# Eaton® Power Xpert™ 9395 High Performance (9395P-600) UPS

## Installation and Operation Manual

For use with 380V, 400V, 415V, and 480V Single UPM (200–600 kVA), Two UPM (400–550 kVA), and Plus 1 (400–600 kVA) UPS Models

Also for use with 600V Single UPM (200–275 kVA), Two UPM (300–550 kVA), and Plus 1 (600 kW-550 kW)

Powering Business Worldwide

p/n: 164000710
Revision 10

## IMPORTANT SAFETY INSTRUCTIONS - SAVE THESE INSTRUCTIONS

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

## CONSIGNES DE SÉCURITÉ IMPORTANTES – CONSERVER CES INSTRUCTIONS

Ce manuel comporte des instructions importantes que vous êtes invité à suivre lors de toute procédure d'installation et de maintenance de la UPS. Veuillez consulter entièrement ces instructions avant de faire fonctionner l'équipement et conserver ce manuel afin de pouvoir vous y reporter ultérieurement.

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Dear Customer,

On behalf of everyone at Eaton, we thank you for partnering with us, and trusting us to maintain your business continuity and preventing downtime at your facility.

Our suite of backup power, power distribution and power management products are designed to protect you from a host of threats including power outages, surges, lighting strikes, and enable you to monitor and control your power infrastructure.

We trust that your Eaton 9395 Uninterruptible Power Supply system, will deliver high quality, reliable backup power for your business, and we are committed to your success.

Please read this Installation and Operation Manual, which details the installation, and operation processes for your uninterruptible power supply system.

Thank you for choosing Eaton!

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30 Pembroke Road,
Dublin 4, D04 Y0C2,
Ireland

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# Chapter 1 Introduction

The Eaton® Power Xpert®9395P-600 uninterruptible power supply (UPS) is a true online, continuous-duty, transformerless, double-conversion, solid-state, three-phase system, providing conditioned and uninterruptible AC power to protect the customer's load from power failures.

The 9395P-600 UPS online power protection system is used to prevent loss of valuable electronic information, minimize equipment downtime, and minimize the adverse effect on production equipment due to unexpected power problems.

The 9395P-600 UPS system continually monitors incoming electrical power and removes the surges, spikes, sags, and other irregularities that are inherent in commercial utility power. Working with a building's electrical system, the UPS system supplies clean, consistent power that sensitive electronic equipment requires for reliable operation. During brownouts, blackouts, and other power interruptions, batteries provide emergency power to safeguard operation.

The UPS is available as a single unit or an optional multiple unit distributed bypass system (see paragraph 1.4.5 *Distributed Bypass System*). The UPS is housed in a free-standing cabinets.

Four 9395P-600 UPS system configurations are available for 480V, 415V, 400V, and 380V models:

- two standard UPM configurations with one or two UPMs (see Figure 1).
- two optional configurations with a field installed UPM (FI-UPM) added to the left of a standard configuration (see Figure 3).

**NOTE** The FI-UPM is not supplied as standard, but is available as an option to provide upgradability to a maximum of 600 kVA. Adding the FI-UPM can also provide N+1 redundancy if the power requirements are less than the single UPM rating. The FI-UPM matches the UPS in style and color.

Four 9395P-600 UPS system configurations are available for 600V models:

- two 600V UPM configurations with one or two UPMs (see Figure 2).
- two optional 600V configurations with a field installed UPM (FI-UPM) added to the left of a 600V configuration (see Figure 4).

## 1.1 Single UPM and Two UPM Configurations

The standard Single UPM 9395P-600 UPS configuration contains two sections:

- an ISBM section configured either as an integrated system bypass module (ISBM) or an input output module (IOM) rated for a maximum of 600 kVA
- a UPM section with one factory installed UPM

The standard Two UPM UPS 9395P-600 configuration has two sections:

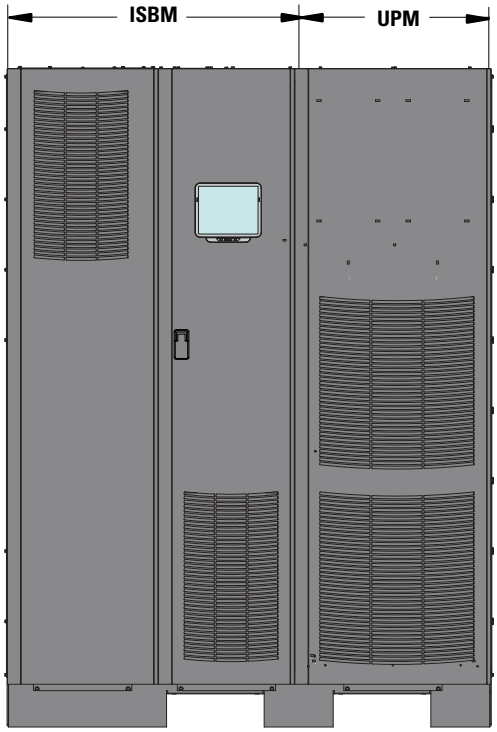
- an ISBM section configured either as an integrated system bypass module (ISBM) or an input output module (IOM) rated for a maximum of 600 kVA
- a UPM section with two UPMs

For all models except the 600V, the two sections are shipped as a joined unit on the same pallet (see Figure 1).

For the 600V Single and Two UPM configurations, the ISBM section and the UPM section are shipped separately on different pallets (see Figure 2).

**NOTE** Note that the ISBM section for the 600V models differs from the ISBM section for the other models.

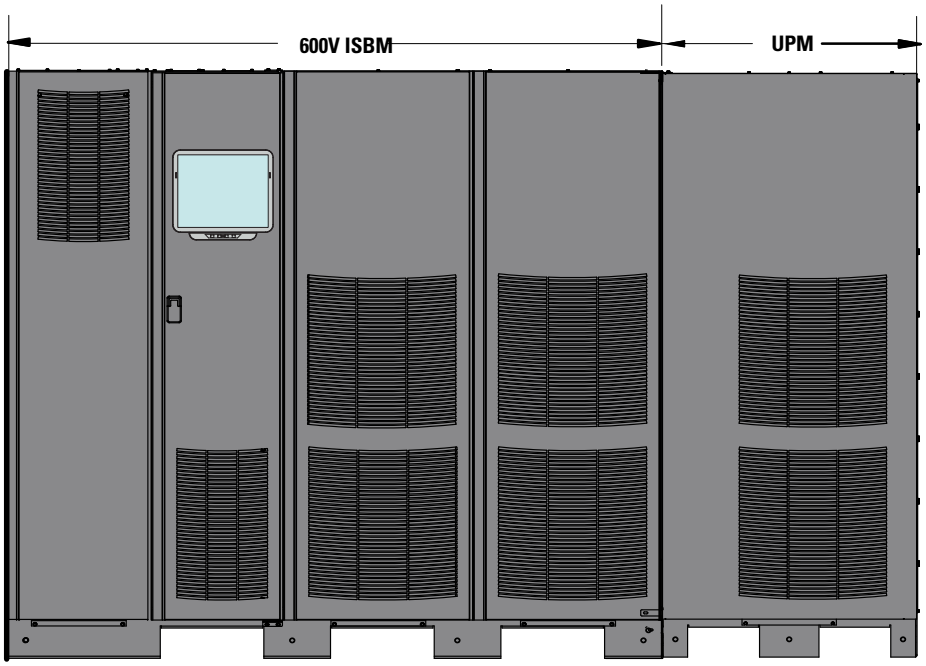
**Figure 1. Standard Single UPM and Two UPM UPS Configurations (all except the 600V model)**



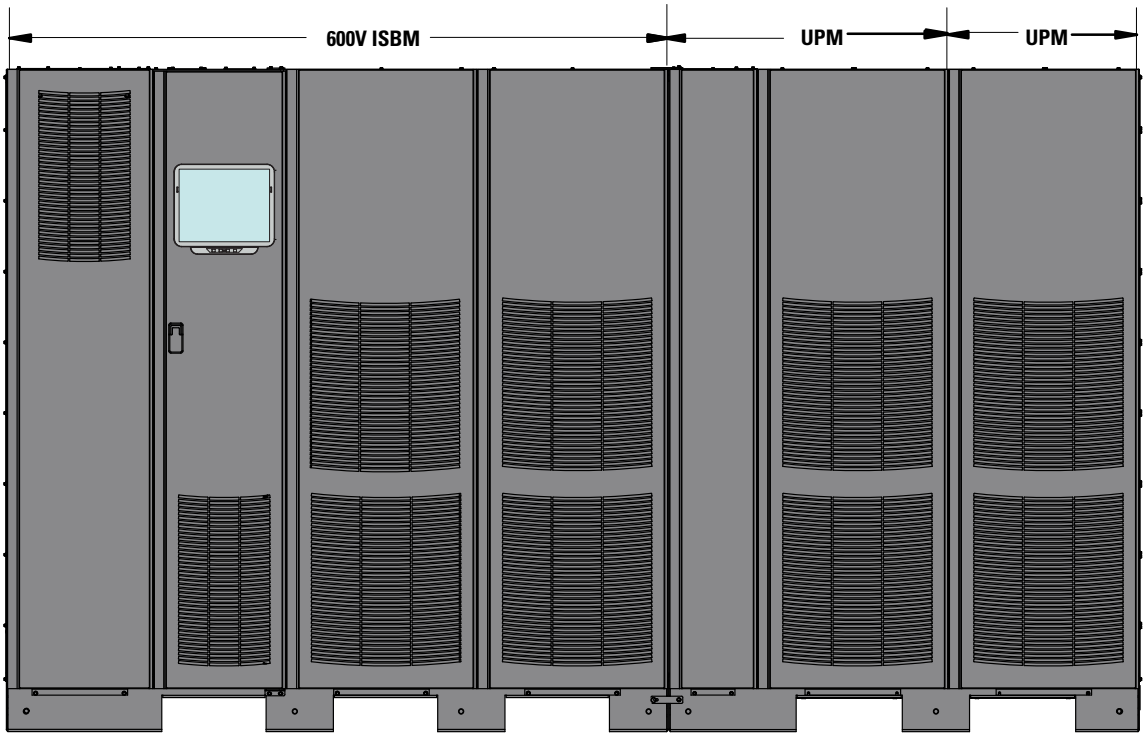

**Standard ISBM and 1 x UPM**
**(380V, 400V, 415V, and 480V models)**


**Standard ISBM and 2 x UPM**
**(380V, 400V, 415V, and 480V models)**

**Figure 2. 600V Single UPM and Two UPM UPS Configurations (600V model only)**




**600V ISBM and 1 x UPM**
**(600V models only)**




**600V ISBM and 2 x UPM**
**(600V models)**

## 1.2 Single UPM Plus 1 and Two UPM Plus 1 Configurations

The optional Single UPM Plus 1 9395P-600 UPS configuration has three sections:

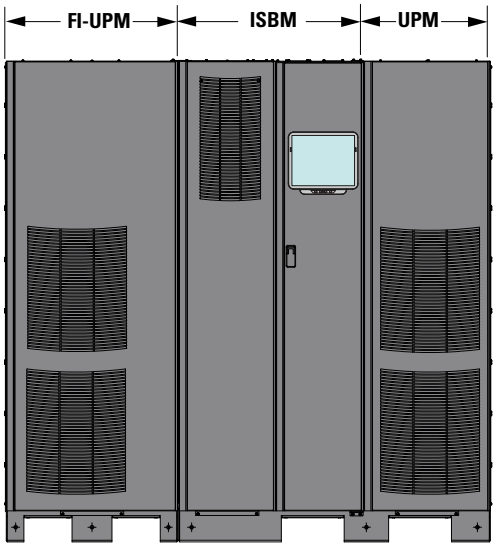
- an ISBM section configured either as an integrated system bypass module (ISBM) or an input output module (IOM) rated for a maximum of 600 kVA
- a UPM section with one UPM
- one field-installed UPM (FI-UPM), which is field upgraded and provides N+1 redundancy for the basic configuration

The optional Two UPM UPS 9395P-600 configuration has three sections:

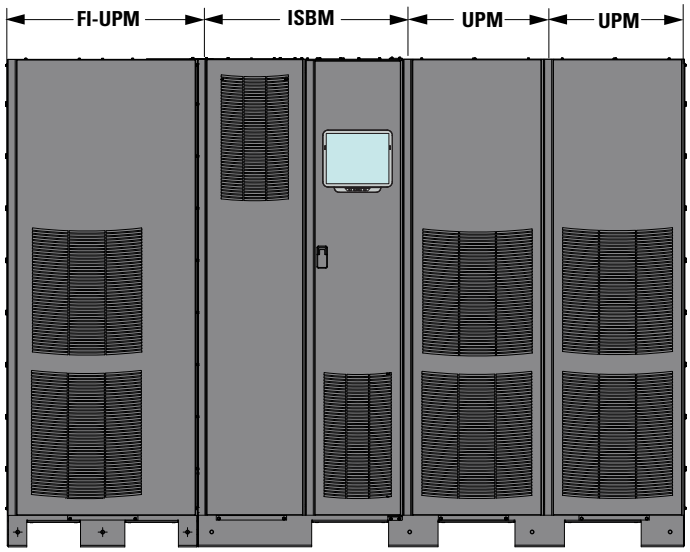
- an ISBM section configured either as an integrated system bypass module (ISBM) or an input output module (IOM) rated for a maximum of 900 kVA
- a UPM section with two UPMs I one field-installed UPM (FI-UPM), which is field upgraded and provides N +1 redundancy for the basic configuration

For Plus 1 field upgrades to all models, the FI-UPM is shipped separately and is added later to the left of the existing configuration (see Figure 3 and Figure 4).

**Figure 3. Standard Single UPM and Two UPM, Plus 1 FI-UPM UPS Configurations (all except the 600V model)**

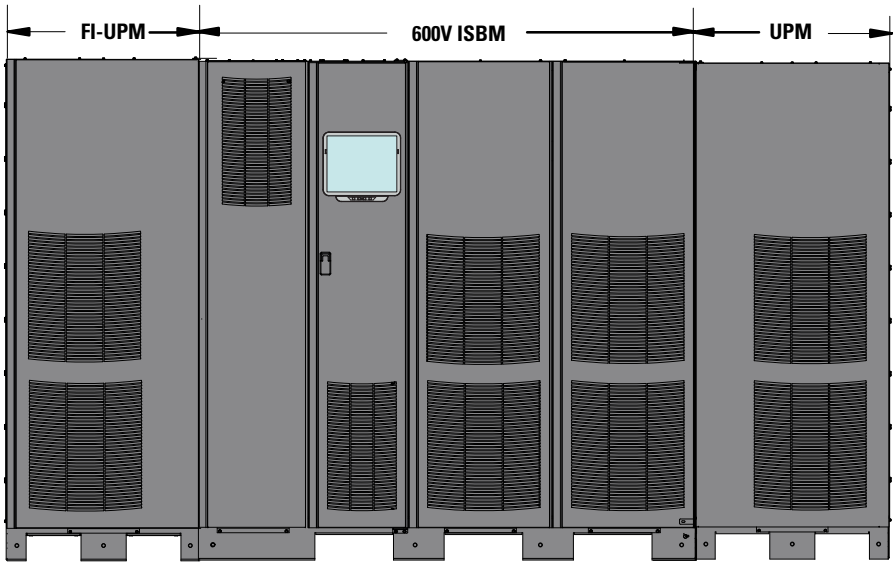



**Standard ISBM and 1 x UPM Section, Upgraded with Plus 1 Field Installed FI-UPM (380V, 400V, 415V, and 480V)**

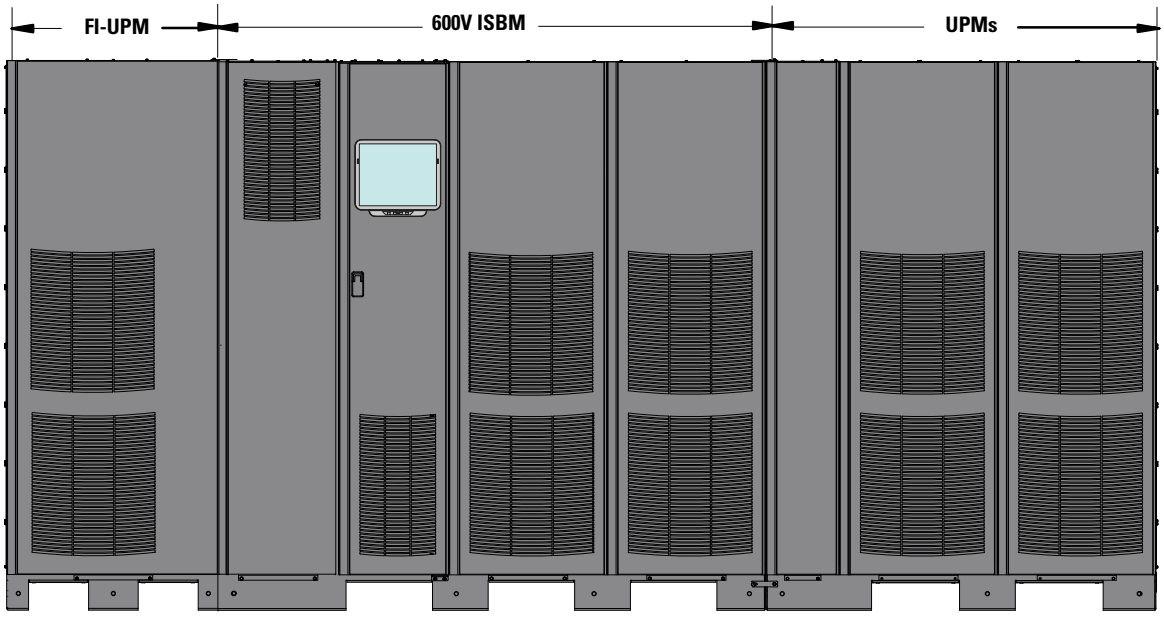



**Standard ISBM and 2 x UPM Section, Upgraded with Plus 1 Field Installed FI-UPM (380V, 400V, 415V, and 480V)**

**Figure 4. 600V ISBM Section and 1 x UPM Section, Upgraded with Plus 1 Field Installed FI-UPM (600V only)**




**600V ISBM Section and 1 x UPM Section, Upgraded with Plus 1 Field Installed FI-UPM (600V only)**




**600V ISBM Section and 2 x UPM Section, Upgraded with Plus 1 Field Installed FI-UPM (600V only)**

**NOTE** Startup and operational checks must be performed by an authorized Eaton Customer Service Engineer, or the warranty terms become void (see Section 1.11 *Warranty*). This service is offered as part of the sales contract for the UPS system. Contact an Eaton service representative in advance (usually a two-week notice is required) to reserve a preferred startup date.

## 1.3 UPS Standard Features

The UPS has many standard features that provide cost-effective and consistently reliable power protection. The descriptions in this section provide a brief overview of the UPS standard features.

### 1.3.1 Installation Features

Each UPS section is shipped separately. The sections are mechanically and electrically joined at the installation site, and can be permanently bolted to the floor.

Power wiring can be routed through the top or bottom of the cabinet with connections made to easily accessible terminals. Control wiring is routed through the top of the cabinet and must be installed in accordance with Class 1 wiring methods.

### 1.3.2 Control Panel

The control panel, located on the front of the UPS is a color touchscreen to control the operation of the UPS and to display the status of the UPS system. See Chapter 7 *UPS Operating Instructions* for additional information.

### 1.3.3 Customer Interface

- **Building Alarm Monitoring**. Up to five inputs in the UPS are available to connect the facility's alarm system contacts. Some system configurations may limit the number of inputs available. The UPS uses these inputs to monitor the building alarms in addition to the UPS status. See Chapter 8 *Communication* for additional information.
- **Alarm Contact**. One alarm contact is provided for connection to equipment at the facility, such as a light, an audible alarm, or a computer terminal. The equipment connected to this contact alerts you to a UPS alarm. See Chapter 8 *Communication* for additional information.
- **X-Slot Communication Bays**. Four communication bays are standard equipment. One to four optional X-Slots inline (for generic slot name; ie: Avaya's alarm adapter) connectivity cards can be installed in the UPS module at any time. X-Slot cards are quickly installed at the front of the UPS and are hot-pluggable. See Chapter 8 *Communication* for additional information.

### 1.3.4 Advanced Battery Management

A three-stage charging system increases battery service life by optimizing recharge time, and protects batteries from damage due to high current charging and inverter ripple currents. Charging at high currents can overheat and damage batteries.

### 1.3.5 Power Management Software

Intelligent Power Management and Intelligent Power Protector software are available through Eaton support. See Chapter 8 *Communication* for additional information.

## 1.4 Options and Accessories

Contact an Eaton sales representative for information about the following options.

### 1.4.1 Integrated Battery Cabinets

Battery backup protection can be provided by equipping the UPS system with 9395P-600 battery cabinets containing sealed lead-acid, maintenance-free batteries. The cabinets are designed for standalone installation

and may be installed adjacent to the UPS or in a separate location. The recommended installation location for adjacent battery cabinets is on the right side of the UPS cabinet to allow for future expansion using an external module.

Consult the *Eaton® Power Xpert® 9395/9395P Integrated Battery Cabinet (Models 1085 and 1085HR) Installation Manual (P-164000580)* for specifics on battery cabinet usage with the 9395P-600.

### 1.4.2 Field Installed UPM

A Field Installed UPM (FI-UPM) provides redundancy for the 9395P-600. The FI-UPM may be installed at any time in the future. The module cabinet is installed on the left side of the ISBM section and is wired directly to the UPS. No input or output wiring changes are needed for adding redundancy. Operation remains the same as the original UPS.

Refer to the *Eaton Power Xpert 9395P UPS Field Installed UPM Mechanical Installation Manual (P-164000503)* for specifics on the FI-UPM usage with the 9395P-600.

### 1.4.3 Sync Control

An optional 9395P-600 Sync Control maintains the critical load outputs of two separate single module 9395P-600 UPS systems in synchronization. This option facilitates the uninterrupted transfer of the load from one load bus to another by means of transfer switches. The Sync Control is housed in a wall-mounted panel that can be located between the UPS units for easy wiring.

Refer to the *Eaton® Power Xpert® 9395P Sync Control Installation and Operation Manual (P-164000502)* for specifics on battery cabinet usage with the 9395P-600.

### 1.4.4 Single-Feed Kit

An optional kit is available for converting the dual-feed rectifier and bypass inputs to a single-feed configuration. The kit consists of jumpers and bus bar extensions for each phase, and the hardware required for installation.

Refer to the *Eaton® Power Xpert® 9395/9395P UPS (1000–1200 kVA) Single-Feed Kit Installation Instructions (P–164000610)* manual for installation instructions.

### 1.4.5 Distributed Bypass System

There are two types of redundancy: UPS based (based on the number of UPSs) and UPM based (based on the number of UPMs).

**NOTE** All UPSs in the distributed bypass system must contain the same number of UPMs. Mixed UPS kVA ratings are not permitted.

A distributed bypass UPS system can be installed to provide a capacity and/or redundant system. This load sharing system provides more capacity than a single UPS, and can provide backup, depending on the load and configuration. In addition, when one UPM is taken out of service for maintenance or is not operating properly, a redundant UPM continues to supply uninterrupted power to the critical load. A Hot Sync Controller Area Network (CAN) Bridge Card provides connectivity and operational mode control.

The tie cabinet is provided by the customer and must contain Module Output Breakers (MOBs) with dual auxiliary contacts for control of the system. Without dual auxiliary MOBs, UPMs are not allowed to go to bypass individually during servicing. All UPMs will go to bypass instead of just the UPM needing service, decreasing critical load protection. With dual auxiliary MOBs, one UPM can be bypassed while the remaining UPMs support the load as long as the remaining UPMs have the capacity to do so.

### 1.4.6 Input Output Module Configuration

The UPS can be supplied in an Input Output Module (IOM) configuration without the bypass input connections, the static switch, and the backfeed protection contactor. This configuration is primarily used in multiple UPS parallel systems that do not need a bypass for each UPS and use a separate System Bypass Module (SBM) to provide system bypass capabilities.

### 1.4.7 Continuous Static Switch

A continuous static switch is used to provide transfer of the load from the inverter to the bypass source in the event the inverter become unavailable.

### 1.4.8 Inherent Redundancy

To deliver greater reliability, the 9395P-600 UPS can be configured by an authorized Eaton Customer Service Engineer for inherent redundancy. When configured, the UPS automatically becomes redundant if the load is at or below the capacity of the UPMs minus the capacity of one UPM. Under normal conditions the UPMs in the UPS share the load equally. If one or more UPMs becomes unavailable and the load is at or below the capacity of remaining UPMs, the remaining UPMs supply the load instead of transferring to bypass.

If the capacity of the UPMs falls below the redundancy level or the load increases above redundancy level, but is still able to maintain the load, a loss of redundancy alarm is sounded. If the load exceeds the capacity of remaining UPMs, the UPS transfers to bypass.

### 1.4.9 Energy Saver and High Alert Modes

**NOTE** Energy Saver System mode requires the UPS to be factory built with a Continuous Static Switch (CSS).

**NOTE** The Variable Module Management System and Energy Saver System modes are mutually exclusive.

As a subset of Normal mode, Energy Saver mode maximizes efficiency by eliminating unnecessary power conversion when the commercial power source is within acceptable voltage and frequency limits. In this mode, the UPS is actively monitoring the critical bus and instantly and seamlessly transitions to double-conversion mode (inverter online) if a commercial electrical power brownout, blackout, overvoltage, undervoltage, or out-of-tolerance frequency condition occurs.

In High Alert mode, the unit transfers from Energy Saver mode to double-conversion mode or if in double-conversion mode remains in double-conversion mode for a default time period of one hour. High Alert mode allows the user to place the unit in double-conversion mode when outside conditions could cause a power disturbance. At the completion of the time period, the unit defaults back to Energy Saver mode. If the High Alert command is received during the time period, the timer will be restarted.

### 1.4.10 Variable Module Management System and High Alert Modes.

**NOTE** Variable Module Management System and Energy Saver modes are mutually exclusive.

Variable Module Management (VMMS) maintains UPM redundancy and achieves higher efficiencies by intelligently controlling the UPM's load level. The efficiency rating for each UPM is highest when loads are greater than 50% of the system rating. Therefore, shifting the load to fewer UPMs can achieve higher efficiencies when the UPS load is lighter.

In VMMS mode, the UPS is actively monitoring the critical bus and UPMs are available to assume load in less then 2 ms to respond to load changes.

The VMMS feature has three configurable modes of operation: Online mode, Online mode with VMMS, and High Alert mode. All modes are selectable from the front panel.

VMMS mode supports both distributed bypass and SBM parallel configurations.

In High Alert mode, all idle UPMs go online for one hour. At the completion of the hour, the UPS defaults back to VMMS mode. If the high alert command is received during the one hour, the one hour timer will be restarted.

### 1.4.11 Monitoring and Communication

The UPS system can be further enhanced by adding optional accessories such as a Remote Emergency Power-off (REPO) control, RMP III, SCM II, RIM II, or X-Slot communication cards. See Chapter 5 *Installing Options and Accessories* for additional information.

- **Remote Monitor Panel III (RMP III)** – An optional RMP III contains a 7" display with status indicators and a local horn, allowing monitoring of the operational status and alarm condition of the UPS from virtually any location within the facility.
- **Relay Interface Module II (RIM II)** – An optional RIM II uses relay contact closures to indicate the UPS operating status and alarm condition.
- **Supervisory Contact Module II (SCM II)**– An optional SCM II establishes an interface between the UPS system equipment and the customer's monitor.
- **X-Slot Cards**– Optional X-Slot cards support several protocols, such as SNMP, HTTP, IBM AS/400, and Modbus.
- **PredictPulse™ Remote Monitoring and Management Service**– PredictPulse is a subscription monitoring and management service from Eaton that collects and analyzes data from connected power infrastructure devices, providing us with the insight needed to make recommendations and take action on your behalf. It's also powered by CA Technologies, bringing together the best in hardware and software. Like a second set of eyes on your power infrastructure, PredictPulse provides 24/7 remote monitoring of alarms and system performance (load, temperature/humidity, battery health, energy savings and service level) to reduce downtime risk and expedite repairs. PredictPulse also shares real-time status and trend information via an online dashboard and smartphone mobile app (Apple and Android), giving subscribers insights about past and current performance, a list of all active alarms, and asset management data (i.e., battery date codes, last and next scheduled service dates, firmware versions). The service notifies customers of critical alarms, supports remote diagnostics, and facilitates smart dispatch of technicians. PredictPulse requires a Power Xpert® Gateway Card (PXGX) connectivity card in an X-Slot communication bay and an Environmental Monitoring Probe (EMP) for battery temperature/humidity monitoring.

See Chapter 8 *Communication* for additional information on monitoring and communication features.

## 1.5 Battery System

Although not provided with the UPS, a battery system is required to provide emergency short-term backup power to safeguard operation during brownouts, blackouts, and other power interruptions. The battery system should be equipped with lead-acid batteries. An external battery disconnect switch must be used.

The UPMs may be powered with either a common or separate battery system. In a common battery system, single and multiple UPMs are powered from one common battery source. In a separate battery system, multiple UPMs are each powered from separate battery sources.

UPSs in distributed bypass and parallel systems must use a separate battery system.

Consult the *Eaton® Power Xpert® 9395/9395P Integrated Battery Cabinet (Models 1085 and 1085HR) Installation Manual (P-164000580)* for specifics on battery cabinet usage with the 9395P-600.

A supplemental 48 Vdc shunt trip signal for the battery disconnect device is provided by the UPS, but is not required for normal operation.

**NOTE** The 9395P-600 system can trip a maximum of six battery cabinets total. This applies to both the 1085 standard and High Rate series batteries. If more than six battery cabinets in total are needed in a separate UPM battery configuration, DO NOT hook up the shunt trips.

## 1.6 Using This Manual

This manual describes how to install and operate the Eaton 9395P-600/450 UPS. Read and understand the procedures described in this manual to ensure trouble-free installation and operation. In particular, be thoroughly familiar with the REPO procedure (see paragraph 7.4.18 *Using the Remote Emergency Power-off Switch*).

The information in this manual is divided into sections and chapters. The system, options, and accessories being installed dictate which parts of this manual should be read. At a minimum, Chapters 1 through 4 and Chapter 7 should be examined.

Read through each procedure before beginning the procedure. Perform only those procedures that apply to the UPS system being installed or operated.

## 1.7 Conventions Used in This Manual

This manual uses these type conventions:

- **Bold type** highlights important concepts in discussions, key terms in procedures, and menu options, or represents a command or option that you type or enter at a prompt.
- Italic type highlights notes and new terms where they are defined.
- `Screen type` represents information that appears on the screen or LCD.

| Icon | Description |
|---|---|
|  | Information notes call attention to important features or instructions. |
| [Keys] | Brackets are used when referring to a specific key, such as [Enter] or [Ctrl]. |

In this manual, the term *UPS* refers only to the UPS cabinet and its internal elements. The term UPS system refers to the entire power protection system – the UPS cabinet, the battery system, and options or accessories installed.

## 1.8 Symbols, Controls, and Indicators

The following are examples of symbols used on the UPS or accessories 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 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.

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.

## 1.9 For More Information

Refer to the *Eaton 9395/9395P Integrated Battery Cabinet (Model I085 and 1085HR) Installation Manual (P-164000580)* for the following additional information:

- Integrated Battery Cabinet (IBC) installation instructions, including site preparation, planning for installation, wiring, and safety information.
- Detailed illustrations of the cabinet, including dimension and connection point drawings.

Refer to the *Eaton 9395P Sync Control Installation and Operation Manual (P-164000502)* for the following additional information:

- Installation instructions, including site preparation, planning for installation, and wiring and safety information. Detailed illustrations of the cabinet with dimensional and connection point drawings are provided.
- Operation, including controls, functions of the standard and optional features, procedures for using with the UPS, and information about maintenance.

Refer to the *Eaton 9395P Field Installed UPM Mechanical Installation Manual (P-164000503)* for the following additional information:

- Mechanical installation instructions, including site preparation, planning for mechanical installation, and safety information.
- Detailed illustrations of the cabinet, including dimension and pallet removal drawings.

Visit www.eaton.com/powerquality or contact an Eaton service representative for information on how to obtain copies of these manuals.

## 1.10 Getting Help

If help is needed with any of the following:

- Scheduling initial startup
- Regional locations and telephone numbers
- A question about any of the information in this manual
- A question this manual does not answer

Please call the Help Desk at:

| | |
|---|---|
| United States: | **1-800-843-9433 or 1-919-870-3028** |
| Canada: | **1-800-461-9166 ext 260** |
| All other countries: | **Call your local service representative** |

Please use the following e-mail address for manual comments, suggestions, or to report an error in this manual:

E-ESSDocumentation@eaton.com

## 1.11 Warranty

To view the UPS warranty please click on the link or copy the address to download from the Eaton website:

UPS Product Warranty

https://www.eaton.com/content/dam/eaton/products/backup-power-ups-surge-it-power-distribution/backup-power-ups/portfolio/eaton-three-phase-ups-warranty.pdf

# Chapter 2 Safety Warnings

## IMPORTANT SAFETY INSTRUCTIONS - SAVE THESE INSTRUCTIONS

This manual contains important instructions that should be followed during installation and maintenance of the UPS and batteries. Read all instructions before operating the equipment and save this manual for future reference.

The UPS is designed for industrial or computer room applications, and contains safety shields behind the door and front panels. However, the UPS is a sophisticated power system and should be handled with appropriate care.

**DANGER**

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.

**DANGER!**

Cet onduleur peut générer des **TENSIONS MORTELLES**. L'installation et l'entretien ne doivent être effectués que par le **PERSONNEL AUTORISÉ**. Ne contient **AUCUNE PIÈCE REMPLAÇABLE**.

**WARNING**

- The UPS is powered by its own energy source (batteries). The output terminals may carry live voltage even when the UPS is disconnected from an AC source.
- 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) [35°C 300 kW, 600 kW model]. Do not operate near water or excessive humidity (95% maximum). The system is not intended for outdoor use.
- Ensure all power is disconnected before performing installation or service.
- Batteries can present a risk of electrical shock or burn from high short–circuit current. The following precautions should be observed: 1) Remove watches, rings, or other metal objects; 2) Use tools with insulated handles; 3) Do not lay tools or metal parts on top of batteries; 4) Wear rubber gloves and boots.
- ELECTRIC ENERGY HAZARD. Do not attempt to alter any battery wiring or connectors. Attempting to alter wiring can cause injury.
- As a result of the connected loads high leakage current is possible. Connection to earth ground is required for safety and proper product operation. Do not check UPS operation by any action that includes removal of the earth (ground) connection with loads attached.
- Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

**AVERTISSEMENT!**

- L'onduleur est alimenté par sa propre source d'énergie (batteries). Les bornes de sortie peuvent être sous tension, même lorsque l'onduleur est débranché d'une source de courant alternatif
- Pour réduire les risques d'incendie et de décharge électrique, installer l'onduleur à l'intérieur, dans un endroit exempt d'éléments conducteurs et où la température et l'humidité sont régulées. La température ambiante ne doit pas dépasser 40°C (104°F) [35°C modèle 300 kW, 600 kW]. Ne pas faire fonctionner près d'une source d'eau ou dans un endroit très humide (95% maximum). Le système n'est pas conçu pour une utilisation extérieure.
- Toutes les sources d'alimentation doivent être débranchées avant de procéder à l'installation et à l'entretien.
- Les batteries peuvent présenter un risque de décharge électrique ou de brûlure en raison du courant de court-circuit élevé. Les précautions de base suivantes doivent être suivies : 1) retirer les montres, bagues et autres objets métalliques; 2) utiliser des outils munis d'une poignée isolée; 3) ne pas déposer les outils ou des pièces de métal sur les batteries; 4) porter des gants et des bottes en caoutchouc.
- DANGERS ÉLECTRIQUES. Ne pas tenter de modifier le câblage et les connecteurs de l'onduleur ou des batteries. Toute tentative de modification peut provoquer des blessures.
- Les charges raccordées pourraient provoquer un courant de fuite élevé. La mise à la terre est donc obligatoire pour garantir la sécurité et le bon fonctionnement du produit. Lors de la vérification du fonctionnement de l'UPS, ne pas enlever la mise à la terre si des charges y sont raccordées.
- Ne pas ouvrir ni abîmer les batteries. L'électrolyte qu'elles contiennent est dangereux pour la peau et les yeux. Il peut être toxique.

**CAUTION**

Installation or servicing should be performed by qualified service personnel knowledgeable of batteries and required precautions. Keep unauthorized personnel away from batteries. Consider all warnings, cautions, and notes before installing or replacing batteries. *DO NOT DISCONNECT the batteries while the UPS is in Battery mode.*

- Replace batteries with the same number and type of batteries as originally installed in the UPS.
- Disconnect the charging source prior to connecting or disconnecting terminals.
- Determine if the battery is inadvertently grounded. If it is, remove the source of the ground. Contacting any part of a grounded battery can cause a risk of electric shock. An electric shock is less likely if you disconnect the grounding connection before you work on the batteries.
- Proper disposal of batteries is required. Refer to local codes for disposal requirements.
- Do not dispose of batteries in a fire. Batteries may explode when exposed to flame.
- Keep the UPS door closed and front panels installed to ensure proper cooling airflow and to protect personnel from dangerous voltages inside the unit.
- Do not install or operate the UPS system close to gas or electric heat sources.
- The operating environment should be maintained within the parameters stated in this manual.
- Keep surroundings uncluttered, clean, and free from excess moisture.
- Observe all DANGER, CAUTION, and WARNING notices affixed to the inside and outside of the equipment.

**ATTENTION!**

- L'installation et l'entretien doivent être effectués par du personnel qualifié en matière d'onduleurs et de batteries, il doit connaître les précautions qui s'imposent. Le personnel non autorisé doit être tenu à l'écart de l'équipement. Il est important de prendre connaissance des avertissements, des mises en garde et des avis avant de procéder à l'installation ou à l'entretien de l'équipement. *NE PAS DÉBRANCHER les batteries lorsque l'onduleur est en mode Batterie.*
- Ne jamais jeter les batteries au feu. L'exposition aux flammes risque de les faire exploser.
- Déconnecter la source d'alimentation avant de brancher ou débrancher les bornes.
- Vérifier que la batterie n'est pas, par inadvertance, reliée à la terre. Si c'est le cas, couper la source de mise à la terre. Les contacts avec une batterie reliée à la terre peuvent provoquer des risques de décharge électrique. Ces risques sont atténués si la mise à la terre est annulée avant le début des travaux sur les batteries.
- L'élimination appropriée des batteries est requise. Se reporter aux codes locaux pour connaître les exigences liées à l'élimination
- Ne pas jeter les batteries au feu. Les batteries peuvent exploser lorsqu'elles sont exposées à des flammes.
- Garder les portes de l'onduleur fermées et les panneaux avant en place pour garantir une circulation adéquate de l'air de refroidissement et pour protéger le personnel des tensions dangereuses dans l'unité.
- Ne pas installer ni faire fonctionner l'onduleur près d'une source de chaleur au gaz ou à l'électricité.
- Le milieu de fonctionnement doit toujours correspondre aux paramètres établis dans ce manuel.
- Maintenir les lieux rangés, propres et exempts d'une humidité excessive.
- Respecter les étiquettes DANGER, MISE EN GARDE et AVERTISSEMENT se trouvant à l'intérieur et à l'extérieur de l'équipement.

**CAUTION**

To prevent damage to the wiring channel and wiring in the UPS cabinet base when lifting or moving the cabinet:

- Lift and move the cabinet using only the front or rear forklift slots.
- Verify that the forklift forks are in a horizontal position before inserting them into the forklift slots.
- DO NOT angle fork tips upward.
- Insert the forks all the way through the base. DO NOT insert forks partially into the base to move the cabinet.
- Forks may be partially inserted into the front or rear forklift slots for minor positioning if the forks are kept in a horizontal position with no upward angling.
- DO NOT use the forklift slots on the end of the cabinet to move the cabinet.
- End forklift slots may be used for minor positioning if the forks are kept in a horizontal position with no upward angling.

If these instructions are not followed, damage to the wiring channel and wiring will occur.

**ATTENTION!**

Pour éviter d'endommager le câblage et son canal à la base de l'armoire de l'onduleur lorsque l'armoire est soulevée ou déplacée.

- Soulever ou déplacer l'armoire en n'utilisant que les passages de fourche à l'avant ou à l'arrière.
- Vérifier que les fourches du chariot élévateur sont en position horizontale avant de les insérer dans les passages de fourche. NE PAS orienter les pointes de fourche vers le haut.
- Insérer complètement les fourches dans les passages de fourche de la base. NE PAS insérer partiellement les fourches dans les passages pour déplacer l'armoire.
- Il est possible d'insérer partiellement les fourches dans les passages avant et arrière pour les petits déplacements, et ce, si les fourches sont en position horizontale sans pointer vers le haut.
- NE PAS utiliser les passages de fourche à l'extrémité de l'armoire pour la déplacer.
- Les passages de fourche à l'extrémité de l'armoire peuvent servir lors des petits déplacements, et ce, si les fourches sont en position horizontale sans pointer vers le haut.

Si ces instructions ne sont pas suivies, des dommages au câblage et à son canal surviendront.

# Chapter 3 UPS Installation Plan and Unpacking

Use the following basic sequence of steps to install the UPS:

1. Create an installation plan for the UPS system (Chapter 3).
2. Prepare your site for the UPS system (Chapter 3).
3. Inspect and unpack the UPS cabinet (Chapter 3).
4. Unload and install the UPS cabinet, and wire the system (Chapter 4 *Installation*).
5. Install features, accessories, or options, as applicable (Chapter 5 *Installing Options and Accessories*).
6. Complete the Installation Checklist (Chapter 4 *Installation*).
7. Have authorized service personnel perform preliminary operational checks and start up the system.

**NOTE** Startup and operational checks must be performed by an authorized Eaton Customer Service Engineer, or the warranty terms specified on the Eaton website in section 1.11 *Warranty* will become void. This service is offered as part of the sales contract for the UPS. Contact an Eaton service representative in advance (usually a two-week notice is required) to reserve a preferred startup date.

## 3.1 Creating an Installation Plan

Before installing the UPS system, read and understand how this manual applies to the system being installed. Use the procedures and illustrations in paragraph 3.2 *Preparing the Site* and Chapter 4 *Installation* to create a logical plan for installing the system.

## 3.2 Preparing the Site

For the UPS system to operate at peak efficiency, the installation site should meet the environmental parameters outlined in this manual. If the UPS is to be operated at an altitude higher than 1000m (3000 ft), contact an Eaton service representative for important information about high altitude operation. The operating environment must meet the weight, clearance, and environmental requirements specified.

### 3.2.1 General Storage Requirements for UPS Equipment

- Equipment which cannot be immediately installed and energized should be stored in an indoor, dry, clean, ventilated area, heated environment (i.e. an temperature and humidity controlled environment). The storage area must be protected from rain, water, chemical agents and gases as shown in Table 1.
- Do not store in areas where conditions such as dampness, changes in temperature, dust, dirt, rubble, paint, conductive particulates, or corrosive atmosphere / gases are present.
- Storage temperature: -25 °C to +60 °C (-13 °F to 140 °F).
- Factory installed packaging and wrapping of the equipment should not be removed until equipment is ready to install.
- Equipment should be checked periodically for any signs of deterioration. It is the responsibility of the receiving contractor to ensure protection during storage.
- Equipment should be placed on true and solid level surfaces for storage.
- Have a plan for condensation and environmental mitigation prior to equipment arrival.

**Table 1. Storage Area Contaminants**

| Contaminant | Gas | Gas Concentration in ppbv |
|---|---|---|
| Group A | $H^2S$ | <3 |
| | $SO^2SO^2$ | <10 |
| | Cl2 | <1 |
| | NOx | <50 |
| Group B | HF | <1 |
| | $NH^3$ | <500 |
| | $O^3$ | <2 |

### 3.2.2 Environmental and Installation Considerations

Make sure that the environment for the 9395P UPS meets the following operating restrictions:

The environmental requirements specified below are for the air at the intake ports of the 9395P, and are the maximum, not to exceed, ratings.

- Use temperature: -0 °C to +40 °C (32 °F to 104 °F).

  **Restriction** Always maintain a non-condensing environment

- There shall be at least a 1.8° F (1.0° C) difference between the dry bulb temperature and the wet bulb temperature, at all times, to maintain a non-condensing environment.
- The maximum rate of temperature change shall be limited to 3° F over 5 minutes (36° F/hour), based on the ASHRAE Standard 90.1-2013.

Cautions regarding UPS operating environmental conditions:

The newer, more energy efficient data center cooling methods (such as air side economization) can create much wider ranges of temperature and Relative Humidity (RH) in the UPS room and/or data center.

There are two aspects of this increased operating environment that can, if ignored, create issues:

- One is the creation of microclimates, which are persistent variations of temperature and/or RH within a single room; for example one side of the room is always cooler than the other side, no matter what the actual temperature is.
- The other aspect is the rate of change of temperature and/or RH, which can occur during transitions within the cooling system. Examples: changing the mixture ratio of inside versus outside air, or external changes in the outside air when going from nighttime into day, and back to night.

When ignored, either one of these aspects can create an undesirable microclimate at the UPS location. If the environment created by this microclimate exceeds the UPS operating specification, the UPS reliability, over time, will be reduced. These same environmental extremes will also create reliability concerns for any servers that are exposed to them.

Do not expose the UPS for overly aggressive environments ANSI/ISA-71.04-2013 classifications). Refer to Table 1 for gas concentration limits. If the UPS is used in a more aggressive environment, it can cause reduced product life and possibly early failure. If the installation location does not meet the recommended environment, contact Eaton service representative for further information.

### 3.2.3 Installation Considerations

The UPS system installation must meet the following guidelines:

- The system must be installed on a level floor suitable for computer or electronic equipment.

- The system must be installed in a temperature and humidity controlled indoor area free of conductive contaminants.

Failure to follow guidelines may void your warranty.

The UPS equipment operating environment must meet the weight requirements shown in Table 2 and the size requirements shown in Figure 5 through Figure 17. Dimensions are in millimeters (inches).

Table 2 Includes the weights of the heaviest cabinet configuration. Actual weights may be less due to installed configuration. Weights are in kilograms (pounds).

**Table 2. UPS Cabinet Maximum Weights**

| Model | Section | Maximum Weight kg (lb) | |
|---|---|---|---|
| | | Shipping | Installed |
| Eaton 9395P-600/600<br>Eaton 9395P-600/550 | ISBM (CSS)<br>+ 2 UPMs | 1500<br>(3307) | 1447<br>(3194) |
| Eaton 9395P-600/550<br>Eaton 9395P-600/450<br>Eaton 9395P-600/400 | FI-UPM | 496<br>(1094) | 471<br>(1037) |
| Eaton 9395P-600/300<br>Eaton 9395P-600/275<br>Eaton 9395P-600/250<br>Eaton 9395P-600/225<br>Eaton 9395P-600/200 | ISBM (CSS)<br>+ 1 UPM | 915<br>(2017) | 865<br>(1904) |

NOTE CSS = Continuous Static Switch
NOTE Table 4 describes power ratings of each model.

The UPS cabinets use forced air cooling to regulate internal component temperature. Air inlets are in the front of the cabinet and outlets are in the top. Allow clearance in front of and above each cabinet for proper air circulation. The clearances required around the UPS cabinet are shown in Table 3. Dimensions are in millimeters (inches).

**Table 3. UPS Cabinet Clearances**

| | |
|---|---|
| **From Top of Cabinet** | 457.2 mm (18") minimum clearance for ventilation |
| **From Front of Cabinet** | 1067mm (42") working space |
| **From Back of Cabinet** | None Required |
| **From Right Side of Cabinet** | None Required |
| **From Left Side of Cabinet** | None Required |

The basic environmental requirements for operation of the UPS are:

- 40°C (32–104°F) at elevations up to 1000m without derating
- For 300 kW and 600 kW: 0–35°C (32–95°F) at elevations up to 1000m without derating
- Recommended Operating Range: 20–25°C (68–77°F)
- Maximum Relative Humidity: 95%, non-condensing

**NOTE**

Eaton battery cabinets are located in the same room as the UPS, the battery cabinet environmental requirements supersede the UPS requirements. Operating temperatures above the recommended range will result in decreased battery life and performance, and will reduce or void the battery warranty. Refer to Eaton's Terms and Conditions of Sale with Battery Replacement Coverage and the Battery Replacement Price Book for more information. These documents can be found at www.eaton.com/powerquality or contact an Eaton service representative for information on how to obtain copies.

The UPS ventilation requirements are shown in Table 4 through Table 6.

**Table 4. 600V Air Conditioning and Ventilation Requirements During Full Load Operation**

| Model | Rating | Input/Output Voltage | Heat Rejection BTU/hr x1000 (kg-cal/hr) | Ventilation Required for Cooling Air Exhaust |
|---|---|---|---|---|
| Eaton 9395P-600/550 (CSS or IOM) | 550 kVA 550 kVA | 600/600 | 103.8 (26.2) | Approximately 2383 liter/sec (5050 CFM) With Field Installed UPM: Approximately 2124 liter/sec (4500 CFM) |
| Eaton 9395P-600/500 (CSS or IOM) | 500 kVA 500 kVA | 600/600 | 94.3 (23.8) | |
| Eaton 9395P-600/450 (CSS or IOM) | 450 kVA 450 kVA | 600/600 | 84.9 (21.4) | |
| Eaton 9395P-600/400 (CSS or IOM) | 400 kVA 400 kVA | 600/600 | 75.5 (19.0) | |
| Eaton 9395P-600/300 (CSS or IOM) | 300 kVA 300 kVA | 600/600 | 56.6 (14.3) | Approximately 1321 liter/sec (2800 CFM) With Field Installed UPM: Approximately 2265 liter/sec (4800 CFM) |

NOTE CSS = Continuous Static Switch; IOM = Input Output Module

The UPS 480V ventilation requirements are shown in Table 5.

**Table 5. 480V Air Conditioning and Ventilation Requirements During Full Load Operation**

| Model | Rating | Input/Output Voltage | Heat Rejection BTU/hr x1000 (kg-cal/hr) | Ventilation Required for Cooling Air Exhaust |
|---|---|---|---|---|
| Eaton 9395P-600/600 (CSS or IOM) | 600 kVA 600 kVA | 480/480 | 78.7 (19.8) | Approximately 2383 liter/sec (5050 CFM) |
| Eaton 9395P-600/550 (CSS or IOM) | 550 kVA 550 kVA | 480/480 | 72.15 (18.2) | |
| Eaton 9395P-600/500 (CSS or IOM) | 500 kVA 500 kVA | 480/480 | 63.8 (16.1) | |
| Eaton 9395P-600/450 (CSS or IOM) | 450 kVA 450 kVA | 480/480 | 54.05 (13.6) | |
| Eaton 9395P-600/400 (CSS or IOM) | 400 kVA 400 kVA | 480/480 | 48.1 (12.1) | |
| Eaton 9395P-600/300 (CSS or IOM) | 300 kVA 300 kVA | 480/480 | 39.4 (9.9) | Approximately 1321 liter/sec (2800 CFM) With Field Installed FI-UPM: Approximately 2265 liter/sec (4800 CFM) |
| Eaton 9395P-600/275 (CSS or IOM) | 275 kVA 275 kVA | 480/480 | 36.1 (9.1) | |

**Table 5. 480V Air Conditioning and Ventilation Requirements During Full Load Operation (Continued)**

| Model | Rating | Input/Output Voltage | Heat Rejection BTU/hr x1000 (kg-cal/hr) | Ventilation Required for Cooling Air Exhaust |
|---|---|---|---|---|
| Eaton 9395P-600/250 (CSS or IOM) | 250 kVA<br>250 kVA | 480/480 | 31.9 (8.0) | |
| Eaton 9395P-600/225 (CSS or IOM) | 225 kVA<br>225 kVA | 480/480 | 27 (6.8) | |
| Eaton 9395P-600/200 (CSS or IOM) | 200 kVA<br>200 kVA | 480/480 | 24 (6.0) | |

NOTE CSS = Continuous Static Switch; IOM = Input Output Module

The UPS 415V/400V/380V ventilation requirements are shown in Table 6.

**Table 6. 415V/400V/380V Air Conditioning and Ventilation Requirements During Full Load Operation**

| Model | Rating | Input/Output Voltage | Heat Rejection BTU/hr x1000 (kg-cal/hr) | Ventilation Required for Cooling Air Exhaust |
|---|---|---|---|---|
| Eaton 9395P-600/550 (CSS or IOM) | 550 kVA<br>550 kVA | 415/415<br>400/400<br>380/380 | 77.42 (19.5) | Approximately 3050 liter/sec (6500 CFM) |
| Eaton 9395P-600/500 (CSS or IOM) | 500 kVA<br>500 kVA | 415/415<br>400/400<br>380/380 | 70.38 (17.7) | |
| Eaton 9395P-600/450 (CSS or IOM) | 450 kVA<br>450 kVA | 415/415<br>400/400<br>380/380 | 63.35 (16.0) | |
| Eaton 9395P-600/400 (CSS or IOM) | 400 kVA<br>400 kVA | 415/415<br>400/400<br>380/380 | 56.31 (14.2) | |
| Eaton 9395P-600/300 (CSS or IOM) | 300 kVA<br>300 kVA | 415/415<br>400/400<br>380/380 | 42.23 (10.6) | Approximately 1700 liter/sec (3600 CFM)<br>With Field Installed FI-UPM:<br>Approximately 3050 liter/sec (6500 CFM) |
| Eaton 9395P-600/275 (CSS or IOM) | 275 kVA<br>275 kVA | 415/415<br>400/400<br>380/380 | 38.71 (9.8) | |
| Eaton 9395P-600/250 (CSS or IOM) | 250 kVA<br>250 kVA | 415/415<br>400/400<br>380/380 | 35.19 (8.9) | |
| Eaton 9395P-600/225 (CSS or IOM) | 225 kVA<br>225 kVA | 415/415<br>400/400<br>380/380 | 31.67 (8.0) | |
| Eaton 9395P-600/200 (CSS or IOM) | 200 kVA<br>200 kVA | 415/415<br>400/400<br>380/380 | 28.15 (7.1) | |

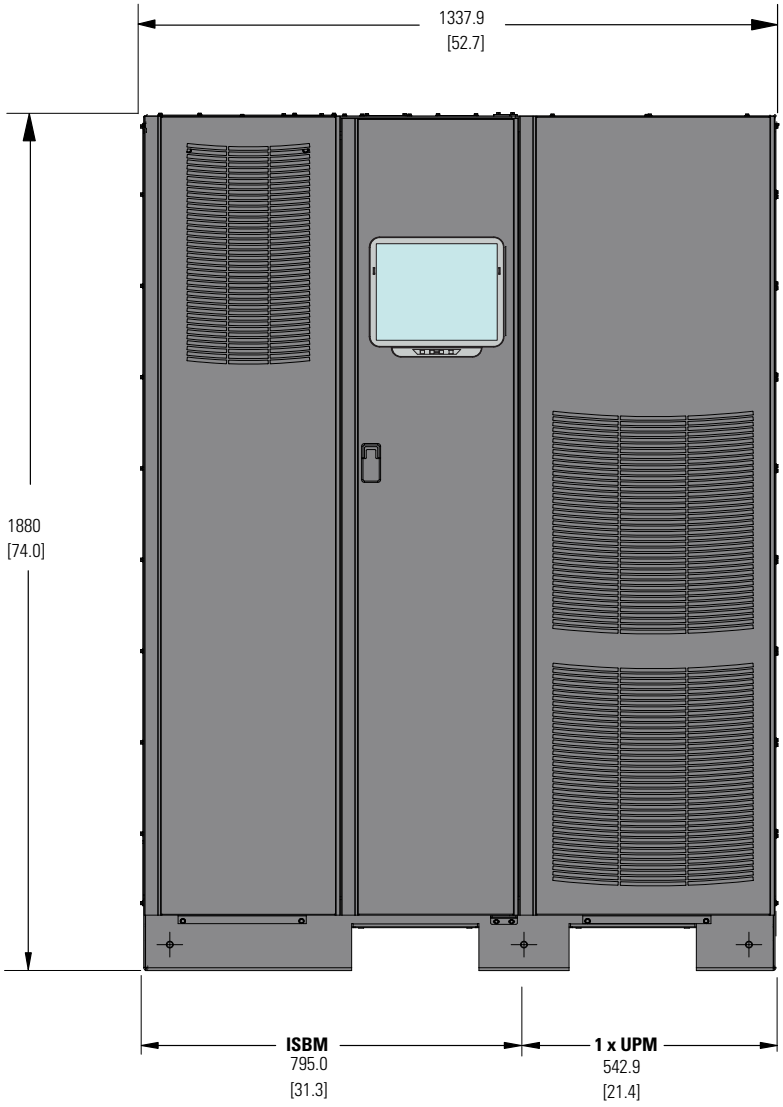
NOTE CSS = Continuous Static Switch; IOM = Input Output Module

### 3.2.4 Standard 380V, 400V, 415V, and 480V Model Configurations

Front view illustrations of configuration dimensions and Center of Gravity measurements are provided for each non-600V model configuration (380V, 400V, 415, and 480V). Figure 17 provides side view illustrations of dimensions and side view Center of Gravity measurements that apply for all configurations.

- **Single UPM**: ISBM and 1 x UPM section (shipped joined on a single pallet). See Figure 5 and Figure 6.
- **Single UPM PLUS 1 UPM**: ISBM and 1 x UPM section (shipped joined on a single pallet), plus 1 Field Installed FI-UPM (shipped separately to be added to configuration later). See Figure 7 and Figure 8.
- **TWO UPM**: ISBM and 2 x UPM section (shipped joined on a single pallet). See Figure 9 and Figure 10.
- **TWO UPM PLUS 1 UPM:**: ISBM and 2 Factory Installed UPMs (shipped joined on a single pallet), plus 1 Field Installed FI-UPM (shipped separately to be added to configuration later). See Figure 11 and Figure 12.

**Figure 5. Standard Single UPM Configuration (Dimensions)**

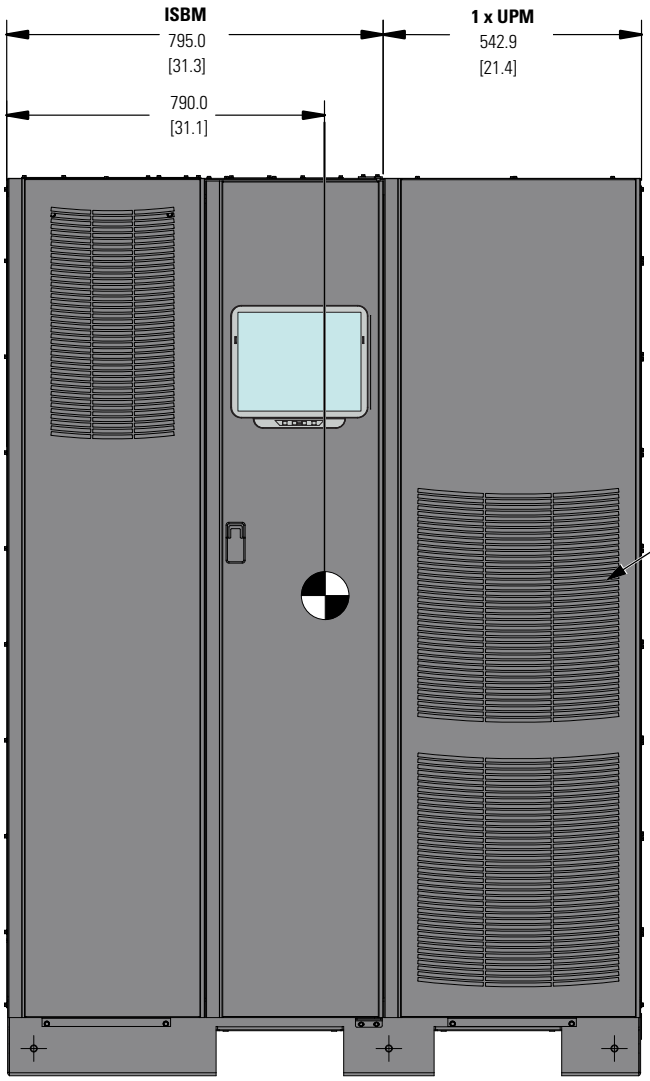



**Front View**

**Standard ISBM and 1 x UPM**
**(380V, 400V, 415V, and 480V models)**

Dimensions are in millimeters [inches].

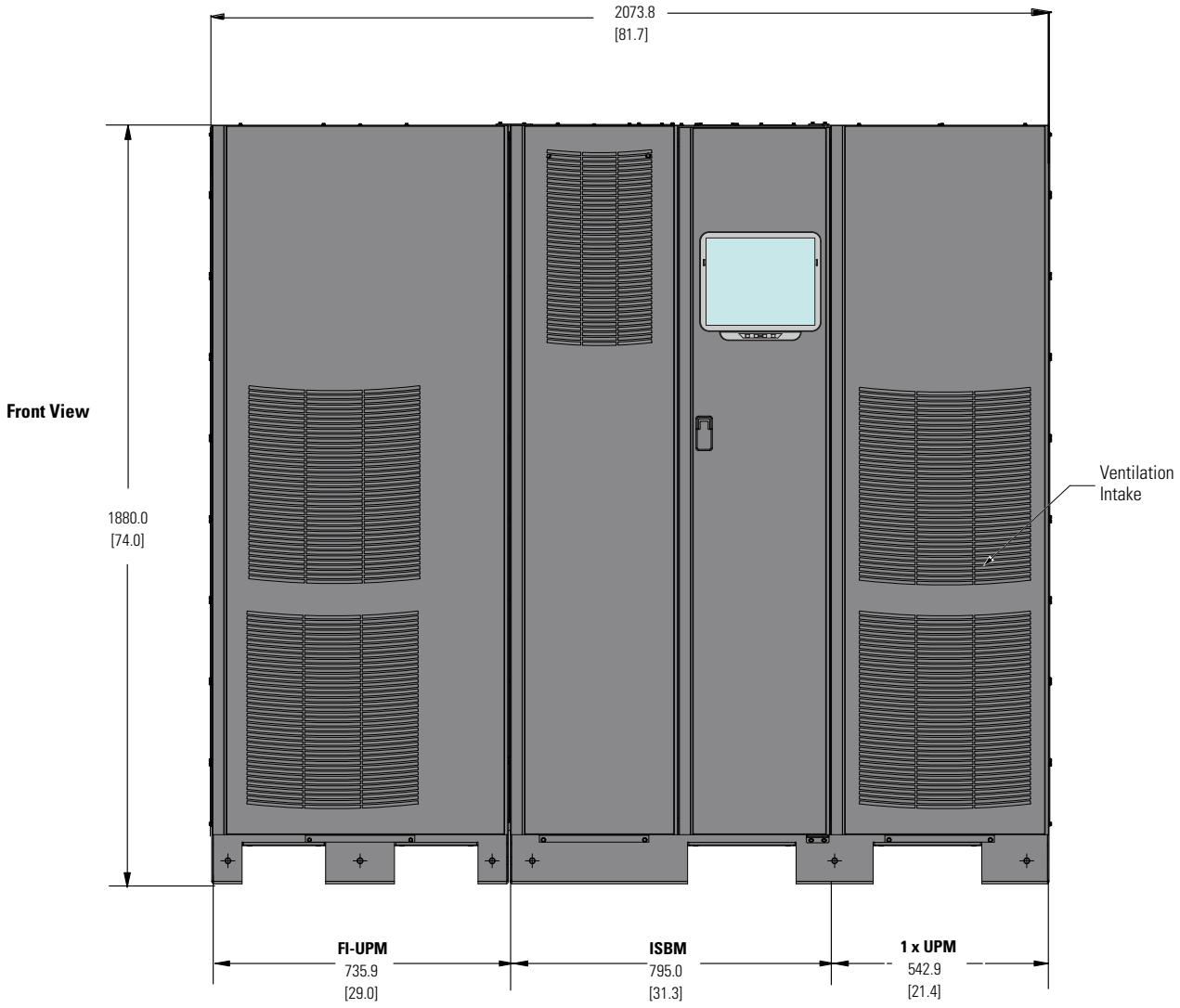
**Figure 6. Standard Single UPM Configuration (Center of Gravity)**




**Standard ISBM and 1 x UPM**
**(380V, 400V, 415V, and 480V models)**

Dimensions are in millimeters [inches].

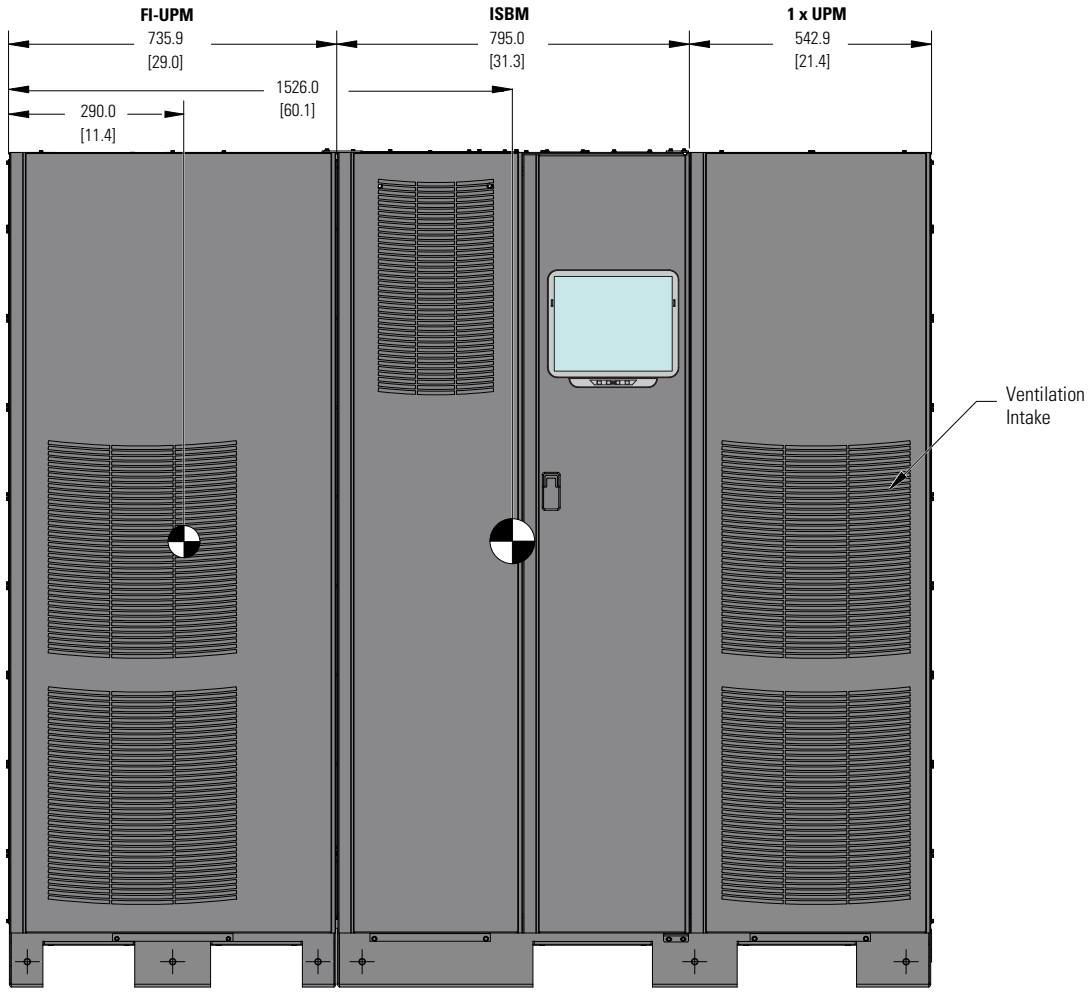
**Figure 7. Standard Single UPM Configuration, Plus 1 FI-UPM (Dimensions)**




**Standard ISBM and 1 x UPM with 1 Field Installed UPM (380V, 400V, 415V, and 480V models)**

Dimensions are in millimeters [inches].

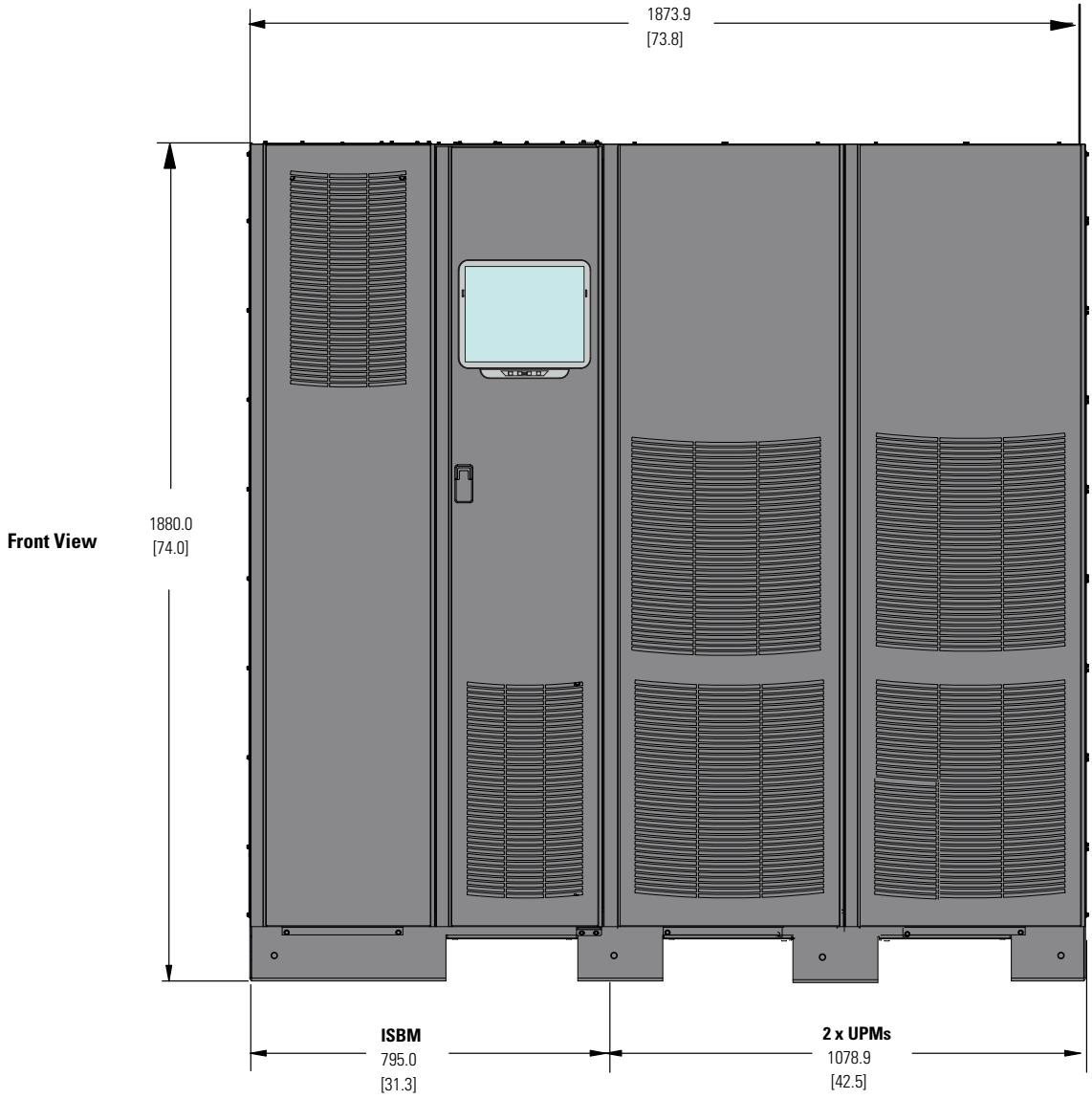
**Figure 8. Standard Single UPM Configuration, Plus 1 FI-UPM (Center of Gravity)**




**Standard ISBM and 1 x UPM with 1 Field Installad UPM**
**(380V, 400V, 415V, and 480V models)**

Dimensions are in millimeters [inches].

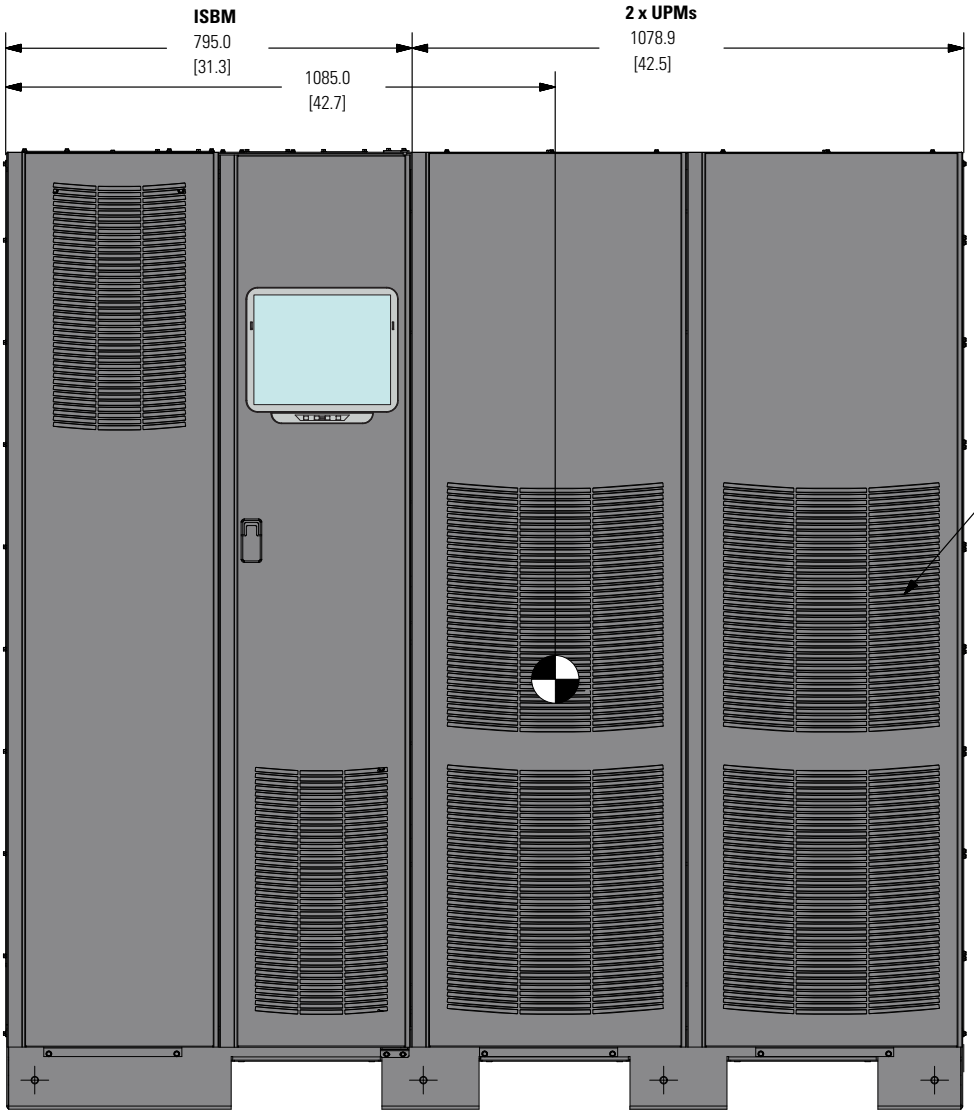
**Figure 9. Standard Two UPM Configuration (Dimensions)**




**Standard ISBM and 2 x UPMs**
**(380V, 400V, 415V, and 480V models)**

Dimensions are in millimeters [inches].

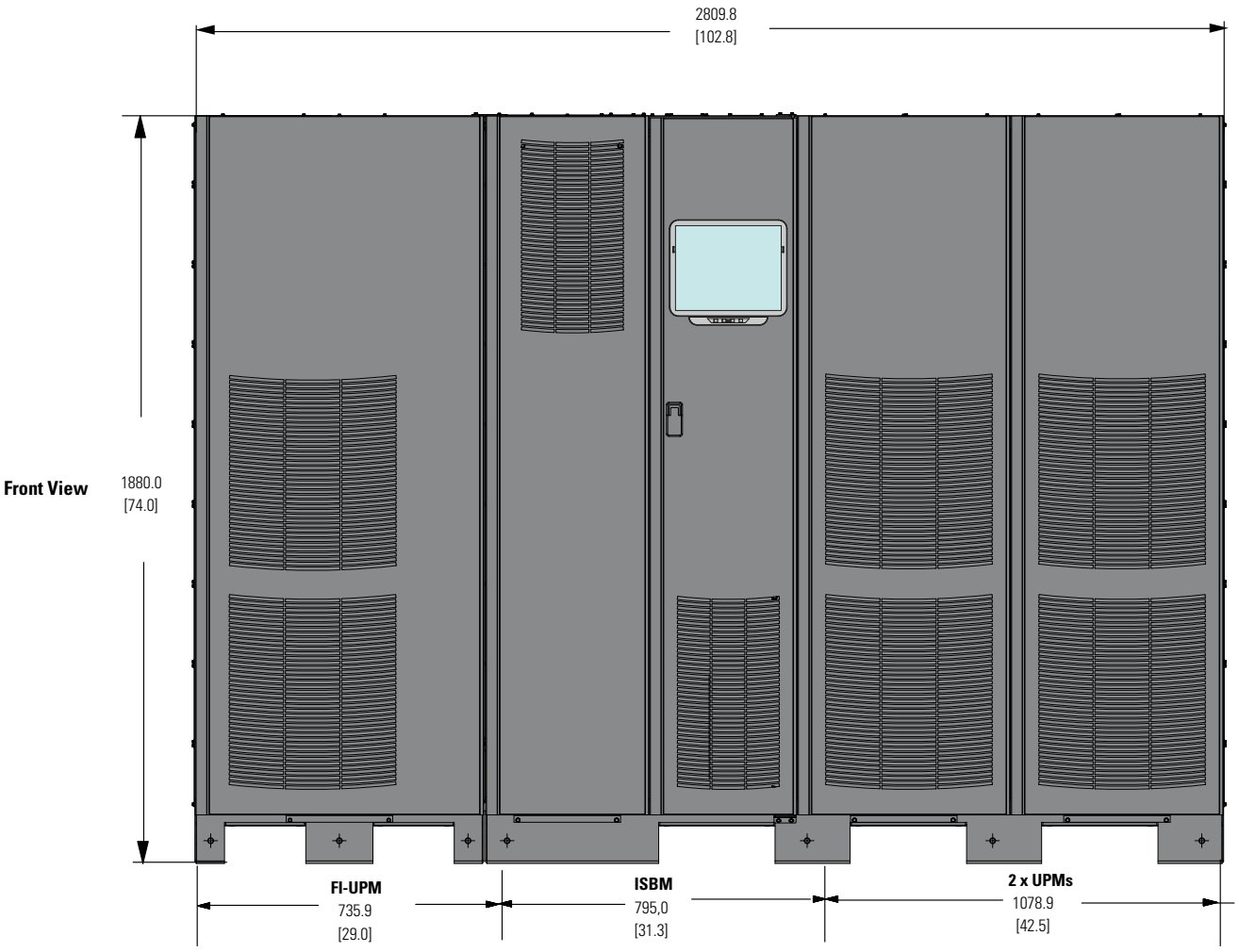
**Figure 10. Standard Two UPM Configuration (Center of Gravity)**




**Standard ISBM and 2 x UPMs**
**(380V, 400V, 415V, and 480V models)**

Dimensions are in millimeters [inches].

