



# Eaton 93T

15–80 kVA

## User's and Installation Guide



*Powering Business Worldwide*

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

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REVISION	DATE	DESCRIPTION OF CHANGE	APPROVED BY
001	14-02-2024	First issue	Jingjin Yu

These are the original instructions.

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# 1 How to read this manual

## 1.1 Safety-related signs

These are the safety-related signs used in this document.



### DANGER

DANGER indicates a hazard with a high level of risk which, if not avoided, may result in serious injury or death.



### WARNING

WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in serious injury or death, or damage to the equipment.



### CAUTION




CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury, or damage to the equipment.

*NOTE:* Notes are used to indicate important information and useful tips.

## 1.2 Symbols and abbreviations

### Hazard symbols





These symbols indicate a hazardous situation or action. Symbols are used to warn of situations, which can cause environmental damage and personal injury.

	General warning sign
	Explosion and fire hazard
	Battery hazard

	Corrosive hazard
	Electrical hazard



**Prohibited action symbols**




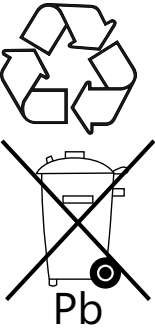
These symbols are used in warnings and notifications to indicate an action that should not be taken. The prohibited action symbols are shown below.

	No smoking
	Limited or restricted access
	General symbol for prohibited action
	Do not touch

**Mandatory action symbols**

These symbols are used in warnings and notifications to indicate an action that must be taken. The mandatory action symbols are shown below.

	Wear eye protection
	General symbol for mandatory action

	Read the manual or instructions
	Disconnect from power source
	First aid
	Batteries marked with this sign must be recycled

### 1.3 Conventions used in this document

This document uses the following 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 when they are defined.

`Screen` type represents information that appears on the screen or LCD.

### 1.4 Glossary

The following acronyms are used in Eaton documentation to refer to Eaton UPS products or their parts.

**Table 1. Glossary of acronyms**

ABM	Advanced Battery Management
EPO	Emergency Power-Off
ESS	Energy Saver System
HMI	Human Machine Interface
HotSync	HotSync wireless parallel technology



IGBT	Insulated Gate Bipolar Transistor
IPM	Intelligent Power Manager
IPP	Intelligent Power Protector
MBP	Maintenance Bypass
MBS	Maintenance Bypass Switch
MiniSlot	MINI communication card
REPO	Remote Emergency Power-Off
SCR	Silicon-Controlled Rectifier
SSW	Static Switch
TB	Terminal Block
UPS	Uninterruptible Power System
UPS system	The entire power protection system: the UPS cabinet, the battery cabinet, and the options or accessories installed.
VRLA	Valve-regulated Lead-acid

# 2 Safety

## 2.1 Safety instructions



### DANGER

Important safety instructions!

This document contains important instructions that must be obeyed during the installation, operation and maintenance of the UPS and the batteries. Read all instructions before operating the equipment.

Keep this manual for future reference. These instructions are also available for download at [www.eaton.eu/](http://www.eaton.eu/)



### DANGER

Operations inside the UPS must be done by an authorized Eaton Customer Service Engineer or by other qualified service personnel authorized by Eaton. There are no user-serviceable parts inside the UPS.

The UPS operates with mains, battery or bypass power. It contains components that carry high currents and voltage. A properly installed enclosure is earthed and IP20 rated against electric shock and unwanted objects. The UPS is a sophisticated power system and only qualified personnel are allowed to install and service it.



### DANGER

This UPS carries lethal voltages. All repairs and service must be done by authorized personnel only. There are no user-serviceable parts inside the UPS.



## WARNING

The UPS is powered by its own energy source (batteries). The output terminals could be energized even when the UPS is disconnected from an AC source.

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 must wait at least 5 minutes for capacitor bleed-off before attempting internal access to the UPS module.

To reduce the risk of fire or electric shock, install the UPS in a temperature and humidity controlled, indoor environment that is free of conductive contaminants. See temperature and humidity limits in chapter *Technical data* in this manual.

The ambient temperature limit must not be exceeded. Do not operate the UPS near water or excessive humidity. The system is not intended for outdoor use.

Before you start any installation or service work, make sure that all AC and DC power sources are disconnected. Power can come from multiple sources. Also ensure system grounding / PE continuity.

In a parallel system, the output terminals could be energized even when the UPS is turned off.



## WARNING

Batteries present a risk of electrical shock or burn from high short-circuit current. Obey proper precautions.

Electric energy hazard. Do not attempt to alter any battery wiring or connectors. Attempting to alter wiring can cause injury.

Do not open or mutilate batteries. Released electrolyte may be toxic and is harmful to the skin and eyes.

Batteries can contain HIGH VOLTAGES, and CORROSIVE, TOXIC and EXPLOSIVE substances. Because of the battery string the output terminals can carry high voltage even when the AC supply is not connected to the UPS. Read the shutdown instructions carefully.

**IMPORTANT:** The battery may consist of multiple parallel strings. Make sure that you disconnect all strings before installation.



### CAUTION

Only qualified service personnel knowledgeable of batteries and the required precautions are allowed to do the installation or service work on batteries. Keep unauthorized personnel away from the batteries. Before you install or replace batteries, consider all the warnings, cautions, and notes concerning appropriate handling. Do not disconnect the batteries when the UPS is in Battery mode.

Make sure that your replacement batteries are of the same number and type as the battery that was originally installed in the UPS. See more accurate instructions on the UPS.

Before you connect or disconnect battery terminals, disconnect the charging source by opening the corresponding battery circuit breaker.

If the battery is inadvertently grounded, remove the source of the ground. All batteries in all UPS models are ungrounded.

Discard batteries according to your local disposal requirements. Do not dispose of batteries in a fire. When exposed to flame, batteries may explode.

To ensure proper cooling airflow and to protect personnel from dangerous voltages inside the unit, keep the UPS door closed and the front panels installed.

Do not install or operate the UPS system close to gas or electric heat sources. Keep the operating environment within the parameters stated in this document.



### CAUTION

Keep the surroundings of the UPS uncluttered, clean, and free from excess moisture.

Obey all DANGER, CAUTION, and WARNING notices affixed to the equipment.



### CAUTION

To prevent damage to the wiring channel and the wiring configuration in the UPS cabinet base when lifting or moving the cabinet, use only the left or right forklift slot to lift and move a packed cabinet.

Make sure that the forklift fork is inserted into the forklift slot at the horizontal position. Do not tilt the fork upwards.

Insert the forks all the way through the base.

Failure to comply with these instructions may cause damage to the wiring channels and the wiring configuration.

## 2.2 Recycling the used UPS or batteries

Remove the battery bank before you discard the UPS or its battery cabinet. Obey the local requirements regarding battery recycling or disposal.



## WARNING

Only authorized personnel are allowed to remove the batteries due to the risk caused by high energy and voltage.

Do not discard waste electrical or electronic equipment in the trash. For proper disposal, contact your local collecting/recycling/reuse or hazardous waste center and follow the local legislation.

The following symbols indicate a product requiring special handling:

Figure 1. WEEE symbol

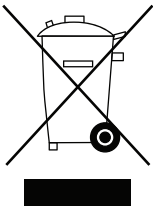


Figure 2. Recycling batteries symbol



When handling waste from electrical and electronic equipment, use proper local collecting centers that meet local legislation.



## WARNING

HAZARDOUS MATERIALS.

Batteries may contain high voltages and caustic, toxic and flammable substances. If used improperly, batteries can injure or kill people and damage equipment.

Do not discard unwanted batteries or battery material in the public waste disposal system. Obey all the applicable local regulations regarding the storage, handling and disposal of batteries and battery materials.

## 2.3 Certification

This product has received the EMC Directive 2014/30/EU certification.

Declarations of conformity with UPS harmonized standards and directives EN 62040-1 (Safety) and 62040-2 (EMC) are available at <http://powerquality.eaton.com> or by contacting your nearest Eaton office or authorized partner.

## 2.4 User precautions

The only permitted user operations are:

- Startup and shutdown of the UPS, excluding the commissioning startup.
- Use of the LCD control panel.

Obey the precautions and do only the described operations. Do not deviate from the instructions. It can be dangerous to you or cause an accidental load loss.



### CAUTION

Electric energy hazard. Do not remove any other screws than those holding the connecting plates and the MBS locking panel.



### CAUTION

If the product is used in a C2 environment, take additional measures to further suppress electromagnetic interference. This product is intended for commercial and industrial application in a C3 environment.

## 2.5 Audience

The intended audience of this document are as follows:

- People who plan and do the installation of the UPS
- People who use the UPS

This document provides guidelines for how to examine the UPS delivery and how to install and operate the UPS.

The reader is expected to know the fundamentals of electricity, wiring, electrical components and electrical schematic symbols. This document is written for a global reader.



### CAUTION

Read this document before you start to operate or do work on the UPS.

## 2.6 Environment

The UPS must be installed according to the recommendations in this document. Never install the UPS in an airtight room, in the presence of vibration, dust, high humidity, flammable gases, flammable liquids, caustic substances, or in an environment exceeding the specifications.

Excessive amount of dust in the operating environment of the UPS may cause damage or lead to malfunction. Always protect the UPS from the outside weather and sunshine. To maximize internal battery service life time, the recommended operating temperature range is from +20 °C to +25 °C.

For further environmental requirements, refer to *Section 4.3.1 Environmental considerations*.



### WARNING

During charge, float charge, heavy discharge, and overcharge, hydrogen and oxygen gases are emitted from lead-acid and NiCd batteries into the surrounding atmosphere. Explosive gas mixture may be created if the hydrogen concentration exceeds 4% by volume in air. Ensure the necessary air flow rate for the ventilation of the UPS location.

## 2.7 For more information

Address any inquiries about the UPS and the battery cabinet to the local office or an agent authorized by the manufacturer. Quote the type code and the serial number of the equipment.

Contact your local service representative if you need help 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 that this manual does not answer

# 3 Introduction to Eaton UPS

## 3.1 About the Eaton UPS

The Eaton® 93T UPS is an uninterruptible power supply system that supplies uninterruptible AC power to critical load and protects it from power failures.

The UPS system is designed considering user load characteristics, usage environment, and the advanced technologies and extensive experience in power supply system design that Eaton has accumulated over the past five decades. The Eaton UPS fully meets the requirements for power supply security for data centers, financial centers, enterprise computer rooms, industrial automation, education systems, medical systems, large offices, and other application scenarios.

The Eaton 93T 15–80 kVA UPS is applicable to small, medium, and large data centers. It is expandable within 15 kVA and 320 kVA. It is a custom power system solution characterized by industry-leading efficiency, usability, and performance. The Eaton UPS is standardized, flexible, expandable, highly adaptable, and available on demand.

Each UPS cabinet provides a static bypass for the centralized system.

**NOTE:** Startup and operational checks must be performed by an authorized Eaton Customer Service Engineer, or the warranty terms specified in *Chapter 10.1 General information about warranty* become void. This service is offered as part of the sales contract for the UPS. Contact service in advance (usually a two-week notice is required) to reserve a preferred startup date.

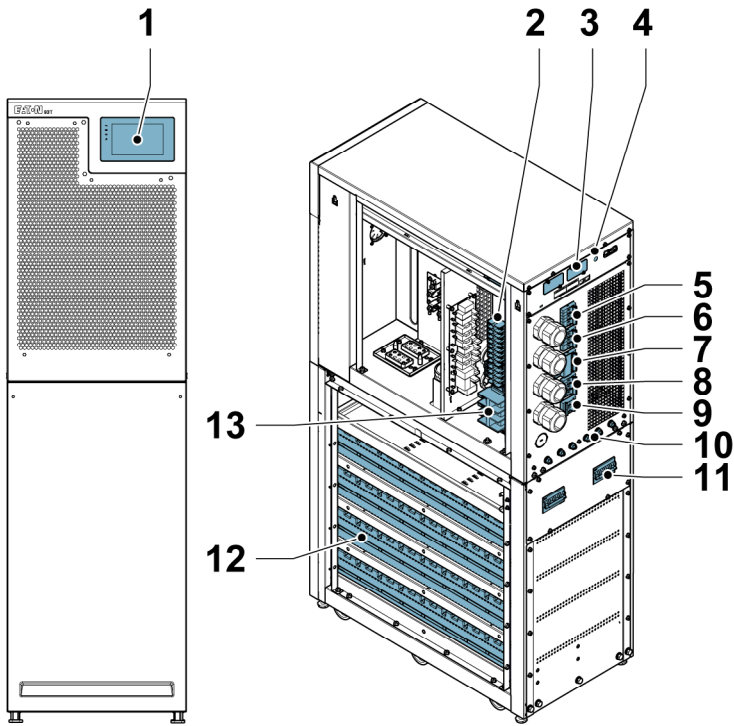
## 3.2 Looking inside the UPS system

The 93T UPS includes a power module, an input switch, a bypass switch, an output switch, and an internal maintenance bypass switch (MBS).

Refer to *Figure 3: 93T UPS (15–30 kVA)*, *Figure 4: 93T UPS (40 kVA)*, and *Figure 5: 93T UPS (60–80 kVA)* for the structure of the UPS cabinet. The power module includes a rectifier, a battery converter, an inverter, and a static bypass.

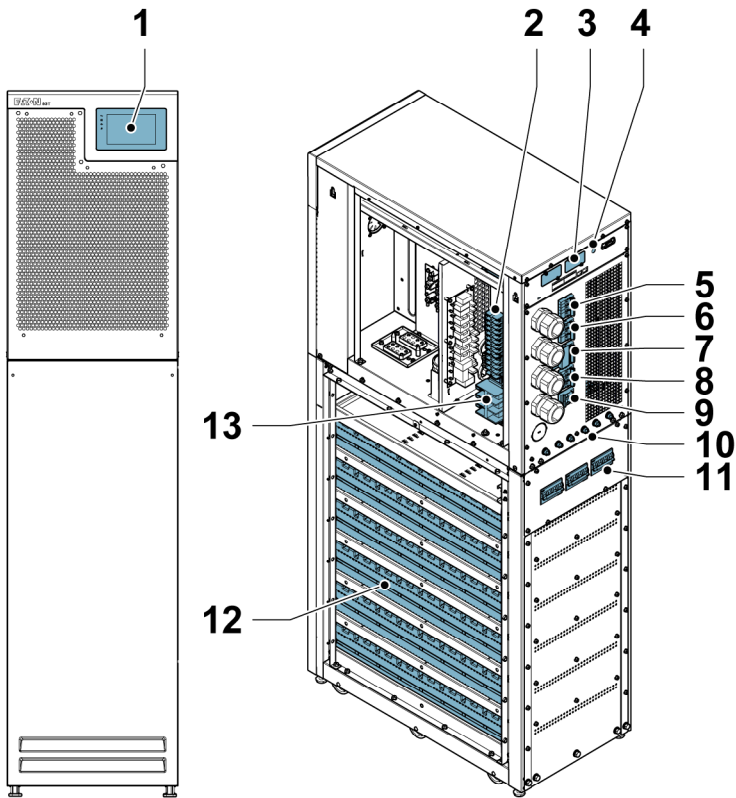


**Figure 3. 93T UPS (15–30 kVA)**



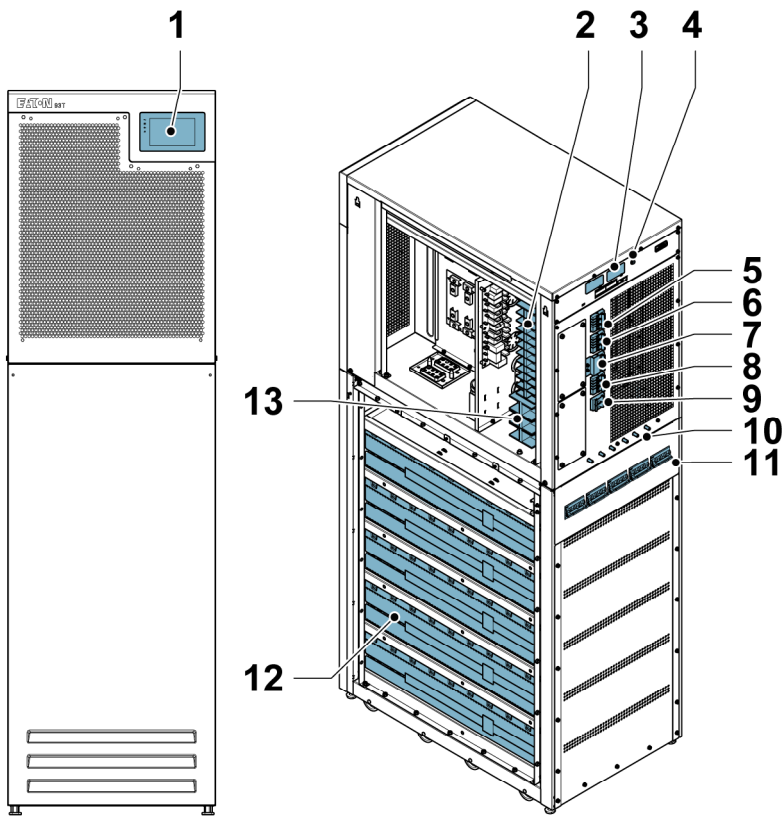
- |                              |                                      |
|------------------------------|--------------------------------------|
| 1. Control panel             | 8. Output switch                     |
| 2. Terminal block            | 9. Neutral switch                    |
| 3. MiniSlot card             | 10. Grounding screw                  |
| 4. Battery startup           | 11. Battery breaker                  |
| 5. Input switch              | 12. Battery                          |
| 6. Bypass switch             | 13. Terminals for external batteries |
| 7. Maintenance bypass switch |                                      |

**Figure 4. 93T UPS (40 kVA)**



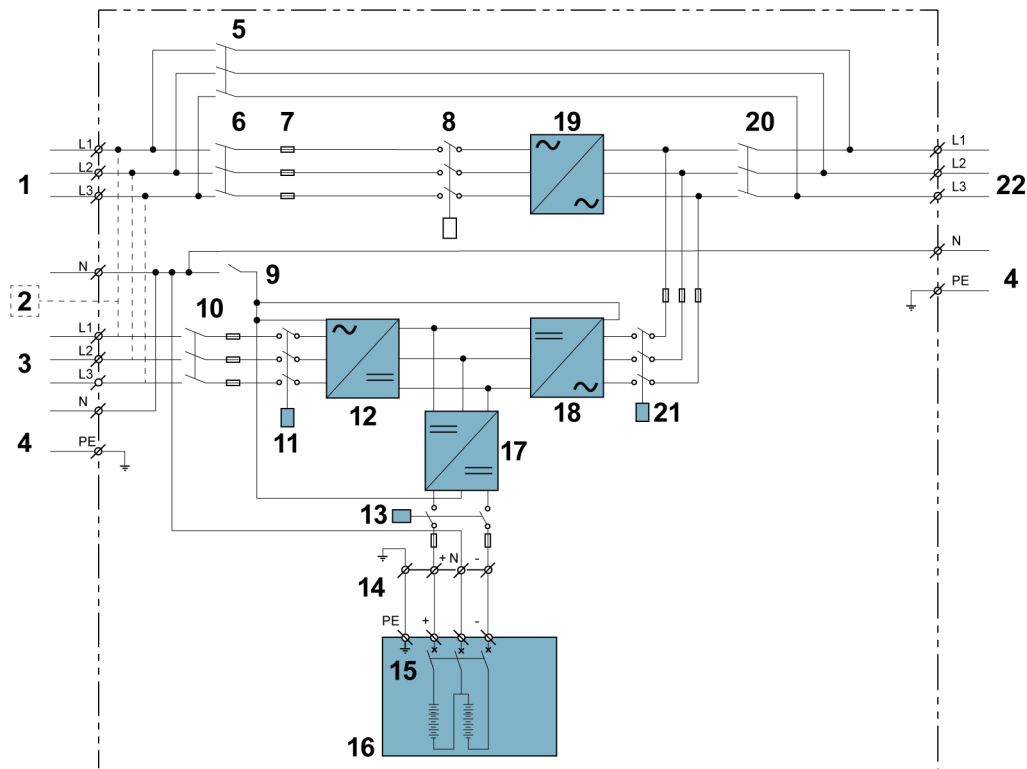
- |                              |                                      |
|------------------------------|--------------------------------------|
| 1. Control panel             | 8. Output switch                     |
| 2. Terminal block            | 9. Neutral switch                    |
| 3. MiniSlot card             | 10. Grounding screw                  |
| 4. Battery startup           | 11. Battery breaker                  |
| 5. Input switch              | 12. Battery                          |
| 6. Bypass switch             | 13. Terminals for external batteries |
| 7. Maintenance bypass switch |                                      |

**Figure 5. 93T UPS (60–80 kVA)**



- |                              |                                      |
|------------------------------|--------------------------------------|
| 1. Control panel             | 8. Output switch                     |
| 2. Terminal block            | 9. Neutral switch                    |
| 3. MiniSlot card             | 10. Grounding screw                  |
| 4. Battery startup           | 11. Battery breaker                  |
| 5. Input switch              | 12. Battery                          |
| 6. Bypass switch             | 13. Terminals for external batteries |
| 7. Maintenance bypass switch |                                      |

**Figure 6. 93T UPS wiring diagram**



- |   |   |
|---|---|
| 1. Bypass supply (230 V, 50 Hz, 3 $\phi$ , 4 wires) | 12. Rectifier   |
| 2. Single feed only                                 | 13. Battery relay                                     |
| 3. Main supply (230 V, 50 Hz, 3 $\phi$ , 4 wires)   | 14. Battery input                                     |
| 4. Protective earthing                              | 15. Battery breaker                                   |
| 5. Maintenance bypass switch                        | 16. Internal battery                                  |
| 6. Bypass switch                                    | 17. Battery converter                                 |
| 7. Bypass fuse                                      | 18. Inverter  |
| 8. Backfeed contactor                               | 19. Static bypass                                     |
| 9. Neutral switch                                   | 20. Output switch                                     |
| 10. Input switch                                    | 21. Output relay                                      |
| 11. Input relay                                     | 22. Output to load (230 V, 50 Hz, 3 $\phi$ , 4 wires) |

If the AC power supply is interrupted or exceeds the technical parameters provided in *Chapter 9.1 About technical data*, the UPS uses the standby battery to supply power to the load. The power supply from the battery continues for a specified period of time or until the AC power supply becomes available again. If there is a long-term interruption of the power supply, the UPS allows switching to another power system, such as a generator, or shuts down the loads in sequence.

### 3.3 UPS operating modes

The table shows the UPS operating modes.

**Table 2. UPS operating modes**

Operating mode	Description
<b>Normal operating modes</b>	
Online mode	The load is powered by the mains AC power through rectification and inversion. In this mode, the battery charger operates when necessary.
Energy Saver System (ESS) mode	The mains supplies power to the load through the static bypass. If there are any anomalies in the mains, the system is able to transfer to Online mode in less than 2 ms. In ESS mode the surge suppression module in the system can protect the load. Operating the UPS in ESS mode increases system efficiency up to 99 %, allowing significant savings in energy losses without compromising system reliability.
<b>Other operating modes</b>	
Battery mode	A DC backup power supply provides energy that is converted to AC power by the UPS inverter. VRLA batteries are the most commonly used backup power source in Battery mode.
Bypass mode	AC power is directly supplied to the load through the UPS static switch.
Power Conditioner mode	The UPS operates without a DC power source connected and the battery alarms are turned off. The UPS provides conditioned output voltage and frequency. It can also support high nonlinear loads without ITHD on the input. If the rectifier is turned off, the UPS attempts a transfer to Bypass mode. The ESS mode is not available in this mode.
Frequency Converter mode	The UPS operates without Bypass mode available and the bypass alarms are turned off. The output frequency can be configured to be different from the standard input frequency (for example, 60 Hz output and 50 Hz input). In this mode, the UPS can also support high nonlinear loads without ITHD on the input.

### 3.3.1 Normal operating modes

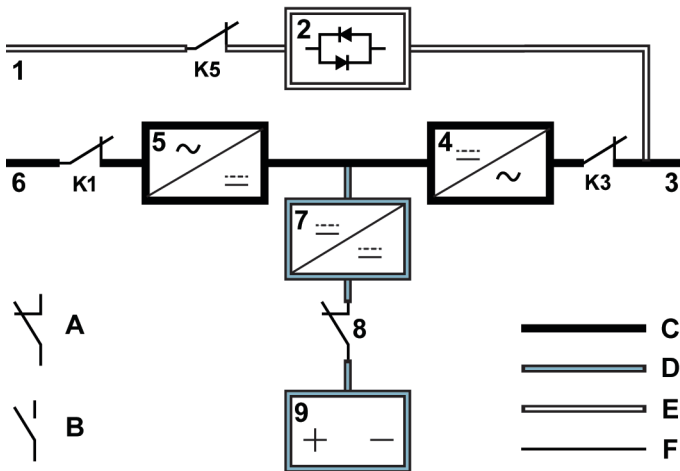
The system includes two normal operating modes: Online mode and Energy Saver System (ESS) mode.

In a normal operating mode the system uses AC power. `Online Mode` is displayed on the front panel, indicating that the incoming AC power is within the permitted voltage and frequency range.

#### 3.3.1.1 Online Mode

*Figure 7: Path of current through the UPS in Online mode* shows the path of electrical power through the UPS system when the UPS is operating in Online mode.

**Figure 7. Path of current through the UPS in Online mode**



1.	Bypass input	A	Internal relay contact closed
2.	Static switch	B	Internal relay contact open
3.	Output	C	Main power flow
4.	Inverter	D	Trickle current
5.	Rectifier	E	Energized
6.	Rectifier input	F	De-energized
7.	Battery converter	K1	Input relay
8.	Battery breaker (closed)	K3	Output relay
9.	Battery	K5	Backfeed relay

A multilevel converter that is composed of an insulated gate bipolar transistor (IGBT) converts 3-phase AC input power to DC and produces a regulated DC voltage to the inverter. The front panel shows the UPS status *Online Mode* and the UPS is in *In Service* state.

The input to the battery converter is the DC output of the rectifier, and it provides regulated charge current to the battery. The battery is connected to the UPS and supports the inverter if the AC input becomes unavailable.

The inverter produces a 3-phase AC output to the critical load. The inverter uses multilevel converter technology of the IGBT and pulse-width modulation (PWM) to convert the output DC power of the rectifier to a regulated AC output.

If the input AC power is interrupted or out of range, the UPS automatically transfers to Battery mode and supplies uninterrupted power to the load. When AC power recovers, the UPS returns to Online mode automatically.

If Online mode is overloaded or unavailable, the UPS transfers to Bypass mode and supplies power to the load through the static bypass. The UPS returns automatically to Online mode when an abnormal condition, such as an extended overload removal, is cleared and the system operation is restored within the specified limits.

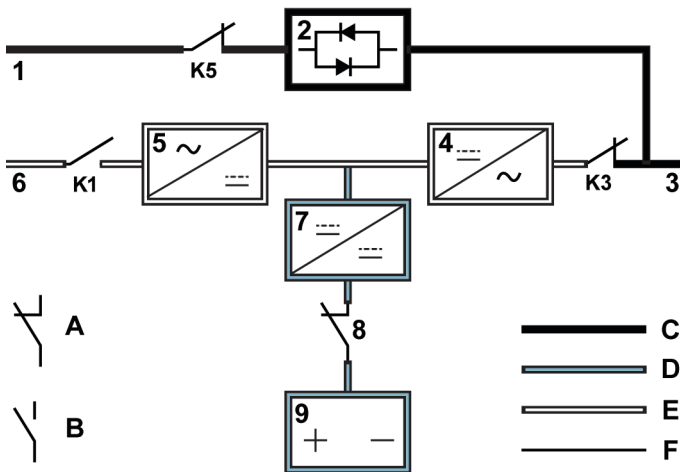
If redundancy is not available to the UPS due to high load, the UPS transfers to Bypass mode automatically and remains in that mode until the failure is corrected during maintenance and the UPS can operate correctly again.

In an external parallel redundant system, each UPS can be isolated from the system for maintenance while the remaining UPSs continue to supply power to the load in Online mode.

### 3.3.1.2 Energy Saver System Mode

Figure 8: Path of current through the UPS in ESS mode shows the path of electrical power through the UPS system when the UPS is operating in Energy Saver System (ESS) mode.

