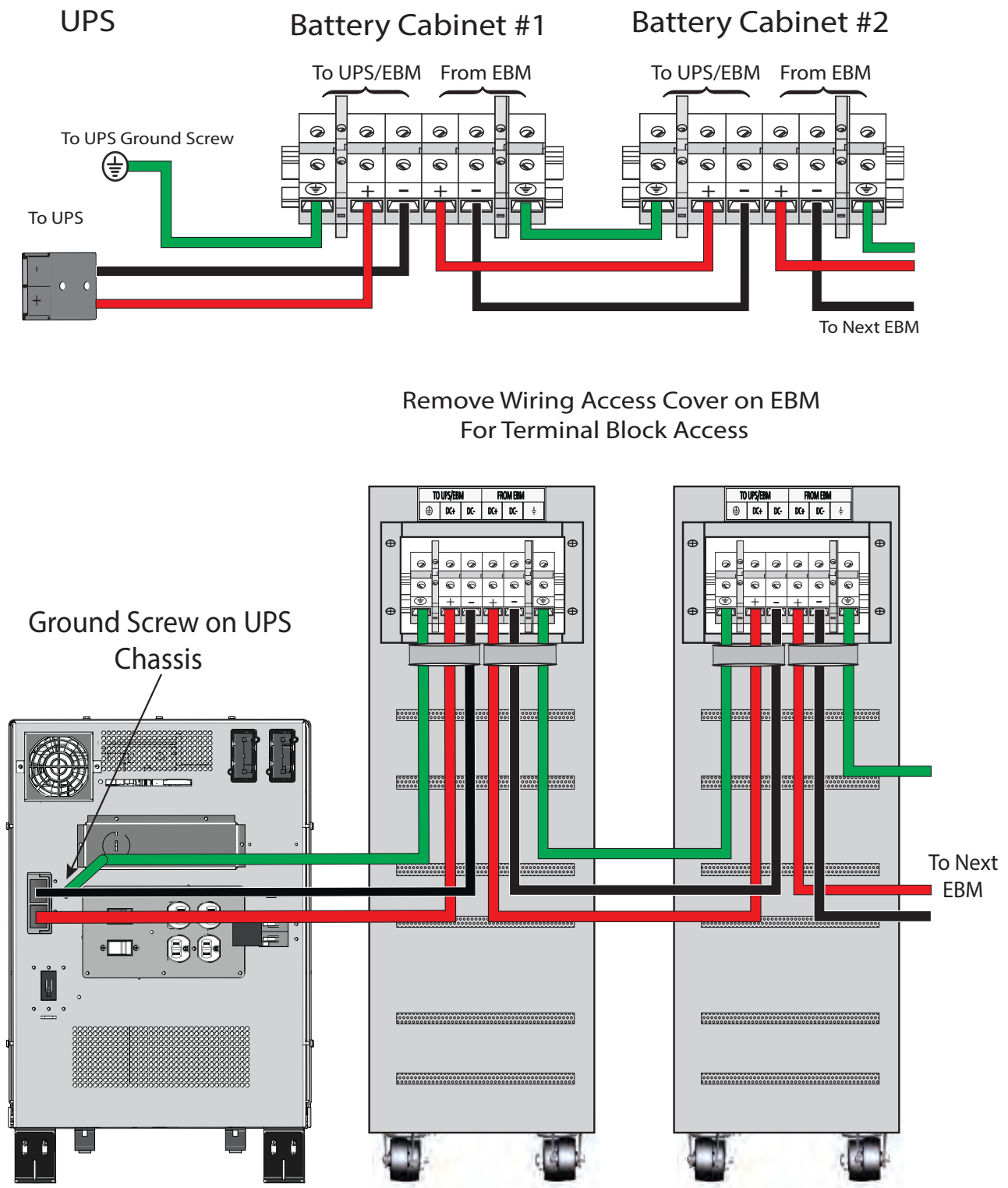
5. Use the meter to check for proper nominal DC voltage at the UPS end of the cable. Verify that the polarity agrees with the markings on the UPS battery terminals.

**Table 10. UPS Nominal Battery Voltage**

Model	Nominal Battery Voltage
FX3100	48Vdc

After you have checked the DC voltage, turn the DC switch on the external battery cabinet(s) to the OFF position.

**Figure 12. Eaton FX3100 UPS to External Battery Cabinet Connections**



## Chapter 6 Communications

### 6.1 Communications

Eaton offers several methods of communicating with your Eaton Ferrups FX UPS system in addition to the front Remote Control Display. The communication slots and USB port are located on the back rear panel of the UPS.

To establish communication between the UPS using IPP/IPM and a computer, connect your computer to the Eaton FX USB communication port on the back of the UPS using an appropriate USB communication cable.

Connectivity cards allow the UPS to communicate in a variety of networking environments and with different types of devices. The Eaton Ferrups FX has two available communication bays for the following connectivity:

- **Predict Pulse**
- **Network— M2 Card**
- **Industrial Gateway — M2**
- **Optional Interface Kits**
- **Relay Card — MS** See [Table 11](#)
- **Industrial Relay— M2** See [Table 12](#)

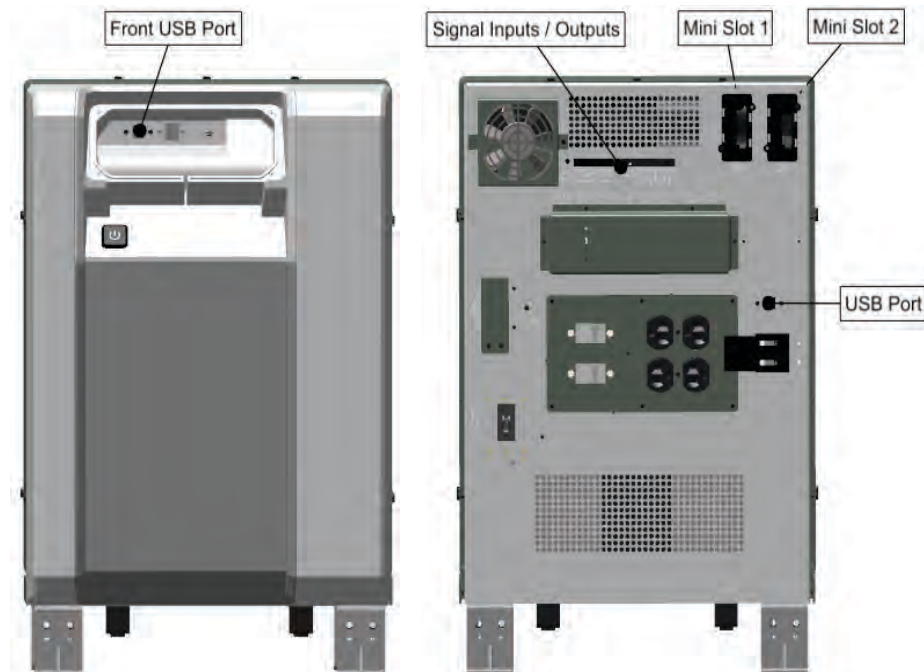
See section 2.5 “Communication Overview” for the communications options available.



#### NOTE

The USB port located behind the RCD mounting plate is used for updating the UPS firmware and by default is not active. See [Figure 13](#).

**Figure 13. Communication Slot Locations**



**Table 11. Relay-MS Card**

No	Function	Description
1	Not used	
2*	Battery fault (Config 2) UPS power off (Config 1)	<b>Config 2:</b> a battery fault occurred
3	Not Used in Eaton FX	Not Used in Eaton FX
4	Load on utility**	The load is protected. The UPS supplies the load using utility power (not from the battery).
5	Common	<b>Config 2:</b> volt-free pin. <b>Config 1 or 3:</b> pin connected to GND.
6	Load on automatic bypass***	The load is not protected. The UPS supplies the load using utility power. If utility power fails, the load will not be supplied.
7	Low battery	The battery has dropped below the preset warning level (depending on UPS setup). If the voltage level continues to drop, the UPS will no longer be capable of supplying power to the load.
8	UPS ON, load powered	The UPS is operational and can supply power to the load, whether utility power is available or not, whether the UPS is on the bypass or not.
9	Load on battery**	The load is protected. The UPS supplies the load from the battery (not using utility).

**NOTE 1** \*The function of this pin varies, depending on the configuration. the battery fault information is available only in Config 2.



**NOTE 2** \*\*Load on utility and Load on battery are complementary signals. They cannot be activated simultaneously.

**NOTE 3** \*\*\*Not available on line-interactive UPS. No manual bypass.

**Table 12. Industrial Relay-MS**

Relay	Function	Description
K1	UPS ON, load powered	The UPS is operational and can supply power to the load, whether utility power is available or not, whether the UPS is on the bypass or not.
K2	Load on battery	The load is protected. The UPS supplies the load from the battery (not using utility power).

**Table 12. Industrial Relay-MS (Continued)**

Relay	Function	Description
K3	Battery fault	A battery fault occurred.
K4	Load on automatic bypass	The load is not protected. The UPS supplies the load using utility power. If utility power fails, the load will not be supplied.
K5	Low battery	The battery has dropped below the preset warning level (depending on UPS setup). If the voltage level continues to drop, the UPS will no longer be capable of supplying power to the load.

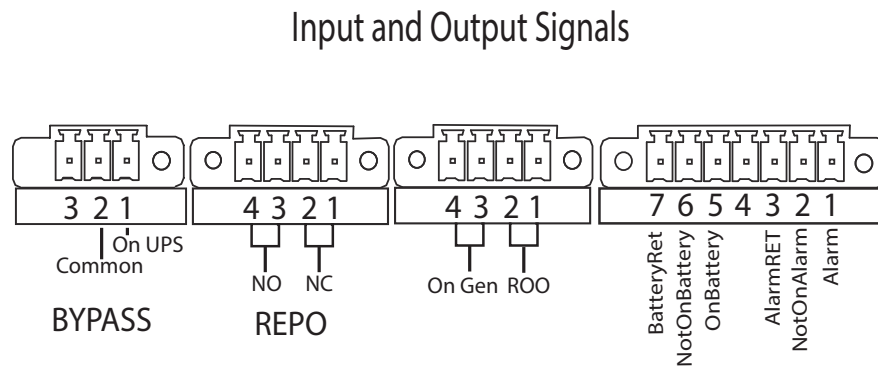


**NOTE 1** The Eaton Ferrups FX Series does not support the input contact.

**NOTE 2** The Eaton Ferrups FX Series **does not allow** configuring contacts for Minislot.

## 6.2 Input and Output Signal Connections

Signal Inputs for external connections are located on the UPS back panel. Use twisted-pair wires for each input and common connection.

**Figure 14. FX Input Signals**

### Remote Emergency Power Off Input Signal:

Connection to a facility Emergency Shutdown switch provides a method for emergency Eaton Ferrups FX shutdown.

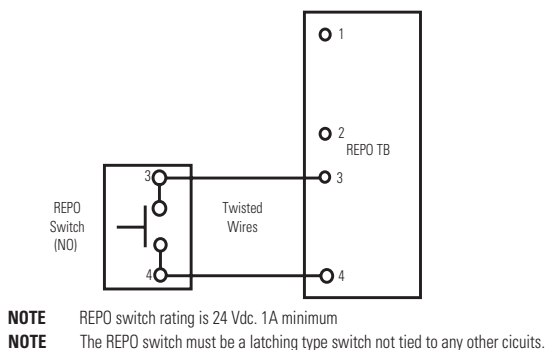
### REPO Connections

For the Eaton Ferrups FX UPS, REPO can be configured either as Normally Open (NO) or Normally Closed (NC) contacts. The REPO connector on the rear panel of the UPS is used for powering off the UPS in a emergency situation

### NO Configuration

For normally open operation, configure with external switch wired to pins 3 and 4. 18 AWG twisted wire is to be used for REPO connections.

