Eaton® 93PM Gen 2 UPS

20–250 kW (480V Three or Four-Wire) – 250 kW Frame
20–250 kW (480V Three or Four-Wire) – 250 kW Frame with Sidecar (Top Wire Entry or Bypass)
Installation and Operation Manual

Powering Business Worldwide

p/n: P-164001031
Revision 02

IMPORTANT SAFETY INSTRUCTIONS - SAVE THESE INSTRUCTIONS

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

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 des batteries et de l'onduleur. Veuillez consulter entièrement ces instructions avant de faire fonctionner l'équipement et conserver ce manuel afin de pouvoir vous y reporter ultérieurement.

⚠ IMPORTANT

Specifications are subject to change. To ensure you have the most up-to-date content and information for this product, please review the latest manual revision on our website, Eaton 93PM 480V UPS resources page.

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P-110000654-001 Revised: December 21st, 2018

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LICENSE NOTICES:
Eaton Intelligent Power Limited
Eaton House,
30 Pembroke Road,
Dublin 4,
D04 Y0C2,
Ireland

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Dear Customer,

On behalf of everyone at Eaton, we thank you for partnering with us, for trusting us to maintain your business continuity and for 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, and lighting strikes, and enable you to monitor and control your power infrastructure.

We trust that our products will deliver high quality, reliable power for your business, and we are committed to your success.

Please read this manual, which details the installation and operation processes for your new Eaton product.

Thank you for choosing Eaton!

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Chapter 1 Introduction

The Eaton® 93PM Gen 2 200/250 kW, Three or Four-Wire 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 Eaton 93PM Gen 2 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 Eaton 93PM Gen 2 UPS 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 Eaton 93PM Gen 2 UPS is available with up to five Uninterruptible Power Modules (UPMs) integrated in one cabinet. Each UPM is rated for a maximum of 50 kW. The system maximum rating is 250 kW. To deliver greater reliability, a UPS with two or more UPMs can provide N+1 redundancy up to a maximum of 200 kW. Should one UPM become unavailable or require servicing, the remaining UPMs supply the load instead of transferring to bypass.

The UPS is housed in a single free-standing cabinet, with safety shields behind the door for hazardous voltage protection. Power wiring is installed through the bottom of the cabinet with an optional sidecar available for top entry wiring.Figure 1 shows the Eaton 93PM Gen 2 UPS and Figure 2 shows the Eaton 93PM Gen 2 UPS with a left or right-mounted Sidecar (either Top Entry Wiring or SIAC-B).

NOTE Startup and operational checks must be performed by an authorized Eaton Customer Service Engineer, or the warranty terms specified on the product's resources page become void. See Chapter 11 *Warranty* for details. This service is offered as part of the sales contract for the UPS. Contact an Eaton service representative in advance (a minimum two-week notice is required) to reserve a preferred startup date.

1.1 UPS Standard Features

1.1.1 Installation Features

- Line-up-and-match or standalone configurations
- Power wiring can be routed through the bottom of the cabinet in standalone configurations or alternately through the top when configured with an optional accessory sidecar
- Battery wiring can be run internally through the left or right sides of the UPS cabinet in line-up-and-match configurations
- Easily accessible mechanical terminals located at the bottom front of the cabinet reduce installation time
- Control wiring can be routed through the top or bottom of the UPS cabinet, or through the left or right sides of the UPS cabinet in line-up-and-match configurations
- Built-in casters for easy cabinet placement
- Cabinet bolt holes are provided for permanently mounting the UPS using optional front and back or left and right side floor mounting bracket kits

Figure 1. Eaton 93PM Gen 2 200/250 kW UPS

Figure 2. Eaton 93PM Gen 2 200/250 kW UPS with Sidecar

UPS with Left-Mounted Sidecar

UPS with Right-Mounted Sidecar

NOTE The Eaton 93PM Gen 2 200 kW UPS (up to 4 UPMs) has the same frame dimensions and ratings as the Eaton 93PM Gen 2 250 UPS.

1.1.2 Control Panel

The control panel, located on the front of the UPS, contains a color liquid crystal touch screen display (LCD) and a horizontal row of LED indicators 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.

1.1.3 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.
- **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.
- **Minislot Communication Bays** – Four communication bays are standard equipment. One to four optional Minislot® connectivity cards can be installed in the UPS at any time. Minislot cards are quickly installed at the front of the UPS and are hot-pluggable.

For additional information on these topics, see Chapter 8 *Communication*.

1.1.4 Energy Saver System Mode

The 93PM Gen 2 Series UPS offers an Energy Saver System (ESS) mode that 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. See Chapter 7 *UPS Operating Instructions*, for additional information.

1.1.5 Internal Redundancy

To deliver greater reliability, the Eaton 93PM Gen 2 UPS can be configured for internal 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.

1.1.6 Advanced Battery Management

Advanced Battery Management (ABM) technology uses sophisticated sensing circuitry and a three-stage charger. The charger is a high-frequency, IGBT-based power conversion stage that extends the useful service life of UPS batteries by isolating the battery from the electrical environment, except for periodic charging or reserve mode operation. ABM also protects batteries from damage due to high current charging and inverter ripple currents. Charging at high currents can overheat and damage batteries.

ABM extends battery life by keeping the batteries charged and performing periodic battery testing. The battery test checks the batteries by transferring to battery mode. During the test the battery voltage is constantly monitored to determine Battery Health. ABM is intended for VRLA style batteries.

An ABM charging cycle starts with the charger driving the battery voltage at maximum current limit, to a battery charge level of 2.30volts/cell. The time it takes for the voltage to reach the battery charge level is saved as the battery charge time. If the battery charge time exceeds 24 hours, an alarm sounds.

When the battery reaches the float level, the battery is charged at the float level for 48 hours. Due to charger capability, some battery cabinet configurations extend float level to 72 hours. Twenty-four hours into the float period, a series of battery tests are performed to check the battery health. The float level charge continues after a successful test.

After initial startup, the battery run time on the front panel display indicates two minutes. After the 24-hour float charging period and automated battery testing, the actual battery run time is determined and the actual battery run time is displayed.

After the float period is completed, the charger is disconnected and the batteries are allowed to rest for up to 672 hours (28 days) maximum rest time. If the battery voltage falls below the opportunity charge level of 2.1V/cell during the first 240 hours (10 days) of the rest period, an alarm sounds.

An ABM charge cycle is initiated whenever one of these four conditions occurs since the last charge cycle:

- The batteries have rested over the maximum rest time of 672 hours.
- Accumulated discharge time is over a maximum battery discharge time of 20 seconds.
- Battery voltage is under the opportunity charge level of 2.1 volts/cell and the cabinet has been in rest mode for longer than 240 hours.
- A Battery Test command has been initiated.

1.2 Options and Accessories

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

1.2.1 Integrated Battery Cabinet

Battery backup protection with additional runtime can be provided by equipping the UPS system with up to four Integrated Battery Cabinets (IBCs) containing sealed lead-acid or lithium-ion, maintenance-free batteries. The IBCs are housed in single, free-standing cabinets designed for line-up-and-match installation, but may be installed separate from the UPS cabinet. An external battery disconnect switch or tie point must be used when three or four IBCs are located separate from the UPS cabinet. The IBCs may be installed on either the right or left side of the UPS cabinet. The recommended installation location for adjacent battery cabinets is on the right side of the UPS cabinet.

1.2.2 Sidecar Integrated Accessory Cabinet-Bypass

A Sidecar Integrated Accessory Cabinet-Bypass (SIAC-B) provides maintenance bypass functions. The SIAC-B is available in two, three, or four breaker configurations enabling power to completely bypass the UPS. The UPS can then be safely serviced or replaced without interrupting power to critical systems. Our manufacturing facility installs the SIAC-B on either the right or left side of the UPS cabinet based on the order requirements. The SIAC-B can also be used for top entry wiring access.

1.2.3 Top Entry Wiring Sidecar

If required, a sidecar is available for top entry power wiring. The sidecar performs the function of a wireway routing the wires to the terminals mounted at the bottom of the UPS cabinet. The sidecar can be installed on the left or right side of the UPS cabinet.

1.2.4 Integrated Accessory Cabinet-Power Distribution

The Integrated Accessory Cabinet-Power Distribution (IAC-PD) provides power distribution options for servers, racks, and other equipment via distribution panelboards, or distributes power to larger loads via distribution subfeed circuit breakers. The distribution options are customer configurable, enabling adaptation and expansion without costly electrical rework. The IAC-PD may be installed in a line-and-match or standalone configuration.

The IAC-PD may be installed on either the right or left side of the UPS cabinet.

1.2.5 Monitoring and Communication

Minislot Cards – Optional Minislot cards support several protocols, such as SNMP, SMTP, HTTP, Modbus®, and TCP/IP. See Chapter 8 *Communication*, for additional information on monitoring and communication features.

Remote Monitoring Device (RMD) – An optional RMD contains a touch screen status display and a local audible alarm, allowing monitoring of the operational status and alarm condition of the UPS from virtually any location within the facility, up to 300 feet from the UPS.

Refer to the ***Eaton Remote Monitoring Device (RMD) Installation and Operation Manual***, listed in paragraph 1.8 *For More Information*, for additional information.

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 an Eaton Industrial Gateway Card (INDGW-M2) connectivity card in an Minislot communication bay and an Environmental Monitoring Probe (EMP) for battery temperature/humidity monitoring. See Chapter 8 *Communication*, for additional information.

1.2.6 Additional Output Surge Protection

The Eaton 93PM Gen 2 UPS complies with ANSI 62.41 for line surges. However, if added security is required an additional Surge Protection Device (SPD) can be installed. For this application, a 480V Delta Style SPD Type 1 or Type 2 installed on the facility power panel feeding the UPS is recommended. The SPD must meet the Maximum Continuous Operating Voltage (MCOV) for a 480V Delta Style SPD. Eaton offers a variety of SPD solutions including the Eaton SPD Series with various kA ratings options.

1.3 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 or lithium-ion batteries. An external battery disconnect switch or tie point must be used when battery systems are located separate from the UPS cabinet and wiring exceeds the number of battery terminals available.

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

1.4 Basic System Configurations

The following basic UPS system configurations are possible:

- Single UPS (20–250 kW) with one to four external battery cabinets
- Single UPS (20–250 kW) with one to four external battery cabinets and accessory cabinets

The UPS system configuration can be enhanced by adding optional accessories such as a Remote Emergency Power-off (REPO) control or Minislot communication cards.

1.5 Using This Manual

This manual describes how to install and operate the Eaton 93PM Gen 2 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 or the LOAD OFF procedure, see Chapter 1 *Introduction*.

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, Chapter 1 *Introduction* through Chapter 4 *UPS System Installation* and Chapter 7 *UPS Operating Instructions* should be examined.

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

1.6 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
Note	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, an external battery system, and options or accessories installed.

The term line-up-and-match refers to accessory cabinets that are physically located adjacent to the UPS. The term standalone refers to accessory cabinets that are located separate from the UPS.

Left and right side notations are referenced standing in front of the cabinet.

1.7 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 or lithium-ion 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.

1.8 For More Information

Refer to the ***Eaton Samsung Gen 3 Battery Cabinet Installation and Operation Manual***, ***Eaton 93PM Integrated Battery Cabinet Installation Manual-Small Welded***, *or the* ***Eaton 93PM Universal Integrated Battery Cabinet Installation Manual-Large and Large High Rate*** for the following additional information:

- Installation instructions, including site preparation, planning for installation, wiring and safety information, and detailed illustrations of cabinets with dimensional and connection point drawings

Refer to the ***Eaton 93PM Integrated Accessory Cabinet-Power Distribution (208V 4–Wire IAC-PD, 480V 3–Wire IAC-PD, 480V 4–Wire IAC-PD) Installation and Operation Manual*** for the following additional information:

- Installation instructions, including site preparation, planning for installation, wiring and safety information, and detailed illustrations of cabinets with dimensional and connection point drawings
- Operation, including breakers, standard features and optional accessories, procedures for using the bypass functions, and information about maintenance

Refer to the ***Eaton Remote Monitoring Device (RMD) Installation and Operation Manual*** for additional installation and operating instructions.

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

1.9 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 Customer Reliability Center at:

United States:	**1-800-843-9433**
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

1.10 Equipment Registration

Please visit www.eaton.com/pq/register to register your new Eaton UPS / Eaton UPS Accessory.

Model Number: _____

Serial Number: _____

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). Do not operate near water or excessive humidity (95% maximum). The system is not intended for outdoor use.
- 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.
- Emergency Power Off (EPO) and Remote Emergency Power Off (REPO) functionality is disabled for UPS systems configured for UL 924 auxiliary lighting. To remove power from the system a LOAD OFF command must be given using the front panel controls and all breakers opened. Review Chapter 7 *UPS Operating Instructions*, for details.
- 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 voltage rated gloves and electrical hazard footwear.
- ELECTRIC ENERGY HAZARD. Do not attempt to alter any UPS or battery wiring or connectors. Attempting to alter wiring can cause injury.
- 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). 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 fonctionnalités de mise hors tension d'urgence (EPO) et de mise hors tension d'urgence à distance (REPO) sont désactivées pour les systèmes UPS configurés pour l'éclairage auxiliaire UL 924. Pour couper l'alimentation du système, une commande LOAD OFF doit être donnée à l'aide des commandes du panneau avant et tous les disjoncteurs doivent être ouverts. Consultez Chapter 7 *UPS Operating Instructions*, pour plus de détails.
- 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 UPS and battery systems, and required precautions. Keep unauthorized personnel away from equipment. Consider all warnings, cautions, and notes before installing or servicing equipment. 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 with 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.
- Lead-acid batteries can present a risk of fire because they generate hydrogen gas. Do not smoke when near batteries. Do not cause flame or spark in battery area. Discharge static electricity from body before touching batteries by first touching a grounded metal surface.
- 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.

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.
2. Prepare your site for the UPS system.
3. Inspect and unpack the UPS cabinet.
4. Unload and install the UPS cabinet, and wire the system.
5. Complete the Installation Checklist.
6. 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 product's resources page become void. See Chapter 11 *Warranty* for details. This service is offered as part of the sales contract for the UPS. Contact an Eaton service representative in advance (a minimum 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 this chapter's procedures and illustrations and those in Chapter 4 *UPS System 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. The operating environment must meet the weight, clearance, and environmental requirements specified.

3.2.1 Environmental and Installation Considerations

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.
- 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.

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 operated at an altitude no higher than 1500m (5000 ft) without derating. For additional assistance with high altitude operation, contact an Eaton service representative (see paragraph 1.9 *Getting Help*).

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

⚠CAUTION

Do not expose the UPS to overly aggressive environments, like salt mist or corrosive gases. High relative humidity accelerates the effects of contaminants. The UPS should be installed in a G1 environment (based on ANSI/ISA S-71.04 classifications). 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 (see paragraph 1.9 *Getting Help*).

⚠ ATTENTION!

N'exposez pas l'onduleur à des environnements trop agressifs, comme du brouillard salin ou des gaz corrosifs. Une humidité relative élevée accélère les effets des contaminants. L'onduleur doit être installé dans un environnement G1 (basé sur les classifications ANSI/ISA S-71.04). Si l'onduleur est utilisé dans un environnement plus agressif, cela peut entraîner une durée de vie réduite du produit et éventuellement une panne précoce. Si l'emplacement d'installation ne correspond pas à l'environnement recommandé, contactez le représentant du service Eaton pour plus d'informations (voir le paragraphe 1.9 *Getting Help*).

- The environmental requirements specified below are for the air at the intake ports of the 93PM UPS, and are the maximum, not to exceed, ratings.
  - 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.
- 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 the actual temperature.
  - 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 night to 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.

The basic environmental requirements for operation of the UPS are:

- Storage Temperature: -25°C to +55°C (-13°F to 131°F)
- Ambient Temperature Range: 5°C to +40°C (41°F to 104°F)
- Recommended Operating Temperature Range: -0°C to +40°C (32°F to 104°F)
- Storage and Use Maximum Relative Humidity: 5 to 95%, noncondensing
  - There shall be at least a 1.8°F (1.0°C) difference between the dry bulb temperature and the wet bulb temperature, always, to maintain a non-condensing environment

- This product was designed for installation and use in a G1 environment as defined in ANSI/ISA-71.04-2013. Refer to Table 1 for gas concentration limits.

Table 1. G1 Equipment Data from ANSI/ISA-71.04-2013

Contaminant	Gas	Gas Concentration in ppbv
Group A	H^2S	<3
	SO^2SO^3	<10
	Cl^2	<1
	NOx	<50
Group B	HF	<1
	NH^3	<500
	O^3	<2
NOTE: Table information copied from Table B1 of ANSI/ISA-71.04-2013 for G1 equipment		

⚠CAUTION

If battery systems are located in the same room as the UPS, the battery manufacturer's environmental requirements should be followed if they are more stringent than the UPS requirements. Operating temperatures above the recommended range will result in decreased battery life and performance, and may reduce or void the battery warranty.

⚠ ATTENTION!

Si les systèmes de batteries sont situés dans la même pièce que l'onduleur, les exigences environnementales du fabricant de la batterie doivent être respectées si elles sont plus strictes que les exigences de l'onduleur. Des températures de fonctionnement supérieures à la plage recommandée entraîneront une diminution de la durée de vie et des performances de la batterie et pourront réduire ou annuler la garantie de la batterie.

The UPS ventilation requirements are shown in Table 2. To allow for future power upgrades, Eaton recommends using air conditioning or ventilation sized for the fully rated UPS kW frame size installed instead of the derated kW ordered. Sizing the site cooling infrastructure to be capable of cooling the maximum kW frame size will allow a full power rating upgrade without having to modify the infrastructure.

Table 2. Air Conditioning or Ventilation Requirements During Full Load Operation (480V)

Model	UPS Rating	Max Heat Dissipation at 100% Load KW (BTU/HR)	Minimum Required Cooling Air Flow
Eaton 93PM Gen 2 200/250-1 Eaton 93PM Gen 2 200-2 (N+1)	50 kW	1.67 [5701]	2400 CFM
Eaton 93PM Gen 2 200/250-2 Eaton 93PM Gen 2 200-3 (N+1)	100 kW	3.34 [11402]	
Eaton 93PM Gen 2 200/250-3 Eaton 93PM Gen 2 200-4 (N+1)	150 kW	5.01 [17102]	
Eaton 93PM Gen 2 200/250-4 Eaton 93PM Gen 2 200-5 (N+1)	200 kW	6.68 [22803]	
Eaton 93PM Gen 2 250-5	250 kW	8.35 [28504]	

The UPS equipment operating environment must meet the weight requirements shown in Table 3, and Table 4 and the size requirements shown in Figure 3 through Figure 11. Dimensions are in millimeters (inches).

Table 3. Three-Wire UPS Cabinet Weights

	Weight					
	Shipping		Installed		Point Loading	
Model	kG	Lbs	kG	Lbs	kG	Lbs
Eaton 93PM Gen 2 200/250 – 1 UPM Installed	388	855	361	795	4 at 90	199
Eaton 93PM Gen 2 200/250 – 2 UPMs Installed	431	949	404	890	4 at 101	222
Eaton 93PM Gen 2 200/250 – 3 UPMs Installed	474	1044	447	985	4 at 112	246
Eaton 93PM Gen 2 200/250 – 4 UPMs Installed	517	1139	490	1079	4 at 122	270
Eaton 93PM Gen 2 200/250 – 5 UPMs Installed	559	1233	532	1174	4 at 133	293
Eaton 93PM Gen 2 200/250–1 with Empty Sidecar	502	1107	469	1035	6 at 78	172
Eaton 93PM Gen 2 200/250–2 with Empty Sidecar	545	1202	512	1129	6 at 85	188
Eaton 93PM Gen 2 200/250–3 with Empty Sidecar	588	1296	555	1224	6 at 93	204
Eaton 93PM Gen 2 200/250–4 with Empty Sidecar	631	1391	598	1319	6 at 100	220
Eaton 93PM Gen 2 200/250–5 with Empty Sidecar	674	1486	641	1413	6 at 107	236
Eaton 93PM Gen 2 200/250–1 with 4-Breaker SIAC-B	615	1355	582	1282	6 at 97	214
Eaton 93PM Gen 2 200/250–2 with 4-Breaker SIAC-B	658	1450	625	1377	6 at 104	230
Eaton 93PM Gen 2 200/250–3 with 4-Breaker SIAC-B	701	1544	668	1472	6 at 111	245
Eaton 93PM Gen 2 200/250–4 with 4-Breaker SIAC-B	744	1639	711	1567	6 at 118	261
Eaton 93PM Gen 2 200/250–5 with 4-Breaker SIAC-B	786	1734	754	1661	6 at 126	277

Table 4. Four-Wire UPS Cabinet Weights

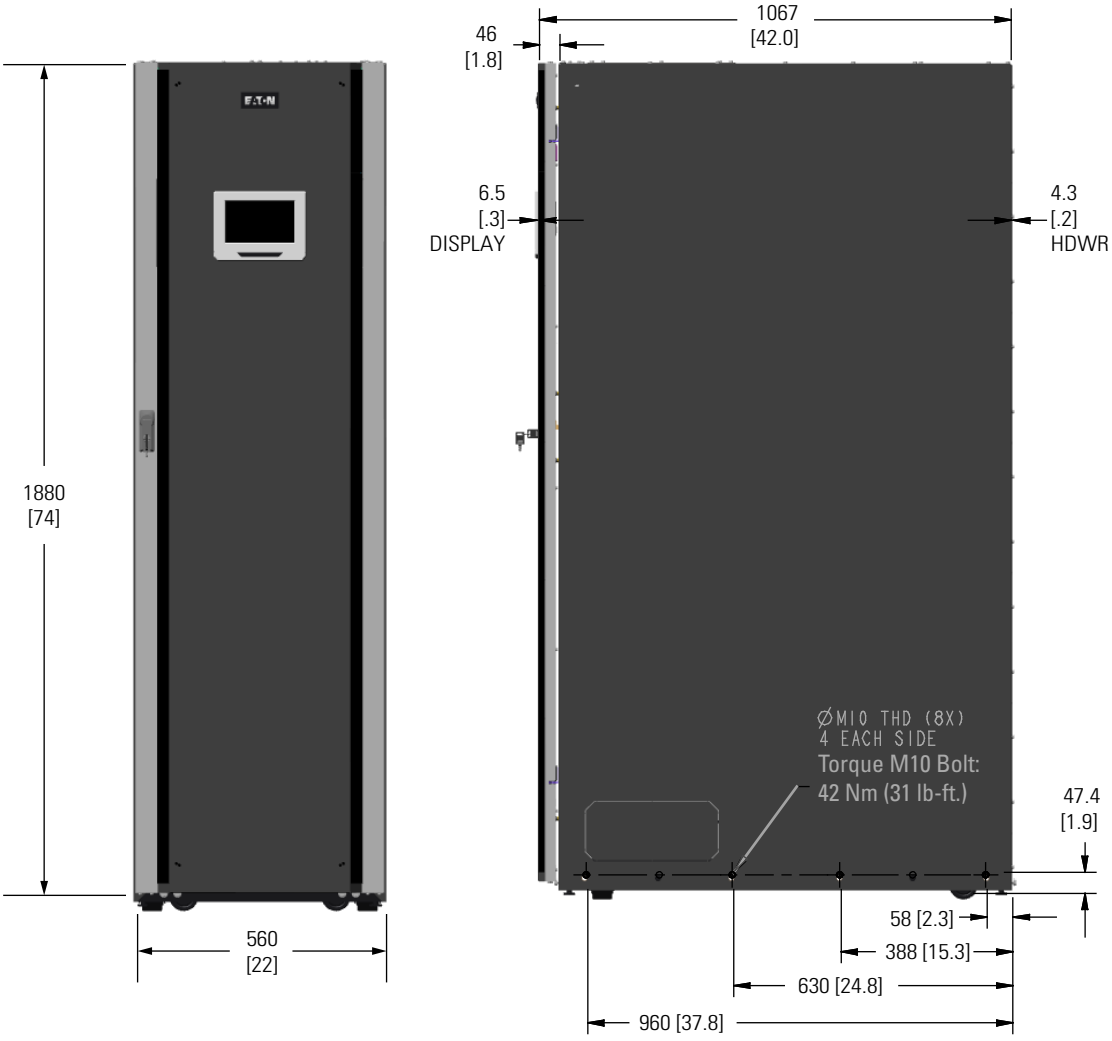
	Weight						
	Shipping		Installed		Point Loading		
Model	kG	Lbs	kG	Lbs		kG	Lbs
Eaton 93PM Gen 2 200/250 – 1 UPM Installed	409	901	382	842	4 at	95	210
Eaton 93PM Gen 2 200/250 – 2 UPMs Installed	452	996	425	937	4 at	106	234
Eaton 93PM Gen 2 200/250 – 3 UPMs Installed	495	1091	468	1031	4 at	117	258
Eaton 93PM Gen 2 200/250 – 4 UPMs Installed	538	1185	511	1126	4 at	128	281
Eaton 93PM Gen 2 200/250 – 5 UPMs Installed	581	1280	554	1220	4 at	138	305
Eaton 93PM Gen 2 200/250–1 with Empty Sidecar	518	1141	491	1081	6 at	82	180
Eaton 93PM Gen 2 200/250–2 with Empty Sidecar	560	1235	533	1176	6 at	89	196
Eaton 93PM Gen 2 200/250–3 with Empty Sidecar	603	1330	576	1271	6 at	96	212
Eaton 93PM Gen 2 200/250–4 with Empty Sidecar	646	1425	619	1365	6 at	103	228
Eaton 93PM Gen 2 200/250–5 with Empty Sidecar	689	1519	662	1460	6 at	110	243
Eaton 93PM Gen 2 200/250–1 with 4-Breaker SIAC-B	642	1415	609	1342	6 at	101	224
Eaton 93PM Gen 2 200/250–2 with 4-Breaker SIAC-B	685	1510	652	1437	6 at	109	240
Eaton 93PM Gen 2 200/250–3 with 4-Breaker SIAC-B	728	1604	695	1532	6 at	116	255
Eaton 93PM Gen 2 200/250–4 with 4-Breaker SIAC-B	771	1699	738	1627	6 at	123	271
Eaton 93PM Gen 2 200/250–5 with 4-Breaker SIAC-B	814	1794	781	1721	6 at	130	287

The UPS cabinet uses forced air cooling to regulate internal component temperature. Air inlets are in the front of the cabinet and outlets are on top or in the back of the cabinet. Allow clearance in front of and on top or in back of the cabinet for proper air circulation. The clearances required around the UPS cabinet are shown in Table 5.

Table 5. UPS Cabinet Clearances

From Front of Cabinet	914 mm (36") working space
From Top of Cabinet with Top Exhaust	457 mm (18") minimum clearance for ventilation
From Top of Cabinet with Rear Exhaust	457 mm (18")
From Back of Cabinet with Rear Exhaust	254 mm (10") minimum clearance for ventilation
From Back of Cabinet with Top Exhaust	None Required
From Right Side of Cabinet	None Required
From Left Side of Cabinet	None Required

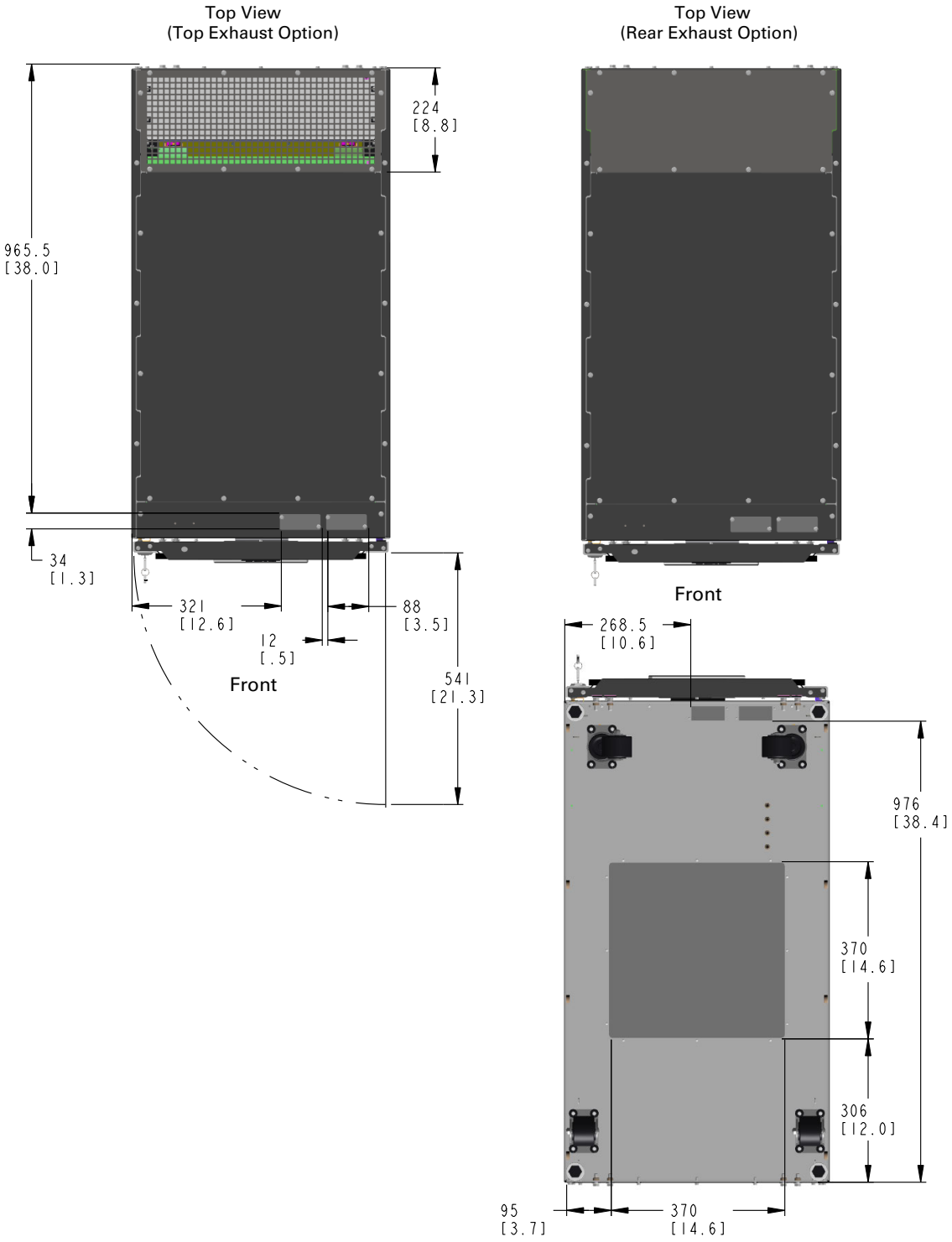
Figure 3. UPS Cabinet Dimensions (Front and Right Side Views)



Front **Right Side**

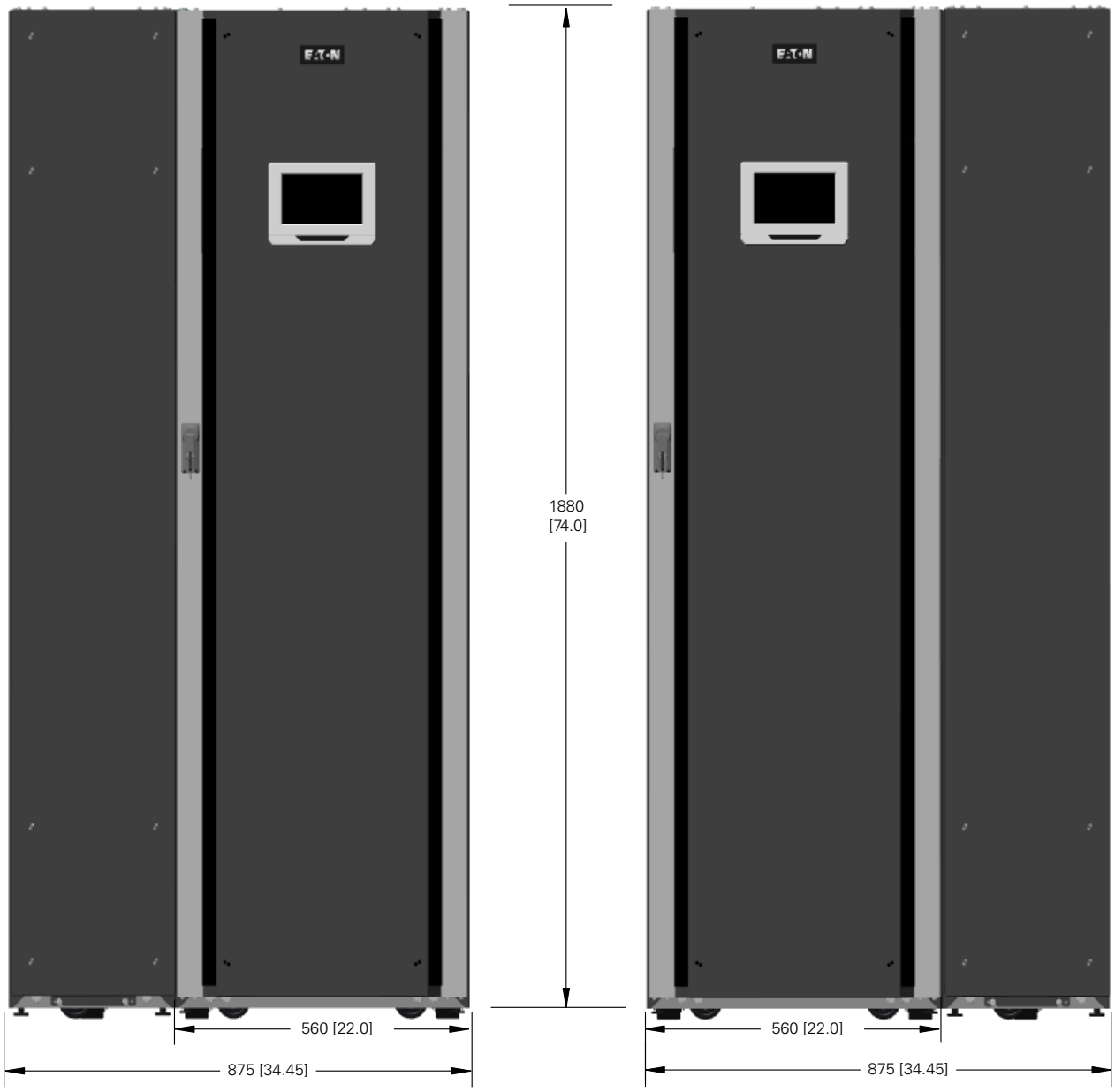
Dimensions are in millimeters [Inches]

Figure 4. UPS Cabinet Dimensions (Top and Bottom Views)



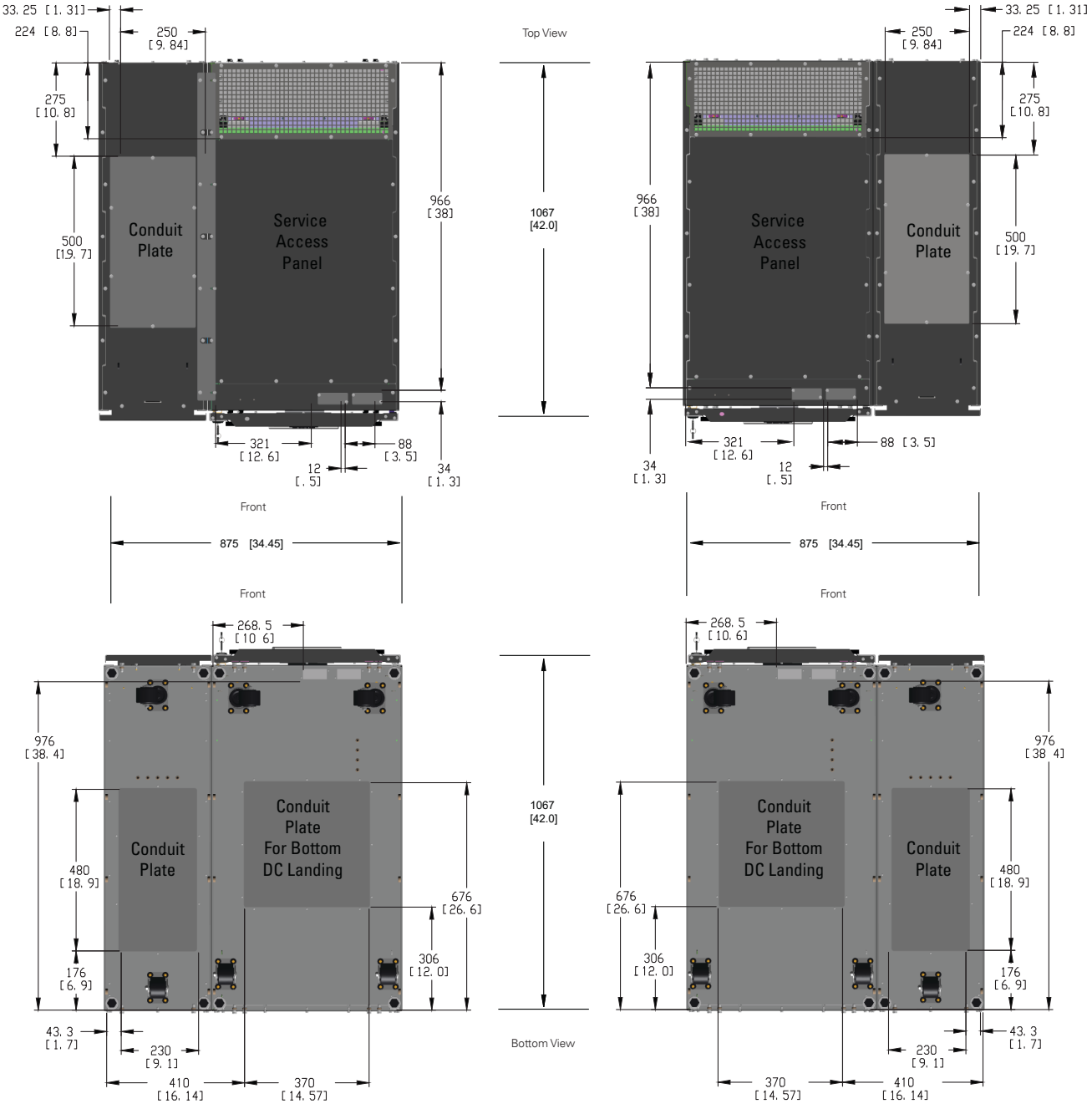
Dimensions are in millimeters [inches]

Figure 5. UPS Cabinet with Left or Right-Mounted Sidecar Dimensions (Front Views)



Dimensions are in millimeters [inches]

Figure 6. UPS Cabinet with Left or Right-Mounted Sidecar Dimensions (Top and Bottom Views)

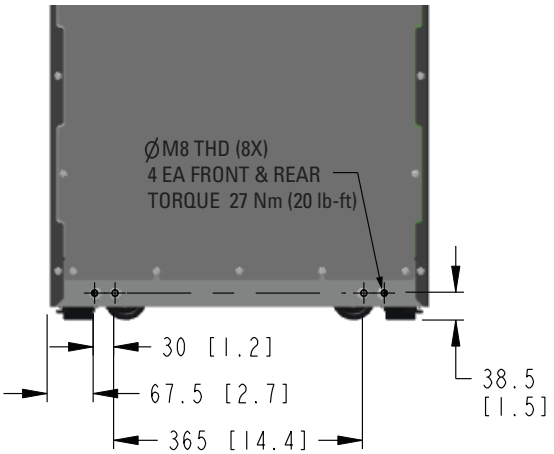


UPS with Left-Mounted Bypass Sidecar
(Top Exhaust Option Shown)

UPS with Right-Mounted Bypass Sidecar
(Top Exhaust Option Shown)

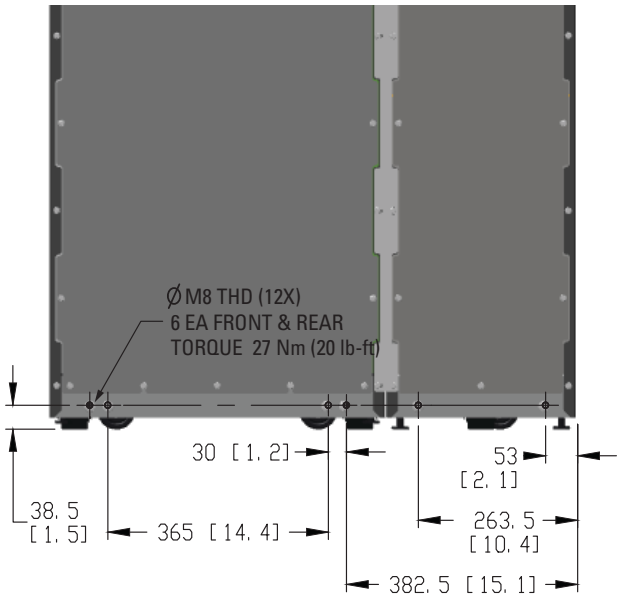
Dimensions are in millimeters [inches]

Figure 7. UPS Cabinet Rear Floor Mounting Bracket Mounting Dimensions

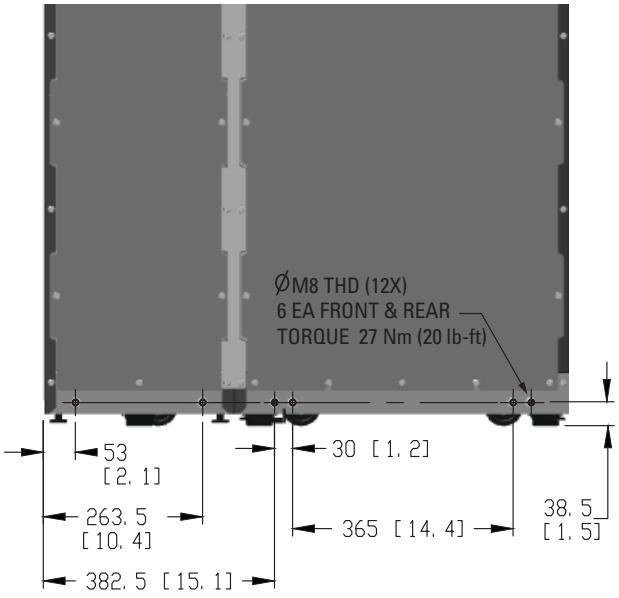


Note: All examples shown with top exhaust option

UPS



UPS with Left-Mounted Sidecar

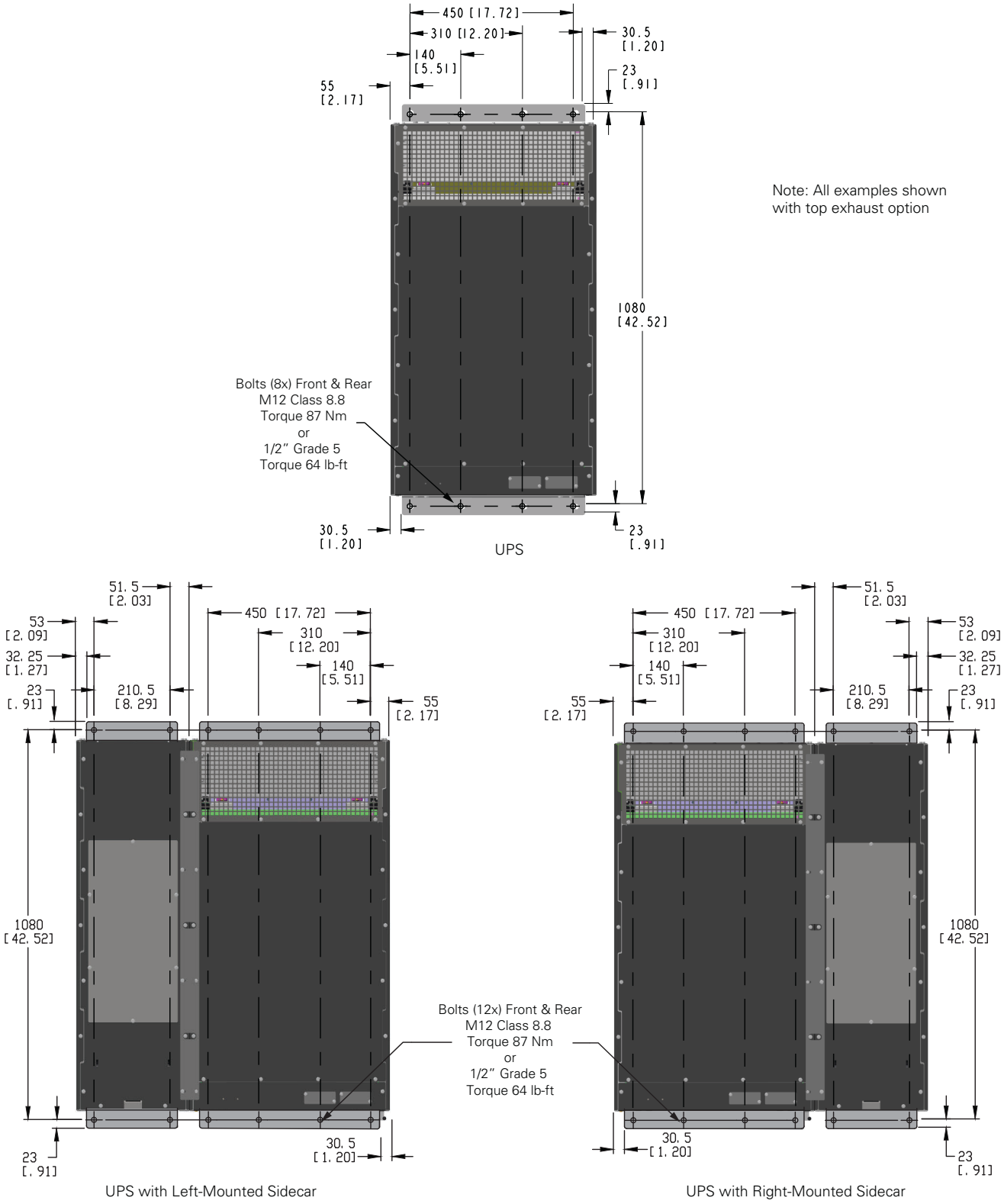


UPS with Right-Mounted Sidecar

Dimensions are in millimeters [inches]

NOTE The UPS Front Floor Mounting Bracket's mounting dimensions are identical to the Rear Floor Mounting Bracket dimensions.