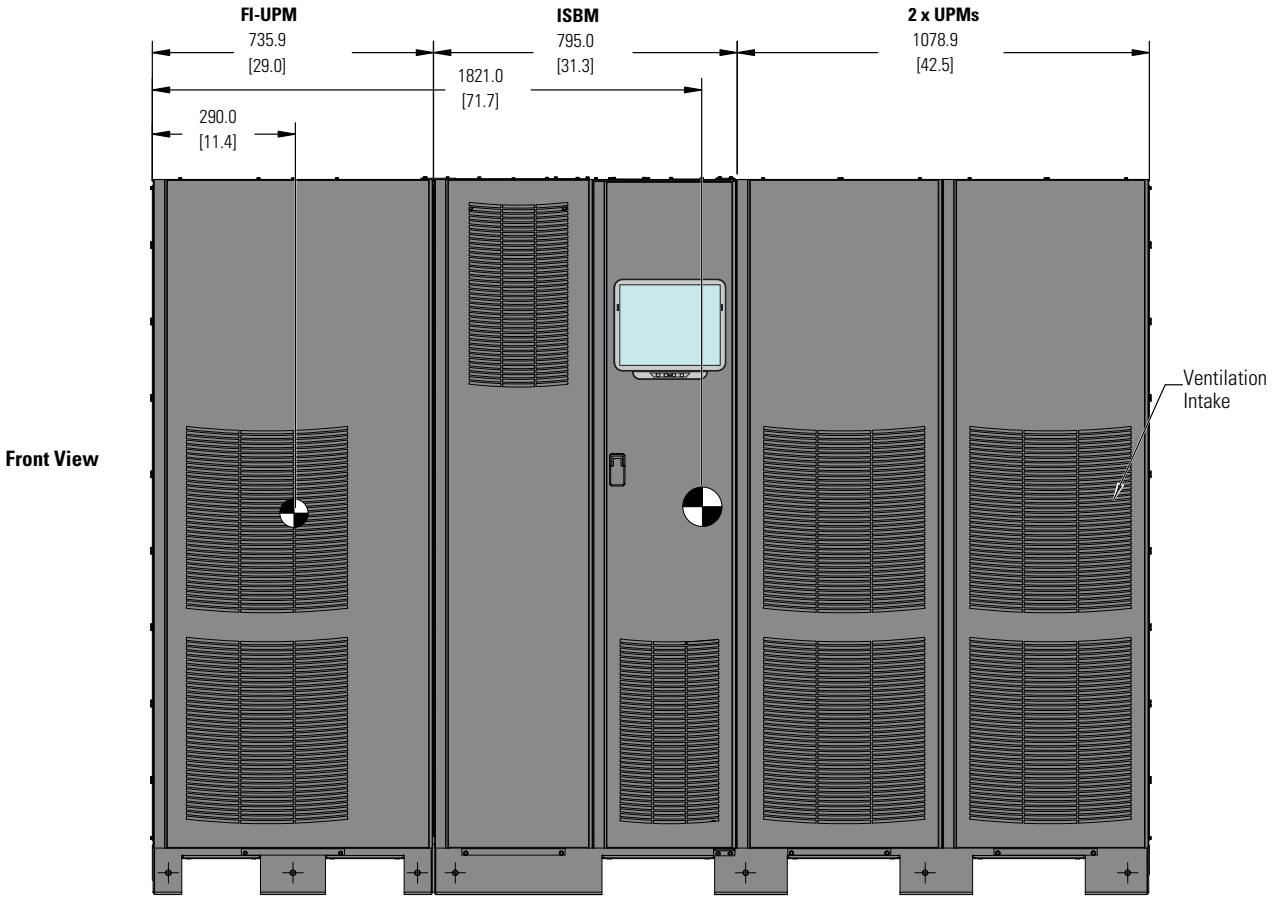
**Figure 11. Standard Two UPM Configuration, Plus 1 FI-UPM (Dimensions)**




**Standard ISBM and 2 x UPMs with 1 Field Installad UPM (380V, 400V, 415V, and 480V models)**

Dimensions are in millimeters [inches].

**Figure 12. Standard Two UPM Configuration, Plus 1 FI-UPM (Center of Gravity)**




**Standard ISBM and 2 x UPMs with 1 Field Installad UPM**
**(380V, 400V, 415V, and 480V models)**

Dimensions are in millimeters [inches].

### 3.2.5 600V Model Configurations

Front view illustrations of configuration dimensions are provided for each 600V model configuration. Figure 17 provides side view illustrations of dimensions and side view Center of Gravity measurements that apply for all configurations.

- **600V Single UPM:**: ISBM section and 1 x UPM section (shipped on separate pallets, ready to be joined). See Figure 13.
- **600V Single UPM PLUS 1 UPM:**: ISBM section and 1 x UPM section (shipped on separate pallets, ready to be joined), plus 1 Field Installed FI-UPM (shipped separately to be added to configuration later). See Figure 14.
- **600V TWO UPM:**: ISBM section and 2 x UPM section (shipped on separate pallets, ready to be joined). See Figure 15.

- **600V TWO UPM PLUS 1 UPM**: ISBM section and 2 x UPM section (shipped on separate pallets, ready to be joined). See Figure 16.

**NOTE** 600V Center of Gravity information will be provided in the next release of this manual.

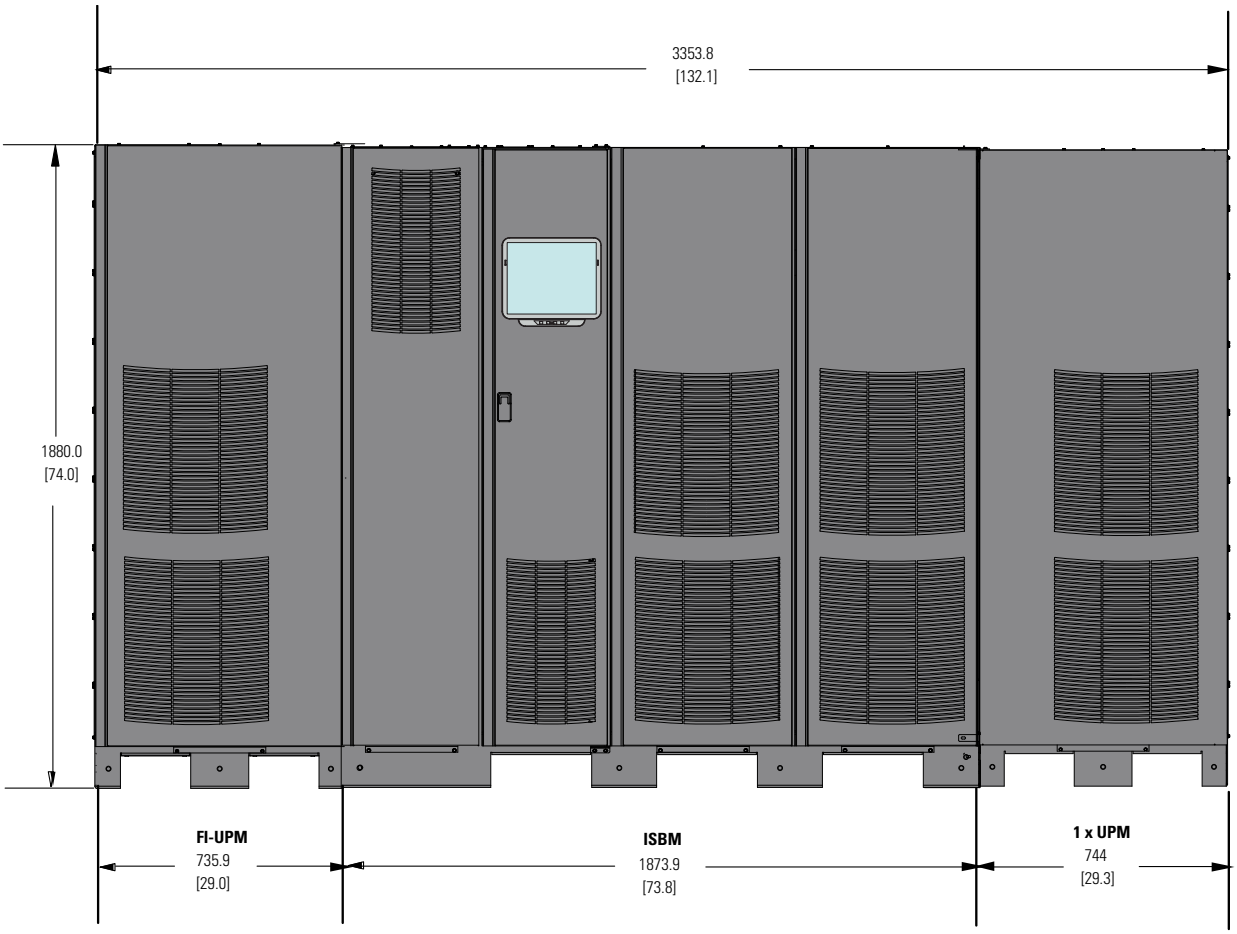
**Figure 13. 600V Single UPM Configuration (Dimensions)**


**Front View**

**600V ISBM Section with 1 x UPM Section**

Dimensions are in millimeters [inches].

**Figure 14. 600V Single UPM Configuration, Plus 1 FI-UPM (Dimensions)**

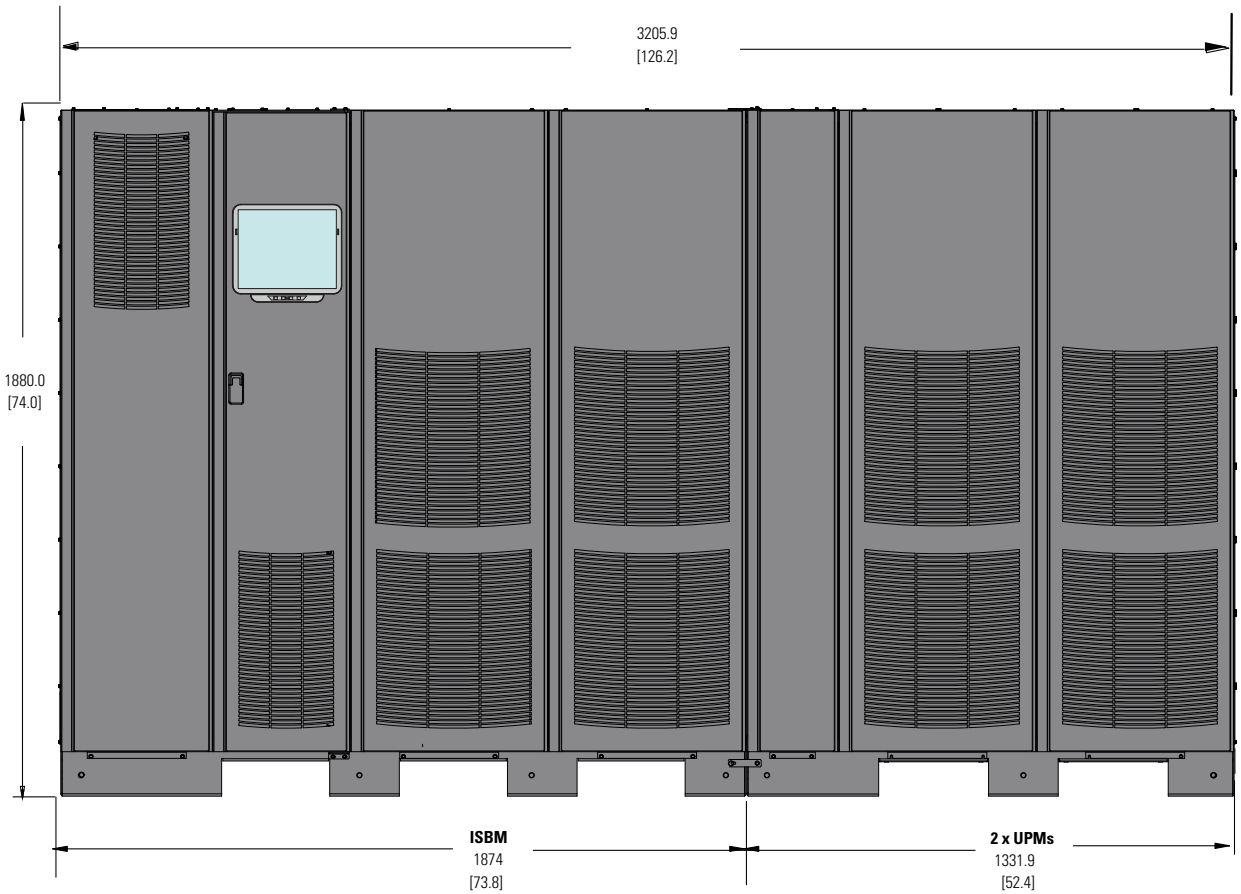



**Front View**

**600V ISBM Section with 1 x UPM Section and Upgraded with 1 Field Installed UPM**

Dimensions are in millimeters [inches].

**Figure 15. 600V Two UPM Configuration (Dimensions)**

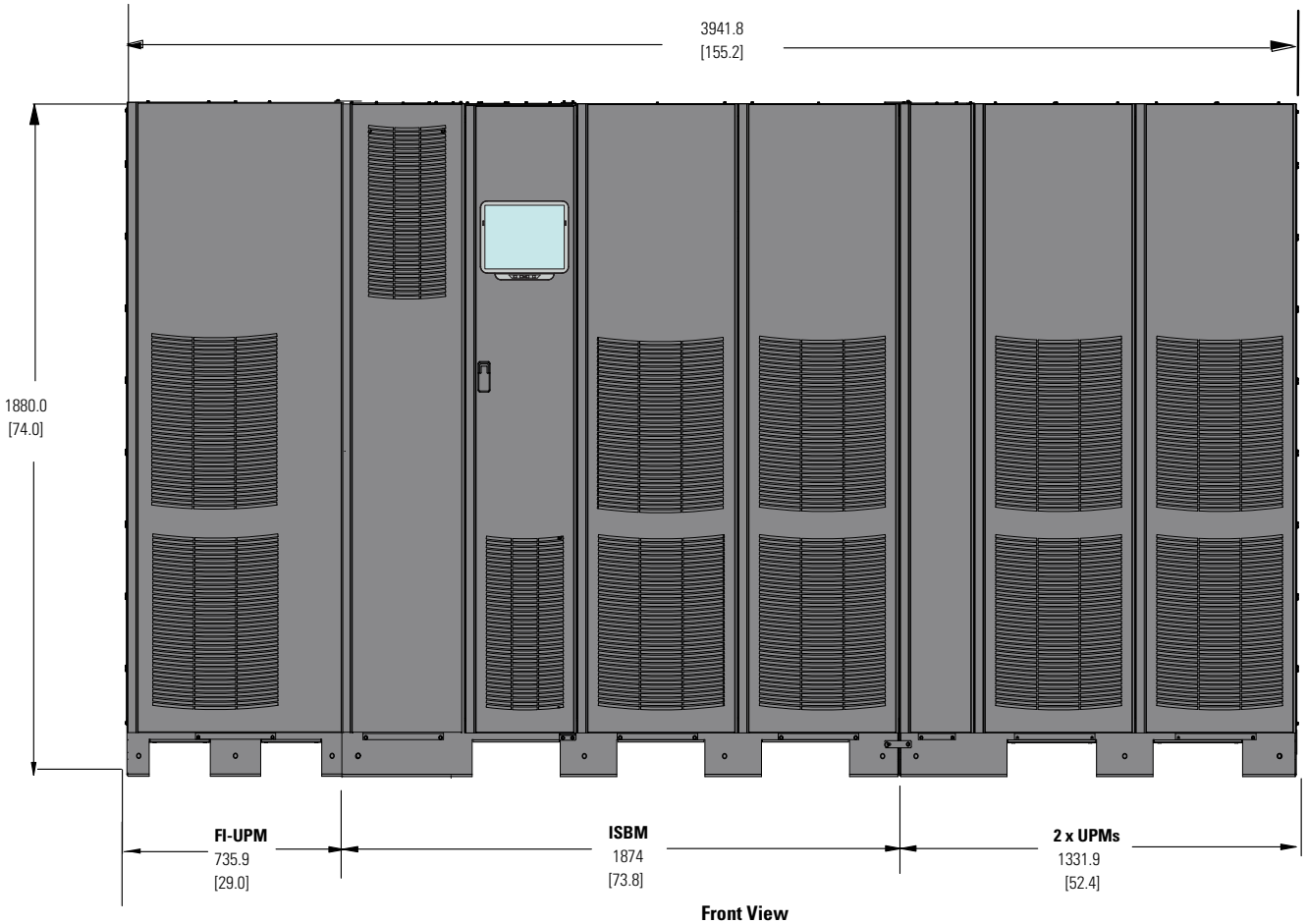



**Front View**

**600V ISBM Section with 2 x UPM Section**

Dimensions are in millimeters [inches].

**Figure 16. 600V Two UPM Configuration, Plus 1 FI-UPM (Dimensions)**

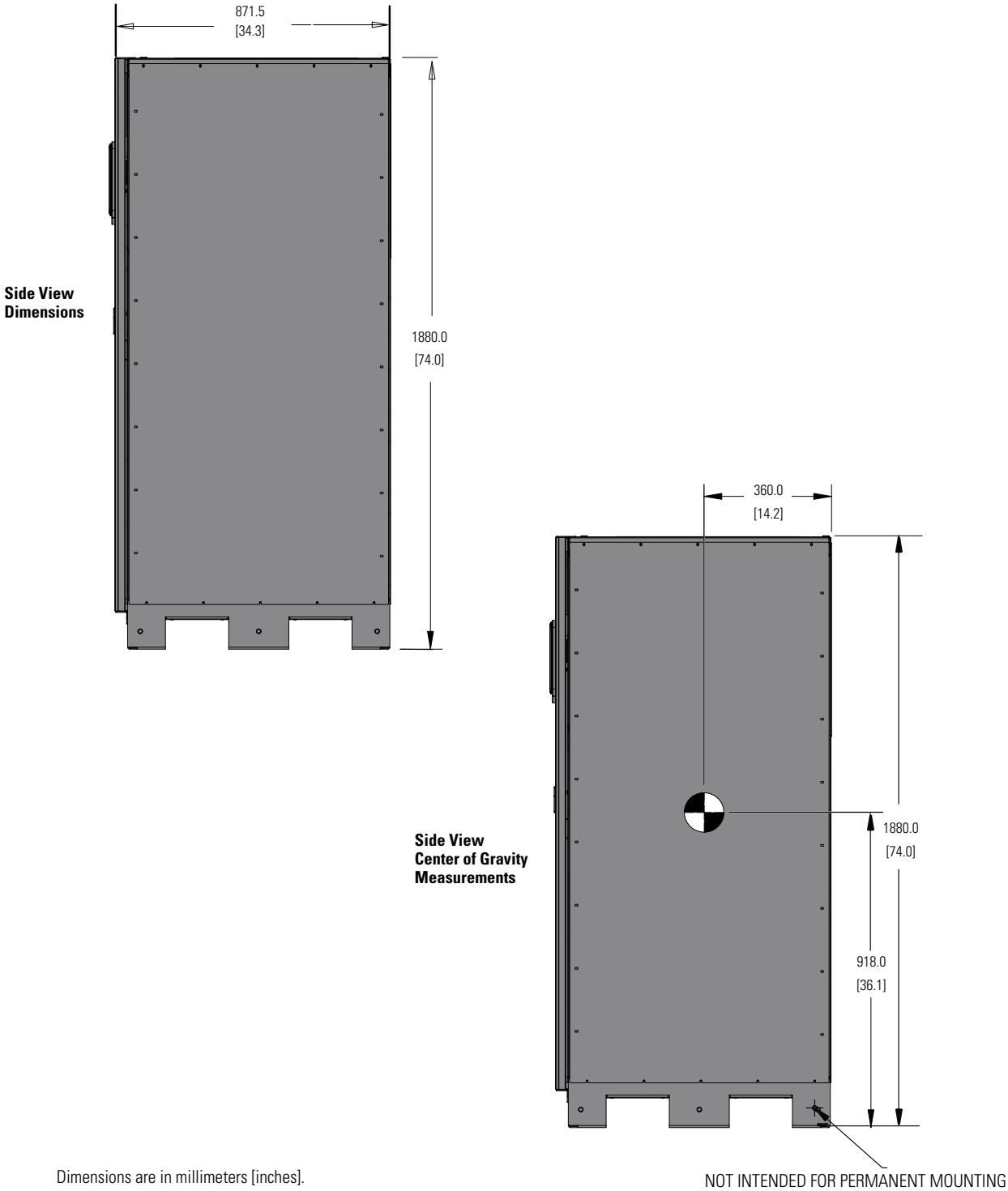



**Front View**

**600V ISBM Section with 2 x UPM Section and Upgraded with 1 Field Installed UPM**

Dimensions are in millimeters [inches].

**Figure 17. Side View Dimensions and Center of Gravity Measurements**




Dimensions are in millimeters [inches].

### 3.2.6 UPS System Power Wiring Preparation

Read and understand the following notes while planning and performing the installation:

- Refer to national and local electrical codes for acceptable external wiring practices.
- To allow for future kVA upgrades, consider installing a derated UPS using wiring and external overcurrent protection breakers sized for a fully rated UPS.
- For external wiring, use 75 °C copper or aluminum wire. Wire sizes listed in Table 7 through Table 18 are for copper wiring only. If wire is run in an ambient temperature greater than 30 °C, higher temperature wire and/or larger size wire may be necessary. Wire sizes are based on using the specified breakers.
- Wire ampacities are chosen from Table 310-16 of the National Electrical Code® (NEC®). Specification is for copper wire with a 75° C rating.
- Material and labor for external wiring requirements are to be provided by designated personnel.
- If installing a maintenance bypass, a minimum of two separate feeds with upstream feeder breakers, or a single feed with two upstream feeder breakers, must be provided: one for the UPS or rectifier input breaker (RIB) (if installed) and one for the maintenance bypass input. DO NOT use a single feed or a single feeder breaker to supply both the UPS or RIB and the maintenance bypass. If a bypass input breaker (BIB) is installed in the maintenance bypass and a single-feed UPS is being installed, a single feed to the maintenance bypass is acceptable for supplying both the UPS and the bypass.
- The bypass and rectifier feeds into this equipment use three wires. The phases must be symmetrical about ground (from a Wye source) for proper equipment operation.
- The Eaton 9395P-600 600V and 480V unit is designed for operation on a grounded-wye source of supply. There is no additional connection point for a neutral conductor. The output of this UPS will not directly support phase to neutral loads.
- The ISBM and UPM sections are shipped with debris shields covering the ventilation grills on top of the sections. Do not remove the debris shields until installation is complete. However, remove the shields before operating the UPS. Once the debris shields are removed, do not place objects on the ventilation grills.
- In a common battery system, all UPMs are powered from one common battery source. In a separate battery system, each UPM is powered from separate battery sources.
- UPSs in distributed bypass and parallel systems must use a separate battery system for each UPS.
- On a UPS configured as an Input Output Module (IOM), requirements for bypass input wiring, termination, conduit, and bypass breaker are not applicable.

If the power rating listed on the nameplate of the installed UPS is not found in the following tables, wire the UPS using the fully rated specifications. Otherwise, calculate the required wire, conduit, and breaker sizes using the following guidelines in addition to those already listed in paragraph 3.2.6 *UPS System Power Wiring Preparation*:

- Select wire size according to the UPS nameplate.
- Do not use wire larger than the largest size listed in Table 7 through Table 18.
- Use terminal recommendations from Table 7 through Table 18.
- Size and number of conduits must not exceed those listed in Table 23 through Table 31.
- Select overcurrent protection input, battery, and output breakers according to the UPS nameplate rated for either 80% or 100%.
- Follow all applicable NEC and local codes.

Wire sizes listed are for copper wiring only.

**Table 7. 600V Input/Output Ratings and External Wiring Recommendations for the One/Two/Three UPM Common Battery**

| Basic Unit Rating | | Units | Rating 50/60 Hz | | | | |
|---|---|---|---|---|---|---|---|
| | | kVA | 300 | 400 | 450 | 500 | 550 |
| | | kW | 300 | 400 | 450 | 500 | 550 |
| **Input and Output Voltage** | | Volts | 600 | 600 | 600 | 600 | 600 |
| **AC Input to UPS Rectifier (0.98 Minimum pF)**<br>Full load current plus battery recharge current<br>(3) Phases, (1) Ground | **A** | Amps | 360 | 480 | 541 | 600 | 640 |
| Minimum Conductor Size<br>Number per Phase | **A** | AWG or kcmil (each) | 3/0 (2) or 1/0 (3) | 300 (2) or 3/0 (3) | 400 (2) or 4/0 (3) | 400 (2) or 4/0 (3) | 500 (2) or 250 (3) |
| **AC Input to UPS Bypass**<br>Full Load Current<br>(3) Phases, (1) Ground | **B** | Amps | 289 | 385 | 433 | 481 | 529 |
| Minimum Conductor Size<br>Number per Phase | **B** | AWG or kcmil (each) | 400 (1) or 2/0 (2) | 4/0 (2) or 1/0 (3) | 250 (2) or 2/0 (3) | 300 (2) or 3/0 (3) | 500 (2) or 250 (3) |
| **DC Input from Battery Disconnect to UPS**<br>(1) Positive, (1) Negative | **C** | Total Amps | 676 | 901 | 1014 | 1126 | 1239 |
| Minimum Conductor Size<br>Number per Pole<br>(1) Positive, (1) Negative | **C** | AWG or kcmil (each) | 500 (2) | 500 (3) | 500 (3) | 500 (4) | 500 (5) |
| **AC Output to Critical Load**<br>Full Load Current<br>(3) Phases, (1) Ground | **D** | Amps | 289 | 385 | 433 | 481 | 529 |
| Minimum Conductor Size<br>Number per Pole | **D** | AWG or kcmil (each) | 400 (1) or 2/0 (2) | 4/0 (2) or 1/0 (3) | 250 (2) or 2/0 (3) | 300 (2) or 3/0 (3) | 500 (2) or 250 (3) |

NOTE: Callout letters **A**, **B**, **C**, and **D** map common battery systems. Callout letters **A**, **C**, and **D** map to separate battery systems. See Figure 67 through Figure 77.

NOTE: Bypass wiring data is not applicable to IOM configurations.

**Battery Conductor Sizing**: Eaton strongly recommends using the specified DC conductor size and quantity shown above for optimum system performance and battery run time.

**Battery Cable Routing Requirements**

**Conduit applications:**

* Each conduit must have a Positive, Negative, and Ground conductor.

* There must be an equal number of positive and negative conductors in a single conduit. Only one ground conductor is required in each conduit.

**Raceway applications:**

* Positive and negative battery cables must be run side by side in the raceway in an alternating pattern (+ - + - + - + -).

* There must be a ground cable running in the raceway with the battery cables.

NOTE If a 4-pole Automatic Transfer Switch (ATS) is used to connect the UPS to a generator or alternative input source, it may interrupt the UPS input neutral during its transition between sources. For the 9395P UPS:

The ATS transition must be open in both directions. The "break" time for the contacts must be at least 50 ms. This allows the UPS to operate properly, *however it is important to evaluate whether the critical load will function properly as its neutral reference is rapidly (50 ms) switched. Note also that if the UPS load is on bypass, an ATS switchover with interruption of the neutral, will interrupt the return current path and cause a loss of all phase-to-neutral loads.*

If an overlapping neutral or make-before-break ATS switch is used, the neutrals must overlap for a minimum of 50 ms during the transition.

**Table 8. 600V Input/Output Ratings and External Wiring Recommendations for the One/Two/Three UPM Separate Battery**

| Basic Unit Rating | | Units | Rating 50/60 Hz | | | | |
|---|---|---|---|---|---|---|---|
| | | kVA | 300 | 400 | 450 | 500 | 550 |
| | | kW | 300 | 400 | 450 | 500 | 550 |
| **Input and Output Voltage** | | Volts | 600 | 600 | 600 | 600 | 600 |
| **AC Input to UPS Rectifier (0.98 Minimum pF)**<br>Full load current plus battery recharge current<br>(3) Phases, (1) Ground | **A** | Amps | 360 | 480 | 542 | 600 | 640 |
| Minimum Conductor Size<br>Number per Phase | **A** | AWG or kcmil (each) | 3/0 (2) or 1/0 (3) | 300 (2) or 3/0 (3) | 400 (2) or 4/0 (3) | 400 (2) or 4/0 (3) | 500 (2) or 250 (3) |
| **AC Input to UPS Bypass**<br>Full Load Current<br>(3) Phases, (1) Ground | **B** | Amps | 289 | 385 | 433 | 481 | 529 |
| Minimum Conductor Size<br>Number per Phase | **B** | AWG or kcmil (each) | 400 (1) or 2/0 (2) | 4/0 (2) or 1/0 (3) | 250 (2) or 2/0 (3) | 300 (2) or 3/0 (3) | 500 (2) or 250 (3) |
| **DC Input from Battery Disconnect to UPS**<br>(1) Positive, (1) Negative | **C** | Total Amps | 620 | 920 | 620 | 620 | 620 |
| Minimum Conductor Size<br>Number per Pole<br>(1) Positive, (1) Negative | **C** | AWG or kcmil (each) | 500 (2) | 500 (2) | 500 (2) | 500 (2) | 500 (2) |
| **AC Output to Critical Load**<br>Full Load Current<br>(3) Phases, (1) Ground | **D** | Amps | 289 | 385 | 433 | 481 | 529 |
| Minimum Conductor Size<br>Number per Pole | **D** | AWG or kcmil (each) | 400 (1) or 2/0 (2) | 4/0 (2) or 1/0 (3) | 250 (2) or 2/0 (3) | 300 (2) or 3/0 (3) | 500 (2) or 250 (3) |

NOTE: Callout letters **A**, **B**, **C**, and **D** map common battery systems. Callout letters **A**, **C**, and **D** map to separate battery systems. See Figure 67 through Figure 77.

NOTE: Bypass wiring data is not applicable to IOM configurations.

**Battery Conductor Sizing**: Eaton strongly recommends using the specified DC conductor size and quantity shown above for optimum system performance and battery run time.

**Battery Cable Routing Requirements**

**Conduit applications:**

* Each conduit must have a Positive, Negative, and Ground conductor.

* There must be an equal number of positive and negative conductors in a single conduit. Only one ground conductor is required in each conduit.

**Raceway applications:**

* Positive and negative battery cables must be run side by side in the raceway in an alternating pattern (+ - + - + - + -).

* There must be a ground cable running in the raceway with the battery cables.

NOTE If a 4-pole Automatic Transfer Switch (ATS) is used to connect the UPS to a generator or alternative input source, it may interrupt the UPS input neutral during its transition between sources. For the 9395P UPS:

The ATS transition must be open in both directions. The "break" time for the contacts must be at least 50 ms. This allows the UPS to operate properly, *however it is important to evaluate whether the critical load will function properly as its neutral reference is rapidly (50 ms) switched. Note also that if the UPS load is on bypass, an ATS switchover with interruption of the neutral, will interrupt the return current path and cause a loss of all phase-to-neutral loads.*

If an overlapping neutral or make-before-break ATS switch is used, the neutrals must overlap for a minimum of 50 ms during the transition.

**Table 9. 575V Input/Output Ratings and External Wiring Recommendations for the One/Two/Three UPM Common Battery**

| Basic Unit Rating | | Units | Rating 50/60 Hz | | | | |
|---|---|---|---|---|---|---|---|
| | | kVA | 300 | 400 | 450 | 500 | 550 |
| | | kW | 300 | 400 | 450 | 500 | 550 |
| **Input and Output Voltage** | | Volts | 575 | 575 | 575 | 575 | 575 |
| **AC Input to UPS Rectifier (0.98 Minimum pF)**<br>Full load current plus battery recharge current<br>(3) Phases, (1) Ground | **A** | Amps | 360 | 480 | 541 | 600 | 640 |
| Minimum Conductor Size<br>Number per Phase | **A** | AWG or kcmil (each) | 3/0 (2) or 1/0 (3) | 300 (2) or 3/0 (3) | 400 (2) or 4/0 (3) | 400 (2) or 4/0 (3) | 500 (2) or 250 (3) |
| **AC Input to UPS Bypass**<br>Full Load Current<br>(3) Phases, (1) Ground | **B** | Amps | 301 | 402 | 452 | 502 | 552 |
| Minimum Conductor Size<br>Number per Phase | **B** | AWG or kcmil (each) | 350 (1) or 1/0 (2) | 4/0 (2) or 1/0 (3) | 250 (2) or 2/0 (3) | 300 (2) or 3/0 (3) | 350 (2) or 4/0 (3) |
| **DC Input from Battery Disconnect to UPS**<br>(1) Positive, (1) Negative | **C** | Total Amps | 676 | 877 | 1014 | 1096 | 1206 |
| Minimum Conductor Size<br>Number per Pole<br>(1) Positive, (1) Negative | **C** | AWG or kcmil (each) | 500 (2) | 500 (3) | 500 (3) | 500 (4) | 500 (5) |
| **AC Output to Critical Load**<br>Full Load Current<br>(3) Phases, (1) Ground | **D** | Amps | 301 | 402 | 452 | 502 | 552 |
| Minimum Conductor Size<br>Number per Pole | **D** | AWG or kcmil (each) | 350 (1) or 1/0 (2) | 4/0 (2) or 1/0 (3) | 250 (2) or 2/0 (3) | 300 (2) or 3/0 (3) | 350 (2) or 250 (3) |

NOTE: Callout letters **A**, **B**, **C**, and **D** map common battery systems. Callout letters **A**, **C**, and **D** map to separate battery systems. See Figure 67 through Figure 77.

NOTE: Bypass wiring data is not applicable to IOM configurations.

**Battery Conductor Sizing**: Eaton strongly recommends using the specified DC conductor size and quantity shown above for optimum system performance and battery run time.

**Battery Cable Routing Requirements**

**Conduit applications:**

* Each conduit must have a Positive, Negative, and Ground conductor.

* There must be an equal number of positive and negative conductors in a single conduit. Only one ground conductor is required in each conduit.

**Raceway applications:**

* Positive and negative battery cables must be run side by side in the raceway in an alternating pattern (+ - + - + - + -).

* There must be a ground cable running in the raceway with the battery cables.

NOTE If a 4-pole Automatic Transfer Switch (ATS) is used to connect the UPS to a generator or alternative input source, it may interrupt the UPS input neutral during its transition between sources. For the 9395P UPS:

The ATS transition must be open in both directions. The "break" time for the contacts must be at least 50 ms. This allows the UPS to operate properly, *however it is important to evaluate whether the critical load will function properly as its neutral reference is rapidly (50 ms) switched. Note also that if the UPS load is on bypass, an ATS switchover with interruption of the neutral, will interrupt the return current path and cause a loss of all phase-to-neutral loads.*

If an overlapping neutral or make-before-break ATS switch is used, the neutrals must overlap for a minimum of 50 ms during the transition.

**Table 10. 575V Input/Output Ratings and External Wiring Recommendations for the One/Two/Three UPM Separate Battery**

| Basic Unit Rating | | Units | Rating 50/60 Hz | | | | |
|---|---|---|---|---|---|---|---|
| | | kVA | 300 | 400 | 450 | 500 | 550 |
| | | kW | 300 | 400 | 450 | 500 | 550 |
| **Input and Output Voltage** | | Volts | 575 | 575 | 575 | 575 | 575 |
| **AC Input to UPS Rectifier (0.98 Minimum pF)**<br>Full load current plus battery recharge current<br>(3) Phases, (1) Ground | **A** | Amps | 360 | 480 | 541 | 600 | 640 |
| Minimum Conductor Size<br>Number per Phase | **A** | AWG or kcmil (each) | 3/0 (1) or 1/0 (3) | 300 (2) or 3/0 (3) | 400 (2) or 4/0 (3) | 400 (2) or 4/0 (3) | 500 (2) or 250 (3) |
| **AC Input to UPS Bypass**<br>Full Load Current<br>(3) Phases, (1) Ground | **B** | Amps | 301 | 402 | 452 | 502 | 552 |
| Minimum Conductor Size<br>Number per Phase | **B** | AWG or kcmil (each) | 350 (1) or 1/0 (2) | 4/0 (2) or 1/0 (3) | 250 (2) or 2/0 (3) | 300 (2) or 3/0 (3) | 350 (2) or 4/0 (3) |
| **DC Input from Battery Disconnect to UPS**<br>(1) Positive, (1) Negative | **C** | Total Amps | 620 | 620 | 620 | 620 | 620 |
| Minimum Conductor Size<br>Number per Pole | **C** | AWG or kcmil (each) | 500 (2) | 500 (2) | 500 (2) | 500 (2) | 500 (2) |
| **AC Output to Critical Load**<br>Full Load Current<br>(3) Phases, (1) Ground | **D** | Amps | 301 | 402 | 452 | 502 | 552 |
| Minimum Conductor Size<br>Number per Pole | **D** | AWG or kcmil (each) | 350 (1) or 1/0 (2) | 4/0 (2) or 1/0 (3) | 250 (2) or 2/0 (3) | 300 (2) or 3/0 (3) | 350 (2) or 4/0 (3) |

NOTE: Callout letters **A**, **B**, **C**, and **D** map common battery systems. Callout letters **A**, **C**, and **D** map to separate battery systems. See Figure 67 through Figure 77.

NOTE: Bypass wiring data is not applicable to IOM configurations.

**Battery Conductor Sizing**: Eaton strongly recommends using the specified DC conductor size and quantity shown above for optimum system performance and battery run time.

**Battery Cable Routing Requirements**

**Conduit applications:**

* Each conduit must have a Positive, Negative, and Ground conductor.
* There must be an equal number of positive and negative conductors in a single conduit. Only one ground conductor is required in each conduit.

**Raceway applications:**

* Positive and negative battery cables must be run side by side in the raceway in an alternating pattern (+ - + - + - + -).
* There must be a ground cable running in the raceway with the battery cables.

NOTE If a 4-pole Automatic Transfer Switch (ATS) is used to connect the UPS to a generator or alternative input source, it may interrupt the UPS input neutral during its transition between sources. For the 9395P UPS:

The ATS transition must be open in both directions. The "break" time for the contacts must be at least 50 ms. This allows the UPS to operate properly, *however it is important to evaluate whether the critical load will function properly as its neutral reference is rapidly (50 ms) switched. Note also that if the UPS load is on bypass, an ATS switchover with interruption of the neutral, will interrupt the return current path and cause a loss of all phase-to-neutral loads.*

If an overlapping neutral or make-before-break ATS switch is used, the neutrals must overlap for a minimum of 50 ms during the transition.

**Table 11. 480V Input/Output Ratings and External Wiring Recommendations for the One/Two/Three UPM Common Battery**

| Basic Unit Rating | | Units | Rating 50/60 Hz | | | | |
|---|---|---|---|---|---|---|---|
| | | kVA | 400 | 450 | 500 | 550 | 600 |
| | | kW | 400 | 450 | 500 | 550 | 600 |
| **Input and Output Voltage** | | Volts | 480/480 | 480/480 | 480/480 | 480/480 | 480/480 |
| **AC Input to UPS Rectifier (0.98 Minimum pF)**<br>Full load current plus battery recharge current<br>(3) Phases, (1) Ground | **A** | Amps | 594 | 668 | 742 | 817 | 891 |
| Minimum Conductor Size<br>Number per Phase | | AWG or kcmil<br>(each) | 350<br>(3) | 350<br>(3) | 350<br>(3) | 350<br>(4) | 350<br>(4) |
| **AC Input to UPS Bypass**<br>Full Load Current<br>(3) Phases, (1) Ground | **B** | Amps | 481 | 541 | 601 | 662 | 722 |
| Minimum Conductor Size<br>Number per Phase | | AWG or kcmil<br>(each) | 350<br>(3) | 350<br>(3) | 350<br>(3) | 350<br>(3) | 350<br>(3) |
| **DC Input from Battery Disconnect to UPS**<br>(1) Positive, (1) Negative | **C** | Total Amps | 877 | 987 | 1096 | 1206 | 1316 |
| Minimum Conductor Size<br>Number per Pole | | AWG or kcmil<br>(each) | 500<br>(6) | 500<br>(6) | 500<br>(6) | 500<br>(6) | 500<br>(6) |
| **AC Output to Critical Load**<br>Full Load Current<br>(3) Phases, (1) Ground | **D** | Amps | 481 | 541 | 601 | 662 | 722 |
| Minimum Conductor Size<br>Number per Pole | | AWG or kcmil<br>(each) | 350<br>(3) | 350<br>(3) | 350<br>(3) | 350<br>(3) | 350<br>(3) |

NOTE: Callout letters **A**, **B**, **C**, and **D** map common battery systems. Callout letters **A**, **C**, and **D** map to separate battery systems. See Figure 67 through Figure 77

NOTE: Bypass wiring data is not applicable to IOM configurations.

**Battery Conductor Sizing**: Eaton strongly recommends using the specified DC conductor size and quantity shown above for optimum system performance and battery run time.

**Battery Cable Routing Requirements**

**Conduit applications:**

* Each conduit must have a Positive, Negative, and Ground conductor.

* There must be an equal number of positive and negative conductors in a single conduit. Only one ground conductor is required in each conduit.

**Raceway applications:**

* Positive and negative battery cables must be run side by side in the raceway in an alternating pattern (+ - + - + - + -).

* There must be a ground cable running in the raceway with the battery cables.

NOTE If a 4-pole Automatic Transfer Switch (ATS) is used to connect the UPS to a generator or alternative input source, it may interrupt the UPS input neutral during its transition between sources. For the 9395P UPS:

The ATS transition must be open in both directions. The "break" time for the contacts must be at least 50 ms. This allows the UPS to operate properly, *however it is important to evaluate whether the critical load will function properly as its neutral reference is rapidly (50 ms) switched. Note also that if the UPS load is on bypass, an ATS switchover with interruption of the neutral, will interrupt the return current path and cause a loss of all phase-to-neutral loads.*

If an overlapping neutral or make-before-break ATS switch is used, the neutrals must overlap for a minimum of 50 ms during the transition.

**Table 12. 480 Input/Output Ratings and External Wiring Requirements for the One/Two UPM Separate Battery**

| Basic Unit Rating | | Units | Rating 50/60 Hz | | | | |
|---|---|---|---|---|---|---|---|
| | | kVA<br>kW | 400<br>400 | 450<br>450 | 500<br>500 | 550<br>550 | 600<br>600 |
| **Input and Output Voltage** | | Volts | 480/480 | 480/480 | 480/480 | 480/480 | 480/480 |
| **AC Input to UPS Rectifier (0.98 Minimum pF)**<br>Full load current plus battery recharge current<br>(3) Phases, (1) Ground | **A** | Amps | 594 | 668 | 742 | 817 | 891 |
| Minimum Conductor Size<br>Number per Phase | | AWG or kcmil<br>(each) | 350<br>(3) | 350<br>(3) | 350<br>(3) | 350<br>(4) | 350<br>(4) |
| **AC Input to UPS Bypass**<br>Full Load Current<br>(3) Phases, (1) Ground | **B** | Amps | 481 | 541 | 601 | 662 | 722 |
| Minimum Conductor Size<br>Number per Phase | | AWG or kcmil<br>(each) | 350<br>(3) | 350<br>(3) | 350<br>(3) | 350<br>(3) | 350<br>(3) |
| **DC Input from Battery Disconnect to Each UPS UPM**<br>(1) Positive, (1) Negative | **C** | Total Amps | 603 | 603 | 603 | 603 | 658 |
| Minimum Conductor Size<br>Number per Pole<br>(1) Positive, (1) Negative | | AWG or kcmil<br>(each) | 500<br>(3) | 500<br>(3) | 500<br>(3) | 500<br>(3) | 500<br>(3) |
| **AC Output to Critical Load**<br>Full Load Current<br>(3) Phases, (1) Ground | **D** | Amps | 481 | 541 | 601 | 662 | 722 |
| Minimum Conductor Size<br>Number per Pole | | AWG or kcmil<br>(each) | 350<br>(3) | 350<br>(3) | 350<br>(3) | 350<br>(3) | 350<br>(3) |

NOTE: Callout letters **A**, **B**, **C**, and **D** map common battery systems. Callout letters **A**, **C**, and **D** map to separate battery systems. See Figure 67 through Figure 77.

NOTE: Bypass wiring data is not applicable to IOM configurations.

**Battery Conductor Sizing**: Eaton strongly recommends using the specified DC conductor size and quantity shown above for optimum system performance and battery run time.

**Battery Cable Routing Requirements**

**Conduit applications:**

* Each conduit must have a Positive, Negative, and Ground conductor.

* There must be an equal number of positive and negative conductors in a single conduit. Only one ground conductor is required in each conduit.

**Raceway applications:**

* Positive and negative battery cables must be run side by side in the raceway in an alternating pattern (+ - + - + - + -).

* There must be a ground cable running in the raceway with the battery cables.

NOTE If a 4-pole Automatic Transfer Switch (ATS) is used to connect the UPS to a generator or alternative input source, it may interrupt the UPS input neutral during its transition between sources. For the 9395P UPS:

The ATS transition must be open in both directions. The "break" time for the contacts must be at least 50 ms. This allows the UPS to operate properly, *however it is important to evaluate whether the critical load will function properly as its neutral reference is rapidly (50 ms) switched. Note also that if the UPS load is on bypass, an ATS switchover with interruption of the neutral, will interrupt the return current path and cause a loss of all phase-to-neutral loads.*

If an overlapping neutral or make-before-break ATS switch is used, the neutrals must overlap for a minimum of 50 ms during the transition.

**Table 13. 415V Input/Output Ratings and External Wiring Recommendations for the One/Two/Three UPM Common Battery**

| Basic Unit Rating | | Units | Rating 50/60 Hz | | | | |
|---|---|---|---|---|---|---|---|
| | | kVA<br>kW | 300<br>300 | 400<br>400 | 450<br>450 | 500<br>500 | 550<br>550 |
| **Input and Output Voltage** | | Volts | 415/415 | 415/415 | 415/415 | 415/415 | 415/415 |
| **AC Input to UPS Rectifier (0.98 Minimum pF)**<br>Full load current plus battery recharge current<br>(3) Phases, (1) Ground | **A** | Amps | 514 | 685 | 770 | 856 | 942 |
| Minimum Conductor Size<br>Number per Phase | | AWG or kcmil<br>(each) | 500<br>(2) | 500<br>(3) | 500<br>(3) | 500<br>(4) | 500<br>(4) |
| **AC Input to UPS Bypass (Five Wire)**<br>Full Load Current<br>3) Phases, (1) Neutral, (1) Ground | **B** | Amps | 417 | 556 | 626 | 696 | 765 |
| Minimum Conductor Size<br>Number per Phase | | AWG or kcmil<br>(each) | 350<br>(2) | 300<br>(3) | 350<br>(3) | 500<br>(3) | 500<br>(3) |
| **DC Input from Battery Disconnect to UPS**<br>(1) Positive, (1) Negative | **C** | Total Amps | 658 | 877 | 987 | 1096 | 1206 |
| Minimum Conductor Size<br>Number per Pole<br>(1) Positive, (1) Negative | | AWG or kcmil<br>(each) | 500<br>(2) | 500<br>(3) | 500<br>(3) | 500<br>(4) | 500<br>(5) |
| **AC Output to Critical Load (Five Wire)**<br>Full Load Current<br>3) Phases, (1) Neutral, (1) Ground | **D** | Amps | 417 | 556 | 626 | 696 | 765 |
| Minimum Conductor Size<br>Number per Pole | | AWG or kcmil<br>(each) | 350<br>(2) | 300<br>(3) | 350<br>(3) | 500<br>(3) | 500<br>(3) |

NOTE: Callout letters **A**, **B**, **C**, and **D** map common battery systems. Callout letters **A**, **C**, and **D** map to separate battery systems. See Figure 67 through Figure 77.

NOTE: Bypass wiring data is not applicable to IOM configurations.

**Battery Conductor Sizing**: Eaton strongly recommends using the specified DC conductor size and quantity shown above for optimum system performance and battery run time.

**Battery Cable Routing Requirements**

**Conduit applications:**

* Each conduit must have a Positive, Negative, and Ground conductor.

* There must be an equal number of positive and negative conductors in a single conduit. Only one ground conductor is required in each conduit.

**Raceway applications:**

* Positive and negative battery cables must be run side by side in the raceway in an alternating pattern (+ - + - + - + -).

* There must be a ground cable running in the raceway with the battery cables.

NOTE If a 4-pole Automatic Transfer Switch (ATS) is used to connect the UPS to a generator or alternative input source, it may interrupt the UPS input neutral during its transition between sources. For the 9395P UPS:

The ATS transition must be open in both directions. The "break" time for the contacts must be at least 50 ms. This allows the UPS to operate properly, *however it is important to evaluate whether the critical load will function properly as its neutral reference is rapidly (50 ms) switched. Note also that if the UPS load is on bypass, an ATS switchover with interruption of the neutral, will interrupt the return current path and cause a loss of all phase-to-neutral loads.*

If an overlapping neutral or make-before-break ATS switch is used, the neutrals must overlap for a minimum of 50 ms during the transition.

**Table 14. 415V Input/Output Ratings and External Wiring Recommendations for the One/Two/Three UPM Separate Battery**

| Basic Unit Rating | | Units | Rating 50/60 Hz | | | | |
|---|---|---|---|---|---|---|---|
| | | kVA<br>kW | 300<br>300 | 400<br>400 | 450<br>450 | 500<br>500 | 550<br>550 |
| **Input and Output Voltage** | | Volts | 415/415 | 415/415 | 415/415 | 415/415 | 415/415 |
| **AC Input to UPS Rectifier (0.98 Minimum pF)**<br>Full load current plus battery recharge current<br>(3) Phases, (1) Ground | **A** | Amps | 514 | 685 | 770 | 856 | 942 |
| Minimum Conductor Size<br>Number per Phase | | AWG or kcmil<br>(each) | 500<br>(2) | 500<br>(3) | 500<br>(3) | 500<br>(4) | 500<br>(4) |
| **AC Input to UPS Bypass (Five Wire)**<br>Full Load Current<br>3) Phases, (1) Neutral, (1) Ground | **B** | Amps | 417 | 556 | 626 | 696 | 765 |
| Minimum Conductor Size<br>Number per Phase | | AWG or kcmil<br>(each) | 350<br>(2) | 300<br>(3) | 350<br>(3) | 500<br>(3) | 500<br>(3) |
| **DC Input from Each Battery Disconnect to Each UPS UPM**<br>(1) Positive, (1) Negative | **C** | Amps per UPM | 603 | 603 | 603 | 603 | 603 |
| Minimum Conductor Size<br>Number per Pole<br>(1) Positive, (1) Negative | | AWG or kcmil<br>(each) | 500<br>(2) | 500<br>(2) | 500<br>(2) | 500<br>(2) | 500<br>(2) |
| **AC Output to Critical Load (Five Wire)**<br>Full Load Current<br>3) Phases, (1) Neutral, (1) Ground | **D** | Amps | 417 | 556 | 626 | 696 | 765 |
| Minimum Conductor Size<br>Number per Pole | | AWG or kcmil<br>(each) | 350<br>(2) | 300<br>(3) | 350<br>(3) | 500<br>(3) | 500<br>(3) |

NOTE: Callout letters **A**, **B**, **C**, and **D** map common battery systems. Callout letters **A**, **C**, and **D** map to separate battery systems. See Figure 67 through Figure 77.

NOTE: Bypass wiring data is not applicable to IOM configurations.

**Battery Conductor Sizing**: Eaton strongly recommends using the specified DC conductor size and quantity shown above for optimum system performance and battery run time.

**Battery Cable Routing Requirements**

**Conduit applications:**

* Each conduit must have a Positive, Negative, and Ground conductor.

* There must be an equal number of positive and negative conductors in a single conduit. Only one ground conductor is required in each conduit.

**Raceway applications:**

* Positive and negative battery cables must be run side by side in the raceway in an alternating pattern (+ - + - + - + -).

* There must be a ground cable running in the raceway with the battery cables.

NOTE If a 4-pole Automatic Transfer Switch (ATS) is used to connect the UPS to a generator or alternative input source, it may interrupt the UPS input neutral during its transition between sources. For the 9395P UPS:

The ATS transition must be open in both directions. The "break" time for the contacts must be at least 50 ms. This allows the UPS to operate properly, *however it is important to evaluate whether the critical load will function properly as its neutral reference is rapidly (50 ms) switched. Note also that if the UPS load is on bypass, an ATS switchover with interruption of the neutral, will interrupt the return current path and cause a loss of all phase-to-neutral loads.*

If an overlapping neutral or make-before-break ATS switch is used, the neutrals must overlap for a minimum of 50 ms during the transition.

**Table 15. 400V Input/Output Ratings and External Wiring Recommendations for the One/Two/Three UPM Common Battery**

| Basic Unit Rating | | Units | Rating 50/60 Hz | | | | |
|---|---|---|---|---|---|---|---|
| | | kVA<br>kW | 300<br>300 | 400<br>400 | 450<br>450 | 500<br>500 | 550<br>550 |
| **Input and Output Voltage** | | Volts | 400/400 | 400/400 | 400/400 | 400/400 | 400/400 |
| **AC Input to UPS Rectifier (0.98 Minimum pF)**<br>Full load current plus battery recharge current<br>(3) Phases, (1) Ground | **A** | Amps | 533 | 710 | 799 | 888 | 960 |
| Minimum Conductor Size<br>Number per Phase | | AWG or kcmil<br>(each) | 500<br>(2) | 500<br>(3) | 500<br>(3) | 500<br>(4) | 500<br>(5) |
| **AC Input to UPS Bypass (Five Wire)**<br>Full Load Current<br>3) Phases, (1) Neutral, (1) Ground | **B** | Amps | 433 | 577 | 650 | 722 | 794 |
| Minimum Conductor Size<br>Number per Phase | | AWG or kcmil<br>(each) | 350<br>(2) | 300<br>(3) | 350<br>(3) | 500<br>(3) | 500<br>(3) |
| **DC Input from Battery Disconnect to UPS**<br>(1) Positive, (1) Negative | **C** | Total Amps | 658 | 877 | 987 | 1096 | 1206 |
| Minimum Conductor Size<br>Number per Pole<br>(1) Positive, (1) Negative | | AWG or kcmil<br>(each) | 500<br>(2) | 500<br>(3) | 500<br>(3) | 500<br>(4) | 500<br>(5) |
| **AC Output to Critical Load (Five Wire)**<br>Full Load Current<br>3) Phases, (1) Neutral, (1) Ground | **D** | Amps | 433 | 577 | 650 | 722 | 794 |
| Minimum Conductor Size<br>Number per Pole | | AWG or kcmil<br>(each) | 350<br>(2) | 300<br>(3) | 350<br>(3) | 500<br>(3) | 500<br>(3) |

NOTE: Callout letters **A**, **B**, **C**, and **D** map common battery systems. Callout letters **A**, **C**, and **D** map to separate battery systems. See Figure 67 through Figure 77.

NOTE: Bypass wiring data is not applicable to IOM configurations.

**Battery Conductor Sizing**: Eaton strongly recommends using the specified DC conductor size and quantity shown above for optimum system performance and battery run time.

**Battery Cable Routing Requirements**

**Conduit applications:**

* Each conduit must have a Positive, Negative, and Ground conductor.

* There must be an equal number of positive and negative conductors in a single conduit. Only one ground conductor is required in each conduit.

**Raceway applications:**

* Positive and negative battery cables must be run side by side in the raceway in an alternating pattern (+ - + - + - + -).

* There must be a ground cable running in the raceway with the battery cables.

NOTE If a 4-pole Automatic Transfer Switch (ATS) is used to connect the UPS to a generator or alternative input source, it may interrupt the UPS input neutral during its transition between sources. For the 9395P UPS:

The ATS transition must be open in both directions. The "break" time for the contacts must be at least 50 ms. This allows the UPS to operate properly, *however it is important to evaluate whether the critical load will function properly as its neutral reference is rapidly (50 ms) switched. Note also that if the UPS load is on bypass, an ATS switchover with interruption of the neutral, will interrupt the return current path and cause a loss of all phase-to-neutral loads.*

If an overlapping neutral or make-before-break ATS switch is used, the neutrals must overlap for a minimum of 50 ms during the transition.

**Table 16. 400V Input/Output Ratings and External Wiring Recommendations for the One/Two/Three UPM Separate Battery**

| Basic Unit Rating | | Units | Rating 50/60 Hz | | | | |
|---|---|---|---|---|---|---|---|
| | | kVA<br>kW | 300<br>300 | 400<br>400 | 450<br>450 | 500<br>500 | 550<br>550 |
| **Input and Output Voltage** | | Volts | 400/400 | 400/400 | 400/400 | 400/400 | 400/400 |
| **AC Input to UPS Rectifier (0.98 Minimum pF)**<br>Full load current plus battery recharge current<br>(3) Phases, (1) Ground | **A** | Amps | 533 | 710 | 799 | 888 | 960 |
| Minimum Conductor Size<br>Number per Phase | | AWG or kcmil<br>(each) | 500<br>(2) | 500<br>(3) | 500<br>(3) | 500<br>(4) | 500<br>(5) |
| **AC Input to UPS Bypass (Five Wire)**<br>Full Load Current<br>3) Phases, (1) Neutral, (1) Ground | **B** | Amps | 433 | 577 | 650 | 722 | 794 |
| Minimum Conductor Size<br>Number per Phase | | AWG or kcmil<br>(each) | 350<br>(2) | 300<br>(3) | 350<br>(3) | 500<br>(3) | 500<br>(3) |
| **DC Input from Each Battery Disconnect to Each UPS UPM**<br>(1) Positive, (1) Negative | **C** | Total Amps | 603 | 603 | 603 | 603 | 603 |
| Minimum Conductor Size<br>Number per Pole<br>(1) Positive, (1) Negative | | AWG or kcmil<br>(each) | 500<br>(2) | 500<br>(2) | 500<br>(2) | 500<br>(2) | 500<br>(2) |
| **AC Output to Critical Load (Five Wire)**<br>Full Load Current<br>3) Phases, (1) Neutral, (1) Ground | **D** | Amps | 433 | 577 | 650 | 722 | 794 |
| Minimum Conductor Size<br>Number per Pole | | AWG or kcmil<br>(each) | 350<br>(2) | 300<br>(3) | 350<br>(3) | 500<br>(3) | 500<br>(3) |

NOTE: Callout letters **A**, **B**, **C**, and **D** map common battery systems. Callout letters **A**, **C**, and **D** map to separate battery systems. See Figure 67 through Figure 77.

NOTE: Bypass wiring data is not applicable to IOM configurations.

**Battery Conductor Sizing**: Eaton strongly recommends using the specified DC conductor size and quantity shown above for optimum system performance and battery run time.

**Battery Cable Routing Requirements**

**Conduit applications:**

* Each conduit must have a Positive, Negative, and Ground conductor.

* There must be an equal number of positive and negative conductors in a single conduit. Only one ground conductor is required in each conduit.

**Raceway applications:**

* Positive and negative battery cables must be run side by side in the raceway in an alternating pattern (+ - + - + - + -).

* There must be a ground cable running in the raceway with the battery cables.

NOTE If a 4-pole Automatic Transfer Switch (ATS) is used to connect the UPS to a generator or alternative input source, it may interrupt the UPS input neutral during its transition between sources. For the 9395P UPS:

The ATS transition must be open in both directions. The "break" time for the contacts must be at least 50 ms. This allows the UPS to operate properly, *however it is important to evaluate whether the critical load will function properly as its neutral reference is rapidly (50 ms) switched. Note also that if the UPS load is on bypass, an ATS switchover with interruption of the neutral, will interrupt the return current path and cause a loss of all phase-to-neutral loads.*

If an overlapping neutral or make-before-break ATS switch is used, the neutrals must overlap for a minimum of 50 ms during the transition.

**Table 17. 380V Input/Output Ratings and External Wiring Recommendations for the One/Two/Three UPM Common Battery**

| Basic Unit Rating | | Units | Rating 50/60 Hz | | | | |
|---|---|---|---|---|---|---|---|
| | | kVA<br>kW | 300<br>300 | 400<br>400 | 450<br>450 | 500<br>500 | 550<br>550 |
| **Input and Output Voltage** | | Volts | 380/380 | 380/380 | 380/380 | 380/380 | 380/380 |
| **AC Input to UPS Rectifier (0.98 Minimum pF)**<br>Full load current plus battery recharge current<br>(3) Phases, (1) Ground | **A** | Amps | 545 | 727 | 800 | 909 | 960 |
| Minimum Conductor Size<br>Number per Phase | | AWG or kcmil<br>(each) | 300<br>(3) | 500<br>(3) | 500<br>(3) | 500<br>(4) | 500<br>(5) |
| **AC Input to UPS Bypass (Five Wire)**<br>Full Load Current<br>3) Phases, (1) Neutral, (1) Ground | **B** | Amps | 456 | 608 | 684 | 760 | 836 |
| Minimum Conductor Size<br>Number per Phase | | AWG or kcmil<br>(each) | 400<br>(2) | 350<br>(3) | 500<br>(3) | 500<br>(3) | 500<br>(4) |
| **DC Input from Battery Disconnect to UPS**<br>(1) Positive, (1) Negative | **C** | Total Amps | 658 | 877 | 987 | 1096 | 1206 |
| Minimum Conductor Size<br>Number per Pole<br>(1) Positive, (1) Negative | | AWG or kcmil<br>(each) | 500<br>(2) | 500<br>(3) | 500<br>(3) | 500<br>(4) | 500<br>(5) |
| **AC Output to Critical Load (Five Wire)**<br>Full Load Current<br>3) Phases, (1) Neutral, (1) Ground | **D** | Amps | 456 | 608 | 684 | 760 | 836 |
| Minimum Conductor Size<br>Number per Pole | | AWG or kcmil<br>(each) | 400<br>(2) | 350<br>(3) | 500<br>(3) | 500<br>(3) | 500<br>(4) |

NOTE: Callout letters **A**, **B**, **C**, and **D** map common battery systems. Callout letters **A**, **C**, and **D** map to separate battery systems. See Figure 67 through Figure 77.

NOTE: Bypass wiring data is not applicable to IOM configurations.

**Battery Conductor Sizing**: Eaton strongly recommends using the specified DC conductor size and quantity shown above for optimum system performance and battery run time.

**Battery Cable Routing Requirements**

**Conduit applications:**

* Each conduit must have a Positive, Negative, and Ground conductor.

* There must be an equal number of positive and negative conductors in a single conduit. Only one ground conductor is required in each conduit.

**Raceway applications:**

* Positive and negative battery cables must be run side by side in the raceway in an alternating pattern (+ - + - + - + -).

* There must be a ground cable running in the raceway with the battery cables.

NOTE If a 4-pole Automatic Transfer Switch (ATS) is used to connect the UPS to a generator or alternative input source, it may interrupt the UPS input neutral during its transition between sources. For the 9395P UPS:

The ATS transition must be open in both directions. The "break" time for the contacts must be at least 50 ms. This allows the UPS to operate properly, *however it is important to evaluate whether the critical load will function properly as its neutral reference is rapidly (50 ms) switched. Note also that if the UPS load is on bypass, an ATS switchover with interruption of the neutral, will interrupt the return current path and cause a loss of all phase-to-neutral loads.*

If an overlapping neutral or make-before-break ATS switch is used, the neutrals must overlap for a minimum of 50 ms during the transition.

**Table 18. 380V Input/Output Ratings and External Wiring Recommendations for the One/Two/Three UPM Separate Battery**

| Basic Unit Rating | | Units | Rating 50/60 Hz | | | | |
|---|---|---|---|---|---|---|---|
| | | kVA<br>kW | 300<br>300 | 400<br>400 | 450<br>450 | 500<br>500 | 550<br>550 |
| **Input and Output Voltage** | | Volts | 380/380 | 380/380 | 380/380 | 380/380 | 380/380 |
| **AC Input to UPS Rectifier (0.98 Minimum pF)**<br>Full load current plus battery recharge current<br>(3) Phases, (1) Ground | **A** | Amps | 545 | 727 | 800 | 909 | 960 |
| Minimum Conductor Size<br>Number per Phase | | AWG or kcmil<br>(each) | 300<br>(3) | 500<br>(3) | 500<br>(3) | 500<br>(4) | 500<br>(5) |
| **AC Input to UPS Bypass (Five Wire)**<br>Full Load Current<br>3) Phases, (1) Neutral, (1) Ground | **B** | Amps | 456 | 608 | 684 | 760 | 836 |
| Minimum Conductor Size<br>Number per Phase | | AWG or kcmil<br>(each) | 400<br>(2) | 350<br>(3) | 500<br>(3) | 500<br>(3) | 500<br>(4) |
| **DC Input from Battery Disconnect to UPS**<br>(1) Positive, (1) Negative | **C** | Amps per UPM | 603 | 603 | 603 | 603 | 603 |
| Minimum Conductor Size<br>Number per Pole<br>(1) Positive, (1) Negative | | AWG or kcmil<br>(each) | 500<br>(2) | 500<br>(2) | 500<br>(2) | 500<br>(2) | 500<br>(2) |
| **AC Output to Critical Load (Five Wire)**<br>Full Load Current<br>3) Phases, (1) Neutral, (1) Ground | **D** | Amps | 456 | 608 | 684 | 760 | 836 |
| Minimum Conductor Size<br>Number per Pole | | AWG or kcmil<br>(each) | 400<br>(2) | 350<br>(3) | 500<br>(3) | 500<br>(3) | 500<br>(4) |

NOTE: Callout letters **A**, **B**, **C**, and **D** map common battery systems. Callout letters **A**, **C**, and **D** map to separate battery systems. See Figure 67through Figure 77.

NOTE: Bypass wiring data is not applicable to IOM configurations.

**Battery Conductor Sizing**: Eaton strongly recommends using the specified D C conductor size and quantity shown above for optimum system performance and battery run time.

**Battery Cable Routing Requirements**

**Conduit applications:**

* Each conduit must have a Positive, Negative, and Ground conductor.

* There must be an equal number of positive and negative conductors in a single conduit. Only one ground conductor is required in each conduit.

**Raceway applications:**

* Positive and negative battery cables must be run side by side in the raceway in an alternating pattern (+ - + - + - + -).

* There must be a ground cable running in the raceway with the battery cables.

NOTE If a 4-pole Automatic Transfer Switch (ATS) is used to connect the UPS to a generator or alternative input source, it may interrupt the UPS input neutral during its transition between sources. For the 9395P UPS:

The ATS transition must be open in both directions. The "break" time for the contacts must be at least 50 ms. This allows the UPS to operate properly, *however it is important to evaluate whether the critical load will function properly as its neutral reference is rapidly (50 ms) switched. Note also that if the UPS load is on bypass, an ATS switchover with interruption of the neutral, will interrupt the return current path and cause a loss of all phase-to-neutral loads.*

If an overlapping neutral or make-before-break ATS switch is used, the neutrals must overlap for a minimum of 50 ms during the transition.

For a UPS with common rectifier input terminals, E1 through E12 are 2-hole bus bar mountings for standard NEMA 2-hole barrel lugs. The power wiring connections for this equipment are rated at 90°C. See Table 19 for external power cable terminations, Table 20 and Table 21 for supplied external wiring terminal hardware, and Table 22 for recommended installation parts and tools not supplied by Eaton.

The torque values listed in Table 19 are the maximum allowable. Tightening further will risk breaking or twisting the stud.

For a UPS with separate rectifier input terminals for the UPMs, E1 through E3 are pressure terminations, UL and CSA rated at 90°C.

**Table 19. External Power Cable Terminations for the One/Two/Three UPM**

| Terminal Function | Terminal | Function | Bus Landings (using both sides of bus) | Tightening Torque Nm (lb ft) | Bolt Size |
|---|---|---|---|---|---|
| AC Input to UPS Rectifier | E1 | Phase A | 4 – 2 bolt mounting | 76 (56) | M12 |
| | E2 | Phase B | 4 – 2 bolt mounting | 76 (56) | M12 |
| | E3 | Phase C | 4 – 2 bolt mounting | 76 (56) | M12 |
| AC Input to Bypass | E6 | Phase A | 4 – 2 bolt mounting | 76 (56) | M12 |
| | E7 | Phase B | 4 – 2 bolt mounting | 76 (56) | M12 |
| | E8 | Phase C | 4 – 2 bolt mounting | 76 (56) | M12 |
| AC Output to Critical Load | E9 | Phase A | 4 – 2 bolt mounting | 76 (56) | M12 |
| | E10 | Phase B | 4 – 2 bolt mounting | 76 (56) | M12 |
| | E11 | Phase C | 4 – 2 bolt mounting | 76 (56) | M12 |
| DC Input from Battery or Battery Disconnect to UPS – Common Battery | E4 | Battery (+) | 8 – 2 bolt mounting<br>12 – 2 bolt mounting<br>(Plus 1) | 76 (56) | M12 |
| | E5 | Battery (-) | 8 – 2 bolt mounting<br>12 – 2 bolt mounting<br>(Plus 1) | 76 (56) | M12 |
| DC Input from Battery or Battery Disconnect to UPS – Separate Battery (UPM 1) | E4 | Battery (+) | 4 – 2 bolt mounting | 76 (56) | M12 |
| | E5 | Battery (-) | 4 – 2 bolt mounting | 76 (56) | M12 |
| DC Input from Battery or Battery Disconnect to UPS – Separate Battery (UPM 2) | E4 | Battery (+) | 4 – 2 bolt mounting | 76 (56) | M12 |
| | E5 | Battery (-) | 4 – 2 bolt mounting | 76 (56) | M12 |
| DC Input from Battery or Battery Disconnect to UPS – Separate Battery (FI-UPM) | E4 | Battery (+) | 4 – 2 bolt mounting | 76 (56) | M12 |
| | E5 | Battery (-) | 4 – 2 bolt mounting | 76 (56) | M12 |
| Input and Output Neutral | E12 | Neutral | 8 – 2 bolt mounting | 22 (16) | M10 |
| Customer Ground | Ground | Ground | 7 – 2 bolt mounting | 22 (16) | M10 |

**NOTE** Customer ground, sized in accordance with NEC Table 250.122, can be run in any conduit listed in Table 24 or Table 26.

**NOTE** Bypass terminations are not applicable to IOM configurations.

**Table 20. Supplied Intercabinet Wiring Terminal Hardware Kit**

| Part | Size | Quantity | Terminals Used On | Eaton Part Number |
|---|---|---|---|---|
| Flat Washer | M8 | 36 | UPM AC Input, UPM Battery Input, UPM AC Output | 180500036-080 |
| Conical Washer | M8 | 36 | UPM AC Input, UPM Battery Input, UPM AC OutputGround and Neutral | 180500037-080 |
| Nut | M8 | 36 | UPM AC Input, UPM Battery Input, UPM AC Output | 180200001-05 |

Terminals E1 through E11 are 2-hole busbar mountings for standard NEMA 2-hole barrel lugs. The power wiring connections for this equipment are rated at 90°C. See Table 20 and Table 21 for supplied terminal hardware, for recommended installation parts and tools not supplied by Eaton, and Table 23 through Table 31 for power cable conduit sizes.

**Table 21. Supplied External Wiring Terminal Hardware Kit**

| Part | Size | Quantity | Terminals Used On | Eaton Part Number |
|---|---|---|---|---|
| Bolt, Grade 5 | M12 x 40 mm | 30 | Ground | 180190078-112 |
| Bolt, Grade 5 | M12 x 50 mm | 86 | Rectifier Input, Bypass Input, Battery Input, and Output | 180190078-115 |
| Flat Washer | M12 | 202 | Rectifier Input, Bypass Input, Battery Input, Output, and Ground | 180500036-120 |
| Conical Washer | M12 | 116 | Rectifier Input, Bypass Input, Battery Input, Output, and Ground | 180500037-120 |
| Nut | M12 | 86 | Rectifier Input, Bypass Input, Battery Input, Output, and Ground | 180200001-07 |

NOTE Bypass terminations are not applicable to IOM configurations.

**Table 22. Recommended Installation Parts and Tools (Not Supplied by Eaton)**

| Part | Size | Quantity | Manufacturer | Part Number | Notes |
|---|---|---|---|---|---|
| Long Barrel 2-Hole Lug | 2/0 AWG | As required | Thomas & Betts | 54862BE | Copper wire only |
| | 3/0 AWG | | Thomas & Betts | 54864BE | |
| | 4/0 AWG | | Thomas & Betts | 54866BE | |
| | 250 MCM | | Thomas & Betts | 54868BE | |
| | 300 MCM | | Thomas & Betts | 54870BE | |
| | 350 MCM | | Thomas & Betts | 54872BE | |
| | 400 MCM | | Thomas & Betts | 54874BE | |
| | 500 MCM | | Thomas & Betts | 54876BE | |
| Manual Hydraulic Crimp Tool | 14 Ton | 1 | Thomas & Betts | TBM14M | |
| Die Set | N/A | 1 | Thomas & Betts | 15506 | |

Conduit sizes were chosen from NEC Table 4, Electrical Metallic Tubing (EMT). See Table 18 through Table 26 for conduit requirements.

Per NEC article 300, 3(B)(1), all three-phase conductors must be run in the same conduit.

Conduit is sized to accommodate one neutral conductor the same size as the phase conductor and one ground conductor sized in accordance with NEC Table 250.122.

Conduit sizes listed are for copper wiring only.

**Table 23. 600V Power Cable Conduit Recommendations**

| UPS Model | Voltage | Terminal | Number of Wires in Conduit | Minimum Conduit Trade Size | Number of Conduits |
|---|---|---|---|---|---|
| Eaton 9395P-600/550 | 600 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 4 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 4 | 3 | 3 |
| Eaton 9395P-600/500 | 600 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 4 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 4 | 3 | 3 |
| Eaton 9395P-600/450 | 600 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 3 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 4 | 3 | 3 |
| Eaton 9395P-600/400 | 600 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 3 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 4 | 3 | 3 |
| Eaton 9395P-600/300 | 600 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 2 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 4 | 3 | 2 |
| DC (same for all ratings) | | Battery (Positive, Negative, Ground) | See Note 1 | | |

NOTE 1 Select conduit taking into consideration the DC input wire sizes and terminations listed in appropriate Tables, type of battery installation, and requirements from NEC Table 4, Electrical Metallic Tubing (EMT).
NOTE 2 Bypass conduit data is not applicable to IOM configurations.
**Battery Conductor Routing**: Refer to the notes at the bottom of Table 7 Input/Output Ratings and External Wiring Requirements.

**Table 24. 575V Power Cable Conduit Recommendations**

| UPS Model | Voltage | Terminal | Number of Wires in Conduit | Minimum Conduit Trade Size | Number of Conduits |
|---|---|---|---|---|---|
| Eaton 9395P-600/550 | 575 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 2 or 3 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 4 | 3 | 2 or 3 |
| Eaton 9395P-600/500 | 575 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 2 or 3 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 4 | 2 | 2 or 3 |
| Eaton 9395P-600/450 | 575 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 2 or 3 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 4 | 3 | 2 or 3 |
| Eaton 9395P-600/400 | 575 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 2 or 3 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 4 | 3 | 2 or 3 |
| Eaton 9395P-600/300 | 575 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 2 or 3 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 4 | 3 | 2 or 3 |
| DC (same for all ratings) | | Battery (Positive, Negative, Ground) | | See Note 1 | |

NOTE 1 Select conduit taking into consideration the DC input wire sizes and terminations listed in appropriate Tables, type of battery installation, and requirements from NEC Table 4, Electrical Metallic Tubing (EMT).

NOTE 2 Bypass conduit data is not applicable to IOM configurations.

**Battery Conductor Routing**: Refer to the notes at the bottom of Table 9 Input/Output Ratings and External Wiring Requirements.