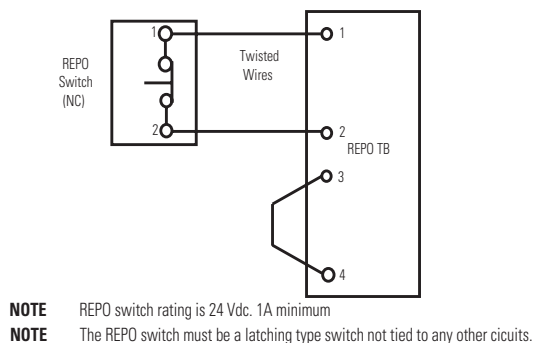
**Figure 15. Normally Open REPO Connection**



## Normally Closed REPO Configuration

For Normally closed operation, add a jumper between pins 3 and 4 of the REPO connection and the EPO switch should be connected to Pins 1 and 2 and should be closed during normal operation of the UPS.

**Figure 16. Normally Closed REPO Connections**



## Maintenance Bypass

The maintenance bypass contact displays a “On Bypass” message on the RCD when activated. Parameter 108 must be set to enabled.

## On Generator Input Signal

The generator contact provides a normally open contact to display a notice to indicate the UPS is being supplied from a generator.

## Remote On/Off ROO Input Signal

Remote On/ Off allows remote action of the UPS power button to switch the UPS On/Off.

## Battery Contacts Output Signal

The battery contact is a optocoupler circuit that provides a 5VDC 1 mA signal that can be used to provide notification that the UPS is on battery. For a general purpose relay contact the Relay Card-MS can be ordered.

## Alarm Contacts Output Signal

The alarm contact is a optocoupler circuit that provides a 5VDC 1 mA signal that can be used to provide notification that the UPS is on alarm. For a general purpose relay contact the Relay Card-MS can be ordered.

## Chapter 7 Operation

### 7.1 Front Panel Indicators

The UPS Remote Control Display indicators indicate how the UPS is operating and also alert you of potential power problems.

#### Eaton Ferrups FX UPS Remote Control Display (RCD)

**Figure 17. Remote Control Display**



#### Scrolling Display

The RCD will continuously scroll and display the following items at the top of the display:

- EATON Ferrups FX
- Mode: The UPS will determine the correct operating mode and updates automatically.
- AVR: Displays Off, Normal, Buck or Boost if the UPS is operating normally but utility is outside normal operating thresholds.
- ABM: Status of the ABM Charger in the UPS
- Beeper: Indication if the beeper is disabled or enabled.
- Charger: Displays if the charger is enabled or disabled

The following information will be shown on the home screen at all times:

- Current Date : Will always be displayed unless viewing the Logs parameter #24.
- Current Time: Will always be displayed unless viewing the Logs parameter #24.
- Level: This is the level of the password programed into the UPS. ( Only visible if a password is entered ).



#### NOTE

The display will time out and go blank after 3 minutes of inactivity, press any button to resume normal activity.

#### Indicator Lights

There are five indicators located on the Remote Control Display and a light bar that indicate the operating mode of the UPS. The light color will change depending on the mode of the UPS.

**Table 13. Indicator Status**

Indicator	Color	Status	Explanation
<b>AC Line</b>	Blue	On	The UPS is getting power from the AC input power source.
		Off	<ul style="list-style-type: none"> <li>The UPS is not getting input power.</li> <li>Input could be outside of the acceptable limits.</li> <li>There is a power outage.</li> <li>The AC input breaker is tripped.</li> <li>The UPS is unplugged.</li> </ul>
<b>Ready</b>	Blue	On	The UPS is ready to provide backup power when needed.
		Off	The UPS cannot provide battery backup power because: <ul style="list-style-type: none"> <li>The UPS is in the Off mode.</li> <li>The UPS may be running on battery power (Inverter Mode).</li> </ul>
		Flashing	The UPS is in Line Condition Mode
<b>Charging</b>	Blue	On	The UPS is charging the batteries.
		Off	The battery charger is off; batteries are at full charge.
<b>On Batt</b>	Yellow	On	<ul style="list-style-type: none"> <li>The UPS is providing power from its batteries; it is in the Inverter On mode.</li> </ul>
		Off	The UPS is providing conditioned power from the AC input power source, or the UPS is off.
<b>Alarm</b>	Red	On	The UPS is warning you that an alarm exists
		Off	No alarm exists.
<b>Light Bar</b>	Blue, Yellow, Red	On	The light bar will change color depending on the state of the UPS <ul style="list-style-type: none"> <li>Blue : UPS is operating without alarms or warnings</li> <li>Yellow: UPS is operating on battery power.</li> <li>Red: The UPS is indicating an alarm condition.</li> </ul>

## 7.2 Changing Operating Modes

The Eaton FERRUPS FX UPS selects the appropriate operating mode automatically; however, there may be times when you need to set the operating mode manually from the control panel.



The names of the Eaton FERRUPS FX control features are located in yellow at the bottom of the Remote Control Display keys. You can change the operating mode by pressing the [CONTROL] button followed by the number that describes the operating mode.

### UPS Operating Mode Commands

**Table 14. UPS Operating Mode Commands**

Operating Mode	How to Select It	What It Means
<b>Off</b>	Press [CONTROL] —1 [ENTER] [ENTER]	The UPS does not provide power to your equipment, but you can still use the control panel if DC power is present. The READY indicator is off.
<b>Auto</b>	Press [CONTROL] —2 [ENTER] [ENTER]	This is the normal operating mode for the FX UPS. The UPS conditions AC input power and provides the conditioned power to your equipment. The AC LINE and READY indicators should be illuminated in this mode.
<b>Line Condition</b>	Press [CONTROL] —3 [ENTER] [ENTER]	The UPS is conditioning the AC input power and providing the conditioned power to your equipment, but if there is power outage the UPS does not switch to battery power. Instead, the UPS shuts down output until AC input power is available again. The READY indicator will blink and the AC LINE indicator is on when the UPS is in this mode.
<b>Inv On</b>	Press [CONTROL] —4 [ENTER] [ENTER]	The UPS converts battery power to AC power for your equipment. It does not charge the batteries. the On Batt indicator is on. The READY indicator is off.

### Additional Control Commands

**Table 15. Additional Control Commands**

Additional Control Functions		
<b>Alarm</b>	Press [CONTROL] —5 [ENTER] [ENTER]	Permanently enables and disables the alarm beeper.
<b>Chgr (Battery Charger)</b>	Press [CONTROL] —6 [ENTER] [ENTER]	Enables and disables the UPS internal charger.
<b>Test (Battery Test)</b>	Press [CONTROL] —7 [ENTER] [ENTER]	Starts the UPS internal battery test. (UPS must set for a custom battery configuration for this to work)
<b>User Test Alarm</b>	Press [CONTROL] —8 [ENTER] [ENTER]	Initiates a User Test Alarm ( Can be cleared by pressing [CONTROL] —8 [ENTER] [ENTER], or by pressing Press [CONTROL] —0 [ENTER] [ENTER])

**Table 15. Additional Control Commands (Continued)**

Additional Control Functions		
<b>Clear Logs</b>	Press [CONTROL] —9 [ENTER] [ENTER]	Clears UPS History Log
<b>Clear Alarms</b>	Press [CONTROL] —0 [ENTER] [ENTER]	Clears any active alarm.
<b>Silence Active Alarms</b>	Press [CONTROL] —". "	Silences the beeper on any active alarm. If a new alarm becomes active the beeper will sound.

### 7.3 Enter a User Password

Before you can change some parameter values, you must enter a user password through the Remote Control Display.

The user-level password is 000377. To enter the user-level password, follow these steps:

**Table 16. Enter a User Password**

Press This Key	Display Shows
[CLEAR]	EATON FX
[PROGRAM]	Password:
[0] [0] [0] [3] [7] [7]	Password: 000377
[ENTER]	Level: User

To clear the password, press [CLEAR] until Password Cleared appears on the remote control display.


**NOTE**

The password will automatically clear out of the system and have to be reentered if there has been no activity for 10 minutes.

### 7.4 Displaying and Changing Parameters

The Remote Control Display allows you to display and change parameters by entering a user password.

#### Displaying a Parameter

The names of the first 11 parameters appear in blue on the top of the number keys. To display a parameter press [DISPLAY], the parameter number, and [ENTER]. For example, to display parameter 0 (Time), follow these steps:

**Table 17. Display a Parameter**

Press this Key	Display Shows
[DISPLAY]	Display:
[0]	Display: 0
[ENTER]	00 Time : 09:30:00

### Changing a Parameter

To display a parameter, press [DISPLAY], the parameter number, and [ENTER]. To change a parameter press [PROGRAM] enter the value then press [ENTER] follow these steps:

**Table 18. Changing a Parameter**

Press This Key	Display Shows
[DISPLAY] [0] [ENTER]	00 Time 07:04:08
[PROGRAM]	00 Pgm:
[9] [3] [0]	00 Pgm: 930
[ENTER]	00 Time 09:30:00

## 7.5 UPS Parameters



### NOTE

Only qualified technicians using the proper metering equipment should change other parameters. Improper calibration may cause the Eaton FX FERRUPS UPS to malfunction. Call your *service representative before you attempt to change any parameters except any parameter mentioned in the Initial parameter setup.*

**Table 19. Parameter List**

Parameter Number	Sample / Default	Password Level	Range	Description
.	"Temp Ambient 38 C"	No Change Allowed	Ambient, InvTop, InvBot, Xfmr, Charger, AcScr, Dvr1, Dvr2	Display cycles through all temperatures. Scrolls to next temperature every 3 seconds. User can toggle scrolling by pressing '0'. When scrolling is stopped, pressing '1' will move to next temperature. List will wrap.
0	"00 Time 12:00:00"	User	00:00:00 -23:59:59	Time of day using 24-hr military time. Time is set to last known time whenever UPS is turned on.
1	"01 V In 120.0 V"	Service	0.0 – 500.0	Measured RMS voltage of the UPS line input cord. Programming changes an internal setting to calibrate reading.
2	"02 V Out 120.0 V"	Service	0.0 – 500.0	Measured RMS voltage of the UPS outlets to the load. Programming changes an internal setting to calibrate reading.
3	"03 I In 10.0 A"	Service	0.0 – 220.0	Measured RMS current of the UPS line input cord. Programming changes an internal setting to calibrate reading.
4	"04 I Out 3.1 A"	Service	0.0 – 220.0	Measured RMS current of the UPS outlets to the load. Programming changes an internal setting to calibrate reading.
6	"06 I Batt 0.0 A"	Service	0.0 – 200.0	When the unit is on battery, this is the discharge current. Otherwise, this is the charging current. Programming changes an internal setting to calibrate reading.