Figure 8. UPS Cabinet Floor Mounting Bracket Dimensions



Dimensions are in millimeters [inches]

Figure 9. UPS Cabinet Center of Gravity

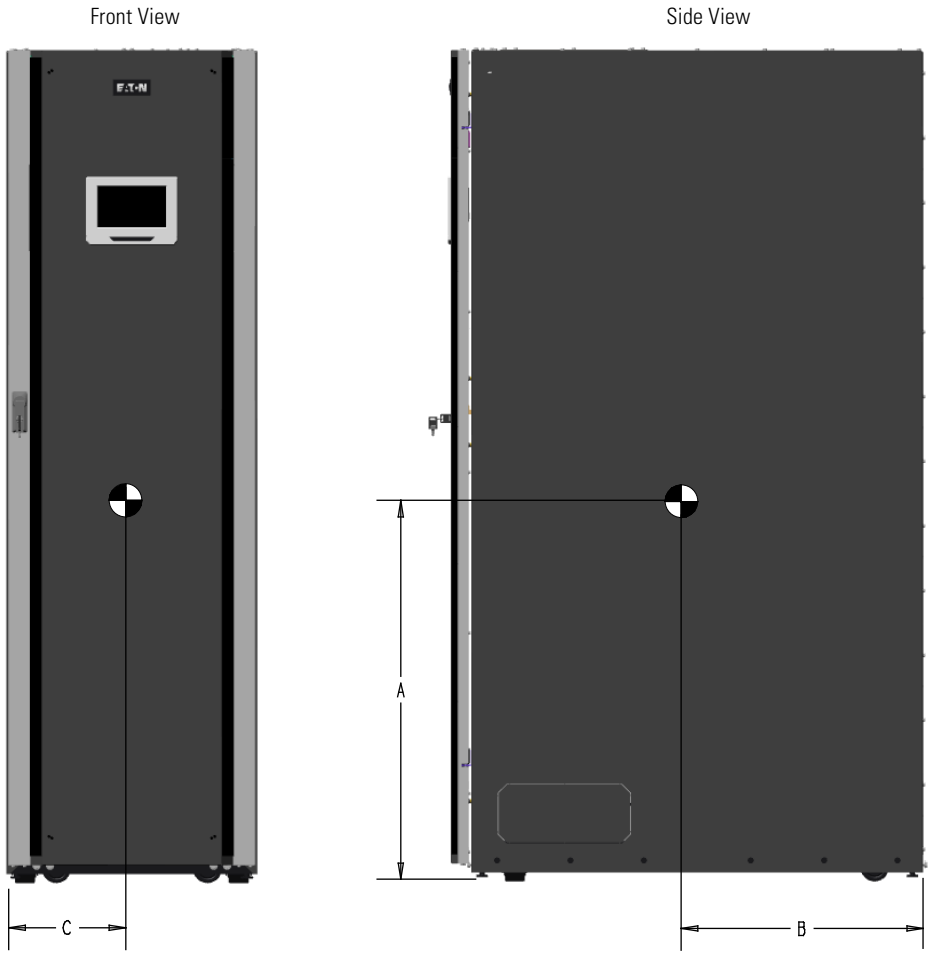


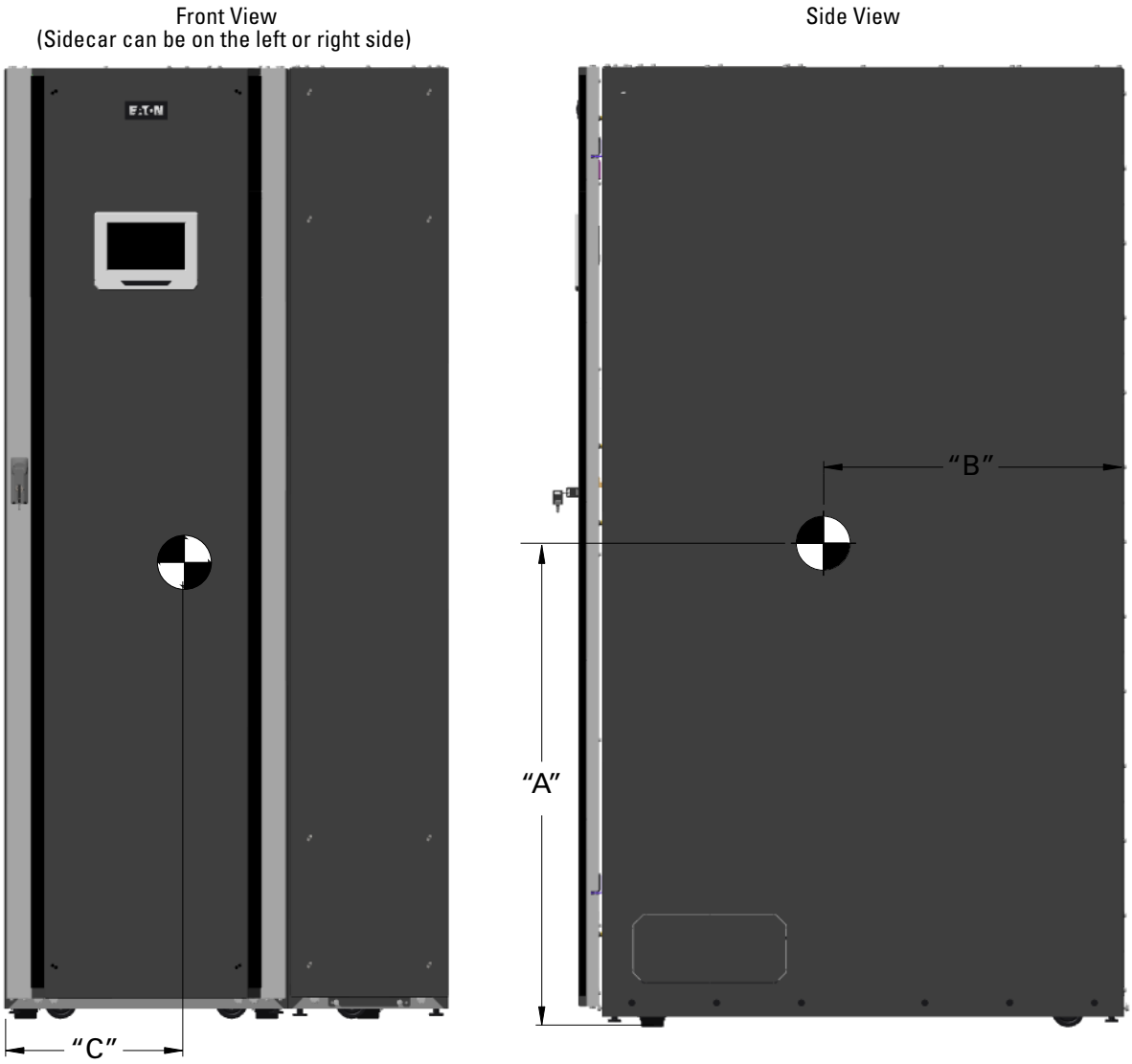
Table 6. Three-Wire UPS – Center of Gravity Dimensions

Weight and Center of Gravity	Dimensions See Figure 9.						Weight	
	A		B		C			
	mm	in	mm	in	mm	in	kG	Lbs
Eaton 93PM Gen 2 200/250 with 1 UPM Installed	905	35.6	514	20.2	279	11.0	361	795
Eaton 93PM Gen 2 200/250 with 2 UPMs Installed	931	36.7	521	20.5	279	11.0	404	890
Eaton 93PM Gen 2 200/250 with 3 UPMs Installed	969	38.2	527	20.8	279	11.0	447	985
Eaton 93PM Gen 2 200/250 with 4 UPMs Installed	1017	40.0	532	21.0	279	11.0	490	1079
Eaton 93PM Gen 2 200/250 with 5 UPMs Installed	1071	42.1	536	21.1	279	11.0	532	1174

Table 7. Four-Wire UPS – Center of Gravity Dimensions

Weight and Center of Gravity	Dimensions mm [in] See Figure 9.						Weight	
	A		B		C			
	mm	in	mm	in	mm	in	kG	Lbs
Eaton 93PM Gen 2 200/250 with 1 UPM Installed	905	35.6	514	20.2	279	11.0	382	842
Eaton 93PM Gen 2 200/250 with 2 UPMs Installed	931	36.7	521	20.5	279	11.0	425	937
Eaton 93PM Gen 2 200/250 with 3 UPMs Installed	969	38.2	527	20.8	279	11.0	468	1031
Eaton 93PM Gen 2 200/250 with 4 UPMs Installed	1017	40.0	532	21.0	279	11.0	511	1126
Eaton 93PM Gen 2 200/250 with 5 UPMs Installed	1071	42.1	536	21.1	279	11.0	554	1220

Figure 10. UPS Cabinet with Left or Right-Mounted Sidecar Center of Gravity



NOTE: For left sidecar, the "C" dimension is mirrored using the right side of UPS as reference.

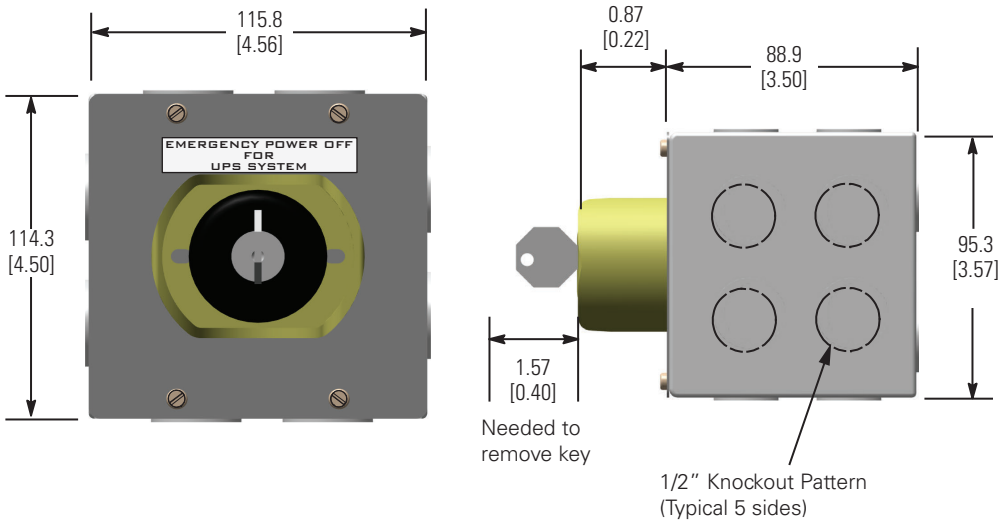
Table 8. Three-Wire UPS with Sidecar - Center of Gravity Dimensions

Weight and Center of Gravity	Dimensions mm [in] See Figure 10.						Weight	
	A		B		C			
	mm	in	mm	in	mm	in	kG	Lbs
Eaton 93PM Gen 2 200/250–1 with Empty Sidecar	901	35.5	521	20.5	388	15.3	469	1035
Eaton 93PM Gen 2 200/250–2 with Empty Sidecar	922	36.3	527	20.7	378	14.9	512	1129
Eaton 93PM Gen 2 200/250–3 with Empty Sidecar	954	37.5	531	20.9	371	14.6	555	1224
Eaton 93PM Gen 2 200/250–4 with Empty Sidecar	994	39.1	535	21.1	364	14.3	598	1319
Eaton 93PM Gen 2 200/250–5 with Empty Sidecar	1040	40.9	538	21.2	358	14.1	641	1413
Eaton 93PM Gen 2 200/250–1 with 4-Breaker SIAC-B	877	34.5	554	21.8	431	17.0	582	1282
Eaton 93PM Gen 2 200/250–2 with 4-Breaker SIAC-B	896	35.3	556	21.9	421	16.6	625	1377
Eaton 93PM Gen 2 200/250–3 with 4-Breaker SIAC-B	924	36.4	558	22.0	411	16.2	668	1472
Eaton 93PM Gen 2 200/250–4 with 4-Breaker SIAC-B	959	37.8	559	22.0	403	15.9	711	1567
Eaton 93PM Gen 2 200/250–5 with 4-Breaker SIAC-B	1001	39.4	561	22.1	396	15.6	754	1661

Table 9. Four-Wire UPS with Sidecar - Center of Gravity Dimensions

Weight and Center of Gravity	Dimensions mm [in] See Figure 10.						Weight	
	A		B		C			
	mm	in	mm	in	mm	in	kG	Lbs
Eaton 93PM Gen 2 200/250–1 with Empty Sidecar	901	35.5	521	20.5	388	15.3	491	1081
Eaton 93PM Gen 2 200/250–2 with Empty Sidecar	922	36.3	527	20.7	378	14.9	533	1176
Eaton 93PM Gen 2 200/250–3 with Empty Sidecar	954	37.5	531	20.9	371	14.6	576	1271
Eaton 93PM Gen 2 200/250–4 with Empty Sidecar	994	39.1	535	21.1	364	14.3	619	1365
Eaton 93PM Gen 2 200/250–5 with Empty Sidecar	1040	40.9	538	21.2	358	14.1	662	1460
Eaton 93PM Gen 2 200/250–1 with 4-Breaker SIAC-B	877	34.5	554	21.8	431	17.0	609	1342
Eaton 93PM Gen 2 200/250–2 with 4-Breaker SIAC-B	896	35.3	556	21.9	421	16.6	652	1437
Eaton 93PM Gen 2 200/250–3 with 4-Breaker SIAC-B	924	36.4	558	22.0	411	16.2	695	1532
Eaton 93PM Gen 2 200/250–4 with 4-Breaker SIAC-B	959	37.8	559	22.0	403	15.9	738	1627
Eaton 93PM Gen 2 200/250–5 with 4-Breaker SIAC-B	1001	39.4	561	22.1	396	15.6	781	1721

Figure 11. Remote EPO Switch Dimensions



Dimensions are in millimeters (inches)

3.2.2 UPS System Power Wiring Preparation

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

⚠WARNING

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.

⚠ AVERTISSEMENT!

En raison des charges connectées, un courant de fuite élevé est possible. Une connexion à la terre est requise pour la sécurité et le bon fonctionnement du produit. Ne vérifiez pas le fonctionnement de l'onduleur par une action incluant le retrait de la connexion à la terre avec les charges connectées.

- Refer to national and local electrical codes for acceptable external wiring practices.
- To allow for future power upgrades, Eaton recommends installing the UPS using wiring and external overcurrent protection breakers sized for the fully rated UPS kW frame size installed instead of the derated kW ordered. Wiring for the maximum kW frame size will allow a full power rating upgrade without having to modify the site wiring infrastructure.
- For external wiring, use 75°C copper wire.

NOTICE

This product has been evaluated for use with **copper wire** *only*. For external wiring, use only 75°C copper wire.

NOTICE

Ce produit a été évalué pour une utilisation avec du fil de cuivre uniquement. Pour le câblage externe, utilisez uniquement du fil de cuivre à 75°C.

Wire sizes listed in Table 10 through Table 13 are for copper wiring only. If wire is run in an ambient temperature greater than 40°C, larger size wire may be necessary. Wire sizes are based on using the specified breakers.

- The AC output and output ground wiring to the critical load should be sized the same as the UPS rectifier, bypass, and rectifier and bypass ground wiring if the recommended output breaker listed in Table 20 is not installed in the system.
- Recommended wire sizes are based on NFPA National Electrical Code® (NEC®)70 Table 310.15(B)(16) 75° C ampacity with 40°C ambient correction factors.
- Connect rectifier input to a 3 wire, grounded Wye source.
- **Three-Wire UPS** — Supported single source, single feed power sources:
  - 3-wire grounded Wye (TN,TT) – Rectifier Input
  - 3-wire grounded Wye (TN,TT) – Bypass Input

⚠CAUTION

SINGLE HIGH IMPEDANCE GROUND SOURCE – In North American installations, the neutral conductor from the high impedance ground source of supply CANNOT be used.

ATTENTION!

SOURCE DE TERRE UNIQUE À HAUTE IMPÉDANCE – Dans les installations nord-américaines, le conducteur neutre de la source d'alimentation à la terre à haute impédance NE PEUT PAS être utilisé.

- **Four-Wire UPS** — Supported single source, single feed power sources:
  - 3-wire grounded Wye (TN,TT) – Rectifier Input
  - 4-wire grounded Wye (TN,TT) – Bypass Input
- Phase rotation must be clockwise starting with phase A (rotation A, B, C).
- If installing an external maintenance bypass, all feeds to the UPS including the Rectifier Input Breaker (RIB) (if installed) must have a service disconnect independent of the maintenance bypass power path. Most maintenance bypass solutions provide UPS input feeds derived from but isolated from the maintenance bypass power path. If the maintenance bypass solution being installed does not provide such functionality, DO NOT use a single feeder breaker to supply both the UPS and the maintenance bypass.
- The Eaton 93PM Gen 2 UPS provides backfeed detection and protection through a shunt trip mechanism of the bypass input breaker.

For external wiring recommendations, including the minimum AWG size of external wiring, see Table 10 through Table 13. Wire sizes listed are for copper wiring only.

NOTICE

This product has been evaluated for use with **copper wire** *only*. For external wiring, use only 75°C copper wire.

NOTICE

Ce produit a été évalué pour une utilisation avec du fil de cuivre uniquement. Pour le câblage externe, utilisez uniquement du fil de cuivre à 75°C.

Table 10. Three-Wire UPS - Input/Output Ratings and Wiring Recommendations: 50–150 kW (480/480)

		Units	Rating 50/60 Hz		
Basic Unit Rating		kW	50	100	150
Input and Output Voltage		Volts	480/480	480/480	480/480
AC Input to UPS Rectifier (0.99 Minimum pF) Full load current plus battery recharge current (3) Phases, (1) Ground	**A**	Amps	73	146	218
Minimum Conductor Size (Phase A, B, and C) Number per Phase		AWG or kcmil (each)	3 (1)	3/0 (1)	1/0 (2)
Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	8 (1)	6 (1)	6 (2)
AC Input to UPS Bypass (Three-Wire UPS) – Full Load Current (3) Phases, (1) Ground	**B**	Amps	73	146	218
Minimum Conductor Size (Phase A, B, C) Number per Phase		AWG or kcmil (each)	3 (1)	3/0 (1)	1/0 (2)

Table 10. Three-Wire UPS - Input/Output Ratings and Wiring Recommendations: 50–150 kW (480/480) (Continued)

Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	8 (1)	6 (1)	6 (2)
DC Input from External Battery Systems (216 Cells) (1) Positive, (1) Negative, (1) Ground	**C**	Voltage Total Amps	432 124	432 248	432 372
Minimum Conductor Size (Phase Positive and Negative) Number per Pole		AWG or kcmil (each)	1/0 (1)	1/0 (2)	4/0 (2)
Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	6 (1)	6 (2)	2 (2)
DC Input from External Battery Systems (240 Cells) (1) Positive, (1) Negative, (1) Ground	**C**	Voltage Total Amps	480 112	480 223	480 335
Minimum Conductor Size (Phase Positive and Negative) Number per Pole		AWG or kcmil (each)	1 (1)	1 (2)	3/0 (2)
Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	6 (1)	6 (2)	4 (2)
AC Output to Critical Load (Three-Wire UPS) – Full Load Current (3) Phases, (1) Ground	**D**	Amps	60	120	180
Minimum Conductor Size (Phase A, B, and C) Number per Phase		AWG or kcmil (each)	4 (1)	2/0 (1)	4/0 (1)
Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	8 (1)	6 (1)	4 (1)

NOTE Callout letters **A**, **B**, **C** and **D** map to Oneline Schematics detailed in Chapter 6 *UPS Oneline Schematics*.

Eaton recommends installing the UPS using wiring and external overcurrent protection breakers sized for the fully rated UPS kW frame size installed.

Table 11. Three-Wire UPS - Input/Output Ratings and Wiring Recommendations: 200–250 kW (480/480)

		Units	**Rating 50/60 Hz**	
Basic Unit Rating		kW	200	250
Input and Output Voltage		Volts	480/480	480/480
AC Input to UPS Rectifier (0.99 Minimum pF) Full load current plus battery recharge current (3) Phases, (1) Ground	**A**	Amps	291	360
Minimum Conductor Size (Phase A, B, and C) Number per Phase		AWG or kcmil (each)	3/0 (2)	4/0 (2)
Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	6 (2)	4 (2)

Table 11. Three-Wire UPS - Input/Output Ratings and Wiring Recommendations: 200–250 kW (480/480) (Continued)

AC Input to UPS Bypass (Three-Wire UPS) – Full Load Current (3) Phases, (1) Ground	**B**	Amps	291	360
Minimum Conductor Size (Phase A, B, C) Number per Phase		AWG or kcmil (each)	3/0 (2)	4/0 (2)
Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	6 (2)	4 (2)
DC Input from External Battery Systems (216 Cells) (1) Positive, (1) Negative, (1) Ground	**C**	Voltage Total Amps	432 496	432 620
Minimum Conductor Size (Phase Positive and Negative) Number per Pole		AWG or kcmil (each)	3/0 (3)	250 MCM (3)
Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	4 (3)	2 (3)
DC Input from External Battery Systems (240 Cells) (1) Positive, (1) Negative, (1) Ground	**C**	Voltage Total Amps	480 447	480 558
Minimum Conductor Size (Phase Positive and Negative) Number per Pole		AWG or kcmil (each)	250 MCM (2)	4/0 (3)
Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	2 (2)	2 (3)
AC Output to Critical Load (Three-Wire UPS) – Full Load Current (3) Phases, (1) Ground	**D**	Amps	241	300
Minimum Conductor Size (Phase A, B, and C) Number per Phase		AWG or kcmil (each)	350 MCM (1)	3/0 (2)
Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	3 (1)	6 (2)

NOTE Callout letters **A**, **B**, **C** and **D** map to Oneline Schematics detailed in Chapter 6 *UPS Oneline Schematics*.

Eaton recommends installing the UPS using wiring and external overcurrent protection breakers sized for the fully rated UPS kW frame size installed.

Table 12. Four-Wire UPS - Input/Output Ratings and Wiring Recommendations: 50–150 kW (480/480)

	Units	**Rating 50/60 Hz**		
Basic Unit Rating	kW	50	100	150
Input and Output Voltage	Volts	480/480	480/480	480/480
AC Input to UPS Rectifier (0.99 Minimum pF) Full load current plus battery recharge current (3) Phases, (1) Ground	Amps	73	146	218
Minimum Conductor Size (Phase A, B, and C) Number per Phase	AWG or kcmil (each)	2 (1)	4/0 (1)	2/0 (2)

Table 12. Four-Wire UPS - Input/Output Ratings and Wiring Recommendations: 50–150 kW (480/480) (Continued)

Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	8 (1)	6 (1)	6 (2)
AC Input to UPS Bypass (Four-Wire UPS) Full Load Current (3) Phases, (1) Neutral – see Note, (1) Ground	**B**	Amps	73	146	218
Neutral Current			73	146	218
Minimum Conductor Size (Phase A, B, C) Number per Phase		AWG or kcmil (each)	2 (1)	4/0 (1)	2/0 (2)
Neutral Wire Size Number			2 (1)	4/0 (1)	2/0 (2)
Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	8 (1)	6 (1)	6 (2)
DC Input from External Battery Systems (240 Cells) (1) Positive, (1) Negative, (1) Ground	**C**	Voltage Total Amps	480 112	480 223	480 335
Minimum Conductor Size (Phase Positive and Negative) Number per Pole		AWG or kcmil (each)	1 (1)	1 (2)	3/0 (2)
Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	6 (1)	6 (2)	4 (2)
AC Output to Critical Load (Four-Wire UPS) Full Load Current (3) Phases, (1) Neutral – see Note, (1) Ground	**D**	Amps	60	120	180
Neutral Current			60	120	180
Minimum Conductor Size (Phase A, B, and C) Number per Phase		AWG or kcmil (each)	3 (1)	2/0 (1)	1 (2)
Neutral Wire Size Number			3 (1)	2/0 (1)	1 (2)
Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	8 (1)	6 (1)	6 (2)

NOTE Callout letters **A**, **B**, **C** and **D** map to Oneline Schematics detailed in Chapter 6 *UPS Oneline Schematics*.

Eaton recommends installing the UPS using wiring and external overcurrent protection breakers sized for the fully rated UPS kW frame size installed.

The neutral conductor is sized the same as the phase conductor for balanced and resistive loads. Non-linear loads, up to the maximum of 1.5x the load current, require a larger neutral conductor and should be sized in accordance with NFPA NEC 70 Article 310.15(B)(5).

Table 13. Four-Wire UPS - Input/Output Ratings and Wiring Recommendations: 200–250 kW (480/480)

		Units	Rating 50/60 Hz	
Basic Unit Rating		kW	200	250
Input and Output Voltage		Volts	480/480	480/480
AC Input to UPS Rectifier (0.99 Minimum pF) Full load current plus battery recharge current (3) Phases, (1) Ground	**A**	Amps	291	360
Minimum Conductor Size (Phase A, B, and C) Number per Phase		AWG or kcmil (each)	4/0 (2)	300 MCM (2)
Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	6 (2)	4 (2)
AC Input to UPS Bypass (Four-Wire UPS) Full Load Current (3) Phases, (1) Neutral – see Note, (1) Ground	**B**	Amps	291	360
Neutral Current			291	360
Minimum Conductor Size (Phase A, B, C) Number per Phase		AWG or kcmil (each)	4/0 (2)	300 MCM (2)
Neutral Wire Size Number			4/0 (2)	300 MCM (2)
Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	6 (2)	4 (2)
DC Input from External Battery Systems (240 Cells) (1) Positive, (1) Negative, (1) Ground	**C**	Voltage Total Amps	480 447	480 558
Minimum Conductor Size (Phase Positive and Negative) Number per Pole		AWG or kcmil (each)	250 MCM (2)	4/0 (3)
Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	2 (2)	2 (3)
AC Output to Critical Load (Four-Wire UPS) Full Load Current (3) Phases, (1) Neutral – see Note, (1) Ground	**D**	Amps	241	300
Neutral Current			241	300
Minimum Conductor Size (Phase A, B, and C) Number per Phase		AWG or kcmil (each)	2/0 (2)	4/0 (2)
Neutral Wire Size Number			2/0 (2)	4/0 (2)

Table 13. Four-Wire UPS - Input/Output Ratings and Wiring Recommendations: 200–250 kW (480/480) (Continued)

Minimum Conductor Size (Ground) Number	–	AWG or kcmil (each)	6 (2)	6 (2)

NOTE Callout letters **A**, **B**, **C** and **D** map to Oneline Schematics detailed in Chapter 6 *UPS Oneline Schematics*.

Eaton recommends installing the UPS using wiring and external overcurrent protection breakers sized for the fully rated UPS kW frame size installed.

The neutral conductor is sized the same as the phase conductor for balanced and resistive loads. Non-linear loads, up to the maximum of 1.5x the load current, require a larger neutral conductor and should be sized in accordance with NFPA NEC 70 Article 310.15(B)(5).

IMPORTANT

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. This UPS should always have an input source neutral connected at the bypass input terminals. This neutral must be continuous and uninterrupted; even if there are no phase-to-neutral loads connected to the UPS output. If the UPS is fed from a 4-pole ATS that interrupts the neutral, a delta-to-wye isolation transformer, with its secondary neutral bonded to ground, must be placed in line with the bypass input of the UPS. This will provide an uninterrupted neutral to the UPS, regardless of the position of the ATS neutral contact.

Note: if an overlapping neutral or make-before-break ATS switch is used, the neutrals must overlap for a minimum of 50 msec during the transition. In these cases, a transformer is not needed.

Power wiring terminals E1 through E11, and E12 for Four-Wire UPS, 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 14 for external power cable terminations, Table 15 for supplied external wiring terminal hardware, and Table 16 for recommended installation parts and tools not supplied by Eaton.

Figure 20 and Figure 21 show the location of the UPS power cable terminals.

Table 14. UPS External Power Cable Terminations

Terminal Function	Terminal	Function	Bus Landings (using back-to-back lugs)	Tightening Torque Nm (lb in)		Screw Size and Type
AC Input to UPS Rectifier	E1	Phase A	4 – 2 bolt mounting	35 (310)		M12 Hex
	E2	Phase B	4 – 2 bolt mounting	35 (310)		M12 Hex
	E3	Phase C	4 – 2 bolt mounting	35 (310)		M12 Hex
AC Input to Bypass	E6	Phase A	4 – 2 bolt mounting	35 (310)		M12 Hex
	E7	Phase B	4 – 2 bolt mounting	35 (310)		M12 Hex
	E8	Phase C	4 – 2 bolt mounting	35 (310)		M12 Hex
If Four-Wire UPS	E12	Neutral	8 – 2 bolt mounting	35 [310]		M12 Hex
AC Output to Critical Load	E9	Phase A	4 – 2 bolt mounting	35 (310)		M12 Hex
	E10	Phase B	4 – 2 bolt mounting	35 (310)		M12 Hex
	E11	Phase C	4 – 2 bolt mounting	35 (310)		M12 Hex
If Four-Wire UPS	E12	Neutral	8 – 2 bolt mounting	35 [310]		M12 Hex
DC Input from Battery	E4	Battery (+)	4 – 2 bolt mounting	35 (310)		M12 Hex
	E5	Battery (-)	4– 2 bolt mounting	35 (310)		M12 Hex
Customer Ground	Ground	Ground	14 - #14-1/0 pressure termination	8 AWG	4.5 [40]	Slotted
				4 AWG - 6 AWG	5.1 [45]	
				3 AWG - 1/0	5.6 [50]	

NOTE Customer ground, sized in accordance with NEC Table 250.122, can be run in any conduit listed in Table 17 and Table 18.

Table 15. Supplied External Wiring Terminal Hardware Kit

Part	Size	Quantity	Terminal Used On
Bolt, Grade 5	M12 x 35 mm	60	Rectifier Input, Bypass Input, Battery Input, and Output to Critical Load
Flat Washer	M12	60	Rectifier Input, Bypass Input, Battery Input, and Output to Critical Load
Conical Washer	M12	60	Rectifier Input, Bypass Input, Battery Input, and Output to Critical Load

NOTE For additional information (including part numbers and manufacturer information) and/or assistance contact an Eaton service representative (see paragraph 1.9 *Getting Help*).

Table 16. Recommended Installation Parts and Tools (Not Supplied by Eaton)

Part	Size	Quantity	Notes
Long Barrel 2-Hole Lug	6 AWG	As Required	Copper wire only
	4 AWG		
	2 AWG		
	1 AWG		
	1/0 AWG		
	2/0 AWG		
	3/0 AWG		
	4/0 AWG		
	250 MCM		
	300 MCM		
	350 MCM		
	500 MCM		
Manual Hydraulic Crimp Tool	14 Ton	1	
Die Set	N/A	1	

NOTE For additional information (including part numbers and manufacturer information) and/or assistance contact an Eaton service representative (see paragraph 1.9 *Getting Help*).

Conduit sizes were chosen from NEC Table 4, Electrical Metallic Tubing (EMT). See Table 17 and Table 18 for conduit recommendations.

Per NEC article 300, 3(B), all three-phase conductors must be run in the same conduit. A ground wire must be run in the same conduit as the phase conductors. If 4–Wire UPS, neutral must be run in the same conduit as the phase conductors.

When running parallel wires in multiple conduits a ground wire must be run in each conduit in accordance with NEC Table 250.122.

Conduit is sized to accommodate one ground conductor per conduit, sized in accordance with NEC Table 250.122.

Conduit sizes listed are for copper wiring only.

Table 17. Three-Wire UPS - Power Cable Conduit Recommendations

UPS Model	UPS Rating	Voltage	Terminal	Number of Wires in Conduit	Minimum Conduit Trade Size (inches)	Number of Conduits
93PM Gen 2 200-1 or 93PM Gen 2 250-1	50 kW	480 Vac	AC Input to UPS Rectifier (A, B, C, Ground)	4	1-1/4	1
			AC Input to UPS Bypass (A, B, C, Ground)	4	1-1/4	1
			AC Output (A, B, C, Ground)	4	1	1
		DC	Battery - 216 Cells (432V) Battery - 240 Cells (480V) (Positive, Negative, Ground)	3	1–1/4	1
93PM Gen 2 200-2 or 93PM Gen 2 250-2	100 kW	480 Vac	AC Input to UPS Rectifier (A, B, C, Ground)	4	2	1
			AC Input to UPS Bypass (A, B, C, Ground)	4	2	1
			AC Output (A, B, C, Ground)	4	2	1
		DC	Battery - 216 Cells (432V) Battery - 240 Cells (480V) (Positive, Negative, Ground)	3	1-1/4	2
93PM Gen 2 200-3 or 93PM Gen 2 250-3	150 kW	480 Vac	AC Input to UPS Rectifier (A, B, C, Ground)	4	1-1/2	2
			AC Input to UPS Bypass (A, B, C, Ground)	4	1-1/2	2
			AC Output (A, B, C, Ground)	4	2	1
		DC	Battery - 216 Cells (432V) Battery - 240 Cells (480V) (Positive, Negative, Ground)	3	2 1-1/2	2

Table 17. Three-Wire UPS - Power Cable Conduit Recommendations (Continued)

UPS Model	UPS Rating	Voltage	Terminal	Number of Wires in Conduit	Minimum Conduit Trade Size (inches)	Number of Conduits
93PM Gen 2 200-4 or 93PM Gen 2 250-4	200 kW	480 Vac	AC Input to UPS Rectifier (A, B, C, Ground)	4	2	2
			AC Input to UPS Bypass (A, B, C, Ground)	4	2	2
			AC Output (A, B, C, Ground)	4	2-1/2	1
		DC	Battery - 216 Cells (432V) Battery - 240 Cells (480V) (Positive, Negative, Ground)	3	1-1/2 2	3 2
93PM Gen 2 250-5	250 kW	480 Vac	AC Input to UPS Rectifier (A, B, C, Ground)	4	2	2
			AC Input to UPS Bypass (A, B, C, Ground)	4	2	2
			AC Output (A, B, C, Ground)	4	2	2
		DC	Battery - 216 Cells (432V) Battery - 240 Cells (480V) (Positive, Negative, Ground)	4	2	3

NOTE Wires per conduit include the ground wire.

Table 18. Four-Wire UPS - Power Cable Conduit Recommendations

UPS Model	UPS Rating	Voltage	Terminal	Number of Wires in Conduit	Minimum Conduit Trade Size (inches)	Number of Conduits
93PM Gen 2 200-1 or 93PM Gen 2 250-1	50 kW	480 Vac	AC Input to UPS Rectifier (A, B, C, Ground)	4	1-1/4	1
			AC Input to UPS Bypass (A, B, C, Neutral, Ground)	5	1-1/4	1
			AC Output (A, B, C, Neutral, Ground)	5	1-1/4	1
		DC	Battery - 240 Cells (480V) (Positive, Negative, Ground)	3	1-1/4	1
93PM Gen 2 200-2 or 93PM Gen 2 250-2	100 kW	480 Vac	AC Input to UPS Rectifier (A, B, C, Ground)	4	2-1/2	1
			AC Input to UPS Bypass (A, B, C, Neutral, Ground)	5	2-1/2	1
			AC Output (A, B, C, Neutral, Ground)	5	2	1
		DC	Battery - 240 Cells (480V) (Positive, Negative, Ground)	3	1-1/4	2
93PM Gen 2 200-3 or 93PM Gen 2 250-3	150 kW	480 Vac	AC Input to UPS Rectifier (A, B, C, Ground)	4	2	2
			AC Input to UPS Bypass (A, B, C, Neutral, Ground)	5	2	2
			AC Output (A, B, C, Neutral, Ground)	5	2	2
		DC	Battery - 240 Cells (480V) (Positive, Negative, Ground)	3	1-1/2	2

Table 18. Four-Wire UPS - Power Cable Conduit Recommendations (Continued)

UPS Model	UPS Rating	Voltage	Terminal	Number of Wires in Conduit	Minimum Conduit Trade Size (inches)	Number of Conduits
93PM Gen 2 200-4 or 93PM Gen 2 250-4	200 kW	480 Vac	AC Input to UPS Rectifier (A, B, C, Ground)	4	2-1/2	2
			AC Input to UPS Bypass (A, B, C, Neutral, Ground)	5	2-1/2	2
			AC Output (A, B, C, Neutral, Ground)	5	2	2
		DC	Battery - 240 Cells (480V) (Positive, Negative, Ground)	3	2	2
93PM Gen 2 250-5	250 kW	480 Vac	AC Input to UPS Rectifier (A, B, C, Ground)	4	2-1/2	2
			AC Input to UPS Bypass (A, B, C, Neutral, Ground)	5	2-1/2	2
			AC Output (A, B, C, Neutral, Ground)	5	2-1/2	2
		DC	Battery - 240 Cells (480V) (Positive, Negative, Ground)	4	2	3

NOTE Wires per conduit include the ground wire.