Figure 8. Path of current through the UPS in ESS mode



1.	Bypass input	A	Internal relay contact closed
2.	Static switch	B	Internal relay contact open
3.	Output	C	Main power flow
4.	Inverter	D	Trickle current
5.	Rectifier	E	Energized
6.	Rectifier input	F	De-energized
7.	Battery converter	K1	Input relay
8.	Battery breaker (closed)	K3	Output relay
9.	Battery	K5	Backfeed relay

In ESS mode, the UPS safely provides mains current to the load when the input is within the acceptable voltage and frequency limits. The front panel shows the UPS status *ESS Mode*, and the UPS is in *In Service* state. In ESS mode, the surge suppression and filtering ensure pure electric energy for the load equipment. If there are any disturbances in the input power supply, the UPS automatically transfers to Online mode and continues to supply power to the load through the inverter. If the input AC power fails or exceeds the system specifications, the UPS transfers automatically to Battery mode to supply uninterrupted power to the load.

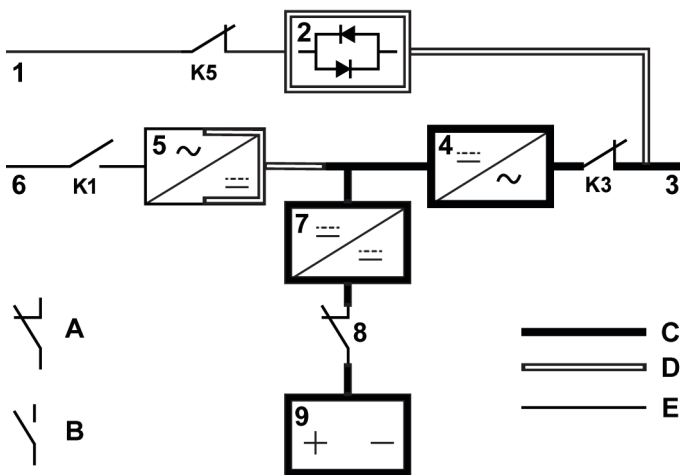
In ESS mode, the UPS's detection and control algorithms continuously monitor the incoming power quality to enable quick mode switching. The UPS can transfer to Online mode in less than 2 ms.

When the input power supply is within acceptable limits, the UPS operates in a high-efficiency energy saving mode, protecting the equipment and supplying pure power to the equipment. The Energy Saver System increases system efficiency up to 99 % when supplying 20–100 % of the rated load.

### 3.3.2 Battery mode

In Online mode and ESS mode, the UPS supplies power to the load through batteries or other stored energy sources if AC power is interrupted or if it is not in compliance with the specified parameters. The front panel shows the UPS status `Battery Mode`, and the UPS is in `In Service` state. In Battery mode the battery provides emergency DC power, which is converted to regulated output power by the inverter. *Figure 9: Path of current through the UPS in Battery mode* shows the path of electrical power through the UPS system when the UPS is operating in Battery mode.

**Figure 9. Path of current through the UPS in Battery mode**



1.	Bypass input	A	Internal relay contact closed
2.	Static switch	B	Internal relay contact open
3.	Output	C	Main power flow
4.	Inverter	D	Energized
5.	Rectifier	E	De-energized
6.	Rectifier input	K1	Input relay
7.	Battery converter	K3	Output relay
8.	Battery breaker (closed)	K5	Backfeed relay
9.	Battery		

When AC power is interrupted, the rectifier cannot convert AC power into DC output to supply the inverter. The input relay K1 is switched off, and the battery supplies UPS output through the inverter. The inverter



operates uninterruptedly during the conversion process and the UPS continues to supply uninterruptible power to the load.

If both the UPS static bypass and the UPS rectifier are energized by AC power, the battery discharges to a very low voltage when AC power and the static bypass cannot restore or AC power is not within the specified limits required for normal system operation. As a result, the inverter cannot continue to supply power to the load. When this event occurs, the UPS issues an audible and visual alarm indicating that the battery has a minimal capacity left and the system shuts down in a short time. If AC power does not become available again, the UPS can support output for a maximum of two minutes before the system shuts down. If a bypass battery is available, the UPS transfers to Bypass mode instead of shutting down.

If AC power becomes available again during the battery discharge, K1 closes and the UPS returns to Online mode. The UPS also starts to recharge the battery to restore the capacity.

### 3.3.3 Bypass mode

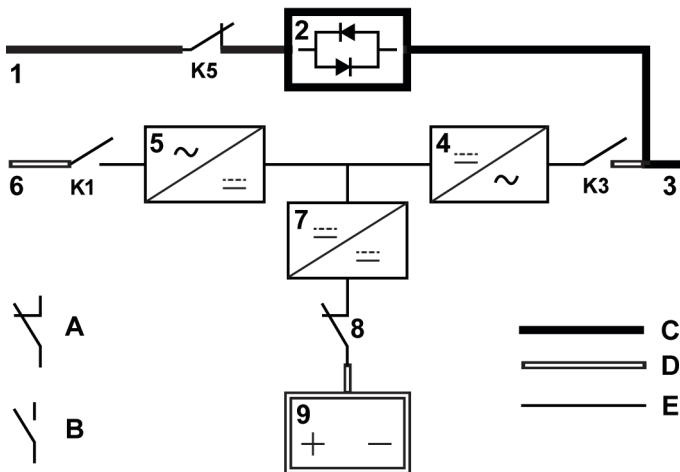
If any overload, load fault, or internal failure is detected, the UPS transfers automatically to Bypass mode. The bypass source supplies AC power directly to the load. The UPS can also be commanded to transfer to Bypass mode manually through the display. The front panel shows UPS status *Bypass Mode*. *Figure 10: Path of current through the UPS in Bypass mode* shows the path of electrical power through the UPS system when the UPS is operating in Bypass mode.



**CAUTION**

**The critical load is not protected in Bypass mode.**

Figure 10. Path of current through the UPS in Bypass mode



- |    |               |   |                               |
|----|---------------|---|-------------------------------|
| 1. | Bypass input  | A | Internal relay contact closed |
| 2. | Static switch | B | Internal relay contact open   |
| 3. | Output        | C | Main power flow               |
| 4. | Inverter      | D | Energized                     |
| 5. | Rectifier     | E | De-energized                  |

---

6.	Rectifier input	K1	Input relay
7.	Battery converter	K3	Output relay
8.	Battery breaker (closed)	K5	Backfeed relay
9.	Battery		

In Bypass mode, the output of the system is supplied with three-phase AC power directly from the system input. In this mode the system output is not protected from voltage or frequency fluctuations, or power outages from the source. In Bypass mode, some power line filtering and transient protection is provided to the load, but no power correction or battery backup is available to the output of the system.

The static bypass consists of a silicon-controlled rectifier (SCR) and a static switch (SSW). When the inverter cannot support the load, the static switch operates continuously. As the static switch is an electronically-controlled device, it can be turned on immediately to pick up the load from the inverter without interruption.

## 3.4 UPS features

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

### 3.4.1 Advanced Battery Management

The Advanced Battery Management (ABM) technology uses sophisticated sensing circuitry and a three-stage charging technique that extends the useful service life of UPS batteries while optimizing the battery recharge time. The UPS also protects batteries from damage caused by high current charging and inverter ripple currents. Charging at high currents can overheat and damage batteries.

In the charge mode, the batteries are recharged. Charging lasts only as long as it takes to bring the battery system up to a predetermined float level. Once this level is reached, the UPS battery charger enters the float stage and the charger operates in the constant voltage mode.

The rest mode begins at the end of the float charge mode; that is, after 48 hours of float charging (user-adjustable). In the rest mode, the battery charger is completely turned off. The battery system receives no charge current during this rest period of approximately 28 days (user-adjustable). During the rest mode, the open circuit battery voltage is monitored constantly, and battery charging is resumed when necessary.

### 3.4.2 Powerware Hot Sync

The Eaton Powerware Hot Sync technology is an algorithm that eliminates the single point of failure in a parallel system and therefore enhances system reliability. The Hot Sync technology is incorporated in all three-phase Eaton UPSs, and it is utilized in both multi-module internal parallel and external parallel systems.

The Hot Sync technology enables all power blocks to operate independently in a parallel system, even without inter-module communications. The power modules utilizing the Hot Sync technology are completely autonomous; each module monitors its own output independently to remain in complete synchronization with the other modules. The power blocks share the load perfectly even in changing capacity or load conditions.

The Powerware Hot Sync technology combines digital signal processing and an advanced control algorithm to provide automatic load sharing and selective tripping in a parallel UPS system. The load share control algorithms maintain synchronization and load balance by constantly making minute adjustments to variations in the output power requirements. The modules conform to demand and are not in conflict with each other for the load. The Powerware Hot Sync systems are capable of paralleling for both redundancy and capacity.

### 3.4.3 Power Conditioner

The Power Conditioner mode is characterized by the UPS operating in Online mode without a DC source connected. In Power Conditioner mode, the UPS provides conditioned output voltage and frequency. The UPS can also support high nonlinear loads without ITHD on the input. The UPS meets the qualifications outlined in this product specification, except for the conditions below.

When in Power Conditioner mode, the UPS has the following functionality and limitations:

1. The UPS operates in Online mode and the battery alarms are turned off.
2. Because there is no DC source, loss of utility power results in the UPS losing power and shutting down.
3. The UPS sustains up to -50 % input voltage tolerance, unless the current limit is reached.
4. If the rectifier is turned off, the UPS attempts a transfer to Bypass mode.
5. ESS mode is not available.

### 3.4.4 Frequency Converter

The Frequency Converter mode is characterized by the UPS running without Bypass mode available. The output frequency can be configured to be different from the standard input frequency (for example, 60 Hz output, 50 Hz input). The UPS can also support high nonlinear loads without iTHD on the input. The UPS meets the qualifications outlined in this product specification, except for the conditions below.

When in the Frequency Converter mode, the UPS has the following functionality and limitations:

1. Operation is the same as when in Online mode with no bypass available.
2. Bypass alarms are suppressed.

### 3.4.5 Software and connectivity features

#### 3.4.5.1 User interface

The Eaton 93T UPS includes two communication bays for MiniSlot communication cards. MiniSlot cards are quickly installed and hot-pluggable. For more information, refer to *Section 5.4 Communication interfaces*.

#### 3.4.5.2 Power Management Software

Intelligent Power Manager (IPM) software offers tools for monitoring and managing power supply devices. For more information, refer to *Section 5.4 Communication interfaces*.

### 3.4.6 Battery system

The battery system provides short-term emergency backup power to safeguard operation during blackouts, power outages, or any other power interruptions. By default, the UPS is configured to use VRLA batteries. If you need to use other types of batteries or other energy storage devices, consult your local Eaton representative.

### 3.4.7 Basic system configurations

#### UPS power rating

The UPS units can be connected in parallel to create larger systems. A maximum of four UPSs can be connected in parallel. If you want to connect more than four cabinets in parallel, contact Eaton's solution team for a power distribution design.

#### UPS options and accessories

For standard and optional 93T UPS features, refer to *Table 3: Standard and optional 93T UPS accessories*.

X = Standard

O = Optional

**Table 3. Standard and optional 93T UPS accessories**

Accessory	15 kVA	20 kVA	30 kVA	40 kVA	60 kVA	80 kVA
Intelligent touch screen for system control and monitoring	X	X	X	X	X	X
MiniSlot communication card (refer to <i>Section 5.4.5 MiniSlot cards</i> for more details)	O	O	O	O	O	O
Maintenance bypass switch (MBS)	X	X	X	X	X	X
Rectified input switch	X	X	X	X	X	X
Inverted output switch	X	X	X	X	X	X
Bypass switch	X	X	X	X	X	X
Single input	X	X	X	X	X	X
Dual input	X	X	X	X	X	X
Dust screen	X	X	X	X	X	X

Additional parts and accessories are also available. These include different software and connectivity options, external switchgear, and power distribution devices.

# 4 UPS installation plan and unpacking

## 4.1 About UPS installation

Install the UPS system in the following order.

1. Create an installation plan for the UPS system.
2. Select an installation site for the UPS system.
3. Examine and unpack the UPS cabinet.
4. Unload and install the UPS cabinet.
5. Install the system circuits.
6. Install any accessories or optional parts, if needed.
7. Complete the installation checklist.
8. Have an authorized Eaton Customer Service Engineer do the preliminary operational checks and startup.

**NOTE:** Startup and operational checks must be done by an authorized Eaton Customer Service Engineer or the warranty terms specified in *Chapter 10.1 General information about warranty* become void. This service is offered as part of the sales contract for the UPS. Contact service in advance (usually a two-week notice is required) to reserve a preferred startup date.



### CAUTION

Make sure that the line input supply is disconnected from the UPS during installation.



### WARNING

All installation work must be done by an authorized Eaton Customer Service Engineer or by other qualified service personnel authorized by Eaton in accordance with the applicable safety standards.

The UPS is not applicable to IT distribution system.

## 4.2 Create an installation plan

Before installing the UPS system, read and understand how these instructions apply to the system that you are going to install. Use the procedures and illustrations in *Section 4.3 Site preparations* and *Section 5.1 About UPS system installation* to create a logical plan for installing the system.

## 4.3 Site preparations

For the UPS system to operate at peak efficiency, the installation site must meet the environmental parameters given in these instructions.

### 4.3.1 Environmental considerations

The air inlet duct environment must meet the following conditions.

- Make sure that the temperature difference between the dry bulb and the wet bulb of the hygroscope is at least 1 °C (1.8 °F) to avoid condensation.
- According to ASHRAE90.1-2013, the maximum variation rate of ambient temperature must be less than 3 °F per 5 minutes (36 °F per hour).

Observe caution regarding UPS operating environmental conditions. The cooling methods used by some data centers can create much wider ranges of temperature and relative humidity in the UPS room and/or data center. This cooling method can cause two problems:

- It can cause a microclimate in the machine room. Microclimates are persistent variations of temperature and/or relative humidity in the room. For example, one side of the room is always cooler than the other, no matter what the actual temperature is.
- It can cause variation in the temperature and/or relative humidity. This problem occurs during the operating transitions of the cooling system.

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 specifications, the UPS reliability is reduced over time. These same environmental extremes create also reliability concerns for any servers that are exposed to them.

**Table 4. Environmental data**

Ambient temperature	+0 °C ... +40 °C
Ambient temperature, battery pack	+20 °C ... +25 °C
Maximum relative humidity	95 %, non-condensing
Operating altitude	Below 1,000 m (3,300 ft.) If the system is operated at an altitude above 2,000 m (6,600 ft.), contact Eaton's service team for more information.

The operating environment of the UPS must meet the weight and size requirements provided in *Table 5: UPS cabinet dimensions and weights* to avoid the risk of an undesirable microclimate at the UPS location.

If the above instructions are not obeyed, the warranty terms specified in *Chapter 10.1 General information about warranty* become void.

### 4.3.2 Installation considerations

Obey the following guidelines when you install the UPS system:

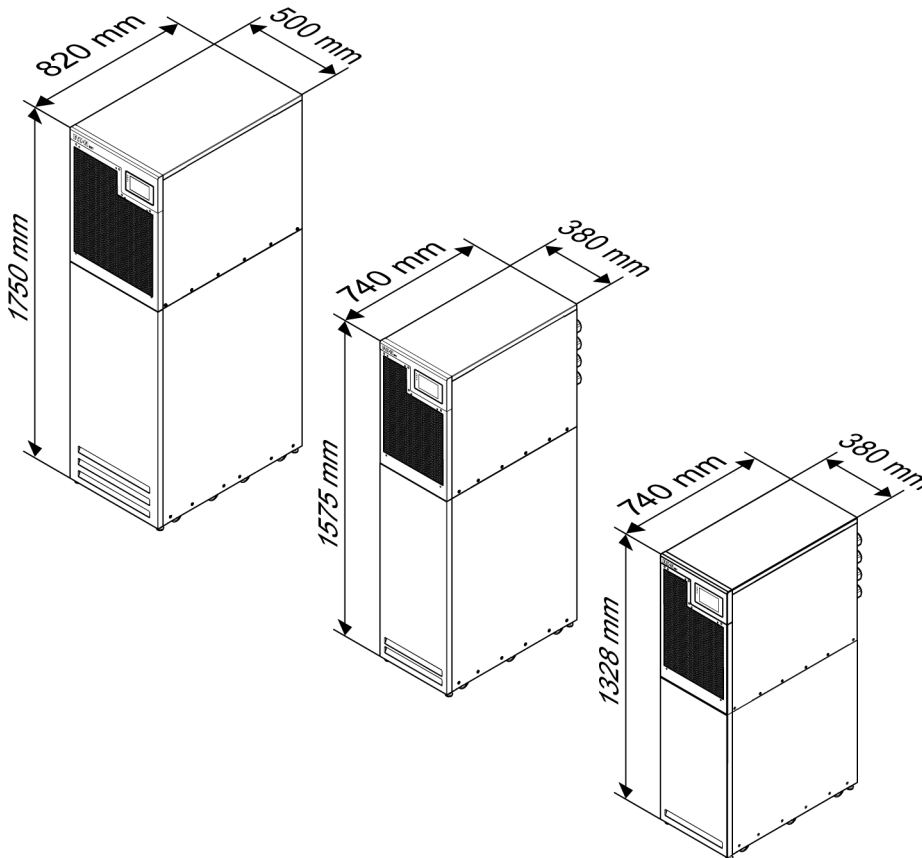
- Install the system on a level floor suitable for computer or electronic equipment. The floor must be suitable for heavy weight and wheeling.
- Install the system in a temperature- and humidity-controlled indoor area free of vibration, dust, high humidity, flammable gases, flammable liquids, or corrosive substances.
- You can install the cabinet in a line-up-and-match configuration or in a standalone configuration.

The UPS equipment operating environment must meet the weight requirements shown in *Table 5: UPS cabinet dimensions and weights*.

**Table 5. UPS cabinet dimensions and weights**

UPS cabinet [kVA]		Packaging dimensions (W x H x D) mm	Cabinet dimensions (W x H x D) mm	Gross weight [kg]	Net weight [kg]
With internal battery	15	650 x 1625 x 950	380 x 1328 x 740	283	237
	20	650 x 1625 x 950	380 x 1328 x 740	334	288
	30	650 x 1625 x 950	380 x 1328 x 740	378	332
	40	650 x 1872 x 950	380 x 1575 x 740	447	399
	60	800 x 1920 x 1100	500 x 1750 x 820	720	660
	80	800 x 1920 x 1100	500 x 1750 x 820	828	768
Without internal battery	15	650 x 1625 x 950	380 x 1328 x 740	193	147
	20	650 x 1625 x 950	380 x 1328 x 740	195	149
	30	650 x 1625 x 950	380 x 1328 x 740	198	152
	40	650 x 1872 x 950	380 x 1575 x 740	207	159
	60	800 x 1920 x 1100	500 x 1750 x 820	320	260
	80	800 x 1920 x 1100	500 x 1750 x 820	328	268

**Figure 11. UPS cabinet dimensions (15–80 kVA)**



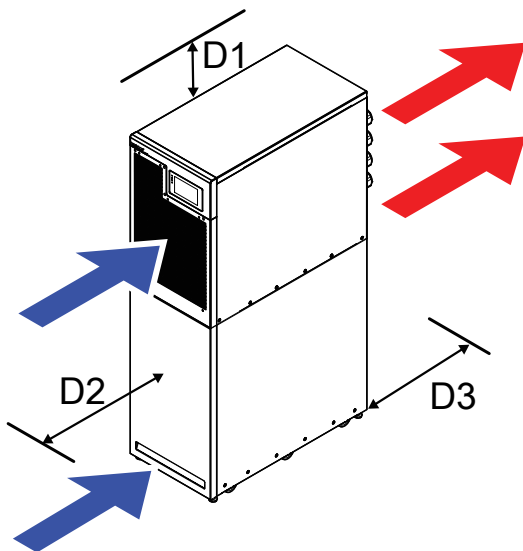
The UPS cabinet uses forced air cooling to regulate internal component temperature. Allow clearance in front of and behind the cabinet for proper air circulation. Refer to *Figure 12: 93T UPS cabinet clearances* for the method of heat radiation. The clearances required for the UPS cabinet are shown in *Table 6: UPS cabinet minimum clearances*.

**Table 6. UPS cabinet minimum clearances**

Location		Clearance [mm]	
		15–40 kVA	60–80 kVA
D1	Above the cabinet	300	300
D2	In front of the cabinet	900	900
D3	Behind the cabinet	300	400

If needed, allow more clearance for wiring.

**Figure 12. 93T UPS cabinet clearances**



- If the D3 clearance is less than the minimum clearance specified in *Table 6: UPS cabinet minimum clearances*, contact your local Eaton representative.
- Refer to *Table 6: UPS cabinet minimum clearances* and *Figure 12: 93T UPS cabinet clearances* for the required clearance. Reserve a minimum of 600 mm clearance on one side of the UPS for maintenance. If you cannot allow enough clearance on the sides, make sure that the cables are at least 800 mm long at D3 so you can pull the UPS to the front for maintenance.

To maximize the service life of batteries, make sure that the operating temperature is between +20 °C and +25 °C.

The optimal ambient temperature of the UPS is between +0 °C and +40 °C, with 50 % derating above +40 °C.

The maximum ambient temperature of the UPS must not exceed +50 °C during operation. Avoid high temperatures and humidity.



### 4.3.3 UPS system power wiring preparations



#### CAUTION

When you are installing a maintenance bypass, use a dual-feed input protected by an upstream circuit breaker or a single-feed input protected by two upstream circuit breakers, one for the UPS/rectifier input breaker (if installed), and the other for the maintenance bypass input. Do not use only a single-feed and single-breaker protection for the UPS/rectifier input and maintenance bypass. If the UPS uses a single feeder line and a bypass input breaker is mounted on the maintenance bypass, a maintenance bypass single-feed input is allowed, and power can be supplied to the UPS and bypass simultaneously.

Read and understand the following guidelines when planning and performing the installation:

- Refer to national and local electrical codes for acceptable external wiring practices.
- To allow for future kVA upgrades, select the power line and the external overcurrent protection switch for derating under full load.
- Material and labor required for external wiring are not part of the UPS delivery.
- For external wiring, use copper cable rated for 90 °C at minimum. For more information, refer to *Table 7: Input/output ratings and external cabling recommendations for the 93T 15–80 kVA UPS*. Cable sizes are based on using the specified circuit breakers.
- If the operating temperature of the conductor rises above 40 °C, use a larger size cable or a cable that is resistant to higher temperatures.
- The wiring specifications are for 90 °C rated copper cables.
- Use a wire with an applicable size to allow future upgrades.



#### CAUTION

For UPS systems configured with a 4-pole ATS or generator:  
 The input uses three live wires, a neutral wire, and a protective earthing conductor. The phase lines must be symmetrical about ground (from a Wye source) for proper equipment operation.  
 Support loads with a neutral wire.  
 Make sure that the switching of the upstream ATS does not disconnect the neutral wire, or that the system recovers from an input neutral wire disconnection before a low battery voltage alert.  
 When the neutral wire is disconnected, make sure that all phase lines are also disconnected.

**Table 7. Input/output ratings and external cabling recommendations for the 93T 15–80 kVA UPS**

	Unit	Rating 50/60 Hz					
Basic unit rating	kVA	15	20	30	40	60	80
Input/output voltage	Volts	400/ 400	400/ 400	400/ 400	400/ 400	400/ 400	400/ 400
Rectifier input (5-wire)	A	27	36	54	72	108	144
Bypass input (5-wire, dual input)	A	21	29	43	58	86	114

		Unit	Rating 50/60 Hz						
Basic unit rating		kVA	15	20	30	40	60	80	
AC output (5-wire)		A	21	29	43	58	86	114	
Rectifier input, bypass input, and AC output cable	Recommended	mm <sup>2</sup>	10	10	10	16	35	50	
	Mazimum size	mm <sup>2</sup>	16	16	25	25	70	70	
DC input from the battery to the UPS (3-wire)		A	50	66	99	132	197	263	
DC input cable	Recommended	mm <sup>2</sup>	16	16	25	50	95	120	
	Mazimum size	mm <sup>2</sup>	50	50	50	50	120	150	
PE cable	1.7 times								
Neutral wire (N), AC/load, non-linear load									
Backfeed protection device	Electrical clearance upon breaking of contact	mm	$\geq 2.0$						
	Break time	s	$\leq 15$						



### CAUTION

The cable sizes shown in *Table 7: Input/output ratings and external cabling recommendations for the 93T 15–80 kVA UPS* are only recommendations. They are not mandatory. Refer to the regional standards and user's requirements to determine the actual cable sizes.

This product does not provide an external overcurrent protection device, but it must comply with the local regulatory requirements. Input/output disconnecting devices must be provided by the user.

Use an even number of batteries and provide a neutral battery wire.

**Table 8. UPS (15–40 kVA) power cable terminations and torques**

Terminal function	Bolt size	Tightening torque [Nm]
AC input to UPS rectifier	M5	2
AC input to bypass	M5	2
UPS output to loads	M5	2

Terminal function	Bolt size	Tightening torque [Nm]
DC input	M8	9
User grounding	M8	15

**Table 9. UPS (60–80 kVA) power cable terminations and torques**

Terminal function	Bolt size	Tightening torque [Nm]
AC mains input to UPS rectifier	M8	9
AC mains input to bypass	M8	9
UPS output to loads	M8	9
DC input	M10	20
User grounding	M8	15



### CAUTION

External overcurrent protection is not provided by this product, but it must comply with local regulatory requirements. Input/output disconnecting devices must be provided by the user.

When connecting external batteries to the Eaton 93T UPS, Eaton recommends that you use the following NZM-series molded case circuit breakers.

**Table 10. Recommended NZM-series molded case circuit breakers and their ratings**

UPS model [kVA]	Type	Rating [A]	Article number
15–20	NZMH2-A63	63	259097
30	NZMH2-A100	100	259099
40	NZMH2-A125	125	259100
60	NZMN2-A200	200	259093
80	NZMN2-A320	320	109669



### CAUTION

To reduce the risk of a fire, the rated current of the circuit breaker must not be less than the specifications shown in *Table 7: Input/output ratings and external cabling recommendations for the 93T 15–80 kVA UPS*.

Balance the loads equally between the phases. Refer to *Table 7: Input/output ratings and external cabling recommendations for the 93T 15–80 kVA UPS*.

Source protection for the AC input to bypass must suit the characteristics of the load and take into account effects such as inrush or starting current.

Bypass and output overcurrent protection switches must be provided by the user.

For the wiring diagram of the UPS, refer to *Section Section 3.2 Looking inside the UPS system*.

#### 4.3.4 UPS system interface wiring preparations

Connect all control wiring for features and options to the user interface terminal block inside the UPS.



### WARNING

Do not connect the feedback contact of the contactor to the mains-related circuits. Reinforced insulation of the feedback contact is required.

After you plan and prepare the installation, carefully read and understand the following guidelines.

- The customer must provide all interface wiring.
- When you install internal interface wiring to MiniSlot terminals, route the wiring through the internal opening in the MiniSlot communication bay.
- All signal inputs require an isolated normally-open contactor or switch with a rated value of 24 VDC and 20 mA at minimum connected between the alarm input and the dry node. The customer must provide all control lines, relays, and switch contactors. Use twisted-pair cables for each alarm input and dry node.
- LAN and telephone drops for use with MiniSlot cards must be provided by facility planners or the customer.
- The Remote EPO 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 Remote EPO switch must be a dedicated switch not tied to any other circuits.
- A jumper cable must be connected between pins 3 and 4 on CN10, if the normally-closed (NC) Remote EPO contact is used.
- Remote EPO wiring must be a minimum of 0.75 mm<sup>2</sup> and a maximum of 2.5 mm<sup>2</sup>.
- The distance between the Remote EPO and the UPS must not exceed 150 meters.
- Alarm relay contacts have a maximum current rating of 5 A and a switched voltage rating of 30 VAC (RMS) and 30 VDC.
- Alarm relay wiring must be a minimum of 0.75 mm<sup>2</sup>.

## 4.4 Unpack and inspect the units

For the UPS system to operate at peak efficiency, the installation site must meet the environmental parameters outlined in these instructions.



### WARNING

The UPS cabinet is heavy. For more information on the weights, refer to *Table 5: UPS cabinet dimensions and weights*.