**Table 19. Parameter List (Continued)**

Parameter Number	Sample / Default	Password Level	Range	Description
7	"07 V Batt 48.1 V"	Service	0.0 – 175.0	Measured average DC volts of the UPS battery. Programming changes an internal setting to calibrate reading.
8	"08 Freq 60.00 Hz"	No Change Allowed	47.00 – 63.00	Line input frequency when line is OK. Line output frequency otherwise. Display parameter only, unprogrammable.
9	"09 RunTime 12 m"	No Change Allowed	0 – 9999	Approximate runtime presently available to the load during inverter operation. Display parameter only, unprogrammable.
10	"10 Date 01/01/20"	User	01/01/00 – 12/31/99	Today's date in Mo/Dy/Yr format. Date is set to last known date whenever UPS is turned on. UPS internally sets years between 2000–2099.
11	"11 Amb Temp 23 C"	No Change Allowed	–63 – 193	Temperature of air around logic board.
12	Reserved			
13	Reserved			
14	14 Xfmr Temp 28 C	No Change Allowed	–63 – 193	Transformer temperature. The FerrUPS will alarm if this value is too high. This parameter is only for models that monitor transformer temperature; for other models, this parameter will always show -63° C.
15	"15 Unit ID "Network #1 UPS"	No Change Allowed	0 – 20 chars	Provides user configurable identification string of the UPS. Usually used in network configurations.
16	"16 FullLoad% 75"	No Change Allowed	0 – 150	FullLoad% = (VAOut/VALimit) * 100. Display parameter only, unprogrammable.
17	"17 Watts 374"	No Change Allowed	0 – 15000	Watts being used by load. = Instantaneous dot product of ACVoltsOut x ACampsOut. (average power)
18	"18 PF 0.73 Lead" or "18 PF 0.82 Lag" or "18 PF 1.00 —"	No Change Allowed	0.00 – 1.00	Power factor of user load. PF types: Lead, Lag, Distortion or — (Indeterminate) depending on load type. PF magnitude = Watts / VA Out. The unit should always display 1.00 — for loads < 25%
19	"19 VALimit 2200 VA"	No Change Allowed		Max allowable load in VA. Limit changes depending on load type. For "Lead" or "Dist" types the unit is prorated as: VALimit = RatedWatts/PF.
20	20 ActiveAlm "Batt Disconnected"	No Change Allowed	N/A	It will scroll all Active alarms, each for 3 seconds. User can toggle scrolling by pressing '0'. When scrolling is stopped, pressing '1' will move to next event (older).

Table 19. Parameter List (Continued)

Parameter Number	Sample / Default	Password Level	Range	Description
				List will wrap to newest event from oldest event.
21–23	Reserved			
24	"24 Logs #69 CLR" "RCD Attached" "2020/03/06 11:35:44"	No Change Allowed	N/A	Log of events and alarms. Display event number and CLR (cleared) or SET (set). Following lines have text description and date/time of event. Scrolls from most recent to oldest event every 3 seconds. User can toggle scrolling by pressing '0'. When scrolling is stopped, pressing '1' will move to next event (older). List will wrap to newest event from oldest event.
25	Reserved			
26	"26 BT Results 1" "01/01/00 00:00:00" "No Results"	No Change Allowed	N/A	Comparative results from past battery tests.
27	"27 Crest 1.41"	No Change Allowed	0.00 – 5.00	Crest Factor = (peak AC amps out) / (RMS AC amps out). CF = 1.41 if ACAO waveform is a sine wave or if load < 25%. Display parameter only, unprogrammable.
28–38	Reserved			
39	39 CTO "FX310000AAA1"	No Change Allowed	0 – 20 characters	CTO describes UPS configuration. When programmed, also changes Rated VA, Rated Watts, Nominal Voltage In, Nominal Voltage Out, etc.
40	40 Serial Number "FE10K25000"	No Change Allowed	0 – 20 characters	Provides factory configurable serial number identification of the UPS.
41	41 Model Number "FX3100"	No Change Allowed	FX3100	Text of Model number.
42	42 NomFrq 1)60 Hz	No Change Allowed	1) 60Hz	Nominal frequency of line input/output voltages. 60Hz supported, this parameter is non-programmable.
43	43 NomVIn 120.0 V	No Change Allowed	60.0 – 500.0	Nominal AC line cord input voltage to the UPS.
44	44 NomVOut 120.0 V	No Change Allowed	60.0 – 500.0	Nominal AC line output to user load.
45	45 RatedVA 3100 VA	No Change Allowed	100 – 30000	Maximum Rated VA UPS may deliver to user load without alarming under any circumstances. .
46	46 RatedW 2200 W	No Change Allowed	100 – 30000	Maximum rated Watts UPS may deliver to user load.
47–57	Reserved			
58	58 XferDly 5 s	Service	1 – 600	Minimum number of seconds the UPS will run on inverter before transferring back to AC line operation. Actual time on inverter

**Table 19. Parameter List (Continued)**

Parameter Number	Sample / Default	Password Level	Range	Description
				may be longer while UPS is attempting to lock to line input again.
59	59 LV0Alrm 60.0 V	No Change Allowed	0.0 – 500.0	Setpoint at which UPS will alarm due to lowAC volts out to the user load.
60	60 LV1Alrm 88.1 V	No Change Allowed	0.0 – 500.0	Setpoint at which UPS will alarm due to lowAC volts into the UPS.
61	61 HVOAlrm 129.6 V	No Change Allowed	0.0 – 500.0	Setpoint at which UPS will alarm due to high AC volts out to the user load.
62	62 HV1Alrm 146.7 V	No Change Allowed	0.0 – 500.0	Setpoint at which UPS will alarm due to high AC volts into the UPS.
63	63 OvrlDlv1 100 %	User	10 – 100	Alarm setpoint for output overload. Alarm condition only – no other action taken.
64	Reserved			
65	65 Shtdwn 1.750 VPC	User	1.670 – 2.100	When using custom batteries, the battery voltage shutdown level, load off and UPS shuts off. Alarm setpoint for low battery condition.
66	66 BattLow 1.833 VPC	User	1.670 – 2.100	Alarm setpoint for near low battery condition. Alarm condition only – no other action taken.
67	67 OvAlarm 2.400 VPC	User	2.200 – 2.600	When using custom batteries, the alarm setpoint for high battery condition. Alarm condition only - no other action taken.
68	68 LowRunTm 3 m	User	0 – 999	Alarm setpoint for low runtime condition. Alarm condition only – no other action taken.
69	Reserved			
70	70 LowBatCap 0 %	User	0 – 99	Low battery capacity setting, percent of battery charge below this level causes a low battery alarm.
71	Reserved			
72	72 TestIntrl 7 d	User	7 - 180	When using custom batteries, the discharge test interval, the time between discharge tests.
73	73 Test@ 1:00:00	User	0 — 23:59:00	When using custom batteries, the time of day that the battery discharge test will start.
74	Reserved			

**Table 19. Parameter List (Continued)**

Parameter Number	Sample / Default	Password Level	Range	Description
75	75 BT Time 60 s	User	60 - 180	When using custom batteries, the test will discharge the batteries for this amount of time.
76	76 DVR Temp 28 C	No Change Allowed	–63 – 193	Temperature in degrees C of the highest reading of the two temperatures sensors on DVR.
77	77 BatAlmDly 5 s	User	0 - 300	Number of seconds to delay before setting the On Battery alarm after the UPS goes on battery.
78	78 AlmEnbl 1)Yes	No Change Allowed	0)No 1)Yes	Permanently enables and disables the alarm beeper. Changes by initiating a Control 5 Enter, Enter Command via the RCD.
79	79 IntrnlBuzr 0)Off	User	0)Off 1)On	Switch On/Off buzzer from control board.
80	80 AT Alarm 60 C	Service	0 – 200	Ambient temperature set point at which UPS will alarm. Programming to 0 will disable Probe Missing alarm.
81	81 AutoMaxPLLError 10.0	User	1.0-30.0	Maximum Angle Error allowed by the PLL to remain locked in Auto Mode.
82	82 LCMaxPLL Error 30.0	User	0.0 – 90.0	Maximum Angle Error allowed by the PLL to remain locked in Line Condition Mode.
83	83 UtilityPLLSense 2	User	1 – 50	Sets how many readings beyond the maximum angle error are required for the PLL to lose lock.
84	84 AutoTapSwDebounce 0.025	User	0.0 – 12.844	Sets the debounce period for determining when to tap switch in Auto Mode.
85	85 LCTapSwDebounce 0.030	User	0.0 – 12.844	Sets the debounce period for determining when to tap switch in Line Condition Mode.
86–89	Reserved			
90	90 Custom Batt 0)No	User	0)No 1)Yes	Selects using custom batteries. Disables ABM. Battery runtime will not be accurate.
91	91 BatAmpHrs 0AH	User	0 – 2000	When using custom batteries, the Amp-hour capacity of batteries in UPS. Value must be entered only when “Custom” battery setting is enabled.
92	92 ABM 1)Enabled	User	0)Disabled 1)Enabled	ABM enable.
93	93 AbmIntrvl 3 mo	User	3,4,5,6 Months	ABM Discharge Test Interval.
94	94 Chrgr 1)Enabled	User	0)Disabled	Charger enable.

**Table 19. Parameter List (Continued)**

Parameter Number	Sample / Default	Password Level	Range	Description
			1)Enabled	
95	95 EBM1 0)NONE	User	0)NONE, 1) FXEBM01, 3) FXEBM03, 4) FXEBM04, 6) FXEBM06 7) FXEBM07 8) FXEBM08	Updates ABM with attached EBM data.
96	96 EBM2 0)NONE	User	0)NONE, 1) FXEBM01, 3) FXEBM03, 4) FXEBM04, 6) FXEBM06 7) FXEBM07 8) FXEBM08	Updates ABM with attached EBM data.
97	97 EBM3 0)NONE	User	0)NONE, 1) FXEBM01, 3) FXEBM03, 4) FXEBM04, 6) FXEBM06 7) FXEBM07 8) FXEBM08	Updates ABM with attached EBM data.
98	98 EBM4 0)NONE	User	0)NONE, 1) FXEBM01, 3) FXEBM03, 4) FXEBM04, 6) FXEBM06 7) FXEBM07 8) FXEBM08	Updates ABM with attached EBM data.
99–105	Reserved			
106	106 EPO 0)Disabled	User	0)Disabled 1) Enabled	Allows enabling and disabling of Remote Emergency Power Off mechanism.
107	107 ROO 0)Disabled	User	0)Disabled 1) Enabled	Allows enabling and disabling of Remote On/Off mechanism.
108	108 Bypss 0)Disabled	User	0)Disabled 1) Enabled	Allows enabling and disabling of Maintenance Bypass mechanism.
109	109 OnGen 0)Disabled	User	0)Disabled 1) Enabled	Allows enabling and disabling of On Generator mechanism.
110	110 Chrgl 20 A	User	0 - 20	Charger Current rating.
111	111 CROO 0)Disabled	User	0)Disabled 1)Enabled	Allows enabling and disabling of Communication Remote On/Off.
112	112 Minislot 1 Baud 2400	No Change Allowed		Baud rate of communication on Minislot 1. The interface defaults to 2400 until negotiated higher.



**Table 19. Parameter List (Continued)**

Parameter Number	Sample / Default	Password Level	Range	Description
113	113 Minislot 1 IPv4 0.0.0.0	No Change Allowed		IPv4 Address of network card on Minislot 1.
114	114 Minislot 2 Baud 2400	No Change Allowed		Baud rate of communication on Minislot 2. The interface defaults to 2400 until negotiated higher.
115	115 Minislot 2 IPv4 0.0.0.0	No Change Allowed		IPv4 Address of network card on Minislot 2.
116	116 Minislot 1 Reset 0) Inactive	User	0)Deactivate 1)Activate	Reports present condition of Minislot 1 reset line. Allows resetting the communication port for Minislot 1.
117	117 Minislot 2 Reset 0) Inactive	User	0)Deactivate 1)Activate	Reports present condition of Minislot 2 reset line. Allows resetting the communication port for Minislot 2.
118	118 SiteWiringDetect 1)Enabled	User	0)Disabled 1)Enabled	Allows enabling and disabling of checking for site wiring fault.
119	119 AutoRestart 1) Enabled	User	0)Disabled 1)Enabled	Allows enabling and disabling of Auto Restart feature.
120	120 R00 Active 1)High	User	0)Low 1)High	Sets the active level for the Communication Remote On/Off input.
121	121 OnGen Active 1) High	User	0)Low 1)High	Sets the active level for the On Generator input.
122	122 Bypss Active 0) Low	User	0)Low 1)High	Sets the active level for the Maintenance Bypass input.
123–128	Reserved			
129	“129 LoACDly 40 s”	Factory	1 – 255	Alarm debounce time in seconds until low AC out alarm/shutdown occurs.
130	“130 B0ostV 86.25 %”	No Change Allowed	60.00 – 276.00	If the AC input voltage is below this level and above the brownout voltage, the UPS will switch to the boost tap. (NOTE: parameter 133 is applied to this set point to provide hysteresis)
131	“131 BucKV 105.58 %”	No Change Allowed	60.00 – 276.00	If the AC input voltage is above this level the UPS will switch to the buck tap. (NOTE: parameter 133 is applied to this set point to provide hysteresis)
132	Reserved			
133	“133 TapHyst 5 V”	No Change Allowed	1 – 10	This parameter is added or subtracted from the other tap switching parameters to provide hysteresis.