**Table 25. 480V Power Cable Conduit Recommendations**

| UPS Model | Voltage | Terminal | Number of Wires in Conduit | Minimum Conduit Trade Size | Number of Conduits |
|---|---|---|---|---|---|
| Eaton 9395P-600/600<br>Eaton 9395P-600/550 | 480 Vac | AC Input to UPS Rectifier<br>(A, B, C, Ground) | 4 | 2.5 | 4 |
| | | AC Input to Bypass and Output<br>(A, B, C, Ground) | 4 | 2.5 | 3 |
| | DC<br>(Common Battery) | Battery<br>(Positive, Negative, Ground) | 7 | 4 | 2 |
| Eaton 9395P-600/500<br>Eaton 9395P-600/450<br>Eaton 9395P-600/400 | 480 Vac | AC Input to UPS Rectifier<br>(A, B, C, Ground) | 4 | 2.5 | 3 |
| | | AC Input to Bypass and Output<br>(A, B, C, Ground) | 4 | 2.5 | 3 |
| | DC<br>(Common Battery) | Battery<br>(Positive, Negative, Ground) | 7 | 4 | 2 |
| Eaton 9395P-600/300<br>Eaton 9395P-600/275<br>Eaton 9395P-600/250<br>Eaton 9395P-600/225<br>Eaton 9395P-600/200<br>See Note | 480 Vac | AC Input to UPS Rectifier<br>(A, B, C, Ground) | 4 | 2.5 | 4 |
| | | AC Input to Bypass and Output<br>(A, B, C, Ground) | 4 | 2.5 | 3 |
| | DC<br>(Common Battery) | Battery<br>(Positive, Negative, Ground) | 7 | 4 | 2 |
| All models | DC<br>(Separate Battery - per UPM) | Battery<br>(Positive, Negative, Ground) | 7 | 4 | 1 |

NOTE Bypass conduit data is not applicable to IOM configurations.
**Battery Conductor Routing**: Refer to the notes at the bottom of Table 9 Input/Output Ratings and External Wiring Requirements.

**Table 26. 415V Power Cable Conduit Recommendations**

| UPS Model | Voltage | Terminal | Number of Wires in Conduit | Minimum Conduit Trade Size | Number of Conduits |
|---|---|---|---|---|---|
| Eaton 9395P-600/550 | 415 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 4 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 5 | 3 | 3 |
| Eaton 9395P-600/500 | 415 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 4 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 5 | 3 | 3 |
| Eaton 9395P-600/450 | 415 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 3 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 5 | 3 | 3 |
| Eaton 9395P-600/400 | 415 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 3 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 5 | 3 | 3 |
| Eaton 9395P-600/300 | 415 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 2 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 5 | 3 | 2 |
| DC (same for all ratings) | | Battery (Positive, Negative, Ground) | See Note 1 | | |

NOTE 1 Select conduit taking into consideration the DC input wire sizes and terminations listed in appropriate Tables, type of battery installation, and requirements from NEC Table 4, Electrical Metallic Tubing (EMT).

NOTE 2 Bypass conduit data is not applicable to IOM configurations.

**Battery Conductor Routing**: Refer to the notes at the bottom of Table 13 Input/Output Ratings and External Wiring Requirements.

**Table 27. 400V Power Cable Conduit Recommendations**

| UPS Model | Voltage | Terminal | Number of Wires in Conduit | Minimum Conduit Trade Size | Number of Conduits |
|---|---|---|---|---|---|
| Eaton 9395P-600/550 | 400 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 5 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 5 | 3 | 3 |
| Eaton 9395P-600/500 | 400 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 4 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 5 | 3 | 3 |
| Eaton 9395P-600/450 | 400 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 3 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 5 | 3 | 3 |
| Eaton 9395P-600/400 | 400 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 3 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 5 | 3 | 3 |
| Eaton 9395P-600/300 | 400 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 2.5 | 2 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 5 | 2.5 | 2 |
| DC (same for all ratings) | | Battery (Positive, Negative, Ground) | See Note 1 | | |

NOTE 1 Select conduit taking into consideration the DC input wire sizes and terminations listed in appropriate Tables, type of battery installation, and requirements from NEC Table 4, Electrical Metallic Tubing (EMT).

NOTE 2 Bypass conduit data is not applicable to IOM configurations.

**Battery Conductor Routing**: Refer to the notes at the bottom of Table 13 Input/Output Ratings and External Wiring Requirements.

**Table 28. 380V Power Cable Conduit Recommendations**

| UPS Model | Voltage | Terminal | Number of Wires in Conduit | Minimum Conduit Trade Size | Number of Conduits |
|---|---|---|---|---|---|
| Eaton 9395P-600/550 | 380 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 5 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 5 | 3 | 4 |
| Eaton 9395P-600/500 | 380 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 4 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 5 | 3 | 3 |
| Eaton 9395P-600/450 | 380 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 3 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 5 | 3 | 3 |
| Eaton 9395P-600/400 | 380 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 3 | 3 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 5 | 3 | 3 |
| Eaton 9395P-600/300 | 380 Vac | AC Input to UPS Rectifier (A, B, C, Ground) | 4 | 2.5 | 3 |
| | | AC Input to Bypass and Output (A, B, C, Ground) | 5 | 3 | 2 |
| DC (same for all ratings) | | Battery (Positive, Negative, Ground) | See Note 1 | | |

NOTE 1 Select conduit taking into consideration the DC input wire sizes and terminations listed in appropriate Tables, type of battery installation, and requirements from NEC Table 4, Electrical Metallic Tubing (EMT).

NOTE 2 Bypass conduit data is not applicable to IOM configurations.

**Battery Conductor Routing**: Refer to the notes at the bottom of Table 17 Input/Output Ratings and External Wiring Requirements.

lists the recommended rating for 600V, 575V, 480V, 415V, 400V, and 380V input circuit breakers with 100% and 80% breaker ratings for rectifier input.

**Table 29. Recommended Input Circuit Breaker Ratings (100% and 80%)**

| UPS Model Output kW/kVA | Input Rating | | | | | | |
|---|---|---|---|---|---|---|---|
| | % | 600V | 575V | 480V | 415V | 400V | 380V |
| Eaton 9395P-600/600 | 100 | N/A | N/A | 1000A | N/A | N/A | N/A |
| | 80 | N/A | N/A | 1200A | N/A | N/A | N/A |
| Eaton 9395P-600/550 | 100 | 700A | 700A | 1000A | 1000A | 1000A | 1000A |
| | 80 | 800A | 800A | 1200A | 1200A | 1200A | 1200A |
| Eaton 9395P-600/500 | 100 | 600A | 600A | 800A | 1000A | 1000A | 1000A |
| | 80 | 800A | 800A | 1000A | 1200A | 1200A | 1200A |
| Eaton 9395P-600/450 | 100 | 600A | 600A | 700A | 800A | 800A | 800A |
| | 80 | 700A | 700A | 1000A | 1000A | 1000A | 1000A |
| Eaton 9395P-600/400 | 100 | 500A | 500A | 600A | 700A | 800A | 800A |
| | 80 | 600A | 600A | 800A | 1000A | 1000A | 1000A |
| Eaton 9395P-600/300 | 100 | 400A | 400A | 500A | 600A | 600A | 600A |
| | 80 | 450A | 450A | 600A | 700A | 700A | 700A |
| Eaton 9395P-600/275 | 100 | 350A | 350A | 450A | 500A | 500A | 500A |
| | 80 | 450A | 450A | 600A | 600A | 600A | 600A |
| Eaton 9395P-600/250 | 100 | 300A | 300A | 400A | 450A | 450A | 450A |
| | 80 | 400A | 400A | 500A | 600A | 600A | 600A |
| Eaton 9395P-600/225 | 100 | 300A | 300A | 350A | 400A | 400A | 400A |
| | 80 | 350A | 350A | 450A | 500A | 500A | 500A |
| Eaton 9395P-600/200 | 100 | 250A | 250A | 300A | 350A | 400A | 400A |
| | 80 | 350A | 350A | 400A | 450A | 500A | 500A |

**⚠CAUTION**

To reduce the risk of fire, connect only to a circuit provided with maximum input circuit breaker current ratings from Table 29 in accordance with the NEC, ANSI/NFPA 70.

**ATTENTION!**

Pour réduire le risque d'incendie, ne brancher qu'à un circuit avec le courant nominal maximal du disjoncteur d'entrée indique dans le tableau (Table 29) conformement à la norme ANSI/ NFPA 70 du NEC.

The line-to-line unbalanced output capability of the UPS is limited only by the full load per phase current values for AC output to critical load shown in Table 7 to Table 18. The recommended line-to-line load unbalance is 50% or less.

Bypass and output overcurrent protection and bypass and output disconnect switches are to be provided by the customer. Module Output Breakers (MOBs) are to be provided by the customer.

Table 30 lists the recommended rating for 600V, 575V, 480V, 415V, 400V, and 380V bypass, output, and MOB circuit breakers with 100% breaker rating. Bypass breakers are not applicable for IOM configurations.

**Table 30. Recommended Bypass, Output, and MOB Circuit Breaker Ratings (100% and 80%)**

| UPS Model Output kW/kVA | Input Rating | | | | | | |
|---|---|---|---|---|---|---|---|
| | % | 600V | 575V | 480V | 415V | 400V | 380V |
| Eaton 9395P-600/600 | 100 | N/A | N/A | 800A | N/A | N/A | N/A |
| | 80 | N/A | N/A | 1000A | N/A | N/A | N/A |
| Eaton 9395P-600/550 | 100 | 600A | 600A | 700A | 800A | 800A | 1000A |
| | 80 | 700A | 700A | 1000A | 1000A | 1000A | 1200A |
| Eaton 9395P-600/500 | 100 | 500A | 600A | 700A | 700A | 800A | 800A |
| | 80 | 700A | 700A | 800A | 1000A | 1000A | 1000A |
| Eaton 9395P-600/450 | 100 | 450A | 500A | 600A | 700A | 700A | 700A |
| | 80 | 600A | 600A | 700A | 800A | 1000A | 1000A |
| Eaton 9395P-600/400 | 100 | 400A | 450A | 500A | 600A | 600A | 700A |
| | 80 | 500A | 600A | 600A | 700A | 800A | 800A |
| Eaton 9395P-600/300 | 100 | 300A | 350A | 400A | 450A | 450A | 500A |
| | 80 | 400A | 400A | 500A | 600A | 600A | 600A |
| Eaton 9395P-600/275 | 100 | 300A | 300A | 350A | 400A | 400A | 450A |
| | 80 | 350A | 350A | 450A | 500A | 500A | 600A |
| Eaton 9395P-600/250 | 100 | 250A | 300A | 350A | 350A | 400A | 400A |
| | 80 | 350A | 350A | 400A | 450A | 500A | 500A |
| Eaton 9395P-600/225 | 100 | 250A | 250A | 300A | 350A | 350A | 350A |
| | 80 | 300A | 300A | 350A | 400A | 450A | 450A |
| Eaton 9395P-600/200 | 100 | 200A | 250A | 300A | 300A | 300A | 350A |
| | 80 | 250A | 300A | 350A | 350A | 400A | 400A |

NOTE Bypass conduit data is not applicable to IOM configurations.

There is no manual DC disconnect device within the UPS.

A battery disconnect switch is required for battery systems and may also be required by NEC or local codes. The battery disconnect switch should be installed between the battery and the UPS.

Battery voltage is computed at 2 volts per cell as defined by Article 480 of the NEC. Rated battery current is computed at 2 volts per cell.

The battery wiring used between the battery and the UPS should not allow a voltage drop of more than 1% of nominal DC voltage at rated battery current.

External DC input overcurrent protection and disconnect switch is to be provided by the customer. Table 31 and Table 32 list the maximum ratings for continuous–duty rated circuit breakers satisfying the criteria for both.

Recommended disconnect size is based on a maximum full load discharge time less than 3 hours. For longer discharge times a larger disconnect may be required.

**Table 31. Recommended DC Input Battery Disconnect Ratings 100% – Common Battery**

| UPS Model | All Ratings |
|---|---|
| Eaton 9395P-600/600<br>Eaton 9395P-600/550<br>Eaton 9395P-600/500 | 1600A |
| Eaton 9395P-600/450<br>Eaton 9395P-600/400 | 1200A |
| Eaton 9395P-600/300<br>Eaton 9395P-600/275<br>Eaton 9395P-600/250<br>Eaton 9395P-600/225<br>Eaton 9395P-600/200<br>See Note | 1600A |

NOTE Bypass conduit data is not applicable to IOM configurations.

**Table 32. Recommended DC Input Battery Disconnect Ratings 100% – Separate Battery**

| UPS Model | All Ratings |
|---|---|
| Eaton 9395P-600/600<br>Eaton 9395P-600/300 | 800A |
| Eaton 9395P-600/550<br>Eaton 9395P-600/500<br>Eaton 9395P-600/400<br>Eaton 9395P-600/250<br>Eaton 9395P-600/225<br>Eaton 9395P-600/200<br>See Note | 700A |

NOTE Bypass conduit data is not applicable to IOM configurations.

### 3.2.7 UPS System Interface Wiring Preparation

Control wiring for features and options should be connected at the customer interface terminal blocks located inside the UPS.

**⚠WARNING**

Do not directly connect relay contacts to the mains related circuits. Reinforced insulation to the mains is required.

**⚠ ATTENTION!**

Ne pas directement brancher les contacts de relais aux circuits du réseau. Une isolation renforcée des réseaux est nécessaire.

Read and understand the following notes while planning and performing the installation:

- Use Class 1 wiring methods (as defined by the NEC) for interface wiring from 30V to 600V. The wire should be rated at 600V, 1A minimum and 12 AWG maximum.
- Use Class 2 wiring methods (as defined by the NEC) for interface wiring up to 30V. The wire should be rated at 24V, 1A minimum. When Class 2 circuit wiring must be mixed with Class 1 wiring, use Class 1 wire and wiring methods.
- Use shielded twisted-pair wires for each input and return or common.
- All interface wiring and conduit is to be provided by the customer.
- When installing external interface wiring (for example, building alarm, relay output, battery breaker trip, and X-Slot) to the UPS interface terminals, conduit must be installed between each device and the UPS cabinet.
- Install the interface wiring in separate conduit from the power wiring.
- When installing internal interface wiring to X-Slot terminals, route the wiring through the internal opening in the X-Slot communication bay.
- All building alarm inputs or remote features require an isolated normally-open contact or switch (rated at 24 Vdc, 20 mA minimum) connected between the alarm input and common terminal. All control wiring and relay and switch contacts are customer-supplied and may need to use Class 1 wiring, see above.
- The building alarms can be programmed to display the alarm functional name.
- LAN drops for use with X-Slot connectivity cards must be provided by the customer and may need to use Class 1 wiring, see above.
- The UPS battery aux signal wiring from the UPS must be connected to the battery disconnect device.
- A supplemental 48 Vdc shunt trip signal for the battery disconnect device is provided, but is not required for normal operation.
- Battery aux and 48 Vdc shunt trip wiring should be a minimum of 18 AWG.
- The REPO feature opens all contactors in the UPS cabinet and isolates power from your critical load. Local electrical codes may also require tripping upstream protective devices to the UPS.
- The REPO switch must be a latching-type switch not tied to any other circuits.
- A jumper wire must be connected between pins 1 and 2 on TB1, if the normally-closed REPO contact is not used.
- REPO wiring should be a minimum of 22 AWG and a maximum of 14 AWG.
- The REPO switch wiring must be in accordance with NEC Article 725 Class 2 requirements.
- The maximum distance between the REPO and the UPS cannot exceed 150 meters (500 feet).
- Alarm relay contacts have a maximum current rating of 5A and a switched voltage rating of 30 Vac and 28 Vdc.
- Alarm relay wiring should be a minimum of 22 AWG.

**NOTE 1** On all 9395P-600 models that will be fed by a site generator at any time it is recommended to have an "*On Generator*" sensing input connected and proven functional. This allows the UPS to optimize its operation with the generator. This function includes reduced input current and battery current limits, slower walk-in to ease the load step on the generator initially, and HIGH ALERT mode for ESS and VMMS operation.

**NOTE 2** HIGH ALERT mode is desired because any loads with a leading power factor will not be seen by the generator. Rectifier operation will be much softer while on generator thereby increasing overall system stability

### 3.2.8 Distributed Bypass Power Wiring Preparation

**NOTE** For full-rated operation of a Distributed Bypass System when in Bypass or ESS mode, the line frequency impedance of all conduction paths must be equal when assessed from the point where the Bypass Power Source connects to the System Switchgear to the point where the Common Load connects to the System Switchgear.

Read and understand the following notes while planning and performing the installation:

- All distributed bypass UPS rectifier inputs must come from one source and all bypass input feeds must come from one source.
- All UPSs in the distributed bypass system must contain the same number of UPMs. Mixed UPS kVA ratings are not permitted.
- Distributed bypass UPS input wiring size requirements and output wiring size requirements from the UPSs to the tie cabinet or distribution panel are the same as listed in Table 7 to Table 18.
- The 9395P-600 480V unit is designed for operation on a ground wire source of supply. There is no additional connection point for a neutral conductor. The output of this UPS will not directly support phase to neutral loads.
- MOBs with dual auxiliary contacts are to be provided by the customer. Table 30 lists the recommended rating for the MOBs.
- The tie cabinet must contain Module Output Breakers (MOBs) with dual auxiliary contacts for control of the system. Without dual auxiliary MOBs, UPMs are not allowed to go to bypass individually during servicing. All UPMs will go to bypass instead of the just the UPM needing service, decreasing critical load protection. With dual auxiliary MOBs, one UPM can be bypassed while the remaining UPMs support the load as long as the remaining UPMs have the capacity to do so.

## 3.3 Inspecting and Unpacking the UPS Cabinet

The UPS cabinet is palletted separately for shipping. The cabinet is shipped bolted to a wooden pallet and protected with outer protective packaging material.

**⚠WARNING**

The UPS cabinet is heavy (see Table 2). If unpacking and unloading instructions are not closely followed, the cabinet may tip and cause serious injury.

**⚠ AVERTISSEMENT!**

Les sections de l'onduleur sont lourdes (voir le Table 2). Suivre attentivement les instructions de déchargement et de déballage pour eviter de renverser les armoires, ce qui pourrait causer de graves blessures.

**⚠CAUTION**

To prevent damage to the wiring channel and wiring in the UPS cabinet base when lifting or moving the cabinet:

- Lift and move the cabinet using only the front or rear forklift slots.
- Verify that the forklift forks are in a horizontal position before inserting them into the forklift slots. DO NOT angle fork tips upward.
- Insert the forks all the way through the base. DO NOT insert forks partially into the base to move the cabinet.
- Forks may be partially inserted into the front or rear forklift slots for minor positioning if the forks are kept in a horizontal position with no upward angling.
- DO NOT use the forklift slots on the end of the cabinet to move the cabinet.
- End forklift slots may be used for minor positioning if the forks are kept in a horizontal position with no upward angling.

If these instructions are not followed, damage to the wiring channel and wiring will occur.

**⚠ ATTENTION!**

Pour éviter d'endommager le câblage et son canal à la base de l'armoire de l'onduleur lorsque l'armoire est soulevée ou déplacée: Soulever ou déplacer l'armoire en n'utilisant que les passages de fourche à l'avant ou à l'arrière.

- Vérifier que les fourches du chariot élévateur sont en position horizontale avant de les insérer dans les passages de fourche. NE PAS orienter les pointes de fourche vers le haut.
- Insérer complètement les fourches dans les passages de fourche de la base. NE PAS insérer partiellement les fourches dans les passages pour déplacer l'armoire.
- Il est possible d'insérer partiellement les fourches dans les passages avant et arrière pour les petits déplacements, et ce, si les fourches sont en position horizontale sans pointer vers le haut.
- NE PAS utiliser les passages de fourche à l'extrémité de l'armoire pour la déplacer.
- Les passages de fourche à l'extrémité de l'armoire peuvent servir lors des petits déplacements, et ce, si les fourches sont en position horizontale sans pointer vers le haut.

Si ces instructions ne sont pas suivies, des dommages au câblage et à son canal surviendront.

1. Carefully inspect the outer packaging for evidence of damage during transit.

**⚠CAUTION**

Do not install a damaged cabinet. Report any damage to the carrier and contact an Eaton service representative immediately.

**⚠ ATTENTION!**

Ne pas installer une armoire endommagée. Signaler les dommages au transporteur et communiquer avec un représentant du service Eaton immédiatement.

**NOTE** For the following step, verify that the forklift or pallet jack is rated to handle the weight of the cabinet (see Table 2 for cabinet weight).

2. Use a forklift or pallet jack to move the packaged cabinets to the installation site, or as close as possible, before unpacking. If possible, move the cabinets using the pallet. Insert the forklift or pallet jack forks from the right side of the pallet (facing the cabinet), between the supports on the bottom of the pallet. If the cabinets must be moved using the cabinet front or rear fork lift slots, see the caution statement at the beginning of this procedure.

**⚠CAUTION**

Do not tilt the UPS cabinet more than 10° from vertical or the cabinet may tip over.

**ATTENTION!**

Ne pas incliner les armoires d'onduleur à plus de 10 degrés de la verticale puisqu'elles pourraient se renverser.

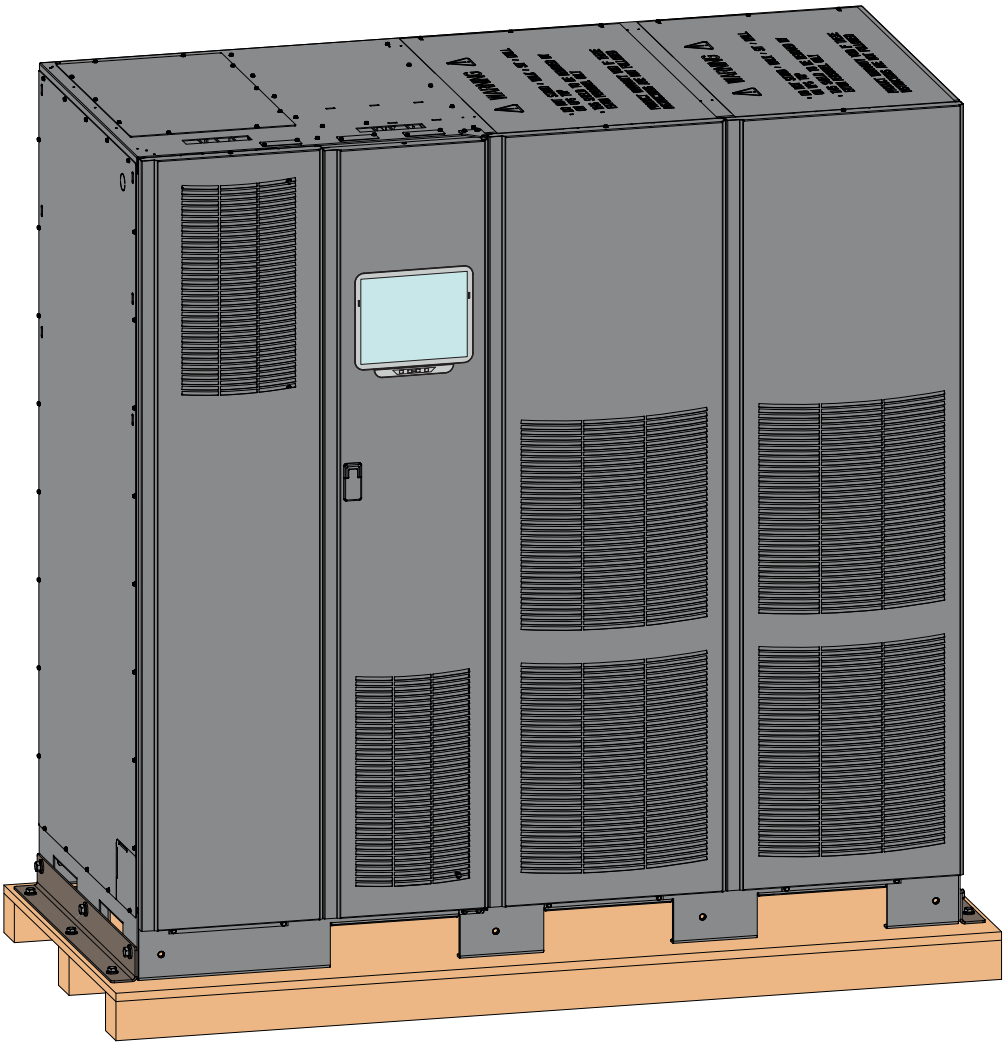
3. Set the pallet on a firm, level surface, allowing a minimum clearance of 3m (10 ft) on each side for removing the cabinet from the pallet.

**NOTE** The ISBM and UPM sections are shipped with debris shields covering the ventilation grills on top of the sections (see Figure 29). Do not remove the debris shields until installation is complete.

4. Remove the protective covering from the cabinet.
5. Remove the packing material, and discard or recycle in a responsible manner.
6. Inspect the contents for any evidence of physical damage, and compare each item with the Bill of Lading. If damage has occurred or shortages are evident, contact an Eaton service representative immediately to determine the extent of the damage and its impact on further installation.

**NOTE** While waiting for installation, protect the unpacked cabinet from moisture, dust, and other harmful contaminants. Failure to store and protect the UPS properly may void your warranty.

**Figure 18. Two UPM Configuration as Shipped on Pallet (380V, 400V, 415V, and 480V)**



# Chapter 4 Installation

## 4.1 Preliminary Installation Information

**⚠WARNING**

Installation should be performed only by qualified personnel.

**⚠ AVERTISSEMENT!**

L'installation ne doit être effectuée que par du personnel qualifié.

Refer to the following while installing the UPS system:

- Chapter 3 for cabinet dimensions, equipment weight, wiring and terminal data, and installation notes.
- Do not tilt the cabinets more than ±10° during installation.
- Remove the conduit landing plates to add conduit landing holes as required. Plate material is 16 gauge steel (1.5 mm/0.06" thick).
- If perforated floor tiles are required for ventilation, place them in front of the UPS.

## 4.2 Unloading the ISBM with UPM Section from the Pallet

The ISBM cabinet section is bolted to a wooden pallet supported by wood skids. The UPM cabinet section is also bolted to a wooden pallet supported by wood skids. The optional field-install UPM (FI-UPM) section is delivered bolted to a wooden pallet supported by wood skids as well. Once unloaded, these sections are mechanically and electrically joined. Together, they are referred to as the UPS.

**⚠WARNING**

The ISBM with UPM or UPMs section is heavy (see Table 2). If unpacking and unloading instructions are not closely followed, the cabinets may tip and cause serious injury.

**⚠ AVERTISSEMENT!**

Les sections de l'onduleur sont lourdes (voir le tableau Table 2). Suivre attentivement les instructions de déchargement et de déballage pour éviter de renverser les armoires, ce qui pourrait causer de graves blessures.

**⚠CAUTION**

- Do not tilt cabinets more than 10° from vertical.
- Lift the cabinets only with a forklift or damage may occur.

To prevent damage to the wiring channel and wiring in the UPM section base when lifting or moving the cabinet:

- Lift and move the UPM section using only the front or rear forklift slots.
- Verify that the forklift forks are in a horizontal position before inserting them into the forklift slots. DO NOT angle fork tips upward.
- Insert the forks all the way through the base. DO NOT insert forks partially into the base to move the cabinet.
- Forks may be partially inserted into the front or rear forklift slots for minor positioning if the forks are kept in a horizontal position with no upward angling.
- DO NOT use the forklift slots on the end of the cabinet to move the cabinet.
- End forklift slots may be used for minor positioning if the forks are kept in a horizontal position with no upward angling.

If these instructions are not followed, damage to the wiring channel and wiring will occur.

**⚠ ATTENTION!**

- Ne pas incliner les armoires à plus de 10 degrés de la verticale.
- Ne soulever les armoires qu'à l'aide d'un chariot élévateur pour éviter de les endommager.

Pour éviter d'endommager le câblage et son canal à la base de la section de l'onduleur lorsque l'armoire est soulevée ou déplacée:

- Soulever ou déplacer la section de l'onduleur en n'utilisant que les passages de fourche à l'avant ou à l'arrière.
- Vérifier que les fourches du chariot élévateur sont en position horizontale avant de les insérer dans les passages de fourche. NE PAS orienter les pointes de fourche vers le haut.
- Insérer complètement les fourches dans les passages de fourche de la base. NE PAS insérer partiellement les fourches dans les passages pour déplacer l'armoire. I Il est possible d'insérer partiellement les fourches dans les passages avant et arrière pour les petits déplacements, et ce, si les fourches sont en position horizontale sans pointer vers le haut
- NE PAS utiliser les passages de fourche à l'extrémité de l'armoire pour la déplacer.
- Les passages de fourche à l'extrémité de l'armoire peuvent servir lors des petits déplacements, et ce, si les fourches sont en position horizontale sans pointer vers le haut.

Si ces instructions ne sont pas suivies, des dommages au câblage et à son canal surviendront.

**NOTE** For the following steps, verify that the forklift or pallet jack is rated to handle the weight of the cabinet (see Table 2 for cabinet weight).

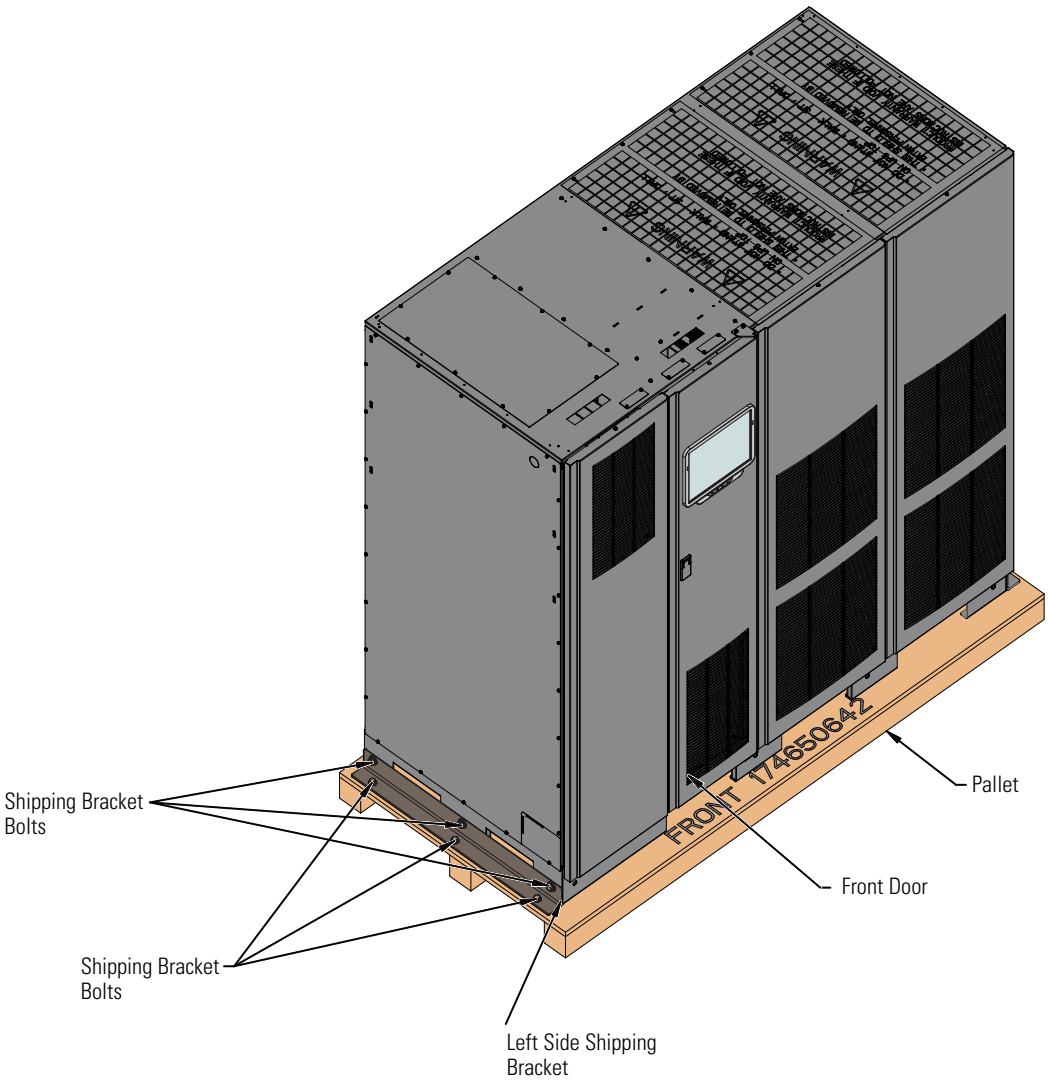
To remove the pallet and mechanically install the UPS:

1. If not already accomplished, use a forklift or pallet jack to move the UPS to the installation area, or as close as possible, before unloading from the pallet. Use a forklift or pallet jack to install the UPS.

Insert the forklift or pallet jack forks from the right side of the pallet (facing the cabinet), between the supports on the bottom of the pallet. If the sections must be moved using the cabinet front or rear fork lift slots, see the caution statements at the beginning of this procedure.

2. Remove the three bolts securing the left side shipping bracket to the cabinet and three bolts securing the bracket to the pallet (see Figure 19). Remove the left side shipping bracket.

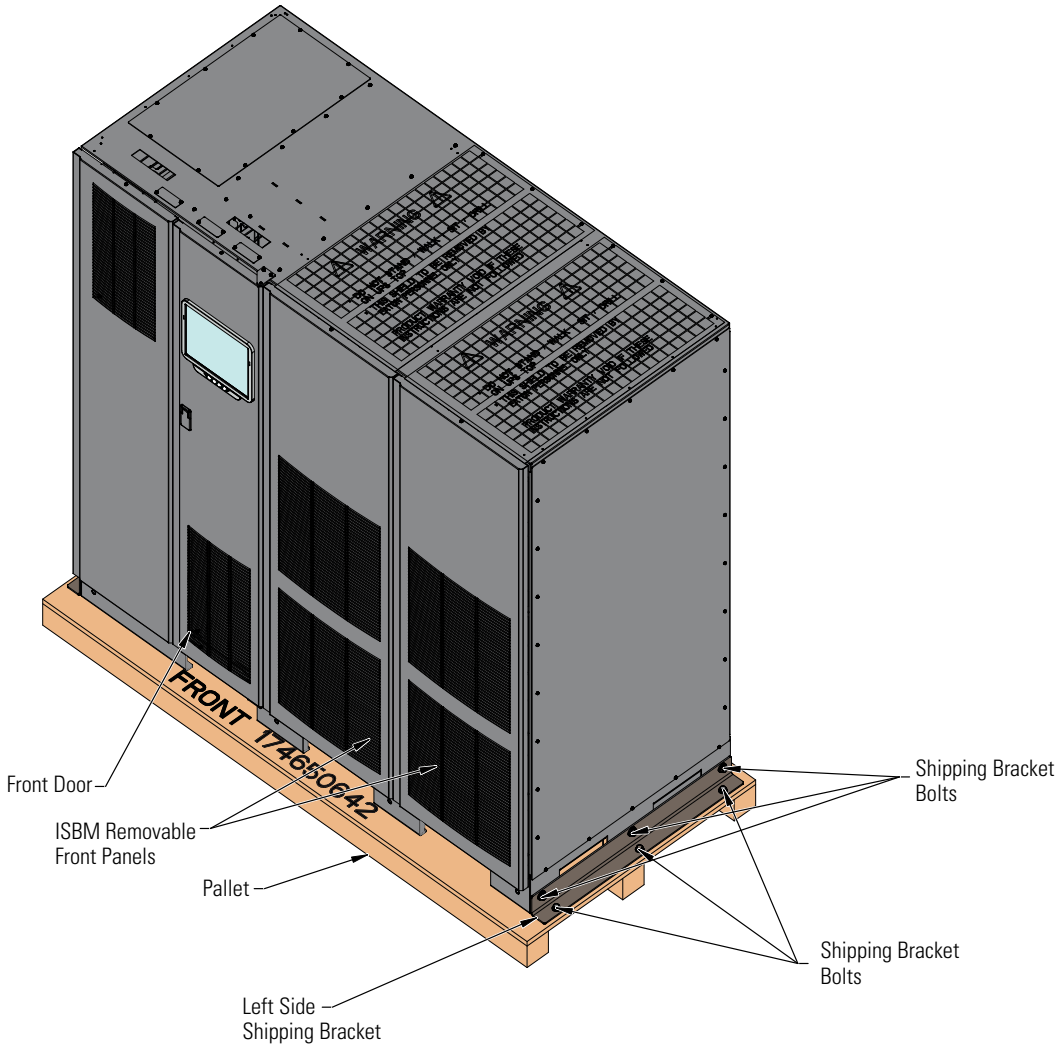
**Figure 19. Removing the ISBM Section Left Side Shipping Bracket**




**NOTE** This figure depicts the Shipping Bracket on the 380V, 400V, 415V, and 480V Two UPM configuration pallet. The 600V sections are oriented the same way and the shipping brackets are removed the same way as this illustration.

3. Remove the three bolts securing the right side shipping bracket to the cabinet and three bolts securing the bracket to the pallet (see Figure 20). Remove the right side shipping bracket.

**Figure 20. Removing the ISBM Section Right Side Shipping Bracket**




4. Using a forklift (see the caution statement at the beginning of this procedure), raise the UPS cabinet section until the cabinet bottom clears the pallet by approximately 3 mm (1/8").
5. Pull the pallet from under the UPS cabinet. Discard or recycle the pallet in a responsible manner.
6. Carefully lower the UPS cabinet until the cabinet base contacts the floor.
7. Repeat Steps 2 through 6 for the remaining cabinet.
8. If installing an FI-UPM, go to paragraph 4.5 *Field Installed UPM Installation*. If installing a battery system, go to paragraph 4.6 *Battery System Installation*. Otherwise, go to paragraph 4.7 *Distributed Bypass Tie Cabinet Installation* to complete the wiring of the UPS.

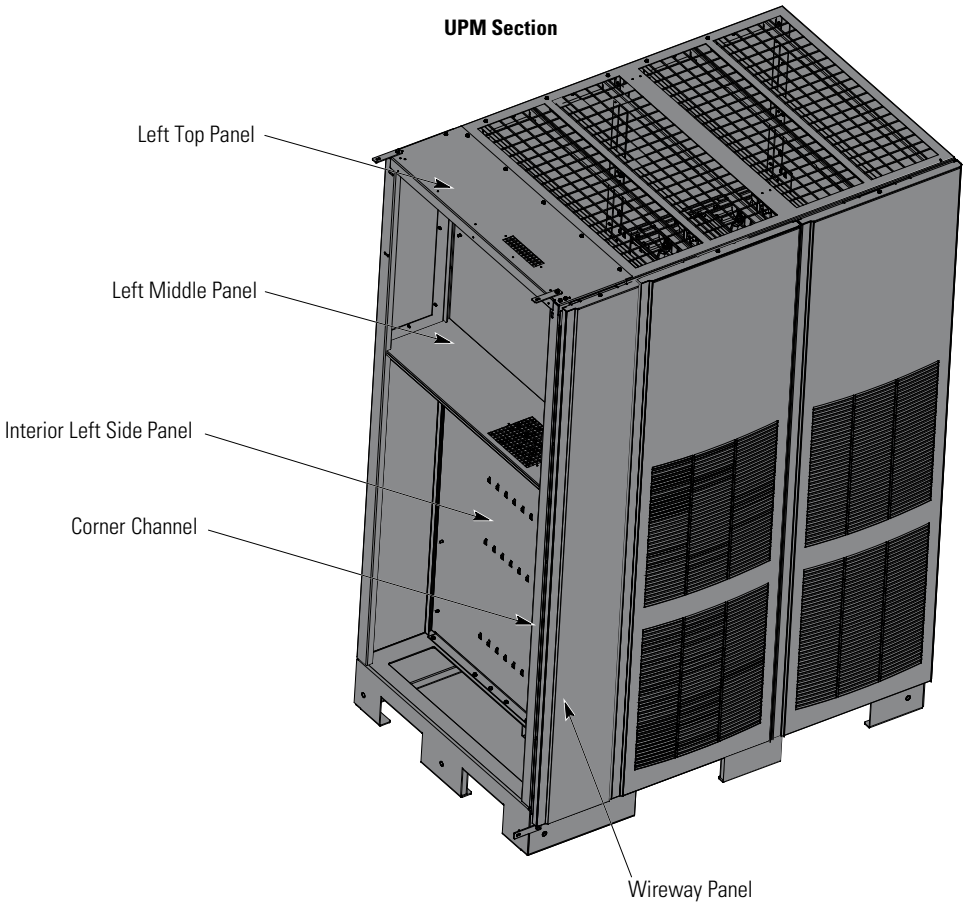
## 4.3 Mechanically Joining the Sections (600V Models Only)

**NOTE** The following procedure permits the UPS sections to be installed in a location where there is limited space to slide the sections together from the sides.

**NOTE** For the following steps, verify that the forklift or pallet jack is rated to handle the weight of the section (see Table 2 for cabinet weight).

1. Using a forklift, move the UPM section to the final installed location.
2. Remove one top screw and two bottom screws securing the UPM section wireway panel (see Figure 21). Lift the panel straight up to remove it from the panel hanger brackets at the top of the cabinet.
3. Remove the screws securing the top and bottom internal safety shield panels and remove the panels. Retain the hardware for later use.
4. Remove the screws securing the corner channel and remove the channel (see Figure 21). Retain the hardware for later use.

**Figure 21. Section Joining**



5. Remove the screws securing the left top panel and remove the panel (see Figure 21). Retain the hardware for later use.
6. Remove the screws securing the left middle panel and remove the panel (see Figure 21). Retain the hardware for later use.

**⚠CAUTION**

Use care during installation to protect components mounted on the right side of the ISBM section and the intercabinet wiring harnesses attached to the left side UPM section from damage.

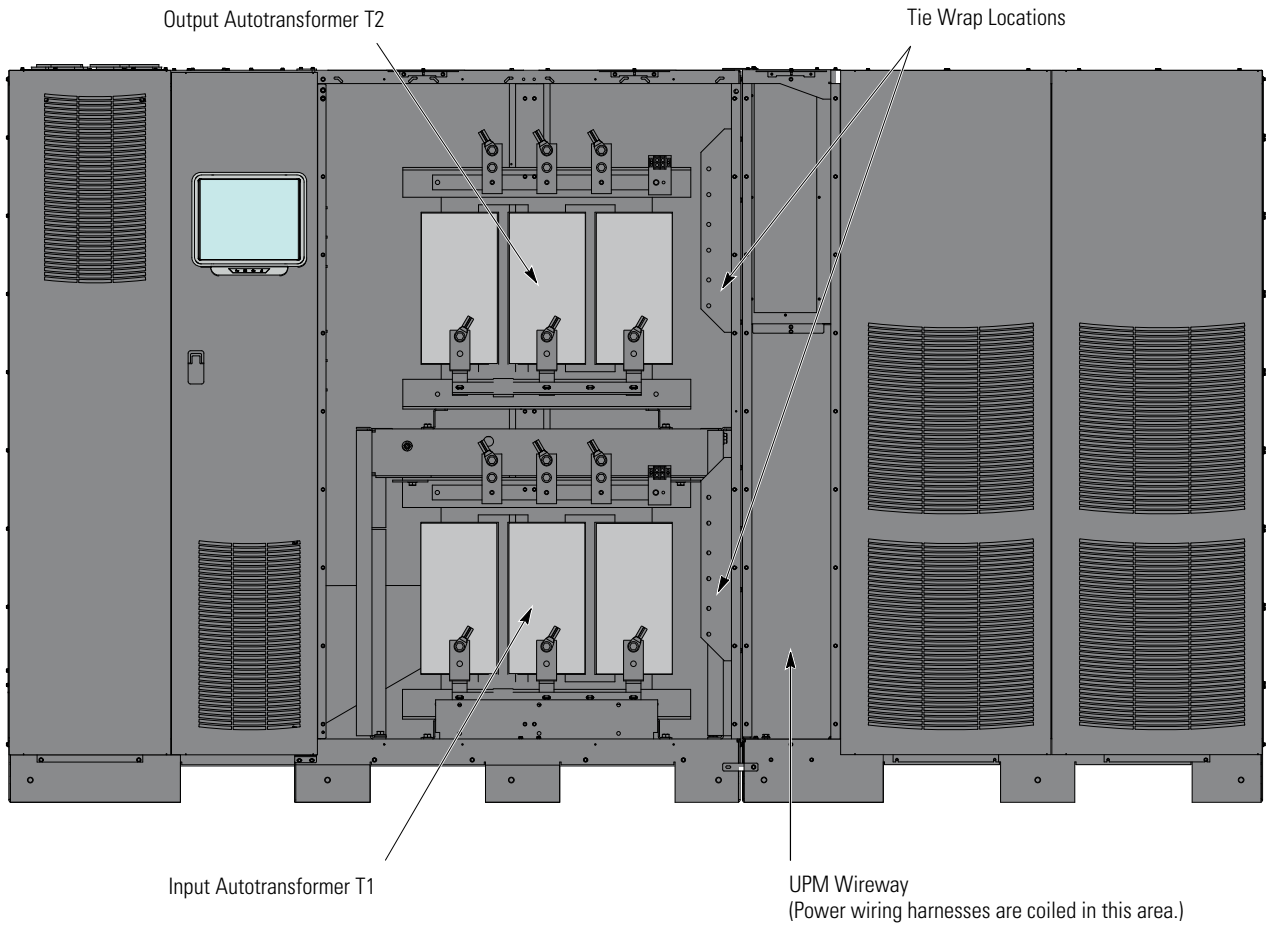
**ATTENTION!**

Lors de l'installation, prendre soin de protéger les composantes du côté droit du module de contournement de système intégré (ISBM) et les faisceaux de câbles reliant les armoires du côté gauche du module d'alimentation universel (UPM).

**NOTE** Clearance between the ISBM and the UPM sections must be less than 1/2" so that joining brackets can be installed.

7. Using a forklift with the forks in the front forklift slots, position the ISBM section adjacent to the left side of the previously installed UPM section. Verify that the ISBM section right side is against the UPM section left side and the front of the cabinet bases are flush with each other (see Figure 22).
8. Reinstall the corner channel (see Figure 21) and secure using the retained hardware.
9. Reinstall the left middle panel (see Figure 21) and secure using the retained hardware.

**Figure 22. ISBM and UPM Sections Joined**

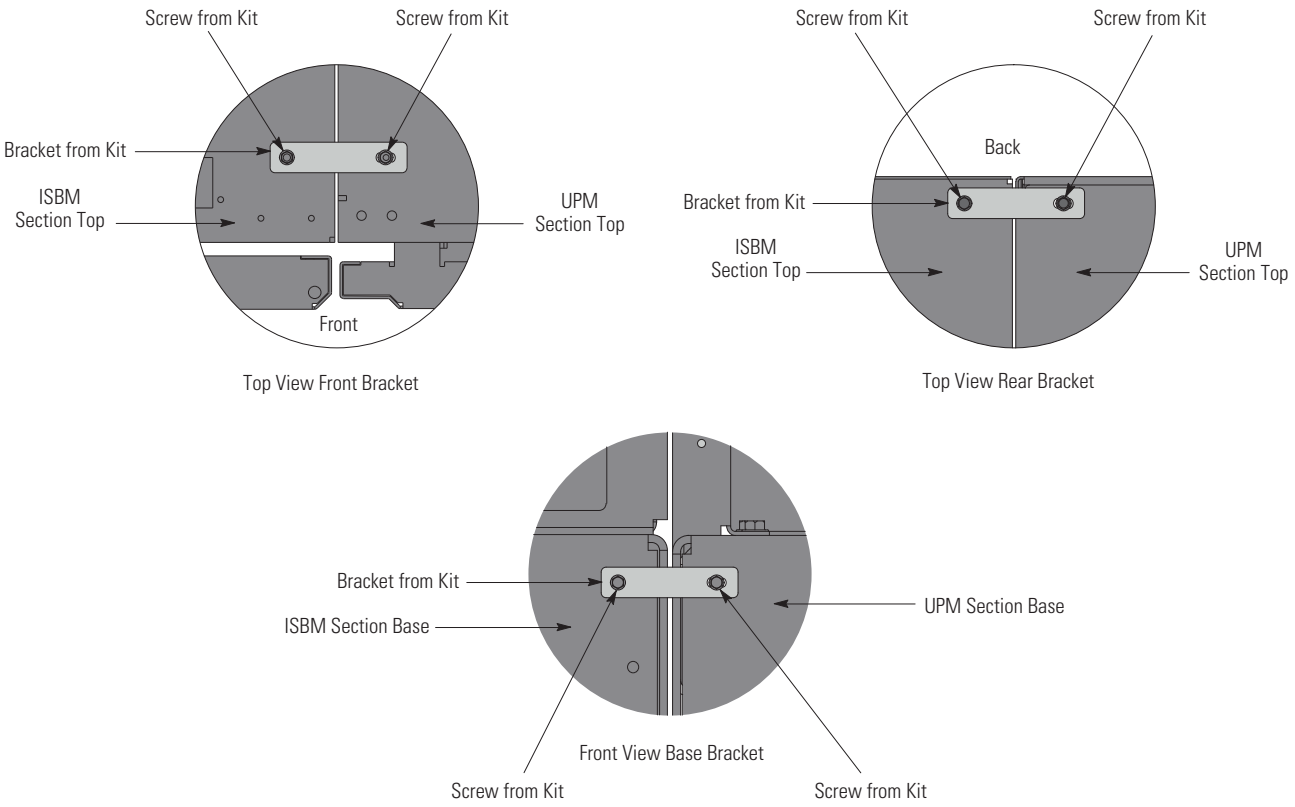



10. Reinstall the left top panel (see Figure 21) and secure using the retained hardware.

**NOTE** Three flat cabinet joining brackets are provided in the hardware kit for securing the ISBM and UPM sections at the top front, top rear, and front base (see Steps 11 and 12).

11. Locate the hardware kit (packed inside a drawstring bag tied to the left middle panel of the UPM section). Locate two flat brackets and screws from the hardware kit. Align the holes in the flat brackets over holes in the top rear and top front of the ISBM and UPM sections. Secure the brackets with the screws from the hardware kit (see Figure 23).
12. Locate one flat bracket and screws from the hardware kit. Align the holes in the flat bracket over holes in the front base of the ISBM and UPM sections. Secure the bracket with the screws from the hardware kit (see Figure 23).
13. Proceed to paragraph 4.4 *Electrically Connecting the Sections (600V Models Only)*.

**Figure 23. ISBM Section to UPM Section Joining Brackets**




## 4.4 Electrically Connecting the Sections (600V Models Only)

**NOTE** AC and DC input intercabinet power wiring harnesses are supplied coiled and secured in the UPM wireway on the left side of the UPM section (see Figure 22).

1. Align the ISBM and UPM sections in their final installation locations.
2. Remove the ISBM doors and optional dead fronts.
3. Remove the UPM section cover to gain access to UPM power wires.
4. Locate the AC and DC input inter-cabinet power wiring harnesses (long cables labeled xG1, xG2, xG3, xG4, and xG5). Remove wire ties as necessary and uncoil the cables.
5. Locate the inter-cabinet wiring terminal hardware kit packed on the bottom right side of the ISBM section.
6. Locate the wires labeled 1G3 and 2G3 for the UPM battery input.
7. Route the wires labeled 1G3 and 2G3 through the transformer section into the I/O section and land on bus bars E4 and E5 (DC+ and DC-). See Figure 25.

**NOTE** When connecting the UPM battery cables, verify the cables are connected to the correct terminals.

8. Locate the wires labeled 1G1, 1G2, 2G1, and 2G2 for the UPM rectifier input.

9. Route the wires labeled 1G1, 1G2, 2G1, and 2G2 to the Input Transformer (T1) and land on the appropriate phases (see Figure 22).
10. Secure the wires with zip ties along inner right wall of ISBM.
11. Locate the wires labeled 1G4, 1G5, 2G4, and 2G5 for the UPM inverter output.
12. Route the wires labeled 1G4, 1G5, 2G4, and 2G5 to the Output Transformer (T2) and land on the appropriate phases (see Figure 22).
13. Secure the wires with zip ties as appropriate.
14. Ensure that the wires in their installed position do not interfere with installation of the optional dead fronts and ISBM doors.
15. Re-install the optional dead fronts, ISBM doors, and UPM section cover.

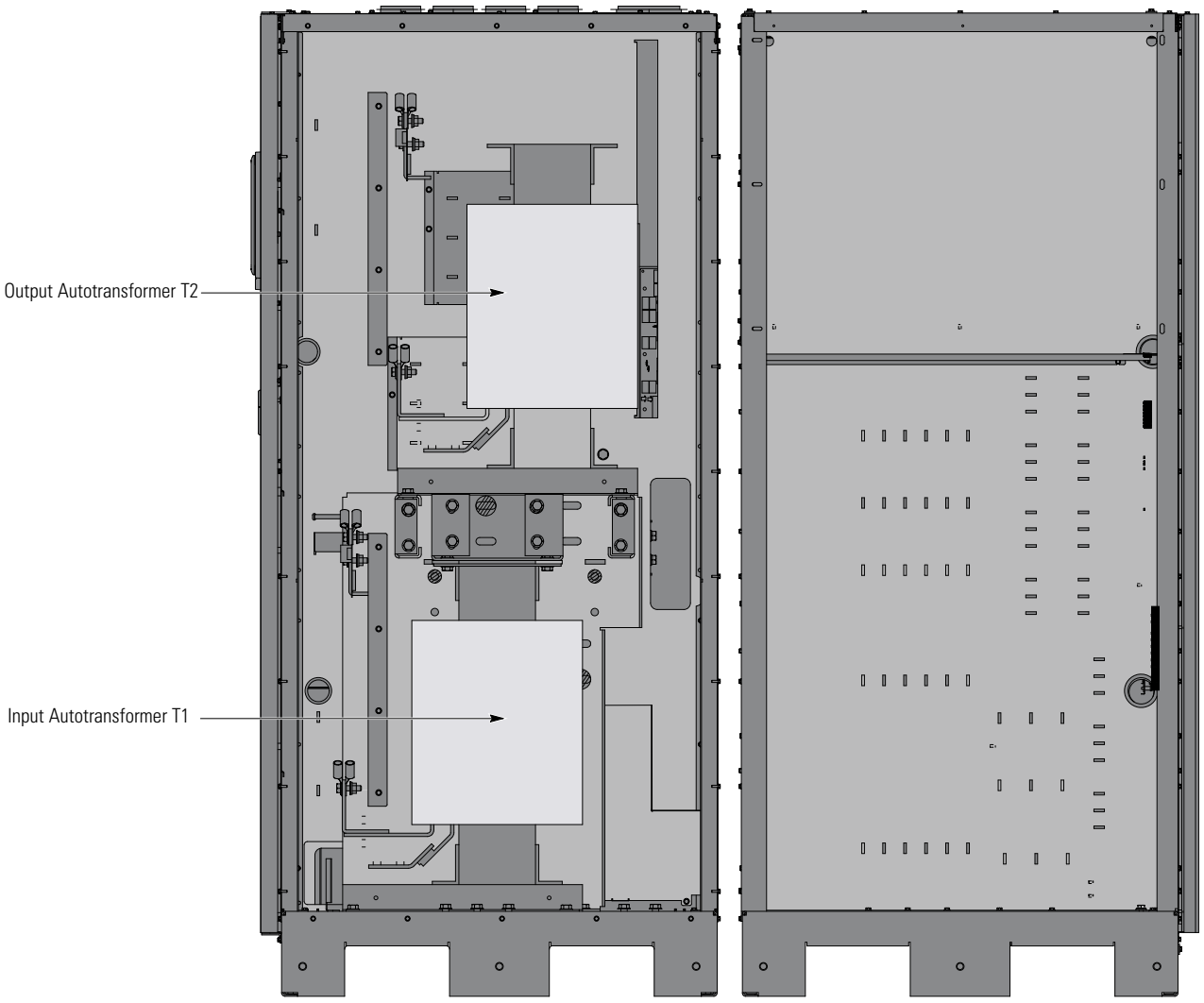
### 4.4.1 Connecting the Ground Braid Cable

1. Locate the ground braid cable (ground strap) in the bottom left front corner of the UPM section. The ground braid cable is secured at the factory to the UPM section ground bolt. Route the ground braid cable through the wiring access in the right side panel of the ISBM section to the ground bolt in the ISBM section.
2. Connect the ground braid cable to the ISBM section ground bolt and secure.

**NOTE** Four intercabinet interface wiring harnesses are supplied coiled inside the protective cage on the right side panel of the ISBM section.

3. In the ISBM section, locate the coiled wiring harnesses with the J50, J51, J61, and J70 connectors attached. Remove the wire ties securing the harnesses and carefully remove the harnesses from the protective cage. If necessary, loosen the screws securing the protective cage.
4. Locate the mating P50 connector in the UPM section wireway and connect the P50 connector to the J50 connector.
5. Locate the mating P51 connector in the UPM section wireway and connect the P51 connector to the J51 connector.
6. Locate the mating P61 connector in the UPM section wireway and connect the P61 connector to the J61 connector.
7. Locate the mating P70 connector in the UPM section wireway and connect the P70 connector to the J70 connector.

**Figure 24. UPS Intercabinet Interface Harness Locations**




### 4.4.2 Connecting Intercabinet CAN Cables and Connectors

**NOTE** Four intercabinet interface wiring harnesses are supplied coiled inside the protective cage on the right side panel of the ISBM section.

1. In the UPM section, locate the coiled RJ-45 CAN cable. Remove the wire ties securing the cable to the interior left side panel of the UPM section. Route this cable through the round wiring access in the right side panel of the ISBM section.
2. In the ISBM section, locate the J39 inverter CAN connector on the PI1 interface board and connect the RJ-45 CAN cable connector to the J39 connector (see Figure 26 and Figure 27).
3. Dress the interface harnesses and secure in place with wire ties as necessary to prevent wire damage.

4. When all wiring is complete, reinstall the safety shield panels removed in previous steps.
5. Reinstall the front wireway panel.
6. If installing a battery system, proceed to paragraph 4.6 *Battery System Installation*; otherwise, proceed to Step 7.
7. If installing a tie cabinet or distribution panel for a distributed bypass system, proceed to paragraph 4.7 *Distributed Bypass Tie Cabinet Installation*; otherwise, proceed to paragraph 4.8 *Installing UPS External and Battery Power Wiring*.

**Figure 25. 600V ISBM Section Intercabinet DC Power Terminal Locations**

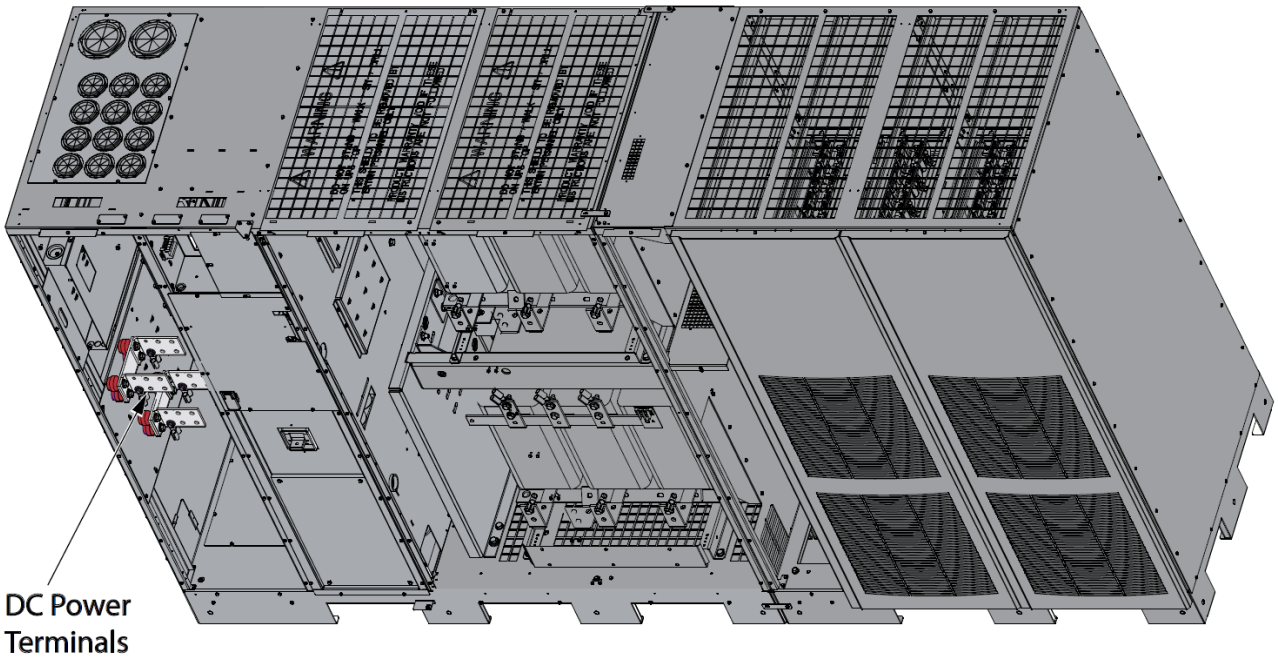
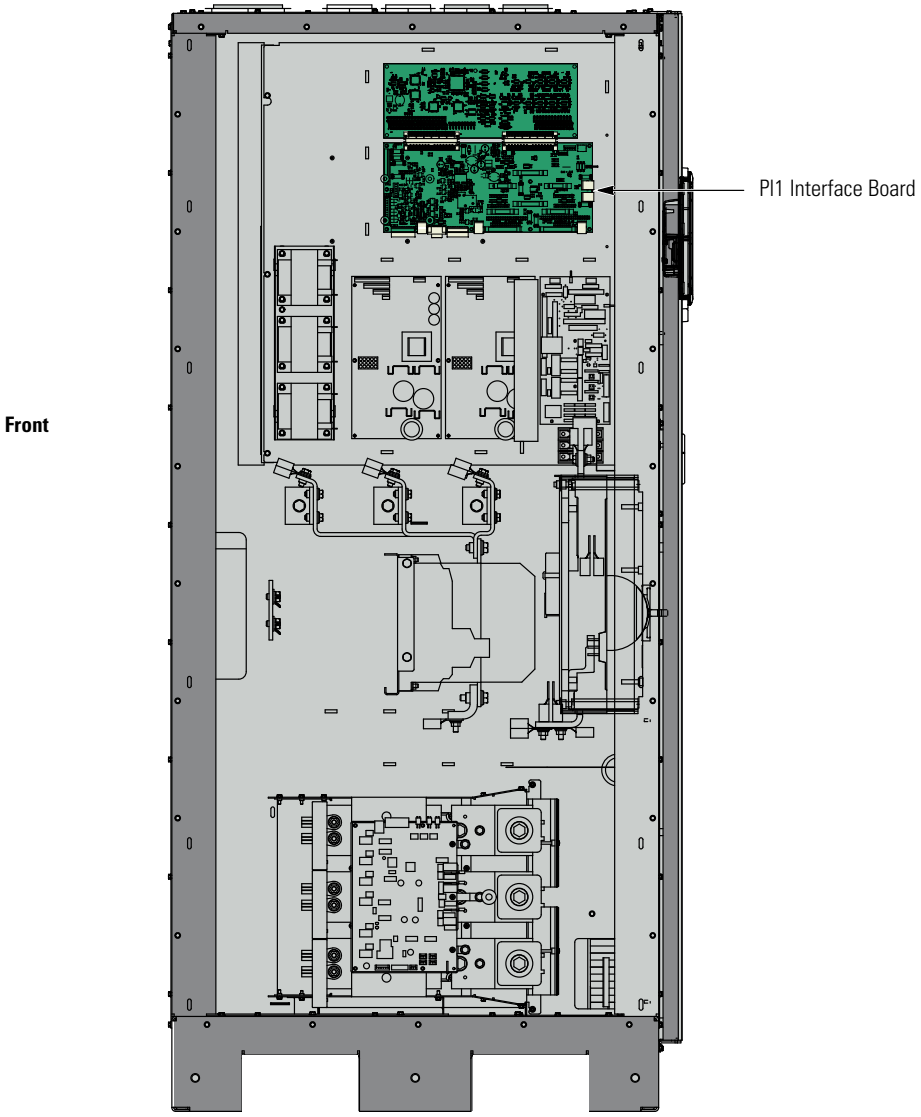
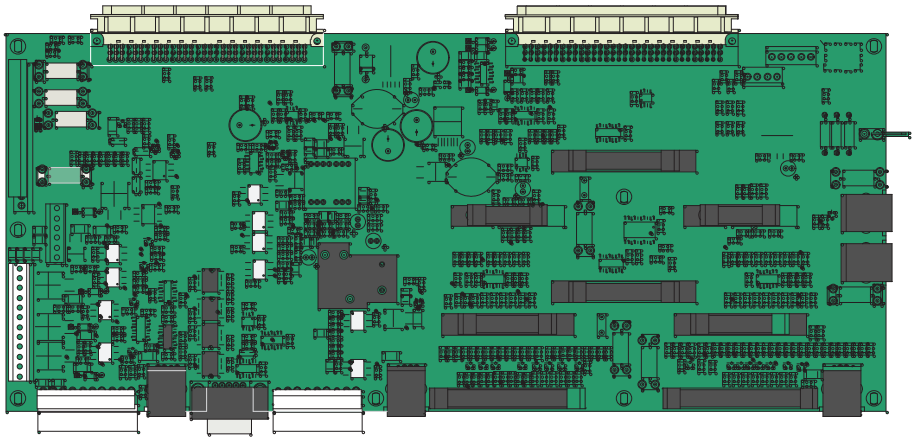


**Figure 26. PI1 Interface Board Location**




**ISBM Section Right Side Inside View**

**Figure 27. J39 Location on PI1 Interface Board**



## 4.5 Field Installed UPM Installation

If installing a Plus 1 configuration with an FI-UPM, install the FI-UPM using the instructions in the *Eaton® Power Xpert® 9395P UPS Field Installed UPM Mechanical Installation Manual* (P-164000503) listed in paragraph 1.9 *For More Information* for more info. After the FI-UPM is installed, proceed to paragraph 4.6 *Battery System Installation* in this document if installing a battery system; otherwise, proceed to paragraph 4.7 *Distributed Bypass Tie Cabinet Installation* in this document to complete the wiring of the UPS.

## 4.6 Battery System Installation

If installing a battery system, install the customer-supplied battery system according to the battery and battery system manufacturer's instructions and all applicable codes and regulations, including the NEC, Article 480. After the battery system is installed, proceed to paragraph 4.7 *Distributed Bypass Tie Cabinet Installation* if installing a distributed bypass tie cabinet; otherwise, proceed to paragraph 4-8 4.8 *Installing UPS External and Battery Power Wiring* to complete the wiring of the UPS.

## 4.7 Distributed Bypass Tie Cabinet Installation

**NOTE**

The tie cabinet must contain Module Output Breakers (MOBs) with dual auxiliary contacts for control of the system. Without dual auxiliary MOBs, UPMs are not allowed to go to bypass individually during servicing. All UPMs will go to bypass instead of the just the UPM needing service, decreasing critical load protection. With dual auxiliary MOBs, one UPM can be bypassed while the remaining UPMs support the load as long as the remaining UPMs have the capacity to do so.

If installing a distributed bypass system, install the customer-supplied tie cabinet or distribution panel according to the tie cabinet or distribution panel manufacturer's instructions and all applicable codes and regulations, including the NEC, Article 480. After the tie cabinet is installed, proceed to paragraph 4.8 to complete the wiring of the UPS.

## 4.8 Installing UPS External and Battery Power Wiring

**NOTE**

The ISBM and UPM sections are shipped with debris shields covering the ventilation grills on top of the sections (see Figure 29). Do not remove the debris shields until installation is complete. However, remove the shields before operating the UPS. Once the debris shields are removed, do not place objects on the ventilation grills.

**NOTE** Remove the ISBM section top or bottom conduit landing plate to drill or punch conduit holes (see Figure 30).

Use the procedures in the following paragraphs to connect the external and battery power wiring.

### 4.8.1 2-Hole Barrel Lug Terminations for Bus Bar Installation

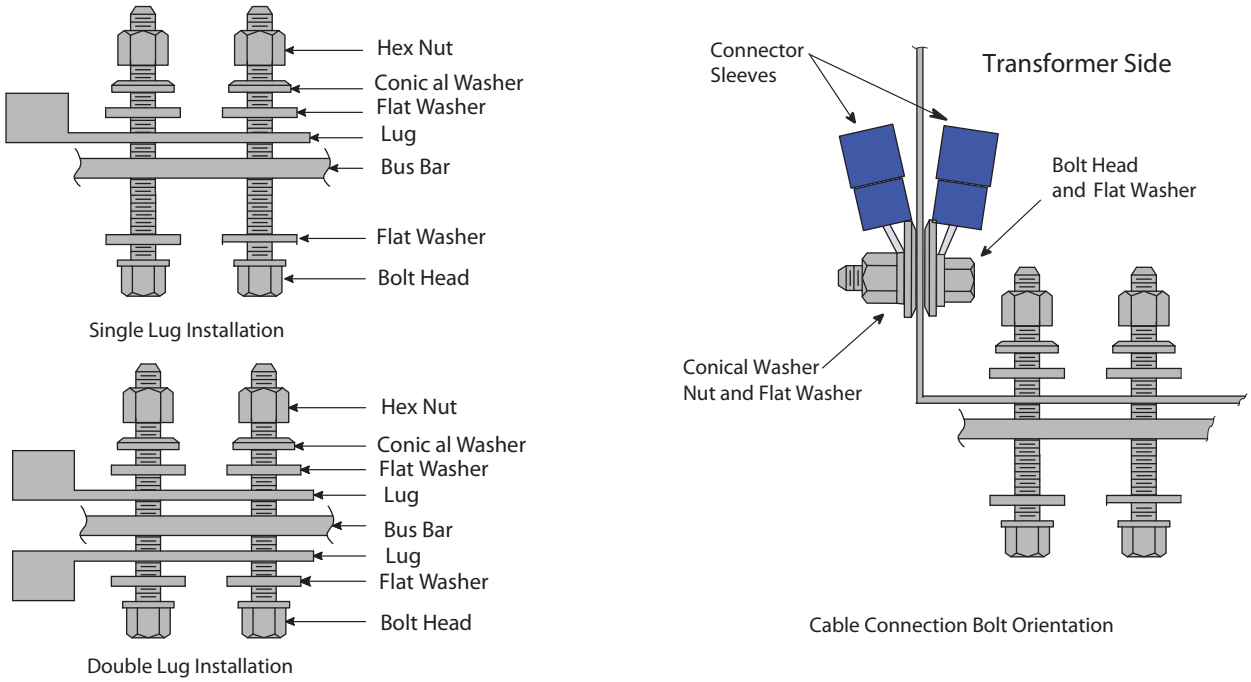
Paragraphs 4.8.2 *External Power Wiring Installation* and 4.8.3 *Battery Power Wiring* require connecting input, output, and battery power wiring using 2-hole barrel lugs. See Figure 28 for the hardware sequence when installing the lugs to the bus bars. Tighten the nut to the torque value listed in Table 19.

**NOTE** Conical washers are special purpose washers that look similar to flat washers, except for a slight conical shape. When installing conical washers, the top of the dome should be next to the nut and the base of the washer should be against a flat washer, or large terminal.

**⚠CAUTION**

One set of bolts secure the bus bar. (See Single and Double Lug Installation in Figure 28). Other bolts are used for the input and output cable connections. (See Cable Connection Bolt Orientation in Figure 28). Always insert the cable connection bolt with the bolt head side closest to the transformer. This avoids interference with the bolt that holds the bus bar.

**Figure 28. Typical Bus Bar Barrel Lug Mounting – Hardware Assembly Sequence**




### 4.8.2 External Power Wiring Installation

To install wiring to connections:

1. Remove one top screw and two bottom screws securing each ISBM section left and right front panel (see Figure 20). Lift the panels straight up to remove them from the panel hanger brackets at the top of the cabinet.
2. Remove the screws securing the top and bottom internal safety shield panels and remove the panels to gain access to the input, output, and battery terminals. Retain the hardware for later use.
3. Route the input and output cables through either the top or bottom of the cabinet to the UPS terminals. See Figure 30 through Figure 34 for wiring access information and terminal locations.

   **Top Access Wiring**. Remove the top conduit plate from the top of the ISBM section. Identify all conduit requirements and mark their location. Drill and punch all conduit holes in the top conduit plate prior to mounting on the ISBM section. Install the conduit plate and install all conduit runs into the plate. Pull wiring through conduit into the ISBM section wiring area.

   **Bottom Access Wiring**. Remove the bottom conduit plate from the inside bottom of the ISBM section. Identify all conduit requirements and mark their location. Drill and punch all conduit holes in the bottom conduit plate prior to mounting on the ISBM section. Install the conduit plate and install all conduit runs into the plate. Pull wiring through conduit into the ISBM section wiring area.

**Figure 29. ISBM and UPM Section Debris Shields**

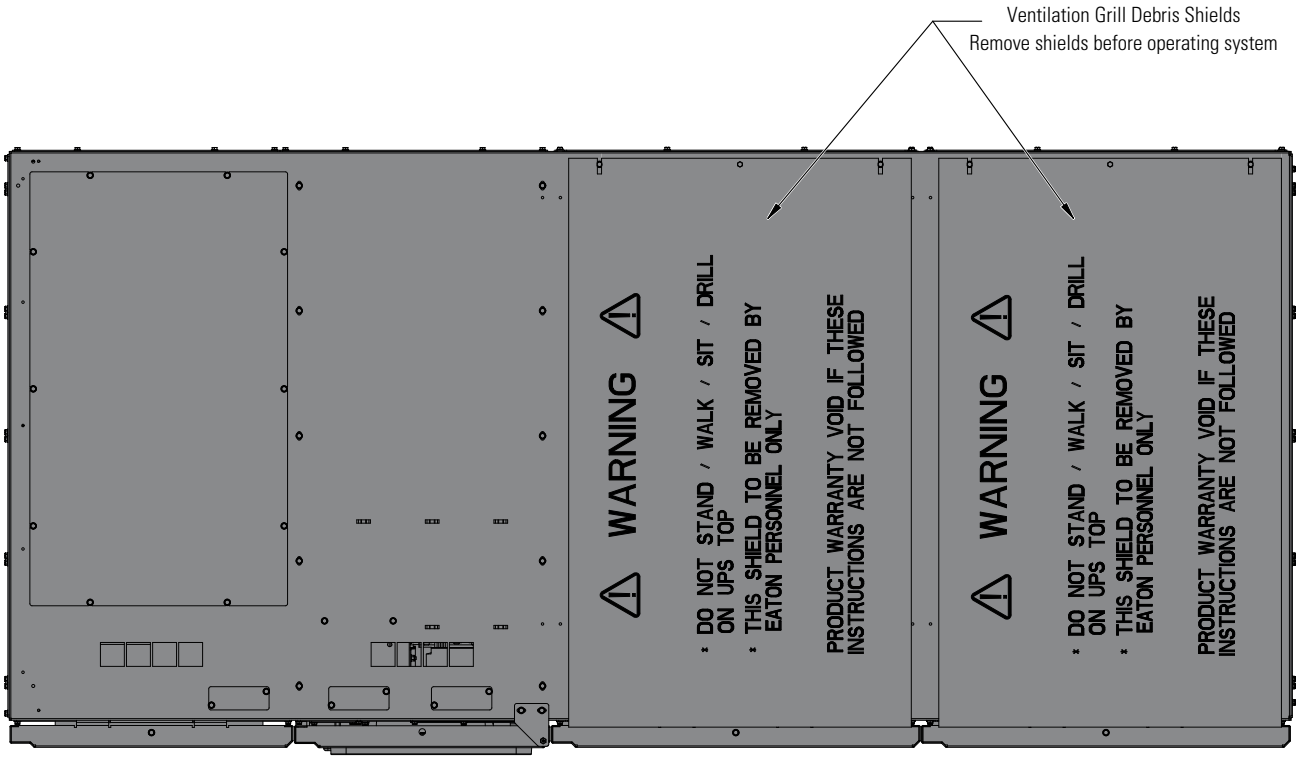
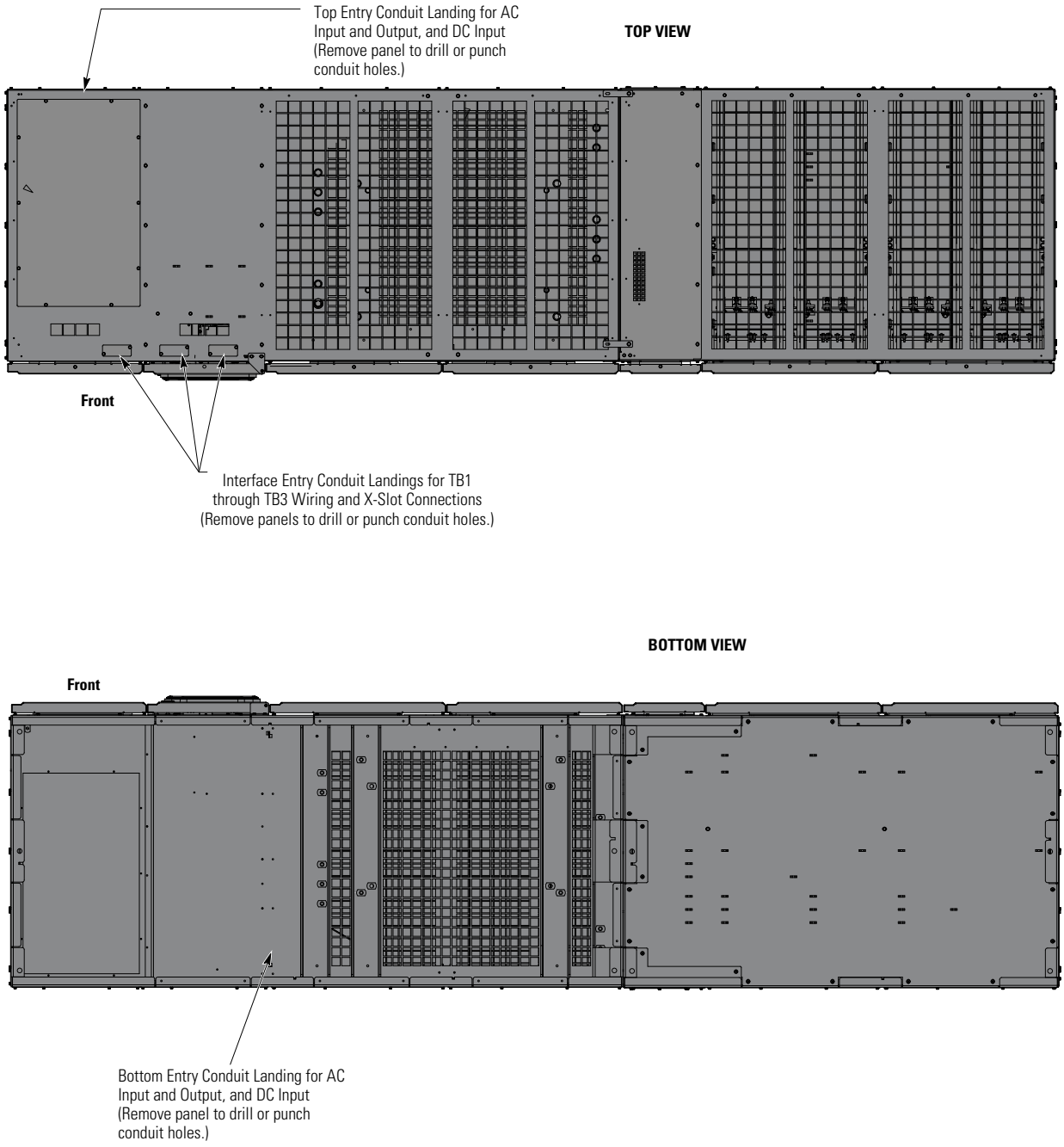


**Figure 30. ISBM and UPM Section Conduit and Wire Entry Locations**




4. Locate the external wiring terminal hardware kit packed on the bottom left side of the ISBM section.
5. Using hardware from the external wiring terminal hardware kit (see Table 21), connect phase A, B, and C rectifier input power wiring from the utility source to the rectifier input terminals in the ISBM section. See paragraph 3.2.6 *UPS System Power Wiring Preparation* for wiring and termination requirements.