Do not stand in front of the pallet when you unload the cabinet.

Obey the loading and unloading instructions or the cabinet may fall and cause serious personal injury.



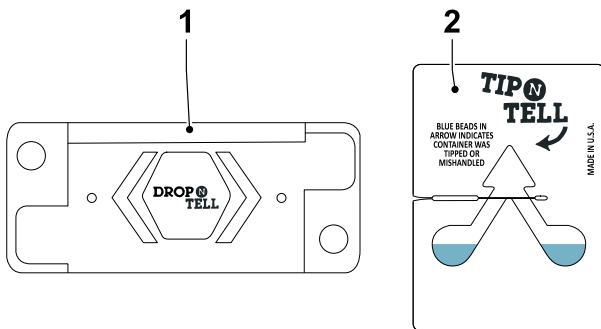
### CAUTION

Make sure that the forklift or pallet lift can support the cabinet's weight.

For transportation purposes, the UPS cabinet is bolted onto a wooden pallet.

Before you start to unpack and unload the UPS, check the TipNTell indicator on the package surface and the DropNTell indicator on the UPS after unpacking. If the equipment has been correctly transported in the upright position, the indicator should be intact. If the indicator arrow has turned all blue, contact the appropriate parties to report inappropriate transportation.

Figure 13. Indicators on the package



1. DropNTell indicator

2. TipNTell indicator

**NOTE:** Sliding the UPS cabinet from the pallet requires a minimum of two people.

To unload the cabinet from the pallet, complete the following steps.

1. Use a forklift or a pallet lift to move the cabinet to the installation site.



### WARNING

The UPS cabinet is heavy. If the unpacking instructions are not closely followed, the cabinet may tip over and cause serious injury.

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

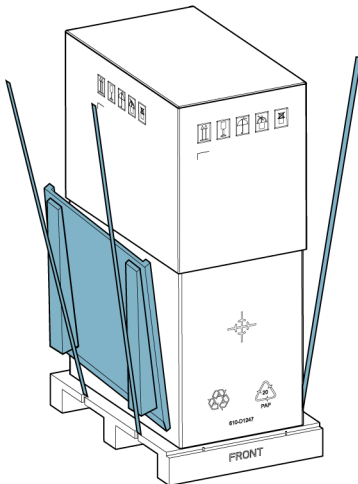


### CAUTION

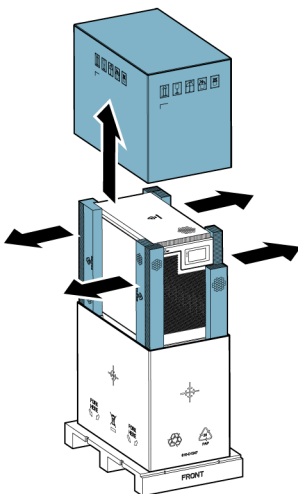
When you lift or move the cabinet, make sure that the forklift fork is inserted into the forklift slot horizontally. This prevents damage to the wiring channels and the wiring configuration in the base.

Do not tilt the fork upwards. The fork must pass through the entire pallet base.

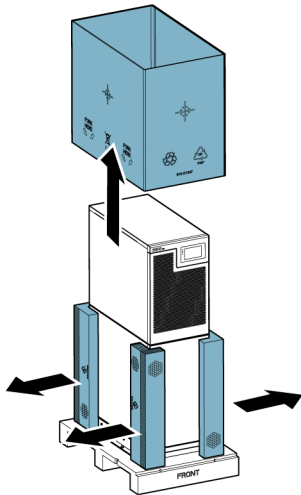
2. Before you open the UPS package, remove the ramp that is delivered with the cabinet. The ramp is used for moving the cabinet off of the pallet.



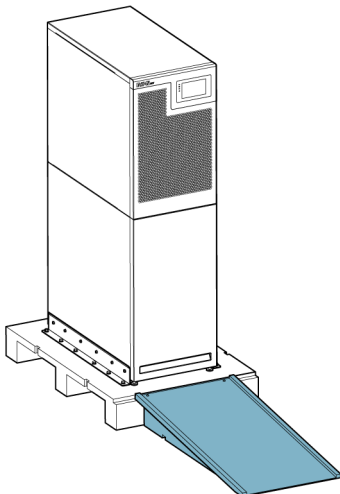
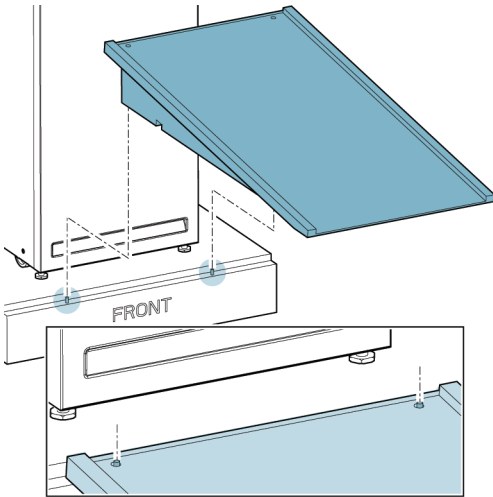
3. Remove the upper carton, cushioning materials, and damp-proof bag.



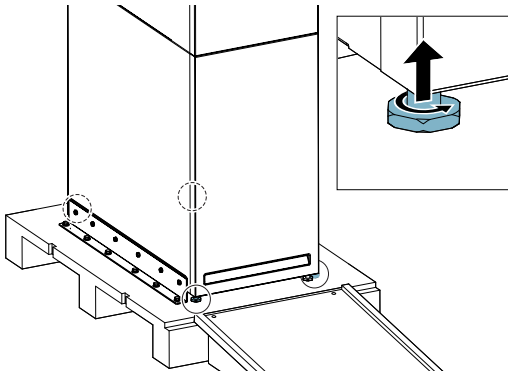
4. Remove the lower carton, cushioning materials, and damp-proof bag.



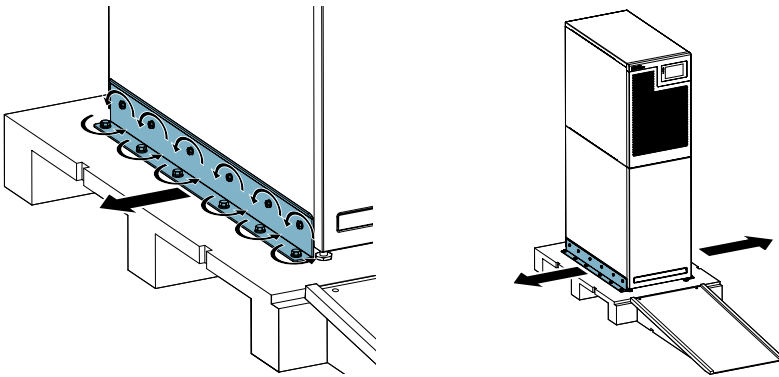
5. Attach the ramp to the pallet. Align the ramp with the two pegs located on the front side of the pallet. Make sure that the ramp is locked in position.



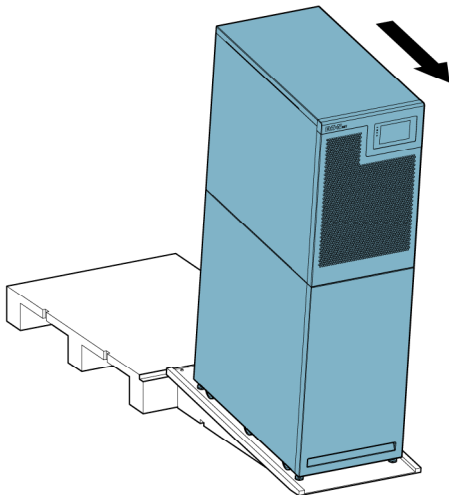
6. Turn the four leveling feet counterclockwise. Turn the leveling feet completely up to lift them off of the pallet.



7. Remove the bolts on both sides that attach the shipping brackets to the cabinet and to the pallet.  
*NOTE: Before you remove the shipping brackets and move the cabinet away from the pallet, it is recommended that there is one person behind the cabinet and another person in front of the cabinet holding the cabinet in position. This is to prevent accidental movement of the cabinet on the pallet.*



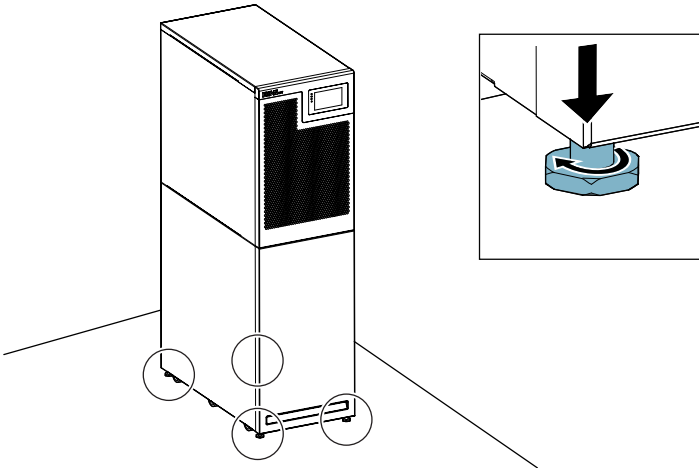
8. Slowly slide the cabinet onto the ground along the ramp.



9. Move the cabinet to the installation site by using the casters on the bottom.



10. When the cabinet is in its final installation location, turn the leveling feet clockwise until the cabinet is levelled.



11. For instructions on installing the UPS system, see *Section 5.2 Install the cables*.

*NOTE: During the installation waiting period, protect the unpacked cabinet from humidity, dust, and other contaminants. Failure to properly store or protect the UPS will cause the warranty terms specified in 10.1 General information about warranty become void.*

# 5 UPS system installation

## 5.1 About UPS system installation

This chapter gives instructions for the mechanical installation and the cable installation of the UPS. The customer must provide the wiring to connect the UPS to the local power source.

The installation inspection and initial startup of the UPS must be carried out by an authorized Eaton Customer Service Engineer or by other qualified service personnel authorized by Eaton. The installation of the battery cabinets can be performed by qualified service personnel of the equipment manufacturer or representative.



### WARNING

To avoid injury to persons, or damage to the UPS or to the load equipment, obey these instructions during the UPS system installation.

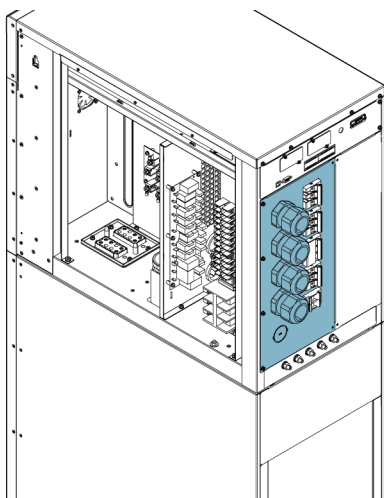
Before you install the UPS system, read and understand the following guidelines.

- Read *Chapter 4.1 About UPS installation* for information on the cabinet dimensions, equipment weight, wiring, terminal data, and other topics related to the UPS system installation.
- Make sure that the tilting angle is not greater than  $\pm 10^\circ$  when installing the cabinet.
- If perforated floor tiles are required for proper air circulation, put them in front of the UPS.

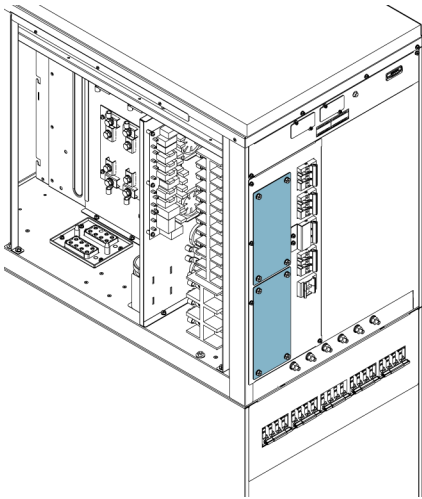
## 5.2 Install the cables

The power and signal cables are installed through the gland plate at the rear of the cabinet. Refer to *Figure 20: Connector locations (15–30 kVA)*, *Figure 21: Connector locations (40 kVA)*, and *Figure 22: Connector locations (60–80 kVA)*.

**Figure 14. Gland plate, 15–40 kVA UPS**



**Figure 15. Gland plates, 60–80 kVA UPS**

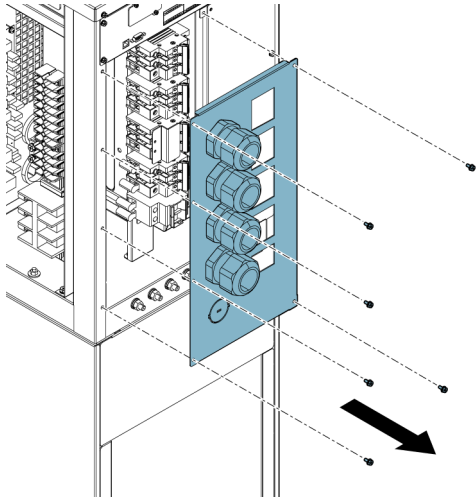


1. Remove the side panel of the cabinet to get access to the connectors.

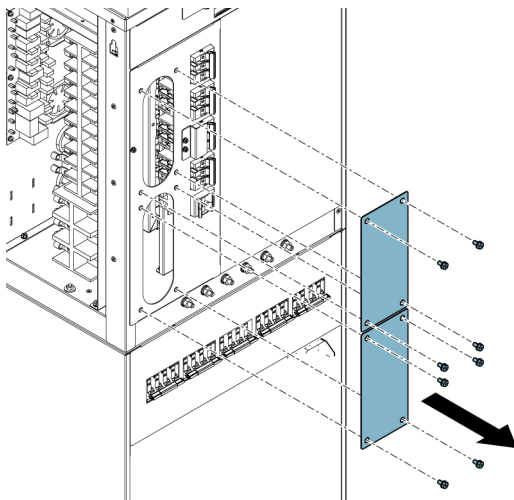
2. Complete one of the following steps:

- For the 15–40 kVA UPS, remove the screws from the gland plate. Then, remove the gland plate.
- For the 60–80 kVA UPS, remove the screws from the gland plates. Then, remove the gland plates.

**Figure 16. Removing the gland plate from the 15–40 kVA UPS**



**Figure 17. Removing the gland plates from the 60–80 kVA UPS**



3. For the 60–80 kVA UPS, complete the following steps.

- a. Drill holes for the cable glands on the gland plates.
- b. Install suitable cable glands on the gland plates.

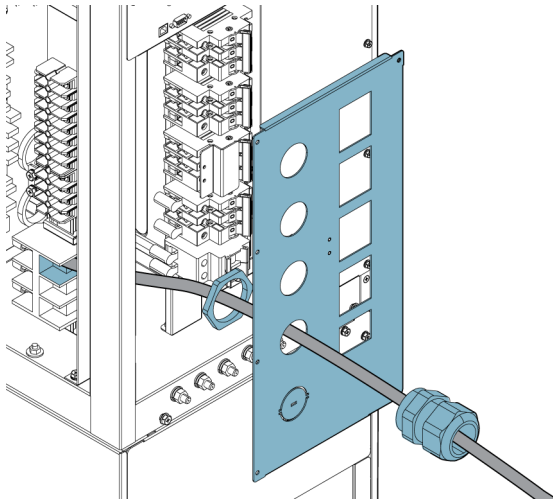


### CAUTION

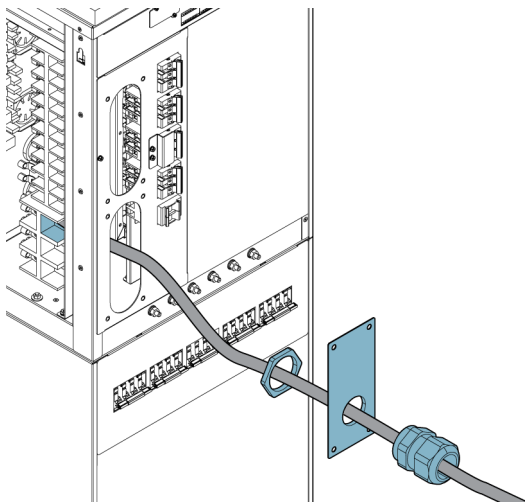
Before you drill the holes, make sure that you removed the gland plates from the cabinet. This is to prevent metal shavings or chips from entering into electronics and causing damage to the UPS.

4. Connect the grounding cable to the grounding screw.
  - For the 15–30 kVA UPS, refer to *Figure 20: Connector locations (15–30 kVA)*.
  - For the 40 kVA UPS, refer to *Figure 21: Connector locations (40 kVA)*.
  - For the 60–80 kVA UPS, refer to *Figure 22: Connector locations (60–80 kVA)*.
5. Route all cables through the cable glands to connect them to their related connectors. For the torque values, refer to *Table 8: UPS (15–40 kVA) power cable terminations and torques* and *Table 9: UPS (60–80 kVA) power cable terminations and torques*.

**Figure 18. Cable routing in the 15–40 kVA UPS**



**Figure 19. Cable routing in the 60–80 kVA UPS**



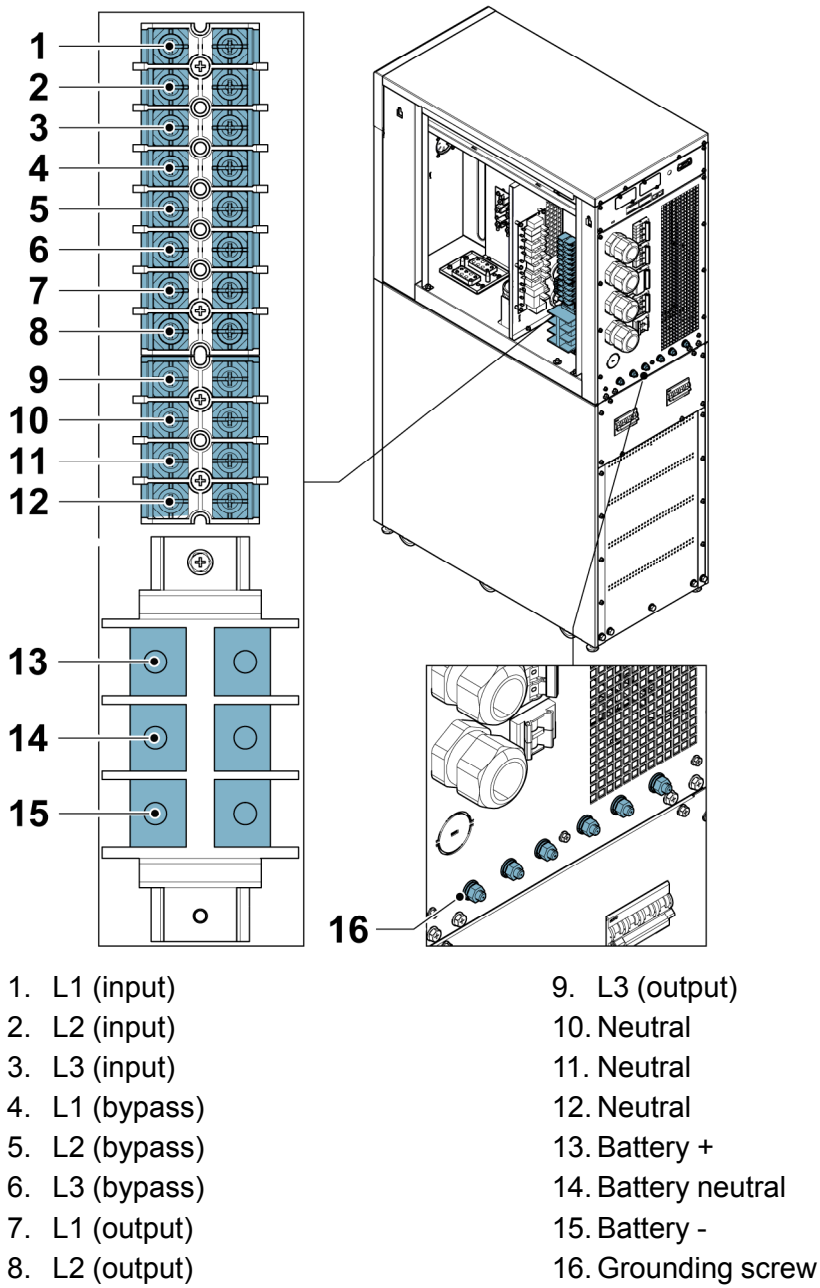
6. After you installed all cables, reinstall the gland plates.
7. To install a parallel system, repeat the above steps to all UPSs in the system.
8. To install the external battery cabinet, refer to *Section 5.3.2 Install the external battery cabinet*.



### WARNING

Route the wires through the sides of the cabinet to prevent them from blocking the hot ventilation area in the rear of the cabinet.

**Figure 20. Connector locations (15–30 kVA)**



**Figure 21. Connector locations (40 kVA)**

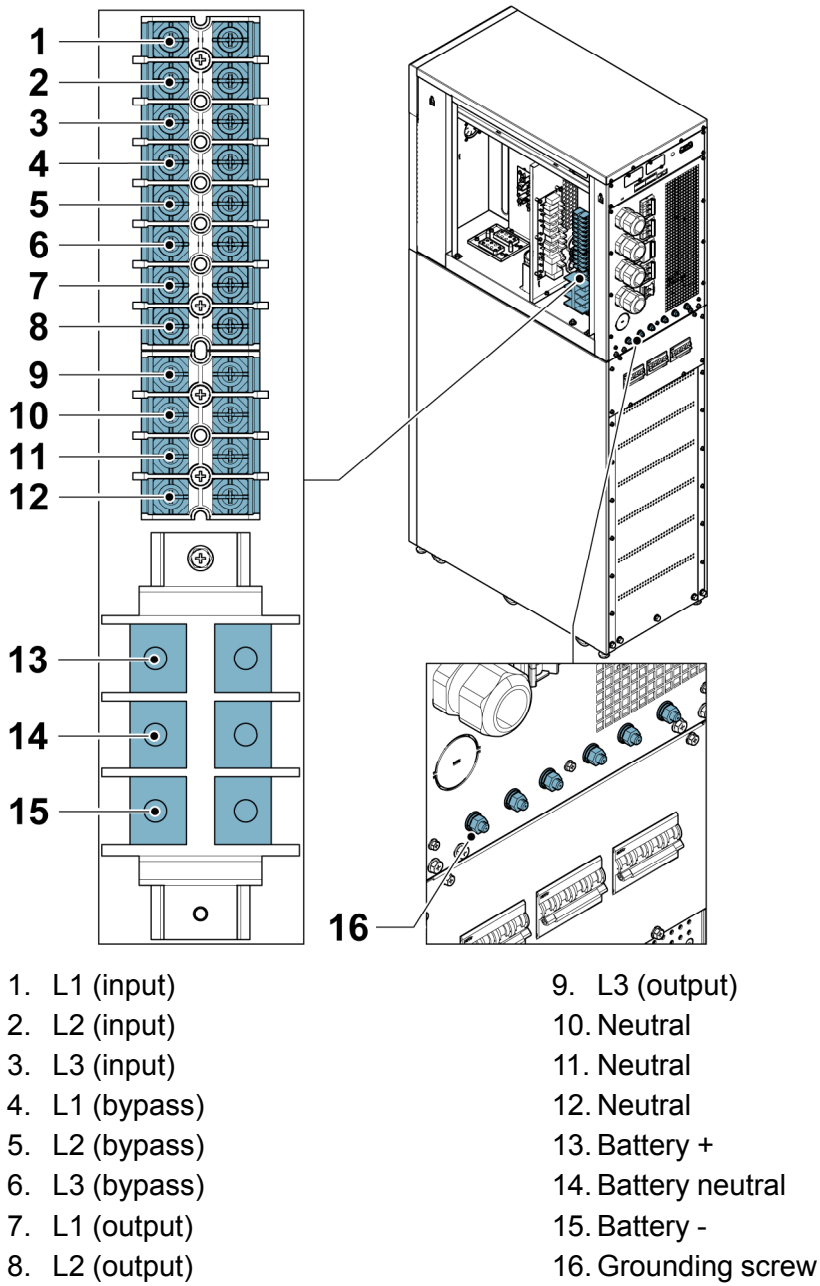
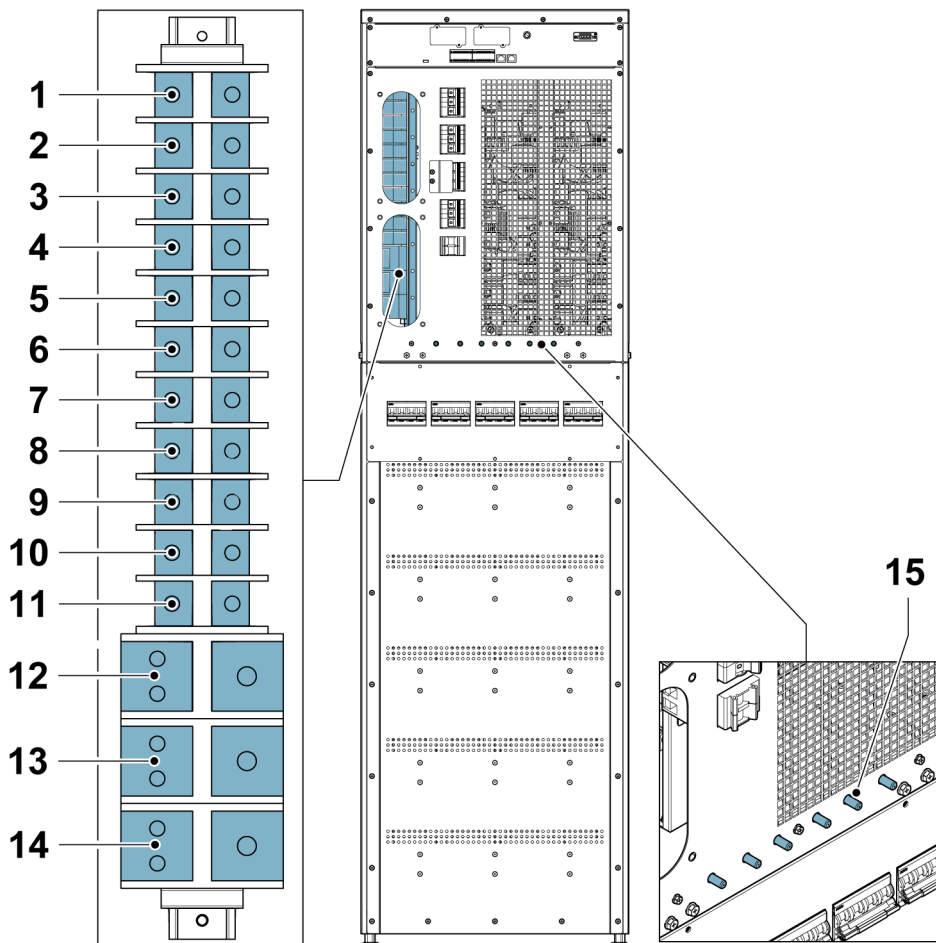


Figure 22. Connector locations (60–80 kVA)



- |                |                     |
|----------------|---------------------|
| 1. L1 (input)  | 9. L3 (output)      |
| 2. L2 (input)  | 10. Neutral         |
| 3. L3 (input)  | 11. Neutral         |
| 4. L1 (bypass) | 12. Battery +       |
| 5. L2 (bypass) | 13. Battery neutral |
| 6. L3 (bypass) | 14. Battery -       |
| 7. L1 (output) | 15. Grounding screw |
| 8. L2 (output) |                     |

### 5.3 Installing the battery system



#### DANGER

This UPS may have external batteries. The batteries are designed to deliver a large amount of energy and an incorrect connection may lead to a short circuit and cause serious injuries to the personnel or damages to the equipment. In order to avoid damages to the equipment or injuries to personnel, only commissioning personnel are allowed to perform the connection of these batteries.



If you are installing a customer-supplied battery system, install the battery system according to the battery and battery system manufacturer's instructions and all the applicable national codes and regulations. Only qualified personnel may install the battery system. Battery cables must be protected against current and thermal overload, that is, the battery system must include proper fuses or breaker with protection function. Ground the frame of the external battery cabinet to the UPS.