**Table 19. Parameter List (Continued)**

Parameter Number	Sample / Default	Password Level	Range	Description
134	"134 UtilHyst 5 V"	Service	1 – 10	This parameter is added or subtracted from the voltage in parameters to provide hysteresis.
135	"135 USB 0)Customer"	User	0)Customer 1)Service	Switch the USB port between Service USB and Customer USB. Setting does not retain after power cycle.
136	"136 UPSSWVer" "01.01.0001"	No Change Allowed	N/A	Software version number for the control board.
137	"137 RCDSWVer" "01.01.0001"	No Change Allowed	N/A	Software version number for the RCD.

## 7.6 Using the Remote Control Display Configuration Menu

The Remote Control Display includes a Configuration Menu that lets you adjust the brightness of the LED, LCD backlight and the Lightbar.

**Table 20. Remote Control Display Configuration menu**

Remote Control Display Configuration Menu		
Menu item	Range	Notes
LCD Backlight	1–9	Display brightness 1= Minimum, 9= Maximum
LED Backlight	1–9	Display brightness 1= Minimum, 9= Maximum
Lightbar Brightness	1–9	Display brightness 1= Minimum, 9= Maximum

### Using the Configuration Menu

1. Press the [CONTROL] and [PROGRAM] buttons at the same time.
2. Press the [ENTER] Button to select the menu item you wish to change.
3. Press the [PROGRAM] button and enter in the desired Range of brightness 1–9.
4. Press the [ENTER] button to confirm the selection.
5. Press [ENTER] to advance to the next menu item or press [CLEAR] to escape the configuration menu.

## 7.7 Locking and Unlocking the Remote Control Panel

You may need to lock the control panel if you want to limit its use.

When disabled the keypad does not respond to the key functions until it is enabled again.

1. To disable the keypad press the [CLEAR] and [ENTER] buttons at the same time. The keypad will then display KEYPAD DISABLED.
2. To enable the keypad press the [CLEAR] and [ENTER] buttons at the same time.
3. Enter in code [0] [8] [2] [0] [4] [9] then press the [ENTER] button. Keypad will then read unlocked.

Locking the Keypad	
Press This Key	Display will Show
[CLEAR] and [ENTER] together	— Keypad Locked —
Unlocking the Keypad	
Press This Key	Display will Show
[CLEAR] and [ENTER] together	Unlock #
[0] [8] [2] [0] [4] [9]	Unlock #: 082049
[ENTER]	Keypad Unlocked



## Chapter 8 UPS Startup

### 8.1 Startup For Hardwired Units

1. **The main circuit breaker in the load distribution panel should be off at this time.**
2. Confirm that an electrician has completed and tested the connection to the proper AC input power source.
3. If your UPS has a DC switch, turn on the switch according to the UPS model:
  - FX3100 with Internal batteries: The DC switch is located on the back of the UPS. If you have a external battery cabinet turn the DC breaker located on the front of the battery cabinet to the ON position.
4. At the UPS AC input service panel, turn on the input power to the UPS.
5. If no alarms are present press and hold the UPS ON/OFF button for four seconds to turn the UPS on.
6. In addition to the AC Line indicator the Ready, and Charging indicator will illuminate solid blue.
7. Confirm that an electrician has completed and tested the connection from the UPS to your protected equipment.
8. Once the proper electrical connections have been verified to the load distribution panel the UPS is ready to supply output power to the load equipment.
9. **The main circuit breaker in the load distribution panel can be turned on at this time.**

### 8.2 Initial Startup for Units Installed with a BPEFX Bypass Switch

After all hardwired connections are complete (including external battery cabinets, if applicable), complete the phase check using the following steps. You will need an AC voltmeter for the phase check

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#### CAUTION

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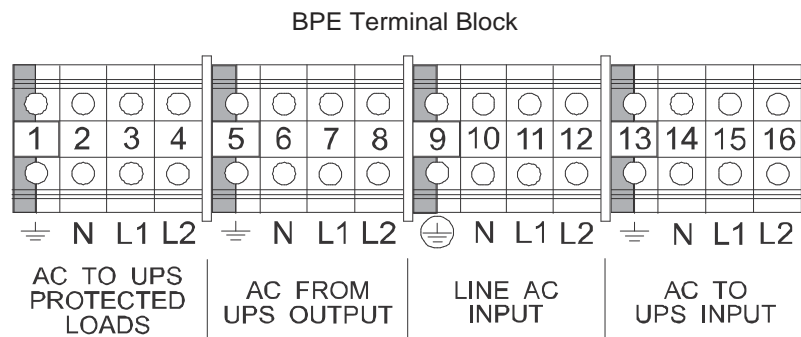
Before operating the bypass switch, use the following procedure to check the wiring for correct installation. To prevent damage to the load, turn off the main circuit breaker in the load service panel or verify that the load cannot receive power from the UPS.

---

1. Confirm that the electrician has completed and tested the connection to the proper power source.
2. Verify that the bypass switch is in the OFF position.
3. If your UPS has a DC switch, turn on the switch according to the UPS model:
  - 3.1kVA: The DC switch is located on the back of the UPS. If you have an external battery cabinet turn the DC breaker located on the front of the battery cabinet to the ON position.
4. At the UPS AC input service panel, turn on the input power to the UPS and the bypass switch.
5. Turn on the Bypass AC disconnect switch.
6. Turn the bypass switch to the UPS position.
7. If no alarms are present on the UPS press the UPS ON/OFF button for four seconds to turn the UPS on.
8. In addition to the AC Line indicator, the Ready, and Charging indicator will illuminate solid blue. The UPS is ready to supply output power.
  - **The main circuit breaker in the load distribution panel should be off at this time.**
9. Use an AC voltmeter to measure voltages on the terminal strip inside the bypass switch cabinet (refer to the label on the back of the switch's lower front cover for the terminal numbers). record your measurements in the following chart according to the type of bypass switch installed. The voltages in the

first column should be nearly equal to the voltages in the second column. If the values differ by more than a few volts, check the terminal strip connections and correct any wiring problems.

**Figure 18. BPE Terminal Block**



**Table 21. UPS Phase Check for Hardwired Installations**

<b>BPE-02, BPE-04, or BPE-05</b>			
AC from UPS Output	Measurements	AC Line Input	Measurement
7 to 8	Vac	11 to 12	Vac
6 to 7	Vac	10 to 11	Vac
6 to 8	Vac	10 to 12	Vac

10. If the bypass switch is a Break-Before-Make, skip this step and proceed to step 11. If the bypass switch is a Make-Before-Break type, verify that the AC voltages from the UPS and the AC line are in phase. Measure the voltage between the following points on the terminal strip. These measurements must be no more than 100 Vac; if they are, call your service representative.

<b>External Bypass Switch (BPE-02, BPE-04, or BPE-05)</b>	
7 to 11	Vac
8 to 12	Vac

11. Measure the AC voltage between the following points on the terminal strip. This reading must be no more than 1 Vac; if it is, call your service representative.

<b>External Bypass Switch (BPE-02, BPE-04, or BPE-05)</b>	
6 to 10	Vac
8 to 12	Vac

12. Turn the bypass switch to the LINE position. Measure the voltage to the protected equipment and verify it is correct.
13. Turn the bypass switch to the UPS position and verify the voltage to the protected equipment is still correct.

14. If the voltage is correct turn the main breaker in the load distribution panel on and apply the load to the UPS.
15. **If the UPS will not be operated immediately proceed to steps 17 – 21.**
16. Turn the bypass switch back to the LINE position.
17. Press the UPS power button for 4 seconds so that the UPS turn off.
18. If your UPS has a DC switch, turn off the switch according to the UPS model:
  - FX3100 : The DC breaker is located on the back of the UPS. If you have an external battery cabinet turn the DC breaker located on the front of the battery cabinet to the OFF position.
19. Turn the AC disconnect switch to the OFF position.
20. Reinstall the bypass switch and UPS front cover panels.
21. The equipment will not be protected by the UPS until you start up the UPS and turn the bypass switch to the UPS position,

### 8.3 Initial Startup Parameters

Before programming the initial startup parameters, enter the user-level password.

The user-level password is 000377. To enter the user-level password, follow these steps:

**Table 22. Enter a User Password**

Press This Key	Display Shows
[CLEAR]	EATON FX
[PROGRAM]	Password:
[0] [0] [0] [3] [7] [7]	Password: 000377
[ENTER]	Level: User

To clear the password, press [CLEAR] until Password Cleared appears on the remote control display.



**NOTE**

The password will automatically clear out of the system and have to be reentered if there has been no activity for 10 minutes.

Set the time and date using the remote control display.

The time parameter is parameter 0. To set the time in 24 hour format follow these steps:

**Table 23. Setting the Time**

Press This Key	Display Shows
[DISPLAY]	Display:
[0]	Display: 0
[ENTER]	00 Time: 11:30:20
[PROGRAM]	00 Pgm:

Enter the correct time (in 24-hour format). For example, if the time is 9:30 a.m.:

Press This Key	Display Shows
[9][3][0]	00 Pgm: 930
[ENTER]	00 Time 09:30:00

The date is parameter 10. To set the date, follow these steps:

**Table 24. Setting the Date**

Press This Key	Display Shows
[DISPLAY]	Display:
[1][0]	Display: 10
[ENTER]	10 Date: 01/01/19
[PROGRAM]	10 Pgm:

Enter the correct date (in MMDDYY format). For example, to enter June 4, 2019:

Press This Key	Display Shows
[0] [1] [0] [1] [1] [9]	10 Pgm: 010119
[ENTER]	10 Date 01/01/19

To ensure maximum battery runtime, the Eaton FX Ferrups UPS can be programmed for up to four FX battery runtime options. To set the battery cabinet options you can program each cabinet type into parameters 95–98.

1. Choose the type of battery cabinet you wish to use with the Eaton FX Ferrups UPS.

**Table 25. External Battery Options Available To Program**

Eaton Ferrups FX External Battery Runtime Options	Battery Cabinet Type	Number to Program into the RCD
FXEBM01	N	1
FXEBM03	P	3
FXEBM04	P	4
FXEBM06	P	6



**NOTE**

If there are four FXEBM01 battery cabinets connected to a FX 3100 UPS, then parameters 95,96,97,98 all should be programmed to a value of 1.

2. Program the first battery cabinet type into parameter 95. See the example below.

**Table 26. Program The External Battery Cabinet Option**

First Battery Cabinet Option Type	
Press This Key	Display Shows



**Table 26. Program The External Battery Cabinet Option (Continued)**

[DISPLAY]	Display:
[9] [5]	Display: 95
[ENTER]	95 EBM 1: Default 0) NONE
[PROGRAM]	95 Pgm:
New Value	95 Pgm: 1) FXEBM01
[ENTER]	95 EBM 1 : 1) FXEBM01

\*0 is the default setting for parameters 95–98\*

- Repeat the steps above for parameters 96 through 98 if more than one Eaton FX Ferrups battery cabinet is to be used.