6. If installing a UPS configured as an Input Output Module (IOM), proceed to Step 8; otherwise, proceed to Step 7.
7. Using hardware from the external wiring terminal hardware kit (see Table 21), connect phase A, B, and C bypass input power wiring from the utility source to the bypass input terminals in the ISBM section. See paragraph 3.2.6 *UPS System Power Wiring Preparation* for wiring and termination requirements.
8. If wiring a distributed bypass system, proceed to Step 9; otherwise, proceed to Step 11.
9. Using hardware from the external wiring terminal hardware kit (see ), connect phase A, B, and C wiring from the output terminals of each UPS unit to the customer-supplied tie cabinet or load distribution panel. See paragraph 3.2.6 *UPS System Power Wiring Preparation* for wiring and termination requirements.
10. Proceed to paragraph 4.8.3 *Battery Power Wiring*.
11. Using hardware from the external wiring terminal hardware kit (see Table 21), connect phase A, B, and C power wiring from output terminals to the critical load. See paragraph 3.2.6 *UPS System Power Wiring Preparation* for wiring and termination requirements.
12. Proceed to paragraph 4.8.3 *Battery Power Wiring*.

**Figure 31. ISBM Section Power Terminal Locations (380V, 400V, 415V, and 480V Models)**

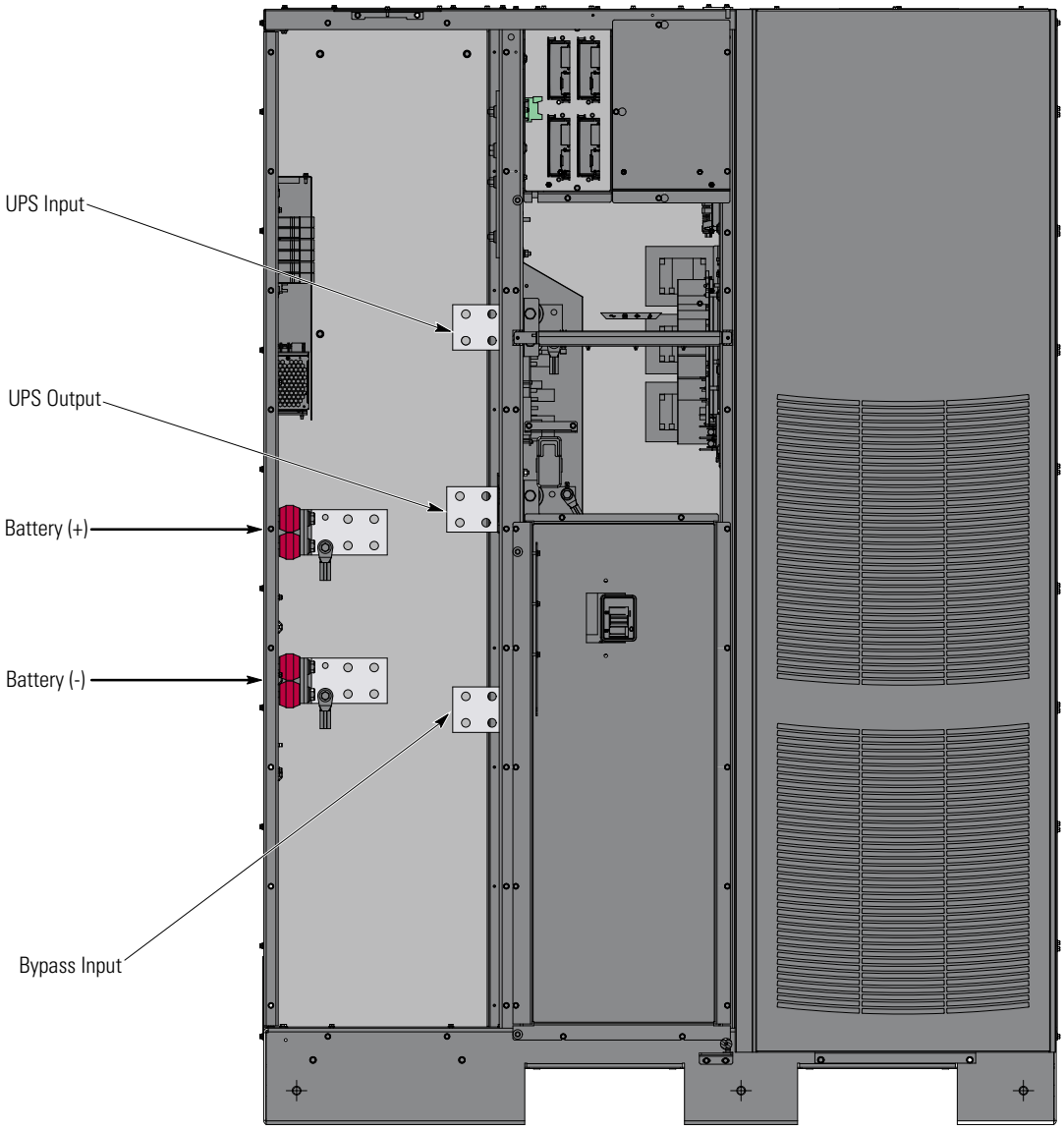


**Figure 32. ISBM Section Power Terminal Locations (600V Models)**

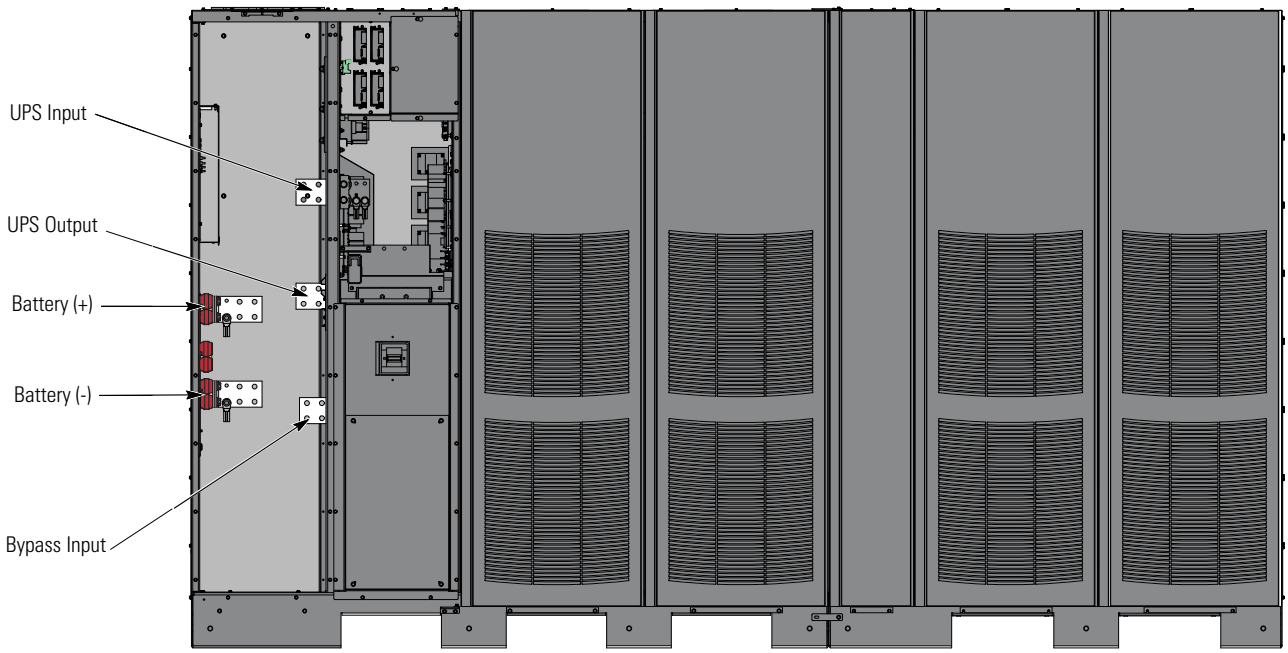
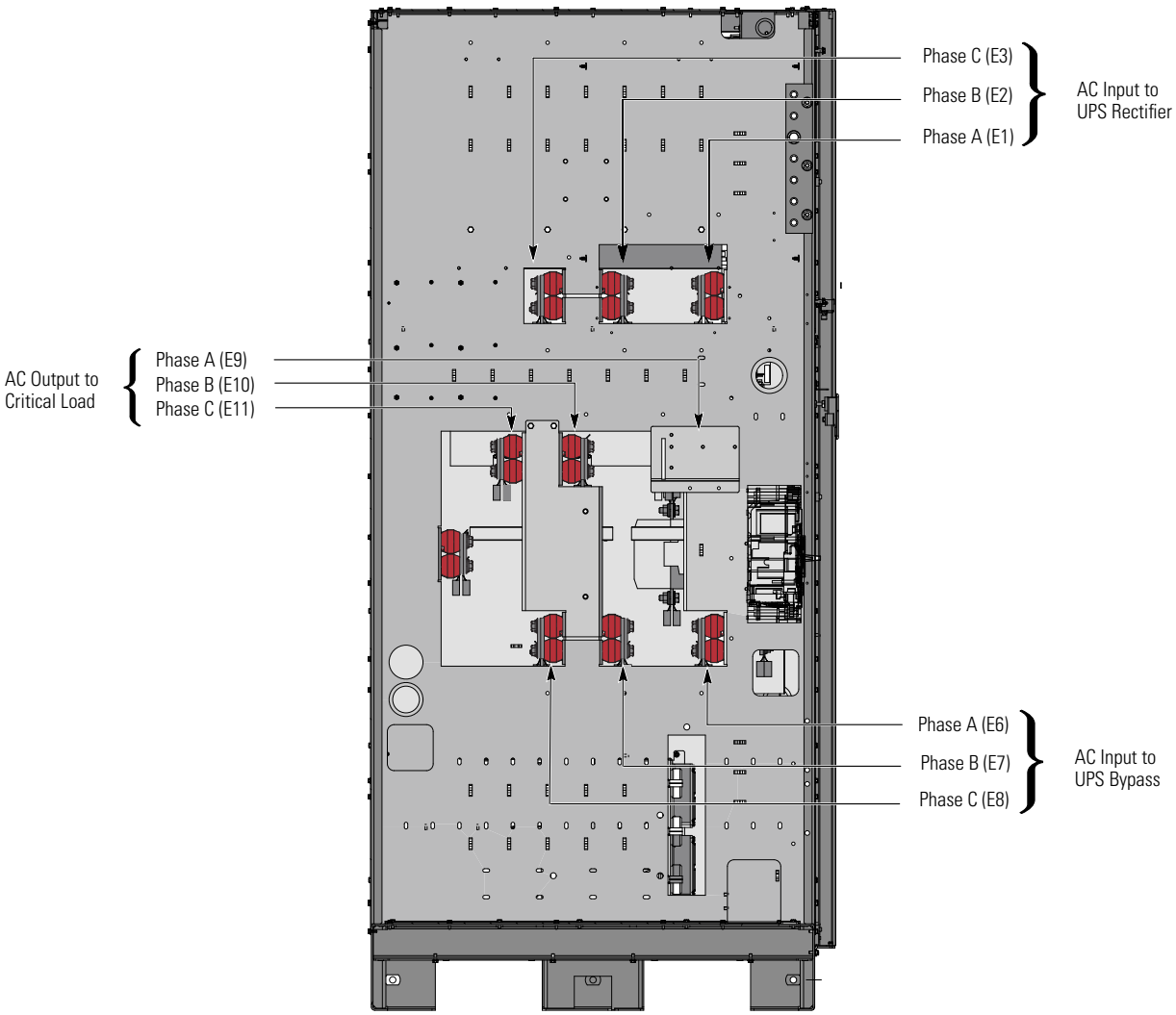


**Figure 33. ISBM Section Power Terminal Detail – Section AA (380V, 400V, 415V, and 480V Models)**




### 4.8.3 Battery Power Wiring

**⚠CAUTION**

When sizing the battery system, do not exceed the internal battery charger capabilities. See Chapter 10 *Product Specifications* for maximum battery charger currents.

**⚠ ATTENTION!**

Lors de l'évaluation du système de batterie, ne pas dépasser les capacités internes du chargeur de batteries. Se reporter au chapitre 10 Chapter 10 *Product Specifications* sur les notices techniques pour connaître les tensions maximales du chargeur de batteries.Ne pas installer une armoire endommagée. Signaler les dommages au transporteur et communiquer avec un représentant du service Eaton immédiatement.

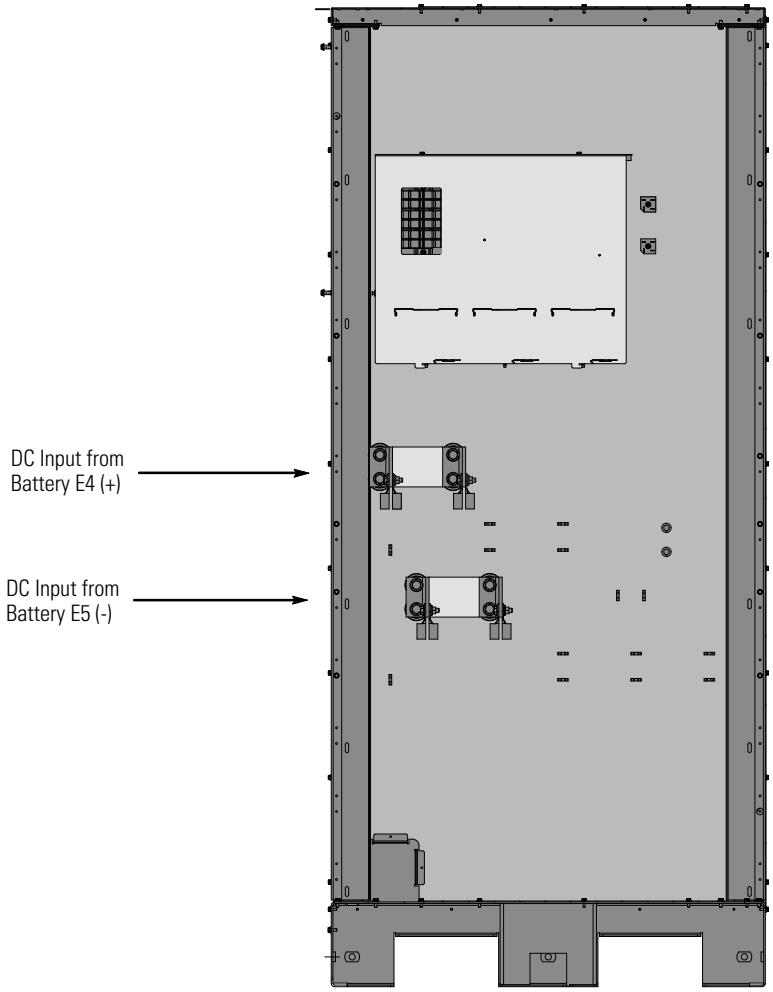
To install wiring to connections:

**NOTE** **Battery Cable Routing Requirements using Conduit**:

- * Each conduit must have a Positive, Negative, and Ground conductor
- * There must be an equal number of positive and negative conductors in a single conduit. Only one ground conductor is required in each conduit.
- **Battery Cable Routing Requirements using Raceway:**
- * Positive and negative battery cables must be run side by side in the raceway in an alternating pattern (+ - + - + - + -).
- * There must be a ground cable running in the raceway with the battery cables.

1. Route the battery cables between the ISBM section and the battery system or battery disconnect. See Figure 30 through Figure 34 for wiring access information and terminal locations.
2. If wiring the UPS for a common battery, proceed to Step 3; if wiring for a separate battery, proceed to Step 5.
3. Using hardware from the external wiring terminal hardware kit (see Table 21), connect the positive, negative, and ground DC power wiring from the battery system or disconnect to the ISBM section battery and ground terminals. Use both sets of terminals shown in Figure 34 as needed. See paragraph 3.2.6 *UPS System Power Wiring Preparation* for wiring and termination requirements.
4. Proceed to Step 6.
5. Using hardware from the external wiring terminal hardware kit (see Table 21), connect the positive, negative, and ground DC power wiring from the battery systems or disconnects to the ISBM section battery and ground terminals. Use one set of terminals for each UPM. See paragraph 3.2.6 *UPS System Power Wiring Preparation* for wiring and termination requirements.
6. After wiring the UPS system to the facility power and critical load, be sure to ground the system according to local and/or national electrical wiring codes.
7. If wiring interface connections, proceed to paragraph 4.9 *Installing Interface Connections*; otherwise, proceed to Step 8.
8. When all wiring is complete, reinstall the top and bottom safety shield panels removed in paragraph 4.8.2 *External Power Wiring Installation*, Step 2. Secure with the retained hardware.
9. Reinstall the left front panel removed in paragraph 4.8.2 *External Power Wiring Installation*, Step 1 and secure with the retained hardware.

**Figure 34. ISBM Section Power Terminal Detail BB – Common Battery**




## 4.9 Installing Interface Connections

**⚠WARNING**

Hazardous voltages are present near the user interface terminal area if the UPS is not totally disconnected.

**⚠ AVERTISSEMENT!**

Des tensions dangereuses sont présentes près de l'enceinte du terminal de l'interface utilisateur si l'onduleur n'est pas totalement débranché.

Use the procedures in the following paragraphs to connect the TB1, TB1 Battery, TB2, and TB3 interface connections.

### 4.9.1 TB1, TB2, and TB3 Connections (Other than TB1 Battery Interface Connections)

**NOTE** When installing interface wiring for TB1, TB2, and TB3 connections, conduit must be installed between each device and the UPS cabinet.

**NOTE** Interface wiring must be installed from the top of the UPS cabinet.

To install wiring to connections:

1. Verify the UPS system is turned off and all power sources are removed. See Chapter 7 *UPS Operating Instructions* for shutdown instructions.
2. If not already opened, unfasten the front door latch and swing the door open (see Figure 20).
3. If not already removed, remove the door. Remove the retaining screw located inside the door at the bottom hinge pivot point, then lift the door off. Retain the hardware for later use.
4. Terminal block TB3 is accessible on the left side of the X-Slot communication bay. To gain access to terminal block TB1, TB2, and the left interface entry conduit landing plates, remove the screws securing the top internal safety shield panel and remove the panel. Retain the hardware for later use (see Figure 35).
5. Remove the interface entry conduit landing plates to drill or punch holes (see Figure 30).
6. Reinstall the interface entry plates and install the conduit.

**WARNING**

Do not directly connect relay contacts to the mains related circuits. Reinforced insulation to the mains is required.

**AVERTISSEMENT!**

Ne pas directement brancher les contacts de relais aux circuits du réseau. Une isolation renforcée des réseaux est nécessaire.

7. To locate the appropriate terminals and review the wiring and termination requirements, see paragraph 3.2.7 *UPS System Interface Wiring Preparation*, Table 33, and Figure 30 through Figure 34 for wiring access.
8. Route and connect the wiring.
9. If wiring TB1 battery interface connections, proceed to paragraph 4.9.2 *TB1 Battery Interface Connections*; if wiring the X-Slot connections only, proceed to paragraph 4.9.3 *X-Slot Connections*; otherwise, proceed to Step 10.
10. Reinstall the top internal safety shield panel and secure with the retained hardware.
11. Reinstall the front door removed in Step 3 and secure with the retained hardware.
12. Close the door and secure the latch.

**Figure 35. ISBM Section Interface Terminal Locations.**

**Table 33. TB1, TB2, and TB3 Interface Connections**

| Terminal TB1 | Name | Description |
|---|---|---|
| 1 | REPO NC | Input: Normally-closed dry contact used to activate UPS EPO from a remote switch. |
| 2 | REPO Return | |
| 3 | REPO NO | Input: Normally-open dry contact used to activate UPS EPO from a remote switch. |
| 4 | REPO Return | |
| 5 | Battery Aux | Input: Normally-open contact used to indicate when UPS battery breaker is open or closed. |
| 6 | Battery Aux Common | |
| 7 | 48 Vdc Battery Shunt Trip + | Output: Contacts used to open battery breaker or disconnect. |
| 8 | 48 Vdc Battery Shunt Trip – | |
| 9 | Output Contactor K3 NC Aux | Output: Normally-closed contact opens when output contactor closes. |
| 10 | Output Contactor K3 NC Aux Common | |
| **Terminal TB2** | **Name** | **Description** |
| 1 | Pull Chain | Output: Backup control for parallel operation. |
| 2 | Pull Chain Common | |
| 3 | Alarm Relay NC | Output: General purpose normally-closed (NC) relay contact. |
| 4 | Alarm Relay Common | |
| 5 | Alarm Relay NO | Output: General purpose normally-open (NO) relay contact. |
| 6 | Alarm Relay Common | |
| 7 | Not Used | |
| 8 | Not Used | |
| 9 | Not Used | |
| 10 | Not Used | |
| **Terminal TB3** | **Name** | **Description** |
| 1 | Building Alarm 1 | Input: Programmable UPS alarm, activated by a remote dry contact closure. |
| 2 | Building Alarm 1 Return | |
| 3 | Building Alarm 2 | Input: Programmable UPS alarm, activated by a remote dry contact closure. |
| 4 | Building Alarm 2 Return | |
| 5 | Building Alarm 3<br>Default: Charger Off | Input: Programmable UPS alarm, activated by a remote dry contact closure. Default function set for charger off. |
| 6 | Building Alarm 3 Return | |
| 7 | Building Alarm 4<br>Default: On Generator | Input: Programmable UPS alarm, activated by a remote dry contact closure. Default function set for on generator. |

**Table 33. TB1, TB2, and TB3 Interface Connections (Continued)**

| Terminal TB3 | Name | Description |
|---|---|---|
| 8 | Building Alarm 4 Return | |
| 9 | Building Alarm 5<br>Default: Maintenance Bypass | Input: Programmable UPS alarm, activated by a remote dry contact closure. Default function set for maintenance bypass. |
| 10 | Building Alarm 5 Return | |
| NOTE "Return" indicates connection to electronics circuit ground. "Common" indicates connection to common side of isolated relay contact. | | |

**Figure 36. Interface Terminal Detail**

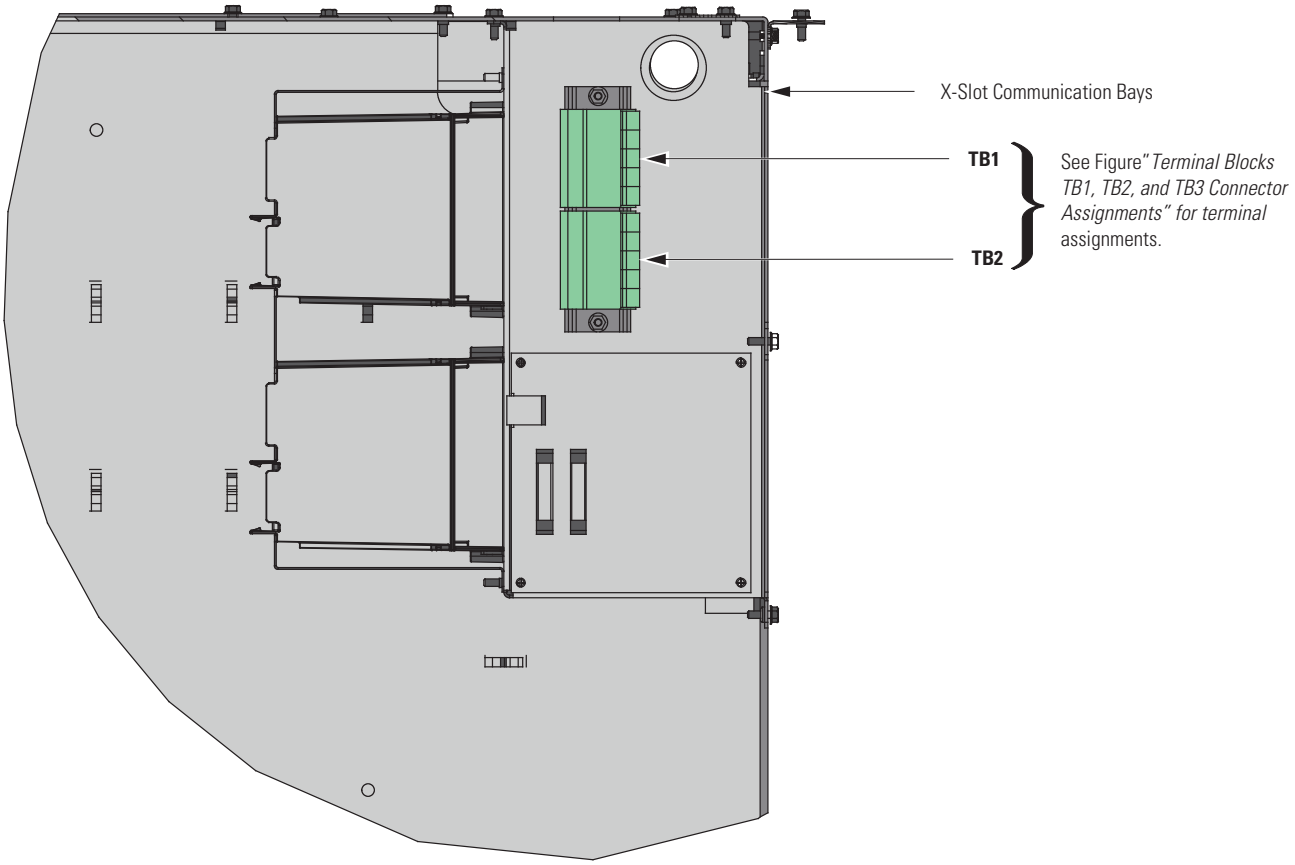
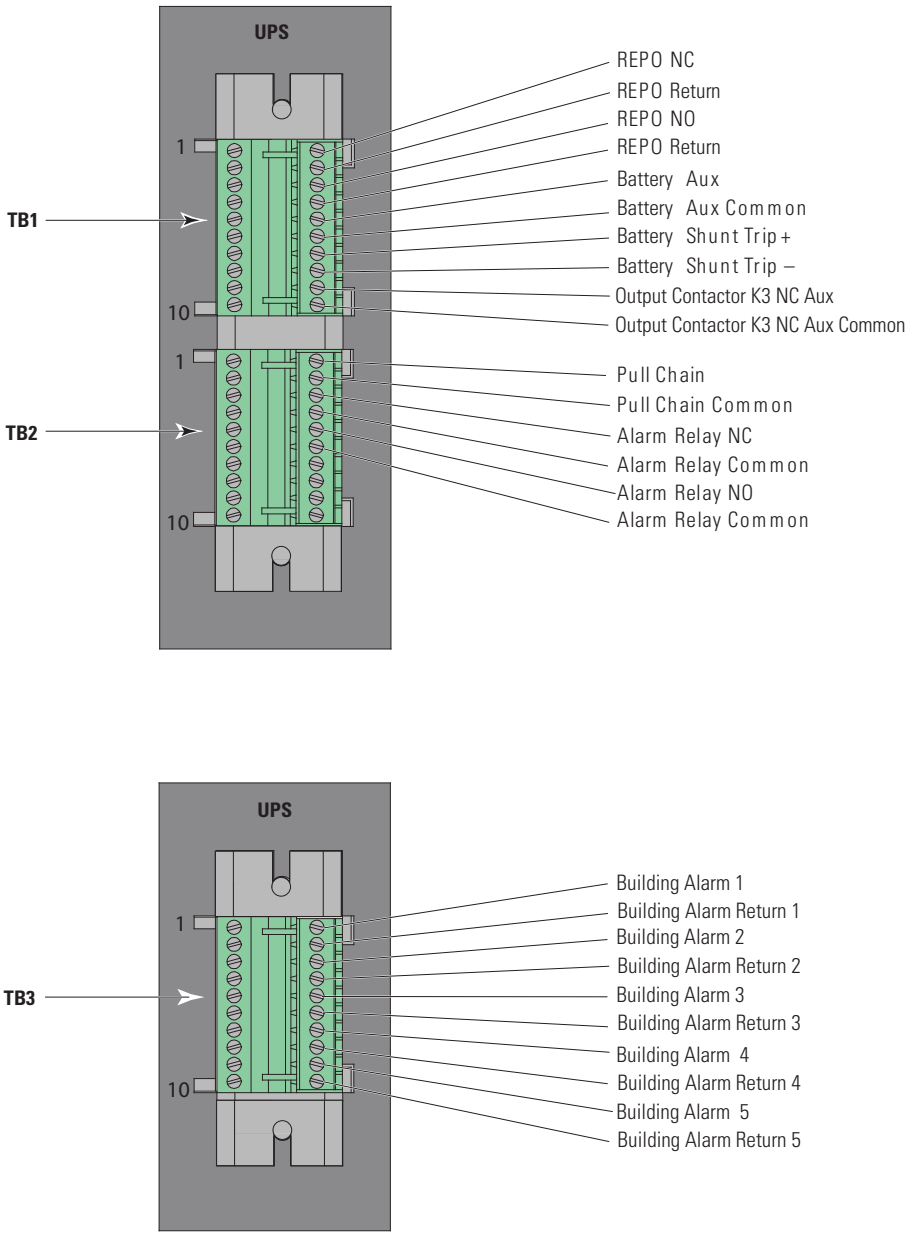


**Figure 37. Typical Alarm Relay Connection**


**NOTE** Alarm relay contacts have a maximum current rating of 5A and a switched voltage rating of 30 Vac and 28 Vdc.
**NOTE** Alarm relay normally-open and normally-closed return terminals are separated on the terminal board but are electrically in common.
**NOTE** Do not directly connect relay contacts to the mains related circuits. Reinforced insulation to the mains is required.
**NOTE** Alarm relay wiring should be a minimum of 22 AWG.

**Figure 38. Terminal Blocks TB1, TB2, and TB3 Connector Assignments**




**NOTE** All building alarm inputs require an isolated normally-open or normally-closed contact or switch (rated at 24 Vdc, 20 mA minimum) connected between the alarm input and common terminal as shown. Building alarm inputs can be programmed for use with either normally-open or normally-closed contacts. All control wiring and relay and switch contacts are customer-supplied.
**NOTE** The building alarms can be programmed to display the alarm functional name.
**NOTE** A jumper wire must be connected between pins 1 and 2 on TB1, if the normally-closed REPO contact is not used.

### 4.9.2 TB1 Battery Interface Connections

To install wiring to connections:

1. Verify the UPS system is turned off and all power sources are removed. See Chapter 7 *UPS Operating Instructions* for shutdown instructions.
2. Unfasten the front door latch and swing the door open (see Figure 20).
3. Remove the door. Remove the retaining screw located inside the door at the bottom hinge pivot point, then lift the door off. Retain the hardware for later use.
4. To gain access to terminal block TB1 and the interface entry conduit landing plate, remove the screws securing the top internal safety shield panel and remove the panel. Retain the hardware for later use (see Figure 35).
5. To locate the appropriate terminals and review the wiring and termination requirements, see paragraph 3.2.6 *UPS System Power Wiring Preparation*, Table 33, and Figure 35 through Figure 40.

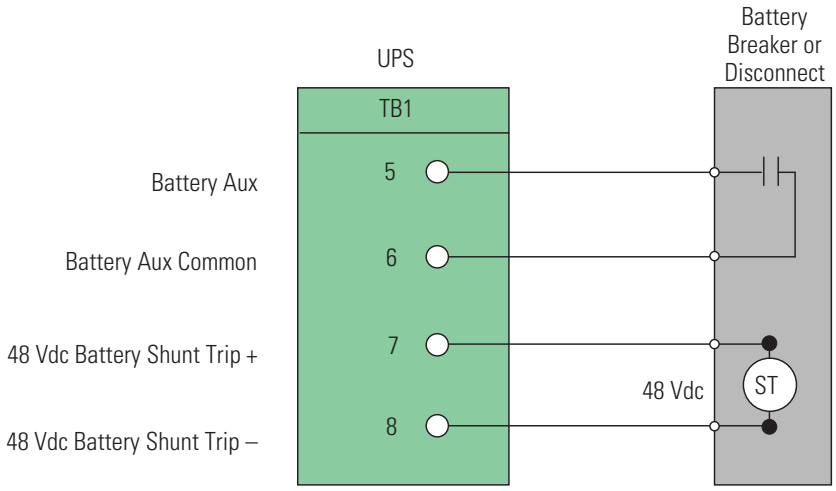
**NOTE** When installing shunt trip and battery aux interface wiring to the UPS interface terminals, conduit must be installed between the UPS and battery system.

6. Remove the left interface entry conduit landing plate to drill or punch holes (see Figure 30).
7. Reinstall the interface entry plate and install the conduit.

**NOTE** The 9395P system can trip a maximum of six battery cabinets total. This applies to both the 1085 standard and High Rate series batteries. If more than six battery cabinets in total are needed in a separate UPM battery configuration, DO NOT hook up the shunt trips.

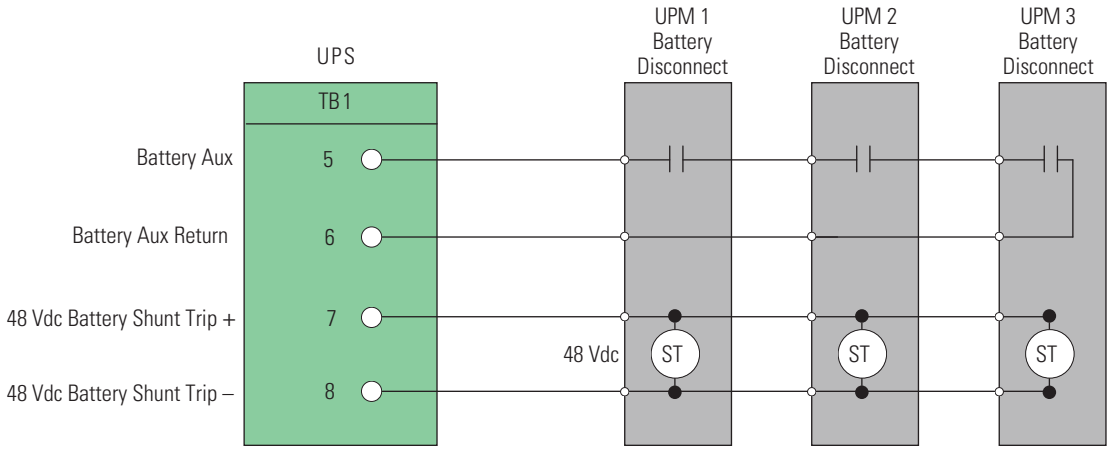
8. Route the shunt trip (optional) and battery aux wiring from the battery disconnects to the UPS cabinet. See Figure 30 and Figure 31 for UPS wiring access information and terminal locations.
9. Connect the wiring to the TB1 terminals.
10. Reinstall the top internal safety shield panel and secure with the retained hardware.
11. Reinstall the front door removed in Step 3 and secure with the retained hardware.
12. If wiring X-Slot connections, proceed to paragraph 4.9.3 *X-Slot Connections*; otherwise, proceed to Step 13.
13. Close the door and secure the latch.

**Figure 39. Typical Battery Interface Connection – Common Battery System**




**NOTE** *Battery Aux and DC Shunt Trip wiring should be a minimum of 18 AWG.*

**Figure 40. Typical Battery Interface Connection – Separate Battery System**




**NOTE** *Battery aux and DC shunt trip wiring should be a minimum of 18 AWG.*

### 4.9.3 X-Slot Connections

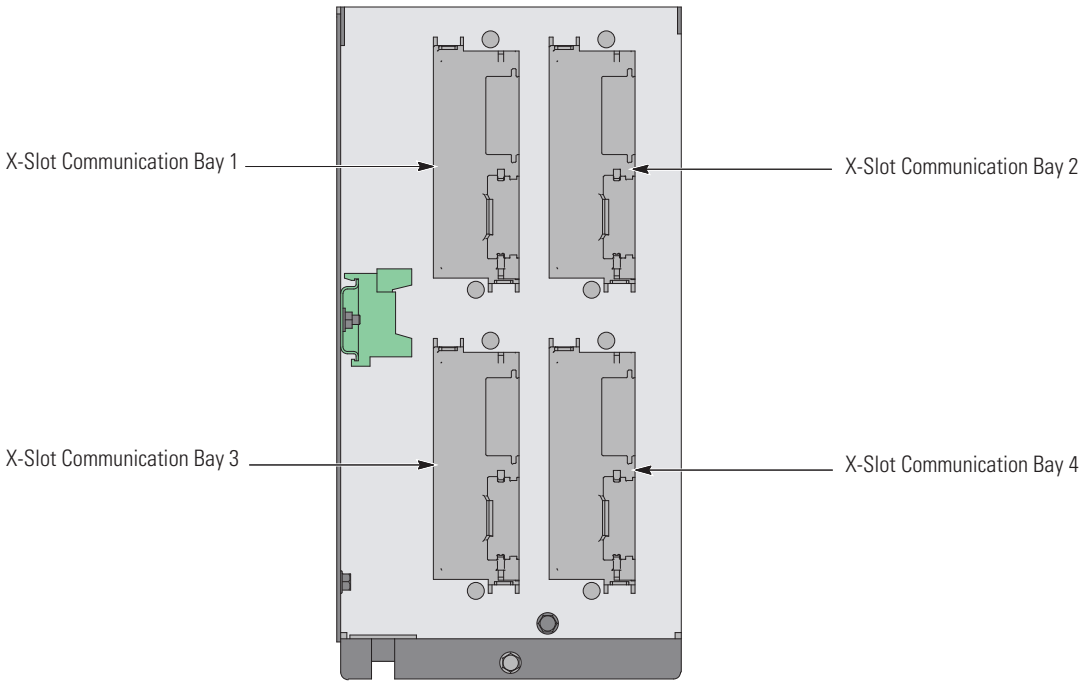
| | | |
|---|---|---|
| | **NOTE** | LAN and telephone drops for use with X-Slot cards must be provided by the customer. |
| | **NOTE** | When installing external wiring to X-Slot cards, conduit must be installed to the UPS cabinet. When installing internal wiring to X-Slot terminals, route the wiring through the internal opening in the X-Slot communication bay. |

For installation and setup of an X-Slot card, contact an Eaton service representative (see paragraph Getting Help 1.10 *Getting Help*).

To install wiring to connections:

1. If not already installed, install the LAN drops.
2. Unfasten the front door latch and swing the door open (see Figure 20).
3. Remove the right interface entry conduit landing plate to drill or punch holes (see Figure 30).
4. Reinstall the interface entry plate and install the conduit.
5. Route and install the LAN and other cables to the appropriate X-Slot cards. See Figure 35 and Figure 41 for X-Slot communication bay locations.
6. Close the door and secure the latch.
7. Refer to the manual supplied with the X-Slot card for operator instructions.

**Figure 41. X-Slot Communication Bays**




## 4.10 Installing a REPO Switch

A latching-type Remote Emergency Power-off (REPO) switch can be used in an emergency to shut down the UPS and remove power to the critical load from a location away from where the UPS is installed. Figure 43 shows a REPO switch.

**NOTE 1** Before installing a REPO switch, verify that the UPS was installed according to the instructions in paragraphs 4.2 *Unloading the ISBM with UPM Section from the Pallet* through 4.9 *Installing Interface Connections*.

**NOTE 2** When installing the REPO switch, you must install conduit between the device and the UPS cabinet for wiring the switch.

**NOTE 3** Remove the UPS cabinet interface entry conduit landing plates to drill or punch holes (see Figure 30).

**NOTE 4** The REPO switch must be a normally-open or normally-closed latching–type switch not tied into any other circuits.

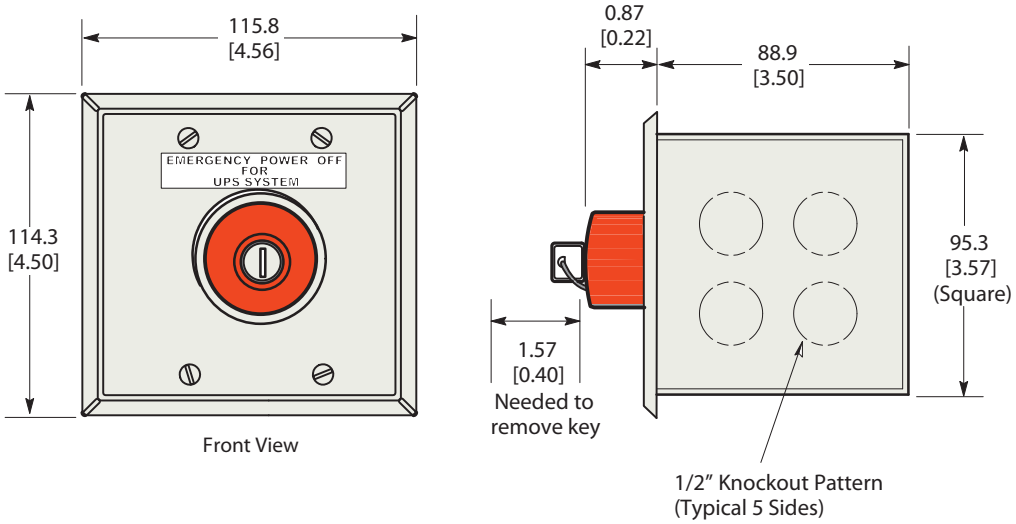
**NOTE 5** This procedure is intended to be used for the installation of the Eaton-supplied REPO switch. If installing another manufacturer's switch, use this procedure only as a guide.

**NOTE 6** The REPO switch wiring must be in accordance with NEC Article 725 Class 2 requirements.

To Install a REPO switch:

1. Verify the UPS system is turned off and all power sources are removed. See Chapter 7 *UPS Operating Instructions* for shutdown instructions.
2. Securely mount the REPO switch. Recommended locations include operator's consoles or near exit doors. See Figure 42 for enclosure dimensions and wiring knockouts.

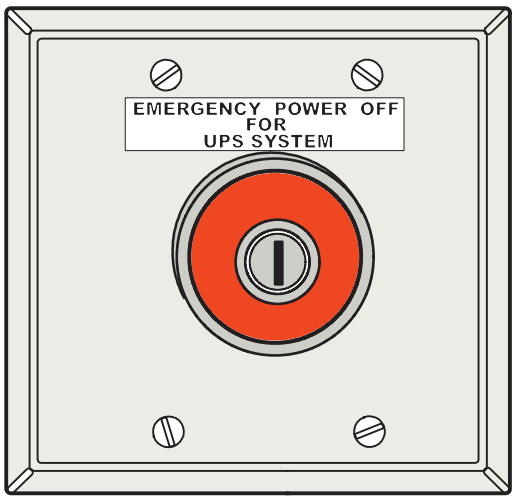
**Figure 42. Remote EPO Switch Dimensions**



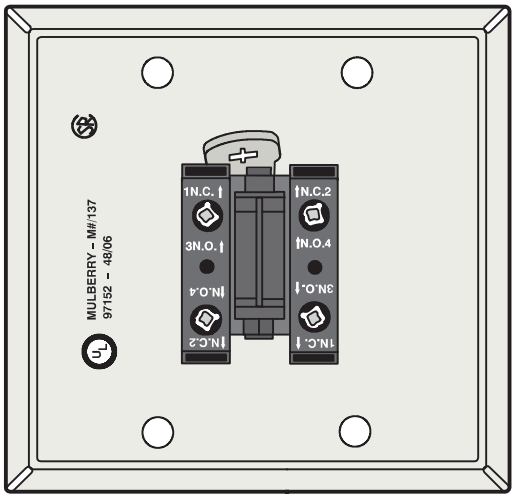

Dimensions are in millimeters [inches].

3. Unfasten the front door latch and swing the door open (see Figure 20).
4. Remove the door. Remove the retaining screw located inside the door at the bottom hinge pivot point, then lift the door off. Retain the hardware for later use.

**Figure 43. REPO Switch**




REPO Switch (Front View)



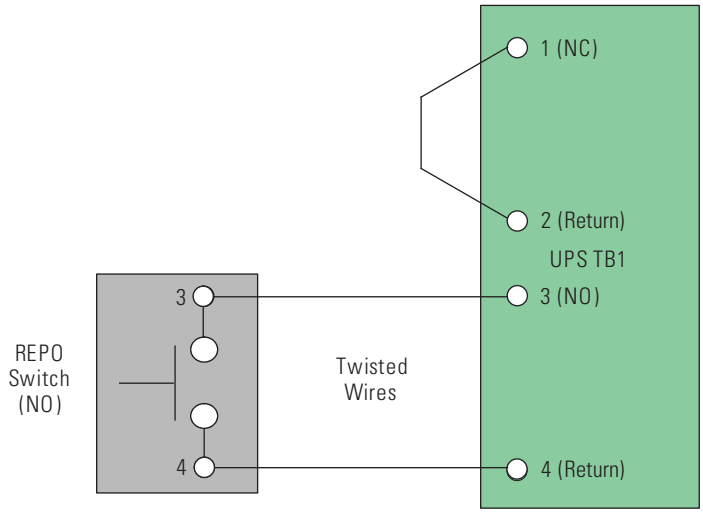

Conta ct Block (Back View, Faceplate Removed)

5. To gain access to terminal block TB1 and the interface entry conduit landing plate, remove the screws securing the top internal safety shield panel and remove the panel. Retain the hardware for later use (see Figure 35).
6. Remove the left interface entry conduit landing plate to drill or punch holes (see Figure 30).
7. Reinstall the interface entry plate and install conduit.
8. To locate the appropriate terminals and review the wiring and termination requirements, see paragraph 3.2.6 *UPS System Power Wiring Preparation*, Table 33, and Figure 38.
9. Route and connect the wiring as shown in Table 34 and Figure 44.
10. If the normally-closed REPO TB1 connection in the UPS is not used, connect a jumper wire between pins 1 and 2 on TB1.
11. If you are installing multiple REPO switches, wire additional switches in parallel with the first REPO.

**Table 34. REPO Wire Terminations**

| From REPO Station(s) Switch Contact Block (Either Block) | To Customer Interface Terminal Board TB1 in UPS Cabinet | Wire Size | Tightening Torque |
|---|---|---|---|
| 3 NO | TB1 3 | Twisted Wires (2) 14 22 AWG (0.75 4.0 mm2) | 7 lb in (0.8 Nm) |
| 4 NO | TB1 4 | | |

**Figure 44. Normally-Open REPO Switch Wiring**

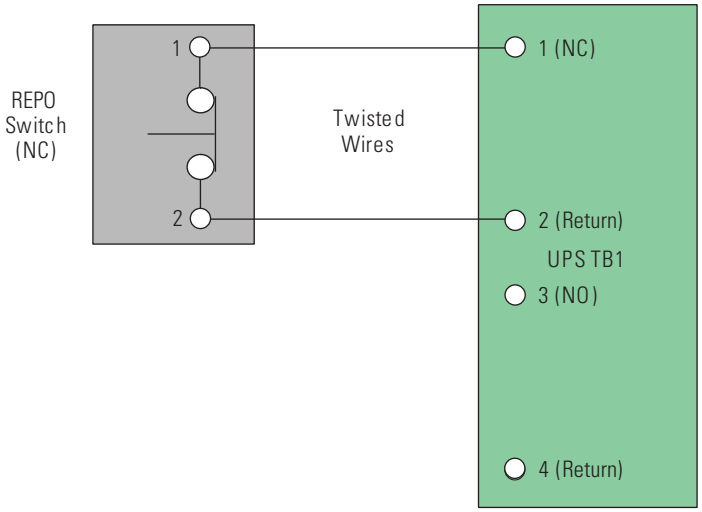



**NOTE** *REPO switch rating is 24 Vdc, 1A minimum.*
**NOTE** *The REPO switch must be a latching-type switch not tied to any other circuits.*
**NOTE** *REPO normally-open and normally-closed return terminals are separated on the terminal board but are electrically in common.*

12. If required, install wiring from the REPO switch to the trip circuitry of the upstream protective devices. A second contact block is provided on the REPO switch for this function (see Figure 43). The REPO switch wiring must be in accordance with NEC Article 725 Class 2 requirements.
13. Reinstall the top internal safety shield panel and secure with the retained hardware.
14. Reinstall the front door removed in Step 4 and secure with the retained hardware.
15. Close the door and secure the latch.

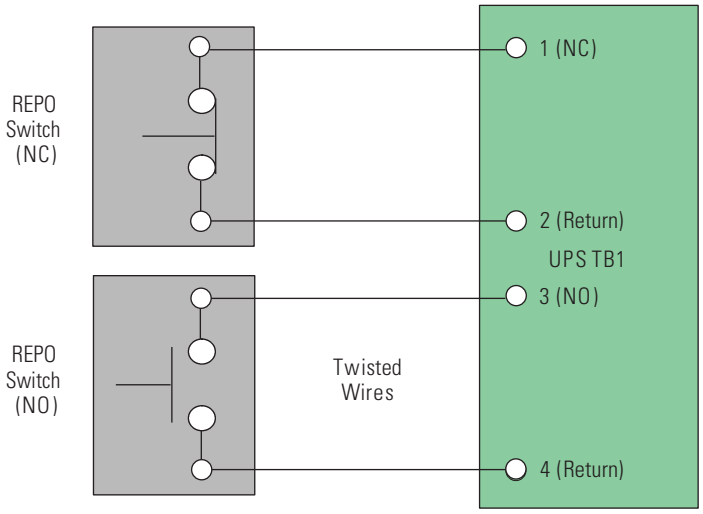
    Figure 45 shows the wiring connections if the normally-closed REPO contacts are used and Figure 46 shows alternative methods of connecting a REPO switch if using another manufacturer's switch.

**Figure 45. Normally-Closed REPO Switch Wiring**




**NOTE** *REPO switch rating is 24 Vdc, 1A minimum.*
**NOTE** *The REPO switch must be a latching-type switch not tied to any other circuits.*
**NOTE** *REPO normally-open and normally-closed return terminals are separated on the terminal board but are electrically in common.*

**Figure 46. Normally-Closed and Normally-Open REPO Switch Wiring**




**NOTE** *REPO switch rating is 24 Vdc, 1A minimum.*
**NOTE** *The REPO switch must be a latching-type switch not tied to any other circuits.*
**NOTE** *REPO normally-open and normally-closed return terminals are separated on the terminal board but are electrically in common.*

## 4.11 Installing Options, Accessories, and Distributed Bypass Control Wiring

To install options, accessories, and distributed bypass control wiring, see Chapter 5 *Installing Options and Accessories*.

## 4.12 Initial Startup

Startup and operational checks must be performed by an authorized Eaton Customer Service Engineer, or the warranty terms become void (see Section 1.11 *Warranty*). This service is offered as part of the sales contract for the UPS system. Contact an Eaton service representative in advance (usually a two-week notice is required) to reserve a preferred startup date.

## 4.13 Completing the Installation Checklist

The final step in installing the UPS system is completing the following Installation Checklist.

This checklist ensures that you have completely installed all hardware, cables, and other equipment. Complete all items listed on the checklist to ensure a smooth installation. Make a copy of the Installation Checklist before filling it out, and retain the original.

After the installation is complete, an Eaton Customer Service Engineer must verify the operation of the UPS system and commission it to support the critical load. The service representative cannot perform any installation tasks other than verifying software and operating setup parameters. Service personnel may request a copy of the completed Installation Checklist to verify all applicable equipment installations have been completed.

**NOTE** The Installation Checklist MUST be completed prior to starting the UPS system for the first time.

**Installation Checklist**

- ❑ All packing materials and restraints have been removed from each cabinet.
- ❑ Each cabinet in the UPS system is placed in its installed location.
- ❑ A cabinet grounding/mounting kit is installed between any cabinets that are bolted together.
- ❑ All conduits and cables are properly routed to the UPS and any ancillary cabinets.
- ❑ All power cables are properly sized and terminated.
- ❑ Battery cables are terminated on E4 (+) and E5 (–).
- ❑ Battery aux contact signal wiring is connected from the UPS to the battery disconnect.
- ❑ Battery shunt trip signal wiring is connected from the UPS to the battery disconnect. (OPTIONAL).
- ❑ LAN and telephone drops are installed.
- ❑ All telephone and LAN connections have been completed.
- ❑ A ground conductor is properly installed.
- ❑ Air conditioning equipment is installed and operating correctly.
- ❑ The area around the installed UPS system is clean and dust–free. (It is recommended that the UPS be installed on a level floor suitable for computer or electronic equipment.)
- ❑ Adequate workspace exists around the UPS and other cabinets.
- ❑ Adequate lighting is provided around all UPS equipment.
- ❑ A 120 Vac service outlet is located within 7.5 meters (25 feet) of the UPS equipment.
- ❑ The REPO device is mounted in its installed location and its wiring is terminated inside the UPS cabinet.
- ❑ The normally-closed (NC) Emergency Power-off contact (pins 1 and 2 on TB1) is jumpered if not used.
- ❑ Alarm relays and building alarms are wired appropriately. (OPTIONAL)
- ❑ A remote battery disconnect control is mounted in its installed location and its wiring is terminated inside the UPS and battery cabinet. (OPTIONAL)
- ❑ Accessories are mounted in installed locations and wiring is terminated inside the UPS cabinet. (OPTIONAL)
- ❑ The debris shield covering the UPS cabinet ventilation grill is removed.
- ❑ Startup and operational checks are performed by an authorized Eaton Customer Service Engineer.

**Distributed Bypass Installation Checklist**

- ❑ Each cabinet in the distributed bypass system is placed in its installed location.
- ❑ All conduits and cables are properly routed to the UPS cabinets and to the tie cabinet or distribution panel.
- ❑ All power cables are properly sized and terminated.
- ❑ A ground conductor is properly installed.
- ❑ Controller Area Network (CAN) wiring between the UPS cabinets is properly installed.
- ❑ Pull-chain wiring between the UPS cabinets is properly installed.
- ❑ Adequate workspace exists around the UPS cabinets, the tie cabinet, and other cabinets.
- ❑ Startup and operational checks are performed by an authorized Eaton Customer Service Engineer.

**Notes**

# Chapter 5 Installing Options and Accessories

Read and understand the following notes while planning and performing the wiring installation:

- Conduit must be installed between the UPS cabinet and the device for signal wiring. Conduit must be installed between the device and the power source for power wiring. Install the signal wiring in separate conduit from the power wiring.
- Conduit and wiring between the UPS and the device are to be supplied by the customer.
- Maximum distance between the UPS cabinet and the device is not to exceed 150 meters (500 feet).
- Use Class 1 wiring methods (as defined by the NEC) for interface and power wiring from 30 to 600V.
- Use Class 2 wiring methods (as defined by the NEC) for interface and power wiring up to 30V. The wire should be rated at 24V, 1A minimum.
- Signal wiring should be a minimum of 22 AWG and a maximum of 14 AWG. The wire should be shielded twisted pair, rated for 5A maximum. Power wiring should be a minimum of 22 AWG and a maximum of 14 AWG. The wire should be rated for 1A minimum.
- Use only 60°C copper wire.
- 120 Vac for the RMP III, RIM II, or SCM II should be provided from the critical bus by facility planners or the customer.

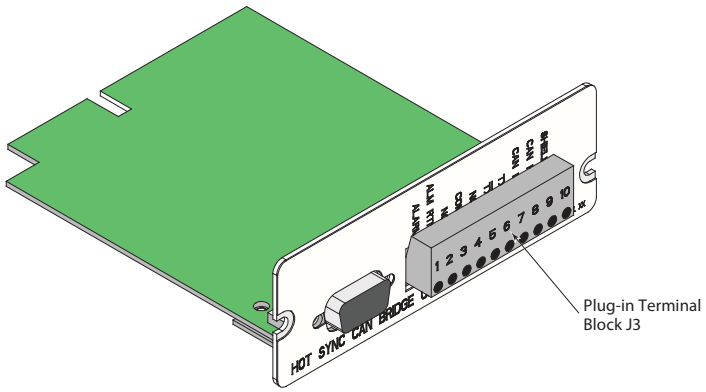
Install wiring the optional accessories in accordance with the following paragraphs:

- Hot Sync CAN Bridge card (see paragraph 5.1 *Installing an Optional Hot Sync CAN Bridge Card*)
- Distributed Bypass Control Wiring (see paragraph 5.2 *Installing Distributed Bypass Control Wiring*)
- RMP III (see paragraph 5.3 *Installing an Optional Remote Monitor Panel III*)
- RIM II (see paragraph 5.4 *Installing an Optional Relay Interface Module II*)
- SCM II (see paragraph 5.5 *Installing an Optional Supervisory Contact Module II*)

## 5.1 Installing an Optional Hot Sync CAN Bridge Card

As an option, a Hot Sync Controller Area Network (CAN) Bridge Card, shown in Figure 47, can be installed to provide connectivity for operational mode control of a parallel system. In addition, this card can be used to connect optional system monitoring devices, such as a Remote Monitor Panel III, a Relay Interface Module II, or a Supervisory Contact Module II to the UPS.

**Figure 47. Hot Sync CAN Bridge Card.**



**NOTE** Only one Hot Sync CAN Bridge Card can be installed in the UPS. Multiple CAN cards are not supported and will cause system conflicts.

To install the card:

1. Verify the UPS system is turned off and all power sources are removed. See Chapter 7 *UPS Operating Instructions* for shutdown instructions.
2. Unfasten the front door latch and swing the door open (see Figure 20).
3. Install the Hot Sync CAN Bridge Card into an open X-Slot communication bay on the front of the UPS. See Figure 35 and Figure 41 for X-Slot communication bay locations.

   To locate the appropriate terminals on the Hot Sync CAN Bridge Card, see Figure 48 and Table 35.

**Figure 48. Hot Sync CAN Bridge Card Connections**

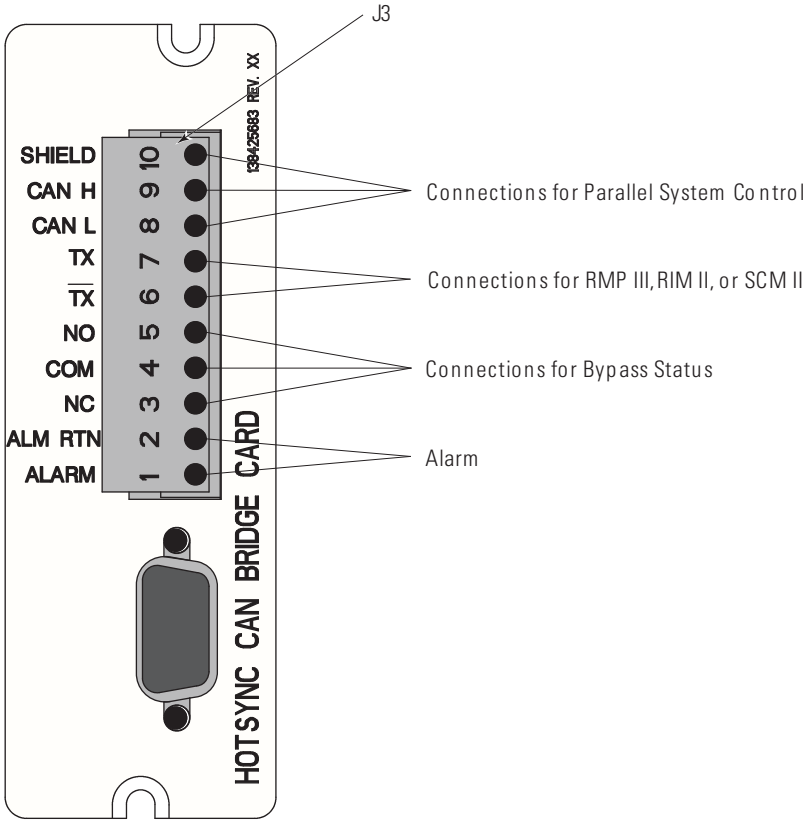



**Table 35. Hot Sync CAN Bridge Card Interface Connections**

| J3 Terminal | Name | Description |
|---|---|---|
| 1 | Alarm | Programmable UPS alarm. Activated by a remote dry contact closure. |
| 2 | Alarm Return | |
| 3 | Alarm Relay NC | Normally closed contact opens when UPS is on bypass. |
| 4 | Alarm Relay Com | Bypass contact return. |

**Table 35. Hot Sync CAN Bridge Card Interface Connections (Continued)**

| | | |
|---|---|---|
| 5 | Alarm Relay NO | Normally open contact closes when UPS is on bypass. |
| 6 | $\overline{TX}$ | RMP III, RIM II, and SCM II connections. |
| 7 | TX | |
| 8 | CAN L | CAN Input for parallel operation. |
| 9 | Can H | |
| 10 | Shield | |

## 5.2 Installing Distributed Bypass Control Wiring

**NOTE 1** When installing external wiring to the Hot Sync CAN Bridge Card, conduit must be installed to the UPS cabinet. When installing internal wiring to the Hot Sync CAN Bridge Card terminals, route the wiring through the internal opening in the X-Slot communication bay.

**NOTE 2** When installing interface wiring for the pull chain, conduit must be installed between UPSs.

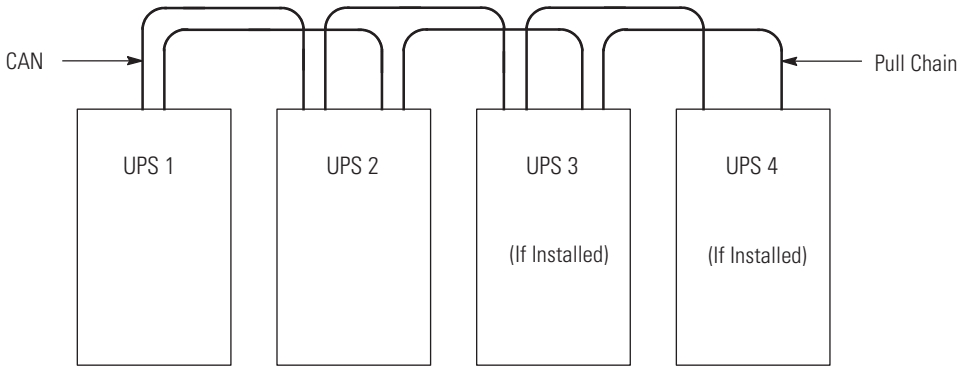
To install distributed bypass control wiring:

1. Verify the UPS system is turned off and all power sources are removed. See Chapter 7 *UPS Operating Instructions* for shutdown instructions.
2. Perform the procedure listed in paragraph Chapter 5 *Installing Options and Accessories*.
3. Terminal block TB3 is accessible on the left side of the X-Slot communication bay (see Figure 35). To gain access to terminal block TB1, TB2, and the left interface entry conduit landing plates, remove the screws securing the top internal safety shield panel and remove the panel. Retain the hardware for later use.
4. Remove the interface entry conduit landing plates to drill or punch holes (see Figure 30).
5. Reinstall the interface entry plates and install the conduit.
6. To locate the appropriate terminals and review the wiring and termination requirements, see paragraph 3.2.7 *UPS System Interface Wiring Preparation*, Table 33, and Figure 35 through Figure 38.
7. Route and install CAN wiring between the UPS cabinets. See Figure 48 and Table 35 for the Hot Sync CAN Bridge Card terminal location and Figure 49, Figure 50, and Table 36 for wiring information.
8. If a tie cabinet with Module Output Breakers (MOBs) is being wired, proceed to Step 11; otherwise, proceed to Step 9.
9. Route and install distributed bypass system pull-chain wiring between the UPS cabinets. See Figure 51 and Table 37 for wiring information.
10. Proceed to Step 12.
11. Route and install distributed bypass system pull-chain wiring between the UPS cabinets and tie cabinet MOBs. See Figure 52 and Table 38 for wiring information.

**NOTE** Setup of the Hot Sync CAN Bridge Card for parallel operation must be performed by an authorized Eaton Customer Service Engineer. Contact an Eaton service representative to schedule a date.

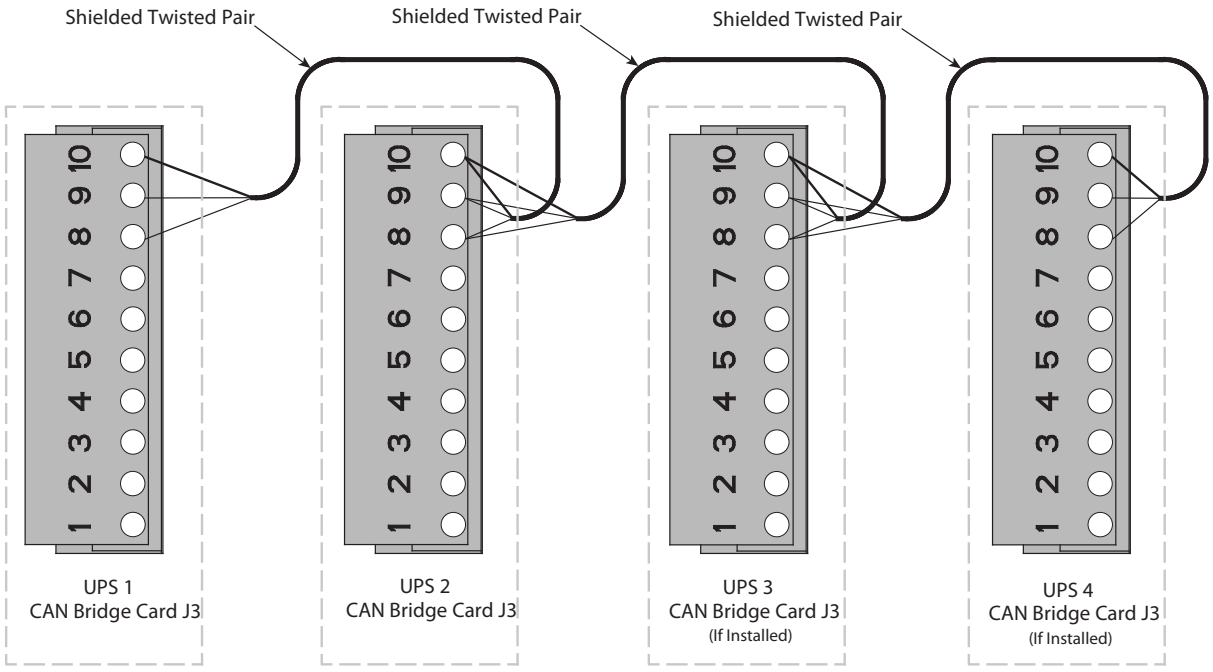
12. Reinstall the small top internal safety shield panel and secure with the cabinet mounted screws.
13. Close the front door and secure the latch.

**Figure 49. Distributed Bypass System CAN and Pull-Chain Simplified Interface Wiring**




**NOTE** *This drawing is for distributed bypass wiring purposes and is not a floor layout plan. UPSs can be placed in any physical order.*

**Figure 50. Distributed Bypass System UPS CAN Wiring without MOBs**

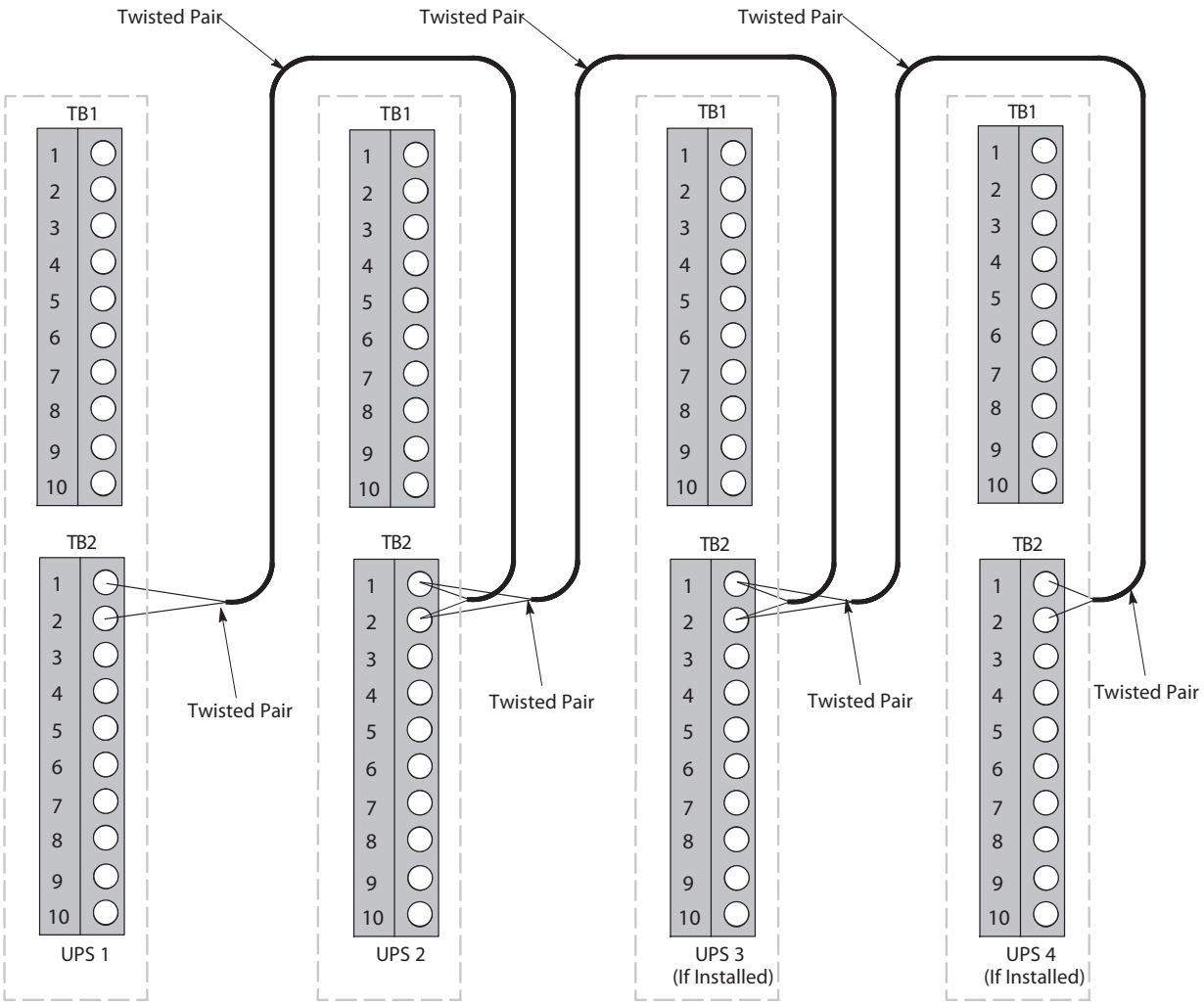



NOTE External CAN connections between UPSs require shielded twisted-pair wire.

**Table 36. CAN Bridge Card Wiring Terminations**

| From UPS 1 CAN Bridge Card | From UPS 2 CAN Bridge Card | To UPS 3 CAN Bridge Card (If Installed) | To UPS 4 CAN Bridge Card (If Installed) |
|---|---|---|---|
| J3 8 (L) | J3 8 (L) | J3 8 (L) | J3 8 (L) |
| J3 9 (H) | J3 9 (H) | J3 9 (H) | J3 9 (H) |
| J3 10 (Shield) | J3 10 (Shield) | J3 10 (Shield) | J3 10 (Shield) |

**Figure 51. Distributed Bypass Pull-Chain Wiring without MOBs**

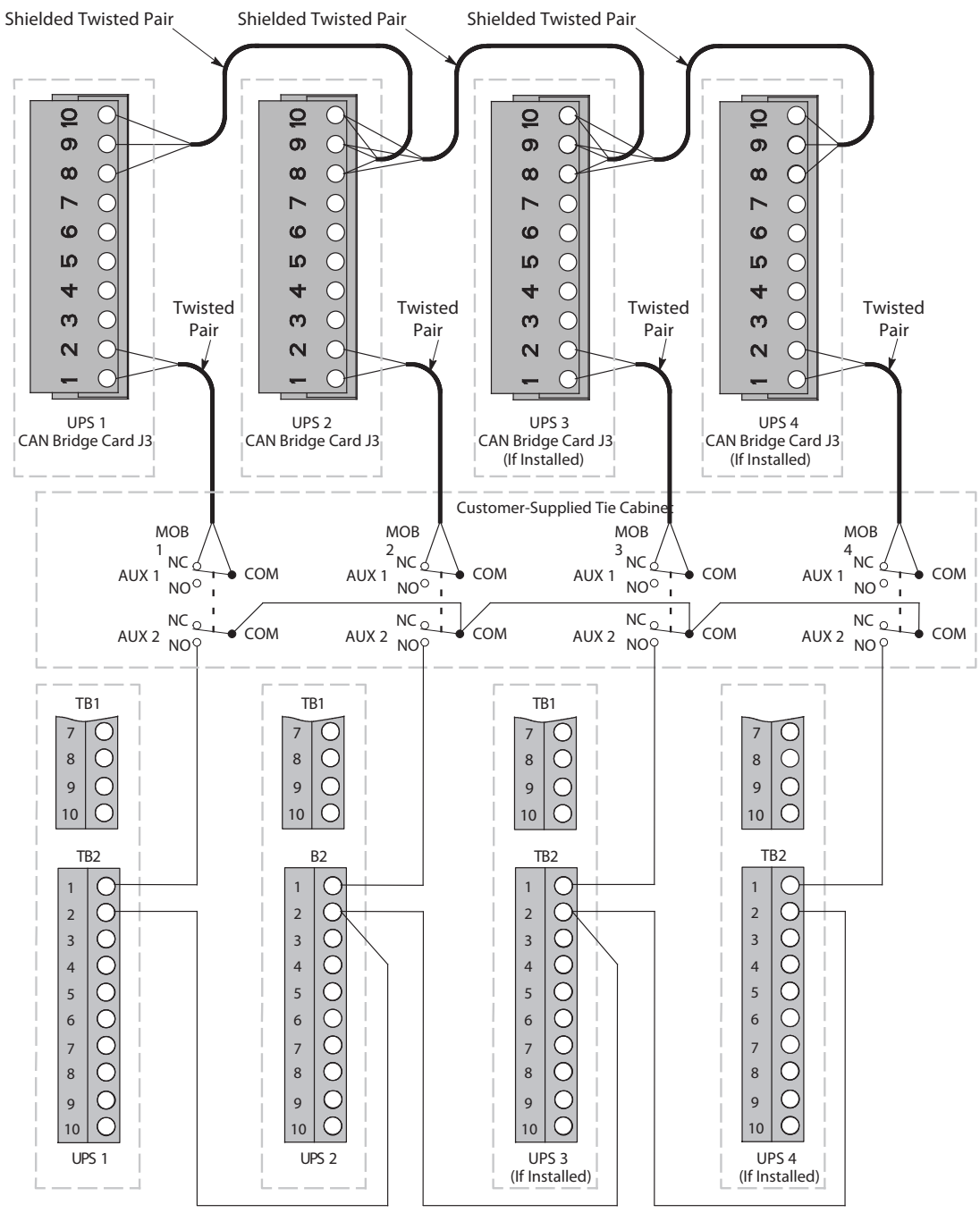



NOTE Use twisted-pair wiring between the UPS and MOB AUX contacts.

**Table 37. Pull-Chain Wiring Terminations**

| From UPS 1 | To UPS 2 | To UPS 3 (If Installed) | To UPS 4 (If Installed) |
|---|---|---|---|
| TB2–1<br>(Pull Chain) | TB2–1<br>(Pull Chain) | TB2–1<br>(Pull Chain) | TB2–1<br>(Pull Chain) |
| TB2–2<br>(Pull Chain Common) | TB2–2<br>(Pull Chain Common) | TB2–2<br>(Pull Chain Common) | TB2–2<br>(Pull Chain Common) |

**Figure 52. Distributed Bypass Pull-Chain Wiring with MOBs**




NOTE NC and NO designations on MOB AUX contacts are defined with breaker in OFF (open) position.
NOTE If MOB contacts have pigtail leads, use the same wire gauge to connect to the UPS and use the correct crimp connections for the wire gauge.
NOTE External CAN connections between UPS cabinets require shielded twisted-pair wire.
NOTE Use twisted-pair wiring between the UPS and MOB AUX contacts.
NOTE Always confirm contact operation prior to wiring.