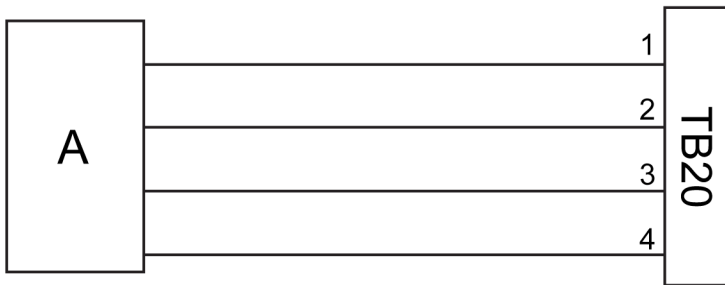
The default battery settings of the UPS are for 12 V VRLA batteries. If you need to use any other type of batteries, contact your Eaton representative.

### 5.3.1 Battery trip wiring

The external battery breakers can be tripped (switched off) by energizing its shunt trip coil. The shunt trip coils are energized (controlled) through connector TB20. The status signal of the external battery breaker is also connected to connector TB20. Status contacts of the Eaton battery breakers are open if the breaker itself is open.

**NOTE:** The default voltage of the battery breaker shunt trip coil is 24 VDC.

**Figure 23. Battery trip wiring for the 93T UPS**



- |                             |                              |
|-----------------------------|------------------------------|
| 1. Pin 1, shunt trip coil + | 3. Pin 3, AUX contact        |
| 2. Pin 2, shunt trip coil - | 4. Pin 4, AUX contact return |

A = External battery breaker

### 5.3.2 Install the external battery cabinet

Before connecting the external battery, read the caution and warning labels attached to the battery cabinet.



#### WARNING

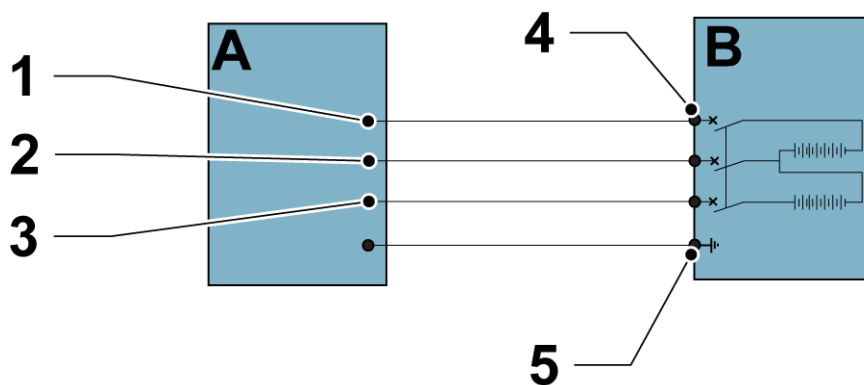
The underpan or the frame of the battery cabinet might be energized. Make sure that the underpan and the frame of the external battery cabinet is grounded to the UPS.

Before you install the external battery cabinet, read and understand the following guidelines.

- Before installing the battery, make sure that the number of batteries matches the charging voltage settings.

- Valve-regulated batteries are usually used in UPS equipment. Make sure that the valve-regulated batteries are sealed.
- The quantity of gas released from valve-regulated batteries must be less than the quantity of gas released from flooded batteries. Reserve sufficient space for ventilation and radiation in the battery installation plan.
- Valve-regulated batteries are not fully maintenance-free. Make sure that they are clean and examine them regularly to make sure that they are tightly connected and free of corrosion.
- Because battery capacity decreases during transportation and storage, make sure that the batteries are fully charged before a battery self-test, which may continue for several hours. Through multiple charge-discharge cycles, the battery performance improves.
- By default, the UPS is configured to use 12 VDC VRLA batteries. If you need to connect other types of batteries, contact your local Eaton representative before you proceed with the installation.

**Figure 24. Connection between the UPS and external battery**



- |    |                          |   |                  |
|----|--------------------------|---|------------------|
| 1. | Battery +                | A | UPS              |
| 2. | Neutral                  | B | External battery |
| 3. | Battery -                |   |                  |
| 4. | Battery breaker          |   |                  |
| 5. | Protective earthing (PE) |   |                  |

To install the external battery cabinet:

1. Shut down the UPS.
2. Make sure that all the circuit breakers of the external batteries are set to the OFF position.
3. Connect the protective earthing wire.
4. Connect the positive, negative, and neutral poles of the external battery cabinet according to the cross-sectional area of the cable and the cable size suitable for the protection device.
5. Refer to the manufacturer's instructions regarding the external battery cabinet.



## WARNING

Make sure that the positive, negative, and neutral poles of the external battery cabinet are connected correctly.

### 5.3.2.1 Supported battery configurations

In case of a parallel use of the 93T UPS, both common battery and separate battery are supported for the cabinets.

If you configure a separate battery, each UPS is connected to a separate battery cabinet. The battery settings vary between different cabinets.

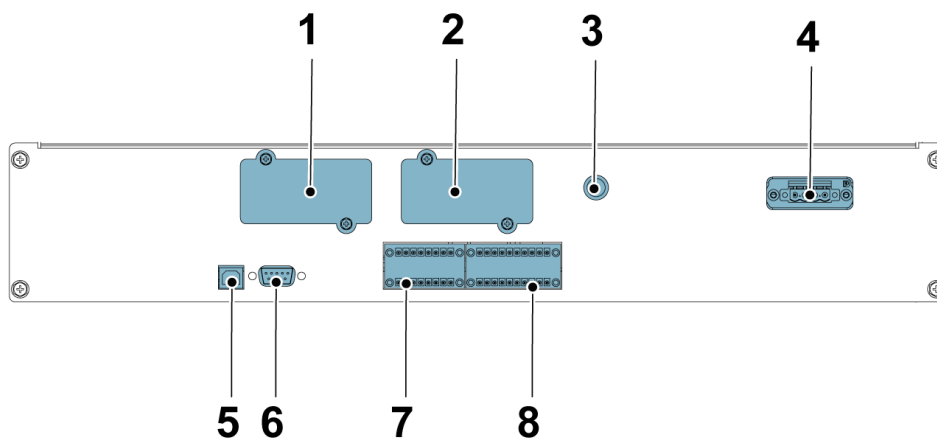
The common battery configuration supports only the parallel connection of the cabinets. In the common battery configuration each cabinet is connected to the same battery cabinet.

Multiple DC sources supported include lead-acid batteries, lithium batteries, and nickel-cadmium batteries. As for the use of lithium batteries, the battery backup time and other battery parameters are subject to the battery management system.

## 5.4 Communication interfaces

This section introduces the communication features of the 93T UPS.

Figure 25. Communication interfaces

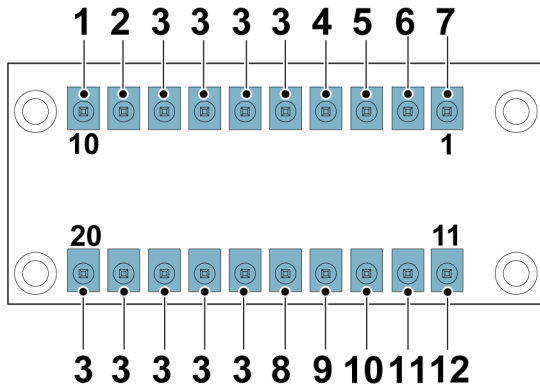


- |                                     |  |
|-------------------------------------|--|
| 1. MiniSlot 1                       | 6. RS232   |
| 2. MiniSlot 2                       | 7. Dry contact input (CN12)                          |
| 3. Battery startup/switch to bypass | 8. Emergency power-off (EPO) and CAN terminal (CN10) |
| 4. External battery trip            |  |
| 5. USB                              |  |

### 5.4.1 CN10

Terminal CN10 can be used to connect the parallel CAN communication signal and the remote emergency power-off (REPO) signal.

Figure 26. CN10 terminal layout



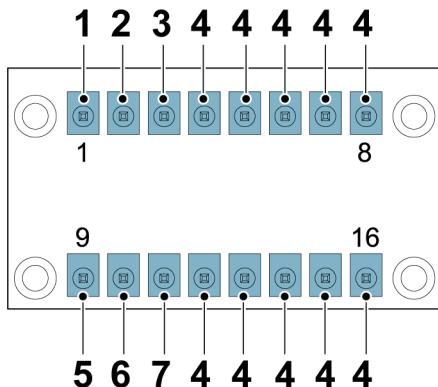
- |                        |  |
|------------------------|--|
| 1. Parallel signal +/- | 8. CAN_GND                                     |
| 2. Parallel signal +/- | 9. CAN-H parallel communication                |
| 3. NULL                | 10. CAN-L parallel communication               |
| 4. NO_EPO_POWER        | 11. Pull-chain -, parallel back control signal |
| 5. EPO_IN              | 12. Pull-chain +, parallel back control signal |
| 6. EPO_GND             |  |
| 7. NC_EPO_POWER        |  |

### 5.4.2 CN12

Terminal CN12 can be used to connect external alarm signals, such as smoke alarm signals and overheat alarm signals.

Use twisted-pair cables to connect the alarm device to its related UPS terminal. For external alarm signal configurations, consult your local Eaton representative.

Figure 27. CN12 terminal layout



1. CI\_ALM1
2. CI\_ALM2
3. CI\_ALM2

- 4. NULL
- 5. CI\_ALM1 RTN
- 6. CI\_ALM2 RTN
- 7. CI\_ALM3 RTN

### 5.4.3 Install a remote EPO switch

You can use a remote EPO switch in case of an emergency to shut down the UPS and remove power to the critical load from a location away from where the UPS is installed.

The remote EPO switch must be a normally-open or normally-closed latching switch that is not tied to any other circuits.

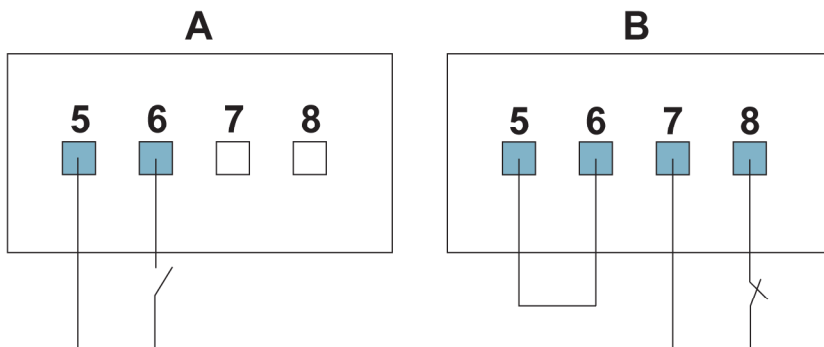
For the connections, use twisted-pair cables of 0.5–2.0 mm<sup>2</sup>. The tightening torque is 0.8 Nm.

Refer to national and local electrical codes for acceptable wiring practices.

To install a remote EPO switch:

1. Make sure that the UPS system is shut down and all power sources are disconnected.
2. For the wiring configurations, refer to *Figure 28: Connections of the EPO switch*. Complete one of the following wiring procedures:
  - For a normally-open remote EPO, complete configuration A.
  - For a normally-closed remote EPO, complete configuration B.
3. If you install a normally-closed remote EPO switch, connect a jumper cable between pins 3 and 4 on terminal CN10. For the location of terminal CN10, refer to *Figure 25: Communication interfaces*.
4. If you install multiple remote EPO switches, wire them in parallel.

**Figure 28. Connections of the EPO switch**



- A Normally open. When pins 5 and 6 are closed, the UPS performs an emergency power-off. Pins 7 and 8 are idle.
- B Normally closed. Pins 5 and 6 are connected with a jumper cable. Keep the pins connected. When pins 7 and 8 are open, the UPS performs an emergency power-off.

### 5.4.4 Battery startup/switch to bypass

The battery startup/switch to bypass button is used to start the UPS on battery power and transfer the UPS to Bypass mode.

For the instructions on how to start the UPS on battery power, refer to *Section 6.3.3 Battery start*.

### 5.4.5 MiniSlot cards

The Eaton 93T UPS has two MiniSlot communication bays. The UPS is compatible with the following MiniSlot cards:

#### Gigabit Network Card

Figure 29. Gigabit Network Card



The second-generation Gigabit Network Card is the new generation network communication card for connecting the UPS with Ethernet and Internet. The new generation network communication card has many novel features. The remarkably increased network communication speed and the confidentiality protocol can provide emergency power-off, data saving, and other services to authorized IT personnel.

#### Environmental Monitoring Probe generation 2 (EMPG2)

Figure 30. Second-generation Environmental Monitoring Probe



The second-generation ambient temperature probe used together with the Gigabit Network Card and Industrial Gateway Card supports series connection of four in a maximum length of 50 meters. Meanwhile, it also detects the ambient temperature and humidity. It can be easily mounted by magnets and provides two additional digital inputs. Warning limits for temperature and humidity can be configured in the network card and monitored in a real-time manner with Eaton's IPM and IPP software. Temperature compensation for lead-acid battery can be achieved as well.

## Industrial Gateway Card

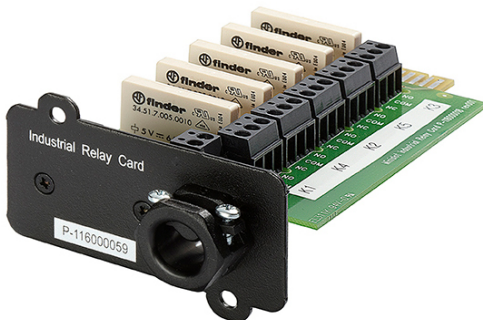
Figure 31. Industrial Gateway Card



The Industrial Gateway Card is integrated with many functions of the SNMP card, for example, the functions of the SNMP agent, the HTTP/Web server, and the Modbus card. Combined with Building Management System (BMS), it can provide continuous, reliable, and accurate remote monitoring service to the UPS system. The user can define remote power-off, uninstallation and other tasks, and receive the system alerts from the UPS in real-time and remotely.

## Industrial Relay Card (INDRELAY-MS)

Figure 32. Industrial Relay Card



The Industrial Relay Card provides a way of connecting the UPS to industrial and electrical monitoring systems. It also enables a wide range of control applications by allowing up to 250 V and 5 A through its 5 relay connections. By connecting wires to the corresponding places in its terminal blocks, you can choose Normally Open or Normally Closed setup for each output.

### 5.4.6 Intelligent Power Manager (IPM) software

Intelligent Power Manager (IPM) is a specialized software for UPS power management. It is a monitoring system that can concentrate the data and alarms of multiple UPS systems, including UPS systems of other brands, intelligent power distribution systems (ePDUs), and other power and environment devices into a single view. The software is web-based, which means that the information can be accessed through any device that has a web browser. Intelligent Power Manager supports virtual environments.

Download Intelligent Power Manager from Eaton's website at [www.eaton.com](http://www.eaton.com).

### 5.4.7 Signal input monitoring

This feature allows you to connect signal inputs, such as smoke detectors or over-temperature alarms, to the UPS. The user interface terminals for external connections are inside the UPS. Use twisted-pair cables for the connections.

The signal input can be programmed to display the alarm functional name.



#### CAUTION

Do not operate the contact at any voltage above 30 VAC (RMS) or 30 VDC, or at any current above 5 A.

## 5.5 Parallel UPS installation

The outputs of multiple 93T UPS systems can be connected in parallel. The outputs are paralleled to increase the load capacity of the power system and for redundancy. If one UPS fails or is out of service due to maintenance, the other parallel-redundant UPS units will continue to provide uninterruptible power to the critical load.

In a parallel system, the rated power of each UPS must be identical, and the rated power of each equipment's static bypass must also be identical. If the specified quantity is exceeded, contact your local Eaton representative for a power distribution design.

Communication between the UPSs is required for system monitoring and module control. The system level communication and control are accomplished using a Controller Area Network (CAN). A pull-chain signal in each UPS ensures bypass control even if the CAN communication is lost.



#### WARNING

Do not use the internal Manual Bypass Switch (MBS) of a separate UPS in a parallel system.

### 5.5.1 Power wiring overview

For the recommended cable and external fuse sizes and installation practices, refer to *Section 4.3.4 UPS system interface wiring preparations*.

#### Rectifier input

The rectifier input is defined as the power source connected to the UPS rectifier. The feed to all UPS's inputs must be derived from the same source.

#### Bypass input

The bypass input is defined as the power source connected to the UPS bypass. The feed to all UPS's bypass must be derived from the same source. The length of the shortest wire from the source to the UPS must be a minimum of 95 % of the length of the longest wire.



## Output

The neutrals of all the UPSs must be connected. The length of the shortest wire from the source to the UPS must be a minimum of 95 % of the length of the longest wire. The measurement is with respect to where the UPS's outputs are tied.

## Dual source

The rectifier input and the bypass input are separate sources. The sources must share a common neutral.

## Battery connection

In case of a parallel use of the Eaton 93T 15–80 kVA UPS, both common battery and separate battery configurations are supported for the cabinets. Refer to *Section 5.3.2.1 Supported battery configurations* for more information on supported common battery configurations.

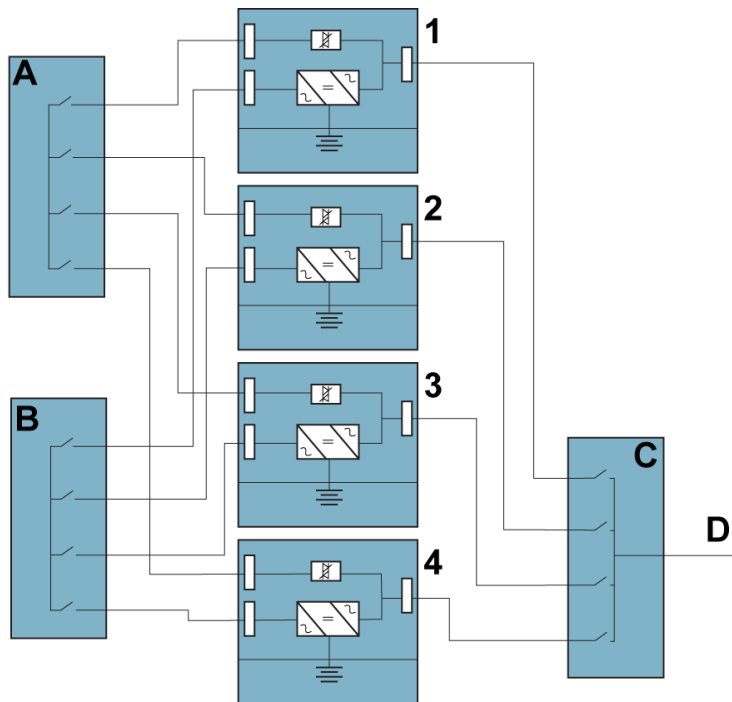
## Parallel system wiring

In a parallel system, the electric line from the input of each UPS to the common point of the AC power source must be as long as from the output of each UPS to the common point of the load. The wiring length must meet the following regulations to make sure that the input resistance and the output resistance of each UPS matches each other. The resistance error must be controlled within  $\pm 10\%$ . This is to make sure that there is current sharing between the UPSs in a parallel system. It is recommended that the combined length of the input and output cables in a parallel system is greater than 10 meters.

If only two UPS units are connected in parallel, the above requirements are not mandatory, but future upgrades might be affected if the requirements are not satisfied.

Make sure that the static bypass input of each UPS in a parallel system is connected to the same feeder, such as an external bypass circuit breaker. If the rectifier input of each UPS in a parallel system is a separate power source, consult your local Eaton representative to make sure that the power is distributed correctly.

**Figure 33. Principle of parallel UPS system wiring**



1	UPS 1	A	Bypass inputs to UPSs
2	UPS 2	B	Rectifier inputs to UPSs
3	UPS 3	C	Outputs from UPSs
4	UPS 4	D	Load

**NOTE:** For correct operation, all cables marked as A must be equal in length, and all cables marked as C must be equal in length.

### 5.5.2 Control signals overview

Two control signals, External CAN Network (ECAN) and Bypass Pull-Chain, are required for an external parallel system. Both of these control signals are employed for the purpose of fault tolerance. If one of them is disconnected, the system raises an alarm and continues normal operation.

In the 93T 15–80 kVA UPS, the ECAN, Bypass Pull-Chain, and the external parallel control signal are connected to terminal CN10. For the location of the terminal, refer to *Figure 25: Communication interfaces*.

#### External CAN (ECAN)

ECAN provides a means for communication between the UPS units in a parallel system. The system continues to share current and protect the load even when this network fails.

#### Bypass Pull-Chain

Bypass Pull-Chain is an open-circuit output signal. When any UPS in a parallel system transfers to Bypass mode, the signal goes low. When External CAN (ECAN) is down and the pull-chain goes low while the UPS is at online state, the UPS transfers and locks to Bypass mode. In this fault mode, the customer service personnel can short the signal and transfer the system to bypass.

## Signal Input Actions

Each UPS has three sets of signal inputs, which can be configured with action items. These action items may affect all the UPSs in a parallel system.

### Wiring the EPO switch in parallel

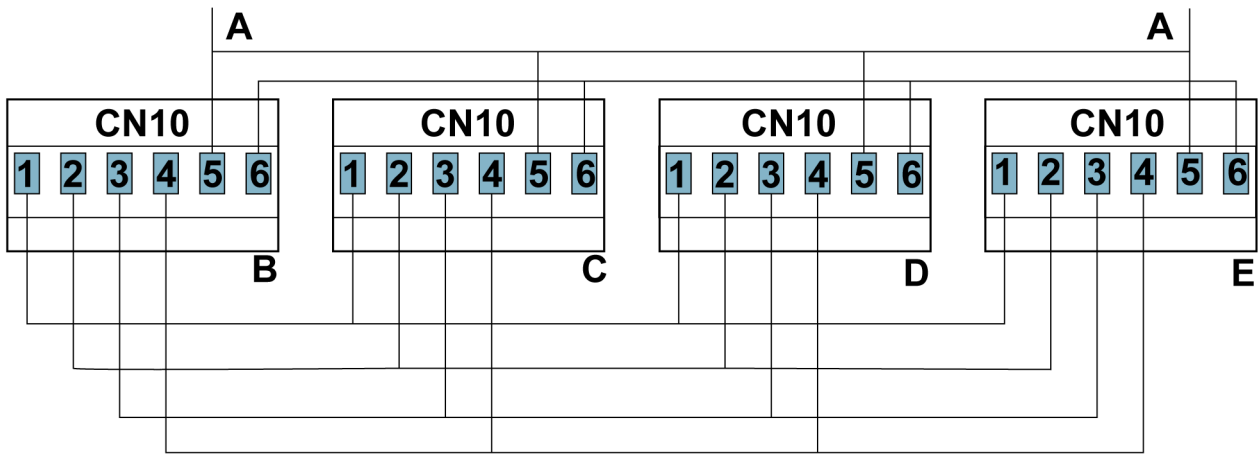
It is recommended to use separate EPO circuits for each parallel unit.

### 5.5.3 External parallel system control wiring

During the installation, obey all the safety instructions given in this document.

1. The external parallel control signal is connected to terminal CN10.  
For the location of the terminal, refer to *Figure 25: Communication interfaces*. For the wiring configuration, refer to *Figure 34: Simplified CAN and Pull-Chain wiring for parallel UPS system*.

**Figure 34. Simplified CAN and Pull-Chain wiring for parallel UPS system**



- |    |        |   |                                     |
|----|--------|---|-------------------------------------|
| 1. | Pin 9  | A | Terminating resistance 120 $\Omega$ |
| 2. | Pin 10 | B | UPS 1                               |
| 3. | Pin 11 | C | UPS 2                               |
| 4. | Pin 12 | D | UPS 3                               |
| 5. | Pin 13 | E | UPS 4                               |
| 6. | Pin 14 |   |                                     |

**NOTE:** Figure 34: Simplified CAN and Pull-Chain wiring for parallel UPS system is for wiring purposes. It is not a floor layout plan. The UPSs can be arranged in any physical order.

**NOTE:** The connection cables used for UPSs in a parallel system must be of shielded twisted-pair cables.

## 5.6 Installation checklists

### 5.6.1 Single UPS system

Action	Yes	No
All packing materials and restraints are removed from each cabinet.		
Each cabinet in the UPS system is placed in its installation location. None of the cabinets is placed below the air outlet of an air conditioner.		
A cabinet grounding kit / mounting kit is installed between any cabinets that are bolted together.		
All conduits and cables are properly routed to the UPS and to any ancillary cabinets.		
All power cables are properly sized and terminated.		
The neutral cable is installed according to the requirements.		
The ground cable is correctly installed.		
The positive, negative, and neutral battery cables are correctly installed.		
The external alarm is correctly wired (OPTIONAL).		
The external battery switch is turned off.		
An alarm label is attached to the external battery switch.		
LAN drops are installed (OPTIONAL).		
All LAN connections are completed (OPTIONAL).		
The Remote Emergency Power-off (REPO) device is correctly installed and its wiring is terminated inside the UPS cabinet.		
If REPO is used in the NC configuration, a jumper is installed on the UPS REPO terminals between pins 3 and 4.		
All terminal cover plates are correctly installed.		
Accessories are correctly installed and their wiring is terminated inside the UPS cabinet (OPTIONAL).		
The gaps between the cables and the cabinet are filled with fireproof mud.		
The surrounding area of the UPS installation site is clean and free of dust. It is recommended that the UPS is installed on a level floor suitable for computer or electronic equipment.		
Air conditioning equipment is installed and operating correctly.		
There is sufficient workspace around the UPS and other cabinets.		

Action	Yes	No
Sufficient lighting is provided around all the UPS equipment.		
A 220 VAC power supply socket is located within 7.5 meters of the UPS equipment.		
Start-up and operational checks are performed by an authorized Eaton Customer Service Engineer.		

### 5.6.2 Parallel UPS system

Action	Yes	No
Each cabinet in the UPS system is placed in its installation location. None of the cabinets is placed below the air outlet of an air conditioner.		
All conduits and cables are properly routed to the UPS.		
All power cables are properly sized and terminated.		
The neutral line is installed between the cabinets according to the requirements.		
The ground cable is correctly installed.		
The parallel wiring is correctly installed between the UPS units.		
The gaps between the cables and the cabinet are filled with fireproof mud.		
There is sufficient workspace around the UPS and other cabinets.		
Sufficient lighting is provided around all the UPS equipment.		
A 220 VAC power supply socket is located within 7.5 meters of the UPS equipment.		
The positive, negative, and neutral battery cables are correctly installed.		
The external battery switch is turned off.		
An alarm label is attached to the external battery switch.		
Start-up and operational checks are performed by an authorized Eaton Customer Service Engineer.		

# 6 UPS operating instructions

## 6.1 About UPS operation

Before UPS startup, make sure that all installation work has been completed, and that the initial startup has been performed by qualified service personnel authorized by Eaton. Before the initial startup, examine all electrical connections to make sure that the system has been successfully installed and correct operation is possible.

Read the operating instructions carefully before operating any control devices, and have a full understanding of UPS operations.

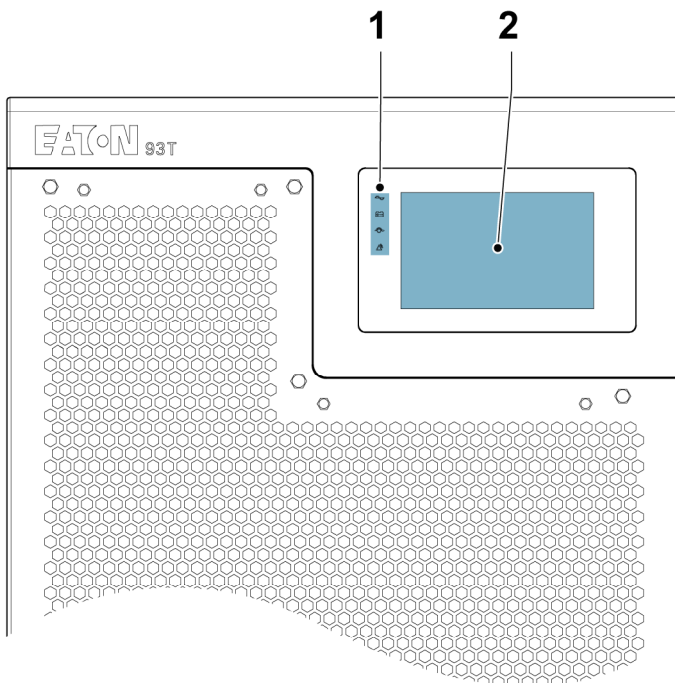
The UPS can operate at any of the following three rated voltages: 220/380, 230/400, or 240/415 VAC. Before you operate the UPS, confirm the rated voltage and frequency of the UPS from **Settings**→**System Information** on the control panel. If the UPS must operate at other voltages or frequencies, contact your local Eaton representative.