### Setup for Using a Custom Non Eaton Ferrups FX Battery Configuration

To set the UPS for a customer supplied battery configuration the following parameters must be set with the user level password:

**Table 27. Enter a User Password**

Press This Key	Display Shows
[CLEAR]	EATON FX
[PROGRAM]	Password:
[0] [0] [0] [3] [7] [7]	Password: 000377
[ENTER]	Level: User

Set the parameter 90 with the RCD to allow the use of a customer supplied custom battery configuration:

Press This Key	Display Shows
[DISPLAY]	Display:
[90]	Display: 90
[ENTER]	90 Custom Batt: 0
[PROGRAM]	90 Pgm: 1 (Yes)

Program in the battery amp hour capacity of the batteries being used with the UPS:

Press This Key	Display Shows
[DISPLAY]	Display:
[91]	Display: 91
[ENTER]	BatAmpHrs: 0 AH
[PROGRAM]	91 Pgm: (Enter in Amp hour of the battery you are using)

**NOTE**

ABM provides optimum battery performance and lifetime improving total cost of ownership. ABM will be enabled when the total UPS and EBM battery capacity is less than or equal to 200Ah. ABM is disabled for UPS and EBM battery capacity exceeding 200 Ah and the UPS internal charger will switch to float charge mode.

## 8.4 Automatic Battery Test

The Eaton FX Ferrups UPS has a built in automatic battery discharge test feature. When ABM is enabled (by default) the battery discharge test will run automatically every 90 days. The duration of the battery test can be modified by changing parameter 93.

93	AbmTestIntrvl	93 AbmIntrvl 3 mo	User	3,4,5,6 Months	ABM Discharge Test Interval.
----	---------------	-------------------	------	----------------	------------------------------

If custom battery is enabled the battery test will run based on the custom battery test parameter set points listed below.

72	TestIntrvl	72 TestIntrvl 7 d	User	7 - 180	When using custom batteries, the discharge test interval, the time between discharge tests.
73	BatTestToD	73 Test@ 1:00:00	User	0 - 23:59:00	When using custom batteries, the time of day that the battery discharge test will start.
75	BatTestLen	75 BT Time 60 s	User	60 - 180	When using custom batteries, the test will discharge the batteries for this amount of time.

## Chapter 9 Maintenance

### 9.1 UPS Shutdown

The Eaton Ferrups FX UPS is designed for many years of round-the-clock operation. Usually, you do not need to shut down the UPS, even if your equipment is shut down for several days. Even when it's not powering your equipment, the UPS monitors its internal condition and keeps the Time and Date parameters current.

The following situations may require a UPS shutdown:

- When you do not expect to use it for an extended period of time.
- When it is being serviced.
- Before you move it.
- When it has gone into the Off mode because the batteries have been discharged during an extended outage.
- When a system malfunction requires a UPS shutdown.

---

#### CAUTION

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When AC input voltage is present, the UPS system can provide output voltage even though its batteries are disconnected. To confirm that there is no UPS output voltage, always disconnect the AC input source; if the UPS has one or more separate external battery cabinets, open the DC disconnect switch on each external battery cabinet or disconnect the external battery cabinet from the UPS.

- 
1. **UPS With no bypass switch:** Turn off the protected equipment. Continue to Step 2. .

If you need to use the equipment while the UPS is off, plug the equipment into standard wall outlets and restart the equipment

**UPSs with a BPE type Break-Before-Make (BBM) bypass switch** ( see the label inside the switch): shut down the protected equipment. Turn the bypass switch to the LINE position. Continue to Step 2.

If you need to use the equipment while the UPS is off, restart the equipment. The equipment receives direct AC line instead of conditioned power from the UPS.

**UPS with a BPE type Make-Before-Break (MBB) bypass switch** (see the label on the side of the switch): Verify that the AC LINE indicator is on, the BATTERY POWER indicator is off, and the UPS is providing output. If all three of these conditions are present, turn the bypass switch to the LINE position. Your equipment receives direct AC line instead of conditioned power from the UPS. Continue to Step 2.

If all three of these conditions are not present, follow steps 2–4 before you turn the bypass switch to the LINE position. This causes a break in power to your equipment between shutting down the UPS and turning the bypass switch to the LINE position.

---

#### CAUTION

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Equipment can be damaged if you change the switch position when line is applied and the UPS is off or on battery!

- 
2. Press and hold the UPS On/OFF button for 3 seconds.
  3. If the UPS is plugged in, unplug it. For hardwired models, turn the AC line disconnect switch to the OFF position.
  4. Turn the DC breaker on the back of the UPS ( if applicable) to the OFF position. If you have an external battery cabinet with a DC switch or a Eaton Ferrups FX battery cabinet with a breaker, turn to the OFF

position. If your external battery cabinet does not have a DC switch or breaker, unplug the connector between the external battery cabinet(s) and the UPS; be sure to reconnect this connector before you start the UPS again.

5. **If the UPS is turned off for an extended period of time**, recharge the batteries every 90–120 days to prevent battery damage.

### 9.2 Routine Maintenance

**NOTE**

Eaton recommends that you schedule preventive maintenance checks at least every six months.

**NOTE**

Only qualified service personnel should perform UPS maintenance tasks. Risk of electrical shock.

The Eaton Ferrups FX UPS is designed to provide years of trouble-free operation. Its internal control system checks the batteries and inverter periodically to ensure reliable operation. In fact, you'll probably find that your FX system requires less maintenance than any of your other computer peripherals.

Nevertheless, the Eaton Ferrups FX UPS and optional external battery cabinets do require some attention to assure continued reliable service. Eaton recommends that you schedule preventive maintenance checks at least every six months. At these checks, the service technician should follow Eaton's recommended maintenance schedule, which includes the following items:

- Check operating environment for clean, cool, dry conditions.
- Inspect and clean the unit.
- View and record the alarm and inverter logs.
- Check the batteries.
- Check the AC and DC meter functions and recalibrate if necessary.
- Perform an outage test.
- Check and record the values of the first 19 parameters while the UPS is online and on battery.

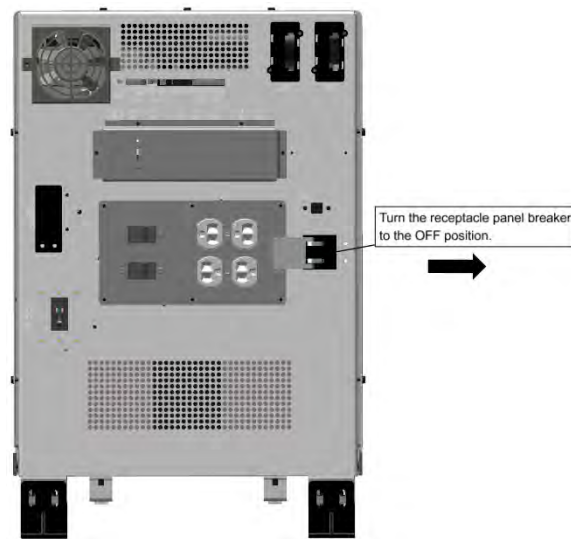
### 9.3 Receptacle Panel Replacement

**NOTE**

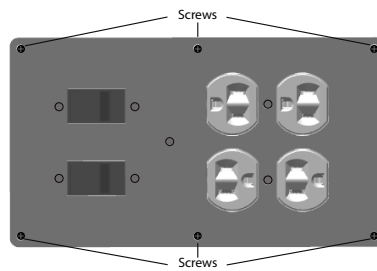
Receptacle panel replacement can be done without placing the UPS in a standby mode. Load equipment plugged into the UPS receptacles will need to be turned off and unplugged from the receptacle panel prior to replacement. If you prefer to shut the UPS down prior to replacing the receptacle panel see section 7.8 [UPS Shutdown](#).

In order to replace the receptacle panel (if equipped) in the back of the Eaton Ferrups FX series follow the procedure described below.

1. Turn the receptacle panel main breaker to the off position.



2. Remove the screws that hold the receptacle panel in place.



3. Grasp the receptacle panel from both sides and pull the assembly straight out from the back of the unit.



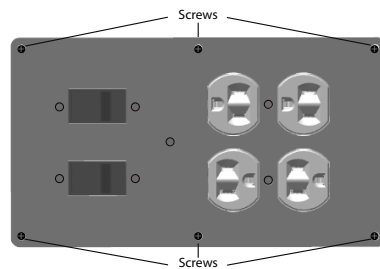
## Installation of a Replacement Receptacle Panel.

1. Insert the new receptacle panel assembly into the back of the unit. Ensure that the panel fits tight to the back panel of the UPS and that the screw holes are in line.

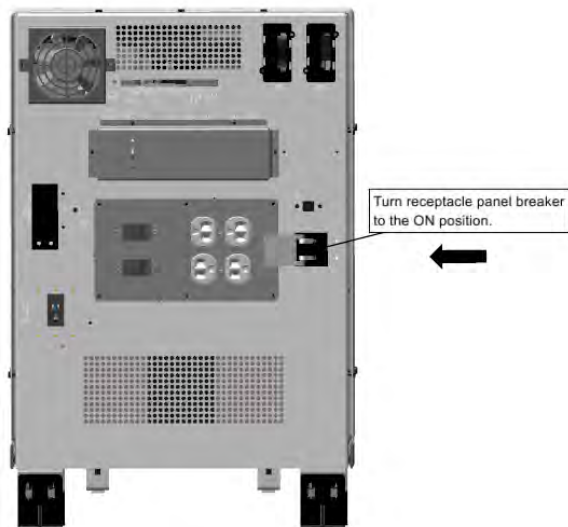
## Receptacle Panel Replacement



2. Install and tighten the screws that secure the receptacle panel in place.



3. Turn the receptacle panel main breaker to the ON position. If the UPS was placed in standby mode prior to replacing the receptacle panel see chapter 8 to turn the UPS back to the auto mode.



## 9.4 Storage and Operating Environment

### Storage Temperature

Store the batteries (in the UPS or external battery cabinet) at  $-15^{\circ}$  to  $40^{\circ}\text{C}$  ( $4^{\circ}$  to  $104^{\circ}\text{F}$ ). Batteries will have a longer shelf life if they are kept below  $25^{\circ}\text{C}$  ( $77^{\circ}\text{F}$ ). The UPS or external battery cabinet without batteries may be stored at  $-40^{\circ}$  to  $60^{\circ}\text{C}$  ( $-40^{\circ}$  to  $140^{\circ}\text{F}$ ).

### Ventilation

The air around the UPS must be clean and free of dust, corrosive chemicals, and other contaminants. The air must be free to circulate around the UPS and external battery cabinet(s).



#### NOTE

*Do not place UPS batteries in a sealed room or container.*

---

### Operating Temperature

The UPS can operate from  $0^{\circ}$  to  $40^{\circ}\text{C}$  ( $32^{\circ}$  to  $104^{\circ}\text{F}$ ). Do not operate near water or excessive humidity (95% max non-condensing). For full battery life, keep the UPS at an ambient temperature of  $25^{\circ}\text{C}$  ( $77^{\circ}\text{F}$ ).

### High Altitude Operation

The maximum operating ambient temperature decreases  $1^{\circ}\text{C}$  per 300 m above sea level ( $2^{\circ}\text{F}$  per 1000 ft above sea level). Maximum elevation is 10000 m (32,808 ft).

## 9.5 Recycling the Used Battery or UPS

Contact your local recycling or hazardous waste center for information on proper disposal of the used battery or UPS.

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### **WARNING**

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- Do not dispose of the battery or batteries in a fire. Batteries may explode. Proper disposal of batteries is required. Refer to your local codes for disposal requirements.
- Do not open or mutilate the battery or batteries. Released electrolyte is harmful to the skin and eyes. It may also be toxic.