External overcurrent protection and disconnect are not provided by this product, but are required by codes. Refer to Table 10 through Table 13 for wiring requirements. If an output lockable disconnect is required, it is to be supplied by the customer.

Table 19 lists the recommended rating for input and bypass circuit breakers.

Table 19. Recommended Input and Bypass Circuit Breaker Ratings

UPS Model	UPS Rating	Input Rating	
		Load Rating	480V
Eaton 93PM Gen 2 200/250-1	50 kW	80% Rated	100A
		100% Rated	80A
Eaton 93PM Gen 2 200/250-2	100 kW	80% Rated	200A
		100% Rated	150A
Eaton 93PM Gen 2 200/250-3	150 kW	80% Rated	300A
		100% Rated	225A
Eaton 93PM Gen 2 200/250-4	200 kW	80% Rated	400A
		100% Rated	300A
Eaton 93PM Gen 2 250-5	250 kW	80% Rated	500A
		100% Rated	400A

⚠CAUTION

To reduce the risk of fire, connect only to a circuit provided with maximum input circuit breaker current ratings from Table 19 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 19) 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 10 through Table 13. 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 supplied by the customer. Table 20 lists the recommended rating for output circuit breakers.

Table 20. Recommended Output Circuit Breaker Ratings

UPS Model	UPS Rating	Output Rating	
		Load Rating	480V
Eaton 93PM Gen 2 200/250-1	50 kW	80% Rated	80A
		100% Rated	60A
Eaton 93PM Gen 2 200/250-2	100 kW	80% Rated	150A
		100% Rated	125A
Eaton 93PM Gen 2 200/250-3	150 kW	80% Rated	225A
		100% Rated	200A
Eaton 93PM Gen 2 200/250-4	200 kW	80% Rated	300A
		100% Rated	250A
Eaton 93PM Gen 2 250-5	250 kW	80% Rated	400A
		100% Rated	300A

There is no manual DC disconnect device within the UPS.

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

If required, external DC input overcurrent protection and disconnect switch is to be supplied by the customer. Table 21 lists the recommended ratings for circuit breakers satisfying the criteria for each battery voltage. 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 21. Recommended DC Input Battery Disconnect Circuit Breaker Ratings

UPS Model	UPS Rating	Output Rating	
		432V	480V
Eaton 93PM Gen 2 200/250-1	50 kW	125A	125A
Eaton 93PM Gen 2 200/250-2	100 kW	250A	250A
Eaton 93PM Gen 2 200/250-3	150 kW	400A	350A
Eaton 93PM Gen 2 200/250-4	200 kW	500A	450A
Eaton 93PM Gen 2 250-5	250 kW	700A	600A

3.2.3 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 for 600V, 1A minimum. 12 AWG maximum wire size.
- Use Class 2 wiring methods (as defined by the NEC) for interface wiring up to 30V. Class 2 circuit wiring must be segregated from Class 1 wiring. The Class 2 wire should be rated for 250V, 1A minimum.
- Because of the battery shunt trip wiring route in the UPS cabinet, the wire should be rated for a minimum of 600V.
- Use twisted-pair wires for each input and return or common.
- All interface wiring and conduit is to be supplied by the customer.
- When installing external interface wiring between a building alarm, relay output, battery breaker trip, or Minislot and the UPS interface terminals, conduit must be installed between each device and the UPS cabinet.
- If using conduit, install the interface wiring in separate conduit from the power wiring.
- All building alarm inputs 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 switch contacts are customer-supplied.
- LAN and telephone drops for use with Minislot connectivity cards must be supplied by the customer.
- The UPS battery detect signal wiring from an UPS building alarm must be connected to the battery disconnect device.
- Program the battery detect building alarm to read battery open and for normally open contacts.
- A supplemental 48 Vdc shunt trip signal for the battery disconnect device is provided, but is not required for normal operation.
- Battery detect and 48 Vdc shunt trip wiring should be a minimum of 18 AWG.
- The REPO feature opens all switchgear 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 3 and 4 on the REPO terminal block if using a normally-closed REPO switch.
- REPO wiring should be a minimum of 18 AWG and a maximum of 16 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 250m (500 ft).
- Alarm relay contacts have a maximum current rating of 5A and a switched voltage rating of 30 Vac or 28 Vdc.
- Recommended alarm relay wiring size is 18 AWG.

3.3 Inspecting and Unpacking the UPS Cabinets

The cabinets are shipped bolted to a metal and wood pallet (see Figure 12) with outer protective packaging material covering the cabinets.

NOTE Startup and operational checks must be performed by an authorized Eaton Customer Service Engineer, or the warranty terms specified on the product's resources page become void. See Warranty for details. This service is offered as part of the sales contract for the UPS. Contact an Eaton service representative in advance (a minimum two-week notice is required) to reserve a preferred startup date.

⚠WARNING

The UPS cabinet is heavy (see Table 3, and Table 4). If unpacking and unloading instructions are not closely followed, the cabinet may tip and cause serious injury or death.

⚠ AVERTISSEMENT!

Les sections de l'onduleur sont lourdes (voir le Table 3, et Table 4). Suivre attentivement les instructions de déchargement et de déballage pour eviter de renverser les armoires, ce qui pourrait causer de graves blessures.

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 3, and Table 4 for cabinet weight).

2. Use a forklift or pallet jack to move the packaged cabinet to the installation site, or as close as possible, before unpacking. If possible, move the cabinet using the pallet. Insert the forklift or pallet jack forks between the supports on the bottom of the pallet (see Figure 9 and Figure 10 for the UPS cabinet and UPS with Sidecar center of gravity measurements).

⚠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.

4. Remove the protective packaging material from the cabinet and recycle in a responsible manner. Retain any parts kits packaged with the cabinet.
5. 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 the warranty.

Figure 12. UPS Cabinet as Shipped on Single Pallet

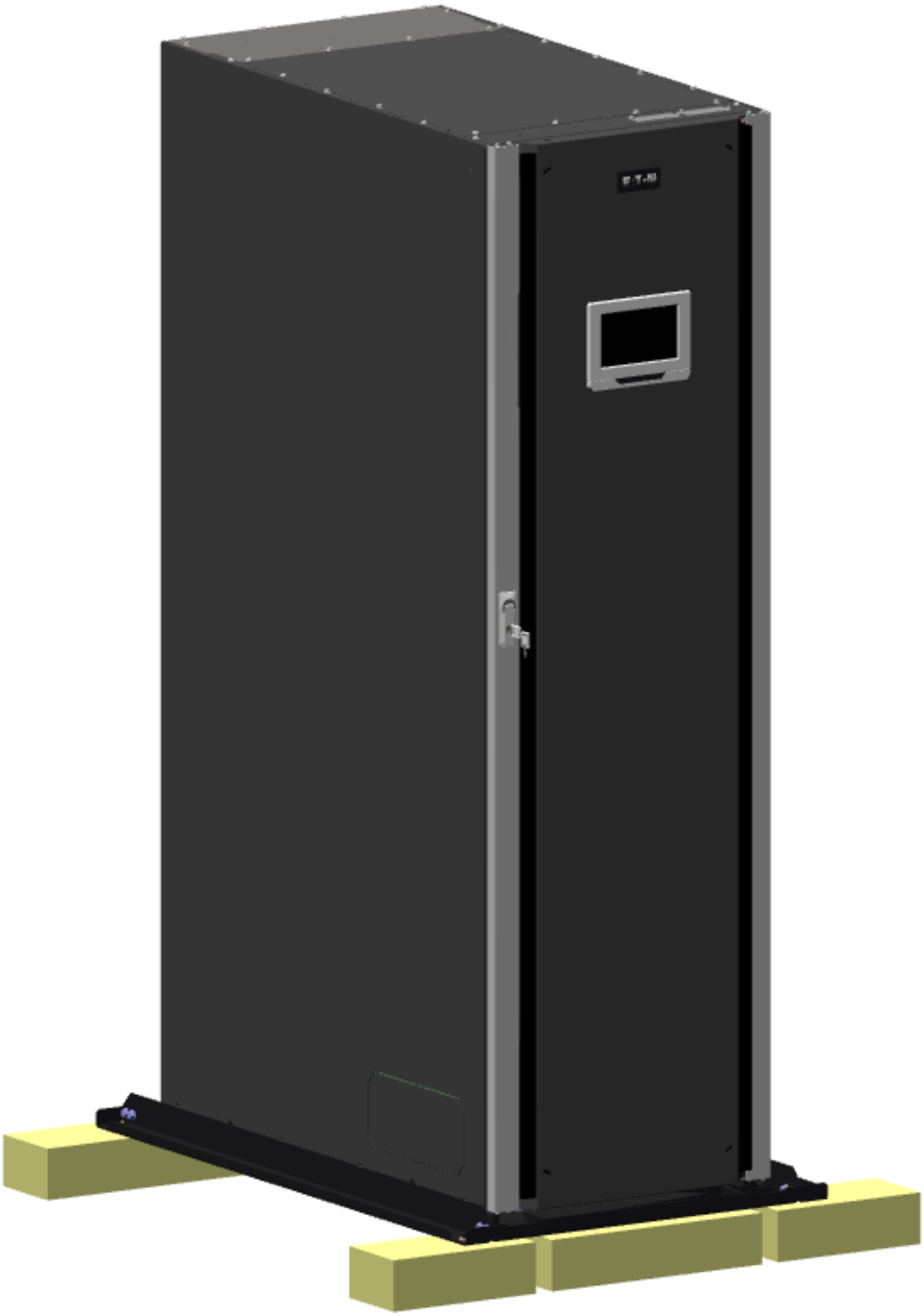


Figure 13. UPS Cabinet with SIAC as Shipped on Single Pallet

UPS with Left-Mounted Sidecar

UPS with Right-Mounted Sidecar

Chapter 4 UPS System 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:

- Review Chapter 3 *UPS Installation Plan and Unpacking* , for cabinet dimensions, equipment weight, wiring and terminal data, and installation notes.
- Do not tilt the cabinets more than ±10° during installation.
- Remove conduit landing plates to add conduit landing holes as required.
- If perforated floor tiles are required for ventilation, place them in front of the UPS.

4.2 Unloading the UPS Cabinet from the Pallet

⚠WARNING

- The UPS cabinet is heavy (see , and.
- Do not tilt cabinet more than 10° from vertical.
- Lift the cabinets only with a forklift or damage may occur.
- Ensure the forklift is rated to handle the weight of the cabinet.

Failure to follow these instructions may result in severe injury or death.

⚠ AVERTISSEMENT!

- L'armoire UPS est lourde (voir , et).
- N'inclinez pas l'armoire à plus de 10° par rapport à la verticale.
- Soulevez les armoires uniquement avec un chariot élévateur, sinon des dommages pourraient survenir.
- Assurez-vous que le chariot élévateur est conçu pour supporter le poids de l'armoire.

Le non-respect de ces instructions peut entraîner des blessures graves, voire la mort.

The UPS cabinet is bolted to a pallet consisting of four metal angle supports secured to two wood supports.

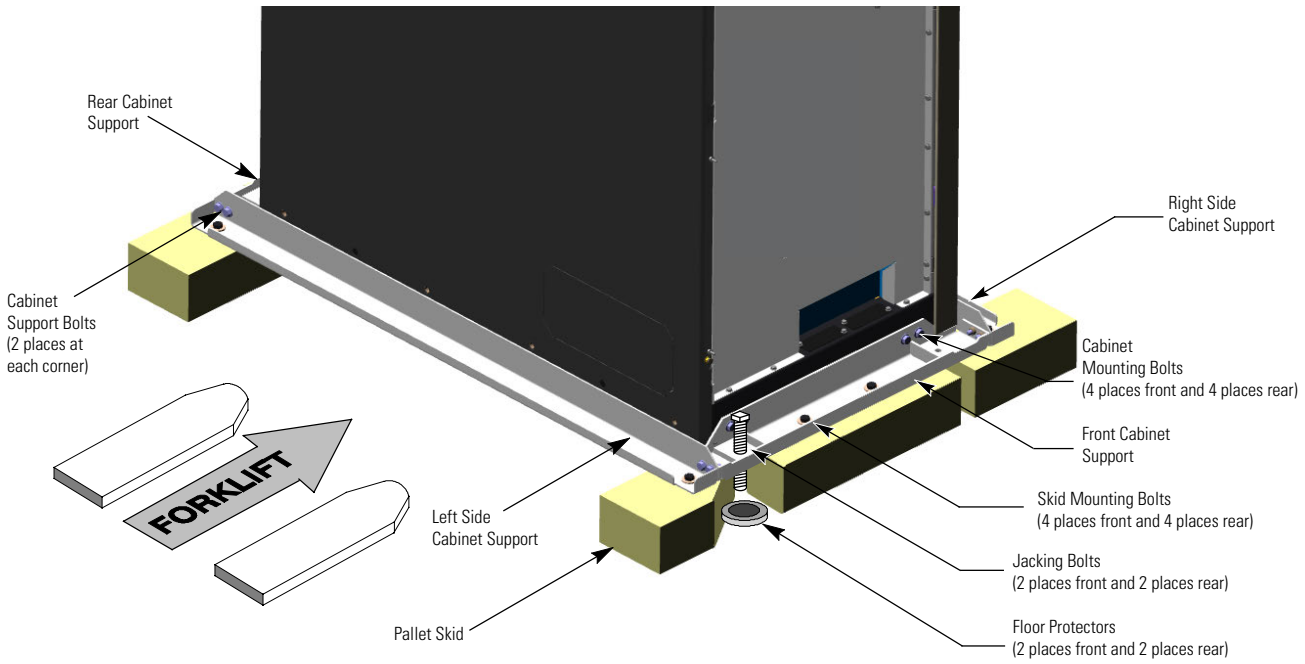
To remove the pallet:

1. If not already accomplished, use a forklift or pallet jack to move the UPS cabinet to the installation area, or as close as possible, before unloading from the pallet. Insert the forklift or pallet jack forks between the supports on the bottom of the pallet (see Figure 9, or Figure 10 and their corresponding Center of Gravity tables for the UPS cabinet center of gravity measurements).

2. Open the front door by lifting the latch from the bottom and turning to the right (counterclockwise) and swing the door open.
3. Locate the four 1/2" jacking bolts from the parts kit and install them in the threaded holes in the front and rear supports as shown in Figure 14. Place a floor protector from the parts kit underneath each jacking bolt, and screw the bolts down against them.

   The floor protectors protect the floor from being marred by the jacking bolts.

Figure 14. Removing the UPS Pallet Skids and Supports



⚠WARNING

Do not remove or loosen the cabinet mounting or cabinet support bolts until instructed. If unpacking and unloading instructions are not closely followed, the cabinet may tip and cause serious injury or death.

⚠ AVERTISSEMENT!

Ne retirez pas et ne desserrez pas les boulons de montage ou de support de l'armoire avant d'y être invité. Si les instructions de déballage et de déchargement ne sont pas scrupuleusement suivies, l'armoire peut basculer et provoquer des blessures graves, voire la mort.

4. Loosen, but do not remove, the skid mounting bolts holding the pallet skids to the front and rear supports, and to the left and right side supports.
5. If a sidecar is attached to the UPS, loosen, but do not remove, the sidecar skid mounting bolts holding the sidecar pallet skids to the sidecar front and rear supports, and to the left and right supports (see Figure 15 for both Top Entry Sidecar or Bypass Sidecar (SIAC-B).

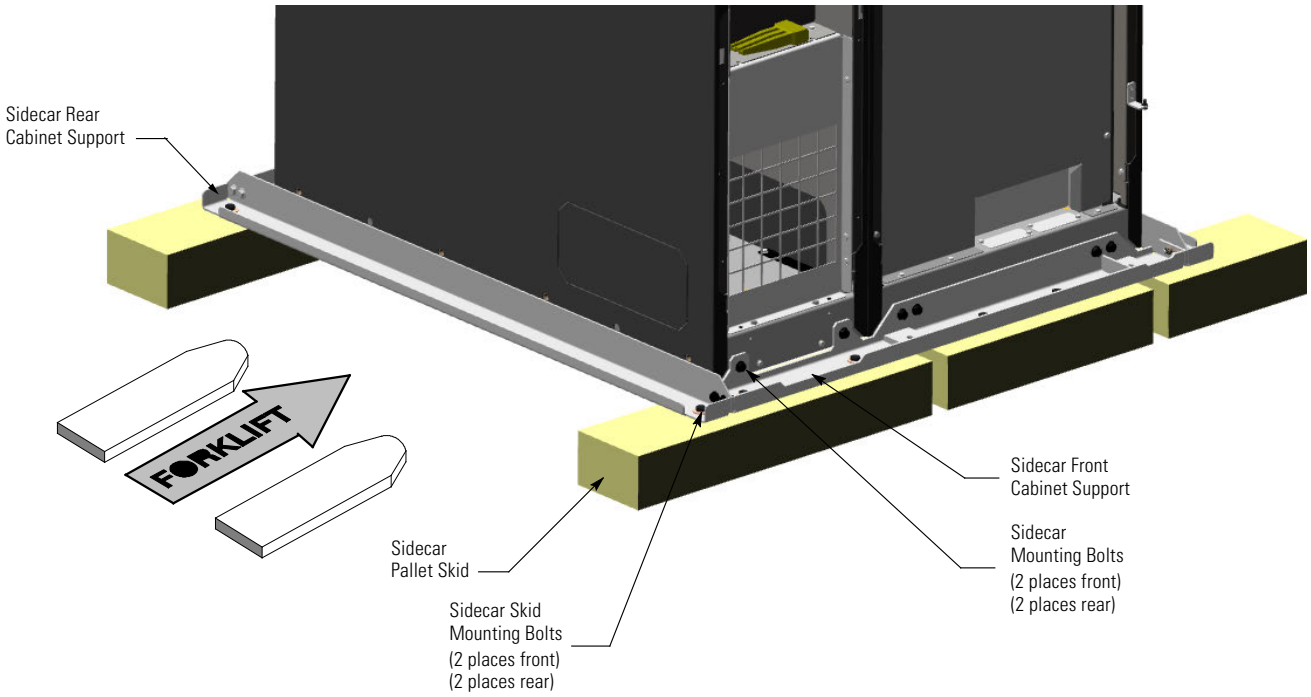
⚠WARNING

RISK OF INSTABILITY. Turning the jacking bolts unevenly may cause the cabinet to become unbalanced. To prevent tipping the cabinet, raise the cabinet no more than 3 mm (1/8") above the floor (just enough to allow the removal of the pallet skids). Failure to follow these instructions can result in serious injury or death.

⚠ AVERTISSEMENT!

RISQUE D'INSTABILITÉ. Une rotation inégale des boulons de levage peut entraîner un déséquilibre de l'armoire. Pour éviter de renverser l'armoire, ne la soulevez pas à plus de 3 mm (1/8") au-dessus du sol (juste assez pour permettre le retrait des patins de palette). Le non-respect de ces instructions peut entraîner des blessures graves, voire la mort.

Figure 15. Removing the Sidecar Pallet Skids and Supports



6. Turn each jacking bolt consecutively, two full turns, until the pallet skids clear the floor by approximately 3 mm (1/8").
7. Remove the hardware loosened in **Step 4**.
8. If a sidecar is attached to the UPS, remove the hardware loosened in **Step 5**.
9. Pull the pallet skids out from under the metal angle supports without disturbing the jacking bolts. Recycle the pallet skids and hardware in a responsible manner.

⚠CAUTION

CABINET MAY FALL. Do not loosen the hardware attaching the front supports to the cabinet base. The cabinet must be lowered by the jacking bolts before the supports can be removed. If unpacking and unloading instructions are not closely followed, the cabinet may tip and cause serious injury or death.

⚠ ATTENTION!

LE CABINET PEUT TOMBER. Ne desserrez pas la quincaillerie fixant les supports avant à la base de l'armoire. L'armoire doit être abaissée par les boulons de levage avant de pouvoir retirer les supports. Si les instructions de déballage et de déchargement ne sont pas scrupuleusement suivies, l'armoire peut basculer et provoquer des blessures graves, voire la mort.

10. Carefully and evenly **lower the cabinet by turning each jacking bolt consecutively two full turns (maximum)** until the casters contact the floor and the cabinet is no longer supported by the jacking bolts.
11. After the UPS is resting on the floor, remove the jacking bolts and floor protectors. Recycle them in a responsible manner.
12. Remove the cabinet support bolts fastening the front, rear, and side cabinet supports together and remove the side supports.
13. If a sidecar is attached to the UPS, loosen the bottom screws and completely remove the top screws securing the sidecar front panel. Lift the panel straight up to remove the panel.
14. If a sidecar is attached to the UPS, remove the sidecar mounting bolts holding the front and rear sidecar supports to the cabinet base.
15. Remove the cabinet mounting bolts holding the front and rear supports to the cabinet base.
16. If installing the cabinet permanently, retain the cabinet mounting bolts; otherwise, recycle the bolts along with the support brackets in a responsible manner.
17. Close the door and secure the latch.
18. If the leveling feet are not retracted, turn all leveling feet until they are retracted as far into the cabinet as possible.

⚠CAUTION

To prevent tipping when rolling the cabinet, push the cabinet from the rear whenever possible.

⚠ ATTENTION!

Pour éviter de basculer lorsque vous faites rouler l'armoire, poussez-la autant que possible par l'arrière.

19. Roll the cabinet to the final installation location.
20. Lower the UPS cabinet feet and using a level, adjust the cabinet height accordingly until the cabinet is level.

NOTE An optional front and rear floor mounting bracket kit is available for permanently mounting the UPS.

21. If installing the cabinet permanently, locate the front and back floor mounting brackets from the optional floor mounting kit.

22. Using the retained cabinet mounting bolts, install the floor mounting brackets to the front and rear of the UPS with the angle facing outward.
23. Secure the cabinet to the floor with customer-supplied hardware.

NOTE Black cover dots are provided, if side mounting bracket holes need to be covered for aesthetic reasons.

24. Locate the black cover dots from the parts kit and install over the left and right side bracket mounting holes.
25. Proceed to paragraph 4.3 *Integrated Battery Cabinet Installation*.

4.3 Integrated Battery Cabinet Installation

If installing Integrated Battery Cabinets (IBCs), refer to the ***Eaton Samsung Gen 3 Battery Cabinet Installation and Operation Manual***, ***Eaton 93PM Universal Integrated Battery Cabinet Installation Manual-Large and Large High Rate***, or the ***Eaton 93PM Integrated Battery Cabinet-Small Welded IBC-SW (432V and 480V) Installation Manual***, listed in paragraph 1.8 *For More Information*, for installation instructions.

IMPORTANT

If the Eaton 93PM Gen 2 UPS has a SIAC-B, the Integrated Battery Cabinet must be installed on the opposite side of the UPS away from the SIAC-B.

IMPORTANT

Si l'onduleur Eaton 93PM Gen 2 est équipé d'un SIAC-B, l'armoire de batteries intégrée doit être installée du côté opposé de l'onduleur, à l'opposé du SIAC-B.

After the IBC is installed, proceed to paragraph 4.4 *External AC Power Wiring Installation* to complete the wiring of the UPS.

4.4 External AC Power Wiring Installation

1. Open the UPS front door by lifting the latch from the bottom and turning to the right (counterclockwise) and swing the door open.
2. Remove the screws securing the bottom internal safety shield panel and remove the panel to gain access to the input, output, and battery power wiring terminals. Retain the hardware for later use.
3. If the UPS has a Sidecar, loosen the bottom screws and completely remove the top screws securing the sidecar front panel. Lift the panel upwards and remove from the unit. Retain the hardware for later use.
4. Remove the screws securing the sidecar internal safety shield panel and remove the panel to gain access to the interior of the sidecar and the UPS inter-cabinet wiring access pass-through. Retain the hardware for later use.
5. If wiring via bottom entry, remove the bottom conduit plate, or plates if sidecar is installed. If wiring via top entry, remove the top entry conduit plate from the sidecar. For details on conduit plate locations see Figure 17.

NOTE Top Entry Wiring for the Eaton 93PM Gen 2 is only available when the system is ordered with a sidecar.

6. Identify all conduit recommendations and mark their location.
7. Proceed to the appropriate wiring configuration:

- **Standalone UPS or UPS with Top Entry Sidecar (No Breakers)**, go to paragraph 4.4.1 *Standalone UPS or UPS with Top Entry Sidecar (No Breakers)*.
- **UPS with 2-Breaker Sidecar (MBP and MIS)**, go to paragraph 4.4.2 *UPS with 2-Breaker Sidecar (MBP and MIS)*.
- **UPS with 3-Breaker Sidecar (BIB, MBP and MIS)**, go to paragraph 4.4.3 *UPS with 3-Breaker Sidecar (BIB, MBP and MIS)*.
- **UPS with 4-Breaker Sidecar (RIB, BIB, MBP and MIS)**, go to paragraph 4.4.4 *UPS with 4-Breaker Sidecar (RIB, BIB, MBP and MIS)*.

4.4.1 Standalone UPS or UPS with Top Entry Sidecar (No Breakers)

1. Drill and punch all conduit holes in the appropriate conduit plate/s prior to mounting. Install the conduit plate/s and install all conduit runs. Pull the wiring through conduit into the wiring area.

   If Top Entry sidecar, pull wiring through conduit into sidecar and into the UPS via the inter-cabinet wiring access pass-through (see Figure 18).

2. Route the input and output cables to the UPS terminals. See Figure 16 and Figure 17 for wiring access information, and Figure 19 for terminal locations.

⚠WARNING

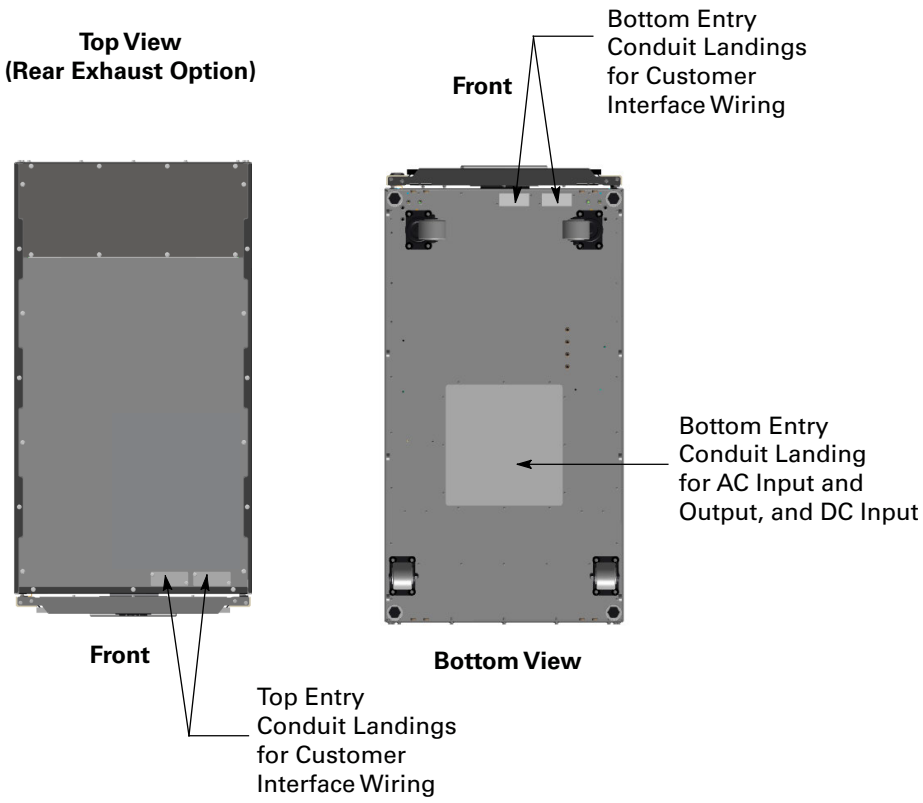
As a result of the connected loads high leakage current is possible. Connection to earth ground is required for safety and proper product operation. Do not check UPS operation by any action that includes removal of the earth (ground) connection with loads attached.

⚠ AVERTISSEMENT!

En raison des charges connectées, un courant de fuite élevé est possible. Une connexion à la terre est requise pour la sécurité et le bon fonctionnement du produit. Ne vérifiez pas le fonctionnement de l'onduleur par une action incluant le retrait de la connexion à la terre avec les charges connectées.

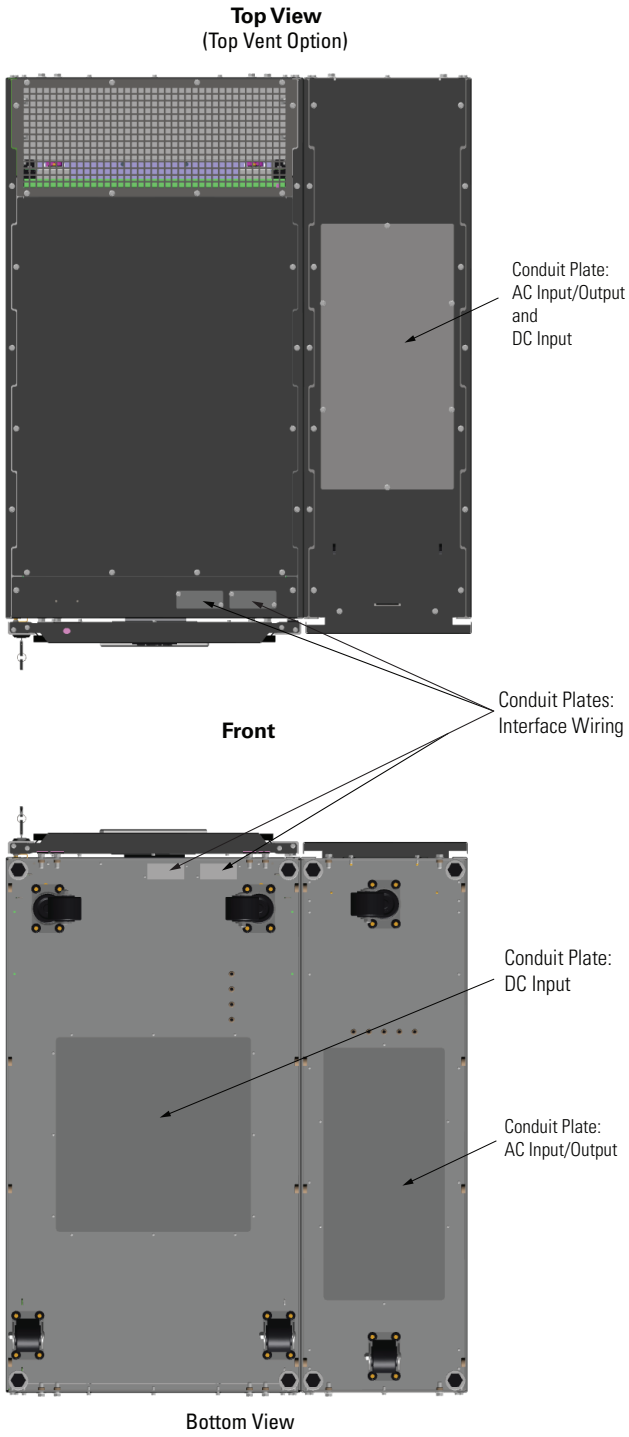
3. Ground the UPS according to local and/or national electrical wiring codes by routing and connecting the ground wire to the input ground lug.
4. Connect phase A, B, and C bypass input power wiring from the utility source to the bypass input terminals. See Figure 20 for Three–Wire power terminal details.
5. If Four–Wire installation, connect the Bypass Neutral to the E12 Neutral terminals. See Figure 21 for Four–Wire power terminal details.
6. Route the output cables to the AC Output to Load terminals.
7. Connect phase A, B, and C power wiring from output terminals to the critical load. See Figure 20 for Three–Wire power terminal details.
8. If Four–Wire installation, connect the AC Output Neutral to the E12 Neutral terminals. See Figure 21 for Four–Wire power terminal details.
9. Proceed to paragraph 4.5 *Battery Power Wiring*.

Figure 16. UPS Conduit and Wire Entry Locations



NOTE: Remove panels to drill or punch conduit holes.

Figure 17. UPS with Sidecar Conduit and Wire Entry Locations



NOTE: Remove panels to drill or punch conduit holes.

Figure 18. UPS Inter-Cabinet Wiring Access Location

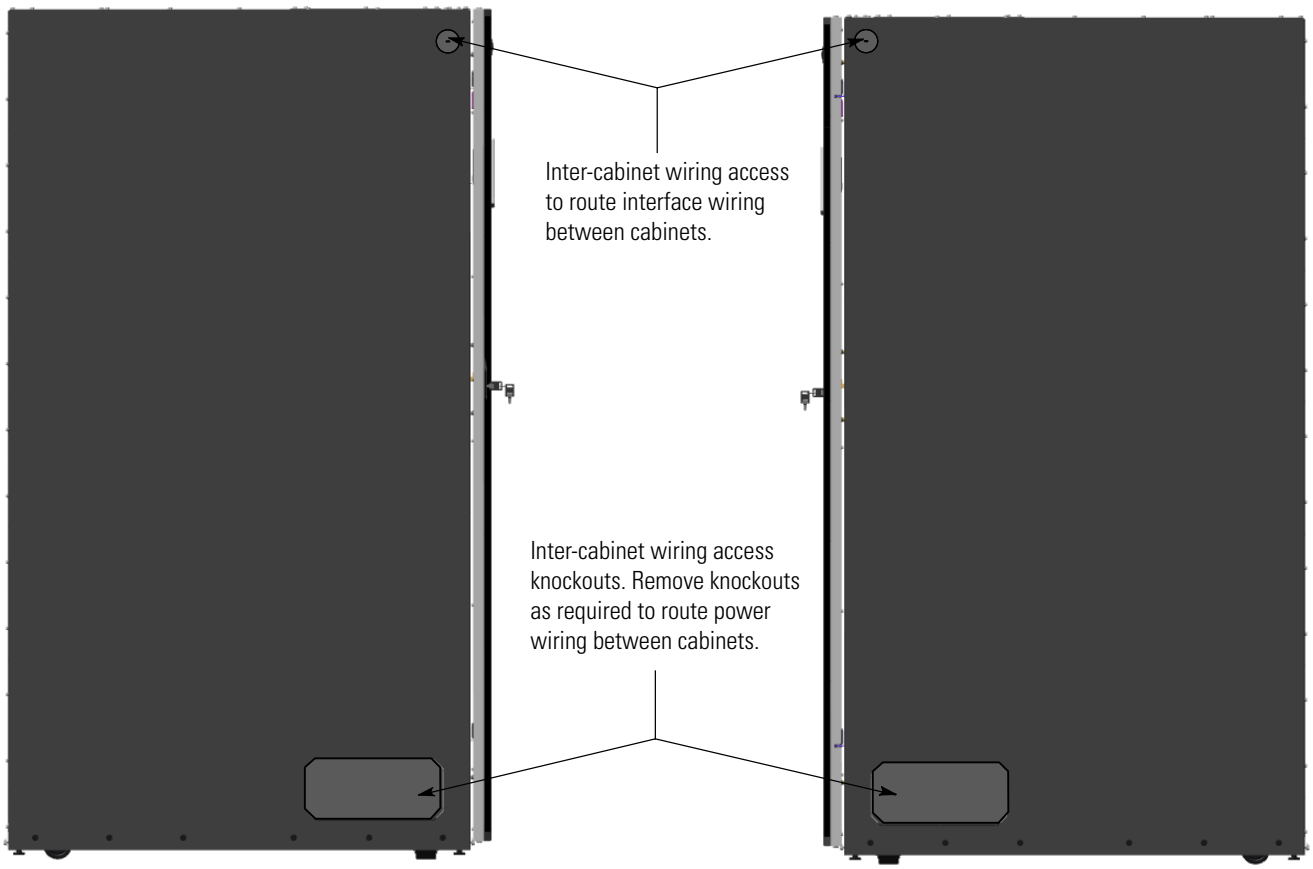


Figure 19. Power Terminal Locations

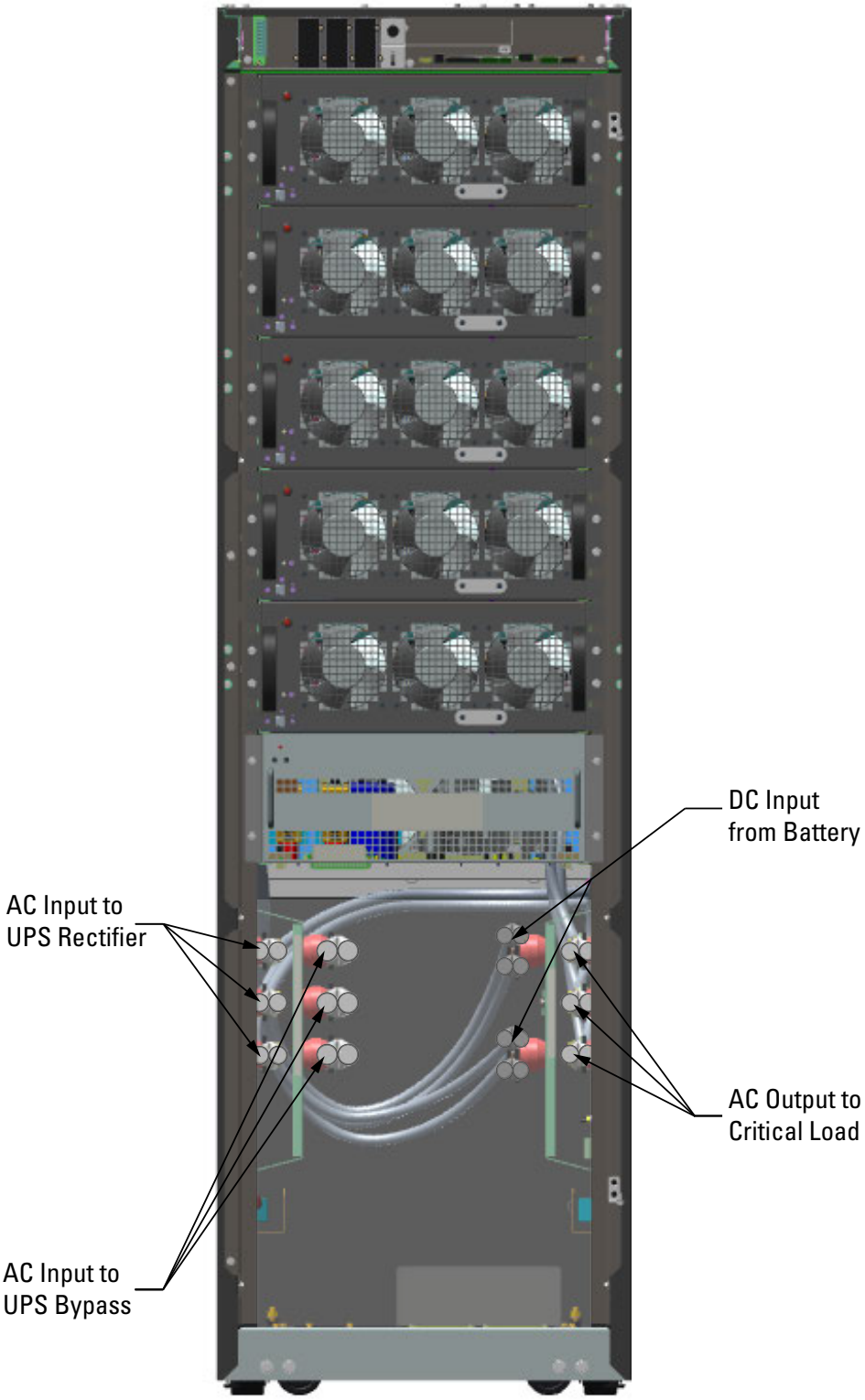


Figure 20. Power Terminal Detail (Three-Wire UPS)

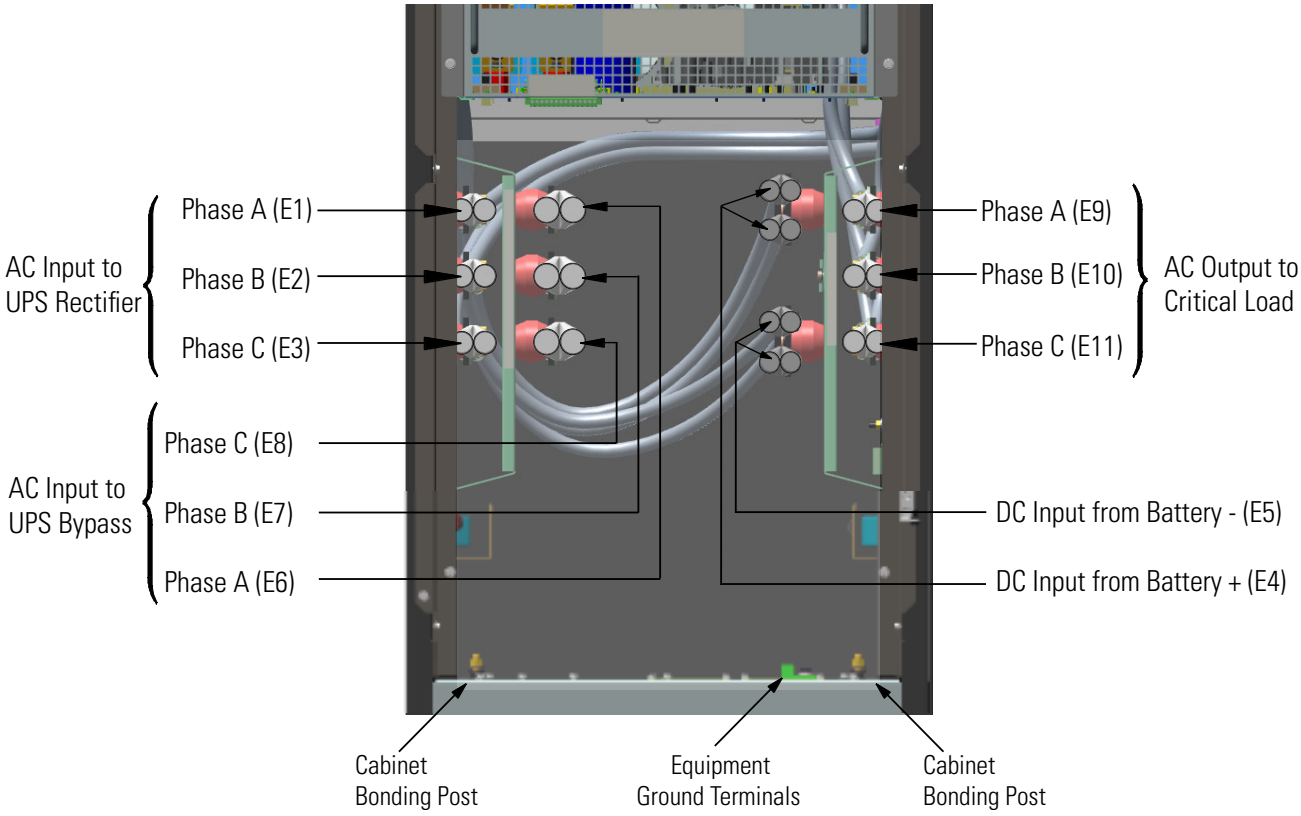
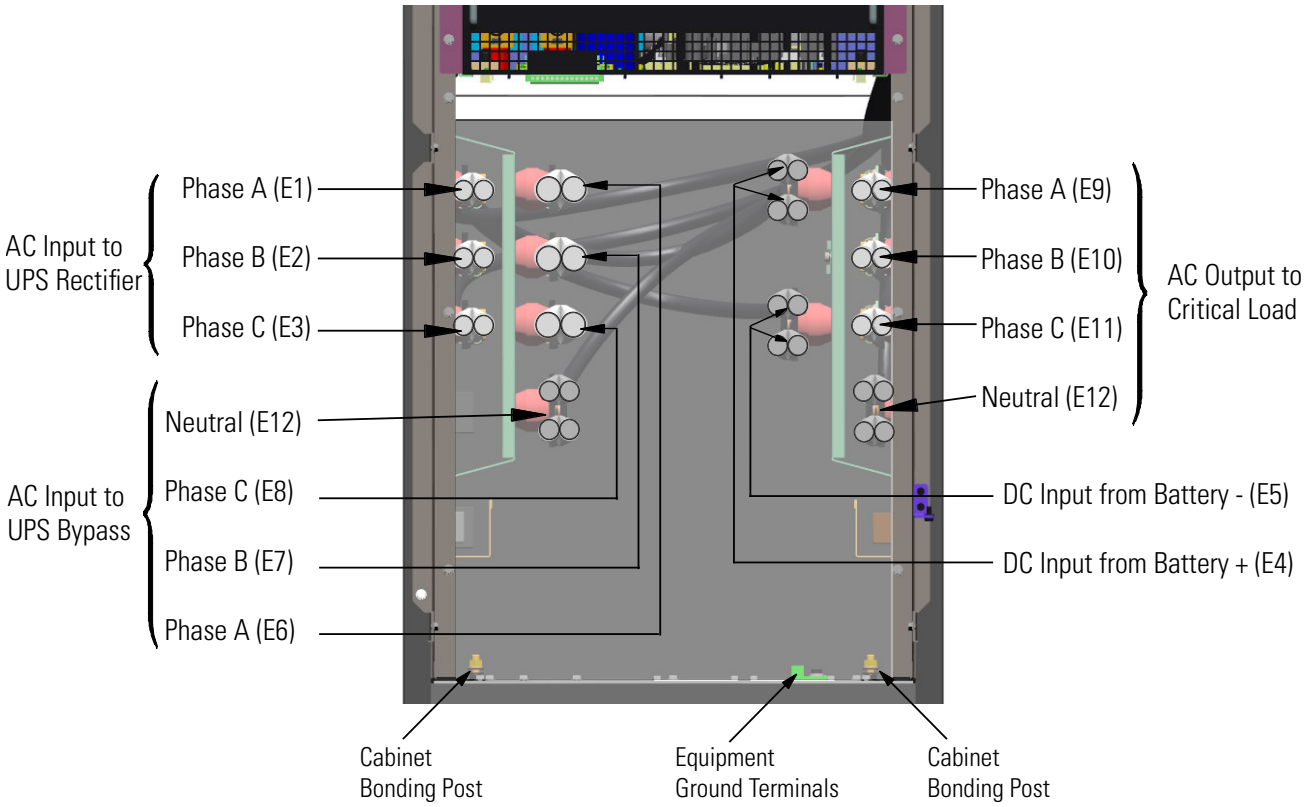


Figure 21. Power Terminal Detail (Four-Wire UPS)



4.4.2 UPS with 2-Breaker Sidecar (MBP and MIS)

1. Drill and punch all conduit holes in the appropriate conduit plate/s prior to mounting. Install the conduit plate/s and install all conduit runs. pull wiring through conduit into sidecar and into the UPS via the inter-cabinet wiring access pass-through.
2. Route the input and output cables to the UPS terminals. See Figure 17 for wiring access information, and Figure 22 for terminal locations.