The UPS is not a measurement device. All measurements displayed are approximate values.

## 6.2 Control panel overview

The control panel is used to set up and control the UPS, and to monitor UPS operation.

**Figure 35. Control panel and UPS status indicator lights**



1. UPS status indicator lights





2. Control panel

## 6.2.1 Using the control panel

### 6.2.1.1 Status indicator lights

The four symbols on the left side of the control panel are status indicator lights, which are color LED lamps. They operate in conjunction with the alarm speaker to inform you of the operating status of the UPS.

**Table 11. Status indicator lights**

UPS status	Status indicator light	Default status	Description
Normal mode	Green 	On	The UPS operates in a normal operating mode. The UPS operates correctly and the power module supplies power to the critical load. For the normal operating modes, refer to <i>Table 2: UPS operating modes</i> .
Battery mode	Green and yellow 	On	The UPS is in Battery mode. Because Battery mode is a normal status of the UPS, the green “Normal ” indicator light is on.
Bypass mode	Yellow 	On	The UPS is in Bypass mode. The critical load is supported by the bypass source. When the system is in Bypass mode, the green “Normal” indicator light is not on.
Alarm	Red 	On	The UPS has an active alarm and requires immediate attention. The active alarm is displayed on the HMI screen. The red “Alarm” indicator light can be on at the same time with other indicator lights.

### 6.2.1.2 System alarms

When the UPS system operates in a normal operating mode, it performs monitoring on itself and the AC mains supply. The buzzer, the system status indicator lights, and the UPS status bar on the control panel home page provide information on active alarms in the UPS system.

#### Buzzer

The system event buzzer generates sounds when there is an alarm in the UPS system. The buzzer stops when the alarm is cleared. To clear an alarm, refer to *Section 6.2.1.7 Log page*.

#### System status indicator lights

The system status indicator lights on the UPS control panel show the current status of the UPS. When the UPS system operates in a normal operating mode, only the green “Normal” indicator light is on. If any other indicator lights are on, there is an active alarm or event in the UPS system. In case of an active alarm, examine first the indicator lights to identify the cause of the alarm. For more information on the status indicator lights, refer to *Section 6.2.1.1 Status indicator lights*

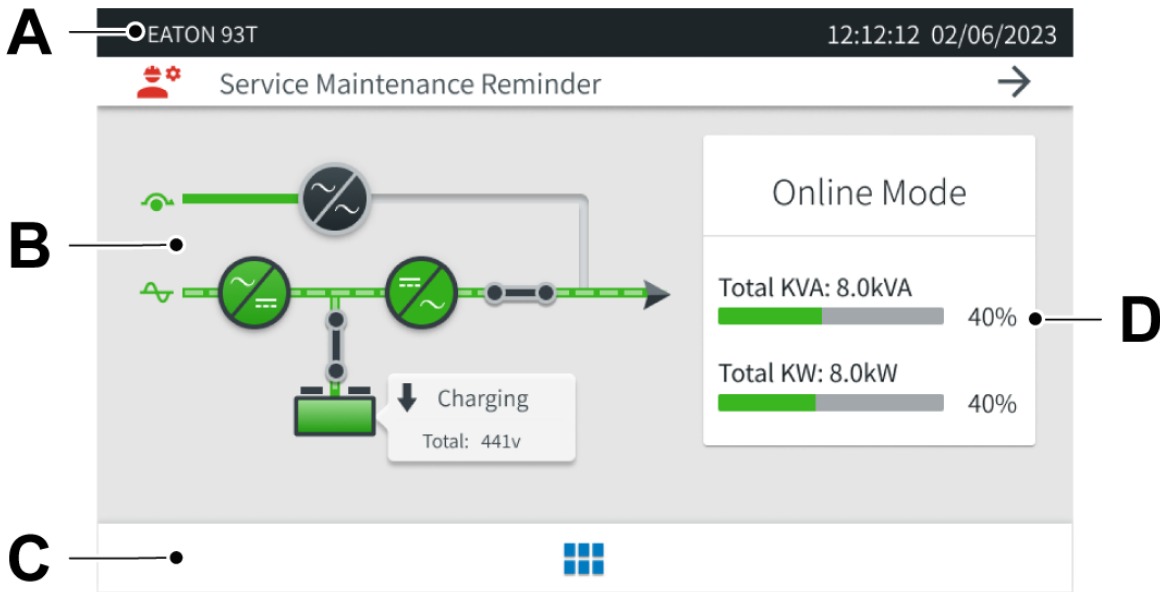
## UPS status bar

The UPS status bar displays active alarm information. For the location of the status bar, refer to *Figure 36: Home page*. Tap on the status bar to access the **Log** page and view active alarm information. For more information on the Log page, refer to *Section 6.2.1.7 Log page*.

### 6.2.1.3 Using the touch screen

The touch screen on the control panel provides an operating interface for the UPS system.

Figure 36. Home page



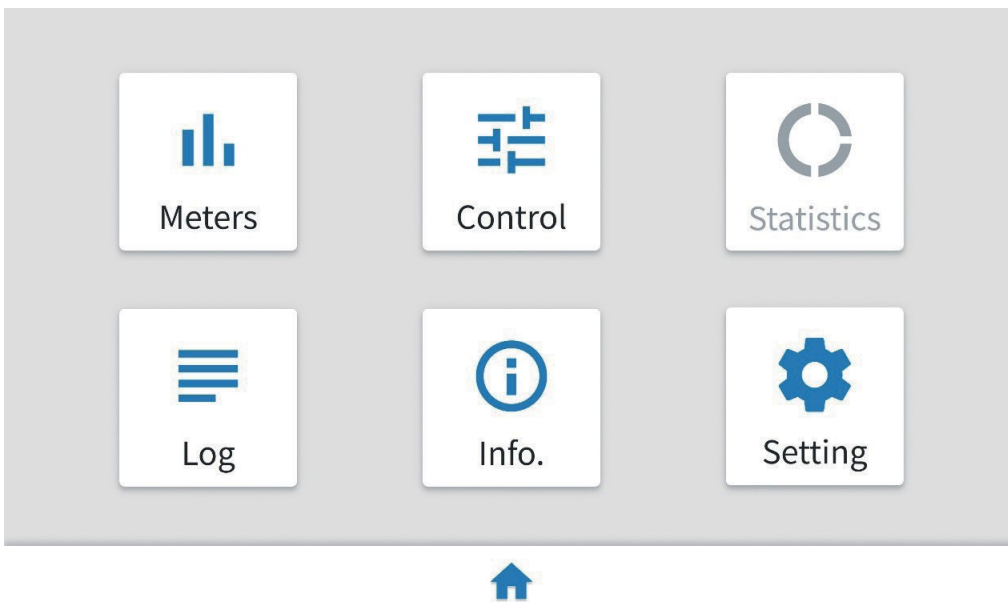
- A The UPS status bar displays the model of the Eaton equipment, current date, time, and active log information.
- B The energy flow diagram displays information about the energy flow status of the UPS operation.
- C Tap on the **Menu** icon to access information on the UPS meters, system control, logs, system, and settings.
- D The current operating mode of the UPS, total kVA and kW, and their respective percentages. Tap on this area to access detailed three-phase data.

### 6.2.1.4 User menu

To access the **Menu** page, tap on the icon at the bottom of the **Home** page. The basic structure of the **Menu** page is shown in *Table 12: Menu functions*.



**Figure 37. Menu page**



**Table 12. Menu functions**

Menu function	Description
Meters	View detailed information on the system input, output, bypass, and battery.
Control	Access various system control functions.
Statistics	Access various operating values of the system. Only service personnel authorized by Eaton can change these values.
Log	View and clear system events.
Info	View detailed information on the UPS and the HMI.
Setting	Access various screen control functions for system operation.

### 6.2.1.5 Meters

To access the **Meters** page, tap on **Meters** on the **Menu** page.

**Table 13. Meters functions**

Meters function	Description
Input	View the input voltage (per phase), input current (per phase), input power (per phase), total frequency, total kVA, total kW, and power factor measurements of the AC mains.
Output	View the output voltage (per phase), output current (per phase), output power (per phase), total frequency, total kVA, total kW, and power factor measurements of the AC mains.
Bypass	View the bypass input voltage (phase voltage), input current (per phase), input power (per phase), total frequency, total kVA, total kW, and power factor measurements of the bypass.
Battery	View the battery voltage, cell voltage, battery current, and more.



**Figure 40. Bypass page**

←] Input				[-> Output	↻ Bypass	🔋 Battery
	Voltage	Current	Power/kVA	Total		
A	229	0	0.0	Load KVA:	0.0	
B	230	0	0.0	Load KW:	0.0	
C	231	0	0.0	Frequency/HZ:	50.0	
				Power Factor:	***	

← Meters

**Figure 41. Battery page**

←] Input				[-> Output	↻ Bypass	🔋 Battery
	Voltage	Cell Voltage	Batt.Current	Batt. Remaining		
Battery+:	220	2.30	6.8	Total Voltage/V:	440	
Battery-:	-220	2.30	6.7	BTR/Min:	10	

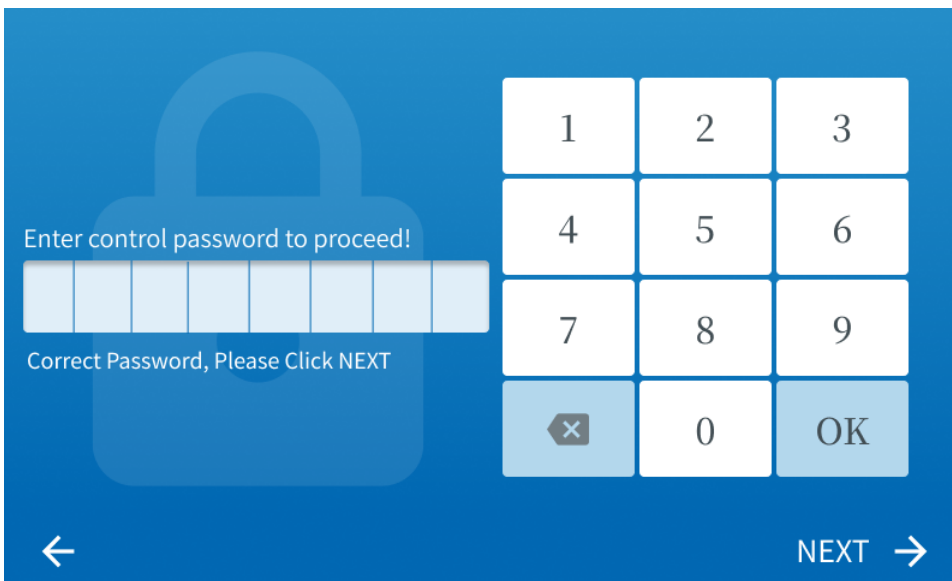
← Meters

### 6.2.1.6 System control

To access the **Control** page:

1. Select **Control** on the **Menu** page.
2. Enter the initial control password 11111111 and select **OK**.
3. When the password is verified, select **Next**.

**Figure 42. Password verification**



**Table 14. Control page functions**

Control function	Description
System	Transfer to Bypass mode, start up the system, shut down the system, enable ESS, or disable ESS. At the top of the page you can view the UPS status and the battery status.
UPS	Perform a battery test, turn on the battery charger, turn off the battery charger, turn on a single UPS, or turn off a single UPS. At the top of the page you can view the UPS status and the battery status.
UPM	View the power block status, the UPS status, and the battery status, or shut down the power block.

### System

On the **System** page you can transfer to Bypass mode, start up the system, shut down the system, enable ESS, or disable ESS. A gray icon indicates that the function is unavailable. At the top of the page you can view the UPS status and the battery status.

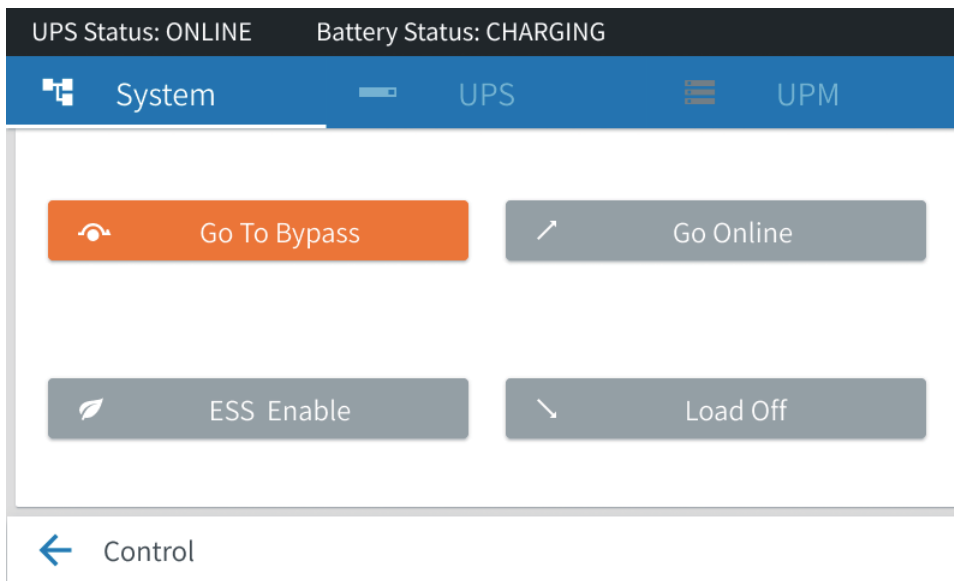
To transfer the system to Bypass mode:

**NOTE:** When the **Go To Bypass** icon is not gray, you can transfer to Bypass mode.

1. Select **Go To Bypass** to access the bypass page.
2. Select **Go to Bypass**.
3. Select **OK** to transfer to Bypass mode.

These instructions apply to the other functions, as well.

**Figure 43. System page**

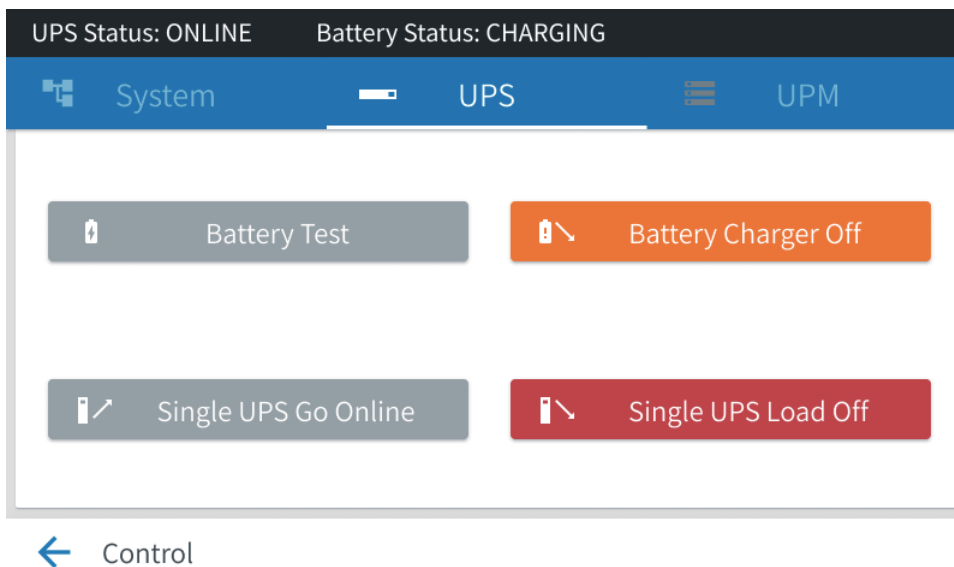


### UPS

On the **UPS** page you can test the battery, turn on a single UPS, shut down a single UPS, turn on the battery charger, or turn off the battery charger. A gray icon indicates that the function is unavailable. At the top of the page you can view the UPS status and the battery status.

If there is only one UPS in the system, the shutdown icon is disabled and the single-UPS shutdown icon is enabled. For the instructions on how to activate a function, refer to the above instructions on transferring to Bypass mode.

**Figure 44. UPS page**

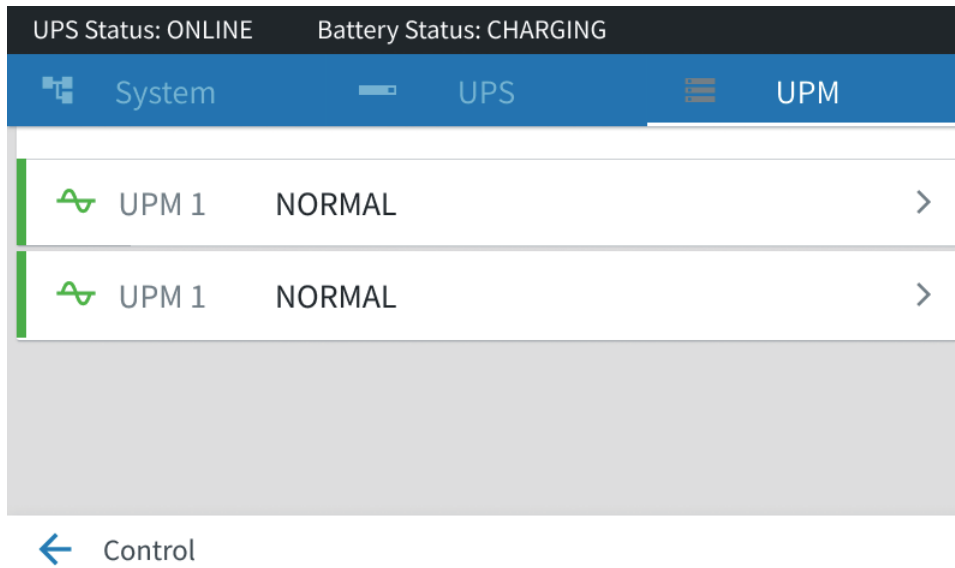


### UPM

On the **UPM** page you can view the UPS status, the battery status, and the power block status. Tap on the > icon to enter the power block shutdown interface. A gray icon indicates that the function is unavailable.

To shut down the power block, select **Turn Off**.

**Figure 45. UPM page**



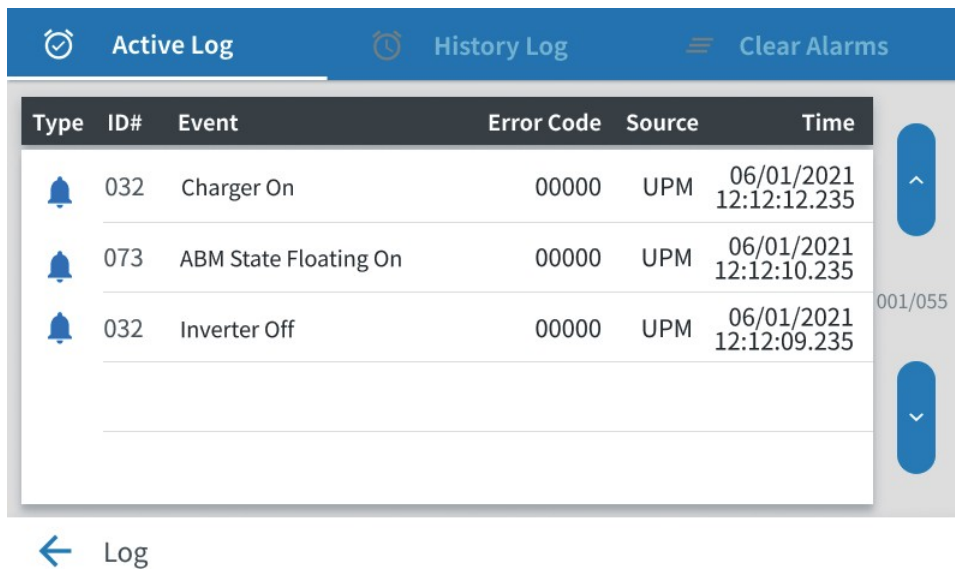
### 6.2.1.7 Log page

To access the **Log** page, select **Log** on the **Menu** page.

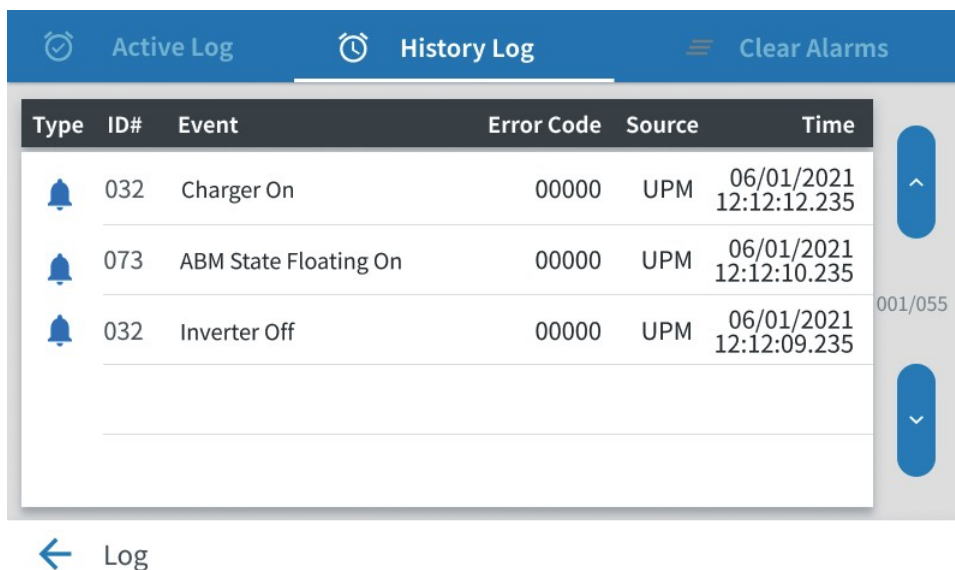
**Table 15. Log page functions**

Log page function	Description
Active Log	View all active system events.
History Log	View all system events. You can view a maximum of 1,024 items on 205 pages.
Clear Alarms	Clear all active system events displayed on the <b>Active Log</b> page.

**Figure 46. Active Log page**



**Figure 47. History Log page**



To clear all active system events, select **Clear all active alarms** on the **Clear Alarms** page.

### 6.2.1.8 Info page

On the **Info** page you can view the UPS name, UPS serial number, power block (UPM) version, and HMI version, among other things.

To access the **Info** page, select **Info** on the **Menu** page.

Figure 48. Info page 1

Name:	EATON 93T
P/N:	9CW02CC50202014
S/N:	4M281LAA13
Output:	230VAC, 50.0Hz, 20.0kVA, 1.00 PF
UPM1 APP:	9.02.0000
UPM1 Bootloader:	1.12.0000
UPM1 PLD:	0.08.0000

1/2

← Info.

Figure 49. Info page 2

CSB APP:	9.02.0003
CSB Bootloader:	1.10.0000
HMI APP:	9.02.0003
HMI Bootloader:	1.04.0016

2/2

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← Info.

### 6.2.1.9 Setting page

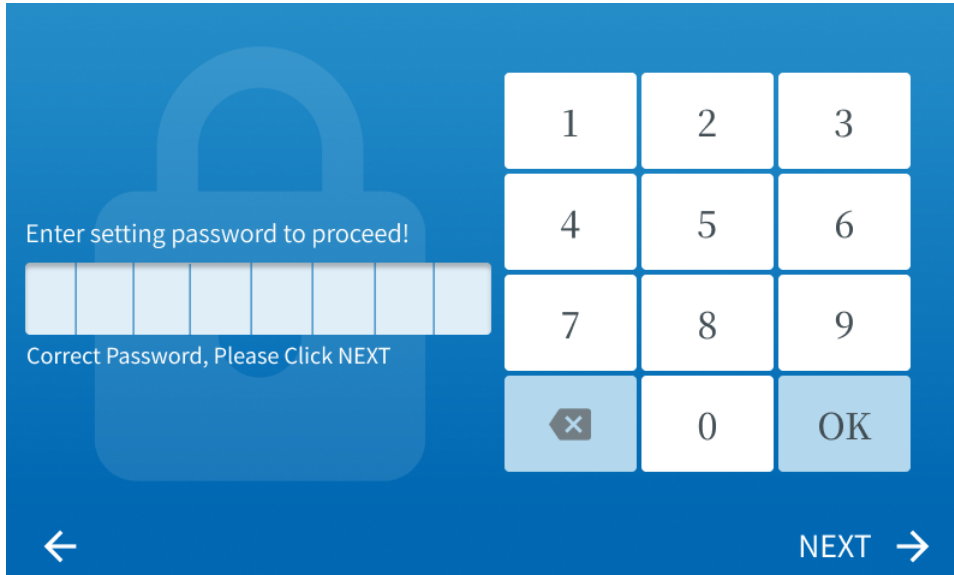
On the **Setting** page you can change the display language, time, display brightness, output voltage, and output frequency. You can also change the Control and Setting page passwords. For more information, refer to *Table 16: Setting page functions*.



To access the **Setting** page:

1. Select **Setting** on the **Menu** page.
2. Enter the initial password 01010101 and select **OK**.
3. When the password is verified, select **Next**.

**Figure 50. Password verification**



**Table 16. Setting page functions**

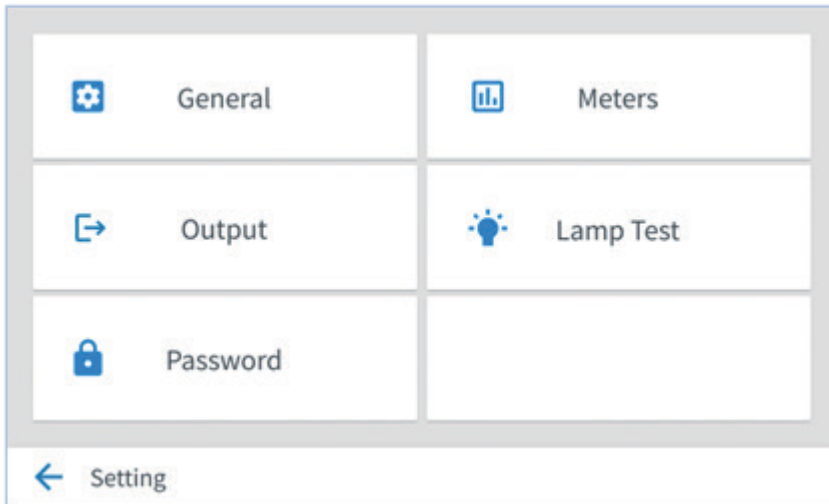
Setting page function	Description
General	Change the display language, date, time, display brightness, and service reminders. Enable or disable the buzzer.
Meters	Change the system meters.
Output	Change the UPS output voltage and frequency.
Lamp Test	Do a test to make sure that the four indicator lights on the control panel are operating correctly.
Password	Change the Control and Setting page passwords.

**Table 17. Control and Setting page passwords**

Password	Description
Control page password	The initial password 11111111 can be used to access the <b>Control</b> page.
Setting page password	The initial password 01010101 can be used to access the <b>Setting</b> page.

*NOTE:* Also users can access the Setting and Control pages with the initial passwords shown in *Table 17: Control and Setting page passwords*.

**Figure 51. Setting page**

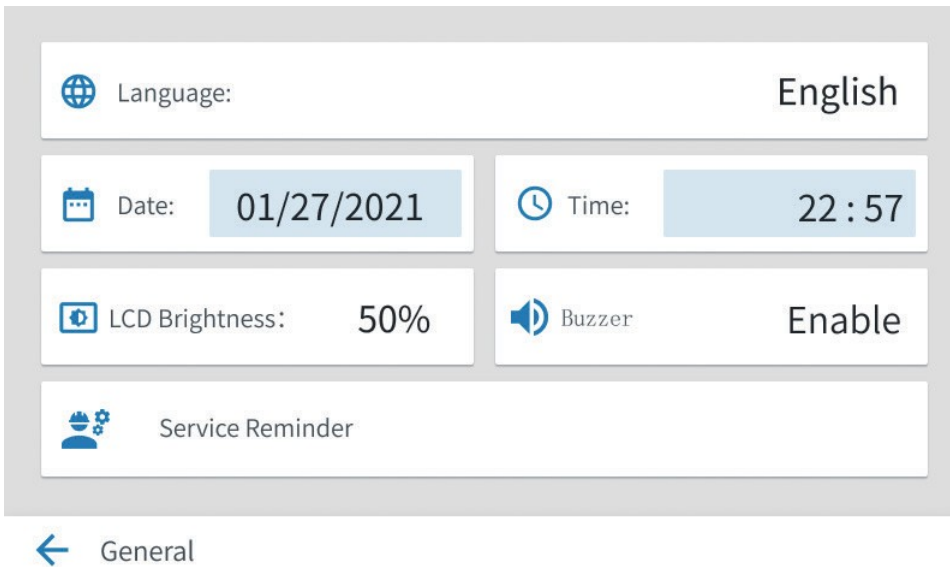


### General

Tap on the **Time** icon on the **General** page to change the time. Save the time settings by selecting **Save**. To return to the **General** page, select **Cancel**.