### **CAUTION**

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Do not discard the UPS or the UPS batteries in the trash. This product contains sealed lead acid batteries and must be disposed of properly. For more information, contact your local recycling / reuse or hazardous waste center.



### **CAUTION**

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Do not discard waste electrical or electronic equipment (WEEE) in the trash. For proper disposal, contact your local recycling / reuse or hazardous waste center.

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## 9.6 Updating the UPS Firmware

To keep the UPS firmware updated with the latest improvements and benefits, visit [www.eaton.com/ferrupsfx](http://www.eaton.com/ferrupsfx) often for updates. You can download the latest firmware version. The downloadable file includes the instructions for installing the update.





## Chapter 10 Troubleshooting

### 10.1 Accessing the UPS Log

The Eaton Ferrups FX UPS stores alarms, events and status information in the UPS log.



To view the UPS log from the remote control display, do the following:

Press this key:	Display shows:
[DISPLAY]	Display:
[2] [4]	Display: 24
[ENTER]	24 Log

The display automatically scrolls through the log entries .

You can use the number keys as you view this scrolling display to :

Use this key:	To do this:
[0]	Pause the scrolling and start it again.
[1]	Go to the next log entry.

Each entry in the UPS log contains three pieces of information:

Displaying Active Alarm Conditions

The parameter number letting you know you are viewing the UPS log.	
The alarm, event or status number and information followed by if the alarm is SET or CLR (Cleared). See <a href="#">Table 29</a> for information about each alarm, status or event.	
The date and time stamp of the entry.	

10.2 Displaying Active Alarm Conditions



Access parameter 20 to view any active alarms on the UPS, to do this press the following on the RCD:

Press this key:	Display shows:
[DISPLAY]	Display:
[2] [0]	Display: 20
[ENTER]	20 Log

The display automatically scrolls through the log entries. You can use the number keys as you view this scrolling display to :

Use this key:	To do this:
[0]	Pause the scrolling and start it again.
[1]	Go to the next log entry.

The RCD will also display the active alarm information on the top line of the display.



### 10.3 Silencing the Alarm

When an alarm condition is displayed via the Remote Control Display a alarm tone is emitted. The alarm tone can be silenced for present or future alarms or can be silenced temporarily until a new alarm becomes is set to a active state.

To silence the alarm beeper for present or future alarms press the following buttons on the Remote Control Display:

- Press [ CONTROL ].
- Press the number [5]
- Press the [ENTER] button
- Press the [ENTER] button

To silence the alarm temporarily until a new alarm becomes active press the following buttons on the Remote Control Display:

- Press [ CONTROL ].
- Press the [.] button

### 10.4 Detecting an Alarm Condition

When the Eaton FERRUPS FX UPS detects an alarm condition, the UPS displays the alarm. The ALARM indicator on the remote control display illuminates and sounds an audible alarm. This section describes important troubleshooting steps you can take to help diagnose and silence typical alarms and conditions.

The UPS displays the alarm with the following indications:

- The lightbar on the remote control display will illuminate red.
- The UPS will sound an audible alarm.
- The remote control display will display the alarm message.

All active alarm conditions can be viewed one of three ways:

- Press Clear until the RCD reaches the scrolling display, any active alarms will be displayed.
- Display parameter 20. If multiple alarms are present the display will automatically scroll through each alarm entry every three seconds. The user can toggle scrolling on or off by pressing '0'. When scrolling is stopped, pressing '1' will move to next event (older). List will wrap to newest event from oldest.
- Display parameter 24 the display will automatically scroll through each alarm entry every three seconds. The user can toggle scrolling on or off by pressing '0'. When scrolling is stopped, pressing '1' will move to next event (older). List will wrap to newest event from oldest.

### 10.5 Troubleshooting the UPS at the System Level

**Table 28. System Level Troubleshooting**

System Level Troubleshooting			
Problem	What it means	UPS Status	Recommended Troubleshooting
New UPS appears dead when power is applied.	No visible or audible signs of life when input AC is turned on.	Off.	Check AC Input Source and make sure it is correct and powered on. Make sure input circuit breaker (external to UPS) is turned on. Make sure the front panel RCD is properly plugged in the front of the UPS. If UPS is still turned off and appears dead, call Eaton Service.
UPS will not start although front panel seems to be on.	Front Panel on but unit not turning on to support load.	Standby Mode.	Press the On/Off switch in front of the UPS for at least 3 seconds Make sure REPO is not activated at the rear panel of the UPS
UPS alarms that there is no battery.	UPS detected no battery.	UPS will not start in the AUTO mode if the battery disconnected alarm is active, however the UPS can start in line condition mode.	Turn on the DC Breaker on the UPS rear panel If this is a UPS without internal batteries, then make sure that there is an EBM (External Battery Module) connected to the UPS. Turn on the DC Breaker on the EBM. Clear any active alarms via the RCD.
UPS turns on but alarms for Site Fault.	UPS has detected a higher than expected voltage between Neutral and Ground at the input.	On	Shut the UPS off – both the AC input and the DC Breaker on the UPS need to be turned off. Check the AC input wiring – to make sure Line and Neutral have not been reversed
UPS turns on and supports load but won't transfer to Battery when input AC is turned off.	UPS will not support load on battery.	On	Turn on the DC Breaker on the UPS' rear panel. If this is a UPS without internal batteries, make sure that an EBM is connected to the UPS

**Table 28. System Level Troubleshooting (Continued)**

			and turn on the EBM DC Breaker if this UPS has no internal batteries. Check if the unit is set to Line Conditioning Mode – you can change this to AUTO mode on the front panel. Get the Event Log and please send it to Eaton Service.
UPS is running fine and suddenly shuts off.	Load dropped unexpectedly.	Off	Check if the AC input is still good and whether the DC Breaker is turned on. Check the REPO signal at the back of the UPS – and make sure that it has not been accidentally activated. Check to see if any active alarms are present on the RCD i.e. output overload or output overcurrent alarms.
UPS continuously transfers back and forth between AC and Battery.	Input AC is not stable.	On	If a generator is being used as AC input, check if ON Gen signal has been activated at the rear ports of the UPS.
USB Port at the rear panel not communicating.	Communication Issue.	On	Pull cable out and check if there is any damage on the cable connector. Reconnect it to the UPS and check if communication is restored. If problem is not resolved, replace with a new cable and check again. Ensure parameter 135 is set to 0 in the RCD. Call Eaton Service if problem is unresolved.
Web card (Network card) won't communicate with the UPS.	Communication Issue.	On	Pull the network card out of the UPS and reinstall and recheck
Front Panel stops working.	UPS operational but RCD panel malfunctioning.	On	Check connector for loose connection and pull the cable out and reconnect properly. If that doesn't fix it, replace front panel and check if the new panel works.

## 10.6 Alarm Conditions

**Table 29. Typical Alarm Conditions**

Typical Alarm Conditions					
Code	Alarm/ Notice/ Command/Status	Alarm (A) Notice (N)	What it Means	UPS Status	Recommended Troubleshooting Steps
0	INPUT AC OVER VOLTAGE	N	UPS measuring higher than input voltage maximum	Battery Mode supporting Load Or Keep-Alive Mode and not supporting load	If UPS is in Battery Mode, that is expected behavior. If UPS is in Keep-Alive Mode: Check Input Circuit Breaker (CB) if it is Off. If it is Off, check AC Input Source and make sure it is compatible with the UPS' ratings. If input AC Source measures good, turn the Input CB ON. If problem persists, call Eaton Service.
1	INPUT AC UNDER VOLTAGE	N	UPS measuring lower than input voltage minimum	Battery Mode supporting Load Or Keep-Alive Mode and not supporting load	If UPS is in Battery Mode, that is expected behavior. If UPS is in Keep-Alive Mode: Check Input Circuit Breaker (CB) if it is Off. If it is Off, check AC Input Source and make sure it is compatible with the UPS' ratings. If input AC Source measures good, turn the Input CB ON. If problem persists, call Eaton Service.
2	INPUT AC OVER FREQUENCY	N	UPS measuring higher than input frequency maximum	Battery Mode supporting Load Or Keep-Alive Mode and not supporting load	If UPS is in Battery Mode, that is expected behavior. If UPS is in Keep-Alive Mode: Check Input Circuit Breaker (CB) if it is Off. If it is Off, check AC Input Source and make sure it is compatible with the UPS' ratings. If input AC Source measures good, turn the Input CB ON. If problem persists, call Eaton Service.
3	INPUT AC UNDER FREQUENCY	N	UPS measuring lower than input frequency minimum	Battery Mode supporting Load Or Keep-Alive Mode and not supporting load	If UPS is in Battery Mode, that is expected behavior. If UPS is in Keep-Alive Mode: Check Input Circuit Breaker (CB) if it is Off. If it is Off, check AC Input Source and make sure it is compatible with the UPS' ratings. If input AC Source measures good, turn the Input CB ON.

**Table 29. Typical Alarm Conditions (Continued)**

					If problem persists, call Eaton Service
4	INVERTER OVERTEMPERATURE	A	Inverter Heatsink temperature exceeded max rating	UPS was supporting load in Battery Mode, but, after some time, the Inverter Heatsink temperature exceeded the max limit and the UPS dropped the load and switched to Keep-Alive Mode	Check if the Fan(s) is (are) ON . Check Input Circuit Breaker and turn it ON. Call Eaton Service if problem persists.
5	INVERTER OUTPUT OVER CURRENT	A	UPS overloaded	Load exceeded max rating	Check to see if the load exceeds the max rating of the UPS. Reduce Load and see if the UPS is working as expected. Call Eaton Service if problem persists.
6	BATTERY CURRENT LIMIT	A	Overloaded	Overload on Inverter	Reduce Load and check if the Alarm goes away. If it doesn't, and the problem persists, please call Eaton Service.
7	EEPROM FAILURE	A	Invalid checksum while reading the EEPROM	UPS will remain in the INIT state, unable to start until the eeprom is reset	Call Eaton Service
8	SHUTDOWN IMMINENT	A	UPS Supporting Load with Battery but Battery Voltage has reached a very low level and the UPS is about to drop load and switch to Keep-Alive mode	UPS supporting load on Battery	Shut Load down gracefully (typically load server software should do this if it reads this A code from the UPS).Check if Input Circuit Breaker is Off – and turn it ON if input measures ok
9	BATTERY LOW	A	UPS Supporting Load with Battery but Battery Voltage has reached a low level	UPS supporting load on Battery	Shut Load down gracefully (typically load server software should do this if it reads this A code from the UPS).Check if Input Circuit Breaker is Off – and turn it ON if input measures ok
10	UTILITY NOT PRESENT	N	Input AC Voltage not available	UPS supporting load on Battery	Check input Circuit Breaker Check input voltage ,If it is good, turn the circuit breaker ON. If problem persists, call Eaton Service.
11	INPUT SWITCHGEAR CLOSED	Status	Indicates Relays turning on (closing) on AC Board	Normal Mode	Nothing.
12	BATTERY DC OVER VOLTAGE	A	Battery Voltage exceeding max limit	Charge Mode supporting Load	Power Cycle. If problem persists, turn unit off and call Eaton Service.