**Table 38. Pull-Chain Wiring Terminations with MOBs**

| From | To | Function |
|---|---|---|
| UPS 1 CAN Bridge Card J3–1 (Alarm) | MOB 1 Aux 1 NC | MOB Open Alarm |
| UPS 1 CAN Bridge Card J3–2 (Alarm Return) | MOB 1 Aux 1 Com | |
| UPS 1 TB2–1 (Pull Chain) | MOB 1 Aux 2 NO | Pull Chain |
| UPS 2 TB2–2 (Pull Chain Common) | UPS 2 TB2–2 (Pull Chain Common) | Pull Chain Common |
| | | |
| UPS 2 CAN Bridge Card J3–1 (Alarm) | MOB 2 Aux 1 NC | MOB Open Alarm |
| UPS 2 CAN Bridge Card J3–2 (Alarm Return) | MOB 2 Aux 1 Com | |
| UPS 2 TB2–1 (Pull Chain) | MOB 2 Aux 2 NO | Pull Chain |
| UPS 2 TB2–2 (Pull Chain Common) | UPS 3 TB2–2 (Pull Chain Common) | Pull Chain Common |
| | | |
| UPS 3 CAN Bridge Card J3–1 (Alarm) | MOB 3 Aux 1 NC | MOB Open Alarm |
| UPS 3 CAN Bridge Card J3–2 (Alarm Return) | MOB 3 Aux 1 Com | |
| UPS 3 TB2–1 (Pull Chain) | MOB 3 Aux 2 NO | Pull Chain |
| UPS 3 TB2–2 (Pull Chain Common) | UPS 4 TB2–2 (Pull Chain Common) | Pull Chain Common |
| | | |
| UPS 4 CAN Bridge Card J3–1 (Alarm) | MOB 4 Aux 1 NC | MOB Open Alarm |
| UPS 4 CAN Bridge Card J3–2 (Alarm Return) | MOB 4 Aux 1 Com | |
| UPS 4 TB2–1 (Pull Chain) | MOB 4 Aux 2 NO | Pull Chain |
| | | |
| MOB 1 Aux 2 Com | MOB 2 Aux 2 Com | Pull Chain MOB Common |
| MOB 2 Aux 2 Com | MOB 3 Aux 2 Com | |
| MOB 3 Aux 2 Com | MOB 4 Aux 2 Com | |

## 5.3 Installing an Optional Remote Monitor Panel III

To install RMP III wiring:

1. Verify the UPS system is turned off and all power sources are removed. See Chapter 7 *UPS Operating Instructions* for shutdown instructions.
2. Perform the procedure listed in paragraph 5.1 *Installing an Optional Hot Sync CAN Bridge Card*.

**NOTE** If mounting to a hollow wall, secure the enclosure to a wood or metal stud within the wall. Do not use hollow wall anchors.

3. Securely mount the RMP III at the desired location. See Figure 60 for mounting hole locations.

**NOTE** When installing signal wiring for CAN card J3 terminals, conduit must be installed between the device and the UPS cabinet.

4. Remove the UPS cabinet top interface conduit landing plates to drill or punch conduit holes (see Figure 30).
5. Reinstall the conduit landing plate.
6. Install conduit between the UPS and RMP III. See Figure 60 for RMP III knockout hole location.
7. Install wiring between the UPS and RMP III. See Figure 48 and Table 35 for the Hot Sync CAN Bridge Card terminal location and wiring information, and Figure 53, Figure 54, and Table 39 for the RMP III terminal location and wiring information.

**NOTE** 120 Vac for the RMP III should be supplied by facility planners or the customer.

8. Install 120 Vac power wiring from the critical bus to the RMP III. See Figure 53, Figure 54, and Table 39 for the terminal location and wiring information.
9. Close the front door and secure the latch.
10. Restart the UPS. See Chapter 7 *UPS Operating Instructions* for startup instructions.

**Figure 53. Remote Monitor Panel III and Remote Monitor Panel III Terminal Locations**

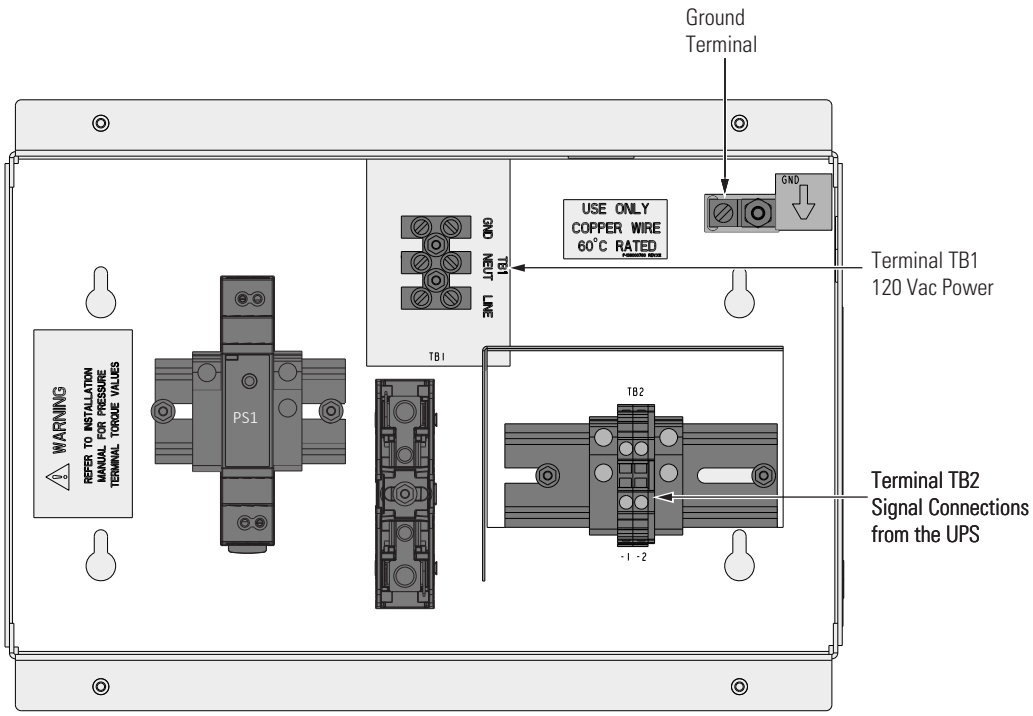


**Figure 54. Remote Monitor Panel III Wiring**

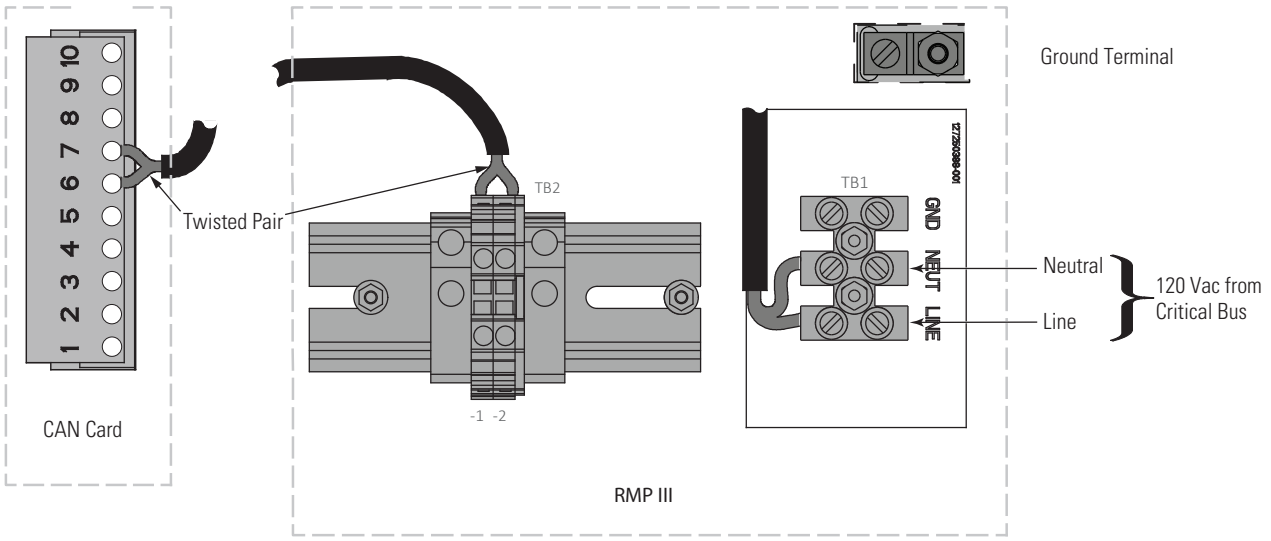



**Table 39. RMP III, RIM II, or SCM II Wiring Terminations**

| From UPS CAN Card | To RIM II, or SCM II | or | To RMP III | Tightening Torque Nm (lb in) | Remarks |
|---|---|---|---|---|---|
| J3–6 ( $\overline{TX}$) | TB1–5 (RDX*) | | TB2-2 | 0.9 (8) | Use twisted pair |
| J3–7 (TX) | TB1–4 (RDX) | | TB2-1 | 0.9 (8) | |
| N/A | TB3 Line | | TB1 Line | 0.9 (8) | |
| N/A | TB3 Neutral | | TB1 Neutral | 0.9 (8) | |
| N/A | Ground Terminal | | Ground Terminal | 2.7 (24) Maximum | |

**NOTE** Setup of the Hot Sync CAN Bridge Card must be performed by an authorized Eaton Customer Service Engineer. Contact an Eaton service representative to schedule a date.

11. To check the operation of the RMP III, ensure that the UPS is supplying the load via inverter or bypass. If the indicators on the RMP III show the appropriate status, then it is operating correctly.

    If the communication link between the UPS and the RMP III is not present, the RMP III performs a self–test (all indicators flash and the horn beeps at one–second intervals). If the self-test occurs, check all harness connectors and the fuse for proper seating. If all connections are secure but the RMP III continues to self–test, replace the fuse with the spare included in the hardware kit. If a fuse replacement does not correct the problem, contact an Eaton service representative for verification that the RMP III is working correctly.

12. To test the indicator lamps, press and hold the horn silence pushbutton for three seconds. All lamps should illuminate, and the horn sounds continuously until you release the pushbutton.

## 5.4 Installing an Optional Relay Interface Module II

To install RIM II wiring:

1. Verify the UPS system is turned off and all power sources are removed. See Chapter 7 *UPS Operating Instructions* for shutdown instructions.
2. Perform the procedure listed in paragraph 5.1 *Installing an Optional Hot Sync CAN Bridge Card*.

**NOTE** If mounting to a hollow wall, secure the enclosure to a wood or metal stud within the wall. Do not use hollow wall anchors.

3. Securely mount the RIM II at the desired location. See Figure 61 for mounting hole locations.

**NOTE** When installing signal wiring for CAN card J3 terminals, conduit must be installed between the device and the UPS cabinet.

4. Remove the UPS cabinet top interface conduit landing plates to drill or punch conduit holes (see Figure 30).
5. Reinstall the conduit landing plate.
6. Install conduit between the UPS and RIM II. See Figure 61 for RIM II knockout hole location.
7. Install wiring between the UPS and RIM II. See Figure 48 and Table 35 for the Hot Sync CAN Bridge Card terminal location and wiring information, and Figure 53, Figure 54, and Table 39 for the RIM II terminal location and wiring information.

**NOTE** 120 Vac for the RIM II should be supplied from the critical bus by facility planners or the customer.

8. Install 120 Vac power wiring from the critical bus to the RIM II. See Figure 53, Figure 54, and Table 39 for the terminal location and wiring information.

**Figure 55. Relay Interface Module II Terminal Locations**

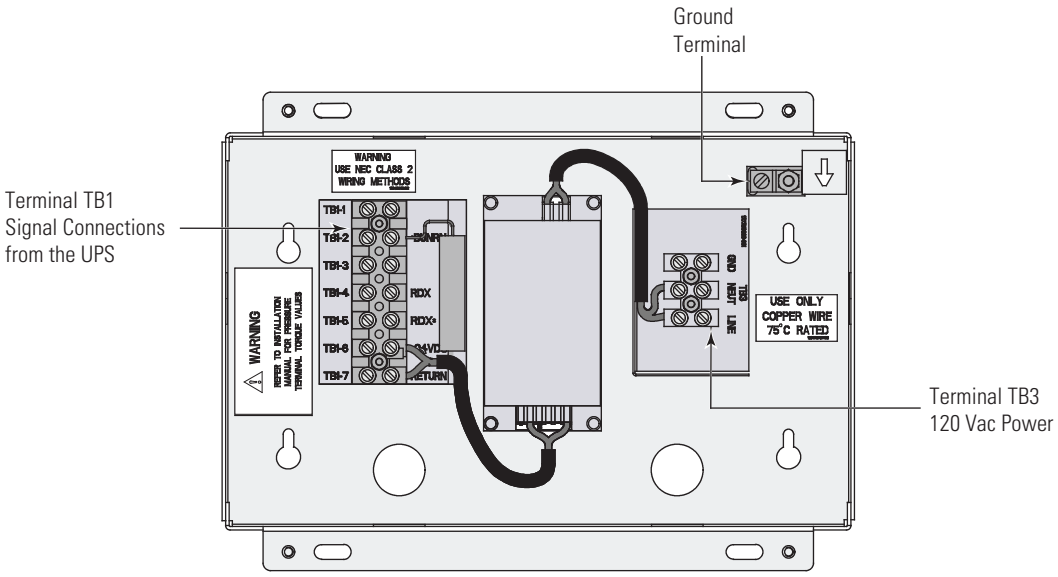
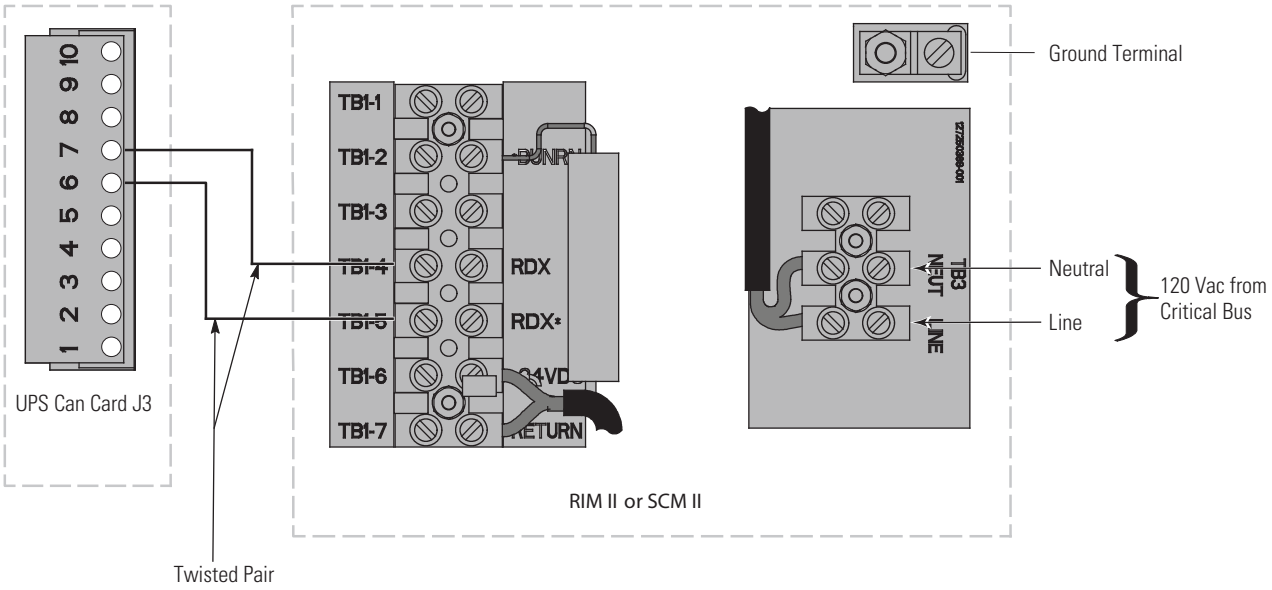


**Figure 56. Relay Interface Module II or Supervisory Contact Module II Wiring**




9. Close the front door and secure the latch.
10. Restart the UPS. See Chapter 7 *UPS Operating Instructions* for startup instructions.

> **NOTE** Setup of the Hot Sync CAN Bridge Card must be performed by an authorized Eaton Customer Service Engineer. Contact an Eaton service representative to schedule a date.

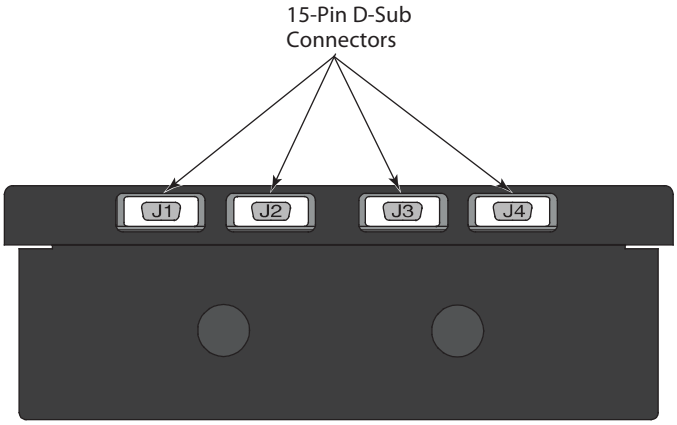
11. Contact an Eaton service representative for verification and testing of the RIM II and its connections prior to making connections with J1 through J4 (see Table 40 and Figure 57).

    You can order interface cables separately for connecting to the 15–Pin D–Sub Connectors.

**Table 40. J1 through J4 Interface Connectors**

| Status | J1 through J4 | Description |
|---|---|---|
| **UPS AVAILABLE** | Pins 1 and 12 | Contacts are closed when the UPS is operating in Online mode or ready to supply the load. |
| **UPS OFFLINE** | Pins 3 and 13 | Contacts are open when the UPS is offline. Contacts are closed when the UPS is operating in Online mode. |
| **BATTERY WEAK** | Pins 5 and 14 | Contacts are closed when approximately two minutes of battery time remains before the critical load is lost. |
| **UTILITY FAILURE** | Pins 6 and 15 | Contacts are closed when Utility Failure is detected. |

**Figure 57. J1, J2, J3, and J4 15-Pin D-Sub Connectors**




## 5.5 Installing an Optional Supervisory Contact Module II

To install SCM II wiring:

1. Verify the UPS system is turned off and all power sources are removed. See Chapter 7 *UPS Operating Instructions* for shutdown instructions.
2. Perform the procedure listed in paragraph 5.1 *Installing an Optional Hot Sync CAN Bridge Card*.

**NOTE** If mounting to a hollow wall, secure the enclosure to a wood or metal stud within the wall. Do not use hollow wall anchors

3. Securely mount the SCM II at the desired location. See Figure 62 for mounting hole locations.

**NOTE** When installing signal wiring for CAN card J3 terminals, conduit must be installed between the device and the UPS cabinet.

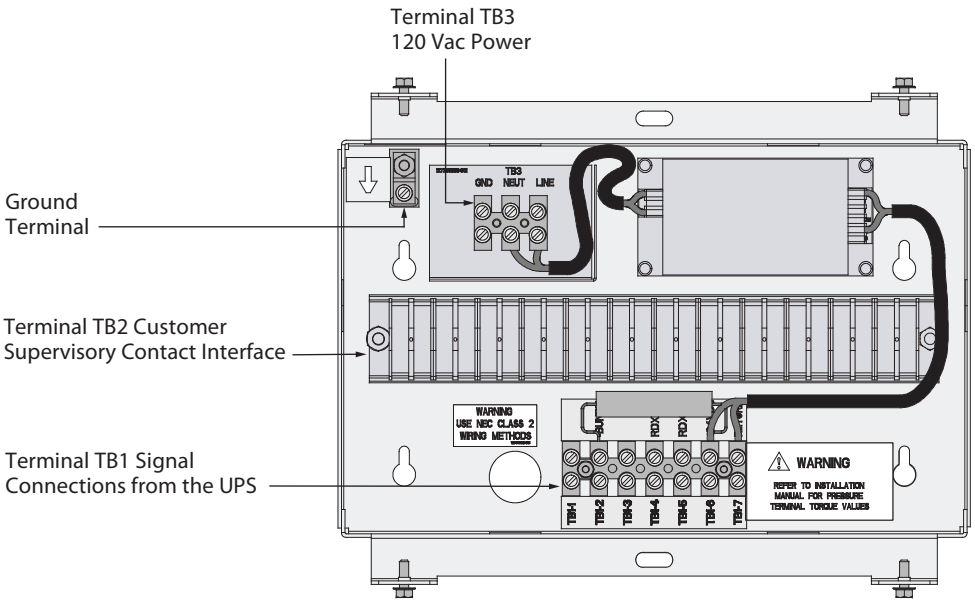
4. Remove the UPS cabinet top interface conduit landing plates to drill or punch conduit holes (see Figure 30).
5. Reinstall the conduit landing plate.
6. Install conduit between the UPS and SCM II. See Figure 62 for SCM II knockout hole location.

7. Install wiring between the UPS and SCM II. See Figure 48 and Table 35 for the Hot Sync CAN Bridge Card terminal location and wiring information, and Figure 58, Figure 54, and Table 39 for the SCM II terminal location and wiring information.

**NOTE** 120 Vac for the SCM II should be supplied from the critical bus by facility planners or the customer.

8. Install 120 Vac power wiring from the critical bus to the SCM II. See Figure 58, Figure 54, and Table 39 for the terminal location and wiring information.

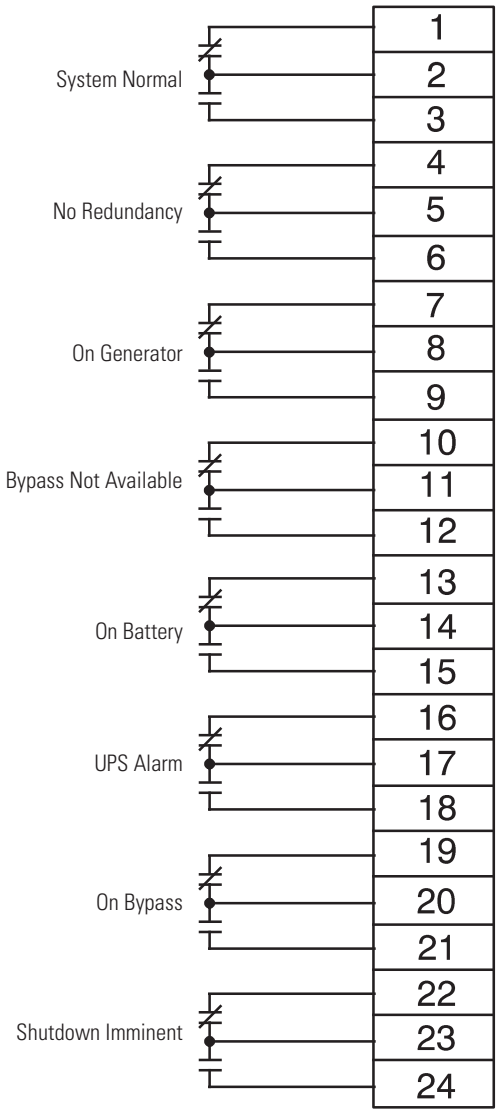
**Figure 58. Supervisory Contact Module II Terminal Location.**




**NOTE** Setup of the Hot Sync CAN Bridge Card must be performed by an authorized Eaton Customer Service Engineer. Contact an Eaton service representative to schedule a date.

9. Install wiring between the SCM II terminal block TB2 and the monitoring equipment. See Figure 58 for terminal block location and Figure 59 for terminal assignments.
10. Close the front door and secure the latch.
11. Restart the UPS. See Chapter 7 *UPS Operating Instructions* for startup instructions.

**Figure 59. Supervisory Contact Module II TB2**




| | | |
|---|---|---|
| | **NOTE** | Supervisory contacts are rated at 2.0A at 28 Vdc or 120 Vac and 0.15A at 115 Vdc. |

| | | |
|---|---|---|
| | **NOTE** | Supervisory contacts require an external power supply. Internal 24 Vdc is not capable of supplying contact current. |

## 5.6 Accessory Mounting Dimensions

Figure 60 through Figure 62 show the dimensions of the RMP III, the RIM II, and the SCM II.

**Figure 60. Remote Monitor Panel III Dimensions**

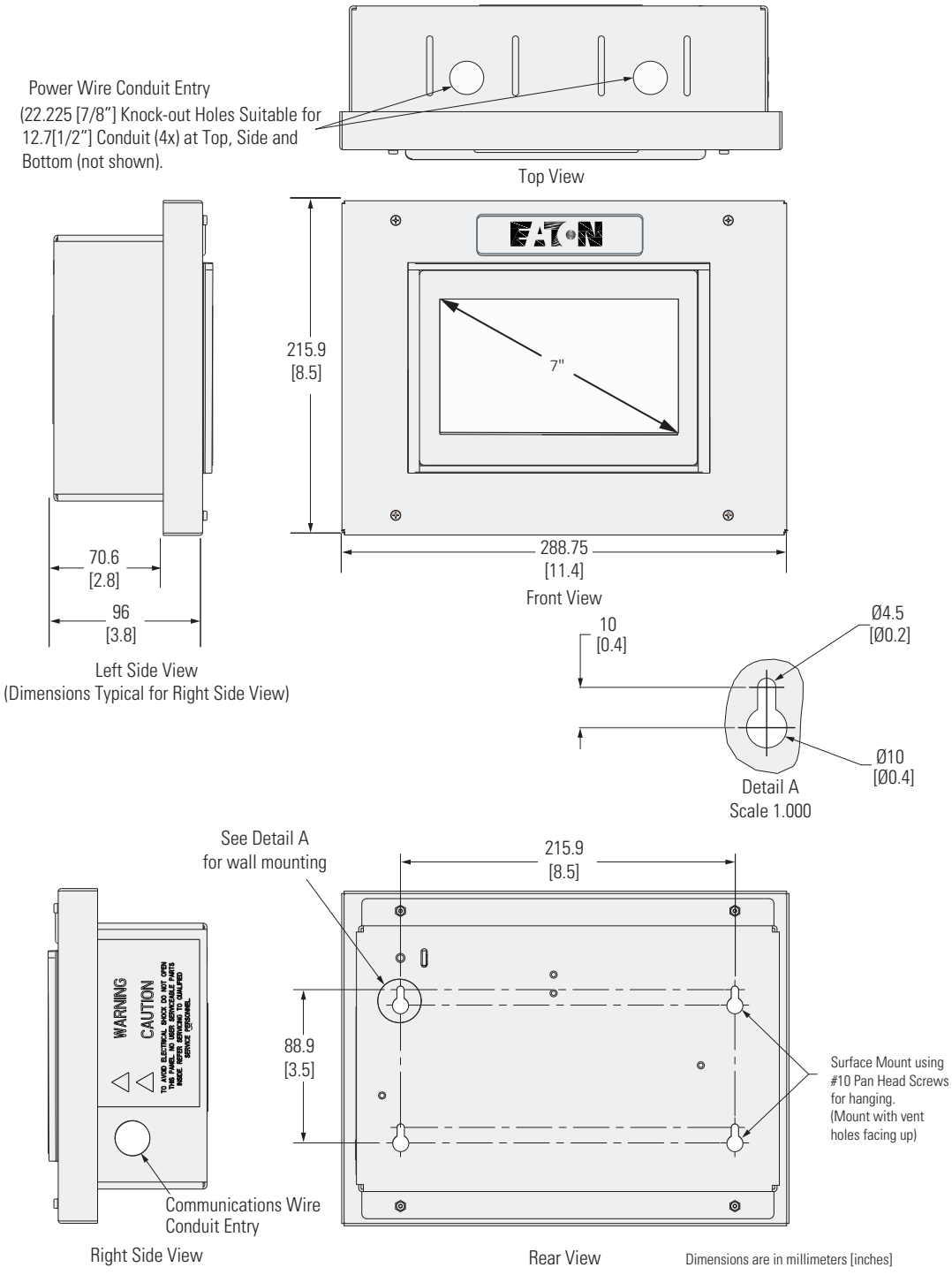
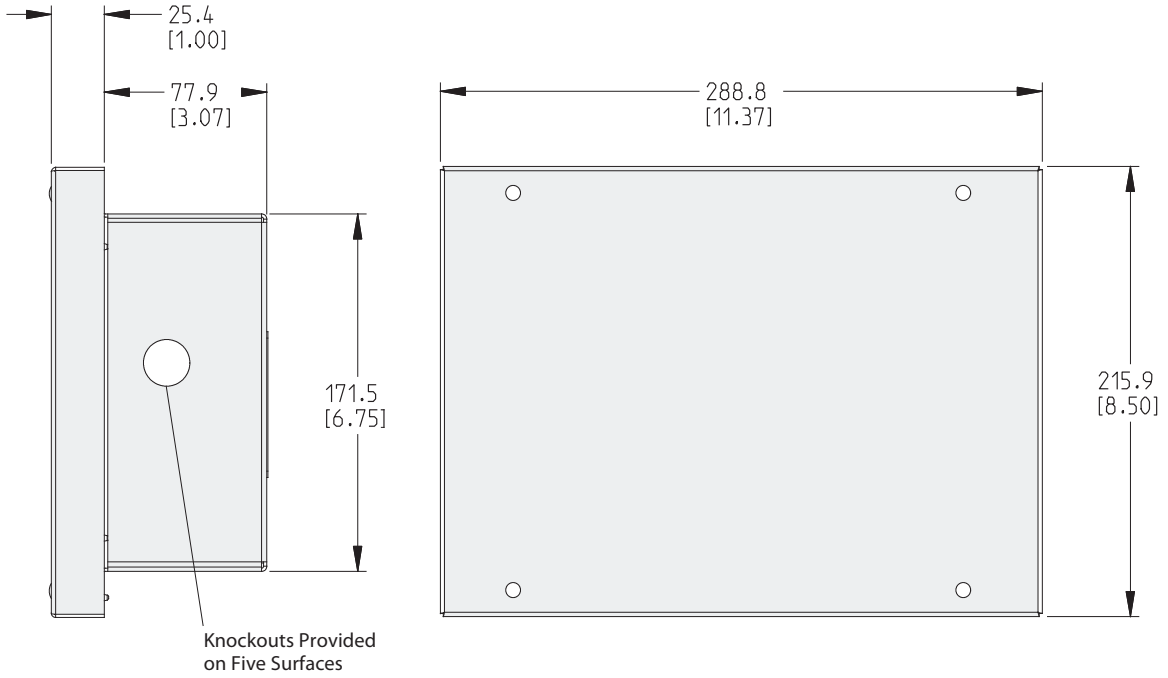
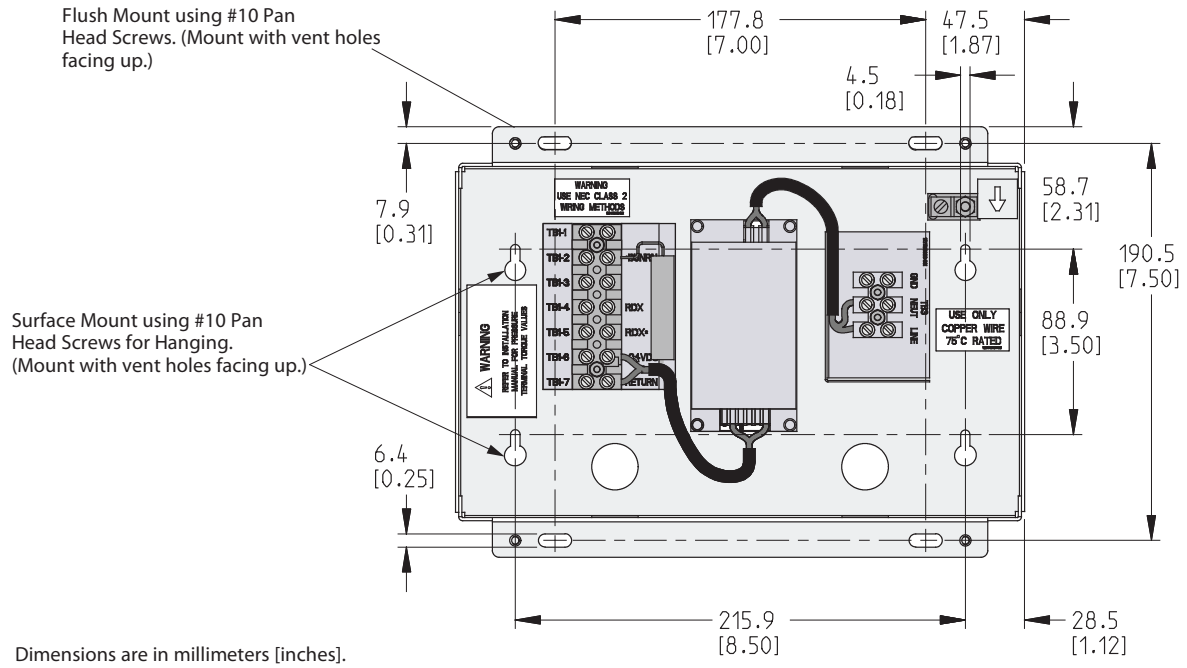


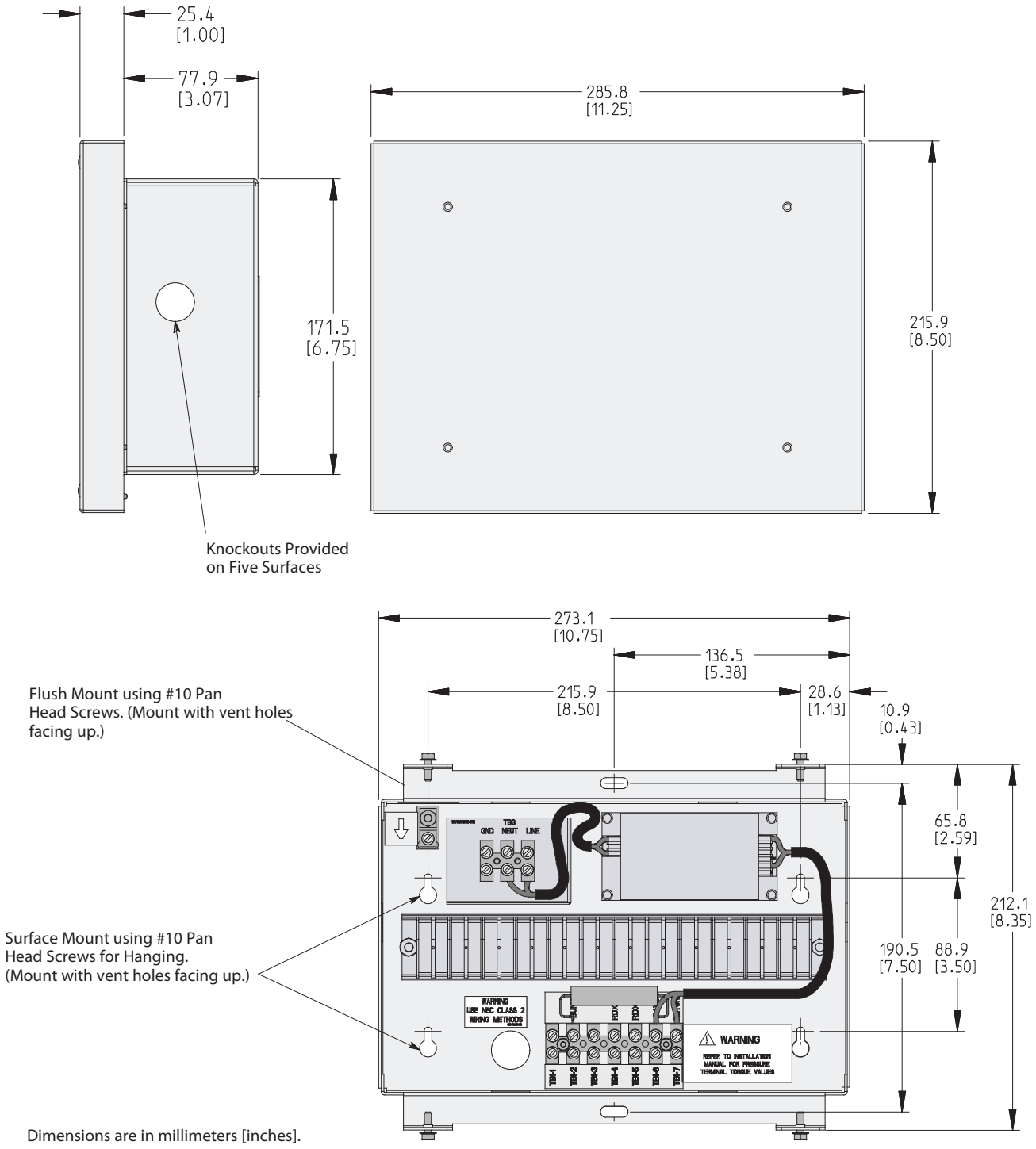
**Figure 61. Relay Interface Module II Dimensions**




Dimensions are in millimeters [inches].

**Figure 62. Supervisory Contact Module II Dimensions**




Dimensions are in millimeters [inches].

# Chapter 6 Understanding UPS Operation

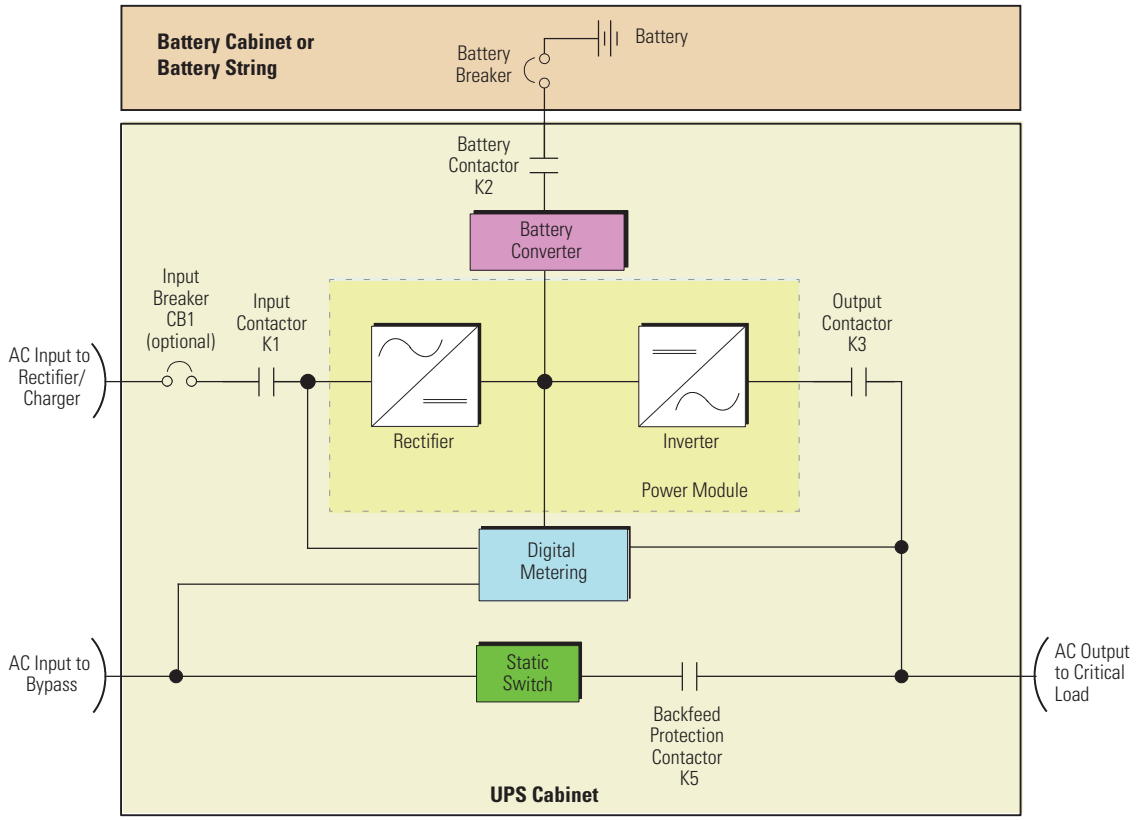
## 6.1 UPS System Overview

The Eaton 9395P-600 UPS is a continuous-duty, solid–state, transformerless (at 480 Vac), three-phase, true online system that provides conditioned and uninterruptible AC power to the UPS system's output and critical load.

The basic system consists of a rectifier, battery converter, inverter, monitoring/operation control panel, integrated communication server, and digital signal processor (DSP) logic. Figure 63 shows the main elements of the UPS system.

If utility power is interrupted or falls outside the parameters specified in Chapter 10 *Product Specifications* the UPS uses a *backup battery supply* to maintain power to the critical load for a specified period of time or until the utility power returns. For extended power outages, the UPS allows you to either transfer to an alternative power system (such as a generator) or shut down your critical load in an orderly manner.

**Figure 63. Main Elements of the UPS System**




**NOTE** *On a UPS configured as an Input Output Module (IOM), the bypass input, static switch, and backfeed protection contactor (K5) are not present.*

The emergency bypass consists of a continuous static switch, and a backfeed protection contactor K5. The bypass breaker (if installed) is located in parallel with the static switch. The backfeed protection contactor is located in series with the static switch. The static switch is armed and ready during normal operation.

On a UPS configured as an Input Output Module (IOM), bypass circuitry is not installed. This configuration is primarily used in multiple UPS parallel systems that do not need a bypass for each UPS and use a separate System Bypass Module (SBM) to provide system bypass capabilities.

## 6.2 Single UPS

A single UPS operates independently to support an applied load from the inverter, providing conditioned and uninterruptible AC power to the critical load from the output of the module. During an outage, the inverter continues to operate, supporting power to the load from the battery supply. If the unit requires service, applied loads are transferred to the internal bypass, continuous-duty static switch either automatically or manually. With the exception of a battery cabinet, no other cabinets or equipment are required for the single UPS to successfully support its applied loads.

### 6.2.1 Modes

The Eaton 9395P-600 UPS supports a critical load in five different modes of operation:

**NOTE** The Variable Module Management System and Energy Saver System modes are mutually exclusive.

- In Online mode, the critical load is supplied by the inverter, which derives its power from rectified utility AC power. In this mode, the battery charger also provides charging current for the battery, if needed.
- In Energy Saver System (ESS) mode, commercial AC power is supplied directly to the critical load through the continuous static switch and transfers automatically to Online mode if an abnormal condition is detected.
- In Variable Module Management System (VMMS) mode, the UPS operates as a traditional double-conversion UPS, but selectively shifts the load to fewer UPMs to increase the efficiency of the UPS.
- In Bypass mode, the critical load is directly supported by utility power.
- In Battery mode, the battery provides DC power, which maintains inverter operation. The battery supports the critical load.

The following paragraphs describe the differences in the UPS operating modes, using block diagrams to show the power flow during each mode of operation.

### 6.2.2 Online Mode

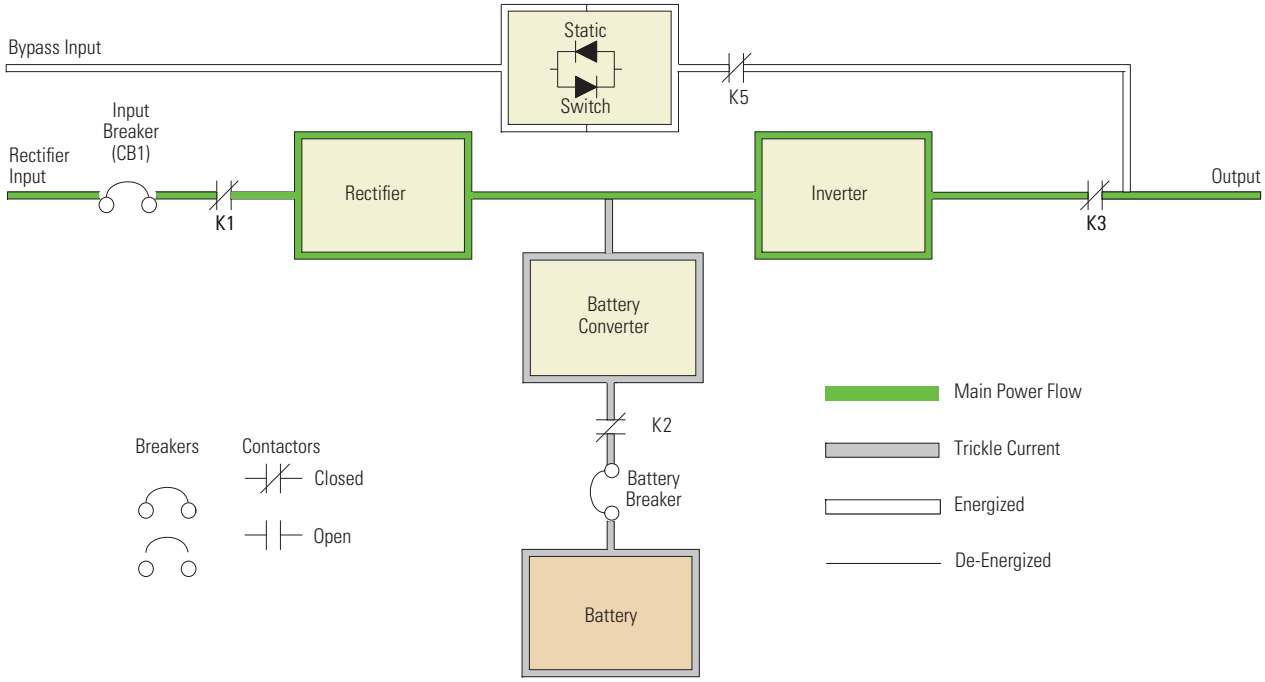
Figure 64 shows the path of electrical power through the UPS system when the UPS is operating in Online mode.

During normal UPS system operation, power for the system is derived from a utility input source through the rectifier input contactor K1. The front panel displays "Online" indicating the incoming power is within voltage and frequency acceptance windows. Three-phase AC input power is converted to DC using IGBT devices to produce a regulated DC voltage to the inverter. When contactor K2 is closed the battery is charged directly from the regulated rectifier output through a buck DC converter.

The battery converter derives its input from the regulated DC output of the rectifier and provides either a boosted or bucked regulated DC voltage charge current to the battery. The battery is always connected to the UPS and ready to support the inverter should the utility input become unavailable.

The inverter produces a three-phase AC output to a customer's load without the use of a transformer. The inverter derives regulated DC from the rectifier and uses IGBT devices and pulse-width modulation (PWM) to produce a regulated and filtered AC output. The AC output of the inverter is delivered to the system output through the output contactor K3.

**Figure 64. Path of Current Through the UPS in Online Mode**




**NOTE** *On a UPS configured as an IOM, the bypass input, static switch, bypass breaker (CB4), and K5 are not present.*

**NOTE** *On a UPS configured with a Continuous Static Switch (CSS), bypass breaker (CB4) is not present.*

If the utility AC power is interrupted or is out of specification, the UPS automatically switches to Battery mode to support the critical load without interruption. When utility power returns, the UPS returns to Online mode.

**NOTE** Bypass mode is not available on a UPS configured as an IOM.

If the UPS becomes overloaded or unavailable, the UPS switches to Bypass mode. The UPS automatically returns to Online mode when the overload condition is cleared and system operation is restored within specified limits.

If the UPS suffers an internal failure, it switches automatically to Bypass mode and remains in that mode until the failure is corrected and the UPS is back in service.

### 6.2.3 Energy Saver System (ESS) Mode

**NOTE** VMMS and ESS modes are mutually exclusive. If ESS mode is enabled, VMMS mode is disabled.

When the UPS is operating in ESS mode, commercial AC power is supplied directly to the critical load through the continuous static switch. Power line filtering and spike protection for the load are provided by the input and output filter networks, and the UPS actively monitors the critical bus for power disturbances. When in this mode, the input and output contactors are closed and the link is maintained through the diode bridge.

If commercial power voltage or frequency disturbances are detected, the system forward transfers to Battery mode for minor disturbances and then to double-conversion mode for more severe disturbances. During a complete power outage, the transfer takes place within 2 ms to ensure loads being fed by the system output are not interrupted. All forward transfers transfer to Battery mode before returning to double-conversion mode.

In High Alert mode the unit transfers from ESS mode to double-conversion mode or if in double-conversion mode remains in double-conversion mode for a default time period of one hour (customer configurable). At the completion of the time period, the unit defaults back to ESS mode. If the High Alert command is received during the time period, the timer will be restarted.

ESS mode is a normal operating mode, and not an alarm condition. While the UPS is in this mode, the **ONLINE** light on the front display will illuminate.

### 6.2.4 Variable Module Management System

**NOTE** VMMS and ESS modes are mutually exclusive. If VMMS mode is enabled, ESS mode is disabled.

In VMMS mode, the UPS operates as a traditional double-conversion UPS. However, the UPS will selectively shift the load to fewer UPMs based on the required load in order to force the remaining UPMs to carry a higher load. The efficiency rating for each UPM is highest when loads are greater than 50% of the system rating. Therefore, with multiple UPMs, a UPS can achieve higher efficiencies for lighter loads.

When a UPM is placed into VMMS mode, the UPM will stop gating the inverter and rectifier and keep the output contactor closed in order to maintain voltage match and phase lock to the critical bus. In this mode the UPS actively monitors the critical bus, keeping the UPM input contactors closed in order to keep the DC link primed (through the rectifier diodes) and also to allow the UPM to immediately return to active mode in the event of a disturbance or load step on the critical bus.

VMMS limits the maximum power available from a UPM when in VMMS mode. The default setting is 80% of the UPM full power rating. If the limit is exceeded, additional UPMs take on the increased load. The VMMS redundancy setting sets the number of redundant UPMs that the customer requires. Both the VMMS UPM load limit and UPM redundancy are customer configurable.

VMMS's UPM automatic scheduling rotates the idle UPMs every month with the ABM cycle. This allows the UPMs to have equal load-share time and also conducts a periodic UPM readiness test. The automatic ABM scheduler selects the next UPM in turn after each charge-to-float transition. If ABM is disabled, the scheduler selects the next UPM after conducting the automatic battery test. If ABM and automatic battery tests are disabled, the scheduler selects the next UPM at the beginning of each month.

In High Alert mode, the UPS defaults to double-conversion Online mode and all UPMs go active for one hour (customer configurable). At the completion of the hour, the UPS defaults back to VMMS mode. If the High Alert command is received during the one hour, the one hour timer will be restarted.

### 6.2.5 Bypass Mode

**NOTE** Bypass mode is not available on a UPS configured as an IOM.

The UPS automatically switches to Bypass mode if it detects an overload, load fault, or internal failure. The UPS can also be transfered from Online mode to Bypass mode manually. The bypass source supplies the commercial AC power to the load directly. Figure 65 shows the path of electrical power through the UPS system when operating in Bypass mode.

In Bypass mode, the output of the system is provided with three-phase AC power directly from the system input. While in this mode, the output of the system is not protected from voltage or frequency fluctuations or power outages from the source. Some power line filtering and spike protection is provided to the load but no active power conditioning or battery support is available to the output of the system in the Bypass mode of operation.

The internal bypass is comprised of a solid-state, silicon-controlled rectifier (SCR) static switch (SSW) and a backfeed protection contactor K5. The static switch is rated as a continuous-duty device that is used anytime the inverter is unable to support the applied load. The static switch is wired in series with the backfeed protection contactor, and together they are wired in parallel with the rectifier and inverter.

**⚠CAUTION**

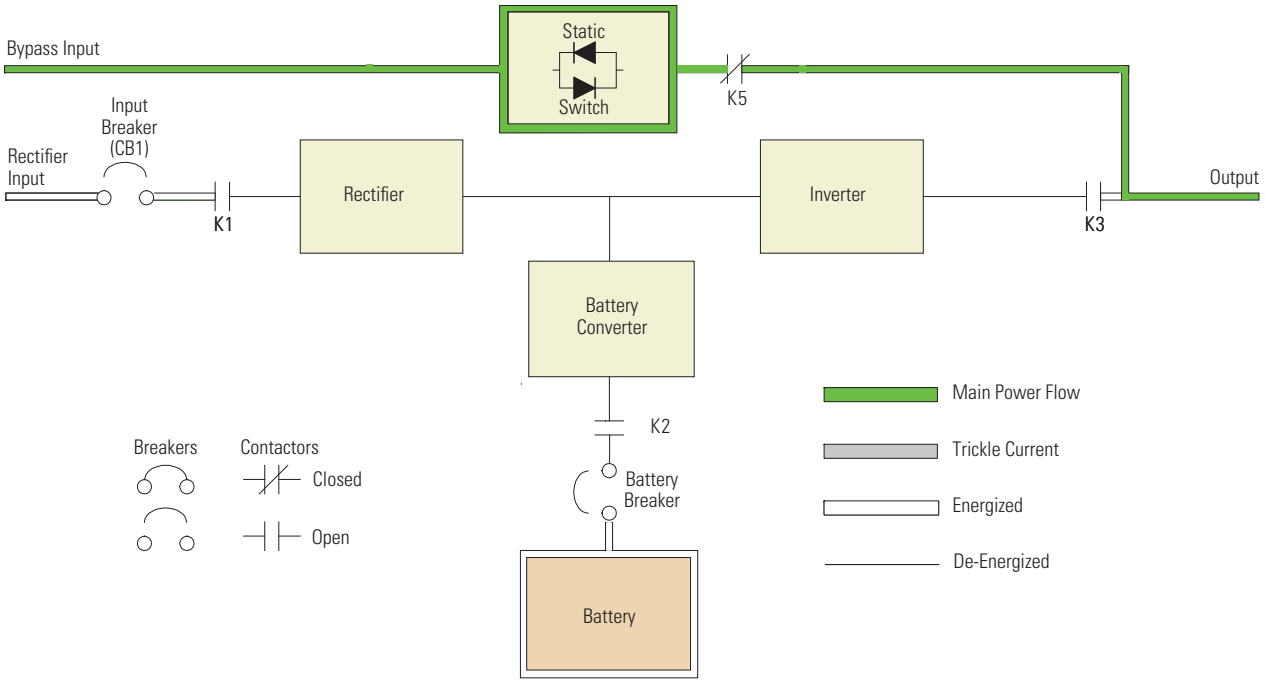
The critical load is not protected from voltage or frequency fluctuations or power outages while the UPS is in Bypass mode.

**⚠ ATTENTION!**

Les charges critiques ne sont pas protégées des fluctuations de tension ou de fréquence ni des pannes de courant lorsque l'onduleur est en mode Contournement.

The static switch, being an electronically-controlled device, can be turned on immediately to pick up the load from the inverter while the inverter output contactor K3 opens to isolate the inverter. The backfeed protection contactor is normally always closed, ready to support the static switch unless the bypass input source becomes unavailable.

**Figure 65. Path of Current Through the UPS in Bypass Mode**




**NOTE** *On a UPS configured as an IOM, the bypass input, static switch, bypass breaker (CB4), and K5 are not present.*

**NOTE** *On a UPS configured with a Continuous Static Switch (CSS), bypass breaker (CB4) is not present.*

If the UPS transfers to Bypass mode from Online mode due to any reason other than operator intervention, the UPS automatically attempts to transfer back to Online mode (up to three times within a ten minute period). The fourth transfer locks the critical load to the bypass source and requires operator intervention to transfer.

### 6.2.6 Battery Mode

The UPS automatically transfers to Battery mode if a utility power outage occurs, or if the utility power does not conform to specified parameters. In Battery mode, the battery provides emergency DC power that the inverter converts to AC power.

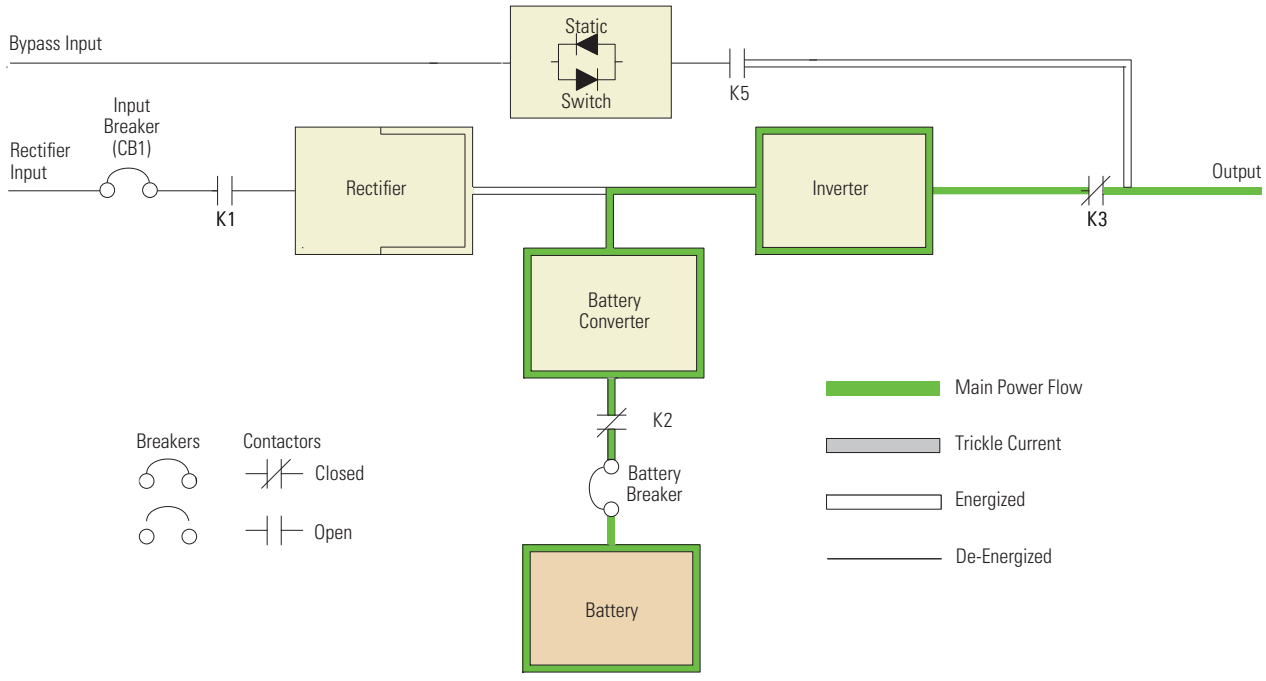
Figure 66 shows the path of electrical power through the UPS system when operating in Battery mode.

During a utility power failure, the rectifier no longer has an AC utility source from which to supply the DC output current required to support the inverter. The input contactor K1 opens and the battery instantaneously supplies energy to the battery converter. The converter either bucks or boosts the voltage so that the inverter can support the customer's load without interruption. If bypass is common with the rectifier input, the backfeed protection contactor K5 also opens. The opening of contactors K1 and K5 prevent system voltages from bleeding backwards through the static switch and rectifier snubber components and re-entering the input source.

If the input power fails to return or is not within the acceptance windows required for normal operation, the battery continues discharging until a DC voltage level is reached where the inverter output can no longer support the connected loads. When this event occurs, the UPS issues another set of audible and visual alarms indicating SHUTDOWN IMMINENT. Unless the rectifier has a valid AC input soon, the output can be supported for only two minutes before the output of the system shuts down. If the bypass source is available, the UPS transfers to bypass instead of shutting down.

If at any time during the battery discharge the input power becomes available again, contactors K1 and K5 close and the rectifier begins to supply DC current to the converter and inverter. At this point, the unit returns to Online mode. Depending on the total load and the duration of the battery discharge, battery current limit alarms may be seen for a short time due to the current required to recharge the battery.

**Figure 66. Path of Current Through the UPS in Battery Mode**




**NOTE** *On a UPS configured as an IOM, the bypass input, static switch, bypass breaker (CB4), and K5 are not present.*

**NOTE** *On a UPS configured with a Continuous Static Switch (CSS), bypass breaker (CB4) is not present.*

## 6.3 Single UPS System Oneline Configurations

The system oneline drawings in this section show the simplified internal structure of the UPS, battery supply, and basic maintenance bypass. The following voltages apply: 380V, 400V, 415V, 480V and 600V.

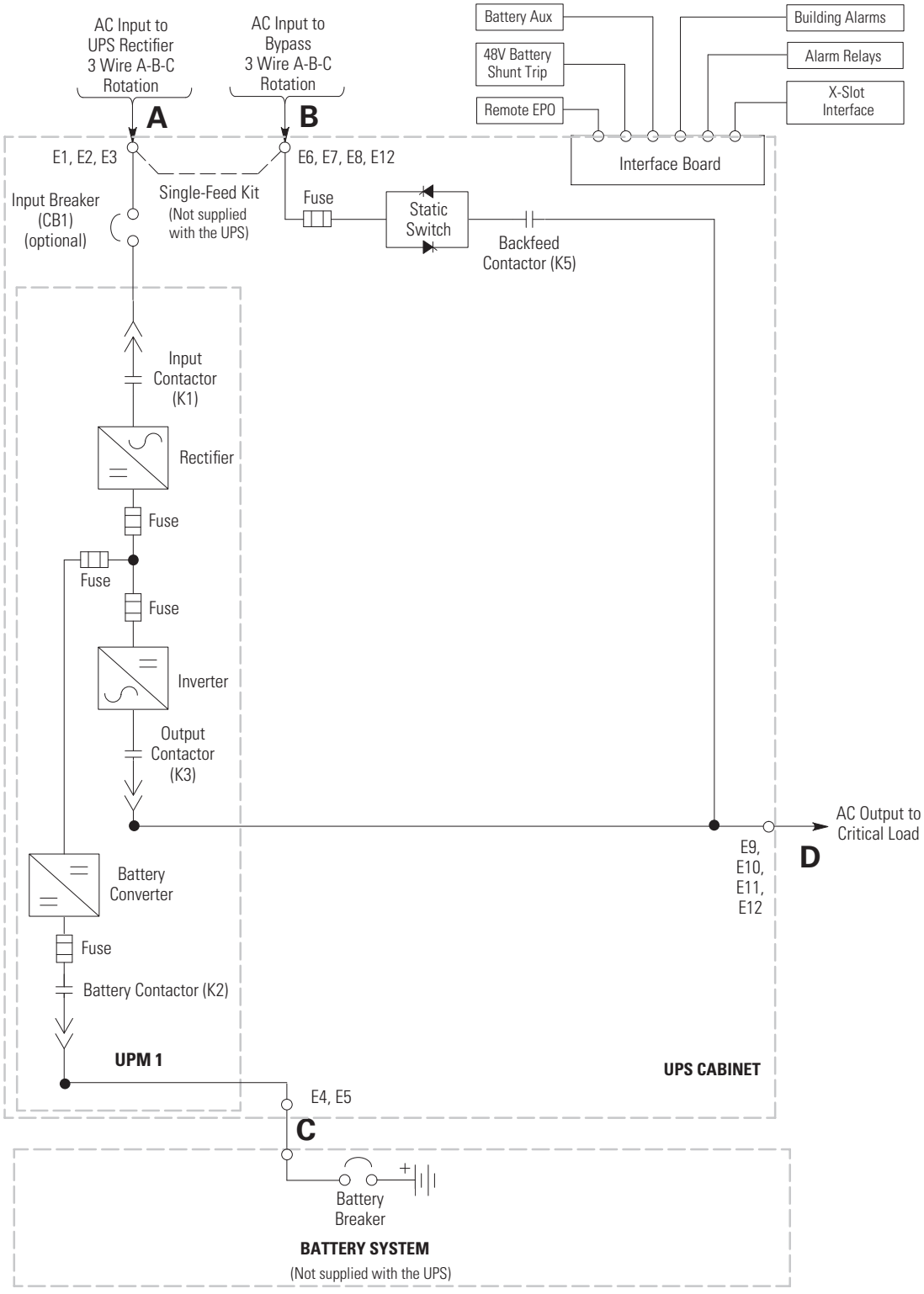
**Table 41. Oneline Configurations**

| Oneline Drawing | UPS Model | System Type |
|---|---|---|
| Figure 67 | Eaton 9395P-600/300<br>Eaton 9395P-600/275<br>Eaton 9395P-600/250<br>Eaton 9395P-600/225<br>Eaton 9395P-600/200 | Single Reverse Transfer UPS – One UPM, Rectifier Feed, Battery System, Dual-Feed Configuration, Continuous Static Switch |
| Figure 68 | Eaton 9395P-600/300<br>Eaton 9395P-600/275<br>Eaton 9395P-600/250<br>Eaton 9395P-600/225<br>Eaton 9395P-600/200 | Single Reverse Transfer UPS – One UPM, Common Rectifier Feed, Common Battery, Dual-Feed Configuration, Continuous Static Switch, FI-UPM |
| Figure 69 | Eaton 9395P-600/600<br>Eaton 9395P-600/550<br>Eaton 9395P-600/500<br>Eaton 9395P-600/450<br>Eaton 9395P-600/400 | Single Reverse Transfer UPS – One UPM, Common Rectifier Feed, Separate Battery, Dual-Feed Configuration, Continuous Static Switch, FI-UPM |
| Figure 70 | Eaton 9395P-600/600<br>Eaton 9395P-600/550<br>Eaton 9395P-600/500<br>Eaton 9395P-600/450<br>Eaton 9395P-600/400 | Single Reverse Transfer UPS – Two UPM, Common Rectifier Feed, Common Battery, Dual-Feed Configuration, Continuous Static Switch |
| Figure 71 | Eaton 9395P-600/600<br>Eaton 9395P-600/550<br>Eaton 9395P-600/500<br>Eaton 9395P-600/450<br>Eaton 9395P-600/400 | Single Reverse Transfer UPS – Two UPM, Common Rectifier Feed, Separate Battery, Dual-Feed Configuration, Continuous Static Switch |
| Figure 72 | Eaton 9395P-600/600<br>Eaton 9395P-600/550<br>Eaton 9395P-600/500<br>Eaton 9395P-600/450<br>Eaton 9395P-600/400 | Single Reverse Transfer UPS – Two UPM, Common Rectifier Feed, Common Battery, Dual-Feed Configuration, Continuous Static Switch, FI-UPM |
| Figure 73 | Eaton 9395P-600/600<br>Eaton 9395P-600/550<br>Eaton 9395P-600/500<br>Eaton 9395P-600/450<br>Eaton 9395P-600/400 | Single Reverse Transfer UPS – Two UPM, Common Rectifier Feed, Separate Battery, Dual-Feed Configuration, Continuous Static Switch, FI-UPM |
| Figure 74 | Eaton 9395P-600/600<br>Eaton 9395P-600/550<br>Eaton 9395P-600/500<br>Eaton 9395P-600/450<br>Eaton 9395P-600/400 | Single Reverse Transfer UPS – Two UPM, Common Rectifier Feed, Common Battery, IOM Configuration |

**Table 41. Oneline Configurations (Continued)**

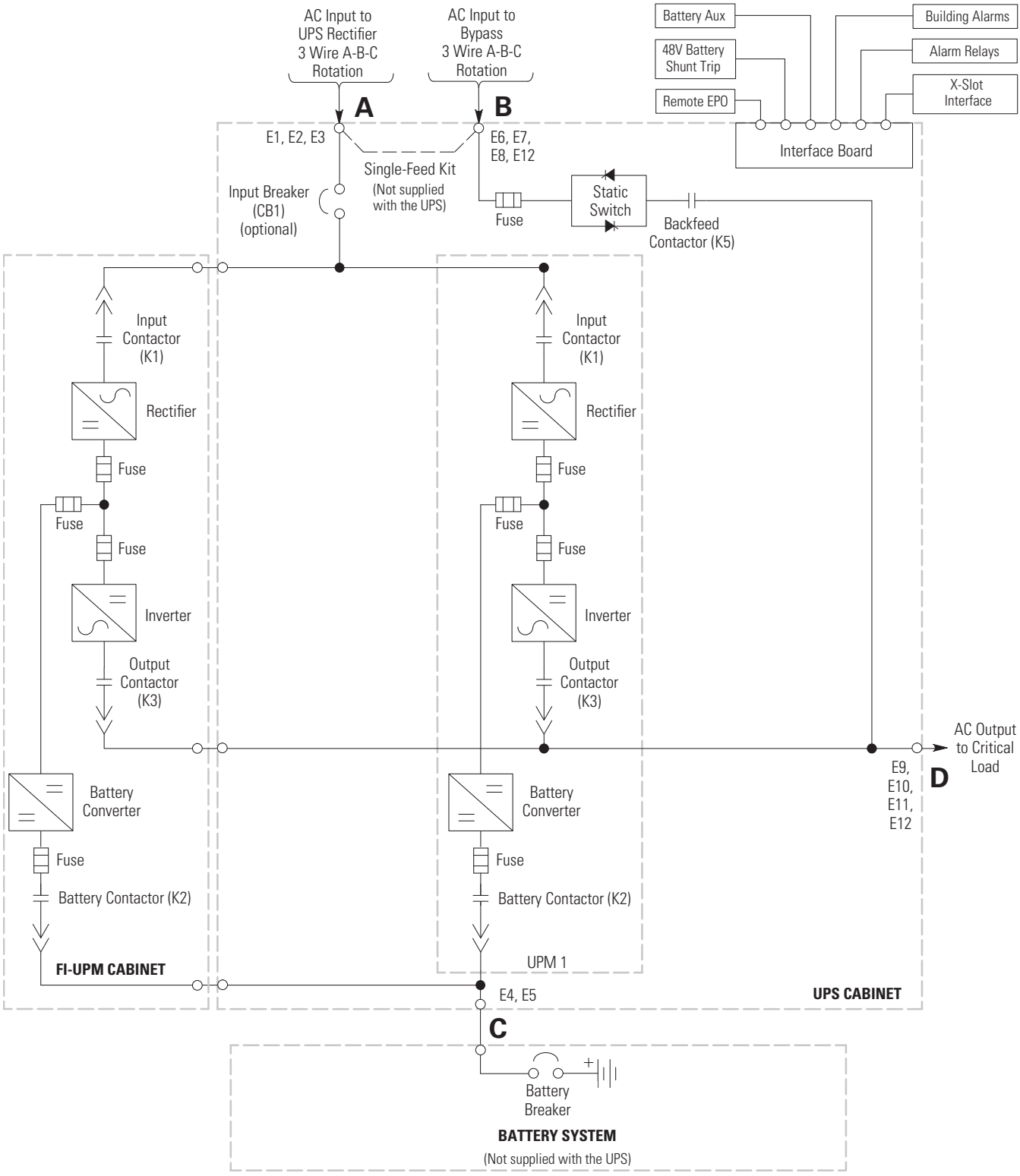
| Oneline Drawing | UPS Model | System Type |
|---|---|---|
| Figure 75 | Eaton 9395P-600/600<br>Eaton 9395P-600/550<br>Eaton 9395P-600/500<br>Eaton 9395P-600/450<br>Eaton 9395P-600/400 | Single Reverse Transfer UPS – Two UPM, Common Rectifier Feed, Separate Battery, IOM Configuration |
| Figure 76 | Eaton 9395P-600/600<br>Eaton 9395P-600/550<br>Eaton 9395P-600/500<br>Eaton 9395P-600/450<br>Eaton 9395P-600/400 | Single Reverse Transfer UPS – Three UPM Common Rectifier Feed, Common Battery, IOM Configuration |
| Figure 77 | Eaton 9395P-600/600<br>Eaton 9395P-600/550<br>Eaton 9395P-600/500<br>Eaton 9395P-600/450<br>Eaton 9395P-600/400 | Single Reverse Transfer UPS – Three UPM Common Rectifier Feed, Separate Battery, IOM Configuration |
| Figure 78 | Eaton 9395P-600/600<br>Eaton 9395P-600/550<br>Eaton 9395P-600/500<br>Eaton 9395P-600/450<br>Eaton 9395P-600/400<br>Eaton 9395P-600/300<br>Eaton 9395P-600/275<br>Eaton 9395P-600/250<br>Eaton 9395P-600/225<br>Eaton 9395P-600/200 | Simplified Dual-Feed UPS with Maintenance Bypass Panel |

**Figure 67. One UPM, Rectifier Feed, Battery System, Dual-Feed Configuration, Continuous Static Switch**



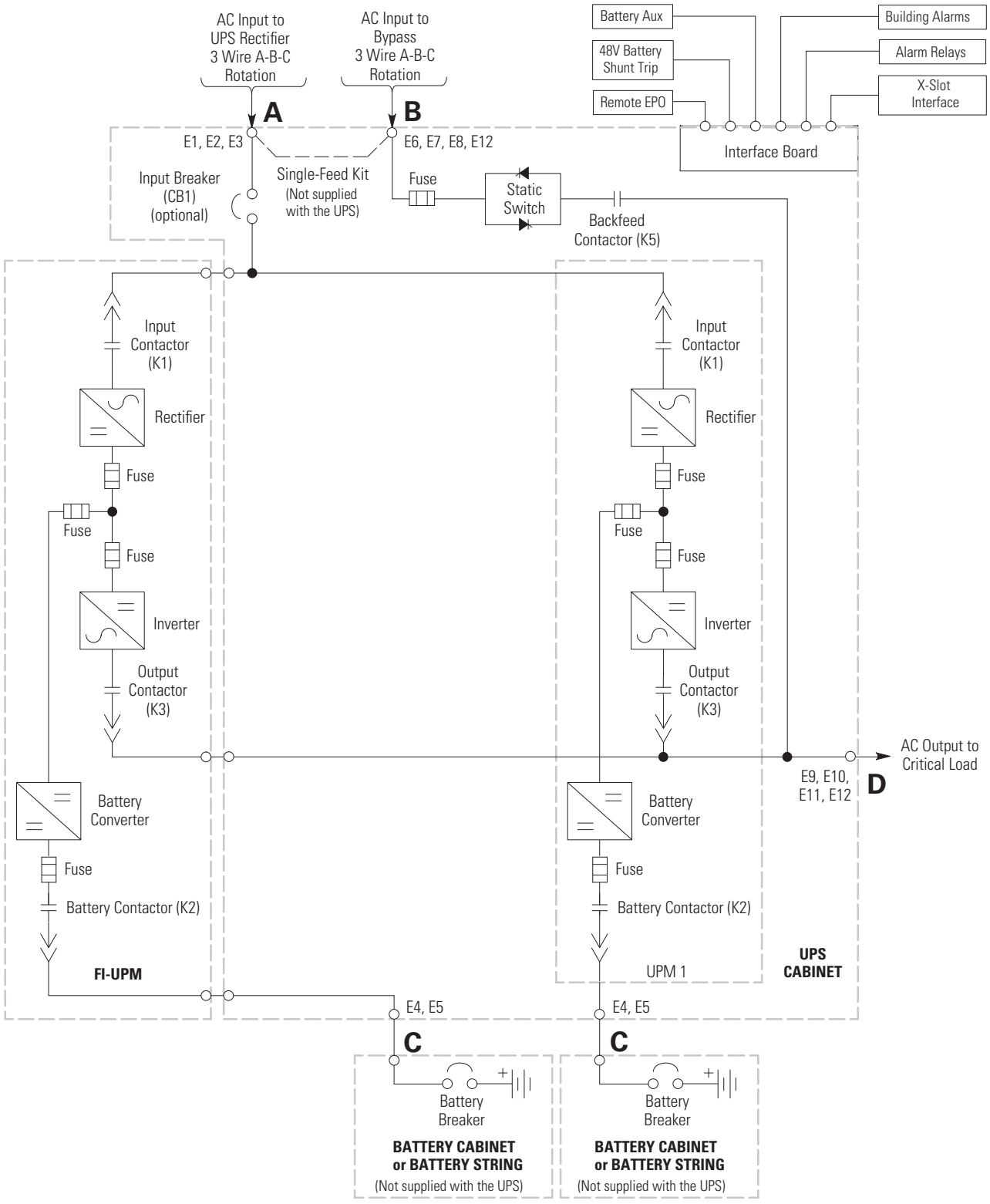

**NOTE** *Callout letters **A**, **B**, **C**, and **D** map to the applicable Input/Output Ratings and External Wiring Requirements Table in Chapter 3.*