⚠WARNING

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.

⚠ AVERTISSEMENT!

En raison des charges connectées, un courant de fuite élevé est possible. Une connexion à la terre est requise pour la sécurité et le bon fonctionnement du produit. Ne vérifiez pas le fonctionnement de l'onduleur par une action incluant le retrait de la connexion à la terre avec les charges connectées.

3. Ground the UPS according to local and/or national electrical wiring codes by routing and connecting the ground wire to the input ground lug.

4. Connect the utility to Maintenance Bypass Phase A, B, and C (from customer supplied breaker) to the Maintenance Bypass Input terminals in the 2-Breaker sidecar (upper frame area). See Figure 22 for Three–Wire power terminal details.
5. If Four–Wire installation, connect the Bypass Neutral to the E12 Neutral terminals. See Figure 23 for Four–Wire power terminal details.
6. Route the output cables to the sidecar AC Output to Load terminals (lower frame area).
7. Connect phase A, B, and C power wiring from output terminals to the critical load. See paragraph 3.2.2 *UPS System Power Wiring Preparation* for wiring and termination requirements. See Figure 22 for Three–Wire power terminal details.
8. If Four–Wire installation, connect the AC Output Neutral to the E12 Neutral terminals. See Figure 23 for Four–Wire power terminal details.
9. Proceed to paragraph 4.5 *Battery Power Wiring*.

Figure 22. Three-Wire UPS with SIAC-B (2-Breaker) Power Terminal Locations

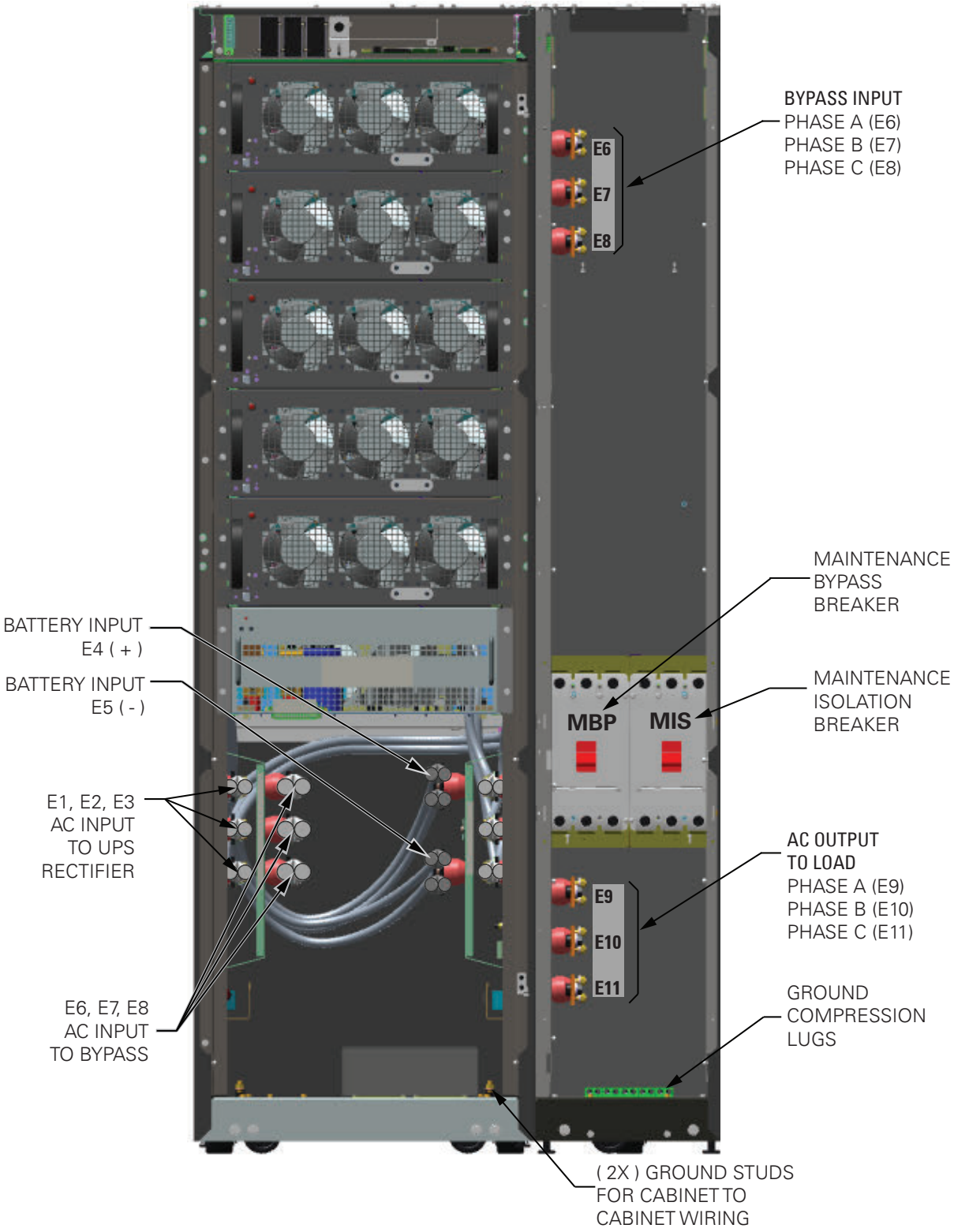
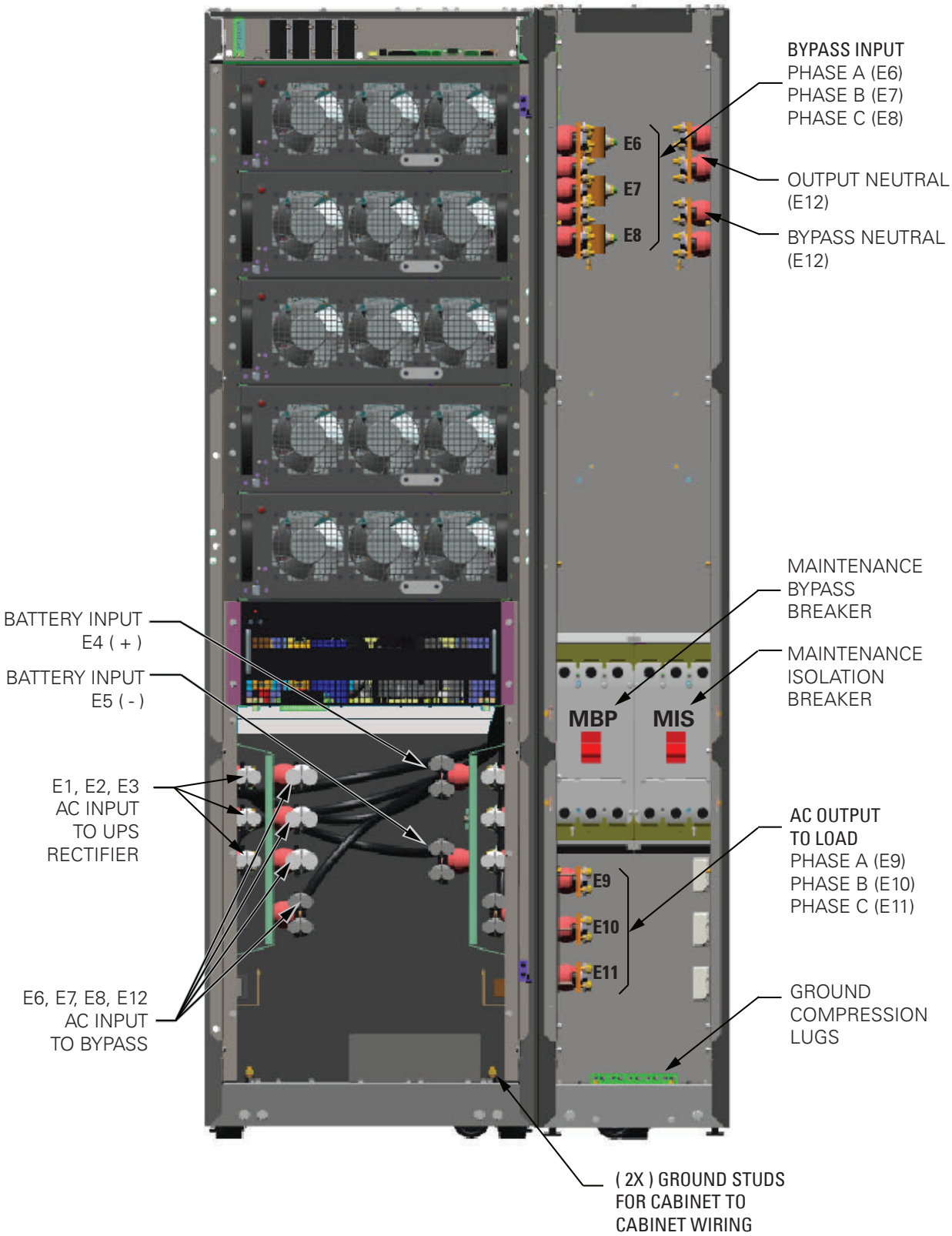


Figure 23. Four-Wire UPS with SIAC-B (2-Breaker) Power Terminal Locations



4.4.3 UPS with 3-Breaker Sidecar (BIB, MBP and MIS)

1. Drill and punch all conduit holes in the appropriate conduit plate/s prior to mounting. Install the conduit plate/s and install all conduit runs. pull wiring through conduit into sidecar and into the UPS via the inter-cabinet wiring access pass-through.
2. Route the input and output cables to the UPS terminals. See Figure 17 for wiring access information, and Figure 24 for terminal locations.

⚠WARNING

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.

3. Ground the UPS according to local and/or national electrical wiring codes by routing and connecting the ground wire to the input ground lug.
4. Connect phase A, B, and C Bypass input power wiring from the utility source to the Bypass input terminals in the 3-Breaker sidecar (upper frame area). See paragraph 3.2.2 *UPS System Power Wiring Preparation* for wiring and termination requirements. See Figure 24 for Three–Wire power terminal details.
5. If Four–Wire installation, connect the Bypass Neutral to the E12 Neutral terminals. See Figure 25 for Four–Wire power terminal details.
6. Route the output cables to the sidecar AC Output to Load terminals (lower frame area).
7. Connect phase A, B, and C power wiring from output terminals to the critical load. See Figure 24 for Three–Wire power terminal details.
8. If Four–Wire installation, connect the AC Output Neutral to the E12 Neutral terminals. See Figure 25 for Four–Wire power terminal details.
9. Proceed to paragraph 4.5 *Battery Power Wiring*.

Figure 24. Three-Wire UPS with SIAC-B (3-Breaker) Power Terminal Locations

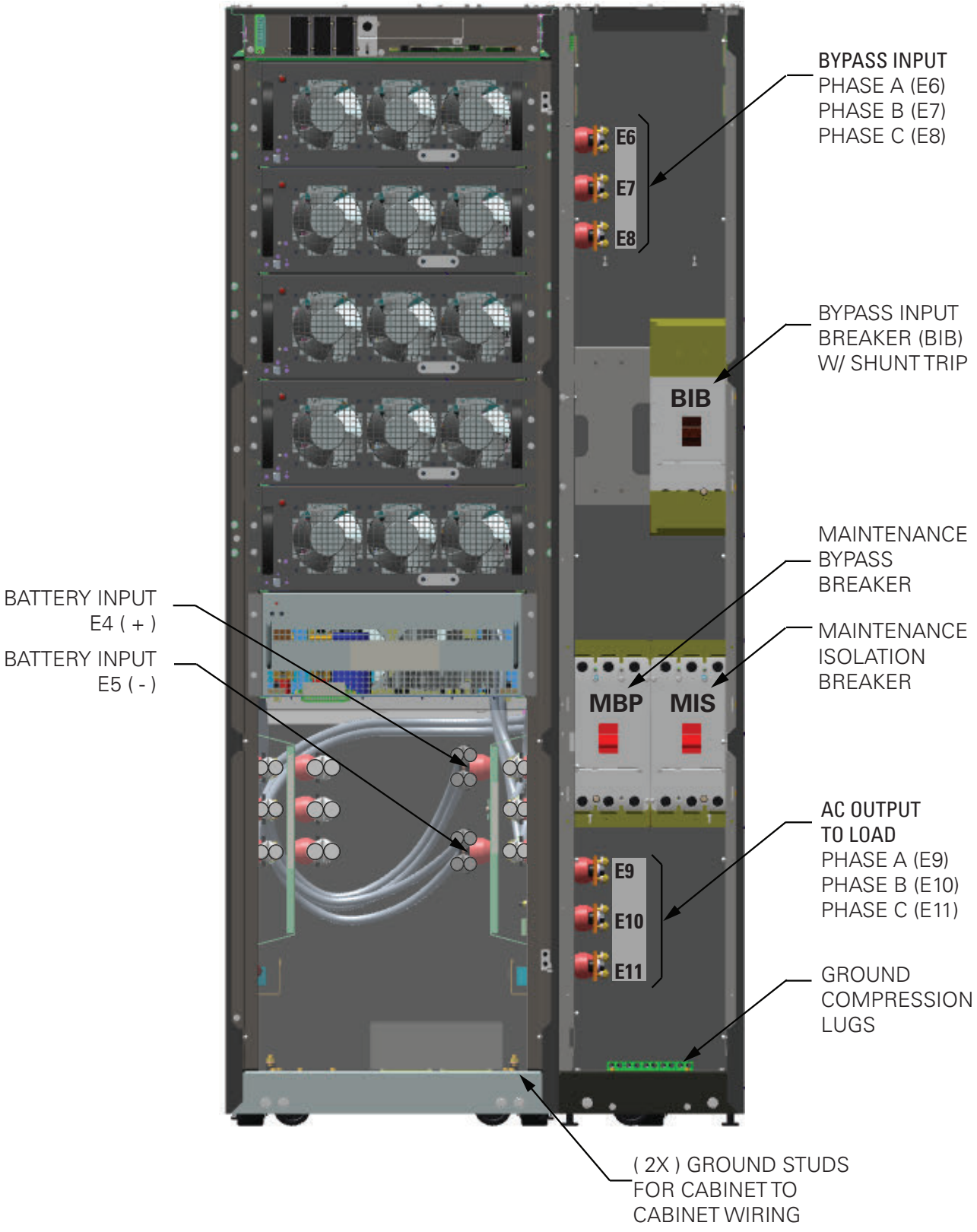
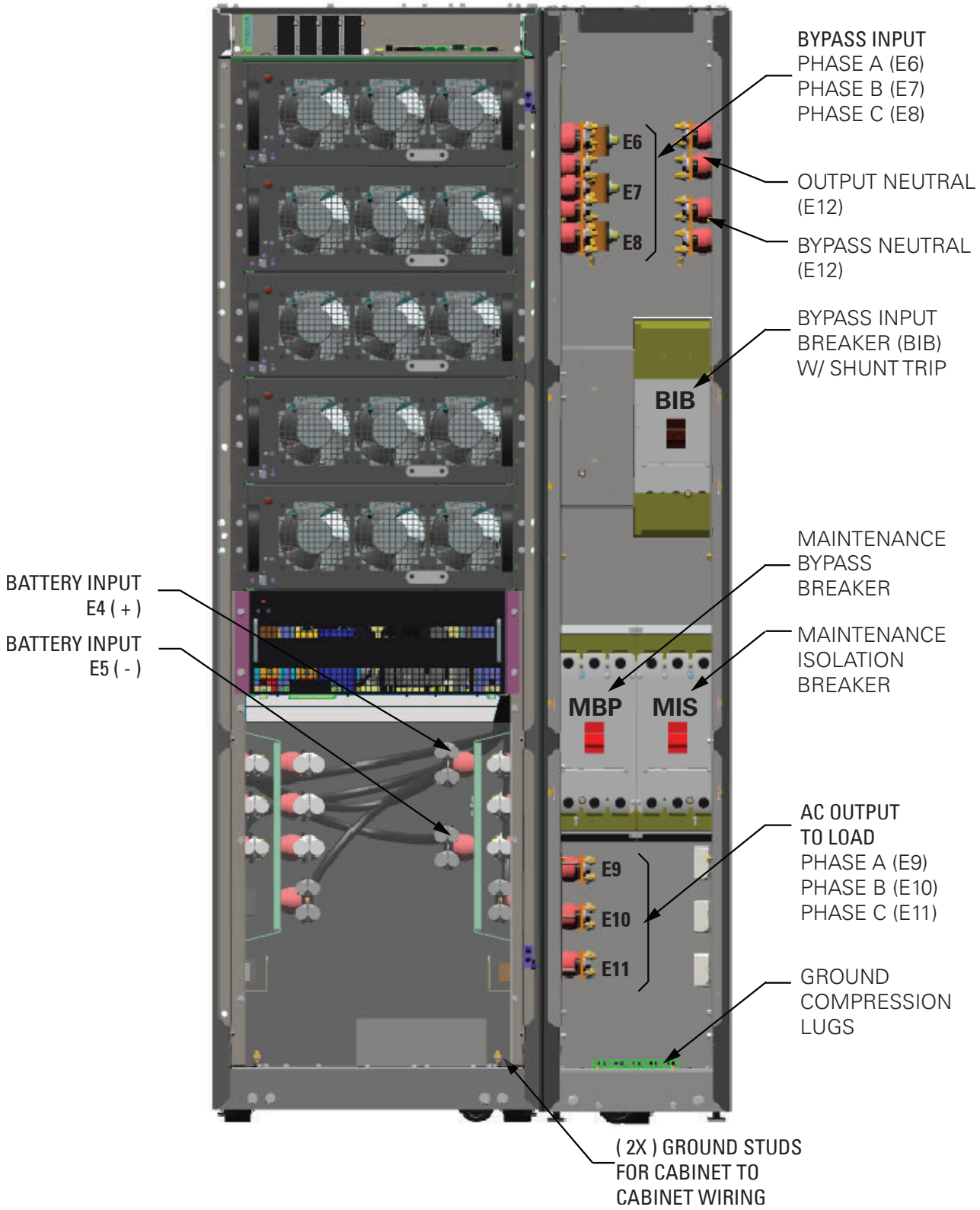


Figure 25. Four-Wire UPS with SIAC-B (3-Breaker) Power Terminal Location



4.4.4 UPS with 4-Breaker Sidecar (RIB, BIB, MBP and MIS)

1. Drill and punch all conduit holes in the appropriate conduit plate/s prior to mounting. Install the conduit plate/s and install all conduit runs. pull wiring through conduit into sidecar and into the UPS via the inter-cabinet wiring access pass-through.
2. Route the input and output cables to the UPS terminals. See Figure 17 for wiring access information, and Figure 26 for terminal locations.

⚠WARNING

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.

⚠ AVERTISSEMENT!

En raison des charges connectées, un courant de fuite élevé est possible. Une connexion à la terre est requise pour la sécurité et le bon fonctionnement du produit. Ne vérifiez pas le fonctionnement de l'onduleur par une action incluant le retrait de la connexion à la terre avec les charges connectées.

3. Ground the UPS according to local and/or national electrical wiring codes by routing and connecting the ground wire to the input ground lug.
4. Connect phase A, B, and C Bypass input power wiring from the utility source to the Bypass input terminals in the 4-Breaker sidecar (upper frame area). See paragraph 3.2.2 *UPS System Power Wiring Preparation* for wiring and termination requirements. See Figure 26 for Three–Wire power terminal details.
5. If Four–Wire installation, connect the Bypass Neutral to the E12 Neutral terminals. See Figure 27 for Four–Wire power terminal details.
6. Connect phase A, B, and C Rectifier input power wiring from the utility source to the Rectifier Input Breaker.

   For a detailed view of the RIB breaker terminals, see Figure 28. Tighten terminals to 31nm (275 lb in) torque.
7. Route the output cables to the sidecar AC Output to Load terminals (lower frame area).
8. Connect phase A, B, and C power wiring from output terminals to the critical load. See Figure 26 for Three–Wire power terminal details.
9. If Four–Wire installation, connect the AC Output Neutral to the E12 Neutral terminals. See Figure 27 for Four–Wire power terminal details.
10. Proceed to paragraph 4.5 *Battery Power Wiring*.

Figure 26. Three-Wire UPS with SIAC-B (4-Breaker) Power Terminal Locations

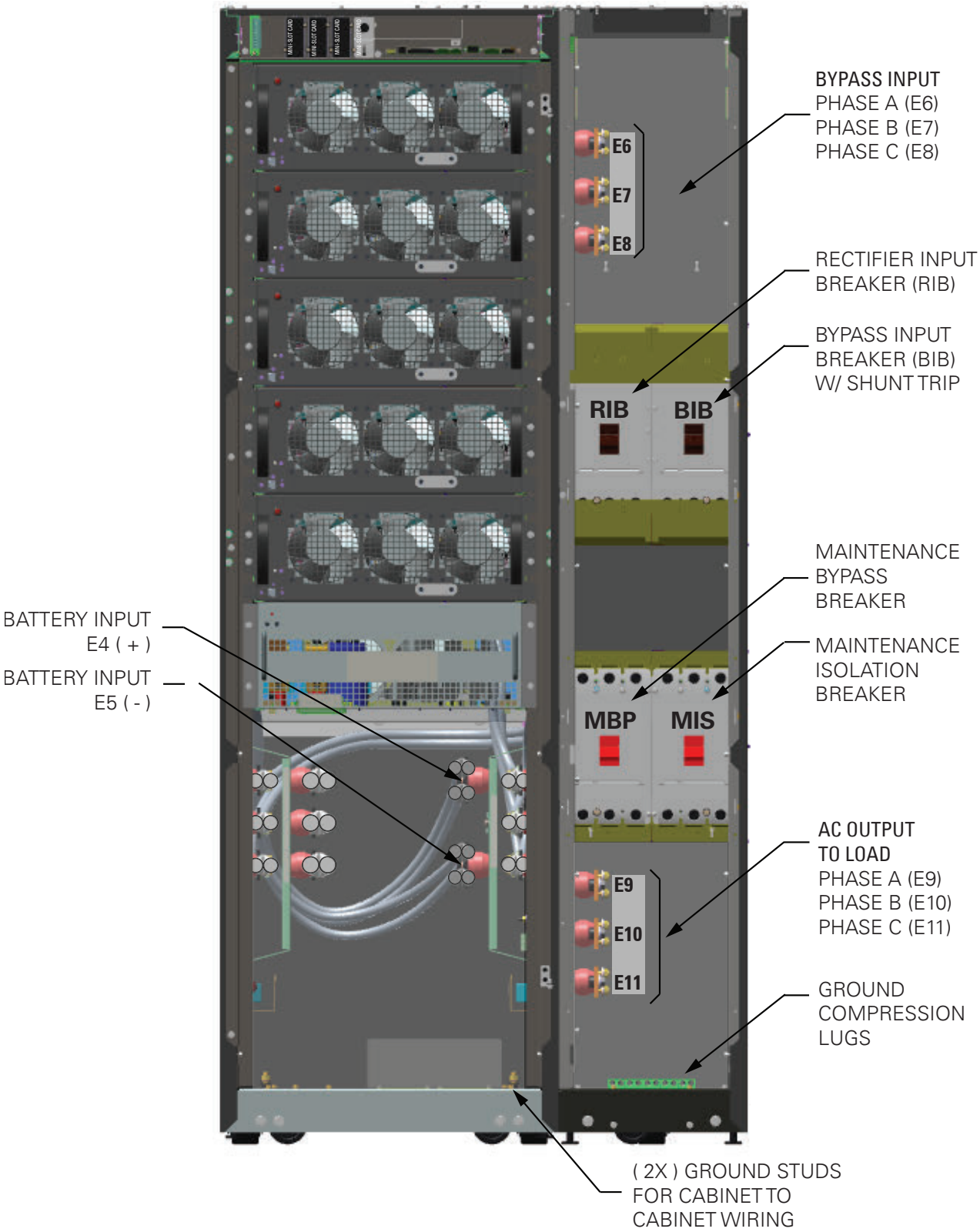


Figure 27. Four-Wire UPS with SIAC-B (4-Breaker) Power Terminal Locations

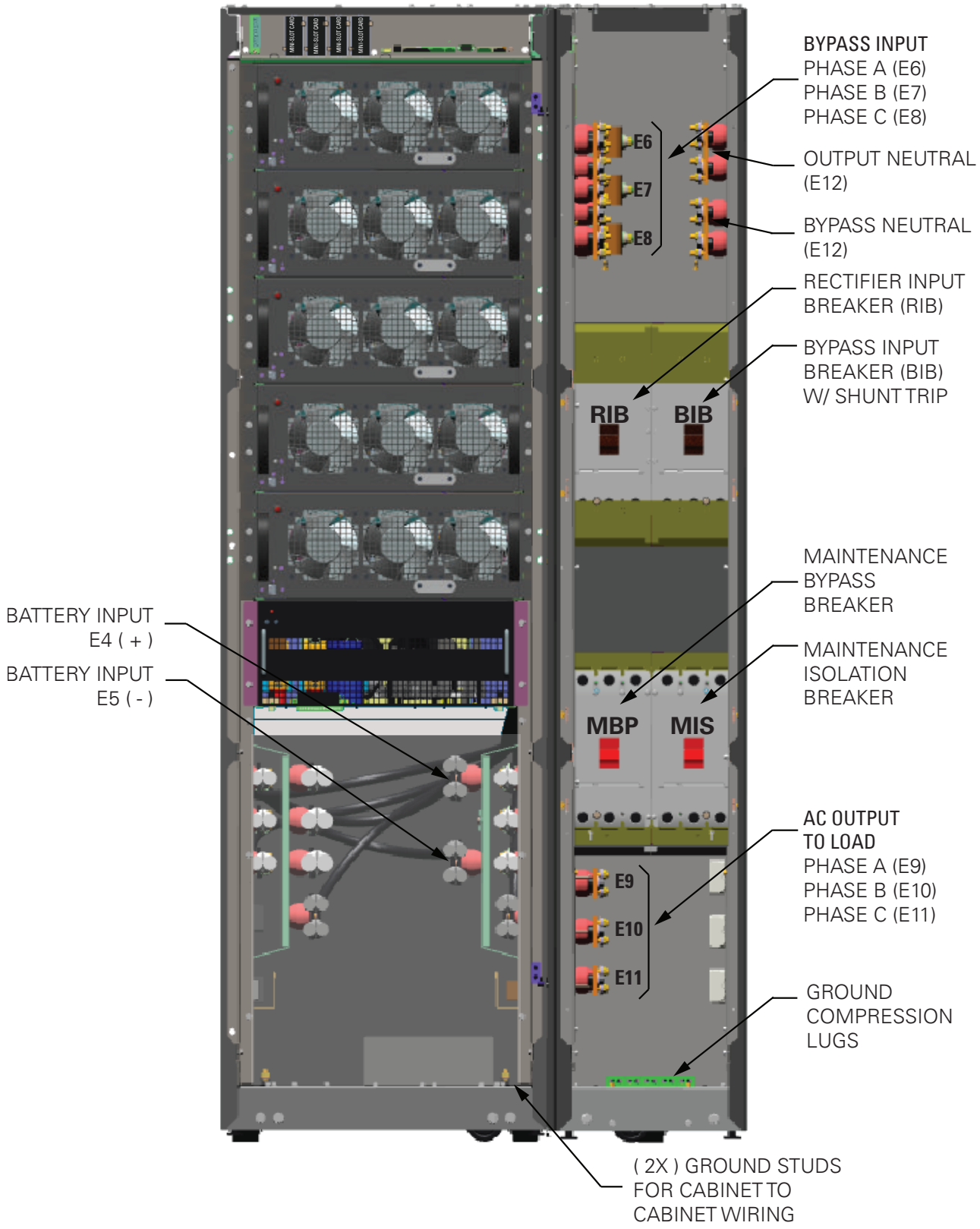
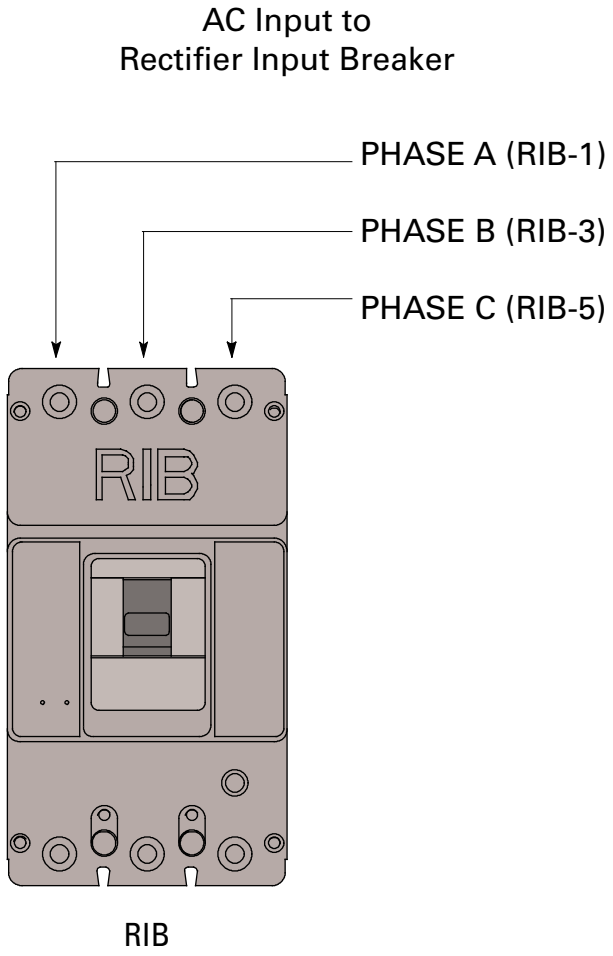


Figure 28. RIB Terminal Detail



4.5 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 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:

1. Route and connect the battery cables between the UPS and battery cabinet or battery disconnect according to the instructions in the ***Eaton Samsung Gen 3 Battery Cabinet Installation and Operation Manual***, ***Eaton 93PM Integrated Battery Cabinet Installation Manual-Small Welded*** or the ***Eaton 93PM Universal Integrated Battery Cabinet Installation Manual-Large and Large High Rate***, listed in paragraph 1.8 *For More Information*. See Figure 16, and Figure 17 for wiring access information, and Figure 19 for terminal locations.
2. Connect the positive, negative, and ground DC power wiring from the battery cabinet or disconnect to the UPS cabinet battery and ground terminals. See paragraph 3.2.2 *UPS System Power Wiring Preparation* for wiring and termination requirements. For a detailed view of the UPS terminal block, see Figure 20.
3. 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.
4. If wiring interface connections, proceed to paragraph 4.6 *Installing Interface Connections*; otherwise, proceed to **Step 5**.
5. Reinstall all safety shield panels previously removed and secure with the retained hardware.
6. If removed, reinstall the sidecar front panel and secure with the retained hardware.
7. Close the UPS outside door and secure the latch.

4.6 Installing Interface Connections

Use the procedures in the following paragraphs to connect the various interface connections.

Table 22 lists all of the available (if installed) interface and control wiring topics, install each based on customer request and options ordered with the UPS.

Table 22. List of Interface and Control Wiring Connection Topics

If wiring:	Proceed to:
Building Alarm and Relay Contact Connections	4.6.1 *Installing Building Alarm and Relay Contact Connections*
Sidecar MIS and RIB Breaker Monitoring Connections	4.6.2 *Sidecar MIS and RIB Breaker Monitoring Connections*
Battery Detect Connections	4.6.3 *Installing Battery Detect Interface Connections*
Battery Shunt Trip and Battery Aux Connections	4.6.4 *Installing Battery Shunt Trip and Battery Aux Connections*
Bypass Shunt Trip Connections	4.6.5 *Installing Bypass Shunt Trip Interface Connections*
Generator Interface Connections	4.6.6 *Generator Interface Connections*
Minislot Interface Connections	4.6.7 *Installing Minislot Interface Connections*
REPO (Remote Power Off) Switch Connections	4.7 *Installing a REPO Switch*

4.6.1 Installing Building Alarm and Relay Contact Connections

	NOTE 1	If installing interface wiring connections between standalone cabinets or separate devices, conduit must be installed between each cabinet or device.
	NOTE 2	Disconnect terminal block plugs from terminal blocks to wire plugs.

To install 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. If not already opened, open the front door by lifting the latch from the bottom and turning to the right (counterclockwise) and swing the door open.
3. If wiring the interface terminals from the bottom of the UPS, proceed to **Step 8**; otherwise, proceed to **Step 4**.
4. **Top Entry Wiring.** Remove the top interface entry conduit landing plates to drill or punch holes (see Figure 16, and Figure 17).
5. Reinstall the interface entry plates and install the conduit.
6. Route the UPS building alarm and relay output interface wiring through the top interface entry conduit landing plates to the UPS building alarm and relay output terminals. See Figure 29 and Figure 30 for UPS interface terminal locations.
7. Proceed to **Step 13**.
8. **Bottom Entry Wiring.** Remove the bottom interface entry conduit landing plates to drill or punch holes (see Figure 31).
9. Reinstall the interface entry plates and install the conduit.
10. Route the UPS building alarm and relay output interface wiring through the bottom interface entry conduit landing plates to the bottom access interface wiring channel along the inside of the front door.
11. Route the wiring along the interface wiring channel.
12. Secure the wiring to the wire tie anchors provided (see Figure 32) using Zip ties.
13. Connect the building alarm interface wiring to the building alarm terminals. See paragraph 3.2.3 *UPS System Interface Wiring Preparation* and Table 23 for wiring and termination requirements, and Figure 33 for terminal assignments.
14. Connect the relay output interface wiring to the relay output terminals. See Table 24 for wiring and termination requirements, and Figure 34 for terminal assignments.
15. If wiring additional interface or control wiring options, see Table 22 for next option to install; otherwise, proceed to **Step 16**.
16. Close the UPS outside door and secure the latch.