**Table 29. Typical Alarm Conditions (Continued)**

13	CONTROL POWER ON	Status	UPS is ok	Turning On	Nothing.
14	HARDWARE INCOMPATIBILITY	A	Hardware doesn't match unit rating	Off	Nothing.
15	PWR BRD EE FAILURE	A	Corrupt hardware	Off	Turn UPS off. Call Eaton Service.
16	BATTERY NEEDS SERVICE	A	Batteries need replacement.	Normal operation but Charger off.	Turn UPS off. Replace Batteries – call Eaton Service.
17	CTO CONFIG ERROR	A	Hardware check needed	Off	Call Eaton Service
18	OS FAILURE	A	UPS Failure	Off	Power Cycle and recheck. Call Eaton Service if problem persists.
19	LEVEL 1 OVERLOAD	N	Load > 100% but < 105%	Normal mode supporting load	Reduce Load to < 100% (5% hysteresis for alarm to clear)
20	LEVEL 2 OVERLOAD	A	Load > 105% but < 115%	Supporting Load but only for a short time (minimum 10 minutes)	Reduce Load to < 100% (5% hysteresis for alarm to clear)
21	LEVEL 3 OVERLOAD	A	Load > 115%	Will shut off in a short time (minimum 10 seconds)	Reduce Load to < 100% (5% hysteresis for alarm to clear)
22	SYSTEM INITIALIZATION ERROR	A	Control Board failure	Off	Power Cycle and recheck. Call Eaton Service if problem persists.
23	FPGA FAILURE	A	Control Board failure	Off	Call Eaton Service
24	USB PORT CHANGE	N	Front or back USB Port usage toggled.	Normal operation	Nothing.
25	UPS ON COMMAND	Command	Turn UPS ON	Turns ON	Nothing.
26	UPS OFF COMMAND	Command	Turn UPS OFF	Turns OFF	Nothing.
27	CHARGER OFF COMMAND	Command	Turn Charger off	Normal with charger off	Not Recommended. Only do this if you are going to use an external charger.
28	CHARGER ON COMMAND	Command	Turn Charger ON	Normal with charger on	Nothing
29	LOW BATTERY SHUTDOWN	A	Unit shutdown after reaching a low battery condition.	Off or in Keep-Alive- Mode	Check input circuit breaker and turn it on if AC Input is OK.
31	REMOTE EMERGENCY POWER OFF	A		Off	Check why REPO was activated at your site Check REPO Wiring at signal input on back of UPS.



**Table 29. Typical Alarm Conditions (Continued)**

32	BATTERY TEST FAILED	A	Batteries may need replacement soon	Normal	Replace Batteries soon
33	FUSE FAILURE	A	Hardware failure	Off or Battery Mode	Call Eaton Service
34	FAN FAILURE	A	Fan(s) not working	Normal	
35	SITE WIRING FAULT	A	Input wiring L-N got reversed	Normal (if previous state was ON) Will not turn on if previous state is Standby	Shut UPS and Input Circuit Breaker off. Check input wiring and correct if L and N got reversed.
36	BATTERIES DISCONNECTED	A	Battery Breaker Turned Off. Battery wires came loose or Battery Voltage too low.	On with Alarm	Should initiate graceful shutdown for load. And then call Eaton Service.
38	PRECHARGE FAILED	A	UPS not turning on	Off	Call Eaton Service
39	CHARGER ON	Status	Charger is ON	Normal	Nothing.
40	UPS ON BATTERY	Status	UPS in Battery Mode	Supporting Load on Battery	Nothing.
41	UPS ON NORMAL	Status	UPS in Line Mode	Supporting Load	Nothing.
42	BATTERY TEST IN PROGRESS	Status	UPS in Line Mode	Supporting Load	Nothing.
45	INVERTER OVERTEMPERATURE TRIP	A	Inverter heatsinks too hot	Off	Check Fans. If they are blocked, unblock them. If they are fine, call Eaton Service.
46	OUTPUT OVERLOAD TRIP	A	Load exceeded Level 1 105% Level 2 110% Level 3 125%	Off	Reduce Load and turn UPS on again.
47	POWER_SUPPLY 5 VOLT FAULT	A	Hardware failure	Off	Call Eaton Service
48	CONTROL POWER OFF	Status	UPS turned off	Off	Nothing.
49	STANDBY COMMAND	Command	UPS turned off	Off	Nothing.
52	CHARGER FAILURE	A	Charger failed	On with charger fail alarm	Call Eaton Service
53	UPS ON GENERATOR	N	On-Generator signal activated by customer	Normal but on Generator	Nothing if this was intentional. If unexpected, check if the signal at the rear of the UPS got activated by mistake.
56	AMBIENT OVERTEMPERATURE	A	Ambient exceeds max temperature of 70C	On	Make sure UPS is in an ambient temperature <= 40C. Check Fans.

**Table 29. Typical Alarm Conditions (Continued)**

58	OUTPUT AC OVER VOLTAGE	N	UPS Measuring higher than expected output	On	Make sure AC Input is compatible with UPS ratings
59	OUTPUT AC UNDER VOLTAGE	N	UPS Measuring lower than expected output	On	Make sure AC Input and Load are compatible with UPS ratings. Make sure Load is within specs.
64	BATTERY DCUV IMMINENT	A	UPS supporting load on battery and the batteries are discharging and about to reach the cut off point.	Supporting Load but will drop load soon as the batteries are low.	Gracefully shutdown Load if Utility has not returned yet. Turn Input Circuit Breaker On if it is off.
66	INTERNAL_CAN_ERROR	A	Issue with CAN communications to RCD	No RCD communication	Check RCD cable connection
67	UPS ON BYPASS	Status	External Bypass switch activated	May need maintenance if customer switched the external bypass to Service Mode	If the UPS needs to be serviced, but the load cannot be shutdown, you would be using an external Bypass Switch that Eaton can provide. Turn the switch to Service Mode and call Eaton Service.
68	UPS SHUTDOWN	Status	UPS off	Off	Nothing.
69	RCD CONNECT	Status	UPS is communicating with the RCD.	Status Unchanged	If the RCD is connected but the status is not active: check for power to the RCD, verify connector is properly seated, inspect cable for damage. If the RCD has power and not responsive, disconnect and reconnect.
70	INVERTER PHASE LOCK	N	UPS about to return to Line Mode from Battery	About to transfer to Line Mode from Battery	Nothing.
71	RCD EVENT	Status	Communication issues with the RCD. This is typically an invalid message or request from the RCD.	Status Unchanged	Inspect cable between UPS and RCD. If using extended cable lengths, connect RCD directly to UPS to determine if issue only occurs with additional cabling.
76	GATE DRIVE PWR SUPPLY FAIL	A	Hardware failure	Off	Call Eaton Service
77	INPUT OVERCURRENT	A	Input max current being exceeded	Hardware failure	Call Eaton Service
78	OUTPUT OVERCURRENT	A	Output current exceeds max rating - overload	Depends on amount of overload	Reduce load and check if alarm clears.

**Table 29. Typical Alarm Conditions (Continued)**

79	DVR OVERCURRENT	A	Transient load steps being monitored on Output of UPS	Off	Call Eaton Service even if UPS continues to support load.
80	PWR BOARD EE FAIL	A	Hardware failure	Off	Call Eaton Service
81	TAP_SWITCH	Status	UPS trying to Buck or Boost the input	Supporting Load	Nothing.
82	ABM CHARGE MODE	Status	Charge mode starts when charger turned on after system startup, battery discharge, or end of 28 day "Rest Mode"	Supporting Load Battery Charging in Constant Current mode	Nothing.
83	ABM FLOAT MODE	Status	Batteries reached 2.3 VPC	Supporting Load Battery Charging in Constant Voltage Mode	Nothing.
84	ABM REST MODE	Status	Batteries are fully charged, normal rest mode last for 28 days	Supporting Load Charger Off	Nothing.
85	ABM OFF	Status	ABM is disabled, or in process of changing from discharge mode to charge mode	Supporting Load	Make sure charger is not disabled or ABM is not disabled.
86	ABM FAILED FLOAT MODE	N	Battery voltage did not reach 2.3 VPC in allotted time(Normally 24 hours)	Supporting Load Battery Charger disabled.	Replace batteries
87	ABM FAILED REST MODE	Status	Battery voltage below 2.1 VPC in first 10 days of ABM rest mode	Supporting Load Battery Charger disabled.	Replace batteries
88	ABM OPPORTUNITY CHARGE	Status	If battery voltage drops below 2.1 VPC from day 11 to 28 of ABM "Rest mode", opportunity charge causes start of new charge cycle	Supporting Load Batteries are getting weak	Monitor how long ABM runs in "rest mode", if time between Rest Mode start and Opportunity charge gets shorter, battery replacement may be needed soon.
89	ABM DISCHARGE TEST FAIL	Status	If the battery voltage drops below 1.833 VPC for >15 minute discharge or 1.83 VPC for less than 15 minute dicharge	Supporting Load	Check batteries, replace if test fails repeatedly
90	ABM DISCHARGE TEST ABORTED	Status	If utility fails or the load changes by more than 10% during the discharge test, the test is aborted	Supporting load, waiting for time to run discharge test again.	Wait for Discharge test to run again when possible

**Table 29. Typical Alarm Conditions (Continued)**

91	UPS STATE CHANGE	Status	Reporting a state change from one mode to another	Supporting Load	Nothing.
92	AMBIENT OVERTEMPERATURE TRIP	A	Ambient temperature too high above max specification	Off	Check if Fan(s) are not running. Check if room temperature is > 40C. If not, call Eaton Service.
93	CHARGER OVERTEMPERATURE	A	Charger reporting over temperature	On but charger is off	Call Eaton Service
94	CHARGER OVERTEMPERATURE TRIP	A	Charger reporting over temperature and turned off	On but charger is off	Call Eaton Service
95	SCR OVERTEMPERATURE	A	SCR Heatsink on AC Board reporting over temperature	On	Call Eaton Service
96	SCR OVERTEMPERATURE TRIP	A	SCR Heatsink on AC Board reporting over temperature and UPS transferred to Battery	On	Call Eaton Service
97	DVR OVERTEMPERATURE	A	DVR reporting over temperature	On	Call Eaton Service
98	DVR OVERTEMPERATURE TRIP	A	DVR reporting over temperature	On	Call Eaton Service
99	XFMR OVERTEMPERATURE	A	Ferro Transformer reporting over temperature and UPS turned off	On	Call Eaton Service
100	XFMR OVERTEMPERATURE TRIP	A	Ferro Transformer reporting over temperature and UPS turned off	On	Call Eaton Service

## Chapter 11 Service and Support

### 11.1 Service and Support

If you have any questions or problems with the UPS, call your **Local Distributor** or the **Eaton Help Desk** at one of the following phone numbers and ask for a technical support representative.

<b>United States:</b>	1-800-356-5737 Option 2 , Option 1 for technical support
<b>Canada:</b>	1-800-461-9166 option 4, Option 1, Option 1 for on-site service dispatching or 1-800-356-5737 Option 2 , Option 1 for technical support
<b>All other Countries:</b>	Call your local service representative

Please have the following information ready when you call for service:

- Model number
- Serial Number
- Firmware version number
- Date of failure or problem
- Symptoms of failure or problem
- Customer return address and contact information

More information on the FX UPS can be found at the main [Eaton FERRUPS FX Product Page](#) .



## Chapter 12 Specifications

### 12.1 Electrical Input and Output

**Table 30. Electrical Input Specifications**

<b>Input Voltage Limits</b>	Nominal Input Voltage	Minimum	Maximum
	120VAC	88VAC	144VAC
<b>Nominal Frequency</b>	Online: 60 Hz, Output frequency tracks input line frequency up to limit, which is adjustable from $\pm 0.01$ Hz to $\pm 3.00$ Hz. Inverter turns on if line frequency exceeds the selected limit. On inverter: 60 Hz (FX) $\pm 0.03$ Hz.		
<b>Nominal Frequency Limits</b>	Nominal Output Frequency	Minimum	Maximum
	60Hz	57Hz	63Hz
<b>Input Current Limits</b>	FX3100 120V in / 120V Out	3.1kVA / 2.2kW	40 Amps
<b>Input Current THD</b>	<10% at full resistive load, under normal operating conditions and with the batteries fully charged with the charger in the off mode.		
<b>Input Power Factor</b>	Input power factor shall be the load power factor when batteries are fully charged.		
<b>TVSS Input Noise Suppression</b>	EN 60950 and IEC62040-1 (contained in EN60950) IEEE C62.41 Joule Rating shall be 150 Joules per UPS chassis		
<b>Inrush Current</b>	Inrush current at power up < 250 amps for one cycle.		
<b>ABF Protection</b>	Anti Backfeed protection compliant with UL1778, 5th ED		
<b>Regulation</b>	$\pm 3\%$ load regulation (under any line, load, or battery condition to within -8.3% and +5% of nominal)		
<b>Voltage Waveform</b>	Sine wave; <5% THD at rated linear loads, computer-grade power		
<b>DC Input Protection</b>	DC fuse and battery charger fuse		
<b>UPS Startup</b>	The Eaton Ferrups FX UPS will start with no internal batteries and an AC input source. The Eaton Ferrups FX UPS will not start with only batteries and no AC input source.		