**Figure 68. One UPM, Common Rectifier Feed, Common Battery, Dual-Feed Configuration, Continuous Static Switch, FI-UPM**



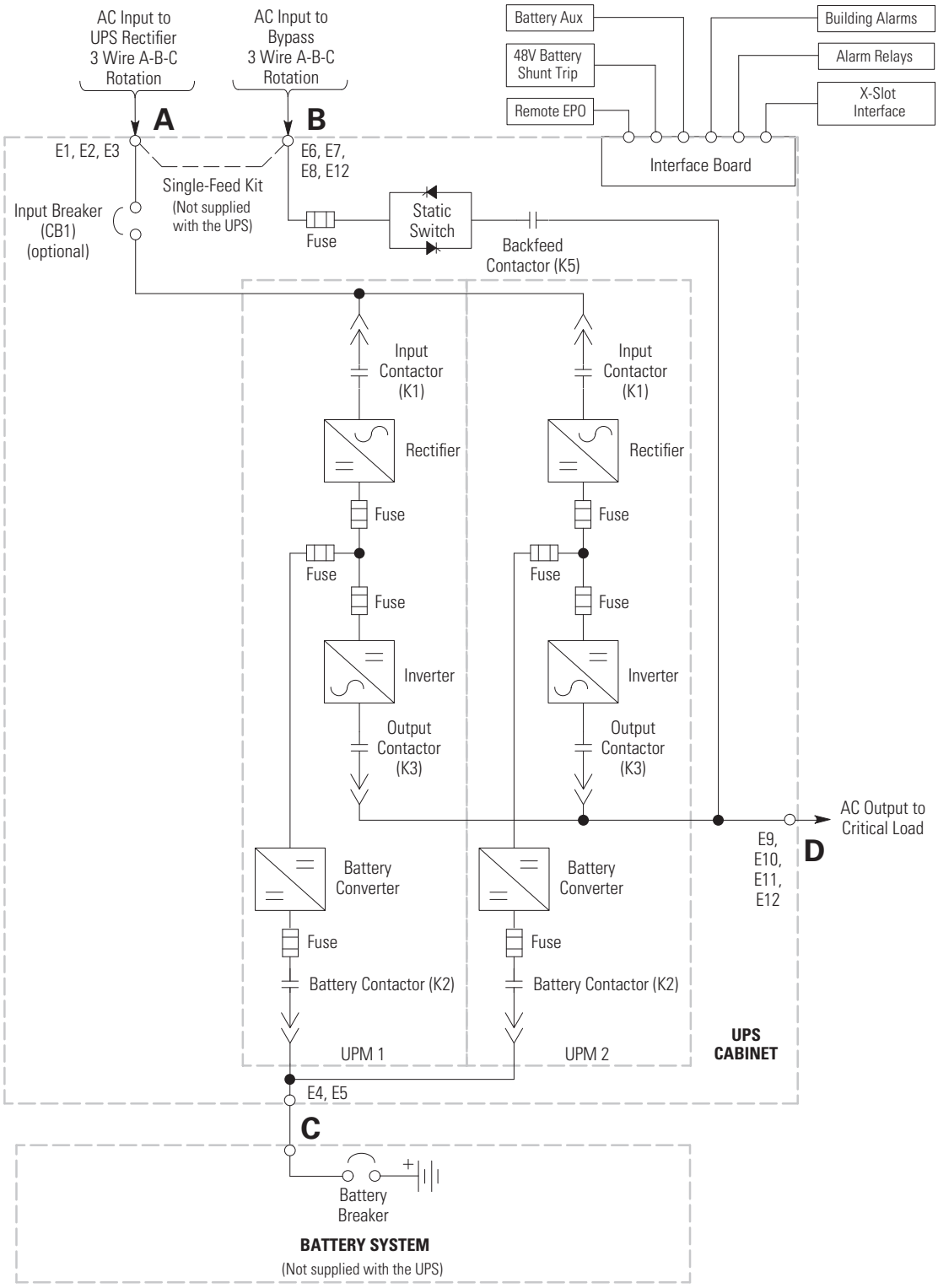

**NOTE** *Callout letters **A**, **B**, **C**, and **D** map to the applicable Input/Output Ratings and External Wiring Requirements Table in Chapter 3.*

**Figure 69. One UPM, Common Rectifier Feed, Separate Battery, Dual-Feed Configuration, Continuous Static Switch, FI-UPM**



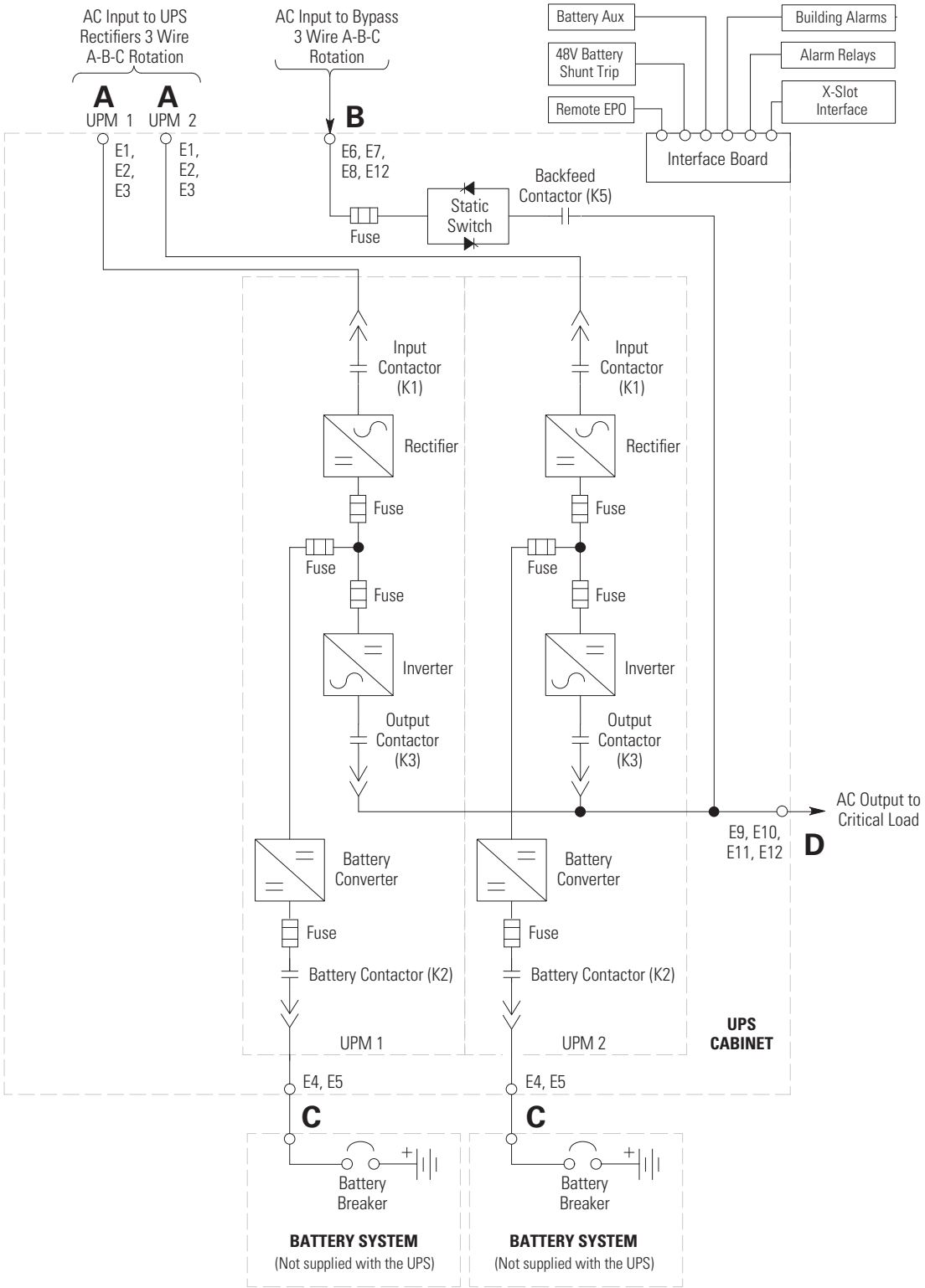

**NOTE** *Callout letters **A**, **B**, **C**, and **D** map to the applicable Input/Output Ratings and External Wiring Requirements Table in Chapter 3.*

**Figure 70. Two UPM, Common Rectifier Feed, Common Battery, Dual-Feed Configuration, Continuous Static Switch**



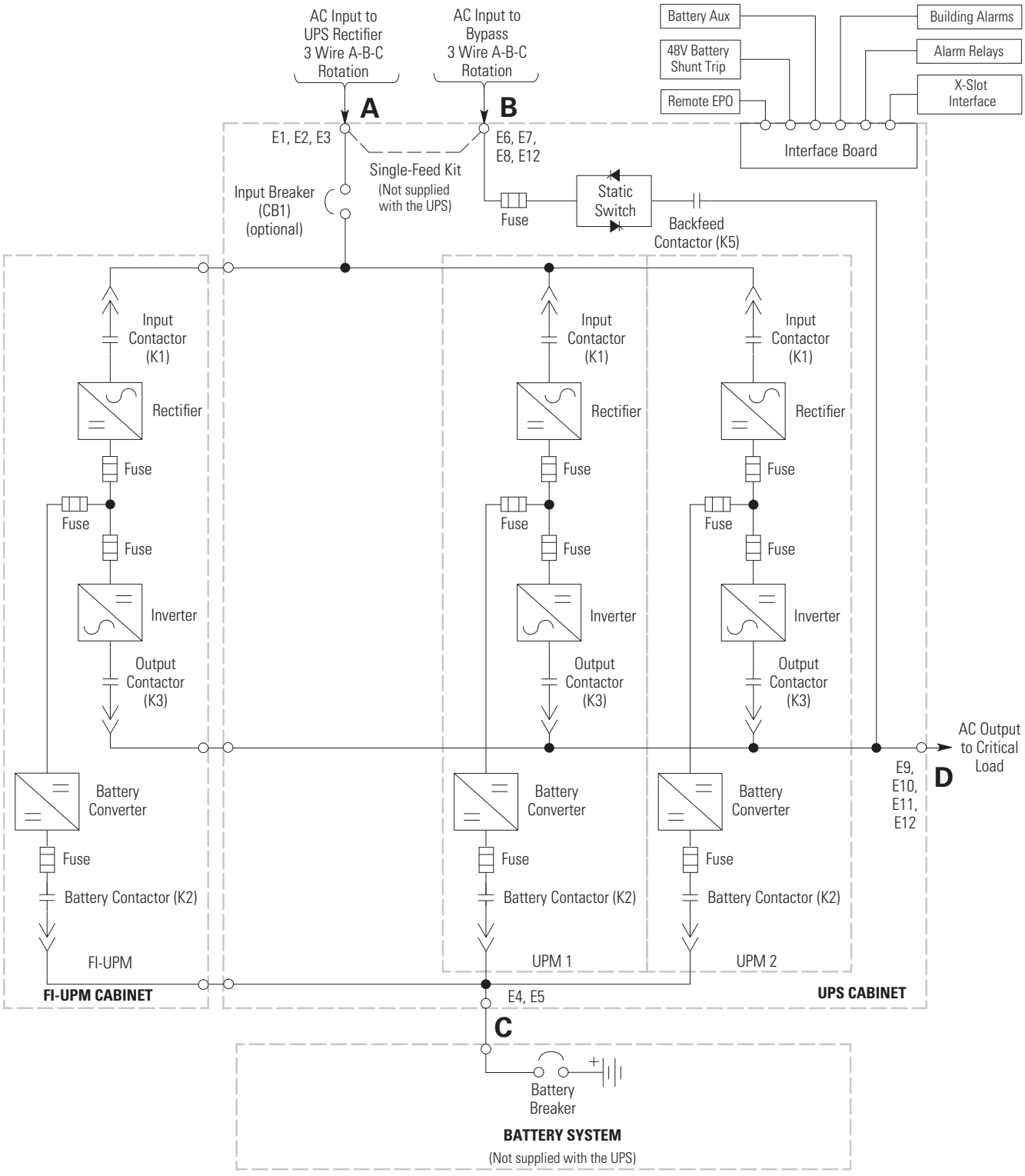

**NOTE** *Callout letters **A**, **B**, **C**, and **D** map to the applicable Input/Output Ratings and External Wiring Requirements Table in Chapter 3.*

**Figure 71. Two UPM, Common Rectifier Feed, Separate Battery, Dual-Feed Configuration, Continuous Static Switch**



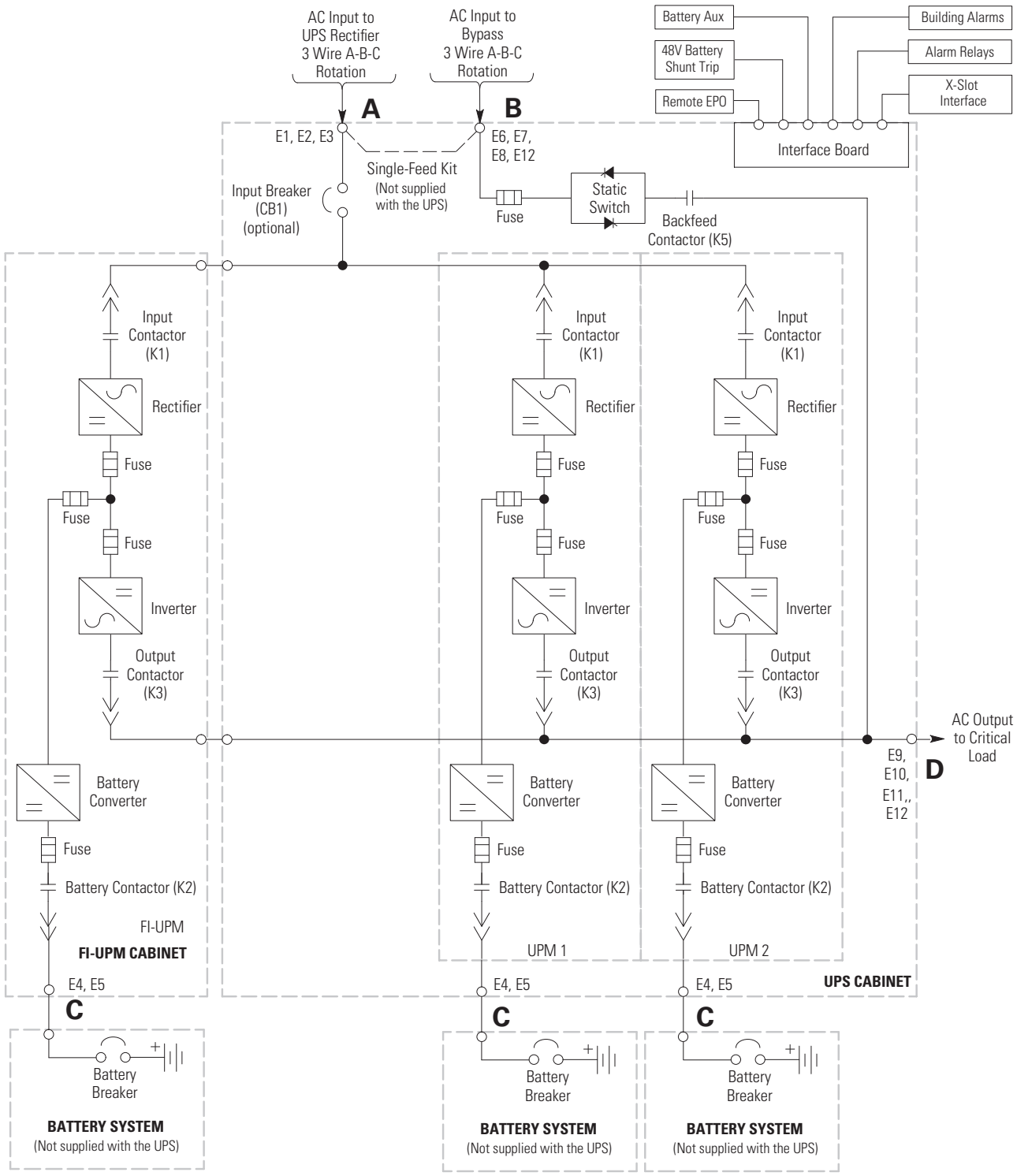

**NOTE** *Callout letters **A**, **B**, **C**, and **D** map to the applicable Input/Output Ratings and External Wiring Requirements Table in Chapter 3.*

**Figure 72. Two UPM, Common Rectifier Feed, Common Battery, Dual-Feed Configuration, Continuous Static Switch, FI-UPM**



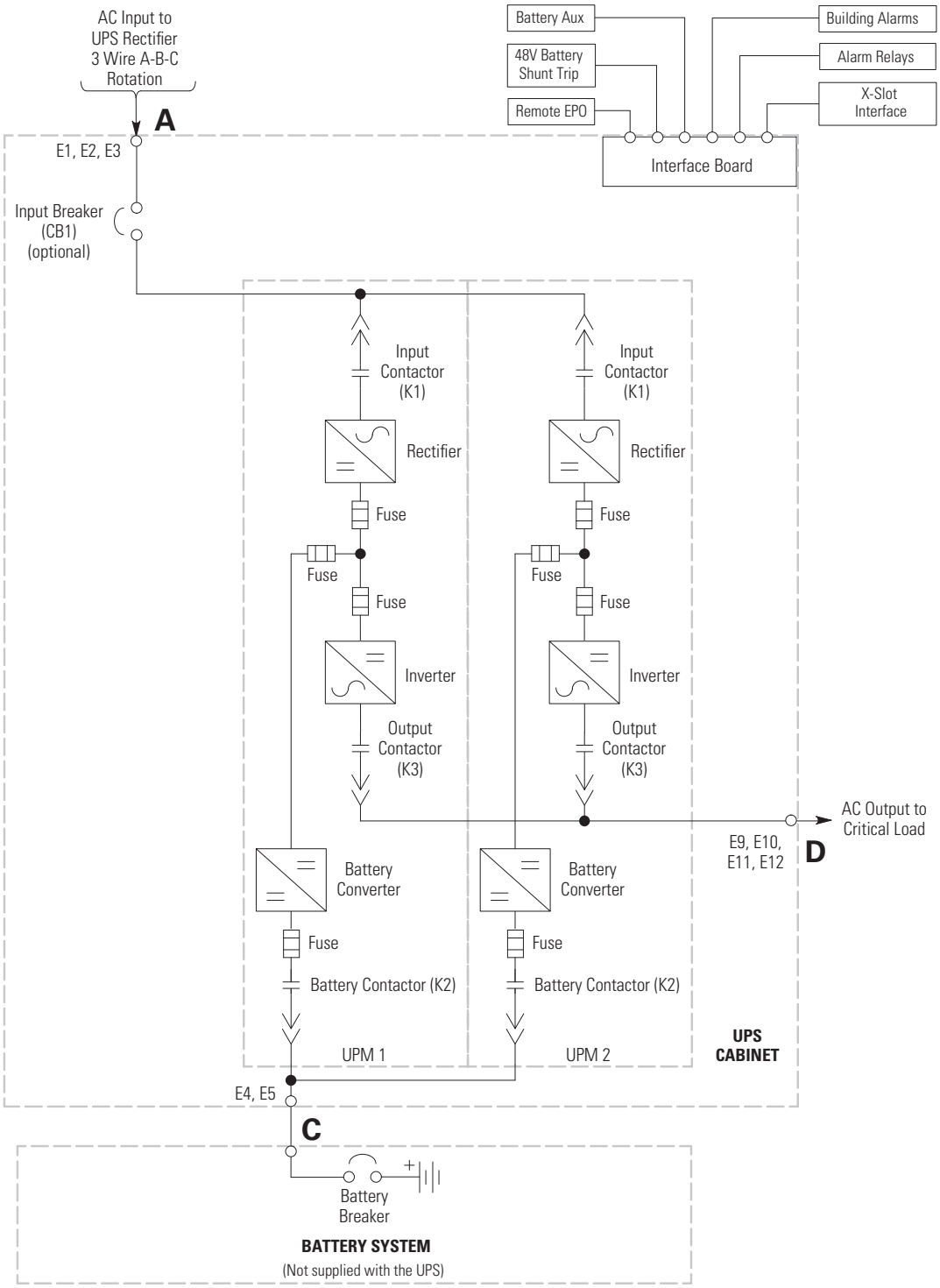

**NOTE** *Callout letters **A**, **B**, **C**, and **D** map to the applicable Input/Output Ratings and External Wiring Requirements Table in Chapter 3*

**Figure 73. Two UPM, Common Rectifier Feed, Separate Battery, Dual-Feed Configuration, Continuous Static Switch, FI-UPM**



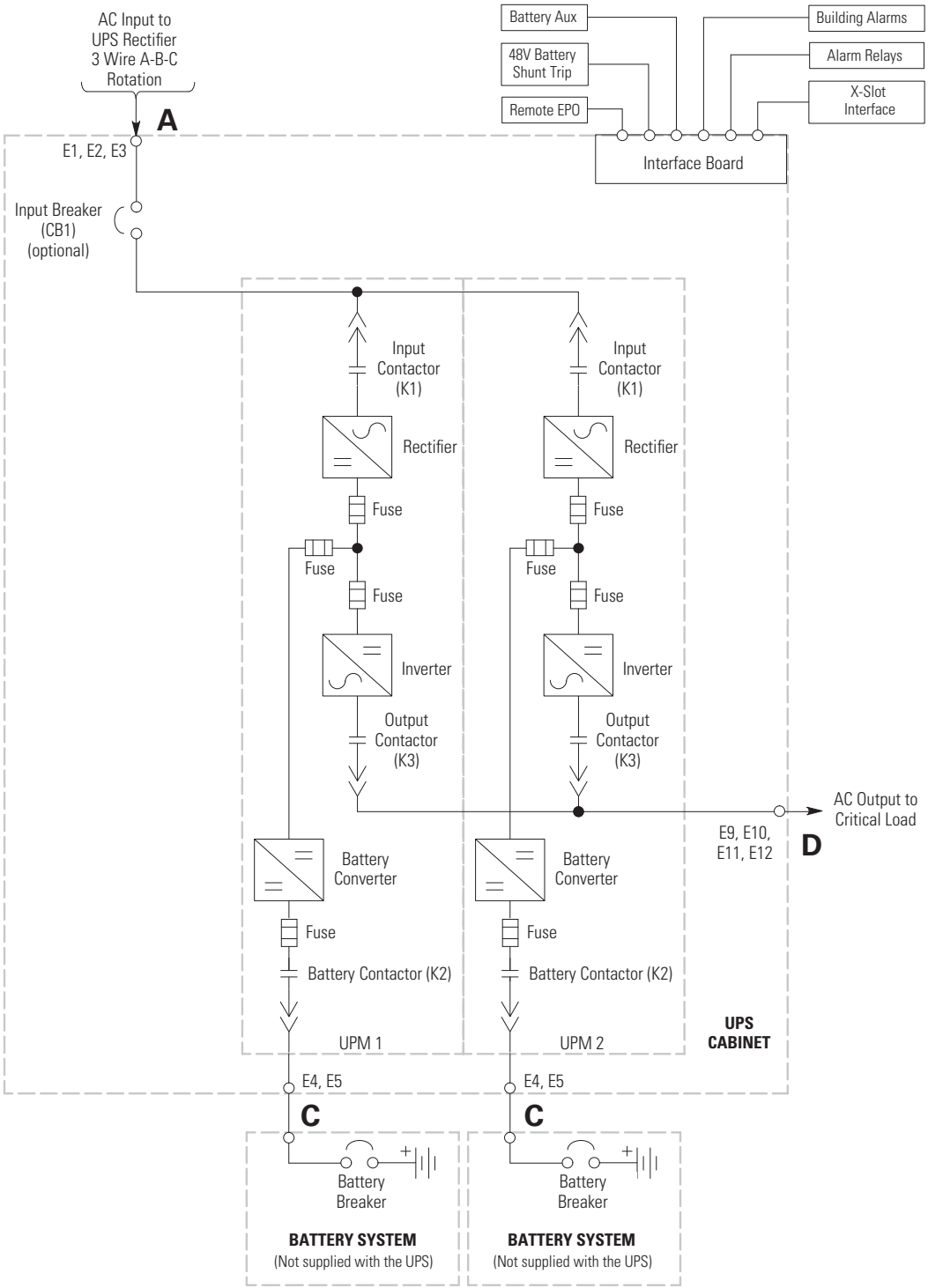

**NOTE** *Callout letters **A**, **B**, **C**, and **D** map to the applicable Input/Output Ratings and External Wiring Requirements Table in Chapter 3.*

**Figure 74. Two UPM, Common Rectifier Feed, Common Battery, IOM Configuration**



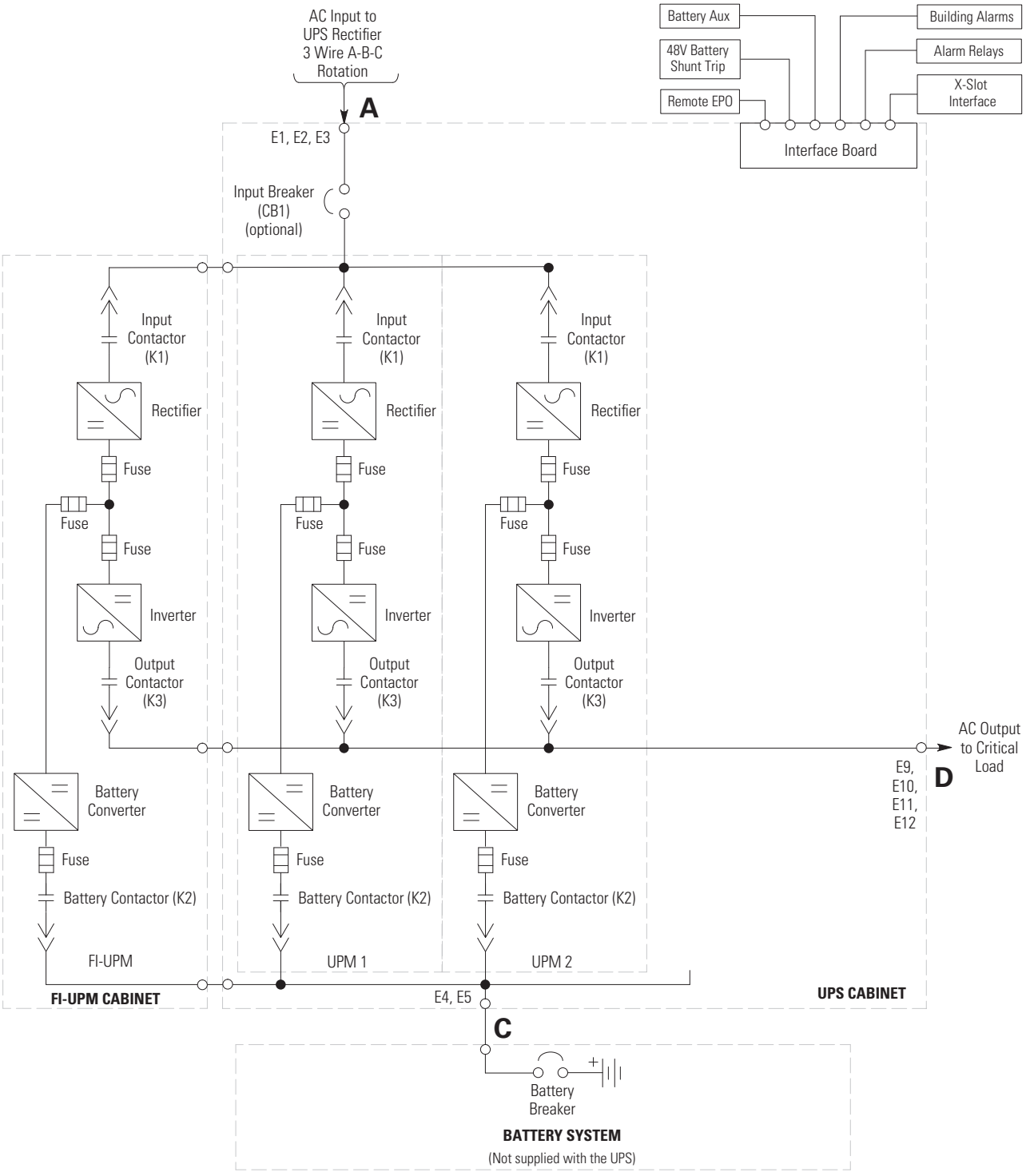

**NOTE** *Callout letters **A**, **B**, **C**, and **D** map to the applicable Input/Output Ratings and External Wiring Requirements Table in Chapter 3.*

**Figure 75. Two UPM, Common Rectifier Feed, Separate Battery, IOM Configuration**



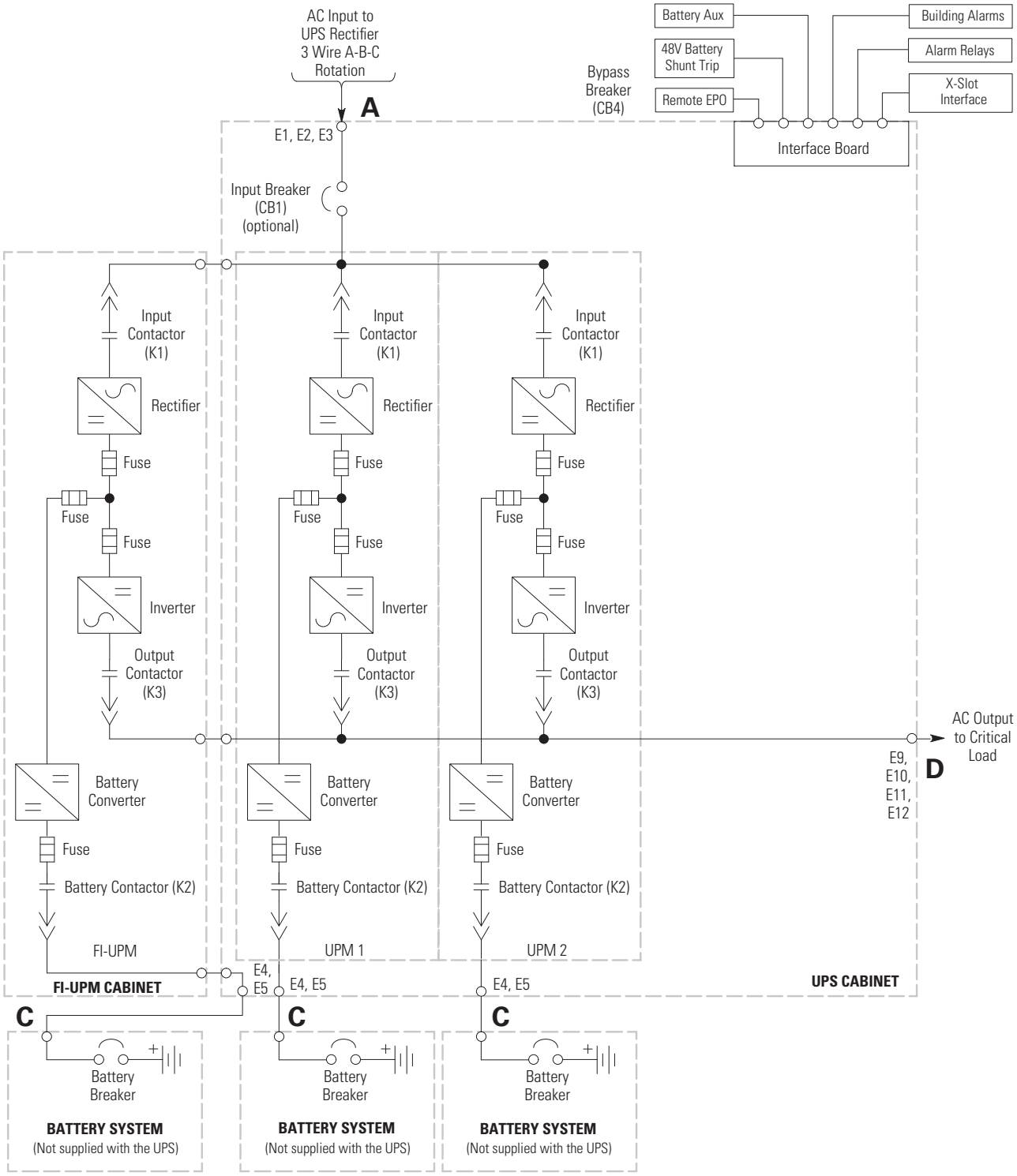

**NOTE** *Callout letters **A**, **B**, **C**, and **D** map to the applicable Input/Output Ratings and External Wiring Requirements Table in Chapter 3.*

**Figure 76. Three UPM Common Rectifier Feed, Common Battery, IOM Configuration**



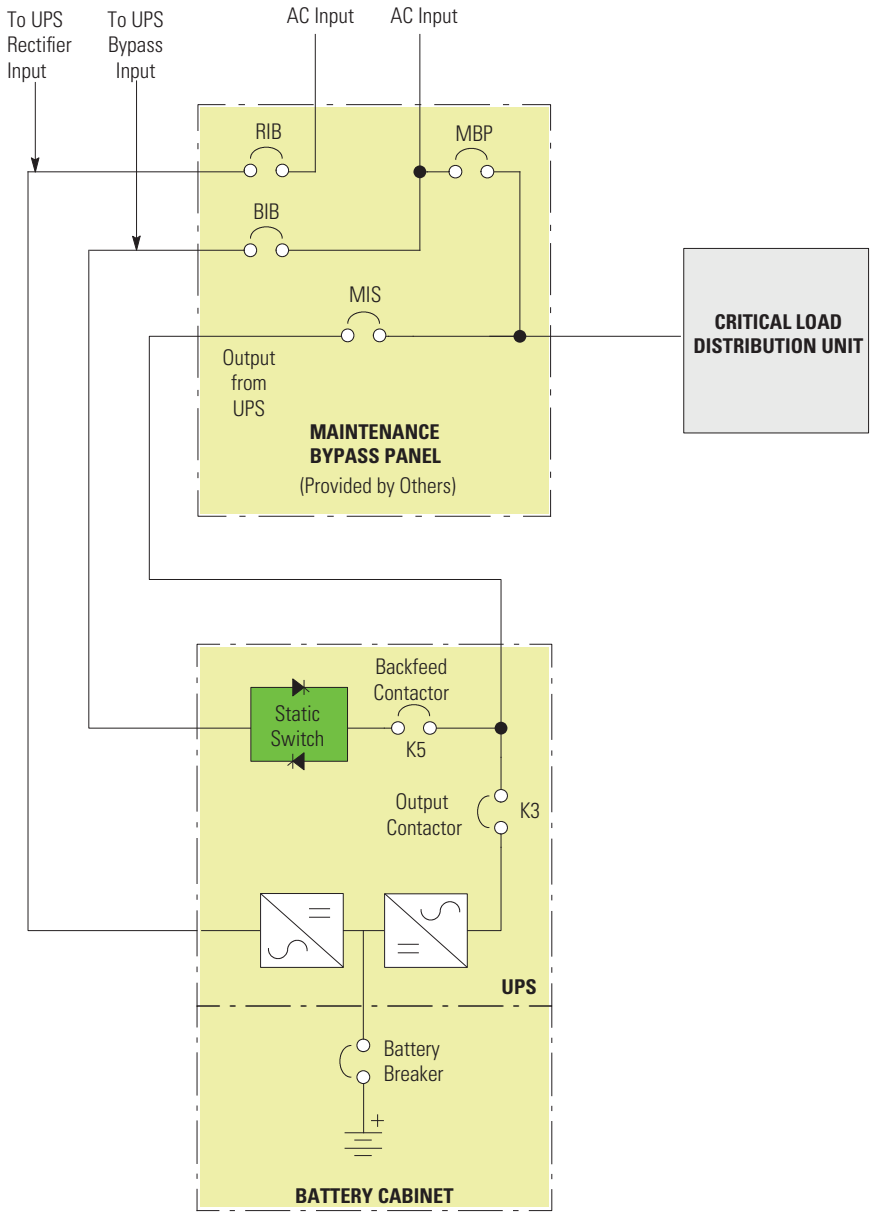

**NOTE** *Callout letters **A**, **B**, **C**, and **D** map to the applicable Input/Output Ratings and External Wiring Requirements Table in Chapter 3.*

**Figure 77. Three UPM Common Rectifier Feed, Separate Battery, IOM Configuration**




**NOTE** *Callout letters **A**, **B**, **C**, and **D** map to the applicable Input/Output Ratings and External Wiring Requirements Table in Chapter 3.*

**Figure 78. Simplified Dual-Feed UPS with Maintenance Bypass Panel**




RIB: Rectifier Input Breaker
BIB: Bypass Input Breaker
MIS: Maintenance Isolation Breaker
MBP: Maintenance Bypass Breaker

**NOTE** If installing a maintenance bypass, a minimum of two separate feeds with upstream feeder breakers, or a single feed with two upstream feeder breakers, must be provided: one for the UPS or rectifier input breaker (RIB) (if installed) and one for the maintenance bypass input. DO NOT use a single feed or a single feeder breaker to supply both the UPS or RIB and the maintenance bypass. If a bypass input breaker (BIB) is installed in the maintenance bypass and a single-feed UPS is being installed, a single feed to the maintenance bypass is acceptable for supplying both the UPS and the bypass.

## 6.4 Multiple UPS Distributed Bypass System

Distributed bypass parallel operation extends the normal operation of Eaton 9395P-600 UPSs by offering increased capacity and/or redundant capability. The parallel system continues to maintain power to the critical loads during commercial electrical power brownout, blackout, overvoltage, undervoltage, and out–of–tolerance frequency conditions.

The output of the system is normally supplied by Uninterruptible Power Modules (UPMs) contained in each UPS. MultipleUPMs are connected with their outputs in parallel (tied together) to provide a load level greater than the rating of one UPM and/or for redundancy. The paralleled UPMs supply the output load with protected power as long as the load does not exceed the combined rating of the paralleled UPMs.

The power system is redundant as long as one of the UPMs can be disconnected from the output bus and the remaining UPMs can continue to supply power to the load without exceeding their ratings.

When the load is being supplied by the UPMs, the system output bus is continuously monitored for an overvoltage or undervoltage condition. If an out of limits condition is detected, the paralleled UPMs transfer the load to bypass using the UPS static switches.

Communication is required between the UPSs for system metering and mode control. System level communication and control are accomplished using a Controller Area Network (CAN). A single building alarm in each UPS, connected to the other UPSs in parallel and tied to the bypass contactor auxiliary contacts in each UPS, are used for a secondary communication path. This arrangement ensures bypass control even if the CAN bus is lost.

The system is paralleled for redundancy (1+1) in a system where two UPMs are paralleled together and the load is less than the supporting capability of one of the UPMs. The system is paralleled for capacity (2+0) if both UPMs in a system are required to support the load.

A parallel capacity system can also be redundant (2+1), as long as there is always one or more UPMs online than required to support the load.

### 6.4.1 Multiple UPS Parallel System Modes

Similar to the single UPS system, the Eaton 9395P-600 UPS parallel system supports a critical load in five different modes of operation. The standard operation modes are:

- In Online mode, the paralleled UPMs supply the critical load with clean, filtered power. Each UPM battery charger also provides charging current for the battery if needed.
- In Energy Saver mode, commercial AC power is supplied directly to the critical load through the continuous static switch and transfers automatically to Online mode if an abnormal condition is detected. The Energy Saver mode requires a UPS with a continuous static switch. Energy Saver mode in a parallel system operates the same as it does in a single (see paragraph 6.2.3 *Energy Saver System (ESS) Mode*).
- In Variable Module Management mode, the UPS operates as a traditional double-conversion UPS, but selectively shifts the load to fewer UPMs to increase the efficiency of the UPS. In a parallel system each UPS will require at least one UPM to be in double-conversion mode at all times; otherwise, Variable Module Management mode operates the same as it does in a single UPS system (see paragraph 6.2.4 *Variable Module Management System*).
- In Bypass mode, the critical load is directly supported by utility power through the bypass circuit in each UPS.
- In Battery mode, the battery provides DC power, which maintains UPM operation. The UPM batteries support the critical load.

The UPSs continually monitor themselves and the incoming utility power and automatically switch between these modes as required, without operator intervention, except when manually switching to Bypass mode. The sophisticated detection and switching logic inside the UPSs ensures that operating mode changes are automatic and transparent to the critical load, while internal monitoring systems indicate the current mode of operation. The UPSs switch operating modes in response to these system events:

- A *command* is an intervention that is externally initiated by an operator or by some site action. A command causes the UPSs to switch operating modes; it usually does not require any further action.
- A *notice* is a minor system event that may or may not require attention.
- An *alarm* is a system event that requires immediate intervention.

The following paragraphs describe the differences in the parallel system operating modes, using block diagrams to show the power flow during each mode of operation.

### 6.4.2 Online Mode – Distributed Bypass

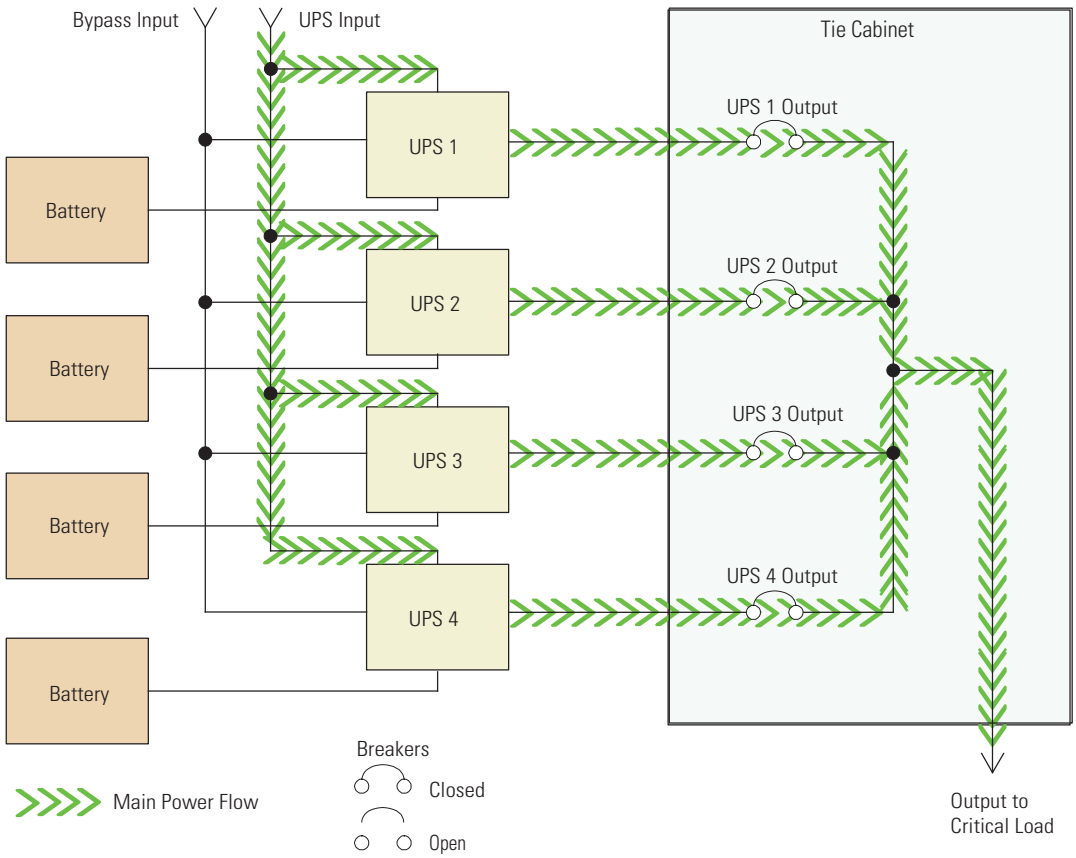
In Online mode, utility AC power is supplied to the UPSs. Each UPS then conditions the incoming AC power and provides clean, regulated AC power to the tie cabinet or distribution panel for parallel systems up to four modules. The applied load is shared equally among the available UPMs in the system.

Figure 79 shows the path of electrical power through the parallel system when operating in Online mode.

If the utility AC power is interrupted or is out of specification, the UPSs automatically switch to Battery mode to support the critical load without interruption. When utility power returns, the UPSs return to Online mode.

If the UPSs become overloaded or unavailable, the distributed bypass system switches to Bypass mode. The distributed bypass system automatically returns to Online mode when the overload condition is cleared and system operation is restored within specified limits.

**Figure 79. Path of Current through the UPSs in Online Mode – Distributed Bypass**



### 6.4.3 Bypass Mode – Distributed Bypass

In Bypass mode, the output of the system is provided with three-phase AC power directly from the bypass input. While in this mode, the output of the system is not protected from fluctuations, spikes, or power outages from the source. No battery support is available to the output of the system in the Bypass mode of operation.

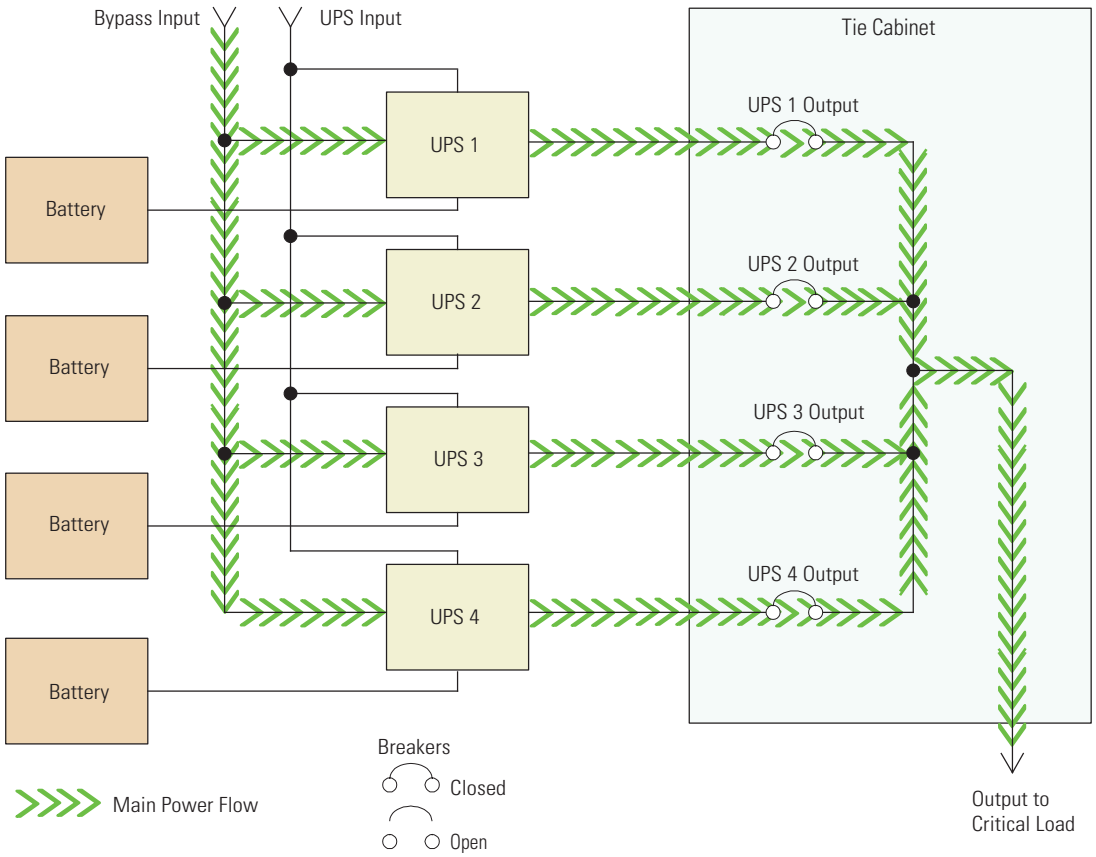
The distributed bypass system automatically switches to Bypass mode if it detects a UPS system overload or load fault.

If one UPS becomes unavailable, the distributed bypass system dynamically updates the redundancy calculation to determine if the remaining UPSs can support the load. If the load can be supported, the system does not switch to bypass.

Figure 80 shows the path of electrical power through the parallel system when operating in Bypass mode.

In a distributed bypass system, each UPS operates similar to a single UPS, but in parallel with each other. The bypass source for the load is derived from the bypass input of one, two, three, or four UPSs, depending on the system configuration, through the internal static switches. If a module is taken offline, the other modules remain online to support the load. If more modules than can support the load must be taken offline, the load must be transferred to maintenance bypass or shut down.

**Figure 80. Path of Current through the UPSs in Bypass Mode – Distributed Bypass**



The distributed bypass system can be transferred from Online mode to Bypass mode manually. However, the distributed bypass system automatically switches to Bypass mode whenever the UPSs can no longer supply the critical load. If the distributed bypass system transfers to Bypass mode from Online mode due to an output voltage deviation, the distributed bypass system automatically attempts to return to Online mode (up to three times within a 10–minute period). After three transfer attempts or an overload, the system locks the critical load to the bypass source and requires operator intervention to transfer.

Bypass mode is a normal operating mode, not an alarm condition. However, if the distributed bypass system is unable to return to Online mode following an automatic transfer to Bypass mode, an alarm condition is recorded.

Bypass may also be used when the UPSs or UPMs in the system must be shut down to perform routine maintenance or repairs.

In the Parallel Redundant (N+1) arrangement, the bypass circuitry in each UPS operates to support the applied loads on bypass. If the UPSs are online and one UPS trips offline, the remaining UPSs do not go to bypass as long as they have the capacity to support the load.

In the Parallel Capacity (N+0) arrangement, if one UPS trips offline and goes to bypass, the remaining UPSs also go to bypass.

### 6.4.4 Battery Mode – Distributed Bypass

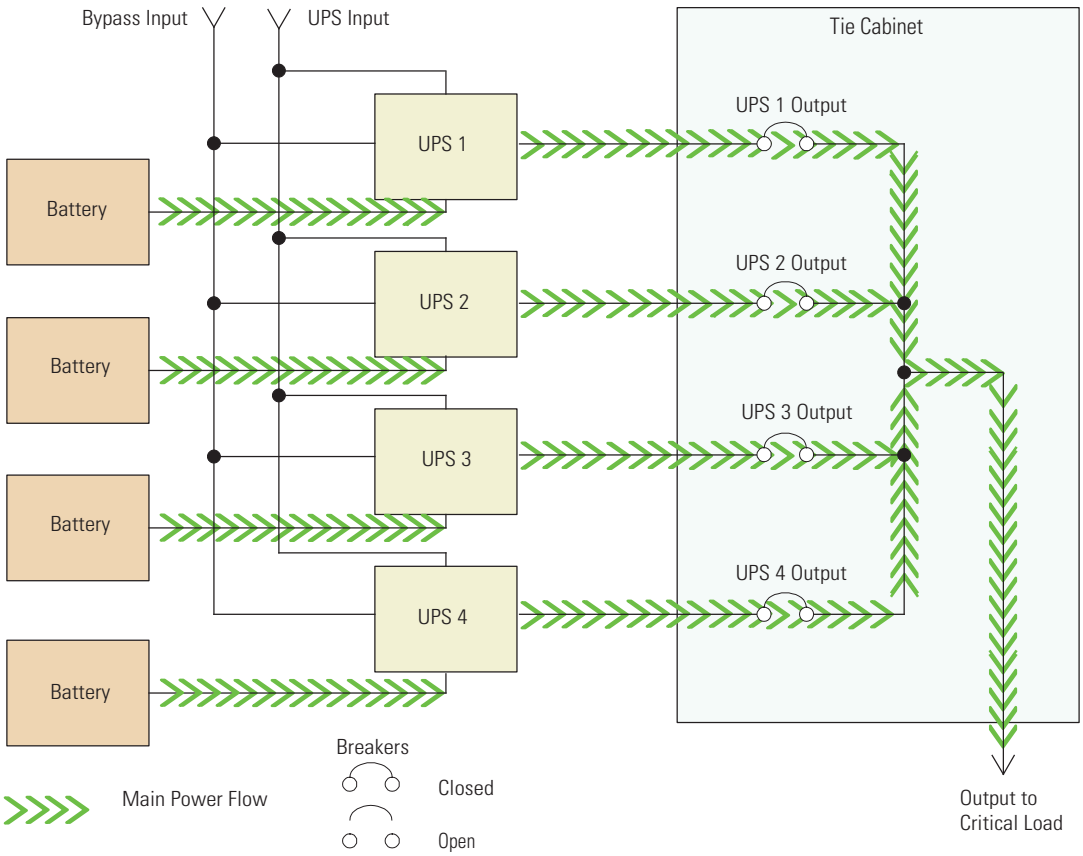
The UPSs transfer to Battery mode automatically if a utility power outage occurs, or if the utility power does not conform to specified parameters. In Battery mode, the battery provides emergency DC power that the inverter converts to AC power.

Figure 81 shows the path of electrical power through the distributed bypass system when operating in Battery mode.

While in Battery mode, the UPSs sound an audible horn, illuminate visual indicator lamps on the front panel (Online and On Battery), and create an entry into the alarm event history. As the battery discharges, the boost converter and inverter constantly make minute adjustments maintaining a steady output. The UPSs remain in this operating mode until the input power to the rectifier is again within the specified voltage or frequency acceptance windows.

If the input power fails to return or is not within the acceptance windows required for normal operation, the battery continues discharging until a DC voltage level is reached where the inverter output can no longer support the shared loads. When this event occurs, each UPS issues another set of audible and visual alarms that indicate a two-minute SHUTDOWN IMMINENT warning. Unless the system has a valid AC input soon, redundant UPMs begin shutting down until there are no longer enough UPMs online to support the connected load. When this event occurs, the system shuts down. If the bypass source is available, the system transfers to bypass instead of shutting down.

**Figure 81. Path of Current through the UPSs in Battery Mode – Distributed Bypass**



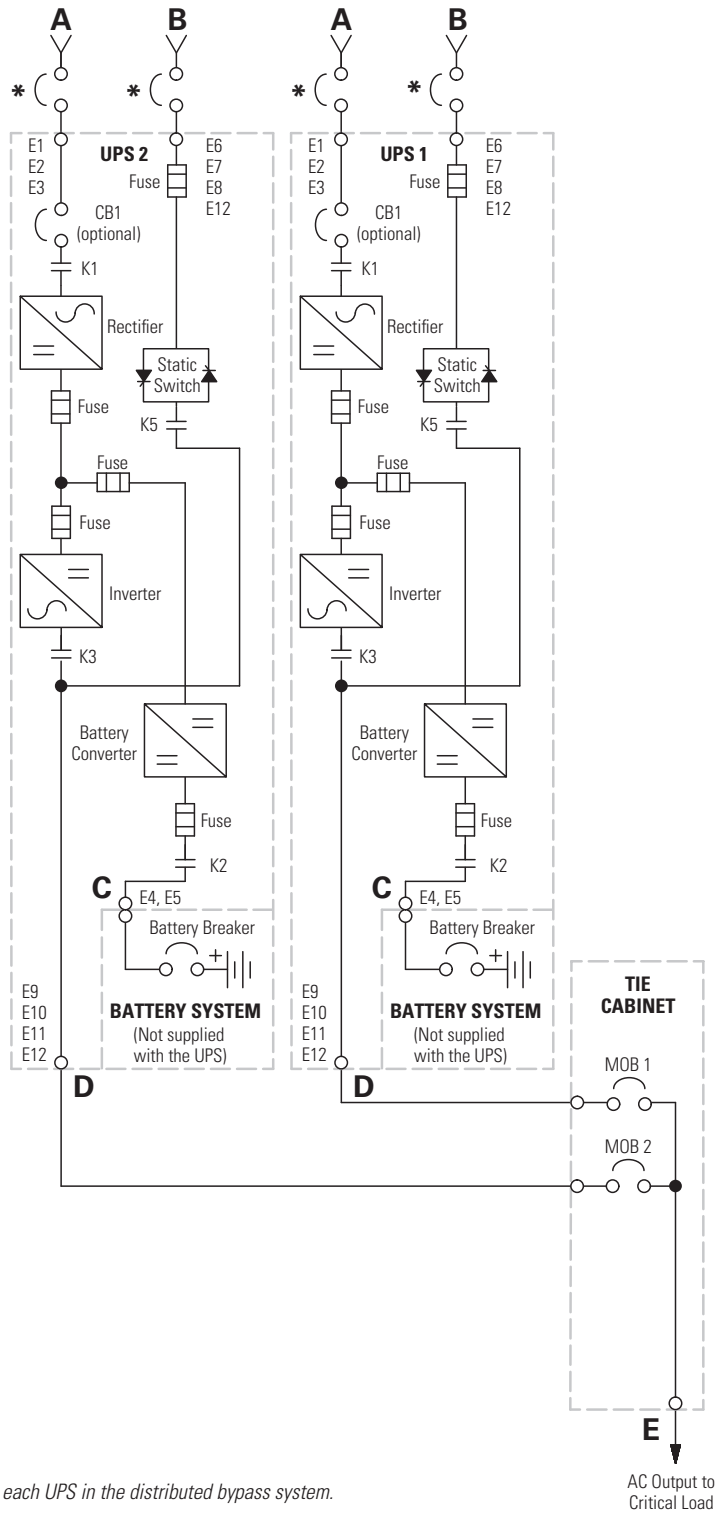

If at any time during the battery discharge the input power becomes available again, the rectifier begins to supply DC current to the inverter. At this point, the UPS returns to Online mode. If at any time during the battery discharge the AC input power becomes available again, each rectifier turns on, assumes the inverter load from the batteries, and begins recharging the batteries. Depending on the total load and the duration of the battery discharge, battery and rectifier input current limit alarms may be seen for a short time due to the current required to recharge the batteries.

## 6.5 Multiple UPS Distributed Bypass System Oneline Configurations

The distributed bypass system oneline drawings in this section show the simplified internal structure of the UPS, battery supply, and basic maintenance bypass in a multiple UPS configuration. These onelines do not show each UPM in the UPSs, but represent each UPS in the distributed bypass system. The following voltages apply: 380V, 400V, 415V, 480V and 600V.

| Oneline Drawing | UPS Model | System Type |
|---|---|---|
| Figure 82 | Eaton 9395P-600/600<br>Eaton 9395P-600/550<br>Eaton 9395P-600/500<br>Eaton 9395P-600/450<br>Eaton 9395P-600/400<br>Eaton 9395P-600/300<br>Eaton 9395P-600/275<br>Eaton 9395P-600/250<br>Eaton 9395P-600/225<br>Eaton 9395P-600/200 | Multiple UPS – Distributed Bypass 1+1 and 2+0 Configurations |
| Figure 83 | Eaton 9395P-600/600<br>Eaton 9395P-600/550<br>Eaton 9395P-600/500<br>Eaton 9395P-600/450<br>Eaton 9395P-600/400<br>Eaton 9395P-600/300<br>Eaton 9395P-600/275<br>Eaton 9395P-600/250<br>Eaton 9395P-600/225<br>Eaton 9395P-600/200 | Multiple UPS – Distributed Bypass 2+1 and 3+0 Configurations |
| Figure 84 | Eaton 9395P-600/600<br>Eaton 9395P-600/550<br>Eaton 9395P-600/500<br>Eaton 9395P-600/450<br>Eaton 9395P-600/400<br>Eaton 9395P-600/300<br>Eaton 9395P-600/275<br>Eaton 9395P-600/250<br>Eaton 9395P-600/225<br>Eaton 9395P-600/200 | Multiple UPS – Distributed Bypass 3+1 and 4+0 Configurations |

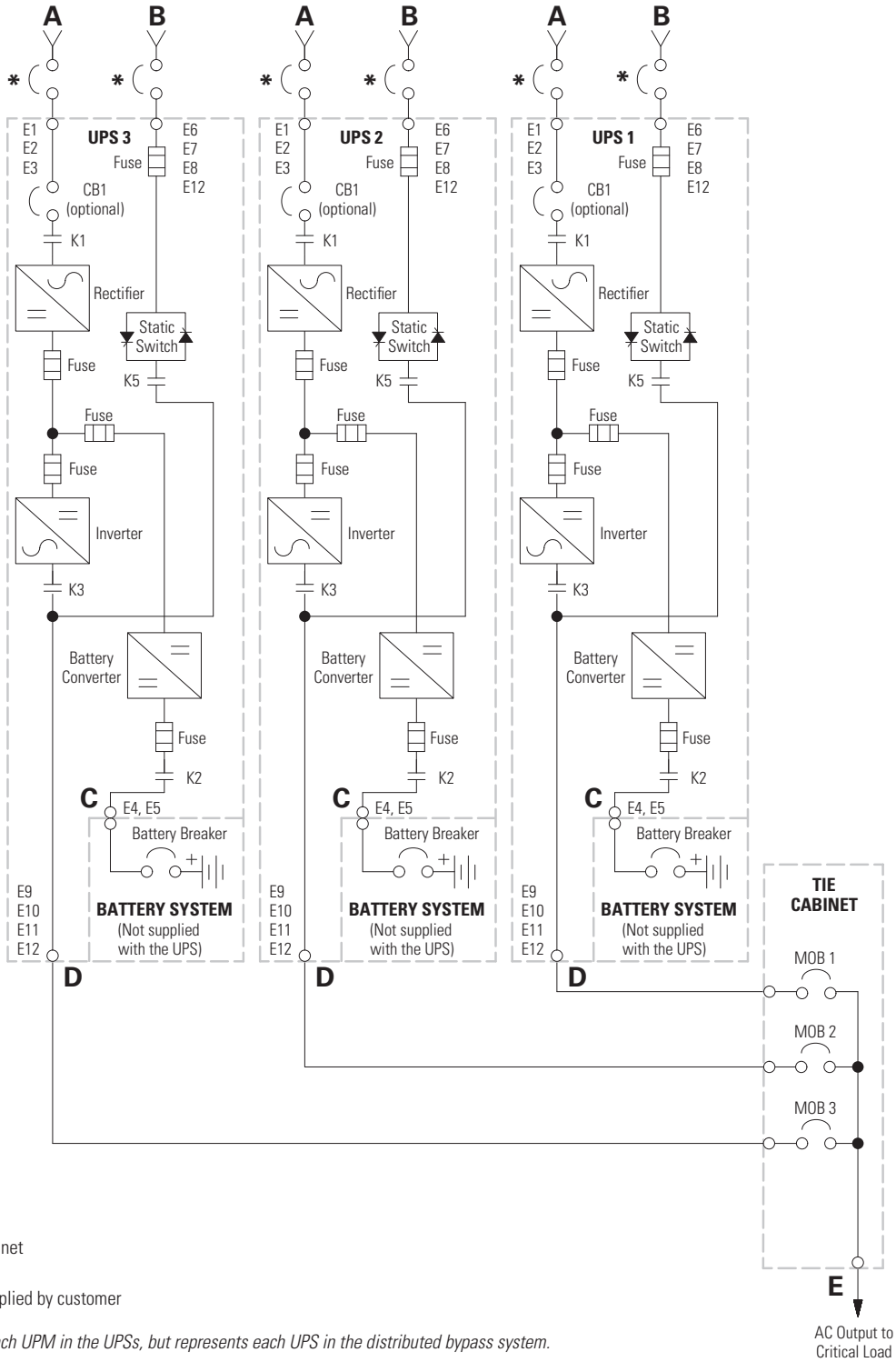
**Figure 82. Typical Distributed Bypass System (1+1 and 2+0 Configurations)**




**A** – AC Input to UPS Rectifier
**B** – AC Input to Bypass
**C** – DC Input from Battery
**D** – UPS AC Output to Tie Cabinet
**E** – Output to Critical Load
***** – Overcurrent Protection supplied by customer

**NOTE** *This oneline does not show each UPM in the UPSs, but represents each UPS in the distributed bypass system.*

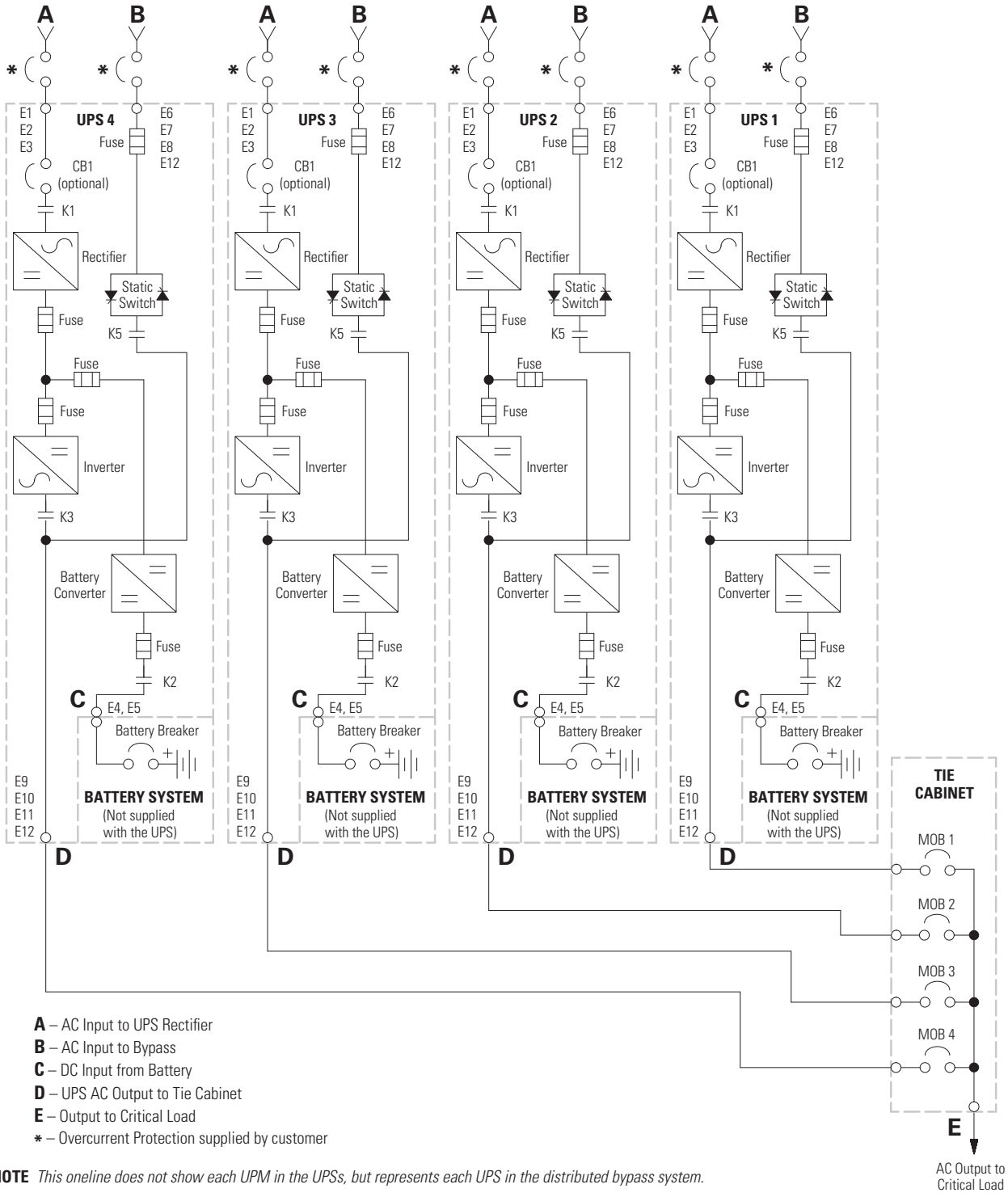
**Figure 83. Typical Distributed Bypass System (2+1 and 3+0 Configurations)**




**A** – AC Input to UPS Rectifier
**B** – AC Input to Bypass
**C** – DC Input from Battery
**D** – UPS AC Output to Tie Cabinet
**E** – Output to Critical Load
***** – Overcurrent Protection supplied by customer

**NOTE** *This oneline does not show each UPM in the UPSs, but represents each UPS in the distributed bypass system.*

**Figure 84. Typical Distributed Bypass System (3+1 and 4+0 Configurations)**




**NOTE** *This oneline does not show each UPM in the UPSs, but represents each UPS in the distributed bypass system.*

# Chapter 7 UPS Operating Instructions

This section describes how to operate the UPS.

**NOTE 1** Before starting the UPS, ensure all installation tasks are complete and a preliminary startup has been performed by authorized service personnel. The preliminary startup verifies all electrical interconnections to ensure the installation was successful and the system operates properly.

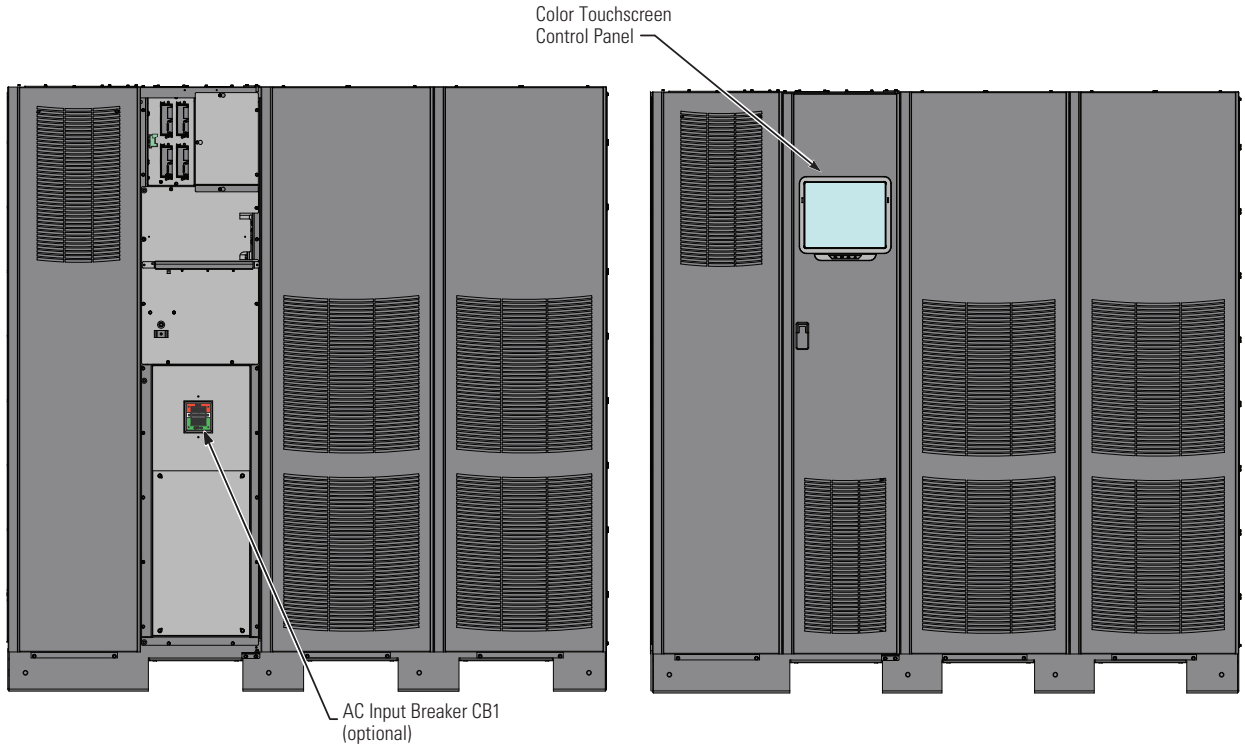
**NOTE 2** Read this section of the manual and have thorough knowledge of UPS operation before attempting to operate any of the controls.

**NOTE 3** The UPS displays two minutes of battery runtime at the initial startup. After a 24-hour charging period, the UPS automatically runs a battery test and the correct battery runtime displays.

## 7.1 UPS Controls and Indicators

The controls and indicators identified and described in this section are used to control and monitor UPS operation. Figure 85 Identifies the touchscreen control panel and the location of the CB1 circuit breaker (optional).

**Figure 85. UPS Controls (380V, 400V, 415V, and 480V)**



### 7.1.1 Control Panel

The control panel is used to set up and control the UPS, and to monitor UPS operation. For a description of the UPS control panel functions, see paragraph *7.3 Using the Color Touchscreen Control Panel*.

### 7.1.2 Circuit Breakers

Optional circuit breaker (CB1) is used to control the AC input to the UPS rectifier.

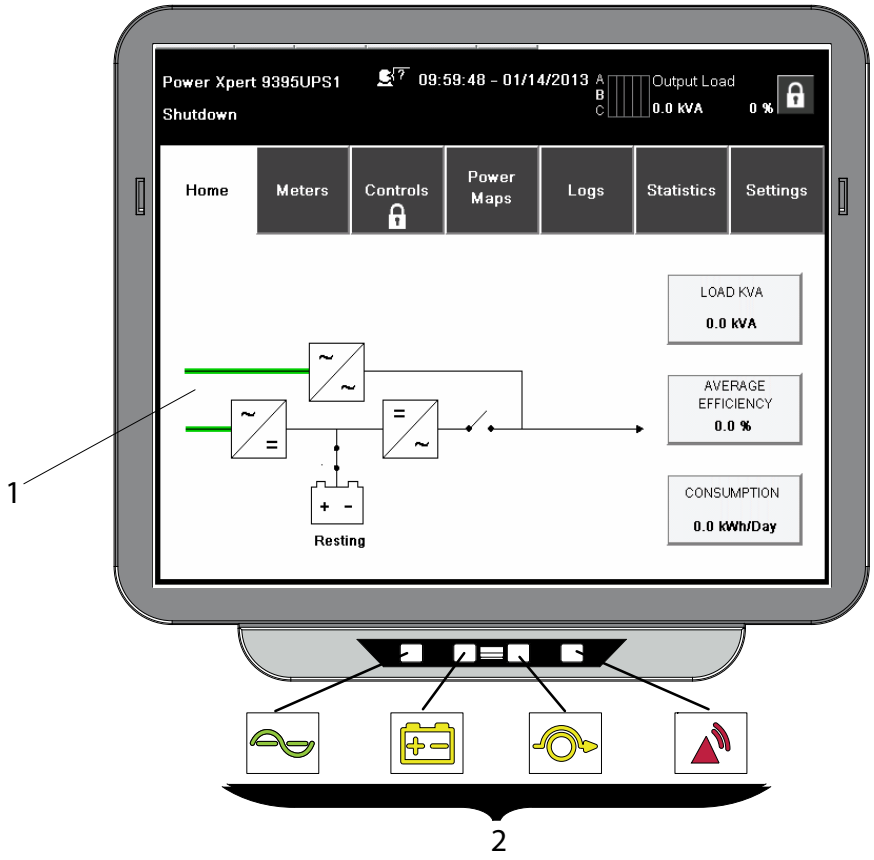
## 7.2 Color Touchscreen Control Panel

This section describes how the various screens are used to control and monitor UPS operation. Figure 85 shows the location of the color touchscreen control panel on the front door of the UPS. Descriptions of the control panel functions follow. For a description of the UPS control panel functions, see paragraph *7.3 Using the Color Touchscreen Control Panel*.

## 7.3 Using the Color Touchscreen Control Panel

The following sections describe the UPS control panel and how to monitor and control UPS operation.

**Figure 86. UPS Color Touchscreen Control Panel (Typical)**




(Symbols enlarged to show detail)

The color touchscreen control panel consists of:

- A color liquid crystal touch screen display (**1**)
- A horizontal row of LED indicators (**2**)

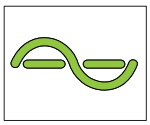
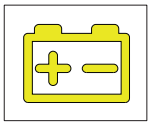
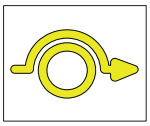
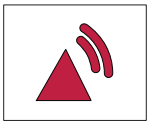
  Before system power up, the panel displays a system status screen similar to the one shown in Figure 86.

  When the unit powers up, the screen displays as shown in Figure 86. When power is applied to the system, the display advances to the Sign In screen shown in Figure 87.

### 7.3.1 Status Indicators

The symbols on the bottom of the control panel are status indicators. These colored light emitting diode (LED) lamps work with the alarm horn to let you know the operating status of the UPS. See Table 42.

**Table 42. Status Indicators**

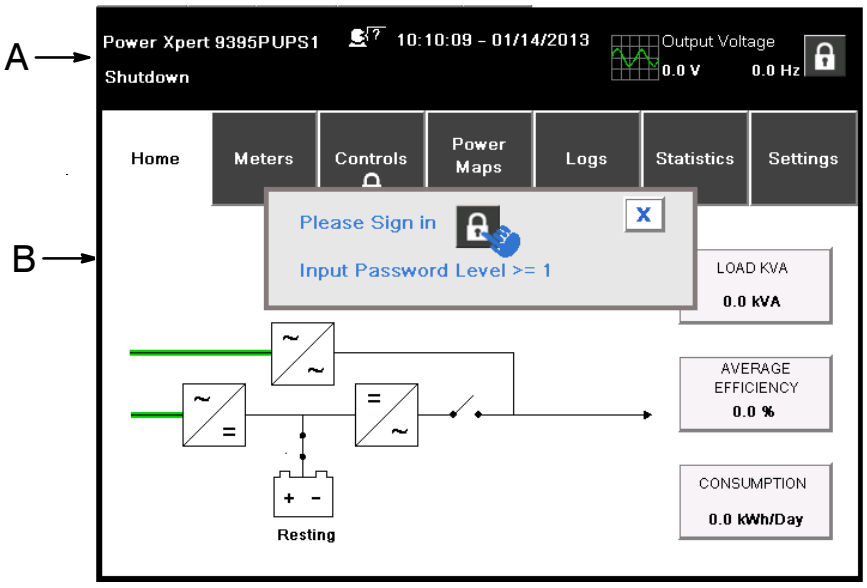
| Indicator | Status | Description |
|---|---|---|
|  **Green** | Lit Steady | The UPS is in Online mode, operating normally. The power module is supplying power to the critical load. |
|  **Yellow** | Lit Steady | The UPS is in Battery mode. Because Battery mode is a normal condition of the UPS, the Normal indicator also remains illuminated. |
|  **Yellow** | Lit Steady | The UPS is in Bypass mode. The critical load is supported by the bypass source. The Online indicator is not illuminated when the system is in Bypass mode. |
|  **Red** | Lit Steady | The UPS has an active alarm and requires immediate attention. The screen shows the highest priority active alarms. All alarms are accompanied by an audible horn. To silence the horn, press any control panel pushbutton once. The Alarm indicator may be illuminated along with other indicators. |
| | Lit Flashing | There is a new UPS alarm condition. The indicator flashes until acknowledged by pressing any control panel pushbutton once. |

### 7.3.2 Using the Touch Screen

The touch screen control panel provides an operator interface with the UPS system. Figure 87 identifies the display areas discussed in the following sections.

Touching anywhere on the screen brings up the Sign In Request pop-up. Touch the X in the upper right corner of the pop-up, then touch the padlock symbol in the upper right corner to obtain the password request pop-up (see Figure 88).

**Figure 87. Parts of the Touch Screen**




**A** The *UPS status* area automatically displays the Eaton model number, current time and date, active alarms, active notices, and load percent and battery run time for the UPS. If the Eaton Environmental Monitoring Probe is installed, the temperature and humidity sensed by the probe will also be displayed. The small head symbol between the system model and time allows the operator select a different language from an imbedded list.

The top line of the display blinks while scrolling when the system needs attention. Some notices and alarms may be accompanied by an audible horn. To silence the horn, touch anywhere on the control panel once. For more information about alarms and notices, see paragraph 7.3.11 *User Log*.

**B** The *information area* contains data about UPS status and operations.

**C** After touching the padlock in the upper right corner, the numerical keypad appears to allow entry of the system access pass code for operation (See Figure 88) . See Table 43 for Security Levels and Functions.