This method can be used to change other parameters, as well.

**Figure 52. General page**



**Figure 53. Output page**

Output Voltage:	220V
Output Frequency:	50.0Hz

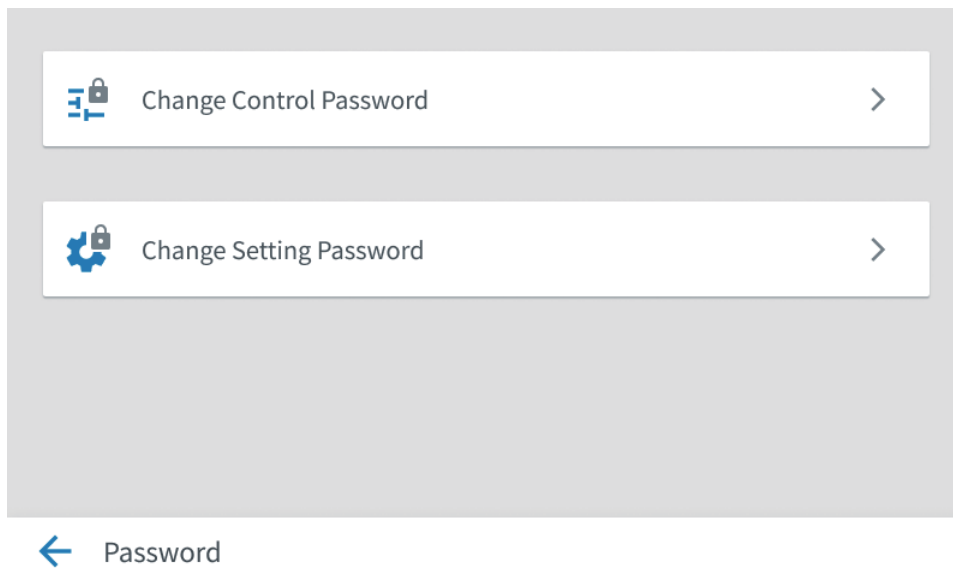
[←](#) Output

**Figure 54. Meters page**

The type for meters:	A, B, C
----------------------	---------

[←](#) Meters

**Figure 55. Password page**



### **Change Control Password**

The **Change Control Password** page is used to change the password for accessing the **Control** page. To change the Control page password, select **Enable Control Password**. As a result, a keyboard and a password input field appear. Enter the old password and the new password. Then, select **OK**.

If the new password is verified, the `New Password Saved` prompt appears. If the entered password is wrong, the `Wrong Old Password` prompt appears, which indicates that you must re-enter your password.

### **Change Setting Password**

The **Change Setting Password** page is used to change the password for accessing the **Setting** page.

To change the Setting page password, tap on the keyboard on the right side of the page. Enter the old password and the new password. Then, select **OK**.

If the new password is verified, the `New Password Saved` prompt appears. If the entered password is wrong, the `Wrong Old Password` prompt appears, which indicates that you must re-enter your password.

#### **6.2.1.10 Service reminder**

When a service expires, the **Service Maintenance Reminder** icon is displayed on the **Home** page.

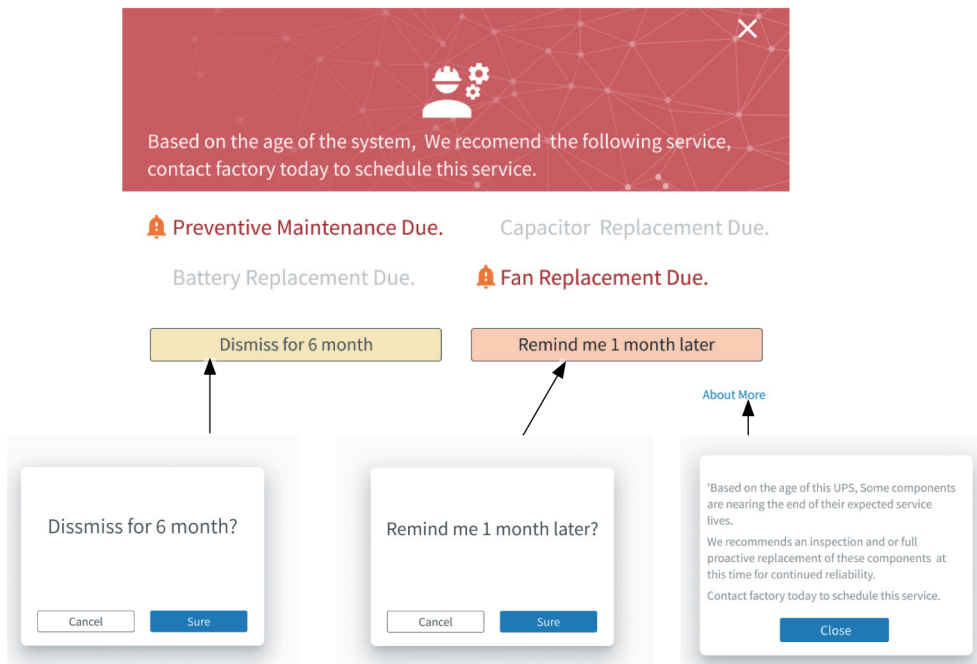
There are four types of service reminders:

1. Preventive maintenance reminder
2. Battery replacement reminder
3. Capacitor replacement reminder
4. Fan replacement reminder

To access the **Service Maintenance Reminder** page, tap on the **Service Maintenance Reminder** icon.

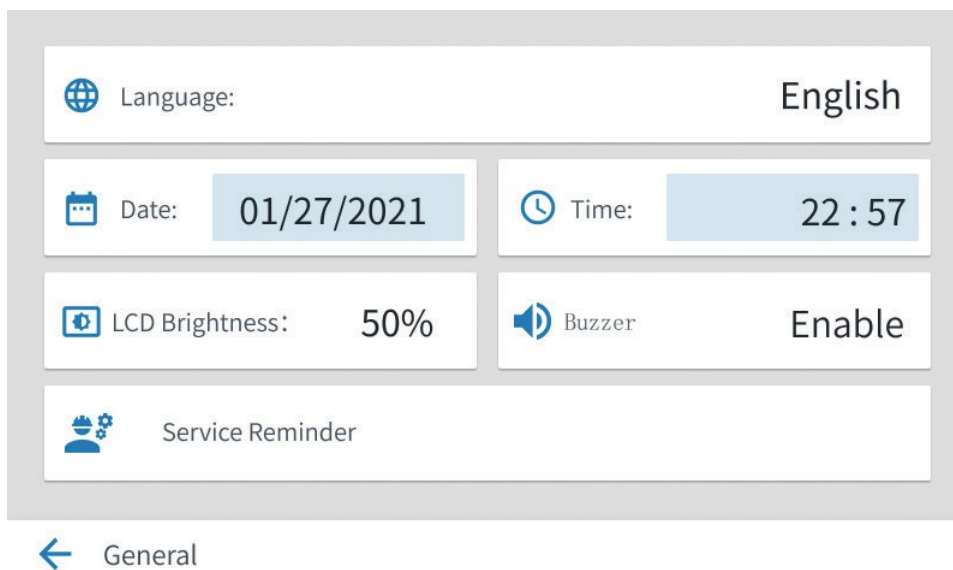
A red prompt indicates that the reminder is expired. A gray prompt indicates that the reminder is not expired or that the reminder is not enabled.

**Figure 56. Service reminders**

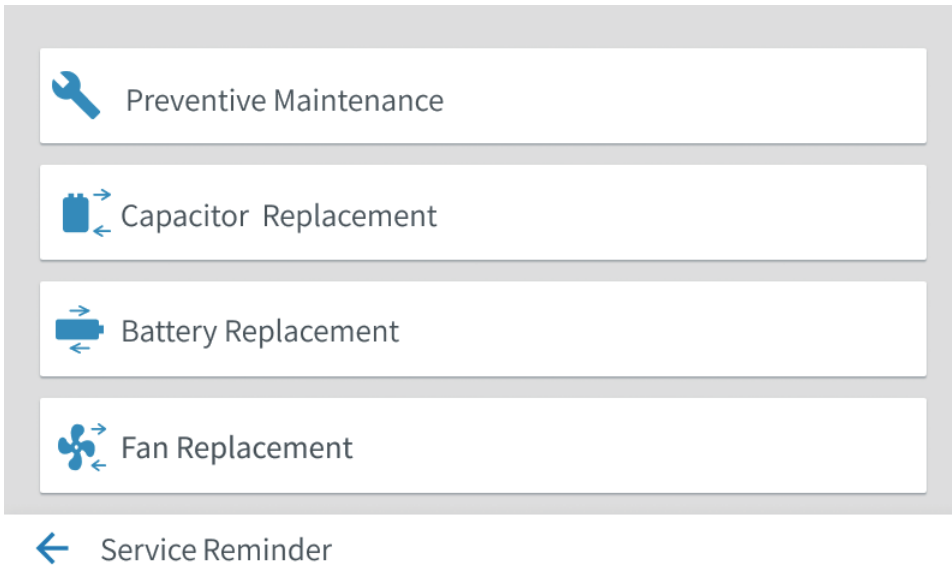


To create a new service reminder, go to **Setting**→**General** and select **Service Reminder**.

**Figure 57. Location of the service reminder function**



**Figure 58. Service Reminder page**



### Fan Replacement

On the **Fan Replacement** page you can change the time interval for a service reminder and enable or disable a service reminder. If a service reminder is disabled, the reminder is not displayed when the service expires and the timing is not reset. If a service reminder is enabled, the reminder activates when the set time expires. When the fan replacement configurations are completed and saved, the reminder date and the enable/disable status are displayed on the interface.

**Figure 59. Fan Replacement page**



## 6.3 System control instructions

### 6.3.1 Start the UPS in Online mode (default mode)

The UPS system can consist of a single UPS unit or several UPS units connected in parallel.

To start the UPS system:

1. Make sure that the rectifier input switch, the output switch, and the bypass switch are closed, and that the maintenance bypass switch is open.
2. Close the external input distribution switch.
3. Close the external bypass distribution switch.
4. Observe the logic power supply indicated on the UPS control panel, and repeat steps 1-3 for each UPS in the system.
5. Make sure that there are no active alarms in the system.
6. Select the **Control** icon on the menu, and press **OK** to start the system.
7. Select **System** on the control page.
8. Tap on the **Start** icon on the system page, and press **OK** to start the system
9. Press the **Start** icon on the **System Control** page.
  - If automatic bypass is enabled, the power is supplied to the critical load through the bypass immediately, the UPS runs in Bypass mode until the inverter is turned on, and the UPS transfers to Online mode.
  - If automatic bypass is disabled, the system turns on the rectifier first, and then turns on the inverter when the rectifier turns normal. When the rectifier is normally turned on, the battery relay is turned off automatically.

It takes approximately 20 seconds for the UPS system to transfer to Online mode.

As a result, the UPS operates in Online mode, and all UPS status indicator lights in the system indicate Online mode.

### 6.3.2 Start the UPS in Bypass mode

If the UPS inverter output is unavailable and the critical load needs a power supply, complete the following steps.



#### CAUTION

When the UPS is in Bypass mode, the critical load is not protected if any bypass interruption or exception occurs.

1. Make sure that the rectifier input switch, the output switch, and the bypass switch are closed, and that the maintenance bypass switch is open (if the UPS is equipped with such a switch).
2. Close the front door.
3. Close the external input distribution switch.
4. Close the external bypass distribution switch.
5. Observe the logic power supply indicated on the UPS control panel, and repeat steps 1–3 for each UPS in the system.
6. Select **Control** on the menu, and enter the password to access the control page.
7. Select **System** on the control page.

8. Tap on the **Enter Bypass Mode** icon on the system page, and press **OK** to switch to bypass operations.

As a result, the UPS operates in Bypass mode, and the bypass indicator light is on.

### 6.3.3 Battery start

To start the UPS on battery power and transfer it to Bypass mode.

1. Lightly press the battery startup/switch to bypass button. For the location of the button, refer to *Figure 25: Communication interfaces*.
2. When the UPS is in Online mode or ESS mode, press the battery startup/switch to bypass button for 10 seconds.

As a result, the UPS transfers to Bypass mode.

### 6.3.4 Transfer from Online mode to Bypass mode

Complete the following steps to transfer the load to Bypass mode.



#### CAUTION

When the UPS is in Bypass mode, the critical load is not protected if any bypass interruption or exception occurs.

1. Tap on the **Control** icon on the menu page to switch to the **System Control** page.
2. Press the **Switch to Bypass** icon on the **System Control** page.
  - If bypass is unavailable, the control unit continues operation and sounds an alarm.
  - Otherwise, the bypass power is supplied to the critical load immediately.

As a result, the system operates in Bypass mode, and the bypass indicator light is on. The UPS is at Ready status, and the system is in Bypass Mode.

### 6.3.5 Transfer from Bypass mode to Online mode

Complete the following steps to transfer the critical load to Online mode.

1. Tap on the **Control** icon on the menu page to switch to the **System Control** page.
2. Press the **Start** icon on the **System Control** page.
  - If the loading capacity of the UPS is insufficient, the system stays in Bypass mode, and the UPS sounds an alarm.
  - Otherwise, the UPS system transfers to Online mode.

As a result, the UPS operates in Online mode and the online status indicator light is on. The system status displayed is Online Mode.

### 6.3.6 Transfer from Online mode to ESS mode

**NOTE:** ESS is displayed only if the Advanced Energy Saving Solution (EAA) mode feature is enabled by the facility or service personnel.

To transfer the load to ESS mode:

1. Select **Control** on the menu page, and enter the password to access the control page.
2. Select **System** on the control page to access the system page.
3. Tap on the **Enable ESS** icon on the system page, and select **OK** to confirm.



If no exception is detected, the UPS transfers to ESS mode when the battery is fully charged. If any exception is detected, the UPS transfers to ESS mode when the exception is removed.

If the bypass is unavailable or the conditions for transferring to ESS mode are immature, the power module continues operation, and the UPS raises an alarm. Otherwise, the entire UPS system transfers to ESS mode, and power is supplied to the critical load from the bypass. The normal status indicator light is on, and the system status displayed is *UPS Online, ESS*. The UPS status is *Ready*.

### 6.3.7 Transfer from ESS mode to Online mode

To transfer the load to Online mode:

1. Select **Control** on the menu page, and enter the password to access the control page.
2. Select **System** on the control page to access the the system page.
3. Tap on the **Disable ESS** icon on the system page, and select **OK** to transfer to Online mode.

As a result, the normal status indicator light is on. If a power module is unavailable and the system stays in Bypass mode, the UPS raises an alarm. Otherwise, the UPS system transfers to Battery mode and then to Online mode. The online mode indicator light is on, and the UPS status displayed is *Online Mode*. The UPS status is *In Service*.

### 6.3.8 Shut down the UPS system

To do maintenance on the critical load, complete the following steps to shut down the system:

Shut down the UPS with the **LOAD OFF** command on the UPS control screen. The UPS **LOAD OFF** command allows the UPS to switch off all outputs.

The UPS, including bypass, is at *Shutdown* state until it is restarted.

1. Select **Control** on the menu page, and enter the password to access the control page.
2. Single-UPS mode: Select **UPS** on the control page to access the UPS page.
3. Tap on the **Single UPS Shutdown** icon on the UPS page, and select **OK** to confirm.

The prompt **Shutdown** appears.



#### CAUTION

If you select **Yes**, the UPS switches off the output. Use this function only when you want to switch off the UPS output.

4. Select **Yes** to shut down the UPS and switch off the UPS output. Select **No** to cancel the process. Then, tap on the return arrow.



#### CAUTION

Do not restart the system after shutdown, unless the reason for shutdown is confirmed and the error is cleared.

5. Turn off the UPS input switch.
6. Turn off the UPS bypass input switch.
7. Turn off the UPS maintenance bypass switch.
8. Turn off the UPS input and bypass distribution switch.
9. If any external battery cabinet is installed, turn off all battery switches, including the neutral battery wire switch.



## CAUTION

There is a power supply inside the UPS cabinet.

## 6.4 Control the UPS system

### 6.4.1 Start a single UPS

Make sure the load does not exceed the capacity of a single UPS. The UPS system may be composed of a single UPS unit or several UPS units connected in parallel.

To start the UPS system:

1. Examine and make sure that the rectifier input switch, the output switch, and the bypass switch are closed, and that the maintenance bypass switch is open (if the UPS is equipped with such a switch). Then, close the front door.
2. Turn on the external input distribution switch.
3. Turn on the external bypass distribution switch.
4. Observe the logic power supply indicated on the UPS control panel.
5. Make sure that there are no active alarms in the system.
6. Select **Control** on the menu page, and enter the password to access the control page.
7. Select **System** on the control page.
8. Tap on the **Start** icon on the system page, and select **OK** to start the system.

When the rectifier and inverter are started and the inverter voltage reaches the set value, *Online* status is displayed and the green online status indicator light is on.

As a result, the UPS operates in Online mode, and all UPS status indicator lights in the system indicate Online mode.

### 6.4.2 Shut down a single UPS



## CAUTION

Shutdown is allowed only when a single UPS is redundant in the system. Shutdown is not allowed if the shutdown of a single UPS causes system overload.

To shut down a single UPS:

1. Tap on the **Control** icon on the menu page to access the system control page.
2. Tap on the **UPS Control** icon on the system control page.
3. Select **Shutdown** on the UPS control page.

## 6.5 Use the Remote Emergency Power-off push-button

A UPS emergency power-off is initiated by the Remote Emergency Power-off (REPO) push-button. In case of an emergency, use this push-button to control the UPS output.

The REPO push-button powers down the UPS and cuts off the output immediately without asking for verification.



### CAUTION

When the REPO push-button is activated, the UPS output is cut off immediately. Use this feature only in case of emergency.

**NOTE:** The following instructions are for the REPO push-button supplied by Eaton. If you are using a customer-supplied REPO push-button, it may not activate in the same way. For operating instructions, refer to the documentation provided with the push button.

To use the REPO push-button:

1. Press the **REPO** push-button.

If verification is not requested, the contactors of the input, output, and bypass are disconnected, and the battery and the power module are turned off immediately.



### CAUTION

Do not restart the system after using the REPO push-button until the conditions for safe start-up have been confirmed.

2. To restart the UPS after using the **REPO** push button, reset the REPO push button first. Then, obey the instructions in *Section 6.3.1 Start the UPS in Online mode (default mode)* or *Section 6.3.2 Start the UPS in Bypass mode*.

## 6.6 Transfer from Online mode to Maintenance bypass mode

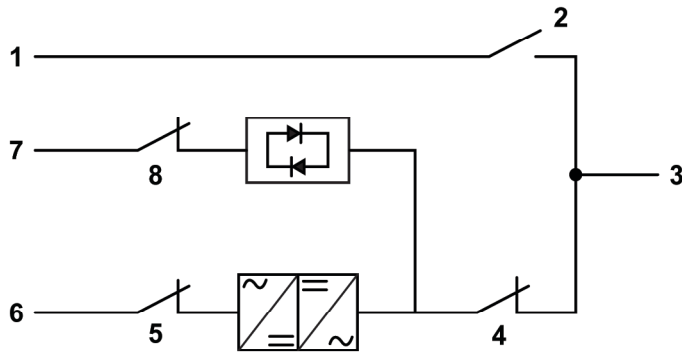
Only trained personnel who are familiar with the behavior and functions of the UPS are allowed to operate the internal MBS. The full UPS wiring diagram with the MBS switch is presented in *Figure 6: 93T UPS wiring diagram*.



### CAUTION

The internal MBS and the static bypass must be supplied by the same source.

**Figure 60. Switch status in Online mode**

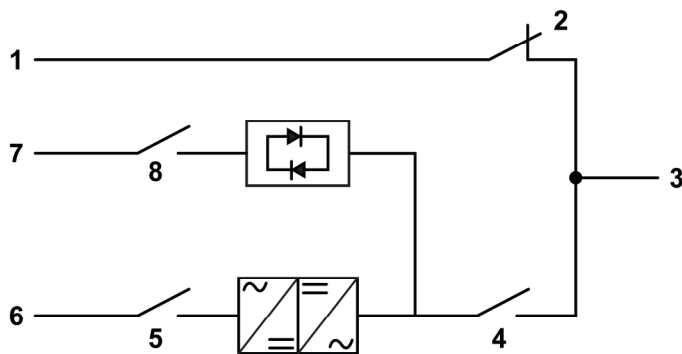


- |                                    |                           |
|------------------------------------|---------------------------|
| 1. Maintenance bypass              | 5. Rectifier input switch |
| 2. Maintenance bypass switch (MBS) | 6. Rectifier input        |
| 3. Output                          | 7. Static bypass input    |
| 4. Output switch                   | 8. Bypass switch          |

To transfer the system from Online mode to Maintenance bypass mode:

1. Transfer the system from Online mode to Bypass mode.  
Refer to *Section 6.3.4 Transfer from Online mode to Bypass mode*
2. Close the maintenance bypass switch.
3. Shut down the system.  
Refer to *Section 6.3.8 Shut down the UPS system.*
4. Open the input switch to cut off the UPS rectifier input.
5. Open the output switch to cut off the UPS inverter output.
6. Open the bypass switch to cut off the UPS bypass input.
7. Open the external battery switches, including the neutral battery wire switch.

**Figure 61. Switch status in Maintenance bypass mode**

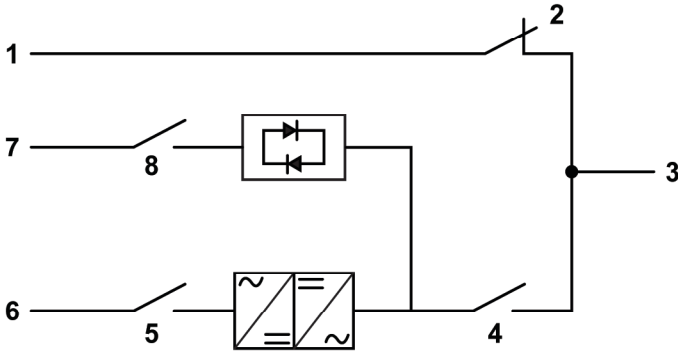


- |                                    |                           |
|------------------------------------|---------------------------|
| 1. Maintenance bypass              | 5. Rectifier input switch |
| 2. Maintenance bypass switch (MBS) | 6. Rectifier input        |
| 3. Output                          | 7. Static bypass input    |
| 4. Output switch                   | 8. Bypass switch          |

## 6.7 Transfer from Maintenance bypass mode to Online mode

For the usual initial position, refer to the following figure.

**Figure 62. Switch status in Maintenance bypass mode**

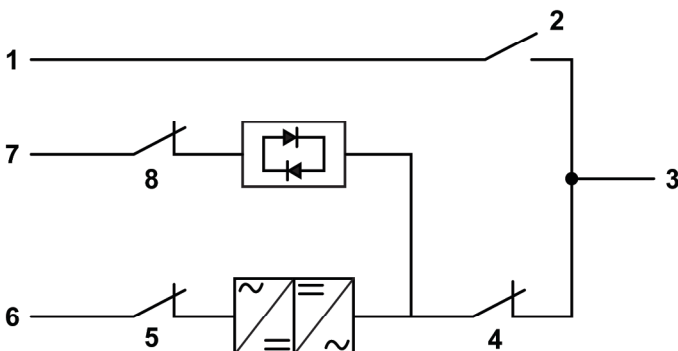


- |                                    |                           |
|------------------------------------|---------------------------|
| 1. Maintenance bypass              | 5. Rectifier input switch |
| 2. Maintenance bypass switch (MBS) | 6. Rectifier input        |
| 3. Output                          | 7. Static bypass input    |
| 4. Output switch                   | 8. Bypass switch          |

To transfer the system from Maintenance bypass mode to Online mode:

1. Close the input switch to turn on the UPS rectifier input.
2. Close the bypass switch to turn on the UPS bypass input.
3. Close the output switch to turn on the UPS inverter output.
4. Close the external battery switches, including the neutral battery wire.
5. Complete the UPS startup steps (Bypass mode).  
Refer to *Section 6.3.2 Start the UPS in Bypass mode.*
6. Open the maintenance bypass static switch to turn off the UPS maintenance bypass switch (MBS) output.
7. Transfer the system from Bypass mode to Online mode.  
Refer to *Section 6.3.5 Transfer from Bypass mode to Online mode.*

**Figure 63. Switch status in Online mode**



1. Maintenance bypass
2. Maintenance bypass switch (MBS)

3. Output
4. Output switch
5. Rectifier input switch
6. Rectifier input
7. Static bypass input
8. Bypass switch

# 7 UPS maintenance

## 7.1 About UPS maintenance

The components inside the UPS cabinet are attached 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. Schedule periodic performance checks of your UPS system to keep it operating correctly. Regular routine checks of the operation and system parameters enable your system to function efficiently for many trouble-free years.

## 7.2 Important safety instructions

Remember that your UPS system is designed to supply power **EVEN WHEN IT IS 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 must wait at least 5 minutes for capacitor bleed-off before attempting internal access to the UPS module.



### DANGER

LETHAL VOLTAGE. Do not operate the UPS system without the cabinet doors or protective panels secured. Do not make any assumptions about the electrical state of any cabinet in the UPS system.



### WARNING

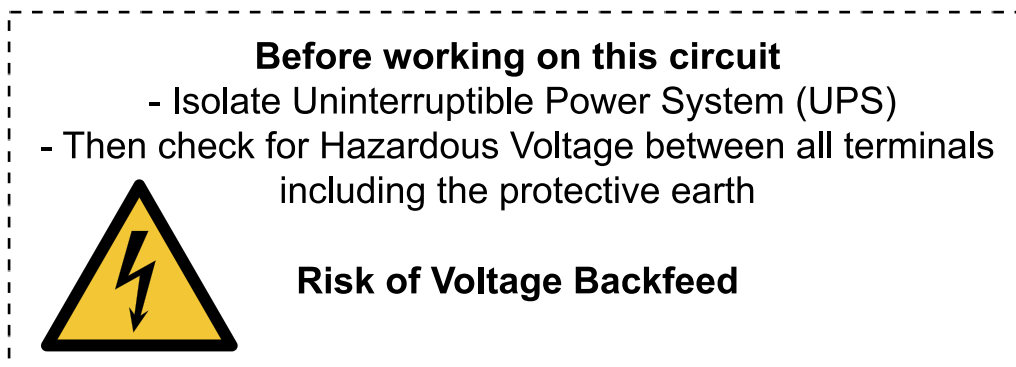
All service and maintenance work must be done only by service personnel qualified and authorized by Eaton.



### CAUTION

A warning label, shown in Figure 64: *Warning label*, must be installed at the UPS input terminals and all the primary power isolators used to isolate the UPS unit if the UPS is connected to an IT earthed supply, or if the UPS input is connected through external isolators that, when opened, isolate the neutral. You can get these warning labels from your local service representative.

Figure 64. Warning label



Since each battery string is an energy source in itself, opening the battery circuit breaker does not de-energize the voltage within the battery string.



### **DANGER**

Do not attempt to access any internal area of the battery string. Voltages are always present in the battery strings. If you suspect that a battery string needs service, contact your service representative.

Obey these precautions when working on or around batteries:

- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of batteries or battery cabinets.
- Before you connect or disconnect a terminal, first disconnect the charging source.
- 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 an electrical shock. The likelihood of such a shock is reduced if such grounds are removed during installation and maintenance.
- When you replace batteries, use the same number of sealed, lead-acid batteries.
- Discard batteries according to your local codes for disposal requirements.