**Table 31. Electrical Output Specifications**

<b>Voltage Regulation</b>	Output Voltage Regulation in battery mode operation shall be < 5% Output voltage regulation on line shall be < 5% of nominal voltage .
<b>Output Frequency</b>	60Hz Only
<b>Output Frequency Regulation</b>	$\pm 3$ Hz of Nominal Frequency
<b>Output Protection</b>	The ferroresonant transformer inherently limits current and provides overload protection. The Eaton Ferrups FX UPS has high AC and low AC output voltage alarms, as well as an overload alarm. If the AC output voltage falls below the low AC output voltage alarm setpoint, the UPS sounds an alarm after 5 seconds. If the AC output voltage falls below the low AC output shutdown setpoint, the UPS sounds an alarm and shuts down. Some models have output receptacles protected by fuses or circuit breakers.

**Table 31. Electrical Output Specifications (Continued)**

<b>Isolation, Including Output Neutral to Ground Bonding</b>	The Eaton Ferrups FX UPS provides a true, separately-derived power source, as defined by National Electrical Code Article 250-5d, with output neutral bonded to ground. There is no direct connection between input and output, and less than 2 pF of effective input to output capacitance.
<b>Load Compatibility</b>	UPS supports R, RCD, SMPS, and PFC loads RCD Loads shall have a minimum power factor of 0.7 Supports Load Crest Factor up to 2.5
<b>Overload Capability</b>	On line with 101 - 124% load, shutdown in 10 minutes On inverter with 101 - 110% load, shutdown in 10 minutes On line with more than 125% load, shutdown in 10 seconds On inverter with more than 110% load, shutdown in 10 seconds
<b>Output Voltage THD</b>	<10% at full resistive load, under normal operating conditions and with the batteries fully charged with the charger in the rest mode.
<b>Short Circuit Protection</b>	Shutdown after 3 line cycles of output short circuit that cannot be cleared.
<b>Transfer Time To Battery</b>	Transfer to Battery Mode operation from Normal Mode operation in zero milliseconds
<b>Efficiency</b>	The UPS efficiency with Line-to-Line Load shall be > 80% with charger off The UPS efficiency with Line-to-Neutral Load shall be > 88% with charger off

## 12.2 Environmental and Safety

**Table 32. Environmental and Safety Specification**

<b>Operating Temperature</b>	0°C to 40°C (32°F to 104°F)
<b>Storage Temperature</b>	UPS with batteries: -15° to 40°C (4° to 104°F) UPS without batteries: -40° to 60°C (-40° to 140°F)
<b>Relative Humidity</b>	0–95% noncondensing
<b>Operating Altitude</b>	The maximum operating ambient temperature decreases 1° C per 300 m above sea level (2° F per 1000 ft above sea level). Maximum elevation is 10000 m (32,808 ft )
<b>Ventilation</b>	The air around the UPS must be clean and free of dust, corrosive chemicals, and other contaminants. The Eaton Ferrups FX UPS uses internal fans to circulate the air for cooling. The air must be free to circulate around the UPS and external battery cabinet(s). Do not operate the UPS in a sealed room or container.
<b>Lightning and Surge Protection</b>	The Eaton Ferrups FX UPS provides 2000-to-1 spike attenuation. Tested using lightning standard per ANSI/IEEE C62.41 Category A (6000V spike and 200A) and Category B (6000V spike and 3000A) test, and ANSI/IEEE C62.45 test procedures.

**Table 33. Heat Dissipation**

Heat Dissipation	UPS Model	BTU / Hour (On line with Full Load)
	FX3100	905



Table 34. Audible Noise

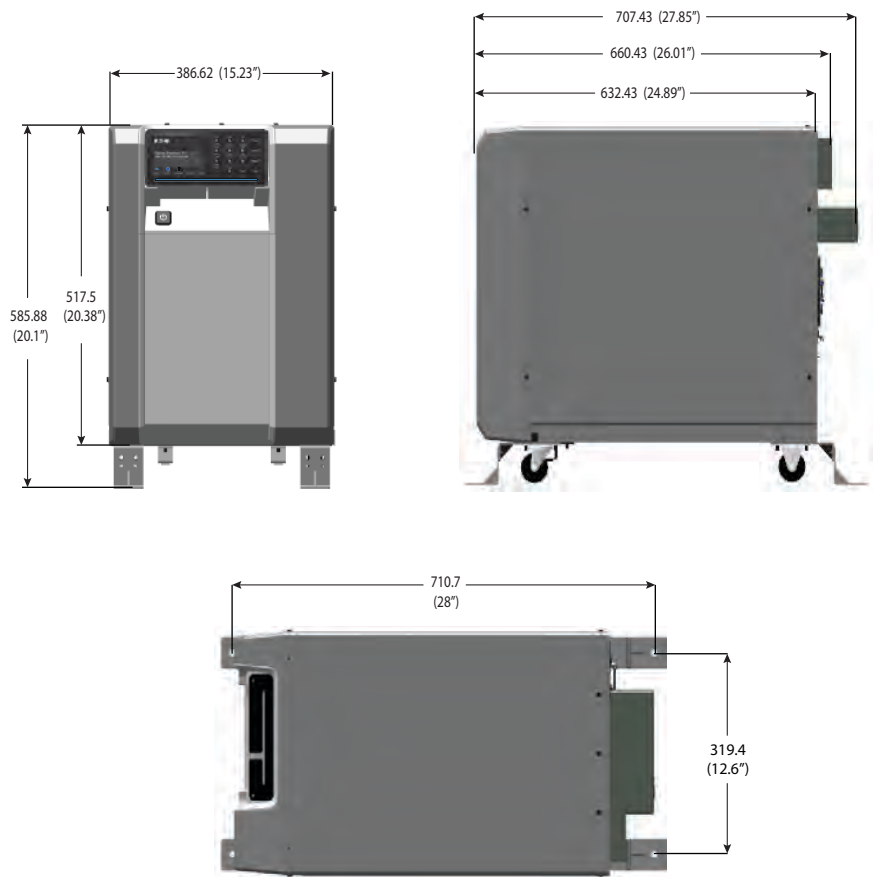
Audible Noise (dB)	UPS Model	Online	Battery
	FX3100	65	62

12.3 UPS Weights and Dimensions

Table 35. UPS Dimensions and Weights

Model	Dimensions (H X W X D)	Weight
FX3100	23.34" x 15.19" x 29.48" (592.73 x 385.8 x 748.79 )	144 lb Without Internal Battery
		248 lb With Internal Battery

Figure 19. FX3100 UPS Overall Cabinet Dimensions



## 12.4 Bypass Switches

**Table 36. Available Make Before Break Bypass Switch Models**

UPS Model	Model Number	Ratings (UL/CSA) Continuous	Ratings (TÜV) Continuous
FX3100	BPEFXMBB02	40A/300 Vac	50A/300 Vac

**Table 37. Available Break Before Make Bypass Switch Models**

UPS Model	Model Number	Ratings (UL/CSA) Continuous	Ratings (TÜV) Continuous
FX3100	BPEFXBBM02	40A/300 Vac	50A/300 Vac

**Table 38. Bypass Switch Dimensions and Weight**

Model	Height (Inches)	Width (Inches)	Depth (Inches)	Weight (Pounds)
BPEFXMBB02	17	12	7	20lbs

## 12.5 Battery Cabinet Weights and Dimensions

**Table 39. Battery Cabinet Dimensions**

Dimensions H X W X D	N Cabinet	P Cabinet
	37" x 19" x 32"	49" X 15' X 32"

**Table 40. Battery Cabinet Weight**

Eaton FERRUPS FX Battery Option	Cabinet Type	Battery Type	Weight
Type "N" Battery Cabinet With No Batteries	-	-	142 lbs
Type "P" Battery Cabinet With No Batteries	-	-	175 lbs
FXEBM01	N	PWHR12280W4FR (12 Volt) X 8	630 lbs
FXEBM03	P	PWHR12280W4FR (12 Volt) X 12	910 lbs
FXEBM04	P	PWHR12330W4FR (12 Volt) X 12	1015 lbs
FXEBM06	P	SWU585-12FR (12 Volt) X 12	1465 lbs

## 12.6 Battery

**Table 41. FX 3100 UPS Runtimes**

Eaton Ferrups FX 3100 Runtimes			
FX EBM Option	Runtime		Ah Rating / DC Voltage
	Full Load	Half Load	
**Standard Internal Batteries Only**	14 Minutes	35 Minutes	33Ah/1 String/48V
**FXEBM01 w/o UPS Internal Batteries**	139 Minutes	355 Minutes	70Ah/2 Strings/48V
**FXEBM01 With UPS Internal Batteries**	189 Minutes	405 Minutes	33Ah/1 String/48V 70Ah/2 Strings/48V
***FXEBM03 w/o UPS Internal Batteries***	232 Minutes	551 Minutes	70Ah/3 Strings/48V
***FXEBM03 With UPS Internal Batteries***	282 Minutes	601 Minutes	33Ah/1 String/48V 70Ah/3 Strings/48V
***FXEBM04 w/o UPS Internal Batteries***	309 Minutes	730 Minutes	100Ah/3 Strings/48V
***FXEBM04 With Internal Batteries***	359 Minutes	780 Minutes	33Ah/1 String/48V 100Ah/3 Strings/48V
***FXEBM06 w/o UPS Internal Batteries***	515 Minutes	1159 Minutes	140Ah/3 Strings/48V
***FXEBM06 With Internal Batteries***	565 Minutes	1209 Minutes	33Ah/1 String/48V 140Ah/3 Strings/48V
<p>**Charging profile is maintained by Eaton ABM charging technology to 2.3VPC**</p> <p>***ABM is disabled and the charging profile is maintained by the UPS internal float charger to 2.3VPC***</p> <p>Backup times are approximate and vary with equipment, configuration, battery age, temperature etc.</p>			

**Table 42. Battery Specification**

<b>Battery Specifications</b>	
<b>Voltage</b>	3.1 kVA models: Nominal battery voltage is 48 Vdc. Standard internal battery charger output is rated at 20 amps.
<b>Type</b>	<p>Eaton Standard batteries are sealed, gas recombinant, lead-acid type, especially designed for UPS use. Minimum 3–5 year float service life at 25°C.</p> <ul style="list-style-type: none"><li>• UPS12–150MR (12 Volt)</li><li>• PWHR12280W4FR (12 Volt)</li><li>• PWHR12330W4FR (12 Volt)</li><li>• SWU585–12FR (12 Volt)</li></ul>
<b>Recharge Time</b>	Charge to 80% usable capacity within 3 hours.

## Chapter 13 Warranty

### 13.1 Two-Year Limited Warranty (US and Canada)

For warranty information, please refer to the Resources link on our website, [Two-Year Limited Warranty](#) or [Eaton Load Protection Guarantee](#).

For product registration please visit the UPS product registration page, [Eaton UPS Product Registration](#).



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