Figure 29. Interface Terminal Locations

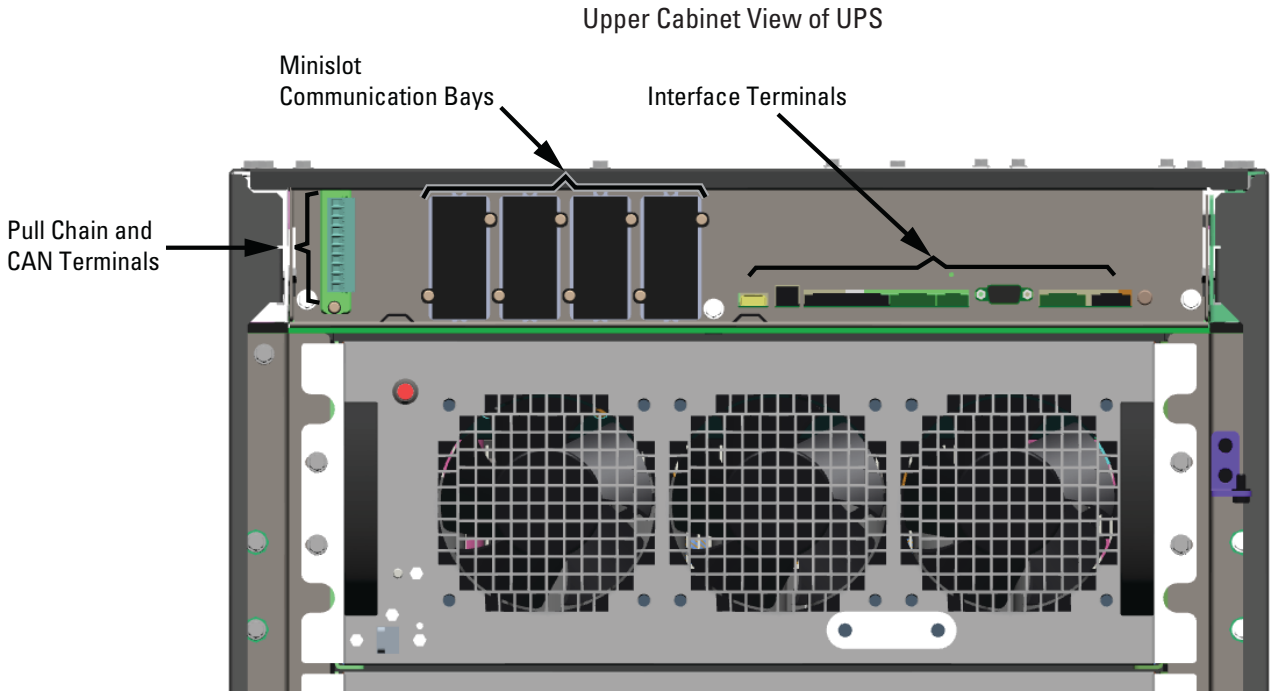


Figure 30. Interface Terminal Detail

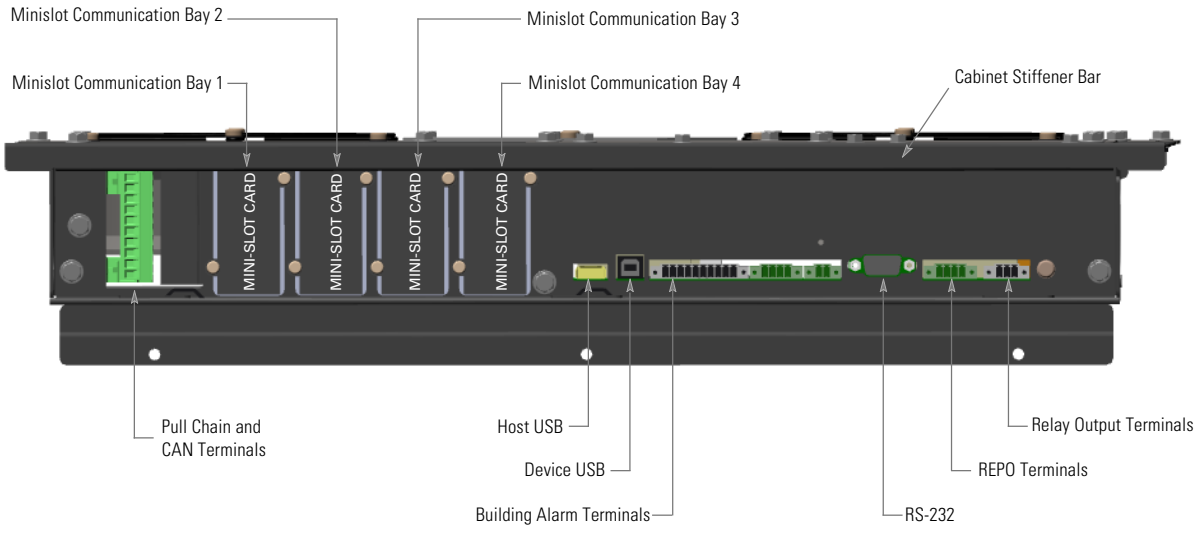


Figure 31. Bottom Access Interface Wiring Location

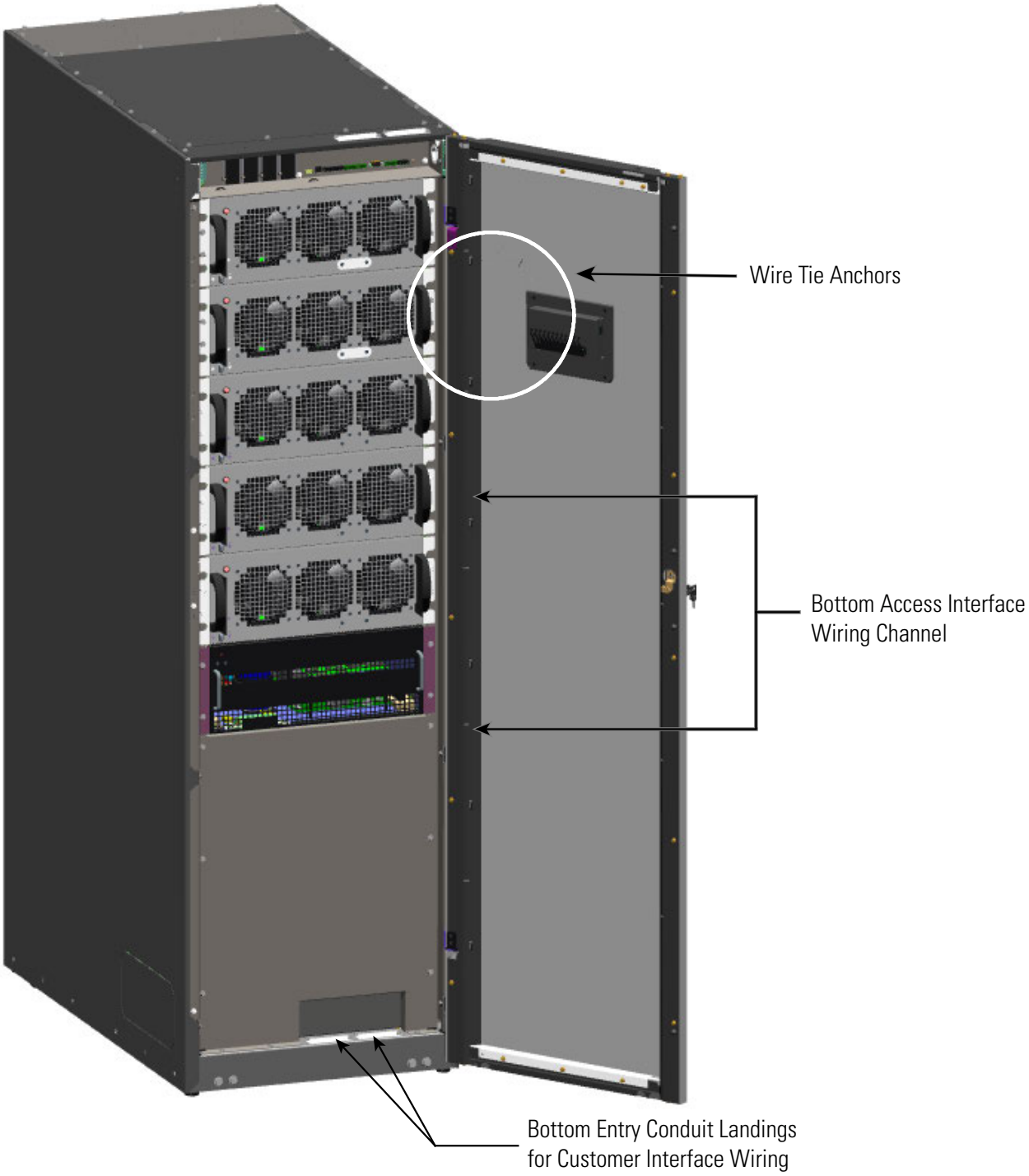


Figure 32. Wire Tie Anchors

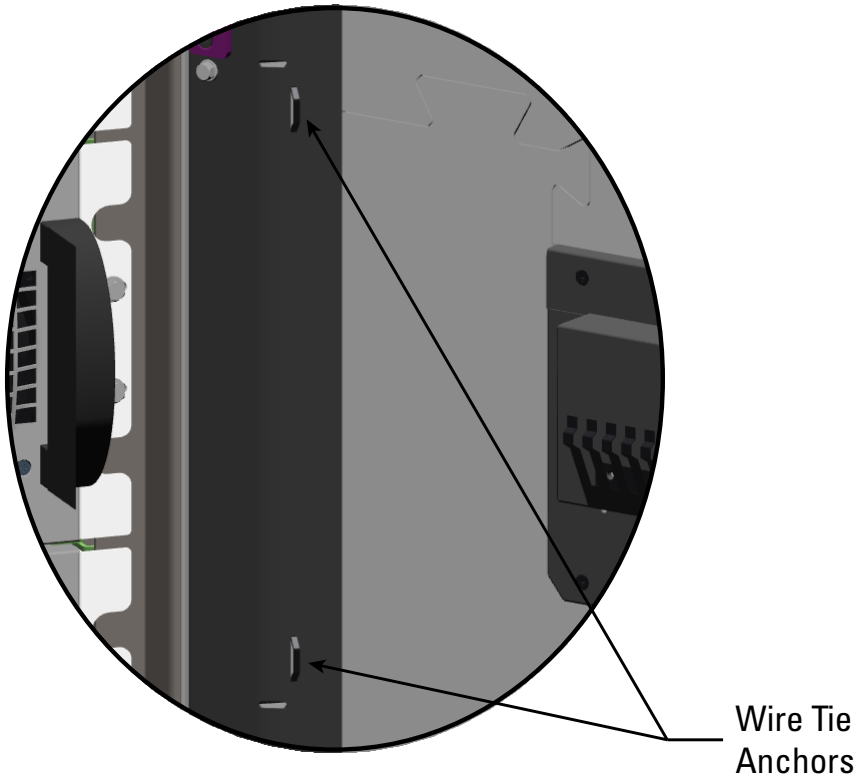


Table 23. Building Alarm Connections and Wire Terminations

Termi-nal	Name	Description	Recommended Minimum Wire Size	Size of Pressure Termination	Tightening Torque
10	Building Alarm 1	Input: Programmable UPS alarm, activated by a remote dry contact closure	Twisted Pair Wires #18 AWG	#14 #30 AWG	2 lb in (0.22-0.25 Nm)
9	Building Alarm 1 Return				
8	Building Alarm 2				
7	Building Alarm 2 Return				
6	Building Alarm 3				
5	Building Alarm 3 Return				
4	Building Alarm 4				
3	Building Alarm 4 Return				
2	Building Alarm 5				
1	Building Alarm 5 Return				

Figure 33. Building Alarm Terminal Block Connector Assignments

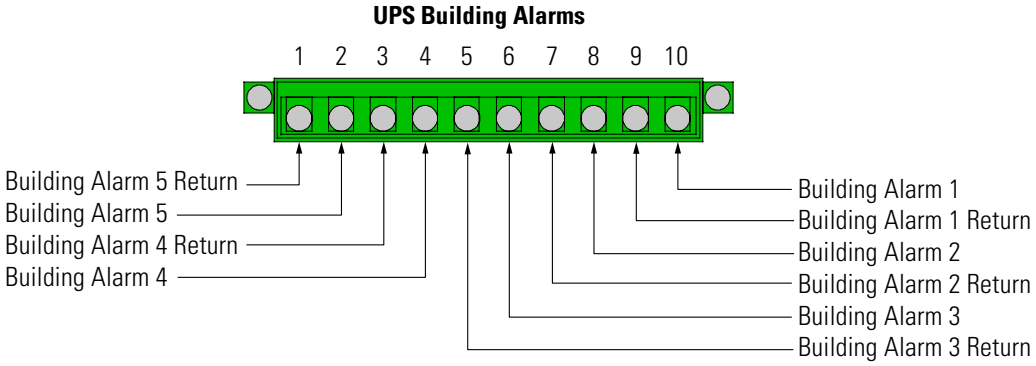
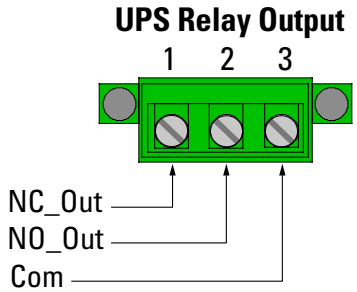


Table 24. Relay Contact Connections and Wire Terminations

Terminal	Name	Description	Recommended Minimum Wire Size	Size of Pressure Termination	Tightening Torque
1	Relay Contact NC	Output: General purpose normally-closed (NC) relay contact	Twisted Pair Wires #18 AWG	#14 #30 AWG	2 lb in (0.22-0.25 Nm)
3	Relay Contact Common				
2	Relay Contact NO	Output: General purpose normally-open (NO) relay contact			
3	Relay Contact Common				

Figure 34. Relay Contact Terminal Block Connector Assignments



4.6.2 Sidecar MIS and RIB Breaker Monitoring Connections

NOTE 1 In a 2 Breaker Sidecar; only the Maintenance Bypass Breaker (MBP) is pre-wired for monitoring.

NOTE 2 In a 3 or 4 Breaker Sidecar; both the Maintenance Bypass Breaker (MBP) and the Bypass Input Breaker (BIB) are pre-wired for monitoring.

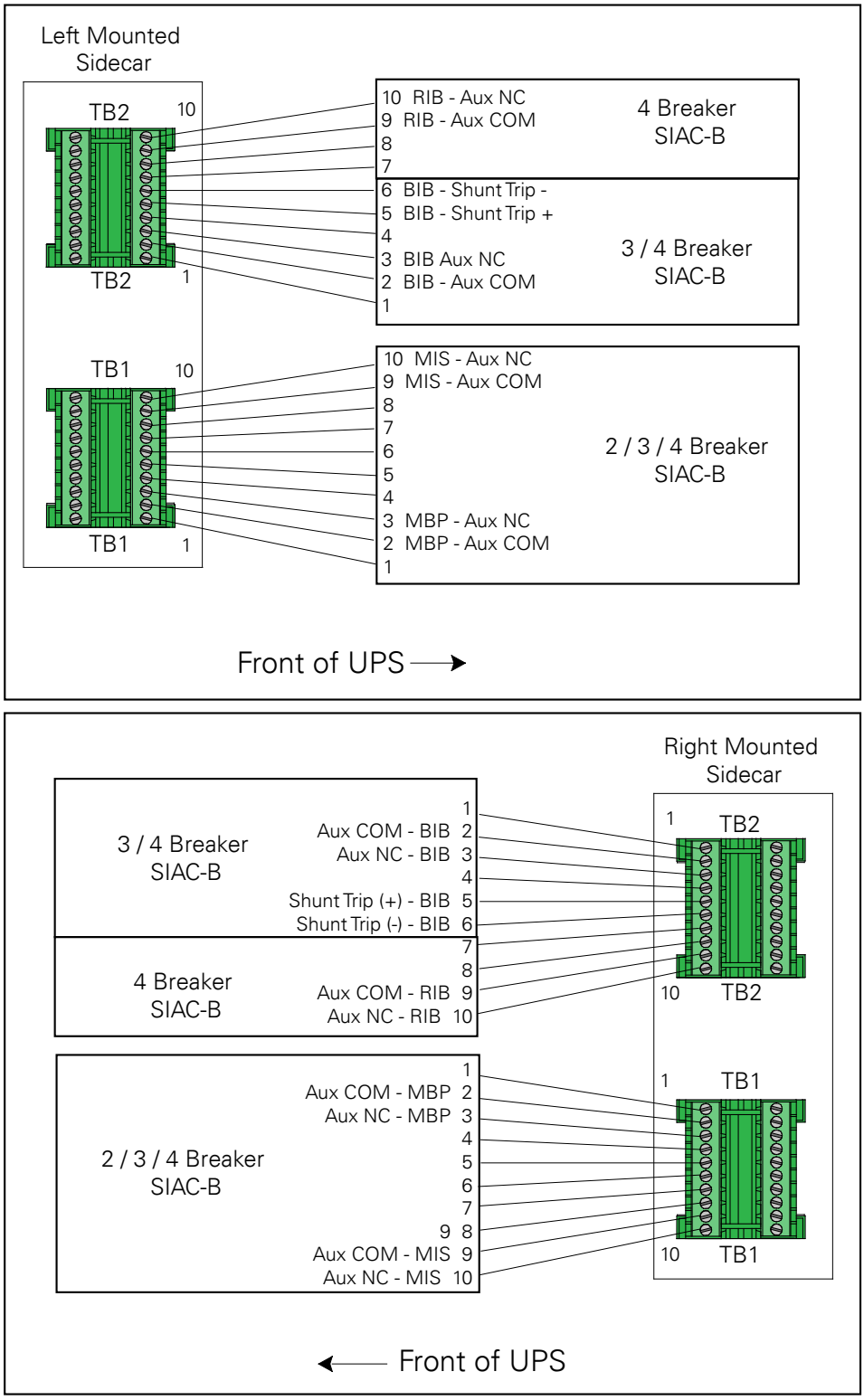
To install wiring:

1. Verify the UPS system is turned off and all power sources are removed. See Chapter 7 *UPS Operating Instructions*, for shutdown instructions.
2. If not already removed, loosen the bottom screws and completely remove the top screws securing the sidecar front panel. Lift the panel upwards and remove from the unit. Retain the hardware for later use.
3. Route the wiring along the sidecar interface wiring channel to the sidecar terminals, TB1 and TB2.
4. Secure the wiring to the wire tie anchors provided using Zip ties.
5. If 2, 3 or 4 Breaker Sidecar and monitoring of the Maintenance Isolation Breaker (MIS) is required, connect the building alarm interface wiring to TB1. See paragraph 3.2.3 *UPS System Interface Wiring Preparation* and Table 25 for wiring and termination requirements, and Figure 35 for terminal assignments.
6. If 4 Breaker Sidecar and monitoring of the Rectifier Input Breaker (RIB) is required, connect the building alarm interface wiring to TB2.
7. If wiring additional interface or control wiring options, see Table 22 for next option to install; otherwise, proceed to **Step 8**.
8. If removed, reinstall all safety shield panels previously removed and secure with the retained hardware.
9. Reinstall the sidecar front panel and secure with the retained hardware.
10. Close the UPS outside door and secure the latch.

Table 25. Sidecar MIS and RIB Breaker Monitoring Connection and Wire Terminations

Terminal Block	Terminal	Name	Recommended Minimum Wire Size	Size of Pressure Termination	Tightening Torque
TB1	9	MIS - Aux COM	Twisted Pair Wires #18 AWG	#14 #30 AWG	2 lb in (0.22-0.25 Nm)
	10	MIS - Aux NC			
TB2	9	RIB - Aux COM			
	10	RIB - Aux NC			

Figure 35. Sidecar TB1 and TB2 Terminal Locations



4.6.3 Installing Battery Detect Interface Connections

NOTE 1 If installing interface wiring connections between standalone cabinets, conduit must be installed between cabinets.

NOTE 2 Refer to the ***Eaton Samsung Gen 3 Battery Cabinet Installation and Operation Manual***, ***Eaton 93PM Integrated Battery Cabinet Installation Manual-Small Welded*** or the ***Eaton 93PM Universal Integrated Battery Cabinet Installation Manual-Large and Large High Rate***, listed in paragraph 1.8 *For More Information*, for battery cabinet wiring access information and instructions.

To install 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. If not already opened, open the front door by lifting the latch from the bottom and turning to the right (counterclockwise) and swing the door open.
3. If wiring the battery detect connections using the inter-cabinet wiring access pass-through (line-up-and-match configurations), proceed to **Step 4**; if wiring the battery interface connections using bottom entry access, proceed to **Step 6**; if wiring the battery interface connections using top entry access, proceed to **Step 10**.
4. **Pass-through Wiring.** Route the battery detect wiring from the battery cabinet through the bottom UPS inter-cabinet wiring access pass-through and static switch shelf bushing to the UPS battery shunt trip terminals (CN8 terminal block). See Figure 18 for UPS wiring access information, and Figure 36 for terminal location.
5. Proceed to **Step 13**.
6. **Bottom Entry Wiring.** Route the battery detect wiring from the battery cabinet through the bottom interface entry conduit landing plate to the bottom access interface wiring channel along the inside of the front door. (See Figure 31).
7. Route the wiring along the interface wiring channel to the UPS battery shunt trip terminals (CN8 terminal block), see Figure 36 for terminal location.
8. Secure the wiring to the wire tie anchors provided (see Figure 32) using Zip ties.
9. Proceed to **Step 13**.
10. **Top Entry Wiring.** Route the battery detect wiring from the battery cabinet through the top interface entry conduit landing plate to the UPS battery shunt trip terminals (CN8 terminal block).
11. Route the wiring along the interface wiring channel to the UPS battery shunt trip terminals (CN8 terminal block), see Figure 36 for terminal location.
12. Secure the wiring to the wire tie anchors provided (see Figure 32) using Zip ties.
13. Connect the wiring to the assigned terminals. See paragraph 3.2.3 *UPS System Interface Wiring Preparation* and Table 26 for wiring and termination requirements, and Figure 37 for terminal assignments.
14. If wiring additional interface or control wiring options, see Table 22 for next option to install; otherwise, proceed to **Step 15**.
15. If removed, reinstall all safety shield panels previously removed and secure with the retained hardware.
16. If removed, reinstall the sidecar front panel and secure with the retained hardware.
17. Close the UPS outside door and secure the latch.

4.6.4 Installing Battery Shunt Trip and Battery Aux Connections

NOTE 1 If installing interface wiring connections between standalone cabinets, conduit must be installed between cabinets.

NOTE 2 Refer to the ***Eaton Samsung Gen 3 Battery Cabinet Installation and Operation Manual***, ***Eaton 93PM Integrated Battery Cabinet Installation Manual-Small Welded*** or the ***Eaton 93PM Universal Integrated Battery Cabinet Installation Manual-Large and Large High Rate***, listed in paragraph 1.8 *For More Information*, for battery cabinet wiring access information and instructions.

To install 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. If not already opened, open the front door by lifting the latch from the bottom and turning to the right (counterclockwise) and swing the door open.
3. If not already removed, remove the screws securing the bottom internal safety shield panel and remove the panel. Retain the hardware for later use.
4. Remove the screws securing the internal safety shield panel above the bottom safety panel and remove the panel to gain access to the battery shunt trip wiring terminals. Retain the hardware for later use.
5. If wiring the battery shunt trip and/or battery aux connections using the inter-cabinet wiring access pass-through (line-up-and-match configurations), proceed to **Step 6**; if wiring the battery shunt trip and/or battery aux connections using bottom entry access, proceed to **Step 8**; if wiring the battery shunt trip and/or battery aux connections using top entry access, proceed to **Step 12**.
6. **Pass-through Wiring.** Route the battery shunt trip wiring (and/or battery aux wiring) from the battery cabinet through the bottom UPS inter-cabinet wiring access pass-through and static switch shelf bushing to the UPS battery shunt trip terminals (CN8 terminal block). See Figure 18 for UPS wiring access information, and Figure 36 for terminal location.
7. Proceed to **Step 15**.
8. **Bottom Entry Wiring.** Route the battery shunt trip wiring (and/or battery aux wiring) from the battery cabinet through the bottom interface entry conduit landing plate to the bottom access interface wiring channel along the inside of the front door. (See Figure 31).
9. Route the wiring along the interface wiring channel to the UPS battery shunt trip terminals (CN8 terminal block), see Figure 36 for terminal location.
10. Secure the wiring to the wire tie anchors provided (see Figure 32) using Zip ties.
11. Proceed to **Step 15**.
12. **Top Entry Wiring.** Route the battery shunt trip wiring (and/or battery aux wiring) from the battery cabinet or battery disconnect through the top of the UPS sidecar and the bottom UPS inter-cabinet wiring access pass-through and static switch shelf bushing to the CN8 terminal block.
13. Route the wiring along the interface wiring channel to the UPS battery shunt trip terminals (CN8 terminal block), see Figure 36 for terminal location.
14. Secure the wiring to the wire tie anchors provided (see Figure 32) using Zip ties.
15. Connect the wiring to the assigned terminals. See paragraph 3.2.3 *UPS System Interface Wiring Preparation* and Table 26 for wiring and termination requirements, and Figure 37 for terminal assignments.
16. If wiring additional interface or control wiring options, see Table 22 for next option to install; otherwise, proceed to **Step 17**.
17. If removed, reinstall all safety shield panels previously removed and secure with the retained hardware.

18. If removed, reinstall the sidecar front panel and secure with the retained hardware.
19. Close the UPS outside door and secure the latch.

Figure 36. Shunt Trip and Auxiliary Terminal Block (CN8) Location

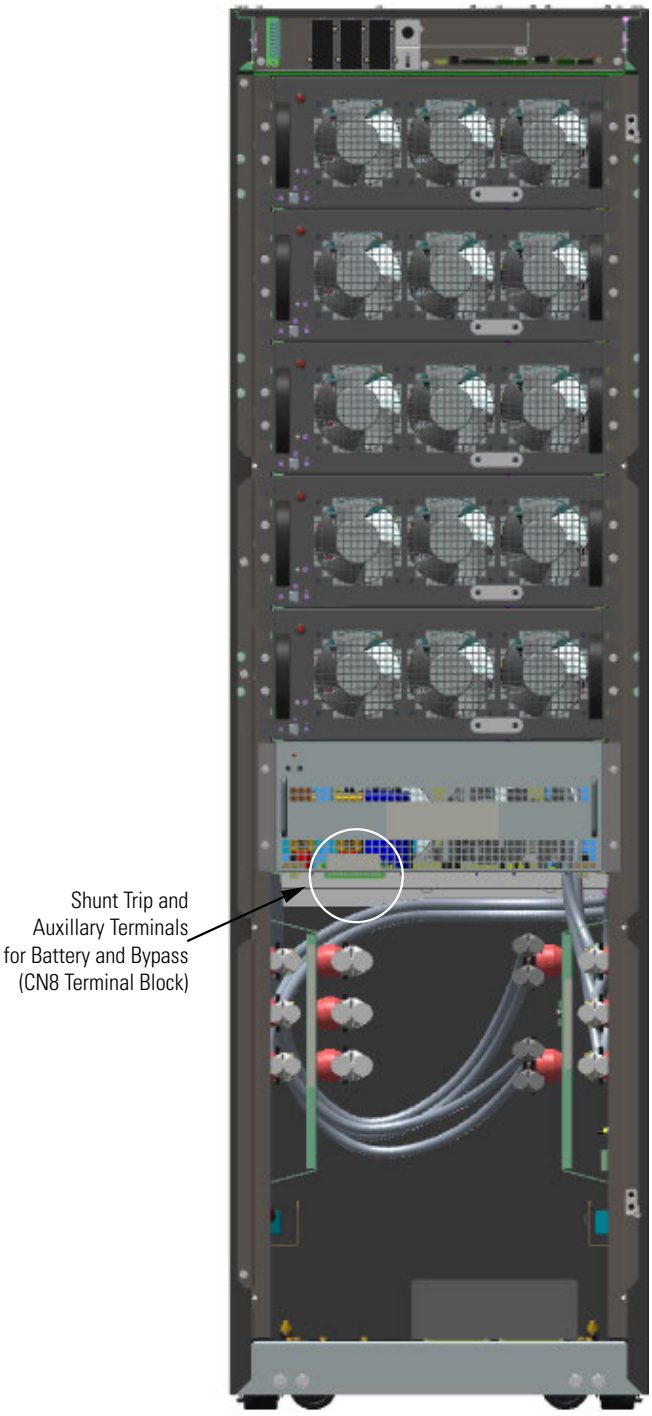


Figure 37. Bypass Shunt Trip, Battery Shunt Trip and Detect Terminal Detail

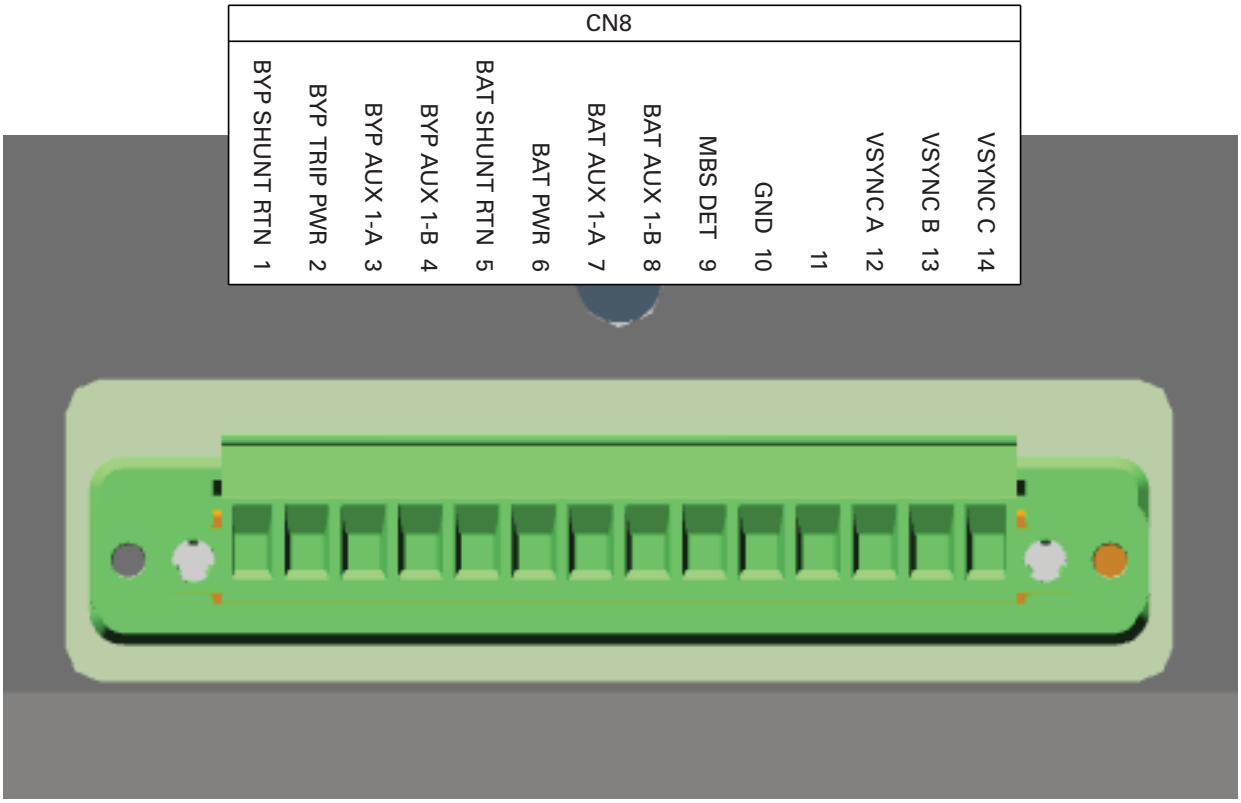


Table 26. Shunt Trip and Battery Detect Connections and Wire Terminations

Terminal	Name	Description	Recommended Minimum Wire Size	Size of Pressure Termination	Tightening Torque
1	48 Vdc Bypass Shunt Trip –	Output: Contacts used to open bypass breaker or disconnect	Twisted Pair Wires #18 AWG	#14 #30 AWG	2 lb in (0.22-0.25 Nm)
2	48 Vdc Bypass Shunt Trip +				
5	48 Vdc Battery Shunt Trip –	Output: Contacts used to open battery breaker or disconnect			
6	48 Vdc Battery Shunt Trip +				
7	48 Vdc Battery Aux 1–A	Input: Contacts used to monitor auxiliary contacts on battery breaker or disconnect			
8	48 Vdc Battery Aux 1–B				

4.6.5 Installing Bypass Shunt Trip Interface Connections

NOTE 1 If installing interface wiring connections between standalone cabinets, conduit must be installed between cabinets.

NOTE 2 Disconnect terminal block plugs from terminal blocks to wire plugs.

To install 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. If not already opened, open the front door by lifting the latch from the bottom and turning to the right (counterclockwise) and swing the door open.
3. If not already removed, remove the screws securing the bottom internal safety shield panel and remove the panel. Retain the hardware for later use.
4. If wiring the bypass shunt trip connections using bottom entry access, proceed to **Step 5**; if wiring the bypass shunt trip connections using top entry access, proceed to **Step 7**.
5. **Bottom Entry Wiring.** Route the bypass shunt trip wiring through the bottom of the UPS to the UPS bypass shunt trip terminals. See Figure 16, and Figure 17 for UPS wiring access information, and Figure 29 and Figure 36 for UPS terminal locations.
6. Proceed to **Step 8**.
7. **Top Entry Wiring.** Route the bypass shunt trip wiring through the top of the UPS and the bottom UPS inter-cabinet wiring access pass-through to the UPS bypass shunt trip terminals.
8. Connect the wiring to the bypass shunt trip terminals. See paragraph 3.2.3 *UPS System Interface Wiring Preparation* and Table 26 for wiring and termination requirements, and Figure 37 for terminal assignments.
9. If wiring additional interface or control wiring options, see Table 22 for next option to install; otherwise, proceed to **Step 10**.
10. If removed, reinstall all safety shield panels previously removed and secure with the retained hardware.
11. If removed, reinstall the sidecar front panel and secure with the retained hardware.
12. Close the UPS outside door and secure the latch.

4.6.6 Generator Interface Connections

If ESS is enabled and the UPS will be fed by a site generator at any time, the On Generator building alarm must be wired and configured to a Building Alarm Input. Wiring the On Generator sensing circuit to a building alarm allows the UPS to optimize its operation with the generator by transferring the UPS from ESS mode to Normal (double conversion) mode.

	NOTE 1	A UPS building alarm input is used to indicate On Generator.
	NOTE 2	Any pair of unused building alarm terminals may be used for On Generator connections.
	**NOTE 3**	Program the building alarm to read On Generator and for either Normally Open (default) or Normally Closed as required by the generator sensing output.
	NOTE 4	If installing interface wiring connections between standalone cabinets, conduit must be installed between cabinets.
	NOTE 5	Disconnect terminal block plugs from terminal blocks to wire plugs.

To Install 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. If not already opened, open the front door by lifting the latch from the bottom and turning to the right (counterclockwise) and swing the door open.
3. If wiring the interface terminals from the bottom of the UPS, proceed to **Step 8**; otherwise, proceed to **Step 4**.
4. **Top Entry Wiring.** Remove the top interface entry conduit landing plates to drill or punch holes (see Figure 16, and Figure 17).
5. Reinstall the interface entry plates and install the conduit.
6. Route the UPS building alarm interface wiring through the top interface entry conduit landing plates to the UPS building alarm terminals. See Figure 29 and Figure 30 for UPS interface terminal locations.
7. Proceed to **Step 13**.
8. **Bottom Entry Wiring.** Remove the bottom interface entry conduit landing plates to drill or punch holes (see Figure 31).
9. Reinstall the interface entry plates and install the conduit.
10. Route the UPS building alarm interface wiring through the bottom interface entry conduit landing plates to the bottom access interface wiring channel along the inside of the front door.
11. Route the wiring along the interface wiring channel.
12. Secure the wiring to the wire tie anchors provided (see Figure 32) using Zip ties.
13. Connect the building alarm interface wiring to the building alarm terminals. See paragraph3.2.3 *UPS System Interface Wiring Preparation* and Table 23 for wiring and termination requirements.
14. If wiring additional interface or control wiring options, see Table 22 for next option to install; otherwise, proceed to **Step 15**.
15. If removed, reinstall all safety shield panels previously removed and secure with the retained hardware.
16. If removed, reinstall the sidecar front panel and secure with the retained hardware.
17. Close the UPS outside door and secure the latch.

4.6.7 Installing Minislot Interface Connections

NOTE 1	LAN drop for use with Minislot cards must be provided by the customer.
NOTE 2	When installing interface wiring connections, conduit must be installed between each device and the UPS cabinet.
NOTE 3	Remove the cabinet stiffener bar (see Interface Terminal Locations) before installing or removing Minislot cards. Reinstall the bar after the procedure is completed.

For installation and setup of a Minislot card, contact an Eaton service representative (see paragraph 1.9 *Getting Help*).

To install wiring:

1. If not already installed, install the LAN drop.
2. If not already opened, open the front door by lifting the latch from the bottom and turning to the right (counterclockwise) and swing the door open.
3. If wiring a Minislot card from the bottom of the UPS, proceed to **Step 8**; otherwise, proceed to **Step 4**.
4. **Top Entry Wiring.** Remove the top interface entry conduit landing plate to drill or punch holes (see Figure 16, and Figure 17).
5. Reinstall the interface entry plate and install the conduit.
6. Route the Minislot card interface wiring through the top interface entry conduit landing plate to the Minislot card terminals. See Figure 29 Minislot card locations.
7. Proceed to **Step 13**.
8. **Bottom Entry Wiring.** Remove the bottom interface entry conduit landing plate to drill or punch holes (see Figure 31).
9. Reinstall the interface entry plate and install the conduit.
10. Route the Minislot card interface wiring through the bottom interface entry conduit landing plate to the bottom access interface wiring channel along the inside of the front door.
11. Route the wiring along the interface wiring channel to the Minislot card terminals.
12. Secure the wiring to the wire tie anchors provided (see Figure 32) using Zip ties.
13. Install the LAN and other cables to the appropriate Minislot cards. Refer to the manual supplied with the Minislot card for terminal assignments.
14. Refer to the manual supplied with the Minislot card for operator instructions.
15. If wiring additional interface or control wiring options, see Table 22 for next option to install; otherwise, proceed to **Step 16**.
16. If removed, reinstall all safety shield panels previously removed and secure with the retained hardware.
17. If removed, reinstall the sidecar front panel and secure with the retained hardware.
18. Close the UPS outside door and secure the latch.

4.7 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 38 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 UPS Cabinet from the Pallet* through *4.4.4 UPS with 4-Breaker Sidecar (RIB, BIB, MBP and MIS)*.

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

NOTE 3 The REPO switch must be a Normally-open or Normally-closed latching-type switch not tied into any other circuits.

NOTE 4 This procedure is intended for installing the Eaton-supplied REPO switch. If installing another manufacturer's switch, use this procedure, Figure 40 and Figure 41 as a guide.

NOTE 5 The REPO switch wiring must be in accordance with NEC Article 725 Class 2 requirements.

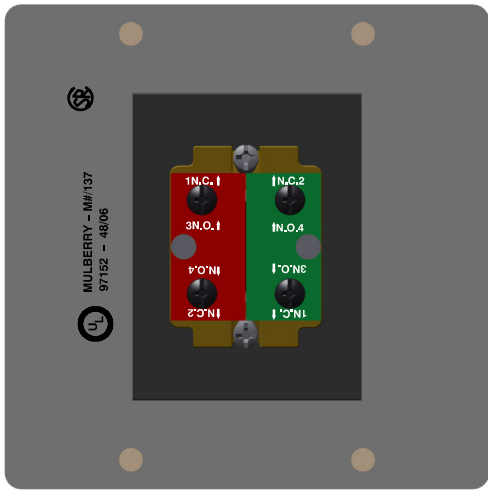
NOTE 6 Disconnect terminal block plugs from terminal blocks to wire plugs.

To Install a REPO switch:

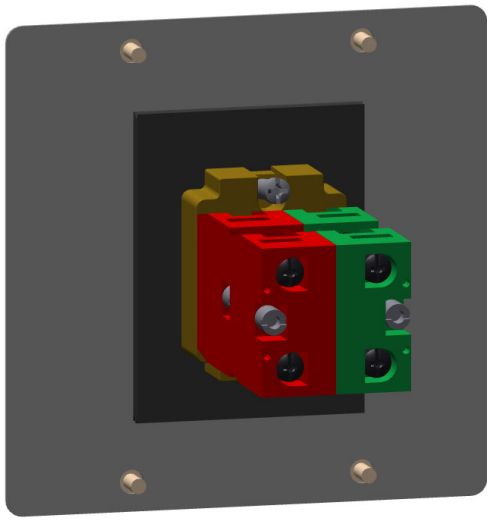
1. Verify the UPS system is turned off and all power sources are removed. See Chapter 7 *UPS Operating Instructions*, for shutdown instructions.
2. Securely mount the REPO switch. Recommended locations include operator's consoles or near exit doors. See Figure 11 for enclosure dimensions and wiring knockouts.
3. If not already opened, open the front door by lifting the latch from the bottom and turning to the right (counterclockwise) and swing the door open.
4. If wiring the REPO terminals from the bottom of the UPS, proceed to **Step 9**; otherwise, proceed to **Step 5**.
5. **Top Entry Wiring.** Remove the top interface entry conduit landing plate to drill or punch holes (see Figure 16, and Figure 17).
6. Reinstall the interface entry plate and install the conduit.
7. Route the REPO wiring through the top interface entry conduit landing plate to the REPO terminals. See Figure 29 and Figure 30 for UPS interface terminal locations.
8. Proceed to **Step 14**.
9. **Bottom Entry Wiring.** Remove the bottom interface entry conduit landing plate to drill or punch holes (see Figure 31).
10. Reinstall the interface entry plate and install the conduit.

Figure 38. REPO Switch

REPO Switch
(Front View)



Contact Block
(Back View, Faceplate Removed)



Contact Block
(Angled Back View, Faceplate Removed)

11. Route the REPO wiring through the bottom interface entry conduit landing plate to the bottom access interface wiring channel along the inside of the front door.
12. Route the wiring along the interface wiring channel.
13. Secure the wiring to the wire tie anchors provided (see Figure 32) using Zip ties.
14. Connect the REPO wiring as shown in Table 27 and Figure 40 for a normally-open REPO or Table 28 and Figure 41 for a normally-closed REPO for a normally-closed REPO. See paragraph 3.2.3 *UPS System*

Interface Wiring Preparation for wiring and termination requirements, and Figure 39 for terminal assignments.

15. If using a normally-closed REPO switch, connect a jumper wire between **pins 3** and **4** on the REPO terminal block.
16. If you are installing multiple REPO switches, wire additional switches in parallel with the first REPO.
17. 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 38). The REPO switch wiring must be in accordance with NEC Article 725 Class 2 requirements.
18. If removed, reinstall all safety shield panels previously removed and secure with the retained hardware.
19. If removed, reinstall the sidecar front panel and secure with the retained hardware.
20. Close the UPS outside door and secure the latch.