## **7.3 Preventive maintenance**

The UPS system requires very little preventive maintenance. However, examine the system regularly to make sure that the units are operating correctly and that the batteries are in good condition.

It is recommended that the service and maintenance work is performed by qualified service personnel authorized by Eaton.

### **7.3.1 Daily maintenance**

Do the following maintenance procedures daily.

1. Examine the area surrounding the UPS system. Make sure that the area is not cluttered and allows free access to the unit.



2. Examine that the air intakes (vents on the front door of the UPS cabinet) and the exhaust openings (at the rear of the UPS cabinet) are not blocked.
3. Make sure that the operating environment is within the parameters specified in *Section 4.3.1 Environmental considerations* and *Chapter 9.1 About technical data*.
4. Make sure that the UPS is in Online mode. The UPS is in Online mode when the Online mode status indicator light is on. If an alarm indicator light is on or the Online mode status indicator is not on, contact your local Eaton service representative.

### 7.3.2 Monthly maintenance



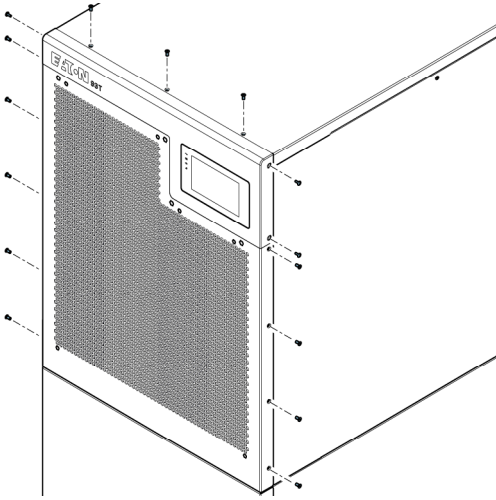
#### WARNING

Only authorized personnel are allowed to work on an energized circuit.

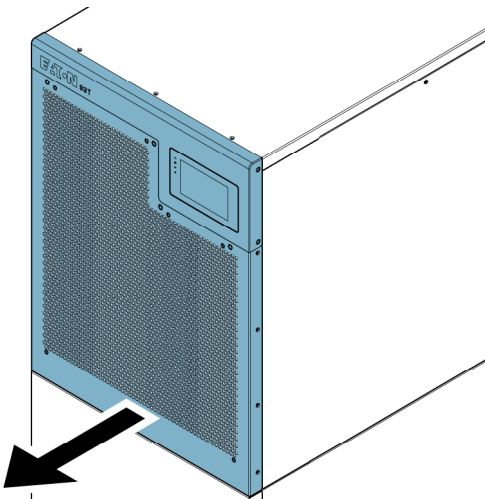
Do the following maintenance procedures once a month.

1. Examine the system parameters on the control panel (see *Section 6.2.1 Using the control panel*).

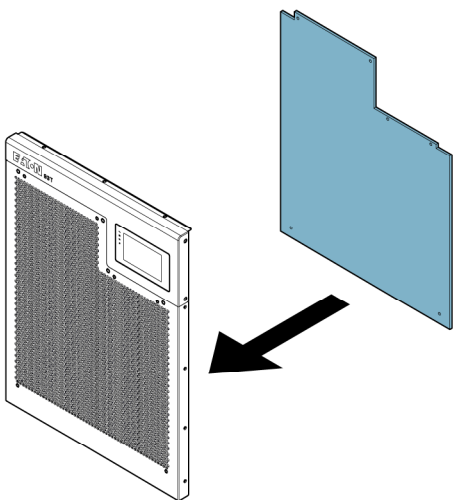
2. If the optional air filters are installed, examine them. The air filters are located behind the front doors. Clean or replace the filters, if needed. Contact your local service representative for replacement filters. To replace the filters:
- a. Remove the fastening screws from the UPS front panel.



- b. Remove the front panel.



- c. Remove the filter from the front panel.



d. Clean or replace the filter.

3. Record the check results and any corrective actions in a service log.

### 7.3.3 Regular maintenance

Examine the UPS unit regularly to make sure that there are no signs of overheating in components, wiring, or interface. Do an inspection of the wire crimping terminals and fasten them during maintenance.

### 7.3.4 Annual maintenance



#### CAUTION

Only authorized personnel that are familiar with the maintenance and servicing of the UPS system are allowed to do annual preventive maintenance. Contact your service representative for more information about service offerings.

### 7.3.5 Battery maintenance



#### CAUTION

Only authorized personnel are allowed to do battery replacement and maintenance. Contact your service representative for battery maintenance.

## 7.4 Battery installation



#### WARNING

HIGH VOLTAGES.

Only authorized personnel are allowed to do battery installation. Contact your local service representative for battery installation.

**NOTE:** There is no manual DC disconnect device in the UPS for external batteries.

To install the battery, refer to the battery manufacturer's instructions.

Recycle used batteries and UPSs.

For proper disposal, contact your local collecting, recycling, reuse, or hazardous waste center and obey the local legislation.



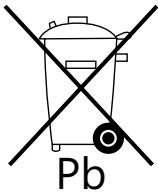
## WARNING

### HAZARDOUS MATERIALS.

Batteries can contain HIGH VOLTAGES, and CORROSIVE, TOXIC, and EXPLOSIVE substances. Incorrect use of batteries can cause injury to personnel and damage to the equipment.

Do not throw unwanted batteries into fire or they may explode. For proper disposal, contact your local collecting, recycling, reuse, or hazardous waste center and obey the local legislation.

Do not disassemble or damage batteries. The released electrolyte can be toxic and cause damage to your skin and eyes.



## CAUTION

Do not discard electrical or electronic equipment in the trash. For proper disposal, contact your local collecting, recycling, reuse, or hazardous waste center and obey the local legislation.

## 7.5 Maintenance training

For more information about training and other services, contact your Eaton representative.

# 8 Troubleshooting

## 8.1 About troubleshooting

If the UPS is not operating correctly, read the fault description form, contact your local Eaton representative, and provide the following information:

1. Product model and serial number of the unit
2. Fault date
3. Description of the fault

## 8.2 Alarms

**Table 18. UPS alarms and faults**

Alarm number	Alarm name	Possible cause	Solution
2	Bypass AC Under Voltage	The bypass switch is not on.	Close the bypass switch.
5	Input AC Under Voltage	The input switch is not on.	Close the input switch.
14	Inverter Output Over Current	The load is a nonlinear load and has a large capacity.	Contact your local service representative.
24	Battery DC Over Voltage	The battery voltage sensors have detected a battery voltage greater than 2.45 VPC.	Contact your local service representative.
29	Bypass Phase Rotation Failed	Incorrect bypass wiring	Examine the bypass wiring.
53	Fan Failed	The fan is not operating correctly.	Contact your local service representative.
54	Site Wiring Fault	Incorrect ground zero wiring	Examine the ground wire and the neutral wire.
59	Output Voltage Abnormal	The Maintenance bypass switch is closed or the output sample voltage has been detected abnormal.	If the maintenance bypass switch is closed, open it. If the output sample voltage has been detected abnormal, contact your local service representative.
61	Configuration Error	Battery cell configuration required	Configure battery cells (EEP 5302). Contact your local service representative, if necessary.

Alarm number	Alarm name	Possible cause	Solution
66	PreCharge Failed	Input voltage collapse	Contact your local service representative.
85	Parallel Can Bus Failed	The parallel connection is not operating correctly.	Examine the parallel connection.
106 107	5 V Power Supply Failed 15 V Power Supply Failed	Power supply failure	Contact your local service representative.
115	Parallel Setup Failed	The parallel setting is incorrect.	Examine the parallel setting. If the parallel setting is correct but the UPS still alarms, contact your local service representative.
131	ESS Not Available	Bypass quality is not good or the charging current is greater than the setup limit.	Contact your local service representative.

# 9 Technical data

## 9.1 About technical data

This chapter introduces the models, standards, UPS input and output information, battery specifications, and environmental specifications of the 93T UPS.

## 9.2 Models

The frequency range of 40–72 Hz is optional for the UPS systems with different rated output powers.

**Table 19. 93T UPS models with rated capacity and frequency range**

93T UPS model	Rated capacity [kVA]	Frequency range [Hz]
93T 15 kVA with batteries	15	40–72
93T 15 kVA without batteries	15	40–72
93T 20 kVA with batteries	20	40–72
93T 20 kVA without batteries	20	40–72
93T 30 kVA with batteries	30	40–72
93T 30 kVA without batteries	30	40–72
93T 40 kVA with batteries	40	40–72
93T 40 kVA without batteries	40	40–72
93T 60 kVA with batteries	60	40–72
93T 60 kVA without batteries	60	40–72
93T 80 kVA with batteries	80	40–72
93T 80 kVA without batteries	80	40–72

## 9.3 Standards

**Table 20. Standards**

<b>Safety</b>	IEC 62040-1
<b>EMC, Emissions</b>	IEC 62040-2
<b>EMC, electromagnetic susceptibility</b>	IEC 61000-2-2 (Low-frequency conducted) IEC 61000-4-2 (ESD) IEC 61000-4-3 (RF electromagnetic field) IEC 61000-4-4 (Electrical Fast Transient/Burst Immunity Test)

	IEC 61000-4-5 (Surge) IEC 61000-4-6 (Conducted RF common mode) IEC 61000-4-8 (Power frequency magnetic field) IEC 61000-4-11 (Voltage dips and Voltage interruptions)
<b>Performance &amp; Tests</b>	IEC 62040-3
<b>Environmental</b>	IEC 62430
<b>RoHS</b>	2011/65/EU
<b>WEEE</b>	2012/19/EU
<b>ECO Design Directive</b>	2012/27/EU
<b>Batteries</b>	2006/66/EC
<b>Packing</b>	2005/20/EC

## 9.4 UPS input

Table 21. 93T UPS input specifications

<b>Rated input voltage</b>	220/380 V 230/400 V 240/415 V
<b>Voltage range (rectifier input)</b>	190/330–276/478 VAC (-15 %, +20 %), 100 % load
	116/201–276/478 VAC (-50 %, +20 %), 50 % load
<b>Voltage range (bypass input)</b>	195/338–264/458 VAC Default rated voltage range: $\pm 15$ % Maximum selection range: $\pm 20$ %
<b>Rated input frequency</b>	50 Hz or 60 Hz, configurable
<b>Frequency range</b>	40–72 Hz
<b>Input phases (rectifier input)</b>	3 phases + neutral
<b>Input phases (bypass input)</b>	3 phases + neutral
<b>Input power factor</b>	> 0.99
<b>Rated input current</b>	Refer to <i>Table 7: Input/output ratings and external cabling recommendations for the 93T 15–80 kVA UPS.</i>
<b>Maximum input current</b>	
<b>Total harmonic current distortion (THDi)</b>	< 3 %



## 9.5 UPS output

Table 22. 93T UPS output specifications

<b>Output phases</b>	3 phases + neutral
<b>Rated output voltage</b>	220/380 V 230/400 V 240/415 V Configurable
<b>Total harmonic voltage distortion (THD)</b>	100 % linear load: < 2 % 100 % non-linear load: < 5 %
<b>Rated output frequency</b>	50 Hz or 60 Hz, configurable
<b>Rated output frequency accuracy</b>	±0.1 Hz
<b>Overload capacity</b>	102–110 % load: 60 min 111–125 % load: 10 min 126–150 % load: 1 min > 151 % load: 150 ms
<b>Output current</b>	Refer to <i>Table 7: Input/output ratings and external cabling recommendations for the 93T 15–80 kVA UPS.</i>
<b>Short circuit capability (200 ms)</b>	15–20 kVA UPS: 73 A 30 kVA UPS: 108 A 40 kVA UPS: 145 A 60 kVA UPS: 217 A 80 kVA UPS: 290 A
<b>Rated load power factor</b>	1.0
<b>Load power factor (allowed)</b>	Lag 0.7 to lead 0.7

## 9.6 Battery



### CAUTION

In case of connecting with an external battery, the neutral wire of the battery must be included.

Table 23. Battery specifications

<b>Battery type</b>	VRLA, 13 VDC
<b>Battery voltage</b>	320–607 VDC with external batteries 468–520 VDC (36-40 blocks) with internal batteries

	<i>NOTE: Do not connect battery strings with a different number of cells in parallel.</i>
	15 kVA: 1x36 blocks, 9 Ah
	20 kVA: 2x32 blocks, 7 Ah
	30 kVA: 2x36 blocks, 9 Ah
	40 kVA: 3x32 blocks, 9 Ah
	60 kVA: 4x40 blocks, 9 Ah
	80 kVA: 5x40 blocks, 9 Ah
<b>Charging configuration</b>	ABM or float charge
<b>End-of-discharge voltage</b>	1.67 VPC
<b>Charging current</b>	15 kVA maximum: 15 A, configurable 20 kVA maximum: 20 A, configurable 30 kVA maximum: 30 A, configurable 40 kVA maximum: 40 A, configurable 60 kVA maximum: 60 A, configurable 80 kVA maximum: 80 A, configurable
<b>Battery startup</b>	Available
<b>Battery environment</b>	Discharging temperature: -20 °C ... +50 °C Charging temperature: +0 °C ... +40 °C Storage temperature: -15 °C ... +40 °C Recommended operating and storage temperature: +25 °C

## 9.7 Environment

Table 24. Environmental specifications

<b>Operating temperature</b>	+0°C ... +40 °C The recommended operating temperature is +25 °C. The system derates at +40 °C ... +50 °C.
<b>Storage ambient temperature</b>	-25 °C ... +55 °C (-13 °F ... 131 °F) when stored in the protective packaging materials.
<b>Operating altitude</b>	The UPS operates correctly below the altitude of 1,000 m (3,300 ft). If the UPS is operated at an altitude above 2,000 m (6,600 ft), contact your local service representative for more information.
<b>Relative humidity (storage and operating)</b>	5 % – 95 %, condensation free Make sure that there is a temperature difference of at least 1 °C (1.8 °F) between the dry bulb and the wet bulb of the hygroscope to avoid condensation.
<b>Acoustic noise at 1 meter</b>	15–20 kVA UPS: ≤ 55 dB

	30–40 kVA UPS: ≤ 63 dB 60–80 kVA UPS: ≤ 68 dB, per ISO 7779
<b>EMC</b>	Class: C3 (GB 7260.2/ IEC 62040-2)
<b>Internal battery recharging during storage</b>	Batteries must be recharged at six-month intervals. Do not store units with internal batteries for longer than six months without recharging. Examine the latest charging date on the delivery package.

### Recommended storage environment and storage time of the overall equipment and spare parts

- Equipment which cannot be installed and energized immediately must be stored indoors in a clean, ventilated, and temperature- and humidity-controlled environment. The storage area must be protected from rain, water, chemicals, and the ambient gases provided in *Table 25: Gas concentration recommendations* and meet the environmental requirements for transportation and storage provided in *Table 26: Environmental requirements for transportation and storage within one year\**.
- Do not place the equipment in an environment with extreme humidity and temperature changes, dust, dirt, rubbles, paint, conductive particles, or corrosive gases.
- Do not remove the equipment packaging before installation.
- The contractor receiving the equipment is responsible for equipment protection during the storage period.
- The equipment must be stored on a solid level floor.
- Before the arrival of the equipment, an ambient temperature and humidity control plan must be formulated.

This product is suitable to be installed and operated in the G1 environment specified in ANSI/ISA- 71.04-2013. The gas concentration recommendations are based on the recommendations presented in Table B1 of ANSI/ISA-71.04-2013 for the G1 equipment environment.

**Table 25. Gas concentration recommendations**

Pollutant group	Gas	Gas concentration/ppbv
Group A	H <sub>2</sub> S	< 3
	SO <sub>2</sub> SO <sub>3</sub>	< 10
	Cl <sub>2</sub>	< 1
	NO <sub>x</sub>	< 50
Group B	HF	< 1
	NH <sub>3</sub>	< 500
	O <sub>3</sub>	< 2

**Table 26. Environmental requirements for transportation and storage within one year\***

<b>Storage site</b>	Indoors
<b>Dust</b>	Good
<b>Storage temperature</b>	< 40 °C

<b>Storage humidity</b>	< 70 % RH
<b>Others</b>	Stored with initial packaging

\* ) The requirements are subject to the production date on the unit's label.

If the actual storage environment of the unit does not meet the environmental requirements presented above, re-evaluate the storage time according to the actual storage environment.

# 10 Warranty

## 10.1 General information about warranty

The product is warranted against defects in materials and workmanship for a period of twelve (12) months from its original date of purchase. The local office or distributor may grant a warranty period different to the above. Please refer to local terms of liability as defined in the supply contract.

The UPS manufacturer is not responsible for:

- Any costs resulting from a failure if the installation, commissioning, repair, alternation, or ambient conditions of the equipment do not fulfill the requirements specified in the documentation delivered with the unit and other relevant documentation.
- Equipment subjected to misuse, negligence or accident.
- Equipment comprised of materials provided or designs stipulated by the purchaser.

The warranty is only valid if the installation inspection and initial startup of the UPS unit is carried out by an authorized Eaton Field Service Engineer or by other qualified service personnel authorized by Eaton. Service and maintenance of the UPS shall also be performed only by an authorized Eaton Field Service Engineer or by other qualified service personnel authorized by Eaton. Otherwise the warranty will be voided.

If the product fails to meet its published specifications due to a defect in material and workmanship, covered by this warranty, the seller will repair or replace the warranted product. Such repair or replacement will be made by Eaton or by a service provider approved by Eaton. Repair or replacement during the warranty period does not extend the original warranty. Warranty does not cover taxes, which will be due in connection with replacement or repair of the product.

Batteries are warranted against failures in material and workmanship, not against the normal aging and reduction of ampere-hour capacity. The product storage environment has to meet manufacturer's specifications, failure to do this will cause the warranty to be voided.

Under no circumstances shall the manufacturer, its suppliers or subcontractors be liable for special, indirect, incidental or consequential damages, losses or penalties.

The technical data, information and specifications are valid at the time of printing. The UPS manufacturer reserves the right to modifications without prior notice.

## 10.2 Whom to contact in case of Warranty

In case of Warranty, or while unsure if the unit in question is covered by warranty, contact the respective sales organization where the unit was purchased. Have the following information available:

- Purchase order number and purchase order date
  - Installation date
- OR
- Serial number and part number of the unit (information available on the unit's label)

# 11 Appendices

## 11.1 Appendix 1: Harmful substances in UPS components

The below table shows the harmful substances used in the UPS components according to SJ/T 11364.

X = the amount of the harmful substance in every homogeneous material of the component is below the limit provided in GB/T 26572.

O = the amount of the harmful substance in a certain homogeneous material of the component is beyond the limit provided in GB/T 26572.

**Table 27. Harmful substances in UPS components**

Component	Harmful substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr (VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
<b>Batteries</b>	X	O	O	O	O	O
<b>Printed circuit assembly</b>	X	O	O	O	O	O
<b>Power cord outlet terminal</b>	X	O	O	O	O	O
<b>Hardware box</b>	X	O	O	O	O	O
<b>Switches/ circuit breakers</b>	O	O	X	O	O	O

### Exemption clauses of environment-friendly use period

The specific environment-friendly use period is only in line with the corresponding laws and regulations of the People's Republic of China, and does not mean that Eaton provides guarantees or bears any obligations to customers. During the environment-friendly use period, it is assumed that the customer uses the product under normal conditions according to this user manual. The environment-friendly use period of some combined parts, such as combined parts equipped with batteries, might be shorter than that of this product.

## 11.2 Appendix 2: End-user license agreement

This End-User License Agreement (the “**Agreement**”) is a legal agreement between you and the Contracting Entity (as defined below). For the purposes of this Agreement, any reference to “Eaton” shall include the Contracting Entity, its holding company, its affiliates and subsidiaries. This Agreement, and any other terms or conditions notified to you, governs your access to and use of 93T 15-80 kW (the “**Product Software**”).

Your use of the Product Software is subject to the terms of this Agreement as set out below which includes any other terms or conditions of the Product Software which may be notified to you from time to time.

By using the Product Software, you agree to us collecting and using anonymised technical information about the devices you use the Product Software on and related software, hardware and peripherals to improve our products and to provide any services to you.

By using the Product Software, you agree to the terms of this Agreement. Your right to use the Product Software is expressly conditioned on acceptance of this Agreement.

## 1 INFORMATION ABOUT US

- 1.1 Santak Electronic (Shenzhen) Co., Ltd. is registered in China and has its registered address at No. 8, Baoshi Road, 72 District, Bao'an District, Shenzhen, Guangdong Province, China (the “**Contracting Entity**”).
- 1.2 If you have any questions about this Agreement, the Privacy Statement or any other terms or conditions in connection with the Product Software, please contact us at [dataprotection@eaton.com](mailto:dataprotection@eaton.com).

## 2 DEFINITIONS

- 2.1 In this Agreement the following expressions shall have the following meanings:

“Arbitrator”	has the meaning as defined in Clause 28.2;
“Business Day”	means a calendar day other than a Saturday, Sunday, Bank Holiday or other statutory holiday in the jurisdiction in which the Contracting Entity is registered;
“Contracting Entity”	has the meaning as defined in Clause 1.1;
“Credentials”	has the meaning as defined in Clause 3.7;
“Dispute”	means any claim, dispute or difference arising under or in connection with this Agreement;
“Documentation”	means any tutorials, user guides and other documents accompanying or made available with the Product Software solely for your own internal business purposes;
“Eaton Hardware”	means the Eaton product provided by Eaton to you, which may include Product Software within it;
“Eaton Open Source Components”	has the meaning as defined in Clause 10.1;
“Eaton Website”	has the meaning as defined in Clause 16.1;
“Effective Date”	means the date upon which you agree to abide by the terms and conditions of this Agreement;
“Export Laws”	has the meaning as defined in Clause 27.1;
“Fees”	has the meaning as defined in Clause 11.1;
“Feedback”	has the meaning as defined in Clause 21.2;
“Force Majeure Event”	has the meaning as defined in Clause 25.1;
“GDPR”	has the meaning as defined in Clause 19.1;

“Indemnified Parties”	has the meaning as defined in Clause 15.1;
“Intellectual Property Rights”	means any ideas (whether or not patentable), inventions, discoveries, processes, works of authorship, marks, names, know-how, and any and all rights in such materials throughout the world, whether existing under statute, common law or equity, now or hereinafter recognized, including but not limited to (i) patents, designs, inventor’s certificates, utility models, copyrights, moral rights, trade secrets, mask works, trade names and marks, service marks, trade dress, domain names, confidential information and know-how; (ii) any application or right to apply for any of the rights referred to in section (i); and (iii) all renewals, extensions, and restorations, now or hereafter in force and effect for any of the rights referred to in section (i);
“Materials”	has the meaning as defined in Clause 21.4;
“Product Software”	means the software provided by Eaton to you, which includes any applications, firmware and/or platforms provided to you from time to time;
“Support Services”	has the meaning defined in Clause 12.1;
“Third Party Licensors”	has the meaning as defined in Clause 9.1;
“Third Party Links and Ads”	has the meaning as defined in Clause 23.1;
“Third-Party Providers”	has the meaning as defined in Clause 21.5;
“Updates”	has the meaning as defined in Clause 6.1.

### **3 GRANT AND SCOPE OF LICENSE**

- 3.1 In consideration of you agreeing to abide by the terms of this Agreement, Eaton hereby grants to you, a limited, non-exclusive, non-transferable, non-sub-licensable, and revocable license to access and use the Product Software with the Eaton Hardware, which is provided to you for your own internal business purposes, solely for your use as permitted in these terms.
- 3.2 Subject to the limited rights expressly granted above, Eaton and its licensors or suppliers reserve all right, title and interest in and to the Product Software, its underlying technology and all Intellectual Property Rights therein. You acknowledge that no licenses or rights are granted to you by implication or otherwise in respect of the Product Software, other than those expressly set forth in this Agreement. You agree not to remove, change or obscure any Intellectual Property Rights notices incorporated in or accompanying the Product Software. You agree to abide by all applicable national and international laws in connection with the use of the Product Software, including those related to cybersecurity and piracy, data protection, privacy, international communications and the transmission of technical or personal data.
- 3.3 Eaton may make services available to you that are provided, in whole or in part, by other parties. Although Eaton may offer this opportunity, you acknowledge that any third party services that you use in connection with the Product Software are not part of the Product Software. You further acknowledge that these terms do not apply to any third party service providers and that your use of those services may require you to agree to additional terms with the third party service provider.
- 3.4 You shall as soon as reasonably practicable notify Eaton in writing by email or by phone to the relevant contact information provided in the “contact us” section below if you become aware of any use of the Product Software other than in accordance with this Agreement and all



applicable laws, rules and regulations. Without limiting the generality of the foregoing, you shall notify, and shall promptly notify, Eaton if you become aware of any third party that does or attempts to: (i) de-compile or reverse engineer the Product Software; (ii) sell, re-license, distribute or commercially exploit the Product Software; (iii) except as expressly permitted by this Agreement, make the Product Software available through any means or media without the prior written approval of Eaton; (iv) except as expressly permitted by this Agreement, copy, modify, publish, transmit, participate in the license or re-license, transfer or sale of, reproduce, create derivative works from, distribute, perform, display or in any way exploit the Product Software, in whole or in part, without the prior written consent of Eaton; and (v) engage in any activity that interferes with or disrupts the Product Software (or the servers and networks connected to the Product Software).

- 3.5 You shall not make more than one (1) copy of the Product Software and such copy is to be made solely for backup and/or archival purposes. You shall account for and number any such copy. All titles, trademarks, copyright and restricted rights or proprietary notices included in the Product Software shall not be removed and must be reproduced in such copy.
- 3.6 You shall not make more than one (1) copy of the Documentation for use by you in connection with the authorized use of the Product Software and you shall account for and number any such copy. All titles, trademarks, copyright and restricted rights or proprietary notices included in the Documentation shall not be removed and must be reproduced in such copy.
- 3.7 You may be required to register to use the Product Software. If so, you must have a valid account with a username and password (“**Credentials**”). You may register for such Credentials at the direction(s) provided with the Product Software or by an authorized Eaton representative. The date of registration shall be the Effective Date of this Agreement. You are responsible for maintaining the confidentiality of your Credentials, and for ensuring that each password is only used by employees granted access to the Product Software on your behalf. You are liable for all transactions and other activities carried out under your Credentials. You agree to promptly notify Eaton if any password is lost, stolen, disclosed to an unauthorized party, or otherwise may have been compromised. You agree to immediately notify Eaton of any unauthorized use of your account or any other breach of security in relation to the Product Software known to you. Eaton shall have no liability for any loss or damage arising from your failure to comply with these requirements or any other losses arising from such unauthorized access. If Eaton suspends or terminates your account under this Agreement, you acknowledge that all information and content associated with such account will no longer be available to you.

#### **4 LOCATION DATA**

- 4.1 The Product Software may make use of location data sent from your devices. Where applicable, you can turn off this functionality at any time by turning off the location services settings for the Product Software on the device. If you use the Product Software, you consent to us and our affiliates' and licensees' transmission, collection, retention, maintenance, processing and use of your location data and queries to provide and improve location-based and road traffic-based products and services.
- 4.2 You may stop us collecting such data at any time by turning off the location services settings on your device.

#### **5 NECESSARY EQUIPMENT**

- 5.1 Full use of the Product Software is dependent upon your use of a device with Internet access and the purchase of Eaton Hardware in which it is installed or to which the Product Software pertains as described in the Documentation.
- 5.2 In order for the Product Software to operate fully, your device may need to be connected to certain wireless and/or communication based technologies. There may be delays, limitations

and other problems inherent in the use of the Internet and wireless and/or communication based technologies. Eaton is not responsible for any delays, failures or other damages resulting from such problems and/or the costs/charges associated with internet data usage.

- 5.3 The maintenance and security of this equipment may affect the performance of the Product Software and it is your responsibility to ensure the equipment's functionality is compatible and for making all arrangements necessary for you to have access to the Product Software.
- 5.4 Internet transmissions are never completely private or secure. Any message or information you send using the Product Software may be read or intercepted by others, even if there is a special notice that a particular transmission is encrypted.