**Figure 88. Sign In or Password Request Screen**

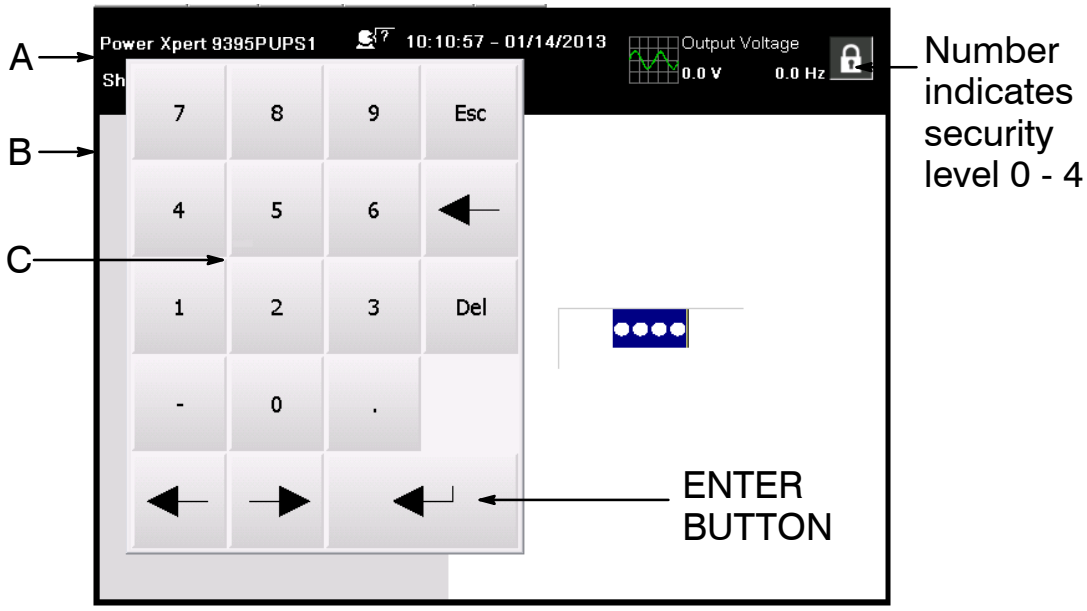



**Table 43. Security Levels and Functions**

| Level | Name | Passcode | Description |
|---|---|---|---|
| 0 | USER | NONE | USER |
| 1 | CONTROL | 1111 | USER + CONTROL |
| 2 | CONFIGURATION | 0101 | USER + CONTROL + CONFIGURATION |
| 3 | SERVICE | Service Only | USER + CONTROL + CONFIGURATION + SERVICE |

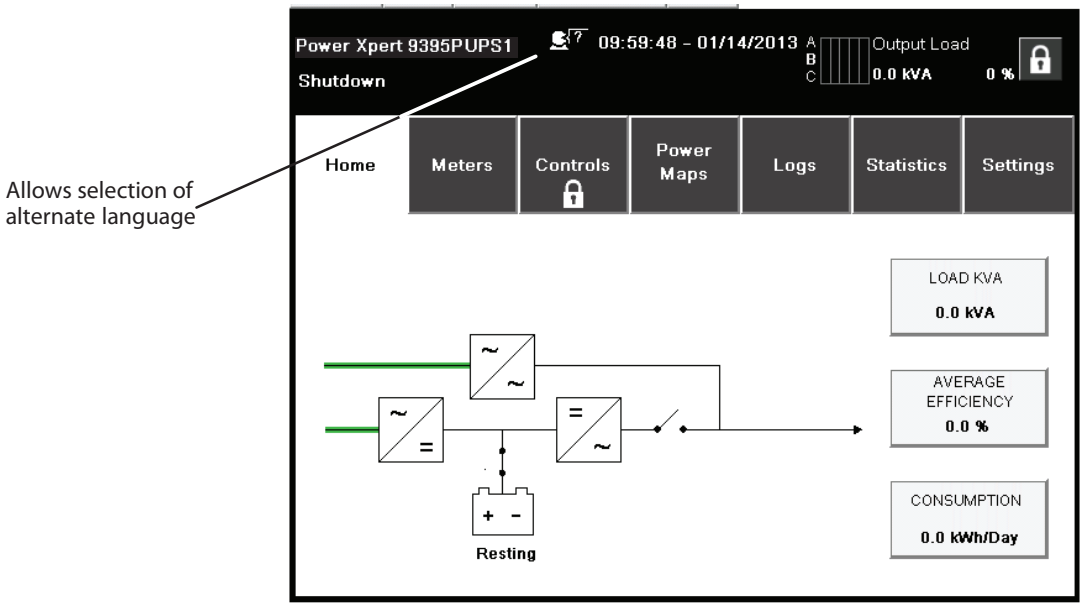
### 7.3.3 Using the Main Menu Buttons

The UPS menu bar shown in Figure 88 allows you to display data in the information area to help you monitor and control UPS operation. Table 44 shows the basic menu structure.

**Table 44. Display Function Menu Map**

| Menu Option | Description |
|---|---|
| **HOME** | Displays the system status both graphically and within the info bar. |
| **METERS** | Displays performance meters for the system or critical load. |
| **CONTROLS** | Allows access to various system performance control screens. |
| **POWER MAPS** | Allows operator to observe system power flow. |
| **LOGS** | Allows access to system information logs. |
| **STATISTICS** | Allows access to see system specific operation values. |
| **SETTINGS** | Allows access to various screen controlled variables for system operation. Level 0, 1 and 2 are for user/ operator. Level 3 is used only by service personnel. |

**Figure 89. Home Screen**




**NOTE** On all screens, Black lines indicate NO power flow, Green lines indicate ACTIVE power flow, Yellow lines indicates an out-of-tolerance condition.

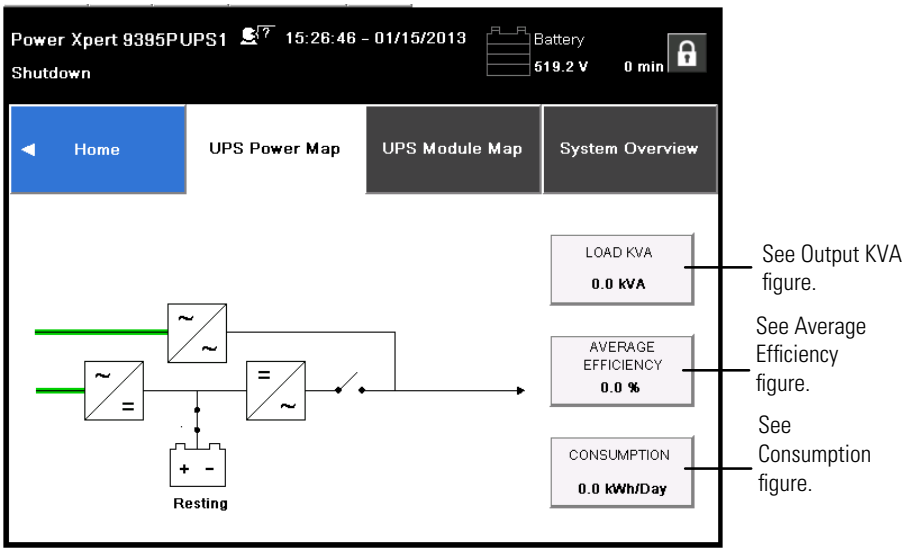
**NOTE** Screens shown are representative examples of system operation. The screen data will vary based on system activity at the time of observation.

### 7.3.4 Power Maps Screen (Online Mode)

Figure 90 shows the Main Menu and Power Maps screen. The Power Maps screen displays immediately after entering the access code.

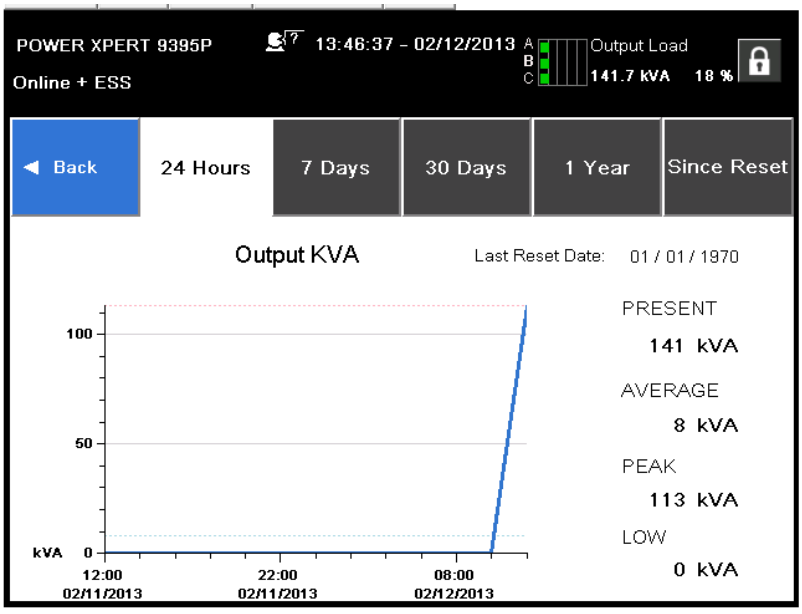
The Power Maps screen shows a real-time graphical representation of the operating status.

**Figure 90. Main Menu and Power Maps Screen (Online Mode)**



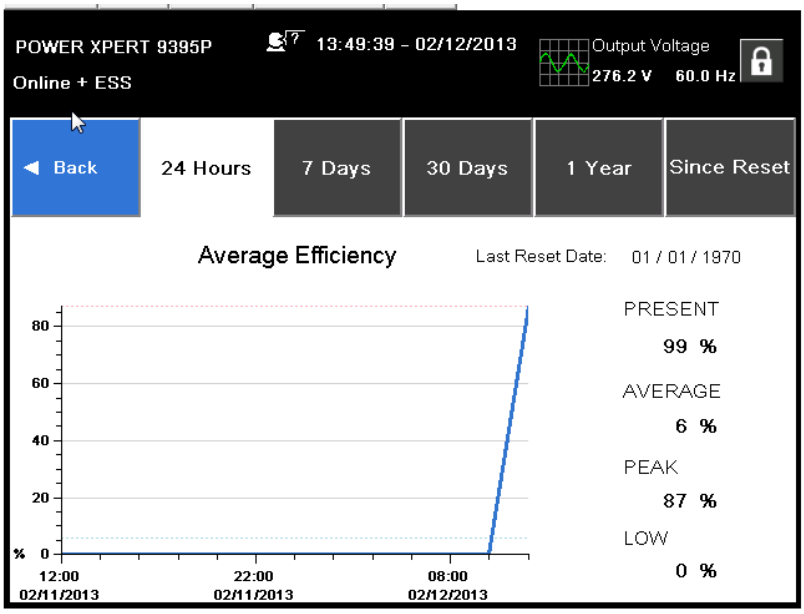

Touching the LOAD kVA button displays the Output kVA screen shown in Figure 91.

**Figure 91. Output kVA Screen from Home Screen**



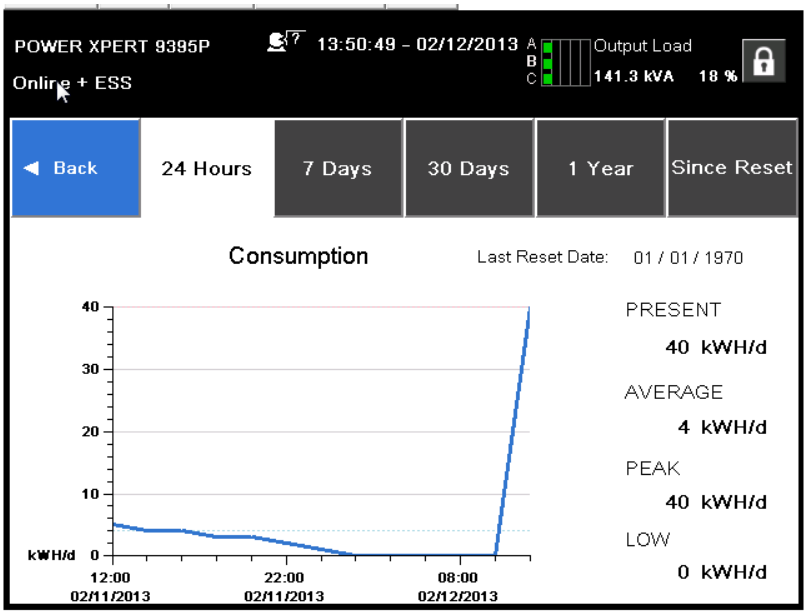
Touching the AVERAGE EFFICIENCY button displays the system efficiency screen shown in Figure 92.

**Figure 92. Average Efficiency Screen from Home Screen**




Touching the CONSUMPTION button displays the screen in Figure 93.

**Figure 93. Consumption Screen from Home Screen**



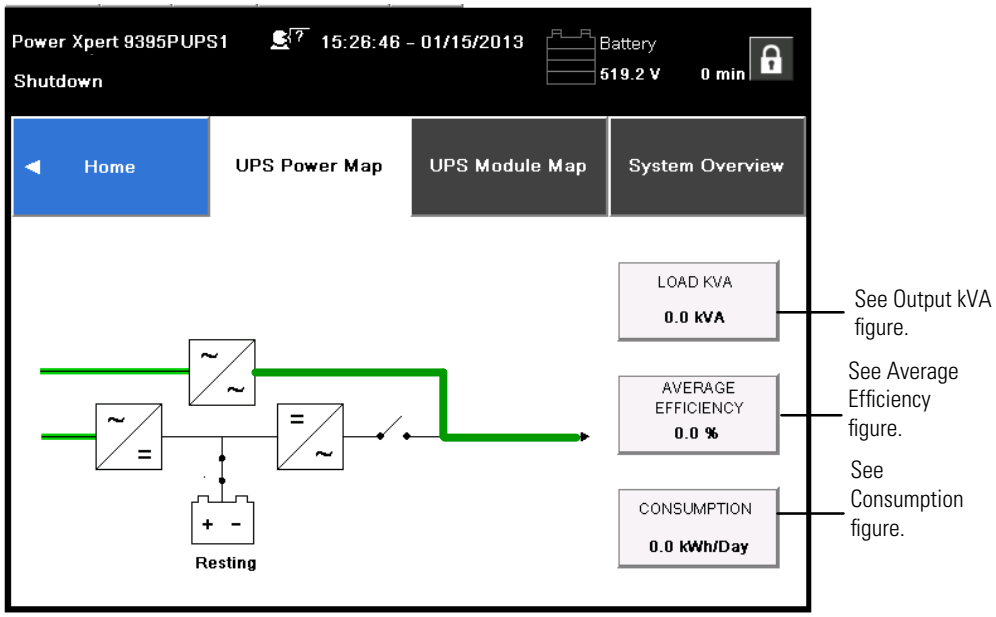
### 7.3.5 Power Maps Screen (Bypass Mode)

Figure 94 shows the Bypass screen. The Bypass screen displays only when the system is in Bypass mode.

The Bypass screen shows a real-time graphical representation of the operating status.

Touching any of the buttons on the right side of the screen takes the user directly to that information screen.

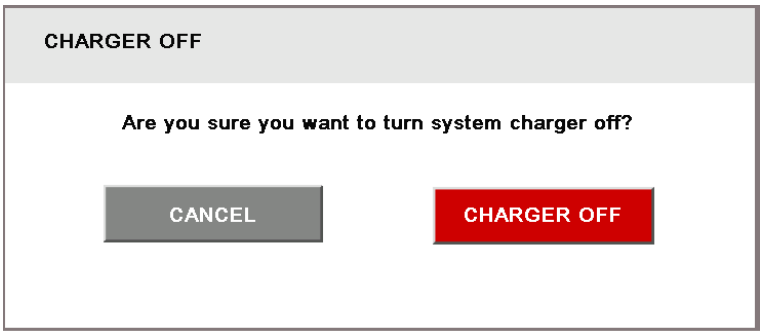
**Figure 94. Bypass Screen**




### 7.3.6 Command Confirmation Pop-Up

Figure 95 is an example of a command request confirmation pop-up screen. This type of pop-up allows the user to confirm that the requested command is valid.

**Figure 95. Typical Command Confirmation Screen (Charger Off)**



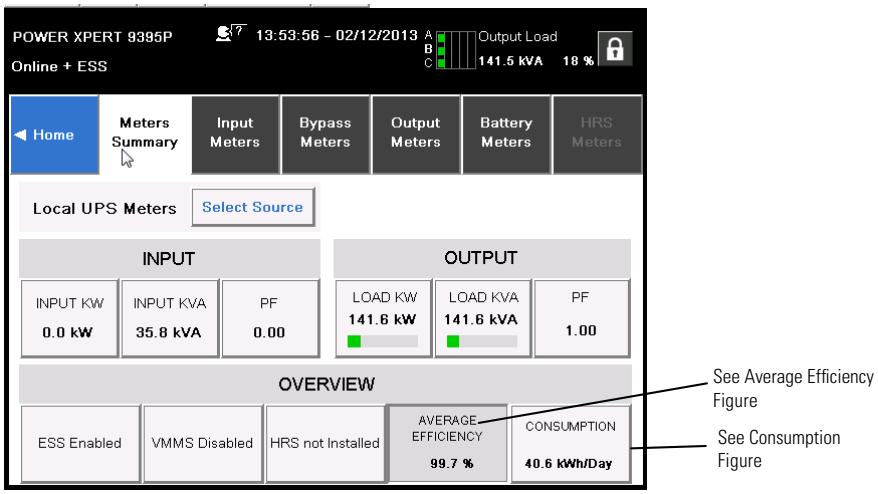
### 7.3.7 Meters Summary Screen

Figure 96 shows the Meters Summary screen. This screen allows selection of the various metering readout functions of Input, Output and overall System status.

The three left items in the OVERVIEW section of the screen are not active buttons but are status detail panels. They show individual conditions of the UPS at that time.

The two items at the far right of the OVERVIEW section are active buttons. They can be selected to show a profile of efficiency or consumption over various time periods of 24 hours, 7 days, 30 days, or 1 year. This is true of all the meters screens listed in the top section.

**Figure 96. Meters Summary Screen**

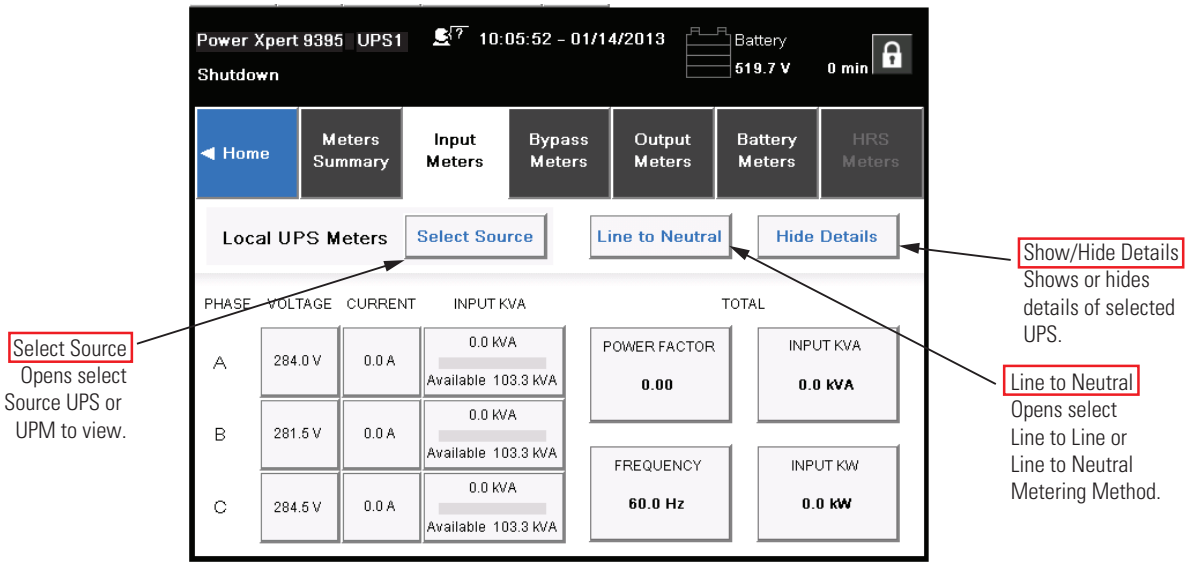



### 7.3.8 Input, Bypass and Output Meters Screens

Meters for UPS Input, Bypass and Output can be selected for detailed status and operation.

Meters Selection Buttons on the Input, Bypass and Output screens allow selection of the source UPS, Metering mode (Line to Line/Line to Neutral) and UPS details See Figure 97.

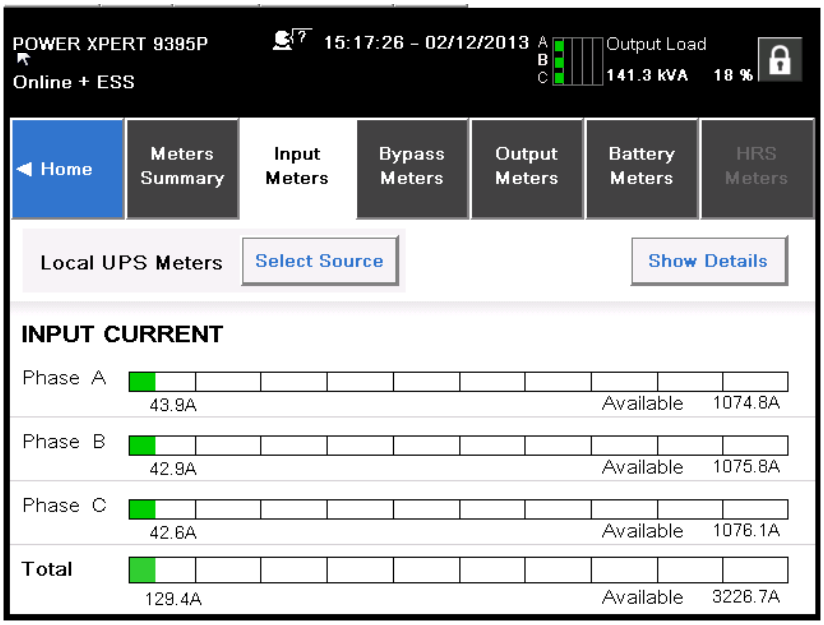
**Figure 97. Meters Selection Buttons (Typical)**




### Input Meters Screen

Figure 98 shows the Input Meters screen. This screen displays the individual phase and total power values of the system.

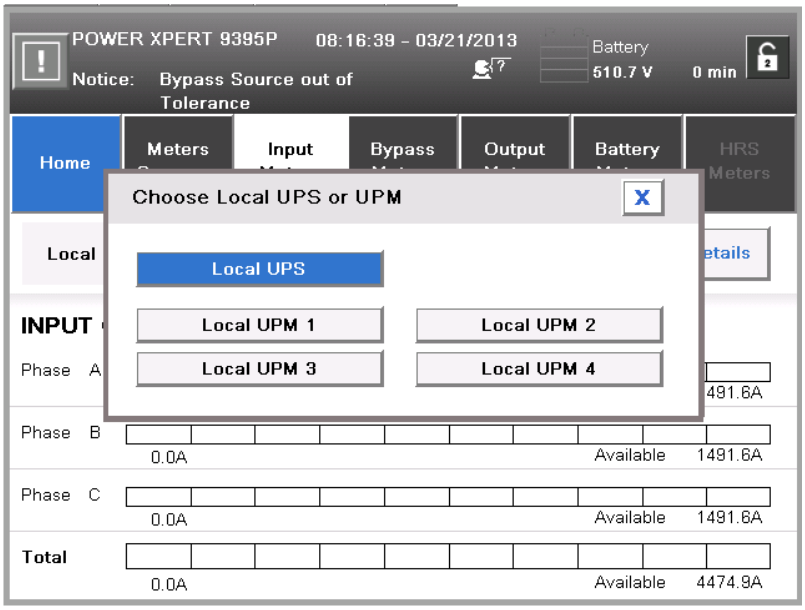
**Figure 98. Input Meters Screen**



### Select Source Screen

The Select Source screen and allows the operator to choose the individual source for system readings (see Figure 99).

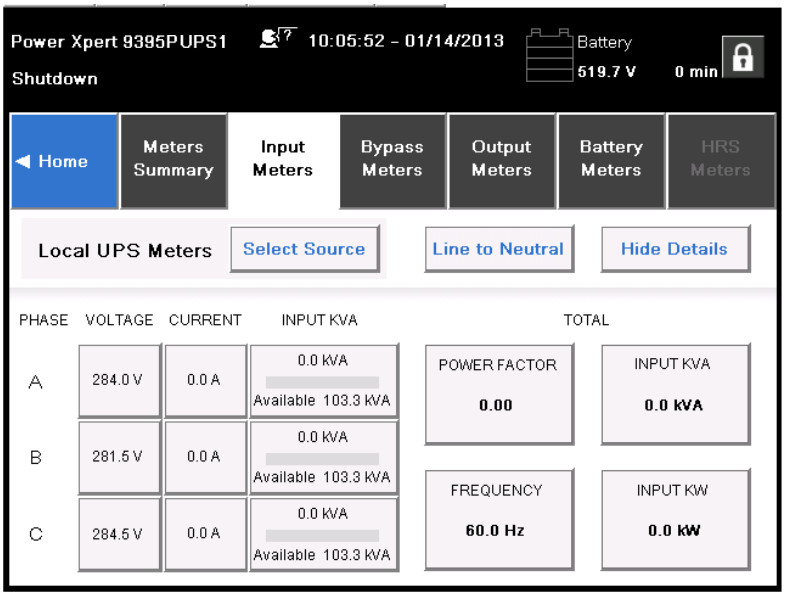
**Figure 99. Select Source Screen**




### Input Meters Detail Screen

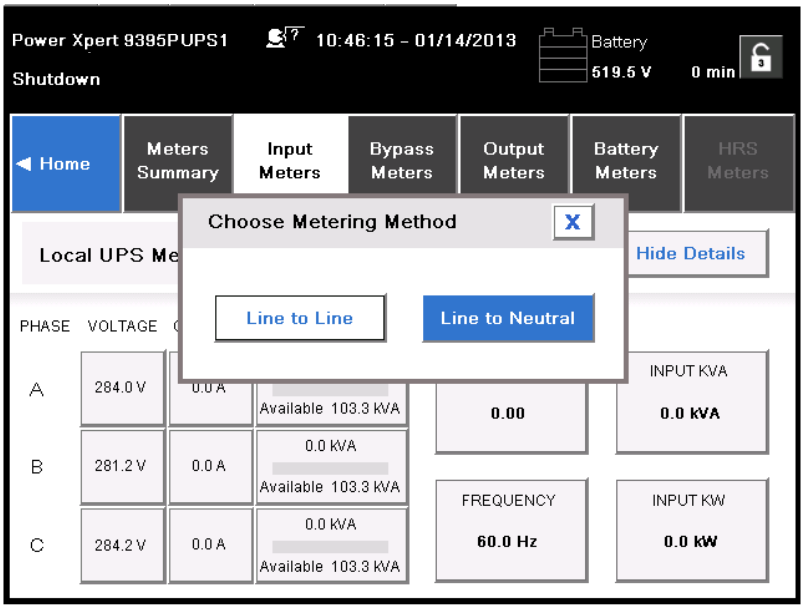
The Show Details button shows the Input Meters detail screen (see Figure 100). This screen displays the individual values of the system in additional detail.

**Figure 100. Input Meters Detail Screen**



The Line to Neutral Button on the Input Meters Detail screen opens the Metering Method Option screen. The operator can select line-to-line or line-to-neutral monitoring values. See Figure 101.

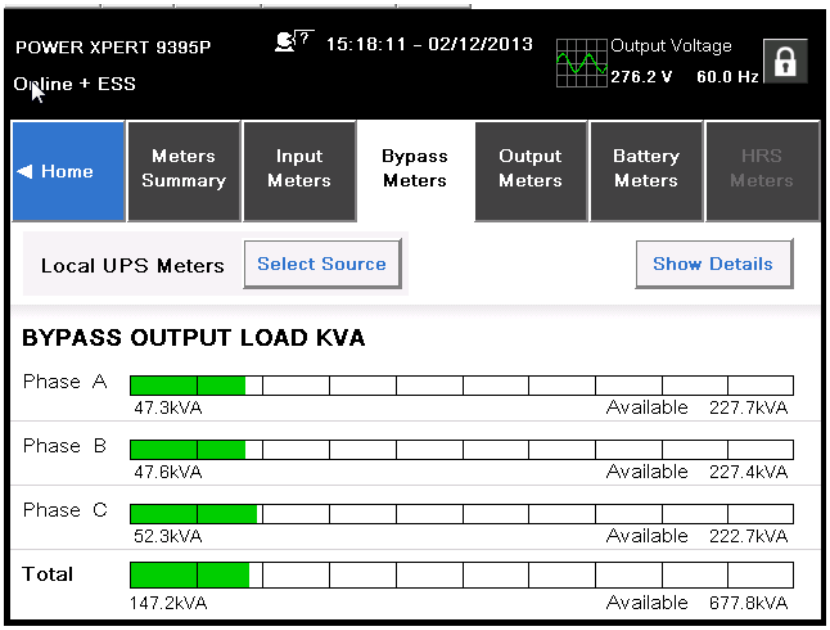
**Figure 101. Online Mode Metering Method Option Screen**




### Bypass Meters Screen

The Bypass Meters Screen shown in Figure 102 displays values pertaining to the Bypass conditions.

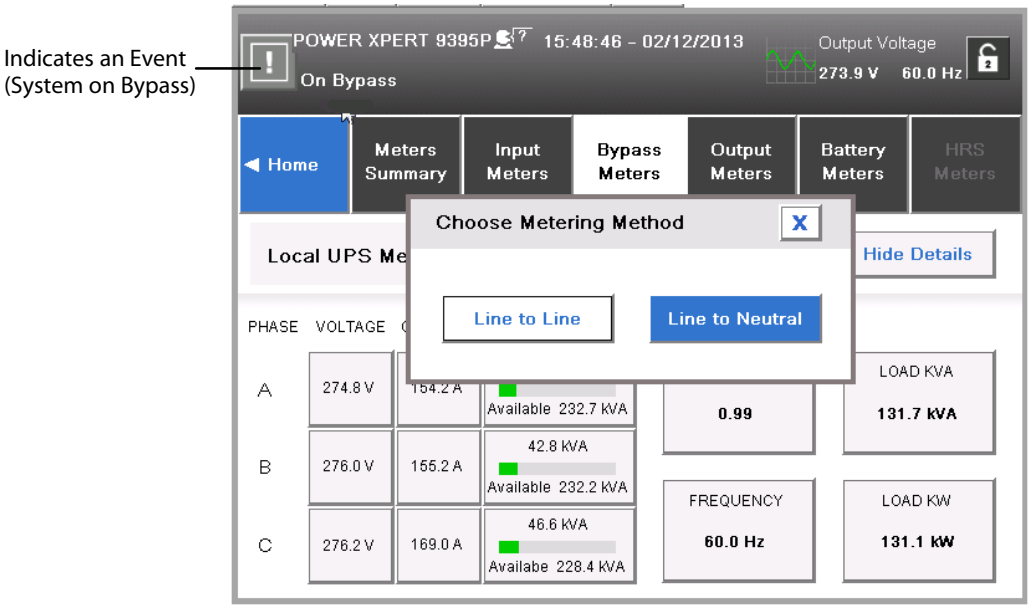
**Figure 102. Bypass Meters Screen**



### Bypass Mode Metering Method Option Screen

The Show Details button on the Bypass Mode Metering Method Option Screen allows the operator to select the metering method for either line-to-line or line-to-neutral monitoring values. See Figure 103

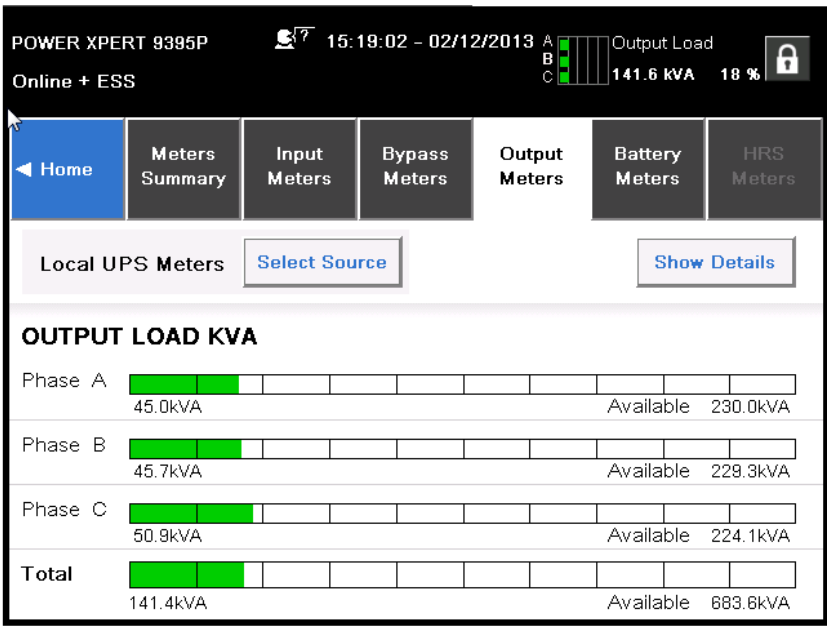
**Figure 103. Bypass Mode Metering Method Option Screen**



### Output Meters Screen

The Output Meters Screen shown in Figure 104 displays values pertaining to the system output.

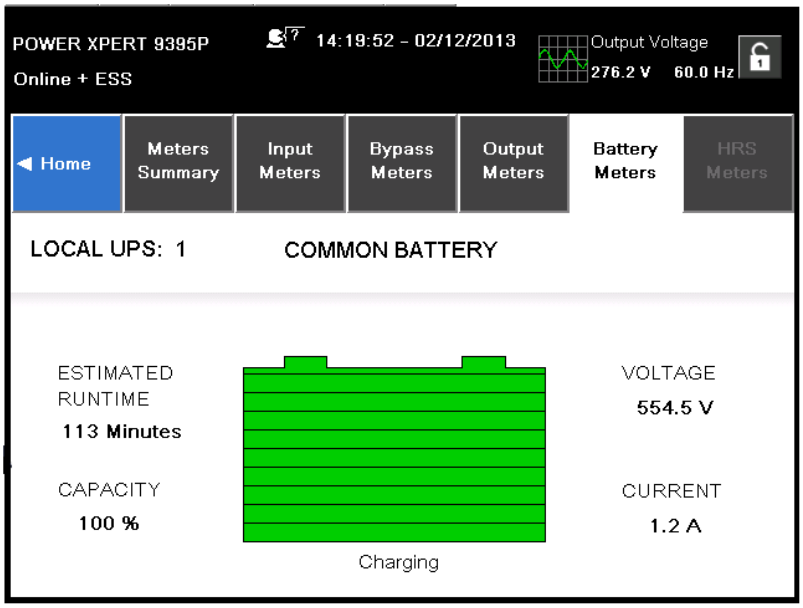
**Figure 104. Output Meters Screen**




## 7.3.9 Battery Meters Screen

Figure 105 shows the Battery Meters basic screen.

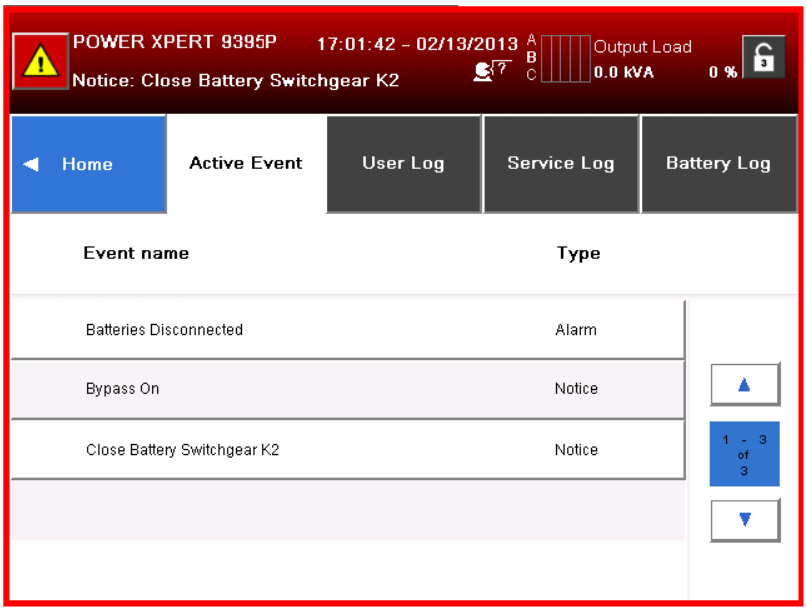
**Figure 105. Battery Meters Screen**



### 7.3.10 System Events Main Screen

When the UPS system is running in Online mode, it continually monitors itself and the incoming utility power. In Battery or Bypass modes, the UPS may issue alarms to display exactly what event caused the change from Online mode. System events on the UPS can be indicated by horns, lights, messages, or all three. The System Events screen can be accessed from the Home screen with the **LOGS** button. See Figure 106.

**Figure 106. System Events Screen**

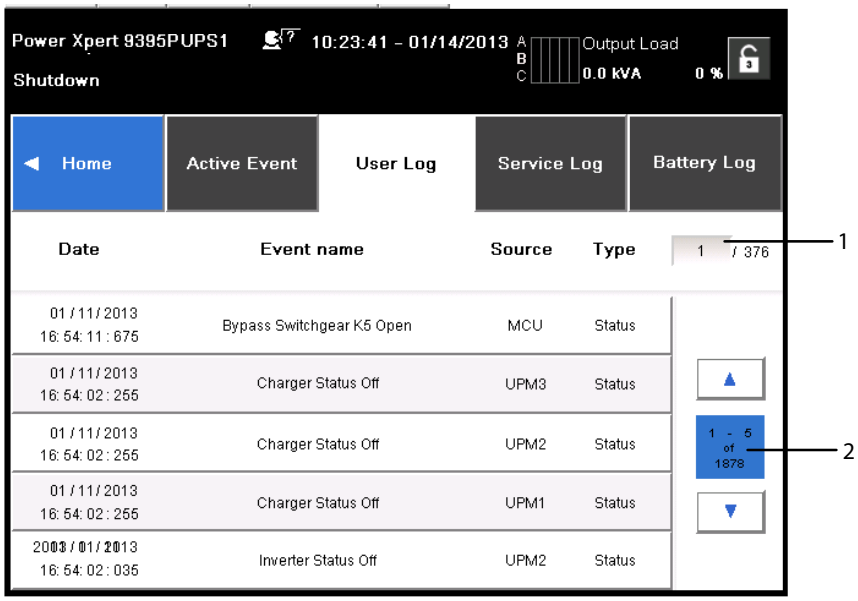



### 7.3.11 User Log

Select **LOGS** from the menu bar on the main menu screen to look at the active events screen. This screen shows any currently active alarms, notices, or commands.

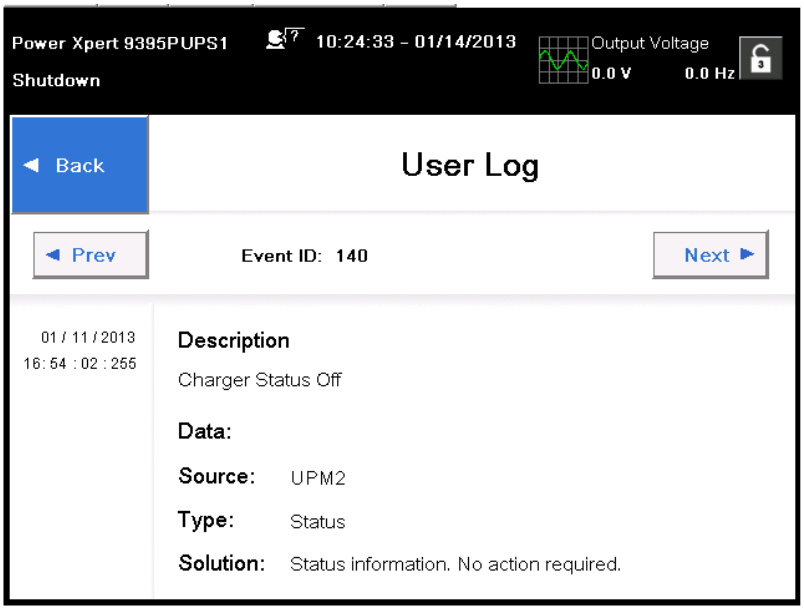
- **System Event Horns** – The system event horn beeps to alert an operator that an event needing attention is taking place. The horn cycles at a half-second rate.
- **System Event Indicators** – The status indicators on the UPS control panel work with the event horn to let the operator know when the UPS is operating in any mode other than normal. Only the ON indicator is visible during normal UPS system operation. The other indicators illuminate to indicate alarms or events. When an alarm occurs, first check these indicators to see what type of event has taken place. For descriptions of the status indicators, see paragraph 7.3.1 *Status Indicators*.
- **System Event Messages** – When a system event occurs, a message appears on the LCD in the UPS status area. This message is also written to the Active Events Log and may be added to the History Log. The messages are divided into four categories: alarms, notices, status, and commands. The user log window (**1**) allows the operator to enter any number up to the number shown to the right of the box. Each window shows five events. The operator can also use the UP/DOWN arrows above and below the blue field (**2**) showing the number of events in the log. See Figure 107.

**Figure 107. User Log Screen**




Selecting an event opens the Event Detail screen shown in Figure 108. This screen details the specifics of the event for the user to see.

**Figure 108. User Log Detail Screen**




## 7.3.12 Battery Log

Select **LOGS** from the menu bar on the main menu screen to look at the battery log screen. Figure 109 shows the Battery Log access screen.

**Figure 109. Battery Log Screen**

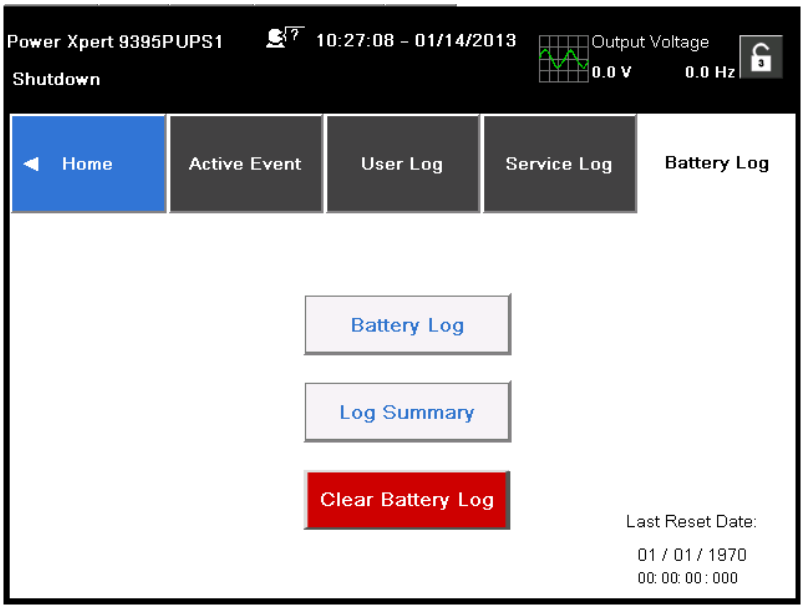



Figure 110 shows the Battery Log Detail screen.

**Figure 110. Battery Log Detail**

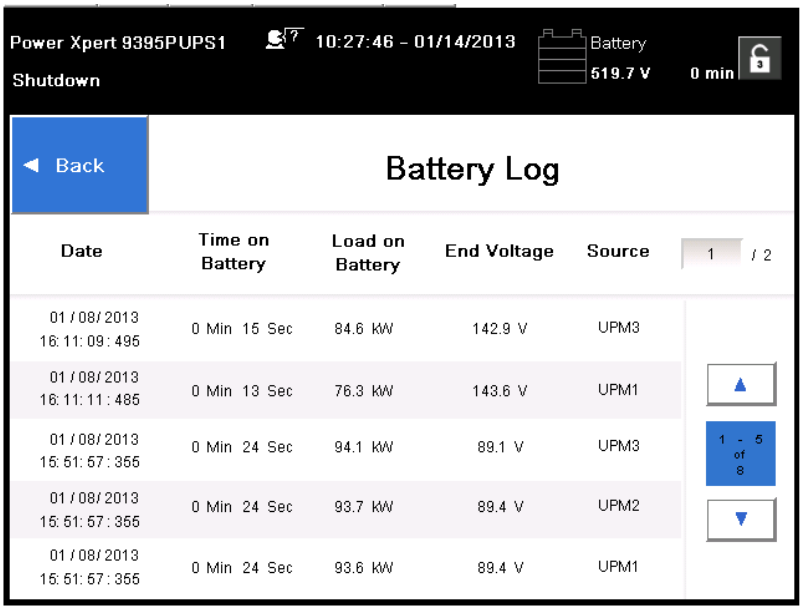
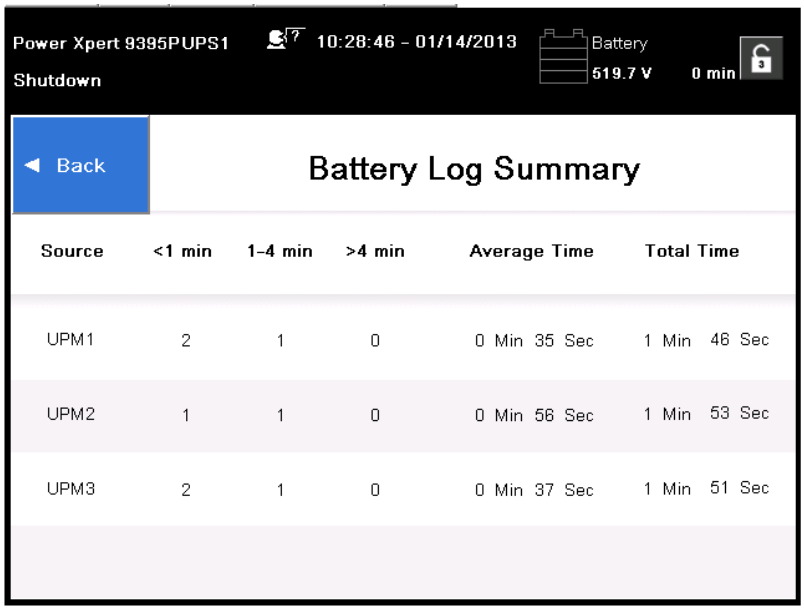



Figure 111 shows the Battery Log Summary screen.

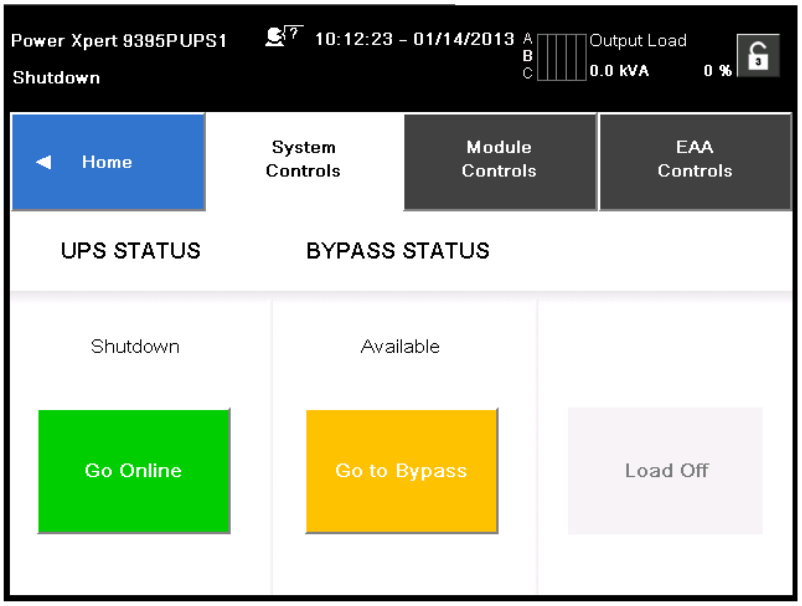
**Figure 111. Battery Log Summary Screen**




### 7.3.13 System Status Screen and Controls

Press the SYSTEM CONTROLS pushbutton on the main menu bar to display the System Status screen. Online operation, transfer to bypass, UPM start up and shutdown, and LOAD OFF commands are controlled through this screen. In addition, the screen displays the current status of the UPS, indicates whether the UPS is in Maintenance Bypass or Bypass, and displays the state of the UPM. Figure 112 shows the System Status screen.

**Figure 112. System Status Screen**



The Load Off button on the System Status screen controls the UPS output by powering down the UPS and de–energizing the critical load (see Figure 113

**Figure 113. Load Off Button**

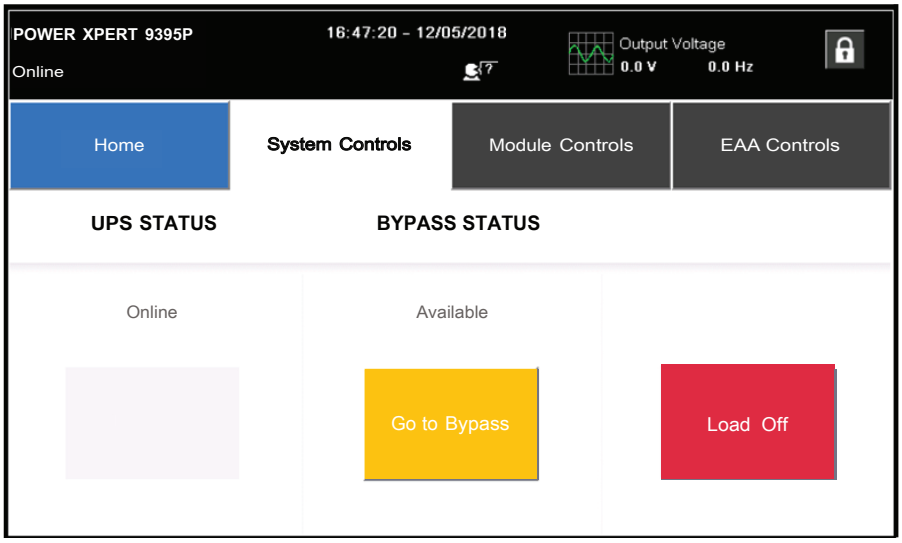



Figure 114 shows the Module Controls screen. This screen allows control of the individual modules within the system. It also gives their values and status.

**Figure 114. Module Controls Screen**

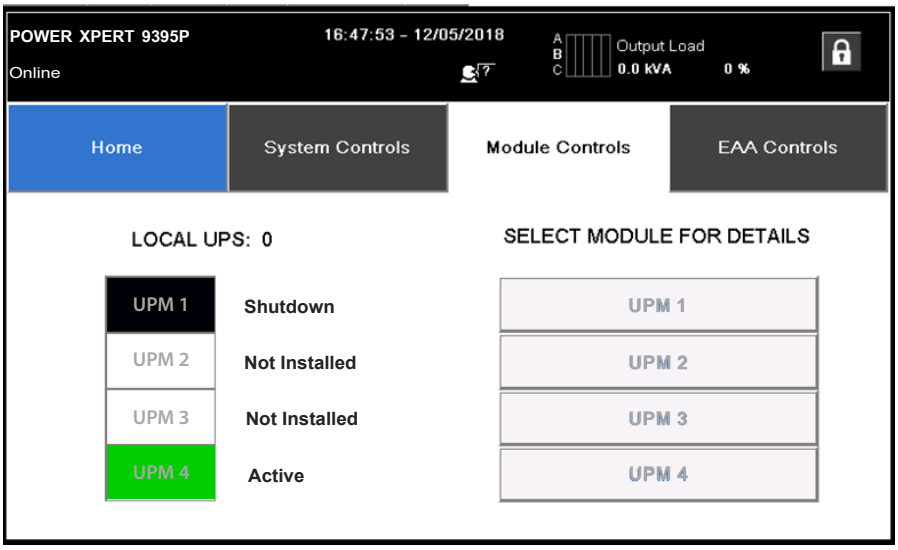
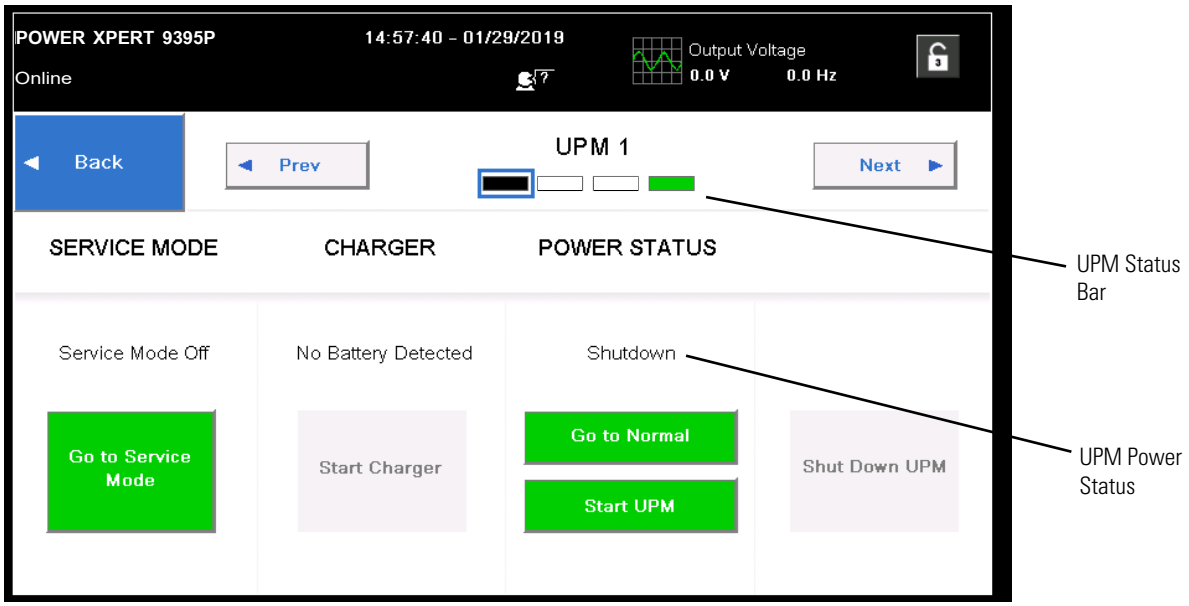


Figure 115 shows the Module Control Detail screen. By selecting any of the modules shown on the previous screen (Figure 114), the user can observe full details of an individual module. It also allows the user to move through various modules and modes while within this screen. The color of the UPM button indicates status:

- Green – Active
- Gray – Idle
- Black – Shutdown

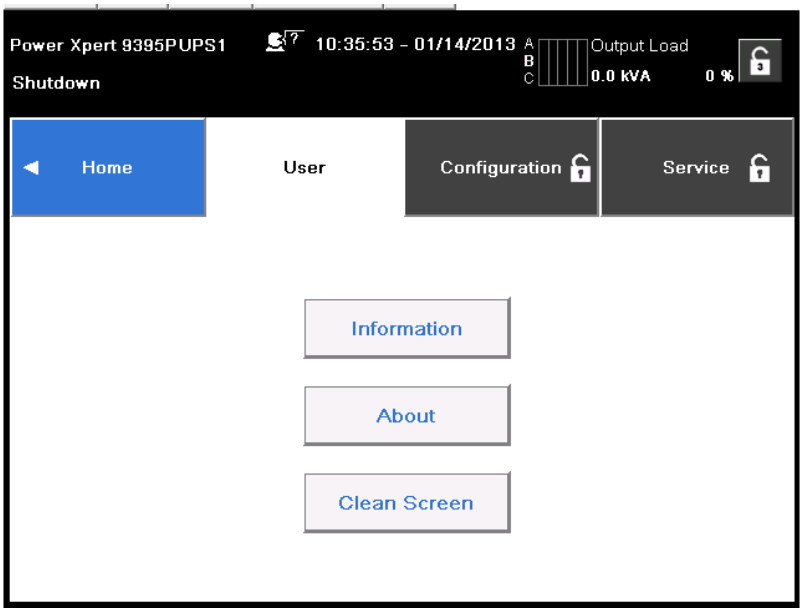
**Figure 115. Module Control Detail Screen**



### 7.3.14 Settings Screen

The screen shown in Figure 116 gives the operator access to basic system information such as serial number, installed firmware version, etc. Touching the CLEAN SCREEN button disables the screen for 30 seconds to allow the user to safely clean the screen without affecting operation.

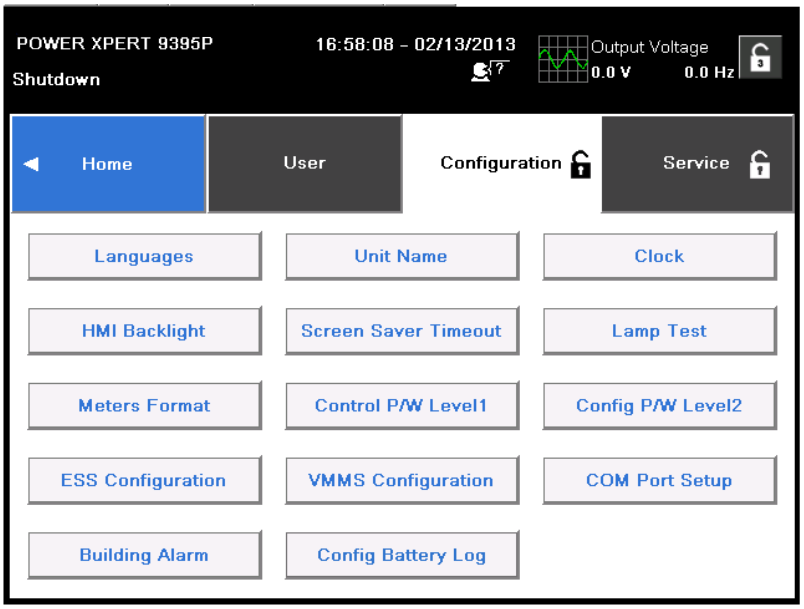
**Figure 116. Settings Screen**




### 7.3.15 Configuration Options Screen

The screen shown in Figure 117 allows the operator to affect changes to various system values.

**Figure 117. Configuration Options Screen**

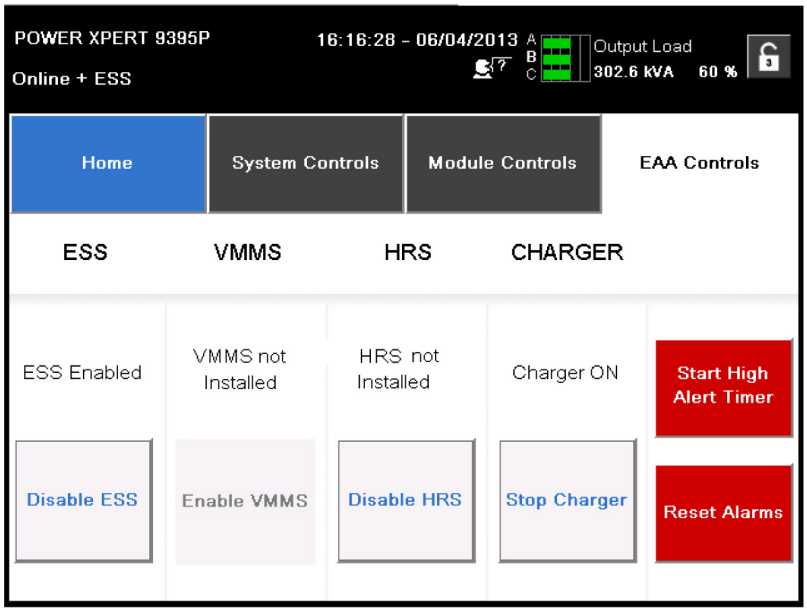


### 7.3.16 Energy Advantage Architecture (EAA) Screen

This screen shown in Figure 118 allows the operator to activate the various energy saving and power efficiency modes of the system.

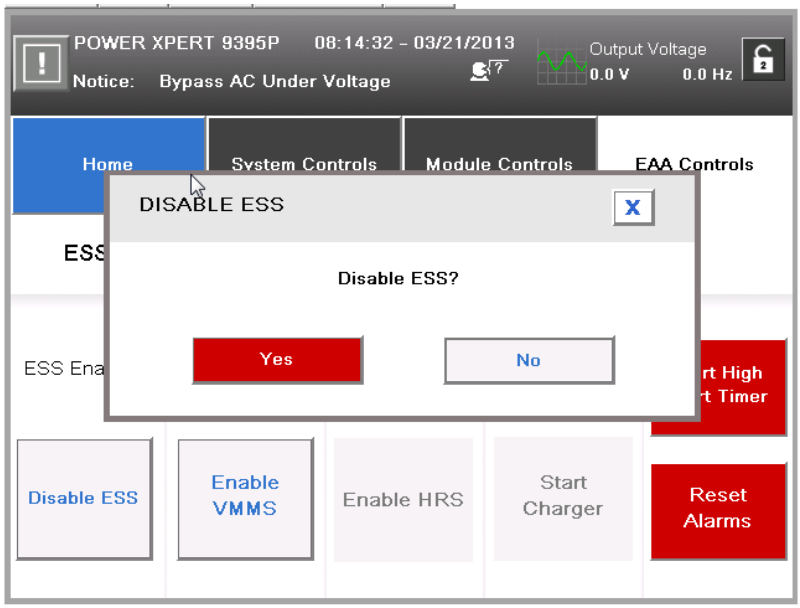
The various Energy Advantage Architecture operations are described in the UPS Installation and Operation manual for your system.

**Figure 118. Energy Advantage Architecture (EAA) Screen**



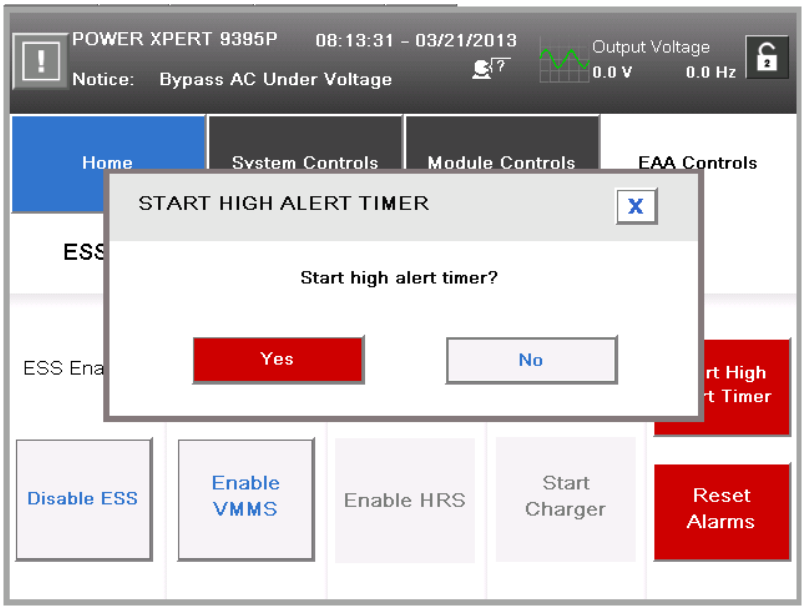

This screen shown in Figure 119 asks the operator to verify disabling the ESS mode running at that time.

**Figure 119. Disable ESS Screen**



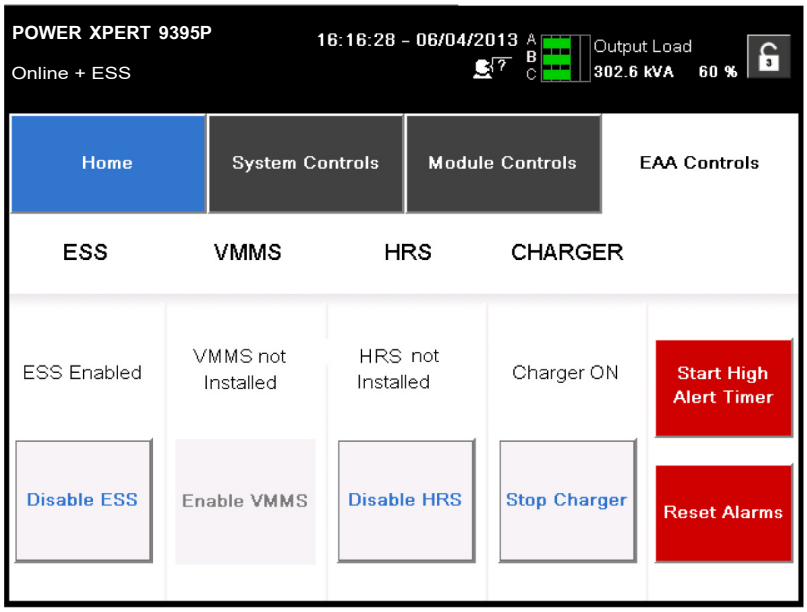

This screen shown in Figure 120 asks the operator if they want to start the High Alert mode timer.

**Figure 120. High Alert Timer Screen**




The **Reset Alarms** button on the EAA Controls screen allows the user to reset alarms after an alarm has been activated.

**Figure 121. Reset Alarms**




## 7.3.17 Statistics Basic Screen

The screen shown in Figure 122 allows the operator to query the system for various operational statistics such as shown in Figure 123.

**Figure 122. Statistics Basic Screen**

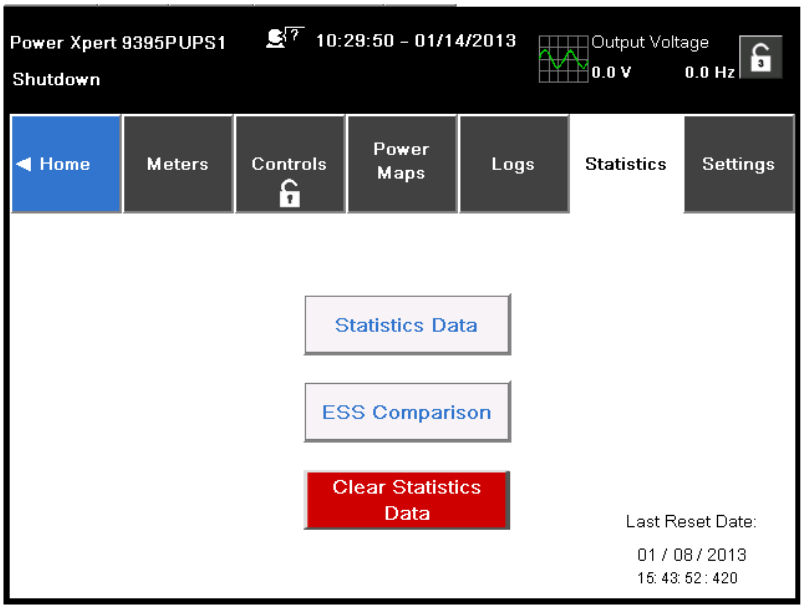
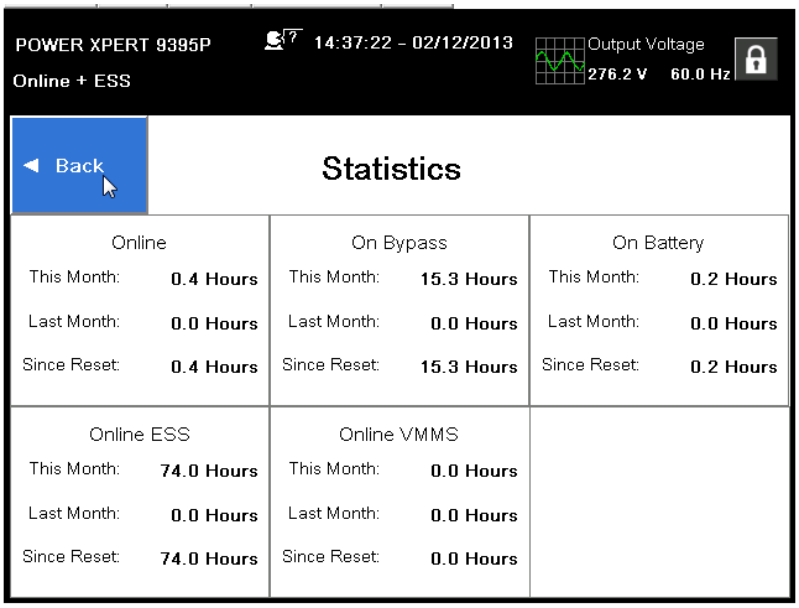


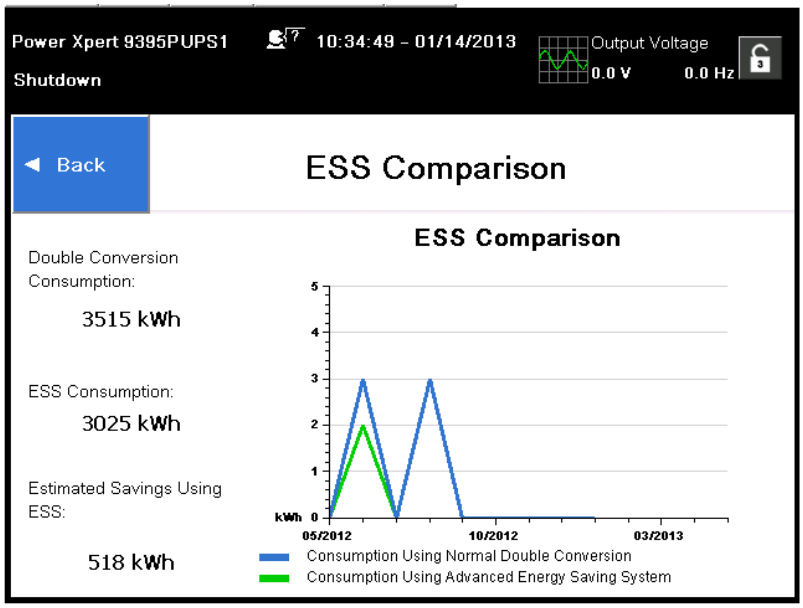
**Figure 123. Statistics Data Detail Screen**




### 7.3.18 ESS Comparison Screen

The screen shown Figure 124 allows the operator to visually obtain EAA mode efficiency values.

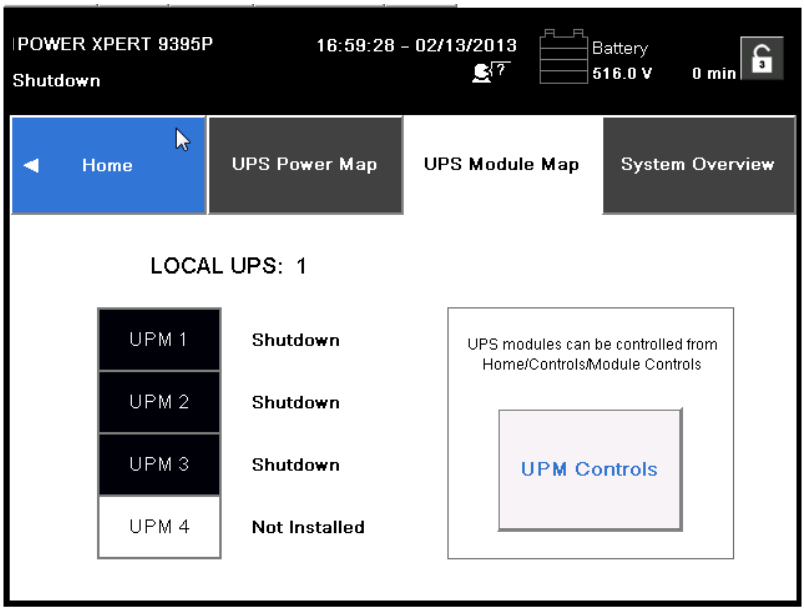
**Figure 124. ESS Comparison Screen**




### 7.3.19 UPS Module Map Screen

The screen shown Figure 125 allows the operator to control the individual UPMs.

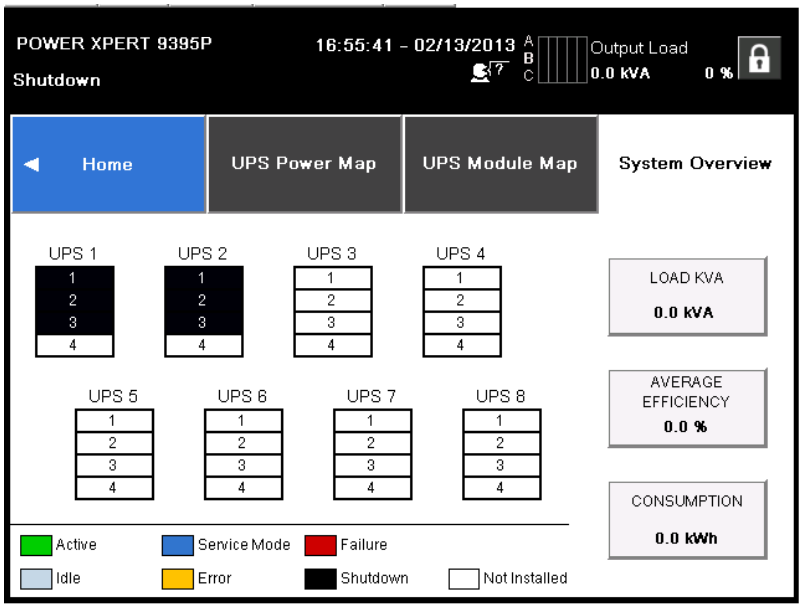
**Figure 125. UPS Module Map Screen**




## 7.3.20 System Overview Screen

The screen shown Figure 126 displays values for all UPS and UPM parameters.

**Figure 126. System Overview Screen**



## 7.4 Single UPS Operation

The paragraphs in this section provide operating instructions for a UPS system containing only one UPS.

**NOTE** If the touch screen fails to respond, open the front door and depress the RESET button located on the bottom of the screen mounting assembly. The screen will reboot but NOT affect system status or operation.

**NOTE** Some UPS operations may require a security level sign-in. If a sign-in request screen appears, see Figure 88 for details.

**NOTE** A Field Installed UPM (FI-UPM) is always designated as UPM 4.

### 7.4.1 Starting the UPS in Online Mode

To start the UPS system:

**⚠WARNING**

If required to close a circuit breaker inside a UPS, use appropriate personal protective equipment. Injury to personnel may occur from electrical shock.

1. Unfasten the front door latch and swing the door open (see Figure 19).

**NOTE** *Only perform steps 2 and 5 if the UPS has an input breaker CB1 (see Figure 85).

2. *Verify that input breaker CB1 is open.
3. Close the UPS input feeder circuit breaker.
4. Close the UPS Bypass input feeder circuit breaker.
5. *Close input breaker CB1.
6. Close the battery breaker.
7. Close the door and secure the latch.
8. Observe the UPS control panel display becoming active, indicating logic power.
9. Make sure you are logged in for user access (see Figure 88).
10. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
11. Select **Go Online**. Select **Yes** on the confirmation screen.

    If Auto Bypass is enabled (factory default), the critical load is immediately supplied by the bypass source in Bypass mode, until the inverter turns on and the UPS transfers to Online mode. The status indicator on the UPS control panel indicates the UPS is in Bypass mode. If Auto Bypass is not enabled, the UPS output remains off until the UPS transfers to Online mode.
12. The **Going Online** screen appears.

    The rectifier and inverter turn on. The inverter continues to ramp up to full voltage.

    When the inverter reaches full voltage, the UPS output contactor K3 closes and the static switch turns off. Power is now supplied to the critical load in Online mode. It takes approximately one minute for the UPS to achieve Online mode.

The Online status indicator is illuminated. The UPS status indicates `Online` on the header section of the screen. The UPM status indicates `Active`, `Charger ON` on the UPM **Module Control Detail** screen (see Figure 115).

To activate or enable/disable any of the UPS operational modes, follow the online screen prompts.

To obtain any system information, follow the on screen prompts to get to the proper screen. The operator cannot inadvertently cause a system dump or disconnect unless they override a warning pop-up. Value or information screens DO NOT affect system operation.

### 7.4.2 Enable Energy Saver System Mode

To enable Energy Saver System mode:

**NOTE 1** The Energy Saver System mode commands are displayed only if enabled at the factory or by an Eaton Customer Service Engineer.

**NOTE 2** The Variable Module Management System and Energy Saver System modes are mutually exclusive.

**NOTE 3** The UPS can transfer to ESS only if the UPS was online. ESS can be enabled in any mode, including Shutdown.

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89) The **System Status** screen is displayed (see Figure 112).
3. On the System Status screen, select **EAA Controls**. The EAA screen is displayed (see Figure 118).
4. On the EAA screen, select **Enable ESS**.
5. Select **Yes** on the confirmation screen.

   The UPS transfers to Energy Saver System mode.

   The Online status indicator is illuminated and `Online + ESS` displays in the UPS status area. If the battery is not charging, the power module fans are off.

### 7.4.3 Disable Energy Saver System Mode

To disable Energy Saver System mode:

**NOTE 1** The Energy Saver System mode commands are displayed only if enabled at the factory or by an Eaton Customer Service Engineer.

**NOTE 2** The Variable Module Management System and Energy Saver System modes are mutually exclusive.

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
3. On the System Status screen, select **EAA Controls**. The EAA screen is displayed (see Figure 118).
4. On the EAA screen, select **Disable ESS** the **Disable ESS?** confirmation screen appears (see Figure 119).
5. Select **Yes** on the confirmation screen.

   The UPS transfers to Battery mode and then to Online mode if it was in Online+ESS mode

   The Online status indicator is illuminated. The UPS status indicates `Online`. The UPM status indicates `Active`.

### 7.4.4 Start Energy Saver System High Alert Mode

**NOTE 1** The High Alert mode commands are displayed only if enabled at the factory or by an Eaton Customer Service Engineer.

**NOTE 2** The Variable Module Management System and Energy Saver System modes are mutually exclusive.

To start ESS High Alert mode:

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).

   The UPS status indicates `Online + ESS`.
3. On the System Status screen, select **EAA Controls**. The EAA screen is displayed (see Figure 118).
4. On the EAA screen, select **Start High Alert Timer** the **Start high alert timer?** confirmation screen appears (see Figure 120).
5. Select **Yes** on the confirmation screen.