Figure 39. REPO Terminal Block Connector Assignments

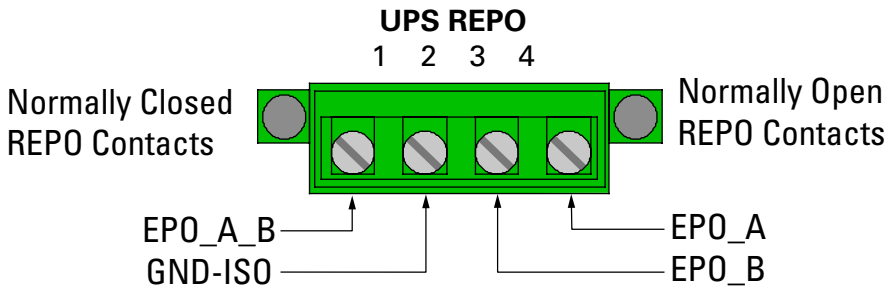


Table 27. Normally-Open REPO Connections and Wire Terminations

From REPO Station Switch Contact Block (Either Block)	UPS REPO Terminal	Name	Description	Recommended Minimum Wire Size	Size of Wire Termination	Tightening Torque
3 NO	3	EPO_A	Input: Normally-open dry contact used to activate UPS EPO from a remote switch	Twisted Pair Wires #18 AWG	#16 #30 AWG	2 lb in (0.22-0.25 Nm)
4 NO	4	EPO_B				

Figure 40. Normally-Open REPO Switch Wiring

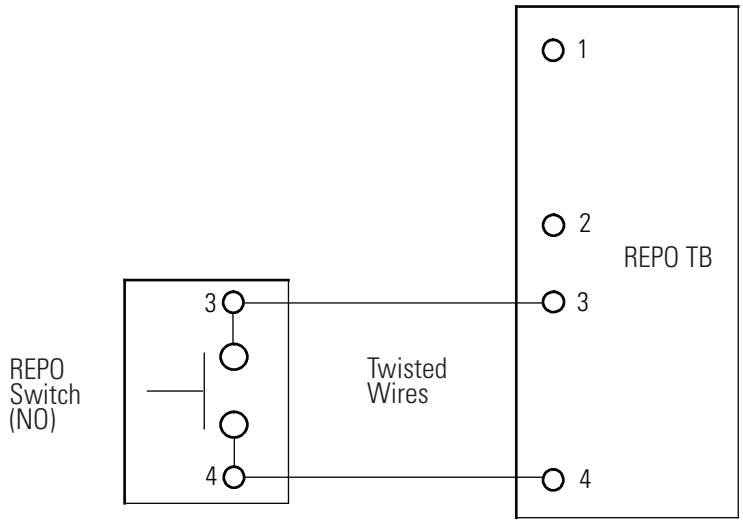
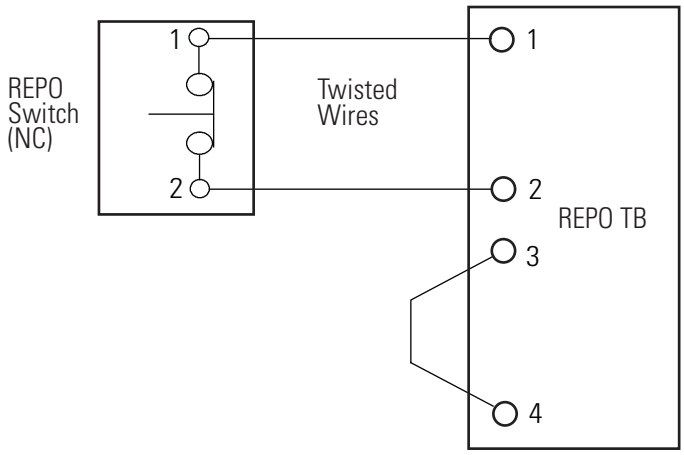


Table 28. Normally-Closed REPO Connections and Wire Terminations

From REPO Station Switch Contact Block (Either Block)	UPS REPO Terminal	Name	Description	Recommended Minimum Wire Size	Size of Wire Termination	Tightening Torque
3 NO	1	EPO_A_B	Input: Normally-closed dry contact used to activate UPS EPO from a remote switch.	Twisted Pair Wires #18 AWG	#16 #30 AWG	2 lb in (0.22-0.25 Nm)
4 NO	2	GND-ISO				

Figure 41. Normally-Closed REPO Switch Wiring



4.8 Initial Startup

Startup may be performed by the customer's battery qualified electrical contractor for single (not parallel) UPS installations without any accessory cabinets such as an External Battery Cabinet.

Startup and operational checks for installations with accessory cabinets must be performed by an authorized Eaton Customer Service Engineer, or the warranty terms specified on the product's resources page become void. See Chapter 11 *Warranty* for details. 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.

4.9 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.

4.10 Installation Checklist

- ❑ All packing materials and restraints have been removed from each cabinet.
- ❑ The UPS cabinet is placed in its installed location.
- ❑ 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 shunt trip signal wiring is connected from the UPS to the battery disconnect.
- ❑ Battery detect signal wiring is connected from the UPS to the battery disconnect.
- ❑ A ground conductor is properly installed.
- ❑ Building alarms and alarm relays are wired appropriately. (Optional)
- ❑ LAN drops are installed. (Optional)
- ❑ LAN connections have been completed. (Optional)
- ❑ The REPO device is mounted in its installed location and its wiring is terminated inside the UPS cabinet. (Optional)
- ❑ A jumper wire is connected between pins 3 and 4 on the REPO terminal block if using a normally-closed REPO switch. (Optional)
- ❑ All internal safety shields are installed.
- ❑ Accessories are mounted in installed locations and wiring is terminated inside the UPS cabinet. (Optional)
- ❑ Air conditioning equipment is installed and operating correctly.
- ❑ The area around the installed UPS system is clean and dust-free. (Eaton recommends 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 7.5m (25 ft) of the UPS equipment.
- ❑ Startup and operational checks are performed by an authorized Eaton Customer Service Engineer for installations with accessory cabinets.
- ❑ Visit www.eaton.com/pq/register to register your new Eaton UPS / Eaton UPS Accessory.

Notes

Chapter 5 Understanding UPS Operation

5.1 UPS System Overview

The Eaton 93PM Gen 2 UPS is a continuous-duty, solid-state, transformerless, 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 42 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.

The emergency bypass consists of a continuous duty static switch. The static switch is armed and ready during normal operation.

IMPORTANT

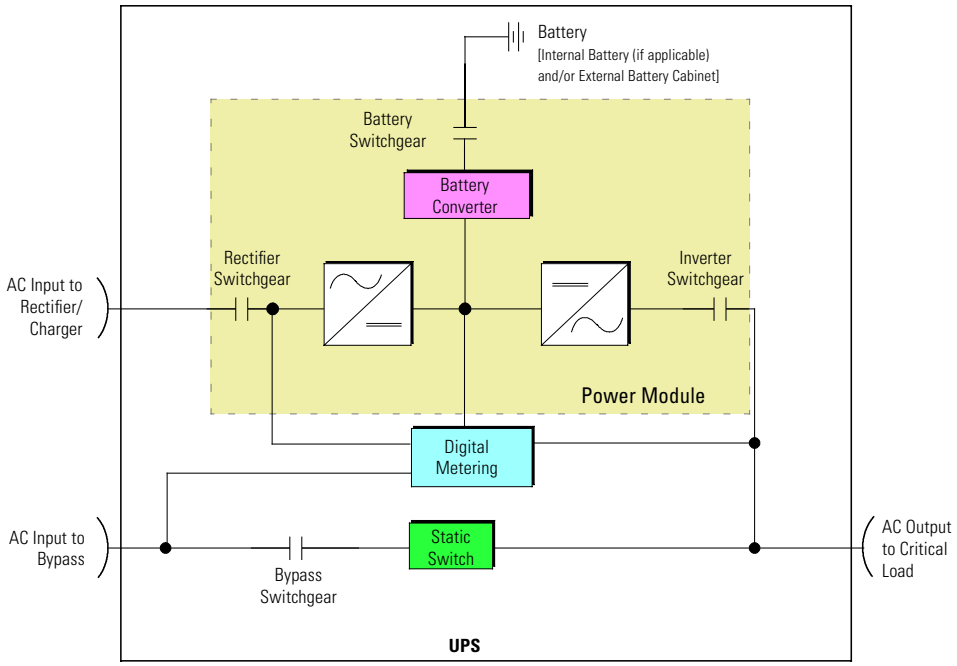
In case of customer installed bypass breaker, the shunt trip and auxiliary should be connected to the static switch. The shunt trip voltage provided by the UPS is 48V DC.

IMPORTANT

Dans le cas d'un disjoncteur de dérivation installé par le client, le déclencheur shunt et l'auxiliaire doivent être connectés à l'interrupteur statique. La tension de déclenchement shunt fournie par l'onduleur est de 48 V CC.

This unit is a three-wire device. The loss of a single input phase will be considered a complete loss of input power and discharge the battery to provide power to the load.

Figure 42. Main Elements of the UPS System



5.2 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 either automatically or manually. With the exception of an optional external battery cabinet, no other cabinets or equipment are required for the single UPS to successfully support its applied loads.

5.2.1 Modes

The Eaton 93PM Gen 2 UPS supports a critical load in four different modes of operation:

- In Energy Saver System (ESS) mode, commercial AC power is supplied directly to the critical load through the internal bypass and transfers automatically to Normal mode (double-conversion on demand) if an abnormal condition is detected. The battery charger also provides charging current for the battery, if needed.
- In Normal (double-conversion) 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 Bypass mode, the critical load is directly supported by utility power. The battery charger also provides charging current for the battery, if needed.
- 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.

5.2.2 Energy Saver System Mode

When the UPS is operating in ESS mode, commercial AC power is supplied directly to the critical load through the internal bypass with the power module in a standby state. Surge protection and some filtering is also provided, ensuring that clean power is delivered to the load equipment. If a commercial power brownout, blackout, overvoltage, undervoltage, out-of-tolerance frequency condition occurs, or any other disturbance is detected in the incoming power, the system forward transfers to normal mode (double-conversion on demand). In case of a complete utility outage or if input power is outside the tolerances of the system, the UPS transfers to battery mode and continues to supply conditioned, clean power to the critical load. When the input line returns to normal operating range, the UPS returns to ESS operation. For charging batteries, the UPS will not enter ESS mode until charger output is 25% or less of maximum charger current.

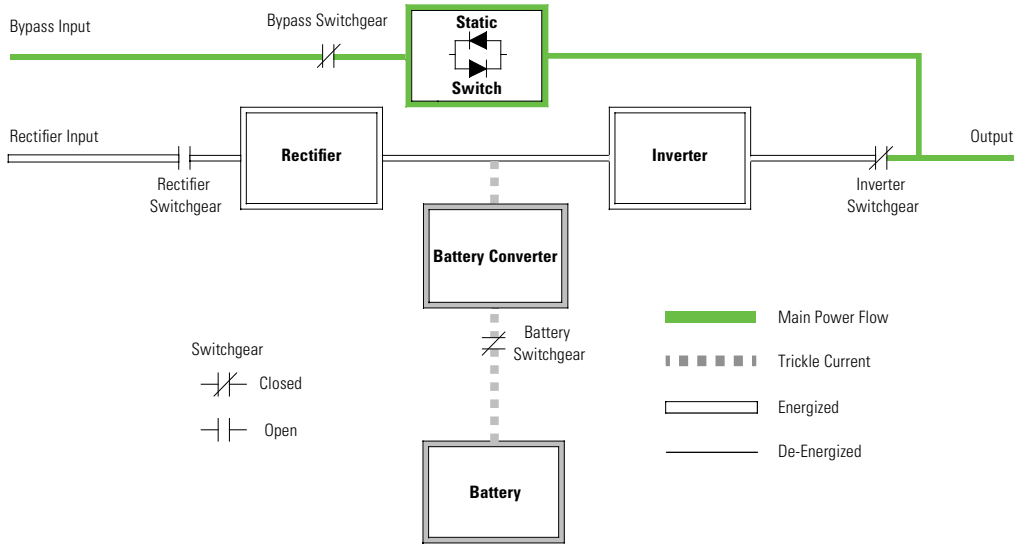
When operating in ESS, the UPS detection and control algorithms continuously monitor incoming power quality and allow the fast engagement of power converters. Typical transition time to double conversion is less than two milliseconds, which is practically seamless. If the UPS detects a fault condition while operating in ESS, it is also able to detect and determine whether the fault is caused by the load or if it is upstream from the UPS. A fault at the bypass source results in an immediate switch over to the inverter. A fault in the utility switches the UPS out of Energy Saver System (ESS) mode while a fault in the load keeps the UPS in ESS mode.

When power conditions are within acceptable limits, the UPS operates as a high-efficiency, energy-saving system — providing surge protection for IT equipment and ensuring clean power is delivered to the critical load. Energy saver system increases system efficiency to 99% at 100% linear load and nominal Vin.

Figure 43 shows the path of electrical power through the UPS system when the UPS is operating in Energy Saver System Mode.

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

Figure 43. Path of Current Through the UPS in Energy Saver System Mode



5.2.3 Normal Mode

During Normal mode, power for the system is derived from a utility input source through the rectifier switchgear. Three-phase AC input power is converted to DC using IGBT devices to produce a regulated DC voltage to the inverter. When the battery switchgear is closed the battery is charged directly from the regulated rectifier output through a buck or boost DC converter, depending on the system voltage and the size of the battery string attached to the unit.

Figure 44 shows the path of electrical power through the UPS system when the UPS is operating in Normal mode.

The battery converter derives its input from the regulated DC output of the rectifier and provides a 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.

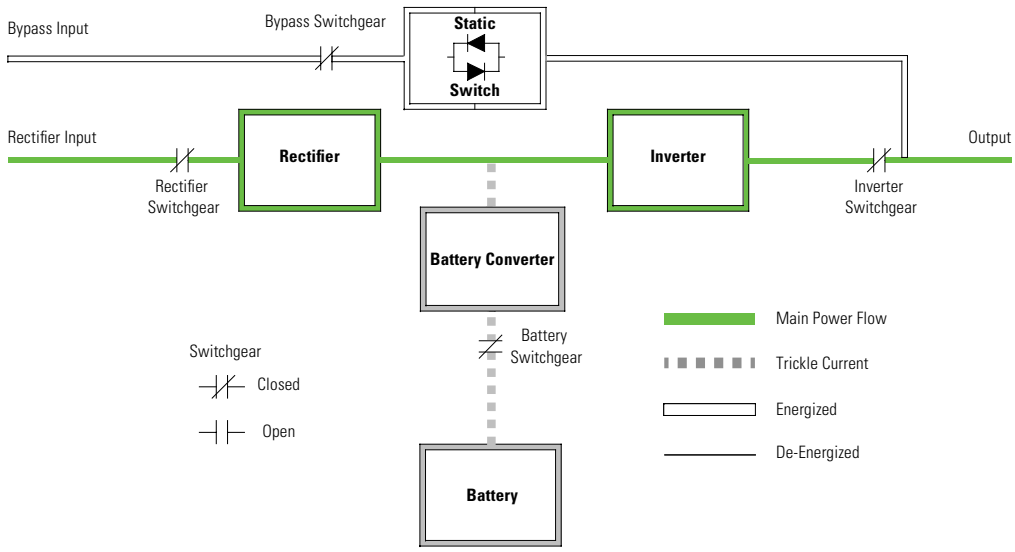
The inverter produces a three-phase AC output to a customer's load without the use of a transformer. The inverter derives regulated DC from the rectifier and uses IGBT devices and pulse-width modulation (PWM) to produce a regulated and filtered AC output. The AC output of the inverter is delivered to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

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 Normal mode.

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

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

Figure 44. Path of Current Through the UPS in Normal Mode



5.2.4 Bypass Mode

⚠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 UPS automatically switches to Bypass mode if it detects an overload, load fault, or internal failure (if configured for capacity). If configured for redundancy (N+1) the UPS would remain on line in Normal mode if one UPM failed. The UPS can also be transferred from Normal mode to Bypass mode manually. The bypass source supplies the commercial AC power to the load directly. Figure 45 shows the path of electrical power through the UPS system when operating in Bypass mode.

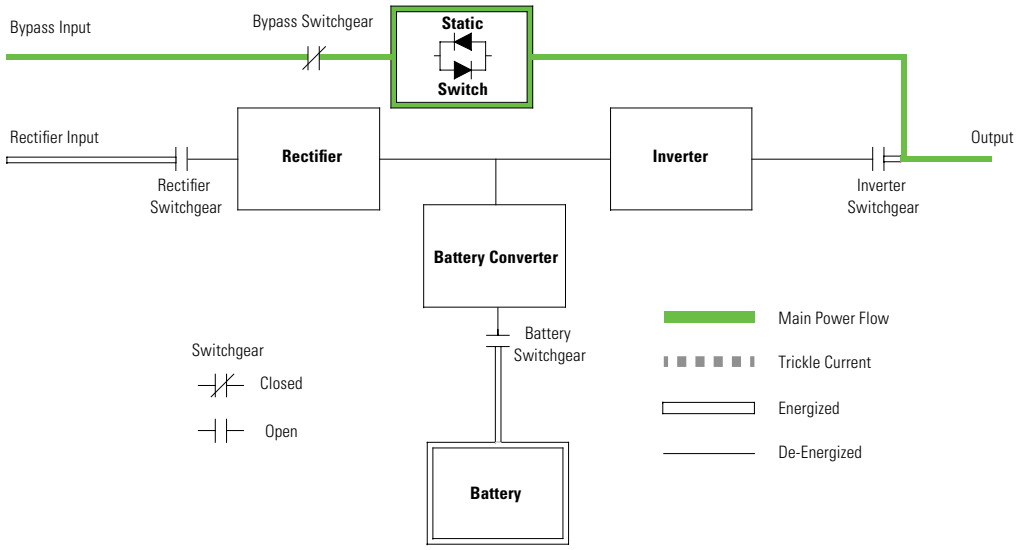
In Bypass mode, the output of the system is provided with three-phase AC power directly from the system input. While in this mode, the output of the system is not protected from voltage or frequency fluctuations or power outages from the source. Some power line filtering and spike protection is provided 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) continuous static switch. The static switch is used instantaneously anytime the inverter is unable to support the applied load. The continuous static switch is wired in parallel with the rectifier and inverter.

The static switch, being an electronically-controlled device, can be turned on immediately to pick up the load from the inverter while the inverter switchgear opens to isolate the inverter.

If the UPS transfers to Bypass mode from Normal mode due to any reason other than operator intervention, the UPS automatically attempts to transfer back to Normal 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.

Figure 45. Path of Current Through the UPS in Bypass Mode



5.2.5 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.

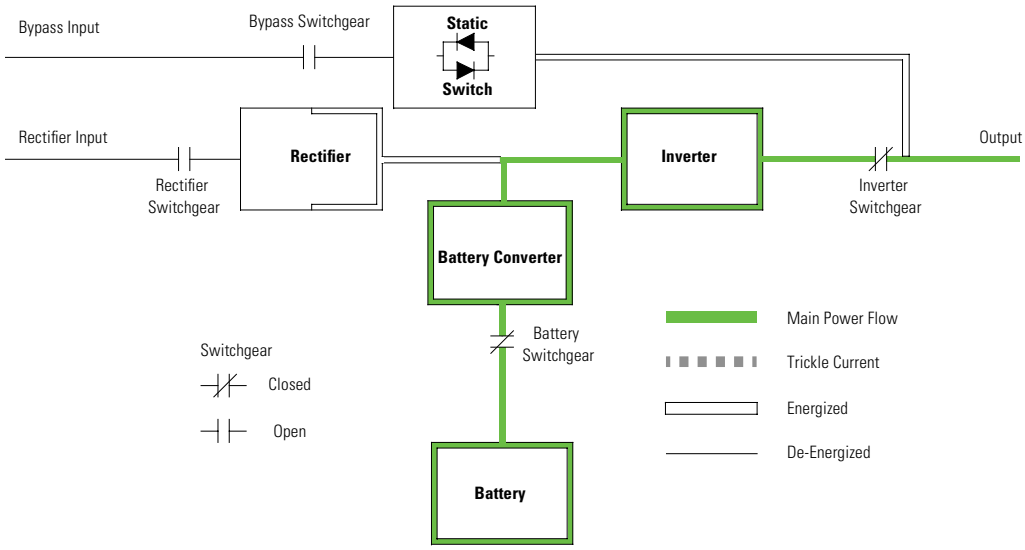
Figure 46 shows the path of electrical power through the UPS system when operating in Battery mode.

During a utility power failure, the rectifier no longer has an AC utility source from which to supply the DC output voltage required to support the inverter. The rectifier switchgear opens and the battery instantaneously supplies energy to the battery converter. The converter boosts the voltage so that the inverter can support the customer's load without interruption. The opening of the rectifier switchgear prevents system voltages from bleeding backwards through the static switch and rectifier snubber components to the utility 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, the rectifier switchgear closes and the rectifier begins to supply DC current to the converter and inverter. At this point, the unit returns to Normal 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.

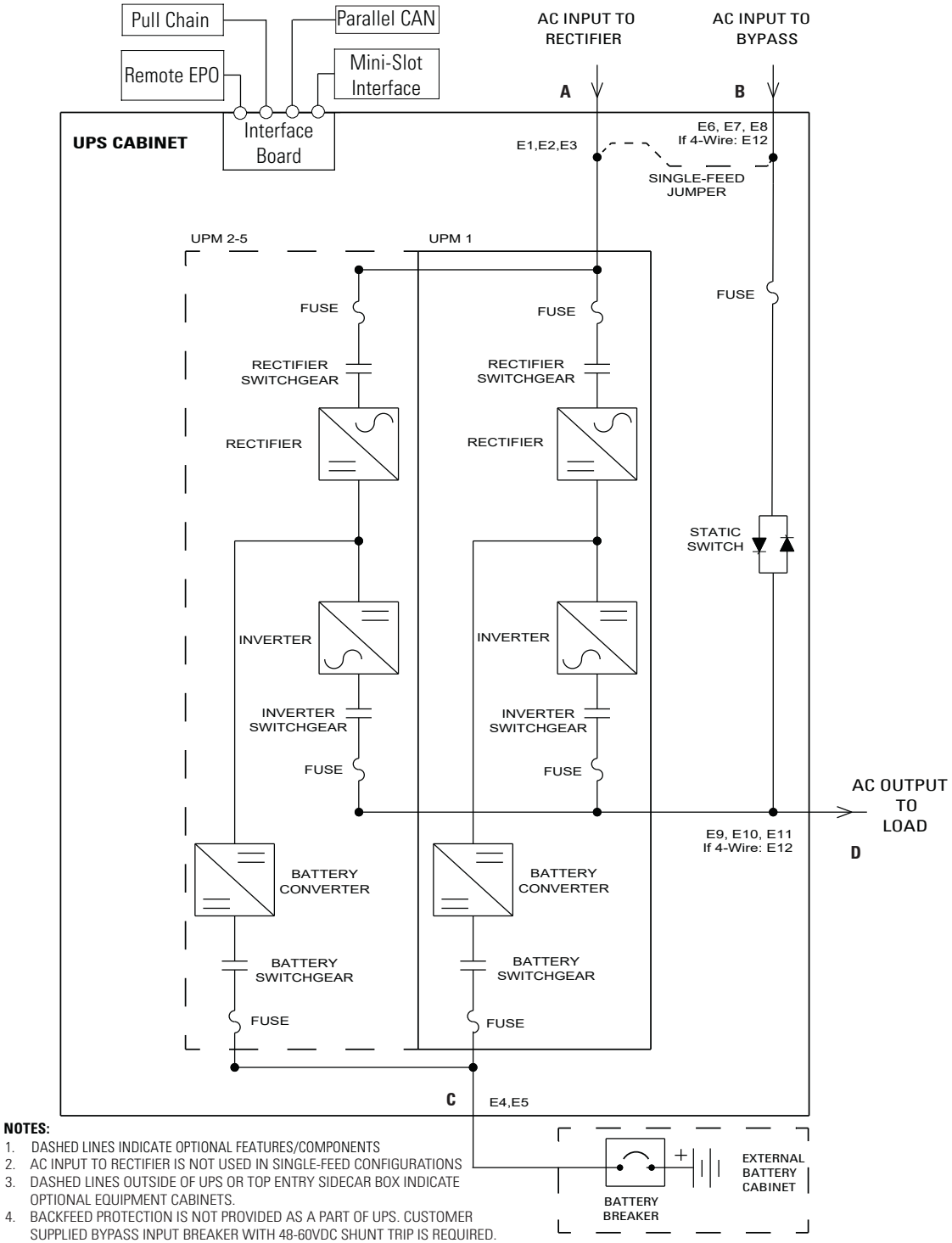
Figure 46. Path of Current Through the UPS in Battery Mode



Chapter 6 UPS Oneline Schematics

The system oneline drawings in this section show the simplified internal structure of the UPS, battery supply, and basic maintenance bypass.

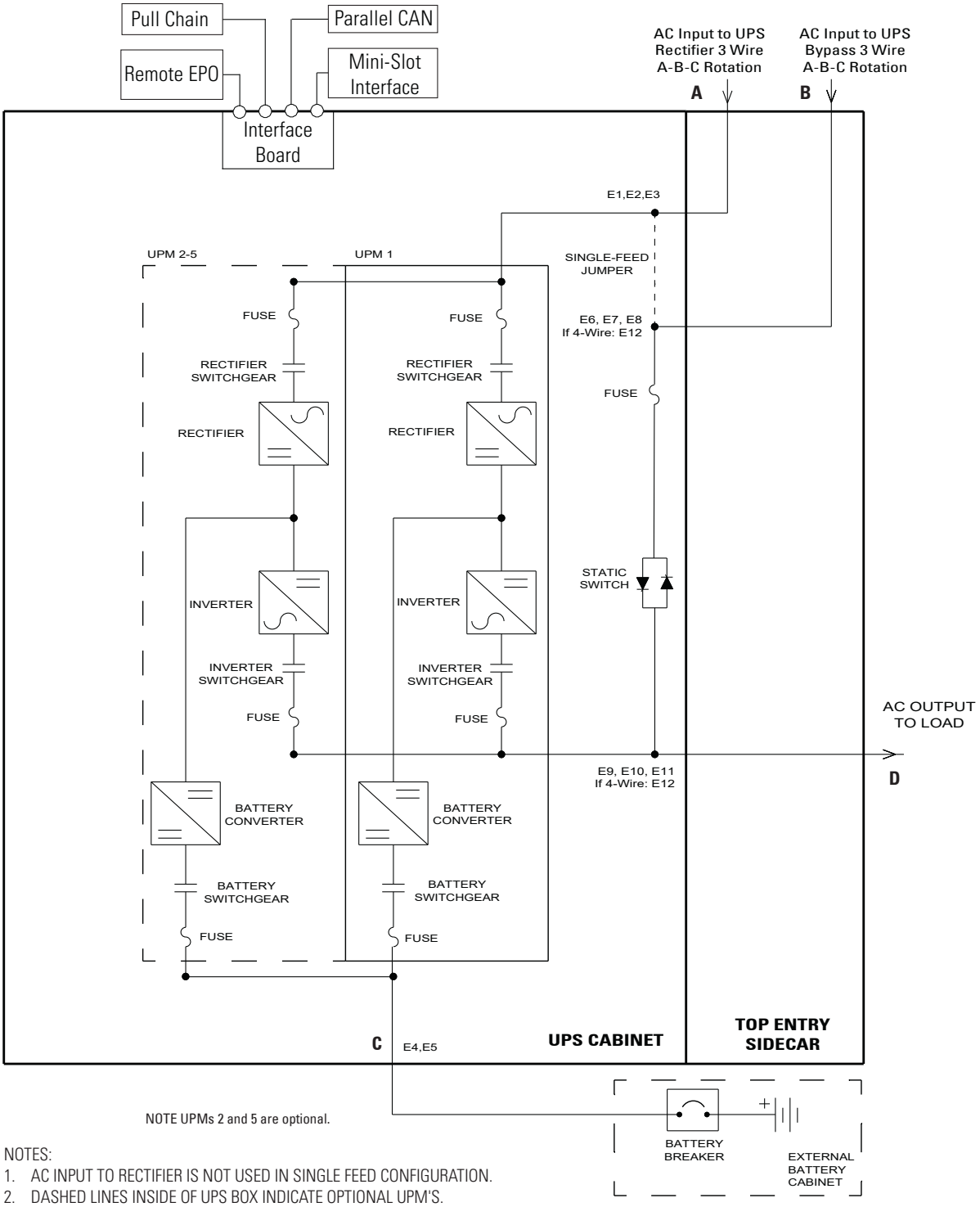
Figure 47. Eaton 93PM Gen 2 UPS System Oneline



NOTES:

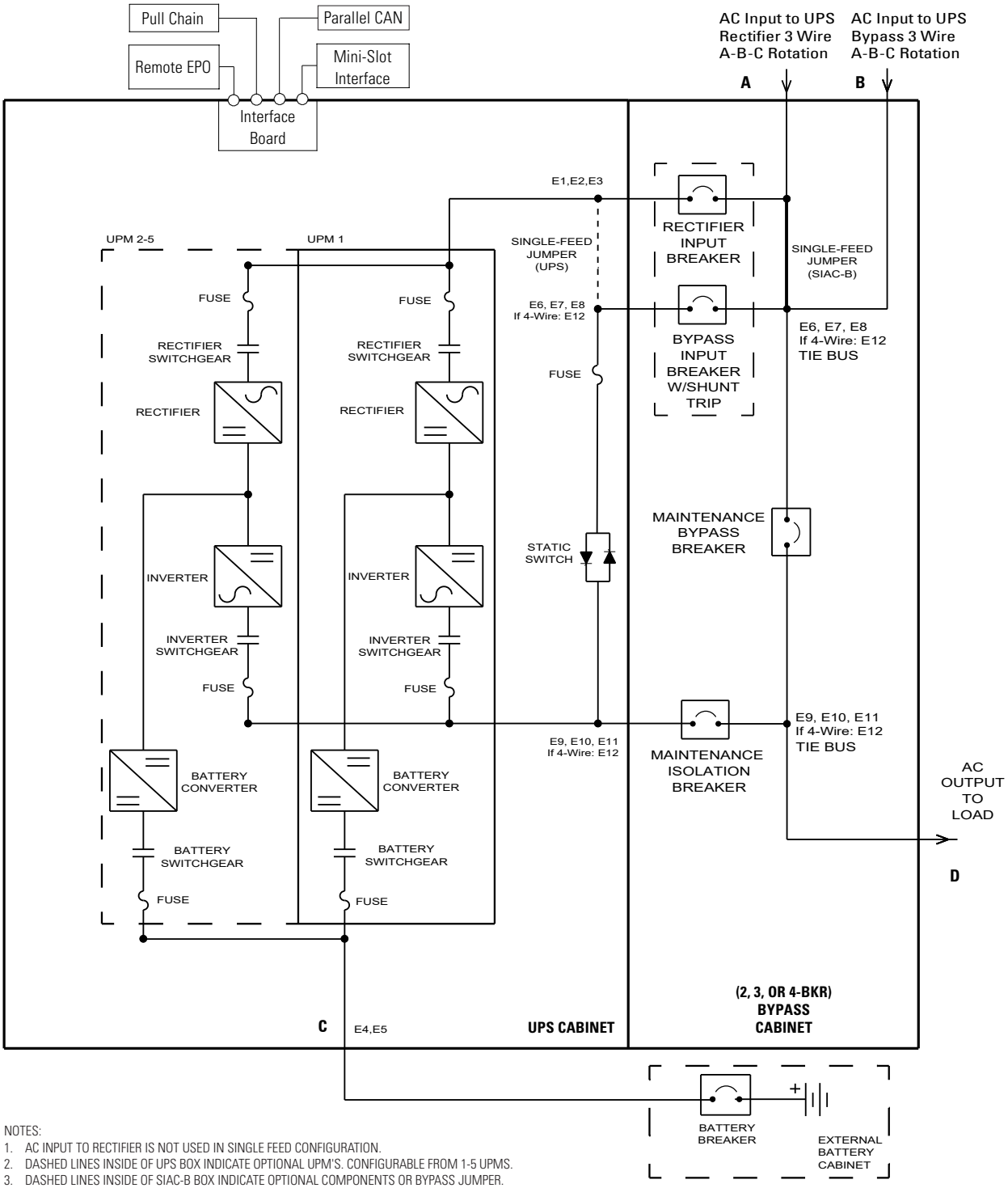
1. DASHED LINES INDICATE OPTIONAL FEATURES/COMPONENTS
2. AC INPUT TO RECTIFIER IS NOT USED IN SINGLE-FEED CONFIGURATIONS
3. DASHED LINES OUTSIDE OF UPS OR TOP ENTRY SIDECAR BOX INDICATE OPTIONAL EQUIPMENT CABINETS.
4. BACKFEED PROTECTION IS NOT PROVIDED AS A PART OF UPS. CUSTOMER SUPPLIED BYPASS INPUT BREAKER WITH 48-60VDC SHUNT TRIP IS REQUIRED.

Figure 48. Eaton 93PM Gen 2 UPS with Top Entry Sidecar System Oneline



NOTES:
1. AC INPUT TO RECTIFIER IS NOT USED IN SINGLE FEED CONFIGURATION.
2. DASHED LINES INSIDE OF UPS BOX INDICATE OPTIONAL UPM'S. CONFIGURABLE FROM 1-5 UPMS.
3. DASHED LINES OUTSIDE OF UPS OR TOP ENTRY SIDECAR BOX INDICATE OPTIONAL EQUIPMENT CABINETS.
4. BACKFEED PROTECTION IS NOT PROVIDED AS A PART OF UPS. CUSTOMER SUPPLIED BYPASS INPUT BREAKER WITH 48-60VDC SHUNT TRIP IS REQUIRED.

Figure 49. Eaton 93PM Gen 2 UPS with Bypass Sidecar (SIAC-B) System Oneline



NOTES:
1. AC INPUT TO RECTIFIER IS NOT USED IN SINGLE FEED CONFIGURATION.
2. DASHED LINES INSIDE OF UPS BOX INDICATE OPTIONAL UPM'S. CONFIGURABLE FROM 1-5 UPMS.
3. DASHED LINES INSIDE OF SIAC-B BOX INDICATE OPTIONAL COMPONENTS OR BYPASS JUMPER.
4. DASHED LINES OUTSIDE OF UPS OR SIAC-B BOX INDICATE OPTIONAL EQUIPMENT CABINETS.
5. BACKFEED PROTECTION IS NOT PROVIDED AS A PART OF UPS. CUSTOMER SUPPLIED BYPASS INPUT BREAKER WITH 48-60VDC SHUNT TRIP IS REQUIRED IF BYPASS SIDE CAR DOES NOT INCLUDE BIB BREAKER.
6. THE SINGLE-FEED JUMPER (UPS) IS FACTORY INSTALLED WHEN THE UPS IS ORDERED WITH A 2 OR 3 BREAKER SIDE CAR.
7. THE SINGLE FEED JUMPER (SIAC-B) IS FACTORY INSTALLED WHEN THE UPS IS ORDERED WITH A 4-BREAKER SIDE CAR. THE JUMPER MUST BE REMOVED FOR A DUAL FEED INSTALLATIONS. A DUAL FEED UPS IS ONLY AVAILABLE WITH A 4-BREAKER SIDE CAR

Chapter 7 UPS Operating Instructions

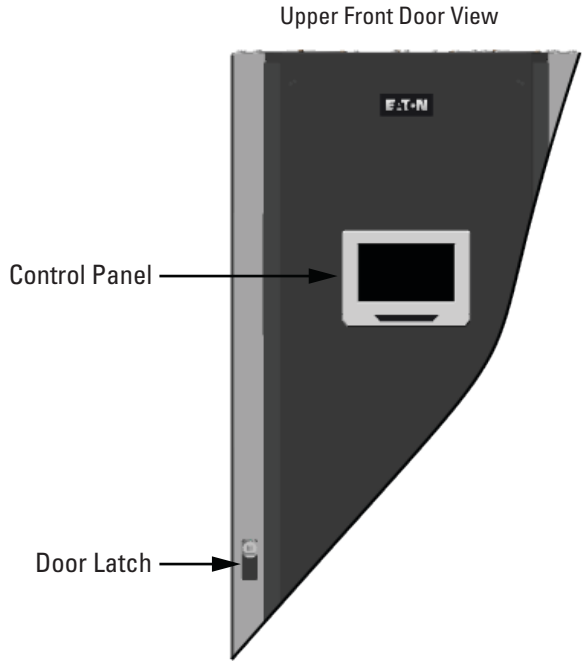
This section describes how to operate the UPS.

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.

7.1 UPS Controls and Indicators

The controls and indicators identified and described in this section are used to set up, control, and monitor UPS operation. Figure 50 shows the control panel location on the front door of the UPS. For a description of the UPS control panel functions, and how to control and monitor UPS operation, see paragraph 7.2 *Using the Control Panel*.

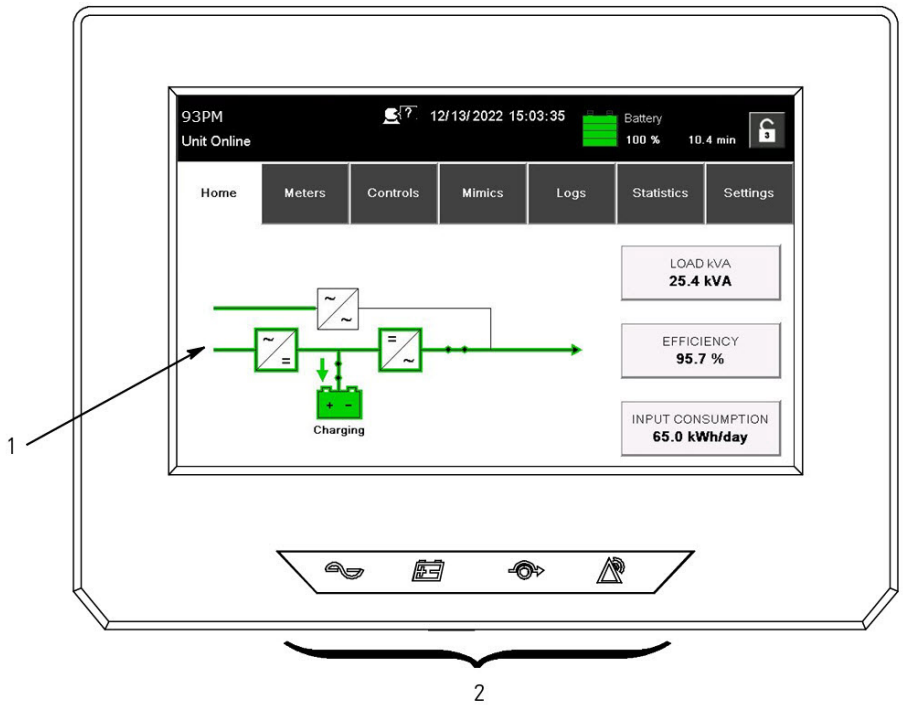
Figure 50. UPS Control Panel and Door Latch Location



7.2 Using the Control Panel

The following paragraphs describe the UPS control panel, including controls and indicators, and how to monitor UPS operation. The control panel is shown in Figure 51.

Figure 51. UPS Control Panel



The control panel consists of:

- A color liquid crystal touch screen display (**1**).
- A horizontal row of status indicators (**2**). See paragraph 7.2.1 *Status Indicators*.

The following paragraphs describe using the UPS control panel to monitor the UPS. See paragraph 7.2.3 *Using the LCD Touch Screen* for use of the operational controls.

When the unit powers up, the screen displays the operator interface as shown in Figure 51.

7.2.1 Status Indicators

The four symbols on the bottom of the control panel are status indicators. These colored light emitting diode (LED) lamps work with the alarm horn to provide the operating status of the UPS.

Table 29 describes the status indicators.

Table 29. Status Indicators

Indicator	Status	Description
 Green	On	The UPS is in Double Conversion mode. The power module is supplying power to the critical load.
	Off	The UPS is turned off.
 Yellow	On	The UPS is in Battery mode. Because Battery mode is a normal condition of the UPS, the normal indicator also remains illuminated.
 Yellow	On	The UPS is in Bypass mode. The critical load is supported by the bypass source. The normal indicator is not illuminated when the system is in Bypass mode.
 Red	On	The UPS has an active alarm and requires immediate attention. The LCD shows the highest priority active alarms. All alarms are accompanied by an audible horn. To silence the horn, touch any control panel button. The Alarm indicator may be illuminated along with other indicators.
	Flashing	There is a new UPS alarm condition. The indicator flashes until acknowledged by touching any control panel button once.

7.2.2 System Events

When the UPS system is running in Double Conversion mode, it continually monitors itself and the incoming utility power. In Battery or Bypass modes, the UPS may issue alarms to let you know exactly what event caused the change from Double Conversion mode. System events on the UPS can be indicated by horns, lights, messages, or all three.

Select the **LOGS** tab from the navigation bar on main menu screen to display the active events screen. This screen shows any currently active alarms, notices, or commands. For more information on using the events screen, see paragraph 7.2.6 *Display Menu Operation*.