## **6 UPDATES**

- 6.1 You are solely responsible for the maintenance and upkeep of the Product Software. Eaton has no obligation to provide updates or maintenance to the Product Software. You agree to install or allow automatic installation of all corrections of substantial defects, security patches, minor bug fixes and updates, including any enhancements ("**Updates**"), for the Product Software in accordance with the instructions and as directed by Eaton.
- 6.2 The provisions of this Agreement shall govern any Updates provided by Eaton, unless such Updates are accompanied by, or references, a separate license agreement in which case the terms of that license agreement shall prevail.
- 6.3 We reserve the right, without notice to you, to update, change, and discontinue (temporarily or permanently) any feature or component of the Product Software. Alternatively, we may ask you to update the Product Software. By continuing to use the Product Software you accept the updates and changes to the Product Software including any changes to or removal of features or components. You agree that your obligations are neither contingent upon the delivery of any future functionality or features nor dependent upon any oral or written comments made by us with respect to future functionality or features. Eaton is not liable to you or to any third party for any update, change, suspension, discontinuance of any feature or component of the Product Software. Eaton reserves the right to determine the timing and content of software updates, which may be automatically downloaded and installed by the Product Software without your notice. If you chose not to install such updates or if you opt out of automatic updates you may not be able to continue using the Product Software.

## **7 TRANSFER AND ASSIGNMENT RESTRICTIONS**

- 7.1 You agree not to sell, resell, assign, lease, sub-license, encumber or otherwise transfer your interest in this Agreement or in the Product Software and/or Documentation, in whole or in part, or allow any other person or entity, including any of your parent or subsidiaries or other subsidiaries of your parent, to copy, distribute, or otherwise transfer the Product Software without the prior written consent of Eaton.
- 7.2 You may transfer the Product Software directly to a third party only in connection with the sale of the Eaton product in which it is installed or to which the Product Software pertains as described by Eaton in the Documentation. In the event of such a sale, you may not keep any copies of the Product Software or any portion thereof and you undertake to ensure the third party to whom you transfer the Product Software is made aware of, agrees to and complies with all of the provisions of this Agreement. Any transfer of the Product Software is deemed to be a transfer with the sale of the Eaton product and is subject to the provisions of this Agreement.

## **8 RESTRICTED USES**

- 8.1 In relation to the Product Software, you warrant, represent and undertake that you shall:

- (i) only use the Product Software with the license key, if the Product Software is subject to the use of a license key;
- (ii) not use the Product Software with any other third party hardware and/or software;
- (iii) not license, sell, rent, lease, transfer, assign, distribute, host, or otherwise commercially exploit the Product Software, whether in whole or in part, or any content displayed on the Product Software;
- (iv) not copy (except as expressly permitted by this Agreement), enhance, decompile, modify, make derivative works of, disassemble, reverse compile or reverse engineer, attempt to derive the source of code of any part of the Product Software;
- (v) not copy (except as expressly permitted by this Agreement), reproduce, distribute, republish, download, display, post or transmit the whole or any part of the Product Software in any form or by any means, except as expressly permitted in this Agreement;
- (vi) not use any part of the Product Software to establish any independent data files, databases, compendiums or any other reference materials except to the extent such foregoing restriction is prohibited by applicable laws or applicable open source license to, and only to, any open source software component that is incorporated into the Product Software (if any). Any attempt to do so is a violation of the rights of Eaton;
- (vii) not access or view Product Software in order to build a similar or competitive product or service to the Product Software;
- (viii) not provide false data including false names, addresses, contact details and fraudulent credit card/debit card details;
- (ix) not enter into fraudulent or deceptive interactions or transactions with Eaton (which shall include entering into interactions or transactions purportedly on behalf of a third party where you have no authority to bind that third party or you are pretending to be a third party);
- (x) not use the Product Software in any way that is unlawful, fraudulent or deceptive, or has any unlawful, fraudulent or deceptive purpose or effect;
- (xi) not use the Product Software except in conjunction with the operation of Eaton products to which the Product Software pertains or other products described by Eaton in the Documentation;
- (xii) not sell any products or services purchased through Eaton, without Eaton's express permission;
- (xiii) not intercept communications transmitted by way of a telecommunications system and/or information society service;
- (xiv) not to distribute, or otherwise provide to any third party any registration code algorithms, registration codes, or encryption keys, where applicable, used by or in connection with the Product Software without the prior written consent of Eaton;
- (xv) not attempt to create any registration codes or passwords, where applicable, to allow unauthorized activation of the Product Software, nor shall you assist others in doing so;

- (xvi) not use any registration code algorithms, registration codes or encryption keys, where applicable, that have not been purchased from Eaton or an authorized representative of Eaton;
- (xvii) not execute any form of network monitoring which will intercept data not intended for you;
- (xviii) not install the Product Software on multiple devices or in multiple locations without purchasing a separate license from Eaton or a third party authorized by Eaton;
- (xix) use of the Product Software must at all times comply with all applicable laws, rules and regulations and be strictly in accordance with this Agreement;
- (xx) not use the Product Software to transmit, or procure the sending of, any unsolicited or unauthorized advertising, promotional material, chain letters, mass mailings or any other form of similar solicitation (spam) or of any material that is illegal, offensive, abusive, indecent, defamatory, obscene, menacing or in breach of proprietary rights, confidence, privacy or any other right, or is injurious to third parties.
- (xxi) not attempt to gain unauthorized access to the Product Software, its facilities and/or services or any accounts, databases, computer systems, servers and networks connected to the Product Software and the server on which our site is stored. You shall not attack the Product Software via a denial of service attack. You will not misuse the Product Software by knowingly or recklessly introducing viruses, Trojans, worms, logic bombs, harmful data or other materials which is malicious or harmful;
- (xxii) not use the Product Software to harvest or otherwise collect by any means any program material or any information whatsoever (including without limitation email addresses or other personal details of other users);
- (xxiii) provide Eaton with accurate and complete information and acknowledge that Eaton's ability to deliver the Product Software is dependent upon your cooperation, as well as the accuracy and completeness of any information you provide to Eaton. Eaton shall not be liable for any costs, expenses or liabilities resulting from your failure to cooperate or to provide such information;
- (xxiv) not access the Product Software through the use of any mechanism other than through the use of an authorized connection;
- (xxv) not use any automated technology such as a robot, spider or scraper, to access, scrape or data mine the Product Software;
- (xxvi) not modify the paper or digital copies of any Materials you print or download in any way, and you must not use any illustrations, photographs, video or audio sequences, or any graphics separately from any accompanying text;
- (xxvii) not, without Eaton's prior express written permission, "mirror", screen-scrape or frame by any other similar method, any Materials contained on this Product Software on any other server;
- (xxviii) not use any part of the Materials for commercial purposes without obtaining permission from our licensors or us. If you are in breach of these terms of use, your right to use the Product Software will cease immediately and you must, at our option, return or destroy any copies of the Materials you have made;

(xxix) use reasonable endeavours to prevent any unauthorized access to, or use of, the Product Software and, in the event of any such unauthorized access or use, immediately without delay notify Eaton in writing by email or by phone to the relevant contact information provided in the “contact us” section below.

8.2 By breaching Clause 8.1 of this Agreement, you could potentially commit a criminal offence. We will report any such breach to the relevant law enforcement authorities, and we will co-operate with those authorities by disclosing your identity to them. In the event of such a breach, your right to use the Product Software will cease immediately.

8.3 We will not be liable for any loss or damage caused by a distributed denial of service attack, viruses or other technologically harmful material that may infect your computer equipment, computer programs, data or other proprietary material due to your use of the Product Software or to your downloading of any material posted on it, or any website linked to it.

## 9 THIRD PARTY SOFTWARE

9.1 The Product Software may contain components (including, notwithstanding Clause 10 of this Agreement, open source software components) that are owned by third parties (“**Third Party Licensors**”) and are provided with, incorporated into, linked to, or embedded in, the Product Software pursuant to license arrangements between Eaton and any such third parties. Third Party Licensor components in the Product Software are not licensed or warranted under the terms of this Agreement, but are instead subject to any license arrangements between Eaton and any such third parties.

9.2 You agree not to modify, delete or obfuscate any copyright or other Intellectual Property Rights notices of Third Party Licensors contained in the Product Software.

9.3 To the extent there are any conflicts between the terms of this Agreement and any license arrangement between Eaton and any such third party license corresponding to Third Party Licensor components or additional obligations by such Third Party Licensors that are not set forth in this Agreement, the terms of the license arrangement between Eaton and any such Third Party Licensor or the corresponding open source license will prevail.

9.4 This Product Software contains the known third party software (including third party open source software components).

## 10 OPEN SOURCE SOFTWARE

10.1 The Product Software may contain certain components owned by Eaton that are provided with, incorporated into, linked to, or embedded in the Product Software that are subject to open source licenses (“**Eaton Open Source Components**”). To the extent there are any conflicts between the terms of this Agreement and any open license corresponding to Eaton Open Source Components or additional obligations by any such open source license that are not set forth in this Agreement, the terms of the open source license shall prevail.

10.2 This Product Software contains the known Eaton Open Source Components.

## 11 FEES

11.1 Where applicable, Eaton may charge you fees for access to the Product Software. You agree to pay all fees and charges, within the agreed upon billing period, including taxes, incurred through your account at the rates in effect for the billing period in which such fees and charges are incurred, including but not limited to, charges for any products or services offered for sale through the Product Software by Eaton (such fees, charges and taxes shall collectively be referred to as “**Fees**”). Eaton reserves the right to change the amount of, or basis for determining, any Fees, and to institute new Fees, effective upon prior notice to you.

## **12 SUPPORT SERVICES**

- 12.1 Eaton or its suppliers and distributors may provide you with support services related to the Product Software (the “**Support Services**”). Use of Support Services is governed by the terms and conditions for the applicable service offering (if any), the policies and programmes described in the Documentation, and/or other Eaton-provided Materials.
- 12.2 Any additional supplemental Materials provided to you as part of the Support Services shall be considered part of the Product Software, as applicable, and subject to the provisions of this Agreement.

## **13 DISCLAIMER OF WARRANTY**

- 13.1 To the extent permitted by applicable law, you expressly acknowledge and agree that use of the product software is at your sole risk and that the entire risk as to satisfactory quality, performance, accuracy and effort of the product software is with you.
- 13.2 To the fullest extent permitted by applicable law, the Product Software, the Material and any information and any services performed or provided by or in connection with the Product Software are provided on an “as is” and “as available” basis, with all bugs and faults and without warranty of any kind. Eaton, its affiliates, subsidiaries, and authorized representatives hereby disclaim all warranties and conditions of any kind with respect to the product software and any services, either express, implied, statutory, or otherwise, including, but without limitation, any implied warranties and/or conditions of merchantability, of satisfactory quality, of fitness for a particular purpose, security, completeness, timeliness, accuracy, quiet enjoyment, title, freedom from computer viruses, and of non-infringement of third party rights. Neither Eaton, nor any of its affiliates or subsidiaries, warrant that the functions or services contained in, accessed from, performed by, displayed on, linked to/from, or provided by, the product software will meet your requirements, that the operation of the product software or services will be uninterrupted, error-free, timely, secure, or that defects or errors in the product software or services will be corrected, or that the product software will be compatible with any system, or that the product software will be free from worms, viruses, malware, Trojan horses, or other harmful or disabling components.
- 13.3 No oral or written information or advice given by Eaton, its affiliates, subsidiaries, or any of their respective authorized representatives shall create a warranty. You assume the entire cost of any and all necessary repairs in the event you experience any loss or damage arising from the use of the product software or any related goods or services. If you are dissatisfied with the product software and/or any related goods or services, your sole and exclusive remedy is to discontinue using the product software.

## **14 LIMITATION OF LIABILITY**

- 14.1 Nothing in this agreement shall exclude or limit Eaton’s liability for death or personal injury resulting from its negligence or of its officers, representatives their servants, agents, affiliates, employees or any other liability which may not be limited or excluded under applicable law. In no event shall Eaton nor any of its officers or other representatives be liable for any loss or damages arising out of or in connection with your use, inability to use or reliance on any facilities, services, products and/or content offered through or from the product software, including, but not limited to, direct loss, loss of data, work stoppage, service interruption, computer failure, system failure, device damage or malfunction, loss of income, profit or opportunity, loss of or damage to property and claims of third parties or for any indirect or consequential loss whatsoever, even if Eaton has been advised of the possibility of such loss or damages, or such loss or damages were reasonably foreseeable.
- 14.2 To the fullest extent permitted by law, Eaton, its affiliates, suppliers, licensors, and any other party involved in creating, producing or delivering the product software makes no warranties,

either express or implied, about the product software. The product software is provided "as is" and "as available".

- 14.3 Except for your indemnification obligations pursuant to Clause 15 of this agreement, in no event will the aggregate liability (whether arising out of liability under breach of contract, tort (including but not limited to negligence), misrepresentation, breach of statutory duty, breach of warranty or claims by third parties arising from any breach of this agreement) of Eaton or its employees or agents to you or to any third party for damages, direct or otherwise, arising out of or in connection with this agreement exceed the lower of \$100 (one hundred United States dollars) or the cost of the product software, regardless of the cause or form of action, and whether such claims are grounded in contract, tort, strict liability or any other legal theory, notwithstanding any failure of essential purpose of any limited remedy.
- 14.4 Nothing in this agreement shall exclude or limit your liability under Clause 11 for any failure to pay any fees due hereunder or for any breach, misuse or infringement of Eaton's intellectual property rights under Clause 21.
- 14.5 If you use the Product Software for commercial, business or resale purpose we will have no liability to you for any loss of profit, loss of business, business interruption, or loss of business opportunity.
- 14.6 Each provision of this Clause 14 excluding or limiting liability shall be construed separately, applying and surviving even if for any reason one or the other of these provisions is held inapplicable or unenforceable and shall remain in force notwithstanding the termination of this agreement, howsoever arising.

## 15 INDEMNIFICATION

- 15.1 You agree to indemnify, defend, and hold harmless Eaton, including its officers, directors, employees, affiliates, subsidiaries, agents, licensors, authorized representatives, attorneys, business partners, and respective successors and assigns (the "**Indemnified Parties**") from and against any and all claims, demands, actions, liabilities, judgments, awards, losses, damages, costs and expenses (including reasonable legal fees, costs of defense, and direct, indirect, punitive, special, individual, consequential, or exemplary damages), Eaton or any of the Indemnified Parties suffer in relation to, arising from, or from the purpose of avoiding, any claim or demand from a third party that relates to your: (a) breach or violation of this Agreement; (b) infringement, misappropriation or any violation of the rights of any other party from use of the Product Software in violation of this Agreement; (c) violation or non-compliance with any applicable law, rule, guidelines, acts, decrees, orders or regulations; (d) use, alteration or export of the Product Software (or any component thereof) in violation of this Agreement; and (e) the use of the Product Software by you or any person using your account.
- 15.2 Eaton and its affiliates reserve the right to assume the exclusive defense and control of any claims or actions subject to indemnification by you and all negotiations for its settlement or compromise, and you agree to fully cooperate with Eaton and its affiliates upon request by Eaton.

## 16 AMENDMENTS TO THIS AGREEMENT

- 16.1 Eaton reserves the right to amend, modify, update or substitute any of the provisions of this Agreement at any time. Any such amendment, modification, update or substitution shall be published on our website at [www.eaton.com](http://www.eaton.com) (the "**Eaton Website**"), as appropriate. You have the right to withdraw from this Agreement if you do not accept any amendments, modifications, updates or substitution of any of the provisions of this Agreement and in such an event you must cease all access and use of the Product Software immediately. By continuing to use the Product Software after Eaton posts or otherwise notifies you of any changes, you accept and agree to the terms and conditions, as modified.

## **17 FOR AUTHORIZED PARTIES IN CALIFORNIA**

- 17.1 In compliance with California Civil Code §1789.3, if you reside in California you have the right to contact Eaton with any complaints or to seek additional information. You may email Eaton at [dataprotection@eaton.com](mailto:dataprotection@eaton.com).
- 17.2 If you reside in California and have any questions or complaints about the use of the Eaton provided Product Software you may also contact: The Complaint Assistance Unit of the Division of Consumer Services of the California Department of Consumer Affairs through writing at 400 R Street, Suite 1080, Sacramento, CA 95814, or by telephone at (916) 445-1254 or (800) 952-5210. Hearing impaired persons may call (916) 928-1227 or (800) 326-2297 via TTY device. For further details, please visit [https://www.dca.ca.gov/about\\_us/contactus.shtml](https://www.dca.ca.gov/about_us/contactus.shtml).
- 17.3 You acknowledge and agree that this Clause 17 shall only apply to you if you are resident in California.

## **18 ENFORCEMENT RIGHTS**

- 18.1 Eaton are not obligated to monitor the access or use of the Product Software, but Eaton reserves the right to do so for the purpose of operating the Product Software, to ensure compliance with these terms, and to comply with applicable law or other legal requirements. Eaton may consult with and disclose unlawful conduct to law enforcement authorities; and pursuant to valid legal process, Eaton may cooperate with law enforcement authorities as part of an investigation and/or to prosecute users who violate the law. In addition to any of its other rights or remedies, Eaton reserves the right to suspend or terminate your access to all or a portion of your Product Software account, without any liability, if Eaton reasonably suspects that your use of the Product Software is harming or threatening to harm Eaton's systems, or in Eaton's reasonable opinion you have violated your responsibilities. Eaton reserves the right to investigate any violation of these terms and any conduct that affects the Product Software.

- 19 NA

## **20 CONFIDENTIAL INFORMATION**

- 20.1 All information provided via the Product Software is Eaton's confidential information. You agree to protect Eaton's confidential information, using the same degree of care used to protect your own confidential or proprietary information, but in any case, using no less than a reasonable degree of care.
- 20.2 You agree to only use Eaton's confidential information for the purposes of obtaining the benefit set out in this Agreement and for no other purpose. You agree not to use or disclose Eaton's confidential information without the prior written consent of Eaton, except to share it with your employees who have a need to know the information and are bound by a duty of confidentiality covering the information that is at least as restrictive as the obligations in this Agreement. You agree not to otherwise disclose such information to any third party without the prior written consent of Eaton. You shall be liable to Eaton for any breach of the confidentiality obligations in this Clause 20 of this Agreement by your employees.
- 20.3 Except for personally identifiable information/personal data, the use and disclosure of which is addressed in the Privacy Statement for the Product Software, any and all information and content provided by you to Eaton is provided on a non-proprietary and non-confidential basis, regardless of whether the information or content is marked or otherwise identified as confidential or proprietary. You agree that Eaton has a royalty-free, perpetual, irrevocable, worldwide, non-exclusive right and license to use, reproduce, modify, adapt, publish, translate, create derivative works from, distribute, perform, and display any provided information or content for the purpose of operating and/or marketing the services or any related services rendered by Eaton. This license includes any right of publicity rights that may be present in the provided information or content.



20.4 The provisions of this Clause 20 shall survive the expiration or termination of this Agreement.

## **21 INTELLECTUAL PROPERTY OWNERSHIP**

21.1 This Agreement does not transfer any Intellectual Property Rights from Eaton to you. Except for the express licenses granted herein, all right, title and interest (including Intellectual Property Rights) in and to any intellectual property owned, created or independently developed by Eaton, including, but not limited to, the Product Software and any derivative work, customisation, modification or enhancement thereof (including all Intellectual Property Rights in any of the foregoing), whether developed prior to, during, or after this Agreement, will remain solely with Eaton and its licensors. Eaton grants no implied licenses hereunder.

21.2 You may provide suggestions, comments or other feedback ("**Feedback**") relating to the Product Software. Your Feedback, even if designated as confidential, shall not, absent a separate written agreement, create any confidentiality obligation for Eaton. Eaton shall be free to use, disclose, reproduce, license or otherwise distribute and exploit such Feedback as it sees fit, entirely without obligation or restriction of any kind on account of intellectual property rights or otherwise.

21.3 You may print off one copy, and may download extracts, of any page(s) of the Materials solely for internal business purposes only. Any paper or digital copies of any Materials which you have printed off or downloaded in any way must not be modified, and you must not use any illustrations, photographs, video or audio sequences or any graphics separately from any accompanying text.

21.4 The content on the Product Software, including all information, text, graphics, images, hyperlinks, illustrations, designs, icons, photographs, documents, products, computer programs, services and written and other materials (collectively, the "**Materials**"), and such information is for general guidance purposes only.

21.5 Unless otherwise noted, all Materials are copyrights, trademarks, trade dress and/or other intellectual properties owned by, controlled by or licensed to Eaton or third parties (hereinafter, the "**Third-Party Providers**").

21.6 Except as stated herein, and to the extent permitted by law, none of the Materials may be copied, reproduced, distributed, republished, downloaded, displayed, posted or transmitted in any form or by any means, including, but not limited to, electronic, mechanical, photocopying, recording, or otherwise, without the prior express written permission of Eaton or the Third-Party Provider.

21.7 Any use of these Materials on any other website or networked computer environment for any purpose is prohibited. Any unauthorized use of any Materials contained on this Product Software may violate copyright, trademark, and other laws, including but not limited to laws of privacy and publicity, and may result in severe civil and criminal penalties.

## **22 TERMINATION OR SUSPENSION**

22.1 This Agreement and the license granted hereunder, shall come into force on the creation of your Product Software account and shall continue in full force and effect unless this Agreement is terminated in accordance with its terms.

22.2 Eaton reserves the right, in its sole discretion and without notice to you, to suspend, terminate, modify or delete an account or access to the Product Software or parts thereof, if you are, or Eaton reasonably suspects that you are, failing to comply with any of the provisions of this Agreement or for any actual or suspected illegal or improper use of the Product Software. If you use multiple accounts, if Eaton does take action against you, you may have action taken against all your accounts.

22.3 For the avoidance of doubt, any wilful unauthorized use, copying, modification, reverse engineering, disclosure, distribution or sublicensing of the Intellectual Property Rights in the Product Software or any related methods, algorithms, techniques or processes by you, your employees, agents, representatives, officers or directors will be deemed a material breach of this Agreement that cannot be cured, and termination may be immediate.

22.4 Upon termination for any reason:

- (i) all rights and licenses granted to you under this Agreement shall cease;
- (ii) you must cease all activities authorized by this Agreement, including your use of the Product Software;
- (iii) you must immediately delete, remove and cease access to the Product Software from all devices on which the Product Software has been installed and all copies of the Product Software then in your possession, custody or control. Eaton may also require that you provide it with evidence of compliance with this provision;
- (iv) you must immediately return or destroy all confidential information of Eaton in your possession, provided that you shall not be required to delete Eaton's confidential information that is and remains stored solely on backup storage pursuant to your standard backup retention procedures if only persons of advanced information technology knowledge and ability would be able to locate and access such information (but such information shall nonetheless remain subject to confidentiality obligations contained herein);
- (v) we may remotely access your devices and remove the Product Software from them and cease providing you with access to the Product Software.

## 23 LINKS

23.1 The Product Software may contain links to third party websites, services and/or display advertisements for third parties (together, "**Third Party Links and Ads**"). Such Third Party Links and Ads are not under Eaton's control. Eaton disclaims all liability and responsibility for any Third Party Links and Ads and you acknowledge and agree that Eaton is not responsible or liable for: (a) the availability or accuracy of such Third Party Links and Ads; or (b) the contents, products or services on or available from such Third Party Links and Ads. Your use of Third Party Links and Ads is at your own risk and is subject to the terms and conditions of the applicable third party. Eaton provides Third Party Links and Ads for your convenience and does not review, approve, monitor, endorse, warrant, or make any representations with respect to Third Party Links and Ads. You will need to make your own independent judgement about whether to use any such independent sites, including whether to buy any products or services offered by them.

## 24 REPRESENTATIONS, WARRANTIES, COVENANTS AND DISCLAIMERS

24.1 You undertake, represent and warrant that:

- (i) you shall comply, at your own expense, with all applicable present or future laws, statutes, instruments, regulations, orders, directives, enactments, including any amendment, extension or replacement thereof which is in force from time to time and which in any way relates to this Agreement and/or the provision of the Product Software or results from your obligations under this Agreement. Without limiting the foregoing, you shall comply with all contracting and procurement regulations associated with the Product Software;
- (ii) you have full power and authority to enter into this Agreement;

- (iii) you shall conduct your business in a manner that reflects favourably at all times on the Product Software and the name and goodwill of Eaton;
- (iv) you shall make no representations, warranties, or guarantees on behalf of Eaton;
- (v) you shall from refrain from amending or varying this Agreement.

24.2 Eaton makes no representations or warranties of any kind regarding the Product Software, the Material, information or any other matter, either express or implied, including, but not limited to implied warranties of fitness for a particular purposes, merchantability, title, accuracy/freedom from error, non-infringement or otherwise. You are not authorized to make any warranty commitment on Eaton's behalf, whether written or oral. You understand that the Product Software may include hyperlinks to other websites or content or resources. Eaton has no control over any websites or resources which are provided by companies or persons other than Eaton. You acknowledge and agree that Eaton is not responsible whatsoever for any harm suffered by you on or in any way due to any third party websites or resources, even where they are accessed from or referred or linked to such sites by the Product Software. You acknowledge and agree that Eaton is not responsible for the availability of any such external sites or resources, and does not endorse any advertising, products or other materials on or available from such websites or resources. You acknowledge and agree that Eaton is not liable for any loss or damage which may be incurred as a result of the availability of those external sites or resources, or as a result of any reliance placed by you on the completeness, accuracy or existence of any advertising, products or other materials on, or available from, such web sites or resources.

## 25 FORCE MAJEURE

- 25.1 Notwithstanding anything else contained in this Agreement, Eaton shall not be liable for any delay in providing the Product Software or support for the Product Software if such delay arises from or is attributable to acts, events or omissions beyond its reasonable control, including (but not limited to) pandemics, epidemics or endemics, nuclear accident, acts of God, war or terrorist activity, riot, civil commotion, malicious damages (excluding malicious damage involving your employees or your sub-contractors), compliance with any law or governmental order or regulation, accident, industrial action by employees of any provider of electrical power, breakdown of plant or machinery, fire, flood or storm (a "**Force Majeure Event**") subject to Eaton promptly notifying you in writing of the reasons for the delay and the expected duration of the delay.
- 25.2 The performance of Eaton shall be suspended during the period that the Force Majeure Event persists and Eaton shall be granted an extension of time for performance equal to the period of the delay arising as a result of the Force Majeure Event.
- 25.3 If a Force Majeure Event continues for more than sixty (60) calendar days, Eaton may terminate this Agreement immediately by notice in writing and neither shall be liable to the other by reason of this termination.

## 26 MISCELLANEOUS

- 26.1 If a term is found unenforceable or invalid, that term will be enforced to the maximum extent permissible and the remaining provisions of the Agreement will remain in full force and effect and an enforceable term will be substituted reflecting our intent as closely as possible. You may not assign or transfer any of your rights under this Agreement, and any such attempt will be void. Eaton may freely assign or transfer its rights to any of its affiliates or subsidiaries, or to any successor in interest of any business associated with the Product Software. Subject to the foregoing, this Agreement will bind and ensure to the benefit of the parties, their successors and permitted assigns. Eaton's failure to enforce a term of this Agreement is not a waiver of its right to do so later. No failure or delay by Eaton or its affiliates to exercise any right or enforce

any obligation shall impair or be construed as a waiver or ongoing waiver of that or any other right or power. Waiving one breach will not be construed to waive any succeeding breach. All waivers must be in writing and signed by the party waiving rights.

## 27 REGULATORY MATTERS

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- 29.1 This Agreement (and any associated order form or other agreements referenced herein) constitutes the entire and exclusive agreement between you and Eaton with respect to the subject matter of this Agreement, and supersedes and replaces any other prior or contemporaneous agreements, or terms and conditions applicable to the subject matter of this Agreement. No provisions in your purchase orders, or in any other business forms employed by you, will supersede the terms and conditions of this Agreement.

**30 LANGUAGE**

This Agreement is made in English and Chinese. If there is any inconsistency, misunderstanding, discrepancy or conflict between English and Chinese language, English language shall prevail.

**31 CONTACT US**

Any questions regarding this Agreement should be directed to Eaton at:

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1000 Eaton Boulevard  
Mail Code 4N  
Cleveland, OH 44122

Eaton  
Attn: Global Data Protection and Privacy Office  
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Cleveland, OH 44122  
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Email: \_\_\_\_\_

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