   The UPS starts High Alert mode with the UPMs online supplying the critical load. After one hour the UPS transfers back to Energy Saver System mode.

   The Online status indicator is illuminated. The UPS status indicates `Online`. The UPM status indicates `Active`. The power module is on.

### 7.4.5 Enable Variable Module Management System Mode

To enable Variable Module Management System mode:

**NOTE 1** The Variable Module Management System mode commands are displayed only if enabled at the factory or by an Eaton Customer Service Engineer.

**NOTE 2** The Variable Module Management System and Energy Saver System modes are mutually exclusive. If the Energy Saver System mode is enabled, the Variable Module Management System mode commands will not be displayed.

**NOTE 3** The UPS can transfer to VMMS only if the UPS was online. VMMS can be enabled in any mode, including Shutdown.

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
3. On the System Status screen, select **EAA Controls**. The EAA screen is displayed (see Figure 118).
4. On the EAA screen, select **Enable VMMS**. The **Enable VMMS?** confirmation screen appears.
5. Select **Yes** on the confirmation screen.

   If the UPS is online, the UPS transfers to Variable Module Management System mode. In approximately twenty seconds the UPS calculates the required number of UPMs needed to support the load.

   The Online status indicator is illuminated and `Online + VMMS` displays in the UPM status area.

### 7.4.6 Disable Variable Module Management System Mode

To disable Variable Module Management System mode:

**NOTE 1** The Variable Module Management System mode commands are displayed only if enabled at the factory or by an Eaton Customer Service Engineer.

**NOTE 2** The Variable Module Management System and Energy Saver System modes are mutually exclusive. If the Energy Saver System mode is enabled, the Variable Module Management System mode commands will not be displayed.

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
3. On the System Status screen, select **EAA Controls**. The EAA screen is displayed (see Figure 118).
4. On the EAA screen, select **Disable VMMS**. The **Disable VMMS?** confirmation screen appears.
5. Select **Yes** on the confirmation screen.

   The UPS transfers to Battery mode and then to Online mode in approximately ten seconds.

   The Online status indicator is illuminated. The UPS status indicates `Online`.

### 7.4.7 Start Variable Module Management System High Alert Mode

**NOTE 1** The High Alert mode commands are displayed only if enabled at the factory or by an Eaton Customer Service Engineer.

**NOTE 2** The Variable Module Management System and Energy Saver System modes are mutually exclusive.

To start VMMS High Alert mode:

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).

   The UPS status indicates `Online + VMMS`.
3. On the System Status screen, select **EAA Controls**. The EAA screen is displayed (see Figure 118).
4. On the EAA screen, select **Start High Alert Timer**. The **Start high alert timer?** confirmation screen appears (see Figure 120).
5. Select **Yes** on the confirmation screen.

   The UPS starts High Alert mode with the UPMs online supplying the critical load. After one hour the UPS transfers to Variable Module Management System mode.

   The Online status indicator is illuminated. The UPS status indicates `Online`. The UPM status indicates `Active` . The power module is on.

### 7.4.8 Starting the UPS in Bypass Mode

**⚠WARNING**

If required to close a circuit breaker inside a UPS, use appropriate personal protective equipment. Injury to personnel may occur from electrical shock.

If the inverter output of the UPS is not available and the critical load needs to be energized:

**⚠CAUTION**

In Bypass mode, the critical load is not protected from commercial power interruptions and abnormalities.

1. Unfasten the front door latch and swing the door open (see Figure 19).

**NOTE** *Only perform steps 2 and 5 if the UPS has an input breaker CB1 (see Figure 85).

2. *Verify that input breaker CB1 is open.
3. Close the UPS input feeder circuit breaker.
4. Close the UPS Bypass input feeder circuit breaker.
5. *Close input breaker CB1.
6. Close the door and secure the latch.
7. Observe the UPS control panel becoming active, indicating logic power.
8. Make sure you are logged in for user access (see Figure 88).
9. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
10. On the System Status screen, verify the UPS status is `Shutdown` and the UPM status is `Idle` (see Figure 114).
11. On the System Status screen, select the **Go to Bypass** button. Select **Yes** on the confirmation screen.

    The critical load is immediately supplied by the bypass source, in Bypass mode.

    The Bypass status indicator is illuminated. The Bypass status indicates `On Bypass`. The UPM status indicates `Shutdown`.

### 7.4.9 Starting the UPMs

**NOTE** This procedure applies to any installed UPM.

To start the power module without transferring the critical load to Online mode:

**⚠WARNING**

If required to close a circuit breaker inside a UPS, use appropriate personal protective equipment. Injury to personnel may occur from electrical shock.

1. Unfasten the front door latch and swing the door open (see Figure 19).

**NOTE** *Only perform steps 2 and 5 if the UPS has an input breaker CB1 (see Figure 85).

2. *Verify that input breaker CB1 is open.
3. Close the UPS input feeder circuit breaker.
4. Close the UPS Bypass input feeder circuit breaker.
5. *Close input breaker CB1.
6. Close the door and secure the latch.

7. Observe the UPS control panel becoming active, indicating logic power.
8. Make sure you are logged in for user access (see Figure 88).
9. Verify no alarms are active.
10. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
11. On the System Status screen, check that the UPS status indicates `Shutdown`.
12. On the System Status screen, select the **Module Controls** button. The Module Controls screen is displayed (see Figure 114). The UPM(s) to start show `Shutdown` (black box).
13. Select the UPM to be started in the left column. The **Module Controls Detail** screen for the UPM appears (see Figure 115).
14. Press the **Start UPM** button in the Power Status section.
15. Select **Yes** on the confirmation screen.

    Verify the following:

    - A message that the selected UPM is starting appears
    - The UPM rectifier and inverter turn on.
    - UPM Power Status line shows `idle`.
    - The UPM status bar shows in a gray color (Idle)
16. Repeat the procedures from step 13 to step 15 to start the other UPMs if required.

**NOTE** To transfer to Online mode after starting individual UPMs, follow the procedure in paragraph 7.4.12 *Transfer from Bypass to Online Mode*.

### 7.4.10 Starting a Single UPM to Online Mode

To start a single UPM:

**⚠WARNING**

If required to close a circuit breaker inside a UPS, use appropriate personal protective equipment. Injury to personnel may occur from electrical shock.

**NOTE** UPM 1 is used in this procedure. Use the same procedure to start any UPM as applicable.

1. Unfasten the front door latch and swing the door open (see Figure 19).

**NOTE** *Only perform steps 2 and 5 if the UPS has an input breaker CB1 (see Figure 85).

2. *Verify that input breaker CB1 is open.
3. Close the UPS input feeder circuit breaker.
4. Close the UPS Bypass input feeder circuit breaker.
5. *Close input breaker CB1.
6. Close the door and secure the latch.
7. Close the battery breaker.

8. Observe the UPS control panel becoming active, indicating logic power.
9. Make sure you are logged in for user access (see Figure 88).
10. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
11. On the System Status screen, the UPS status should indicate `Shutdown` and the UPM status should indicate `Shutdown`.
12. Verify no alarms are active.
13. On the System Status screen, select the **Module Controls** button. The Module Controls screen is displayed (see Figure 114).
14. Select the detail button of the UPM to start. The **Module Controls Detail** screen for the selected UPM appears (see Figure 115).
15. Press the **Go to Normal** button in the Power Status section. Select **Yes** on the confirmation screen.

    Verify the following:

    - The message `UPM 1 IS STARTING` appears.
    - The UPM 1 rectifier and inverter turn on.
    - UPM 1 Power Status line shows `idle`.
    - The UPM 1 status bar shows in a gray color (Idle).
16. To transfer the UPM to Online mode, select the **Go to Normal** button under the Power Status section.
    - The UPM 1 Power Status shows `Active`
    - The UPM 1 status bar shows in a green color (Active)

If UPM 4 (FI-UPM) is installed and the Inherent Redundancy option is enabled, a loss of redundancy alarm will be issued. Silence the alarm

### 7.4.11 Transfer from Online to Bypass Mode

To transfer the critical load to Bypass mode:

**⚠CAUTION**

In Bypass mode, the critical load is not protected from commercial power interruptions and abnormalities.

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
3. On the System Status screen, select the **Go to Bypass** button. Select **Yes** on the confirmation screen.

   The UPS transfers to Bypass mode and the critical load is immediately supplied by the bypass source. If the bypass source is not available, the power module remains on and an alarm sounds.

   The Bypass status indicator is illuminated. The Bypass status indicates `On Bypass`. The UPM status indicates `Idle`. The power module remains on.

**⚠WARNING**

Power is present inside the UPS cabinet.

### 7.4.12 Transfer from Bypass to Online Mode

To transfer the critical load to Online mode:

1. If not already closed, close the battery breaker.
2. Make sure you are logged in for user access (see Figure 88).
3. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
4. On the System Status screen, select **Go to Online**.
5. Select **Yes** when the confirmation screen appears.

   The UPS transfers to Online mode. If the power module is not available, the system remains on bypass and an alarm sounds while the UPMs start.

   The **ONLINE** status indicator is illuminated. The UPS status indicates `Online`. The UPM status indicates `Active` on the applicable **Module Control Detail** screen (see Figure 115).

### 7.4.13 Transfer from Online to Bypass Mode and Shut Down UPMs

To transfer the critical load to Bypass mode and shut down the UPMs:

1. Transfer the critical load to bypass by performing the procedure in paragraph (see *7.4.11 Transfer from Online to Bypass Mode*).
2. Shutdown the UPMs by performing the procedure in paragraph *7.4.14 Single UPM Shutdown*.
3. Repeat the procedures for any active UPM

### 7.4.14 Single UPM Shutdown

To shut down a single UPM:

**NOTE** Depending on the system configuration, the last online UPM in a system may not shut down or the UPS may transfer to BP.

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
3. Select **Module Controls**. The Module Controls screen is displayed (see Figure 114).
4. On the Module Controls screen, select the applicable UPM details button. The UPM **Module Controls Detail** screen appears (see Figure 115).
5. On the UPM Module Control Detail screen, select **Shutdown UPM**. Select **Yes** on the confirmation screen.
6. Verify the following:

   `UPM "x" IS SHUTTING DOWN` message appears

   The UPM POWER STATUS shows `Idle` on the **Module Control Detail** screen, (see Figure 115).

   The UPM status bar shows in a gray color (Idle).

**NOTE** The shutdown UPM button must be pressed twice to fully shutdown the UPM.

7. Repeat step 4.
8. Verify the following:

`UPM "x" IS SHUTTING DOWN` message appears

The UPM POWER STATUS shows `Shutdown` on the Module Control Detail screen, (see Figure 115).

The UPM status bar shows in a black color (Shutdown)

The UPM rectifier and inverter turn off.

Logic power remains on.

9. Repeat the procedures in this section to shut down any other UPMs as applicable.

### 7.4.15 Single UPM Restart

To restart a single UPM from a shutdown state refer to the procedures in 7.4.10 *Starting a Single UPM to Online Mode*.

### 7.4.16 Charger Control

To turn the battery charger on:

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
3. On the System Status screen, select **Module Controls**. The Module Controls screen is displayed (see Figure 114).
4. Select the Module Controls Detail screen for the applicable UPM to start the charger (see Figure 115).
5. Select **Start Charger**. The charger status shows `Charger On`.

To turn the battery charger off:

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
3. On the System Status screen, select the **Module Controls** button. The Module Controls screen is displayed (see Figure 114).
4. Select the Module Controls Detail screen for the applicable UPM to start the charger (seeFigure 115).
5. Select **Stop Charger**. The charger status shows `Charger Off`.

### 7.4.17 Using the UPS Load Off Button / UPS and Critical Load Shutdown

A UPS Load Off is initiated by the **Load Off** button on the **System Status Screen**. The UPS Load Off controls the UPS output by powering down the UPS and de–energizing the critical load.

The UPS (including Bypass) remains off until restarted.

To use the **Load Off** button:

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).

**⚠CAUTION**

All power to the critical load is lost when the Load Off is selected in the following step. You should use this feature only when you want to de–energize the critical load.

3. Press the **Load Off** button.

   The **Shut Down?** confirmation screen is displayed, providing a choice to proceed or abort the shutdown. Select **Yes** to continue or **No** to cancel.

   When Load Off is selected, the input, output, battery, and bypass backfeed contactors open, and the power module is turned off.

**⚠CAUTION**

Do not attempt to restart the system after Load Off until the cause of the shutdown has been identified and cleared.

4. To restart the UPS after pressing the **Load Off** button, follow the procedure in paragraph 7.4.1 *Starting the UPS in Online Mode* or 7.4.8 *Starting the UPS in Bypass Mode* .

**⚠WARNING**

Power is present inside the UPS cabinet until the upstream input feeder circuit breaker is opened.

The UPS status is **Shutdown**.

### 7.4.18 Using the Remote Emergency Power-off Switch

A UPS emergency power-off is initiated by the **REPO**pushbutton switch. In an emergency, you can use this switch to control the UPS output. The REPO switch de–energizes the critical load and powers down the UPS immediately, without asking for verification.

The UPS, including Bypass, remains off until restarted.

**⚠CAUTION**

All power to the critical load is lost when the REPO switch is activated in the following step. You should use this feature only when you want to de–energize the critical load.

**⚠ ATTENTION!**

L'alimentation de la charge critique est complètement coupée lorsque le circuit d'arrêt d'urgence à distance est déclenché à l'étape suivante. N'utiliser cette fonction que pour mettre la charge critique hors tension.

**NOTE** The following instructions are for the Eaton-supplied REPO switch. If a customer-supplied REPO switch is used, it may not activate in the same manner; refer to the operating instructions provided with the switch.

To use the Eaton REPO switch:

1. Firmly push the red pushbutton until it locks into place. The switch latches into the activated state (see Figure 127).

   The input, output, and bypass backfeed contactors open, the battery breaker or disconnect is tripped, and the power module is turned off immediately, without asking for verification.

**⚠CAUTION**

Do not attempt to restart the system after the REPO until the cause of the shutdown has been identified and cleared.

**ATTENTION!**

Ne pas tenter de redémarrer le système après le déclenchement du circuit d'arrêt d'urgence à distance avant d'avoir déterminé la raison du déclenchement.

2. To deactivate the REPO switch in preparation for restarting the UPS, insert the supplied key and rotate clockwise until the red pushbutton releases (see Figure 127). To remove the key, rotate the key back to the vertical position.
3. Restart the UPS by following the procedure in paragraph 7.4.1 *Starting the UPS in Online Mode* or . 7.4.8 *Starting the UPS in Bypass Mode*

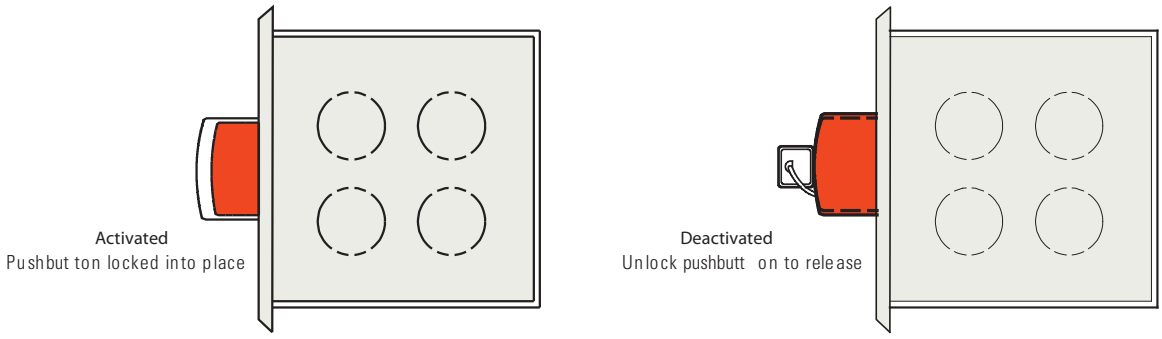
**⚠WARNING**

Power is present inside the UPS cabinet until the upstream input feeder circuit breaker is opened.

**AVERTISSEMENT!**

L'intérieur de l'armoire de l'onduleur est alimenté jusqu'à ce que le disjoncteur du circuit d'alimentation en amont soit activé.

**Figure 127. REPO Operation**




## 7.5 Multiple UPS Distributed Bypass Operation

This section provides operating instructions for a UPS system containing multiple UPSs in a Distributed Bypass System configuration.

**NOTE** A Field Installed UPM (FI-UPM) is always designated as UPM 4.

**NOTE** To obtain any system information, follow the on screen prompts to get to the proper screen. The operator cannot inadvertently cause a system dump or disconnect unless they override a warning pop-up. Value or information screens DO NOT affect system operation.

### 7.5.1 Starting the Distributed Bypass System in Online Mode

To start the distributed bypass system:

**⚠WARNING**

If required to close a circuit breaker inside a UPS, use appropriate personal protective equipment. Injury to personnel may occur from electrical shock.

1. Unfasten the front door latches and swing the doors open on all of the UPSs (see Figure 19).
2. If the UPSs contain input breakers (CB1), verify that all input breakers are open (see Figure 85).
3. Close all Module Output Breakers (MOBs).
4. Close all UPS input feeder circuit breakers.
5. Close all UPS Bypass input feeder circuit breakers.
6. Close all battery breakers.
7. If the UPSs contain input breakers (CB1), close all input breakers.
8. Close the doors and secure the latches.
9. Observe the UPS control panel displays becoming active, indicating logic power.
10. Make sure you are logged in for user access (see Figure 88).
11. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
12. On the System Status screen, verify the UPS status is `SHUTDOWN` and the UPM status is `SHUTDOWN`.
13. Verify no alarms are active on the Events Log screen.
14. On the System Status screen, select the **Go Online**.

    If Auto Bypass is enabled (factory default), the critical load is immediately supplied by the bypass source in Bypass mode from all UPSs, until the inverter turns on and the UPSs transfer to Online mode. The status indicator on the UPS control panel indicates the UPS is in Bypass mode. If Auto Bypass is not enabled, the UPS outputs remain off until the UPSs turn on the inverter and close the inverter output contactors.
15. Verify the following:

    The rectifier and inverter turn on. The inverter continues to ramp to full voltage.

    Once the inverter reaches full voltage, all UPS output contactors (K3) close and the bypass circuits open. Power is now supplied to the critical load in Online mode from all UPSs. It takes approximately one minute for the UPSs to achieve Online mode.

    The Online status indicator is illuminated. The UPS status indicates `Online`. The UPM status indicates `Active`, `Charger ON`.

### 7.5.2 Enable Energy Saver System Mode

To enable Energy Saver System mode:

**NOTE 1** The Energy Saver System mode commands are displayed only if enabled at the factory or by an Eaton Customer Service Engineer.

**NOTE 2** The Variable Module Management System and Energy Saver System modes are mutually exclusive. If the Variable Module Management System mode is enabled, the Energy Saver System mode commands will not be displayed.

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
3. On the System Status screen, select **EAA Controls**. The EAA screen is displayed (see Figure 118).
4. On the EAA screen, select **Enable ESS**.
5. Select **Yes** on the confirmation screen.

   The UPS transfers to Energy Saver System mode.

   The Online status indicator is illuminated and `Online + ESS` displays in the UPS status area. If the battery is not charging, the power module is off.

### 7.5.3 Disable Energy Saver System Mode

To disable Energy Saver System mode:

**NOTE 1** The Energy Saver System mode commands are displayed only if enabled at the factory or by an Eaton Customer Service Engineer.

**NOTE 2** The Variable Module Management System and Energy Saver System modes are mutually exclusive. If the Variable Module Management System mode is enabled, the Energy Saver System mode commands will not be displayed.

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
3. On the System Status screen, select **EAA Controls**. The EAA screen is displayed (see Figure 118).
4. On the EAA screen, select **Disable ESS** the **Disable ESS?** confirmation screen appears (see Figure 119).
5. Select **Yes** on the confirmation screen.

   The UPS transfers to Battery mode and then to Online mode.

   The Online status indicator is illuminated. The UPS status indicates `Online`. The UPM status indicates `Active`.

### 7.5.4 Start Energy Saver System High Alert Mode

**NOTE 1** The High Alert mode commands are displayed only if enabled at the factory or by an Eaton Customer Service Engineer.

**NOTE 2** The Variable Module Management System and Energy Saver System modes are mutually exclusive. If the Variable Module Management System mode is enabled, the Energy Saver System mode commands will not be displayed.

To start ESS High Alert mode:

1. Make sure you are logged in for user access (see Figure 88).

2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).

   The UPS status indicates `Online + ESS`.

3. On the System Status screen, select **EAA Controls**. The EAA screen is displayed (see Figure 118).
4. On the EAA screen, select **Start High Alert Timer** the **Start high alert timer?** confirmation screen appears (see Figure 120).
5. Select **Yes** on the confirmation screen.

   The UPS starts High Alert mode with the UPMs online supplying the critical load. After one hour the UPS transfers to Energy Saver System mode.

   The Online status indicator is illuminated. The UPS status indicates `Online`. The UPM status indicates `Active`. The power module is on.

### 7.5.5 Enable Variable Module Management System Mode

To enable Variable Module Management System mode:

**NOTE 1** The Variable Module Management System mode commands are displayed only if enabled at the factory or by an Eaton Customer Service Engineer.

**NOTE 2** The Variable Module Management System and Energy Saver System modes are mutually exclusive. If the Energy Saver System mode is enabled, the Variable Module Management System mode commands will not be displayed.

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
3. On the System Status screen, select **EAA Controls**. The EAA screen is displayed (see Figure 118).
4. On the EAA screen, select **Enable VMMS**. The **Enable VMMS?** confirmation screen appears.
5. Select **Yes** on the confirmation screen.

   If the UPS is online, the UPS transfers to Variable Module Management System mode. In approximately twenty seconds the UPS calculates the required number of UPMs needed to support the load.

   The Online status indicator is illuminated and `Online + VMMS` displays in the UPM status area.

### 7.5.6 Disable Variable Module Management System Mode

To disable Variable Module Management System mode:

**NOTE 1** The Variable Module Management System mode commands are displayed only if enabled at the factory or by an Eaton Customer Service Engineer.

**NOTE 2** The Variable Module Management System and Energy Saver System modes are mutually exclusive. If the Energy Saver System mode is enabled, the Variable Module Management System mode commands will not be displayed.

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
3. On the System Status screen, select **EAA Controls**. The EAA screen is Figure 118).
4. On the EAA screen, select **Disable VMMS**. The **Disable VMMS?** confirmation screen appears.

5. Select **Yes** on the confirmation screen.

   The UPS transfers to Battery mode and then to Online mode in approximately ten seconds.

   The Online status indicator is illuminated. The UPS status indicates `Online`.

### 7.5.7 Start Variable Module Management System High Alert Mode

To start High Alert mode:

**NOTE 1** The High Alert mode commands are displayed only if enabled at the factory or by an Eaton Customer Service Engineer.

**NOTE 2** The Variable Module Management System and Energy Saver System modes are mutually exclusive. If the Energy Saver System mode is enabled, the Variable Module Management System mode commands will not be displayed.

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
3. On the System Status screen, select **EAA Controls**. The EAA screen is displayed (see Figure 118).
4. On the EAA screen, select **Start High Alert Timer** the **Start high alert timer?** confirmation screen appears (see Figure 120).
5. Select **Yes** on the confirmation screen.

   The UPS starts High Alert mode with the UPMs online supplying the critical load. After one hour the UPS transfers to Variable Module Management System mode.

   The Online status indicator is illuminated. The UPS status indicates `Online + High Alert Timer`. The UPM status indicates `Active` . The power module is on.

### 7.5.8 Starting the Distributed Bypass System in Bypass Mode

**⚠WARNING**

If required to close a circuit breaker inside a UPS, use appropriate personal protective equipment. Injury to personnel may occur from electrical shock.

**⚠CAUTION**

In Bypass mode, the critical load is not protected from commercial power interruptions and abnormalities.

If the inverter output of the distributed bypass system is not available and the critical load needs to be energized, start the distributed bypass system in bypass mode:

1. Unfasten the front door latches and swing the doors open on all of the UPSs (see Figure 19).
2. If the UPSs contain input breakers (CB1), verify that all input breakers are open (see Figure 85).

**NOTE** *Only perform steps 3 and 7 if the UPSs have an input breaker CB1.

3. *Verify that all input breakers (CB1) are open.
4. Close all MOBs.
5. Close all UPS input feeder circuit breakers.

6. Close all UPS Bypass input feeder circuit breakers.
7. *Close all input breakers (CB1).
8. Close the doors and secure the latches.
9. Observe the UPS control panel displays becoming active, indicating logic power.
10. Make sure you are logged in for user access (see Figure 88).
11. On any UPS, press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
12. On the System Status screen, verify the UPS status is `SHUTDOWN` and the UPM status is `Idle`.
13. On the System Status screen, select the **Go to Bypass** button. The **Go to bypass?** confirmation screen appears.
14. Select **Yes** on the confirmation screen.

    The critical load is immediately supplied by the bypass source in Bypass mode from all UPSs.

    The Bypass status indicator is illuminated. The Bypass status indicates `On Bypass`. The UPM status indicates `Shutdown`.

### 7.5.9 Starting the UPS UPMs

To start the power modules without transferring the critical load to Online mode:

**⚠WARNING**

If required to close a circuit breaker inside a UPS, use appropriate personal protective equipment. Injury to personnel may occur from electrical shock.

1. Unfasten the front door latches and swing the doors open on all of the UPSs (see Figure 19).

**NOTE** *Only perform steps 2 and 5 if the UPSs have input breakers CB1 (see Figure 85).

2. *Verify that the input breakers CB1 are open.
3. Close all UPS input feeder circuit breakers.
4. Close all UPS Bypass input feeder circuit breakers.
5. *Close the CB1 input breakers.
6. Close the doors and secure the latches.
7. Observe the UPS control panel becoming active, indicating logic power.
8. Make sure you are logged in for user access (see Figure 88).
9. Verify no alarms are active.
10. On any UPS, press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
11. On the System Status screen, check that the UPS status indicates `Shutdown`.
12. On the System Status screen, select the **Module Controls** button. The Module Controls screen is displayed (see Figure 114). The UPM(s) to start show `Shutdown` (black box).
13. Select the UPM to be started in the left column. The **Module Controls Detail** screen for the UPM appears (see Figure 115).

14. Press the **Start UPM** button in the Power Status section.
15. Select **Yes** on the confirmation screen.

    Verify the following:

    - A message that the selected UPM is starting appears
    - The UPM rectifier and inverter turn on.
    - UPM Power Status line shows `idle`.
    - The UPM status bar shows in a gray color (Idle)
16. Repeat the procedures from step 13 to step 15 to start the other UPMs if required.

**NOTE** To transfer to Online mode after starting individual UPMs, follow the procedure in paragraph .7.5.12 *Transfer from Bypass to Online Mode*.

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### 7.5.10 Starting a Single UPM

To start a single UPM:

**⚠WARNING**

If required to close a circuit breaker inside a UPS, use appropriate personal protective equipment. Injury to personnel may occur from electrical shock.

**NOTE** UPM 1 is used in this procedure. Use the same procedure to start any UPM as applicable.

1. Unfasten the front door latch and swing the door open (see Figure 19).

**NOTE** *Only perform steps 2 and 5 if the UPS has an input breaker CB1 (see Figure 85).

2. *Verify that input breaker CB1 is open.
3. Close the UPS input feeder circuit breaker.
4. Close the UPS Bypass input feeder circuit breaker.
5. *Close input breaker CB1.
6. Close the door and secure the latch.
7. Observe the UPS control panel becoming active, indicating logic power.
8. Make sure you are logged in for user access (see Figure 88).
9. Verify no alarms are active.
10. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
11. On the System Status screen, verify the UPS status is `Shutdown`
12. On the System Status screen, select the **Module Controls** button. The Module Controls screen is displayed (see Figure 114). The UPM(s) to start show `Shutdown` (black box).
13. Select the UPM to be started in the left column (black box). The **Module Controls Detail** screen for the UPM appears (see Figure 115).

14. Press the **Start UPM** button in the Power Status section.
15. Select **Yes** on the confirmation screen.

    Verify the following message is displayed:

    - `UPM 1 IS STARTING`
    - The UPM 1 rectifier and inverter turn on.
    - UPM Power Status line shows `idle`.
    - The UPM status bar shows in a gray color (Idle)
16. Repeat the procedures from step 13 to step 15 to start the other UPMs if required.

### 7.5.11 Transfer from Online to Bypass Mode

To transfer the critical load to Bypass mode:

**⚠CAUTION**

In Bypass mode, the critical load is not protected from commercial power interruptions and abnormalities.

1. Make sure you are logged in for user access (see Figure 88).
2. On any UPS, press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
3. On the System Status screen, select the **Go to Bypass** command.
4. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
5. On the System Status screen, select **Go to Bypass**. Select **Yes** on the confirmation screen.

All of the UPSs transfer to Bypass mode and the critical load is immediately supplied by the bypass source. If the bypass source is not available, the power module remains on and an alarm sounds.

The **BYPASS** status indicator is illuminated. The Bypass status indicates `ON`. The UPM status indicates `Idle`. The power module remains on.

**⚠WARNING**

Power is present inside the UPS cabinet.

### 7.5.12 Transfer from Bypass to Online Mode

To transfer the critical load to Online mode:

1. If not already closed, close the battery breaker.
2. Make sure you are logged in for user access (see Figure 88).
3. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
4. On the System Status screen, select **Go to Online**.
5. Select **Yes** when the confirmation screen appears.

   All of the UPSs transfer to Online mode. If the power module is not available, the system remains on bypass and an alarm sounds.

The Online status indicator is illuminated. The UPS status indicates `Online`. The UPM status indicates `Active` on the Figure 114.

### 7.5.13 Transfer from Online to Bypass Mode and Shut Down UPMs

To transfer the critical load to Bypass mode and shut down all UPMs:

1. Transfer the critical load to bypass by performing the procedure in paragraph 7.5.11 *Transfer from Online to Bypass Mode*.
2. Shutdown the UPMs by performing the procedure in paragraph 7.5.14 *Single UPM Shutdown*

### 7.5.14 Single UPM Shutdown

To shut down a single UPM:

**NOTE** Depending on the system configuration, the last online UPM in a system may not shut down or the UPS may transfer to BP.

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
3. Select **Module Controls**. The Module Controls screen is displayed (see Figure 114).
4. On the Module Controls screen, select the applicable UPM details button. The UPM **Module Controls Detail** screen appears (see Figure 115).
5. On the UPM Module Control Detail screen, select **Shutdown UPM**. Select **Yes** on the confirmation screen.
6. Verify the following:

   `UPM "x" IS SHUTTING DOWN` message appears

   The UPM POWER STATUS shows `Idle` on the Module Control Detail screen, (see Figure 115).

   The UPM status bar shows in a gray color (Idle).

**NOTE** The shutdown UPM button must be pressed twice to fully shutdown the UPM.

7. Repeat step 4.
8. Verify the following:

   `UPM "x" IS SHUTTING DOWN` message appears

   The UPM POWER STATUS shows `Shutdown` on the Module Control Detail screen, (see Figure 115).

   The UPM status bar shows in a black color (Shutdown)

   The UPM rectifier and inverter turn off.

   Logic power remains on.
9. Repeat the procedures in this section to shut down any other UPMs as applicable.

### 7.5.15 Single UPM Restart

To restart a single UPM from a shutdown state refer to start procedures in .7.5.10 *Starting a Single UPM*

### 7.5.16 Single UPS Shutdown Using Load Off

**NOTE** To shut down a single UPS, MOBs with dual auxiliary contacts must be installed and connected according to the procedure in paragraph 5.1 *Installing an Optional Hot Sync CAN Bridge Card*.

To shut down a single UPS:

1. Open the MOB for the UPS being shut down.
2. Make sure you are logged in for user access (see Figure 88).
3. On the UPS to shut down, press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
4. On the System Status screen, select the **Load Off** button.
5. Select **Go To Bypass**.

   The UPS being shut down transfers to Bypass mode.

   The Bypass status indicator is illuminated. The Bypass status indicates `On Bypass`. The UPM status indicates `Idle`. The power module remains on.

**NOTE** Load Off will turn off only the UPS being shut down. The remaining UPSs will remain online supplying power to the critical load.

6. Perform the Load Off procedure in paragraph 7.5.21 *Using the UPS Load Off Button / UPS and Critical Load Shutdown* on the UPS being shut down.

   The input, output, battery, and bypass backfeed contactors open, and the power module is turned off on the UPS being shut down.

   Logic power remains on.

7. Verify the battery breaker or disconnect for the UPS being shut down is open. If not, open the breaker.

**⚠WARNING**

Power is present inside the UPS cabinet until the upstream input feeder circuit breaker is opened.

**NOTE** If the UPS contains an input breaker (CB1), DO NOT open the breaker unless no input feeder breaker is installed.

8. Open the input and bypass feeder circuit breakers for the UPS being shut down.

   The UPS is now completely shut down.

   External Communications Failure alarm is active on remaining online UPSs. This is an expected event and will clear upon UPS restart.

### 7.5.17 Single UPS Shutdown Using UPM Shutdown

**NOTE** To shut down a single UPS, MOBs with dual auxiliary contacts must be installed and connected according to the procedure in paragraph 5.1 *Installing an Optional Hot Sync CAN Bridge Card*.

To shut down a single UPS:

1. Open the MOB for the UPS being shut down.

2. Make sure you are logged in for user access (see Figure 88).
3. On the UPS to shut down, press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
4. On the System Status screen, select the **Go to Bypass** button. The **Go to bypass?** confirmation screen appears.

   Select **Yes** on the confirmation screen.

   The UPS being shut down transfers to Bypass mode.

   The Bypass status indicator is illuminated and `Bypass On` displays in the UPS status area. If the battery is not charging, the power module is off.

   On the Modules Control screen, select the UPM to shutdown. The applicable UPM **Module Control Detail** screen is appears (see Figure 115).
5. On the UPM Module Control Detail screen, select **Shut Down UPM** .The **Shutdown UPM?** confirmation screen appears.
6. Select **Yes** on the confirmation screen.
7. Verify the following:

   `UPM "x" IS SHUTTING DOWN` message appears

   The UPM POWER STATUS shows `Idle` on the Module Control Detail screen, (see Figure 115).

   The UPM status bar shows in a gray color (Idle).

**NOTE** The shutdown UPM button must be pressed twice to fully shutdown the UPM.

8. Repeat step 4.
9. Verify the following:

   `UPM "x" IS SHUTTING DOWN` message appears

   The UPM POWER STATUS shows `Shutdown` on the Module Control Detail screen, (see Figure 115).

   The UPM status bar shows in a black color (Shutdown)

   The UPM rectifier and inverter turn off.

   Logic power remains on.
10. Verify the battery breaker or disconnect for the UPS being shut down is open. If not, open the breaker.

**⚠WARNING**

Power is present inside the UPS cabinet until the upstream input feeder circuit breaker is opened.

**NOTE** If the UPS contains an input breaker (CB1), DO NOT open the breaker unless no input feeder breaker is installed.

11. Open the input and bypass feeder circuit breakers for the UPS being shut down.

    The UPS is now completely shut down.

    External Communications Failure alarm is active on remaining online UPSs. This is an expected event and will clear upon UPS restart.

### 7.5.18 Single UPS Restart

To restart a single UPS from a shutdown state:

**⚠WARNING**

If required to close a circuit breaker inside a UPS, use appropriate personal protective equipment. Injury to personnel may occur from electrical shock.

1. Close the MOB for the UPS being restarted.
2. Close UPS input and bypass feeder circuit breakers for the UPS being restarted.
3. Unfasten the front door latch and swing the door open on the UPS being restarted (see Figure 19).
4. If input breaker (CB1) is installed on the UPS being restarted and is open, close the breaker Figure 85.
5. Close the door and secure the latch.
6. On the UPS being restarted, observe the UPS control panel display becoming active, indicating logic power.
7. Make sure you are logged in for user access (see Figure 88).
8. On the UPS being restarted, press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
9. On the System Status screen, verify that the UPS STATUS is `Shutdown` and the UPM status is `Shutdown` on the Module Controls screen.
10. Close the battery breaker for the UPS being restarted.
11. Verify no alarms are active on UPS being restarted.
12. Verify the External Communications Failure alarm has cleared and no other alarms are active on the online UPSs.
13. On the System Status screen, select **Go Online**. The **Go Online?** confirmation screen appears.

    Select **Yes** on the confirmation screen.

**NOTE** If the UPS is starting on a bus with other online paralleled UPSs, the UPS will not go to bypass during startup. The UPS will start, sync to the other UPSs online, and go online.

The `Going Online` message appears.

The rectifier and inverter turn on. The inverter continues to ramp to full voltage.

Once the inverter reaches full voltage, the UPS output contactor (K3) closes. Power is now supplied to the critical load in Online mode along with the other UPSs online. It takes approximately one minute for the UPS to achieve Online mode.

The Online status indicator is illuminated. The UPS status indicates `Online`. The UPM status indicates `Active`.

### 7.5.19 UPS and Critical Load Shutdown

To perform maintenance or service on the critical load, shut down power to the load:

1. Turn off all equipment that is being powered by the distributed bypass system.
2. Transfer the UPSs to bypass by performing the procedure in paragraph 7.5.11 *Transfer from Online to Bypass Mode*

3. Perform the Load Off procedure in paragraph .
   7.5.21 *Using the UPS Load Off Button / UPS and Critical Load Shutdown*

   The input, output, battery, and bypass backfeed contactors open, and the power module is turned off.

**⚠WARNING**

Power is present inside the UPS cabinet until the upstream input feeder circuit breaker is opened.

4. If the UPSs contain input breakers (CB1), open all UPS input breakers.
5. Open the input and bypass feeder circuit breakers on all UPSs.

### 7.5.20 Charger Control

To turn the battery charger on:

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
3. On the System Status screen, select **Module Controls**. The Module Controls screen is displayed (see Figure 114).
4. Select the Module Controls Detail screen for the applicable UPM to start the charger (see Figure 115).
5. Select **Start Charger**. The charger status shows `Charger On`.

To turn the battery charger off:

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).
3. Select the Module Controls Detail screen for the applicable UPM charger stop (see Figure 115).
4. Select **Stop Charger**. The charger status shows `Charger Off`.

### 7.5.21 Using the UPS Load Off Button / UPS and Critical Load Shutdown

A UPS Load Off is initiated by the **Load Off** button on the **System Status Screen**. The UPS Load Off controls the UPS output by powering down the UPS and de–energizing the critical load.

The UPS (including Bypass) remains off until restarted.

**NOTE** The UPS Load Off controls each UPS independently and does not shut down the whole distributed bypass system unless all UPSs have been transferred to bypass. To immediately shut down the whole system, use the REPO switch (see paragraph 7.5.21 *Using the UPS Load Off Button / UPS and Critical Load Shutdown*).

To use the **Load Off** button:

1. Make sure you are logged in for user access (see Figure 88).
2. Press the **Controls** button on the **Home** screen (see Figure 89). The **System Status** screen is displayed (see Figure 112).

**⚠CAUTION**

All power to the critical load is lost when the Load Off is selected in the following step. You should use this feature only when you want to de–energize the critical load.

3. Press the **Load Off** button.

   The **Shut Down?** confirmation screen is displayed, providing a choice to proceed or abort the shutdown. Select **Yes** to continue or **No** to cancel.

   When Load Off is selected, the input, output, battery, and bypass backfeed contactors open, and the power module is turned off.

4. If another UPS is to be shut down, proceed to that UPS and repeat Steps 1 and 2.

**⚠CAUTION**

Do not attempt to restart the system after Load Off until the cause of the shutdown has been identified and cleared.

5. To restart the UPS after pressing the **Load Off** button, follow the procedure in paragraph 7.5.1 *Starting the Distributed Bypass System in Online Mode* or 7.5.8 *Starting the Distributed Bypass System in Bypass Mode*.

**⚠WARNING**

Power is present inside the UPS cabinet until the upstream input feeder circuit breaker is opened.

The UPS status is **Shutdown**.

### 7.5.22 Using the Remote Emergency Power-off Switch

**NOTE** This procedure applies to the Eaton REPO switch installed in 4.10 *Installing a REPO Switch*4.10 *Installing a REPO Switch*. Refer to the applicable manufacturer's instructions if other REPO switch type installed.

A UPS emergency power-off is initiated by the **REPO** pushbutton switch. In an emergency, you can use this switch to control the UPS output. The REPO switch de–energizes the critical load and powers down the UPSs immediately, without asking for verification.

The UPS, including Bypass, remains off until restarted.

**⚠CAUTION**

All power to the critical load is lost when the REPO switch is activated in the following step. You should use this feature only when you want to de–energize the critical load.

**NOTE** The following instructions are for the Eaton-supplied REPO switch. If a customer-supplied REPO switch is used, it may not activate in the same manner; refer to the operating instructions provided with the switch.

To use the REPO pushbutton switch:

1. Firmly push the red pushbutton until it locks into place. The switch latches into the activated state (see Figure 127).

The input, output, and bypass backfeed contactors open, the battery breaker or disconnect is tripped, and the power module is turned off immediately, without asking for verification on all UPSs.

**⚠CAUTION**

Do not attempt to restart the system after the REPO until the cause of the shutdown has been identified and cleared.

2. To deactivate the REPO switch in preparation for restarting the UPS, insert the supplied key and rotate clockwise until the red pushbutton releases (see Figure 127). To remove the key, rotate the key back to the vertical position.
3. Restart the UPSs by following the procedure in paragraph 7.5.1 *Starting the Distributed Bypass System in Online Mode* or 7.5.8 *Starting the Distributed Bypass System in Bypass Mode*.

**⚠WARNING**

Power is present inside the UPS cabinet until the upstream input feeder circuit breaker is opened.

# Chapter 8 Communication

This chapter describes the communication features of the Eaton Power Xpert 9395P-600 UPS system and provides information about connecting hardware. For terminal wiring information, see paragraph 3.2.7 *UPS System Interface Wiring Preparation* and paragraph 4.9 *Installing Interface Connections*. For location of the customer interface panels and terminals, see Figure 30 and Figure 35 through Figure 38.

## 8.1 X-Slot Cards

The 9395P-600 UPS system has four standard, factory-installed X-Slot communication bays. See Figure 35 for bay locations. The UPS is compatible with the following X-Slot cards (see Figure 128):

- Gigabit Industrial Gateway Card -provides a data gateway from the UPS to Visual Power Manager; provides remote monitoring through a Web browser interface, e-mail, and a network management system using SNMP; connects to a twisted-pair Ethernet (10/100/1000 BaseT) network. Modbus TCP support provides direct integration of the UPS's parameters to a Building Management System (BMS).

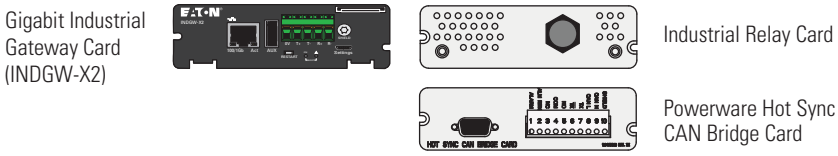
**NOTE** BACnet IP and BACnet BBMD (BACnet Broadcast Management Device) protocols are also supported.

- Industrial Relay Card® (IRC) indicates the operating status of the UPS system using the customer's monitoring equipment. The IRC uses four isolated normally-open or normally-closed dry relay contacts to indicate the UPS status. Online, Bypass, Battery, and Alarm modes can be monitored.
- Powerware Hot Sync CAN Bridge Card® provides connectivity for operational mode control and metering of a parallel system at any UPM in the system. In addition, this card can be used to connect optional system monitoring devices, such as a Remote Monitor Panel II (RMP III), a Relay Interface Module II (RIM II), or a Supervisory Contact Module II (SCM II) to the UPS. LAN drops for use with X-Slot connectivity cards must be provided by facility planners or the customer.

LAN drops for use with X-Slot connectivity cards must be provided by facility planners or the customer.

For installation and setup of an X-Slot card, contact an Eaton service representative (see section 1.10 *Getting Help*). Refer to the manual supplied with the X-Slot card for user instructions.

**Figure 128. Optional X-Slot Cards**




## 8.2 PredictPulse

PredictPulse Remote Monitoring and Management Service is a subscription monitoring and management service that collects and analyzes data from connected power infrastructure devices, providing Eaton with the insight needed to make recommendations and take action on your behalf. It is also powered by CA Technologies, bringing together the best in hardware and software. PredictPulse Service is included at no charge during the first year of 9395P-600 UPS operation (warranty period) along with the required connectivity parts. Beyond that, it may be purchased with Eaton Support Agreements or as a standalone subscription after the initial warranty expires. PredictPulse may also be subscribed to for free as part of a 90-day trial period. PredictPulse availability and first year bundled offers may vary by market. For more information, visit www.eaton.com/predictpulse.

### 8.2.1 PredictPulse Features

PredictPulse provides proactive monitoring, an online dashboard, mobile app with alarm status information and a monthly report detailing the ongoing health of your Eaton 9395P UPS. Features include:

- Proactive monitoring that automatically analyzes the status of the Eaton 9395P UPS 96 times every day (every 15 minutes). All health data gathered from the unit, current and historical, is analyzed at the Customer Reliability Center (CRC). Algorithms and sophisticated analytics software is constantly scanning your UPS's data for potential failures. Anomalies are escalated to a Software and Monitoring analyst or Technical Support specialist. Critical events are remotely diagnosed to expedite repairs, including smart dispatch of field technicians with probable cause and likely parts (avoiding return visits due to lack of required parts). Through this service, the CRC can take pre-emptive, corrective action to ensure the highest level of availability of your Eaton 9395P UPS system.
- Easy self-installation in minutes from a wizard installer or directly from the PowerXpert Gateway UPS card. PredictPulse uses standard Eaton connectivity hardware, requiring no special software (devices only need to be connected to a network).
- Ability to give an unlimited number of coworkers access to the real-time data and reports found in PredictPulse’s online dashboard and mobile app. This allows you to collaborate and Eaton to notify the most appropriate person responsible for a specific site or device.
- Real-time access to key performance information, alarms and trended health data about your Eaton 9395P UPS via the PredictPulse online dashboard. Depending on the model, the dashboard aggregates all subscribed devices and provides detailed information about voltages, loads, energy savings, service levels, external factors such as temperature and humidity, attached batteries, and system availability. All of these factors contribute to the Relative Performance Index (RPI) score that allows you to compare your unit's health relative to Eaton's optimum UPS operating levels.
- Real-time alarm events for all subscribed devices via the PredictPulse mobile app (Apple and Android). You can track all alarms by device. As critical alarms occur, Eaton will acknowledge them so you know when Eaton has diagnosed the alarm (and pending notification of resolution).
- A monthly summary report that delivers key performance information, alarms and trended health data about your Eaton 9395P UPS system, based on the prior month’s data.
- A foundation based on CA Technologies’ leading Data Center Infrastructure Management (DCIM) software application. This enables powerful reporting, analytics, security and compatibility with hundreds of power infrastructure devices.

### 8.2.2 Installing PredictPulse

A quick start guide and self-installation wizard tool are available at www.eaton.com/predictpulse. The latest updates, installation tips and information on connecting PredictPulse are also available at that link. For installation support or questions about PredictPulse, contact **predictpulsesupport@eaton.com**.

PredictPulse relies on a Power Xpert Gateway UPS card installed with the UPS to send one-way outbound SMTP e-mails to Eaton, as well as an environmental monitoring probe (EMP) for battery temperature/humidity monitoring. PredictPulse is secure as Eaton never communicates through your firewall—it only listens for health data and alarm data—and uses industry-standard security protocols. By using a common e-mail transport mechanism, you do not have to open your network to proprietary or potentially unsecure protocols and transports. The PXGX connectivity card gathers information directly from the UPS and any external sensors that are attached, and transmits that data every 15 minutes (or 96 times per day), enabling real-time monitoring and advanced virtual preventive maintenance.

## 8.3 Power Management Software

Eaton’s software solutions, based on Web2.0 technology, include two applications: Intelligent Power Manager® for UPS management and monitoring, and Intelligent Power Protector®, which allows graceful shutdown of operating systems.

Eaton's Intelligent Power Software gives you all the tools you need to monitor and manage power devices on your network, even in a virtualized environment. This innovative software solution combines the most critical applications in ensuring system uptime and data integrity: not only power monitoring and management, but also graceful shutdown during an extended power outage.

Because it can manage redundant power systems, it is an ideal solution for the most critical IT environments with stringent requirements for power availability and reliability. Yet it is easy to use – the software scales flexibly from a simple single-computer, single-UPS configuration, to the most sophisticated high availability environments.

The software's mass configuration capabilities make installation and maintenance easy, which minimizes the effort required and benefits the bottom line. Eaton's cost effective Intelligent Power Software manages up to ten devices at no charge, with licences for up to 100 devices – or even an unlimited number – also available.

Contact your Eaton Sales representative for additional information.

## 8.4 Building Alarm Monitoring

This standard feature lets you connect the UPS to your building alarms, such as smoke detectors or over-temperature alarms. The customer interface terminals for external connections are located inside the UPS. You should use twisted-pair wires for each alarm input and common.

The building alarms can be programmed to display the alarm functional name.

## 8.5 General Purpose Relay Contact

One general purpose relay contact is provided as a standard feature on the UPS. The alarm contact is located inside the UPS on the customer interface terminal board.

You can use a normally-closed or normally-open contact. If the state of the contact changes from the state you specify as normal, a signal is issued. You can connect this contact to equipment at your facility (such as a light or an alarm bell) to let you know when an alarm is active on the UPS. This feature is useful if the UPS is located in a remote area where the UPS horn may not be heard immediately.

**⚠CAUTION**

Contacts should not be operated in excess of 30 Vac @ 5A maximum.

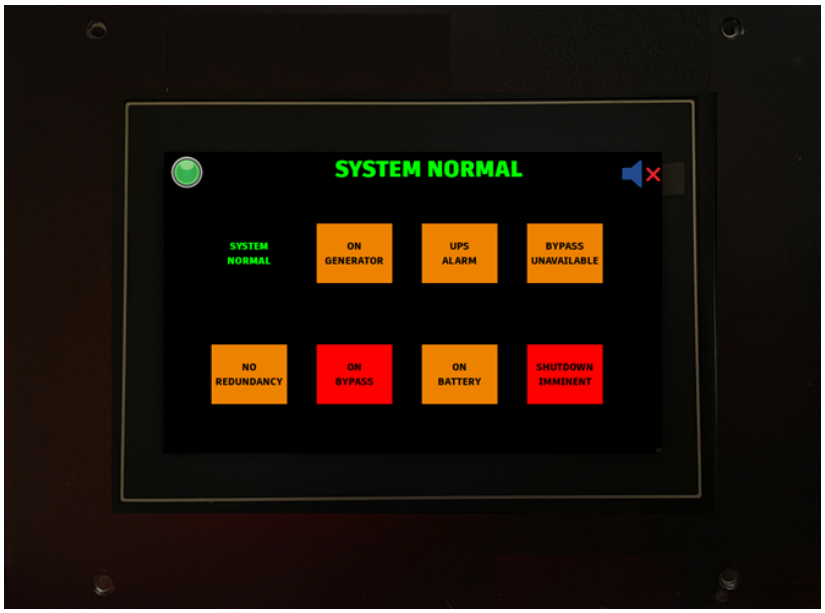
**⚠ ATTENTION!**

Ne pas faire fonctionner les contacts à plus de 30 VCA à 5 A maximum.

## 8.6 Remote Monitor Panel III

As an option, an RMP III can be installed to monitor the operation of the UPS system from virtually any location within the facility, up to 150m (500 ft) from the UPS. The RMP III contains backlit status indicators and a local horn. The RMP III is to be surface–mounted on a desktop, or secured to a wall. Figure 129 shows an RMP III.

**Figure 129. Remote Monitor Panel III**




The RMP III contains a local horn and the backlit status indicators listed in Table 45.

**Table 45. RMP III Status Indicators**

**SYSTEM NORMAL**
The UPS is energized (either with utility power or battery backup) and is supplying conditioned power to the critical load.

**NO REDUNDANCY**
This indicator applies only to parallel systems when one cabinet is not functioning.

**ON GENERATOR**
The UPS input and bypass are being supplied by the power from the generator instead of from the utility power.

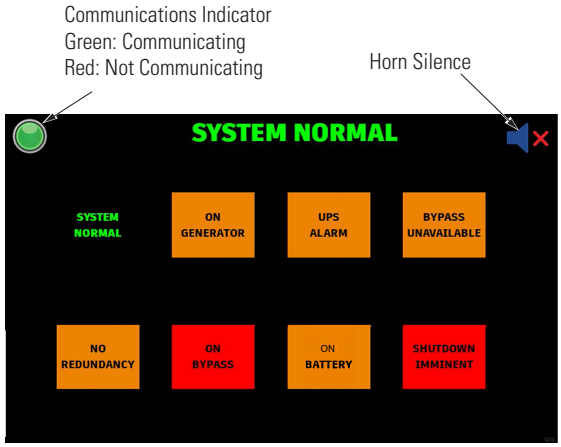
**ON BYPASS**
The bypass source is supplying the critical load. Usually this means that the UPS is not energized. The load is not protected in Bypass mode, and a horn sounds after 30 seconds.

**UPS ALARM**
The UPS system is issuing an alarm. Conditions that affect the current UPS mode are indicated by the indicators and horn on the UPS.

**ON BATTERY**
The UPS battery backup is supplying the critical load. The utility power is either interrupted or out of specification. The SYSTEM NORMAL indicator is also illuminated.

**BYPASS UNAVAILABLE**
The UPS system is in Online mode, but a bypass source is not within specification. A horn sounds after 30 seconds.

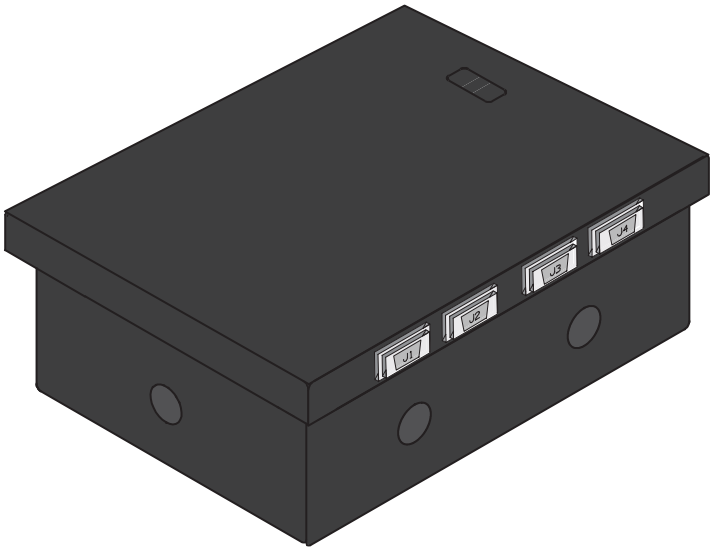
**SHUTDOWN IMMINENT**
The UPS is preparing to shut down because the UPS is in Battery mode and the DC voltage is approaching its low limit. This indicator is accompanied by a horn.



## 8.7 Relay Interface Module II

An optional RIM II uses relay contact closures to indicate the operating status and alarm condition of the UPS system. The module uses a serial interface line and may support up to eight critical loads. The RIM II can be flush–mounted or surface–mounted on a desktop, or secured to a wall. Figure 130 shows the RIM II with its four 15–pin connectors labeled J1 through J4.

**Figure 130. Relay Interface Module II**




The RIM II can provide the status and alarm signals shown in Table 46.

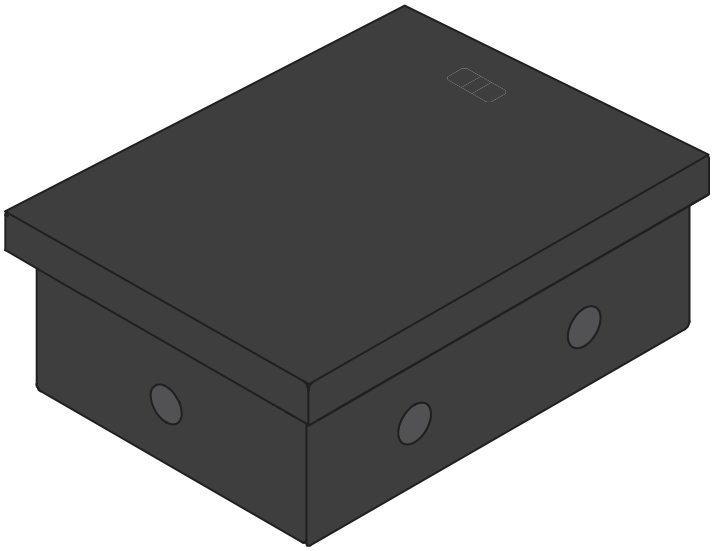
**Table 46. Customer Interface Connectors**

| Status | J1 through J4 | Description |
|---|---|---|
| **UPS AVAILABLE** | Pins 1 and 12 | Contacts are closed when the UPS is operating in Online mode or ready to supply the load. |
| **UPS OFFLINE** | Pins 3 and 13 | Contacts are open when the UPS is offline.<br>Contacts are closed when the UPS is operating in Online mode. |
| **BATTERY WEAK** | Pins 5 and 14 | Contacts are closed when approximately two minutes of battery time is remaining before the critical load is lost. |
| **UTILITY FAILURE** | Pins 6 and 15 | Contacts are closed when Utility Failure is detected. |

## 8.8 Supervisory Contact Module II

An optional SCM II establishes an interface between the UPS system and the customer's monitor. This interface allows the customer to monitor operational status of the UPS system equipment. The SCM II can be flush–mounted or surface–mounted on a desktop, or secured to a wall. Figure 131 shows the SCM II.

**Figure 131. Supervisory Contact Module II**



The SCM II provides signals for the indications shown in Table 47.

**Table 47. SCM II Status Indicators and Connections**

| Indication | TB2 Connections |
|---|---|
| **SYSTEM NORMAL** | TB2–1 through TB2–3 |
| **NO REDUNDANCY** | TB2–4 through TB2–6 |
| **ON GENERATOR** | TB2–7 through TB2–9 |
| **BYPASS NOT AVAILABLE** | TB2–10 through TB2–12 |
| **ON BATTERY** | TB2–13 through TB2–15 |
| **UPS ALARM** | TB2–16 through TB2–18 |
| **ON BYPASS** | TB2–19 through TB2–21 |
| **SHUTDOWN IMMINENT** | TB2–22 through TB2–24 |

# Chapter 9 UPS Maintenance

The components inside the UPS cabinet are secured to a sturdy metal frame. All repairable parts and assemblies are located for easy removal, with very little disassembly. This design allows authorized service personnel to perform routine maintenance and servicing quickly.

You must schedule periodic performance checks of your UPS system to keep it running properly. Regular routine checks of operation and system parameters enable your system to function efficiently for many trouble–free years.

## 9.1 Important Safety Instructions

Remember that your UPS system is designed to supply power **EVEN WHEN DISCONNECTED FROM THE UTILITY POWER**. The UPS module interiors are unsafe until the DC power source is disconnected and the electrolytic capacitors are discharged. After disconnecting the utility power and the DC power, authorized service personnel should wait at least five minutes for capacitor bleedoff before attempting internal access to the UPS module.

**⚠WARNING**

- Servicing and maintenance should be performed by qualified service personnel only.
- LETHAL VOLTAGE PRESENT. This unit should not be operated with the cabinet doors open or protective panels removed. Do not make any assumptions about the electrical state of any cabinet in the UPS system.

**⚠ AVERTISSEMENT!**

- L'installation et l'entretien ne doivent être effectués que par du personnel qualifié.
- PRÉSENCE DE TENSIONS MORTELLES. Ne pas faire fonctionner cette unité lorsque les portes de l'armoire sont ouvertes ou si les panneaux de protection ne sont pas en place. Ne jamais faire de suppositions au sujet de l'état électrique des armoires du système d'onduleur.

Because each battery string is an energy source in itself, opening the battery circuit breaker does not de-energize the voltage within the battery string. **DO NOT ATTEMPT TO ACCESS ANY INTERNAL AREA OF THE BATTERY STRING YOURSELF. VOLTAGES ARE ALWAYS PRESENT IN THE BATTERY STRING**. If you suspect that a battery string needs service, contact an Eaton service representative.

If the string requires service, refer to the battery manufacturer's operating manual for instructions on battery maintenance or contact an Eaton service representative.

Observe these precautions when working on or around batteries:

- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of batteries or battery cabinets.
- Disconnect the charging source prior to connecting or disconnecting terminals.
- Determine if the battery is inadvertently grounded. If it is, remove the source of the ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock is reduced if such grounds are removed during installation and maintenance.

- When replacing batteries, use the same number of sealed, lead–acid batteries.
- Proper disposal of batteries is required. Refer to your local codes for disposal requirements.
- Do not dispose of batteries in a fire. Batteries may explode when exposed to flame.
- Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

## 9.2 Performing Preventive Maintenance

The UPS system requires very little preventive maintenance. However, the system should be inspected periodically to verify that the units are operating normally and that the batteries are in good condition.

### 9.2.1 DAILY Maintenance

Perform the following steps daily:

1. Check the area surrounding the UPS system. Ensure the area is not cluttered, allowing free access to the unit.
2. Ensure the air intakes (vents on the front door and panel) and the exhaust opening (on top of the UPS cabinet) are not blocked.
3. Ensure the operating environment is within the parameters specified in paragraph 3.2.3 *Installation Considerations* and Chapter 10 *Product Specifications*.
4. Ensure the UPS is in Online mode (Online status indicator is illuminated). If an alarm lamp is illuminated or the Online status indicator is not illuminated, contact an Eaton service representative.

### 9.2.2 MONTHLY Maintenance

Perform the following steps monthly:

1. Monitor system parameters as described in paragraph 7.3 *Using the Color Touchscreen Control Panel*.
2. Check the UPS air filters (located behind the front panels or door) and wash or replace as necessary. See Figure 132 and Figure 133 for filter locations, and Table 48 for filter sizes. Contact an Eaton service representative for replacement filters. To remove the filters:

**Table 48. UPS Filter Sizes**

| Filter Location | Size |
|---|---|
| Bottom Left ISBM Section Air Filters (Continuous Static Switch only) | 12" x 20" x 0.25" |
| Bottom Right ISBM Section Air Filters (Continuous Static Switch only) | 12" x 20" x 0.25" |
| Middle Right ISBM Section Air Filter (Continuous Static Switch only) | 20" x 6.3" x 0.25" |
| FI-UPM Section Air Filters | 20" x 44" x 0.25" |

**⚠CAUTION**

Verify washed filters are thoroughly dry before reinstalling.

**ATTENTION!**

Vérifier que les filtres sont bien secs avant de les réinstaller.

To remove and replace the filters:

1. Remove one top screw and two bottom screws securing each UPM front panel. Lift each panel straight up to remove it from the panel hanger bracket at the top of the cabinet.
2. Remove one top screw and two bottom screws securing the ISBM left front panel. Lift the panel straight up to remove it from the panel hanger bracket at the top of the cabinet.
3. If the UPS is a continuous static switch configuration, unfasten the front door latch and swing the door open (See Figure 20).
4. Pull the foam filters over the screw heads on the cabinet mounted studs and remove the filters from the cabinet.
5. Push the washed or new foam filters over the screw heads on the cabinet mounted studs until seated against the cabinet.
6. Reinstall the UPM section front panels removed in Step a and secure with the retained hardware.
7. Reinstall the ISBM section front panel removed in Step b. and secure with the retained hardware.
8. If opened, close the front door and secure the latch.

**Figure 132. ISBM and UPM Section Air Filter Locations - Continuous Static Switch**

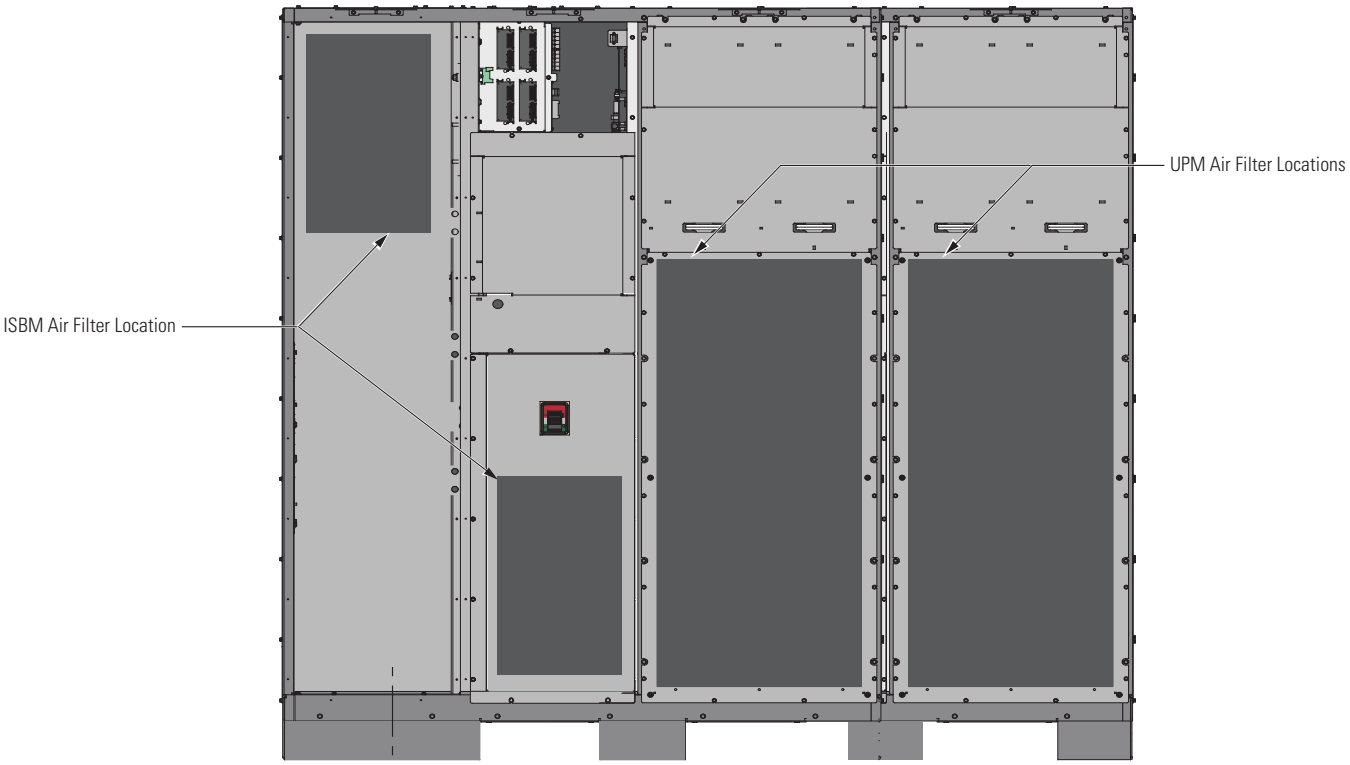
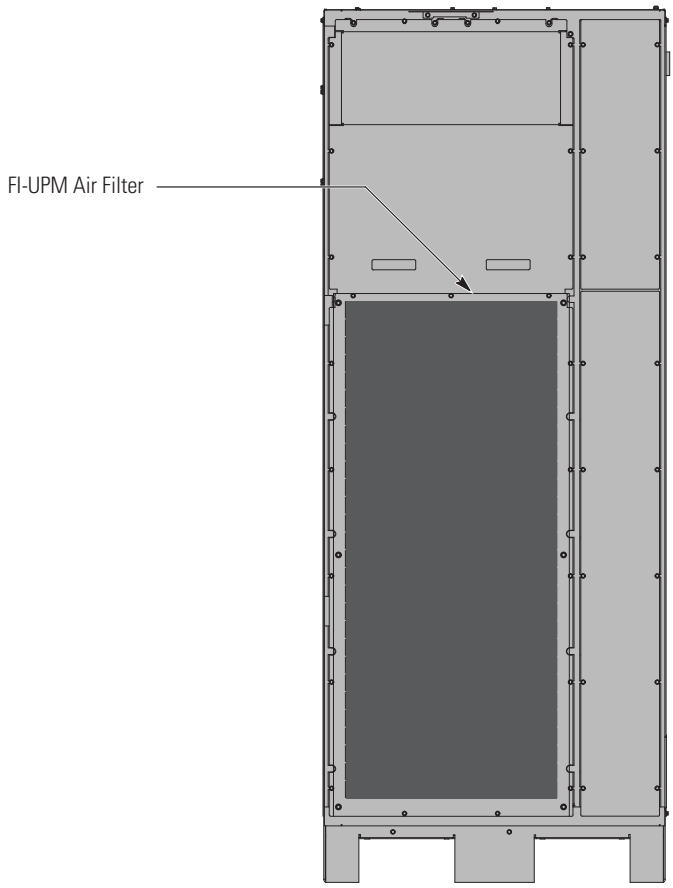


**Figure 133. FI-UPM Section Air Filter Locations**




9. If the UPS configuration included an FI-UPM model, check the FI-UPM air filter (located behind the front panel) and wash or replace as necessary. See Figure 133 for the filter location. The FI-UPM filter size is 20" x 44" x 0.25". Contact an Eaton service representative for a replacement filter. To remove the filter:

   a. Remove one top screw and two bottom screws securing the FI-UPM front panel (refer to the *Eaton® Power Xpert® 9395P UPS Field Installed UPM Mechanical Installation Manual (P-164000503)).* Lift the panel straight up to remove it from the panel hanger bracket at the top of the cabinet.

   b. Pull the foam filter over the screw heads on the cabinet mounted studs and remove the filter from the cabinet.

**⚠CAUTION**

Verify washed filter is thoroughly dry before reinstalling.

**⚠ ATTENTION!**

Vérifier que les filtres sont bien secs avant de les réinstaller.

   c. Push the washed or new foam filter over the screw heads on the cabinet mounted studs until seated against the cabinet.

d. Reinstall the FI-UPM front panel removed in Step a and secure with the retained hardware.

10. Record maintenance results and any corrective actions in a suitable log.

### 9.2.3 PERIODIC Maintenance

Periodic inspections of the UPS should be made to determine if components, wiring, and connections exhibit evidence of overheating. Particular attention should be given to bolted connections. Maintenance procedures should specify that the bolted connections be retorqued to values listed in this manual.

### 9.2.4 ANNUAL Maintenance

Annual preventive maintenance should be performed only by authorized service personnel familiar with maintenance and servicing of the UPS system. Contact an Eaton service representative for more information about service offerings.

### 9.2.5 BATTERY Maintenance

Contact an Eaton service representative for battery maintenance. Battery replacement and maintenance should be performed only by authorized service personnel.

## 9.3 Installing Batteries

**NOTE** There is no manual DC disconnect device within the UPS.

Install batteries in accordance with the battery and battery cabinet or battery rack manufacturer's instructions.

## 9.4 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.

**WARNING**

- 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 be toxic.
- A battery can cause electrical shock, burn from high short–circuit current, or fire. Observe proper precautions.

**AVERTISSEMENT!**

- Une batterie peut prêsenter un risque de choc êlectrique, de brulure, ou d'incendie. Suivre les précautions qui s'imposent.
- Pour le remplacement, utiliser le même nombre et modéle des batteries.
- L'élimination des batteries est règlementée. Consulter les codes locaux à cet effet.


**NO DISPOSAL**

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.


**ATTENTION!**

Ne pas jeter l'onduleur ou ses batteries aux ordures. Ce produit contient des batteries au plomb scellées, il est important de l'éliminer convenablement. Pour plus de renseignements, communiquer avec le centre régional de récupération/réutilisation ou d'élimination des déchets dangereux.

**NO DISPOSAL**

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

**ATTENTION!**

Ne pas éliminer les déchets d'équipements électriques et électroniques (DEEE) aux ordures. Pour connaître la méthode d'élimination appropriée, communiquer avec le centre régional de récupération/réutilisation ou d'élimination des déchets dangereux.

## 9.5 Maintenance Training

A basic training course, available from Eaton Corporation, gives you a competent working knowledge of the UPS system operation and teaches you how to perform first level corrective maintenance. For more information about training and other services, contact the Help Desk (see para. 1.10 *Getting Help*).

# Chapter 10 Product Specifications

## 10.1 Model Numbers

The UPS is housed in one or two free-standing cabinets with safety shields behind the door and front panels. The UPS is available in 50 or 60 Hz with various output power ratings.

| Models | Power Rating | Frequency |
|---|---|---|
| Eaton 9395P-600/600 (one or two UPM) | 600 kVA, 600 kVA | 50/60 Hz |
| Eaton 9395P-600/550 (one or two UPM) | 600 kVA, 550 kVA | 50/60 Hz |
| Eaton 9395P-600/500 (one or two UPM) | 600 kVA, 500 kVA | 50/60 Hz |
| Eaton 9395P-600/450 (one or two UPM) | 600 kVA, 450 kVA | 50/60 Hz |
| Eaton 9395P-600/400 (one or two UPM) | 600 kVA, 400 kVA | 50/60 Hz |
| Eaton 9395P-600/300 (one or two UPM) | 600 kVA, 300 kVA | 50/60 Hz |
| Eaton 9395P-600/275 (one or two UPM) | 600 kVA, 275 kVA | 50/60 Hz |
| Eaton 9395P-600/250 (one or two UPM) | 600 kVA, 250 kVA | 50/60 Hz |
| Eaton 9395P-600/225 (one or two UPM) | 600 kVA, 225 kVA | 50/60 Hz |
| Eaton 9395P-600/200 (one or two UPM) | 600 kVA, 200 kVA | 50/60 Hz |

## 10.2 Specifications

The following sections detail the input, output, battery, and environmental specifications for the UPS.

### 10.2.1 UPS Input

**Table 49. UPS Input**

| | |
|---|---|
| **Operating Input Voltage** | 600 Vac, 480 Vac, 415 Vac, 400 Vac, 380 Vac |
| **Operating Input Frequency Range** | 50/60 Hz |
| **Operating Input Current** | See Table 7 or Table 8 for 600V One/Two/Three UPM models.<br>See Table 9 or Table 10 for 575V One/Two/Three UPM models.<br>See Table 11 or Table 12 for 480V One/Two/Three UPM models.<br>See Table 13 or Table 14 for 415V One/Two/Three UPM models.<br>See Table 15 or Table 16 for 400V One/Two/Three UPM models.<br>See Table 17 or Table 18 for 380V One/Two/Three UPM models. |
| **Input Current Harmonic Content** | 3% THD at full load |
| **Power Factor** | Minimum 0.99 at full load |
| **Line Surges** | 6 kV OC, 3 kA SC per ANSI 62.41 and IEC 801-4 |
| **Battery Voltage** | 480 Vdc |
| **Battery Charging Capacity** | Configurable per UPM at nominal line voltage:<br>Up to 120A |
| **Battery Shunt Trip** | 48 Vdc |

### 10.2.2 UPS Output

**Table 50. UPS Output**

| | |
|---|---|
| **Output Voltage Regulation** | ±1.5% (10% to 100% load) |
| **Output Voltage (Nominal +/–3%)** | 600 Vac nominal, adjustable from 582 Vac to 618 Vac<br>575 Vac nominal, adjustable from 558 Vac to 592 Vac<br>480 Vac nominal, adjustable from 466 Vac to 494 Vac<br>400 Vac nominal, adjustable from 388 Vac to 412 Vac<br>380 Vac nominal, adjustable from 369 Vac to 391 Vac |
| **Output Voltage Harmonic Content** | 1.5% maximum THD (linear load)<br>5% maximum THD (nonlinear load) |
| **Output Current** | See Table 7 or Table 8 for 600V One/Two/Three UPM models.<br>See Table 9 or Table 10 for 575V One/Two/Three UPM models.<br>See Table 11 or Table 12 for 480V One/Two/Three UPM models.<br>See Table 13 or Table 14 for 415V One/Two/Three UPM models.<br>See Table 15 or Table 16 for 400V One/Two/Three UPM models.<br>See Table 17 or Table 18 for 380V One/Two/Three UPM models. |
| **Output Voltage Balance** | 2.5% for 100% maximum load imbalance (linear load) |
| **Output Voltage Phase Displacement** | ±4° for 100% maximum load imbalance (linear load) |
| **Output Transients** | Meets Class 1 IEC 62040-3 (10% to 100% load) |
| **Frequency Regulation** | ±0.1 Hz free running |
| **Synchronous to Bypass** | +10% to -10% |
| **Frequency Slew Rate** | .7 Hz per second maximum |
| **Load Compatibility** | 0.9 pF Leading<br>0.8 pF Lagging |
| **Overload Capability** | 110% for 10 minutes<br>125% for 120 seconds<br>150% for 15 seconds |

**NOTE** The 125% and 150% overloads are based on the non-derated hardware capability of the UPS.

### 10.2.3 UPS Environmental

**Table 51. UPS Environmental**

| | |
|---|---|
| **Operating Temperature** | All ratings except 600 kW, 300 kW: 0 to 40°C (32 to 104°F) at elevation up to 1000m without derating.<br>For 600 kW, 300 kW: 0 to 35°C at elevation up to 1000m without derating.<br>The recommended operating temperature is 25°C (77°F). |
| **Operating Altitude** | Maximum 1000 m (3000 ft) at 40°C without derating |
| **Storage Temperature** | –25 to +60°C, excluding batteries (prolonged storage above 40°C causes rapid battery self discharge) |
| **Relative Humidity (Operating and Storage)** | 5% to 95% maximum non-condensing |
| **Acoustical Noise** | 78 dB at a 1m distance, A weighted for one UPM UPS<br>81 dB at a 1m distance, A weighted for two UPM UPS<br>83 dB at a 1m distance, A weighted for three UPM UPS |
| **Electrostatic Discharge (ESD) Immunity** | Meets IEC 801-2 specifications. Withstands up to 25 kV pulse without damage and with no disturbance or adverse effect to the critical load. |

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