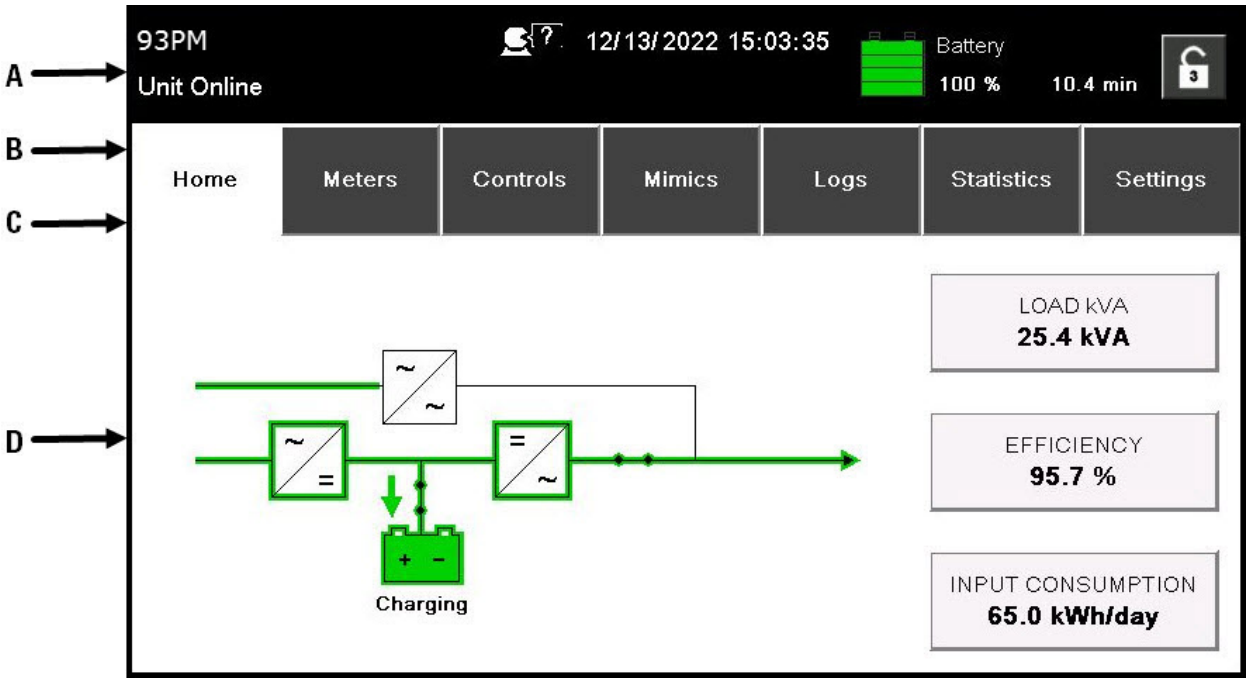
- **System Event Horns** – The system event horn beeps to alert an operator that an event needing attention is taking place. The horn cycles at a half-second rate. To silence the horn, touch any control panel button.
- **System Event Indicators** – The status indicators on the UPS control panel work with the event horn to let the operator know when the UPS is operating in any mode other than double conversion. Only the normal mode indicator is illuminated 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 7.2.1 *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 Events Log and may be added to the History Log. The messages are divided into four categories: alarms, notices, status, and commands.

7.2.3 Using the LCD Touch Screen

The LCD touch screen on the control panel provides an operator interface with the UPS system. Figure 52 identifies the display areas discussed in the following sections.

All functions and commands are accessed by touching or tapping the screen tabs or buttons. When text input is required, either a Qwerty keyboard or numeric keypad will be displayed.

Figure 52. Parts of the LCD



A: Status Bar displays the UPS name, UPS state, current date and time, meter information, active alarms and notices, and a sign in/sign out button. For more information about alarms and notices, see paragraph 7.2.2 *System Events*.

B: Main Menu Navigation Bar displays main menu functions and selections as tab buttons. To select a screen function touch the tab name.

C: Secondary Menu Navigation Bar displays functions and selections related to the current screen as tab buttons. To select a screen function touch the tab name.

D: Information Area contains status data, operational controls, acknowledgments, action confirmations, and screen prompts.

You can use the LCD touch screen to:

- Look at a log of UPS events (alarms, notices, and commands)
- Monitor UPS operation
- Set UPS parameters
- Control UPS operations

For details on these operations, see paragraphs 7.2.6 *Display Menu Operation* and 7.2.8 *System Controls*.

7.2.4 Using the Menu

The UPS navigation tab menu bar allows you to display data in the information area to help you monitor and control UPS operation. Table 30 shows the basic menu structure.

Table 30. Display Function Menu Map

Menu Option	Description
HOME	Displays the system status both graphically (mimic) and written.
METERS	Displays performance meters for the system or critical load.
CONTROLS	Displays the Controls screen.
MIMIC	Displays the mimic screens and access to system information screens.
LOGS	Displays the list of active events and provides access to historical system events.
STATISTICS	Displays UPS statistical data (uptime, downtime, maintenance, efficiency, etc.
SETTINGS	Allows access to various screen controlled variables for the system operation. Settings include date and time for the time stamp, display language, the unit name, meter subscripts, password, and view the firmware version numbers Used only by service personnel.

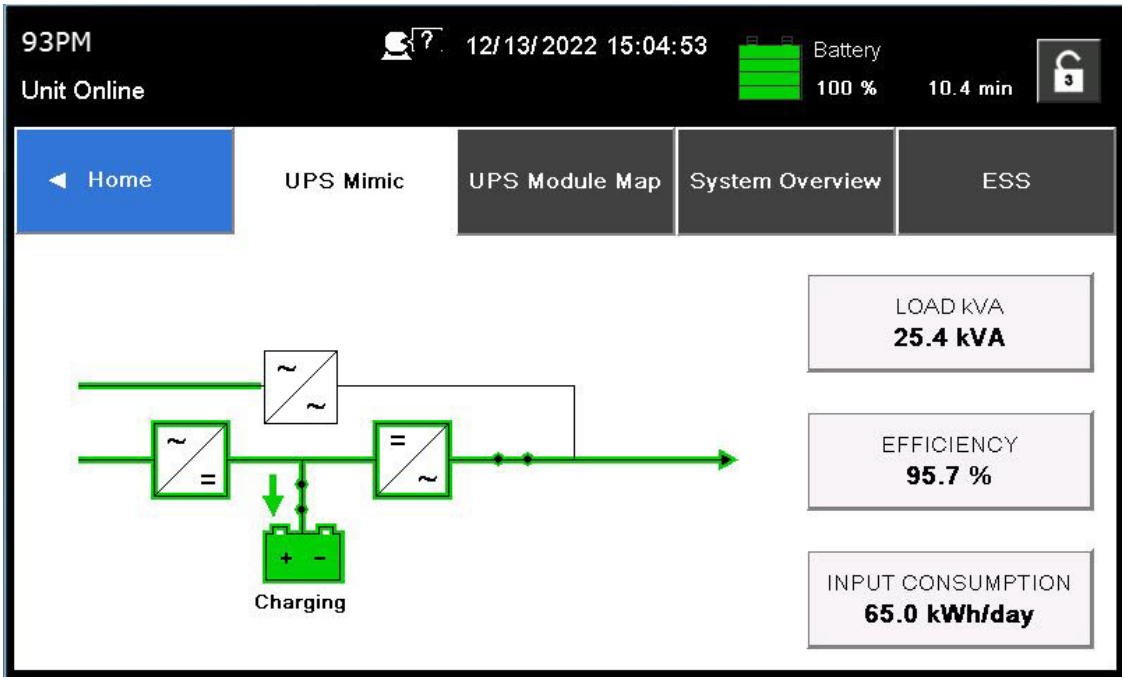
NOTE Screens shown are representative examples of system operation. The screen data will vary based on system activity at the time of observation.

7.2.5 Mimic Screen

Figure 53 shows the Main Menu and Mimic screen.

The Mimic screen shows the internal components of the UPS cabinet and a real-time graphical representation of the operating status of the system.

Figure 53. Main Menu and Mimic Screen



7.2.6 Display Menu Operation

Table 31 describes the menu functions and how to use them.

Table 31. Display Menu Operation

Function	Subfunction	Operation
Home		An overview of UPS operation, including information on load, efficiency and consumption.
Meters – UPS		The meter screens show the UPS meter readings for the unit. The default voltage displayed on these screens is phase-to-neutral. These can be changed to display the voltage phase-to-phase (A-B, B-C, C-A). Tap the **METERS** tab on the main menu navigation bar to display the **METER SUMMARY** screen (see Figure 54). The current UPS readings are displayed in the information area of the screen. To display individual meter details, tap the desired meter button to display the detailed meter screen.
	Output – UPS	The Output screen shows output voltage (phase to neutral), output current (each phase), and frequency being supplied by the UPS, as well as the kVA, kW, and power factor measurements.
	Input – UPS	The Input screen shows input voltage (phase to neutral), input current (each phase), and frequency of the incoming utility source, as well as the kVA, kW, and power factor measurements.
	Bypass	The Bypass screen shows the bypass input voltage (phase to neutral), input current (each phase), and frequency of the incoming utility source, as well as the kVA, kW, and power factor measurements.
	Battery – UPS	The Battery screen displays the battery voltage (Vdc) and the battery current (Idc).
Mimics	UPS Mimic	Tap the **MIMICS** tab on the main menu navigation bar to display an overview of UPS operation, including information on load, efficiency and consumption. If there is an error, an error indicator is displayed next to the affected part. Active events log can be opened by tapping the error indicator.
	UPS Module Map	Tap the **UPS MODULE MAP** tab on the secondary menu navigation bar to display the status of each UPM.
	System Overview	Tap the **SYSTEM OVERVIEW** tab on the secondary menu navigation bar to display the status and meters summary for each UPS.
	ESS	Tap the **ESS** tab on the secondary menu navigation bar to display the approximate consumption and energy savings of ESS mode.
Logs	Active	Tap the **LOGS** tab on the main menu navigation bar to display the **ACTIVE EVENTS** screen (see Figure 55). A listing of all system events that are currently active is displayed. The most recent event is listed first. As events clear, they are removed from the Events listing. To scroll through the events, press the up or down scroll bar.
	System Log (Historical)	Tap the **SYSTEM LOG** tab on the secondary menu navigation bar to display the **SYSTEM LOG** screen (see Figure 56). The history Log lists up to 512 events in chronological order, with the most recent event listed last (once 512 is reached, the earliest event is overwritten). The end of the log (the most recent events) is displayed first; scroll upward to view older event listings. To scroll through the events, press the up or down scroll bar.

Table 31. Display Menu Operation (Continued)

Function	Subfunction	Operation
Settings		Configurable system settings. Tap the **SETTINGS** tab on the main menu navigation bar to display the settings screen. Settings may be password restricted. Settings Level 2 default password is **101010**.
	User	Tap the **USER** tab on the secondary menu navigation bar to display the USER screen (see Figure 57). Tap the **INFORMATION** or **ABOUT** button to display system information (see Figure 58 and Figure 59).
	Configuration	Tap the **CONFIGURATION** tab on the secondary menu navigation bar to display the screen. Tap the function to be changed. Make and save the changes. Follow screen prompts to accept or abort changes. For additional functions, tap the 2 button. See Figure 60 and Figure 61 for configuration screens.
Statistics	Statistics Summary	Tap the **STATISTICS** tab on the main menu navigation bar to display a summary of UPS statistics (see Figure 62).
	Statistics Details	Tap the desired statistic button to display the detailed statistic screen.
Controls		See paragraph 7.2.8 *System Controls* for details.

Figure 54. Typical Meters Summary Screen

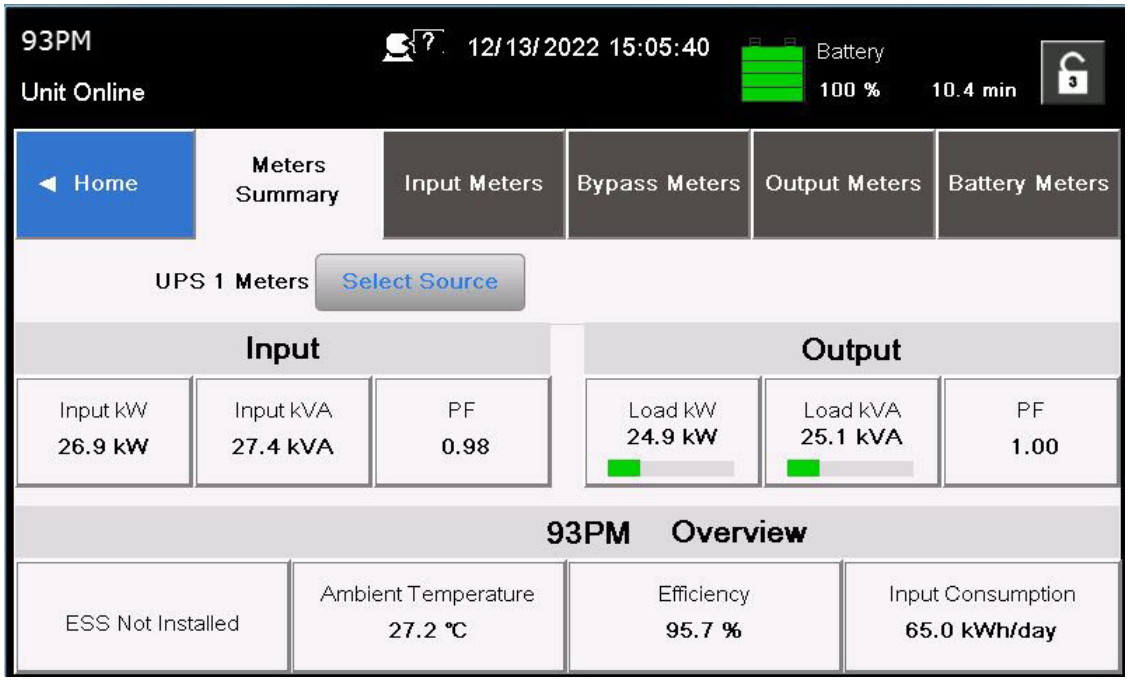


Figure 55. Typical Active Events Screen

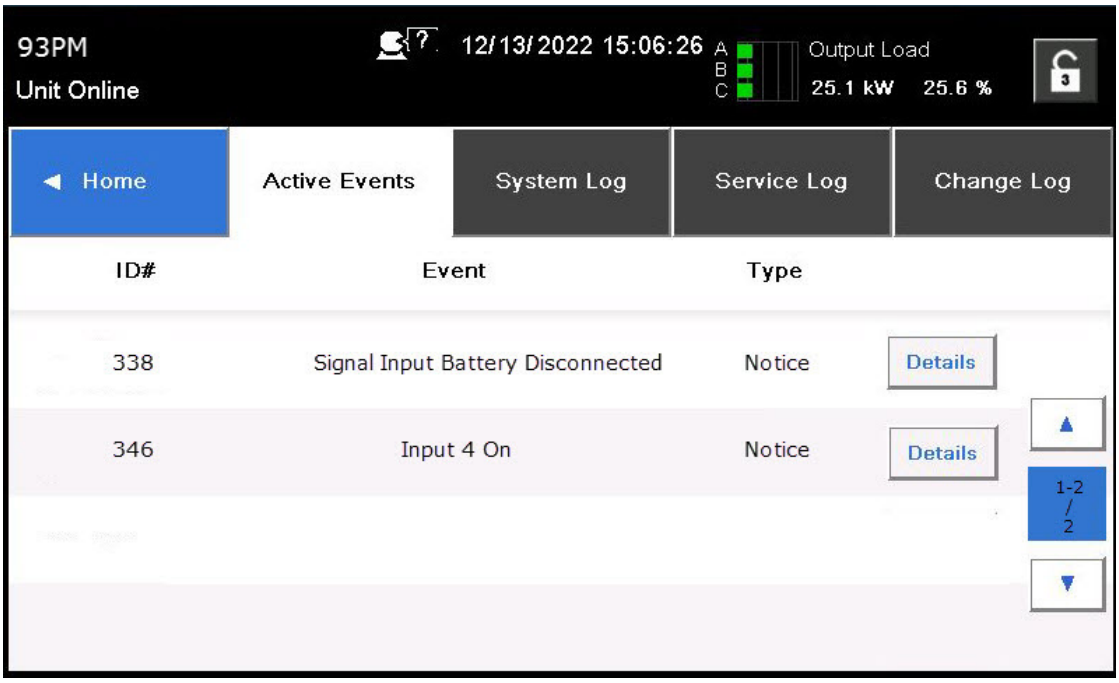


Figure 56. Typical System Log Screen

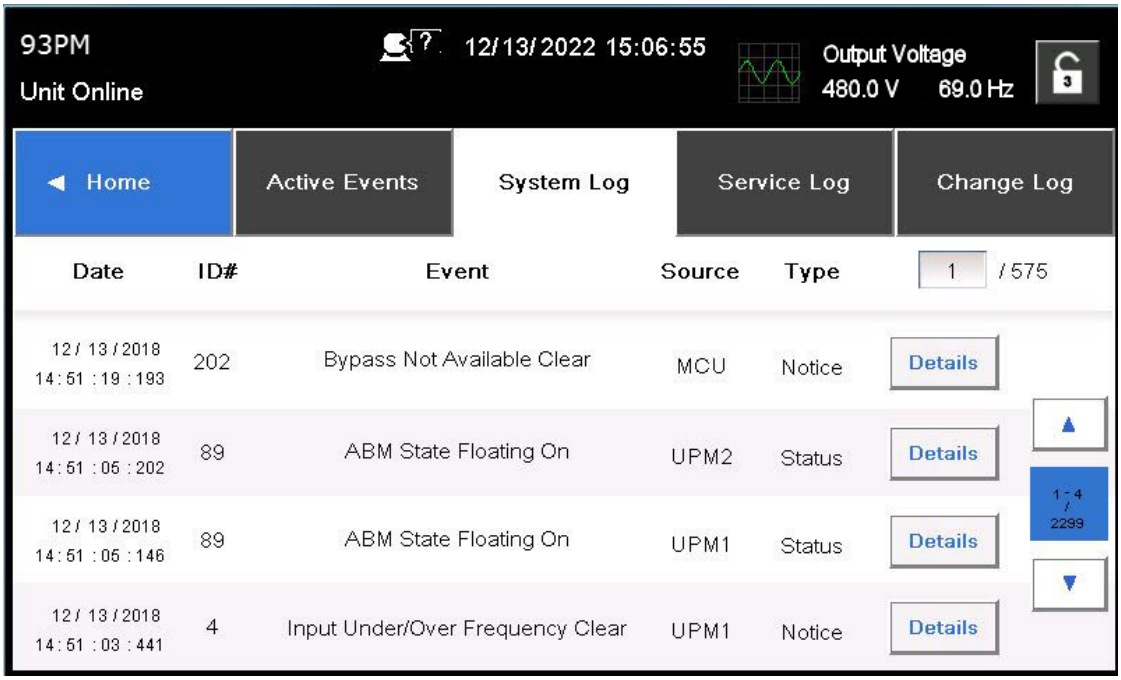


Figure 57. Typical Settings User Screen

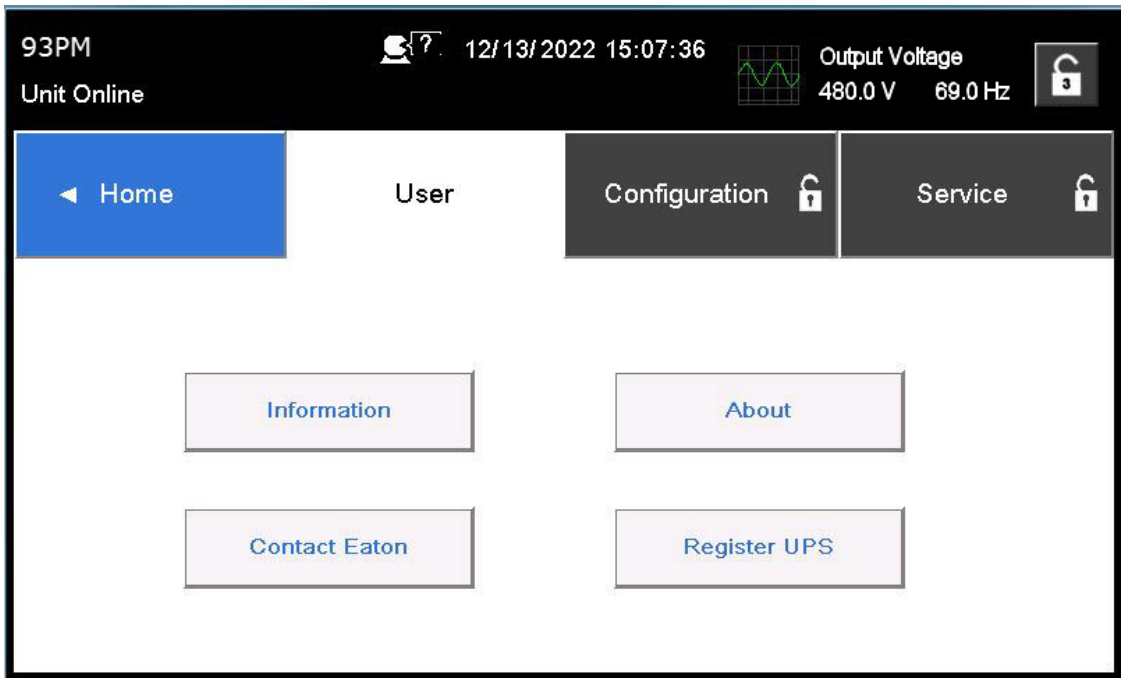


Figure 58. Typical Information Screen

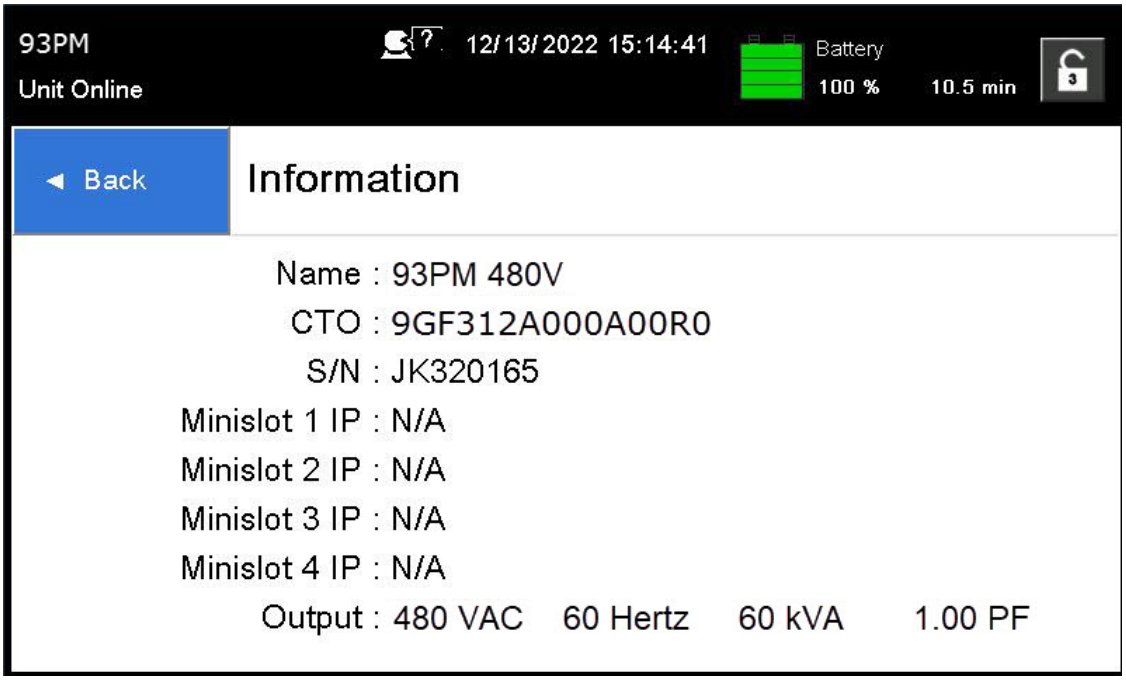


Figure 59. Typical About Screen

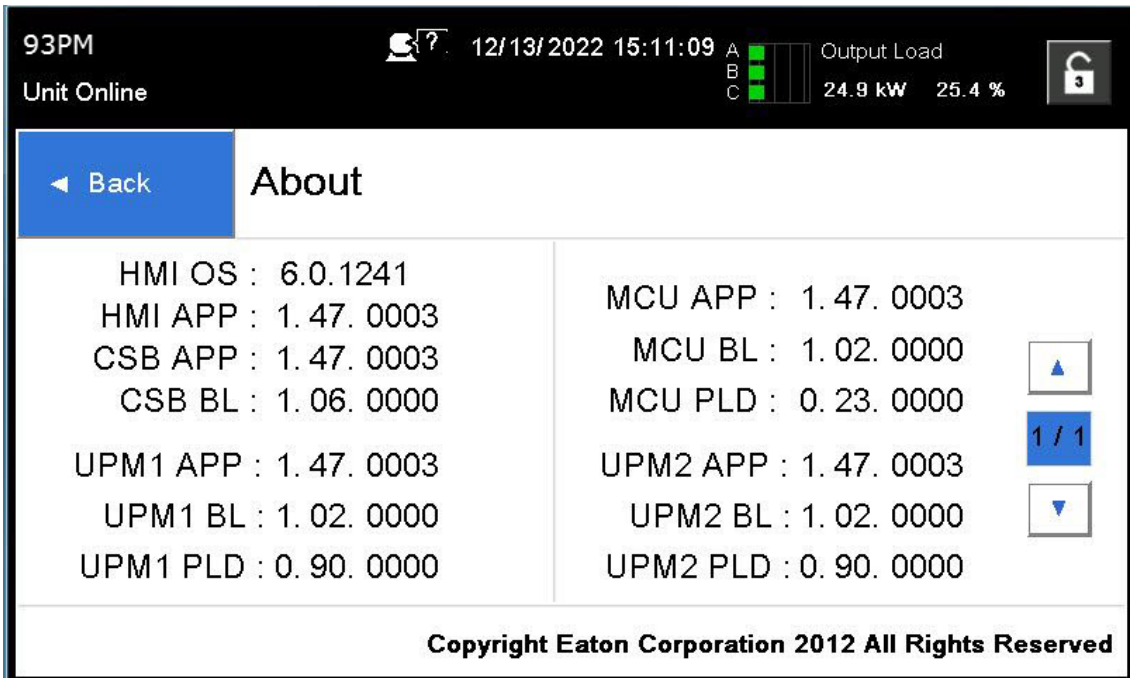


Figure 60. Typical Settings Configuration 1 Screen

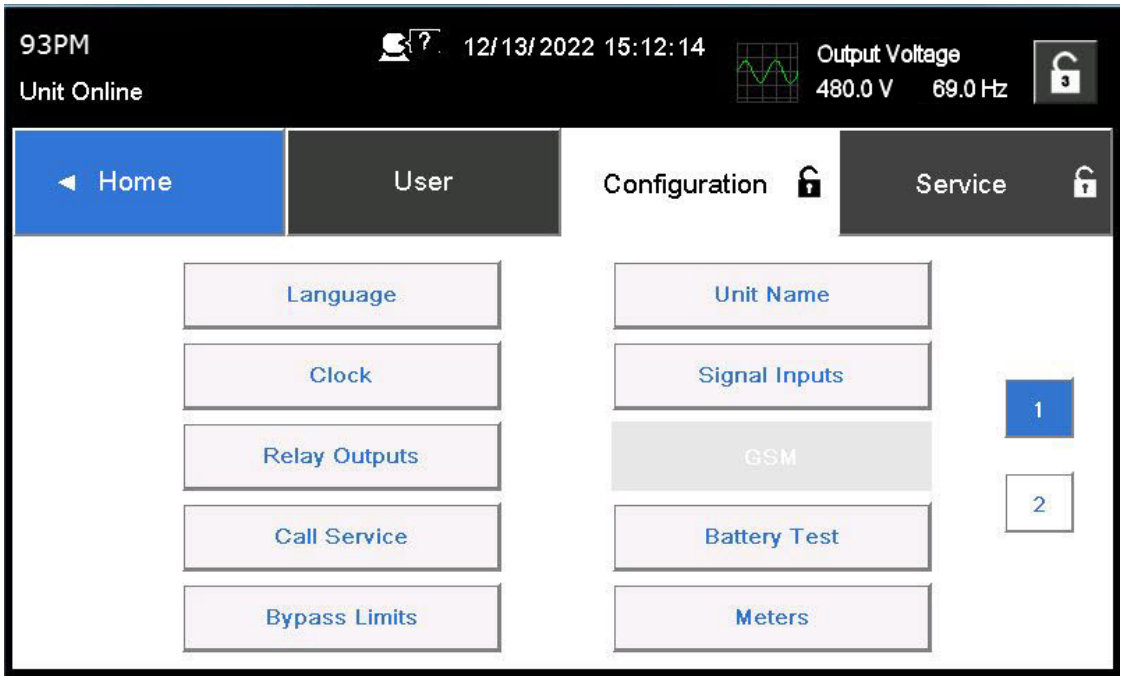


Figure 61. Typical Settings Configuration 2 Screen

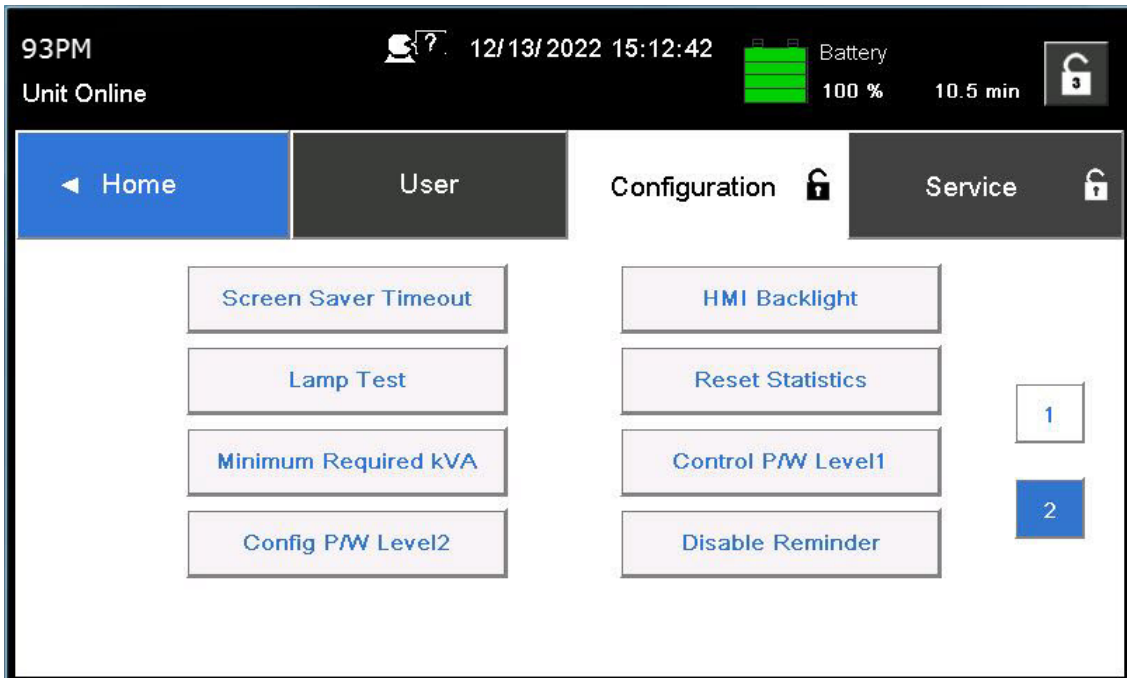
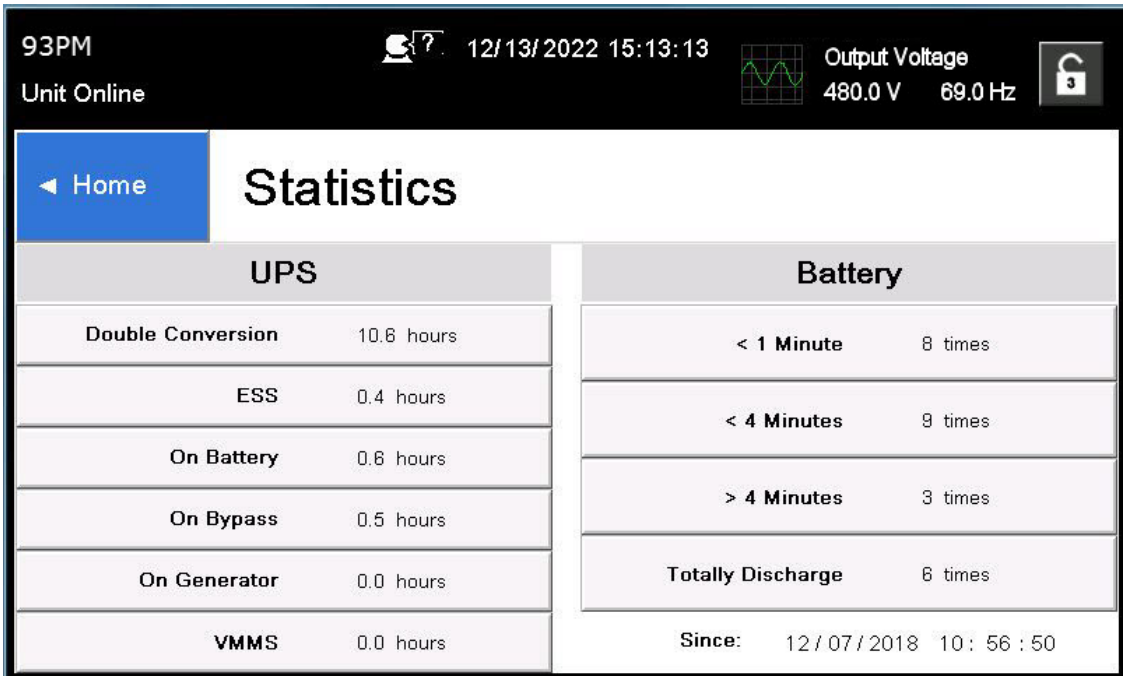


Figure 62. Typical Statistics Screen



7.2.7 Sign In

The Controls and Setting screens are restricted. The user must sign in using a password to gain access.

CAUTION

To prevent inadvertent or unauthorized power disruption to the critical load or auxiliary lighting system, change the Level 1 and Level 2 default passwords when system commissioning startup is performed.

ATTENTION!

Pour éviter toute coupure de courant accidentelle ou non autorisée de la charge critique ou du système d'éclairage auxiliaire, modifiez les mots de passe par défaut de niveau 1 et de niveau 2 lors du démarrage de la mise en service du système.

To Sign in:

1. Tap the lock button in the upper right corner of the screen. The sign in screen is displayed (see Figure 63).
2. Tap the password entry area on the screen.
3. Enter the password using the keypad displayed and tap the return key (see Figure 64).

   Level 1 default password is **111111**. Settings Level 2 default password is **101010**.

NOTICE

- User will be logged out after 10 minutes of inactivity.
- User will be locked out for 15 minutes after three (3) unsuccessful login attempts.

4. Sign in is complete. Tap continue to return to previous screen.

Figure 63. Sign In Password Screen

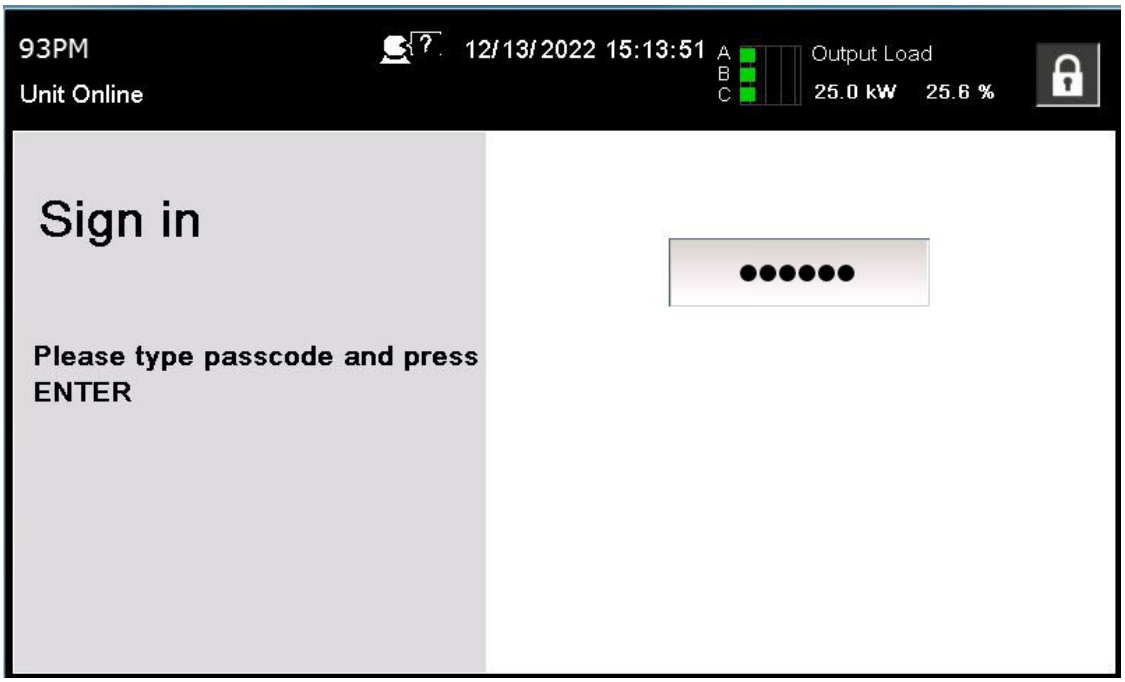
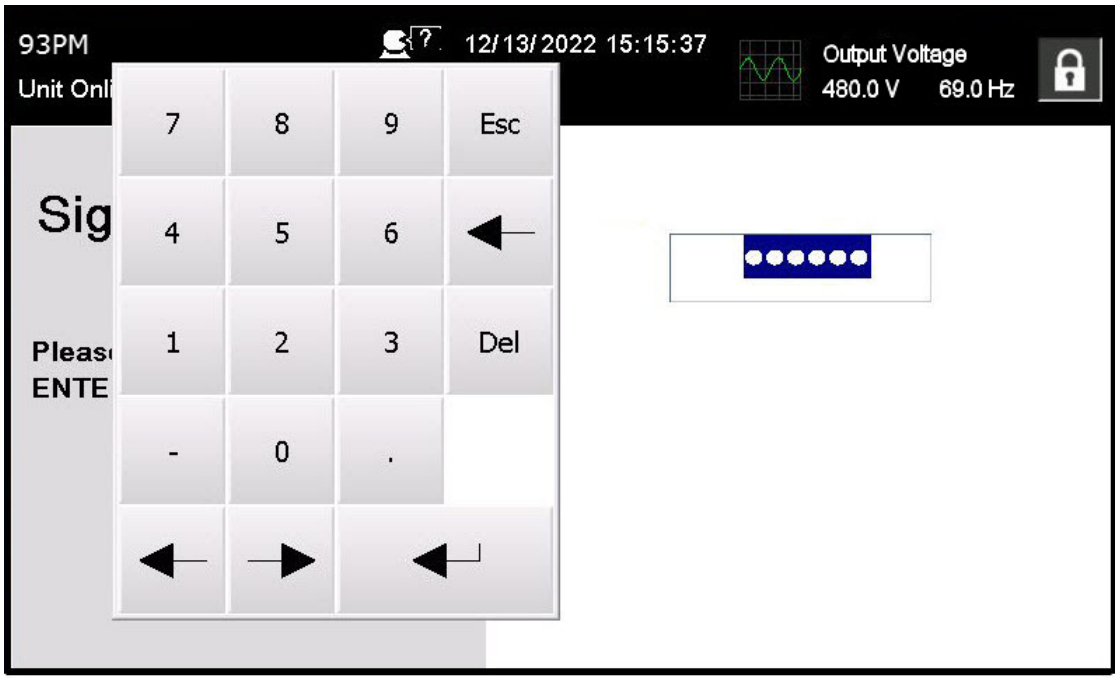


Figure 64. Sign In Keypad



7.2.8 System Controls

Tap the **CONTROLS** tab on the main menu navigation bar to display the Controls screen. Double conversion operation, transfer to bypass, shutdown, and charger control commands are controlled through this screen. In addition, the screen displays the current status of the UPS.

Table 32 describes the control functions and provides instructions to access and use the command menu screens.

Table 33 lists the typical System Status Screen Messages that are displayed during UPS operation.

Figure 65 through Figure 69 show the major control screens.

Table 32. Controls Menu Operation

Function	Subfunction	Operation
System Controls		The **CONTROLS** tab on the main menu navigation bar displays the System Controls screen.
	System Status	**GO ONLINE** starts the UPS in Double Conversion mode or transfers the UPS to Double Conversion mode from Bypass mode.
	Bypass	**GO TO BYPASS** starts the UPS in Bypass mode or transfers the UPS to Bypass mode from Double Conversion mode.
	Charger	**TURN ON CHARGER/TURN OFF CHARGER** sets the battery charger on or off.
	Battery Test	**RUN BATTERY TEST** starts the battery test.

Table 33. Typical System Status Messages

Function	Message
UPS	Double Conversion; Bypass; ESS
Bypass	Off; On; Available
Charger	Charger Resting; Charger

Figure 65. Typical System Control Screen

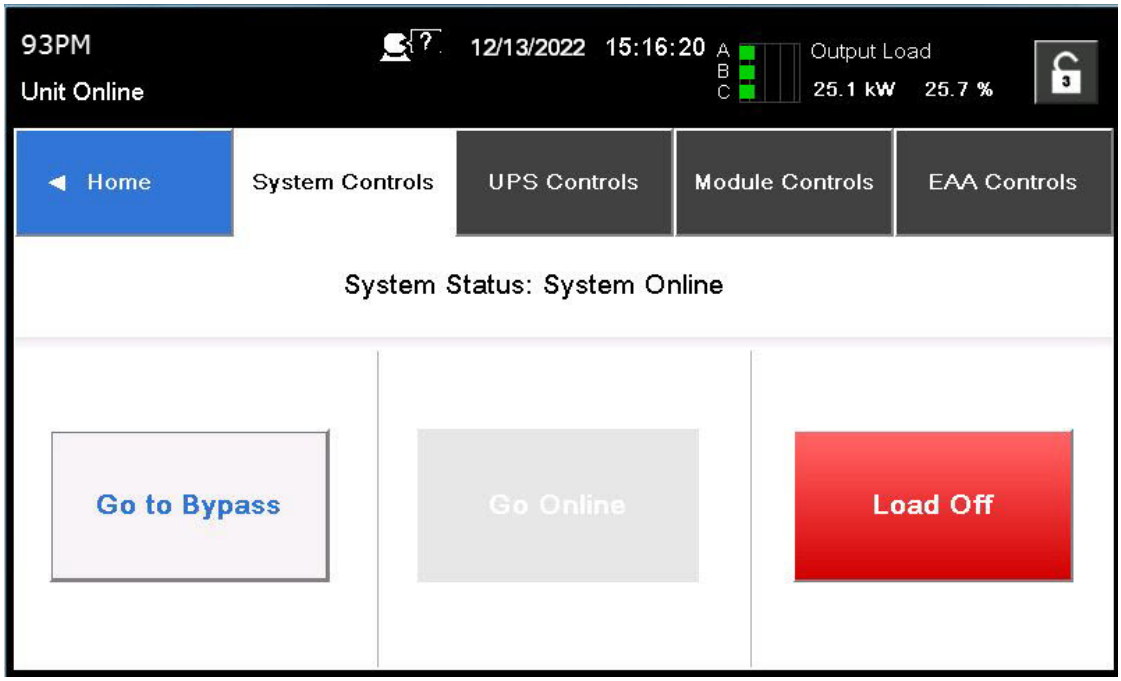


Figure 66. Typical UPS Control Screen

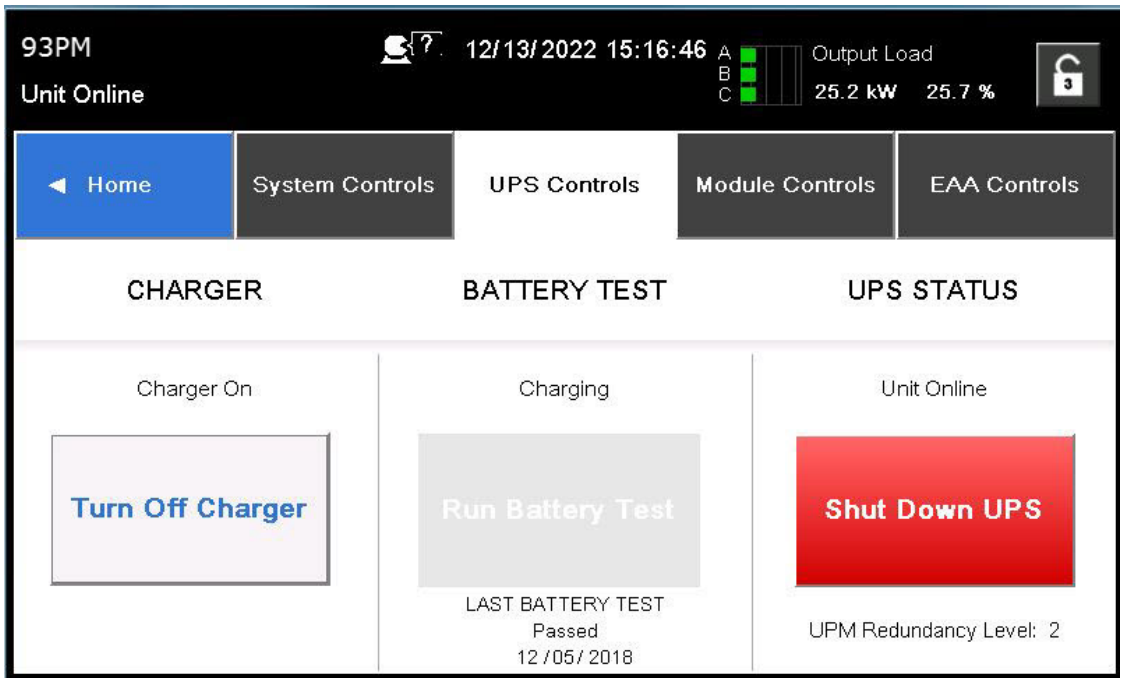


Figure 67. Typical UPM Select Screen

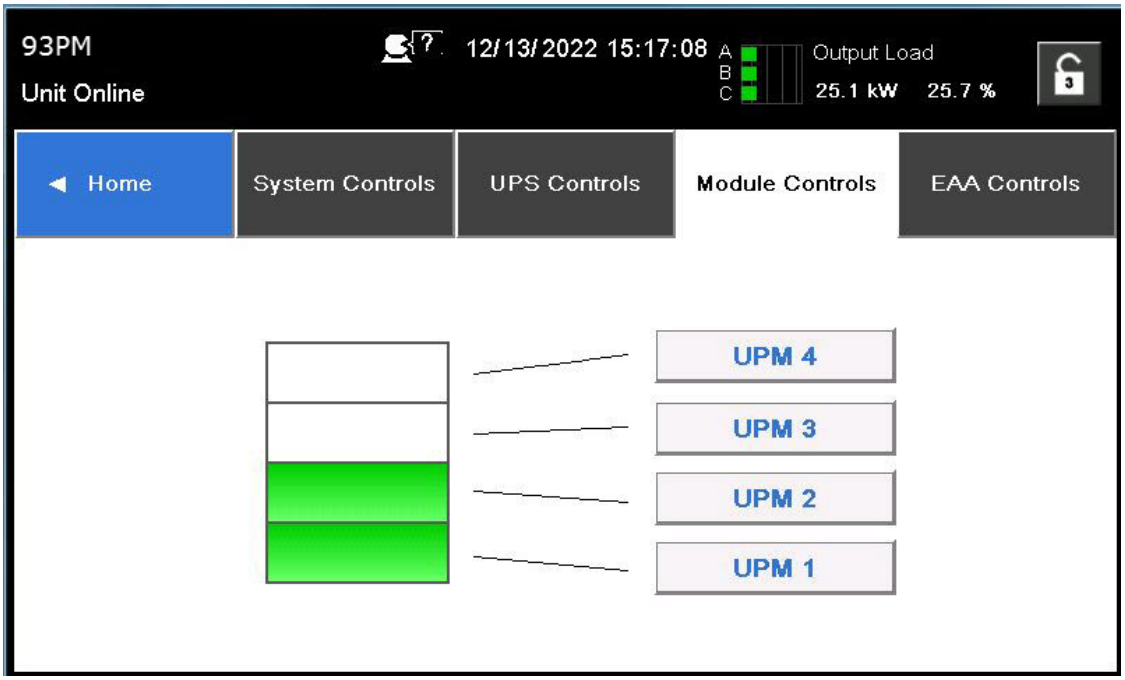


Figure 68. Typical UPM Control Screen

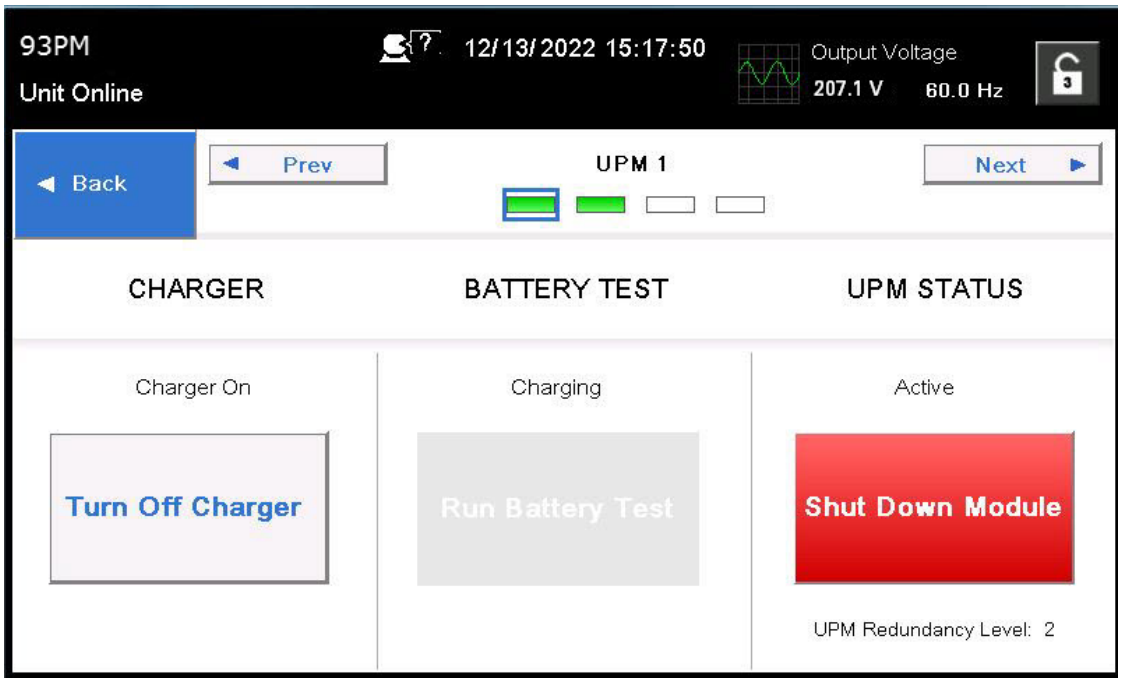
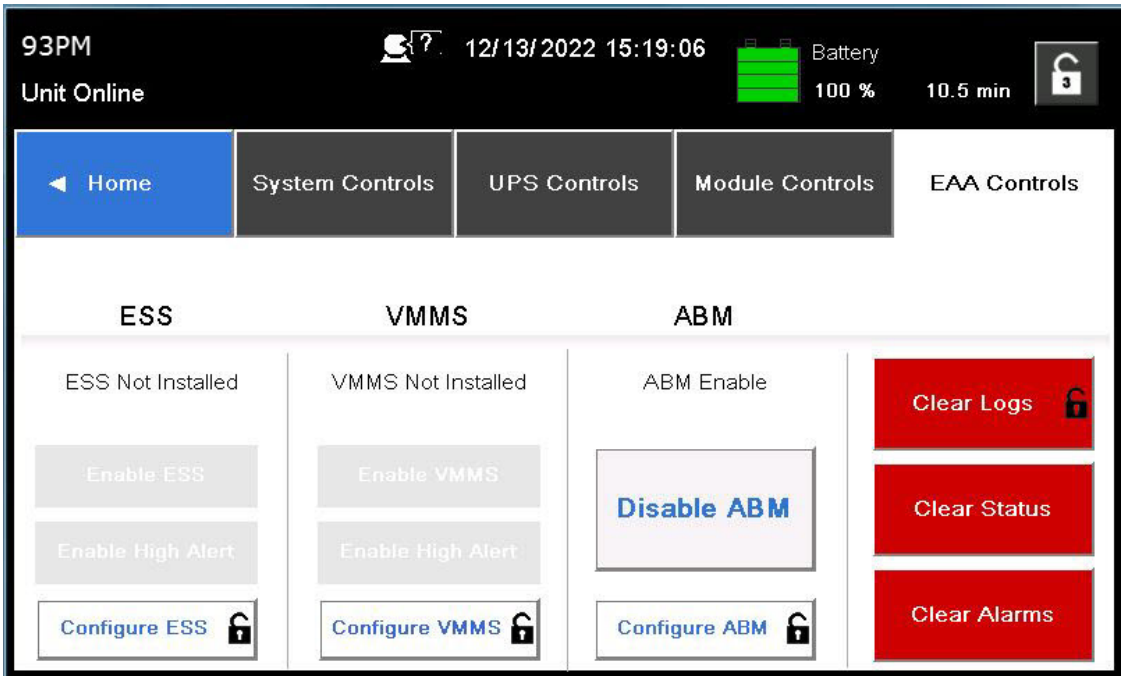


Figure 69. Typical EAA Control Screen



7.3 Single UPS Operation

NOTE 1 If an Integrated Battery Cabinet (IBC) is installed, refer to its installation and operation manual, listed in paragraph For More Information, for IBC battery breaker location.

NOTE 2 If a Sidecar Integrated Accessory Cabinet (SIAC) or an Integrated Accessory Cabinet (IAC) is installed, refer to its installation and operation manual, listed in For More Information, for operating instructions.

NOTE 3 This unit is a theer-wire device. The loss of a single input phase will be considered a complete loss of input power and discharge the battery to provide power to the load.

7.3.1 Starting the UPS in Double Conversion Mode

To start the UPS system:

1. Close the UPS input feeder circuit breaker.
2. If IBCs are installed, close the battery breakers. (If internal batteries are installed, close the internal battery breaker.)
3. Observe the UPS control panel display becoming active, indicating logic power.
4. Verify no alarms are active.
5. Tap the **CONTROLS** tab on the main menu navigation bar. The System Control screen is displayed.
6. Tap the **GO ONLINE** button.
7. If requested, enter the Level 1 password. Default password is **111111**.

   The rectifier and inverter turn on. The inverter continues to ramp up to full voltage.

   Once the inverter reaches full voltage, the UPS inverter switchgear closes and the static switch turns off. Power is now supplied to the critical load in double conversion mode. It takes approximately one minute for the UPS to achieve the double conversion mode.

   The Normal status indicator is illuminated.

7.3.2 Starting the UPS in Bypass Mode

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.

⚠ ATTENTION!

En mode Bypass, la charge critique n'est pas protégée contre les interruptions et anomalies de l'alimentation commerciale.

1. Close the UPS input feeder circuit breaker.
2. If IBCs are installed, close the battery breakers.
3. Observe the UPS control panel display becoming active, indicating logic power.
4. Verify no alarms are active.
5. Tap the **CONTROLS** tab on the main menu navigation bar. The System Control screen is displayed.
6. Tap the **GO TO BYPASS** button.

The critical load is immediately supplied by the bypass source, in Bypass mode.

The **BYPASS** status indicator is illuminated.

7.3.3 Starting the UPS via DC Start Button

IMPORTANT

Secure the UPS output. Performing DC start will energize UPS Output and customer loads (verify that no work is being done downstream).

If installed, verify that the Maintenance Bypass Breaker (MBP) is Open.

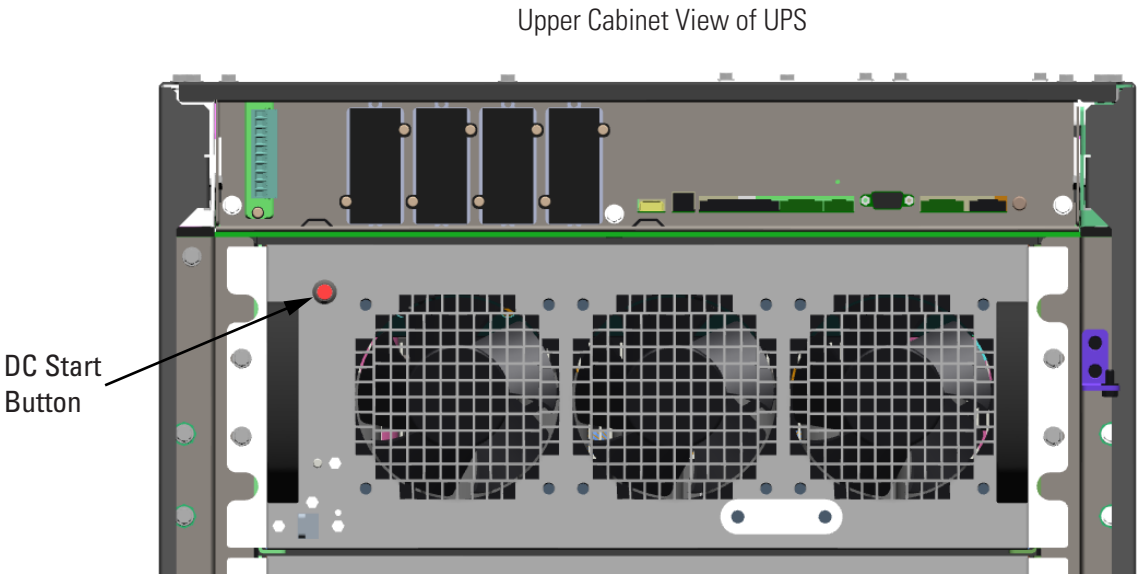
IMPORTANT

Sécurisez la sortie de l'onduleur. L'exécution d'un démarrage CC alimentera la sortie de l'onduleur et les charges client (vérifiez qu'aucun travail n'est effectué en aval).

S'il est installé, vérifiez que le disjoncteur de dérivation de maintenance (MBP) est ouvert.

1. Open the UPS front door by lifting the latch from the bottom and turning to the right (counterclockwise) and swing the door open.
2. Verify that the UPS input breaker is open.
3. Close the UPS input feeder circuit breaker.
4. Close the UPS input breaker.
5. If the UPS contains a Rectifier Input Breaker (RIB), close the Rectifier Input Breaker.
6. If the UPS contains a battery breaker, close the UPS battery breaker.
7. If Integrated Battery Cabinets (IBCs) are installed, close the IBC battery breakers.
8. Press the DC Start button on the front of each UPM to power on the UPM power supply. (See Figure 70 for DC Start Button location).

Figure 70. DC Start Button Location



9. Close the door and secure the latch.
10. Observe the UPS control panel display becoming active, indicating logic power.
11. Verify no alarms are active.
12. Tap the **CONTROLS** tab on the main menu navigation bar. The System Control screen is displayed.
13. Tap the **GO ONLINE** button.

    If requested, enter the Level 1 password. Default password is **111111**.

    The unit will start on battery power. Restoration of utility power during this time will transfer the system to normal operation.

7.3.4 Starting the UPMs

To start the power modules without transferring the critical load to Double Conversion mode:

1. Close the UPS input feeder circuit breaker.
2. Observe the UPS control panel becoming active, indicating logic power.
3. Verify no alarms are active.
4. Tap the **CONTROLS** tab on the main menu navigation bar. The System Control screen is displayed.
5. Tap the **MODULES CONTROLS** tab on the secondary Control menu navigation bar. The UPM Select screen is displayed.
6. On the UPM Select screen, select UPM 1. The UPM Control Screen is displayed.
7. Tap the **START MODULE** button.

   The UPM 1 rectifier and inverter turn on. When the inverter reaches full voltage, the UPS is ready to transfer to the Double Conversion mode and supply the critical load.
8. Repeat **Steps 5** through **Step 8** selecting UPM 2 to start UPM 2.

The UPM 2 rectifier and inverter turn on. When the inverter reaches full voltage, the UPS is ready to transfer to the Double Conversion mode and supply the critical load.

9. Repeat **Steps 5** through **Step 8** selecting UPM 3 to start UPM 3.

   The UPM 3 rectifier and inverter turn on. When the inverter reaches full voltage, the UPS is ready to transfer to the Double Conversion mode and supply the critical load.

7.3.5 Starting a Single UPM

To Start a single UPM:

1. Close the UPS input feeder circuit breaker.
2. Observe the UPS control panel becoming active, indicating logic power.
3. Verify no alarms are active.
4. Tap the **CONTROLS** tab on the main menu navigation bar. The System Control screen is displayed.
5. Tap the **MODULES CONTROLS** tab on the secondary Control menu navigation bar. The UPM Select screen is displayed.
6. On the UPM Select screen, select the UPM to start. The UPM Control Screen is displayed.
7. Tap the **START MODULE** button.

   The UPM rectifier and inverter turn on. When the inverter reaches full voltage, the UPS is ready to transfer to the Double Conversion mode and supply the critical load.

7.3.6 Transfer from Double Conversion 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.

ATTENTION!

En mode Bypass, la charge critique n'est pas protégée contre les interruptions et anomalies de l'alimentation commerciale.

1. Tap the **CONTROLS** tab on the main menu navigation bar. The System Control screen is displayed.
2. Tap the **GO TO BYPASS** button.

   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 power module remains on.

⚠WARNING

Power is present inside the UPS cabinet.

AVERTISSEMENT!

L'alimentation est présente à l'intérieur de l'armoire de l'onduleur.

7.3.7 Transfer from Bypass to Double Conversion Mode

To transfer the critical load to Normal mode:

1. Tap the **CONTROLS** tab on the main menu navigation bar. The System Control screen is displayed.
2. Tap the **GO ONLINE** button.

   The UPS transfers to Double Conversion mode. If the power module is not available, the system remains on bypass and an alarm sounds.

   The **NORMAL** status indicator is illuminated.

7.3.8 Transfer from ESS Mode to Double Conversion Mode

To transfer the load to Standard Normal mode:

1. Tap the **CONTROLS** tab on the main menu navigation bar. The Control screen is displayed.
2. Tap the **EAA CONTROLS** tab on the secondary Control menu navigation bar. The **EAA CONTROLS** screen is displayed.
3. Tap the **DISABLE ESS** button.

   The UPS transfers to Double Conversion mode.

   The **NORMAL** status indicator is illuminated.

7.3.9 Transfer from Double Conversion Mode to ESS Mode

To transfer the load to HE Normal mode:

1. Tap the **CONTROLS** tab on the main menu navigation bar. The Control screen is displayed.
2. Tap the **EAA CONTROLS** tab on the secondary Control menu navigation bar. The **EAA CONTROLS** screen is displayed.
3. Tap the **ENABLE ESS** button.

   The UPS transfers to ESS mode if no abnormal power conditions are detected. If abnormal power conditions are detected, the UPS will wait and transfer to ESS mode when conditions are cleared.

   The **NORMAL** status indicator is illuminated.

7.3.10 Transfer from Double Conversion 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 7.3.6 *Transfer from Double Conversion to Bypass Mode*.
2. Tap the **CONTROLS** tab on the main menu navigation bar. The System Control screen is displayed.
3. Tap the **MODULES CONTROLS** tab on the secondary Control menu navigation bar. The UPM Select screen is displayed.
4. On the UPM Select screen, select UPM 1. The UPM Control Screen is displayed.
5. Tap the **SHUT DOWN MODULE** button.

   The UPM status indicates SHUTDOWN. The power module is turned off.

   Logic power remains on.
6. Repeat **Steps 2** through **Step 5** selecting UPM 2 to shut down UPM 2.

   The UPM status indicates SHUTDOWN. The power module is turned off.

   Logic power remains on.

7. Repeat **Steps 2** through **Step 5** selecting UPM 3 to shut down UPM 3.

   The UPM status indicates SHUTDOWN. The power module is turned off.

   Logic power remains on.

7.3.11 Single UPM Shutdown

To shut down a single UPM:

1. Tap the **CONTROLS** tab on the main menu navigation bar. The System Control screen is displayed.
2. Tap the **MODULES CONTROLS** tab on the secondary Control menu navigation bar. The UPM Select screen is displayed.
3. On the UPM Select screen, select the UPM to shutdown. The UPM Control Screen is displayed.
4. Tap the **SHUT DOWN MODULE** button.

   The UPM status indicates SHUTDOWN. The power module is turned off. The remaining UPMs continue to supply the critical load.

   Logic power remains on.

7.3.12 Single UPM Restart

To restart a single UPM from a shutdown state:

1. Tap the **CONTROLS** tab on the main menu navigation bar. The System Control screen is displayed.
2. Tap the **MODULES CONTROLS** tab on the secondary Control menu navigation bar. The UPM Select screen is displayed.
3. On the UPM Select screen, select the UPM to start. The UPM Control Screen is displayed.
4. Tap the **START MODULE** button.

   The UPM rectifier and inverter turn on. When the inverter reaches full voltage, the UPS is ready to transfer to the Double Conversion mode and supply the critical load.

7.3.13 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 UPS.
2. Perform the Load Off procedure in paragraph 7.3.16 *Using the UPS LOAD OFF Command*.

   The inverter switchgear is open, and the power module is turned off.

3. Perform the battery charger off procedure in paragraph 7.3.14 *Charger Control*.

   The rectifier and battery switchgear open.

⚠WARNING

Power is present inside the UPS cabinet until the upstream input feeder circuit breakers and battery breakers are opened. Wait at least 5 minutes before accessing internal components.

⚠ AVERTISSEMENT!

L'alimentation est présente à l'intérieur de l'armoire de l'onduleur jusqu'à ce que les disjoncteurs d'alimentation d'entrée en amont et les disjoncteurs de batterie soient ouverts. Attendez au moins 5 minutes avant d'accéder aux composants internes.

4. Open the UPS input feeder circuit breaker.
5. If IBCs are installed, open all battery breakers.

7.3.14 Charger Control

To turn the battery charger on:

1. Tap the **CONTROLS** tab on the main menu navigation bar. The Control screen is displayed.
2. Tap the **UPS CONTROLS** tab on the secondary navigation bar. The UPS Control screen is displayed.
3. Tap the **TURN ON CHARGER** button.

To turn the battery charger off:

1. Tap the **CONTROLS** tab on the main menu navigation bar. The Control screen is displayed.
2. Tap the **UPS CONTROLS** tab on the secondary navigation bar. The UPS Control screen is displayed.
3. Tap the **TURN OFF CHARGER** button.

7.3.15 Battery Test

NOTE 1 The UPS has a user initiated battery test intended to determine if the batteries are able to support the load.

NOTE 2 The battery test is only able to be initiated when the battery is fully charged. This normally occurs within 72 hours of the start of a charging cycle. The command will not be shown if the test is not able to be run.

To start the battery test:

1. Tap the **CONTROLS** tab on the main menu navigation bar. The System Control screen is displayed.
2. Tap the **UPS CONTROLS** tab on the secondary navigation bar. The UPS Control screen is displayed.
3. Tap the **RUN BATTERY TEST** button.

7.3.16 Using the UPS LOAD OFF Command

A UPS shutdown is initiated by the **LOAD OFF** command on the UPS Control 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** command:

1. Tap the **CONTROLS** tab on the main menu navigation bar. The System Control screen is displayed.

⚠CAUTION

All power to the critical load is lost when LOAD OFF is selected in the following step. You should use this feature only when you want to de-energize the critical load.

⚠ ATTENTION!

Toute l'alimentation de la charge critique est perdue lorsque LOAD OFF est sélectionné à l'étape suivante. Vous ne devez utiliser cette fonctionnalité que lorsque vous souhaitez mettre hors tension la charge critique.

2. Tap the **LOAD OFF** button.

An action confirmation screen is displayed. Follow the on screen prompts to shut down the UPS or to cancel the shutdown. Selecting **YES** will immediately shut down the UPS and de-energize the critical load. Selecting **NO** will abort the shutdown.

⚠CAUTION

Do not attempt to restart the system after Load Off until the cause of the shutdown has been identified and cleared.

⚠ ATTENTION!

N'essayez pas de redémarrer le système après l'arrêt du chargement tant que la cause de l'arrêt n'a pas été identifiée et éliminée.

3. To restart the UPS after using the **LOAD OFF** follow the procedure in paragraph 7.3.1 *Starting the UPS in Double Conversion Mode* or 7.3.2 *Starting the UPS in Bypass Mode*.

⚠WARNING

Power is present inside the UPS cabinet until the upstream input feeder circuit breakers and battery breakers are opened. Wait at least 5 minutes before accessing internal components.

⚠ AVERTISSEMENT!

L'alimentation est présente à l'intérieur de l'armoire de l'onduleur jusqu'à ce que les disjoncteurs d'alimentation d'entrée en amont et les disjoncteurs de batterie soient ouverts. Attendez au moins 5 minutes avant d'accéder aux composants internes.

7.3.17 Using the Remote Emergency Power-off Switch

⚠WARNING

Emergency Power Off (EPO) and Remote Emergency Power Off (REPO) functionality is disabled for UPS systems configured for UL 924 auxiliary lighting. To remove power from the system a LOAD OFF command (see paragraph 7.3.16 *Using the UPS LOAD OFF Command*) must be given using the front panel controls and all breakers opened.

⚠ AVERTISSEMENT!

Les fonctionnalités de mise hors tension d'urgence (EPO) et de mise hors tension d'urgence à distance (REPO) sont désactivées pour les systèmes UPS configurés pour l'éclairage auxiliaire UL 924. Pour couper l'alimentation du système, une commande LOAD OFF (voir paragraphe 7.3.16 *Using the UPS LOAD OFF Command*) doit être donnée à l'aide des commandes du panneau avant et de tous les disjoncteurs. ouvert.

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 REPO switch:

1. Firmly push the red pushbutton until it locks into place. The switch latches into the activated state (see Figure 71).

   The rectifier, inverter, and battery switchgear open, 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 71). To remove the key, rotate the key back to the vertical position.
3. Restart the UPS by following the procedure in paragraph *7.3.1 Starting the UPS in Double Conversion Mode* or *7.3.2 Starting the UPS in Bypass Mode*.

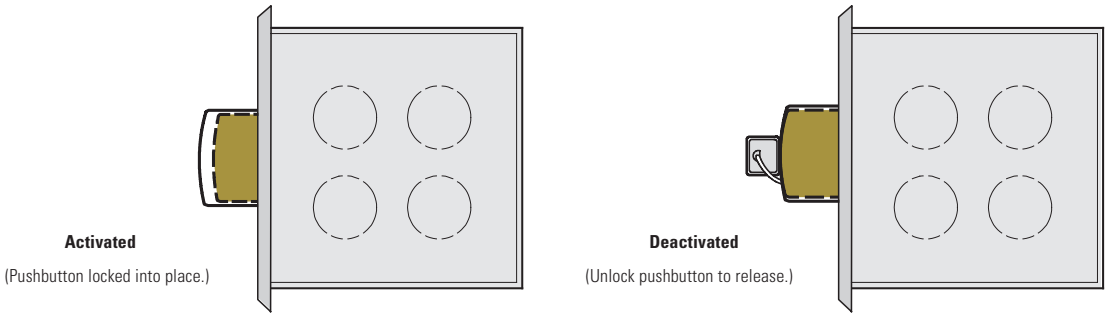
WARNING

Power is present inside the UPS cabinet until the upstream input feeder circuit breakers and battery breakers are opened. Wait at least 5 minutes before accessing internal components.

AVERTISSEMENT!

L'alimentation est présente à l'intérieur de l'armoire de l'onduleur jusqu'à ce que les disjoncteurs d'alimentation d'entrée en amont et les disjoncteurs de batterie soient ouverts. Attendez au moins 5 minutes avant d'accéder aux composants internes.

Figure 71. REPO Operation



Activated

(Pushbutton locked into place.)

Deactivated

(Unlock pushbutton to release.)

Chapter 8 Communication

This chapter describes the communication features of the Eaton 93PM Gen 2 UPS.

8.1 Minislot Cards

The Eaton 93PM Gen 2 UPS has four standard, factory-installed Minislot communication bays. The UPS is compatible with the following Minislot cards (see Figure 72):

- **Eaton Industrial Gateway Card (INDGW-M2)** – combines the features of an SNMP agent, HTTP/web server and a Modbus card to facilitate remote monitoring of your UPS system through any Building Management System. Enjoy the freedom to customize and schedule actions, like shutdown protocols and load shedding, and receive immediate notifications during power events, without having to be onsite.
- **Industrial Relay Card-Minislot (IRC-MS)** – can be used to indicate the operating status of the UPS system using the customer's monitoring equipment. The Industrial Relay Card uses five isolated normally-open or normally-closed dry relay contacts to indicate the UPS status. Normal, Bypass, Battery, and Alarm modes can be monitored. See Table 34 for default triggers. The contact ratings and wire range are listed in the IRC-MS installation guide. One input can be activated by a switch or dry contact. The voltage source is provided by the card, no external voltage source is needed.

  For installation and setup of a Minislot card, contact an Eaton service representative (see paragraph 1.9 *Getting Help*). Refer to the manual supplied with the Minislot card for user instructions.

Figure 72. Optional Minislot Cards

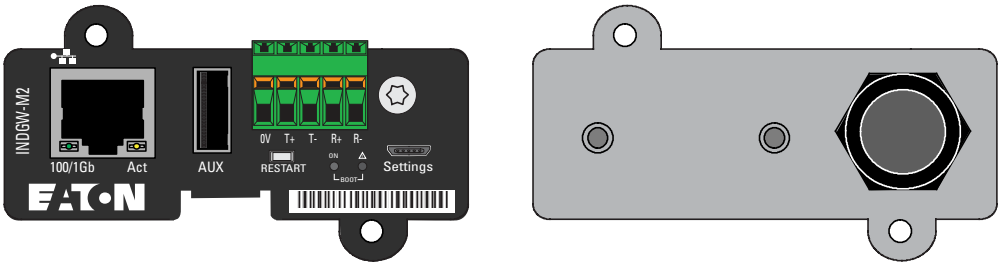


Table 34. IRC-MS Default Triggers

Relay	Trigger
K1	UPS supporting the load
K2	UPS on Battery
K3	Summary alarm
K4	UPS on bypass
K5	UPS battery low

8.2 Building Alarm Monitoring

This standard feature lets you connect the UPS to your building alarms, such as smoke detectors or overtemperature alarms. The building alarm customer interface terminals for external are located inside the UPS. Use twisted-pair wires for each alarm input and common.

The building alarms can be programmed to display the alarm functional name.

8.3 General Purpose Relay Contact

One general purpose relay contact is provided as a standard feature on the UPS. The relay contact customer interface terminals are located inside the UPS. Use twisted-pair wires for the normally-closed or normally-open and common connections.

Normally-closed or normally-open contacts can be used. If the state of the contact changes from the state specified as normal, a signal is issued. This contact can be connected to equipment at the facility (such as a light or an alarm bell) to notify the operator 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 or 28 Vdc @ 5A.

⚠ ATTENTION!

Ne pas faire fonctionner les contacts à plus de 30 VCA à 5 A maximum.

NOTE If contact ratings are required that can be operated above the rated voltage and current available with the UPS general purpose relay contacts, an IRC-MS card should be used.

8.4 PredictPulse Remote Monitoring and Management Service

The Eaton 93PM Gen 2 UPS supports Eaton's PredictPulse remote monitoring and management service. PredictPulse is a subscription monitoring and management service 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. PredictPulse Service is included at no charge during the first year of Eaton 93PM Gen 2 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.

8.4.1 PredictPulse Service 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 93PM Gen 2 UPS. Features include:

- Proactive monitoring that automatically analyzes the status of the Eaton 93PM Gen 2 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 93PM Gen 2 UPS.

- Easy self-installation in minutes from a wizard installer or directly from the INDGW-M2 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 93PM Gen 2 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 93PM Gen 2 UPS, 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.

8.4.2 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 INDGW-M2 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 INDGW-M2 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.

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.

Each battery string is an energy source in itself. **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.

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.
- 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 or lithium-ion 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 of the UPS cabinet and the exhaust openings (on the rear of the UPS cabinet) are not blocked.
3. Ensure the operating environment is within the parameters specified in **Chapter 9 *Product Specifications***.
4. Ensure the UPS is in Normal mode (Normal status indicator is illuminated). If an alarm lamp is illuminated or the Normal 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 7.2 *Using the Control Panel*.
2. Check the UPS air filter (located behind the front door) and wash or replace as necessary. SeeFigure 73 for filter location. Contact an Eaton service representative for replacement filters.

⚠CAUTION

Verify the spare washed filter is thoroughly dry before installing.

⚠ ATTENTION!

Vérifier que les filtres sont bien secs avant de les réinstaller.

To remove the filters:

a. Unfasten the front door by lifting the latch from the bottom and turning to the right (counterclockwise) and swing the door open (see Figure 73).

b. Remove the foam filters from the frame on the front door.

c. Install the customer's spare foam filters, either washed or new foam filters, into the frame on the front door.

⚠ IMPORTANT

The foam filters are to be replaced with new or washed filter immediately. The ups is not meant to be run without filters installed.

IMPORTANT

Les filtres en mousse doivent être remplacés immédiatement par des filtres neufs ou lavés. L'onduleur n'est pas destiné à fonctionner sans filtres installés.

d. Close the front door and secure the latch.

3. Record maintenance results and any corrective actions in a suitable log.

Figure 73. Air Filter Location

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 the compression lug connections. Maintenance procedures should specify that the compression lug 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 system 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.

⚠WARNING

- 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.

Pb NO DISPOSAL

Do not discard the UPS or the UPS batteries in the trash. This product contains sealed, lead-acid or lithium-ion 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, 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 Customer Reliability Center (see paragraph 1.9 *Getting Help*).

Chapter 10 Product Specifications

10.1 Models

The UPS is housed in a free-standing cabinet with safety shields behind the door. The UPS is available in 50 or 60 Hz with various output power ratings.

Model	Power Rating
Eaton 93PM Gen 2 200-1 Eaton 93PM Gen 2 200-2 (N+1)	50 kW
Eaton 93PM Gen 2 250-1 Eaton 93PM Gen 2 250-2 (N+1)	
Eaton 93PM Gen 2 200-2 Eaton 93PM Gen 2 200-3 (N+1)	100 kW
Eaton 93PM Gen 2 250-2 Eaton 93PM Gen 2 250-3 (N+1)	
Eaton 93PM Gen 2 200-3 Eaton 93PM Gen 2 200-4 (N+1)	150 kW
Eaton 93PM Gen 2 250-3 Eaton 93PM Gen 2 250-4 (N+1)	
Eaton 93PM Gen 2 200-4	200 kW
Eaton 93PM Gen 2 250-4 Eaton 93PM Gen 2 250-5 (N+1)	
Eaton 93PM Gen 2 250-5	250 kW

10.2 Specifications

The following sections detail the input, output, environmental, and battery specifications for the UPS.

IMPORTANT

Specifications are subject to change. To ensure you have the most up-to-date content and information for this product, please review the latest manual revision on our website, Eaton 93PM 480V UPS resources page.

10.2.1 UPS Input

Operating Input Voltage	Rectifier: 480 Vac Wye, 3W + ground. Neutral not used. Bypass: 480 Vac Wye, 3W + ground. or *if Four-Wire UPS:* Bypass: 480 Vac Wye, 3W + Neutral + ground.
Operating Input Frequency Range	50/60 Hz
Operating Input Current	For Three-Wire UPS: See Table 10 through Table 11. For Four-Wire UPS: See Table 12 through Table 13. Adjustable
Input Current Harmonic Content	≤ 3.0% THD at full load for 3-Wire UPS ≤ 4.5% THD at full load for 4-Wire UPS
Input Current Harmonic Content	≤ 3.5% THD at full load
Power Factor	Minimum 0.99
Line Surges	6 kV OC, 3 kA SC per ANSI 62.41 and IEC 801 4
Battery Voltage	216 cell - 432Vdc for 3W unit 240 cell - 480Vdc for 3W and 4W units
Battery Charging Capacity	16.5A max per 50kW module at full load 29.3A max per 50kW module <80% load at nominal voltage

10.2.2 UPS Output

Output Voltage Regulation	± 1% (10% to 100% load)
Output Voltage	480 Vac Wye, 3W + ground or *if Four-Wire UPS:* 480 Vac Wye, 3W + Neutral + ground.
Output Voltage Harmonic Content	<1% max THD for 3W (linear load) <1.5% max THD for 4W (linear load)
Output Current	For Three-Wire UPS: See Table 10 through Table 11. For Four-Wire UPS: See Table 12 through Table 13.
Output Voltage Balance	< 2% for 100% maximum load imbalance (linear load)
Output Voltage Phase Displacement	< 2.5° for 100% maximum load imbalance (linear load)
Frequency Regulation	0.1 Hz free running
Synchronous to Bypass	± 4 Hz (default setting)
Frequency Slew Rate	1 Hz per second (default setting)

Load Compatibility	0.8 pF Leading 0.8 pF Lagging
Overload Capability	<110% for 10 minutes <125% for 60 seconds <150% for 10 seconds >150% for 300 milliseconds

10.2.3 UPS Environmental

Operating Temperature	5 to 40° C (41 to 104° F) without derating. The recommended operating temperature is 25° C (77 °F).
Operating Altitude	Maximum 1500m (5000 ft) at 40° C without derating
Storage Temperature	-25 to +55° C, excluding batteries (prolonged storage above 40° C causes rapid battery self-discharge)
Relative Humidity (operating and storage)	5 to 95%, noncondensing
Acoustical Noise	250 kW at 100% load – 65 dBA at a 1m distance, per ISO 7779
Agency Markings	Safety: UL1778 5th Ed./CSA22.2 No. 107.3–14 3rd Ed.
EMI Emissions	Meets IEC 62040-2 C2, CISPR 22, VCCI and FCC Part 15 Subpart B Class A limits.
Immunity / Electrostatic Discharge (ESD)	Meets IEC 61000-4-2 Level 3 specifications and CISPR 24. Withstands up to 4 kV contact pulse without damage and with no disturbance or adverse effect to the critical load.

Chapter 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

EQUIPMENT REGISTRATION

Please visit www.eaton.com/pq/register to register your new Eaton UPS / Eaton UPS Accessory.

Model Number:

Serial Number:

P-164001031 02